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Computer Testing Supplement for Inspection Authorization

U.S. Department
of Transportation
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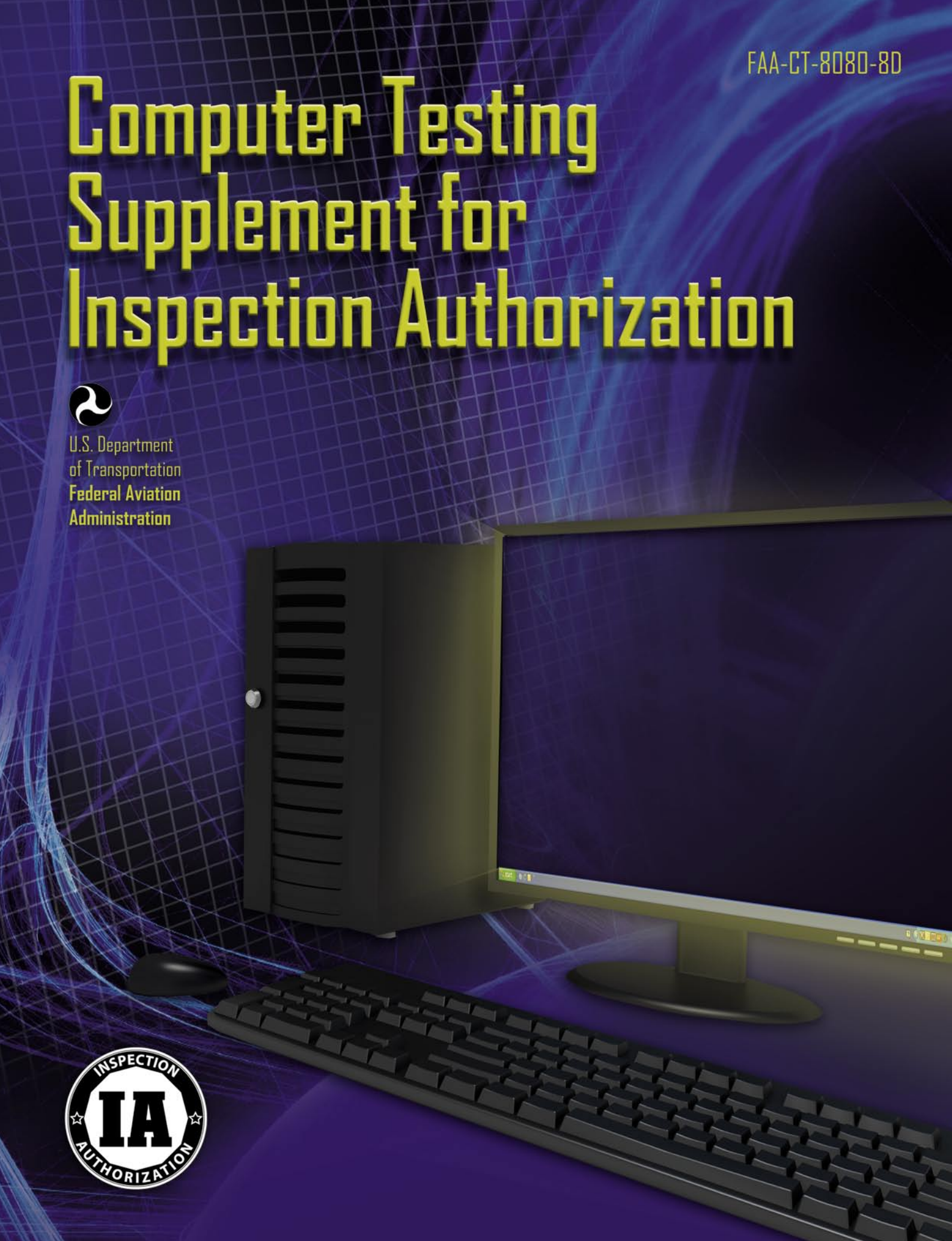
Administration



Computer Testing Supplement for Inspection Authorization

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U.S. Department of Transportation
FEDERAL AVIATION ADMINISTRATION
Flight Standards Service

Preface

This publication was prepared by the Flight Standards Service of the Federal Aviation Administration (FAA) for the specific purpose of Inspection Authorization (IA) testing at selected testing centers.

Applicants for Inspection Authorization Certificates will be required to use FAA-CT-8080-8D, Computer Testing Supplement for Inspection Authorization, to answer the computer-assisted IA airman knowledge test questions.

The supplement material consists of excerpts of selected advisary circulars, airworthiness directives, Code of Federal Regulations, type certificate data sheets, aircraft specifications, FAA orders, and forms.

Applicants should note that reference material contained in this supplement is for testing purposes only. To ensure current material is available for use in day-to-day certification activities, users should be aware that they must initiate and order the publications desired, and maintain contact with the managing FAA office for the latest information, forms, and guidance.

FAA-CT-8080-8D supercedes FAA-CT-8080-8C, Computer Testing Supplement for Inspection Authorization, dated 2005, Series B.

Comments regarding FAA-CT-8080-8D should be sent, in email form, to the following address.

AFS630comments@faa.gov

Table of Contents

- 2A13, Piper PA-28
- 3A19, Cessna 150
- E-295, Lycoming 0-540
- A7CE, Cessna 400 Series
- 3A13, Cessna 182
- A7S0, Piper PA-34-200
- A11EA, Gulfstream American AA-1
- 1A6, Piper PA-22
- E-273, Continental 0-470
- P57GL, McCauley
- P-920, Hartzell
- 2A4, Twin Commander
- E-284, Textron Lycoming
- A9CE, Cessna 188
- 3A12, Cessna 172
- A16CE, Cessna 207/T207
- 3A21, Cessna 210
- A3SO, Piper PA-32-260

SECTION V—FAA FORMS

Section I: Title 14 of the Code of Federal Regulations (14 CFR)

- 14 CFR part 1, Definitions and Abbreviations

- 14 CFR part 23, Airworthiness Standards: Normal, Utility, Acrobatic, and Commuter Category Airplanes
  - Subpart A—General
  - Subpart B—Flight
  - Subpart F—Equipment
  - Subpart G—Operating Limitations and Information
  - Appendix G—Instructions for Continued Airworthiness

- 14 CFR part 27, Airworthiness Standards: Normal Category Rotorcraft
  - Subpart A—General
  - Subpart B—Flight
  - Subpart F—Equipment
  - Subpart G—Operating Limitations and Information
  - Appendix A—Instructions for Continued Airworthiness

- 14 CFR part 39, Airworthiness Directives

- 14 CFR part 43, Maintenance, Preventative Maintenance, Rebuilding, and Alteration
  - Appendix A—Major Alterations, Major Repairs, and Preventative Maintenance
  - Appendix B—Recording of Major Repairs and Major Alterations
  - Appendix D—Scope and Detail of Items (as Applicable to the Particular Aircraft) to be included in Annual and 100-Hour Inspections
  - Appendix E—Altimeter System Test and Inspection
  - Appendix F—ATC Transponder Tests and Inspections

- 14 CFR part 45, Identification and Registration Marking
  - Subpart A—General
  - Subpart B—Identification of Aircraft and Related Products
  - Subpart C—Nationality and Registration Marks

- 14 CFR part 91, General Operating and Flight Rules
  - Subpart A—General
  - Subpart C—Equipment, Instrument, and Certificate Requirements
  - Subpart E—Maintenance, Preventative Maintenance, and Alterations

PART 1—DEFINITIONS AND ABBREVIATIONS

§ 1.1 General definitions.

As used in Subchapters A through K of this chapter, unless the context requires otherwise:

Administrator means the Federal Aviation Administrator or any person to whom he has delegated his authority in the matter concerned.

Aerodynamic coefficients means non-dimensional coefficients for aerodynamic forces and moments.

Air carrier means a person who undertakes directly by lease, or other arrangement, to engage in air transportation.

Air commerce means interstate, overseas, or foreign air commerce or the transportation of mail by aircraft or any operation or navigation of aircraft within the limits of any Federal airway or any operation or navigation of aircraft which directly affects, or which may endanger safety in, interstate, overseas, or foreign air commerce.

Aircraft means a device that is used or intended to be used for flight in the air.

Aircraft engine means an engine that is used or intended to be used for propelling aircraft. It includes turbosuperchargers, appurtenances, and accessories necessary for its functioning, but does not include propellers.

Airframe means the fuselage, booms, nacelles, cowlings, fairings, airfoil surfaces (including rotors but excluding propellers and rotating airfoils of engines), and landing gear of an aircraft and their accessories and controls.

Airplane means an engine-driven fixed-wing aircraft heavier than air, that is supported in flight by the dynamic reaction of the air against its wings.

Airport means an area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any.

Airship means an engine-driven lighter-than-air aircraft that can be steered.

Air traffic means aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air traffic clearance means an authorization by air traffic control, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace.

Air traffic control means a service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

Air Traffic Service (ATS) route is a specified route designated for channeling the flow of traffic as necessary for the provision of air traffic services. The term "ATS route" refers to a variety of airways, including jet routes, area navigation (RNAV) routes, and arrival and departure routes. An ATS route is defined by route specifications, which may include:

(1) An ATS route designator;

(2) The path to or from significant points;

(3) Distance between significant points;

(4) Reporting requirements; and

(5) The lowest safe altitude determined by the appropriate authority.

Air transportation means interstate, overseas, or foreign air transportation or the transportation of mail by aircraft.

Alert Area. An alert area is established to inform pilots of a specific area wherein a high volume of pilot training or an unusual type of aeronautical activity is conducted.

Alternate airport means an airport at which an aircraft may land if a landing at the intended airport becomes inadvisable.

Altitude engine means a reciprocating aircraft engine having a rated takeoff power that is producible from sea level to an established higher altitude.

Appliance means any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communications equipment, that is used or intended to be used in operating or controlling an aircraft in flight, is installed in or attached to the aircraft, and is not part of an airframe, engine, or propeller.

Approved, unless used with reference to another person, means approved by the Administrator.

Area navigation (RNAV) is a method of navigation that permits aircraft operations on any desired flightpath.

Area navigation (RNAV) route is an ATS route based on RNAV that can be used by suitably equipped aircraft.

Armed Forces means the Army, Navy, Air Force, Marine Corps, and Coast Guard, including their regular and reserve components and members serving without component status.

Autorotation means a rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in motion.

Auxiliary rotor means a rotor that serves either to counteract the effect of the main rotor torque on a rotorcraft or to maneuver the rotorcraft about one or more of its three principal axes.

Balloon means a lighter-than-air aircraft that is not engine driven, and that sustains flight through the use of either gas buoyancy or an airborne heater.

Brake horsepower means the power delivered at the propeller shaft (main drive or main output) of an aircraft engine.

Calibrated airspeed means the indicated airspeed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.

Canard means the forward wing of a canard configuration and may be a fixed, movable, or variable geometry surface, with or without control surfaces.

Canard configuration means a configuration in which the span of the forward wing is substantially less than that of the main wing.

Category:

(1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a broad classification of aircraft. Examples include: airplane; rotorcraft; glider; and lighter-than-air; and

(2) As used with respect to the certification of aircraft, means a grouping of aircraft based upon intended use or operating limitations. Examples include: transport, normal, utility, acrobatic, limited, restricted, and provisional.

Category A, with respect to transport category rotorcraft, means multiengine rotorcraft designed with engine and system isolation features specified in Part 29 and utilizing scheduled takeoff and landing operations under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight in the event of engine failure.

Category B, with respect to transport category rotorcraft, means single-engine or multiengine rotorcraft which do not fully meet all Category A standards. Category B rotorcraft have no guaranteed stay-up ability in the event of engine failure and unscheduled landing is assumed.

Category II operations, with respect to the operation of aircraft, means a straight-in ILS approach to the runway of an airport under a Category II ILS instrument approach procedure issued by the Administrator or other appropriate authority.

Category III operations, with respect to the operation of aircraft, means an ILS approach to, and landing on, the runway of an airport using a Category III ILS instrument approach procedure issued by the Administrator or other appropriate authority.

Category IIIa operations, an ILS approach and landing with no decision height (DH), or a DH below 100 feet (30 meters), and controlling runway visual range not less than 700 feet (200 meters).

Category IIIb operations, an ILS approach and landing with no DH, or with a DH below 50 feet (15 meters), and controlling runway visual range less than 700 feet (200 meters), but not less than 150 feet (50 meters).

Category IIIc operations, an ILS approach and landing with no DH and no runway visual range limitation.

Ceiling means the height above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken", "overcast", or "obscuration", and not classified as "thin" or "partial".

Civil aircraft means aircraft other than public aircraft.
Class:

(1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a classification of aircraft within a category having similar operating characteristics. Examples include: single engine; multiengine; land; water; gyroplane; helicopter; airship; and free balloon; and

(2) As used with respect to the certification of aircraft, means a broad grouping of aircraft having similar characteristics of propulsion, flight, or landing. Examples include: airplane; rotorcraft; glider; balloon; landplane; and seaplane.

Clearway means:

(1) For turbine engine powered airplanes certificated after August 29, 1959, an area beyond the runway, not less than 500 feet wide, centrally located about the extended centerline of the runway, and under the control of the airport authorities. The clearway is expressed in terms of a clearway plane, extending from the end of the runway with an upward slope not exceeding 1.25 percent, above which no object nor any terrain protrudes. However, threshold lights may protrude above the plane if their height above the end of the runway is 26 inches or less and if they are located to each side of the runway.

(2) For turbine engine powered airplanes certificated after September 30, 1958, but before August 30, 1959, an area beyond the takeoff runway extending no less than 300 feet on either side of the extended centerline of the runway, at an elevation no higher than the elevation of the end of the runway, clear of all fixed obstacles, and under the control of the airport authorities.

Climbout speed, with respect to rotorcraft, means a referenced airspeed which results in a flight path clear of the height-velocity envelope during initial climbout.

Commercial operator means a person who, for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property, other than as an air carrier or foreign air carrier or under the authority of Part 375 of this title. Where it is doubtful that an operation is for "compensation or hire", the test applied is whether the carriage by air is merely incidental to the person's other business or is, in itself, a major enterprise for profit.

Configuration, Maintenance, and Procedures (CMP) document means a document approved by the FAA that contains minimum configuration, operating, and maintenance requirements, hardware life-limits, and Master Minimum Equipment List (MMEL) constraints necessary for an airplane-engine combination to meet ETOPS type design approval requirements.

Consensus standard means, for the purpose of certificating light-sport aircraft, an industry-developed consensus standard that applies to aircraft design, production, and airworthiness. It includes, but is not limited to, standards for aircraft design and performance, required equipment, manufacturer quality assurance systems, production acceptance test procedures, operating instructions, maintenance and inspection procedures, identification and recording of major repairs and major alterations, and continued airworthiness.

Controlled airspace means an airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification.
Note: Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D, and Class E airspace.

Controlled Firing Area. A controlled firing area is established to contain activities, which if not conducted in a controlled environment, would be hazardous to nonparticipating aircraft.

Crewmember means a person assigned to perform duty in an aircraft during flight time.

Critical altitude means the maximum altitude at which, in standard atmosphere, it is possible to maintain, at a specified rotational speed, a specified power or a specified manifold pressure. Unless otherwise stated, the critical altitude is the maximum altitude at which it is possible to maintain, at the maximum continuous rotational speed, one of the following:

(1) The maximum continuous power, in the case of engines for which this power rating is the same at sea level and at the rated altitude.

(2) The maximum continuous rated manifold pressure, in the case of engines, the maximum continuous power of which is governed by a constant manifold pressure.

Critical engine means the engine whose failure would most adversely affect the performance or handling qualities of an aircraft.

Decision altitude (DA) is a specified altitude in an instrument approach procedure at which the pilot must decide whether to initiate an immediate missed approach if the pilot does not see the required visual reference, or to continue the approach. Decision altitude is expressed in feet above mean sea level.

Decision height (DH) is a specified height above the ground in an instrument approach procedure at which the pilot must decide whether to initiate an immediate missed approach if the pilot does not see the required visual reference, or to continue the approach. Decision height is expressed in feet above ground level.

Early ETOPS means ETOPS type design approval obtained without gaining non-ETOPS service experience on the candidate airplane-engine combination certified for ETOPS.

Enhanced flight visibility (EFV) means the average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent topographical objects may be clearly distinguished and identified by day or night by a pilot using an enhanced flight vision system.

Enhanced flight vision system (EFVS) means an electronic means to provide a display of the forward external scene topography (the natural or manmade features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors, such as a forward looking infrared, millimeter wave radiometry, millimeter wave radar, low light level image intensifying.

Equivalent airspeed means the calibrated airspeed of an aircraft corrected for adiabatic compressible flow for the particular altitude. Equivalent airspeed is equal to calibrated airspeed in standard atmosphere at sea level.

ETOPS Significant System means an airplane system, including the propulsion system, the failure or malfunctioning of which could adversely affect the safety of an ETOPS flight, or the continued safe flight and landing of an airplane during an ETOPS diversion. Each ETOPS significant system is either an ETOPS group 1 significant system or an ETOPS group 2 significant system.

(1) An ETOPS group 1 Significant System—

(i) Has fail-safe characteristics directly linked to the degree of redundancy provided by the number of engines on the airplane.

(ii) Is a system, the failure or malfunction of which could result in an IFSD, loss of thrust control, or other power loss.

(iii) Contributes significantly to the safety of an ETOPS diversion by providing additional redundancy for any system power source lost as a result of an inoperative engine.

(iv) Is essential for prolonged operation of an airplane at engine inoperative altitudes.

(2) An ETOPS group 2 significant system is an ETOPS significant system that is not an ETOPS group 1 significant system.

Extended Operations (ETOPS) means an airplane flight operation, other than an all-cargo operation in an airplane with more than two engines, during which a portion of the flight is conducted beyond a time threshold identified in part 121 or part 135 of this chapter that is determined using an approved one-engine-inoperative cruise speed under standard atmospheric conditions in still air.

Extended over-water operation means—

(1) With respect to aircraft other than helicopters, an operation over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline; and

(2) With respect to helicopters, an operation over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline and more than 50 nautical miles from an off-shore heliport structure.

External load means a load that is carried, or extends, outside of the aircraft fuselage.

External-load attaching means the structural components used to attach an external load to an aircraft, including external-load containers, the backup structure at the attachment points, and any quick-release device used to jettison the external load.

Final approach fix (FAF) defines the beginning of the final approach segment and the point where final segment descent may begin.

Final takeoff speed means the speed of the airplane that exists at the end of the takeoff path in the en route configuration with one engine inoperative.

Fireproof—

(1) With respect to materials and parts used to confine fire in a designated fire zone, means the capacity to withstand at least as well as steel in dimensions appropriate for the purpose for which they are used, the heat produced when there is a severe fire of extended duration in that zone; and

(2) With respect to other materials and parts, means the capacity to withstand the heat associated with fire at least as well as steel in dimensions appropriate for the purpose for which they are used.

Fire resistant—

(1) With respect to sheet or structural members means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used; and

(2) With respect to fluid-carrying lines, fluid system parts, wiring, air ducts, fittings, and powerplant controls, means the capacity to perform the intended functions under the heat and other conditions likely to occur when there is a fire at the place concerned.

Flame resistant means not susceptible to combustion to the point of propagating a flame, beyond safe limits, after the ignition source is removed.

Flammable, with respect to a fluid or gas, means susceptible to igniting readily or to exploding.

Flap extended speed means the highest speed permissible with wing flaps in a prescribed extended position.

Flash resistant means not susceptible to burning violently when ignited.

Flightcrew member means a pilot, flight engineer, or flight navigator assigned to duty in an aircraft during flight time.

Flight level means a level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet; flight level 255, an indication of 25,500 feet.

Flight plan means specified information, relating to the intended flight of an aircraft, that is filed orally or in writing with air traffic control.

Flight simulation training device (FSTD) means a flight simulator or a flight training device.

Flight time means:

(1) Pilot time that commences when an aircraft moves under its own power for the purpose of flight and ends when the aircraft comes to rest after landing; or

(2) For a glider without self-launch capability, pilot time that commences when the glider is towed for the purpose of flight and ends when the glider comes to rest after landing.

Flight training device (FTD) means a replica of aircraft instruments, equipment, panels, and controls in an open flight deck area or an enclosed aircraft cockpit replica. It includes the equipment and computer programs necessary to represent aircraft (or set of aircraft) operations in ground and flight conditions having the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standard (QPS) for a specific FTD qualification level.

Flight visibility means the average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.

Foreign air carrier means any person other than a citizen of the United States, who undertakes directly, by lease or other arrangement, to engage in air transportation.

Foreign air commerce means the carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in the United States and any place outside thereof; whether such commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation.

Foreign air transportation means the carriage by aircraft of persons or property as a common carrier for compensation or hire, or the carriage of mail by aircraft, in commerce between a place in the United States and any place outside of the United States, whether that commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation.

Forward wing means a forward lifting surface of a canard configuration or tandem-wing configuration airplane. The surface may be a fixed, movable, or variable geometry surface, with or without control surfaces.

Full flight simulator (FFS) means a replica of a specific type; or make, model, and series aircraft cockpit. It includes the assemblage of equipment and computer programs necessary to represent aircraft operations in ground and flight conditions, a visual system providing an out-of-the-cockpit view, a system that provides cues at least equivalent to those of a three-degree-of-freedom motion system, and has the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standards (QPS) for a specific FFS qualification level.

Glider means a heavier-than-air aircraft, that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine.

Ground visibility means prevailing horizontal visibility near the earth's surface as reported by the United States National Weather Service or an accredited observer.

Go-around power or thrust setting means the maximum allowable in-flight power or thrust setting identified in the performance data.

Gyrodyne means a rotorcraft whose rotors are normally engine-driven for takeoff, hovering, and landing, and for forward flight through part of its speed range, and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system.

Gyroplane means a rotorcraft whose rotors are not engine-driven, except for initial starting, but are made to rotate by action of the air when the rotorcraft is moving; and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system.

Helicopter means a rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors.

Heliport means an area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters.

Idle thrust means the jet thrust obtained with the engine power control level set at the stop for the least thrust position at which it can be placed.

IFR conditions means weather conditions below the minimum for flight under visual flight rules.

IFR over-the-top, with respect to the operation of aircraft, means the operation of an aircraft over-the-top on an IFR flight plan when cleared by air traffic control to maintain "VFR conditions" or "VFR conditions on top".

Indicated airspeed means the speed of an aircraft as shown on its pitot static airspeed indicator calibrated to reflect standard atmosphere adiabatic compressible flow at sea level uncorrected for airspeed system errors.

In-flight shutdown (IFSD) means, for ETOPS only, when an engine ceases to function (when the airplane is airborne) and is shutdown, whether self induced, flightcrew initiated or caused by an external influence. The FAA considers IFSD for all causes: for example, flameout, internal failure, flightcrew initiated shutdown, foreign object ingestion, icing, inability to obtain or control desired thrust or power, and cycling of the start control, however briefly, even if the engine operates normally for the remainder of the flight. This definition excludes the airborne cessation of the functioning of an engine when immediately followed by an automatic engine relight and when an engine does not achieve desired thrust or power but is not shutdown.

Instrument means a device using an internal mechanism to show visually or aurally the attitude, altitude, or operation of an aircraft or aircraft part. It includes electronic devices for automatically controlling an aircraft in flight.

Instrument approach procedure (IAP) is a series of predetermined maneuvers by reference to flight instruments with specified protection from obstacles and assurance of navigation signal reception capability. It begins from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point:

(1) From which a landing can be completed; or

(2) If a landing is not completed, to a position at which holding or en route obstacle clearance criteria apply.

Interstate air commerce means the carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in any State of the United States, or the District of Columbia, and a place in any other State of the United States, or the District of Columbia; or between places in the same State of the United States through the airspace over any place outside thereof; or between places in the same territory or possession of the United States, or the District of Columbia.

Interstate air transportation means the carriage by aircraft of persons or property as a common carrier for compensation or hire, or the carriage of mail by aircraft in commerce:

(1) Between a place in a State or the District of Columbia and another place in another State or the District of Columbia;

(2) Between places in the same State through the airspace over any place outside that State; or

(3) Between places in the same possession of the United States;

Whether that commerce moves wholly by aircraft of partly by aircraft and partly by other forms of transportation.

Intrastate air transportation means the carriage of persons or property as a common carrier for compensation or hire, by turbojet-powered aircraft capable of carrying thirty or more persons, wholly within the same State of the United States.

Kite means a framework, covered with paper, cloth, metal, or other material, intended to be flown at the end of a rope or cable, and having as its only support the force of the wind moving past its surfaces.

Landing gear extended speed means the maximum speed at which an aircraft can be safely flown with the landing gear extended.

Landing gear operating speed means the maximum speed at which the landing gear can be safely extended or retracted.

Large aircraft means aircraft of more than 12,500 pounds, maximum certificated takeoff weight.

Light-sport aircraft means an aircraft, other than a helicopter or powered-lift that, since its original certification, has continued to meet the following:

(1) A maximum takeoff weight of not more than—

(i) 1,320 pounds (600 kilograms) for aircraft not intended for operation on water; or

(ii) 1,430 pounds (650 kilograms) for an aircraft intended for operation on water.

(2) A maximum airspeed in level flight with maximum continuous power (V_H) of not more than 120 knots CAS under standard atmospheric conditions at sea level.

(3) A maximum never-exceed speed (V_{NE}) of not more than 120 knots CAS for a glider.

(4) A maximum stalling speed or minimum steady flight speed without the use of lift-enhancing devices (V_{S1}) of not more than 45 knots CAS at the aircraft's maximum certificated takeoff weight and most critical center of gravity.

(5) A maximum seating capacity of no more than two persons, including the pilot.

(6) A single, reciprocating engine, if powered.

(7) A fixed or ground-adjustable propeller if a powered aircraft other than a powered glider.

(8) A fixed or autofeathering propeller system if a powered glider.

(9) A fixed-pitch, semi-rigid, teetering, two-blade rotor system, if a gyroplane.

(10) A nonpressurized cabin, if equipped with a cabin.

(11) Fixed landing gear, except for an aircraft intended for operation on water or a glider.

(12) Fixed or retractable landing gear, or a hull, for an aircraft intended for operation on water.

(13) Fixed or retractable landing gear for a glider.

Lighter-than-air aircraft means aircraft that can rise and remain suspended by using contained gas weighing less than the air that is displaced by the gas.

Load factor means the ratio of a specified load to the total weight of the aircraft. The specified load is expressed in terms of any of the following: aerodynamic forces, inertia forces, or ground or water reactions.

Long-range communication system (LRCS). A system that uses satellite relay, data link, high frequency, or another approved communication system which extends beyond line of sight.

Long-range navigation system (LRNS). An electronic navigation unit that is approved for use under instrument flight rules as a primary means of navigation, and has at least one source of navigational input, such as inertial navigation system, global positioning system, Omega/very low frequency, or Loran C.

Mach number means the ratio of true airspeed to the speed of sound.

Main rotor means the rotor that supplies the principal lift to a rotorcraft.

Maintenance means inspection, overhaul, repair, preservation, and the replacement of parts, but excludes preventive maintenance.

Major alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications—

(1) That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

(2) That is not done according to accepted practices or cannot be done by elementary operations.

Major repair means a repair:

(1) That, if improperly done, might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

(2) That is not done according to accepted practices or cannot be done by elementary operations.

Manifold pressure means absolute pressure as measured at the appropriate point in the induction system and usually expressed in inches of mercury.

Maximum speed for stability characteristics, V_{FC}/M_{FC} means a speed that may not be less than a speed midway between maximum operating limit speed (V_{MO}/M_{MO}) and demonstrated flight diving speed (V_{DF}/M_{DF}), except that, for altitudes where the Mach number is the limiting factor, M_{FCneed} not exceed the Mach number at which effective speed warning occurs.

Medical certificate means acceptable evidence of physical fitness on a form prescribed by the Administrator.

Military operations area. A military operations area (MOA) is airspace established outside Class A airspace to separate or segregate certain nonhazardous military activities from IFR Traffic and to identify for VFR traffic where theses activities are conducted.

V_A means design maneuvering speed.

V_B means design speed for maximum gust intensity.

V_C means design cruising speed.

V_D means design diving speed.

V_{DF}/M_{DF} means demonstrated flight diving speed.

V_{EF} means the speed at which the critical engine is assumed to fail during takeoff.

V_F means design flap speed.

V_{FC}/M_{FC} means maximum speed for stability characteristics.

$\mathbf{V_{FE}}$ means maximum flap extended speed.

V_H means maximum speed in level flight with maximum continuous power.

V_{LE} means maximum landing gear extended speed.

V_{LO} means maximum landing gear operating speed.

$\mathbf{V_{LOF}}$ means lift-off speed.

V_{MC} means minimum control speed with the critical engine inoperative.

V_{MO}/M_{MO} means maximum operating limit speed.

V_{MU} means minimum unstick speed.

V_{NE} means never-exceed speed.

V_{NO} means maximum structural cruising speed.

V_R means rotation speed.

V_S means the stalling speed or the minimum steady flight speed at which the airplane is controllable.

Minimum descent altitude (MDA) is the lowest altitude specified in an instrument approach procedure, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering until the pilot sees the required visual references for the heliport or runway of intended landing.

Minor alteration means an alteration other than a major alteration.

Minor repair means a repair other than a major repair.

Navigable airspace means airspace at and above the minimum flight altitudes prescribed by or under this chapter, including airspace needed for safe takeoff and landing.

Night means the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.

Nonprecision approach procedure means a standard instrument approach procedure in which no electronic glide slope is provided.

Operate, with respect to aircraft, means use, cause to use or authorize to use aircraft, for the purpose (except as provided in §91.13 of this chapter) of air navigation including the piloting of aircraft, with or without the right of legal control (as owner, lessee, or otherwise).

Operational control, with respect to a flight, means the exercise of authority over initiating, conducting or terminating a flight.

Overseas air commerce means the carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in any State of the United States, or the District of Columbia, and any place in a territory or possession of the United States; or between a place in a territory or possession of the United States, and a place in any other territory or possession of the United States.

Overseas air transportation means the carriage by aircraft of persons or property as a common carrier for compensation or hire, or the carriage of mail by aircraft, in commerce:

(1) Between a place in a State or the District of Columbia and a place in a possession of the United States; or

(2) Between a place in a possession of the United States and a place in another possession of the United States; whether that commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation.

Over-the-top means above the layer of clouds or other obscuring phenomena forming the ceiling.

Parachute means a device used or intended to be used to retard the fall of a body or object through the air.

Person means an individual, firm, partnership, corporation, company, association, joint-stock association, or governmental entity. It includes a trustee, receiver, assignee, or similar representative of any of them.

Pilotage means navigation by visual reference to landmarks.

Pilot in command means the person who:

(1) Has final authority and responsibility for the operation and safety of the flight;

(2) Has been designated as pilot in command before or during the flight; and

(3) Holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight.

Pitch setting means the propeller blade setting as determined by the blade angle measured in a manner, and at a radius, specified by the instruction manual for the propeller.

Positive control means control of all air traffic, within designated airspace, by air traffic control.

Powered parachute means a powered aircraft comprised of a flexible or semi-rigid wing connected to a fuselage so that the wing is not in position for flight until the aircraft is in motion. The fuselage of a powered parachute contains the aircraft engine, a seat for each occupant and is attached to the aircraft's landing gear.

Powered-lift means a heavier-than-air aircraft capable of vertical takeoff, vertical landing, and low speed flight that depends principally on engine-driven lift devices or engine thrust for lift during these flight regimes and on nonrotating airfoil(s) for lift during horizontal flight.

Precision approach procedure means a standard instrument approach procedure in which an electronic glide slope is provided, such as ILS and PAR.

Preventive maintenance means simple or minor preservation operations and the replacement of small standard parts not involving complex assembly operations.

Prohibited area. A prohibited area is airspace designated under part 73 within which no person may operate an aircraft without the permission of the using agency.

Propeller means a device for propelling an aircraft that has blades on an engine-driven shaft and that, when rotated, produces by its action on the air, a thrust approximately perpendicular to its plane of rotation. It includes control components normally supplied by its manufacturer, but does not include main and auxiliary rotors or rotating airfoils of engines.

Public aircraft means any of the following aircraft when not being used for a commercial purpose or to carry an individual other than a crewmember or qualified non-crewmenber:

(1) An aircraft used only for the United States Government; an aircraft owned by the Government and operated by any person for purposes related to crew training, equipment development, or demonstration; an aircraft owned and operated by the government of a State, the District of Columbia, or a territory or possession of the United States or a political subdivision of one of these governments; or an aircraft exclusively leased for at least 90 continuous days by the government of a State, the District of Columbia, or a territory or possession of the United States or a political subdivision of one of these governments.

(i) For the sole purpose of determining public aircraft status, commercial purposes means the transportation of persons or property for compensation or hire, but does not include the operation of an aircraft by the armed forces for reimbursement when that reimbursement is required by any Federal statute, regulation, or directive, in effect on November 1, 1999, or by one government on behalf of another government under a cost reimbursement agreement if the government on whose behalf the operation is conducted certifies to the Administrator of the Federal Aviation Administration that the operation is necessary to respond to a significant and imminent threat to life or property (including natural resources) and that no service by a private operator is reasonably available to meet the threat.

(ii) For the sole purpose of determining public aircraft status, governmental function means an activity undertaken by a government, such as national defense, intelligence missions, firefighting, search and rescue, law enforcement (including transport of prisoners, detainees, and illegal aliens), aeronautical research, or biological or geological resource management.

(iii) For the sole purpose of determining public aircraft status, qualified non-crewmember means an individual, other than a member of the crew, aboard an aircraft operated by the armed forces or an intelligence agency of the United States Government, or whose presence is required to perform, or is associated with the performance of, a governmental function.

(2) An aircraft owned or operated by the armed forces or chartered to provide transportation to the armed forces if—

(i) The aircraft is operated in accordance with title 10 of the United States Code;

(ii) The aircraft is operated in the performance of a governmental function under title 14, 31, 32, or 50 of the United States Code and the aircraft is not used for commercial purposes; or

(iii) The aircraft is chartered to provide transportation to the armed forces and the Secretary of Defense (or the Secretary of the department in which the Coast Guard is operating) designates the operation of the aircraft as being required in the national interest.

(3) An aircraft owned or operated by the National Guard of a State, the District of Columbia, or any territory or possession of the United States, and that meets the criteria of paragraph (2) of this definition, qualifies as a public aircraft only to the extent that it is operated under the direct control of the Department of Defense.

Rated 30-second OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under part 33 of this chapter, for continued one-flight operation after the failure of one engine in multiengine rotorcraft, limited to three periods of use no longer than 30 seconds each in any one flight, and followed by mandatory inspection and prescribed maintenance action.

Rated 2-minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under part 33 of this chapter, for continued one-flight operation after the failure of one engine in multiengine rotorcraft, limited to three periods of use no longer than 2 minutes each in any one flight, and followed by mandatory inspection and prescribed maintenance action.

Rated continuous OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under Part 33 of this chapter, and limited in use to the time required to complete the flight after the failure of one engine of a multiengine rotorcraft.

Rated maximum continuous augmented thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically or in flight, in standard atmosphere at a specified altitude, with fluid injection or with the burning of fuel in a separate combustion chamber, within the engine operating limitations established under Part 33 of this chapter, and approved for unrestricted periods of use.

Rated maximum continuous power, with respect to reciprocating, turbopropeller, and turboshaft engines, means the approved brake horsepower that is developed statically or in flight, in standard atmosphere at a specified altitude, within the engine operating limitations established under Part 33, and approved for unrestricted periods of use.

Rated maximum continuous thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically or in flight, in standard atmosphere at a specified altitude, without fluid injection and without the burning of fuel in a separate combustion chamber, within the engine operating limitations established under Part 33 of this chapter, and approved for unrestricted periods of use.

Rated takeoff augmented thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically under standard sea level conditions, with fluid injection or with the burning of fuel in a separate combustion chamber, within the engine operating limitations established under Part 33 of this chapter, and limited in use to periods of not over 5 minutes for takeoff operation.

Rated takeoff power, with respect to reciprocating, turbopropeller, and turboshaft engine type certification, means the approved brake horsepower that is developed statically under standard sea level conditions, within the engine operating limitations established under Part 33, and limited in use to periods of not over 5 minutes for takeoff operation.

Rated takeoff thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically under standard sea level conditions, without fluid injection and without the burning of fuel in a separate combustion chamber, within the engine operating limitations established under Part 33 of this chapter, and limited in use to periods of not over 5 minutes for takeoff operation.

Rated 30-minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under Part 33 of this chapter, and limited in use to a period of not more than 30 minutes after the failure of one engine of a multiengine rotorcraft.

Rated 2½-minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under Part 33 of this chapter, and limited in use to a period of not more than 2½ minutes after the failure of one engine of a multiengine rotorcraft.

Rating means a statement that, as a part of a certificate, sets forth special conditions, privileges, or limitations.

Reference landing speed means the speed of the airplane, in a specified landing configuration, at the point where it descends through the 50 foot height in the determination of the landing distance.

Reporting point means a geographical location in relation to which the position of an aircraft is reported.

Restricted area. A restricted area is airspace designated under Part 73 within which the flight of aircraft, while not wholly prohibited, is subject to restriction.

Rocket means an aircraft propelled by ejected expanding gases generated in the engine from self-contained propellants and not dependent on the intake of outside substances. It includes any part which becomes separated during the operation.

Rotorcraft means a heavier-than-air aircraft that depends principally for its support in flight on the lift generated by one or more rotors.

Rotorcraft-load combination means the combination of a rotorcraft and an external-load, including the external-load attaching means. Rotorcraft-load combinations are designated as Class A, Class B, Class C, and Class D, as follows:

(1) Class A rotorcraft-load combination means one in which the external load cannot move freely, cannot be jettisoned, and does not extend below the landing gear.

(2) Class B rotorcraft-load combination means one in which the external load is jettisonable and is lifted free of land or water during the rotorcraft operation.

(3) Class C rotorcraft-load combination means one in which the external load is jettisonable and remains in contact with land or water during the rotorcraft operation.

(4) Class D rotorcraft-load combination means one in which the external-load is other than a Class A, B, or C and has been specifically approved by the Administrator for that operation.

Route segment is a portion of a route bounded on each end by a fix or navigation aid (NAVAID).

Sea level engine means a reciprocating aircraft engine having a rated takeoff power that is producible only at sea level.

Second in command means a pilot who is designated to be second in command of an aircraft during flight time.

Show, unless the context otherwise requires, means to show to the satisfaction of the Administrator.

Small aircraft means aircraft of 12,500 pounds or less, maximum certificated takeoff weight.

Special VFR conditions mean meteorological conditions that are less than those required for basic VFR flight in controlled airspace and in which some aircraft are permitted flight under visual flight rules.

Special VFR operations means aircraft operating in accordance with clearances within controlled airspace in meteorological conditions less than the basic VFR weather minima. Such operations must be requested by the pilot and approved by ATC.

Standard atmosphere means the atmosphere defined in U.S. Standard Atmosphere, 1962 (Geopotential altitude tables).

Stopway means an area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted takeoff, without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff.

Suitable RNAV system is an RNAV system that meets the required performance established for a type of operation, e.g. IFR; and is suitable for operation over the route to be flown in terms of any performance criteria (including accuracy) established by the air navigation service provider for certain routes (e.g. oceanic, ATS routes, and IAPs). An RNAV system's suitability is dependent upon the availability of ground and/or satellite navigation aids that are needed to meet any route performance criteria that may be prescribed in route specifications to navigate the aircraft along the route to be flown. Information on suitable RNAV systems is published in FAA guidance material.

Synthetic vision means a computer-generated image of the external scene topography from the perspective of the flight deck that is derived from aircraft attitude, high-precision navigation solution, and database of terrain, obstacles and relevant cultural features.

Synthetic vision system means an electronic means to display a synthetic vision image of the external scene topography to the flight crew.

Takeoff power:

(1) With respect to reciprocating engines, means the brake horsepower that is developed under standard sea level conditions, and under the maximum conditions of crankshaft rotational speed and engine manifold pressure approved for the normal takeoff, and limited in continuous use to the period of time shown in the approved engine specification; and

(2) With respect to turbine engines, means the brake horsepower that is developed under static conditions at a specified altitude and atmospheric temperature, and under the maximum conditions of rotor shaft rotational speed and gas temperature approved for the normal takeoff, and limited in continuous use to the period of time shown in the approved engine specification.

Takeoff safety speed means a referenced airspeed obtained after lift-off at which the required one-engine-inoperative climb performance can be achieved.

Takeoff thrust, with respect to turbine engines, means the jet thrust that is developed under static conditions at a specific altitude and atmospheric temperature under the maximum conditions of rotorshaft rotational speed and gas temperature approved for the normal takeoff, and limited in continuous use to the period of time shown in the approved engine specification.

Tandem wing configuration means a configuration having two wings of similar span, mounted in tandem.

TCAS I means a TCAS that utilizes interrogations of, and replies from, airborne radar beacon transponders and provides traffic advisories to the pilot.

TCAS II means a TCAS that utilizes interrogations of, and replies from airborne radar beacon transponders and provides traffic advisories and resolution advisories in the vertical plane.

TCAS III means a TCAS that utilizes interrogation of, and replies from, airborne radar beacon transponders and provides traffic advisories and resolution advisories in the vertical and horizontal planes to the pilot.

Time in service, with respect to maintenance time records, means the time from the moment an aircraft leaves the surface of the earth until it touches it at the next point of landing.

Traffic pattern means the traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from, an airport.

True airspeed means the airspeed of an aircraft relative to undisturbed air. True airspeed is equal to equivalent airspeed multiplied by $(\rho 0/\rho)1/2$.

Type:

(1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a specific make and basic model of aircraft, including modifications thereto that do not change its handling or flight characteristics. Examples include: DC–7, 1049, and F–27; and

(2) As used with respect to the certification of aircraft, means those aircraft which are similar in design. Examples include: DC–7 and DC–7C; 1049G and 1049H; and F–27 and F–27F.

(3) As used with respect to the certification of aircraft engines means those engines which are similar in design. For example, JT8D and JT8D–7 are engines of the same type, and JT9D–3A and JT9D–7 are engines of the same type.

United States, in a geographical sense, means (1) the States, the District of Columbia, Puerto Rico, and the possessions, including the territorial waters, and (2) the airspace of those areas.

United States air carrier means a citizen of the United States who undertakes directly by lease, or other arrangement, to engage in air transportation.

VFR over-the-top, with respect to the operation of aircraft, means the operation of an aircraft over-the-top under VFR when it is not being operated on an IFR flight plan.

Warning area. A warning area is airspace of defined dimensions, extending from 3 nautical miles outward from the coast of the United States, that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

Weight-shift-control aircraft means a powered aircraft with a framed pivoting wing and a fuselage controllable only in pitch and roll by the pilot's ability to change the aircraft's center of gravity with respect to the wing. Flight control of the aircraft depends on the wing's ability to flexibly deform rather than the use of control surfaces.

Winglet or tip fin means an out-of-plane surface extending from a lifting surface. The surface may or may not have control surfaces.

[Doc. No. 1150, 27 FR 4588, May 15, 1962]

Editorial Note: For Federal Register citations affecting §1.1, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 1.2 Abbreviations and symbols.

In Subchapters A through K of this chapter:

AFM means airplane flight manual.

AGL means above ground level.

ALS means approach light system.

APU means auxiliary power unit.

ASR means airport surveillance radar.

ATC means air traffic control.

ATS means Air Traffic Service.

CAMP means continuous airworthiness maintenance program.

CAS means calibrated airspeed.

CAT II means Category II.

CHDO means an FAA Flight Standards certificate holding district office.

CMP means configuration, maintenance, and procedures.

CONSOL or CONSOLAN means a kind of low or medium frequency long range navigational aid.

DH means decision height.

DME means distance measuring equipment compatible with TACAN.

EAS means equivalent airspeed.

EFVS means enhanced flight vision system.

Equi-Time Point means a point on the route of flight where the flight time, considering wind, to each of two selected airports is equal.

ETOPS means extended operations.

EWIS, as defined by §25.1701 of this chapter, means electrical wiring interconnection system.

FAA means Federal Aviation Administration.

FFS means full flight simulator.

FM means fan marker.

FSTD means flight simulation training device.

FTD means flight training device.

GS means glide slope.

HIRL means high-intensity runway light system.

IAS means indicated airspeed.

ICAO means International Civil Aviation Organization.

IFR means instrument flight rules.

IFSD means in-flight shutdown.

ILS means instrument landing system.

IM means ILS inner marker.

INT means intersection.

LDA means localizer-type directional aid.

LFR means low-frequency radio range.

LMM means compass locator at middle marker.

LOC means ILS localizer.

LOM means compass locator at outer marker.

M means mach number.

MAA means maximum authorized IFR altitude.

MALS means medium intensity approach light system.

MALSR means medium intensity approach light system with runway alignment indicator lights.

MCA means minimum crossing altitude.

MDA means minimum descent altitude.

MEA means minimum en route IFR altitude.

MEL means minimum equipment list.

MM means ILS middle marker.

MOCA means minimum obstruction clearance altitude.

MRA means minimum reception altitude.

MSL means mean sea level.

NDB (ADF) means nondirectional beacon (automatic direction finder).

NM means nautical mile.

NOPAC means North Pacific area of operation.

NOPT means no procedure turn required.

OEI means one engine inoperative.

OM means ILS outer marker.

OPSPECS means operations specifications.

PACOTS means Pacific Organized Track System.

PAR means precision approach radar.

PTRS means Performance Tracking and Reporting System.

RAIL means runway alignment indicator light system.

RBN means radio beacon.

RCLM means runway centerline marking.

RCLS means runway centerline light system.

REIL means runway end identification lights.

RFFS means rescue and firefighting services.

RNAV means area navigation.

RR means low or medium frequency radio range station.

RVR means runway visual range as measured in the touchdown zone area.

SALS means short approach light system.

SATCOM means satellite communications.

SSALS means simplified short approach light system.

SSALSR means simplified short approach light system with runway alignment indicator lights.

TACAN means ultra-high frequency tactical air navigational aid.

TAS means true airspeed.

TCAS means a traffic alert and collision avoidance system.

TDZL means touchdown zone lights.

TVOR means very high frequency terminal omnirange station.

V_A means design maneuvering speed.

V_B means design speed for maximum gust intensity.

V_C means design cruising speed.

V_D means design diving speed.

V_{DF}/M_{DF} means demonstrated flight diving speed.

V_{EF} means the speed at which the critical engine is assumed to fail during takeoff.

V_F means design flap speed.

V_{FC}/M_{FC} means maximum speed for stability characteristics.

V_{FE} means maximum flap extended speed.

V_{FTO} means final takeoff speed.

V_H means maximum speed in level flight with maximum continuous power.

V_{LE} means maximum landing gear extended speed.

V_{LO} means maximum landing gear operating speed.

V_{LOF} means lift-off speed.

V_{MC} means minimum control speed with the critical engine inoperative.

V_{MO}/M_{MO} means maximum operating limit speed.

V_{MU} means minimum unstick speed.

V_{NE} means never-exceed speed.

V_{NO} means maximum structural cruising speed.

V_R means rotation speed.

V_{REF} means reference landing speed.

V_S means the stalling speed or the minimum steady flight speed at which the airplane is controllable.

V_{S0} means the stalling speed or the minimum steady flight speed in the landing configuration.

V_{S1} means the stalling speed or the minimum steady flight speed obtained in a specific configuration.

V_{SR} means reference stall speed.

V_{SRO} means reference stall speed in the landing configuration.

V_{SR1} means reference stall speed in a specific configuration.

V_{SW} means speed at which onset of natural or artificial stall warning occurs.

V_{TOSS} means takeoff safety speed for Category A rotorcraft.

V_X means speed for best angle of climb.

V_Y means speed for best rate of climb.

V_1 means the maximum speed in the takeoff at which the pilot must take the first action (e.g., apply brakes, reduce thrust, deploy speed brakes) to stop the airplane within the accelerate-stop distance. V1 also means the minimum speed in the takeoff, following a failure of the critical engine at VEF, at which the pilot can continue the takeoff and achieve the required height above the takeoff surface within the takeoff distance.

V_2 means takeoff safety speed.

V_{2min} means minimum takeoff safety speed.

VFR means visual flight rules.

VHF means very high frequency.

VOR means very high frequency omnirange station.

VORTAC means collocated VOR and TACAN.

[Doc. No. 1150, 27 FR 4590, May 15, 1962]

Note: For Federal Registercitations affecting §1.2, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 1.3 Rules of construction.

(a) In Subchapters A through K of this chapter, unless the context requires otherwise:

(1) Words importing the singular include the plural;

(2) Words importing the plural include the singular; and

(3) Words importing the masculine gender include the feminine.

(b) In Subchapters A through K of this chapter, the word:

(1) Shall is used in an imperative sense;

(2) May is used in a permissive sense to state authority or permission to do the act prescribed, and the words "no person may * * *" or "a person may not * * *" mean that no person is required, authorized, or permitted to do the act prescribed; and

(3) Includes means "includes but is not limited to".

[Doc. No. 1150, 27 FR 4590, May 15, 1962, as amended by Amdt. 1–10, 31 FR 5055, Mar. 29, 1966]

PART 23—AIRWORTHINESS STANDARDS: NORMAL, UTILITY, ACROBATIC, AND COMMUTER CATEGORY AIRPLANES

Subpart A—General

§ 23.1 Applicability.

(a) This part prescribes airworthiness standards for the issue of type certificates, and changes to those certificates, for airplanes in the normal, utility, acrobatic, and commuter categories.

(b) Each person who applies under Part 21 for such a certificate or change must show compliance with the applicable requirements of this part.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–34, 52 FR 1825, Jan. 15, 1987]

§ 23.2 Special retroactive requirements.

(a) Notwithstanding §§21.17 and 21.101 of this chapter and irrespective of the type certification basis, each normal, utility, and acrobatic category airplane having a passenger seating configuration, excluding pilot seats, of nine or less, manufactured after December 12, 1986, or any such foreign airplane for entry into the United States must provide a safety belt and shoulder harness for each forward- or aft-facing seat which will protect the occupant from serious head injury when subjected to the inertia loads resulting from the ultimate static load factors prescribed in §23.561(b)(2) of this part, or which will provide the occupant protection specified in §23.562 of this part when that section is applicable to the airplane. For other seat orientations, the seat/restraint system must be designed to provide a level of occupant protection equivalent to that provided for forward- or aft-facing seats with a safety belt and shoulder harness installed.

(b) Each shoulder harness installed at a flight crewmember station, as required by this section, must allow the crewmember, when seated with the safety belt and shoulder harness fastened, to perform all functions necessary for flight operations.

(c) For the purpose of this section, the date of manufacture is:

(1) The date the inspection acceptance records, or equivalent, reflect that the airplane is complete and meets the FAA approved type design data; or

(2) In the case of a foreign manufactured airplane, the date the foreign civil airworthiness authority certifies the airplane is complete and issues an original standard airworthiness certificate, or the equivalent in that country.

[Amdt. 23–36, 53 FR 30812, Aug. 15, 1988]

§ 23.3 Airplane categories.

(a) The normal category is limited to airplanes that have a seating configuration, excluding pilot seats, of nine or less, a maximum certificated takeoff weight of 12,500 pounds or less, and intended for nonacrobatic operation. Nonacrobatic operation includes:

(1) Any maneuver incident to normal flying;

(2) Stalls (except whip stalls); and

(3) Lazy eights, chandelles, and steep turns, in which the angle of bank is not more than 60 degrees.

(b) The utility category is limited to airplanes that have a seating configuration, excluding pilot seats, of nine or less, a maximum certificated takeoff weight of 12,500 pounds or less, and intended for limited acrobatic operation. Airplanes certificated in the utility category may be used in any of the operations covered under paragraph (a) of this section and in limited acrobatic operations. Limited acrobatic operation includes:

(1) Spins (if approved for the particular type of airplane); and

(2) Lazy eights, chandelles, and steep turns, or similar maneuvers, in which the angle of bank is more than 60 degrees but not more than 90 degrees.

(c) The acrobatic category is limited to airplanes that have a seating configuration, excluding pilot seats, of nine or less, a maximum certificated takeoff weight of 12,500 pounds or less, and intended for use without restrictions, other than those shown to be necessary as a result of required flight tests.

(d) The commuter category is limited to propeller-driven, multiengine airplanes that have a seating configuration, excluding pilot seats, of 19 or less, and a maximum certificated takeoff weight of 19,000 pounds or less. The commuter category operation is limited to any maneuver incident to normal flying, stalls (except whip stalls), and steep turns, in which the angle of bank is not more than 60 degrees.

(e) Except for commuter category, airplanes may be type certificated in more than one category if the requirements of each requested category are met.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–4, 32 FR 5934, Apr. 14, 1967; Amdt. 23–34, 52 FR 1825, Jan. 15, 1987; 52 FR 34745, Sept. 14, 1987; Amdt. 23–50, 61 FR 5183, Feb. 9, 1996]

Subpart B—Flight

General

§ 23.21 Proof of compliance.

(a) Each requirement of this subpart must be met at each appropriate combination of weight and center of gravity within the range of loading conditions for which certification is requested. This must be shown—

(1) By tests upon an airplane of the type for which certification is requested, or by calculations based on, and equal in accuracy to, the results of testing; and

(2) By systematic investigation of each probable combination of weight and center of gravity, if compliance cannot be reasonably inferred from combinations investigated.

(b) The following general tolerances are allowed during flight testing. However, greater tolerances may be allowed in particular tests:

Item	Tolerance
Weight	+5%, –10%.
Critical items affected by weight	+5%, –1%.
C.G.	±7% total travel.

§ 23.23 Load distribution limits.

(a) Ranges of weights and centers of gravity within which the airplane may be safely operated must be established. If a weight and center of gravity combination is allowable only within certain lateral load distribution limits that could be inadvertently exceeded, these limits must be established for the corresponding weight and center of gravity combinations.

(b) The load distribution limits may not exceed any of the following:

(1) The selected limits;

(2) The limits at which the structure is proven; or

(3) The limits at which compliance with each applicable flight requirement of this subpart is shown.

[Doc. No. 26269, 58 FR 42156, Aug. 6, 1993]

§ 23.25 Weight limits.

(a) *Maximum weight.* The maximum weight is the highest weight at which compliance with each applicable requirement of this part (other than those complied with at the design landing weight) is shown. The maximum weight must be established so that it is—

(1) Not more than the least of—

(i) The highest weight selected by the applicant; or

(ii) The design maximum weight, which is the highest weight at which compliance with each applicable structural loading condition of this part (other than those complied with at the design landing weight) is shown; or

(iii) The highest weight at which compliance with each applicable flight requirement is shown, and

(2) Not less than the weight with—

(i) Each seat occupied, assuming a weight of 170 pounds for each occupant for normal and commuter category airplanes, and 190 pounds for utility and acrobatic category airplanes, except that seats other than pilot seats may be placarded for a lesser weight; and

(A) Oil at full capacity, and

(B) At least enough fuel for maximum continuous power operation of at least 30 minutes for day-VFR approved airplanes and at least 45 minutes for night-VFR and IFR approved airplanes; or

(ii) The required minimum crew, and fuel and oil to full tank capacity.

(b) *Minimum weight.* The minimum weight (the lowest weight at which compliance with each applicable requirement of this part is shown) must be established so that it is not more than the sum of—

(1) The empty weight determined under §23.29;

(2) The weight of the required minimum crew (assuming a weight of 170 pounds for each crewmember); and

(3) The weight of—

(i) For turbojet powered airplanes, 5 percent of the total fuel capacity of that particular fuel tank arrangement under investigation, and

(ii) For other airplanes, the fuel necessary for one-half hour of operation at maximum continuous power.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–7, 34 FR 13086, Aug. 13, 1969; Amdt. 23–21, 43 FR 2317, Jan. 16, 1978; Amdt. 23–34, 52 FR 1825, Jan. 15, 1987; Amdt. 23–45, 58 FR 42156, Aug. 6, 1993; Amdt. 23–50, 61 FR 5183, Feb. 9, 1996]

§ 23.29 Empty weight and corresponding center of gravity.

(a) The empty weight and corresponding center of gravity must be determined by weighing the airplane with—

(1) Fixed ballast;

(2) Unusable fuel determined under §23.959; and

(3) Full operating fluids, including—

(i) Oil;

(ii) Hydraulic fluid; and

(iii) Other fluids required for normal operation of airplane systems, except potable water, lavatory precharge water, and water intended for injection in the engines.

(b) The condition of the airplane at the time of determining empty weight must be one that is well defined and can be easily repeated.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23–21, 43 FR 2317, Jan. 16, 1978]

Subpart F—Equipment

General

§23.1301 Function and installation.

Each item of installed equipment must --

(a) Be of a kind and design appropriate to its intended function.

(b) Be labeled as to its identification, function, or operating limitations, or any applicable combination of these factors;

(c) Be installed according to limitations specified for that equipment; and

(d) Function properly when installed.

[Amdt. 23-20, 42 FR 36968, July 18, 1977]

§23.1303 Flight and navigation instruments.

The following are the minimum required flight and navigation instruments:

(a) An airspeed indicator.

(b) An altimeter.

(c) A direction indicator (nonstabilized magnetic compass).

(d) For reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight and turbine engine powered airplanes, a free air temperature indicator or an air-temperature indicator which provides indications that are convertible to free-air.

(e) A speed warning device for --

(1) Turbine engine powered airplanes; and

(2) Other airplanes for which V_{MO}/M_{MO} and V_D/M_D are established under §§23.335(b)(4) and 23.1505(c) if V_{MO}/M_{MO} is greater than 0.8 V_D/M_D.

The speed warning device must give effective aural warning (differing distinctively from aural warnings used for other purposes) to the pilots whenever the speed exceeds V_{MO} plus 6 knots or M_{MO}+0.01. The upper limit of the production tolerance for the warning device may not exceed the prescribed warning speed. The lower limit of the warning device must be set to minimize nuisance warning;

(f) When an attitude display is installed, the instrument design must not provide any means, accessible to the flightcrew, of adjusting the relative positions of the attitude reference symbol and the horizon line beyond that necessary for parallax correction.

(g) In addition, for commuter category airplanes:

(1) If airspeed limitations vary with altitude, the airspeed indicator must have a maximum allowable airspeed indicator showing the variation of V_{MO} with altitude.

(2) The altimeter must be a sensitive type.

(3) Having a passenger seating configuration of 10 or more, excluding the pilot's seats and that are approved for IFR operations, a third attitude instrument must be provided that:

(i) Is powered from a source independent of the electrical generating system;

(ii) Continues reliable operation for a minimum of 30 minutes after total failure of the electrical generating system;

(iii) Operates independently of any other attitude indicating system;

(iv) Is operative without selection after total failure of the electrical generating system;

(v) Is located on the instrument panel in a position acceptable to the Administrator that will make it plainly visible to and usable by any pilot at the pilot's station; and

(vi) Is appropriately lighted during all phases of operation.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-17, 41 FR 55465, Dec. 20, 1976; Amdt. 23-43, 58 FR 18975, Apr. 9, 1993; Amdt. 23-49, 61 FR 5168, Feb. 9, 1996]

§23.1305 Powerplant instruments.

The following are required powerplant instruments:

(a) *For all airplanes.*

(1) A fuel quantity indicator for each fuel tank, installed in accordance with §23.1337(b).

(2) An oil pressure indicator for each engine.

(3) An oil temperature indicator for each engine.

(4) An oil quantity measuring device for each oil tank which meets the requirements of §23.1337(d).

(5) A fire warning means for those airplanes required to comply with §23.1203.

(b) *For reciprocating engine-powered airplanes.* In addition to the powerplant instruments required by paragraph (a) of this section, the following powerplant instruments are required:

(1) An induction system air temperature indicator for each engine equipped with a preheater and having induction air temperature limitations that can be exceeded with preheat.

(2) A tachometer indicator for each engine.

(3) A cylinder head temperature indicator for --

(i) Each air-cooled engine with cowl flaps;

(ii) [Reserved]

(iii) Each commuter category airplane.

(4) For each pump-fed engine, a means:

(i) That continuously indicates, to the pilot, the fuel pressure or fuel flow; or

(ii) That continuously monitors the fuel system and warns the pilot of any fuel flow trend that could lead to engine failure.

(5) A manifold pressure indicator for each altitude engine and for each engine with a controllable propeller.

(6) For each turbocharger installation:

(i) If limitations are established for either carburetor (or manifold) air inlet temperature or exhaust gas or turbocharger turbine inlet temperature, indicators must be furnished for each temperature for which the limitation is established unless it is shown that the limitation will not be exceeded in all intended operations.

(ii) If its oil system is separate from the engine oil system, oil pressure and oil temperature indicators must be provided.

(7) A coolant temperature indicator for each liquid-cooled engine.

(c) *For turbine engine-powered airplanes.* In addition to the powerplant instruments required by paragraph (a) of this section, the following powerplant instruments are required:

(1) A gas temperature indicator for each engine.

(2) A fuel flowmeter indicator for each engine.

(3) A fuel low pressure warning means for each engine.

(4) A fuel low level warning means for any fuel tank that should not be depleted of fuel in normal operations.

(5) A tachometer indicator (to indicate the speed of the rotors with established limiting speeds) for each engine.

(6) An oil low pressure warning means for each engine.

(7) An indicating means to indicate the functioning of the powerplant ice protection system for each engine.

(8) For each engine, an indicating means for the fuel strainer or filter required by §23.997 to indicate the occurrence of contamination of the strainer or filter before it reaches the capacity established in accordance with §23.997(d).

(9) For each engine, a warning means for the oil strainer or filter required by §23.1019, if it has no bypass, to warn the pilot of the occurrence of contamination of the strainer or filter screen before it reaches the capacity established in accordance with §23.1019(a)(5).

(10) An indicating means to indicate the functioning of any heater used to prevent ice clogging of fuel system components.

(d) *For turbojet/turbofan engine-powered airplanes.* In addition to the powerplant instruments required by paragraphs (a) and (c) of this section, the following powerplant instruments are required:

(1) For each engine, an indicator to indicate thrust or to indicate a parameter that can be related to thrust, including a free air temperature indicator if needed for this purpose.

(2) For each engine, a position indicating means to indicate to the flight crew when the thrust reverser, if installed, is in the reverse thrust position.

(e) *For turbopropeller-powered airplanes.* In addition to the powerplant instruments required by paragraphs (a) and (c) of this section, the following powerplant instruments are required:

(1) A torque indicator for each engine.

(2) A position indicating means to indicate to the flight crew when the propeller blade angle is below the flight low pitch position, for each propeller, unless it can be shown that such occurrence is highly improbable.

[Doc. No. 26344, 58 FR 18975, Apr. 9, 1993; 58 FR 27060, May 6, 1993; Amdt. 23-51, 61 FR 5138, Feb. 9, 1996; Amdt. 23-52, 61 FR 13644, Mar. 27, 1996]

§23.1307 Miscellaneous equipment.

The equipment necessary for an airplane to operate at the maximum operating altitude and in the kinds of operation and meteorological conditions for which certification is requested and is approved in accordance with §23.1559 must be included in the type design.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-23, 43 FR 50593, Oct. 30, 1978; Amdt. 23-43, 58 FR 18976, Apr. 9, 1993; Amdt. 23-49, 61 FR 5168, Feb. 9, 1996]

§23.1309 Equipment, systems, and installations.

(a) Each item of equipment, each system, and each installation:

(1) When performing its intended function, may not adversely affect the response, operation, or accuracy of any --

(i) Equipment essential to safe operation; or

(ii) Other equipment unless there is a means to inform the pilot of the effect.

(2) In a single-engine airplane, must be designed to minimize hazards to the airplane in the event of a probable malfunction or failure.

(3) In a multiengine airplane, must be designed to prevent hazards to the airplane in the event of a probable malfunction or failure.

(4) In a commuter category airplane, must be designed to safeguard against hazards to the airplane in the event of their malfunction or failure.

(b) The design of each item of equipment, each system, and each installation must be examined separately and in relationship to other airplane systems and installations to determine if the airplane is dependent upon its function for continued safe flight and landing and, for airplanes not limited to VFR conditions, if failure of a system would significantly reduce the capability of the airplane or the ability of the crew to cope with adverse operating conditions. Each item of equipment, each system, and each installation identified by this examination as one upon which the airplane is dependent for proper functioning to ensure continued safe flight and landing, or whose failure would

significantly reduce the capability of the airplane or the ability of the crew to cope with adverse operating conditions, must be designed to comply with the following additional requirements:

(1) It must perform its intended function under any foreseeable operating condition.

(2) When systems and associated components are considered separately and in relation to other systems --

(i) The occurrence of any failure condition that would prevent the continued safe flight and landing of the airplane must be extremely improbable; and

(ii) The occurrence of any other failure condition that would significantly reduce the capability of the airplane or the ability of the crew to cope with adverse operating conditions must be improbable.

(3) Warning information must be provided to alert the crew to unsafe system operating conditions and to enable them to take appropriate corrective action. Systems, controls, and associated monitoring and warning means must be designed to minimize crew errors that could create additional hazards.

(4) Compliance with the requirements of paragraph (b)(2) of this section may be shown by analysis and, where necessary, by appropriate ground, flight, or simulator tests. The analysis must consider --

(i) Possible modes of failure, including malfunctions and damage from external sources;

(ii) The probability of multiple failures, and the probability of undetected faults.;

(iii) The resulting effects on the airplane and occupants, considering the stage of flight and operating conditions; and

(iv) The crew warning cues, corrective action required, and the crew's capability of determining faults.

(c) Each item of equipment, each system, and each installation whose functioning is required by this chapter and that requires a power supply is an "essential load" on the power supply. The power sources and the system must be able to supply the following power loads in probable operating combinations and for probable durations:

(1) Loads connected to the power distribution system with the system functioning normally.

(2) Essential loads after failure of --

(i) Any one engine on two-engine airplanes; or

(ii) Any two engines on an airplane with three or more engines; or

(iii) Any power converter or energy storage device.

(3) Essential loads for which an alternate source of power is required, as applicable, by the operating rules of this chapter, after any failure or malfunction in any one power supply system, distribution system, or other utilization system.

(d) In determining compliance with paragraph (c)(2) of this section, the power loads may be assumed to be reduced under a monitoring procedure consistent with safety in the kinds of operations authorized. Loads not required in controlled flight need not be considered for the two-engine-inoperative condition on airplanes with three or more engines.

(e) In showing compliance with this section with regard to the electrical power system and to equipment design and installation, critical environmental and atmospheric conditions, including radio frequency energy and the effects (both direct and indirect) of lightning strikes, must be considered. For electrical generation, distribution, and utilization equipment required by or used in complying with this chapter, the ability to provide continuous, safe service under foreseeable environmental conditions may be shown by environmental tests, design analysis, or reference to previous comparable service experience on other airplanes.

(f) As used in this section, "system" refers to all pneumatic systems, fluid systems, electrical systems, mechanical systems, and powerplant systems included in the airplane design, except for the following:

(1) Powerplant systems provided as part of the certificated engine.

(2) The flight structure (such a wing, empennage, control surfaces and their systems, the fuselage, engine mounting, and landing gear and their related primary attachments) whose requirements are specific in subparts C and D of this part.

[Amdt. 23-41, 55 FR 43309, Oct. 26, 1990; 55 FR 47028, Nov. 8, l990, as amended by Amdt. 23-49, 61 FR 5168, Feb. 9, 1996]

§23.1311 Electronic display instrument systems.

(a) Electronic display indicators, including those with features that make isolation and independence between powerplant instrument systems impractical, must:

(1) Meet the arrangement and visibility requirements of §23.1321.

(2) Be easily legible under all lighting conditions encountered in the cockpit, including direct sunlight, considering the expected electronic display brightness level at the end of an electronic display indictor's useful life. Specific limitations on display system useful life must be contained in the Instructions for Continued Airworthiness required by §23.1529.

(3) Not inhibit the primary display of attitude, airspeed, altitude, or powerplant parameters needed by any pilot to set power within established limitations, in any normal mode of operation.

(4) Not inhibit the primary display of engine parameters needed by any pilot to properly set or monitor powerplant limitations during the engine starting mode of operation.

(5) Have an independent magnetic direction indicator and either an independent secondary mechanical altimeter, airspeed indicator, and attitude instrument or individual electronic display indicators for the altitude, airspeed, and attitude that are independent from the airplane's primary electrical power system. These secondary instruments may be installed in panel positions that are displaced from the primary positions specified by §23.1321(d), but must be located where they meet the pilot's visibility requirements of §23.1321(a).

(6) Incorporate sensory cues for the pilot that are equivalent to those in the instrument being replaced by the electronic display indicators.

(7) Incorporate visual displays of instrument markings, required by §§23.1541 through 23.1553, or visual displays that alert the pilot to abnormal operational values or approaches to established limitation values, for each parameter required to be displayed by this part.

(b) The electronic display indicators, including their systems and installations, and considering other airplane systems, must be designed so that one display of information essential for continued safe flight and landing will remain available to the crew, without need for immediate action by any pilot for continued safe operation, after any single failure or probable combination of failures.

(c) As used in this section, "instrument" includes devices that are physically contained in one unit, and devices that are composed of two or more physically separate units or components connected together (such as a remote indicating gyroscopic direction indicator that includes a magnetic sensing element, a gyroscopic unit, an amplifier, and an indicator connected together). As used in this section, "primary" display refers to the display of a parameter that is located in the instrument panel such that the pilot looks at it first when wanting to view that parameter.

[Doc. No. 27806, 61 FR 5168, Feb. 9, 1996]

§23.1321 Arrangement and visibility.

(a) Each flight, navigation, and powerplant instrument for use by any required pilot during takeoff, initial climb, final approach, and landing must be located so that any pilot seated at the controls can monitor the airplane's flight path and these instruments with minimum head and eye movement. The powerplant instruments for these flight conditions are those needed to set power within powerplant limitations.

(b) For each multiengine airplane, identical powerplant instruments must be located so as to prevent confusion as to which engine each instrument relates.

(c) Instrument panel vibration may not damage, or impair the accuracy of, any instrument.

(d) For each airplane, the flight instruments required by §23.1303, and, as applicable, by the operating rules of this chapter, must be grouped on the instrument panel and centered as nearly as practicable about the vertical plane of each required pilot's forward vision. In addition:

(1) The instrument that most effectively indicates the attitude must be on the panel in the top center position;

(2) The instrument that most effectively indicates airspeed must be adjacent to and directly to the left of the instrument in the top center position;

(3) The instrument that most effectively indicates altitude must be adjacent to and directly to the right of the instrument in the top center position;

(4) The instrument that most effectively indicates direction of flight, other than the magnetic direction indicator required by §23.1303(c), must be adjacent to and directly below the instrument in the top center position; and

(5) Electronic display indicators may be used for compliance with paragraphs (d)(1) through (d)(4) of this section when such displays comply with requirements in §23.1311.

(e) If a visual indicator is provided to indicate malfunction of an instrument, it must be effective under all probable cockpit lighting conditions.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-14, 38 FR 31824, Nov. 19, 1973; Amdt. 23-20, 42 FR 36968, July 18, 1977; Amdt. 23-41, 55 FR 43310, Oct. 26, 1990; 55 FR 46888, Nov. 7, 1990; Amdt. 23-49, 61 FR 5168, Feb. 9, 1996]

§23.1322 Warning, caution, and advisory lights.

If warning, caution, or advisory lights are installed in the cockpit, they must, unless otherwise approved by the Administrator, be --

(a) Red, for warning lights (lights indicating a hazard which may require immediate corrective action);

(b) Amber, for caution lights (lights indicating the possible need for future corrective action);

(c) Green, for safe operation lights; and

(d) Any other color, including white, for lights not described in paragraphs (a) through (c) of this section, provided the color differs sufficiently from the colors prescribed in paragraphs (a) through (c) of this section to avoid possible confusion.

(e) Effective under all probable cockpit lighting conditions.

[Amdt. 23-17, 41 FR 55465, Dec. 20, 1976, as amended by Amdt. 23-43, 58 FR 18976, Apr. 9, 1993]

§23.1323 Airspeed indicating system.

(a) Each airspeed indicating instrument must be calibrated to indicate true airspeed (at sea level with a standard atmosphere) with a minimum practicable instrument calibration error when the corresponding pitot and static pressures are applied.

(b) Each airspeed system must be calibrated in flight to determine the system error. The system error, including position error, but excluding the airspeed indicator instrument calibration error, may not exceed three percent of the calibrated airspeed or five knots, whichever is greater, throughout the following speed ranges:

(1) 1.3 V_{S1} to V_{MO}/M_{MO} or V_{NE}, whichever is appropriate with flaps retracted.

(2) 1.3 V_{S1} to V_{FE} with flaps extended.

(c) The design and installation of each airspeed indicating system must provide positive drainage of moisture from the pitot static plumbing.

(d) If certification for instrument flight rules or flight in icing conditions is requested, each airspeed system must have a heated pitot tube or an equivalent means of preventing malfunction due to icing.

(e) In addition, for commuter category airplanes, the airspeed indicating system must be calibrated to determine the system error during the accelerate-takeoff ground run. The ground run calibration must be obtained between 0.8 of the minimum value of V_1, and 1.2 times the maximum value of V_1 considering the approved ranges of altitude and weight. The ground run calibration must be determined assuming an engine failure at the minimum value of V_1.

(f) For commuter category airplanes, where duplicate airspeed indicators are required, their respective pitot tubes must be far enough apart to avoid damage to both tubes in a collision with a bird.

[Amdt. 23-20, 42 FR 36968, July 18, 1977, as amended by Amdt. 23-34, 52 FR 1834, Jan. 15, 1987; 52 FR 34745, Sept. 14, 1987; Amdt. 23-42, 56 FR 354, Jan. 3, 1991; Amdt. 23-49, 61 FR 5168, Feb. 9, 1996]

§23.1325 Static pressure system.

(a) Each instrument provided with static pressure case connections must be so vented that the influence of airplane speed, the opening and closing of windows, airflow variations, moisture, or other foreign matter will least affect the accuracy of the instruments except as noted in paragraph (b)(3) of this section.

(b) If a static pressure system is necessary for the functioning of instruments, systems, or devices, it must comply with the provisions of paragraphs (b)(1) through (3) of this section.

(1) The design and installation of a static pressure system must be such that --

(i) Positive drainage of moisture is provided;

(ii) Chafing of the tubing, and excessive distortion or restriction at bends in the tubing, is avoided; and

(iii) The materials used are durable, suitable for the purpose intended, and protected against corrosion.

(2) A proof test must be conducted to demonstrate the integrity of the static pressure system in the following manner:

(i) *Unpressurized airplanes.* Evacuate the static pressure system to a pressure differential of approximately 1 inch of mercury or to a reading on the altimeter, 1,000 feet above the aircraft elevation at the time of the test. Without additional pumping for a period of 1 minute, the loss of indicated altitude must not exceed 100 feet on the altimeter.

(ii) *Pressurized airplanes.* Evacuate the static pressure system until a pressure differential equivalent to the maximum cabin pressure differential for which the airplane is type certificated is achieved. Without additional pumping for a period of 1 minute, the loss of indicated altitude must not exceed 2 percent of the equivalent altitude of the maximum cabin differential pressure or 100 feet, whichever is greater.

(3) If a static pressure system is provided for any instrument, device, or system required by the operating rules of this chapter, each static pressure port must be designed or located in such a manner that the correlation between air pressure in the static pressure system and true ambient atmospheric static pressure is not altered when the airplane encounters icing conditions. An antiicing means or an alternate source of static pressure may be used in showing compliance with this requirement. If the reading of the altimeter, when on the alternate static pressure system differs from the reading of the altimeter when on the primary static system by more than 50 feet, a correction card must be provided for the alternate static system.

(c) Except as provided in paragraph (d) of this section, if the static pressure system incorporates both a primary and an alternate static pressure source, the means for selecting one or the other source must be designed so that --

(1) When either source is selected, the other is blocked off; and

(2) Both sources cannot be blocked off simultaneously.

(d) For unpressurized airplanes, paragraph (c)(1) of this section does not apply if it can be demonstrated that the static pressure system calibration, when either static pressure source is selected, is not changed by the other static pressure source being open or blocked.

(e) Each static pressure system must be calibrated in flight to determine the system error. The system error, in indicated pressure altitude, at sea-level, with a standard atmosphere, excluding instrument calibration error, may not exceed ±30 feet per 100 knot speed for the appropriate configuration in the speed range between 1.3 VS0 with flaps extended, and 1.8 VS1 with flaps retracted. However, the error need not be less than 30 feet.

(f) [Reserved]

(g) For airplanes prohibited from flight in instrument meteorological or icing conditions, in accordance with §23.1559(b) of this part, paragraph (b)(3) of this section does not apply.

[Amdt. 23-1, 30 FR 8261, June 29, 1965, as amended by Amdt. 23-6, 32 FR 7586, May 24, 1967; 32 FR 13505, Sept. 27, 1967; 32 FR 13714, Sept. 30, 1967; Amdt. 23-20, 42 FR 36968, July 18, 1977; Amdt. 23-34, 52 FR 1834, Jan. 15, 1987; Amdt. 23-42, 56 FR 354, Jan. 3, 1991; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996; Amdt. 23-50, 61 FR 5192, Feb. 9, 1996]

§23.1326 Pitot heat indication systems.

If a flight instrument pitot heating system is installed to meet the requirements specified in §23.1323(d), an indication system must be provided to indicate to the flight crew when that pitot heating system is not operating. The indication system must comply with the following requirements:

(a) The indication provided must incorporate an amber light that is in clear view of a flightcrew member.

(b) The indication provided must be designed to alert the flight crew if either of the following conditions exist:

(1) The pitot heating system is switched "off."

(2) The pitot heating system is switched "on" and any pitot tube heating element is inoperative.

[Doc. No. 27806, 61 FR 5169, Feb. 9, 1996]

§23.1327 Magnetic direction indicator.

(a) Except as provided in paragraph (b) of this section --

(1) Each magnetic direction indicator must be installed so that its accuracy is not excessively affected by the airplane's vibration or magnetic fields; and

(2) The compensated installation may not have a deviation in level flight, greater than ten degrees on any heading.

(b) A magnetic nonstabilized direction indicator may deviate more than ten degrees due to the operation of electrically powered systems such as electrically heated windshields if either a magnetic stabilized direction indicator, which does not have a deviation in level flight greater than ten degrees on any heading, or a gyroscopic direction indicator, is installed. Deviations of a magnetic nonstabilized direction indicator of more than 10 degrees must be placarded in accordance with §23.1547(e).

[Amdt. 23-20, 42 FR 36969, July 18, 1977]

§23.1329 Automatic pilot system.

If an automatic pilot system is installed, it must meet the following:

(a) Each system must be designed so that the automatic pilot can --

(1) Be quickly and positively disengaged by the pilots to prevent it from interfering with their control of the airplane; or

(2) Be sufficiently overpowered by one pilot to let him control the airplane.

(b) If the provisions of paragraph (a)(1) of this section are applied, the quick release (emergency) control must be located on the control wheel (both control wheels if the airplane can be operated from either pilot seat) on the side opposite the throttles, or on the stick control, (both stick controls, if the airplane can be operated from either pilot seat) such that it can be operated without moving the hand from its normal position on the control.

(c) Unless there is automatic synchronization, each system must have a means to readily indicate to the pilot the alignment of the actuating device in relation to the control system it operates.

(d) Each manually operated control for the system operation must be readily accessible to the pilot. Each control must operate in the same plane and sense of motion as specified in §23.779 for cockpit controls. The direction of motion must be plainly indicated on or near each control.

(e) Each system must be designed and adjusted so that, within the range of adjustment available to the pilot, it cannot produce hazardous loads on the airplane or create hazardous deviations in the flight path, under any flight condition appropriate to its use, either during normal operation or in the event of a malfunction, assuming that corrective action begins within a reasonable period of time.

(f) Each system must be designed so that a single malfunction will not produce a hardover signal in more than one control axis. If the automatic pilot integrates signals from auxiliary controls or furnishes signals for operation of other equipment, positive interlocks and sequencing of engagement to prevent improper operation are required.

(g) There must be protection against adverse interaction of integrated components, resulting from a malfunction.

(h) If the automatic pilot system can be coupled to airborne navigation equipment, means must be provided to indicate to the flight crew the current mode of operation. Selector switch position is not acceptable as a means of indication.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-23, 43 FR 50593, Oct. 30, 1978; Amdt. 23-43, 58 FR 18976, Apr. 9, 1993; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

§23.1331 Instruments using a power source.

For each instrument that uses a power source, the following apply:

(a) Each instrument must have an integral visual power annunciator or separate power indicator to indicate when power is not adequate to sustain proper instrument performance. If a separate indicator is used, it must be located so that the pilot using the instruments can monitor the indicator with minimum head and eye movement. The power must be sensed at or near the point where it enters the instrument. For electric and vacuum/pressure instruments, the power is considered to be adequate when the voltage or the vacuum/pressure, respectively, is within approved limits.

(b) The installation and power supply systems must be designed so that --

(1) The failure of one instrument will not interfere with the proper supply of energy to the remaining instrument; and

(2) The failure of the energy supply from one source will not interfere with the proper supply of energy from any other source.

(c) There must be at least two independent sources of power (not driven by the same engine on multiengine airplanes), and a manual or an automatic means to select each power source.

[Doc. No. 26344, 58 FR 18976, Apr. 9, 1993]

§23.1335 Flight director systems.

If a flight director system is installed, means must be provided to indicate to the flight crew its current mode of operation. Selector switch position is not acceptable as a means of indication.

[Amdt. 23-20, 42 FR 36969, July 18, 1977]

§23.1337 Powerplant instruments installation.

(a) *Instruments and instrument lines.*

(1) Each powerplant and auxiliary power unit instrument line must meet the requirements of §23.993.

(2) Each line carrying flammable fluids under pressure must --

(i) Have restricting orifices or other safety devices at the source of pressure to prevent the escape of excessive fluid if the line fails; and

(ii) Be installed and located so that the escape of fluids would not create a hazard.

(3) Each powerplant and auxiliary power unit instrument that utilizes flammable fluids must be installed and located so that the escape of fluid would not create a hazard.

(b) *Fuel quantity indication.* There must be a means to indicate to the flightcrew members the quantity of usable fuel in each tank during flight. An indicator calibrated in appropriate units and clearly marked to indicate those units must be used. In addition:

(1) Each fuel quantity indicator must be calibrated to read “zero” during level flight when the quantity of fuel remaining in the tank is equal to the unusable fuel supply determined under §23.959(a);

(2) Each exposed sight gauge used as a fuel quantity indicator must be protected against damage;

(3) Each sight gauge that forms a trap in which water can collect and freeze must have means to allow drainage on the ground;

(4) There must be a means to indicate the amount of usable fuel in each tank when the airplane is on the ground (such as by a stick gauge);

(5) Tanks with interconnected outlets and airspaces may be considered as one tank and need not have separate indicators; and

(6) No fuel quantity indicator is required for an auxiliary tank that is used only to transfer fuel to other tanks if the relative size of the tank, the rate of fuel transfer, and operating instructions are adequate to --

(i) Guard against overflow; and

(ii) Give the flight crewmembers prompt warning if transfer is not proceeding as planned.

(c) *Fuel flowmeter system.* If a fuel flowmeter system is installed, each metering component must have a means to by-pass the fuel supply if malfunctioning of that component severely restricts fuel flow.

(d) *Oil quantity indicator.* There must be a means to indicate the quantity of oil in each tank --

(1) On the ground (such as by a stick gauge); and

(2) In flight, to the flight crew members, if there is an oil transfer system or a reserve oil supply system.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13096, Aug. 13, 1969; Amdt. 23-18, 42 FR 15042, Mar. 17, 1977; Amdt. 23-43, 58 FR 18976, Apr. 9, 1993; Amdt. 23-51, 61 FR 5138, Feb. 9, 1996; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

Electrical Systems and Equipment

§23.1351 General.

(a) *Electrical system capacity.* Each electrical system must be adequate for the intended use. In addition --

(1) Electric power sources, their transmission cables, and their associated control and protective devices, must be able to furnish the required power at the proper voltage to each load circuit essential for safe operation; and

(2) Compliance with paragraph (a)(1) of this section must be shown as follows --

(i) For normal, utility, and acrobatic category airplanes, by an electrical load analysis or by electrical measurements that account for the electrical loads applied to the electrical system in probable combinations and for probable durations; and

(ii) For commuter category airplanes, by an electrical load analysis that accounts for the electrical loads applied to the electrical system in probable combinations and for probable durations.

(b) *Function.* For each electrical system, the following apply:

(1) Each system, when installed, must be --

(i) Free from hazards in itself, in its method of operation, and in its effects on other parts of the airplane;

(ii) Protected from fuel, oil, water, other detrimental substances, and mechanical damage; and

(iii) So designed that the risk of electrical shock to crew, passengers, and ground personnel is reduced to a minimum.

(2) Electric power sources must function properly when connected in combination or independently.

(3) No failure or malfunction of any electric power source may impair the ability of any remaining source to supply load circuits essential for safe operation.

(4) In addition, for commuter category airplanes, the following apply:

(i) Each system must be designed so that essential load circuits can be supplied in the event of reasonably probable faults or open circuits including faults in heavy current carrying cables;

(ii) A means must be accessible in flight to the flight crewmembers for the individual and collective disconnection of the electrical power sources from the system;

(iii) The system must be designed so that voltage and frequency, if applicable, at the terminals of all essential load equipment can be maintained within the limits for which the equipment is designed during any probable operating conditions;

(iv) If two independent sources of electrical power for particular equipment or systems are required, their electrical energy supply must be ensured by means such as duplicate electrical equipment, throwover switching, or multichannel or loop circuits separately routed; and

(v) For the purpose of complying with paragraph (b)(5) of this section, the distribution system includes the distribution busses, their associated feeders, and each control and protective device.

(c) *Generating system.* There must be at least one generator/alternator if the electrical system supplies power to load circuits essential for safe operation. In addition --

(1) Each generator/alternator must be able to deliver its continuous rated power, or such power as is limited by its regulation system.

(2) Generator/alternator voltage control equipment must be able to dependably regulate the generator/alternator output within rated limits.

(3) Automatic means must be provided to prevent damage to any generator/alternator and adverse effects on the airplane electrical system due to reverse current. A means must also be provided to disconnect each generator/alternator from the battery and other generators/alternators.

(4) There must be a means to give immediate warning to the flight crew of a failure of any generator/alternator.

(5) Each generator/alternator must have an overvoltage control designed and installed to prevent damage to the electrical system, or to equipment supplied by the electrical system that could result if that generator/alternator were to develop an overvoltage condition.

(d) *Instruments.* A means must exist to indicate to appropriate flight crewmembers the electric power system quantities essential for safe operation.

(1) For normal, utility, and acrobatic category airplanes with direct current systems, an ammeter that can be switched into each generator feeder may be used and, if only one generator exists, the ammeter may be in the battery feeder.

(2) For commuter category airplanes, the essential electric power system quantities include the voltage and current supplied by each generator.

(e) *Fire resistance.* Electrical equipment must be so designed and installed that in the event of a fire in the engine compartment, during which the surface of the firewall adjacent to the fire is heated to 2,000 °F for 5 minutes or to a lesser temperature substantiated by the applicant, the equipment essential to continued safe operation and located behind the firewall will function satisfactorily and will not create an additional fire hazard.

(f) *External power.* If provisions are made for connecting external power to the airplane, and that external power can be electrically connected to equipment other than that used for engine starting, means must be provided to ensure that no external power supply having a reverse polarity, or a reverse phase sequence, can supply power to the airplane's electrical system. The external power connection must be located so that its use will not result in a hazard to the airplane or ground personnel.

(g) It must be shown by analysis, tests, or both, that the airplane can be operated safely in VFR conditions, for a period of not less than five minutes, with the normal electrical power (electrical power sources excluding the battery and any other standby electrical sources) inoperative, with critical type fuel (from the standpoint of flameout and restart capability), and with the airplane initially at the maximum certificated altitude. Parts of the electrical system may remain on if --

(1) A single malfunction, including a wire bundle or junction box fire, cannot result in loss of the part turned off and the part turned on; and

(2) The parts turned on are electrically and mechanically isolated from the parts turned off.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13096, Aug. 13, 1969; Amdt. 23-14, 38 FR 31824, Nov. 19, 1973; Amdt. 23-17, 41 FR 55465, Dec. 20, 1976; Amdt. 23-20, 42 FR 36969, July 18, 1977; Amdt. 23-34, 52 FR 1834, Jan. 15, 1987; 52 FR 34745, Sept. 14, 1987; Amdt. 23-43, 58 FR 18976, Apr. 9, 1993; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

§23.1353 Storage battery design and installation.

(a) Each storage battery must be designed and installed as prescribed in this section.

(b) Safe cell temperatures and pressures must be maintained during any probable charging and discharging condition. No uncontrolled increase in cell temperature may result when the battery is recharged (after previous complete discharge) --

(1) At maximum regulated voltage or power;

(2) During a flight of maximum duration; and

(3) Under the most adverse cooling condition likely to occur in service.

(c) Compliance with paragraph (b) of this section must be shown by tests unless experience with similar batteries and installations has shown that maintaining safe cell temperatures and pressures presents no problem.

(d) No explosive or toxic gases emitted by any battery in normal operation, or as the result of any probable malfunction in the charging system or battery installation, may accumulate in hazardous quantities within the airplane.

(e) No corrosive fluids or gases that may escape from the battery may damage surrounding structures or adjacent essential equipment.

(f) Each nickel cadmium battery installation capable of being used to start an engine or auxiliary power unit must have provisions to prevent any hazardous effect on structure or essential systems that may be caused by the maximum amount of heat the battery can generate during a short circuit of the battery or of its individual cells.

(g) Nickel cadmium battery installations capable of being used to start an engine or auxiliary power unit must have --

(1) A system to control the charging rate of the battery automatically so as to prevent battery overheating;

(2) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or

(3) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of battery failure.

(h) In the event of a complete loss of the primary electrical power generating system, the battery must be capable of providing at least 30 minutes of electrical power to those loads that are essential to continued safe flight and landing. The 30 minute time period includes the time needed for the pilots to recognize the loss of generated power and take appropriate load shedding action.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-20, 42 FR 36969, July 18, 1977; Amdt. 23-21, 43 FR 2319, Jan. 16, 1978; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

§23.1357 Circuit protective devices.

(a) Protective devices, such as fuses or circuit breakers, must be installed in all electrical circuits other than --

(1) Main circuits of starter motors used during starting only; and

(2) Circuits in which no hazard is presented by their omission.

(b) A protective device for a circuit essential to flight safety may not be used to protect any other circuit.

(c) Each resettable circuit protective device ("trip free" device in which the tripping mechanism cannot be overridden by the operating control) must be designed so that --

(1) A manual operation is required to restore service after tripping; and

(2) If an overload or circuit fault exists, the device will open the circuit regardless of the position of the operating control.

(d) If the ability to reset a circuit breaker or replace a fuse is essential to safety in flight, that circuit breaker or fuse must be so located and identified that it can be readily reset or replaced in flight.

(e) For fuses identified as replaceable in flight --

(1) There must be one spare of each rating or 50 percent spare fuses of each rating, whichever is greater; and

(2) The spare fuse(s) must be readily accessible to any required pilot.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-20, 42 FR 36969, July 18, 1977]; Amdt. 23-43, 58 FR 18976, Apr. 9, 1993

§23.1359 Electrical system fire protection.

(a) Each component of the electrical system must meet the applicable fire protection requirements of §§23.863 and 23.1182.

(b) Electrical cables, terminals, and equipment in designated fire zones that are used during emergency procedures must be fire-resistant.

(c) Insulation on electrical wire and electrical cable must be self-extinguishing when tested at an angle of 60 degrees in accordance with the applicable portions of appendix F of this part, or other approved equivalent methods. The average burn length must not exceed 3 inches (76 mm) and the average flame time after removal of the flame source must not exceed 30 seconds. Drippings from the test specimen must not continue to flame for more than an average of 3 seconds after falling.

[Doc. No. 27806, 61 FR 5169, Feb. 9, 1996]

§23.1361 Master switch arrangement.

(a) There must be a master switch arrangement to allow ready disconnection of each electric power source from power distribution systems, except as provided in paragraph (b) of this section. The point of disconnection must be adjacent to the sources controlled by the switch arrangement. If separate switches are incorporated into the master switch arrangement, a means must be provided for the switch arrangement to be operated by one hand with a single movement.

(b) Load circuits may be connected so that they remain energized when the master switch is open, if the circuits are isolated, or physically shielded, to prevent their igniting flammable fluids or vapors that might be liberated by the leakage or rupture of any flammable fluid system; and

(1) The circuits are required for continued operation of the engine; or

(2) The circuits are protected by circuit protective devices with a rating of five amperes or less adjacent to the electric power source.

(3) In addition, two or more circuits installed in accordance with the requirements of paragraph (b)(2) of this section must not be used to supply a load of more than five amperes.

(c) The master switch or its controls must be so installed that the switch is easily discernible and accessible to a crewmember.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-20, 42 FR 36969, July 18, 1977; Amdt. 23-43, 58 FR 18977, Apr. 9, 1993; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

§23.1365 Electric cables and equipment.

(a) Each electric connecting cable must be of adequate capacity.

(b) Any equipment that is associated with any electrical cable installation and that would overheat in the event of circuit overload or fault must be flame resistant. That equipment and the electrical cables must not emit dangerous quantities of toxic fumes.

(c) Main power cables (including generator cables) in the fuselage must be designed to allow a reasonable degree of deformation and stretching without failure and must --

(1) Be separated from flammable fluid lines; or

(2) Be shrouded by means of electrically insulated flexible conduit, or equivalent, which is in addition to the normal cable insulation.

(d) Means of identification must be provided for electrical cables, terminals, and connectors.

(e) Electrical cables must be installed such that the risk of mechanical damage and/or damage cased by fluids vapors, or sources of heat, is minimized.

(f) Where a cable cannot be protected by a circuit protection device or other overload protection, it must not cause a fire hazard under fault conditions.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-14, 38 FR 31824, Nov. 19, 1973; Amdt. 23-43, 58 FR 18977, Apr. 9, 1993; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

§23.1367 Switches.

Each switch must be --

(a) Able to carry its rated current;

(b) Constructed with enough distance or insulating material between current carrying parts and the housing so that vibration in flight will not cause shorting;

(c) Accessible to appropriate flight crewmembers; and

(d) Labeled as to operation and the circuit controlled.

Lights

§23.1381 Instrument lights.

The instrument lights must –

(a) Make each instrument and control easily readable and discernible;

(b) Be installed so that their direct rays, and rays reflected from the windshield or other surface, are shielded from the pilot's eyes; and

(c) Have enough distance or insulating material between current carrying parts and the housing so that vibration in flight will not cause shorting.

A cabin dome light is not an instrument light.

§23.1383 Taxi and landing lights.

Each taxi and landing light must be designed and installed so that:

(a) No dangerous glare is visible to the pilots.

(b) The pilot is not seriously affected by halation.

(c) It provides enough light for night operations.

(d) It does not cause a fire hazard in any configuration.

[Doc. No. 27806, 61 FR 5169, Feb. 9, 1996]

§23.1385 Position light system installation.

(a) *General.* Each part of each position light system must meet the applicable requirements of this section and each system as a whole must meet the requirements of §§23.1387 through 23.1397.

(b) *Left and right position lights.* Left and right position lights must consist of a red and a green light spaced laterally as far apart as practicable and installed on the airplane such that, with the airplane in the normal flying position, the red light is on the left side and the green light is on the right side.

(c) *Rear position light.* The rear position light must be a white light mounted as far aft as practicable on the tail or on each wing tip.

(d) *Light covers and color filters.* Each light cover or color filter must be at least flame resistant and may not change color or shape or lose any appreciable light transmission during normal use.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-17, 41 FR 55465, Dec. 20, 1976; Amdt. 23-43, 58 FR 18977, Apr. 9, 1993]

§23.1387 Position light system dihedral angles.

(a) Except as provided in paragraph (e) of this section, each position light must, as installed, show unbroken light within the dihedral angles described in this section.

(b) Dihedral angle *L* (left) is formed by two intersecting vertical planes, the first parallel to the longitudinal axis of the airplane, and the other at 110 degrees to the left of the first, as viewed when looking forward along the longitudinal axis.

(c) Dihedral angle *R* (right) is formed by two intersecting vertical planes, the first parallel to the longitudinal axis of the airplane, and the other at 110 degrees to the right of the first, as viewed when looking forward along the longitudinal axis.

(d) Dihedral angle *A* (aft) is formed by two intersecting vertical planes making angles of 70 degrees to the right and to the left, respectively, to a vertical plane passing through the longitudinal axis, as viewed when looking aft along the longitudinal axis.

(e) If the rear position light, when mounted as far aft as practicable in accordance with §23.1385(c), cannot show unbroken light within dihedral angle A (as defined in paragraph (d) of this section), a solid angle or angles of obstructed visibility totaling not more than 0.04 steradians is allowable within that dihedral angle, if such solid angle is within a cone whose apex is at the rear position light and whose elements make an angle of 30° with a vertical line passing through the rear position light.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-12, 36 FR 21278, Nov. 5, 1971; Amdt. 23-43, 58 FR 18977, Apr. 9, 1993]

§23.1389 Position light distribution and intensities.

(a) *General.* The intensities prescribed in this section must be provided by new equipment with each light cover and color filter in place. Intensities must be determined with the light source operating at a steady value equal to the average luminous output of the source at the normal operating voltage of the airplane. The light distribution and intensity of each position light must meet the requirements of paragraph (b) of this section.

(b) *Position lights.* The light distribution and intensities of position lights must be expressed in terms of minimum intensities in the horizontal plane, minimum intensities in any vertical plane, and maximum intensities in overlapping beams, within dihedral angles L, R, and A, and must meet the following requirements:

(1) *Intensities in the horizontal plane.* Each intensity in the horizontal plane (the plane containing the longitudinal axis of the airplane and perpendicular to the plane of symmetry of the airplane) must equal or exceed the values in §23.1391.

(2) *Intensities in any vertical plane.* Each intensity in any vertical plane (the plane perpendicular to the horizontal plane) must equal or exceed the appropriate value in §23.1393, where I is the minimum intensity prescribed in §23.1391 for the corresponding angles in the horizontal plane.

(3) *Intensities in overlaps between adjacent signals.* No intensity in any overlap between adjacent signals may exceed the values in §23.1395, except that higher intensities in overlaps may be used with main beam intensities substantially greater than the minima specified in §§23.1391 and 23.1393, if the overlap intensities in relation to the main beam intensities do not adversely affect signal clarity. When the peak intensity of the left and right position lights is more than 100 candles, the maximum overlap intensities between them may exceed the values in §23.1395 if the overlap intensity in Area A is not more than 10 percent of peak position light intensity and the overlap intensity in Area B is not more than 2.5 percent of peak position light intensity.

(c) *Rear position light installation.* A single rear position light may be installed in a position displaced laterally from the plane of symmetry of an airplane if --

(1) The axis of the maximum cone of illumination is parallel to the flight path in level flight; and

(2) There is no obstruction aft of the light and between planes 70 degrees to the right and left of the axis of maximum illumination.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-43, 58 FR 18977, Apr. 9, 1993]

§23.1391 Minimum intensities in the horizontal plane of position lights.

Each position light intensity must equal or exceed the applicable values in the following table:

Dihedral angle (light included)	Angle from right or left of longitudinal axis, measured from dead ahead	Intensity (candles)
L and R (red and green)	0° to 10°...	40
	10° to 20°	30
	20° to 110°	5
A (rear white)	110° to 180°	20

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-43, 58 FR 18977, Apr. 9, 1993]

§23.1393 Minimum intensities in any vertical plane of position lights.

Each position light intensity must equal or exceed the applicable values in the following table:

Angle Above Or Below The Horizontal Plane	Intensity
0°	1.00
0° to 5°	0.90
5° to 10°	0.80
10° to 15°	0.70
15° to 20°	0.50
20° to 30°	0.30
30° to 40°	0.10
40° to 90°	0.05

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-43, 58 FR 18977, Apr. 9, 1993]

§23.1395 Maximum intensities in overlapping beams of position lights.

No position light intensity may exceed the applicable values in the following equal or exceed the applicable values in §23.1389(b)(3):

	Maximum Intensity	
Overlaps	Area A (Candles)	Area B (Candles)
Green in dihedral angle L	10	1
Red in dihedral angle R	10	1
Green in dihedral angle A	5	1
Red in dihedral angle A	5	1
Rear white in dihedral angle L	5	1
Rear white in dihedral angle R	5	1

Where --

(a) Area A includes all directions in the adjacent dihedral angle that pass through the light source and intersect the common boundary plane at more than 10 degrees but less than 20 degrees; and

(b) Area B includes all directions in the adjacent dihedral angle that pass through the light source and intersect the common boundary plane at more than 20 degrees.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-43, 58 FR 18977, Apr. 9, 1993]

§23.1397 Color specifications.

Each position light color must have the applicable International Commission on Illumination chromaticity coordinates as follows:

(a) *Aviation red* –

y is not greater than 0.335; and

z is not greater than 0.002.

(b) *Aviation green* –

x is not greater than $0.440-0.320y$;

x is not greater than $y-0.170$; and

y is not less than $0.390-0.170x$.

(c) *Aviation white* –

x is not less than 0.300 and not greater than 0.540;

y is not less than $x-0.040$ or $y0-0.010$, whichever is the smaller; and

y is not greater than $x+0.020$ nor $0.636-0.400x$;

Where $y0$ is the y coordinate of the Planckian radiator for the value of x considered.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, amended by Amdt. 23-11, 36 FR 12971, July 10, 1971]

§23.1399 Riding light.

(a) Each riding (anchor) light required for a seaplane or amphibian, must be installed so that it can --

(1) Show a white light for at least two miles at night under clear atmospheric conditions; and

(2) Show the maximum unbroken light practicable when the airplane is moored or drifting on the water.

(b) Externally hung lights may be used.

§23.1401 Anticollision light system.

(a) *General.* The airplane must have an anticollision light system that:

(1) Consists of one or more approved anticollision lights located so that their light will not impair the flight crewmembers' vision or detract from the conspicuity of the position lights; and

(2) Meets the requirements of paragraphs (b) through (f) of this section.

(b) *Field of coverage.* The system must consist of enough lights to illuminate the vital areas around the airplane, considering the physical configuration and flight characteristics of the airplane. The field of coverage must extend in each direction within at least 75 degrees above and 75 degrees below the horizontal plane of the airplane, except that there may be solid angles of obstructed visibility totaling not more than 0.5 steradians.

(c) *Flashing characteristics.* The arrangement of the system, that is, the number of light sources, beam width, speed of rotation, and other characteristics, must give an effective flash frequency of not less than 40, nor more than 100, cycles per minute. The effective flash frequency is the frequency at which the airplane's complete anticollision light

system is observed from a distance, and applies to each sector of light including any overlaps that exist when the system consists of more than one light source. In overlaps, flash frequencies may exceed 100, but not 180, cycles per minute.

(d) *Color.* Each anticollision light must be either aviation red or aviation white and must meet the applicable requirements of §23.1397.

(e) *Light intensity.* The minimum light intensities in any vertical plane, measured with the red filter (if used) and expressed in terms of "effective" intensities, must meet the requirements of paragraph (f) of this section. The following relation must be assumed:

where:

Ie=effective intensity (candles).

$I(t)$=instantaneous intensity as a function of time.

$t2-t1$=flash time interval (seconds).

Normally, the maximum value of effective intensity is obtained when $t2$ and $t1$ are chosen so that the effective intensity is equal to the instantaneous intensity at $t2$ and $t1$.

(f) *Minimum effective intensities for anticollision lights.* Each anticollision light effective intensity must equal or exceed the applicable values in the following table.

Angle Above Or Below The Horizontal Plane	Effective Intensity (candles)
0° to 5°	400
5° to 10°	240
10° to 20°	80
20° to 30°	40
30° to 75°	20

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-11, 36 FR 12972, July 10, 1971; Amdt. 23-20, 42 FR 36969, July 18, 1977; Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

Safety Equipment

§23.1411 General.

(a) Required safety equipment to be used by the flight crew in an emergency, such as automatic liferaft releases, must be readily accessible.

(b) Stowage provisions for required safety equipment must be furnished and must --

(1) Be arranged so that the equipment is directly accessible and its location is obvious; and

(2) Protect the safety equipment from damage caused by being subjected to the inertia loads resulting from the ultimate static load factors specified in §23.561(b)(3) of this part.

[Amdt. 23-17, 41 FR 55465, Dec. 20, 1976, as amended by Amdt. 23-36, 53 FR 30815, Aug. 15, 1988]

§23.1415 Ditching equipment.

(a) Emergency flotation and signaling equipment required by any operating rule in this chapter must be installed so that it is readily available to the crew and passengers.

(b) Each raft and each life preserver must be approved.

(c) Each raft released automatically or by the pilot must be attached to the airplane by a line to keep it alongside the airplane. This line must be weak enough to break before submerging the empty raft to which it is attached.

(d) Each signaling device required by any operating rule in this chapter, must be accessible, function satisfactorily, and must be free of any hazard in its operation.

§23.1416 Pneumatic de-icer boot system.

If certification with ice protection provisions is desired and a pneumatic de-icer boot system is installed --

(a) The system must meet the requirements specified in §23.1419.

(b) The system and its components must be designed to perform their intended function under any normal system operating temperature or pressure, and

(c) Means to indicate to the flight crew that the pneumatic de-icer boot system is receiving adequate pressure and is functioning normally must be provided.

[Amdt. 23-23, 43 FR 50593, Oct. 30, 1978]

§23.1419 Ice protection.

If certification with ice protection provisions is desired, compliance with the requirements of this section and other applicable sections of this part must be shown:

(a) An analysis must be performed to establish, on the basis of the airplane's operational needs, the adequacy of the ice protection system for the various components of the airplane. In addition, tests of the ice protection system must be conducted to demonstrate that the airplane is capable of operating safely in continuous maximum and intermittent maximum icing conditions, as described in appendix C of part 25 of this chapter. As used in this section, "Capable of operating safely," means that airplane performance, controllability, maneuverability, and stability must not be less than that required in part 23, subpart B.

(b) Except as provided by paragraph (c) of this section, in addition to the analysis and physical evaluation prescribed in paragraph (a) of this section, the effectiveness of the ice protection system and its components must be shown by flight tests of the airplane or its components in measured natural atmospheric icing conditions and by one or more of the following tests, as found necessary to determine the adequacy of the ice protection system --

(1) Laboratory dry air or simulated icing tests, or a combination of both, of the components or models of the components.

(2) Flight dry air tests of the ice protection system as a whole, or its individual components.

(3) Flight test of the airplane or its components in measured simulated icing conditions.

(c) If certification with ice protection has been accomplished on prior type certificated airplanes whose designs include components that are thermodynamically and aerodynamically equivalent to those used on a new airplane design, certification of these equivalent components may be accomplished by reference to previously accomplished tests, required in §23.1419 (a) and (b), provided that the applicant accounts for any differences in installation of these components.

(d) A means must be identified or provided for determining the formation of ice on the critical parts of the airplane. Adequate lighting must be provided for the use of this means during night operation. Also, when monitoring of the external surfaces of the airplane by the flight crew is required for operation of the ice protection equipment, external lighting must be provided that is adequate to enable the monitoring to be done at night. Any illumination that is used must be of a type that will not cause glare or reflection that would handicap crewmembers in the performance of their duties. The Airplane Flight Manual or other approved manual material must describe the means of determining ice formation and must contain information for the safe operation of the airplane in icing conditions.

[Doc. No. 26344, 58 FR 18977, Apr. 9, 1993]

Miscellaneous Equipment

§23.1431 Electronic equipment.

(a) In showing compliance with §23.1309(b)(1) and (2) with respect to radio and electronic equipment and their installations, critical environmental conditions must be considered.

(b) Radio and electronic equipment, controls, and wiring must be installed so that operation of any unit or system of units will not adversely affect the simultaneous operation of any other radio or electronic unit, or system of units, required by this chapter.

(c) For those airplanes required to have more than one flightcrew member, or whose operation will require more than one flightcrew member, the cockpit must be evaluated to determine if the flightcrew members, when seated at their duty station, can converse without difficulty under the actual cockpit noise conditions when the airplane is being operated. If the airplane design includes provision for the use of communication headsets, the evaluation must also consider conditions where headsets are being used. If the evaluation shows conditions under which it will be difficult to converse, an intercommunication system must be provided.

(d) If installed communication equipment includes transmitter "off-on" switching, that switching means must be designed to return from the "transmit" to the "off" position when it is released and ensure that the transmitter will return to the off (non transmitting) state.

(e) If provisions for the use of communication headsets are provided, it must be demonstrated that the flightcrew members will receive all aural warnings under the actual cockpit noise conditions when the airplane is being operated when any headset is being used.

[Doc. No. 26344, 58 FR 18977, Apr. 9, 1993, as amended by Amdt. 23-49, 61 FR 5169, Feb. 9, 1996]

§23.1435 Hydraulic systems.

(a) *Design.* Each hydraulic system must be designed as follows:

(1) Each hydraulic system and its elements must withstand, without yielding, the structural loads expected in addition to hydraulic loads.

(2) A means to indicate the pressure in each hydraulic system which supplies two or more primary functions must be provided to the flight crew.

(3) There must be means to ensure that the pressure, including transient (surge) pressure, in any part of the system will not exceed the safe limit above design operating pressure and to prevent excessive pressure resulting from fluid volumetric changes in all lines which are likely to remain closed long enough for such changes to occur.

(4) The minimum design burst pressure must be 2.5 times the operating pressure.

(b) *Tests.* Each system must be substantiated by proof pressure tests. When proof tested, no part of any system may fail, malfunction, or experience a permanent set. The proof load of each system must be at least 1.5 times the maximum operating pressure of that system.

(c) *Accumulators.* A hydraulic accumulator or reservoir may be installed on the engine side of any firewall if --

(1) It is an integral part of an engine or propeller system, or

(2) The reservoir is nonpressurized and the total capacity of all such nonpressurized reservoirs is one quart or less.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13096, Aug. 13, 1969; Amdt. 23-14, 38 FR 31824, Nov. 19, 1973; Amdt. 23-43, 58 FR 18977, Apr. 9, 1993; Amdt. 23-49, 61 FR 5170, Feb. 9, 1996]

§23.1437 Accessories for multiengine airplanes.

For multiengine airplanes, engine-driven accessories essential to safe operation must be distributed among two or more engines so that the failure of any one engine will not impair safe operation through the malfunctioning of these accessories.

§23.1438 Pressurization and pneumatic systems.

(a) Pressurization system elements must be burst pressure tested to 2.0 times, and proof pressure tested to 1.5 times, the maximum normal operating pressure.

(b) Pneumatic system elements must be burst pressure tested to 3.0 times, and proof pressure tested to 1.5 times, the maximum normal operating pressure.

(c) An analysis, or a combination of analysis and test, may be substituted for any test required by paragraph (a) or (b) of this section if the Administrator finds it equivalent to the required test.

[Amdt. 23-20, 42 FR 36969, July 18, 1977]

§23.1441 Oxygen equipment and supply.

(a) If certification with supplemental oxygen equipment is requested, or the airplane is approved for operations at or above altitudes where oxygen is required to be used by the operating rules, oxygen equipment must be provided that meets the requirements of this section and §§23.1443 through 23.1449. Portable oxygen equipment may be used to meet the requirements of this part if the portable equipment is shown to comply with the applicable requirements, is identified in the airplane type design, and its stowage provisions are found to be in compliance with the requirements of §23.561.

(b) The oxygen system must be free from hazards in itself, in its method of operation, and its effect upon other components.

(c) There must be a means to allow the crew to readily determine, during the flight, the quantity of oxygen available in each source of supply.

(d) Each required flight crewmember must be provided with --

(1) Demand oxygen equipment if the airplane is to be certificated for operation above 25,000 feet.

(2) Pressure demand oxygen equipment if the airplane is to be certificated for operation above 40,000 feet.

(e) There must be a means, readily available to the crew in flight, to turn on and to shut off the oxygen supply at the high pressure source. This shutoff requirement does not apply to chemical oxygen generators.

[Amdt. 23-9, 35 FR 6386, Apr. 21, 1970, as amended by Amdt. 23-43, 58 FR 18978, Apr. 9, 1993]

§23.1443 Minimum mass flow of supplemental oxygen.

(a) If continuous flow oxygen equipment is installed, an applicant must show compliance with the requirements of either paragraphs (a)(1) and (a)(2) or paragraph (a)(3) of this section:

(1) For each passenger, the minimum mass flow of supplemental oxygen required at various cabin pressure altitudes may not be less than the flow required to maintain, during inspiration and while using the oxygen equipment (including masks) provided, the following mean tracheal oxygen partial pressures:

(i) At cabin pressure altitudes above 10,000 feet up to and including 18,500 feet, a mean tracheal oxygen partial pressure of 100 mm. Hg when breathing 15 liters per minute, Body Temperature, Pressure, Saturated (BTPS) and with a tidal volume of 700 cc. with a constant time interval between respirations.

(ii) At cabin pressure altitudes above 18,500 feet up to and including 40,000 feet, a mean tracheal oxygen partial pressure of 83.8 mm. Hg when breathing 30 liters per minute, BTPS, and with a tidal volume of 1,100 cc. with a constant time interval between respirations.

(2) For each flight crewmember, the minimum mass flow may not be less than the flow required to maintain, during inspiration, a mean tracheal oxygen partial pressure of 149 mm. Hg when breathing 15 liters per minute, BTPS, and with a maximum tidal volume of 700 cc. with a constant time interval between respirations.

(3) The minimum mass flow of supplemental oxygen supplied for each user must be at a rate not less than that shown in the following figure for each altitude up to and including the maximum operating altitude of the airplane.

(b) If demand equipment is installed for use by flight crewmembers, the minimum mass flow of supplemental oxygen required for each flight crewmember may not be less than the flow required to maintain, during inspiration, a mean tracheal oxygen partial pressure of 122 mm. Hg up to and including a cabin pressure altitude of 35,000 feet, and 95 percent oxygen between cabin pressure altitudes of 35,000 and 40,000 feet, when breathing 20 liters per minute BTPS. In addition, there must be means to allow the crew to use undiluted oxygen at their discretion.

(c) If first-aid oxygen equipment is installed, the minimum mass flow of oxygen to each user may not be less than 4 liters per minute, STPD. However, there may be a means to decrease this flow to not less than 2 liters per minute, STPD, at any cabin altitude. The quantity of oxygen required is based upon an average flow rate of 3 liters per minute per person for whom first-aid oxygen is required.

(d) As used in this section:

(1) BTPS means Body Temperature, and Pressure, Saturated (which is, 37 °C, and the ambient pressure to which the body is exposed, minus 47 mm. Hg, which is the tracheal pressure displaced by water vapor pressure when the breathed air becomes saturated with water vapor at 37 °C).

(2) STPD means Standard, Temperature, and Pressure, Dry (which is, 0 °C at 760 mm. Hg with no water vapor).

[Doc. No. 26344, 58 FR 18978, Apr. 9, 1993]

§23.1445 Oxygen distribution system.

(a) Except for flexible lines from oxygen outlets to the dispensing units, or where shown to be otherwise suitable to the installation, nonmetallic tubing must not be used for any oxygen line that is normally pressurized during flight.

(b) Nonmetallic oxygen distribution lines must not be routed where they may be subjected to elevated temperatures, electrical arcing, and released flammable fluids that might result from any probable failure.

[Doc. No. 26344, 58 FR 18978, Apr. 9, 1993]

§23.1447 Equipment standards for oxygen dispensing units.

If oxygen dispensing units are installed, the following apply:

(a) There must be an individual dispensing unit for each occupant for whom supplemental oxygen is to be supplied. Each dispensing unit must:

(1) Provide for effective utilization of the oxygen being delivered to the unit.

(2) Be capable of being readily placed into position on the face of the user.

(3) Be equipped with a suitable means to retain the unit in position on the face.

(4) If radio equipment is installed, the flightcrew oxygen dispensing units must be designed to allow the use of that equipment and to allow communication with any other required crew member while at their assigned duty station.

(b) If certification for operation up to and including 18,000 feet (MSL) is requested, each oxygen dispensing unit must:

(1) Cover the nose and mouth of the user; or

(2) Be a nasal cannula, in which case one oxygen dispensing unit covering both the nose and mouth of the user must be available. In addition, each nasal cannula or its connecting tubing must have permanently affixed --

(i) A visible warning against smoking while in use;

(ii) An illustration of the correct method of donning; and

(iii) A visible warning against use with nasal obstructions or head colds with resultant nasal congestion.

(c) If certification for operation above 18,000 feet (MSL) is requested, each oxygen dispensing unit must cover the nose and mouth of the user.

(d) For a pressurized airplane designed to operate at flight altitudes above 25,000 feet (MSL), the dispensing units must meet the following:

(1) The dispensing units for passengers must be connected to an oxygen supply terminal and be immediately available to each occupant wherever seated.

(2) The dispensing units for crewmembers must be automatically presented to each crewmember before the cabin pressure altitude exceeds 15,000 feet, or the units must be of the quick-donning type, connected to an oxygen supply terminal that is immediately available to crewmembers at their station.

(e) If certification for operation above 30,000 feet is requested, the dispensing units for passengers must be automatically presented to each occupant before the cabin pressure altitude exceeds 15,000 feet.

(f) If an automatic dispensing unit (hose and mask, or other unit) system is installed, the crew must be provided with a manual means to make the dispensing units immediately available in the event of failure of the automatic system.

[Amdt. 23-9, 35 FR 6387, Apr. 21, 1970, as amended by Amdt. 23-20, 42 FR 36969, July 18, 1977; Amdt. 23-30, 49 FR 7340, Feb. 28, 1984; Amdt. 23-43, 58 FR 18978, Apr. 9, 1993; Amdt. 23-49, 61 FR 5170, Feb. 9, 1996]

§23.1449 Means for determining use of oxygen.

There must be a means to allow the crew to determine whether oxygen is being delivered to the dispensing equipment.

[Amdt. 23-9, 35 FR 6387, Apr. 21, 1970]

§23.1450 Chemical oxygen generators.

(a) For the purpose of this section, a chemical oxygen generator is defined as a device which produces oxygen by chemical reaction.

(b) Each chemical oxygen generator must be designed and installed in accordance with the following requirements:

(1) Surface temperature developed by the generator during operation may not create a hazard to the airplane or to its occupants.

(2) Means must be provided to relieve any internal pressure that may be hazardous.

(c) In addition to meeting the requirements in paragraph (b) of this section, each portable chemical oxygen generator that is capable of sustained operation by successive replacement of a generator element must be placarded to show --

(1) The rate of oxygen flow, in liters per minute;

(2) The duration of oxygen flow, in minutes, for the replaceable generator element; and

(3) A warning that the replaceable generator element may be hot, unless the element construction is such that the surface temperature cannot exceed 100 °F.

[Amdt. 23-20, 42 FR 36969, July 18, 1977]

§23.1451 Fire protection for oxygen equipment.

Oxygen equipment and lines must:

(a) Not be installed in any designed fire zones.

(b) Be protected from heat that may be generated in, or escape from, any designated fire zone.

(c) Be installed so that escaping oxygen cannot come in contact with and cause ignition of grease, fluid, or vapor accumulations that are present in normal operation or that may result from the failure or malfunction of any other system.

[Doc. No. 27806, 61 FR 5170, Feb. 9, 1996]

§23.1453 Protection of oxygen equipment from rupture.

(a) Each element of the oxygen system must have sufficient strength to withstand the maximum pressure and temperature, in combination with any externally applied loads arising from consideration of limit structural loads, that may be acting on that part of the system.

(b) Oxygen pressure sources and the lines between the source and the shutoff means must be:

(1) Protected from unsafe temperatures; and

(2) Located where the probability and hazard of rupture in a crash landing are minimized.

[Doc. No. 27806, 61 FR 5170, Feb. 9, 1996]

§23.1457 Cockpit voice recorders.

(a) Each cockpit voice recorder required by the operating rules of this chapter must be approved and must be installed so that it will record the following:

(1) Voice communications transmitted from or received in the airplane by radio.

(2) Voice communications of flight crewmembers on the flight deck.

(3) Voice communications of flight crewmembers on the flight deck, using the airplane's interphone system.

(4) Voice or audio signals identifying navigation or approach aids introduced into a headset or speaker.

(5) Voice communications of flight crewmembers using the passenger loudspeaker system, if there is such a system and if the fourth channel is available in accordance with the requirements of paragraph (c)(4)(ii) of this section.

(b) The recording requirements of paragraph (a)(2) of this section must be met by installing a cockpit-mounted area microphone, located in the best position for recording voice communications originating at the first and second pilot stations and voice communications of other crewmembers on the flight deck when directed to those stations. The microphone must be so located and, if necessary, the preamplifiers and filters of the recorder must be so adjusted or supplemented, so that the intelligibility of the recorded communications is as high as practicable when recorded under flight cockpit noise conditions and played back. Repeated aural or visual playback of the record may be used in evaluating intelligibility.

(c) Each cockpit voice recorder must be installed so that the part of the communication or audio signals specified in paragraph (a) of this section obtained from each of the following sources is recorded on a separate channel:

(1) For the first channel, from each boom, mask, or handheld microphone, headset, or speaker used at the first pilot station.

(2) For the second channel from each boom, mask, or handheld microphone, headset, or speaker used at the second pilot station.

(3) For the third channel -- from the cockpit-mounted area microphone.

(4) For the fourth channel from:

(i) Each boom, mask, or handheld microphone, headset, or speaker used at the station for the third and fourth crewmembers.

(ii) If the stations specified in paragraph (c)(4)(i) of this section are not required or if the signal at such a station is picked up by another channel, each microphone on the flight deck that is used with the passenger loudspeaker system, if its signals are not picked up by another channel.

(5) And that as far as is practicable all sounds received by the microphone listed in paragraphs (c)(1), (2), and (4) of this section must be recorded without interruption irrespective of the position of the interphone-transmitter key switch. The design shall ensure that sidetone for the flight crew is produced only when the interphone, public address system, or radio transmitters are in use.

(d) Each cockpit voice recorder must be installed so that:

(1) It receives its electric power from the bus that provides the maximum reliability for operation of the cockpit voice recorder without jeopardizing service to essential or emergency loads.

(2) There is an automatic means to simultaneously stop the recorder and prevent each erasure feature from functioning, within 10 minutes after crash impact; and

(3) There is an aural or visual means for preflight checking of the recorder for proper operation.

(e) The record container must be located and mounted to minimize the probability of rupture of the container as a result of crash impact and consequent heat damage to the record from fire. In meeting this requirement, the record container must be as far aft as practicable, but may not be where aft mounted engines may crush the container during impact. However, it need not be outside of the pressurized compartment.

(f) If the cockpit voice recorder has a bulk erasure device, the installation must be designed to minimize the probability of inadvertent operation and actuation of the device during crash impact.

(g) Each recorder container must:

(1) Be either bright orange or bright yellow;

(2) Have reflective tape affixed to its external surface to facilitate its location under water; and

(3) Have an underwater locating device, when required by the operating rules of this chapter, on or adjacent to the container which is secured in such manner that they are not likely to be separated during crash impact.

[Amdt. 23-35, 53 FR 26142, July 11, 1988]

Subpart G – Operation Limitations and Information

§ 23.1501 General.

(a) Each operating limitation specified in §§ 23.1505 through 23.1527 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crewmembers as prescribed in §§ 23.1541 through 23.1589.

[Amdt. 23-21, 43 FR 2319, Jan. 16, 1978]

23.1505 Airspeed limitations.

(a) The never-exceed speed V_{NE} must be established so that it is --

(1) Not less than 0.9 times the minimum value of V_D allowed under § 23.335; and

(2) Not more than the lesser of --

(i) 0.9 V_D established under § 23.335; or

(ii) 0.9 times the maximum speed shown under § 23.251.

(b) The maximum structural cruising speed V_{NO} must be established so that it is --

(1) Not less than the minimum value of V_C allowed under § 23.335; and

(2) Not more than the lesser of --

(i) V_C established under § 23.335; or

(ii) 0.89 V_{NE} established under paragraph (a) of this section.

(c) Paragraphs (a) and (b) of this section do not apply to turbine airplanes or to airplanes for which a design diving speed V_D/M_D is established under § 23.335(b)(4). For those airplanes, a maximum operating limit speed (V_{MO}/M_{MO}-airspeed or Mach number, whichever is critical at a particular altitude) must be established as a speed that may not be deliberately exceeded in any regime of flight (climb, cruise, or descent) unless a higher speed is authorized for flight test or pilot training operations. V_{MO}/M_{MO} must be established so that it is not greater than the design cruising speed V_C/M_C and so that it is sufficiently below V_D/M_D and the maximum speed shown under § 23.251 to make it highly improbable that the latter speeds will be inadvertently exceeded in operations. The speed margin between V_{MO}/M_{MO} and V_D/M_D or the maximum speed shown under § 23.251 may not be less than the speed margin established between V_C/M_C and V_D/M_D under § 23.335(b), or the speed margin found necessary in the flight test conducted under § 23.253.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13096, Aug. 13, 1969]

23.1507 Operating maneuvering speed.

The maximum operating maneuvering speed, V_O, must be established as an operating limitation. V_O is a selected speed that is not greater than $V_{S\sqrt{n}}$ established in § 23.335(c).

[Doc. No. 26269, 58 FR 42165, Aug. 6, 1993]

23.1511 Flap extended speed.

(a) The flap extended speed V_{FE} must be established so that it is --

(1) Not less than the minimum value of V_F allowed in § 23.345(b); and

(2) Not more than V_F established under § 23.345(a), (c), and (d).

(i) V_F established under § 23.345; or

(ii) V_F established under § 23.457.

(b) Additional combinations of flap setting, airspeed, and engine power may be established if the structure has been proven for the corresponding design conditions.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-50, 61 FR 5192, Feb. 9, 1996]

23.1513 Minimum control speed.

The minimum control speed V_{MC}, determined under § 23.149, must be established as an operating limitation.

23.1519 Weight and center of gravity.

The weight and center of gravity limitations determined under § 23.23 must be established as operating limitations.

23.1521 Powerplant limitations.

(a) *General.* The powerplant limitations prescribed in this section must be established so that they do not exceed the corresponding limits for which the engines or propellers are type certificated. In addition, other powerplant limitations used in determining compliance with this part must be established.

(b) *Takeoff operation.* The powerplant takeoff operation must be limited by --

(1) The maximum rotational speed (rpm);

(2) The maximum allowable manifold pressure (for reciprocating engines);

(3) The maximum allowable gas temperature (for turbine engines);

(4) The time limit for the use of the power or thrust corresponding to the limitations established in paragraphs (b)(1) through (3) of this section; and

(5) The maximum allowable cylinder head (as applicable), liquid coolant and oil temperatures.

(c) *Continuous operation.* The continuous operation must be limited by --

(1) The maximum rotational speed;

(2) The maximum allowable manifold pressure (for reciprocating engines);

(3) The maximum allowable gas temperature (for turbine engines); and

(4) The maximum allowable cylinder head, oil, and liquid coolant temperatures.

(d) *Fuel grade or designation.* The minimum fuel grade (for reciprocating engines), or fuel designation (for turbine engines), must be established so that it is not less than that required for the operation of the engines within the limitations in paragraphs (b) and (c) of this section.

(e) *Ambient temperature.* For all airplanes except reciprocating engine-powered airplanes of 6,000 pounds or less maximum weight, ambient temperature limitations (including limitations for winterization installations if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§ 23.1041 through 23.1047 is shown.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-21, 43 FR 2319, Jan. 16, 1978; Amdt. 23-45, 58 FR 42165, Aug. 6, 1993; Amdt. 23-50, 61 FR 5192, Feb. 9, 1996]

23.1522 Auxiliary power unit limitations.
If an auxiliary power unit is installed, the limitations established for the auxiliary power must be specified in the operating limitations for the airplane. [Doc. No. 26269, 58 FR 42166, Aug. 6, 1993]

23.1523 Minimum flight crew.
The minimum flight crew must be established so that it is sufficient for safe operation considering --

(a) The workload on individual crewmembers and, in addition for commuter category airplanes, each crewmember workload determination must consider the following:

(1) Flight path control,

(2) Collision avoidance,

(3) Navigation,

(4) Communications,

(5) Operation and monitoring of all essential airplane systems,

(6) Command decisions, and

(7) The accessibility and ease of operation of necessary controls by the appropriate crewmember during all normal and emergency operations when at the crewmember flight station;

(b) The accessibility and ease of operation of necessary controls by the appropriate crewmember; and

(c) The kinds of operation authorized under § 23.1525.

[Amdt. 23-21, 43 FR 2319, Jan. 16, 1978, as amended by Amdt. 23-34, 52 FR 1834, Jan. 15, 1987]

23.1524 Maximum passenger seating configuration.
The maximum passenger seating configuration must be established.

[Amdt. 23-10, 36 FR 2864, Feb. 11, 1971]

23.1525 Kinds of operation.
The kinds of operation authorized (e.g. VFR, IFR, day or night) and the meteorological conditions (e.g. icing) to which the operation of the airplane is limited or from which it is prohibited, must be established appropriate to the installed equipment.

[Doc. No. 26269, 58 FR 42166, Aug. 6, 1993]

23.1527 Maximum operating altitude.

(a) The maximum altitude up to which operation is allowed, as limited by flight, structural, powerplant, functional or equipment characteristics, must be established.

(b) A maximum operating altitude limitation of not more than 25,000 feet must be established for pressurized airplanes unless compliance with § 23.775(e) is shown.

[Doc. No. 26269, 58 FR 42166, Aug. 6, 1993]

23.1529 Instructions for Continued Airworthiness.
The applicant must prepare Instructions for Continued Airworthiness in accordance with appendix G to this part that are acceptable to the Administrator. The instructions may be incomplete at type certification if a program exists to ensure their completion prior to delivery of the first airplane or issuance of a standard certificate of airworthiness, whichever occurs later.

[Amdt. 23-26, 45 FR 60171, Sept. 11, 1980]

23.1541 General.

(a) The airplane must contain --

(1) The markings and placards specified in §§ 23.1545 through 23.1567; and

(2) Any additional information, instrument markings, and placards required for the safe operation if it has unusual design, operating, or handling characteristics.

(b) Each marking and placard prescribed in paragraph (a) of this section --

(1) Must be displayed in a conspicuous place; and

(2) May not be easily erased, disfigured, or obscured.

(c) For airplanes which are to be certificated in more than one category --

(1) The applicant must select one category upon which the placards and markings are to be based; and

(2) The placards and marking information for all categories in which the airplane is to be certificated must be furnished in the Airplane Flight Manual.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-21, 43 FR 2319, Jan. 16, 1978]

23.1543 Instrument markings: General.

For each instrument --

(a) When markings are on the cover glass of the instrument, there must be means to maintain the correct alignment of the glass cover with the face of the dial; and

(b) Each arc and line must be wide enough and located to be clearly visible to the pilot.

(c) All related instruments must be calibrated in compatible units.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-50, 61 FR 5192, Feb. 9, 1996]

23.1545 Airspeed indicator.

(a) Each airspeed indicator must be marked as specified in paragraph (b) of this section, with the marks located at the corresponding indicated airspeeds.

(b) The following markings must be made:

(1) For the never-exceed speed V_{NE}, a radial red line.

(2) For the caution range, a yellow arc extending from the red line specified in paragraph (b)(1) of this section to the upper limit of the green arc specified in paragraph (b)(3) of this section.

(3) For the normal operating range, a green arc with the lower limit at V_{S1} with maximum weight and with landing gear and wing flaps retracted, and the upper limit at the maximum structural cruising speed V_{NO} established under § 23.1505(b).

(4) For the flap operating range, a white arc with the lower limit at V_{S0} at the maximum weight, and the upper limit at the flaps-extended speed V_{FE} established under § 23.1511.

(5) For reciprocating multiengine-powered airplanes of 6,000 pounds or less maximum weight, for the speed at which compliance has been shown with § 23.69(b) relating to rate of climb at maximum weight and at sea level, a blue radial line.

(6) For reciprocating multiengine-powered airplanes of 6,000 pounds or less maximum weight, for the maximum value of minimum control speed, V_{MC}, (one-engine-inoperative) determined under § 23.149(b), a red radial line.

(c) If V_{NE} or V_{NO} vary with altitude, there must be means to indicate to the pilot the appropriate limitations throughout the operating altitude range.

(d) Paragraphs (b)(1) through (b)(3) and paragraph (c) of this section do not apply to aircraft for which a maximum operating speed V_{MO}/M_{MO} is established under § 23.1505(c). For those aircraft there must either be a maximum allowable airspeed indication showing the variation of V_{MO}/M_{MO} with altitude or compressibility limitations (as appropriate), or a radial red line marking for V_{MO}/M_{MO} must be made at lowest value of V_{MO}/M_{MO} established for any altitude up to the maximum operating altitude for the airplane.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-3, 30 FR 14240, Nov. 13, 1965; Amdt. 23-7, 34 FR 13097, Aug. 13, 1969; Amdt. 23-23, 43 FR 50593, Oct. 30, 1978; Amdt. 23-50, 61 FR 5193, Feb. 9, 1996]

23.1547 Magnetic direction indicator.

(a) A placard meeting the requirements of this section must be installed on or near the magnetic direction indicator.

(b) The placard must show the calibration of the instrument in level flight with the engines operating.

(c) The placard must state whether the calibration was made with radio receivers on or off.

(d) Each calibration reading must be in terms of magnetic headings in not more than 30 degree increments.

(e) If a magnetic nonstabilized direction indicator can have a deviation of more than 10 degrees caused by the operation of electrical equipment, the placard must state which electrical loads, or combination of loads, would cause a deviation of more than 10 degrees when turned on.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-20, 42 FR 36969, July 18, 1977]

23.1549 Powerplant and auxiliary power unit instruments.

For each required powerplant and auxiliary power unit instrument, as appropriate to the type of instruments --

(a) Each maximum and, if applicable, minimum safe operating limit must be marked with a red radial or a red line;

(b) Each normal operating range must be marked with a green arc or green line, not extending beyond the maximum and minimum safe limits;

(c) Each takeoff and precautionary range must be marked with a yellow arc or a yellow line; and

(d) Each engine, auxiliary power unit, or propeller range that is restricted because of excessive vibration stresses must be marked with red arcs or red lines.

[Amdt. 23-12, 41 FR 55466, Dec. 20, 1976, as amended by Amdt. 23-28, 47 FR 13315, Mar. 29, 1982; Amdt. 23-45, 58 FR 42166, Aug. 6, 1993]

23.1551 Oil quantity indicator.

Each oil quantity indicator must be marked in sufficient increments to indicate readily and accurately the quantity of oil.

23.1553 Fuel quantity indicator.

A red radial line must be marked on each indicator at the calibrated zero reading, as specified in § 23.1337(b)(1).

[Doc. No. 27807, 61 FR 5193, Feb. 9, 1996]

23.1555 Control markings.

(a) Each cockpit control, other than primary flight controls and simple push button type starter switches, must be plainly marked as to its function and method of operation.

(b) Each secondary control must be suitably marked.

(c) For powerplant fuel controls --

(1) Each fuel tank selector control must be marked to indicate the position corresponding to each tank and to each existing cross feed position;

(2) If safe operation requires the use of any tanks in a specific sequence, that sequence must be marked on or near the selector for those tanks;

(3) The conditions under which the full amount of usable fuel in any restricted usage fuel tank can safely be used must be stated on a placard adjacent to the selector valve for that tank; and

(4) Each valve control for any engine of a multiengine airplane must be marked to indicate the position corresponding to each engine controlled.

(d) Usable fuel capacity must be marked as follows:

(1) For fuel systems having no selector controls, the usable fuel capacity of the system must be indicated at the fuel quantity indicator.

(2) For fuel systems having selector controls, the usable fuel capacity available at each selector control position must be indicated near the selector control.

(e) For accessory, auxiliary, and emergency controls --

(1) If retractable landing gear is used, the indicator required by § 23.729 must be marked so that the pilot can, at any time, ascertain that the wheels are secured in the extreme positions; and

(2) Each emergency control must be red and must be marked as to method of operation. No control other than an emergency control, or a control that serves an emergency function in addition to its other functions, shall be this color.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-21, 43 FR 2319, Jan. 16, 1978; Amdt. 23-50, 61 FR 5193, Feb. 9, 1996]

23.1557 Miscellaneous markings and placards.

(a) *Baggage and cargo compartments, and ballast location.* Each baggage and cargo compartment, and each ballast location, must have a placard stating any limitations on contents, including weight, that are necessary under the loading requirements.

(b) *Seats.* If the maximum allowable weight to be carried in a seat is less than 170 pounds, a placard stating the lesser weight must be permanently attached to the seat structure.

(c) *Fuel, oil, and coolant filler openings.* The following apply:

(1) Fuel filter openings must be marked at or near the filler cover with --

(i) For reciprocating engine-powered airplanes --

(A) The word “Avgas”; and

(B) The minimum fuel grade.

(ii) For turbine engine-powered airplanes --

(A) The words “Jet Fuel”; and

(B) The permissible fuel designations, or references to the Airplane Flight Manual (AFM) for permissible fuel designations.

(iii) For pressure fueling systems, the maximum permissible fueling supply pressure and the maximum permissible defueling pressure.

(2) Oil filler openings must be marked at or near the filler cover with the word “Oil” and the permissible oil designations, or references to the Airplane Flight Manual (AFM) for permissible oil designations.

(3) Coolant filler openings must be marked at or near the filler cover with the word “Coolant”.

(d) *Emergency exit placards.* Each placard and operating control for each emergency exit must be red. A placard must be near each emergency exit control and must clearly indicate the location of that exit and its method of operation.

(e) The system voltage of each direct current installation must be clearly marked adjacent to its external power connection.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; as amended by Amdt. 23-21, 42 FR 15042, Mar. 17, 1977; Amdt. 23-23, 43 FR 50594, Oct. 30, 1978; Amdt. 23-45, 58 FR 42166, Aug. 6, 1993]

23.1559 Operating limitations placard.

(a) There must be a placard in clear view of the pilot stating --

(1) That the airplane must be operated in accordance with the Airplane Flight Manual; and

(2) The certification category of the airplane to which the placards apply.

(b) For airplanes certificated in more than one category, there must be a placard in clear view of the pilot stating that other limitations are contained in the Airplane Flight Manual.

(c) There must be a placard in clear view of the pilot that specifies the kind of operations to which the operation of the airplane is limited or from which it is prohibited under § 23.1525.

[Doc. No. 27807, 61 FR 5193, Feb. 9, 1996]

23.1561 Safety equipment.

(a) Safety equipment must be plainly marked as to method of operation.

(b) Stowage provisions for required safety equipment must be marked for the benefit of occupants.

23.1563 Airspeed placards.

There must be an airspeed placard in clear view of the pilot and as close as practicable to the airspeed indicator. This placard must list --

(a) The operating maneuvering speed, V_O; and

(b) The maximum landing gear operating speed V_{LO}.

(c) For reciprocating multiengine-powered airplanes of more than 6,000 pounds maximum weight, and turbine engine-powered airplanes, the maximum value of the minimum control speed, V_{MC} (one-engine-inoperative) determined under § 23.149(b).

[Amdt. 23-7, 34 FR 13097, Aug. 13, 1969, as amended by Amdt. 23-45, 58 FR 42166, Aug. 6, 1993; Amdt. 23-50, 61 FR 5193, Feb. 9, 1996]

23.1567 Flight maneuver placard.

(a) For normal category airplanes, there must be a placard in front of and in clear view of the pilot stating: “No acrobatic maneuvers, including spins, approved.”

(b) For utility category airplanes, there must be --

(1) A placard in clear view of the pilot stating: “Acrobatic maneuvers are limited to the following -- -- -- “ (list approved maneuvers and the recommended entry speed for each); and

(2) For those airplanes that do not meet the spin requirements for acrobatic category airplanes, an additional placard in clear view of the pilot stating: “Spins Prohibited.”

(c) For acrobatic category airplanes, there must be a placard in clear view of the pilot listing the approved acrobatic maneuvers and the recommended entry airspeed for each. If inverted flight maneuvers are not approved, the placard must bear a notation to this effect.

(d) For acrobatic category airplanes and utility category airplanes approved for spinning, there must be a placard in clear view of the pilot –

(1) Listing the control actions for recovery from spinning maneuvers; and

(2) Stating that recovery must be initiated when spiral characteristics appear, or after not more than six turns or not more than any greater number of turns for which the airplane has been certificated.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23-13, 37 FR 20023, Sept. 23, 1972; Amdt. 23-21, 43 FR 2319, Jan. 16, 1978; Amdt. 23-50, 61 FR 5193, Feb. 9, 1996]

23.1581 General.

(a) *Furnishing information.* An Airplane Flight Manual must be furnished with each airplane, and it must contain the following:

(1) Information required by §§ 23.1583 through 23.1589.

(2) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(3) Further information necessary to comply with the relevant operating rules.

(b) *Approved information.*

(1) Except as provided in paragraph (b)(2) of this section, each part of the Airplane Flight Manual containing information prescribed in §§ 23.1583 through 23.1589 must be approved, segregated, identified and clearly distinguished from each unapproved part of that Airplane Flight Manual.

(2) The requirements of paragraph (b)(1) of this section do not apply to reciprocating engine-powered airplanes of 6,000 pounds or less maximum weight, if the following is met:

(i) Each part of the Airplane Flight Manual containing information prescribed in § 23.1583 must be limited to such information, and must be approved, identified, and clearly distinguished from each other part of the Airplane Flight Manual.

(ii) The information prescribed in §§ 23.1585 through 23.1589 must be determined in accordance with the applicable requirements of this part and presented in its entirety in a manner acceptable to the Administrator.

(3) Each page of the Airplane Flight Manual containing information prescribed in this section must be of a type that is not easily erased, disfigured, or misplaced, and is capable of being inserted in a manual provided by the applicant, or in a folder, or in any other permanent binder.

(c) The units used in the Airplane Flight Manual must be the same as those marked on the appropriate instruments and placards.

(d) All Airplane Flight Manual operational airspeeds, unless otherwise specified, must be presented as indicated airspeeds.

(e) Provision must be made for stowing the Airplane Flight Manual in a suitable fixed container which is readily accessible to the pilot.

(f) *Revisions and amendments.* Each Airplane Flight Manual (AFM) must contain a means for recording the incorporation of revisions and amendments.

[Amdt. 23-21, 43 FR 2319, Jan. 16, 1978, as amended by Amdt. 23-34, 52 FR 1834, Jan. 15, 1987; Amdt. 23-45, 58 FR 42166, Aug. 6, 1993; Amdt. 23-50, 61 FR 5193, Feb. 9, 1996]

23.1583 Operating limitations.

The Airplane Flight Manual must contain operating limitations determined under this part 23, including the following --

(a) *Airspeed limitations.* The following information must be furnished:

(1) Information necessary for the marking of the airspeed limits on the indicator as required in §23.1545, and the significance of each of those limits and of the color coding used on the indicator.

(2) The speeds V_{MC}, V_O, V_{LE}, and V_{LO}, if established, and their significance.

(3) In addition, for turbine powered commuter category airplanes --

(i) The maximum operating limit speed, V_{MO}/M_{MO} and a statement that this speed must not be deliberately exceeded in any regime of flight (climb, cruise or descent) unless a higher speed is authorized for flight test or pilot training;

(ii) If an airspeed limitation is based upon compressibility effects, a statement to this effect and information as to any symptoms, the probable behavior of the airplane, and the recommended recovery procedures; and

(iii) The airspeed limits must be shown in terms of V_{MO}/M_{MO} instead of V_{NO} and V_{NE}.

(b) *Powerplant limitations.* The following information must be furnished:

(1) Limitations required by § 23.1521.

(2) Explanation of the limitations, when appropriate.

(3) Information necessary for marking the instruments required by § 23.1549 through § 23.1553.

(c) *Weight.* The airplane flight manual must include --

(1) The maximum weight; and

(2) The maximum landing weight, if the design landing weight selected by the applicant is less than the maximum weight.

(3) For normal, utility, and acrobatic category reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight and for turbine engine-powered airplanes in the normal, utility, and acrobatic category, performance operating limitations as follows --

(i) The maximum takeoff weight for each airport altitude and ambient temperature within the range selected by the applicant at which the airplane complies with the climb requirements of § 23.63(c)(1).

(ii) The maximum landing weight for each airport altitude and ambient temperature within the range selected by the applicant at which the airplane complies with the climb requirements of § 23.63(c)(2).

(4) For commuter category airplanes, the maximum takeoff weight for each airport altitude and ambient temperature within the range selected by the applicant at which --

(i) The airplane complies with the climb requirements of § 23.63(d)(1); and

(ii) The accelerate-stop distance determined under § 23.55 is equal to the available runway length plus the length of any stopway, if utilized; and either:

(iii) The takeoff distance determined under § 23.59(a) is equal to the available runway length; or

(iv) At the option of the applicant, the takeoff distance determined under § 23.59(a) is equal to the available runway length plus the length of any clearway and the takeoff run determined under § 23.59(b) is equal to the available runway length.

(5) For commuter category airplanes, the maximum landing weight for each airport altitude within the range selected by the applicant at which --

(i) The airplane complies with the climb requirements of § 23.63(d)(2) for ambient temperatures within the range selected by the applicant; and

(ii) The landing distance determined under § 23.75 for standard temperatures is equal to the available runway length.

(6) The maximum zero wing fuel weight, where relevant, as established in accordance with § 23.343.

(d) *Center of gravity.* The established center of gravity limits.

(e) *Maneuvers.* The following authorized maneuvers, appropriate airspeed limitations, and unauthorized maneuvers, as prescribed in this section.

(1) *Normal category airplanes.* No acrobatic maneuvers, including spins, are authorized.

(2) *Utility category airplanes.* A list of authorized maneuvers demonstrated in the type flight tests, together with recommended entry speeds and any other associated limitations. No other maneuver is authorized.

(3) *Acrobatic category airplanes.* A list of approved flight maneuvers demonstrated in the type flight tests, together with recommended entry speeds and any other associated limitations.

(4) *Acrobatic category airplanes and utility category airplanes approved for spinning.* Spin recovery procedure established to show compliance with § 23.221(c).

(5) *Commuter category airplanes.* Maneuvers are limited to any maneuver incident to normal flying, stalls, (except whip stalls) and steep turns in which the angle of bank is not more than 60 degrees.

(f) *Maneuver load factor.* The positive limit load factors in g's, and, in addition, the negative limit load factor for acrobatic category airplanes.

(g) *Minimum flight crew.* The number and functions of the minimum flight crew determined under § 23.1523.

(h) *Kinds of operation.* A list of the kinds of operation to which the airplane is limited or from which it is prohibited under § 23.1525, and also a list of installed equipment that affects any operating limitation and identification as to the equipment's required operational status for the kinds of operation for which approval has been given.

(i) *Maximum operating altitude.* The maximum altitude established under § 23.1527.

(j) *Maximum passenger seating configuration.* The maximum passenger seating configuration.

(k) *Allowable lateral fuel loading.* The maximum allowable lateral fuel loading differential, if less than the maximum possible.

(l) *Baggage and cargo loading.* The following information for each baggage and cargo compartment or zone --

(1) The maximum allowable load; and

(2) The maximum intensity of loading.

(m) *Systems.* Any limitations on the use of airplane systems and equipment.

(n) *Ambient temperatures.* Where appropriate, maximum and minimum ambient air temperatures for operation.

(o) *Smoking.* Any restrictions on smoking in the airplane.

(p) *Types of surface.* A statement of the types of surface on which operations may be conducted. (See § 23.45(g) and § 23.1587 (a)(4), (c)(2), and (d)(4)).

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13097, Aug. 13, 1969; Amdt. 23-10, 36 FR 2864, Feb. 11, 1971; Amdt. 23-21, 43 FR 2320, Jan. 16, 1978; Amdt. 23-23, 43 FR 50594, Oct. 30, 1978; Amdt. 23-34, 52 FR 1834, Jan. 15, 1987; Amdt. 23-45, 58 FR 42166, Aug. 6, 1993; Amdt. 23-50, 61 FR 5193, Feb. 9, 1996]

23.1585 Operating procedures.

(a) For all airplanes, information concerning normal, abnormal (if applicable), and emergency procedures and other pertinent information necessary for safe operation and the achievement of the scheduled performance must be furnished, including --

(1) An explanation of significant or unusual flight or ground handling characteristics;

(2) The maximum demonstrated values of crosswind for takeoff and landing, and procedures and information pertinent to operations in crosswinds;

(3) A recommended speed for flight in rough air. This speed must be chosen to protect against the occurrence, as a result of gusts, of structural damage to the airplane and loss of control (for example, stalling);

(4) Procedures for restarting any turbine engine in flight, including the effects of altitude; and

(5) Procedures, speeds, and configuration(s) for making a normal approach and landing, in accordance with §§ 23.73 and 23.75, and a transition to the balked landing condition.

(6) For seaplanes and amphibians, water handling procedures and the demonstrated wave height.

(b) In addition to paragraph (a) of this section, for all single-engine airplanes, the procedures, speeds, and configuration(s) for a glide following engine failure, in accordance with § 23.71 and the subsequent forced landing, must be furnished.

(c) In addition to paragraph (a) of this section, for all multiengine airplanes, the following information must be furnished:

(1) Procedures, speeds, and configuration(s) for making an approach and landing with one engine inoperative;

(2) Procedures, speeds, and configuration(s) for making a balked landing with one engine inoperative and the conditions under which a balked landing can be performed safely, or a warning against attempting a balked landing;

(3) The V_{SSE} determined in § 23.149; and

(4) Procedures for restarting any engine in flight including the effects of altitude.

(d) In addition to paragraphs (a) and either (b) or (c) of this section, as appropriate, for all normal, utility, and acrobatic category airplanes, the following information must be furnished:

(1) Procedures, speeds, and configuration(s) for making a normal takeoff, in accordance with § 23.51 (a) and (b), and § 23.53 (a) and (b), and the subsequent climb, in accordance with § 23.65 and § 23.69(a).

(2) Procedures for abandoning a takeoff due to engine failure or other cause.

(e) In addition to paragraphs (a), (c), and (d) of this section, for all normal, utility, and acrobatic category multiengine airplanes, the information must include the following:

(1) Procedures and speeds for continuing a takeoff following engine failure and the conditions under which takeoff can safely be continued, or a warning against attempting to continue the takeoff.

(2) Procedures, speeds, and configurations for continuing a climb following engine failure, after takeoff, in accordance with § 23.67, or enroute, in accordance with § 23.69(b).

(f) In addition to paragraphs (a) and (c) of this section, for commuter category airplanes, the information must include the following:

(1) Procedures, speeds, and configuration(s) for making a normal takeoff.

(2) Procedures and speeds for carrying out an accelerate-stop in accordance with § 23.55.

(3) Procedures and speeds for continuing a takeoff following engine failure in accordance with § 23.59(a)(1) and for following the flight path determined under § 23.57 and § 23.61(a).

(g) For multiengine airplanes, information identifying each operating condition in which the fuel system independence prescribed in § 23.953 is necessary for safety must be furnished, together with instructions for placing the fuel system in a configuration used to show compliance with that section.

(h) For each airplane showing compliance with § 23.1353 (g)(2) or (g)(3), the operating procedures for disconnecting the battery from its charging source must be furnished.

(i) Information on the total quantity of usable fuel for each fuel tank, and the effect on the usable fuel quantity, as a result of a failure of any pump, must be furnished.

(j) Procedures for the safe operation of the airplane's systems and equipment, both in normal use and in the event of malfunction, must be furnished.

[Doc. No. 27807, 61 FR 5194, Feb. 9, 1996]

23.1587 Performance information.

Unless otherwise prescribed, performance information must be provided over the altitude and temperature ranges required by § 23.45(b).

(a) For all airplanes, the following information must be furnished --

(1) The stalling speeds VSO and VS1 with the landing gear and wing flaps retracted, determined at maximum weight under § 23.49, and the effect on these stalling speeds of angles of bank up to 60 degrees;

(2) The steady rate and gradient of climb with all engines operating, determined under § 23.69(a);

(3) The landing distance, determined under § 23.75 for each airport altitude and standard temperature, and the type of surface for which it is valid;

(4) The effect on landing distances of operation on other than smooth hard surfaces, when dry, determined under § 23.45(g); and

(5) The effect on landing distances of runway slope and 50 percent of the headwind component and 150 percent of the tailwind component.

(b) In addition to paragraph (a) of this section, for all normal, utility, and acrobatic category reciprocating engine-powered airplanes of 6,000 pounds or less maximum weight, the steady angle of climb/descent, determined under § 23.77(a), must be furnished.

(c) In addition to paragraphs (a) and (b) of this section, if appropriate, for normal, utility, and acrobatic category airplanes, the following information must be furnished --

(1) The takeoff distance, determined under § 23.53 and the type of surface for which it is valid.

(2) The effect on takeoff distance of operation on other than smooth hard surfaces, when dry, determined under § 23.45(g);

(3) The effect on takeoff distance of runway slope and 50 percent of the headwind component and 150 percent of the tailwind component;

(4) For multiengine reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight and multiengine turbine powered airplanes, the one-engine-inoperative takeoff climb/descent gradient, determined under § 23.66;

(5) For multiengine airplanes, the enroute rate and gradient of climb/descent with one engine inoperative, determined under § 23.69(b); and

(6) For single-engine airplanes, the glide performance determined under § 23.71.

(d) In addition to paragraph (a) of this section, for commuter category airplanes, the following information must be furnished --

(1) The accelerate-stop distance determined under § 23.55;

(2) The takeoff distance determined under § 23.59(a);

(3) At the option of the applicant, the takeoff run determined under § 23.59(b);

(4) The effect on accelerate-stop distance, takeoff distance and, if determined, takeoff run, of operation on other than smooth hard surfaces, when dry, determined under § 23.45(g);

(5) The effect on accelerate-stop distance, takeoff distance, and if determined, takeoff run, of runway slope and 50 percent of the headwind component and 150 percent of the tailwind component;

(6) The net takeoff flight path determined under § 23.61(b);

(7) The enroute gradient of climb/descent with one engine inoperative, determined under § 23.69(b);

(8) The effect, on the net takeoff flight path and on the enroute gradient of climb/descent with one engine inoperative, of 50 percent of the headwind component and 150 percent of the tailwind component;

(9) Overweight landing performance information (determined by extrapolation and computed for the range of weights between the maximum landing and maximum takeoff weights) as follows --

(i) The maximum weight for each airport altitude and ambient temperature at which the airplane complies with the climb requirements of § 23.63(d)(2); and

(ii) The landing distance determined under § 23.75 for each airport altitude and standard temperature.

(10) The relationship between IAS and CAS determined in accordance with § 23.1323 (b) and (c).

(11) The altimeter system calibration required by § 23.1325(e).

[Doc. No. 27807, 61 FR 5194, Feb. 9, 1996]

23.1589 Loading information.

The following loading information must be furnished:

(a) The weight and location of each item of equipment that can be easily removed, relocated, or replaced and that is installed when the airplane was weighed under the requirement of § 23.25.

(b) Appropriate loading instructions for each possible loading condition between the maximum and minimum weights established under § 23.25, to facilitate the center of gravity remaining within the limits established under § 23.23.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-45, 58 FR 42167, Aug. 6, 1993; Amdt. 23-50, 61 FR 5195, Feb. 9, 1996]

Appendix G to Part 23—Instructions for Continued Airworthiness

G23.1 General.

(a) This appendix specifies requirements for the preparation of Instructions for Continued Airworthiness as required by § 23.1529.

(b) The Instructions for Continued Airworthiness for each airplane must include the Instructions for Continued Airworthiness for each engine and propeller (hereinafter designated 'products'), for each appliance required by this chapter, and any required information relating to the interface of those appliances and products with the airplane. If Instructions for Continued Airworthiness are not supplied by the manufacturer of an appliance or product installed in the airplane, the Instructions for Continued Airworthiness for the airplane must include the information essential to the continued airworthiness of the airplane.

(c) The applicant must submit to the FAA a program to show how changes to the Instructions for Continued Airworthiness made by the applicant or by the manufacturers of products and appliances installed in the airplane will be distributed.

G23.2 Format.

(a) The Instructions for Continued Airworthiness must be in the form of a manual or manuals as appropriate for the quantity of data to be provided.

(b) The format of the manual or manuals must provide for a practical arrangement.

G23.3 Content.

The contents of the manual or manuals must be prepared in the English language. The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:

(a) *Airplane maintenance manual or section.*

(1) Introduction information that includes an explanation of the airplane's features and data to the extent necessary for maintenance or preventive maintenance.

(2) A description of the airplane and its systems and installations including its engines, propellers, and appliances.

(3) Basic control and operation information describing how the airplane components and systems are controlled and how they operate, including any special procedures and limitations that apply.

(4) Servicing information that covers details regarding servicing points, capacities of tanks, reservoirs, types of fluids to be used, pressures applicable to the various systems, location of access panels for inspection and servicing, locations of lubrication points, lubricants to be used, equipment required for servicing, tow instructions and limitations, mooring, jacking, and leveling information.

(b) *Maintenance instructions.*

(1) Scheduling information for each part of the airplane and its engines, auxiliary power units, propellers, accessories, instruments, and equipment that provides the recommended periods at which they should be cleaned, inspected, adjusted, tested, and lubricated, and the degree of inspection, the applicable wear tolerances, and work

recommended at these periods. However, the applicant may refer to an accessory, instrument, or equipment manufacturer as the source of this information if the applicant shows that the item has an exceptionally high degree of complexity requiring specialized maintenance techniques, test equipment, or expertise. The recommended overhaul periods and necessary cross reference to the Airworthiness Limitations section of the manual must also be included. In addition, the applicant must include an inspection program that includes the frequency and extent of the inspections necessary to provide for the continued airworthiness of the airplane.

(2) Troubleshooting information describing probable malfunctions, how to recognize those malfunctions, and the remedial action for those malfunctions.

(3) Information describing the order and method of removing and replacing products and parts with any necessary precautions to be taken.

(4) Other general procedural instructions including procedures for system testing during ground running, symmetry checks, weighing and determining the center of gravity, lifting and shoring, and storage limitations.

(c) Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided.

(d) Details for the application of special inspection techniques including radiographic and ultrasonic testing where such processes are specified.

(e) Information needed to apply protective treatments to the structure after inspection.

(f) All data relative to structural fasteners such as identification, discard recommendations, and torque values.

(g) A list of special tools needed.

(h) In addition, for commuter category airplanes, the following information must be furnished:

(1) Electrical loads applicable to the various systems;

(2) Methods of balancing control surfaces;

(3) Identification of primary and secondary structures; and

(4) Special repair methods applicable to the airplane.

G23.4 Airworthiness Limitations section.

The Instructions for Continued Airworthiness must contain a section titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure required for type certification. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads: "The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved."

[Amdt. 23-26, 45 FR 60171, Sept. 11, 1980, as amended by Amdt. 23-34, 52 FR 1835, Jan. 15, 1987; 52 FR 34745, Sept. 14, 1987; Amdt. 23-37, 54 FR 34329, Aug. 18, 1989]

Part 27—Airworthiness Standards: Normal Category Rotorcraft

Subpart A—General

§27.1 Applicability.

(a) This part prescribes airworthiness standards for the issue of type certificates, and changes to those certificates, for normal category rotorcraft with maximum weights of 7,000 pounds or less and nine or less passenger seats.

(b) Each person who applies under Part 21 for such a certificate or change must show compliance with the applicable requirements of this part.

(c) Multiengine rotorcraft may be type certified as Category A provided the requirements referenced in appendix C of this part are met.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-33, 61 FR 21906, May 10, 1996; Amdt. 27-37, 64 FR 45094, Aug. 18, 1999]

§27.2 Special retroactive requirements.

(a) For each rotorcraft manufactured after September 16, 1992, each applicant must show that each occupant's seat is equipped with a safety belt and shoulder harness that meets the requirements of paragraphs (a), (b), and (c) of this section.

(1) Each occupant's seat must have a combined safety belt and shoulder harness with a single-point release. Each pilot's combined safety belt and shoulder harness must allow each pilot, when seated with safety belt and shoulder harness fastened, to perform all functions necessary for flight operations. There must be a means to secure belts and harnesses, when not in use, to prevent interference with the operation of the rotorcraft and with rapid egress in an emergency.

(2) Each occupant must be protected from serious head injury by a safety belt plus a shoulder harness that will prevent the head from contacting any injurious object.

(3) The safety belt and shoulder harness must meet the static and dynamic strength requirements, if applicable, specified by the rotorcraft type certification basis.

(4) For purposes of this section, the date of manufacture is either --

(i) The date the inspection acceptance records, or equivalent, reflect that the rotorcraft is complete and meets the FAA-Approved Type Design Data; or

(ii) The date the foreign civil airworthiness authority certifies that the rotorcraft is complete and issues an original standard airworthiness certificate, or equivalent, in that country.

(b) For rotorcraft with a certification basis established prior to October 18, 1999 --

(1) The maximum passenger seat capacity may be increased to eight or nine provided the applicant shows compliance with all the airworthiness requirements of this part in effect on October 18, 1999.

(2) The maximum weight may be increased to greater than 6,000 pounds provided --

(i) The number of passenger seats is not increased above the maximum number certificated on October 18, 1999, or

(ii) The applicant shows compliance with all of the airworthiness requirements of this part in effect on October 18, 1999.

[Doc. No. 26078, 56 FR 41051, Aug. 16, 1991, as amended by Amdt. 27-37, 64 FR 45094, Aug. 18, 1999]

Subpart B—Flight
General

27.21 Proof of compliance.

Each requirement of this subpart must be met at each appropriate combination of weight and center of gravity within the range of loading conditions for which certification is requested. This must be shown --

(a) By tests upon a rotorcraft of the type for which certification is requested, or by calculations based on, and equal in accuracy to, the results of testing; and

(b) By systematic investigation of each required combination of weight and center of gravity if compliance cannot be reasonably inferred from combinations investigated.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-21, 49 FR 44432, Nov. 6, 1984]

27.25 Weight limits.

(a) *Maximum weight.* The maximum weight (the highest weight at which compliance with each applicable requirement of this part is shown) must be established so that it is --

(1) Not more than --

(i) The highest weight selected by the applicant;

(ii) The design maximum (the highest weight at which compliance with each applicable structural loading condition of this part is shown); or

(iii) The highest weight at which compliance with each applicable flight requirement of this part is shown; and

(2) Not less than the sum of --

(i) The empty weight determined under § 27.29; and

(ii) The weight of usable fuel appropriate to the intended operation with full payload;

(iii) The weight of full oil capacity; and

(iv) For each seat, an occupant weight of 170 pounds or any lower weight for which certification is requested.

(b) *Minimum weight.* The minimum weight (the lowest weight at which compliance with each applicable requirement of this part is shown) must be established so that it is --

(1) Not more than the sum of --

(i) The empty weight determined under § 27.29; and

(ii) The weight of the minimum crew necessary to operate the rotorcraft, assuming for each crewmember a weight no more than 170 pounds, or any lower weight selected by the applicant or included in the loading instructions; and

(2) Not less than --

(i) The lowest weight selected by the applicant;

(ii) The design minimum weight (the lowest weight at which compliance with each applicable structural loading condition of this part is shown); or

(iii) The lowest weight at which compliance with each applicable flight requirement of this part is shown.

(c) *Total weight with jettisonable external load.* A total weight for the rotorcraft with a jettisonable external load attached that is greater than the maximum weight established under paragraph (a) of this section may be established for any rotorcraft-load combination if --

(1) The rotorcraft-load combination does not include human external cargo,

(2) Structural component approval for external load operations under either § 27.865 or under equivalent operational standards is obtained,

(3) The portion of the total weight that is greater than the maximum weight established under paragraph (a) of this section is made up only of the weight of all or part of the jettisonable external load,

(4) Structural components of the rotorcraft are shown to comply with the applicable structural requirements of this part under the increased loads and stresses caused by the weight increase over that established under paragraph (a) of this section, and

(5) Operation of the rotorcraft at a total weight greater than the maximum certificated weight established under paragraph (a) of this section is limited by appropriate operating limitations under § 27.865(a) and (d) of this part. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 29, 1964, as amended by Amdt. 27-11, 41 FR 55468, Dec. 20, 1976; Amdt. 25-42, 43 FR 2324, Jan. 16, 1978; Amdt. 27-36, 64 FR 43019, Aug. 6, 1999]

27.27 Center of gravity limits.

The extreme forward and aft centers of gravity and, where critical, the extreme lateral centers of gravity must be established for each weight established under § 27.25. Such an extreme may not lie beyond –

(a) The extremes selected by the applicant;

(b) The extremes within which the structure is proven; or

(c) The extremes within which compliance with the applicable flight requirements is shown.

[Amdt. 27-2, 33 FR 962, Jan. 26, 1968]

§27.29 Empty weight and corresponding center of gravity.

(a) The empty weight and corresponding center of gravity must be determined by weighing the rotorcraft without the crew and payload, but with --

(1) Fixed ballast;

(2) Unusable fuel; and

(3) Full operating fluids, including --

(i) Oil;

(ii) Hydraulic fluid; and

(iii) Other fluids required for normal operation of roto-craft systems, except water intended for injection in the engines.

(b) The condition of the rotorcraft at the time of determining empty weight must be one that is well defined and can be easily repeated, particularly with respect to the weights of fuel, oil, coolant, and installed equipment. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-14, 43 FR 2324, Jan. 16, 1978]

Subpart F—Equipment
General

§27.1301 Function and installation.

Each item of installed equipment must --

(a) Be of a kind and design appropriate to its intended function;

(b) Be labeled as to its identification, function, or operating limitations, or any applicable combination of these factors;

(c) Be installed according to limitations specified for that equipment; and

(d) Function properly when installed.

§27.1303 Flight and navigation instruments.
The following are the required flight and navigation instruments:

(a) An airspeed indicator.

(b) An altimeter.

(c) A magnetic direction indicator.

§27.1305 Powerplant instruments.
The following are the required powerplant instruments:

(a) A carburetor air temperature indicator, for each engine having a preheater that can provide a heat rise in excess of 60 °F.

(b) A cylinder head temperature indicator, for each --

(1) Air cooled engine;

(2) Rotorcraft with cooling shutters; and

(3) Rotorcraft for which compliance with §27.1043 is shown in any condition other than the most critical flight condition with respect to cooling.

(c) A fuel pressure indicator, for each pump-fed engine.

(d) A fuel quantity indicator, for each fuel tank.

(e) A manifold pressure indicator, for each altitude engine.

(f) An oil temperature warning device to indicate when the temperature exceeds a safe value in each main rotor drive gearbox (including any gearboxes essential to rotor phasing) having an oil system independent of the engine oil system.

(g) An oil pressure warning device to indicate when the pressure falls below a safe value in each pressure-lubricated main rotor drive gearbox (including any gearboxes essential to rotor phasing) having an oil system independent of the engine oil system.

(h) An oil pressure indicator for each engine.

(i) An oil quantity indicator for each oil tank.

(j) An oil temperature indicator for each engine.

(k) At least one tachometer to indicate the r.p.m. of each engine and, as applicable --

(1) The r.p.m. of the single main rotor;

(2) The common r.p.m. of any main rotors whose speeds cannot vary appreciably with respect to each other; or

(3) The r.p.m. of each main rotor whose speed can vary appreciably with respect to that of another main rotor.

(l) A low fuel warning device for each fuel tank which feeds an engine. This device must --

(1) Provide a warning to the flightcrew when approximately 10 minutes of usable fuel remains in the tank; and

(2) Be independent of the normal fuel quantity indicating system.

(m) Means to indicate to the flightcrew the failure of any fuel pump installed to show compliance with §27.955.

(n) A gas temperature indicator for each turbine engine.

(o) Means to enable the pilot to determine the torque of each turboshaft engine, if a torque limitation is established for that engine under §27.1521(e).

(p) For each turbine engine, an indicator to indicate the functioning of the powerplant ice protection system.

(q) An indicator for the fuel filter required by §27.997 to indicate the occurrence of contamination of the filter at the degree established by the applicant in compliance with §27.955.

(r) For each turbine engine, a warning means for the oil strainer or filter required by §27.1019, if it has no bypass, to

warn the pilot of the occurrence of contamination of the strainer or filter before it reaches the capacity established in accordance with §27.1019(a)(2).

(s) An indicator to indicate the functioning of any selectable or controllable heater used to prevent ice clogging of fuel system components.

(t) For rotorcraft for which a 30-second/2-minute OEI power rating is requested, a means must be provided to alert the pilot when the engine is at the 30-second and the 2-minute OEI power levels, when the event begins, and when the time interval expires.

(u) For each turbine engine utilizing 30-second/2-minute OEI power, a device or system must be provided for use by ground personnel which --

(1) Automatically records each usage and duration of power at the 30-second and 2-minute OEI levels;

(2) Permits retrieval of the recorded data;

(3) Can be reset only by ground maintenance personnel; and

(4) Has a means to verify proper operation of the system or device.

(v) Warning or caution devices to signal to the flight crew when ferromagnetic particles are detected by the chip detector required by §27.1337(e).

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-9, 39 FR 35462, Oct. 1, 1974; Amdt. 27-23, 53 FR 34214, Sept. 2, 1988; Amdt. 27-29, 59 FR 47767, Sept. 16, 1994; Amdt. 27-37, 64 FR 45095, Aug. 18, 1999; 64 FR 47563, Aug. 31, 1999]

§27.1307 Miscellaneous equipment.

The following is the required miscellaneous equipment:

(a) An approved seat for each occupant.

(b) An approved safety belt for each occupant.

(c) A master switch arrangement.

(d) An adequate source of electrical energy, where electrical energy is necessary for operation of the rotorcraft.

(e) Electrical protective devices.

§27.1309 Equipment, systems, and installations.

(a) The equipment, systems, and installations whose functioning is required by this subchapter must be designed and installed to ensure that they perform their intended functions under any foreseeable operating condition.

(b) The equipment, systems, and installations of a multiengine rotorcraft must be designed to prevent hazards to the rotorcraft in the event of a probable malfunction or failure.

(c) The equipment, systems, and installations of single-engine rotorcraft must be designed to minimize hazards to the rotorcraft in the event of a probable malfunction or failure.

(d) In showing compliance with paragraph (a), (b), or (c) of this section, the effects of lightning strikes on the rotorcraft must be considered in accordance with §27.610.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1321 Arrangement and visibility.

(a) Each flight, navigation, and powerplant instrument for use by any pilot must be easily visible to him.

(b) For each multiengine rotorcraft, identical powerplant instruments must be located so as to prevent confusion as to which engine each instrument relates.

(c) Instrument panel vibration may not damage, or impair the readability or accuracy of, any instrument.

(d) If a visual indicator is provided to indicate malfunction of an instrument, it must be effective under all probable cockpit lighting conditions. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964; 29 FR 17885, Dec. 17, 1964, as amended by Amdt. 27-13, 42 FR 36971, July 18, 1977]

§27.1322 Warning, caution, and advisory lights.

If warning, caution or advisory lights are installed in the cockpit, they must, unless otherwise approved by the Administrator, be --

(a) Red, for warning lights (lights indicating a hazard which may require immediate corrective action):

(b) Amber, for caution lights (lights indicating the possible need for future corrective action);

(c) Green, for safe operation lights; and

(d) Any other color, including white, for lights not described in paragraphs (a) through (c) of this section, provided the color differs sufficiently from the colors prescribed in paragraphs (a) through (c) of this section to avoid possible confusion.

[Amdt. 27-11, 41 FR 55470, Dec. 20, 1976]

§27.1323 Airspeed indicating system.

(a) Each airspeed indicating instrument must be calibrated to indicate true airspeed (at sea level with a standard atmosphere) with a minimum practicable instrument calibration error when the corresponding pitot and static pressures are applied.

(b) The airspeed indicating system must be calibrated in flight at forward speeds of 20 knots and over.

(c) At each forward speed above 80 percent of the climbout speed, the airspeed indicator must indicate true airspeed, at sea level with a standard atmosphere, to within an allowable installation error of not more than the greater of --

(1) ±3 percent of the calibrated airspeed; or

(2) Five knots. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-13, 42 FR 36972, July 18, 1977]

§27.1325 Static pressure systems.

(a) Each instrument with static air case connections must be vented so that the influence of rotorcraft speed, the opening and closing of windows, airflow variation, and moisture or other foreign matter does not seriously affect its accuracy.

(b) Each static pressure port must be designed and located in such manner that the correlation between air pressure in the static pressure system and true ambient atmospheric static pressure is not altered when the rotorcraft encounters icing conditions. An anti-icing means or an alternate source of static pressure may be used in showing compliance with this requirement. If the reading of the altimeter, when on the alternate static pressure system, differs from the reading of the altimeter when on the primary static system by more than 50 feet, a correction card must be provided for the alternate static system.

(c) Except as provided in paragraph (d) of this section, if the static pressure system incorporates both a primary and an alternate static pressure source, the means for selecting one or the other source must be designed so that --

(1) When either source is selected, the other is blocked off; and

(2) Both sources cannot be blocked off simultaneously.

(d) For unpressurized rotorcraft, paragraph (c)(1) of this section does not apply if it can be demonstrated that the static pressure system calibration, when either static pressure source is selected is not changed by the other static pressure source being open or blocked. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-13, 42 FR 36972, July 18, 1977]

§27.1327 Magnetic direction indicator.

(a) Except as provided in paragraph (b) of this section --

(1) Each magnetic direction indicator must be installed so that its accuracy is not excessively affected by the rotorcraft's vibration or magnetic fields; and

(2) The compensated installation may not have a deviation, in level flight, greater than 10 degrees on any heading.

(b) A magnetic nonstabilized direction indicator may deviate more than 10 degrees due to the operation of electrically powered systems such as electrically heated windshields if either a magnetic stabilized direction indicator, which does not have a deviation in level flight greater than 10 degrees on any heading, or a gyroscopic direction indicator, is installed. Deviations of a magnetic nonstabilized direction indicator of more than 10 degrees must be placarded in accordance with §27.1547(e). (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 27-13, 42 FR 36972, July 18, 1977]

§27.1329 Automatic pilot system.

(a) Each automatic pilot system must be designed so that the automatic pilot can --

(1) Be sufficiently overpowered by one pilot to allow control of the rotorcraft; and

(2) Be readily and positively disengaged by each pilot to prevent it from interfering with control of the rotorcraft.

(b) Unless there is automatic synchronization, each system must have a means to readily indicate to the pilot the alignment of the actuating device in relation to the control system it operates.

(c) Each manually operated control for the system's operation must be readily accessible to the pilots.

(d) The system must be designed and adjusted so that, within the range of adjustment available to the pilot, it cannot produce hazardous loads on the rotorcraft or create hazardous deviations in the flight path under any flight condition appropriate to its use, either during normal operation or in the event of a malfunction, assuming that corrective action begins within a reasonable period of time.

(e) If the automatic pilot integrates signals from auxiliary controls or furnishes signals for operation of other equipment, there must be positive interlocks and sequencing of engagement to prevent improper operation.

(f) If the automatic pilot system can be coupled to airborne navigation equipment, means must be provided to indicate to the pilots the current mode of operation. Selector switch position is not acceptable as a means of indication.

[Amdt. 27-21, 49 FR 44435, Nov. 6, 1984, as amended by Amdt. 27-35, 63 FR 43285, Aug. 12, 1998]

§27.1335 Flight director systems.

If a flight director system is installed, means must be provided to indicate to the flight crew its current mode of operation. Selector switch position is not acceptable as a means of indication. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 27-13, 42 FR 36972, July 18, 1977]

§27.1337 Powerplant instruments.

(a) *Instruments and instrument lines.*

(1) Each powerplant instrument line must meet the requirements of §§27.- 961 and 27.993.

(2) Each line carrying flammable fluids under pressure must --

(i) Have restricting orifices or other safety devices at the source of pressure to prevent the escape of excessive fluid if the line fails; and

(ii) Be installed and located so that the escape of fluids would not create a hazard.

(3) Each powerplant instrument that utilizes flammable fluids must be installed and located so that the escape of fluid would not create a hazard.

(b) *Fuel quantity indicator.* Each fuel quantity indicator must be installed to clearly indicate to the flight crew the quantity of fuel in each tank in flight. In addition --

(1) Each fuel quantity indicator must be calibrated to read "zero" during level flight when the quantity of fuel remaining in the tank is equal to the unusable fuel supply determined under §27.959;

(2) When two or more tanks are closely interconnected by a gravity feed system and vented, and when it is impossible to feed from each tank separately, at least one fuel quantity indicator must be installed; and

(3) Each exposed sight gauge used as a fuel quantity indicator must be protected against damage.

(c) *Fuel flowmeter system.* If a fuel flowmeter system is installed, each metering component must have a means for bypassing the fuel supply if malfunction of that component severely restricts fuel flow.

(d) *Oil quantity indicator.* There must be means to indicate the quantity of oil in each tank --

(1) On the ground (including during the filling of each tank); and

(2) In flight, if there is an oil transfer system or reserve oil supply system.

(e) Rotor drive system transmissions and gearboxes utilizing ferromagnetic materials must be equipped with chip detectors designed to indicate the presence of ferromagnetic particles resulting from damage or excessive wear. Chip detectors must --

(1) Be designed to provide a signal to the device required by §27.1305(v) and be provided with a means to allow crewmembers to check, in flight, the function of each detector electrical circuit and signal.

(2) [Reserved] (Secs. 313(a), 601, and 603, 72 Stat. 752, 775, 49 U.S.C. 1354(a), 1421, and 1423; sec. 6(c) 49 U.S.C. 1655(c))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-12, 42 FR 15046, Mar. 17, 1977; Amdt. 27-23, 53 FR 34214, Sept. 2, 1988; Amdt. 27-37, 64 FR 45095, Aug. 18, 1999]

Electrical Systems and Equipment

§27.1351 General.

(a) *Electrical system capacity.* Electrical equipment must be adequate for its intended use. In addition --

(1) Electric power sources, their transmission cables, and their associated control and protective devices must be able to furnish the required power at the proper voltage to each load circuit essential for safe operation; and

(2) Compliance with paragraph (a)(1) of this section must be shown by an electrical load analysis, or by electrical measurements that take into account the electrical loads applied to the electrical system, in probable combinations and for probable durations.

(b) *Function.* For each electrical system, the following apply:

(1) Each system, when installed, must be --

(i) Free from hazards in itself, in its method of operation, and in its effects on other parts of the rotorcraft; and

(ii) Protected from fuel, oil, water, other detrimental substances, and mechanical damage.

(2) Electric power sources must function properly when connected in combination or independently.

(3) No failure or malfunction of any source may impair the ability of any remaining source to supply load circuits essential for safe operation.

(4) Each electric power source control must allow the independent operation of each source.

(c) *Generating system.* There must be at least one generator if the system supplies power to load circuits essential for safe operation. In addition --

(1) Each generator must be able to deliver its continuous rated power;

(2) Generator voltage control equipment must be able to dependably regulate each generator output within rated limits;

(3) Each generator must have a reverse current cutout designed to disconnect the generator from the battery and from the other generators when enough reverse current exists to damage that generator; and

(4) Each generator must have an overvoltage control designed and installed to prevent damage to the electrical system, or to equipment supplied by the electrical system, that could result if that generator were to develop an overvoltage condition.

(d) *Instruments.* There must be means to indicate to appropriate crewmembers the electric power system quantities essential for safe operation of the system. In addition --

(1) For direct current systems, an ammeter that can be switched into each generator feeder may be used; and

(2) If there is only one generator, the ammeter may be in the battery feeder.

(e) *External power.* If provisions are made for connecting external power to the rotorcraft, and that external power can be electrically connected to equipment other than that used for engine starting, means must be provided to ensure that no external power supply having a reverse polarity, or a reverse phase sequence, can supply power to the rotorcraft's electrical system. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-11, 41 FR 55470, Dec. 20, 1976; Amdt. 27-13, 42 FR 36972, July 18, 1977]

§27.1353 Storage battery design and installation.

(a) Each storage battery must be designed and installed as prescribed in this section.

(b) Safe cell temperatures and pressures must be maintained during any probable charging and discharging condition. No uncontrolled increase in cell temperature may result when the battery is recharged (after previous complete discharge) --

(1) At maximum regulated voltage or power;

(2) During a flight of maximum duration; and

(3) Under the most adverse cooling condition likely to occur in service.

(c) Compliance with paragraph (b) of this section must be shown by test unless experience with similar batteries and installations has shown that maintaining safe cell temperatures and pressures presents no problem.

(d) No explosive or toxic gases emitted by any battery in normal operation, or as the result of any probable malfunction in the charging system or battery installation, may accumulate in hazardous quantities within the rotorcraft.

(e) No corrosive fluids or gases that may escape from the battery may damage surrounding structures or adjacent essential equipment.

(f) Each nickel cadmium battery installation capable of being used to start an engine or auxiliary power unit must have provisions to prevent any hazardous effect on structure or essential systems that may be caused by the maximum amount of heat the battery can generate during a short circuit of the battery or of its individual cells.

(g) Nickel cadmium battery installations capable of being used to start an engine or auxiliary power unit must have --

(1) A system to control the charging rate of the battery automatically so as to prevent battery overheating;

(2) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or

(3) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of battery failure. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-13, 42 FR 36972, July 18, 1977; Amdt. 27-14, 43 FR 2325, Jan. 16, 1978]

§27.1357 Circuit protective devices.

(a) Protective devices, such as fuses or circuit breakers, must be installed in each electrical circuit other than --

(1) The main circuits of starter motors; and

(2) Circuits in which no hazard is presented by their omission.

(b) A protective device for a circuit essential to flight safety may not be used to protect any other circuit.

(c) Each resettable circuit protective device ("trip free" device in which the tripping mechanism cannot be overridden by the operating control) must be designed so that --

(1) A manual operation is required to restore service after trippling; and

(2) If an overload or circuit fault exists, the device will open the circuit regardless of the position of the operating control.

(d) If the ability to reset a circuit breaker or replace a fuse is essential to safety in flight, that circuit breaker or fuse must be located and identified so that it can be readily reset or replaced in flight.

(e) If fuses are used, there must be one spare of each rating, or 50 percent spare fuses of each rating, whichever is greater. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964; 29 FR 17885, Dec. 17, 1964, as amended by Amdt. 27-13, 42 FR 36972, July 18, 1977]

§27.1361 Master switch.

(a) There must be a master switch arrangement to allow ready disconnection of each electric power source from the main bus. The point of disconnection must be adjacent to the sources controlled by the switch.

(b) Load circuits may be connected so that they remain energized after the switch is opened, if they are protected by circuit protective devices, rated at five amperes or less, adjacent to the electric power source.

(c) The master switch or its controls must be installed so that the switch is easily discernible and accessible to a crewmember in flight.

§27.1365 Electric cables.

(a) Each electric connecting cable must be of adequate capacity.

(b) Each cable that would overheat in the event of circuit overload or fault must be at least flame resistant and may not emit dangerous quantities of toxic fumes.

(c) Insulation on electrical wire and cable installed in the rotorcraft must be self-extinguishing when tested in accordance with Appendix F, Part I(a)(3), of part 25 of this chapter.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-35, 63 FR 43285, Aug. 12, 1998]

§27.1367 Switches.

Each switch must be --

(a) Able to carry its rated current;

(b) Accessible to the crew; and

(c) Labeled as to operation and the circuit controlled.

Lights

§27.1381 Instrument lights.

The instrument lights must --

(a) Make each instrument, switch, and other devices for which they are provided easily readable; and

(b) Be installed so that --

(1) Their direct rays are shielded from the pilot's eyes; and

(2) No objectionable reflections are visible to the pilot.

§27.1383 Landing lights.

(a) Each required landing or hovering light must be approved.

(b) Each landing light must be installed so that --

(1) No objectionable glare is visible to the pilot;

(2) The pilot is not adversely affected by halation; and

(3) It provides enough light for night operation, including hovering and landing.

(c) At least one separate switch must be provided, as applicable --

(1) For each separately installed landing light; and

(2) For each group of landing lights installed at a common location.

§27.1385 Position light system installation.

(a) *General.* Each part of each position light system must meet the applicable requirements of this section, and each system as a whole must meet the requirements of §§27.1387 through 27.1397.

(b) *Forward position lights.* Forward position lights must consist of a red and a green light spaced laterally as far apart as practicable and installed forward on the rotorcraft so that, with the rotorcraft in the normal flying position, the red light is on the left side and the green light is on the right side. Each light must be approved.

(c) *Rear position light.* The rear position light must be a white light mounted as far aft as practicable, and must be approved.

(d) *Circuit.* The two forward position lights and the rear position light must make a single circuit.

(e) *Light covers and color filters.* Each light cover or color filter must be at least flame resistant and may not change color or shape or lose any appreciable light transmission during normal use.

§27.1387 Position light system dihedral angles.

(a) Except as provided in paragraph (e) of this section, each forward and rear position light must, as installed, show unbroken light within the dihedral angles described in this section.

(b) Dihedral angle L (left) is formed by two intersecting vertical planes, the first parallel to the longitudinal axis of the rotorcraft, and the other at 110 degrees to the left of the first, as viewed when looking forward along the longitudinal axis.

(c) Dihedral angle R (right) is formed by two intersecting vertical planes, the first parallel to the longitudinal axis of the rotorcraft, and the other at 110 degrees to the right of the first, as viewed when looking forward along the longitudinal axis.

(d) Dihedral angle A (aft) is formed by two intersecting vertical planes making angles of 70 degrees to the right and to the left, respectively, to a vertical plane passing through the longitudinal axis, as viewed when looking aft along the longitudinal axis.

(e) If the rear position light, when mounted as far aft as practicable in accordance with §25.1385(c), cannot show unbroken light within dihedral angle A (as defined in paragraph (d) of this section), a solid angle or angles of obstructed visibility totaling not more than 0.04 steradians is allowable within that dihedral angle, if such solid angle is within a cone whose apex is at the rear position light and whose elements make an angle of 30° with a vertical line passing through the rear position light. (49 U.S.C. 1655(c))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-7, 36 FR 21278, Nov. 5, 1971]

§27.1389 Position light distribution and intensities.

(a) *General.* the intensities prescribed in this section must be provided by new equipment with light covers and color filters in place. Intensities must be determined with the light source operating at a steady value equal to the average luminous output of the source at the normal operating voltage of the rotorcraft. The light distribution and intensity of each position light must meet the requirements of paragraph (b) of this section.

(b) *Forward and rear position lights.* The light distribution and intensities of forward and rear position lights must be expressed in terms of minimum intensities in the horizontal plane, minimum intensities in any vertical plane, and maximum intensities in overlapping beams, within dihedral angles L, R, and A, and must meet the following requirements:

(1) Intensities in the horizontal plane. Each intensity in the horizontal plane (the plane containing the longitudinal axis of the rotorcraft and perpendicular to the plane of symmetry of the rotorcraft) must equal or exceed the values in §27.1391.

(2) Intensities in any vertical plane. Each intensity in any vertical plane (the plane perpendicular to the horizontal plane) must equal or exceed the appropriate value in §27.1393, where I is the minimum intensity prescribed in §27.1391 for the corresponding angles in the horizontal plane.

(3) *Intensities in overlaps between adjacent signals.* No intensity in any overlap between adjacent signals may exceed the values in §27.1395, except that higher intensities in overlaps may be used with main beam intensities substantially greater than the minima specified in §§27.1391 and 27.1393, if the overlap intensities in relation to the main beam intensities do not adversely affect signal clarity. When the peak intensity of the forward position lights is greater than 100 candles, the maximum overlap intensities between them may exceed the values in §27.1395 if the overlap intensity in Area A is not more than 10 percent of peak position light intensity and the overlap intensity in Area B is not more than 2.5 percent of peak position light intensity.

§27.1391 Minimum intensities in the horizontal plane of forward and rear position lights.
Each position light intensity must equal or exceed the applicable values in the following table:

Dihedral angle (light included)	Angle from right or left of longitudinal axis, measured from dead ahead	Intensity (candles)
L and R (forward red and green).....	10° to 10°	40
	10° to 20°	30
	20° to 110°	5
A (rear white).....	110° to 180°	20

§27.1393 Minimum intensities in any vertical plane of forward and rear position lights.
Each position light intensity must equal or exceed the applicable values in the following table:

Angle above or below the horizontal plane	Intensity
0°	1.00
0° to 5°	0.90
5° to 10°.	0.80
10° to 15°.	0.70
15° to 20°.	0.50
20° to 30°	0.30
30° to 40°	0.10
40° to 90°	0.05

§27.1395 Maximum intensities in overlapping beams of forward and rear position lights.
No position light intensity may exceed the applicable values in the following table, except as provided in §27.1389(b)(3).

	Maximum Intensity	
Overlaps	Area A (candles)	Area B (candles)
Green in dihedral angle L	10	1
Red in dihedral angle R	10	1
Green in dihedral angle A	5	1
Red in dihedral angle A	5	1
Rear white in dihedral angle L	5	1
Rear white in dihedral angle R	5	1

Where --

(a) Area A includes all directions in the adjacent dihedral angle that pass through the light source and intersect the common boundary plane at more than 10 degrees but less than 20 degrees, and

(b) Area B includes all directions in the adjacent dihedral angle that pass through the light source and intersect the common boundary plane at more than 20 degrees.

§27.1397 Color specifications.

Each position light color must have the applicable International Commission on Illumination chromaticity coordinates as follows:

(a) *Aviation red* --

y is not greater than 0.335; and

z is not greater than 0.002.

(b) *Aviation green* --

x is not greater than 0.440–0.320y;

x is not greater than y–0.170; and

y is not less than 0.390–0.170x.

(c) *Aviation white* --

x is not less than 0.300 and not greater than 0.540;

y is not less than x–0.040" or yc–0.010, whichever is the smaller; and

y is not greater than x+0.020 nor 0.636–0.400x;

Where yc is the y coordinate of the Planckian radiator for the value of x considered.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-6, 36 FR 12972, July 10, 1971]

§27.1399 Riding light.

(a) Each riding light required for water operation must be installed so that it can --

(1) Show a white light for at least two nautical miles at night under clear atmospheric conditions; and

(2) Show a maximum practicable unbroken light with the rotorcraft on the water.

(b) Externally hung lights may be used.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-2, 33 FR 964, Jan. 26, 1968]

§27.1401 Anticollision light system.

(a) *General.* If certification for night operation is requested, the rotorcraft must have an anticollision light system that --

(1) Consists of one or more approved anticollision lights located so that their emitted light will not impair the crew's vision or detract from the conspicuity of the position lights; and

(2) Meets the requirements of paragraphs (b) through (f) of this section.

(b) *Field of coverage.* The system must consist of enough lights to illuminate the vital areas around the rotorcraft, considering the physical configuration and flight characteristics of the rotorcraft. The field of coverage must extend in each direction within at least 30 degrees below the horizontal plane of the rotorcraft, except that there may be solid angles of obstructed visibility totaling not more than 0.5 steradians.

(c) *Flashing characteristics.* The arrangement of the system, that is, the number of light sources, beam width, speed of rotation, and other characteristics, must give an effective flash frequency of not less than 40, nor more than 100, cycles per minute. The effective flash frequency is the frequency at which the rotorcraft's complete anticollision light system is observed from a distance, and applies to each sector of light including any overlaps that exist when the system consists of more than one light source. In overlaps, flash frequencies may exceed 100, but not 180, cycles per minute.

(d) *Color.* Each anticollision light must be aviation red and must meet the applicable requirements of §27.1397.

(e) *Light intensity.* The minimum light intensities in any vertical plane, measured with the red filter (if used) and expressed in terms of "effective" intensities, must meet the requirements of paragraph (f) of this section. The following relation must be assumed:

where:

Ie=effective intensity (candles).

I(t)=instantaneous intensity as a function of time.

t2−t1=flash time interval (seconds).

Normally, the maximum value of effective intensity is obtained when t2 and t1 are chosen so that the effective intensity is equal to the instantaneous intensity at t2 and t1.

(f) *Minimum effective intensities for anticollision light.* Each anticollision light effective intensity must equal or exceed the applicable values in the following table:

Angle above or below the horizontal plane	Effective intensity (candles)
0° to 5°	150
5° to 10°	90
10° to 20°	30
20° to 30°	15

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-6, 36 FR 12972, July 10, 1971; Amdt. 27-10, 41 FR 5290, Feb. 5, 1976]

Safety Equipment

§27.1411 General.

(a) Required safety equipment to be used by the crew in an emergency, such as flares and automatic liferaft releases, must be readily accessible.

(b) Stowage provisions for required safety equipment must be furnished and must --

(1) Be arranged so that the equipment is directly accessible and its location is obvious; and

(2) Protect the safety equipment from damage caused by being subjected to the inertia loads specified in §27.561.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-11, 41 FR 55470, Dec. 20, 1976]

§27.1413 Safety belts.

Each safety belt must be equipped with a metal to metal latching device. (Secs. 313, 314, and 601 through 610 of the Federal Aviation Act of 1958 (49 U.S.C. 1354, 1355, and 1421 through 1430) and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-15, 43 FR 46233, Oct. 5, 1978; Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1415 Ditching equipment.

(a) Emergency flotation and signaling equipment required by any operating rule in this chapter must meet the requirements of this section.

(b) Each raft and each life preserver must be approved and must be installed so that it is readily available to the crew and passengers. The storage provisions for life preservers must accommodate one life preserver for each occupant for which certification for ditching is requested.

(c) Each raft released automatically or by the pilot must be attached to the rotorcraft by a line to keep it alongside the rotorcraft. This line must be weak enough to break before submerging the empty raft to which it is attached.

(d) Each signaling device must be free from hazard in its operation and must be installed in an accessible location.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-11, 41 FR 55470, Dec. 20, 1976]

§27.1419 Ice protection.

(a) To obtain certification for flight into icing conditions, compliance with this section must be shown.

(b) It must be demonstrated that the rotorcraft can be safely operated in the continuous maximum and intermittent maximum icing conditions determined under appendix C of Part 29 of this chapter within the rotorcraft altitude envelope. An analysis must be performed to establish, on the basis of the rotorcraft's operational needs, the adequacy of the ice protection system for the various components of the rotorcraft.

(c) In addition to the analysis and physical evaluation prescribed in paragraph (b) of this section, the effectiveness of the ice protection system and its components must be shown by flight tests of the rotorcraft or its components in measured natural atmospheric icing conditions and by one or more of the following tests as found necessary to determine the adequacy of the ice protection system:

(1) Laboratory dry air or simulated icing tests, or a combination of both, of the components or models of the components.

(2) Flight dry air tests of the ice protection system as a whole, or its individual components.

(3) Flight tests of the rotorcraft or its components in measured simulated icing conditions.

(d) The ice protection provisions of this section are considered to be applicable primarily to the airframe. Powerplant installation requirements are contained in Subpart E of this part.

(e) A means must be indentified or provided for determining the formation of ice on critical parts of the rotorcraft. Unless otherwise restricted, the means must be available for nighttime as well as daytime operation. The rotorcraft flight manual must describe the means of determining ice formation and must contain information necessary for safe operation of the rotorcraft in icing conditions.

[Amdt. 27-19, 48 FR 4389, Jan. 31, 1983]

§27.1435 Hydraulic systems.

(a) *Design.* Each hydraulic system and its elements must withstand, without yielding, any structural loads expected in addition to hydraulic loads.

(b) *Tests.* Each system must be substantiated by proof pressure tests. When proof tested, no part of any system may fail, malfunction, or experience a permanent set. The proof load of each system must be at least 1.5 times the maximum operating pressure of that system.

(c) *Accumulators.* No hydraulic accumulator or pressurized reservoir may be installed on the engine side of any firewall unless it is an integral part of an engine.

§27.1457 Cockpit voice recorders.

(a) Each cockpit voice recorder required by the operating rules of this chapter must be approved, and must be installed so that it will record the following:

(1) Voice communications transmitted from or received in the rotorcraft by radio.

(2) Voice communications of flight crewmembers on the flight deck.

(3) Voice communications of flight crewmembers on the flight deck, using the rotorcraft's interphone system.

(4) Voice or audio signals identifying navigation or approach aids introduced into a headset or speaker.

(5) Voice communications of flight crewmembers using the passenger loudspeaker system, if there is such a system, and if the fourth channel is available in accordance with the requirements of paragraph (c)(4)(ii) of this section.

(b) The recording requirements of paragraph (a)(2) of this section may be met:

(1) By installing a cockpit-mounted area microphone located in the best position for recording voice communications originating at the first and second pilot stations and voice communications of other crewmembers on the flight deck when directed to those stations; or

(2) By installing a continually energized or voice-actuated lip microphone at the first and second pilot stations.

The microphone specified in this paragraph must be so located and, if necessary, the preamplifiers and filters of the recorder must be adjusted or supplemented so that the recorded communications are intelligible when recorded under flight cockpit noise conditions and played back. The level of intelligibility must be approved by the Administrator. Repeated aural or visual playback of the record may be used in evaluating intelligibility.

(c) Each cockpit voice recorder must be installed so that the part of the communication or audio signals specified in paragraph (a) of this section obtained from each of the following sources is recorded on a separate channel:

(1) For the first channel, from each microphone, headset, or speaker used at the first pilot station.

(2) For the second channel, from each microphone, headset, or speaker used at the second pilot station.

(3) For the third channel, from the cockpit-mounted area microphone, or the continually energized or voice-actuated lip microphone at the first and second pilot stations.

(4) For the fourth channel, from:

(i) Each microphone, headset, or speaker used at the stations for the third and fourth crewmembers; or

(ii) If the stations specified in paragraph (c)(4)(i) of this section are not required or if the signal at such a station is picked up by another channel, each microphone on the flight deck that is used with the passenger loudspeaker system if its signals are not picked up by another channel.

(iii) Each microphone on the flight deck that is used with the rotorcraft's loudspeaker system if its signals are not picked up by another channel.

(d) Each cockpit voice recorder must be installed so that:

(1) It receives its electric power from the bus that provides the maximum reliability for operation of the cockpit voice recorder without jeopardizing service to essential or emergency loads;

(2) There is an automatic means to simultaneously stop the recorder and prevent each erasure feature from functioning, within 10 minutes after crash impact; and

(3) There is an aural or visual means for preflight checking of the recorder for proper operation.

(e) The record container must be located and mounted to minimize the probability of rupture of the container as a result of crash impact and consequent heat damage to the record from fire.

(f) If the cockpit voice recorder has a bulk erasure device, the installation must be designed to minimize the probability of inadvertent operation and actuation of the device during crash impact.

(g) Each recorder container must be either bright orange or bright yellow.

[Amdt. 27-22, 53 FR 26144, July 11, 1988]

§27.1459 Flight recorders.

(a) Each flight recorder required by the operating rules of Subchapter G of this chapter must be installed so that:

(1) It is supplied with airspeed, altitude, and directional data obtained from sources that meet the accuracy requirements of §§27.1323, 27.1325, and 27.1327 of this part, as applicable;

(2) The vertical acceleration sensor is rigidly attached, and located longitudinally within the approved center of gravity limits of the rotorcraft;

(3) It receives its electrical power from the bus that provides the maximum reliability for operation of the flight recorder without jeopardizing service to essential or emergency loads;

(4) There is an aural or visual means for preflight checking of the recorder for proper recording of data in the storage medium;

(5) Except for recorders powered solely by the engine-driven electrical generator system, there is an automatic means to simultaneously stop a recorder that has a data erasure feature and prevent each erasure feature from functioning, within 10 minutes after any crash impact; and

(b) Each nonejectable recorder container must be located and mounted so as to minimize the probability of container rupture resulting from crash impact and subsequent damage to the record from fire.

(c) A correlation must be established between the flight recorder readings of airspeed, altitude, and heading and the corresponding readings (taking into account correction factors) of the first pilot's instruments. This correlation must cover the airspeed range over which the aircraft is to be operated, the range of altitude to which the aircraft is limited, and 360 degrees of heading. Correlation may be established on the ground as appropriate.

(d) Each recorder container must:

(1) Be either bright orange or bright yellow;

(2) Have a reflective tape affixed to its external surface to facilitate its location under water; and

(3) Have an underwater locating device, when required by the operating rules of this chapter, on or adjacent to the container which is secured in such a manner that they are not likely to be separated during crash impact.

[Amdt. 27-22, 53 FR 26144, July 11, 1988]

§27.1461 Equipment containing high energy rotors.

(a) Equipment containing high energy rotors must meet paragraph (b), (c), or (d) of this section.

(b) High energy rotors contained in equipment must be able to withstand damage caused by malfunctions, vibration, abnormal speeds, and abnormal temperatures. In addition --

(1) Auxiliary rotor cases must be able to contain damage caused by the failure of high energy rotor blades; and

(2) Equipment control devices, systems, and instrumentation must reasonably ensure that no operating limitations affecting the integrity of high energy rotors will be exceeded in service.

(c) It must be shown by test that equipment containing high energy rotors can contain any failure of a high energy rotor that occurs at the highest speed obtainable with the normal speed control devices inoperative.

(d) Equipment containing high energy rotors must be located where rotor failure will neither endanger the occupants nor adversely affect continued safe flight.

[Amdt. 27-2, 33 FR 964, Jan. 26, 1968]

Subpart G—Operating Limitations and Information

§27.1501 General.

(a) Each operating limitation specified in §§27.1503 through 27.1525 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crewmembers as prescribed in §§27.1541 through 27.1589. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 27-14, 43 FR 2325, Jan. 16, 1978]

Operating Limitations

§27.1503 Airspeed limitations: general.

(a) An operating speed range must be established.

(b) When airspeed limitations are a function of weight, weight distribution, altitude, rotor speed, power, or other factors, airspeed limitations corresponding with the critical combinations of these factors must be established.

§27.1505 Never-exceed speed.

(a) The never-exceed speed, V_{NE}, must be established so that it is --

(1) Not less than 40 knots (CAS); and

(2) Not more than the lesser of --

(i) 0.9 times the maximum forward speeds established under §27.309;

(ii) 0.9 times the maximum speed shown under §§27.251 and 27.629; or

(iii) 0.9 times the maximum speed substantiated for advancing blade tip mach number effects.

(b) V_{NE} may vary with altitude, r.p.m., temperature, and weight, if --

(1) No more than two of these variables (or no more than two instruments integrating more than one of these variables) are used at one time; and

(2) The ranges of these variables (or of the indications on instruments integrating more than one of these variables) are large enough to allow an operationally practical and safe variation of V_{NE}.

(c) For helicopters, a stabilized power-off V_{NE} denoted as V_{NE} (power-off) may be established at a speed less than V_{NE} established pursuant to paragraph (a) of this section, if the following conditions are met:

(1) V_{NE} (power-off) is not less than a speed midway between the power-on V_{NE} and the speed used in meeting the requirements of --

(i) §27.65(b) for single engine helicopters; and

(ii) §27.67 for multiengine helicopters.

(2) V_{NE} (power-off) is --

(i) A constant airspeed;

(ii) A constant amount less than power-on V_{NE}; or

(iii) A constant airspeed for a portion of the altitude range for which certification is requested, and a constant amount less than power-on V_{NE} for the remainder of the altitude range. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 27-2, 33 FR 964, Jan. 26, 1968, and Amdt. 27-14, 43 FR 2325, Jan. 16, 1978; Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1509 Rotor speed.

(a) *Maximum power-off (autorotation).* The maximum power-off rotor speed must be established so that it does not exceed 95 percent of the lesser of --

(1) The maximum design r.p.m. determined under §27.309(b); and

(2) The maximum r.p.m. shown during the type tests.

(b) *Minimum power off.* The minimum power-off rotor speed must be established so that it is not less than 105 percent of the greater of --

(1) The minimum shown during the type tests; and

(2) The minimum determined by design substantiation.

(c) *Minimum power on.* The minimum power-on rotor speed must be established so that it is --

(1) Not less than the greater of --

(i) The minimum shown during the type tests; and

(ii) The minimum determined by design substantiation; and

(2) Not more than a value determined under §27.33(a)(1) and (b)(1).

§27.1519 Weight and center of gravity.

The weight and center of gravity limitations determined under §§27.25 and 27.27, respectively, must be established as operating limitations.

[Amdt. 27-2, 33 FR 965, Jan. 26, 1968, as amended by Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1521 Powerplant limitations.

(a) *General.* The powerplant limitations prescribed in this section must be established so that they do not exceed the corresponding limits for which the engines are type certificated.

(b) *Takeoff operation.* The powerplant takeoff operation must be limited by --

(1) The maximum rotational speed, which may not be greater than --

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable manifold pressure (for reciprocating engines);

(3) The time limit for the use of the power corresponding to the limitations established in paragraphs (b)(1) and (2) of this section;

(4) If the time limit in paragraph (b)(3) of this section exceeds two minutes, the maximum allowable cylinder head, coolant outlet, or oil temperatures;

(5) The gas temperature limits for turbine engines over the range of operating and atmospheric conditions for which certification is requested.

(c) *Continuous operation.* The continuous operation must be limited by --

(1) The maximum rotational speed which may not be greater than --

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The minimum rotational speed shown under the rotor speed requirements in §27.1509(c); and

(3) The gas temperature limits for turbine engines over the range of operating and atmospheric conditions for which certification is requested.

(d) *Fuel grade or designation.* The minimum fuel grade (for reciprocating engines), or fuel designation (for turbine engines), must be established so that it is not less than that required for the operation of the engines within the limitations in paragraphs (b) and (c) of this section.

(e) *Turboshaft engine torque.* For rotorcraft with main rotors driven by turboshaft engines, and that do not have a torque limiting device in the transmission system, the following apply:

(1) A limit engine torque must be established if the maximum torque that the engine can exert is greater than --

(i) The torque that the rotor drive system is designed to transmit; or

(ii) The torque that the main rotor assembly is designed to withstand in showing compliance with §27.547(e).

(2) The limit engine torque established under paragraph (e)(1) of this section may not exceed either torque specified in paragraph (e)(1)(i) or (ii) of this section.

(f) *Ambient temperature.* For turbine engines, ambient temperature limitations (including limitations for winterization installations, if applicable) must be established as the maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§27.1041 through 27.1045 is shown.

(g) *Two and one-half-minute OEI power operation.* Unless otherwise authorized, the use of 2 1/2-minute OEI power must be limited to engine failure operation of multiengine, turbine-powered rotorcraft for not longer than 2 1/2 minutes after failure of an engine. The use of 2 1/2-minute OEI power must also be limited by --

(1) The maximum rotational speed, which may not be greater than --

(i) The maximum value determined by the rotor design; or

(ii) The maximum demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

(h) *Thirty-minute OEI power operation.* Unless otherwise authorized, the use of 30-minute OEI power must be limited to multiengine, turbine-powered rotorcraft for not longer than 30 minutes after failure of an engine. The use of 30-minute OEI power must also be limited by --

(1) The maximum rotational speed, which may not be greater than --

(i) The maximum value determined by the rotor design; or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

(i) Continuous OEI power operation. Unless otherwise authorized, the use of continuous OEI power must be limited to multiengine, turbine-powered rotorcraft for continued flight after failure of an engine. The use of continuous OEI power must also be limited by --

(1) The maximum rotational speed, which may not be greater than --

(i) The maximum value determined by the rotor design; or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

(j) *Rated 30-second OEI power operation.* Rated 30-second OEI power is permitted only on multiengine, turbine-powered rotorcraft, also certificated for the use of rated 2-minute OEI power, and can only be used for continued operation of the remaining engine(s) after a failure or precautionary shutdown of an engine. It must be shown that following application of 30-second OEI power, any damage will be readily detectable by the applicable inspections and other related procedures furnished in accordance with Section A27.4 of appendix A of this part and Section A33.4 of appendix A of part 33. The use of 30-second OEI power must be limited to not more than 30 seconds for any period in which that power is used, and by --

(1) The maximum rotational speed, which may not be greater than --

(i) The maximum value determined by the rotor design; or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque.

(k) *Rated 2-minute OEI power operation.* Rated 2-minute OEI power is permitted only on multiengine, turbine-powered rotorcraft, also certificated for the use of rated 30-second OEI power, and can only be used for continued operation of the remaining engine(s) after a failure or precautionary shutdown of an engine. It must be shown that following application of 2-minute OEI power, any damage will be readily detectable by the applicable inspections and other related procedures furnished in accordance with Section A27.4 of appendix A of this part and Section A33.4 of appendix A of part 33. The use of 2-minute OEI power must be limited to not more than 2 minutes for any period in which that power is used, and by --

(1) The maximum rotational speed, which may not be greater than --

(i) The maximum value determined by the rotor design; or

(ii) The maximum value demonstrated during the type tests;

(2) The maximum allowable gas temperature; and

(3) The maximum allowable torque. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-14, 43 FR 2325, Jan. 16, 1978; Amdt. 27-23, 53 FR 34214, Sept. 2, 1988; Amdt. 27-29, 59 FR 47767, Sept. 16, 1994]

§27.1523 Minimum flight crew.
The minimum flight crew must be established so that it is sufficient for safe operation, considering --

(a) The workload on individual crewmembers;

(b) The accessibility and ease of operation of necessary controls by the appropriate crewmember; and

(c) The kinds of operation authorized under §27.1525.

§27.1525 Kinds of operations.

The kinds of operations (such as VFR, IFR, day, night, or icing) for which the rotorcraft is approved are established by demonstrated compliance with the applicable certification requirements and by the installed equipment.

[Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1527 Maximum operating altitude.
The maximum altitude up to which operation is allowed, as limited by flight, structural, powerplant, functional, or equipment characteristics, must be established. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 27-14, 43 FR 2325, Jan. 16, 1978]

§27.1529 Instructions for Continued Airworthiness.
The applicant must prepare Instructions for Continued Airworthiness in accordance with appendix A
to this part that are acceptable to the Administrator. The instructions may be incomplete at type certification if a program exists to ensure their completion prior to delivery of the first rotorcraft or issuance of a standard certificate of airworthiness, whichever occurs later.

[Amdt. 27-18, 45 FR 60177, Sept. 11, 1980]

Markings and Placards

§27.1541 General.

(a) The rotorcraft must contain --

(1) The markings and placards specified in §§27.1545 through 27.1565, and

(2) Any additional information, instrument markings, and placards required for the safe operation of rotorcraft with unusual design, operating or handling characteristics.

(b) Each marking and placard prescribed in paragraph (a) of this section --

(1) Must be displayed in a conspicuous place; and

(2) May not be easily erased, disfigured, or obscured.

§27.1543 Instrument markings: general.
For each instrument --

(a) When markings are on the cover glass of the instrument, there must be means to maintain the correct alignment of the glass cover with the face of the dial; and

(b) Each arc and line must be wide enough, and located, to be clearly visible to the pilot.

§27.1545 Airspeed indicator.

(a) Each airspeed indicator must be marked as specified in paragraph (b) of this section, with the marks located at the corresponding indicated airspeeds.

(b) The following markings must be made:

(1) A red radial line --

(i) For rotocraft other than helicopters, at VNE; and

(ii) For helicopters at VNE (power-on).

(2) A red cross-hatched radial line at VNE (power-off) for helicopters, if VNE (power-off) is less than VNE (power-on).

(3) For the caution range, a yellow arc.

(4) For the safe operating range, a green arc. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-14, 43 FR 2325, Jan. 16, 1978; 43 FR 3900, Jan. 30, 1978; Amdt. 27-16, 43 FR 50599, Oct. 30, 1978]

§27.1547 Magnetic direction indicator.

(a) A placard meeting the requirements of this section must be installed on or near the the magnetic direction indicator.

(b) The placard must show the calibration of the instrument in level flight with the engines operating.

(c) The placard must state whether the calibration was made with radio receivers on or off.

(d) Each calibration reading must be in terms of magnetic heading in not more than 45 degree increments.

(e) If a magnetic nonstabilized direction indicator can have a deviation of more than 10 degrees caused by the operation of electrical equipment, the placard must state which electrical loads, or combination of loads, would cause a deviation of more than 10 degrees when turned on. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-13, 42 FR 36972, July 18, 1977]

§27.1549 Powerplant instruments.

For each required powerplant instrument, as appropriate to the type of instrument --

(a) Each maximum and, if applicable, minimum safe operating limit must be marked with a red radial or a red line;

(b) Each normal operating range must be marked with a green arc or green line, not extending beyond the maximum and minimum safe limits;

(c) Each takeoff and precautionary range must be marked with a yellow arc or yellow line;

(d) Each engine or propeller range that is restricted because of excessive vibration stresses must be marked with red arcs or red lines; and

(e) Each OEI limit or approved operating range must be marked to be clearly differentiated from the markings of paragraphs (a) through (d) of this section except that no marking is normally required for the 30-second OEI limit.

[Amdt. 27-11, 41 FR 55470, Dec. 20, 1976, as amended by Amdt. 27-23, 53 FR 34215, Sept. 2, 1988; Amdt. 27-29, 59 FR 47768, Sept. 16, 1994]

§27.1551 Oil quantity indicator.
Each oil quantity indicator must be marked with enough increments to indicate readily and accurately the quantity of oil.

§27.1553 Fuel quantity indicator.
If the unusable fuel supply for any tank exceeds one gallon, or five percent of the tank capacity, whichever is greater, a red arc must be marked on its indicator extending from the calibrated zero reading to the lowest reading obtainable in level flight.

§27.1555 Control markings.

(a) Each cockpit control, other than primary flight controls or control whose function is obvious, must be plainly marked as to its function and method of operation.

(b) For powerplant fuel controls --

(1) Each fuel tank selector control must be marked to indicate the position corresponding to each tank and to each existing cross feed position;

(2) If safe operation requires the use of any tanks in a specific sequence, that sequence must be marked on, or adjacent to, the selector for those tanks; and

(3) Each valve control for any engine of a multiengine rotorcraft must be marked to indicate the position corresponding to each engine controlled.

(c) Usable fuel capacity must be marked as follows:

(1) For fuel systems having no selector controls, the usable fuel capacity of the system must be indicated at the fuel quantity indicator.

(2) For fuel systems having selector controls, the usable fuel capacity available at each selector control position must be indicated near the selector control.

(d) For accessory, auxiliary, and emergency controls --

(1) Each essential visual position indicator, such as those showing rotor pitch or landing gear position, must be marked so that each crewmember can determine at any time the position of the unit to which it relates; and

(2) Each emergency control must be red and must be marked as to method of operation.

(e) For rotorcraft incorporating retractable landing gear, the maximum landing gear operating speed must be displayed in clear view of the pilot.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-11, 41 FR 55470, Dec. 20, 1976; Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1557 Miscellaneous markings and placards.

(a) *Baggage and cargo compartments, and ballast location.* Each baggage and cargo compartment, and each ballast location must have a placard stating any limitations on contents, including weight, that are necessary under the loading requirements.

(b) *Seats.* If the maximum allowable weight to be carried in a seat is less than 170 pounds, a placard stating the lesser weight must be permanently attached to the seat structure.

(c) *Fuel and oil filler openings.* The following apply:

(1) Fuel filler openings must be marked at or near the filler cover with --

(i) The word “fuel”;

(ii) For reciprocating engine powered rotorcraft, the minimum fuel grade;

(iii) For turbine engine powered rotorcraft, the permissible fuel designations; and

(iv) For pressure fueling systems, the maximum permissible fueling supply pressure and the maximum permissible defueling pressure.

(2) Oil filler openings must be marked at or near the filler cover with the word "oil".

(d) *Emergency exit placards.* Each placard and operating control for each emergency exit must be red. A placard must be near each emergency exit control and must clearly indicate the location of that exit and its method of operation.

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-11, 41 FR 55471, Dec. 20, 1976]

§27.1559 Limitations placard.

There must be a placard in clear view of the pilot that specifies the kinds of operations (such as VFR, IFR, day, night, or icing) for which the rotorcraft is approved.

[Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1561 Safety equipment.

(a) Each safety equipment control to be operated by the crew in emergency, such as controls for automatic liferaft releases, must be plainly marked as to its method of operation.

(b) Each location, such as a locker or compartment, that carries any fire extinguishing, signaling, or other life saving equipment, must be so marked.

§27.1565 Tail rotor.

Each tail rotor must be marked so that its disc is conspicuous under normal daylight ground conditions.

[Amdt. 27-2, 33 FR 965, Jan. 26, 1968]

Rotorcraft Flight Manual and Approved Manual Material

§27.1581 General.

(a) *Furnishing information.* A Rotorcraft Flight Manual must be furnished with each rotorcraft, and it must contain the following:

(1) Information required by §§27.1583 through 27.1589.

(2) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) *Approved information.* Each part of the manual listed in §§27.1583 through 27.1589, that is appropriate to the rotorcraft, must be furnished, verified, and approved, and must be segregated, identified, and clearly distinguished from each unapproved part of that manual.

(c) [Reserved]

(d) *Table of contents.* Each Rotorcraft Flight Manual must include a table of contents if the complexity of the manual indicates a need for it. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 27-14, 43 FR 2325, Jan. 16, 1978]

§27.1583 Operating limitations.

(a) *Airspeed and rotor limitations.* Information necessary for the marking of airspeed and rotor limitations on, or near, their respective indicators must be furnished. The significance of each limitation and of the color coding must be explained.

(b) *Powerplant limitations.* The following information must be furnished:

(1) Limitations required by §27.1521.

(2) Explanation of the limitations, when appropriate.

(3) Information necessary for marking the instruments required by §§27.1549 through 27.1553.

(c) *Weight and loading distribution.* The weight and center of gravity limits required by §§27.25 and 27.27, respectively, must be furnished. If the variety of possible loading conditions warrants, instructions must be included to allow ready observance of the limitations.

(d) *Flight crew.* When a flight crew of more than one is required, the number and functions of the minimum flight crew determined under §27.1523 must be furnished.

(e) *Kinds of operation.* Each kind of operation for which the rotorcraft and its equipment installations are approved must be listed.

(f) [Reserved]

(g) *Altitude.* The altitude established under §27.1527 and an explanation of the limiting factors must be furnished. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-2, 33 FR 965, Jan. 26, 1968; Amdt. 27-14, 43 FR 2325, Jan. 16, 1978; Amdt. 27-16, 43 FR 50599, Oct. 30, 1978]

§27.1585 Operating procedures.

(a) Parts of the manual containing operating procedures must have information concerning any normal and emergency procedures and other information necessary for safe operation, including takeoff and landing procedures and associated airspeeds. The manual must contain any pertinent information including --

(1) The kind of takeoff surface used in the tests and each appropriate climbout speed; and

(2) The kind of landing surface used in the tests and appropriate approach and glide airspeeds.

(b) For multiengine rotorcraft, information identifying each operating condition in which the fuel system independence prescribed in §27.953 is necessary for safety must be furnished, together with instructions for placing the fuel system in a configuration used to show compliance with that section.

(c) For helicopters for which a VNE (power-off) is established under §27.1505(c), information must be furnished to explain the VNE (power-off) and the procedures for reducing airspeed to not more than the VNE (power-off) following failure of all engines.

(d) For each rotorcraft showing compliance with §27.1353 (g)(2) or (g)(3), the operating procedures for disconnecting the battery from its charging source must be furnished.

(e) If the unusable fuel supply in any tank exceeds five percent of the tank capacity, or one gallon, whichever is greater, information must be furnished which indicates that when the fuel quantity indicator reads “zero” in level flight, any fuel remaining in the fuel tank cannot be used safely in flight.

(f) Information on the total quantity of usable fuel for each fuel tank must be furnished.

(g) The airspeeds and rotor speeds for minimum rate of descent and best glide angle as prescribed in §27.71 must be provided. (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 27-1, 32 FR 6914, May 5, 1967, as amended by Amdt. 27-14, 43 FR 2326, Jan. 16, 1978; Amdt. 27-16, 43 FR 50599, Oct. 30, 1978; Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1587 Performance information.

(a) The rotorcraft must be furnished with the following information, determined in accordance with §§27.51 through 27.79 and 27.143(c):

(1) Enough information to determine the limiting height-speed envelope.

(2) Information relative to --

(i) The hovering ceilings and the steady rates of climb and descent, as affected by any pertinent factors such as airspeed, temperature, and altitude;

(ii) The maximum safe wind for operation near the ground. If there are combinations of weight, altitude, and temperature for which performance information is provided and at which the rotorcraft cannot land and takeoff safely with the maximum wind value, those portions of the operating envelope and the appropriate safe wind conditions shall be identified in the flight manual;

(iii) For reciprocating engine-powered rotorcraft, the maximum atmospheric temperature at which compliance with the cooling provisions of §§27.1041 through 27.1045 is shown; and

(iv) Glide distance as a function of altitude when autorotating at the speeds and conditions for minimum rate of descent and best glide as determined in §27.71.

(b) The Rotorcraft Flight Manual must contain --

(1) In its performance information section any pertinent information concerning the takeoff weights and altitudes used in compliance with §27.51; and

(i) Any pertinent information concerning the takeoff procedure, including the kind of takeoff surface used in the tests and each appropriate climb- out speed; and

(ii) Any pertinent landing procedures, including the kind of landing surface used in the tests and appropriate approach and glide airspeeds; and

(2) The horizontal takeoff distance determined in accordance with §27.65(a)(2)(i). (Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c) of the Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5074, 29 FR 15695, Nov. 24, 1964, as amended by Amdt. 27-14, 43 FR 2326, Jan. 16, 1978; Amdt. 27-21, 49 FR 44435, Nov. 6, 1984]

§27.1589 Loading information.

There must be loading instructions for each possible loading condition between the maximum and minimum weights determined under §27.25 that can result in a center of gravity beyond any extreme prescribed in §27.27, assuming any probable occupant weights.

Appendix A to Part 27—Instructions for Continued Airworthiness

A27.1 General.

(a) This appendix specifies requirements for the preparation of Instructions for Continued Airworthiness as required by §27.1529.

(b) The Instructions for Continued Airworthiness for each rotorcraft must include the Instructions for Continued Airworthiness for each engine and rotor (hereinafter designated 'products'), for each appliance required by this chapter, and any required information relating to the interface of those appliances and products with the rotorcraft. If Instructions for Continued Airworthiness are not supplied by the manufacturer of an appliance or product installed in the rotorcraft, the Instructions for Continued Airworthiness for the rotorcraft must include the information essential to the continued airworthiness of the rotorcraft.

(c) The applicant must submit to the FAA a program to show how changes to the Instructions for Continued Airworthiness made by the applicant or by the manufacturers of products and appliances installed in the rotorcraft will be distributed.

A27.2 Format.

(a) The Instructions for Continued Airworthiness must be in the form of a manual or manuals as appropriate for the quantity of data to be provided.

(b) The format of the manual or manuals must provide for a practical arrangement.

A27.3 Content.

The contents of the manual or manuals must be prepared in the English language. The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:

(a) *Rotorcraft maintenance manual or section.*

(1) Introduction information that includes an explanation of the rotorcraft's features and data to the extent necessary for maintenance or preventive maintenance.

(2) A description of the rotorcraft and its systems and installations including its engines, rotors, and appliances.

(3) Basic control and operation information describing how the rotorcraft components and systems are controlled and how they operate, including any special procedures and limitations that apply.

(4) Servicing information that covers details regarding servicing points, capacities of tanks, reservoirs, types of fluids to be used, pressures applicable to the various systems, location of access panels for inspection and servicing, locations of lubrication points, the lubricants to be used, equipment required for servicing, tow instructions and limitations, mooring, jacking, and leveling information.

(b) *Maintenance instructions.*

(1) Scheduling information for each part of the rotorcraft and its engines, auxiliary power units, rotors, accessories, instruments and equipment that provides the recommended periods at which they should be cleaned, inspected, adjusted, tested, and lubricated, and the degree of inspection, the applicable wear tolerances, and work recommended at these periods. However, the applicant may refer to an accessory, instrument, or equipment manufacturer as the source of this information if the applicant shows the item has an exceptionally high degree of complexity requiring specialized maintenance techniques, test equipment, or expertise. The recommended overhaul periods and necessary cross references to the Airworthiness Limitations section of the manual must also be included. In addition, the applicant must include an inspection program that includes the frequency and extent of the inspections necessary to provide for the continued airworthiness of the rotorcraft.

(2) Troubleshooting information describing problem malfunctions, how to recognize those malfunctions, and the remedial action for those malfunctions.

(3) Information describing the order and method of removing and replacing products and parts with any necessary precautions to be taken.

(4) Other general procedural instructions including procedures for system testing during ground running, symmetry checks, weighing and determining the center of gravity, lifting and shoring, and storage limitations.

(c) Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided.

(d) Details for the application of special inspection techniques including radiographic and ultrasonic testing where such processes are specified.

(e) Information needed to apply protective treatments to the structure after inspection.

(f) All data relative to structural fasteners such as identification, discarded recommendations, and torque values.

(g) A list of special tools needed.

A27.4 Airworthiness Limitations section.

The Instructions for Continued Airworthiness must contain a section, titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure approved under §27.571. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads: "The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved."

[Amdt. 27-17, 45 FR 60178, Sept. 11, 1980, as amended by Amdt. 27-24, 54 FR 34329, Aug. 18, 1989]

PART 39—AIRWORTHINESS DIRECTIVES

§39.1 Purpose of this regulation.

The regulations in this part provide a legal framework for FAA's system of Airworthiness Directives.

§39.3 Definition of airworthiness directives.

FAA's airworthiness directives are legally enforceable rules that apply to the following products: aircraft, aircraft engines, propellers, and appliances.

§39.5 When does FAA issue airworthiness directives?

FAA issues an airworthiness directive addressing a product when we find that:

(a) An unsafe condition exists in the product; and

(b) The condition is likely to exist or develop in other products of the same type design.

§39.7 What is the legal effect of failing to comply with an airworthiness directive?

Anyone who operates a product that does not meet the requirements of an applicable airworthiness directive is in violation of this section.

§39.9 What if I operate an aircraft or use a product that does not meet the requirements of an airworthiness directive?

If the requirements of an airworthiness directive have not been met, you violate §39.7 each time you operate the aircraft or use the product.

§39.11 What actions do airworthiness directives require?

Airworthiness directives specify inspections you must carry out, conditions and limitations you must comply with, and any actions you must take to resolve an unsafe condition.

§39.13 Are airworthiness directives part of the Code of Federal Regulations?

Yes, airworthiness directives are part of the Code of Federal Regulations, but they are not codified in the annual edition. FAA publishes airworthiness directives in full in the FEDERAL REGISTER as amendments to §39.13.

Editorial Note: For a complete list of citations to airworthiness directives published in the FEDERAL REGISTER, consult the following publications: For airworthiness directives published in the FEDERAL REGISTER since 1986, see the entries for 14 CFR 39.13 in the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access. For citations to prior amendments, see the entries for 14 CFR 39.13 in the separate publications "List of CFR Sections Affected, 1973-1985" and "List of CFR Sections Affected, 1964-1972," and the entries for 14 CFR 507.10 in the "List of Sections Affected, 1949-1963." See also the annual editions of the Federal Register Index for subject matter references and citations to FAA airworthiness directives. For a list of aircraft service documents approved by the Director of the Federal Register for incorporation by reference in this part under 5 U.S.C. 552(a) and 1 CFR 51, see Material Approved for Incorporation by Reference, which appears in the Finding Aids section of the printed volume and on GPO Access.

§39.15 Does an airworthiness directive apply if the product has been changed?

Yes, an airworthiness directive applies to each product identified in the airworthiness directive, even if an individual product has been changed by modifying, altering, or repairing it in the area addressed by the airworthiness directive.

§39.17 What must I do if a change in a product affects my ability to accomplish the actions required in an airworthiness directive?

If a change in a product affects your ability to accomplish the actions required by the airworthiness directive in any way, you must request FAA approval of an alternative method of compliance. Unless you can show the change eliminated the unsafe condition, your request should include the specific actions that you propose to address the unsafe condition. Submit your request in the manner described in §39.19.

§39.19 May I address the unsafe condition in a way other than that set out in the airworthiness directive?

Yes, anyone may propose to FAA an alternative method of compliance or a change in the compliance time, if the proposal provides an acceptable level of safety. Unless FAA authorizes otherwise, send your proposal to your principal inspector. Include the specific actions you are proposing to address the unsafe condition. The principal inspector may add comments and will send your request to the manager of the office identified in the airworthiness directive (manager). You may send a copy to the manager at the same time you send it to the principal inspector. If you do not have a principal inspector send your proposal directly to the manager. You may use the alternative you propose only if the manager approves it.

§39.21 Where can I get information about FAA-approved alternative methods of compliance?

Each airworthiness directive identifies the office responsible for approving alternative methods of compliance. That office can provide information about alternatives it has already approved.

§39.23 May I fly my aircraft to a repair facility to do the work required by an airworthiness directive?

Yes, the operations specifications giving some operators authority to operate include a provision that allow them to fly their aircraft to a repair facility to do the work required by an airworthiness directive. If you do not have this authority, the local Flight Standards District Office of FAA may issue you a special flight permit unless the airworthiness directive states otherwise. To ensure aviation safety, FAA may add special requirements for operating your aircraft to a place where the repairs or modifications can be accomplished. FAA may also decline to issue a special flight permit in particular cases if we determine you cannot move the aircraft safely.

§39.25 How do I get a special flight permit?

Apply to FAA for a special flight permit following the procedures in 14 CFR 21.199.

§39.27 What do I do if the airworthiness directive conflicts with the service document on which it is based?

In some cases an airworthiness directive incorporates by reference a manufacturer’s service document. In these cases, the service document becomes part of the airworthiness directive. In some cases the directions in the service document may be modified by the airworthiness directive. If there is a conflict between the service document and the airworthiness directive, you must follow the requirements of the airworthiness directive.

PART 43—MAINTENANCE, PREVENTIVE MAINTENANCE, REBUILDING, AND ALTERATION

§ 43.1 Applicability.

(a) Except as provided in paragraphs (b) and (d) of this section, this part prescribes rules governing the maintenance, preventive maintenance, rebuilding, and alteration of any—

(1) Aircraft having a U.S. airworthiness certificate;

(2) Foreign-registered civil aircraft used in common carriage or carriage of mail under the provisions of Part 121 or 135 of this chapter; and

(3) Airframe, aircraft engines, propellers, appliances, and component parts of such aircraft.

(b) This part does not apply to any aircraft for which the FAA has issued an experimental certificate, unless the FAA has previously issued a different kind of airworthiness certificate for that aircraft.

(c) This part applies to all life-limited parts that are removed from a type certificated product, segregated, or controlled as provided in §43.10.

(d) This part applies to any aircraft issued a special airworthiness certificate in the light-sport category except:

(1) The repair or alteration form specified in §§43.5(b) and 43.9(d) is not required to be completed for products not produced under an FAA approval;

(2) Major repairs and major alterations for products not produced under an FAA approval are not required to be recorded in accordance with appendix B of this part; and

(3) The listing of major alterations and major repairs specified in paragraphs (a) and (b) of appendix A of this part is not applicable to products not produced under an FAA approval.

[Doc. No. 1993, 29 FR 5451, Apr. 23, 1964, as amended by Amdt. 43–23, 47 FR 41084, Sept. 16, 1982; Amdt. 43–37, 66 FR 21066, Apr. 27, 2001; Amdt. 43–38, 67 FR 2109, Jan. 15, 2002; Amdt. 43–39, 69 FR 44863, July 27, 2004]

§ 43.2 Records of overhaul and rebuilding.

(a) No person may describe in any required maintenance entry or form an aircraft, airframe, aircraft engine, propeller, appliance, or component part as being overhauled unless—

(1) Using methods, techniques, and practices acceptable to the Administrator, it has been disassembled, cleaned, inspected, repaired as necessary, and reassembled; and

(2) It has been tested in accordance with approved standards and technical data, or in accordance with current standards and technical data accepteble to the Administrator, which have been developed and documented by the holder of the type certificate, supplemental type certificate, or a material, part, process, or applicance approval under §21.305 of this chapter.

(b) No person may describe in any required maintenance entry or form an aircraft, airframe, aircraft engine, propeller, appliance, or component part as being rebuilt unless it has been disassembled, cleaned, inspected, repaired as necessary, reassembled, and tested to the same tolerances and limits as a new item, using either new parts or used parts that either conform to new part tolerances and limits or to approved oversized or undersized dimensions.

[Amdt. 43–23, 47 FR 41084, Sept. 16, 1982]

§ 43.3 Persons authorized to perform maintenance, preventive maintenance, rebuilding, and alterations.

(a) Except as provided in this section and §43.17, no person may maintain, rebuild, alter, or perform preventive maintenance on an aircraft, airframe, aircraft engine, propeller, appliance, or component part to which this part applies. Those items, the performance of which is a major alteration, a major repair, or preventive maintenance, are listed in appendix A.

(b) The holder of a mechanic certificate may perform maintenance, preventive maintenance, and alterations as provided in Part 65 of this chapter.

(c) The holder of a repairman certificate may perform maintenance, preventive maintenance, and alterations as provided in part 65 of this chapter.

(d) A person working under the supervision of a holder of a mechanic or repairman certificate may perform the maintenance, preventive maintenance, and alterations that his supervisor is authorized to perform, if the supervisor personally observes the work being done to the extent necessary to ensure that it is being done properly and if the supervisor is readily available, in person, for consultation. However, this paragraph does not authorize the performance of any inspection required by Part 91 or Part 125 of this chapter or any inspection performed after a major repair or alteration.

(e) The holder of a repair station certificate may perform maintenance, preventive maintenance, and alterations as provided in Part 145 of this chapter.

(f) The holder of an air carrier operating certificate or an operating certificate issued under Part 121 or 135, may perform maintenance, preventive maintenance, and alterations as provided in Part 121 or 135.

(g) Except for holders of a sport pilot certificate, the holder of a pilot certificate issued under part 61 may perform preventive maintenance on any aircraft owned or operated by that pilot which is not used under part 121, 129, or 135 of this chapter. The holder of a sport pilot certificate may perform preventive maintenance on an aircraft owned or operated by that pilot and issued a special airworthiness certificate in the light-sport category.

(h) Notwithstanding the provisions of paragraph (g) of this section, the Administrator may approve a certificate holder under Part 135 of this chapter, operating rotorcraft in a remote area, to allow a pilot to perform specific preventive maintenance items provided—

(1) The items of preventive maintenance are a result of a known or suspected mechanical difficulty or malfunction that occurred en route to or in a remote area;

(2) The pilot has satisfactorily completed an approved training program and is authorized in writing by the certificate holder for each item of preventive maintenance that the pilot is authorized to perform;

(3) There is no certificated mechanic available to perform preventive maintenance;

(4) The certificate holder has procedures to evaluate the accomplishment of a preventive maintenance item that requires a decision concerning the airworthiness of the rotorcraft; and

(5) The items of preventive maintenance authorized by this section are those listed in paragraph (c) of appendix A of this part.

(i) Notwithstanding the provisions of paragraph (g) of this section, in accordance with an approval issued to the holder of a certificate issued under part 135 of this chapter, a pilot of an aircraft type-certificated for 9 or fewer passenger seats, excluding any pilot seat, may perform the removal and reinstallation of approved aircraft cabin seats, approved cabin-mounted stretchers, and when no tools are required, approved cabin-mounted medical oxygen bottles, provided—

(1) The pilot has satisfactorily completed an approved training program and is authorized in writing by the certificate holder to perform each task; and

(2) The certificate holder has written procedures available to the pilot to evaluate the accomplishment of the task.

(j) A manufacturer may—

(1) Rebuild or alter any aircraft, aircraft engine, propeller, or appliance manufactured by him under a type or production certificate;

(2) Rebuild or alter any appliance or part of aircraft, aircraft engines, propellers, or appliances manufactured by him under a Technical Standard Order Authorization, an FAA-Parts Manufacturer Approval, or Product and Process Specification issued by the Administrator; and

(3) Perform any inspection required by Part 91 or Part 125 of this chapter on aircraft it manufacturers, while currently operating under a production certificate or under a currently approved production inspection system for such aircraft.

[Doc. No. 1993, 29 FR 5451, Apr. 23, 1964, as amended by Amdt. 43–4, 31 FR 5249, Apr. 1, 1966; Amdt. 43–23, 47 FR 41084, Sept. 16, 1982; Amdt. 43–25, 51 FR 40702, Nov. 7, 1986; Amdt. 43–36, 61 FR 19501, May 1, 1996; Amdt. 43–37, 66 FR 21066, Apr. 27, 2001; Amdt. 43–39, 69 FR 44863, July 27, 2004]

§ 43.5 Approval for return to service after maintenance, preventive maintenance, rebuilding, or alteration.

No person may approve for return to service any aircraft, airframe, aircraft engine, propeller, or appliance, that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—

(a) The maintenance record entry required by §43.9 or §43.11, as appropriate, has been made;

(b) The repair or alteration form authorized by or furnished by the Administrator has been executed in a manner prescribed by the Administrator; and

(c) If a repair or an alteration results in any change in the aircraft operating limitations or flight data contained in the approved aircraft flight manual, those operating limitations or flight data are appropriately revised and set forth as prescribed in §91.9 of this chapter.

[Doc. No. 1993, 29 FR 5451, Apr. 23, 1964, as amended by Amdt. 43–23, 47 FR 41084, Sept. 16, 1982; Amdt. 43–31, 54 FR 34330, Aug. 18, 1989]

§ 43.7 Persons authorized to approve aircraft, airframes, aircraft engines, propellers, appliances, or component parts for return to service after maintenance, preventive maintenance, rebuilding, or alteration.

(a) Except as provided in this section and §43.17, no person, other than the Administrator, may approve an aircraft, airframe, aircraft engine, propeller, appliance, or component part for return to service after it has undergone maintenance, preventive maintenance, rebuilding, or alteration.

(b) The holder of a mechanic certificate or an inspection authorization may approve an aircraft, airframe, aircraft engine, propeller, appliance, or component part for return to service as provided in Part 65 of this chapter.

(c) The holder of a repair station certificate may approve an aircraft, airframe, aircraft engine, propeller, appliance, or component part for return to service as provided in Part 145 of this chapter.

(d) A manufacturer may approve for return to service any aircraft, airframe, aircraft engine, propeller, appliance, or component part which that manufacturer has worked on under §43.3(j). However, except for minor alterations, the work must have been done in accordance with technical data approved by the Administrator.

(e) The holder of an air carrier operating certificate or an operating certificate issued under Part 121 or 135, may approve an aircraft, airframe, aircraft engine, propeller, appliance, or component part for return to service as provided in Part 121 or 135 of this chapter, as applicable.

(f) A person holding at least a private pilot certificate may approve an aircraft for return to service after performing preventive maintenance under the provisions of §43.3(g).

(g) The holder of a repairman certificate (light-sport aircraft) with a maintenance rating may approve an aircraft issued a special airworthiness certificate in light-sport category for return to service, as provided in part 65 of this chapter.

(h) The holder of at least a sport pilot certificate may approve an aircraft owned or operated by that pilot and issued a special airworthiness certificate in the light-sport category for return to service after performing preventive maintenance under the provisions of §43.3(g).

[Amdt. 43–23, 47 FR 41084, Sept. 16, 1982, as amended by Amdt. 43–36, 61 FR 19501, May 1, 1996; Amdt. 43–37, 66 FR 21066, Apr. 27, 2001; Amdt. 43–39, 69 FR 44863, July 27, 2004]

§ 43.9 Content, form, and disposition of maintenance, preventive maintenance, rebuilding, and alteration records (except inspections performed in accordance with part 91, part 125, §135.411(a)(1), and §135.419 of this chapter).

(a) *Maintenance record entries.* Except as provided in paragraphs (b) and (c) of this section, each person who maintains, performs preventive maintenance, rebuilds, or alters an aircraft, airframe, aircraft engine, propeller, appliance, or component part shall make an entry in the maintenance record of that equipment containing the following information:

(1) A description (or reference to data acceptable to the Administrator) of work performed.

(2) The date of completion of the work performed.

(3) The name of the person performing the work if other than the person specified in paragraph (a)(4) of this section.

(4) If the work performed on the aircraft, airframe, aircraft engine, propeller, appliance, or component part has been performed satisfactorily, the signature, certificate number, and kind of certificate held by the person approving the work. The signature constitutes the approval for return to service only for the work performed.

(b) Each holder of an air carrier operating certificate or an operating certificate issued under Part 121 or 135, that is required by its approved operations specifications to provide for a continuous airworthiness maintenance program, shall make a record of the maintenance, preventive maintenance, rebuilding, and alteration, on aircraft, airframes, aircraft engines, propellers, appliances, or component parts which it operates in accordance with the applicable provisions of Part 121 or 135 of this chapter, as appropriate.

(c) This section does not apply to persons performing inspections in accordance with Part 91, 125, §135.411(a)(1), or §135.419 of this chapter.

(d) In addition to the entry required by paragraph (a) of this section, major repairs and major alterations shall be entered on a form, and the form disposed of, in the manner prescribed in appendix B, by the person performing the work.

[Amdt. 43–23, 47 FR 41085, Sept. 16, 1982, as amended by Amdt. 43–37, 66 FR 21066, Apr. 27, 2001; Amdt. 43–39, 69 FR 44863, July 27, 2004]

§ 43.10 Disposition of life-limited aircraft parts.

(a) *Definitions used in this section.* For the purposes of this section the following definitions apply.

Life-limited part means any part for which a mandatory replacement limit is specified in the type design, the Instructions for Continued Airworthiness, or the maintenance manual.

Life status means the accumulated cycles, hours, or any other mandatory replacement limit of a life-limited part.

(b) *Temporary removal of parts from type-certificated products.* When a life-limited part is temporarily removed and reinstalled for the purpose of performing maintenance, no disposition under paragraph (c) of this section is required if—

(1) The life status of the part has not changed;

(2) The removal and reinstallation is performed on the same serial numbered product; and

(3) That product does not accumulate time in service while the part is removed.

(c) *Disposition of parts removed from type-certificated products.* Except as provided in paragraph (b) of this section, after April 15, 2002 each person who removes a life-limited part from a type-certificated product must ensure that the part is controlled using one of the methods in this paragraph. The method must deter the installation of the part after it has reached its life limit. Acceptable methods include:

(1) *Record keeping system.* The part may be controlled using a record keeping system that substantiates the part number, serial number, and current life status of the part. Each time the part is removed from a type certificated product, the record must be updated with the current life status. This system may include electronic, paper, or other means of record keeping.

(2) *Tag or record attached to part.* A tag or other record may be attached to the part. The tag or record must include the part number, serial number, and current life status of the part. Each time the part is removed from a type certificated product, either a new tag or record must be created, or the existing tag or record must be updated with the current life status.

(3) *Non-permanent marking.* The part may be legibly marked using a non-permanent method showing its current life status. The life status must be updated each time the part is removed from a type certificated product, or if the mark is removed, another method in this section may be used. The mark must be accomplished in accordance with the instructions under §45.16 of this chapter in order to maintain the integrity of the part.

(4) *Permanent marking.* The part may be legibly marked using a permanent method showing its current life status. The life status must be updated each time the part is removed from a type certificated product. Unless the part

is permanently removed from use on type certificated products, this permanent mark must be accomplished in accordance with the instructions under §45.16 of this chapter in order to maintain the integrity of the part.

(5) *Segregation.* The part may be segregated using methods that deter its installation on a type-certificated product. These methods must include, at least—

(i) Maintaining a record of the part number, serial number, and current life status, and

(ii) Ensuring the part is physically stored separately from parts that are currently eligible for installation.

(6) *Mutilation.* The part may be mutilated to deter its installation in a type certificated produce. The mutilation must render the part beyond repair and incapable of being reworked to appear to be airworthy.

(7) *Other methods.* Any other method approved or accepted by the FAA.

(d) *Transfer of life-limited parts.* Each person who removes a life-limited part from a type certificated product and later sells or otherwise transfers that part must transfer with the part the mark, tag, or other record used to comply with this section, unless the part is mutilated before it is sold or transferred.

[Doc. No. FAA–2000–8017, 67 FR 2110, Jan. 15, 2002]

§ 43.11 Content, form, and disposition of records for inspections conducted under parts 91 and 125 and §§135.411(a)(1) and 135.419 of this chapter.

(a) *Maintenance record entries.* The person approving or disapproving for return to service an aircraft, airframe, aircraft engine, propeller, appliance, or component part after any inspection performed in accordance with part 91, 125, §135.411(a)(1), or §135.419 shall make an entry in the maintenance record of that equipment containing the following information:

(1) The type of inspection and a brief description of the extent of the inspection.

(2) The date of the inspection and aircraft total time in service.

(3) The signature, the certificate number, and kind of certificate held by the person approving or disapproving for return to service the aircraft, airframe, aircraft engine, propeller, appliance, component part, or portions thereof.

(4) Except for progressive inspections, if the aircraft is found to be airworthy and approved for return to service, the following or a similarly worded statement—"I certify that this aircraft has been inspected in accordance with (insert type) inspection and was determined to be in airworthy condition."

(5) Except for progressive inspections, if the aircraft is not approved for return to service because of needed maintenance, noncompliance with applicable specifications, airworthiness directives, or other approved data, the following or a similarly worded statement—"I certify that this aircraft has been inspected in accordance with (insert type) inspection and a list of discrepancies and unairworthy items dated (date) has been provided for the aircraft owner or operator."

(6) For progressive inspections, the following or a similarly worded statement—"I certify that in accordance with a progressive inspection program, a routine inspection of (identify whether aircraft or components) and a detailed inspection of (identify components) were performed and the (aircraft or components) are (approved or disapproved) for return to service." If disapproved, the entry will further state "and a list of discrepancies and unairworthy items dated (date) has been provided to the aircraft owner or operator."

(7) If an inspection is conducted under an inspection program provided for in part 91, 125, or §135.411(a)(1), the entry must identify the inspection program, that part of the inspection program accomplished, and contain a statement that the inspection was performed in accordance with the inspections and procedures for that particular program.

(b) *Listing of discrepancies and placards.* If the person performing any inspection required by part 91 or 125 or §135.411(a)(1) of this chapter finds that the aircraft is unairworthy or does not meet the applicable type certificate data, airworthiness directives, or other approved data upon which its airworthiness depends, that persons must give the owner or lessee a signed and dated list of those discrepancies. For those items permitted to be inoperative under §91.213(d)(2) of this chapter, that person shall place a placard, that meets the aircraft's airworthiness certification

regulations, on each inoperative instrument and the cockpit control of each item of inoperative equipment, marking it "Inoperative," and shall add the items to the signed and dated list of discrepancies given to the owner or lessee.

[Amdt. 43–23, 47 FR 41085, Sept. 16, 1982, as amended by Amdt. 43–30, 53 FR 50195, Dec. 13, 1988; Amdt. 43–36, 61 FR 19501, May 1, 1996; 71 FR 44188, Aug. 4, 2006]

§ 43.12 Maintenance records: Falsification, reproduction, or alteration.

(a) No person may make or cause to be made:

(1) Any fraudulent or intentionally false entry in any record or report that is required to be made, kept, or used to show compliance with any requirement under this part;

(2) Any reproduction, for fraudulent purpose, of any record or report under this part; or

(3) Any alteration, for fraudulent purpose, of any record or report under this part.

(b) The commission by any person of an act prohibited under paragraph (a) of this section is a basis for suspending or revoking the applicable airman, operator, or production certificate, Technical Standard Order Authorization, FAA-Parts Manufacturer Approval, or Product and Process Specification issued by the Administrator and held by that person.

[Amdt. 43–19, 43 FR 22639, May 25, 1978, as amended by Amdt. 43–23, 47 FR 41085, Sept. 16, 1982]

§ 43.13 Performance rules (general).

(a) Each person performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance shall use the methods, techniques, and practices prescribed in the current manufacturer's maintenance manual or Instructions for Continued Airworthiness prepared by its manufacturer, or other methods, techniques, and practices acceptable to the Administrator, except as noted in §43.16. He shall use the tools, equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices. If special equipment or test apparatus is recommended by the manufacturer involved, he must use that equipment or apparatus or its equivalent acceptable to the Administrator.

(b) Each person maintaining or altering, or performing preventive maintenance, shall do that work in such a manner and use materials of such a quality, that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition (with regard to aerodynamic function, structural strength, resistance to vibration and deterioration, and other qualities affecting airworthiness).

(c) *Special provisions for holders of air carrier operating certificates and operating certificates issued under the provisions of Part 121 or 135 and Part 129 operators holding operations specifications.* Unless otherwise notified by the administrator, the methods, techniques, and practices contained in the maintenance manual or the maintenance part of the manual of the holder of an air carrier operating certificate or an operating certificate under Part 121 or 135 and Part 129 operators holding operations specifications (that is required by its operating specifications to provide a continuous airworthiness maintenance and inspection program) constitute acceptable means of compliance with this section.

[Doc. No. 1993, 29 FR 5451, Apr. 23, 1964, as amended by Amdt. 43–20, 45 FR 60182, Sept. 11, 1980; Amdt. 43–23, 47 FR 41085, Sept. 16, 1982; Amdt. 43–28, 52 FR 20028, June 16, 1987; Amdt. 43–37, 66 FR 21066, Apr. 27, 2001]

§ 43.15 Additional performance rules for inspections.

(a) *General.* Each person performing an inspection required by part 91, 125, or 135 of this chapter, shall—

(1) Perform the inspection so as to determine whether the aircraft, or portion(s) thereof under inspection, meets all applicable airworthiness requirements; and

(2) If the inspection is one provided for in part 125, 135, or §91.409(e) of this chapter, perform the inspection in accordance with the instructions and procedures set forth in the inspection program for the aircraft being inspected.

(b) *Rotorcraft.* Each person performing an inspection required by Part 91 on a rotorcraft shall inspect the following systems in accordance with the maintenance manual or Instructions for Continued Airworthiness of the manufacturer concerned:

(1) The drive shafts or similar systems.

(2) The main rotor transmission gear box for obvious defects.

(3) The main rotor and center section (or the equivalent area).

(4) The auxiliary rotor on helicopters.

(c) *Annual and 100-hour inspections.*

(1) Each person performing an annual or 100-hour inspection shall use a checklist while performing the inspection. The checklist may be of the person's own design, one provided by the manufacturer of the equipment being inspected or one obtained from another source. This checklist must include the scope and detail of the items contained in appendix D to this part and paragraph (b) of this section.

(2) Each person approving a reciprocating-engine-powered aircraft for return to service after an annual or 100-hour inspection shall, before that approval, run the aircraft engine or engines to determine satisfactory performance in accordance with the manufacturer's recommendations of—

(i) Power output (static and idle r.p.m.);

(ii) Magnetos;

(iii) Fuel and oil pressure; and

(iv) Cylinder and oil temperature.

(3) Each person approving a turbine-engine-powered aircraft for return to service after an annual, 100-hour, or progressive inspection shall, before that approval, run the aircraft engine or engines to determine satisfactory performance in accordance with the manufacturer's recommendations.

(d) *Progressive inspection.*

(1) Each person performing a progressive inspection shall, at the start of a progressive inspection system, inspect the aircraft completely. After this initial inspection, routine and detailed inspections must be conducted as prescribed in the progressive inspection schedule. Routine inspections consist of visual examination or check of the appliances, the aircraft, and its components and systems, insofar as practicable without disassembly. Detailed inspections consist of a thorough examination of the appliances, the aircraft, and its components and systems, with such disassembly as is necessary. For the purposes of this subparagraph, the overhaul of a component or system is considered to be a detailed inspection.

(2) If the aircraft is away from the station where inspections are normally conducted, an appropriately rated mechanic, a certificated repair station, or the manufacturer of the aircraft may perform inspections in accordance with the procedures and using the forms of the person who would otherwise perform the inspection.

[Doc. No. 1993, 29 FR 5451, Apr. 23, 1964, as amended by Amdt. 43–23, 47 FR 41086, Sept. 16, 1982; Amdt. 43–25, 51 FR 40702, Nov. 7, 1986; Amdt. 43–31, 54 FR 34330, Aug. 18, 1989; 71 FR 44188, Aug. 4, 2006]

§ 43.16 Airworthiness limitations.

Each person performing an inspection or other maintenance specified in an Airworthiness Limitations section of a manufacturer's maintenance manual or Instructions for Continued Airworthiness shall perform the inspection or other maintenance in accordance with that section, or in accordance with operations specifications approved by the Administrator under part 121 or 135, or an inspection program approved under §91.409(e).

[71 FR 44188, Aug. 4, 2006]

§ 43.17 Maintenance, preventive maintenance, and alterations performed on U.S. aeronautical products by certain Canadian persons.

(a) *Definitions.* For purposes of this section:

Aeronautical product means any civil aircraft or airframe, aircraft engine, propeller, appliance, component, or part to be installed thereon.

Canadian aeronautical product means any aeronautical product under airworthiness regulation by Transport Canada Civil Aviation.

U.S. aeronautical product means any aeronautical product under airworthiness regulation by the FAA.

(b) *Applicability.* This section does not apply to any U.S. aeronautical products maintained or altered under any bilateral agreement made between Canada and any country other than the United States.

(c) *Authorized persons.*

(1) A person holding a valid Transport Canada Civil Aviation Maintenance Engineer license and appropriate ratings may, with respect to a U.S.-registered aircraft located in Canada, perform maintenance, preventive maintenance, and alterations in accordance with the requirements of paragraph (d) of this section and approve the affected aircraft for return to service in accordance with the requirements of paragraph (e) of this section.

(2) A Transport Canada Civil Aviation Approved Maintenance Organization (AMO) holding appropriate ratings may, with respect to a U.S.-registered aircraft or other U.S. aeronautical products located in Canada, perform maintenance, preventive maintenance, and alterations in accordance with the requirements of paragraph (d) of this section and approve the affected products for return to service in accordance with the requirements of paragraph (e) of this section.

(d) *Performance requirements.* A person authorized in paragraph (c) of this section may perform maintenance (including any inspection required by Sec. 91.409 of this chapter, except an annual inspection), preventive maintenance, and alterations, provided—

(1) The person performing the work is authorized by Transport Canada Civil Aviation to perform the same type of work with respect to Canadian aeronautical products;

(2) The maintenance, preventive maintenance, or alteration is performed in accordance with a Bilateral Aviation Safety Agreement between the United States and Canada and associated Maintenance Implementation Procedures that provide a level of safety equivalent to that provided by the provisions of this chapter;

(3) The maintenance, preventive maintenance, or alteration is performed such that the affected product complies with the applicable requirements of part 36 of this chapter; and

(4) The maintenance, preventive maintenance, or alteration is recorded in accordance with a Bilateral Aviation Safety Agreement between the United States and Canada and associated Maintenance Implementation Procedures that provide a level of safety equivalent to that provided by the provisions of this chapter.

(e) *Approval requirements.*

(1) To return an affected product to service, a person authorized in paragraph (c) of this section must approve (certify) maintenance, preventive maintenance, and alterations performed under this section, except that an Aircraft Maintenance Engineer may not approve a major repair or major alteration.

(2) An AMO whose system of quality control for the maintenance, preventive maintenance, alteration, and inspection of aeronautical products has been approved by Transport Canada Civil Aviation, or an authorized employee performing work for such an AMO, may approve (certify) a major repair or major alteration performed under this section if the work was performed in accordance with technical data approved by the FAA.

(f) No person may operate in air commerce an aircraft, airframe, aircraft engine, propeller, or appliance on which maintenance, preventive maintenance, or alteration has been performed under this section unless it has been approved for return to service by a person authorized in this section.

[Amdt. 43–33, 56 FR 57571, Nov. 12, 1991, as amended by Amdt. 43–40, 71 FR 40877, July 14, 2005]

Appendix A to Part 43—Major Alterations, Major Repairs, and Preventive Maintenance

(a) *Major alterations—*

(1) *Airframe major alterations.* Alterations of the following parts and alterations of the following types, when not listed in the aircraft specifications issued by the FAA, are airframe major alterations:

(i) Wings.

(ii) Tail surfaces.

(iii) Fuselage.

(iv) Engine mounts.

(v) Control system.

(vi) Landing gear.

(vii) Hull or floats.

(viii) Elements of an airframe including spars, ribs, fittings, shock absorbers, bracing, cowling, fairings, and balance weights.

(ix) Hydraulic and electrical actuating system of components.

(x) Rotor blades.

(xi) Changes to the empty weight or empty balance which result in an increase in the maximum certificated weight or center of gravity limits of the aircraft.

(xii) Changes to the basic design of the fuel, oil, cooling, heating, cabin pressurization, electrical, hydraulic, de-icing, or exhaust systems.

(xiii) Changes to the wing or to fixed or movable control surfaces which affect flutter and vibration characteristics.

(2) *Powerplant major alterations.* The following alterations of a powerplant when not listed in the engine specifications issued by the FAA, are powerplant major alterations.

(i) Conversion of an aircraft engine from one approved model to another, involving any changes in compression ratio, propeller reduction gear, impeller gear ratios or the substitution of major engine parts which requires extensive rework and testing of the engine.

(ii) Changes to the engine by replacing aircraft engine structural parts with parts not supplied by the original manufacturer or parts not specifically approved by the Administrator.

(iii) Installation of an accessory which is not approved for the engine.

(iv) Removal of accessories that are listed as required equipment on the aircraft or engine specification.

(v) Installation of structural parts other than the type of parts approved for the installation.

(vi) Conversions of any sort for the purpose of using fuel of a rating or grade other than that listed in the engine specifications.

(3) *Propeller major alterations.* The following alterations of a propeller when not authorized in the propeller specifications issued by the FAA are propeller major alterations:

(i) Changes in blade design.

(ii) Changes in hub design.

(iii) Changes in the governor or control design.

(iv) Installation of a propeller governor or feathering system.

(v) Installation of propeller de-icing system.

(vi) Installation of parts not approved for the propeller.

(4) *Appliance major alterations.* Alterations of the basic design not made in accordance with recommendations of the appliance manufacturer or in accordance with an FAA Airworthiness Directive are appliance major alterations. In addition, changes in the basic design of radio communication and navigation equipment approved under type certification or a Technical Standard Order that have an effect on frequency stability, noise level, sensitivity, selectivity, distortion, spurious radiation, AVC characteristics, or ability to meet environmental test conditions and other changes that have an effect on the performance of the equipment are also major alterations.

(b) *Major repairs—*

(1) *Airframe major repairs.* Repairs to the following parts of an airframe and repairs of the following types, involving the strengthening, reinforcing, splicing, and manufacturing of primary structural members or their replacement, when replacement is by fabrication such as riveting or welding, are airframe major repairs.

(i) Box beams.

(ii) Monocoque or semimonocoque wings or control surfaces.

(iii) Wing stringers or chord members.

(iv) Spars.

(v) Spar flanges.

(vi) Members of truss-type beams.

(vii) Thin sheet webs of beams.

(viii) Keel and chine members of boat hulls or floats.

(ix) Corrugated sheet compression members which act as flange material of wings or tail surfaces.

(x) Wing main ribs and compression members.

(xi) Wing or tail surface brace struts.

(xii) Engine mounts.

(xiii) Fuselage longerons.

(xiv) Members of the side truss, horizontal truss, or bulkheads.

(xv) Main seat support braces and brackets.

(xvi) Landing gear brace struts.

(xvii) Axles.

(xviii) Wheels.

(xix) Skis, and ski pedestals.

(xx) Parts of the control system such as control columns, pedals, shafts, brackets, or horns.

(xxi) Repairs involving the substitution of material.

(xxii) The repair of damaged areas in metal or plywood stressed covering exceeding six inches in any direction.

(xxiii) The repair of portions of skin sheets by making additional seams.

(xxiv) The splicing of skin sheets.

(xxv) The repair of three or more adjacent wing or control surface ribs or the leading edge of wings and control surfaces, between such adjacent ribs.

(xxvi) Repair of fabric covering involving an area greater than that required to repair two adjacent ribs.

(xxvii) Replacement of fabric on fabric covered parts such as wings, fuselages, stabilizers, and control surfaces.

(xxviii) Repairing, including rebottoming, of removable or integral fuel tanks and oil tanks.

(2) *Powerplant major repairs.* Repairs of the following parts of an engine and repairs of the following types, are powerplant major repairs:

(i) Separation or disassembly of a crankcase or crankshaft of a reciprocating engine equipped with an integral supercharger.

(ii) Separation or disassembly of a crankcase or crankshaft of a reciprocating engine equipped with other than spur-type propeller reduction gearing.

(iii) Special repairs to structural engine parts by welding, plating, metalizing, or other methods.

(3) *Propeller major repairs.* Repairs of the following types to a propeller are propeller major repairs:

(i) Any repairs to, or straightening of steel blades.

(ii) Repairing or machining of steel hubs.

(iii) Shortening of blades.

(iv) Retipping of wood propellers.

(v) Replacement of outer laminations on fixed pitch wood propellers.

(vi) Repairing elongated bolt holes in the hub of fixed pitch wood propellers.

(vii) Inlay work on wood blades.

(viii) Repairs to composition blades.

(ix) Replacement of tip fabric.

(x) Replacement of plastic covering.

(xi) Repair of propeller governors.

(xii) Overhaul of controllable pitch propellers.

(xiii) Repairs to deep dents, cuts, scars, nicks, etc., and straightening of aluminum blades.

(xiv) The repair or replacement of internal elements of blades.

(4) *Appliance major repairs.* Repairs of the following types to appliances are appliance major repairs:

(i) Calibration and repair of instruments.

(ii) Calibration of radio equipment.

(iii) Rewinding the field coil of an electrical accessory.

(iv) Complete disassembly of complex hydraulic power valves.

(v) Overhaul of pressure type carburetors, and pressure type fuel, oil and hydraulic pumps.

(c) *Preventive maintenance.* Preventive maintenance is limited to the following work, provided it does not involve complex assembly operations:

(1) Removal, installation, and repair of landing gear tires.

(2) Replacing elastic shock absorber cords on landing gear.

(3) Servicing landing gear shock struts by adding oil, air, or both.

(4) Servicing landing gear wheel bearings, such as cleaning and greasing.

(5) Replacing defective safety wiring or cotter keys.

(6) Lubrication not requiring disassembly other than removal of nonstructural items such as cover plates, cowlings, and fairings.

(7) Making simple fabric patches not requiring rib stitching or the removal of structural parts or control surfaces. In the case of balloons, the making of small fabric repairs to envelopes (as defined in, and in accordance with, the balloon manufacturers' instructions) not requiring load tape repair or replacement.

(8) Replenishing hydraulic fluid in the hydraulic reservoir.

(9) Refinishing decorative coating of fuselage, balloon baskets, wings tail group surfaces (excluding balanced control surfaces), fairings, cowlings, landing gear, cabin, or cockpit interior when removal or disassembly of any primary structure or operating system is not required.

(10) Applying preservative or protective material to components where no disassembly of any primary structure or operating system is involved and where such coating is not prohibited or is not contrary to good practices.

(11) Repairing upholstery and decorative furnishings of the cabin, cockpit, or balloon basket interior when the repairing does not require disassembly of any primary structure or operating system or interfere with an operating system or affect the primary structure of the aircraft.

(12) Making small simple repairs to fairings, nonstructural cover plates, cowlings, and small patches and reinforcements not changing the contour so as to interfere with proper air flow.

(13) Replacing side windows where that work does not interfere with the structure or any operating system such as controls, electrical equipment, etc.

(14) Replacing safety belts.

(15) Replacing seats or seat parts with replacement parts approved for the aircraft, not involving disassembly of any primary structure or operating system.

(16) Trouble shooting and repairing broken circuits in landing light wiring circuits.

(17) Replacing bulbs, reflectors, and lenses of position and landing lights.

(18) Replacing wheels and skis where no weight and balance computation is involved.

(19) Replacing any cowling not requiring removal of the propeller or disconnection of flight controls.

(20) Replacing or cleaning spark plugs and setting of spark plug gap clearance.

(21) Replacing any hose connection except hydraulic connections.

(22) Replacing prefabricated fuel lines.

(23) Cleaning or replacing fuel and oil strainers or filter elements.

(24) Replacing and servicing batteries.

(25) Cleaning of balloon burner pilot and main nozzles in accordance with the balloon manufacturer's instructions.

(26) Replacement or adjustment of nonstructural standard fasteners incidental to operations.

(27) The interchange of balloon baskets and burners on envelopes when the basket or burner is designated as interchangeable in the balloon type certificate data and the baskets and burners are specifically designed for quick removal and installation.

(28) The installations of anti-misfueling devices to reduce the diameter of fuel tank filler openings provided the specific device has been made a part of the aircraft type certificiate data by the aircraft manufacturer, the aircraft manufacturer has provided FAA-approved instructions for installation of the specific device, and installation does not involve the disassembly of the existing tank filler opening.

(29) Removing, checking, and replacing magnetic chip detectors.

(30) The inspection and maintenance tasks prescribed and specifically identified as preventive maintenance in a primary category aircraft type certificate or supplemental type certificate holder's approved special inspection and preventive maintenance program when accomplished on a primary category aircraft provided:

(i) They are performed by the holder of at least a private pilot certificate issued under part 61 who is the registered owner (including co-owners) of the affected aircraft and who holds a certificate of competency for the affected aircraft (1) issued by a school approved under §147.21(e) of this chapter; (2) issued by the holder of the production certificate for that primary category aircraft that has a special training program approved under §21.24 of this subchapter; or (3) issued by another entity that has a course approved by the Administrator; and

(ii) The inspections and maintenance tasks are performed in accordance with instructions contained by the special inspection and preventive maintenance program approved as part of the aircraft's type design or supplemental type design.

(31) Removing and replacing self-contained, front instrument panel-mounted navigation and communication devices that employ tray-mounted connectors that connect the unit when the unit is installed into the instrument panel, (excluding automatic flight control systems, transponders, and microwave frequency distance measuring equipment (DME)). The approved unit must be designed to be readily and repeatedly removed and replaced, and pertinent instructions must be provided. Prior to the unit's intended use, and operational check must be performed in accordance with the applicable sections of part 91 of this chapter.

(32) Updating self-contained, front instrument panel-mounted Air Traffic Control (ATC) navigational software data bases (excluding those of automatic flight control systems, transponders, and microwave frequency distance measuring equipment (DME)) provided no disassembly of the unit is required and pertinent instructions are provided. Prior to the unit's intended use, an operational check must be performed in accordance with applicable sections of part 91 of this chapter. (Secs. 313, 601 through 610, and 1102, Federal Aviation Act of 1958 as amended (49 U.S.C. 1354, 1421 through 1430 and 1502); (49 U.S.C. 106(g) (Revised Pub. L. 97–449, Jan. 21, 1983); and 14 CFR 11.45)

[Doc. No. 1993, 29 FR 5451, Apr. 23, 1964, as amended by Amdt. 43–14, 37 FR 14291, June 19, 1972; Amdt. 43–23, 47 FR 41086, Sept. 16, 1982; Amdt. 43–24, 49 FR 44602, Nov. 7, 1984; Amdt. 43–25, 51 FR 40703, Nov. 7, 1986; Amdt. 43–27, 52 FR 17277, May 6, 1987; Amdt. 43–34, 57 FR 41369, Sept. 9, 1992; Amdt. 43–36, 61 FR 19501, May 1, 1996]

Appendix B to Part 43—Recording of Major Repairs and Major Alterations

(a) Except as provided in paragraphs (b), (c), and (d) of this appendix, each person performing a major repair or major alteration shall—

(1) Execute FAA Form 337 at least in duplicate;

(2) Give a signed copy of that form to the aircraft owner; and

(3) Forward a copy of that form to the FAA Aircraft Registration Branch in Oklahoma City, Oklahoma, within 48 hours after the aircraft, airframe, aircraft engine, propeller, or appliance is approved for return to service.

(b) For major repairs made in accordance with a manual or specifications acceptable to the Administrator, a certificated repair station may, in place of the requirements of paragraph (a)—

(1) Use the customer's work order upon which the repair is recorded;

(2) Give the aircraft owner a signed copy of the work order and retain a duplicate copy for at least two years from the date of approval for return to service of the aircraft, airframe, aircraft engine, propeller, or appliance;

(3) Give the aircraft owner a maintenance release signed by an authorized representative of the repair station and incorporating the following information:

(i) Identity of the aircraft, airframe, aircraft engine, propeller or appliance.

(ii) If an aircraft, the make, model, serial number, nationality and registration marks, and location of the repaired area.

(iii) If an airframe, aircraft engine, propeller, or appliance, give the manufacturer's name, name of the part, model, and serial numbers (if any); and

(4) Include the following or a similarly worded statement—

"The aircraft, airframe, aircraft engine, propeller, or appliance identified above was repaired and inspected in accordance with current Regulations of the Federal Aviation Agency and is approved for return to service.

Pertinent details of the repair are on file at this repair station under Order No. ___,

Date_____

Signed_____

For signature of authorized representative)

Repair station name) (Certificate No.) _____."

(Address)

(c) Except as provided in paragraph (d) of this appendix, for a major repair or major alteration made by a person authorized in §43.17, the person who performs the major repair or major alteration and the person authorized by §43.17 to approve that work shall execute an FAA Form 337 at least in duplicate. A completed copy of that form shall be—

(1) Given to the aircraft owner; and

(2) Forwarded to the Federal Aviation Administration, Aircraft Registration Branch, AFS–750, Post Office Box 25504, Oklahoma City, OK 73125, within 48 hours after the work is inspected.

(d) For extended-range fuel tanks installed within the passenger compartment or a baggage compartment, the person who performs the work and the person authorized to approve the work by §43.7 shall execute an FAA Form 337 in at least triplicate. A completed copy of that form shall be—

(1) Placed on board the aircraft as specified in §91.417 of this chapter;

(2) Given to the aircraft owner; and

(3) Forwarded to the Federal Aviation Administration, Aircraft Registration Branch, AFS–751, Post Office Box 25724, Oklahoma City, OK 73125, within 48 hours after the work is inspected.

(Secs. 101, 610, 72 Stat. 737, 780, 49 U.S.C. 1301, 1430)

[Doc. No. 1993, 29 FR 5451, Apr. 23, 1964, as amended by Amdt. 43–10, 33 FR 15989, Oct. 31, 1968; Amdt. 43–29, 52 FR 34101, Sept. 9, 1987; Amdt. 43–31, 54 FR 34330, Aug. 18, 1989; 71 FR 58495, Oct. 4, 2006; Amdt. 43–41, 72 FR 53680, Sept. 20, 2007]

Appendix C to Part 43 [Reserved]

Appendix D to Part 43—Scope and Detail of Items (as Applicable to the Particular Aircraft) To Be Included in Annual and 100-Hour Inspections

(a) Each person performing an annual or 100-hour inspection shall, before that inspection, remove or open all necessary inspection plates, access doors, fairing, and cowling. He shall thoroughly clean the aircraft and aircraft engine.

(b) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the fuselage and hull group:

(1) Fabric and skin—for deterioration, distortion, other evidence of failure, and defective or insecure attachment of fittings.

(2) Systems and components—for improper installation, apparent defects, and unsatisfactory operation.

(3) Envelope, gas bags, ballast tanks, and related parts—for poor condition.

(c) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the cabin and cockpit group:

(1) Generally—for uncleanliness and loose equipment that might foul the controls.

(2) Seats and safety belts—for poor condition and apparent defects.

(3) Windows and windshields—for deterioration and breakage.

(4) Instruments—for poor condition, mounting, marking, and (where practicable) improper operation.

(5) Flight and engine controls—for improper installation and improper operation.

(6) Batteries—for improper installation and improper charge.

(7) All systems—for improper installation, poor general condition, apparent and obvious defects, and insecurity of attachment.

(d) Each person performing an annual or 100-hour inspection shall inspect (where applicable) components of the engine and nacelle group as follows:

(1) Engine section—for visual evidence of excessive oil, fuel, or hydraulic leaks, and sources of such leaks.

(2) Studs and nuts—for improper torquing and obvious defects.

(3) Internal engine—for cylinder compression and for metal particles or foreign matter on screens and sump drain plugs. If there is weak cylinder compression, for improper internal condition and improper internal tolerances.

(4) Engine mount—for cracks, looseness of mounting, and looseness of engine to mount.

(5) Flexible vibration dampeners—for poor condition and deterioration.

(6) Engine controls—for defects, improper travel, and improper safetying.

(7) Lines, hoses, and clamps—for leaks, improper condition and looseness.

(8) Exhaust stacks—for cracks, defects, and improper attachment.

(9) Accessories—for apparent defects in security of mounting.

(10) All systems—for improper installation, poor general condition, defects, and insecure attachment.

(11) Cowling—for cracks, and defects.

(e) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the landing gear group:

(1) All units—for poor condition and insecurity of attachment.

(2) Shock absorbing devices—for improper oleo fluid level.

(3) Linkages, trusses, and members—for undue or excessive wear fatigue, and distortion.

(4) Retracting and locking mechanism—for improper operation.

(5) Hydraulic lines—for leakage.

(6) Electrical system—for chafing and improper operation of switches.

(7) Wheels—for cracks, defects, and condition of bearings.

(8) Tires—for wear and cuts.

(9) Brakes—for improper adjustment.

(10) Floats and skis—for insecure attachment and obvious or apparent defects.

(f) Each person performing an annual or 100-hour inspection shall inspect (where applicable) all components of the wing and center section assembly for poor general condition, fabric or skin deterioration, distortion, evidence of failure, and insecurity of attachment.

(g) Each person performing an annual or 100-hour inspection shall inspect (where applicable) all components and systems that make up the complete empennage assembly for poor general condition, fabric or skin deterioration, distortion, evidence of failure, insecure attachment, improper component installation, and improper component operation.

(h) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the propeller group:

(1) Propeller assembly—for cracks, nicks, binds, and oil leakage.

(2) Bolts—for improper torquing and lack of safetying.

(3) Anti-icing devices—for improper operations and obvious defects.

(4) Control mechanisms—for improper operation, insecure mounting, and restricted travel.

(i) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the radio group:

(1) Radio and electronic equipment—for improper installation and insecure mounting.

(2) Wiring and conduits—for improper routing, insecure mounting, and obvious defects.

(3) Bonding and shielding—for improper installation and poor condition.

(4) Antenna including trailing antenna—for poor condition, insecure mounting, and improper operation.

(j) Each person performing an annual or 100-hour inspection shall inspect (where applicable) each installed miscellaneous item that is not otherwise covered by this listing for improper installation and improper operation.

Appendix E to Part 43—Altimeter System Test and Inspection

Each person performing the altimeter system tests and inspections required by §91.411 shall comply with the following:

(a) Static pressure system:

(1) Ensure freedom from entrapped moisture and restrictions.

(2) Determine that leakage is within the tolerances established in §23.1325 or §25.1325, whichever is applicable.

(3) Determine that the static port heater, if installed, is operative.

(4) Ensure that no alterations or deformations of the airframe surface have been made that would affect the relationship between air pressure in the static pressure system and true ambient static air pressure for any flight condition.

(b) Altimeter:

(1) Test by an appropriately rated repair facility in accordance with the following subparagraphs. Unless otherwise specified, each test for performance may be conducted with the instrument subjected to vibration. When tests are conducted with the temperature substantially different from ambient temperature of approximately 25 degrees C., allowance shall be made for the variation from the specified condition.

(i) Scale error. With the barometric pressure scale at 29.92 inches of mercury, the altimeter shall be subjected successively to pressures corresponding to the altitude specified in Table I up to the maximum normally expected operating altitude of the airplane in which the altimeter is to be installed. The reduction in pressure shall be made at a rate not in excess of 20,000 feet per minute to within approximately 2,000 feet of the test point. The test point shall be approached at a rate compatible with the test equipment. The altimeter shall be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before a reading is taken. The error at all test points must not exceed the tolerances specified in Table I.

(ii) Hysteresis. The hysteresis test shall begin not more than 15 minutes after the altimeter's initial exposure to the pressure corresponding to the upper limit of the scale error test prescribed in subparagraph (i); and while the altimeter is at this pressure, the hysteresis test shall commence. Pressure shall be increased at a rate simulating a descent in altitude at the rate of 5,000 to 20,000 feet per minute until within 3,000 feet of the first test point (50 percent of maximum altitude). The test point shall then be approached at a rate of approximately 3,000 feet per minute. The altimeter shall be kept at this pressure for at least 5 minutes, but not more than 15 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is reached. The altimeter shall be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until atmospheric pressure is reached. The reading of the altimeter at either of the two test points shall not differ by more than the tolerance specified in Table II from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in paragraph (b)(i).

(iii) After effect. Not more than 5 minutes after the completion of the hysteresis test prescribed in paragraph (b)(ii), the reading of the altimeter (corrected for any change in atmospheric pressure) shall not differ from the original atmospheric pressure reading by more than the tolerance specified in Table II.

(iv) Friction. The altimeter shall be subjected to a steady rate of decrease of pressure approximating 750 feet per minute. At each altitude listed in Table III, the change in reading of the pointers after vibration shall not exceed the corresponding tolerance listed in Table III.

(v) Case leak. The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18,000 feet, shall not change the altimeter reading by more than the tolerance shown in Table II during an interval of 1 minute.

(vi) Barometric scale error. At constant atmospheric pressure, the barometric pressure scale shall be set at each of the pressures (falling within its range of adjustment) that are listed in Table IV, and shall cause the pointer to indicate the equivalent altitude difference shown in Table IV with a tolerance of 25 feet.

(2) Altimeters which are the air data computer type with associated computing systems, or which incorporate air data correction internally, may be tested in a manner and to specifications developed by the manufacturer which are acceptable to the Administrator.

(c) Automatic Pressure Altitude Reporting Equipment and ATC Transponder System Integration Test. The test must be conducted by an appropriately rated person under the conditions specified in paragraph (a). Measure the automatic pressure altitude at the output of the installed ATC transponder when interrogated on Mode C at a sufficient number of test points to ensure that the altitude reporting equipment, altimeters, and ATC transponders perform their intended functions as installed in the aircraft. The difference between the automatic reporting output and the altitude displayed at the altimeter shall not exceed 125 feet.

(d) Records: Comply with the provisions of §43.9 of this chapter as to content, form, and disposition of the records. The person performing the altimeter tests shall record on the altimeter the date and maximum altitude to which the altimeter has been tested and the persons approving the airplane for return to service shall enter that data in the airplane log or other permanent record.

Table I

Altitude	Equivalent pressure (inches of mercury)	Tolerance ±(feet)
−1,000	31.018	20
0	29.921	20
500	29.385	20
1,000	28.856	20
1,500	28.335	25
2,000	27.821	30
3,000	26.817	30
4,000	25.842	35
6,000	23.978	40
8,000	22.225	60
10,000	20.577	80
12,000	19.029	90
14,000	17.577	100
16,000	16.216	110
18,000	14.942	120
20,000	13.750	130
22,000	12.636	140
25,000	11.104	155
30,000	8.885	180
35,000	7.041	205
40,000	5.538	230
45,000	4.355	255
50,000	3.425	280

Table II—Test Tolerances

Test	Tolerance (feet)
Case Leak Test	±100
Hysteresis Test:	
First Test Point (50 percent of maximum altitude)	75
Second Test Point (40 percent of maximum altitude)	75
After Effect Test	30

Table III—Friction

Altitude (feet)	Tolerance (feet)
1,000	±70
2,000	70
3,000	70
5,000	70
10,000	80
15,000	90
20,000	100
25,000	120
30,000	140
35,000	160
40,000	180
50,000	250

Table IV—Pressure-Altitude Difference

Pressure (inches of Hg)	Altitude difference (feet)
28.10	−1,727
28.50	−1,340
29.00	−863
29.50	−392
29.92	0
30.50	+531
30.90	+893
30.99	+974

(Secs. 313, 314, and 601 through 610 of the Federal Aviation Act of 1958 (49 U.S.C. 1354, 1355, and 1421 through 1430) and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Amdt. 43–2, 30 FR 8262, June 29, 1965, as amended by Amdt. 43–7, 32 FR 7587, May 24, 1967; Amdt. 43–19, 43 FR 22639, May 25, 1978; Amdt. 43–23, 47 FR 41086, Sept. 16, 1982; Amdt. 43–31, 54 FR 34330, Aug. 18, 1989]

Appendix F to Part 43—ATC Transponder Tests and Inspections

The ATC transponder tests required by §91.413 of this chapter may be conducted using a bench check or portable test equipment and must meet the requirements prescribed in paragraphs (a) through (j) of this appendix. If portable test equipment with appropriate coupling to the aircraft antenna system is used, operate the test equipment for ATCRBS transponders at a nominal rate of 235 interrogations per second to avoid possible ATCRBS interference. Operate the test equipment at a nominal rate of 50 Mode S interrogations per second for Mode S. An additional 3 dB loss is allowed to compensate for antenna coupling errors during receiver sensitivity measurements conducted in accordance with paragraph (c)(1) when using portable test equipment.

(a) Radio Reply Frequency:

(1) For all classes of ATCRBS transponders, interrogate the transponder and verify that the reply frequency is 1090 ±3 Megahertz (MHz).

(2) For classes 1B, 2B, and 3B Mode S transponders, interrogate the transponder and verify that the reply frequency is 1090 ±3 MHz.

(3) For classes 1B, 2B, and 3B Mode S transponders that incorporate the optional 1090 ±1 MHz reply frequency, interrogate the transponder and verify that the reply frequency is correct.

(4) For classes 1A, 2A, 3A, and 4 Mode S transponders, interrogate the transponder and verify that the reply frequency is 1090 ±1 MHz.

(b) Suppression: When Classes 1B and 2B ATCRBS Transponders, or Classes 1B, 2B, and 3B Mode S transponders are interrogated Mode 3/A at an interrogation rate between 230 and 1,000 interrogations per second; or when Classes 1A and 2A ATCRBS Transponders, or Classes 1B, 2A, 3A, and 4 Mode S transponders are interrogated at a rate between 230 and 1,200 Mode 3/A interrogations per second:

(1) Verify that the transponder does not respond to more than 1 percent of ATCRBS interrogations when the amplitude of P2pulse is equal to the P1pulse.

(2) Verify that the transponder replies to at least 90 percent of ATCRBS interrogations when the amplitude of the P2pulse is 9 dB less than the P1pulse. If the test is conducted with a radiated test signal, the interrogation rate shall be 235 ±5 interrogations per second unless a higher rate has been approved for the test equipment used at that location.

(c) Receiver Sensitivity:

(1) Verify that for any class of ATCRBS Transponder, the receiver minimum triggering level (MTL) of the system is −73 ±4 dbm, or that for any class of Mode S transponder the receiver MTL for Mode S format (P6 type) interrogations is −74 ±3 dbm by use of a test set either:

(i) Connected to the antenna end of the transmission line;

(ii) Connected to the antenna terminal of the transponder with a correction for transmission line loss; or

(iii) Utilized radiated signal.

(2) Verify that the difference in Mode 3/A and Mode C receiver sensitivity does not exceed 1 db for either any class of ATCRBS transponder or any class of Mode S transponder.

(d) Radio Frequency (RF) Peak Output Power:

(1) Verify that the transponder RF output power is within specifications for the class of transponder. Use the same conditions as described in (c)(1)(i), (ii), and (iii) above.

(i) For Class 1A and 2A ATCRBS transponders, verify that the minimum RF peak output power is at least 21.0 dbw (125 watts).

(ii) For Class 1B and 2B ATCRBS Transponders, verify that the minimum RF peak output power is at least 18.5 dbw (70 watts).

(iii) For Class 1A, 2A, 3A, and 4 and those Class 1B, 2B, and 3B Mode S transponders that include the optional high RF peak output power, verify that the minimum RF peak output power is at least 21.0 dbw (125 watts).

(iv) For Classes 1B, 2B, and 3B Mode S transponders, verify that the minimum RF peak output power is at least 18.5 dbw (70 watts).

(v) For any class of ATCRBS or any class of Mode S transponders, verify that the maximum RF peak output power does not exceed 27.0 dbw (500 watts).

Note: The tests in (e) through (j) apply only to Mode S transponders.

(e) Mode S Diversity Transmission Channel Isolation: For any class of Mode S transponder that incorporates diversity operation, verify that the RF peak output power transmitted from the selected antenna exceeds the power transmitted from the nonselected antenna by at least 20 db.

(f) Mode S Address: Interrogate the Mode S transponder and verify that it replies only to its assigned address. Use the correct address and at least two incorrect addresses. The interrogations should be made at a nominal rate of 50 interrogations per second.

(g) Mode S Formats: Interrogate the Mode S transponder with uplink formats (UF) for which it is equipped and verify that the replies are made in the correct format. Use the surveillance formats UF=4 and 5. Verify that the altitude reported in the replies to UF=4 are the same as that reported in a valid ATCRBS Mode C reply. Verify that the identity reported in the replies to UF=5 are the same as that reported in a valid ATCRBS Mode 3/A reply. If the transponder is so equipped, use the communication formats UF=20, 21, and 24.

(h) Mode S All-Call Interrogations: Interrogate the Mode S transponder with the Mode S-only all-call format UF=11, and the ATCRBS/Mode S all-call formats (1.6 microsecond P4pulse) and verify that the correct address and capability are reported in the replies (downlink format DF=11).

(i) ATCRBS-Only All-Call Interrogation: Interrogate the Mode S transponder with the ATCRBS-only all-call interrogation (0.8 microsecond P4pulse) and verify that no reply is generated.

(j) Squitter: Verify that the Mode S transponder generates a correct squitter approximately once per second.

(k) Records: Comply with the provisions of §43.9 of this chapter as to content, form, and disposition of the records.

[Amdt. 43–26, 52 FR 3390, Feb. 3, 1987; 52 FR 6651, Mar. 4, 1987, as amended by Amdt. 43–31, 54 FR 34330, Aug. 18, 1989]

PART 45—IDENTIFICATION AND REGISTRATION MARKING

Subpart A—General

§ 45.1 Applicability.

This part prescribes the requirements for—

(a) Identification of aircraft, and identification of aircraft engines and propellers that are manufactured under the terms of a type or production certificate:

(b) Identification of certain replacement and modified parts produced for installation on type certificated products; and

(c) Nationality and registration marking of U.S. registered aircraft.

[Doc. No. 2047, 29 FR 3223, Mar. 11, 1964, as amended by Amdt. 45–3, 32 FR 188, Jan. 10, 1967]

Subpart B—Identification of Aircraft and Related Products

§ 45.11 General.

(a) *Aircraft and aircraft engines.* Aircraft covered under §21.182 of this chapter must be identified, and each person who manufacturers an aircraft engine under a type or production certificate shall identify that engine, by means of a fireproof plate that has the information specified in §45.13 of this part marked on it by etching, stamping, engraving, or other approved method of fireproof marking. The identification plate for aircraft must be secured in such a manner that it will not likely be defaced or removed during normal service, or lost or destroyed in an accident. Except as provided in paragraphs (c), (d), and (e) of this section, the aircraft identification plate must be secured to the aircraft fuselage exterior so that it is legible to a person on the ground, and must be either adjacent to and aft of the rear-most entrance door or on the fuselage surface near the tail surfaces. For aircraft engines, the identification plate must be affixed to the engine at an accessible location in such a manner that it will not likely be defaced or removed during normal service, or lost or destroyed in an accident.

(b) *Propellers and propeller blades and hubs.* Each person who manufactures a propeller, propeller blade, or propeller hub under the terms of a type or production certificate shall identify his product by means of a plate, stamping, engraving, etching, or other approved method of fireproof identification that is placed on it on a noncritical surface, contains the information specified in §45.13, and will not be likely to be defaced or removed during normal service or lost or destroyed in an accident.

(c) For manned free balloons, the identification plate prescribed in paragraph (a) of this section must be secured to the balloon envelope and must be located, if practicable, where it is legible to the operator when the balloon is inflated. In addition, the basket and heater assembly must be permanently and legibly marked with the manufacturer's name, part number (or equivalent) and serial number (or equivalent).

(d) On aircraft manufactured before March 7, 1988, the identification plate required by paragraph (a) of this section may be secured at an accessible exterior or interior location near an entrance, if the model designation and builder's serial number are also displayed on the aircraft fuselage exterior. The model designation and builder's serial number must be legible to a person on the ground and must be located either adjacent to and aft of the rear-most entrance door or on the fuselage near the tail surfaces. The model designation and builder's serial number must be displayed in such a manner that they are not likely to be defaced or removed during normal service.

(e) For powered parachutes and weight-shift-control aircraft, the identification plate prescribed in paragraph (a) of this section must be secured to the aircraft fuselage exterior so that it is legible to a person on the ground.

[Amdt. 45–3, 32 FR 188, Jan. 10, 1967 as amended by Amdt. 45–7, 33 FR 14402, Sept. 25, 1968; Amdt. 45–12, 45 FR 60183, Sept. 11, 1980; 45 FR 85597, Dec. 29, 1980; Amdt. 45–17, 52 FR 34101, Sept. 9, 1987; 52 FR 36566, Sept. 30, 1987; Amdt. 45–24, 69 FR 44863, July 27, 2004]

§ 45.13 Identification data.

(a) The identification required by §45.11 (a) and (b) shall include the following information:

(1) Builder's name.

(2) Model designation.

(3) Builder's serial number.

(4) Type certificate number, if any.

(5) Production certificate number, if any.

(6) For aircraft engines, the established rating.

(7) On or after January 1, 1984, for aircraft engines specified in part 34 of this chapter, the date of manufacture as defined in §34.1 of that part, and a designation, approved by the Administrator of the FAA, that indicates compliance with the applicable exhaust emission provisions of part 34 and 40 CFR part 87. Approved designations include COMPLY, EXEMPT, and NON-US as appropriate.

(i) The designation COMPLY indicates that the engine is in compliance with all of the applicable exhaust emissions provisions of part 34. For any engine with a rated thrust in excess of 26.7 kilonewtons (6000 pounds) which is not used or intended for use in commercial operations and which is in compliance with the applicable provisions of part 34, but does not comply with the hydrocarbon emissions standard of §34.21(d), the statement "May not be used as a commercial aircraft engine" must be noted in the permanent powerplant record that accompanies the engine at the time of manufacture of the engine.

(ii) The designation EXEMPT indicates that the engine has been granted an exemption pursuant to the applicable provision of §34.7 (a)(1), (a)(4), (b), (c), or (d), and an indication of the type of exemption and the reason for the grant must be noted in the permanent powerplant record that accompanies the engine from the time of manufacture of the engine.

(iii) The designation NON-US indicates that the engine has been granted an exemption pursuant to §34.7(a)(1), and the notation "This aircraft may not be operated within the United States", or an equivalent notation approved by the Administrator of the FAA, must be inserted in the aircraft logbook, or alternate equivalent document, at the time of installation of the engine.

(8) Any other information the Administrator finds appropriate.

(b) Except as provided in paragraph (d)(1) of this section, no person may remove, change, or place identification information required by paragraph (a) of this section, on any aircraft, aircraft engine, propeller, propeller blade, or propeller hub, without the approval of the Administrator.

(c) Except as provided in paragraph (d)(2) of this section, no person may remove or install any identification plate required by §45.11 of this part, without the approval of the Administrator.

(d) Persons performing work under the provisions of Part 43 of this chapter may, in accordance with methods, techniques, and practices acceptable to the Administrator—

(1) Remove, change, or place the identification information required by paragraph (a) of this section on any aircraft, aircraft engine, propeller, propeller blade, or propeller hub; or

(2) Remove an identification plate required by §45.11 when necessary during maintenance operations.

(e) No person may install an identification plate removed in accordance with paragraph (d)(2) of this section on any aircraft, aircraft engine, propeller, propeller blade, or propeller hub other than the one from which it was removed.

[Amdt. 45–3, 32 FR 188, Jan. 10, 1967, as amended by Amdt. 45–10, 44 FR 45379, Aug. 2, 1979; Amdt. 45–12, 45 FR 60183, Sept. 11, 1980; Amdt. 45–20, 55 FR 32861, Aug. 10, 1990; 55 FR 37287, Sept. 10, 1990]

§ 45.14 Identification of critical components.

Each person who produces a part for which a replacement time, inspection interval, or related procedure is specified in the Airworthiness Limitations section of a manufacturer's maintenance manual or Instructions for Continued Airworthiness shall permanently and legibly mark that component with a part number (or equivalent) and a serial number (or equivalent).
[Amdt. 45–16, 51 FR 40703, Nov. 7, 1986]

§ 45.15 Replacement and modification parts.

(a) Except as provided in paragraph (b) of this section, each person who produces a replacement or modification part under a Parts Manufacturer Approval issued under §21.303 of this chapter shall permanently and legibly mark the part with—

(1) The letters "FAA-PMA";

(2) The name, trademark, or symbol of the holder of the Parts Manufacturer Approval;

(3) The part number; and

(4) The name and model designation of each type certificated product on which the part is eligible for installation.

(b) If the Administrator finds that a part is too small or that it is otherwise impractical to mark a part with any of the information required by paragraph (a) of this section, a tag attached to the part or its container must include the information that could not be marked on the part. If the marking required by paragraph (a)(4) of this section is so extensive that to mark it on a tag is impractical, the tag attached to the part or the container may refer to a specific readily available manual or catalog for part eligibility information.

[Amdt. 45–8, 37 FR 10660, May 26, 1972, as amended by Amdt. 45–14, 47 FR 13315, Mar. 29, 1982]

§ 45.16 Marking of life-limited parts.

When requested by a person required to comply with §43.10 of this chapter, the holder of a type certificate or design approval for a life-limited part must provide marking instructions, or must state that the part cannot be practicably marked without compromising its integrity. Compliance with this paragraph may be made by providing marking instructions in readily available documents, such as the maintenance manual or the Instructions for Continued Airworthiness.

[Doc. No. FAA–200–8017, 67 FR 2110, Jan. 15, 2002]

Subpart C—Nationality and Registration Marks

§ 45.21 General.

(a) Except as provided in §45.22, no person may operate a U.S.-registered aircraft unless that aircraft displays nationality and registration marks in accordance with the requirements of this section and §§45.23 through 45.33.

(b) Unless otherwise authorized by the Administrator, no person may place on any aircraft a design, mark, or symbol that modifies or confuses the nationality and registration marks.

(c) Aircraft nationality and registration marks must—

(1) Except as provided in paragraph (d) of this section, be painted on the aircraft or affixed by any other means insuring a similar degree of permanence;

(2) Have no ornamentation;

(3) Contrast in color with the background; and

(4) Be legible.

(d) The aircraft nationality and registration marks may be affixed to an aircraft with readily removable material if—

(1) It is intended for immediate delivery to a foreign purchaser;

(2) It is bearing a temporary registration number; or

(3) It is marked temporarily to meet the requirements of §45.22(c)(1) or §45.29(h) of this part, or both.

[Doc. No. 8093, Amdt. 45–5, 33 FR 450, Jan 12, 1968, as amended by Amdt. 45–17, 52 FR 34102, Sept. 9, 1987]

§ 45.22 Exhibition, antique, and other aircraft: Special rules.

(a) When display of aircraft nationality and registration marks in accordance with §§45.21 and 45.23 through 45.33 would be inconsistent with exhibition of that aircraft, a U.S.-registered aircraft may be operated without displaying those marks anywhere on the aircraft if:

(1) It is operated for the purpose of exhibition, including a motion picture or television production, or an airshow;

(2) Except for practice and test fights necessary for exhibition purposes, it is operated only at the location of the exhibition, between the exhibition locations, and between those locations and the base of operations of the aircraft; and

(3) For each flight in the United States:

(i) It is operated with the prior approval of the Flight Standards District Office, in the case of a flight within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for the takeoff airport, or within 4.4 nautical miles of that airport if it is within Class G airspace; or

(ii) It is operated under a flight plan filed under either §91.153 or §91.169 of this chapter describing the marks it displays, in the case of any other flight.

(b) A small U.S.-registered aircraft built at least 30 years ago or a U.S.-registered aircraft for which an experimental certificate has been issued under §21.191(d) or 21.191(g) for operation as an exhibition aircraft or as an amateur-built aircraft and which has the same external configuration as an aircraft built at least 30 years ago may be operated without displaying marks in accordance with §§45.21 and 45.23 through 45.33 if:

(1) It displays in accordance with §45.21(c) marks at least 2 inches high on each side of the fuselage or vertical tail surface consisting of the Roman capital letter "N" followed by:

(i) The U.S. registration number of the aircraft; or

(ii) The symbol appropriate to the airworthiness certificate of the aircraft ("C", standard; "R", restricted; "L", limited; or "X", experimental) followed by the U.S. registration number of the aircraft; and

(2) It displays no other mark that begins with the letter "N" anywhere on the aircraft, unless it is the same mark that is displayed under paragraph (b)(1) of this section.

(c) No person may operate an aircraft under paragraph (a) or (b) of this section—

(1) In an ADIZ or DEWIZ described in Part 99 of this chapter unless it temporarily bears marks in accordance with §§45.21 and 45.23 through 45.33;

(2) In a foreign country unless that country consents to that operation; or

(3) In any operation conducted under Part 121, 133, 135, or 137 of this chapter.

(d) If, due to the configuration of an aircraft, it is impossible for a person to mark it in accordance with §§45.21 and 45.23 through 45.33, he may apply to the Administrator for a different marking procedure.

[Doc. No. 8093, Amdt. 45–5, 33 FR 450, Jan. 12, 1968, as amended by Amdt. 45–13, 46 FR 48603, Oct. 1, 1981; Amdt. 45–19, 54 FR 39291, Sept. 25, 1989; Amdt. 45–18, 54 FR 34330, Aug. 18, 1989; Amdt. 45–21, 56 FR 65653, Dec. 17, 1991; Amdt. 45–22, 66 FR 21066, Apr. 27, 2001]

§ 45.23 Display of marks; general.

(a) Each operator of an aircraft shall display on that aircraft marks consisting of the Roman capital letter "N" (denoting United States registration) followed by the registration number of the aircraft. Each suffix letter used in the marks displayed must also be a Roman capital letter.

(b) When marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.

[Doc. No. 8093, Amdt. 45–5, 33 FR 450, Jan. 12, 1968, as amended by Amdt. 45–9, 42 FR 41102, Aug. 15, 1977; Amdt. 45–24, 69 FR 44863, July 27, 2004]

§ 45.25 Location of marks on fixed-wing aircraft.

(a) The operator of a fixed-wing aircraft shall display the required marks on either the vertical tail surfaces or the sides of the fuselage, except as provided in §45.29(f).

(b) The marks required by paragraph (a) of this section shall be displayed as follows:

(1) If displayed on the vertical tail surfaces, horizontally on both surfaces, horizontally on both surfaces of a single vertical tail or on the outer surfaces of a multivertical tail. However, on aircraft on which marks at least 3 inches high may be displayed in accordance with §45.29(b)(1), the marks may be displayed vertically on the vertical tail surfaces.

(2) If displayed on the fuselage surfaces, horizontally on both sides of the fuselage between the trailing edge of the wing and the leading edge of the horizontal stabilizer. However, if engine pods or other appurtenances are located in this area and are an integral part of the fuselage side surfaces, the operator may place the marks on those pods or appurtenances.

[Amdt. 45–9, 42 FR 41102, Aug. 15, 1977]

§ 45.27 Location of marks; nonfixed-wing aircraft.

(a) *Rotorcraft.* Each operator of a rotorcraft shall display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by §45.23.

(b) *Airships.* Each operator of an airship shall display on that airship the marks required by §45.23, horizontally on—

(1) The upper surface of the right horizontal stabilizer and on the under surface of the left horizontal stabilizer with the top of the marks toward the leading edge of each stabilizer; and

(2) Each side of the bottom half of the vertical stabilizer.

(c) *Spherical balloons.* Each operator of a spherical balloon shall display the marks required by §45.23 in two places diametrically opposite and near the maximum horizontal circumference of that balloon.

(d) *Nonspherical balloons.* Each operator of a nonspherical balloon shall display the marks required by §45.23 on each side of the balloon near its maximum cross section and immediately above either the rigging band or the points of attachment of the basket or cabin suspension cables.

(e) *Powered parachutes and weight-shift-control aircraft.* Each operator of a powered parachute or a weight-shift-control aircraft must display the marks required by §§45.23 and 45.29(b)(2) of this part. The marks must be displayed in two diametrically opposite positions on the fuselage, a structural member, or a component of the aircraft and must be visible from the side of the aircraft.

[Doc. No. 2047, 29 FR 3223, Mar. 11, 1964, as amended by Amdt. 45–15, 48 FR 11392, Mar. 17, 1983; Amdt. 45–24, 69 FR 44863, July 27, 2004; Amdt. 45–25, 72 FR 52469, Sept. 14, 2007]

§ 45.29 Size of marks.

(a) Except as provided in paragraph (f) of this section, each operator of an aircraft shall display marks on the aircraft meeting the size requirements of this section.

(b) *Height.* Except as provided in paragraph (h) of this part, the nationality and registration marks must be of equal height and on—

(1) Fixed-wing aircraft, must be at least 12 inches high, except that:

(i) An aircraft displaying marks at least 2 inches high before November 1, 1981 and an aircraft manufactured after November 2, 1981, but before January 1, 1983, may display those marks until the aircraft is repainted or the marks are repainted, restored, or changed;

(ii) Marks at least 3 inches high may be displayed on a glider;

(iii) Marks at least 3 inches high may be displayed on an aircraft for which the FAA has issued an experimental certificate under §21.191 (d), §21.191 (g), or §21.191 (i) of this chapter to operate as an exhibition

aircraft, an amateur-built aircraft, or a light-sport aircraft when the maximum cruising speed of the aircraft does not exceed 180 knots CAS; and

(iv) Marks may be displayed on an exhibition, antique, or other aircraft in accordance with §45.22.

(2) Airships, spherical balloons, nonspherical balloons, powered parachutes, and weight-shift-control aircraft must be at least 3 inches high; and

(3) Rotorcraft, must be at least 12 inches high, except that rotorcraft displaying before April 18, 1983, marks required by §45.29(b)(3) in effect on April 17, 1983, and rotorcraft manufactured on or after April 18, 1983, but before December 31, 1983, may display those marks until the aircraft is repainted or the marks are repainted, restored, or changed.

(c) *Width.* Characters must be two-thirds as wide as they are high, except the number "1", which must be one-sixth as wide as it is high, and the letters "M" and "W" which may be as wide as they are high.

(d) *Thickness.* Characters must be formed by solid lines one-sixth as thick as the character is high.

(e) *Spacing.* The space between each character may not be less than one-fourth of the character width.

(f) If either one of the surfaces authorized for displaying required marks under §45.25 is large enough for display of marks meeting the size requirements of this section and the other is not, full size marks shall be placed on the larger surface. If neither surface is large enough for full-size marks, marks as large as practicable shall be displayed on the larger of the two surfaces. If no surface authorized to be marked by §45.27 is large enough for full-size marks, marks as large as practicable shall be placed on the largest of the authorized surfaces. However, powered parachutes and weight-shift-control aircraft must display marks at least 3 inches high.

(g) *Uniformity.* The marks required by this part for fixed-wing aircraft must have the same height, width, thickness, and spacing on both sides of the aircraft.

(h) After March 7, 1988, each operator of an aircraft penetrating an ADIZ or DEWIZ shall display on that aircraft temporary or permanent nationality and registration marks at least 12 inches high.

[Doc. No. 2047, 29 FR 3223, Mar. 11, 1964, as amended by Amdt. 45–2, 31 FR 9863, July 21, 1966; Amdt. 45–9, 42 FR 41102, Aug. 15, 1977; Amdt. 45–13, 46 FR 48604, Oct. 1, 1981; Amdt. 45–15, 48 FR 11392, Mar. 17, 1983; Amdt. 45–17, 52 FR 34102, Sept. 9, 1987; 52 FR 36566, Sept. 30, 1987; Amdt. 45–24, 69 FR 44863, July 27, 2004; Amdt. No. 45–25, 72 FR 52469, Sept. 14, 2007]

§ 45.31 Marking of export aircraft.

A person who manufactures an aircraft in the United States for delivery outside thereof may display on that aircraft any marks required by the State of registry of the aircraft. However, no person may operate an aircraft so marked within the United States, except for test and demonstration flights for a limited period of time, or while in necessary transit to the purchaser.

§ 45.33 Sale of aircraft; removal of marks.

When an aircraft that is registered in the United States is sold, the holder of the Certificate of Aircraft Registration shall remove, before its delivery to the purchaser, all United States marks from the aircraft, unless the purchaser is—

(a) A citizen of the United States;

(b) An individual citizen of a foreign country who is lawfully admitted for permanent residence in the United States; or

(c) When the aircraft is to be based and primarily used in the United States, a corporation (other than a corporation which is a citizen of the United States) lawfully organized and doing business under the laws of the United States or any State thereof.

[Amdt. 45–11, 44 FR 61938, Oct. 29, 1979]

PART 91—GENERAL OPERATING AND FLIGHT RULES

Subpart A—General

Source: Docket No. 18334, 54 FR 34292, Aug. 18, 1989, unless otherwise noted.

§ 91.1 Applicability.

(a) Except as provided in paragraphs (b) and (c) of this section and §§91.701 and 91.703, this part prescribes rules governing the operation of aircraft (other than moored balloons, kites, unmanned rockets, and unmanned free balloons, which are governed by part 101 of this chapter, and ultralight vehicles operated in accordance with part 103 of this chapter) within the United States, including the waters within 3 nautical miles of the U.S. coast.

(b) Each person operating an aircraft in the airspace overlying the waters between 3 and 12 nautical miles from the coast of the United States must comply with §§91.1 through 91.21; §§91.101 through 91.143; §§91.151 through 91.159; §§91.167 through 91.193; §91.203; §91.205; §§91.209 through 91.217; §91.221; §§91.303 through 91.319; §§91.323 through 91.327; §91.605; §91.609; §§91.703 through 91.715; and §91.903.

(c) This part applies to each person on board an aircraft being operated under this part, unless otherwise specified.

(d) This part also establishes requirements for operators to take actions to support the continued airworthiness of each airplane.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–257, 64 FR 1079, Jan. 7, 1999; Amdt. 91–282, 69 FR 44880, July 27, 2004; Amdt. 91–297, 72 FR 63410, Nov. 8, 2007]

§ 91.3 Responsibility and authority of the pilot in command.

(a) The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.

(b) In an in-flight emergency requiring immediate action, the pilot in command may deviate from any rule of this part to the extent required to meet that emergency.

(c) Each pilot in command who deviates from a rule under paragraph (b) of this section shall, upon the request of the Administrator, send a written report of that deviation to the Administrator.

(Approved by the Office of Management and Budget under control number 2120–0005)

§ 91.5 Pilot in command of aircraft requiring more than one required pilot.

No person may operate an aircraft that is type certificated for more than one required pilot flight crewmember unless the pilot in command meets the requirements of §61.58 of this chapter.

§ 91.7 Civil aircraft airworthiness.

(a) No person may operate a civil aircraft unless it is in an airworthy condition.

(b) The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. The pilot in command shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.

§ 91.9 Civil aircraft flight manual, marking, and placard requirements.

(a) Except as provided in paragraph (d) of this section, no person may operate a civil aircraft without complying with the operating limitations specified in the approved Airplane or Rotorcraft Flight Manual, markings, and placards, or as otherwise prescribed by the certificating authority of the country of registry.

(b) No person may operate a U.S.-registered civil aircraft—

(1) For which an Airplane or Rotorcraft Flight Manual is required by §21.5 of this chapter unless there is available in the aircraft a current, approved Airplane or Rotorcraft Flight Manual or the manual provided for in §121.141(b); and

(2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

(c) No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with part 45 of this chapter.

(d) Any person taking off or landing a helicopter certificated under part 29 of this chapter at a heliport constructed over water may make such momentary flight as is necessary for takeoff or landing through the prohibited range of the limiting height-speed envelope established for the helicopter if that flight through the prohibited range takes place over water on which a safe ditching can be accomplished and if the helicopter is amphibious or is equipped with floats or other emergency flotation gear adequate to accomplish a safe emergency ditching on open water.

§ 91.11 Prohibition on interference with crewmembers.

No person may assault, threaten, intimidate, or interfere with a crewmember in the performance of the crewmember's duties aboard an aircraft being operated.

§ 91.13 Careless or reckless operation.

(a) *Aircraft operations for the purpose of air navigation.* No person may operate an aircraft in a careless or reckless manner so as to endanger the life or property of another.

(b) *Aircraft operations other than for the purpose of air navigation.* No person may operate an aircraft, other than for the purpose of air navigation, on any part of the surface of an airport used by aircraft for air commerce (including areas used by those aircraft for receiving or discharging persons or cargo), in a careless or reckless manner so as to endanger the life or property of another.

§ 91.15 Dropping objects.

No pilot in command of a civil aircraft may allow any object to be dropped from that aircraft in flight that creates a hazard to persons or property. However, this section does not prohibit the dropping of any object if reasonable precautions are taken to avoid injury or damage to persons or property.

§ 91.17 Alcohol or drugs.

(a) No person may act or attempt to act as a crewmember of a civil aircraft—

(1) Within 8 hours after the consumption of any alcoholic beverage;

(2) While under the influence of alcohol;

(3) While using any drug that affects the person's faculties in any way contrary to safety; or

(4) While having an alcohol concentration of 0.04 or greater in a blood or breath specimen. Alcohol concentration means grams of alcohol per deciliter of blood or grams of alcohol per 210 liters of breath.

(b) Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care) to be carried in that aircraft.

(c) A crewmember shall do the following:

(1) On request of a law enforcement officer, submit to a test to indicate the alcohol concentration in the blood or breath, when—

(i) The law enforcement officer is authorized under State or local law to conduct the test or to have the test conducted; and

(ii) The law enforcement officer is requesting submission to the test to investigate a suspected violation of State or local law governing the same or substantially similar conduct prohibited by paragraph (a)(1), (a)(2), or (a)(4) of this section.

(2) Whenever the FAA has a reasonable basis to believe that a person may have violated paragraph (a)(1), (a)(2), or (a)(4) of this section, on request of the FAA, that person must furnish to the FAA the results, or authorize any clinic,

hospital, or doctor, or other person to release to the FAA, the results of each test taken within 4 hours after acting or attempting to act as a crewmember that indicates an alcohol concentration in the blood or breath specimen.

(d) Whenever the Administrator has a reasonable basis to believe that a person may have violated paragraph (a)(3) of this section, that person shall, upon request by the Administrator, furnish the Administrator, or authorize any clinic, hospital, doctor, or other person to release to the Administrator, the results of each test taken within 4 hours after acting or attempting to act as a crewmember that indicates the presence of any drugs in the body.

(e) Any test information obtained by the Administrator under paragraph (c) or (d) of this section may be evaluated in determining a person's qualifications for any airman certificate or possible violations of this chapter and may be used as evidence in any legal proceeding under section 602, 609, or 901 of the Federal Aviation Act of 1958.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–291, June 21, 2006]

§ 91.19 Carriage of narcotic drugs, marihuana, and depressant or stimulant drugs or substances.

(a) Except as provided in paragraph (b) of this section, no person may operate a civil aircraft within the United States with knowledge that narcotic drugs, marihuana, and depressant or stimulant drugs or substances as defined in Federal or State statutes are carried in the aircraft.

(b) Paragraph (a) of this section does not apply to any carriage of narcotic drugs, marihuana, and depressant or stimulant drugs or substances authorized by or under any Federal or State statute or by any Federal or State agency.

§ 91.21 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S.-registered civil aircraft:

(1) Aircraft operated by a holder of an air carrier operating certificate or an operating certificate; or

(2) Any other aircraft while it is operated under IFR.

(b) Paragraph (a) of this section does not apply to—

(1) Portable voice recorders;

(2) Hearing aids;

(3) Heart pacemakers;

(4) Electric shavers; or

(5) Any other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

(c) In the case of an aircraft operated by a holder of an air carrier operating certificate or an operating certificate, the determination required by paragraph (b)(5) of this section shall be made by that operator of the aircraft on which the particular device is to be used. In the case of other aircraft, the determination may be made by the pilot in command or other operator of the aircraft.

§ 91.23 Truth-in-leasing clause requirement in leases and conditional sales contracts.

(a) Except as provided in paragraph (b) of this section, the parties to a lease or contract of conditional sale involving a U.S.-registered large civil aircraft and entered into after January 2, 1973, shall execute a written lease or contract and include therein a written truth-in-leasing clause as a concluding paragraph in large print, immediately preceding the space for the signature of the parties, which contains the following with respect to each such aircraft:

(1) Identification of the Federal Aviation Regulations under which the aircraft has been maintained and inspected during the 12 months preceding the execution of the lease or contract of conditional sale, and certification by the parties thereto regarding the aircraft's status of compliance with applicable maintenance and inspection requirements in this part for the operation to be conducted under the lease or contract of conditional sale.

(2) The name and address (printed or typed) and the signature of the person responsible for operational control of the aircraft under the lease or contract of conditional sale, and certification that each person understands that person's responsibilities for compliance with applicable Federal Aviation Regulations.

(3) A statement that an explanation of factors bearing on operational control and pertinent Federal Aviation Regulations can be obtained from the nearest FAA Flight Standards district office.

(b) The requirements of paragraph (a) of this section do not apply—

(1) To a lease or contract of conditional sale when—

(i) The party to whom the aircraft is furnished is a foreign air carrier or certificate holder under part 121, 125, 135, or 141 of this chapter, or

(ii) The party furnishing the aircraft is a foreign air carrier or a person operating under part 121, 125, and 141 of this chapter, or a person operating under part 135 of this chapter having authority to engage in on-demand operations with large aircraft.

(2) To a contract of conditional sale, when the aircraft involved has not been registered anywhere prior to the execution of the contract, except as a new aircraft under a dealer's aircraft registration certificate issued in accordance with §47.61 of this chapter.

(c) No person may operate a large civil aircraft of U.S. registry that is subject to a lease or contract of conditional sale to which paragraph (a) of this section applies, unless—

(1) The lessee or conditional buyer, or the registered owner if the lessee is not a citizen of the United States, has mailed a copy of the lease or contract that complies with the requirements of paragraph (a) of this section, within 24 hours of its execution, to the Aircraft Registration Branch, Attn: Technical Section, P.O. Box 25724, Oklahoma City, OK 73125;

(2) A copy of the lease or contract that complies with the requirements of paragraph (a) of this section is carried in the aircraft. The copy of the lease or contract shall be made available for review upon request by the Administrator, and

(3) The lessee or conditional buyer, or the registered owner if the lessee is not a citizen of the United States, has notified by telephone or in person the FAA Flight Standards district office nearest the airport where the flight will originate. Unless otherwise authorized by that office, the notification shall be given at least 48 hours before takeoff in the case of the first flight of that aircraft under that lease or contract and inform the FAA of—

(i) The location of the airport of departure;

(ii) The departure time; and

(iii) The registration number of the aircraft involved.

(d) The copy of the lease or contract furnished to the FAA under paragraph (c) of this section is commercial or financial information obtained from a person. It is, therefore, privileged and confidential and will not be made available by the FAA for public inspection or copying under 5 U.S.C. 552(b)(4) unless recorded with the FAA under part 49 of this chapter.

(e) For the purpose of this section, a lease means any agreement by a person to furnish an aircraft to another person for compensation or hire, whether with or without flight crewmembers, other than an agreement for the sale of an aircraft and a contract of conditional sale under section 101 of the Federal Aviation Act of 1958. The person furnishing the aircraft is referred to as the lessor, and the person to whom it is furnished the lessee.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–212, 54 FR 39293, Sept. 25, 1989; Amdt. 91–253, 62 FR 13253, Mar. 19, 1997; Amdt. 91–267, 66 FR 21066, Apr. 27, 2001]

§ 91.25 Aviation Safety Reporting Program: Prohibition against use of reports for enforcement purposes.

The Administrator of the FAA will not use reports submitted to the National Aeronautics and Space Administration under the Aviation Safety Reporting Program (or information derived therefrom) in any enforcement action except information concerning accidents or criminal offenses which are wholly excluded from the Program.

§§ 91.27-91.99 [Reserved]

Subpart C—Equipment, Instrument, and Certificate Requirements

Source: Docket No. 18334, 54 FR 34304, Aug. 18, 1989, unless otherwise noted.

§ 91.201 [Reserved]

§ 91.203 Civil aircraft: Certifications required.

(a) Except as provided in §91.715, no person may operate a civil aircraft unless it has within it the following:

(1) An appropriate and current airworthiness certificate. Each U.S. airworthiness certificate used to comply with this subparagraph (except a special flight permit, a copy of the applicable operations specifications issued under §21.197(c) of this chapter, appropriate sections of the air carrier manual required by parts 121 and 135 of this chapter containing that portion of the operations specifications issued under §21.197(c), or an authorization under §91.611) must have on it the registration number assigned to the aircraft under part 47 of this chapter. However, the airworthiness certificate need not have on it an assigned special identification number before 10 days after that number is first affixed to the aircraft. A revised airworthiness certificate having on it an assigned special identification number, that has been affixed to an aircraft, may only be obtained upon application to an FAA Flight Standards district office.

(2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second duplicate copy (pink) of the Aircraft Registration Application as provided for in §47.31(b), or a registration certificate issued under the laws of a foreign country.

(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

(c) No person may operate an aircraft with a fuel tank installed within the passenger compartment or a baggage compartment unless the installation was accomplished pursuant to part 43 of this chapter, and a copy of FAA Form 337 authorizing that installation is on board the aircraft.

(d) No person may operate a civil airplane (domestic or foreign) into or out of an airport in the United States unless it complies with the fuel venting and exhaust emissions requirements of part 34 of this chapter.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–218, 55 FR 32861, Aug. 10, 1990]

§ 91.205 Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.

(a) *General.* Except as provided in paragraphs (c)(3) and (e) of this section, no person may operate a powered civil aircraft with a standard category U.S. airworthiness certificate in any operation described in paragraphs (b) through (f) of this section unless that aircraft contains the instruments and equipment specified in those paragraphs (or FAA-approved equivalents) for that type of operation, and those instruments and items of equipment are in operable condition.

(b) *Visual-flight rules (day).* For VFR flight during the day, the following instruments and equipment are required:

(1) Airspeed indicator.

(2) Altimeter.

(3) Magnetic direction indicator.

(4) Tachometer for each engine.

(5) Oil pressure gauge for each engine using pressure system.

(6) Temperature gauge for each liquid-cooled engine.

(7) Oil temperature gauge for each air-cooled engine.

(8) Manifold pressure gauge for each altitude engine.

(9) Fuel gauge indicating the quantity of fuel in each tank.

(10) Landing gear position indicator, if the aircraft has a retractable landing gear.

(11) For small civil airplanes certificated after March 11, 1996, in accordance with part 23 of this chapter, an approved aviation red or aviation white anticollision light system. In the event of failure of any light of the anticollision light system, operation of the aircraft may continue to a location where repairs or replacement can be made.

(12) If the aircraft is operated for hire over water and beyond power-off gliding distance from shore, approved flotation gear readily available to each occupant and, unless the aircraft is operating under part 121 of this subchapter, at least one pyrotechnic signaling device. As used in this section, "shore" means that area of the land adjacent to the water which is above the high water mark and excludes land areas which are intermittently under water.

(13) An approved safety belt with an approved metal-to-metal latching device for each occupant 2 years of age or older.

(14) For small civil airplanes manufactured after July 18, 1978, an approved shoulder harness for each front seat. The shoulder harness must be designed to protect the occupant from serious head injury when the occupant experiences the ultimate inertia forces specified in §23.561(b)(2) of this chapter. Each shoulder harness installed at a flight crewmember station must permit the crewmember, when seated and with the safety belt and shoulder harness fastened, to perform all functions necessary for flight operations. For purposes of this paragraph—

(i) The date of manufacture of an airplane is the date the inspection acceptance records reflect that the airplane is complete and meets the FAA-approved type design data; and

(ii) A front seat is a seat located at a flight crewmember station or any seat located alongside such a seat.

(15) An emergency locator transmitter, if required by §91.207.

(16) For normal, utility, and acrobatic category airplanes with a seating configuration, excluding pilot seats, of 9 or less, manufactured after December 12, 1986, a shoulder harness for—

(i) Each front seat that meets the requirements of §23.785 (g) and (h) of this chapter in effect on December 12, 1985;

(ii) Each additional seat that meets the requirements of §23.785(g) of this chapter in effect on December 12, 1985.

(17) For rotorcraft manufactured after September 16, 1992, a shoulder harness for each seat that meets the requirements of §27.2 or §29.2 of this chapter in effect on September 16, 1991.

(c) *Visual flight rules (night).* For VFR flight at night, the following instruments and equipment are required:

(1) Instruments and equipment specified in paragraph (b) of this section.

(2) Approved position lights.

(3) An approved aviation red or aviation white anticollision light system on all U.S.-registered civil aircraft. Anticollision light systems initially installed after August 11, 1971, on aircraft for which a type certificate was issued or applied for before August 11, 1971, must at least meet the anticollision light standards of part 23, 25, 27, or 29 of this chapter, as applicable, that were in effect on August 10, 1971, except that the color may be either aviation red or aviation white. In the event of failure of any light of the anticollision light system, operations with the aircraft may be continued to a stop where repairs or replacement can be made.

(4) If the aircraft is operated for hire, one electric landing light.

(5) An adequate source of electrical energy for all installed electrical and radio equipment.

(6) One spare set of fuses, or three spare fuses of each kind required, that are accessible to the pilot in flight.

(d) *Instrument flight rules.* For IFR flight, the following instruments and equipment are required:

(1) Instruments and equipment specified in paragraph (b) of this section, and, for night flight, instruments and equipment specified in paragraph (c) of this section.

(2) Two-way radio communication and navigation equipment suitable for the route to be flown.

(3) Gyroscopic rate-of-turn indicator, except on the following aircraft:

(i) Airplanes with a third attitude instrument system usable through flight attitudes of 360 degrees of pitch and roll and installed in accordance with the instrument requirements prescribed in §121.305(j) of this chapter; and

(ii) Rotorcraft with a third attitude instrument system usable through flight attitudes of ±80 degrees of pitch and ±120 degrees of roll and installed in accordance with §29.1303(g) of this chapter.

(4) Slip-skid indicator.

(5) Sensitive altimeter adjustable for barometric pressure.

(6) A clock displaying hours, minutes, and seconds with a sweep-second pointer or digital presentation.

(7) Generator or alternator of adequate capacity.

(8) Gyroscopic pitch and bank indicator (artificial horizon).

(9) Gyroscopic direction indicator (directional gyro or equivalent).

(e) *Flight at and above 24,000 feet MSL (FL 240).* If VOR navigation equipment is required under paragraph (d)(2) of this section, no person may operate a U.S.-registered civil aircraft within the 50 states and the District of Columbia at or above FL 240 unless that aircraft is equipped with approved DME or a suitable RNAV system. When the DME or RNAV system required by this paragraph fails at and above FL 240, the pilot in command of the aircraft must notify ATC immediately, and then may continue operations at and above FL 240 to the next airport of intended landing where repairs or replacement of the equipment can be made.

(f) *Category II operations.* The requirements for Category II operations are the instruments and equipment specified in—

(1) Paragraph (d) of this section; and

(2) Appendix A to this part.

(g) *Category III operations.* The instruments and equipment required for Category III operations are specified in paragraph (d) of this section.

(h) *Exclusions.* Paragraphs (f) and (g) of this section do not apply to operations conducted by a holder of a certificate issued under part 121 or part 135 of this chapter.

[Doc. No. 18334, 54 FR 34292, Aug. 18, 1989, as amended by Amdt. 91–220, 55 FR 43310, Oct. 26, 1990; Amdt. 91–223, 56 FR 41052, Aug. 16, 1991; Amdt. 91–231, 57 FR 42672, Sept. 15, 1992; Amdt. 91–248, 61 FR 5171, Feb. 9, 1996; Amdt. 91–251, 61 FR 34560, July 2, 1996; Amdt. 91–285, 69 FR 77599, Dec. 27, 2004; Amdt. 91–296, 72 FR 31679, June 7, 2007]

§ 91.207 Emergency locator transmitters.

(a) Except as provided in paragraphs (e) and (f) of this section, no person may operate a U.S.-registered civil airplane unless—

(1) There is attached to the airplane an approved automatic type emergency locator transmitter that is in operable condition for the following operations, except that after June 21, 1995, an emergency locator transmitter that meets the requirements of TSO-C91 may not be used for new installations:

(i) Those operations governed by the supplemental air carrier and commercial operator rules of parts 121 and 125;

(ii) Charter flights governed by the domestic and flag air carrier rules of part 121 of this chapter; and

(iii) Operations governed by part 135 of this chapter; or

(2) For operations other than those specified in paragraph (a)(1) of this section, there must be attached to the airplane an approved personal type or an approved automatic type emergency locator transmitter that is in operable condition, except that after June 21, 1995, an emergency locator transmitter that meets the requirements of TSO-C91 may not be used for new installations.

(b) Each emergency locator transmitter required by paragraph (a) of this section must be attached to the airplane in such a manner that the probability of damage to the transmitter in the event of crash impact is minimized. Fixed and deployable automatic type transmitters must be attached to the airplane as far aft as practicable.

(c) Batteries used in the emergency locator transmitters required by paragraphs (a) and (b) of this section must be replaced (or recharged, if the batteries are rechargeable)—

(1) When the transmitter has been in use for more than 1 cumulative hour; or

(2) When 50 percent of their useful life (or, for rechargeable batteries, 50 percent of their useful life of charge) has expired, as established by the transmitter manufacturer under its approval.

The new expiration date for replacing (or recharging) the battery must be legibly marked on the outside of the transmitter and entered in the aircraft maintenance record. Paragraph (c)(2) of this section does not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

(d) Each emergency locator transmitter required by paragraph (a) of this section must be inspected within 12 calendar months after the last inspection for—

(1) Proper installation;

(2) Battery corrosion;

(3) Operation of the controls and crash sensor; and

(4) The presence of a sufficient signal radiated from its antenna.

(e) Notwithstanding paragraph (a) of this section, a person may—

(1) Ferry a newly acquired airplane from the place where possession of it was taken to a place where the emergency locator transmitter is to be installed; and

(2) Ferry an airplane with an inoperative emergency locator transmitter from a place where repairs or replacements cannot be made to a place where they can be made.

No person other than required crewmembers may be carried aboard an airplane being ferried under paragraph (e) of this section.

(f) Paragraph (a) of this section does not apply to—

(1) Before January 1, 2004, turbojet-powered aircraft;

(2) Aircraft while engaged in scheduled flights by scheduled air carriers;

(3) Aircraft while engaged in training operations conducted entirely within a 50-nautical mile radius of the airport from which such local flight operations began;

(4) Aircraft while engaged in flight operations incident to design and testing;

(5) New aircraft while engaged in flight operations incident to their manufacture, preparation, and delivery;

(6) Aircraft while engaged in flight operations incident to the aerial application of chemicals and other substances for agricultural purposes;

(7) Aircraft certificated by the Administrator for research and development purposes;

(8) Aircraft while used for showing compliance with regulations, crew training, exhibition, air racing, or market surveys;

(9) Aircraft equipped to carry not more than one person.

(10) An aircraft during any period for which the transmitter has been temporarily removed for inspection, repair, modification, or replacement, subject to the following:

(i) No person may operate the aircraft unless the aircraft records contain an entry which includes the date of initial removal, the make, model, serial number, and reason for removing the transmitter, and a placard located in view of the pilot to show “ELT not installed.”

(ii) No person may operate the aircraft more than 90 days after the ELT is initially removed from the aircraft; and

(11) On and after January 1, 2004, aircraft with a maximum payload capacity of more than 18,000 pounds when used in air transportation.

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–242, 59 FR 32057, June 21, 1994; 59 FR 34578, July 6, 1994; Amdt. 91–265, 65 FR 81319, Dec. 22, 2000; 66 FR 16316, Mar. 23, 2001]

§ 91.209 Aircraft lights.

No person may:

(a) During the period from sunset to sunrise (or, in Alaska, during the period a prominent unlighted object cannot be seen from a distance of 3 statute miles or the sun is more than 6 degrees below the horizon)—

(1) Operate an aircraft unless it has lighted position lights;

(2) Park or move an aircraft in, or in dangerous proximity to, a night flight operations area of an airport unless the aircraft—

(i) Is clearly illuminated;

(ii) Has lighted position lights; or

(iii) Is in an area that is marked by obstruction lights;

(3) Anchor an aircraft unless the aircraft—

(i) Has lighted anchor lights; or

(ii) Is in an area where anchor lights are not required on vessels; or

(b) Operate an aircraft that is equipped with an anticollision light system, unless it has lighted anticollision lights. However, the anticollision lights need not be lighted when the pilot-in-command determines that, because of operating conditions, it would be in the interest of safety to turn the lights off.

[Doc. No. 27806, 61 FR 5171, Feb. 9, 1996]

§ 91.211 Supplemental oxygen.

(a) *General.* No person may operate a civil aircraft of U.S. registry—

(1) At cabin pressure altitudes above 12,500 feet (MSL) up to and including 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen for that part of the flight at those altitudes that is of more than 30 minutes duration;

(2) At cabin pressure altitudes above 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen during the entire flight time at those altitudes; and

(3) At cabin pressure altitudes above 15,000 feet (MSL) unless each occupant of the aircraft is provided with supplemental oxygen.

(b) *Pressurized cabin aircraft.*

(1) No person may operate a civil aircraft of U.S. registry with a pressurized cabin—

(i) At flight altitudes above flight level 250 unless at least a 10-minute supply of supplemental oxygen, in addition to any oxygen required to satisfy paragraph (a) of this section, is available for each occupant of the aircraft for use in the event that a descent is necessitated by loss of cabin pressurization; and

(ii) At flight altitudes above flight level 350 unless one pilot at the controls of the airplane is wearing and using an oxygen mask that is secured and sealed and that either supplies oxygen at all times or automatically supplies oxygen whenever the cabin pressure altitude of the airplane exceeds 14,000 feet (MSL), except that the one pilot need not wear and use an oxygen mask while at or below flight level 410 if there are two pilots at the controls and each pilot has a quick-donning type of oxygen mask that can be placed on the face with one hand from the ready position within 5 seconds, supplying oxygen and properly secured and sealed.

(2) Notwithstanding paragraph (b)(1)(ii) of this section, if for any reason at any time it is necessary for one pilot to leave the controls of the aircraft when operating at flight altitudes above flight level 350, the remaining pilot at the controls shall put on and use an oxygen mask until the other pilot has returned to that crewmember's station.

§ 91.213 Inoperative instruments and equipment.

(a) Except as provided in paragraph (d) of this section, no person may take off an aircraft with inoperative instruments or equipment installed unless the following conditions are met:

(1) An approved Minimum Equipment List exists for that aircraft.

(2) The aircraft has within it a letter of authorization, issued by the FAA Flight Standards district office having jurisdiction over the area in which the operator is located, authorizing operation of the aircraft under the Minimum Equipment List. The letter of authorization may be obtained by written request of the airworthiness certificate holder. The Minimum Equipment List and the letter of authorization constitute a supplemental type certificate for the aircraft.

(3) The approved Minimum Equipment List must—

(i) Be prepared in accordance with the limitations specified in paragraph (b) of this section; and

(ii) Provide for the operation of the aircraft with the instruments and equipment in an inoperable condition.

(4) The aircraft records available to the pilot must include an entry describing the inoperable instruments and equipment.

(5) The aircraft is operated under all applicable conditions and limitations contained in the Minimum Equipment List and the letter authorizing the use of the list.

(b) The following instruments and equipment may not be included in a Minimum Equipment List:

(1) Instruments and equipment that are either specifically or otherwise required by the airworthiness requirements under which the aircraft is type certificated and which are essential for safe operations under all operating conditions.

(2) Instruments and equipment required by an airworthiness directive to be in operable condition unless the airworthiness directive provides otherwise.

(3) Instruments and equipment required for specific operations by this part.

(c) A person authorized to use an approved Minimum Equipment List issued for a specific aircraft under subpart K of this part, part 121, 125, or 135 of this chapter must use that Minimum Equipment List to comply with the requirements in this section.

(d) Except for operations conducted in accordance with paragraph (a) or (c) of this section, a person may takeoff an aircraft in operations conducted under this part with inoperative instruments and equipment without an approved Minimum Equipment List provided—

(1) The flight operation is conducted in a—

(i) Rotorcraft, non-turbine-powered airplane, glider, lighter-than-air aircraft, powered parachute, or weight-shift-control aircraft, for which a master minimum equipment list has not been developed; or

(ii) Small rotorcraft, nonturbine-powered small airplane, glider, or lighter-than-air aircraft for which a Master Minimum Equipment List has been developed; and

(2) The inoperative instruments and equipment are not—

(i) Part of the VFR-day type certification instruments and equipment prescribed in the applicable airworthiness regulations under which the aircraft was type certificated;

(ii) Indicated as required on the aircraft's equipment list, or on the Kinds of Operations Equipment List for the kind of flight operation being conducted;

(iii) Required by §91.205 or any other rule of this part for the specific kind of flight operation being conducted; or

(iv) Required to be operational by an airworthiness directive; and

(3) The inoperative instruments and equipment are—

(i) Removed from the aircraft, the cockpit control placarded, and the maintenance recorded in accordance with §43.9 of this chapter; or

(ii) Deactivated and placarded "Inoperative." If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded in accordance with part 43 of this chapter; and

(4) A determination is made by a pilot, who is certificated and appropriately rated under part 61 of this chapter, or by a person, who is certificated and appropriately rated to perform maintenance on the aircraft, that the inoperative instrument or equipment does not constitute a hazard to the aircraft.

An aircraft with inoperative instruments or equipment as provided in paragraph (d) of this section is considered to be in a properly altered condition acceptable to the Administrator.

(e) Notwithstanding any other provision of this section, an aircraft with inoperable instruments or equipment may be operated under a special flight permit issued in accordance with §§21.197 and 21.199 of this chapter.

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54560, Sept. 17, 2003; Amdt. 91–282, 69 FR 44880, July 27, 2004]

§ 91.215 ATC transponder and altitude reporting equipment and use.

(a) *All airspace:* U.S.-registered civil aircraft. For operations not conducted under part 121 or 135 of this chapter, ATC transponder equipment installed must meet the performance and environmental requirements of any class of TSO-C74b (Mode A) or any class of TSO-C74c (Mode A with altitude reporting capability) as appropriate, or the appropriate class of TSO-C112 (Mode S).

(b) *All airspace.* Unless otherwise authorized or directed by ATC, no person may operate an aircraft in the airspace described in paragraphs (b)(1) through (b)(5) of this section, unless that aircraft is equipped with an operable coded radar beacon transponder having either Mode 3/A 4096 code capability, replying to Mode 3/A interrogations with the code specified by ATC, or a Mode S capability, replying to Mode 3/A interrogations with the code specified by ATC and intermode and Mode S interrogations in accordance with the applicable provisions specified in TSO C–112, and that aircraft is equipped with automatic pressure altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100-foot increments. This requirement applies—

(1) *All aircraft.* In Class A, Class B, and Class C airspace areas;

(2) *All aircraft.* In all airspace within 30 nautical miles of an airport listed in appendix D, section 1 of this part from the surface upward to 10,000 feet MSL;

(3) Notwithstanding paragraph (b)(2) of this section, any aircraft which was not originally certificated with an engine-driven electrical system or which has not subsequently been certified with such a system installed, balloon or glider may conduct operations in the airspace within 30 nautical miles of an airport listed in appendix D, section 1 of this part provided such operations are conducted—

(i) Outside any Class A, Class B, or Class C airspace area; and

(ii) Below the altitude of the ceiling of a Class B or Class C airspace area designated for an airport or 10,000 feet MSL, whichever is lower; and

(4) All aircraft in all airspace above the ceiling and within the lateral boundaries of a Class B or Class C airspace area designated for an airport upward to 10,000 feet MSL; and

(5) All aircraft except any aircraft which was not originally certificated with an engine-driven electrical system or which has not subsequently been certified with such a system installed, balloon, or glider—

(i) In all airspace of the 48 contiguous states and the District of Columbia at and above 10,000 feet MSL, excluding the airspace at and below 2,500 feet above the surface; and

(ii) In the airspace from the surface to 10,000 feet MSL within a 10-nautical-mile radius of any airport listed in appendix D, section 2 of this part, excluding the airspace below 1,200 feet outside of the lateral boundaries of the surface area of the airspace designated for that airport.

(c) *Transponder-on operation.* While in the airspace as specified in paragraph (b) of this section or in all controlled airspace, each person operating an aircraft equipped with an operable ATC transponder maintained in accordance with §91.413 of this part shall operate the transponder, including Mode C equipment if installed, and shall reply on the appropriate code or as assigned by ATC.

(d) *ATC authorized deviations.* Requests for ATC authorized deviations must be made to the ATC facility having jurisdiction over the concerned airspace within the time periods specified as follows:

(1) For operation of an aircraft with an operating transponder but without operating automatic pressure altitude reporting equipment having a Mode C capability, the request may be made at any time.

(2) For operation of an aircraft with an inoperative transponder to the airport of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made or both, the request may be made at any time.

(3) For operation of an aircraft that is not equipped with a transponder, the request must be made at least one hour before the proposed operation.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–221, 56 FR 469, Jan. 4, 1991; Amdt. 91–227, 56 FR 65660, Dec. 17, 1991; Amdt. 91–227, 7 FR 328, Jan. 3, 1992; Amdt. 91–229, 57 FR 34618, Aug. 5, 1992; Amdt. 91–267, 66 FR 21066, Apr. 27, 2001]

§ 91.217 Data correspondence between automatically reported pressure altitude data and the pilot's altitude reference.

No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder—

(a) When deactivation of that equipment is directed by ATC;

(b) Unless, as installed, that equipment was tested and calibrated to transmit altitude data corresponding within 125 feet (on a 95 percent probability basis) of the indicated or calibrated datum of the altimeter normally used to maintain flight altitude, with that altimeter referenced to 29.92 inches of mercury for altitudes from sea level to the maximum operating altitude of the aircraft; or

(c) Unless the altimeters and digitizers in that equipment meet the standards of TSO-C10b and TSO-C88, respectively.

§ 91.219 Altitude alerting system or device: Turbojet-powered civil airplanes.

(a) Except as provided in paragraph (d) of this section, no person may operate a turbojet-powered U.S.-registered civil airplane unless that airplane is equipped with an approved altitude alerting system or device that is in operable condition and meets the requirements of paragraph (b) of this section.

(b) Each altitude alerting system or device required by paragraph (a) of this section must be able to—

(1) Alert the pilot—

(i) Upon approaching a preselected altitude in either ascent or descent, by a sequence of both aural and visual signals in sufficient time to establish level flight at that preselected altitude; or

(ii) Upon approaching a preselected altitude in either ascent or descent, by a sequence of visual signals in sufficient time to establish level flight at that preselected altitude, and when deviating above and below that preselected altitude, by an aural signal;

(2) Provide the required signals from sea level to the highest operating altitude approved for the airplane in which it is installed;

(3) Preselect altitudes in increments that are commensurate with the altitudes at which the aircraft is operated;

(4) Be tested without special equipment to determine proper operation of the alerting signals; and

(5) Accept necessary barometric pressure settings if the system or device operates on barometric pressure. However, for operation below 3,000 feet AGL, the system or device need only provide one signal, either visual or aural, to comply with this paragraph. A radio altimeter may be included to provide the signal if the operator has an approved procedure for its use to determine DA/DH or MDA, as appropriate.

(c) Each operator to which this section applies must establish and assign procedures for the use of the altitude alerting system or device and each flight crewmember must comply with those procedures assigned to him.

(d) Paragraph (a) of this section does not apply to any operation of an airplane that has an experimental certificate or to the operation of any airplane for the following purposes:

(1) Ferrying a newly acquired airplane from the place where possession of it was taken to a place where the altitude alerting system or device is to be installed.

(2) Continuing a flight as originally planned, if the altitude alerting system or device becomes inoperative after the airplane has taken off; however, the flight may not depart from a place where repair or replacement can be made.

(3) Ferrying an airplane with any inoperative altitude alerting system or device from a place where repairs or replacements cannot be made to a place where it can be made.

(4) Conducting an airworthiness flight test of the airplane.

(5) Ferrying an airplane to a place outside the United States for the purpose of registering it in a foreign country.

(6) Conducting a sales demonstration of the operation of the airplane.

(7) Training foreign flight crews in the operation of the airplane before ferrying it to a place outside the United States for the purpose of registering it in a foreign country.

[Doc. No. 18334, 54 FR 34304, Aug. 18, 1989, as amended by Amdt. 91–296, 72 FR 31679, June 7, 2007]

§ 91.221 Traffic alert and collision avoidance system equipment and use.

(a) *All airspace:* U.S.-registered civil aircraft. Any traffic alert and collision avoidance system installed in a U.S.-registered civil aircraft must be approved by the Administrator.

(b) *Traffic alert and collision avoidance system, operation required.* Each person operating an aircraft equipped with an operable traffic alert and collision avoidance system shall have that system on and operating.

§ 91.223 Terrain awareness and warning system.

(a) *Airplanes manufactured after March 29, 2002.* Except as provided in paragraph (d) of this section, no person may operate a turbine-powered U.S.-registered airplane configured with six or more passenger seats, excluding any pilot seat, unless that airplane is equipped with an approved terrain awareness and warning system that as a minimum meets the requirements for Class B equipment in Technical Standard Order (TSO)–C151.

(b) *Airplanes manufactured on or before March 29, 2002.* Except as provided in paragraph (d) of this section, no person may operate a turbine-powered U.S.-registered airplane configured with six or more passenger seats, excluding any pilot seat, after March 29, 2005, unless that airplane is equipped with an approved terrain awareness and warning system that as a minimum meets the requirements for Class B equipment in Technical Standard Order (TSO)–C151.

(Approved by the Office of Management and Budget under control number 2120–0631)

(c) *Airplane Flight Manual.* The Airplane Flight Manual shall contain appropriate procedures for—

(1) The use of the terrain awareness and warning system; and

(2) Proper flight crew reaction in response to the terrain awareness and warning system audio and visual warnings.

(d) *Exceptions.* Paragraphs (a) and (b) of this section do not apply to—

(1) Parachuting operations when conducted entirely within a 50 nautical mile radius of the airport from which such local flight operations began.

(2) Firefighting operations.

(3) Flight operations when incident to the aerial application of chemicals and other substances.

[Doc. No. 29312, 65 FR 16755, Mar. 29, 2000]

§§ 91.224-91.299 [Reserved]

Subpart E—Maintenance, Preventive Maintenance, and Alterations

Source: Docket No. 18334, 54 FR 34311, Aug. 18, 1989, unless otherwise noted.

§ 91.401 Applicability.

(a) This subpart prescribes rules governing the maintenance, preventive maintenance, and alterations of U.S.-registered civil aircraft operating within or outside of the United States.

(b) Sections 91.405, 91.409, 91.411, 91.417, and 91.419 of this subpart do not apply to an aircraft maintained in accordance with a continuous airworthiness maintenance program as provided in part 121, 129, or §§91.1411 or 135.411(a)(2) of this chapter.

(c) Sections 91.405 and 91.409 of this part do not apply to an airplane inspected in accordance with part 125 of this chapter.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–280, 68 FR 54560, Sept. 17, 2003]

§ 91.403 General.

(a) The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition, including compliance with part 39 of this chapter.

(b) No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including part 43 of this chapter.

(c) No person may operate an aircraft for which a manufacturer's maintenance manual or instructions for continued airworthiness has been issued that contains an airworthiness limitations section unless the mandatory replacement times, inspection intervals, and related procedures specified in that section or alternative inspection intervals and related procedures set forth in an operations specification approved by the Administrator under part 121 or 135 of this chapter or in accordance with an inspection program approved under §91.409(e) have been complied with.

(d) A person must not alter an aircraft based on a supplemental type certificate unless the owner or operator of the aircraft is the holder of the supplemental type certificate, or has written permission from the holder.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–293, 71 FR 56005, Sept. 26, 2006]

§ 91.405 Maintenance required.

Each owner or operator of an aircraft—

(a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;

(b) Shall ensure that maintenance personnel make appropriate entries in the aircraft maintenance records indicating the aircraft has been approved for return to service;

(c) Shall have any inoperative instrument or item of equipment, permitted to be inoperative by §91.213(d)(2) of this part, repaired, replaced, removed, or inspected at the next required inspection; and

(d) When listed discrepancies include inoperative instruments or equipment, shall ensure that a placard has been installed as required by §43.11 of this chapter.

§ 91.407 Operation after maintenance, preventive maintenance, rebuilding, or alteration.

(a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—

(1) It has been approved for return to service by a person authorized under §43.7 of this chapter; and

(2) The maintenance record entry required by §43.9 or §43.11, as applicable, of this chapter has been made.

(b) No person may carry any person (other than crewmembers) in an aircraft that has been maintained, rebuilt, or altered in a manner that may have appreciably changed its flight characteristics or substantially affected its operation in flight until an appropriately rated pilot with at least a private pilot certificate flies the aircraft, makes an operational check of the maintenance performed or alteration made, and logs the flight in the aircraft records.

(c) The aircraft does not have to be flown as required by paragraph (b) of this section if, prior to flight, ground tests, inspection, or both show conclusively that the maintenance, preventive maintenance, rebuilding, or alteration has not appreciably changed the flight characteristics or substantially affected the flight operation of the aircraft.

(Approved by the Office of Management and Budget under control number 2120–0005)

§ 91.409 Inspections.

(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—

(1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by §43.7 of this chapter; or

(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

No inspection performed under paragraph (b) of this section may be substituted for any inspection required by this paragraph unless it is performed by a person authorized to perform annual inspections and is entered as an "annual" inspection in the required maintenance records.

(b) Except as provided in paragraph (c) of this section, no person may operate an aircraft carrying any person (other than a crewmember) for hire, and no person may give flight instruction for hire in an aircraft which that person provides, unless within the preceding 100 hours of time in service the aircraft has received an annual or 100-hour inspection and been approved for return to service in accordance with part 43 of this chapter or has received an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter. The 100-hour limitation may be exceeded by not more than 10 hours while en route to reach a place where the inspection can be done. The excess time used to reach a place where the inspection can be done must be included in computing the next 100 hours of time in service.

(c) Paragraphs (a) and (b) of this section do not apply to—

(1) An aircraft that carries a special flight permit, a current experimental certificate, or a light-sport or provisional airworthiness certificate;

(2) An aircraft inspected in accordance with an approved aircraft inspection program under part 125 or 135 of this chapter and so identified by the registration number in the operations specifications of the certificate holder having the approved inspection program;

(3) An aircraft subject to the requirements of paragraph (d) or (e) of this section; or

(4) Turbine-powered rotorcraft when the operator elects to inspect that rotorcraft in accordance with paragraph (e) of this section.

(d) *Progressive inspection.* Each registered owner or operator of an aircraft desiring to use a progressive inspection program must submit a written request to the FAA Flight Standards district office having jurisdiction over the area in which the applicant is located, and shall provide—

(1) A certificated mechanic holding an inspection authorization, a certificated airframe repair station, or the manufacturer of the aircraft to supervise or conduct the progressive inspection;

(2) A current inspection procedures manual available and readily understandable to pilot and maintenance personnel containing, in detail—

(i) An explanation of the progressive inspection, including the continuity of inspection responsibility, the making of reports, and the keeping of records and technical reference material;

(ii) An inspection schedule, specifying the intervals in hours or days when routine and detailed inspections will be performed and including instructions for exceeding an inspection interval by not more than 10 hours while en route and for changing an inspection interval because of service experience;

(iii) Sample routine and detailed inspection forms and instructions for their use; and

(iv) Sample reports and records and instructions for their use;

(3) Enough housing and equipment for necessary disassembly and proper inspection of the aircraft; and

(4) Appropriate current technical information for the aircraft.

The frequency and detail of the progressive inspection shall provide for the complete inspection of the aircraft within each 12 calendar months and be consistent with the manufacturer's recommendations, field service experience, and the kind of operation in which the aircraft is engaged. The progressive inspection schedule must ensure that the aircraft, at all times, will be airworthy and will conform to all applicable FAA aircraft specifications, type certificate data sheets, airworthiness directives, and other approved data. If the progressive inspection is discontinued, the owner or operator shall immediately notify the local FAA Flight Standards district office, in writing, of the discontinuance. After the discontinuance, the first annual inspection under §91.409(a)(1) is due within 12 calendar months after the last complete inspection of the aircraft under the progressive inspection. The 100-hour inspection under §91.409(b) is due within 100 hours after that complete inspection. A complete inspection of the aircraft, for the purpose of determining when the annual and 100-hour inspections are due, requires a detailed inspection of the aircraft and all its components in accordance with the progressive inspection. A routine inspection of the aircraft and a detailed inspection of several components is not considered to be a complete inspection.

(e) *Large airplanes (to which part 125 is not applicable), turbojet multiengine airplanes, turbopropeller-powered multiengine airplanes, and turbine-powered rotorcraft.* No person may operate a large airplane, turbojet multiengine airplane, turbopropeller-powered multiengine airplane, or turbine-powered rotorcraft unless the replacement times for life-limited parts specified in the aircraft specifications, type data sheets, or other documents approved by the Administrator are complied with and the airplane or turbine-powered rotorcraft, including the airframe, engines, propellers, rotors, appliances, survival equipment, and emergency equipment, is inspected in accordance with an inspection program selected under the provisions of paragraph (f) of this section, except that, the owner or operator of a turbine-powered rotorcraft may elect to use the inspection provisions of §91.409(a), (b), (c), or (d) in lieu of an inspection option of §91.409(f).

(f) *Selection of inspection program under paragraph (e) of this section.* The registered owner or operator of each airplane or turbine-powered rotorcraft described in paragraph (e) of this section must select, identify in the aircraft maintenance records, and use one of the following programs for the inspection of the aircraft:

(1) A continuous airworthiness inspection program that is part of a continuous airworthiness maintenance program currently in use by a person holding an air carrier operating certificate or an operating certificate issued under part 121 or 135 of this chapter and operating that make and model aircraft under part 121 of this chapter or operating that make and model under part 135 of this chapter and maintaining it under §135.411(a)(2) of this chapter.

(2) An approved aircraft inspection program approved under §135.419 of this chapter and currently in use by a person holding an operating certificate issued under part 135 of this chapter.

(3) A current inspection program recommended by the manufacturer.

(4) Any other inspection program established by the registered owner or operator of that airplane or turbine-powered rotorcraft and approved by the Administrator under paragraph (g) of this section. However, the Administrator may require revision of this inspection program in accordance with the provisions of §91.415.

Each operator shall include in the selected program the name and address of the person responsible for scheduling the inspections required by the program and make a copy of that program available to the person performing inspections on the aircraft and, upon request, to the Administrator.

(g) *Inspection program approved under paragraph (e) of this section.* Each operator of an airplane or turbine-powered rotorcraft desiring to establish or change an approved inspection program under paragraph (f)(4) of this section must submit the program for approval to the local FAA Flight Standards district office having jurisdiction over the area in which the aircraft is based. The program must be in writing and include at least the following information:

(1) Instructions and procedures for the conduct of inspections for the particular make and model airplane or turbine-powered rotorcraft, including necessary tests and checks. The instructions and procedures must set forth in detail the parts and areas of the airframe, engines, propellers, rotors, and appliances, including survival and emergency equipment required to be inspected.

(2) A schedule for performing the inspections that must be performed under the program expressed in terms of the time in service, calendar time, number of system operations, or any combination of these.

(h) *Changes from one inspection program to another.* When an operator changes from one inspection program under paragraph (f) of this section to another, the time in service, calendar times, or cycles of operation accumulated under the previous program must be applied in determining inspection due times under the new program.

(Approved by the Office of Management and Budget under control number 2120–0005)

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989; Amdt. 91–211, 54 FR 41211, Oct. 5, 1989; Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–282, 69 FR 44882, July 27, 2004]

§ 91.410 [Reserved]

§ 91.411 Altimeter system and altitude reporting equipment tests and inspections.

(a) No person may operate an airplane, or helicopter, in controlled airspace under IFR unless—

(1) Within the preceding 24 calendar months, each static pressure system, each altimeter instrument, and each automatic pressure altitude reporting system has been tested and inspected and found to comply with appendices E and F of part 43 of this chapter;

(2) Except for the use of system drain and alternate static pressure valves, following any opening and closing of the static pressure system, that system has been tested and inspected and found to comply with paragraph (a), appendix E, of part 43 of this chapter; and

(3) Following installation or maintenance on the automatic pressure altitude reporting system of the ATC transponder where data correspondence error could be introduced, the integrated system has been tested, inspected, and found to comply with paragraph (c), appendix E, of part 43 of this chapter.

(b) The tests required by paragraph (a) of this section must be conducted by—

(1) The manufacturer of the airplane, or helicopter, on which the tests and inspections are to be performed;

(2) A certificated repair station properly equipped to perform those functions and holding—

(i) An instrument rating, Class I;

(ii) A limited instrument rating appropriate to the make and model of appliance to be tested;

(iii) A limited rating appropriate to the test to be performed;

(iv) An airframe rating appropriate to the airplane, or helicopter, to be tested; or

(3) A certificated mechanic with an airframe rating (static pressure system tests and inspections only).

(c) Altimeter and altitude reporting equipment approved under Technical Standard Orders are considered to be tested and inspected as of the date of their manufacture.

(d) No person may operate an airplane, or helicopter, in controlled airspace under IFR at an altitude above the maximum altitude at which all altimeters and the automatic altitude reporting system of that airplane, or helicopter, have been tested.

[Docket No. 18334, 54 FR 34308, Aug. 18, 1989, as amended by Amdt. 91–269, 66 FR 41116, Aug. 6, 2001; 72 FR 7739, Feb. 20, 2007]

§ 91.413 ATC transponder tests and inspections.

(a) No persons may use an ATC transponder that is specified in 91.215(a), 121.345(c), or §135.143(c) of this chapter unless, within the preceding 24 calendar months, the ATC transponder has been tested and inspected and found to comply with appendix F of part 43 of this chapter; and

(b) Following any installation or maintenance on an ATC transponder where data correspondence error could be introduced, the integrated system has been tested, inspected, and found to comply with paragraph (c), appendix E, of part 43 of this chapter.

(c) The tests and inspections specified in this section must be conducted by—

(1) A certificated repair station properly equipped to perform those functions and holding—

(i) A radio rating, Class III;

(ii) A limited radio rating appropriate to the make and model transponder to be tested;

(iii) A limited rating appropriate to the test to be performed;

(2) A holder of a continuous airworthiness maintenance program as provided in part 121 or §135.411(a)(2) of this chapter; or

(3) The manufacturer of the aircraft on which the transponder to be tested is installed, if the transponder was installed by that manufacturer.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–267, 66 FR 21066, Apr. 27, 2001; Amdt. 91–269, 66 FR 41116, Aug. 6, 2001]

§ 91.415 Changes to aircraft inspection programs.

(a) Whenever the Administrator finds that revisions to an approved aircraft inspection program under §91.409(f)(4) or §91.1109 are necessary for the continued adequacy of the program, the owner or operator must, after notification by the Administrator, make any changes in the program found to be necessary by the Administrator.

(b) The owner or operator may petition the Administrator to reconsider the notice to make any changes in a program in accordance with paragraph (a) of this section.

(c) The petition must be filed with the Director, Flight Standards Service within 30 days after the certificate holder or fractional ownership program manager receives the notice.

(d) Except in the case of an emergency requiring immediate action in the interest of safety, the filing of the petition stays the notice pending a decision by the Administrator.

[Doc. No. 18334, 54 FR 34311, Aug. 18, 1989, as amended by Amdt. 91–280, 68 FR 54560, Sept. 17, 2003]

§ 91.417 Maintenance records.

(a) Except for work performed in accordance with §§91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

(i) A description (or reference to data acceptable to the Administrator) of the work performed; and

(ii) The date of completion of the work performed; and

(iii) The signature, and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) including, for each, the method of compliance, the AD number, and revision date. If the AD involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by §43.9(a) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

(b) The owner or operator shall retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under §43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

(c) The owner or operator shall make all maintenance records required to be kept by this section available for inspection by the Administrator or any authorized representative of the National Transportation Safety Board (NTSB). In addition, the owner or operator shall present Form 337 described in paragraph (d) of this section for inspection upon request of any law enforcement officer.

(d) When a fuel tank is installed within the passenger compartment or a baggage compartment pursuant to part 43 of this chapter, a copy of FAA Form 337 shall be kept on board the modified aircraft by the owner or operator.

(Approved by the Office of Management and Budget under control number 2120–0005)

§ 91.419 Transfer of maintenance records.

Any owner or operator who sells a U.S.-registered aircraft shall transfer to the purchaser, at the time of sale, the following records of that aircraft, in plain language form or in coded form at the election of the purchaser, if the coded form provides for the preservation and retrieval of information in a manner acceptable to the Administrator:

(a) The records specified in §91.417(a)(2).

(b) The records specified in §91.417(a)(1) which are not included in the records covered by paragraph (a) of this section, except that the purchaser may permit the seller to keep physical custody of such records. However, custody of records by the seller does not relieve the purchaser of the responsibility under §91.417(c) to make the records available for inspection by the Administrator or any authorized representative of the National Transportation Safety Board (NTSB).

§ 91.421 Rebuilt engine maintenance records.

(a) The owner or operator may use a new maintenance record, without previous operating history, for an aircraft engine rebuilt by the manufacturer or by an agency approved by the manufacturer.

(b) Each manufacturer or agency that grants zero time to an engine rebuilt by it shall enter in the new record—

(1) A signed statement of the date the engine was rebuilt;

(2) Each change made as required by airworthiness directives; and

(3) Each change made in compliance with manufacturer's service bulletins, if the entry is specifically requested in that bulletin.

(c) For the purposes of this section, a rebuilt engine is a used engine that has been completely disassembled, inspected, repaired as necessary, reassembled, tested, and approved in the same manner and to the same tolerances and limits as a new engine with either new or used parts. However, all parts used in it must conform to the production drawing tolerances and limits for new parts or be of approved oversized or undersized dimensions for a new engine.

§§ 91.423-91.499 [Reserved]

END OF SECTION 1

Section II: Airworthiness Directives

- 80-10-02—Messerschmitt-Bolkow-Blohm-Gmbh and Messerschmitt-Bolkow-Blohm Helicopter
- 80-15-12—Agusta, Contruzioni Aeronautiche Giovanni
- 81-23-01—R1—Beech
- 82-06-12—Air Tractor, Inc.
- 82-11-05—Bendix
- 90-01-06—Enstrom Helicopter Corporation
- 90-08-14—Beech
- 93-24-03—Beech Aircraft Corporation
- 95-13-08—Pratt & Whitney Aircraft of Canada

MESSERSCHMITT-BOLKOW-BLOHM-GMBH AND MESSERSCHMITT-BOLKOW-BLOHM HELICOPTER

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80-10-02 MESSERSCHMITT-BOLKOW-BLOHM: Amendment 39-3765. Applies to Model BO-105 series helicopters with tail rotor blade grip P/N 105-31711 or P/N 105-31722 installed, certificated in any category.

To prevent failure of the tail rotor system, accomplish the following:

(a) Within the next 10 hours time in service after the effective date of this AD, unless already accomplished within the last 90 hours time in service, and thereafter at intervals not to exceed 100 hours time in service from the last inspection, inspect the visible part of the inner surface of the tail rotor blade grip clevis area (do not remove blade retaining bolt bushings) for cracks using the dye penetrant method in accordance with Messerschmitt-Bolkow-Blohm BO-105 Alert Service Bulletin No. 18 dated March 15, 1979, or an FAA-approved equivalent.

(b) Within the next 100 hours after installing a replacement tail rotor blade grip in accordance with paragraph (g) of this AD, and thereafter at intervals not to exceed 100 hours time in service from the last inspection, inspect the visible part of the inner surface of the tail rotor blade grip clevis area (do not remove blade retaining bolt bushings) for cracks using the dye penetrant method in accordance with Messerschmitt-Bolkow-Blohm BO-105 Alert Service Bulletin No. 18 dated March 15, 1979, or an FAA-approved equivalent.

(c) Within the next 100 hours time in service after the effective date of this AD—

(1) Visually inspect the inboard end of the tail rotor blade grip for cracks in accordance with paragraph 2.A.1 "Accomplishment Instructions" of Messerschmitt-Bolkow-Blohm Service Bulletin 30-24 dated December 1, 1978, or an FAA-approved equivalent; and

(2) Inspect the tail rotor blade grip in the vicinity of the bore of the laminated pack retaining bolt (on the inner side) for cracks using the dye penetrant method in accordance with paragraph 2.A.2 "Accomplishment Instructions" of Messerschmitt-Bolkow-Blohm BO-105 Service Bulletin 30-24 dated December 1, 1978, or an FAA-approved equivalent.

(d) Within the next 100 hours time in service after accomplishing the inspection required by paragraph (c)(1) of this AD or installing a replacement tail rotor blade grip in accordance with paragraph (g) of this AD, and thereafter at intervals not to exceed 100 hours time in service from the last inspection, visually inspect the inboard end of the tail rotor blade grip for cracks in accordance with "Special Inspections." Chapter 10 of the Messerschmitt-Bolkow-Blohm BO-105 Maintenance and Overhaul Manual or an FAA-approved equivalent.

(e) Within the next 600 hours time in service after accomplishing the inspection required by paragraph (c)(2) of this AD or installing a replacement tail rotor blade grip in accordance with paragraph (g) of this AD, and thereafter at intervals not to exceed 600 hours from the last inspection, inspect the tail rotor blade grip in the vicinity of the bore of the laminated pack retaining bolt (on the inner side) for cracks using the dye penetrant method in accordance with "Special Inspections," Chapter 10, of the Messerschmitt-Bolkow-Blohm BO-105 Maintenance and Overhaul Manual or an FAA-approved equivalent.

(f) If, during any inspection required by this AD, any cracks are found, before further flight, replace the cracked tail rotor blade grip in accordance with paragraph (g) of this AD.

(g) For all replacement tail rotor blade grips installed after the effective date of this AD—

(1) Use a new or used crack-free tail rotor blade grip of the same part number. Before installation of a used tail rotor blade grip, inspect the part using the dye penetrant method to ensure that it is crack-free; and

(2) Comply with the repetitive inspection requirements of paragraphs (b), (d), and (e) of this AD.

NOTE: This AD applies to both tail rotor blade grips installed on the helicopter.

This amendment becomes effective May 1, 1980, as to all persons except those persons to whom it was made immediately effective by the telegram dated March 30, 1979, which contained this amendment.

AGUSTA, COSTRUZIONI AERONAUTICHE GIOVANNI

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80-15-12 COSTRUZIONI AERONAUTICHE GIOVANNI AGUSTA: Amendment 39-3854. Applies to Model A109A series helicopters, certificated in all categories, all serial numbers up to S/N 7165 inclusive, which have main rotor mast bearing inner race P/N 109-0404-14 installed.

Compliance required as indicated.

To prevent failure of the main rotor mast upper thrust bearing, accomplish the following:

(a) Within the next 25 hours time in service after the effective date of this AD, unless already accomplished, visually inspect the area between the swashplate support, P/N 109-0110-05, and the main transmission upper case flange, for evidence of oil leaks in accordance with "ACCOMPLISHMENT INSTRUCTIONS," Part I, paragraph A, of Agusta Service Bulletin No. 109-12, Revision A, dated December 12, 1979 (hereinafter referred to as the Service Bulletin), or an FAA-approved equivalent.

(b) If no evidence of oil leaks is found, continue in service and comply with paragraph (d) of this AD.

(c) If, as a result of the inspection required in paragraph (a) of this AD, or of a repetitive inspection required by paragraph (d) of this AD, evidence of oil leaks is found, raise swashplate support, P/N 109-0110-05, and carefully inspect, using the visual method, the entire exposed surface of the bearing inner race, P/N 109-0404-14, for evidence of damage or cracks.

(i) If no cracks or damage are found, replace the packing P/N 109-0406-68, with new packing in accordance with "ACCOMPLISHMENT INSTRUCTIONS," Part I, paragraph B.2 of the Service Bulletin, or an FAA-approved equivalent.

(ii) If cracks or damage are found, before further flight, except that the helicopter may be flown to a base in accordance with FAR 21.197 and 21.199 where the repairs may be accomplished, replace the bearing inner race with a new part number inner race, P/N 109-0404-14-15, in accordance with "ACCOMPLISHMENT INSTRUCTIONS," Part II, of the Service Bulletin, or an FAA-approved equivalent.

(iii) Upon accomplishment of paragraph (c)(i) or (c)(ii) of this AD, return to service and comply with paragraph (d) of this AD.

(d) After the termination of each flight, conduct the inspection described in paragraph (a) of this AD on all helicopters up to S/N 7165, inclusive.

(e) Within the next 200 hours time in service after the effective date of this AD, unless already accomplished, for all helicopters up to S/N 7165 inclusive, and except for helicopters S/N 7140, 7142, 7148, 7150, 7152, 7158, 7160, 7161, 7162, 7163 and 7164, remove the main rotor mast upper bearing inner race, P/N 109-0404-14, and replace with a new part number bearing inner race, P/N 109-0404-14-15, in accordance with Part II of the Service Bulletin, or an FAA-approved equivalent, and continue to comply with paragraph (d) of this AD.

(f) For all main transmission gearboxes S/N 58 and below, held as spares, replace the main rotor mast upper bearing inner race, P/N 109-0404-14, with a new inner race P/N 109-0404-14-15 in accordance with Part II of the Service Bulletin before release of the gearbox to service.

(g) Upon request of an operator, the Chief, Aircraft Certification Staff, FAA, Europe, Africa, and Middle East Office, c/o American Embassy, Brussels, Belgium, may adjust the compliance time specified in paragraph (d) of this AD provided such requests are made through an FAA maintenance inspector and the request contains substantiating data to justify the request for that operator.

(h) For the purpose of this AD, and FAA-approved equivalent may be approved by the Chief, Aircraft Certification Staff, AEU-100, Europe, Africa, and Middle East Office, Federal Aviation Administration, c/o American Embassy, Brussels, Belgium.

This amendment becomes effective August 7, 1980.

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81-23-01 R1 BEECH: Amendment 39-4289. Applies to the following model airplanes regardless of the category or categories of airworthiness certification:

MODELS	SERIAL NUMBER (S/N)*
65, A65 & A65-8200	LC-181 through LC-335
70	LB-1 through LB-35
65-A80, 65-A80-8800 & 65-B80	LD-151 through LD-511 and LD-34,
	LD-46, LD-119
65-A88, 65-88	LP-1 through LP-54
65-90, 65-A90, B90 & C-90	LJ-1 through LJ-929
E90	LW-1 through LW-342
99, 99A, B99	U-1 through U-164
100 & A100	B-1 through B-247
B100	BE-1 through BE-102, and BE-104
Military:	
L23F**	**LF-7 through LF-76**
65-A90-1	LM-1 through LM-144
65-A90-2	LS-1, -2, -3
65-A90-3	LT-1, -2
65-A90-4	LU-1 through LU-16
NU-8F	LG-1

*Except that airplanes which have installed BEECHCRAFT Kit No. 90-4077-1 S, BEECHCRAFT Kit No. 99-4023-1 S, or Aviadesign Supplemental Type Certificate SA1178CE or SA1583CE are not affected by this AD.

**Except that Model L23F airplanes which do not have a preload indicating washer assembly (i.e., one with radial holes in a center ring) are not affected by this AD.

COMPLIANCE: Required as indicated, unless already accomplished.

In order to assure integrity of bolts and nuts at the lower forward attachments of outer wing panels to the wing center section, accomplish the following:

A) Prior to next flight, accomplish all of the following:

1. Remove all bolts, washers, and nuts from each lower forward wing attachment and thoroughly clean each removed part. Throughout all action required by this AD:

   a. Use procedures in the applicable Beech Maintenance Manual except where other procedures are specified by this AD,

   b. Unless different instruction from Beech Aircraft Corporation is obtained and followed, reposition wing, as necessary, to remove or reinstall bolt by hand without using any tool,

   c. Keep parts of each preload indicating washer assembly together so that parts of one assembly cannot be intermingled with parts of another assembly,

   d. Clean each removed part with naptha or methyl ethyl ketone (MEK) using a bristle brush, and repeat this cleaning as necessary prior to each subsequently specified action until lubricant is applied, and

   e. Accomplish all of the specified actions on both (i.e., left and right) sides of the airplane.

2. Visually inspect each bolt and nut for reddish rust. Do not classify copper residue over cadmium plating as rust. For a bolt, rust is acceptable only on the end (including not more than one thread) farthest from the head and within counterboard recess between wrench serrations of the bolt head. For compliance with Paragraph A)6 and C), below, classify a bolt as rusted if rust is found elsewhere. Classify a nut as rusted if rust is found anywhere.

3. Visually inspect each bolt and nut for a pit or crack in steel (not cadmium or copper plating) material. Use 10X or stronger magnifying glass. For each bolt, pay particular attention to the fillet and shank, including threads. For each nut, pay particular attention to the chamfer (that faces the bolt head when installed) and perceptible threads adjacent to this chamfer. (Refer to Paragraphs A)6 and C) below.)

4. Bake each bolt and nut continuously for 23 hours at 350 degrees to 400 degrees Fahrenheit and cool in still air.

5. After accomplishment of Paragraph A)4, above, use a magnetic particle method of Advisory Circular AC43.13-1A to inspect each bolt and nut for a crack, paying particular attention to locations specified in Paragraph A)3, above. For each bolt, use a fluorescent particle method with 5250 to 6750 ampereturns in a coil to produce longitudinal magnetization in each bolt. (6,000 ampereturns means 2,000 amperes in a 3-turn coil or 1,000 amperes in a 6-turn coil, etc.) For each nut, use any magnetic particule method with 500 to 700 amperes through a central conductor of at least 0.6-inch diameter through two nuts to produce circular magnetization. Demagnetize each bolt and nut after the above inspection.

6. Replace each rusted, pitted, and/or cracked nut and bolt with a new Part Number (P/N) as follows:

   a. If new preload indicating (PLI) washer assembly is to be used in accordance with Paragraph A)9, below, nut P/N is 72789-1414, 72789M-1414, FN22-1414, or FN22M-1414. ("M" in P/N denotes black coating. All eligible nuts have a locking feature which necessitates use of a wrench for full engagement with bolt.)

   b. If a used PLI washer assembly is reinstalled in accordance with Paragraph A)9, below, nut P/N is 72789-1414 or FN22-1414.

   c. Bolt is P/N LWB 22-14-XX or VEP 220121-14-XX where XX is 31 for airplanes with S/N LD-34, LD-46, LD-119, and LJ-1 through LJ-67, and XX is 32 for all other airplanes affected by this AD.

   Replace preload indicating washer with new P/N 61475-14-43.5 assembly (not any other P/N) if this assembly is available. Obtain new parts only from Beech Service Centers or Beech Aircraft Corporation. (Neither baking nor field inspection of new parts is necessary.) Do not replate any part.

7. Clean the bore and recessed washer seat area of the outboard and inboard wing fittings with naptha or methyl ethyl ketone (MEK). Visually inspect these areas for corrosion, burrs, gouges and coining. If any defect is found, contact Beech Aircraft Service Department, 9709 East Central, Wichita, Kansas 67201; telephone (316) 681-7261, 7278, or 7352, for rework disposition. Also, if any defect is found, treat the bore and recessed washer seat areas of the inboard and outboard wing fittings with Alodine 1200, 1200S, or 1201. Allow the alodine coating to dry for 5 minutes. Wash the coating with water and blow dry with air without wiping. Paint treated washer seat areas with zinc chromate primer (obtain locally) and allow primer to dry.

8. Coat the inspected areas of the wing fittings, all of each bolt, all of each nut, and all of each preload indicating washer assembly with either clean MIL-C-16173, Grade 2 corrosion preventative compound or clean General Electric G322L Versilube Silicone Lubricant.

9. Install removed or new parts using standard procedures except as follows:

   a. Preload indicating (PLI) washer assembly may be reused with P/N 72789-1414 and/or P/N FN22-1414 nuts, only.

   b. Ascertain that a radius of the adjacent washer is next to the fillet under the bolt head and next to the outer edge of the recess in each wing fitting. Position wing as necessary to allow bolt to slide into fitting without use of any tool.

   c. Tighten the joint by rotating the nut (do not turn the bolt). Use standard procedure if new PLI washer assembly is installed. If used PLI washer assembly is reinstalled, make necessary correction for any torque wrench adapter and apply 3250 to 3400 inch-pounds torque, but install new PLI washer assembly if center ring of the used assembly turns after 3400 inch-pounds torque is applied. Do not allow wrench to bear against fitting.

d. Coat entire portion of bolt that projects beyond nut, using a material that is specified in Paragraph A)8, above.

e. Make aircraft maintenance record entry showing work accomplished, especially procedure used for tightening nut, and whether new or used PLI washer was installed. Indicating washer assembly with either clean MIL-C-16173, Grade 2 corrosion preventative compound or clean General Electric G322L Versilube Silicone Lubricant.

B) Between 90 and 110 hours time-in-service after accomplishment of action specified by Paragraph A) of this AD, check nut tightness, using the same procedure that was used for accomplishment of Paragraph A)9c, above.

C) Within 3 days after replacing a part in accordance with Paragraph A)6, above, or noting a defect when complying with this AD, submit a written report to the Federal Aviation Administration via an FAA M or D Report (FAA Form 8330-2) or a letter to the office specified in Paragraph E), below and send the replaced part(s) to Beech Aircraft Corporation. In the submitted report, please advise date of last previous bolt removal.

D) A special flight permit in accordance with Federal Aviation Regulation 21.197 for flight to the nearest base is permitted in order to accomplish Paragraph A) of this AD. The nearest FAA Flight Standards District Office may be contacted to obtain a telegraphic special flight permit.

E) Any equivalent method of compliance with this AD must be approved by the Chief, Aircraft Certification Program, Federal Aviation Administration, Room 238, Terminal Building 2299, Mid-Continent Airport, Wichita, Kansas 67209; Telephone (316) 269-7000, 7001, or 7002.

This amendment becomes effective on January 4, 1982, to all persons except those to whom it has already been made effective by an airmail letter from the FAA dated October 31, 1981.

82-06-12 AIR TRACTOR: Amendment 39-4350. Applies to Models AT-300 (S/Ns 300-0001 through 300-9999); AT-301 (S/Ns 301-0001 through 301-9999); AT-302 (S/Ns 302-0001 through 302-9999); AT-400 (S/Ns 400-0244 through 400-9999); and AT-400A (S/Ns 400A-0397 through 400A-9999) airplanes certified in any category and equipped with 1-inch-thick (P/N 40007-2 or P/N 40058-1) main landing gear struts.

COMPLIANCE: Required as indicated, unless already accomplished.

To prevent possible failure of the P/N 40007-2 or P/N 40058-1 main landing gear struts accomplish the following:

(a) Models AT-300 and AT-301 airplanes:

(1) On struts having exceeded, or upon accumulating, 1,000 hours time-in-service or 5,000 landings, whichever occurs first, within 20 hours time-in-service or 100 landings, whichever occurs first, after the effective date of this AD and thereafter at intervals of 100 hours time-in-service or 500 landings, whichever occurs first, inspect and replace as necessary the landing gear struts in accordance with paragraph (c).

(2) On struts having exceeded, or upon accumulating, 2,000 hours time-in-service or 7,500 landings, whichever occurs first, prior to further flight, replace the struts with new struts of the same part number.

(b) Models AT-302, AT-400 and AT-400A airplanes:

(1) On struts having exceeded, or upon accumulating, 600 hours time-in-service or 3,000 landings, whichever occurs first, within 20 hours time in-service or 100 landings, whichever occurs first, after the effective date of this AD and thereafter at intervals of 100 hours time-in-service or 500 landings, whichever occurs first, inspect the struts and replace as necessary in accordance with paragraph (c).

(2) On struts having exceeded, or upon accumulating, 1,200 hours time-in-service, or 6,000 landings, whichever occurs first, prior to further flight, replace the struts with new struts of the same part number.

(c) Remove the left and right outboard fuselage clamp blocks. Remove all minor corrosion on both main landing gears by sandblasting. Inspect both main landing gears using dye penetrant or magnetic particle inspection procedures with special attention in the areas of strut contact with the clamp blocks. Replace all parts which are damaged, cracked, or have severe corrosion pitting with new parts of the same part number before further flight. All struts returned to service must be painted.

(d) The aircraft hours and landings may be used as the time-in-service or landings on the struts if time-in-service or landings on the struts cannot be established by the airplane maintenance records.

(e) A special flight permit may be issued in accordance with FAR 21.197 to allow flight of the aircraft to a location where this AD can be accomplished.

(f) An equivalent method of compliance with this AD may be used when approved by the Chief, Aircraft Certification Division, Federal Aviation Administration, 4400 Blue Mound Road, Fort Worth, Texas 76101.

Snow Engineering Company Service Letter No. 45, dated November 1, 1981, covers the subject matter of this AD.

Compliance with this Service Letter within the last 100 hours time-in-service or 500 landings, whichever comes first, satisfies the initial inspection requirement of paragraphs (a) and (b) of this AD.

This amendment becomes effective on March 25, 1982.

82-11-05 BENDIX: Amendment 39-4389. Applies to Bendix Engine Products Division D-2000 and D-2200 series magnetos with serial numbers below 35480 (red identification plate) and with serial numbers below 8122106 (blue identification plate), unless identified with an "X" in the upper left corner of the identification plate.

Compliance required as indicated, unless already accomplished.

To reduce the possibility of engine power loss and engine damage resulting from looseness of the distributor gear electrode, accomplish Paragraphs (a) and (b):

(a) Comply with the inspection requirements specified in the "Detailed Instructions" of Bendix Service Bulletin No. 617, dated November 1981, or later FAA-approved revision in accordance with the following schedule:

MAGNETO TIME IN SERVICE

SINCE NEW OR OVERHAUL	ACCOMPLISH
Less than 500 hours	Within the next 50 hours in service and every 100 hours in service thereafter up to 550 hours in service.
500 hours or more	Within the next 50 hours in service.

(b) Magnetos with 1900 hours or more in service since new or overhaul: Within the next 100 hours time in service, replace distributor gear assembly with new serviceable gear assembly in accordance with Bendix Service Bulletin No. 617, dated November 1981, or later FAA approved revision.

(c) If the distributor block is contaminated with brass filings or bronze colored dust, inspect the engine as follows:

(1) Observe engine pistons through spark plug hole for evidence of burning.

(2) Check valve dry tappet clearance per engine manufacturer's instructions.

If piston damage, or lower than specified dry tappet clearance, is present, the engine must be inspected in accordance with the engine manufacturer's instructions for continued airworthiness.

Equivalent means of compliance may be approved by the Chief of the New York Aircraft Certification Office, ANE-170, Federal Aviation Administration (FAA), New England Aircraft Certification Division, Federal Building, JFK International Airport, Jamaica, New York 11430. As permitted by FAR 21.197, aircraft may be flown to a base where maintenance required by this AD can be accomplished.

This AD is effective June 9, 1982.

90-01-06 ENSTROM HELICOPTER CORPORATION: Amendment 39-6457. Docket No. 89-ASW-59.

Applicability: Enstrom Model F-28, F-28A, F-28C, F-28C-2, F-28F, 280, 280C, 280F and 280FX Series Helicopters, equipped with tail rotor gearboxes, P/N 28-13500-1, 28-13525-1, -3, and 5, containing spiral miter gear-set "Boston Gear XR 137 2YR" and "Boston Gear XR-137-2YL."

Compliance: Required as indicated, unless already accomplished.

To prevent the loss of tail rotor thrust and directional control, which could result in loss of the helicopter, accomplish the following:

(a) Within the next five hours' time in service--

(1) Determine from the aircraft log book if tail rotor gearbox, P/N 28-13500-1, 28-13525-1, -3, or -5, is installed in the helicopter;

(2) Remove all -1, -3 or -5 tail rotor gearboxes containing spiral miter gear-set "Boston Gear XR-137-2YR" and "Boston Gear XR-137-2YL", with 1,200 or more hours' time in service since the last overhaul, and replace with an airworthy gearbox; and

(3) For tail rotor gearboxes with less than 1,200 hours' time in service since the last overhaul, remove the magnetic chip detector (plug), drain the oil from the tail rotor gearbox, filter the oil using a white filter paper, and inspect the magnetic plug and the filter paper with a ten power magnifying glass--

(i) If no metal contaminants are found, return the tail rotor gearbox to service;

(ii) If the inspection required by paragraph (a)(3) above reveals the presence of more than 15 thin metal flakes, splinters, or granular-shaped steel particles greater than 0.005 inches thick or longer than 0.015 inches, remove and replace the tail rotor gearbox with an airworthy gearbox; and

(iii) If metal contaminants are found that are fewer in number and smaller than those described in paragraph (ii) above, conduct further servicing and inspection in accordance with paragraph (a)(4).

(4) Flush the gearbox with clean oil and clean the magnetic plug with a cotton swab and/or an air gun.

NOTE: Do not clean the magnetic plug with a strong magnet. This weakens the magnet on the chip detector.

(i) Refill the tail rotor gearbox with Mil-L-6082B Shell SAE10W, Mil-L-6082B Texaco SAE 10W, or Mil-L-22851B Phillips SAE 20W-50W lubricant. If any of these lubricants are not available, consult Enstrom Helicopter Corporation, Customer Service Department, for a possible alternative.

(ii) Conduct a serviceability check by flying the helicopter for one hour at various power settings up to full power, and then repeat the inspection required by paragraphs (a)(3) above.

(A) If no metal contaminants are found, return the tail rotor gearbox to service.

(B) If the repeat inspection reveals the presence of any metal contaminants, regardless of size or number, remove and replace the tail rotor gearbox with an airworthy gearbox.

(b) At intervals not to exceed 100 hours' time in service on all gearboxes returned to service after passing the inspections of paragraph (a), remove the magnetic chip detector (plug), drain the oil from the tail rotor gearbox, filter the oil using a white filter paper, and inspect the magnetic plug and the filter paper with a ten-power magnifying glass.

(1) If the inspection reveals the presence of any metal contaminants, regardless of size or number, remove and replace the tail rotor gearbox with an airworthy gearbox.

(2) If no metal contaminants are found return the tail rotor gearbox to service.

(c) Within 1,200 hours' time in service since the last overhaul, remove and replace the tail rotor gearbox with an airworthy gearbox.

(d) An alternate method of compliance with this AD, which provides an equivalent level of safety, may be used when approved by the Manager, Chicago Aircraft Certification Office, FAA, 2300 East Devon Avenue, Room 232, Des Plaines, Illinois 60018.

(e) In accordance with Sections 21.197 and 21.199, flight is permitted to a base where the maintenance required by this AD may be accomplished.

This amendment (39-6457, AD 90-01-06) becomes effective on February 1, 1990.

90-08-14 BEECH: Amendment 39-6563. Docket No. 89-CE-26-AD.

Applicability: The following airplanes certificated in any category.

MODELS	SERIAL NUMBERS
95, B95, B95A, D95A, E95	TD-1 through TD-721
95-55, 95-A55, 95-B55 and	TC-1 through TC-2456,
95-B55A	except TC-350
95-C55, 95-C55A, D55,	TC-350 and TE-1 through
D55A, E55 AND E55A	TE-1201
95-B55B (T42A)	TF-1 through TF-70
56TC, A56TC	TG-1 through TG-94
58, 58A	TH-1 through TH-1475

Compliance: Required as indicated in the body of the AD, unless already accomplished.

To prevent cracks in the wing forward spar carry-through web structure from propagating to lengths that could compromise the integrity of the wing attachment to the fuselage, accomplish the following:

(a) Within the next 100 hours time-in-service (TIS), after the effective date of this AD, or upon the accumulation of 1,500 hours total TIS, whichever occurs later, and thereafter at the intervals specified below, inspect the wing forward spar carry-through web structure in accordance with the instructions in Beech Service Bulletin (SB) No. 2269, Revision 1, dated March 1990.

(1) If no cracks are found, repeat the inspection at 500 hour TIS intervals thereafter.

(2) For cracks in the bend radius:

(i) If the crack length is less than 2.25 inches, prior to further flight stop drill the crack in accordance with the instructions in Beech SB No. 2269, Revision 1, and reinspect for crack progression every 200 hours TIS thereafter. Only one stop drilled crack for the left side and one stop drilled crack for the right side of the web structure are permissible.

(ii) If the crack length is greater than 2.25 inches but less than 4.0 inches, prior to further flight stop drill the crack in accordance with the instructions in Beech SB No. 2269, Revision 1, and within the next 100 hours TIS, repair the web structure with the applicable Beech Part Number (P/N) 58-4008 kit as specified in the above SB. After installation of the applicable Beech P/N 58-4008 kit, dye-penetrant inspect this area for cracks within the next 1,500 hours TIS from the time of installation of the applicable kit, and reinspect for cracks at 500 hours TIS intervals thereafter. If cracks are detected in these subsequent inspections, prior to further flight, contact the Wichita Aircraft Certification Office at the address below for disposition.

(iii) If the crack length is greater than 4.0 inches, prior to further flight repair the web structure with the applicable Beech P/N 58-4008 kit as specified in the above SB. After installation of the applicable Beech P/N 58 4008 kit, dye-penetrant inspect this area for cracks within the next 1,500 hours TIS from the time of installation of the applicable kit, and reinspect for cracks at 500 hours TIS intervals thereafter. If cracks are detected in these subsequent inspections, prior to further flight, contact the Wichita Aircraft Certification Office at the address below for disposition.

(3) For cracks in the web face, in the area of the huckbolt fasteners:

(i) If the crack length is less than 1.0 inch, reinspect for crack progression every 100 hours TIS thereafter. Only one crack for the left side and one crack for the right side are permissible, provided neither crack exceeds 1.0 inch in length.

NOTE 1: Do not stop drill these cracks due to the possibility of damaging the structure behind the web face.

(ii) If any crack length is greater than 1.0 inch, or a crack is connecting two fastener holes, within the next 25 hours TIS, repair the web face with the applicable Beech P/N 58-4008 kit as specified in the above SB. After installation of the applicable Beech P/N 58-4008 kit, dye-penetrant inspect this area for cracks within the next 1,500 hours TIS from the time of installation of the applicable kit, and reinspect for cracks at 500 hours TIS intervals thereafter. If cracks are detected in these subsequent inspections, prior to further flight, contact the Wichita Aircraft Certification Office at the address below for disposition.

(iii) If any crack passes through two fastener holes and extends beyond the holes for more than 0.5 inch, prior to further flight repair the web face with the applicable Beech P/N 58-4008 kit as specified in the above SB. After installation of the applicable Beech P/N 58-4008 kit, dye-penetrant inspect this area for cracks within the next 1,500 hours TIS from the time of installation of the applicable kit, and reinspect for cracks at 500 hours TIS intervals thereafter. If cracks are detected in these subsequent inspections, prior to further flight, contact the Wichita Aircraft Certification Office at the address below for disposition.

(4) If cracks are found on the same side of the airplane in both the forward and aft web face, or the bend radii, and any of the cracks are more than 1.0 inch long, prior to further flight repair the web structure with the applicable Beech P/N 58-4008 kit as specified in the above SB. After installation of the applicable Beech P/N 58-4008 kit, dye-penetrant inspect this area for cracks within the next 1,500 hours TIS from the time of installation of the applicable kit, and reinspect for cracks at 500 hours TIS intervals thereafter. If cracks are detected in these subsequent inspections, prior to further flight, contact the Wichita Aircraft Certification Office at the address below for disposition.

NOTE 2: If a fuselage skin crack is discovered around the opening for the lower forward carry-through fitting, an external doubler may be required.

(b) Airplanes may be flown in accordance with FAR 21.197 to a location where the AD may be accomplished.

(c) An alternate method of compliance or adjustment of the initial or repetitive compliance times, which provides an equivalent level of safety, may be approved by the Manager, Wichita Aircraft Certification Office, FAA, Room 100, 1801 Airport Road, Wichita, Kansas 67209.

NOTE 3: The request should be forwarded through an FAA Maintenance Inspector, who may add comments and then send it to the Manager, Wichita Aircraft Certification Office.

All persons affected by this directive may obtain copies of the document referred to herein upon request to Beech Aircraft Corporation, Commercial Service, Department 52, P.O. Box 85, Wichita, Kansas 67201-0085; or may examine this document at the FAA, Office of the Assistant Chief Counsel, Room 1558, 601 East 12th Street, Kansas City, Missouri 64106.

This amendment (39-6563, AD 90-08-14) becomes effective on May 7, 1990.

93-24-03 BEECH AIRCRAFT CORPORATION: Amendment 39-8752; Docket No. 93-CE- 22-AD. Supersedes AD 92-15-06, Amendment 39-8300 which superseded AD 91-23-07, Amendment 39-8076.

Applicability: The following Beech model and serial numbered airplanes, certificated in any category:

MODELS	SERIAL NUMBERS
35-33, 35-A33, 35-B33, 35-C33, E33, F33, and G33	CD-1 through CD-1304
35-C33A, E33A, and F33A	CE-1 through CE-1425
E33C and F33C	CJ-1 through CJ-179
36 and A36	E-1 through E-2518
A36TC and B36TC	EA-1 through EA-500

Compliance: Required as indicated after the effective date of this AD, unless already accomplished (compliance with superseded AD 92-15-06 or superseded AD 91-23-07).

To prevent separation of the rudder from the airplane caused by cracks in the forward rudder spar, accomplish the following:

(a) Upon the accumulation of 1,000 hours time-in-service (TIS) or within the next 100 hours TIS, whichever occurs later, inspect the rudder forward spar for cracks in accordance with the instructions in Beech Service Bulletin (SB) No. 2333, Revision 1, dated November 1991.

(b) If no cracks are found, accomplish one of the following:

(1) Reinspect the rudder forward spar for cracks in accordance with the instructions in Beech SB No. 2333, Revision 1, dated November 1991, at intervals not to exceed 500 hours TIS until either paragraph (b)(2), (b)(3), or (b)(4) of this AD is accomplished;

(2) Install Kit No. 33-6001-1 S in accordance with Beech SB No. 2333, Revision 1, dated November 1991;

(3) Install a Spacecraft Machine Products (SMP) rudder spar upper-hinge reinforcement bracket in accordance with Supplemental Type Certificate (STC) SA4899NM; or

(4) Replace the rudder assembly with either part number 33-630000-137, - 139, -141, -167, or -169, as applicable, in accordance with the instructions in Beech SB No. 2333, Revision 1, dated November 1991.

(c) If cracks are found, prior to further flight, accomplish one of the following:

(1) Replace the rudder assembly with either part number 33-630000-137, - 139, -141, -167, or -169, as applicable, in accordance with the instructions in Beech SB No. 2333, Revision 1, dated November 1991;

(2) Install Kit No. 33-6001-1 S in accordance with Beech SB No. 2333, Revision 1, dated November 1991; or

(3) If the cracks are found in the area of the upper hinge, the middle hinge, or both the upper and middle hinge as specified in Beech SB No. 2333, Revision 1, dated November 1991, then stop drill the cracks and install an SMP upper-hinge reinforcement bracket in accordance with STC SA4899NM. For cracks in the middle hinge, install the upper-hinge reinforcement bracket and also install an SMP rudder spar middle-hinge reinforcement bracket in accordance with STC SA5870NM.

(d) If a modification or replacement has been accomplished in accordance with either paragraph (b)(2), (b)(3), (b)(4), (c)(1), (c)(2), or (c)(3) of this AD, then no repetitive inspections are required by this AD.

(e) Special flight permits may be issued in accordance with FAR 21.197 and 21.199 to operate the airplane to a location where the requirements of this AD can be accomplished.

(f) An alternative method of compliance or adjustment of the initial or repetitive compliance times that provides an equivalent level of safety may be approved by the Manager, Wichita Aircraft Certification Office, FAA, 1801 Airport Road, Mid-Continent Airport, Wichita, Kansas 67209. The request shall be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Wichita Aircraft Certification Office.

NOTE: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Wichita Aircraft Certification Office.

(g) The inspections, installations, or replacements required by this AD shall be done in accordance with Beech Service Bulletin No. 2333, Revision 1, dated November 1991. This incorporation by reference was previously approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51 on August 22, 1992. Copies may be obtained from Beech Aircraft Corporation, P.O. Box 85, Wichita, Kansas 67201-0085. Copies may be inspected at the FAA, Central Region, Office of the Assistant Chief Counsel, Room 1558, 601 E. 12th Street, Kansas City, Missouri, or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

(h) This amendment (39-8752) supersedes AD 92-15-06, Amendment 39-8300 which superseded AD 91-23-07, Amendment 39-8076.

(i) This amendment (39-8752) becomes effective on January 21, 1994.

95-13-08 Pratt & Whitney Canada: Amendment 39-9288. Docket 95-ANE-33. Supersedes AD 94-10-02, Amendment 39-8909.

Applicability: Pratt & Whitney Canada (PWC) Model PT6A-67D turboprop engines with serial numbers prior to PC-E114100, installed on but not limited to Beech Model 1900D airplanes. NOTE: This airworthiness directive (AD) applies to each engine identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For engines that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must use the authority provided in paragraph (o) to request approval from the Federal Aviation Administration (FAA). This approval may address either no action, if the current configuration eliminates the unsafe condition, or different actions necessary to address the unsafe condition described in this AD. Such a request should include an assessment of the effect of the changed configuration on the unsafe condition addressed by this AD. In no case does the presence of any modification, alteration, or repair remove any engine from the applicability of this AD.

Compliance: Required as indicated, unless accomplished previously.

To prevent aircraft handling problems due to imposition of the engine RPM restriction, accomplish the following:

(a) For those operators that have previously complied with AD 94-10-02, this AD requires compliance with only paragraph (n).

(b) Prior to further flight, amend the Beech Model 1900D Aircraft Flight Manual (AFM), Part Number (P/N) 129-590000-3, by inserting the following requirements between pages 2-4 and 2-5: "ENGINE OPERATING LIMITATIONS

Gas Generator RPM (N1) - Continuous operation of the gas generator between 94.0% and 97.1% is prohibited.

NOTES

1. This limitation does not prohibit the use of N1's between 94.0% and 97.1% when the pilot in command determines that the power setting is required for the safe operation of the airplane. If such occurrences exceed 5 minutes, the engine(s) must be inspected in accordance with Pratt & Whitney Canada Service Bulletin No. 14128, Revision 3, dated April 19, 1993.
2. This limitation does not prohibit the use of static Take-Off Power and Maximum Continuous Power between 94.0% and 97.1% N1 to meet the required Take-Off performance. If such occurrences exceed 5 minutes, the engine(s) must be inspected in accordance with Pratt & Whitney Canada Service Bulletin No. 14128, Revision 3, dated April 19, 1993.
3. Operation at 94.0% and below, and at 97.1% and above are permitted. Continuous operation at 94.1% through 97.0% is prohibited.
4. "Continuous Operation" means time periods exceeding 5 minutes.
5. High Speed Cruise Power Tables found in the Pilot's Operating Manual may produce N1's in the prohibited range. Flights should be planned using Intermediate or Long Range Power settings. 6. The goal of the operator should be to keep the total time of operation in the prohibited range to the absolute minimum, since the effects of operating between N1's of 94.0% and 97.1% are cumulative. PLACARDS

Located in front of the pilot on the aft edge of the glareshield between the Master Caution annunciator and the fire extinguisher control switch:

CONTINUOUS OPERATION BETWEEN
94.0% AND 97.1% N1 IS PROHIBITED
SEE AFM"

(c) Compliance with the requirements of paragraph (b) of this AD may also be accomplished by inserting a copy of this AD into the Beech Model 1900D AFM.

(d) Prior to further flight, install the placard as specified in paragraph (b) of this AD.

(e) For engines that have not been inspected prior to the effective date of this AD in accordance with PWC SB No. 14128, Revision 1, dated November 13, 1992, or debladed and inspected in accordance with PWC SB No. 14128, Revision 2, dated December 22, 1992, or PWC SB No. 14128, Revision 3, dated April 19, 1993, accomplish the following:

(1) For engines with Serial Numbers PC-E114001 to PC-E114044, within 25 hours time in service (TIS) after the effective date of AD 94-10-02, June 15, 1994, deblade the CT disk, inspect the entire disk surface area and fir tree area of the CT blades for cracking and the trailing edge of the blade airfoil section for irregularities, and replace, if necessary, with serviceable parts, in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 3, dated April 19, 1993.

(2) For engines with Serial Numbers PC-E114045 to PC-E114099, within 50 hours TIS after the effective date of AD 94-10-02, June 15, 1994, deblade the CT disk, inspect the entire disk surface area and fir tree area of the CT blades for cracking, and replace, if necessary, with serviceable parts, in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 3, dated April 19, 1993.

(f) For engines that have been inspected in accordance with PWC SB No. 14128, Revision 1, dated November 13, 1992, prior to the effective date of this AD, deblade the CT disk, inspect the entire disk surface area and fir tree area of the CT blades for cracking, and replace, if necessary, with serviceable parts, in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 3, dated April 19, 1993, as follows:

(1) For blade sets with greater than 600 hours TIS since new on the effective date of AD 94-10-02, June 15, 1994, deblade, inspect, and replace, if necessary, within the next 50 hours TIS after the effective date of AD 94-10-02, June 15, 1994.

(2) For blade sets with greater than or equal to 250 hours TIS, and less than or equal to 600 hours TIS, since new, on the effective date of AD 94-10-02, June 15, 1994, deblade, inspect, and replace, if necessary, within the next 100 hours TIS after the effective date of AD 94-10-02, June 15, 1994.

(3) For blade sets with less than 250 hours TIS since new on the effective date of AD 94-10-02, June 15, 1994, deblade, inspect, and replace, if necessary, within the next 250 hours TIS after the effective date of AD 94-10-02, June 15, 1994.

(g) For uninstalled CT disk and blade assemblies that have not been inspected in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 2, dated December 22, 1992, or PWC SB No. 14128, Revision 3, dated April 19, 1993, in the preceding 250 hours TIS from the effective date of AD 94-10-02, June 15, 1994, deblade the CT disk, inspect the entire disk surface area and fir tree area of CT blades for cracking, and replace, if necessary, with serviceable parts, in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 3, dated April 19, 1993, prior to installation.

(h) For engines with CT disk and blade assemblies that have been debladed and inspected in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 2, dated December 22, 1992, or PWC SB No. 14128, Revision 3, dated April 19, 1993, prior to the effective date of AD 94-10-02, June 15, 1994, within 250 hours TIS since the last deblading and inspection, deblade the CT disk, inspect the entire disk surface area and fir tree area of CT blades for cracking, and replace, if necessary, with serviceable parts, in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 3, dated April 19, 1993.

(i) For CT disk and blade assemblies that have been debladed and inspected in accordance with paragraphs (e), (f), (g), and (h) of this AD, deblade the CT disk, reinspect the entire disk surface area and fir tree area of CT blades for cracking, and replace, if necessary, with serviceable parts, in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 3, dated April 19, 1993, at intervals not to exceed 250 hours TIS since the last deblading and inspection performed in accordance with the Accomplishment Instructions of PWC SB No. 14128, Revision 3, dated April 19, 1993.

(j) Install a CT stator assembly, a CT shroud housing, and a small exit duct assembly in accordance with PWC SB No. 14132, Revision 1, dated May 12, 1993, at the next shop visit after the effective date of this AD, or within 30 days after the effective date of this AD, whichever occurs first.

(k) Install CT blades and feather seals in accordance with PWC SB No. 14142, Revision 1, dated May 12, 1993, at the next shop visit after the effective date of this AD, or 30 days after the effective date of this AD, whichever occurs first.

(l) For the purpose of this AD, a shop visit is defined as when major engine flanges are separated.

(m) Installation of improved hardware in accordance with paragraphs (j) and (k) of this AD constitutes terminating action for the inspections required by paragraphs (e) through (i) of this AD.

(n) For aircraft equipped with engines that have complied with paragraphs (j) and (k) of this AD, or AD 94-10-02, accomplish the following:

(1) Remove the amendment to the Beech Model 1900D AFM, P/N 129-590000-3, described in paragraphs (b) or (c) of this AD.

(2) Remove the placard described in paragraph (d) of this AD.

(o) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Engine Certification Office. The request should be forwarded through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Engine Certification Office.

NOTE: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Engine Certification Office.

(p) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the aircraft to a location where the requirements of this AD can be accomplished.

(q) The inspections and modifications shall be done in accordance with the following SB's:

Document No.	**Pages**	**Revision**	**Date**
PWC SB No. 14128 Total pages: 5	1-5	3	April 19, 1993
PWC SB No. 14132 Total pages: 6	1-6	1	May 12, 1993
PWC SB No. 14142 Total pages: 7	1-7	1	May 12, 1993

This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from Pratt & Whitney Canada, 1000 Marie-Victorin, Longueil, Quebec, Canada J4G 1A1. Copies may be inspected at the FAA, New England Region, Office of the Assistant Chief Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

(r) This amendment becomes effective on July 12, 1995.

END OF SECTION 2

Section III: Exhibits

- Exhibit 1 — Rivet identification and part number breakdown
- Exhibit 2 — Aircraft rivet identification
- Exhibit 3 — Aircraft rivet identification (continued)
- Exhibit 4 — Rivet requirement chart for bare and clad alloys
- Exhibit 5 — Rivet requirement chart for ALCLAD alloys
- Exhibit 6 — Rivet requirement chart for 5052 alloys
- Exhibit 7 — Recommended radii for 90º bends in aluminum alloys
- Exhibit 8 — Minimum Bend Radius for Aluminum Alloys
- Exhibit 9 — Bend allowance chart
- Exhibit 10 — K-chart for determining setback for bends other than 90º
- Exhibit 11 — Empty weight center-of-gravity formulas
- Exhibit 12 — Empty weight and empty weight center-of-gravity—tail-wheel type aircraft
- Exhibit 13 — Empty weight and empty weight center-of-gravity—nose-wheel type aircraft
- Exhibit 14 — Example of check of most forward weight and balance extreme
- Exhibit 15 — Example of check of most rearward weight and balance extreme
- Exhibit 16 — AC 43.13-2A, Chapter 1. Structural data
- Exhibit 17 — Turnbuckle safetying guide
- Exhibit 18 — Straight-shank terminal dimensions (cable terminals)
- Exhibit 19 — Minimum bend radii for MIL-H-8794 and MIL-H-8788 hose
- Exhibit 20 — Minimum bend radii for Teflon hose
- Exhibit 21 — AC 43.13-2A, Chapter 11. Adding or Relocating Instruments
- Exhibit 22 — Electrical Wiring Rating
- Exhibit 23 — Minimum Equipment List Page
- Exhibit 24 — IAR Bend Allowance
- Exhibit 25 — IAR Circumference Formula

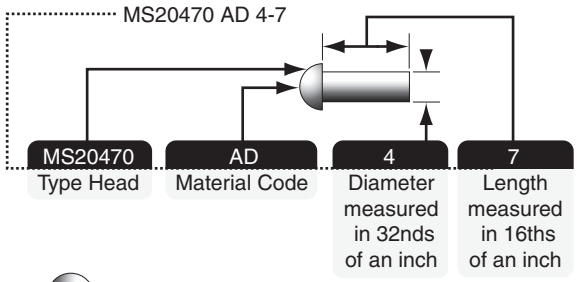
EXHIBIT 1

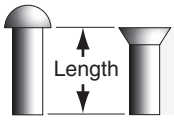
Rivet identification and part number breakdown.

RIVET IDENTIFICATION
The material can be identified by the head marking

Rivet	Material Code	Head Marking	Material
	A	Plain (Dyed)	1100
	AD	Dimpled	2117
	D	Raised Dot	2017T
	DD	Two Raised Dashes	2024
	B	Raised Cross (Dyed)	5056
	E	Raised Circle	7050
	M	Two Dots	Monel

PART NUMBER BREAKDOWN





Length is measured from the top of the flush head and the underside of the universal head.

EXHIBIT 2

Aircraft rivet identification.

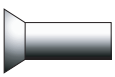
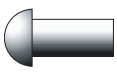
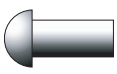
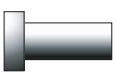
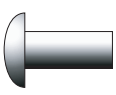
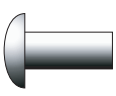
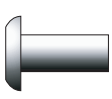
Material	1100	2117T	2017T	2017T-HD	2024T	50567	7075-T73
Head Marking	Plain	Dimpled	Raised Dot	Raised Dot	Raised Double Dash	Raised Cross	Three Raised Dashes
AN Material Code	A	AD	D	D	DD	B	
 **AN425 78 ▪ Counter-Sunk Head**	X	X	X	X	X		X
 **AN426 100 ▪ Counter-Sunk Head MS20426**	X	X	X	X	X	X	X
 **AN427** 100 ▪ **Counter-Sunk Head MS20427**							
 **AN430 Round Head MS20470**	X	X	X	X	X	X	X
 **AN435 Round Head MS20613 MS20615**							
 **AN441 Flat Head**							
 **AN441 Flat Head MS20470**	X	X	X	X	X	X	X
 **AN 455 Brazier Head MS20470**	X	X	X	X	X	X	X
 **AN 456 Brazier Head MS20470**	X	X	X	X	X	X	X
 **AN 470 Universal Head MS20470**	X	X	X	X	X	X	X
Heat Treat Before Using	No	No	Yes	No	Yes	No	No
Shear Strength psi	10000	30000	34000	38000	41000	27000	
Bearing Strength psi	25000	100000	113000	126000	136000	90000	

EXHIBIT 3

Aircraft rivet identification. (continued)

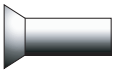
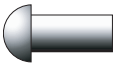
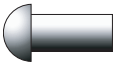
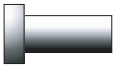
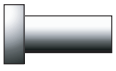
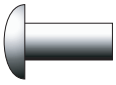
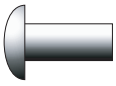
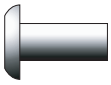
Material	Carbon Steel	Corrosion-Resistant Steel	Copper	Monel	Monel Nickel-Copper Alloy	Brass	Titanium
Head Marking	Recessed Triangle 	Recessed Dash 	Plain 	Plain 	Recessed Double Dots 	Plain 	Recessed Large and Small Dot 
AN Material Code		F	C	M	C		
 **AN425 78 ▪ Counter-Sunk Head**							
AN426							MS 20426
 **AN427 100 ▪ Counter-Sunk Head MS20427**	X	X	X	X			
 **AN430 Round Head MS20470**							
 **AN435 Round Head MS20613 MS20615**	X MS20613	X MS20613	X		X MS20615	X MS20615	
 **AN441 Flat Head**	X		X	X			X
 **AN442 Flat Head MS20470**							
 **AN 455 Brazier Head MS20470**							
 **AN 456 Brazier Head MS20470**							
 **AN 470 Universal Head MS20470**							
Heat Treat Before Using	No	No	No	No	No	No	No
Shear Strength psi	35000	65000	23000	49000	49000		95000
Bearing Strength psi	90000	90000					

EXHIBIT 4

Number of rivets required for splices (single-lap joint) in bare 2014-T6, 2024-T3, 2024-T36, and 7075-T6 sheet, clad 2014-T6, 2024-T3, 2024-T36, and 7075-T6 sheet, 2024-T4, and 7075-T6 plate, bar, rod, tube, and extrusions, 2014-T6 extrusions.

Thickness "t" in inches	No. of 2117-T4 (AD) protruding head rivets required per inch of width "W" Rivet size					No. of Bolts
	3/32	1/8	5/32	3/16	1/4	AN-3
.016	6.5	4.9	- -	- -	- -	- -
.020	6.9	4.9	3.9	- -	- -	- -
.025	8.6	4.9	3.9	- -	- -	- -
.032	11.1	6.2	3.9	3.3	- -	- -
.036	12.5	7.0	4.5	3.3	2.4	- -
.040	13.8	7.7	5.0	3.5	2.4	3.3
.051	- -	9.8	6.4	4.5	2.5	3.3
.064	- -	12.3	8.1	5.6	3.1	3.3
.081	- -	- -	10.2	7.1	3.9	3.3
.091	- -	- -	11.4	7.9	4.4	3.3
.102	- -	- -	12.8	8.9	4.9	3.4
.128	- -	- -	- -	11.2	6.2	3.2

NOTES:

a. For stringers in the upper surface of a wing, or in a fuselage, 80 percent of the number of rivets shown in the table may be used.

b. For intermediate frames, 60 percent of the number shown may be used.

c. For single lap sheet joints, 75 percent of the number shown may be used.

ENGINEERING NOTES:

a. The load per inch of width of material was calculated by assuming a strip 1 inch wide in tension.

b. Number of rivets required was calculated for 2117-T4 (AD) rivets, based on a rivet allowable shear stress equal to 40 percent of the sheet allowable tensile stress, and a sheet allowable bearing stress equal to 160 percent of the sheet allowable tensile stress, using nominal bolt diameters for rivets.

c. Combinations of sheet thickness and rivet size above the underlined numbers are critical in (i.e., will fail by) bearing on the sheet; those below are critical in shearing of the rivets.

d. The number of AN-3 bolts required below the underlined number was calculated based on a sheet allowable tensile stress of 70,000 psi and a bolt allowable single shear load of 2,126 pounds.

EXHIBIT 5

Number of rivets required for splices (single-lap joint) in 2017, 1017 ALCLAD, 2024 T3 ALCLAD sheet, plate, bar, rod, tube, and extrusions.

Thickness "t" in inches	No. of 2117-T4 (AD) protruding head rivets required per inch of width "W" Rivet size					No. of Bolts
	3/32	1/8	5/32	3/16	1/4	AN-3
.016	6.5	4.9	- -	- -	- -	- -
.020	6.5	4.9	3.9	- -	- -	- -
.025	6.9	4.9	3.9	- -	- -	- -
.032	8.9	4.9	3.9	3.3	- -	- -
.036	10.0	5.6	3.9	3.3	2.4	- -
.040	11.1	6.2	4.0	3.3	2.4	- -
.051	- -	7.9	5.1	3.6	2.4	3.3
.064	- -	9.9	6.5	4.5	2.5	3.3
.081	- -	12.5	8.1	5.7	3.1	3.3
.091	- -	- -	9.1	6.3	3.5	3.3
.102	- -	- -	10.3	7.1	3.9	3.3
.128	- -	- -	12.9	8.9	4.9	3.3

NOTES:

a. For stringers in the upper surface of a wing, or in a fuselage, 80 percent of the number of rivets shown in the table may be used.

b. For intermediate frames, 60 percent of the number shown may be used.

c. For single lap sheet joints, 75 percent of the number shown may be used.

ENGINEERING NOTES:

a. The load per inch of width of material was calculated by assuming a strip 1 inch wide in tension.

b. Number of rivets required was calculated for 2117-T4 (AD) rivets, based on a rivet allowable shear stress equal to percent of the sheet allowable tensile stress, and a sheet allowable bearing stress equal to 160 percent of the sheet allowable tensile stress, using nominal hole diameters for rivets.

c. Combinations of sheet thickness and rivet size above the underlined numbers are critical in (i.e., will fail by) bearing on the sheet; those below are critical in shearing of the rivets.

d. The number of AN-3 bolts required below the underlined number was calculated based on a sheet allowable tensile stress of 55,000 psi and a bolt allowable single shear load of 2,126 pounds.

EXHIBIT 6

Number of rivets required for splices (single-lap joint) in 5052 (all hardnesses) sheet.

Thickness "t" in inches	No. of 2117-T4 (AD) protruding head rivets required per inch of width "W" Rivet size					No. of Bolts
	3/32	1/8	5/32	3/16	1/4	AN-3
.016	6.3	4.7		- -	- -	- -
.020	6.3	4.7	3.8	- -	- -	- -
.025	6.3	4.7	3.8	- -	- -	- -
.032	6.3	4.7	3.8	3.2	- -	- -
.036	7.1	4.7	3.8	3.2	2.4	- -
.040	7.9	4.7	3.8	3.2	2.4	- -
.051	10.1	5.6	3.8	3.2	2.4	- -
.064	12.7	7.0	4.6	3.2	2.4	- -
.081	- -	8.9	5.8	4.0	2.4	3.2
.091	- -	10.0	6.5	4.5	2.5	3.2
.102	- -	11.2	7.3	5.1	2.8	3.2
.128	- -	- -	9.2	6.4	3.5	3.2

NOTES:

a. For stringers in the upper surface of a wing, or in a fuselage, 80 percent of the number of rivets shown in the table may be used.

b. For intermediate frames, 60 percent of the number shown may be used.

c. For single lap sheet joints, 75 percent of the number shown may be used.

ENGINEERING NOTES:

a. The load per inch of width of material was calculated by assuming a strip 1 inch wide in tension.

b. Number of rivets required was calculated for 2117-T4 (AD) rivets, based on a rivet allowable shear stress equal to 70 percent of the sheet allowable tensile stress, and a sheet allowable bearing stress equal to 160 percent of the sheet allowable tensile stress, using nominal hole diameters for rivets.

c. Combinations of sheet thickness and rivet size above the underlined numbers are critical in (i.e., will fail by) bearing on the sheet, those below are critical in shearing of the rivets.

EXHIBIT 7

Recommended radii for 90° bends in aluminum alloys

Alloy and	Approximate sheet thickness (t) (inch)					
temper	0.016	0.032	0.064	0.128	0.182	0.258
2024-0[1]	0	0-1t	0-1t	0-1t	0-1t0-1t	0-1t
2024-T3[1,2]	1½t-3t	2t-4t	3t-5t	4t-6t	4t-6t	5t-7t
2024-T6[1]	2t-4t	3t-5t	3t-5t	4t-6t	5t-7t	6t-10t
5052-0	0	0	0-1t	0-1t	0-1t	0-1t
5052-H32	0	0	½t-1t	½t-1½t	½t-1½t	½t-1½t
5052-H34	0	0	½t-1½t	1½t-2½t	1½t-2½t	2t-3t
5052-H36	0-1t	½t-1½t	1t-2t	1½t-3t	2t-4t	2t-4t
5052-H38	½t-1½t	1t-2t	1½t-3t	2t-4t	3t-5t	4t-6t
6061-0	0	0-1t	0-1t	0-1t	0-1t	0-1t
6061-T4	0-1t	0-1t	½t-1½t	1t-2t	1½t-3t	2½t-4t
6061-T6	0-1t	½t-1½t	1t-2t	1½t-3t	2t-4t	3t-4t
7075-0	0	0-1t	0-1t	½t-1½t	1t-2t	1½t-3t
7075-T6[1]	2t-4t	3t-5t	4t-6t	5t-7t	5t-7t	6t-10t

[1] Alclad sheet may be bent over slight smaller radii than the corresponding tempers of uncoated alloy.

[2] Immediately after quenching this alloy may be formed over appreciably smaller radii.

EXHIBIT 8

Minimum Bend Radius for Aluminum Alloys								
Alloy	**Thickness**							
	0.020	**0.025**	**0.032**	**0.040**	**0.051**	**0.064**	**0.072**	**0.081**
2024-O	1/32	1/16	1/16	1/16	1/16	3/32	1/8	1/8
2024-T4	1/16	1/16	3/32	3/32	1/8	5/32	7/32	1/4
5052-O	1/32	1/32	1/16	1/16	1/16	1/16	1/8	1/8
5052-H34	1/32	1/16	1/16	1/16	3/32	3/32	1/8	1/8
6061-O	1/32	1/32	1/32	1/16	1/16	1/16	3/32	3/32
6061-T4	1/32	1/32	1/32	1/16	1/16	3/32	5/32	5/32
6061-T6	1/16	1/16	1/16	3/32	3/32	1/8	3/16	3/16
7075-O	1/16	1/16	1/16	1/16	3/32	3/32	5/32	3/16
7075-W	3/32	3/32	1/8	5/32	3/16	1/4	9/32	3/16
7075-T6	1/6	1/8	1/8	3/16	1/4	5/16	3/8	7/16

EXHIBIT 9

Bend allowance chart

RADIUS / THICKNESS	1/32 .031	1/16 .063	3/32 .094	1/8 .125	5/32 .156	3/16 .188	7/32 .219	1/4 .250	9/32 .281	5/16 .313	11/32 .344	3/8 .375	7/16 .438	1/2 .500
.020	.062 .000693	.113 .001251	.161 .001792	.210 .002333	.259 .002874	.309 .003433	.358 .003974	.406 .004515	.455 .005056	.505 .005614	.554 .006155	.603 .006695	.702 .007795	.799 .008877
.025	.066 .000736	.116 .001294	.165 .001835	.214 .002376	.263 .002917	.313 .003476	.362 .004017	.410 .004558	.459 .005098	.509 .005657	.558 .006198	.607 .006739	.705 .007838	.803 .008920
.028	.068 .000759	.119 .001318	.167 .001859	.216 .002400	.265 .002941	.315 .003499	.364 .004040	.412 .004581	.461 .005122	.511 .005680	.560 .006221	.609 .006762	.708 .007853	.804 .007862
.032	.071 .000787	.121 .001345	.170 .001886	.218 .002427	.267 .002968	.317 .003526	.366 .004067	.415 .004608	.463 .005149	.514 .005708	.562 .006249	.611 .006789	.710 .007889	.807 .008971
.038	.075 .000837	.126 .001396	.174 .001937	.223 .002478	.272 .003019	.322 .003577	.371 .004118	.419 .004659	.468 .005200	.518 .005758	.567 .006299	.616 .006840	.715 .007940	.812 .009021
.040	.077 .00853	.127 .001411	.176 .001952	.224 .002493	.273 .003034	.323 .003593	.372 .004134	.421 .004675	.469 .005215	.520 .005774	.568 .006315	.617 .006856	.716 .007955	.813 .009037
.051		.134 .001413	.183 .002034	.232 .002575	.280 .003116	.331 .003675	.379 .004215	.428 .004756	.477 .005297	.527 .005855	.576 .006397	.624 .006934	.723 .008037	.821 .009119
.064		.144 .001595	.192 .002136	.241 .002676	.290 .003218	.340 .003776	.389 .004317	.437 .004858	.486 .005399	.536 .005957	.585 .006498	.634 .007039	.732 .008138	.830 .009220
.072			.196 .002202	.247 .002743	.296 .003284	.346 .003842	.385 .004283	.443 .004924	.492 .005465	.542 .006023	.591 .006564	.639 .007105	.738 .008205	.836 .009287
.078			.202 .002247	.251 .002787	.300 .003327	.350 .003885	.399 .004426	.447 .004963	.496 .005512	.546 .006070	.595 .006611	.644 .007152	.742 .008243	.840 .009333
.081			.204 .002270	.253 .002811	.302 .003351	.352 .003909	.401 .004449	.449 .004969	.498 .005535	.548 .006094	.598 .006635	.646 .007176	.744 .008266	.842 .009357
.091			.212 .002350	.260 .002891	.309 .003432	.359 .003990	.408 .004531	.456 .005072	.505 .005613	.555 .006172	.604 .006713	.653 .007254	.752 .008353	.849 .009435
.094			.214 .002374	.262 .002914	.311 .003455	.361 .004014	.410 .004555	.459 .005096	.507 .005637	.588 .006195	.606 .006736	.655 .007277	.754 .008376	.851 .009458
.102				.268 .002977	.317 .003518	.367 .004076	.416 .004617	.464 .005158	.513 .005699	.563 .006257	.612 .006798	.661 .007339	.760 .008439	.857 .009521
.109				.273 .003031	.321 .003572	.372 .004131	.420 .004672	.469 .005213	.518 .005754	.568 .006312	.617 .006853	.665 .008394	.764 .008493	.862 .009575
.125				.284 .003156	.333 .003697	.383 .004256	.432 .004797	.480 .005338	.529 .005678	.579 .006437	.628 .006978	.677 .007519	.776 .008618	.873 .009700
.156					.355 .003939	.405 .004497	.453 .005038	.502 .005579	.551 .006120	.601 .006679	.650 .007220	.698 .007761	.797 .008860	.895 .009942
.188						.417 .004747	.476 .005288	.525 .005829	.573 .006370	.624 .006928	.672 .007469	.721 .008010	.820 .009109	.917 .010191
.250								.568 .006313	.617 .06853	.667 .007412	.716 .007953	.764 .008494	.863 .009593	.961 .010675

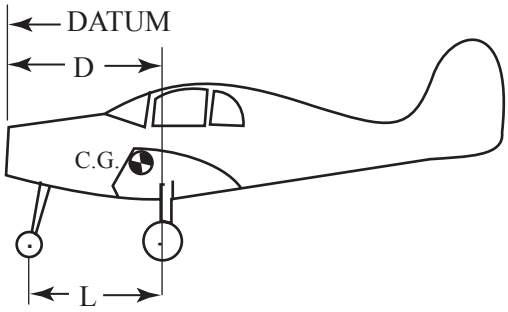
EXHIBIT 10

K-chart for determining setback for bends other than 90°

Deg.	K	Deg.	K	Deg.	K	Deg.	K	Deg.	K
1	0.0087	37	0.3346	73	0.7399	109	1.401	145	3.171
2	0.0174	38	0.3443	74	0.7535	110	1.428	146	3.270
3	0.0261	39	0.3541	75	0.7673	111	1.455	147	3.375
4	0.0349	40	0.3639	76	0.7812	112	1.482	148	3.487
5	0.0436	41	0.3738	77	0.7954	113	1.510	149	3.605
6	0.0524	42	0.3838	78	0.8097	114	1.539	150	3.732
7	0.0611	43	0.3939	79	0.8243	115	1.569	151	3.866
8	0.0699	44	0.4040	80	0.8391	116	1.600	152	4.010
9	0.0787	45	0.4142	81	0.8540	117	1.631	153	4.165
10	0.0874	46	0.4244	82	0.8692	118	1.664	154	4.331
11	0.0963	47	0.4348	83	0.8847	119	1.697	155	4.510
12	0.1051	48	0.4452	84	0.9004	120	1.732	156	4.704
13	0.1139	49	0.4557	85	0.9163	121	1.767	157	4.915
14	0.1228	50	0.4663	86	0.9324	122	1.804	158	5.144
15	0.1316	51	0.4769	87	0.9489	123	1.841	159	5.399
16	0.1405	52	0.4877	88	0.9656	124	1.880	160	5.671
17	0.1494	53	0.4985	89	0.9827	125	1.921	161	5.975
18	0.1583	54	0.5095	90	1.000	126	1.962	162	6.313
19	0.1673	55	0.5205	91	1.017	127	2.005	163	6.691
20	0.1763	56	0.5317	92	1.035	128	2.050	164	7.115
21	0.1853	57	0.5429	93	1.053	129	2.096	165	7.595
22	0.1943	58	0.5543	94	1.072	130	2.144	166	8.144
23	0.2034	59	0.5657	95	1.091	131	2.194	167	8.776
24	0.2125	60	0.5773	96	1.110	132	2.246	168	9.514
25	0.2216	61	0.5890	97	1.130	133	2.299	169	10.38
26	0.2308	62	0.6008	98	1.150	134	2.355	170	11.43
27	0.2400	63	0.6128	99	1.170	135	2.414	171	12.70
28	0.2493	64	0.6248	100	1.191	136	2.475	172	14.30
29	0.2586	65	0.6370	101	1.213	137	2.538	173	16.35
30	0.2679	66	0.6494	102	1.234	138	2.605	174	19.08
31	0.2773	67	0.6618	103	1.257	139	2.674	175	22.90
32	0.2867	68	0.6745	104	1.279	140	2.747	176	26.63
33	0.2962	69	0.6872	105	1.303	141	2.823	177	38.18
34	0.3057	70	0.7002	106	1.327	142	2.904	178	57.29
35	0.3153	71	0.7132	107	1.351	143	2.988	179	114.59
36	0.3249	72	0.7265	108	1.376	144	3.077	180	Inf.

EXHIBIT 11

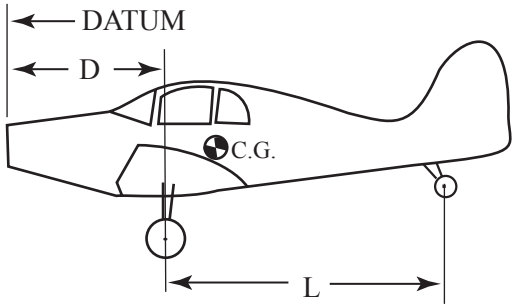
Empty weight center-of-gravity formulas.



NOSE WHEEL TYPE AIRCRAFT

DATUM LOCATED FORWARD OF THE MAIN WHEELS

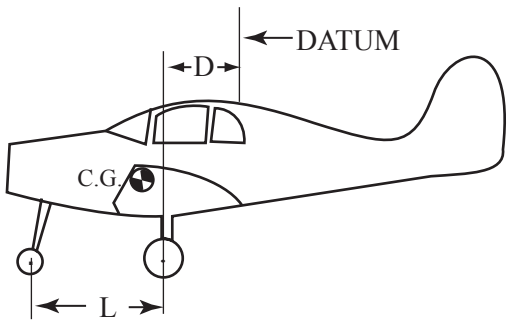
$$C.G. = D \left(\frac{F \times L}{W}\right)$$



TAIL WHEEL TYPE AIRCRAFT

DATUM LOCATED FORWARD OF THE MAIN WHEELS

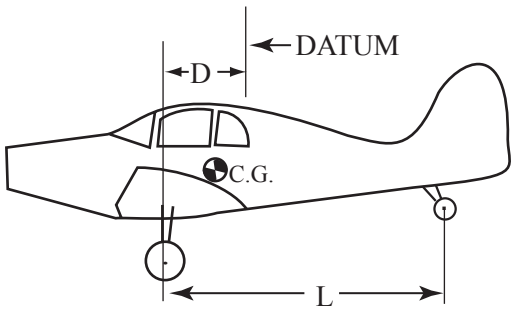
$$C.G. = D + \left(\frac{R \times L}{W}\right)$$



NOSE WHEEL TYPE AIRCRAFT

DATUM LOCATED AFT OF THE MAIN WHEELS

$$C.G. = - \left(D + \frac{F \times L}{W}\right)$$



TAIL WHEEL TYPE AIRCRAFT

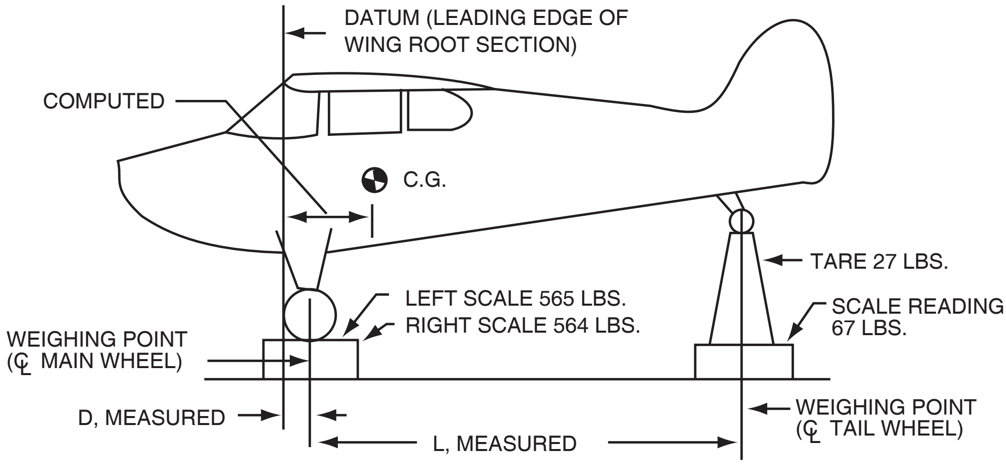
DATUM LOCATED AFT OF THE MAIN WHEELS

$$C.G. = - D + \left(\frac{R \times L}{W}\right)$$

CG = Distance from datum to center of gravity of the aircraft.
W = The weight of the aircraft at the time of weighing.
D = The horizontal distance measured from the datum to the main wheel weighing point.
L = The horizontal distance measured from the main wheel weighing point to the nose or tail weighing point.
F = The weight at the nose weighing point.
R = The weight at the tail weighing point.

EXHIBIT 12

Empty weight and empty center of gravity—tail-wheel type aircraft.



TO FIND: EMPTY WEIGHT AND EMPTY WEIGHT CENTER OF GRAVITY

Datum is the leading edge of the wing (from aircraft specification)

(D) Actual measured horizontal distance from the main wheel weighing point ℄ main wheel) to the Datum - 3"

(L) Actual measured horizontal distance from the rear wheel weighing point (℄ rear wheel) to the main wheel weighing point - 222"

SOLVING: EMPTY WEIGHT

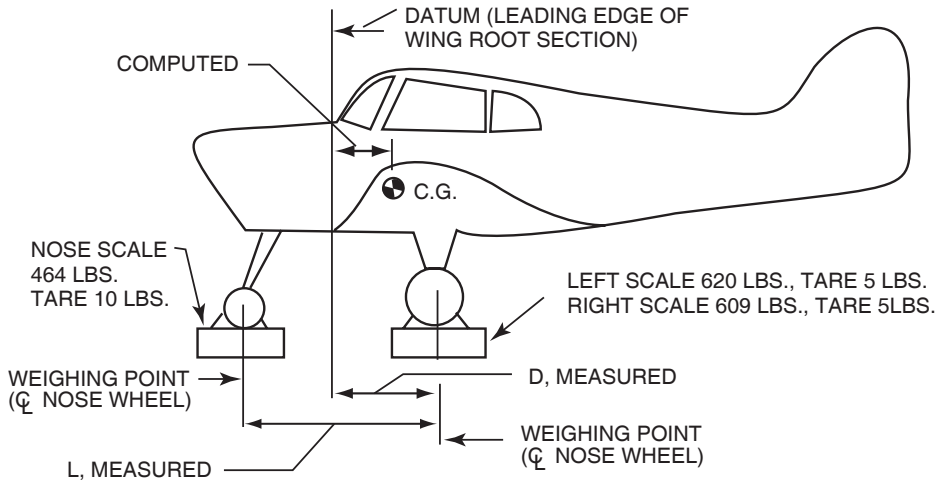
Weighing Point	Scale Reading #	Tare #	Net Weight #
Right	564	0	564
Left	565	0	565
Rear	567	7	40
Empty Weight (W)			1169

SOLVING: EMPTY WEIGHT CENTER OF GRAVITY

Formula: $\text{C.G.} = D + \frac{R \times L}{W} = 3'' + \frac{40 \times 222}{1169} = 3'' + 7.6'' = 10.6''$

EXHIBIT 13

Empty weight and empty center of gravity—nose-wheel type aircraft



TO FIND: EMPTY WEIGHT AND EMPTY WEIGHT CENTER OF GRAVITY

Datum is the leading edge of the wing (from aircraft specification)

(D) Actual measured horizontal distance from the main wheel weighing point ($\mathcal{C}_L$ main wheel) to the Datum ---------- 34.0"

(L) Actual measured horizontal distance from the rear wheel weighing point ($\mathcal{C}_L$ rear wheel) to the main wheel weighing point ---------- 67.8"

SOLVING: EMPTY WEIGHT

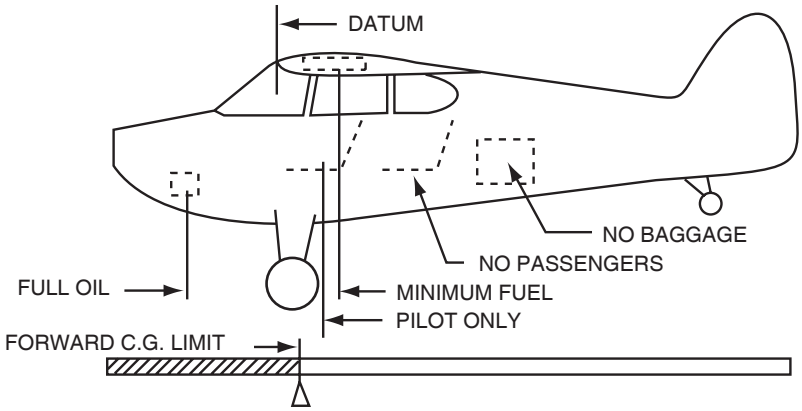
Weighing Point	Scale Reading #	Tare #	Net Weight
Right	609	5	604
Left	620	5	615
Front	464	10	454
Empty Weight (W)			1673

SOLVING: EMPTY WEIGHT CENTER OF GRAVITY

Formula: $C.G. = D - \frac{F \times L}{W} = 34" - \frac{454 \times 67.8}{1673} = 34" - 18.3" = 15.7"$

EXHIBIT 14

Example of check of most forward weight and balance extreme



TO CHECK: MOST FORWARD WEIGHT AND BALANCE EXTREME.

GIVEN: Actual empty weight of the airplane ---------- 1169#
Empty weight center of gravity ---------- +10.6"
*Maximum weight ---------- 2100#
*Forward C.G. limit ---------- + 8.5"
*Oil, capacity 9 qts. ---------- 17# at -49
*Pilot in farthest forward seat equipped with controls (unless otherwise placarded) ---------- 170# at + 16"
*Since the fuel tank is located to the rear of the forward C.G. limit, minimum fuel should be included. $\frac{\text{METO HP}}{12} = \frac{160}{12} =$ 13.75 GAL. x 6# ---------- 83# at + 22"

*Information should be obtained from the aircraft specification.

Note: Any items or passengers must be used if they are located ahead of the forward C.G. limit.
Full fuel must be used if the tank is located ahead of the forward C.G. limit.

CHECK OF FORWARD WEIGHT AND BALANCE EXTREME

	Weight (#)	x Arm (") =	Moment ("#)
Aircraft Empty	+ 1169	+ 10.6	+ 12391
Oil	+ 17	- 49	- 833
Pilot	+ 170	+ 16	+ 2720
Fuel	+ 83	+ 22	+ 1826
Total	+ 1439 (TW)		+ 16104 (TM)

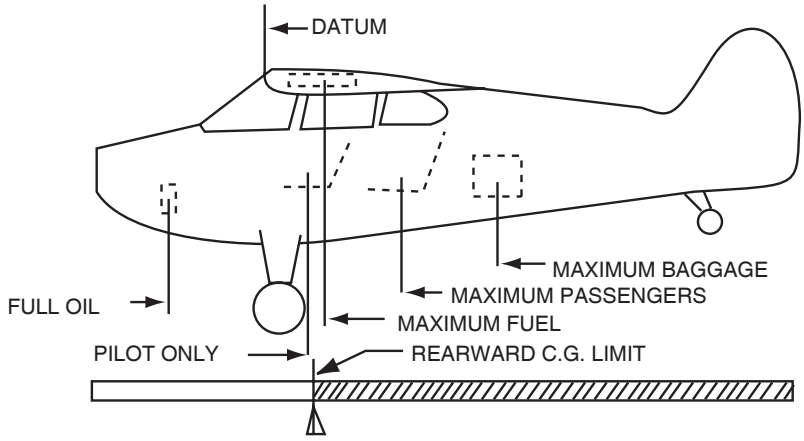
Divide the TM (Total Moment) by the TW (Total Weight) to obtain the forward weight and balance extreme.

$\frac{TM}{TW} = \frac{16104}{1439} = +$ 11.2"

Since the forward C.G. limit and the maximum weight are not exceeded, the forward weight and balance extreme condition is satisfactory.

EXHIBIT 15

Example of check of most rearward weight and balance extreme



TO CHECK: MOST REARWARD WEIGHT AND BALANCE EXTREME.

GIVEN: Actual empty weight of the airplane ---- 1169#
Empty weight center of gravity ---- +10.6"
*Maximum weight ---- 2100#
*Rearward C.G. limit ---- 21.9"
*Oil, capacity 9 qts. ---- 17# at -49
* Baggage, placarded do not exceed 100 lbs. ---- 100# at 75.5"
*Two passengers in rear seats, 170 x 2 ---- 340# at +48
*Pilot in most rearward seat equipped with controls (unless otherwise placarded) ---- 170# at + 16"
*Since the fuel tank is located aft of the rearward C.G. limit full fuel must be used ---- 240# at + 22"

*Information should be obtained from the aircraft specification.

Note: If fuel tanks are located ahead of the rearward C.G. limit minimum fuel should be used.

CHECK OF REARWARD WEIGHT AND BALANCE EXTREME

	Weight (#)	x Arm (")	= Moment ("#)
Aircraft Empty	+ 1169	+ 10.6	+ 12391
Oil	+ 17	- 49	- 833
Pilot (1)	+ 170	+ 16	+ 2720
Passengers (2)	+ 340	+ 48	+ 16320
Fuel (40 gals.)	+ 240	+ 22	+ 5280
Baggage	+ 100	+ 75.5	+ 7550
Total	+ 2036 (TW)		+ 43428 (TM)

Divide the TM (Total Moment) by the TW (Total Weight) to obtain the forward weight and balance extreme.

$$\frac{TM}{TW} = \frac{43428}{2036} = + 21.3"$$

Since the rearward C.G. limit and the maximum weight are not exceeded, the rearward weight and balance extreme condition is satisfactory.

EXHIBIT 16

Chapter 1. STRUCTURAL DATA

1. GENERAL. The minimum airworthiness requirements are those under which the aircraft was type certificated. Addition or removal of equipment involving changes in weight could affect the structural integrity, weight, balance, flight characteristics, or performance of an aircraft.

2. STATIC LOADS. Utilize equipment supporting structure and attachments that are capable of withstanding the additional inertia forces ("g." load factors) imposed by weight of equipment installed. Load factors are defined as follws:

a. Limit load factors are the maximum load factors which may be expected during service (the manuevering, gust, or ground load factors established by the manufacturer for type certification).

b. Ultimate Load Factors are the limit load factors multiplied by a prescribed factor of safety. Certain loads, such as the minimum ultimate inertia forces prescribed for emergency landing conditions, are given directly in terms of ultimate loads.

c. Static Test Load Factors are the ultimate load factors multiplied by prescribed casting, fitting, bearing, and/or other special factors. Where no special factors apply, the static test load factors are equal to the ul;timate load factors.

d. Critical Static Test Load factors are the greater of the manuevering, gust, ground and inertia load static test load factors for each direction (up, down, side, fore, and aft).

Static tests using the following load factors are acceptable for euipment installations:

Direction of Force Applied	*Normal Utility FAR 23 (CAR3)*	*Acrobatic FAR 23 (CAR3)*	*Transport FAR 25 (CAR 4b)*	*Rotorcraft FAR 27, 29 (CAR 6, 7)*
Sideward	1.5g	1.5g	1.5g	2.0G
Upward	3.0g	4.5g	**	1.5g
Forward*	9.0g	9.0g	9.0g	4.0g
Downward	6.6g	9.0g	**	4.0g

* When equipment mounting is loacted externally to one side, or forward of occupants, a forward load factor of 2.0g is sufficient.

** Due to differences among various aircraft designs in flight and ground load factors, contact the aircraft manufacturer for the loaf factors required for a given model and location. in lieu of specific information, the factors used for FAR 23 utility category are acceptable for aircraft with never exceed speed of 250 knots or less and the factors used for FAR 23 acrobatic category for all other transport aircraft..

The following is an example of determining the static test loads for a 7-pound piece of equipment to be installed in a utility category aircraft (FAR Part 23).

When an additional load is to be added to structure already supporting previously installed equipment, determine the capability of the structure to support the total load (previous load plus added load).

Load factors (From the above table)	*Static Test Loads* (Load factor x 7 pounds)
Sideward 1.5g	10.5 pounds
Upward 3.0g	21.0 pounds
Downward 6.6g	46.2 pounds
Forward 9.0g	63.0 pounds

3. STATIC TESTS.

Caution: The aircraft and/or equipment can be damaged in applying static loads, particularly if careless or improper procedure is used.

It is recommended, whenever practicable, that staic testing be conducted on a duplicate installation in a jig or mockup which simulates the related aircraft structure. Static test loads may exceed the yiled limits of the assemblies being substantiated and can result in partially sheared fasteners, elongated holes, or other damage which may not be visible unless the structure is disassembled. If the structure is materially weakened during testing, it may fail at a later date.

Riveted sheet metal and composite laminate construction methods especially do not lend themselves to easy detection of such damage. To conduct static tests:

a. Determine the weight and center of gravity position of the equipment item.

b. Make actual or simulated installation of attachment in the aircraft or preferably on a jig using the applicable static test load factors.

c. Determine the critical ultimate load factors for the up, down side, fore, and aft directions. A hypothetical example which follows steps (1) through (4) below is shown in figure 1.1.

(1) Convert the gust, maneuvering, and ground load factors obtained from the manufacturer or FAA engineering to ultimate load factors. Unless otherwise specified in the airworthiness standards

applicable to the aircraft. ultimate load factors are limit load factors multiplied by a 1.5 safety factor. (See columns 1, 2, and 3 for items A, B, and C of fig. 1.1.)

(2) Determine the ultimate inertia load forces for the emergency landing conditions as prescribed in the applicable airworthiness standards. (See items D and E, column 3, of fig. 1.1.)

(3) Determine what additional load factors are applicable to the specific seat, litter, berth or cargo tiedown device installation. The ultimate load factors are then multiplied by these factors to obtain the static test factors. (To simplify this example, only the seat, litter, berth, and safety belt attachment factor of 1.33 was assumed to be applicable. See Item E, column 4, of fig. 1.1.)

(4) Select the highest static test load factors obtained in Steps 1, 2, and/or 3 for each direction (up, down, side, fore, and aft). These factors are the critical static test load factors used to compute the static test load. (See column 6 of fig. 1.1.)

d. Apply load at center of gravity position (of equipment item or dummy) by any suitable means that will demonstrate that the attachment and structure are capable of supporting the required loads.

When no damage or permanent deformation occurs after 3 seconds of applied static load. The structure and attachments are acceptable. Should permanent deformation occur after 3 seconds, repair or replace the deformed structure to return it to its normal configuration and strength. Additional load testing is not necessary.

4. MATERIALS. Use materials conforming to an accepted standard such as AN, NAS, TSO, or MIL–SPEC.

5. FABRICATION. When a fabrication process which requires close control is used. Employ methods which produce consistently sound structure that is compatible with the aircraft structure.

6. FASTENERS. Use hardware conforming to an accepted standard such as AN, NAS, TSO, or MIL–SPEC. Attach equipment so as to prevent loosening in service due to vibration.

7.PROTECTION AGAINST DETERIORATION. Provide protection against deterioration or loss of strength due to corrosion, abrasion, electrolytic action, or other causes.

8. PROVISIONS FOR INSPECTION. Provide adequate provisions to permit close examination of equipment or adjacent parts of the aircraft that regularly require inspection, adjustment, lubrication, etc.

9. EFFECTS ON WEIGHT AND BALANCE. Assure that the altered aircraft can be operated within the weight and center of gravity ranges listed in the FAA Type Certificate (T.C.) Data Sheet or Aircraft Listing. Determine that the altered aircraft will not exceed maximum gross weight. (If applicable, correct the loading schedule to reflect the current loading procedure.) Consult Advisory Circular 43.13–1A, "Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair" for Weight and Balance Computation Procedures.

10. EFFECTS ON SAFE OPERATION. Install equipment in a manner that will not interfere with or adversely affect the safe operation of the aircraft (controls, navigation equipment operation, etc.).

11. CONTROLS AND INDICATORS. Locate and identify equipment controls and indicators so they can be operated and read from the appropriate crewmember position.

12. PLACARDING. Label equipment requiring identification and, if necessary, placard operational instructions. Amend weight and balance information as required.

13.–20. [RESERVED]

Utility Category Aircraft (FAR 23)							
TYPE OF LOAD	LOAD FACTORS						
	Direction	1 Limit	2 X Safety	3 = Ultimate	4 X Special	5 = Static Test	6 Critical Static Test
A. Maneuvering	Fwd	(None)					
	Down	6.2 g	1.5	9.30 g		9.3 g	9.3 g
	Side	(None)					
	Up	-3.8 g	1.5	-5.7 g		-5.7 g	5.7 g
	Aft	1.0 g	1.5	1.5 g		1.5 g	
B. Gust (= 30FPS @ KVc)	Fwd	(None)					
	Down	6.0 g	1.5	9.0 g		9.0 g	
	Down*	6.4 g	1.5	9.6 g		9.6 g	*9.6 g
*For locations aft of fuelage Sta. 73.85	Side	1.6 g	1.5	2.4 g		2.4 g	2.4 g
	Up	-2.8 g	1.5	-4.2 g		-4.2 g	
	Aft	(None)					
C. Ground	Fwd	6.6 g	1.5	9.9 g		9.9 g	9.9 g
	Down	4.0 g	1.5	6.0 g		6.0 g	
D. Ultuimate Inertia Forces for Emergency Landing Condition (FAR 23.561). **For Separate cargo compartments.	Fwd	Already Prescribed as Ultimate		9.0 g			
	Fwd**	"	"	4.5 g			**4.5 g
	Down	"	"	(None)			
	Side	"	"	1.5 g		1.5 g	
	Up	"	"	-3.0 g		-3.0 g	
	Aft	"	"	(None)			
E. Ultimate Inertia Forces for Emergency Landing Condition For Seat, Litter, & Berth Attachment to Aircraft Structure (FAR 23.785).a	Fwd	"	"	9.0 g	1.33	12.0 g	12.0 g
	Down	"	"	(None)			
	Side	"	"	1.5 g	1.33	2.0 g	
	Up	"	"	-3.0 g	1.33	-4.0 g	
	Aft	"	"	(None)			
* Asterisks denote special load conditions for the situation shown.							

EXHIBIT 17

Turnbuckle safetying guide

Cable size	Type of Wrap	Diameter of safety wire	Material (annealed condition)
1/16	Single	0.040	Copper, brass.[1]
3/32	Single	0.040	Copper, brass.[1]
1/8	Single	0.040	Stainless steel, Monel and "K" Monel.
1/8	Double	0.040	Copper, brass.[1]
1/8	Single	0.057 min	Copper, brass.[1]
5/32 and greater	Double	0.040	Stainless steel, Monel and "K" Monel.[1]
5/32 and greater	Single	0.057 min	Stainless steel, Monel and "K" Monel.[1]
5/32 and greater	Double	0.051[2]	Copper, brass.[1]
[1] Galvanized or tinned steel, or soft iron wires are also acceptable.			
[2] The safety wire holes in 5/32-inch diameter and larger turnbuckle terminals for swagging may be drilled sufficiently to accommodate the double 0.051-inch diamter copper or brass wires when used.			

EXHIBIT 18

Straight-shank terminal dimensions (cross reference AN to MS: AN-666 to MS 21259, AN-667 to MS 20667, AN-668 to MS 20668, AN-669 to MS 21260)

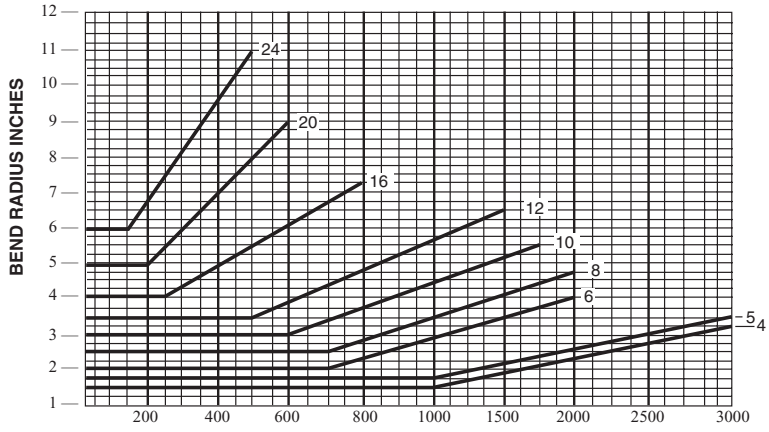
Straight-shank terminal dimensions (cross reference AN to MS: AN-666 to MS 21259, AN-667 to MS 20667, AN-668 to MS 20668, AN-669 to MS 21260

Cable size (inches)	Wire strands	Before Swaging				After swaging	
		Outside diameter	Bore diameter	Bore length	Swaging length	Minimum breaking strength (pounds)	Shank diameter*
1/16	7 x 7	0.160	0.078	1.042	0.969	480	0.138
3/32	7 x 7	.218	.109	1.261	1.188	920	.190
1/8	7 x 19	.250	.141	1.511	1.438	2,000	.219
5/32	7 x 19	.297	.172	1.761	1.688	2,800	.250
3/16	7 x 19	.359	.203	2.011	1.938	4,200	.313
7/32	7 x 19	.427	.234	2.261	2.188	5,600	.375
1/4	7 x 19	.494	.265	2.511	2.438	7,000	.438
9/32	7 x 19	.563	.297	2.761	2.688	8,000	.500
5/16	7 x 19	.635	.328	3.011	2.938	9,800	.563
3/8	7 x 19	.703	.390	3.510	3.438	14,400	.625

* Use gauges in kit for checking diameters.

EXHIBIT 19

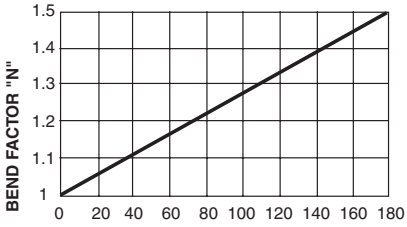
INSIDE BEND RADII V.S. OPERATING PRESSURE MIL-H-8794 HOSE WITH NO FLEXING



OPERATING PRESSURE — POUNDS/SQ. IN. (–3 TO –24 INCLUSIVE)

MINIMUM BEND RADII FOR –32, –40, AND –48 AT ALL PRESSURES ARE AS FOLLOWS:

–32 13.25"
–40 24"
–48 33"

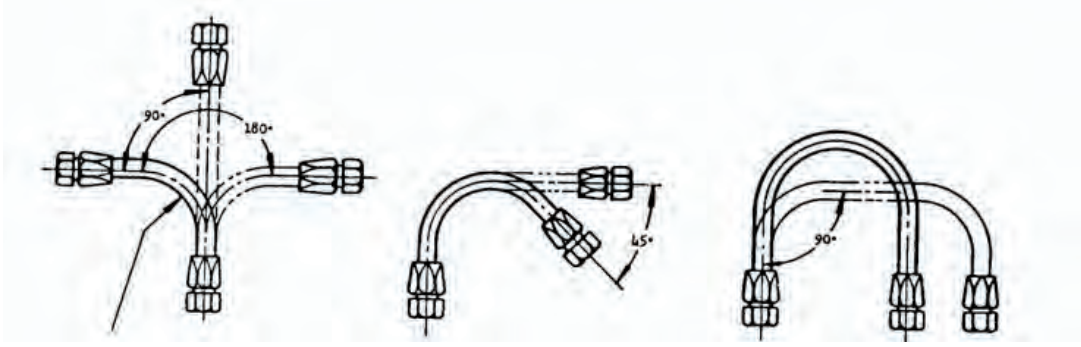


TOTAL FLEXING RANGE OF INSTALLED HOSE (DEGREES)

MIL-H-8788 HOSE WITH NO FLEXING	
DASH NO.	BEND RADII
4	3.000
5	3.375
6	5.000
8	5.750
10	6.500
12	7.750
16	9.625

MINIMUM BEND RADIUS OF HOSE UNDER FLEXING CONDITIONS = "N" X NO FLEXING BEND RADIUS OF EITHER MIL-H-8794 OR MIL-H-8788 HOSE.

EXAMPLE: FOR MIL-H-8794 HOSE –12 SIZE AT 1500 PSI AND HAVING A FLEXING RANGE OF 60° MINIMUM BEND RADIUS = 1.16 X 6.5 = $7\frac{1}{2}$ INCHES (MEASURED AT INSIDE OF BEND).



MINIMUM BEND RADII MEASURED AT INSIDE OF BEND
DIMENSIONS IN INCHES.

EXHIBIT 20

Minimum Bend Radii-Teflon Hose

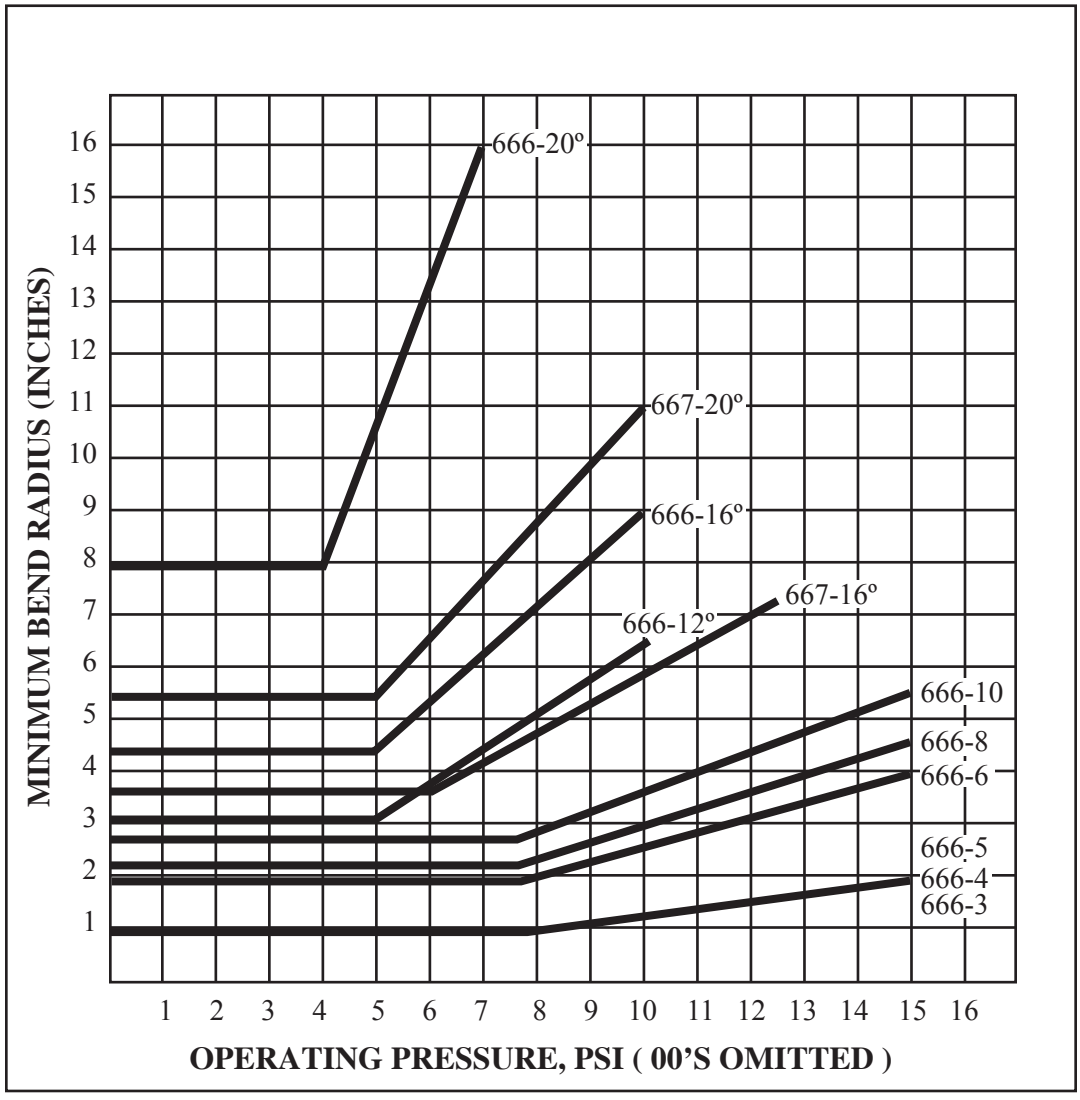


EXHIBIT 21

Chapter 11. Adding or Relocating Instruments

211. GENERAL. This chapter contains structural and design information to be considered when aircraft alterations involving the addition and relocation of instruments are being made.

212. PREPARATION. First determine what regulation, (CAR 3, 4b, FAR 23, 25, etc.) is the basis for the aircraft type certificate. That regulation establishes the structural and performance requirements to be considered when instruments are to be added or relocated.

a. ***Structure.*** Chapter 1 of this handbook provides information by which structural integrity may be determined. Chapter 2, paragraph 23a through f provides information pertinent to instrument panel installation.

b. ***Location.*** Consult the applicable regulation for the specific requirements for instrument location and arrangement.

(1) In the absence of specific requirements, installation of IFR flight instruments in a "T" arrangement is recommended. Locate the aircraft attitude indicator at top center, airspeed indicator to the left, altimeter to the right and directional indicator directly below, thus forming the letter "T." When a radio altimeter is used, the indicator may be placed on the immediate right of the attitude indicator with the pressure altimeter to the right of the radio altimeter indicator.

213. INSTALLATION. Mount all instruments so they are visible to the crewmember primarily responsible for their use. Mount self-contained gyroscopic instruments so that the sensitive axis is parallel to the aircraft longitudinal axis.

a. ***Structure.*** When making structural changes such as adding holes in the instrument panel to mount instruments, refer to chapter 2, paragraph 23a through f of this handbook. Refer to the aircraft manufacturer's instructions and Advisory Circular 43.13–1A, "Acceptable Methods, Techniques. and Practices—Aircraft Inspection and Repair," chapter 2, section 3, for methods and techniques of retaining structural integrity.

b. ***Plumbing.*** Refer to the manufacturers instructions for fabrication, routing and installation of instrument system lines. Advisory Circular 43.13–1A provides information regarding the installation and fabrication of aircraft plumbing.

c. Vacuum Source. Minimum requirements for installation and performance of instrument vacuum systems are covered in the applicable FAR Airworthiness Standards under "Instruments: Installation."

(1) In the absence of specific requirements for vacuum pump installation, refer to FAR Part 25, section 25.1433 for guidance. It is desirable to install a "T" fitting between the pump and relief valve to facilitate ground checking and adjustment of the system.

(2) When a venturi tube power source is used, it should not be taken for granted that a venturi will produce sufficient vacuum to properly operate one or more instruments. Many of the venturi tubes available for aircraft have a flow rate of approximately 2.3 cubic feet per minute at 3.75 inches of mercury (in. Hg) vacuum. Therefore, it is essential that the vacuum load requirements be carefully evaluated.

(3) Vacuum loads may be calculated as follows:

(a) Gyroscopic instruments require optimum value of airflow to produce their rated rotor speed. For instance, a bank and pitch indicator requires approximately 2.30 cubic feet per minute for its operation and a resistance or pressure drop of 4.00 in. Hg. Therefore, operating an instrument requiring 4.00 in. Hg from one venturi would be marginal. Similarly, the directional gyro indicator consumes approximately 1.30 cubic feet per minute and a pressure drop of 4.00 in. Hg. The turn and bank indicator has a flow requirement of 0.50 cubic feet per minute and reaches this flow at a pressure drop of 2.00 in. Hg. The above instruments are listed in Tables 11.1 and 11.3. Optimum values are shown in Table 11.3. It should be noted that the negative pressure air soruce must not only deliver the optimum air source of vacuum to the instruments, but must also have sufficient volume capacity to accommodate the total flow requirements of the various instruments which it serves

EXHIBIT 21 (continued)

Table 11.1—Instrument air consumption.

	Air consumption at sea level	
Instrument	*Differential drop in. Hg suction (Optimum)*	*Cubic feet/per minute*
AUTOMATIC PILOT SYSTEM (Types A-2, A-3, & A-3A)		
Directional gyro control unit across mount assembly	5.00	2.15*
Bank & climb gyro control unit across mount assembly	5.00	3.85*
Total	------	6.00*
AUTOMATIC PILOT SYSTEM (Type A-4)		
Directional gyro control unit	5.00	3.50*
Bank & climb gyro control unit	5.00	5.00*
Total	------	8.50*
Bank & Pitch indicator	4.00	2.30
Directional gyro indicator	4.00	1.30
Turn & bank indicator	2.00	.50
* NOTE.—Includes air required for operation of pneumatic relays.		

(b) To calculate the flow requirements of a simple vacuum system, assume four right-angle elbows and 20 feet of line (1/2 O.D. x .042) tubing.

1 Assume the flow requirements for:

Turn & bank indicator	.50 CFM
Directional gyro indicator	1.30 CFM
Bank & pitch indicator	2.30 CFM
Total flow required	4.10 CFM

2 The pressure drop for one 90° 1/2-inch O.D. x .042 elbow is equivalent to 0.62 feet of straight tubing, figure 11.1. Therefore, the pressure drop of four 90° elbows is equivalent to 2.48 feet of tubing.

Table 11.2—Equivalent straight tube line drops for 90° elbow.

Tubing size			Pressure drop in a 90° elbox in terms of length of straight tube equivalent to a 90° elbow
O.D. inch		*Wall thickness inch*	*Feet*
1/4	x	.035	0.28
3/8	x	.035	0.46
1/2	x	.042	0.62
5/8	x	.042	0.81
3/4	x	.049	0.98
1	x	.049	1.35

3 Determine the pressure drop through 22.48 feet (20 feet + 2.48 equivalent feet) of 1/2O.D. X .042 tubing at 4.10 CFM flow. From figure 11.1, pressure drop per each 10-foot length = 0.68 in. Hg. Divide 22.48 feet of tubing by 10 to obtain the number of 10-foot sections, i.e., 22.48 ÷ 10 = 2.248. Multiply the number of sections by 0.68 in. Hg to obtain the pressure drop through the system. (0.68 X 2.248 = 1.53 in. Hg)

	Suction in inches of mercury		
Instrument	*Minimum*	*Optimum*	*Maximum*
AUTOMATIC PILOT SYSTEM (Types A-2, A-3, & A-3A)			
Directional gyro control unit across mount assembly	4.75	5.00	5.25
Bank & climb gyro control unit across mount assembly	4.75	5.00	5.25
Gauge reading (differential gauge in B & C control unit)	3.75	4.00	4.25
AUTOMATIC PILOT SYSTEM (Type A-4)			
Directional gyro control unit	3.75	5.00	5.00
Bank & climb gyro control unit	3.75	5.00	5.00
Bank & Pitch indicator	3.75	4.00	5.00
Directional gyro indicator	3.75	4.00	5.00
Turn & bank indicator	1.80	2.00	2.20

4 The pump must therefore be capable of producing a minimum pressure

differential of 5.53 in. Hg, i.e., 4.00 in. Hg for maximum instrument usage + 1.53 in. Hg (determined) at a flow of 4.10 cubic feet per minute.

d. Filter. Filters are used to prevent dust, lint and other foreign matter from entering the instrument and vacuum system. Filters may be located at the instrument intake port or at the manifold intake port when instruments are interconnected. Determine that the capacity of the filter is as great or greater than the capacity of the vacuum system. Assure that there is no pressure drop across the filter media.

e. Electrical Supply for Instruments. Guidelines for the installation of instrument electrical wiring and power source are provided in Advisory Circular 43.13-1A, chapter 11, sections 2 and 3, and Chapter 16, section 3.

NOTE: Strict conformance to the shielding specifications supplied by compass manufacturers is recommended in all installations to eliminate any possibility of spurious signals.

f. Instrument Lighting. Instrument lighting must be installed in accordance with the regulations that are applicable to the aircraft type certification requirements. If in some instances the reflection of the lights is unsatisfactory, provide a shield or a means for controlling the intensity of illumination.

g. Magnetic Headings. Calibrate magnetic instruments with the powerplants operating. After this initial calibration, switch all nav/com and electrical equipment, such as windshield wipers and defrosters, "on" to determine if any electrical system interference affects the instrument calibration. If the calibration is affected, prepare an instrument placard identifying the compass headings with the equipment "on" and also with the equipment "off." Placard in accordance with par. 214f of this chapter.

214. TESTING, MARKING, AND PLACARDING.

a. Testing the Venturi Tube-Powered Systems. At normal inflight cruise speed, check the venturi tube-powered system to assure that the required vacuum pressure is being supplied.

b. Testing the Vacuum Air Pump Powered System. When the system is powered by vacuum air pumps, check the system while the pumps are operating at their rated r.p.m. and measure the vacum available to the instruments.

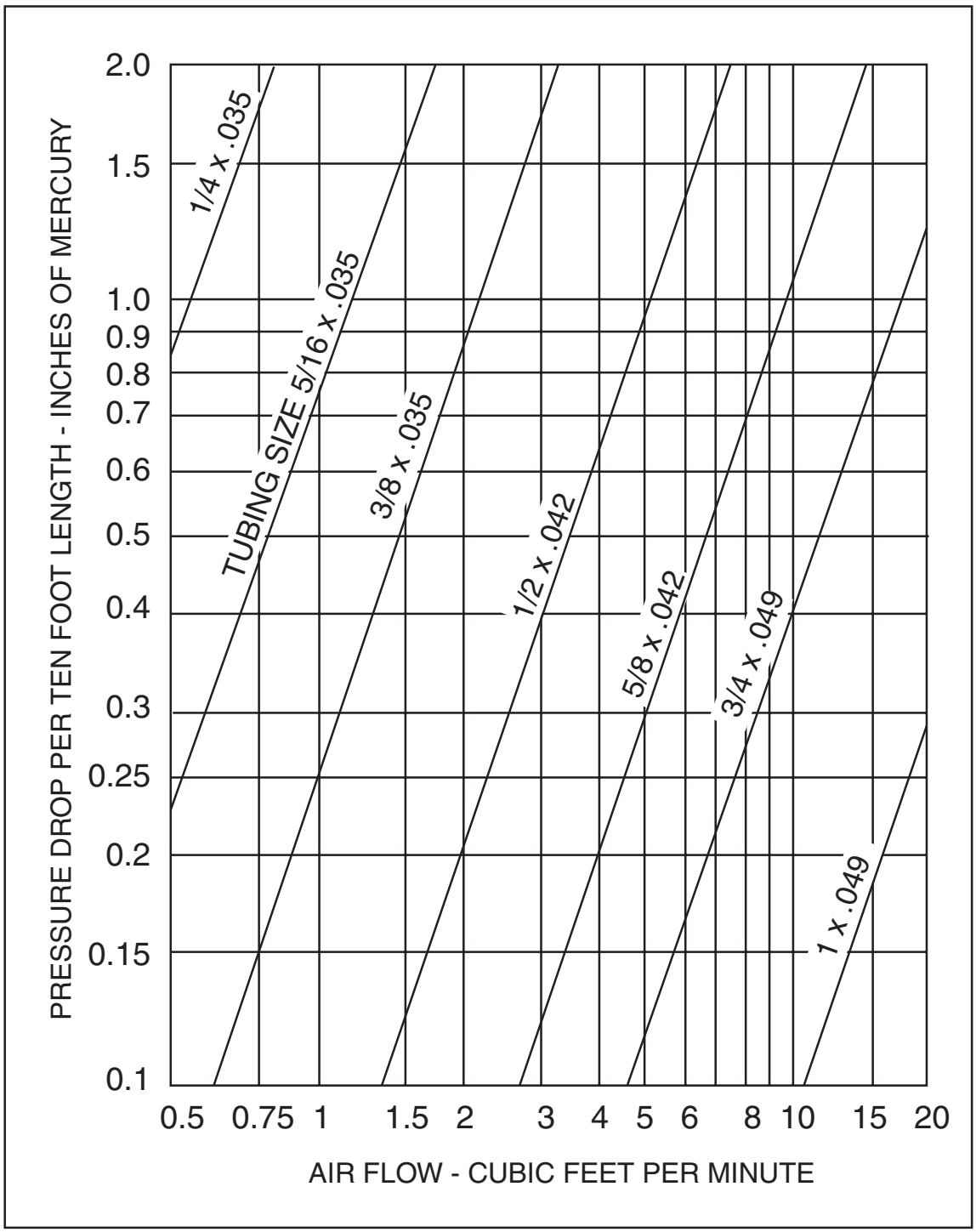
c. Testing of Altimeters and Static Systems. When checking the operation of an altimeter static system to determine that the system is free of any contaminating materials, be sure to disconnect the plumbing from all air operated instruments before purging the lines with dry air or nitrogen since the pressure necessary for purging may damage any connected instrument. Static system test procedures are provided in FAR 43, Appendix E.

d. Testing electrical supply (instruments). Check the voltage at the instrument terminals and determine that it is equal to the manufacturer's recommended values.

e. Fuel, Oil, and Hydraulic (Instrument Supply). Measure the fluid pressure at the instrument end of the line to determine whether it is equivalent to that at the pressure source.

f. Instrument Markings and Placards. When additional instruments are installed they must be appropriately marked. Refer to the applicable CAR/FAR under "Markings and Placards" for specific instrument marking and placard requirements.

215. - 240. [RESERVED]



PRESSURE DROP DATA FOR SMOOTH TUBING

EXHIBIT 22

ELECTRICAL WIRE RATING

DC wire and circuit protector chart.

Wire AN gauge copper	Circuit breaker amp.	Fuse amp.
22	5	5
20	7.5	5
18	10	10
16	15	10
14	20	15
12	30	20
10	40	30
8	50	50
6	80	70
4	100	70
2	125	100
1		150
0		150

Basis of chart:
(1) Wire bundles in 135 °F. ambient and altitudes up to 30,000 feet.
(2) Wire bundles of 15 or more wires, with wires carrying no more than 20 percent of the total current carrying capacity of the bundle as given in Specification MIL-W-5088 (ASG).
(3) Protectors in 75 to 85 °F. ambient.
(4) Copper wire Specification MIL-W-5088.
(5) Circuit breakers to Specification MIL-C-5809 or equivalent.
(6) Fuses to Specification MIL-F-15160 or equivalent.

TABLE 11-6. Tabulation chart (allowable voltage drop between bus and utilization equipment ground).

Nominal system voltage	Allowable voltage drop continuous operation	Intermittent operation
14	0.5	1
28	1	2
115	4	8
200	7	14

Tables 11-7 and 11-8 show formulas that may be used to determine electrical resistance in wires and some typical examples.

a. Resistance Calculation Methods. Figures 11-2 and 11-3 provide a convenient means of calculating maximum wire length for the given circuit current.

(1) Values in tables 11-7 and 11-8 are for tin-plated copper conductor wires. Because the resistance of tin-plated wire is slightly higher than that of nickel or silver-plated wire, maximum run lengths determined from these charts will be slightly less than the allowable limits for nickel or silver-plated copper wire and are therefore safe to use. Figures 11-2 and 11-3 can be used to derive slightly longer maximum run lengths for silver or nickel-plated wires by multiplying the maximum run length by the ratio of resistance of tin-plated wire, divided by the resistance of silver or nickel-plated wire.

TABLE 11-7. Examples of determining required tin-plated copper wire size and checking voltage drop using figure 11-2

Voltage drop	Run Lengths (Feet)	Circuit Current (Amps)	Wire Size From Chart	Check-calculated voltage drop (VD)= (Resistance/Ft) (Length) (Current)
1	107	20	No. 6	VD= (.00044 ohms/ft) (107)(20)= 0.942
0.5	90	20	No. 4	VD= (.00028 ohms/ft) (90)(20)= 0.504
4	88	20	No. 12	VD= (.00202 ohms/ft) (88)(20)= 3.60
7	100	20	No. 14	VD= (.00306 ohms/ft) (100)(20)= 6.12

TABLE 11-8. Examples of determining maximum tin-plated copper wire length and checking voltage drop using figure 11-2.

Maximum Voltage drop	Wire Size	Circuit Current (Amps)	Maximum Wire Run Length (Feet)	Check-calculated voltage drop (VD)= (Resistance/Ft) (Length) (Current)
1	No. 10	20	39	VD= (.00126 ohms/ft) (39)(20)= .98
0.5	----		19.5	VD= (.00126 ohms/ft) (19.5)(20)= .366
4	----		156	VD= (.00126 ohms/ft) (156)(20)= 3.93
7	----		273	VD= (.00126 ohms/ft) (273)(20)= 6.88

(2) As an alternative method or a means of checking results from figure 11-2, continuous flow resistance for a given wire size can be read from table 11-9 and multiplied by the wire run length and the circuit current. For intermittent flow, use figure 11-3.

(3) Voltage drop calculations for aluminum wires can be accomplished by multiplying the resistance for a given wire size, defined in table 11-10, by the wire run length and circuit current.

(4) When the estimated or measured conductor temperature (T2) exceeds 20 °C, such as in areas having elevated ambient temperatures or in fully loaded power-feed wires, the maximum allowable run length (L2), must be shortened from L1 (the 20 °C value) using the following formula for copper conductor wire:

$$L_2 = \frac{(254.5\,°C)(L_1)}{(234.5\,°C)+(T_2)}$$

For aluminum conductor wire, the formula is:

$$L_2 = \frac{(258.1\,°C)(L_1)}{(238.1\,°C)+(T_2)}$$

These formulas use the reciprocal of each material's resistively temperature coefficient to take into account increased conductor resistance resulting from operation at elevated temperatures.

(5) To determine T2 for wires carrying a high percentage of their current carrying capability at elevated temperatures, laboratory testing using a load bank and a high-temperature chamber is recommended. Such tests should be run at anticipated worse case ambient temperature and maximum current-loading combinations.

(6) Approximate T2 can be estimated using the following formula:

$$T_2 = T_1 + (T_R - T_1)(\sqrt{I_2 / I_{\max}})$$

EXHIBIT 22 (continued)

Where:

T_1 = Ambient Temperature
T_2 = Estimated Conductor Temperature
T_R = Conductor Temperature Rating
I_2 = Circuit Current (A=Amps)
I_{max} = Maximum Allowable Current

(A=Amps) at T_R

This formula is quite conservative and will typically yield somewhat higher estimated temperatures than are likely to be encountered under actual operating conditions.

Note: Aluminum wire-From Table 11-9 and 11-10 note that the conductor resistance of aluminum wire and that of copper wire (two numbers higher) are similar. Accordingly, the electric wire current in Table 11-9 can be used when it is desired to substitute aluminum wire and the proper size can be selected by reducing the copper wire size by two numbers and referring to Table 11-10. The use of aluminum wire size smaller than No. 8 is not recommended.

TABLE 11-9. Current carrying capacity and resistance of copper wire**.**

Wire Size	Continuous duty current (amps)-Wires in bundles, groups, harnesses, or conduits. (See Note #1)			Max. resistance ohms/1000ft@20 °C	Nominal conductor
	Wire Conductor Temperature Rating			tin plated conductor	area -
	105 °C	150 °C	200 °C	(See Note #2)	
24	2.5	4	5	28.40	475
22	3	5	6	16.20	755
20	4	7	9	9.88	1,216
18	6	9	12	6.23	1,900
16	7	11	14	4.81	2,426
14	10	14	18	3.06	3,831
12	13	19	25	2.02	5,874
10	17	26	32	1.26	9,354
8	38	57	71	0.70	16,983
6	50	76	97	0.44	26,818
4	68	103	133	0.28	42,615
2	95	141	179	0.18	66,500
1	113	166	210	0.15	81,700
0	128	192	243	0.12	104,500
00	147	222	285	0.09	133,000
000	172	262	335	0.07	166,500
0000	204	310	395	0.06	210,900

Note #1: Rating is for 70°C ambient, 33 or more wires in the bundle for sizes 24 through 10, and 9 wires for size 8 and larger, with no more than 20 percent of harness current carrying capacity being used, at an operating altitude of 60,000 feet. For rating of wires under other conditions or configurations see paragraph 11-69.

Note #2: For resistance of silver or nickel-plated conductors see wire specifications.

TABLE 11-10. Current carrying capacity and resistance of aluminum wire.

Wire Size	Continuous duty current (amps) Wires in bundles, groups or harnesses or conduits (See table 11-9 Note #1)		Max. resistance ohms/1000ft
	Wire conductor temperature rating		@ 20 °C
	105 °C	150 °C	
8	30	45	1.093
6	40	61	0.641
4	54	82	0.427
2	76	113	0.268
1	90	133	0.214
0	102	153	0.169
00	117	178	0.133
000	138	209	0.109
0000	163	248	0.085
Note: Observe design practices described in paragraph 11-67 for aluminum conductor			

11-67. METHODS FOR DETERMINING CURRENT CARRYING CAPACITY OF WIRES. This paragraph contains methods for determining the current carrying capacity of electrical wire, both as a single wire in free air and when bundled into a harness. It presents derating factors for altitude correction and examples showing how to use the graphical and tabular data provided for this purpose. In some instances, the wire may be capable of carrying more current than is recommended for the contacts of the related connector. In this instance, it is the contact rating that dictates the maximum current to be carried by a wire. Wires of larger gauge may need to be used to fit within the crimp range of connector contacts that are adequately rated for the current being carried. Figure 11-5 gives a family of curves whereby the bundle derating factor may be obtained.

a. **Effects of Heat Aging on Wire Insulation.** Since electrical wire may be installed in areas where inspection is infrequent over extended periods of time, it is necessary to give special consideration to heat-aging characteristics in the selection of wire. Resistance to heat is of primary importance in the selection of wire for aircraft use, as it is the basic factor in wire rating. Where wire may be required to operate at higher temperatures due either to high ambient temperatures, high-current loading, or a combination of the two, selection should be made on the basis of satisfactory performance under the most severe operating conditions.

b. **Maximum Operating Temperature.** The current that causes a temperature steady state condition equal to the rated temperature of the wire should not be exceeded. Rated temperature of the wire may be based upon the ability of either the conductor or the insulation to withstand continuous operation without degradation.

c. **Single Wire in Free Air.** Determining a wiring system's current carrying capacity begins with determining the maximum current that a given-sized wire can carry without exceeding the allowable temperature difference (wire rating minus ambient °C). The curves are based upon a single copper wire in free air. (See figures 11-4a and 11-4b.)

d. **Wires in a Harness.** When wires are bundled into harnesses, the current derived for a single wire must be reduced as shown in figure 11-5. The amount of current derating is a function of the number of wires in the bundle and the percentage of the total wire bundle capacity that is being used.

e. **Harness at Altitude.** Since heat loss from the bundle is reduced with increased altitude, the amount of current should be de-rated. Figure 11-6 gives a curve whereby the altitude-derating factor may be obtained.

f. **Aluminum Conductor Wire.** When aluminum conductor wire is used, sizes should be selected on the basis of current ratings shown in table 11-10. The use of sizes smaller than #8 is discouraged (Ref. AS50881A). Aluminum wire should not be attached to engine mounted accessories or used in areas having corrosive fumes, severe vibration, mechanical stresses, or where there is a need for frequent disconnection. Use of aluminum wire is also discouraged for runs of less than 3 feet (AS50991A). Termination hardware should be of the type specifically designed for use with aluminum conductor wiring.

11-4. INSTRUCTIONS FOR USE OF ELECTRICAL WIRE CHART.

a. **Correct Size.** To select the correct size of electrical wire, two major requirements must be met:

(1) The wire size should be sufficient to prevent an excessive voltage drop while carrying the required current over the required distance. (See table 11-6, Tabulation Chart, for allowable voltage drops.)

(2) The size should be sufficient to prevent overheating of the wire carrying the required current. (See paragraph 11-69 for allowable current carrying calculation methods.)

b. Two Requirements. To meet the two requirements (see paragraph 11-66b) in selecting the correct wire size using figure 11-2 or figure 11-3, the following must be known:

(1) The wire length in feet.

(2) The number of amperes of current to be carried.

(3) The allowable voltage drop permitted.

(4) The required continuous or intermittent current.

(5) The estimated or measured conductor temperature.

(6) Is the wire to be installed in conduit and/or bundle?

(7) Is the wire to be installed as a single wire in free air?

c. Example No. 1. Find the wire size in figure 11-2 using the following known information.

(1) The wire run is 50 feet long, including the ground wire.

(2) Current load is 20 amps.

(3) The voltage source is 28 volts from bus to equipment.

(4) The circuit has continuous operation.

(5) Estimated conductor temperature is 20 °C or less.

The scale on the left of the chart represents maximum wire length in feet to prevent an excessive voltage drop for a specified voltage source system (e.g., 14V, 28V, 115V, 200V). This voltage is identified at the top of scale and the corresponding voltage drop limit for continuous operation at the bottom. The scale (slant lines) on top of the chart represents amperes. The scale at the bottom of the chart represents wire gauge.

STEP 1: From the left scale find the wire length, 50 feet under the 28V source column.

STEP 2: Follow the corresponding horizontal line to the right until it intersects the slanted line for the 20-amp load.

STEP 3: At this point, drop vertically to the bottom of the chart. The value falls between No. 8 and No. 10. Select the next larger size wire to the right, in this case No. 8. This is the smallest size wire that can be used without exceeding the voltage drop limit expressed at the bottom of the left scale. This example is plotted on the wire chart, figure 11-2. Use figure 11-2 for continuous flow and figure 11-3 for intermittent flow.

b. Procedures in Example No. 1 paragraph 11-68c, can be used to find the wire size for any continuous or intermittent operation (maximum two minutes). Voltage (e.g. 14 volts, 28 volts, 115 volts, 200 volts) as indicated on the left scale of the wire chart in figure 11-2 and 11-3.

c. Example No. 2. Using figure 11-2, find the wire size required to meet the allowable voltage drop in table 11-6 for a wire carrying current at an elevated conductor temperature using the following information:

(1) The wire run is 15.5 feet long, including the ground wire.

(2) Circuit current (I2) is 20 amps, continuous.

(3) The voltage source is 28 volts.

(4) The wire type used has a 200 °C conductor rating and it is intended to use this thermal rating to minimize the wire gauge. Assume that the method described in paragraph 11-66d(6) was used and the minimum wire size to carry the required current is #14.

(5) Ambient temperature is 50 °C under hottest operating conditions.

d. Procedures in example No. 2.

STEP 1: Assuming that the recommended load bank testing described in paragraph 11-66d(5) is unable to be conducted, then the estimated calculation methods outlined in paragraph 11-66d(6) may be used to determine the estimated maximum current (Imax). The #14 gauge wire mentioned above can carry the required current at 50 °C ambient (allowing for altitude and bundle derating).

(1) Use figure 11-4a to calculate the Imax a #14 gauge wire can carry.

Where:

T_2 = estimated conductor temperature

T_1 = 50 °C ambient temperature

T_R = 200 °C maximum conductor rated temperature

(2) Find the temperature differences (T_R-T_1) = (200 °C-50 °C) = 150 °C.

(3) Follow the 150 °C corresponding horizontal line to intersect with #14 wire size, drop vertically and read 47 Amps at bottom of chart (current amperes).

(4) Use figure 11-5, left side of chart reads 0.91 for 20,000 feet, multiple 0.91 x 47 Amps = 42.77 A mps.

(5) Use figure 11-6, find the derate factor for 8 wires in a bundle at 60 percent. First find the number of wires in the bundle (8) at bottom of graph and intersect with the 60 percent curve meet. Read derating factor, (left side of graph) which is 0.6. Multiply 0.6 x 42.77 Amps = 26 Amps.

I_{max} = 26 amps (this is the maximum current the #14 gauge wire could carry at 50°C ambient

L_1=15.5 feet maximum run length for size #14 wire carrying 20 amps from figure 11-2

STEP 2: From paragraph 11-66d (5) and (6), determine the T_2 and the resultant maximum wire length when the increased resistance of the higher temperature conductor is taken into account.

$$T_2 = T_1 + (T_R - T_1)\left(\sqrt{I_2}/I_{max}\right)$$

$$T_2 = 50\ °C = (200\ °C - 50\ °C)\left(\sqrt{20A/26A}\right)$$
$$= 50\ °C + (150\ °C)(.877)$$
$$T_2 = 182\ °C$$

$$L_2 = \frac{(254.5\ °C)(L_1)}{(234.5\ °C) + (T_2)} =$$

$$L_2 = \frac{(254.5\ °C)(15.5\ Ft)}{(234.5\ °C) + (182\ °C)}$$

$$L_2 = 9.5\ ft$$

The size #14 wire selected using the methods outlined in paragraph 11-66d is too small to meet the voltage drop limits from figure 11-2 for a 15.5 feet long wire run.

STEP 3: Select the next larger wire (size #12) and repeat the calculations as follows:

L_1=24 feet maximum run length for 12 gauge wire carrying 20 amps from figure 11-2.

I_{max} = 37 amps (this is the maximum current the size #12 wire can carry at 50 °C ambient. Use calculation methods outlined in paragraph 11-69 and figure 11-4a.

T_2 = 50 °C + (200 °C - 50 °C) ($\sqrt{}$20A/37A) =
50 °C+(150 °C)(-540) = 131 °C

$$L_2 = \frac{(254.5\ °C)(L_1)}{(234.5\ °C) + (T_2)} =$$

$$L_2 = \frac{(254.5\ °C)(24\ Ft)}{(234.5\ °C) + (131\ °C)} = \frac{6108}{366}$$

$$L_2 = \frac{(254.5\ °C)(24\ Ft)}{366} = 16.7\ ft$$

The resultant maximum wire length, after adjusting downward for the added resistance associated with running the wire at a higher temperature, is 15.4 feet, which will meet the original 15.5 foot wire run length requirement without exceeding the voltage drop limit expressed in figure 11-2.

11-5. COMPUTING CURRENT CARRY- ING CAPACITY.

a. Example 1. Assume a harness (open or braided), consisting of 10 wires, size #20, 200 °C rated copper and 25 wires, size #22, 200 °C rated copper, will be installed in an area where the ambient temperature is 60 °C and the vehicle is capable of operating at a 60,000-foot altitude. Circuit analysis reveals that 7 of the 35 wires in the bundle (7/35 = 20 percent) will be carrying power currents nearly at or up to capacity.

STEP 1: Refer to the "single wire in free air" curves in figure 11-4a. Determine the change of temperature of the wire to determine free air ratings. Since the wire will be in an ambient of 60 ºC and rated at 200° C, the change of to temperature is 200 °C - 60 °C = 140 °C. Follow the 140 °C temperature difference horizontally until it intersects with wire size line on figure 11-4a. The free air rating for size #20 is 21.5 amps, and the free air rating for size #22 is 16.2 amps.

STEP 2: Refer to the "bundle derating curves" in figure 11-5, the 20 percent curve is selected since circuit analysis indicate that 20 percent or less of the wire in the harness would be carrying power currents and less than 20 percent of the bundle capacity would be used. Find 35 (on the abscissa) since there are 35 wires in the bundle and determine a derating factor of 0.52 (on the ordinate) from the 20 percent curve.

STEP 3: Derate the size #22 free air rating by multiplying 16.2 by 0.52 to get 8.4 amps in-harness rating. Derate the size #20 free airrating by multiplying 21.5 by 0.52 to get 11.2 amps in-harness rating.

STEP 4: Refer to the "altitude derating curve" of figure 11-6, look for 60,000 feet (on the abscissa) since that is the altitude at which the vehicle will be operating. Note that the wire must be derated by a factor of 0.79 (found on the ordinate). Derate the size
#22 harness rating by multiplying 8.4 amps by 0.79 to get 6.6 amps. Derate the size #20 harness rating by multiplying 11.2 amps by 0.79 to get 8.8 amps.

STEP 5: To find the total harness capacity, multiply the total number of size #22 wires by the derated capacity (25 x 6.6 = 165.0 amps) and add to that the number of size #20 wires multiplied by the derated capacity (10 x 8.8 = 88 amps) and multiply the sum by the 20 percent harness capacity factor. Thus, the total harness capacity is (165.0 + 88.0) x 0.20 = 50.6 amps. It has been determined that the total harness current should not exceed 50.6 A, size #22 wire should not carry more than 6.6 amps and size #20 wire should not carry more than 8.8 amps.

STEP 6: Determine the actual circuit current for each wire in the bundle and for the whole bundle. If the values calculated in step #5 are exceeded, select the next larger size wire and repeat the calculations.

b. Example 2. Assume a harness (open or braided), consisting of 12, size #12, 200 °C rated copper wires, will be operated in an ambient of 25 °C at sea level and 60 °C at a 20,000-foot altitude. All 12 wires will be operated at or near their maximum capacity.

EXHIBIT 22 (continued)

STEP 1: Refer to the "single wire in free air" curve in figure 11-4a, determine the temperature difference of the wire to determine free air ratings. Since the wire will be in ambient of 25 °C and 60 °C and is rated at 200 °C, the temperature differences are 200 °C-25 °C = 175 °C and 200 °C-60 °C = 140 °C respectively. Follow the 175 °C and the 140 °C temperature difference lines on figure 11-4a until each intersects wire size line, the free air ratings of size #12 are 68 amps and 61 amps, respectively.

STEP 2: Refer to the "bundling derating curves" in figure 11-5, the 100 percent curve is selected because we know all 12 wires will be carrying full load. Find 12 (on the abscissa) since there are 12 wires in the bundle and determine a derating factor of 0.43 (on the ordinate) from the 100 percent curve.

STEP 3: Derate the size #12 free air ratings by multiplying 68 amps and 61 amps by 0.43 to get 29.2 amps and 26.2 amps, respectively.

STEP 4: Refer to the "altitude derating curve" of figure 11-6, look for sea level and 20,000 feet (on the abscissa) since these are the conditions at which the load will be carried. The wire must be derated by a factor of 1.0 and 0.91, respectively.

STEP 5: Derate the size #12 in a bundle ratings by multiplying 29.2 amps at sea level and 26.6 amps at 20,000 feet by 1.0 and 0.91, respectively, to obtained 29.2 amps and 23.8 amps. The total bundle capacity at sea level and 25 °C ambient is 29.2x12=350.4 amps. At 20,000 feet and 60 °C ambient the bundle capacity is 23.8x12=285.6 amps. Each size #12 wire can carry 29.2 amps at sea level, 25 °C ambient or 23.8 amps at 20,000 feet, and 60 °C ambient.

STEP 6: Determine the actual circuit current for each wire in the bundle and for the bundle. If the values calculated in Step #5 are exceeded, select the next larger size wire and repeat the calculations.

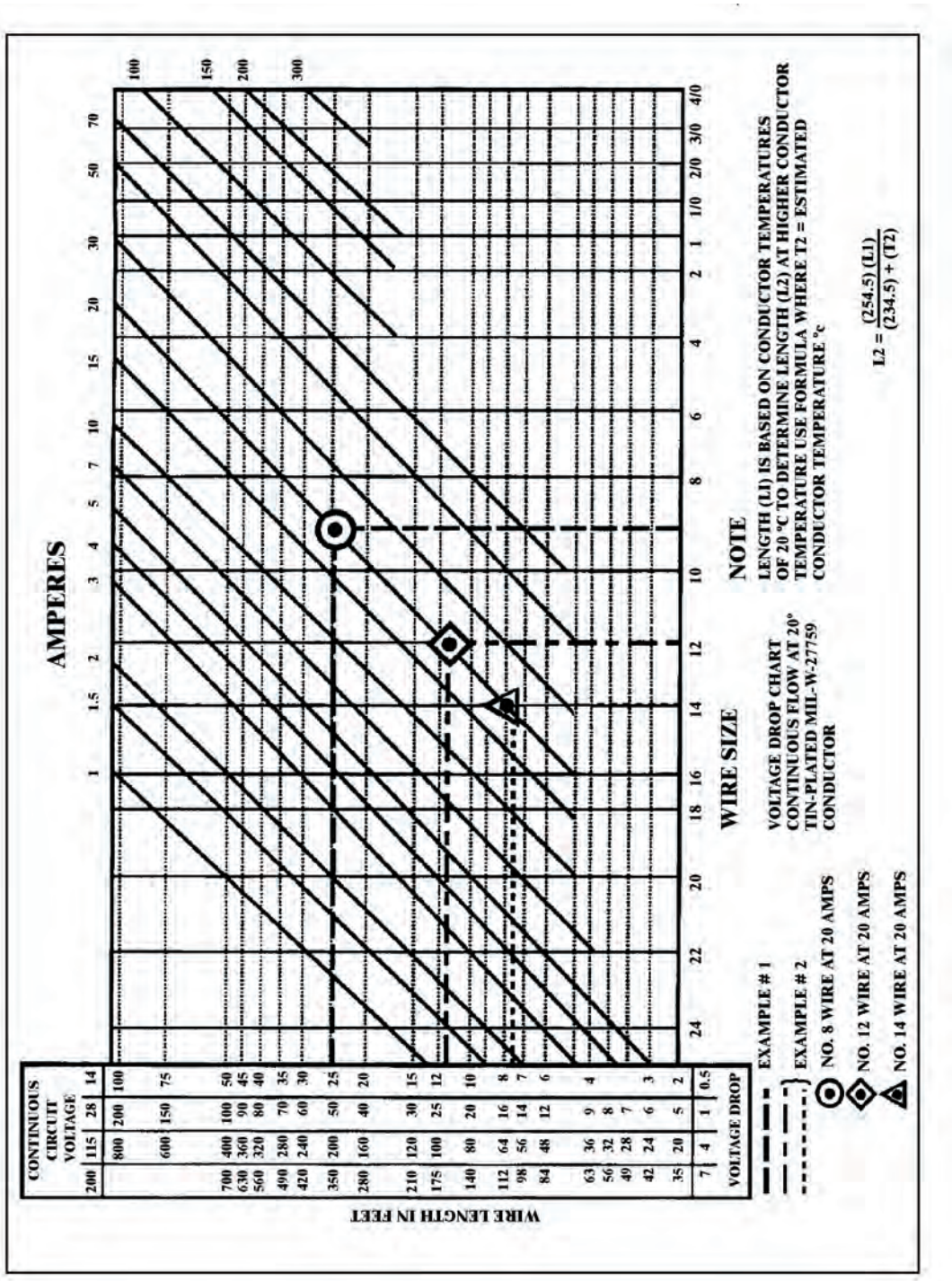


Figure 11-2. Conductor chart, continuous flow.

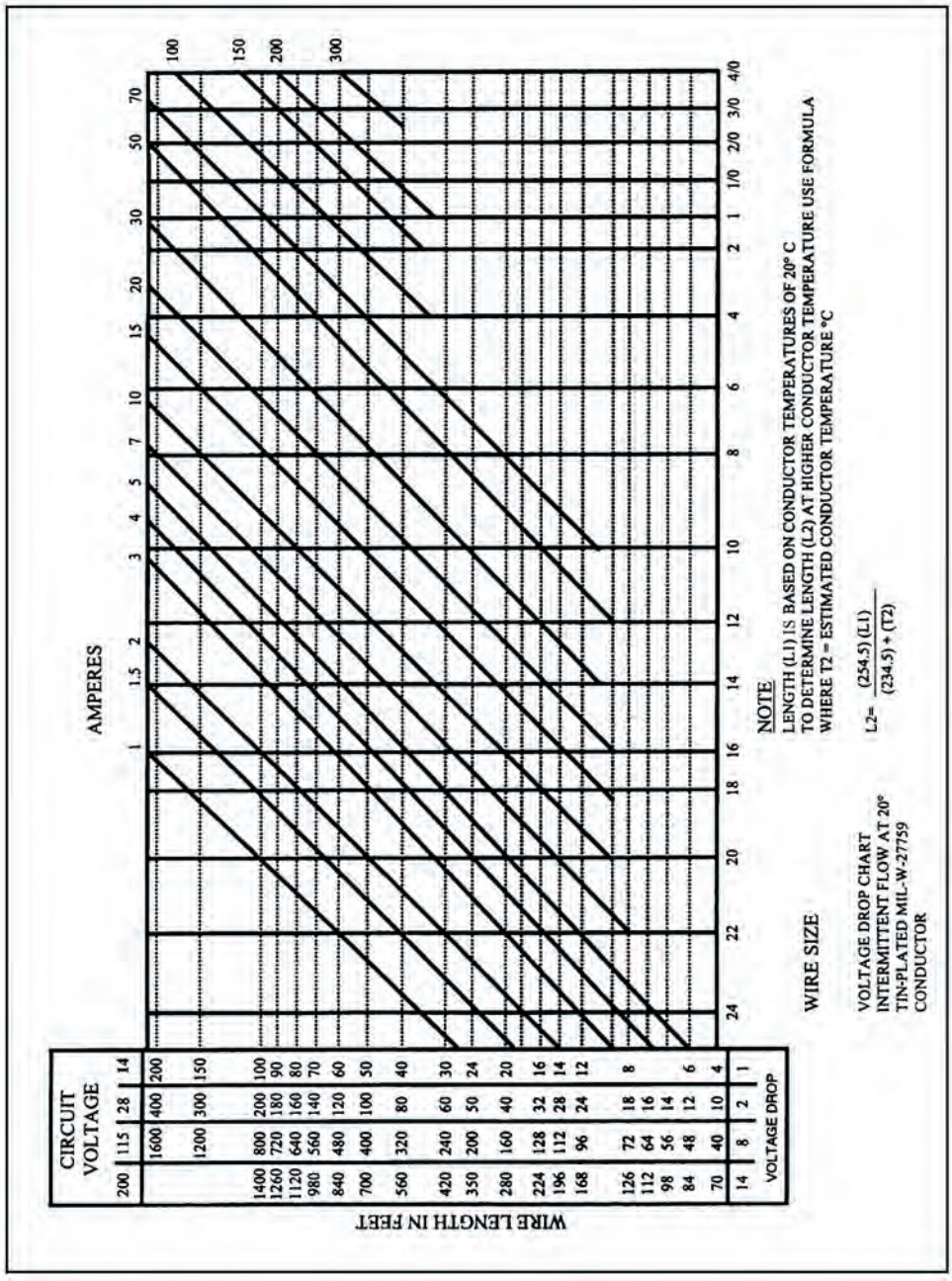


Figure 11-3. Conductor chart, intermittent flow.

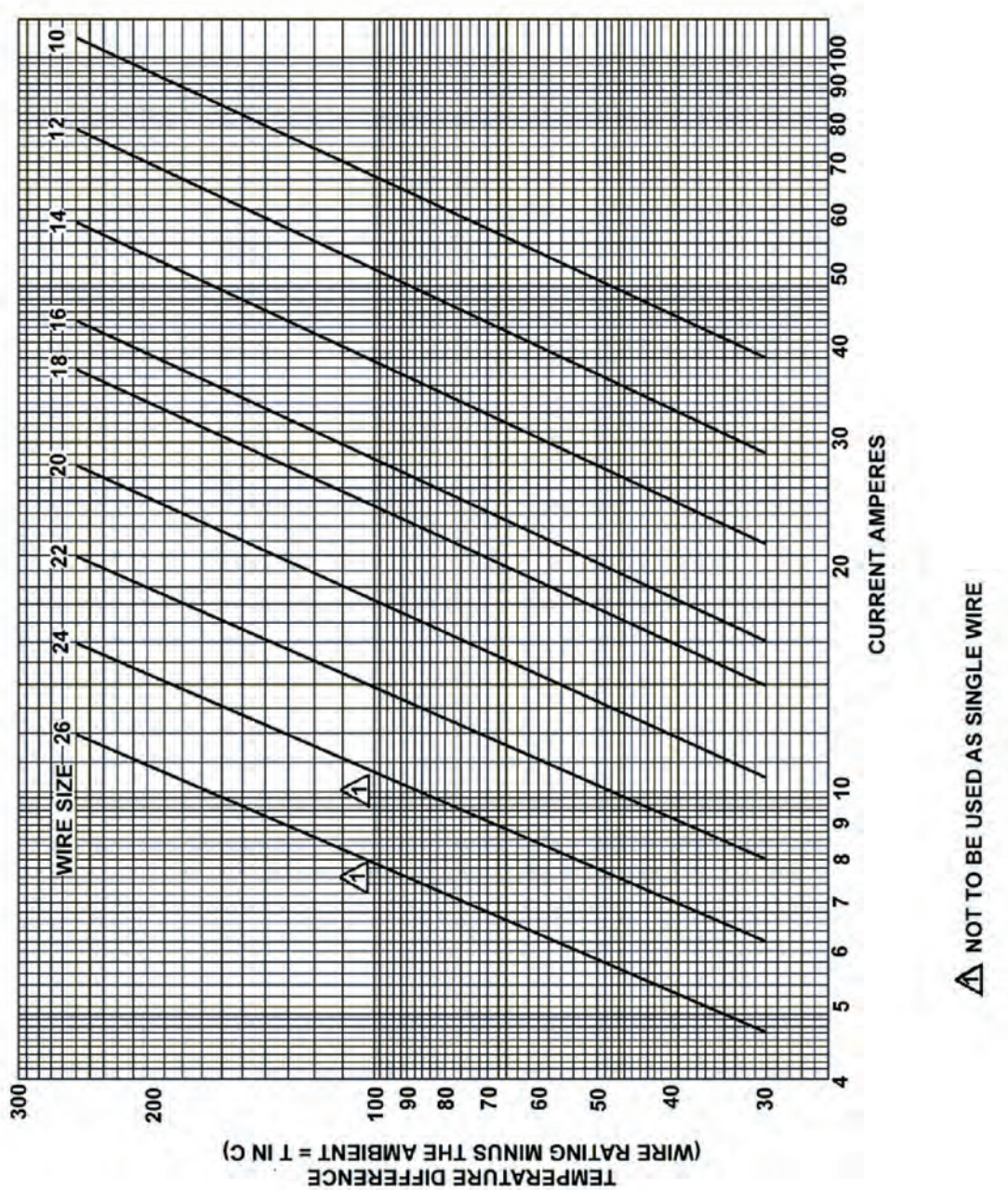


Figure 11-4a. Single copper wire in free air.

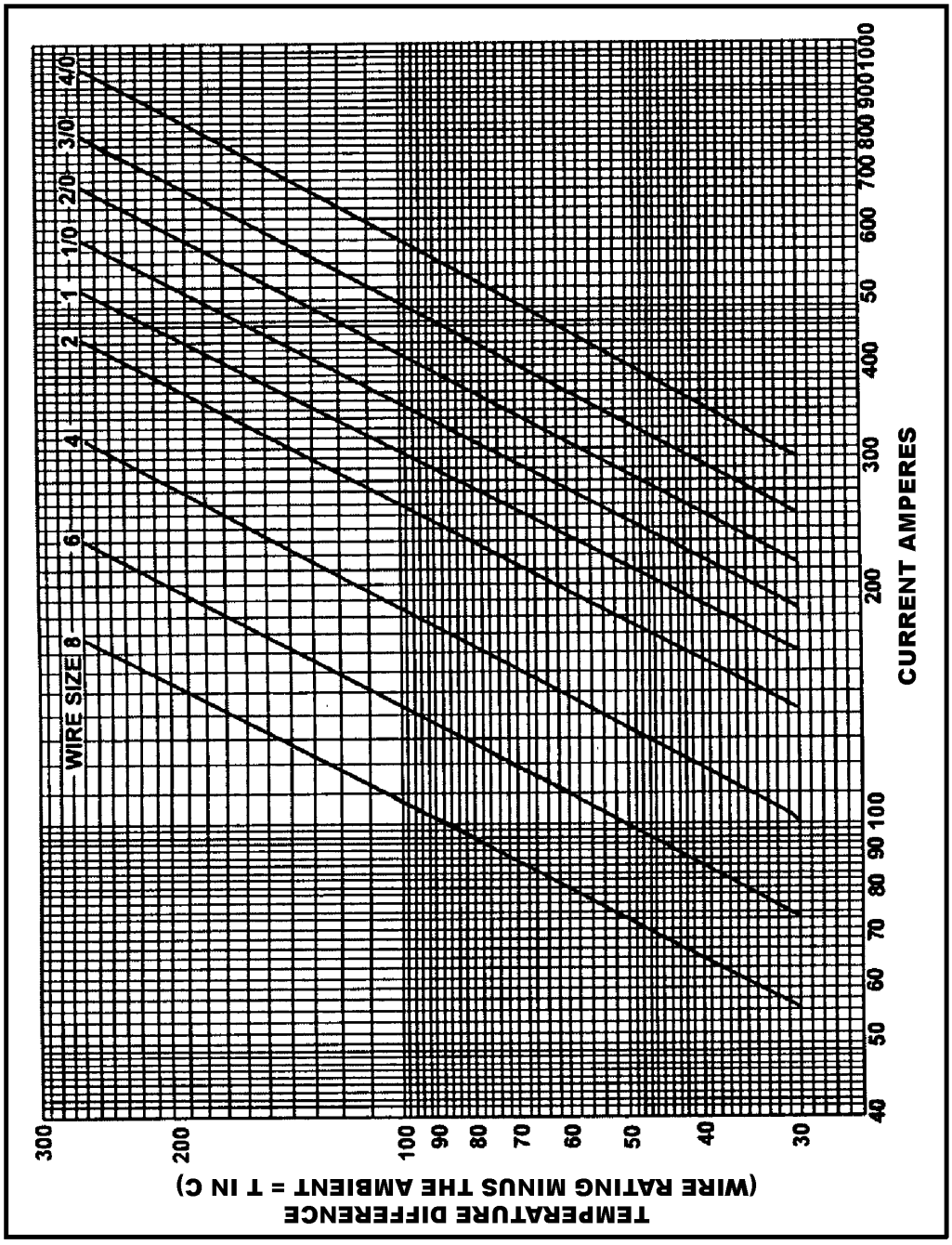


Figure 11-4b. Single copper wire in free air.

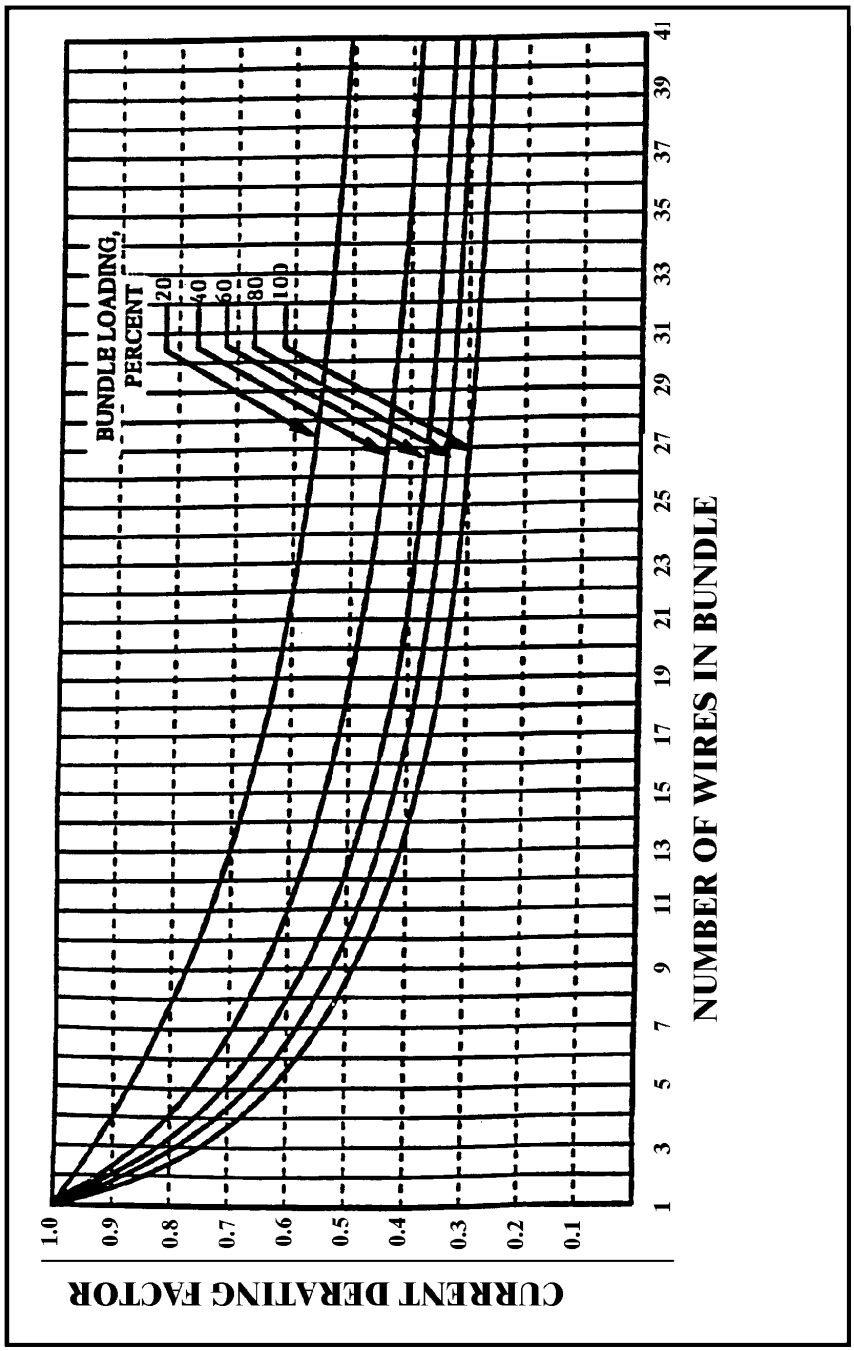


Figure 11-5. Bundle derating curves.

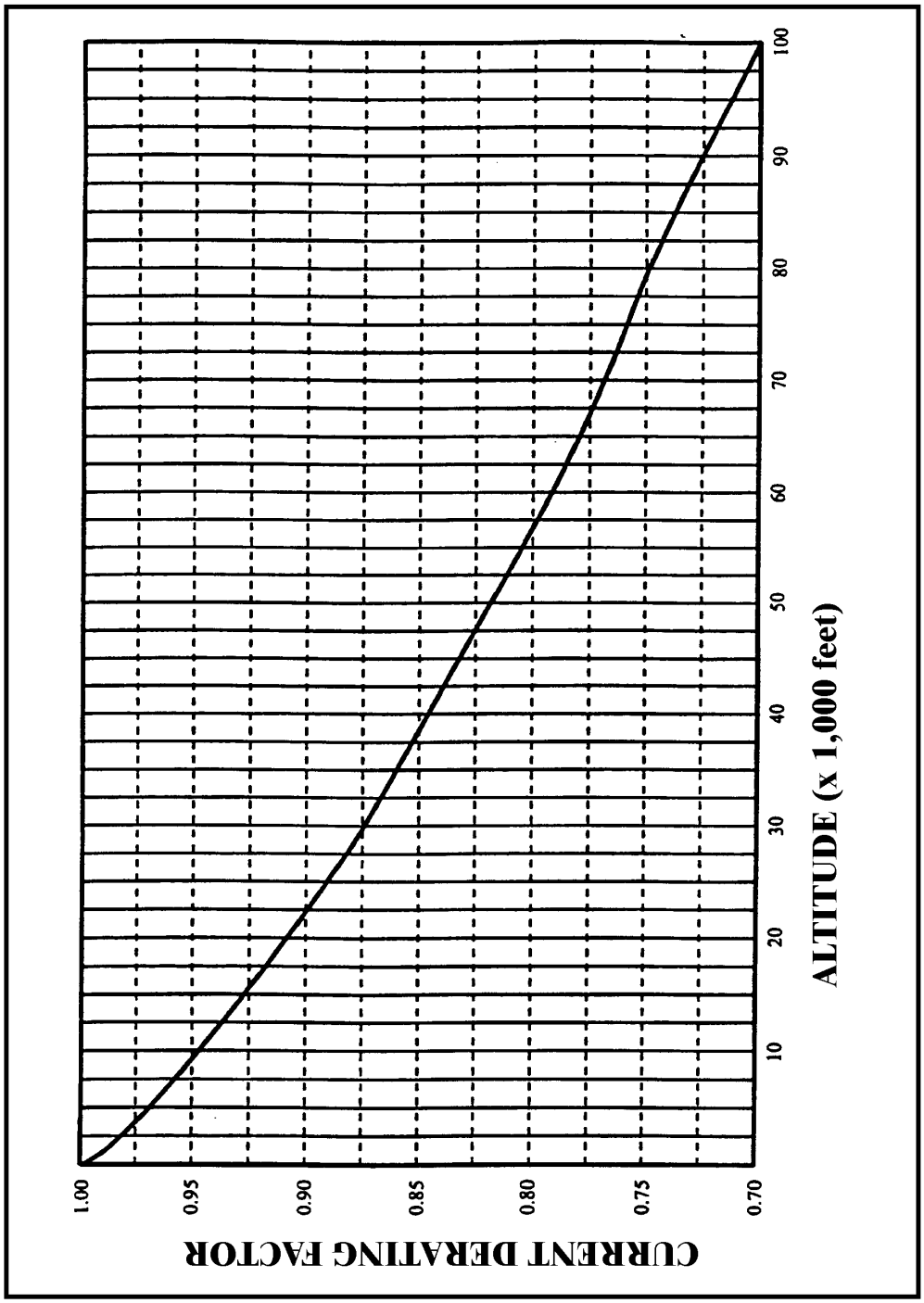


FIGURE 11-6. Altitude derating curve.

11-70. – 11-75. [RESERVED

EXHIBIT 23

Minimum Equipment List Page

MINIMUM EQUIPMENT LIST

AIRCRAFT:	REVISION NO: 2	PAGE:
CESSNA – (TURBOPROP) 421 C STC SA1361SO		25-1

SYSTEM & SEQUENCE NUMBERS	ITEM	1.	2. NUMBER INSTALLED	3. NUMBER REQUIRED FOR DISPATCH	4. REMARKS OR EXCEPTIONS
25	EQUIPMENT/FURNISHINGS				
1.	Cockpit Shoulder Harness	B	2.	1	*One may be inoperative. The aircraft may continue the flight or series of flights, but shall not depart an airport where repair or replacement can be made.
2.	Passenger Seats	C	–	0	* (M) All may be inoperative provided: a) Affected seat does not block emergency agress to the aisle or exit, and b) Affected seat is blocked and placarded "DO NOT OCCUPY." NOTE: 1. A seat with an inoperative seatbelt or shoulder harness is considered to be inoperative. 2. A seat with an inoperative recline mechanism is considered to be inoperative if the seat back cannot be secured in the upright position.
3.	Floatation Devices	C	–	–	As required by FAR.
4.	ELT	C	1	0	*May be inoperative for published scheduled flights in scheduled air carrier service. Must be operative for all other flights.

EXHIBIT 24

$$\textbf{Bend Allowance} = \frac{2\pi\ (R + 1/2T)}{4}$$

(use lowest value for radii)

EXHIBIT 25

$$c = 2\pi \sqrt{\frac{a^2 + b^2}{2}}$$

Circumference Formula

END OF SECTION 3

Section IV: Type Certificate Data Sheet and Specifications (TCDS)

- TCDS Background Information
- A37C, Cessna 208
- E4EA, Pratt & Whitney PT6A
- P9NE, Hartzell
- P60GL, McCauley
- E252, Continental C90
- 2A13, Piper PA-28
- 3A19, Cessna 150
- E-295, Lycoming 0-540
- A7CE, Cessna 400 Series
- 3A13, Cessna 182
- A7SO, Piper PA-34-200
- A11EA, Gulfstream American AA-1
- 1A6, Piper PA-22
- E-273, Continental 0-470
- P57GL, McCauley
- P-920, Hartzell
- 2A4, Twin Commander
- E-284, Textron Lycoming
- A9CE, Cessna 188
- 3A12, Cessna 172
- A16CE, Cessna 207/T207
- 3A21, Cessna 210
- A3SO, Piper PA-32-260

Type Certificate Data Sheets and Specifications (TCDS) set forth essential factors and other conditions which are necessary for U.S. airworthiness certification. Aircraft, engines, and propellers which conform to a U.S. type certificate (TC) are eligible for U.S. airworthiness certification when found to be in a condition for safe operation and ownership requisites are fulfilled.

These are two kinds of certification documents contained in the TCDS file:

(1) Type Certificate Data Sheets

(2) Specifications

"Type Certificate Data Sheets" were originated and first published in January 1958. FAR 21.41 indicates they are part of the type certificate. As such, a type certificate data sheet is evidence the product has been type certificated. Generally, type certificate data sheets are compiled from details supplied by the type certificate holder; however, FAA may request and incorporate additional details when conditions warrant.

"Specifications" were originated during implementation of the Air Commerce Act of 1926. Specifications are FAA recordkeeping documents issued for both type certificated and non-type certificated products which have been found eligible for U.S. airworthiness certification. Although they are no longer issued, specifications remain in effect and will be further amended. Specifications covering type certificated products may be converted to type certificate data sheets at the option of the type certificate holder. However, to do so requires the type certificate holder to provide an equipment list. A specification is NOT part of a type certificate. Specifications are subdivided into five major groups as follows:

(1) **Type Certificated Aircraft, Engines and Propellers.** Covering standard, restricted and limited types issued for domestic, foreign, and military surplus products.

(2) **Group II - Aircraft, Engine, and Propeller Approvals.** Covering domestic, foreign, and military surplus products constructed or modified between October 1, 1927, and August 22, 1938, all of which have met minimum airworthiness requirements without formal type certification. Such products are eligible for standard airworthiness certification as though they are type certificated products.

(3) **Group III - Aircraft, Engine and Propeller Approvals.** Covering domestic products manufactured prior to October 1, 1927, and foreign products manufactured prior to June 20, 1931, and certain military surplus engines and propellers all of which have met minimum airworthiness requirements of the Air Commerce Act of 1926 and implementing Air Commerce Regulations without formal type certification. Such products are eligible for standard airworthiness certification as though they are type certificated products.

(4) **Group IV - Engine Ratings.** Covering unapproved engines rated for maximum power and speed only, their use being limited to specific aircraft with maximum gross weights less than 1,000 pounds. Such engines are not eligible for independent airworthiness certification. These ratings are no longer issued.

(5) **Group V - Engine Approvals.** Covering military surplus engines meeting Civil Air Regulations (CAR) 13 design requirements without formal type certification. Such engines are eligible for airworthiness certification as though they are type certificated engines.

NOTE: Most products found in Groups II, III, and IV were approved prior to 1938. Although such products may still be eligible for U.S. airworthiness certification, they may require issuance of specific operating limitations. Specifications covering Groups II, III, IV, and V products may be recognized in two ways:

(1) An approval number which begins with 2- (sometimes A-2- or G-2-), 3-, 4-, or 5E-.

(2) The words Group 2, Group 3, Group 4, or Group 5E in lieu of the specification number.

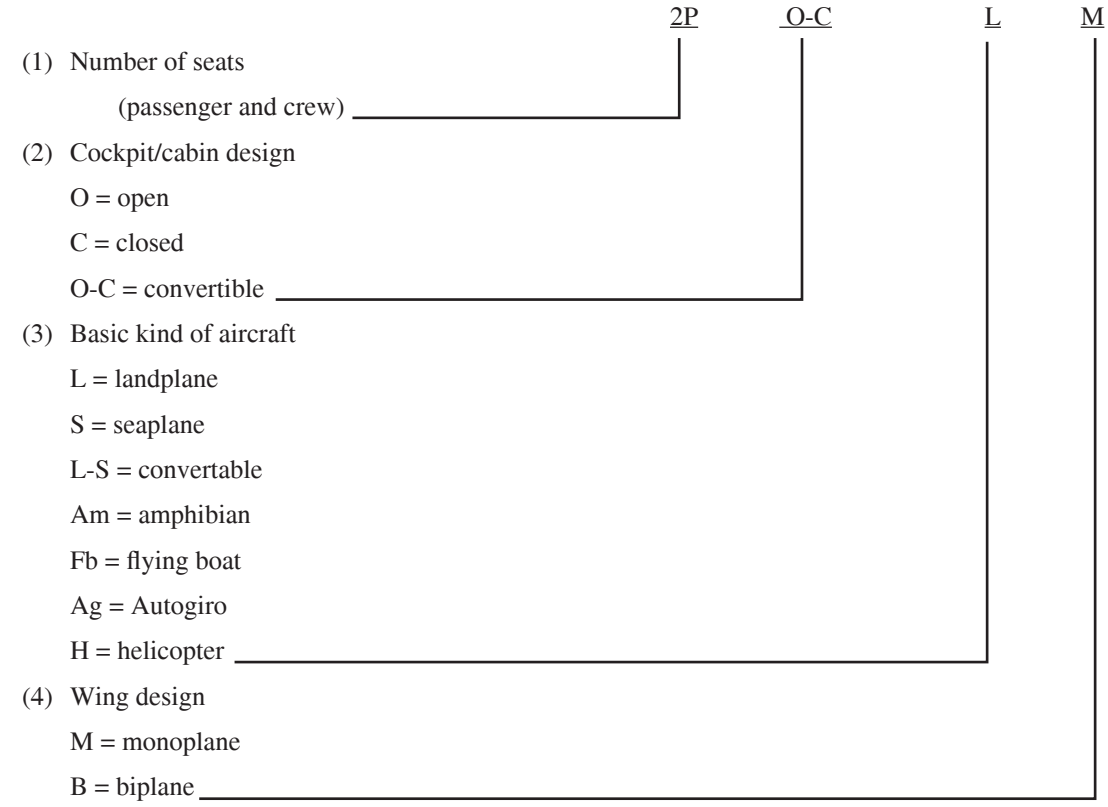
Specifications have also been used to record the approval of major alterations performed on any of the products for which they were issued. Such approvals are presently recorded on a “Supplemental Type Certificate” (STC). STC’s are not published in data sheet format. However, they are listed in the “Summary of Supplemental Type Certificates” when the holder indicates that parts (kits), data, and design rights are available to the public (see the latest revision of Advisory Circular 21-5 for ordering instructions).

Coded Entries

Many aircraft and engine specifications and some type certificate data sheets carry coded information to describe the general characteristics of the product. Theses may be found in the model caption line or a separate line entry titled “Type” or “Designation”.

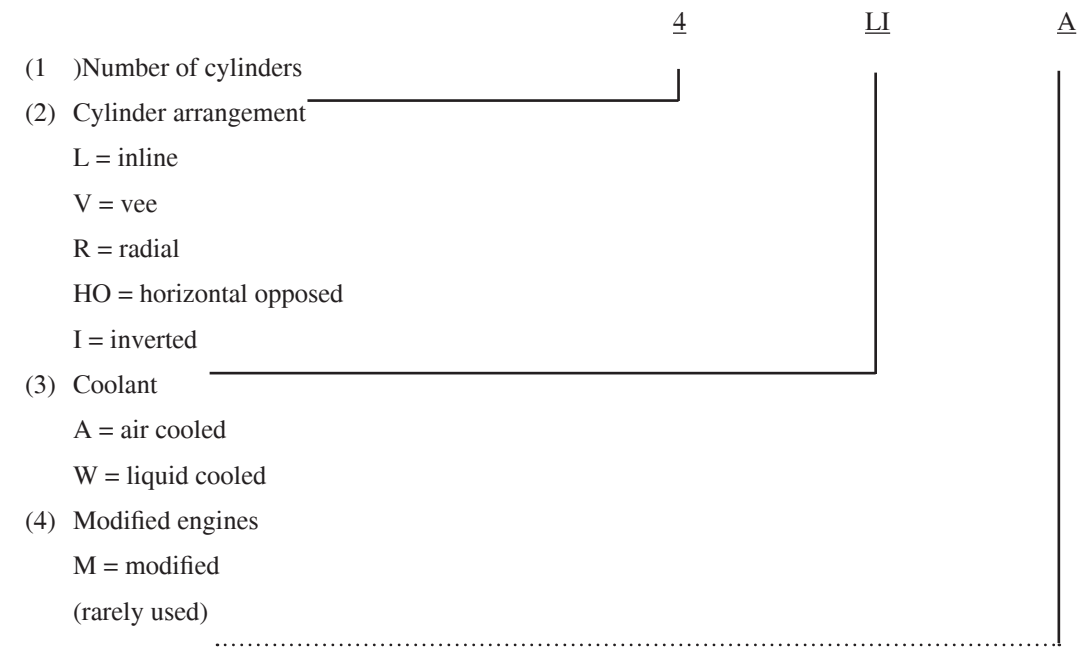
Aircraft codes (Designations) are as follows:

Example: 2 PO-CIM



Engine Codes (Type) are as follows:

Example: 4LIA (sometimes 4LAI)



DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

A37CE
Revision 13
CESSNA
208
208B
March 21, 2008

TYPE CERTIFICATE DATA SHEET NO. A37CE

This data sheet which is part of Type Certificate No. A37CE prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P. O. Box 7704
Wichita, Kansas 67277

I. Model 208, Caravan, 11 PCLM (Normal Category), Approved October 23, 1984; 11 PCSM (Normal Category), Approved March 26, 1986

Engine [Applicable to S/N 20800001 through 20800276]
Pratt & Whitney of Canada Ltd., PT6A-114 Turbo Prop
Pratt & Whitney of Canada Ltd., PT6A-114A Turbo Prop
(When operated to PT6A-114 operating limitations)

Engine [Applicable to S/N 20800277 and Up]
Pratt & Whitney of Canada Ltd., PT6A-114A Turbo Prop

Fuel — Aviation turbine fuel Jet A, Jet A-1, Jet B, JP-1, JP-4, JP-5 or JP-8. For required use of anti-icing additives and emergency use of aviation gasoline, refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Engine Limits: [Applicable to S/N 20800001 through 20800276]

P&W PT6A-114 or PT6A-114A when operated to PT6A-114 operating limits

	Shaft Horsepower	NG Gas Generator Speed (% rpm)	Indicator Torque (ft.-lbs.)	Prop Shaft Speed (rpm)	Maximum Permissible Interturbine Temp. (°C)
Takeoff static & max. continuous	600 (1)	101.6	1658	1900	805
Maximum climb	600 (1)	101.6	1658/1970(2)	1900	765
Maximum cruise	600 (1)	101.6	1658/1970(2)	1900	740
Idle	-	52 min.	-	-	685
Starting (2 sec.)	-	-	-	-	1090
Max. reverse (1 min.)	600 (1)	101.6	1658	1825	805
Transient (2 sec.)	-	102.6	2200	2090	850

I. Model 208, Caravan (cont'd)

Engine Limits: [Applicable to S/N 20800277 and Up]

P&W PT6A-114A

	Shaft Horsepower	NG Gas Generator Speed (% rpm)	Indicator Torque (ft.-lbs.)	Prop Shaft Speed (rpm)	Maximum Permissible Interturbine Temp. (°C)
Takeoff static & max. continuous	675 (1)	101.6	1865	1900	805
Maximum climb	675 (1)	101.6	1865/1970(2)	1900	765
Maximum cruise	675 (1)	101.6	1865/1970(2)	1900	740
Idle	-	52 min.	-	-	685
Starting (2 sec.)	-	-	-	-	1090
Max. reverse (1 min.)	675 (1)	101.6	1865	1825	805
Transient (2 sec.)	-	102.6	2200	2090	850

(1) Flat Rated:
The engines may produce more power than that for which the airplane has been certificated. Under these conditions, the stated torque, ITT, or Ng limitations shall not be exceeded.

(2) If maximum torque is used, propeller r.p.m. must be set so as not to exceed power limitations.

Propeller and Propeller Limits [Applicable to S/N 20800001 through 20800276]:

Hartzell composite three-bladed, constant speed, full-feathering, reversible Model: HC-B3MN3/M10083
Diameter: Maximum 100 inches, minimum 100 inches, no cutoff approved
Pitch at 42-inch station:

Low pitch (Beta pickup)	9°
Feathered	78.4°
Maximum Reverse	-18°

Propeller and Propeller Limits [Applicable to S/N 20800001 and Up and all TKS equipped aircraft]:

McCauley aluminum three-bladed, constant speed, full-feathering, reversible
Model: 3GFR34C703/106GA-0
Diameter: Maximum 106 inches, minimum 104 inches (2-inch cutoff on diameter allowed)
Pitch at 30-inch station:

Low pitch (Beta pickup)	+15.6°
Feathered	+88°
Maximum Reverse	-14°

*Airspeed Limits S/N 20800001 through 20800060

V_{MO} (Max Operating)	175 KIAS
V_A (Maneuvering) at 7300 lbs.	148 KIAS

See POH/AFM for variations with weight and altitude.
V_{FE} (Flaps extended)

To 10°	175 KIAS
10° to 20°	150 KIAS
20° to 30°	125 KIAS

*Airspeed Limits S/N 20800061 and Up

V_{MO} (Max Operating)	175 KIAS
V_A (Maneuvering) at 8000 lbs.	150 KIAS

See POH/AFM for variations with weight and altitude.
V_{FE} (Flaps extended)

To 10°	175 KIAS
10° to 20°	150 KIAS
20° to 30°	125 KIAS

I. Model 208, Caravan (cont'd)

*Airspeed Limits	V_{MO} (Max Operating)	175 KIAS
Amphibian	V_A (Maneuvering) at 7600 lbs.	141 KIAS
S/N 20800014 and Up	See POH/AFM for variations with weight and altitude.	
	V_{FE} (Flaps extended)	
	To 10°	175 KIAS
	10° to 20°	150 KIAS
	20° to 30°	125 KIAS
C.G. Range	Takeoff, flight, and landing	
S/N 2080001 through 20800060	(+171.91) to (+182.68) at 7300 lbs.	
	(+162.41) to (+182.68) at 4200 lbs.	
	Straight line variation between points given	
C.G. Range	Takeoff and flight	
S/N 20800061 and Up	(+174.06) to (+184.35) at 8000 lbs.	
	(+162.41) to (+184.35) at 4200 lbs.	
	Straight line variation between points given	
	Landing	
	(+173.44) to (+184.35) at 7800 lbs.	
	(+162.41) to (+184.35) at 4200 lbs.	
	Straight line variation between points given	
C.G. Range	Takeoff and flight	
Amphibian	(+172.83) to (+182.68) at 7600 lbs.	
S/N 20800014 and Up	(+165.47) to (+182.68) at 5200 lbs.	
	Straight line variation between points given	
	Landing	
	(+171.91) to (+182.68) at 7300 lbs.	
	(+165.47) to (+182.68) at 5200 lbs.	
	Straight line variation between points given	
Empty Wt. C.G. Range	None	
Maximum Weight	7300 lb. takeoff, flight, and landing	
S/N 2080001 through 20800060	7335 lb. ramp	
Maximum Weight	8000 lb. takeoff and flight	
S/N 20800061 and Up	7800 lb. landing	
	8035 lb. ramp	
Maximum Weight	7600 lb. takeoff and flight	
Amphibian	7300 lb. landing	
S/N 20800014 and Up	7635 lb. ramp	
No. of Seats	1 through 2 (at +133.5 to +146.5) Pilot Seat Locations.	
	3 through 11 refer to current Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for passenger seating arrangements.	
Maximum Baggage	Reference weight and balance data	
Fuel Capacity	335 gal. (332 gal. usable), two 167.5 gal. tanks in wings at +183.8	
	See NOTE 1 for data on unusable fuel.	

I. Model 208, Caravan (cont'd)

Oil Capacity: 3.5 gal. total, 2.37 gal. usable in engine mounted tank at +69.2

Maximum Operating Altitude: 30,000 ft. - Landplane
20,000 ft. – Amphibian and Flight into known Icing

Control Surface Movements:

Wing flaps 0° ±1° Up, 10° +1° -2° Down, 20° ±2° Down, 30° +1° -2° Down

LH & RH Flap Extension to be symmetric within 1/2° at all positions

Main surfaces

Ailerons	Up	25° +4° -0°	Down	16° +1° -0°
Spoiler	Up	40° ±5°	Down	0° +0° -5°
Elevator	Up	25° ±2°	Down	20° ±2°
Rudder (Landplane)	Right	25° ±2°	Left	25° ±2°
(Amphibian)	Right	23° +2°, -0°	Left	23° +2°, -0°

(Measured perpendicular to hinge line)

Tabs (main surfaces in neutral)

Aileron (RH)	Up	15° ±2°	Down	15° ±2°
Elevator	Up	15° ±2°	Down	15° ±2°

Tabs servo actions

Aileron (RH) (tab adjusted to neutral)
50% of aileron travel ±1° Up and Down
Aileron (LH) 50% of aileron travel ±1° Up and Down

Serial Nos. Eligible: 20800001 and up - Landplane
20800014 and up - Amphibian with Wipline Model 8000 Amphibious/Seaplane Floats.

II - Model 208B, Caravan, 2 PCLM (Normal Category), Approved October 9, 1986
Model 208B, Caravan, 11 PCLM (Normal Category), Approved December 13, 1989

Engine: Pratt & Whitney of Canada Ltd., PT6A-114 Turbo Prop, S/N 208B0001 through S/N 208B0178 and 208B0180 through 208B0229, and as modified by SK208-84

Pratt & Whitney of Canada Ltd., PT6A-114A Turbo Prop,
(a) S/N 208B0001 through S/N 208B0178 and 208B0180 through 208B0229 and as modified by SK208-84 when operated to PT6A-114 operating limits
(b) S/N 208B0179, S/N 208B0230 and on, and as modified by SK208-80
S/N 208B0230 and on, and as modified by SK208-80

Fuel: Aviation turbine fuel Jet A, Jet A-1, Jet B, JP-1, JP-4, JP-5 or JP-8. For required use of anti-icing additives and emergency use of aviation gasoline, refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Engine Limits: P&W PT6A-114 or PT6A-114A when operated to PT6A-114 operating limits

	Shaft Horsepower	NG Gas Generator Speed (% rpm)	Indicator Torque (ft.-lbs.)	Prop Shaft Speed (rpm)	Maximum Permissible Interturbine Temp. (°C)
Takeoff static & max. continuous	600 (1)	101.6	1658	1900	805
Maximum climb	600 (1)	101.6	1658/1970(2)	1900	765
Maximum cruise	600 (1)	101.6	1658/1970(2)	1900	740
Idle	-	52 min.	-	-	685
Starting (2 sec.)	-	-	-	-	1090
Max. reverse (1 min.)	600 (1)	101.6	1658	1825	805
Transient (2 sec.)	-	102.6	2200	2090	850

II. - Model 208B, Caravan (cont'd)

Engine Limits (cont'd) PT6A-114A (675 hp)

	Shaft Horsepower	NG Gas Generator Speed (% rpm)	Indicator Torque (ft.-lbs.)	Prop Shaft Speed (rpm)	Maximum Permissible Interturbine Temp. (°C)
Takeoff static & max. continuous	675 (1)	101.6	1865	1900	805
Maximum climb	675 (1)	101.6	1865/1970(2)	1900	765
Maximum cruise	675 (1)	101.6	1865/1970(2)	1900	740
Idle	-	52 min.	-	-	685
Starting (2 sec.)	-	-	-	-	1090
Max. reverse (1 min.)	675 (1)	101.6	1865	1825	805
Transient (2 sec.)	-	102.6	2200	2090	850

(1) Flat Rated:
The engines may produce more power than that for which the airplane has been certificated. Under these conditions, the stated torque, ITT, or Ng limitations shall not be exceeded.

(2) If maximum torque is used, propeller r.p.m. must be set so as not to exceed power limitations.

Propeller and Propeller Limits

Hartzell composite three-bladed, constant speed, full-feathering, reversible.
Model: HC-B3MN3/M10083
Diameter: Maximum 100 inches, minimum 100 inches, no cutoff approved
Pitch at 42-inch station:

Low pitch (Beta pickup)	9°
Feathered	78.4°
Maximum Reverse	-18°

McCauley aluminum three-bladed, constant speed, full-feathering, reversible.
Note: All aircraft equipped with TKS anti-ice system must use this prop.
Model: 3GFR34C703/106GA-0
Diameter: Maximum 106 inches, minimum 104 inches (2-inch cutoff on diameter allowed)
Pitch at 30-inch station:

Low pitch (Beta pickup)	+15.6°
Feathered	+88°
Maximum Reverse	-14°

*Airspeed Limits

V_{MO} (Max Operating)	175 KIAS
V_A (Maneuvering) at 8750 lbs.	148 KIAS

See POH/AFM for variations with weight and altitude.

V_{FE} (Flaps extended)	
To 10°	175 KIAS
10° to 20°	150 KIAS
20° to 30°	125 KIAS

C.G. Range

Takeoff and flight
(+199.15) to (+204.35) at 8750 lbs.
(+193.37) to (+204.35) at 8000 lbs.
(+179.60) to (+204.35) at 5500 lbs.
Straight line variation between points given

Landing
(+197.22) to (+204.35) at 8500 lbs.
(+193.37) to (+204.35) at 8000 lbs.
(+179.60) to (+204.35) at 5500 lbs.
Straight line variation between points given

Empty Wt. C.G. Range None

II. - Model 208B, Caravan (cont'd)

Maximum Weight	8750 lb. takeoff and flight 8500 lb. landing 8785 lb. ramp For Flight Into Known Icing: With PT6A-114 engine and PT6A-114A when operated to PT6A-114 operating limits 8000 lb. takeoff and flight - cargo pod installed 8450 lb. takeoff and flight - cargo pod removed With PT6A-114A (675 hp.) engine 8550 lb. takeoff and flight - cargo pod installed 8750 lb. takeoff and flight - cargo pod removed With PT6A-114A (675 hp.) engine and TKS Anti-ice System installed 8750 lb. takeoff and flight
No. of Seats	1 through 2 (at +133.5 to +146.5) Pilot Seat Locations for Cargo and Passenger Versions. 3 through 11 refer to POH for passenger seat locations Passenger Version only.
Maximum Baggage	Reference weight and balance data
Fuel Capacity	335 gal. (332 gal. usable), two 167.5 gal. tanks in wings at +203.8 See NOTE 1 for data on unusable fuel.
Oil Capacity	3.5 gal. total, 2.37 gal. usable in engine mounted tank at +69.2
Maximum Operating Altitude	25,000 ft. 20,000 ft. for Flight Into Known Icing
Control Surface Movements	Wing flaps 0° ±1° Up, 10° +1° -2° Down, 20° ±2° Down, 30° +1° -2° Down LH & RH Flap Extension to be symmetric within 1/2° at all positions Main surfaces Ailerons Up 25° +4° -0° Down 16° +1° -0° Spoiler Up 40° ±5° Down 0° +0° -5° Elevator Up 25° ±2° Down 20° ±2° Rudder Right 25° ±2° Left 25° ±2° (Measured perpendicular to hinge line) Tabs (main surfaces in neutral) Aileron (RH) Up 15° ±2° Down 15° ±2° Elevator Up 15° ±2° Down 15° ±2° Tabs servo actions Aileron (RH) (tab adjusted to neutral) 50% of aileron travel ±1° Up and Down Aileron (LH) 50% of aileron travel ±1° Up and Down
Serial Nos. Eligible	208B0001 and up

Data Pertinent to All Models

Datum	100.00 in. forward of center of nose gear jack point (Landplane). 100.00 in. forward of front face of firewall (Amphibian).
Leveling Means	Two jig located nutplates and screws installed on left side of fuselage below side windows and forward of cargo door.

Data Pertinent to All Models (cont'd)

Certification Basis - Applies to Models 208 and 208B when equipped with PW PT6A-114 engine and Hartzell propeller:

(1) FAR Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by Amendments 23-1 through 23-28.
(2) FAR Part 36 effective December 1, 1969, as amended by Amendments 36-1 through 36-12.
(3) SFAR 27 effective February 1, 1974, as amended by Amendments 27-1 through 27-4.
(4) Special Conditions as follows:
  (a) 23-ACE-3; Dynamic Evaluation, Engine Installation.
(5) Equivalent Level of Safety applicable to Model 208 and 208B not equipped with the Garmin G1000 Integrated Cockpit System:
  (a) FAR 23.955(f)(2), Fuel System.
(6) Compliance with ice protection has been demonstrated in accordance with § 23.1419 when ice protection equipment is installed in accordance with the airplane equipment list and is operated per the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Certification Basis - Applies to
  (a) Models 208 and 208B when equipped with P&W PT6A-114 engine and McCauley propeller; and
  (b) Model 208B when equipped with P&W PT6A-114A engine and either McCauley or Hartzell propeller; and
  (c) Model 208 when equipped with P&W PT6A-114A engine and McCauley propeller:

(1) FAR Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by Amendments 23-1 through 23-28.
(2) FAR Part 36 effective December 1, 1969, as amended by Amendments 36-1 through 36-18.
(3) SFAR 27 effective February 1, 1974, as amended by Amendments 27-1 through 27-4.

Additions for the Garmin G1000 Integrated Cockpit System (ICS) and, as annotated, for the GFC-700 Automatic Flight Control System (AFCS) applicable to the Model 208 and 208B when equipped with PW PT64-114A Engine:

14 CFR 23 regulations as amended by Amendment N/C:
14 CFR 23.301(a), (d), 23.303, 23.305(a), (b), 23.307(a), 23.561(e), 23.601, 23.605 23.607, 23.671(a), 23.1367 and 23.1381.

14 CFR 23 regulations as amended by Amendment 23-7:
14 CFR 23.611, 23.689(a), and 23.867(a), (b).

14 CFR 23 regulations as amended by Amendment 23-13:
14 CFR 23.1589.

14 CFR 23 regulations as amended by Amendment 23-14:
14 CFR 23.1365(a), (b), 23.1419(b), (c), and 23.771(a).

14 CFR 23 regulations as amended by Amendment 23-17:
14 CFR 23.607, 23.685(a), and 23.1309(a)(1), (a)(2), (c), 23.1165 (b), (c).

14 CFR 23 regulations as amended by Amendment 23-20:
14 CFR 23.1301, 23.1327, 23.1335 GFC-700 Automatic Flight Control System (AFCS), 23.1547(b), (e), 23.1351(a), (b), (c), (d), (e), and 23.1361(a), (b), (c).

14 CFR 23 regulations as amended by Amendment 23-21:
14 CFR 23.1501, 23.1541(a)(1)(2), (b)(1)(2), and 23.1353(g).

14 CFR 23 regulations as amended by Amendment 23-23:
14 CFR 23.603(a), (b), and 23.605(a).

Data Pertinent to All Models (cont'd)

Additions for the Garmin G1000 Integrated Cockpit System (ICS) (cont'd)

14 CFR 23 regulations as amended by Amendment 23-26:
14 CFR 23.1529.

14 CFR 23 regulations as amended by Amendment 23-34:
14 CFR 23.853(e), 23.1523, 23.1581(a)(2), 23.1583(a)(1), (b), (h), and 23.1585(a), (b), (d).

14 CFR 23 regulations as amended by Amendment 23-42:
14 CFR 23.677(d).

14 CFR 23 regulations as amended by Amendment 23-43:
14 CFR 23.1322, 23.1331, and 23.1357(a), (b), (c), (d), (e).

14 CFR 23 regulations as amended by Amendment 23-45:
14 CFR 23.773(a)(1), (a)(2), 23.1525, and, 23.1549.

14 CFR 23 regulations as amended by Amendment 23-49:
14 CFR 23 Safety Aspects of 23.1309(b)(3)(e), 23.1309(a)(1)(2), (b)(2)(4), (c)(1)(2)(iii)(3), (d), (e), (f)(1), 23.677(d), 23.1301(a), 23.1303(a), (b), (c), (d), (e)(1), (f), 23.1311, 23.1321(a), (c), (d), (e), 23.1323(a), (b)(1)(2), (c), 23.1329 GFC-700 Automatic Flight Control System (AFCS), 23.1351(a), (b), (c), (d), (e), 23.1361(c), 23.1365(a), (b), (d), (e), 23.1431(a), (b), (d), (e).

14 CFR 23 regulations as amended by Amendment 23-50:
14 CFR 23.1325(a), (b)(1)(i)(ii)(iii), (b)(2)(i)(3), (c)(1)(2), (d), (e), 23.1543(b), (c), 23.1553, 23.1545(a), (b)(4), (d), 23.1555(a), (b), 23.1567(a).

14 CFR 23 regulations as amended by Amendment 23-51:
14 CFR 23.777(a), (b), 23.955(a)(1)(2), (f), 23.959, 23.1337(a)(1)(2), (b)(1)(4), (c), (d), 23.1183, and 23.1203(b), (c), (d), (e).

14 CFR 23 regulations as amended by Amendment 23-52:
14 CFR 23.1305(a)(1)(2)(3)(5), (c)(1-10), (e)

14 CFR 23 regulations as amended by Amendment 23-53:
14 CFR 23.901(a), (b)

14 CFR 23 regulations as amended by Amendment 23-57:
14 CFR 23.1308

Special Conditions as follows:

(a) 23-214-SC; HIRF, with guidance from AC20-158.

Equivalent Level of Safety as follows:

(1) Applicable to Model 208 and 208B equipped with the Garmin G1000 Integrated Cockpit System:
   (a) 23.1305 Powerplant instruments – (c)(2), (c)(5), Amendment 52.
   (b) 23.1549 Powerplant and auxiliary power unit instruments – (a) through (d), Amendment 45, additionally, with guidance from AC 23.1311-1B, Installation of Electronic Display (Section 9 – Powerplant Displays), Section 9.4 Direct-Reading Alphanumeric-Only Displays.

Compliance with ice protection has been demonstrated in accordance with § 23.1419 when ice protection equipment is installed in accordance with the airplane equipment list and is operated per the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Application for type certificate dated June 2, 1982. Type Certificate No. A37CE issued October 23, 1984, obtained by the manufacturer under delegation option provisions of Part 21 of the Federal Aviation Regulations.

Data Pertinent to All Models (cont'd)

Production Basis — Production Certificate No. 4. Delegation Option Manufacturer No. CE-1 (2080001 through 20800246, 208B0001 through 208B0501) and CE-3 (20800247 and on, 208B0502 and on), and Delegation Option Manufacturer No. CE-3 (20800247 and on, 208B0502 and on) authorized to issue airworthiness certificates under delegation option provisions of Part 21 of the Federal Aviation Regulations.

Equipment — The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

NOTE 1 Current weight and balance report including list of equipment included in certificated empty weight and loading instructions, when necessary, must be provided for each aircraft at the time of original certification. Verify from aircraft records whether or not SK 208-52 "Wing Take External Sump Installation" has been installed. The certified empty weight and corresponding center of gravity location must include full oil of 29 lbs. (at +69.2), and unusable fuel as follows:

MODEL	SERIAL EFFECTIVITY/MODIFICATION	UNUSABLE FUEL lbs. @ c. g.
208	20800001 through 20800130 *NOT* modified with SK208-52	20.1 @ +185.7
208	20800001 through 20800130 modified with SK208-52	24.1 @ +186.4
208	20800131 and On	24.1 @ +186.4
208B	208B0001 through 208B0089 *NOT* modified with SK208-52	20.1 @ +205.7
208B	208B0001 through 208B0089 modified with SK208-52	24.1 @ +206.4
208B	208B0090 and On	24.1 @ +206.4

NOTE 2 The placards specified in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manuals listed below (or later revision) must be displayed:

MODEL	CESSNA PART NUMBER
208 [600 SHP]	D1307-27-13PH
208 [675 SHP]	D1352-13PH
208 [675 SHP]	208PHBUS-00
208B [600 SHP]	D1309-21-13PH
208B [675 SHP]	D1329-16-13PH
208B [675 SHP]	208BPHBUS-00

Model 208 airplanes modified in accordance with SK-208-12 should use Cessna P/N D1307-27-13PH (or later revision).

NOTE 3 Airplanes 20800001 through 20800060 are eligible for operation at the same weight and C.G. approved for S/N 20800061 and up when modified in accordance with SK-208-12 or SK-208-85A "208A to 208 Caravan I Cargo Configuration Conversion".

NOTE 4 Mandatory inspection times for all wing and wing carry through structural components are contained in the Model 208 Series Maintenance Manual.

NOTE 5 In addition to the placards required by NOTE 2 above, the prescribed operating limitations indicated by an asterisk (*) must also be displayed as permanent markings.

.....END.....

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E4EA	TCDS NUMBER E4EA REVISION: 24* DATE: June 21, 2007 PRATT & WHITNEY CANADA MODELS: PT6A-6, PT6A-6A, PT6A-6B, PT6A-6/C20, PT6A-11, PT6A-11AG, PT6A-15AG, PT6A-20, PT6A-20A, PT6A-20B, PT6A-21 PT6A-25, PT6A-25A, PT6A-25C, PT6A-27, PT6A-28, PT6A-29, PT6A-34, PT6A-34B, PT6A-34AG, PT6A-35, PT6A-36, PT6A-38 PT6A-40, PT6A-41, PT6A-41AG, PT6A-42, PT6A-42A, PT6A-45, PT6A-45A, PT6A-45B, PT6A-45R, PT6A-50, PT6A-60, PT6A-60A, PT6A-60AG PT6A-61, PT6A-61A, PT6A-65B, PT6A-65R, PT6A-65AR, PT6A-65AG, PT6A-110, PT6A-112, PT6A-114, PT6A-114A, PT6A-116, PT6A-121, PT6A-135, PT6A-135A, PT6A-52 PT6B-9 PT6B-35F PT6D-114A

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E4EA) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations, provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER: Pratt & Whitney Canada Corp.
(Formerly Pratt & Whitney Canada, Inc., Pratt & Whitney Aircraft of Canada, Ltd., and United Aircraft of Canada, Ltd.)
Longueuil, Quebec, Canada J4G 1A1

I. MODEL TYPE (see pages 2, 3, 4, 5, 6, 7)	PT6A-6, -6A, -6B, -6/C20, -11, -11AG, -15AG, -20, -20A -20B, -21, -25, -25A, -25C, -27, -28, -29, -34, -34B, -34AG, -35, -36, -110, -112, -114, -114A, -116, -121, -135, -135A, PT6D-114A Free turbine turbo-prop / 3 axial plus one centrifugal stage compressor / single annular combustion chamber, single-stage gas generator turbine / single-stage power turbine
II. MODEL TYPE (see pages 7, 8, 9, 10)	PT6A-38, -40, -41, -41AG, -42, -42A, -45, -45A, -45B, -45R, -50, -60, -60A, -60AG, -61, -61A, -52 Free turbine turbo-prop / 3 axial plus one centrifugal stage comp / single annular combustion chamber / single stage gas generator turbine / two stage power turbine
III. MODEL TYPE (see pages 10-11)	PT6A-65B, -65R, -65AR, -65AG Free turbine turbo-prop / 3 axial plus one centrifugal stage comp / single annular combustion chamber / single stage gas generator turbine / two stage power turbine

*

PAGE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
REV.	24	22	22	22	22	22	21	23	23	22	22	22	23	24	23	23	23	23	23	23	22	23				

LEGEND: "- -" INDICATES "SAME AS PRECEDING MODEL"
"---" NOT APPLICABLE
NOTE: , SIGNIFICANT CHANGES ARE BLACK-LINED IN THE LEFT MARGIN.

IV. MODEL TYPE (see pages 11-12)

PT6B-9, -35F

Free turbine turboshaft (free turbine turboprop -35F) / 3 axial plus one centrifugal stage comp / single annular combustion chamber / single stage gas generator turbine / single stage power turbine

I. MODELS	PT6A-6	PT6A-6A	PT6A-6B	PT6A-11, -11AG	PT6A-20, -20A, -20B,-6/C20
REDUCTION GEAR RATIO	.0668:1	- -	- -	- -	- -
RATINGS					
Maximum continuous at sea level					
Equivalent shaft hp.	525	- -	- -	528	579
Shaft hp.	500	- -	- -	500	550
Jet thrust, lb.	62	- -	- -	70(75,-11AG)	72
Output rpm	2,200	- -	- -	- -	- -
Gas generator rpm	38,100	- -	- -	- -	- -
Takeoff (5 min.) at sea level					
Equivalent shaft hp.	578	- -	- -	528	579
Shaft hp.	550	- -	- -	500	550
Jet thrust, lb.	70	- -	- -	- -(75, 11AG)	72
Output rpm	2,200	- -	- -	- -	- -
Gas generator rpm	38,100	- -	- -	- -	- -
Maximum reverse					
Shaft hp.	---	500	- -	475	500
Output rpm (max)	---	2,100	- -	- -	- -
Output Shaft	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See P&WC Installation Drawing)	- -	- -	- -	- -
FUEL (See NOTE 8)	Fuels conforming to P&WC Spec. CPW204 and CPW46. For PT6-AG engines CPW381 also.	- -	- -	- -	- -
OIL	See NOTE 9	- -	- -	- -	- -
OIL TANK CAPACITY, gal.	2.3	- -	- -	- -	- -
USABLE OIL TANK CAPACITY, gal.	1.5	- -	- -	- -	- -
USABLE OIL WHEN INVERTED, gal.	---	---	---	---	---
PRINCIPAL DIMENSIONS, in.					
Length	61.89	- -	- -	- -	- -
Nominal diameter	18.29	- -	- -	- -	- -
Maximum radius (excluding exhaust ports)	10.85	- -	- -	11.50	-10.85
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6 and -20models only) and ignition power source)	280	284	- -	339 340(-11AG)	286(20, 6/C20) 289(20A, 20B)

I. MODELS (cont.)	PT6A-6	PT6A-6A	PT6A-6B	PT6A-11, -11AG	PT6A-20, -20A, -20B, -6/C20
CENTER OF GRAVITY (dry weight) (in.)					
Forward of mount plane	4.20	4.40	- -	3.18	4.14(20, 6/C20 4.58(20A, 20B)
Aft of forward mount plane	---	---	---	---	---
Below engine centerline	0.34	- -	- -	0.26	0.45(20, 6/C20) 20A, 20B)
Right of engine centerline	0.32	- -	- -	0.36	0.07(20, 6/C20) 0.08(20A, 20B)

	PT6A-21,-25, -25A	PT6A-25C	PT6A-15AG, -27, -28	PT6A-29	PT6A-34,-34AG, -34B, -36
REDUCTION GEAR RATIO	.0668:1	.0663:1	- -	- -	- -
RATINGS					
Maximum continuous at sea level					
Equivalent shaft hp.	580	783	715	778	783
Shaft hp.	550	750	680	750	- -
Jet thrust, lb.	75	82	90	71	82
Output rpm	2,200	- -	- -	- -	- -
Gas generator rpm	38,100	- -	- -	- -	- -
Takeoff (5 min.) at sea level					
Equivalent shaft hp	580	783	715	778	783
Shaft hp.	550	750	680	750	- -
Jet thrust, lb.	75	82	90	71	82
Output rpm	2,200	- -	- -	- -	- -
Gas generator rpm	38,100	- -	- -	- -	- -
Maximum reverse					
Shaft hp	500	720	620	750	720
Output rpm (max)	2,100	- -	- -	- -	- -
Output Shaft	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See P&WC Installation Drawing)	- -	- -	- -	- -
FUEL (See NOTE 8)	Fuels conforming to P&WC Spec. CPW204 & CPW46. For PT6-AG engines CPW381 also.	- -	- -	- -	- -
OIL	See NOTE 9	- -	- -	- -	- -

I. MODELS (Cont.))	PT6A-21, -25, -25A	PT6A-25C	PT6A-15AG, -27, -28	PT6A-29	PT6A-34, -34AG, -34B, -36
OIL TANK CAPACITY, gal	2.8(-25, -25A)	- -	2.3	- -	- -
USABLE OIL TANK CAPACITY, gal.	1.5	- -	- -	- -	- -
USABLE OIL WHEN INVERTED, gal.	.25(-25, -25A)	- -	---	---	---
PRINCIPAL DIMENSIONS, in.					
Length	61.89((62.91,-25,-25A)	62.91	61.89	- -	- -
Nominal diameter	18.29(23.00, -25, -25A)	23.00	18.29	- -	- -
Maximum radius (excluding exhaust ports)	10.85(16.00, -25, -25A)	16.00	11.50	- -	- -
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6, -20, and PT6D-114A models only) and ignition power source)	337 (-21) 362 (-25) 352 (-25A)	355	337	- -	340 (353 -34B)
CENTER OF GRAVITY (dry weight) (in.)					
Forward of mount plane	3.04(-21) 3.00(-25, -25A)	3.00	3.04	- -	- -(3.38 -34B)
Aft of forward mount plane	---	---	---	---	---
Below engine centerline	0.32(-21) 0.47(-25, -25A)	0.47	0.32	- -	- -(0.37 -34B)
Right of engine centerline	0.20(-21) 0.29(-25, -25A)	0.29	0.20	- -	- -(0.38 -34B)

	PT6A-110	PT6A-112	PT6A-114	PT6A-114A	PT6A-116
REDUCTION GEAR RATIO	.0576:1	- -	- -	- -	- -
RATINGS					
Maximum continuous at sea level					
Equivalent shaft hp	502	528	632	725	736
Shaft hp	475	500	600	675	700
Jet thrust, lb.	68	70	79	124	89
Output rpm	1,900	- -	- -	- -	- -
Gas generator rpm	38,100	- -	- -	- -	- -
Takeoff (5 min.) at sea level					
Equivalent shaft hp	502	528	632	725	736
Shaft hp.	475	500	600	675	700
Jet thrust, lb.	68	70	79	124	89
Output rpm	1,900	- -	- -	- -	- -
Gas generator rpm	38,100	- -	- -	- -	- -

I. MODELS (cont.)	PT6A-110	PT6A-112	PT6A-114	PT6A-114A	PT6A-116
Maximum reverse					
Shaft hp.	455	475	600	675	672
Output rpm (max)	1,825	- -	- -	- -	- -
Output Shaft	Flanged 4.250" B.C., 8 holes .594± .005: diameter (See PWC Installation Drawing	- -	- -	- -	- -
FUEL (See NOTE 8)	Fuels conforming to P&WC Spec. CPW204 & CPW46.	- -	- -	- -	- -
OIL	See NOTE 9	- -	- -	- -	- -
OIL TANK CAPACITY, gal.	2.3	- -	- -	- -	- -
USABLE OIL TANK CAPACITY, gal.	1.5	- -	- -	- -	- -
PRINCIPAL DIMENSIONS, in.					
Length, in.	61.89	- -	61.89		- -
Nominal diameter	18.29	- -	18.29		18.06
Maximum radius (excluding exhaust ports)	11.50	- -	11.73		11.50
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6, -20, and PT6D-114A models only) and ignition power source)	343	- -	359	360	348
CENTER OF GRAVITY (dry weight) (in.)					
Forward of mount plane	3.80	- -	3.88	- -	3.87
Aft of forward mount plane	---	---	---	- -	---
Below engine centerline	0.26	- -	- -	- -	0.25
Right of engine centerline	0.34	- -	0.38	- -	0.35

	PT6A-121	PT6A-135,-135A	PT6D-114A	PT6A-35	
REDUCTION GEAR RATIO	.0576:1	- -	.1875	.0663:1	
RATINGS					
Maximum continuous at sea level					
Equivalent shaft hp.	647	787	729	787	
Shaft hp.	615	750	680	750	
Jet thrust, lb.	80	93	124	93	
Output rpm	1,900	- -	6,188	2,190	
Gas generator rpm	38,100	- -	38,100	- -	
Takeoff (5 min.) at sea level					
Equivalent shaft hp.	647	787	729	787	
Shaft hp.	615	750	680	750	
Jet thrust, lb.	80	93	124	93	
Output rpm	1,900	- -	6,188	2,190	
Gas generator rpm	38,100	- -	- -	- -	

I. MODELS (cont.)	PT6A-121	PT6A-135, -135A	PT6D-114A	PT6A-35	
Maximum reverse					
Shaft hp.	591	720	680	720	
Output rpm (max)	1,825	- -	5,940	2,100	
Output Shaft	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See PWC Installation Drawing	- -	- -	- -	
FUEL (See NOTE 8)	Fuels conforming to P&WC Spec. CPW204 & CPW46.	- -	- -	- -	
OIL	See NOTE 9	- -	- -	- -	
OIL TANK CAPACITY, gal.	2.3	- -	- -	- -	
USABLE OIL TANK CAPACITY, gal.	1.5	- -	- -	- -	
PRINCIPAL DIMENSIONS, in.					
Length	61.89	- -	52.8	61.89	
Nominal diameter	18.29	- -	18.29	- -	
Maximum radius (excluding exhaust ports)	11.50	- -	11.73	- -	
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6, -20 and PT6D-114A models only) and ignition power source)	343	347	297	334	
CENTER OF GRAVITY (dry weight) (in.)					
Forward of mount plane	3.8	3.87	0.19	3.87	
Aft of forward mount plane	---	---	---	---	
Below engine centerline	0.26	0.25	0.31	0.25	
Right of engine centerline	0.34	0.35	0.25	0.35	

	PT6A-38	PT6A-40	PT6A-41, -41AG, -42 -42A	PT6A-45	PT6A-45A, -45B
REDUCTION GEAR RATIO	.0663:1	- -	- -	.0568:1	- -
RATINGS					
Maximum continuous at sea level					
Equivalent shaft hp.	801	749	903	1,070	- -
Shaft hp.	750	700	850	1,020	- -
Jet thrust, lb.	127	122	134	127	- -
Output rpm	2,000	- -	- -	1,700	- -
Gas generator rpm	38,100	39,000	38,100	38,100	39,000
Takeoff (5 min.) at sea level					
Equivalent shaft hp.	801	749	903	1,174	1,229
Shaft hp.	750	700	850	1,120	1,173
Jet thrust, lb.	127	122	134	136	- - 140(-45B)
Output rpm	2,000	- -	- -	1,700	- -
Gas generator rpm	38,100	39,000	38,100	38,100	39,000

II. MODELS	PT6A-38	PT6A-40	PT6A-41, -41AG -42, -42A	PT6A-45	PT6A-45A, -45B
Maximum reverse					
Shaft hp.	700	- -	800	900	- -
Output rpm (max)	1,900	- -	- -	1,650	- -
Output Shaft	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See PWC Installation Drawing)	- -	- -	- -	- -
FUELS (See NOTE 8)	Fuels conforming to PWC Spec. CPW204 & CPW46. For PT6-AG engines CPW381 also.	- -	- -	- -	- -
OIL	See NOTE 9	- -	- -	- -	- -
OIL TANK CAPACITY, gal.	2.5	- -	- -	- -	- -
USABLE OIL TANK CAPACITY, gal.	1.5	- -	- -	- -	- -
PRINCIPAL DIMENSIONS, in.					
Length	66.47	- -	- -	72.62	- -
Nominal diameter	18.29	- -	- -	- -	- -
Maximum radius (excluding exhaust ports)	12.84	- -	- -	- -	- -
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6, -20 and PT6D-114A models only) and ignition power source)	405	419	- -	445	- -
CENTER OF GRAVITY (dry weight)(in.)					
Forward of mount plane	2.49	- -	- -	5.38	5.38
Aft of forward mount plane	---	---	---	---	---
Below engine centerline	0.32	- -	- -	0.12	0.12
Right of engine centerline	0.19	- -	- -	0.27	0.27

II. MODELS	PT6A-45R	PT6A-50	PT6A-60, -60A	PT6A-61, -61A	PT6A-60AG	PT6A-52
REDUCTION GEAR RATIO	.0568:1	.0438:1	.0568:1	.0663:1		.0663:1
RATINGS						
Maximum continuous at sea level						
Equivalent shaft hp.	1,070	1,022	1,113	902	1,081	898
Shaft hp.	1,020	973	1,050	850	1,020	850
Jet thrust, lb.	127	124	157	132	154	120
Output rpm	1,700	1,210	1,700	2,000	1,700	2000
Gas generator rpm	39,000	38,100	39,000	- -	- -	- -
Takeoff (5 min.) at sea level						
Equivalent shaft hp.	1,254	1,174	1,113	902	1,113	898
Shaft hp.	1,197	1,120	1,050	850	1,050	850
Jet thrust, lb.	141	136	157	132	157	120
Output rpm	1,700	1,210	1,700	2,000	1,700	2000
Gas generator rpm	39,000	38,500	39,000	- -	- -	- -
Maximum reverse						
Shaft hp.	900	1,120	900	800	900	800
Output rpm (max)	1,650	1,210	1,650	1,900	1,650	1900
Output Shaft	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See PWC Installation Drawing	Flanged 5.125" B.C., 8 holes .594 ± .005" diameter (See PWC Installation Drawing)	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See PWC Installation Drawing)	- -	- -	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See PWC Installation Drawing)
FUEL (See NOTE 8)	Fuels conforming to P&WC Spec. CPW204 & CPW 46. For PT6-AG engines CPW381 also.	- -	- -	- -	- -	See PWC SB 13044 for approved fuel types.
OIL	See NOTE 9	- -	- -	- -	- -	- -
OIL TANK CAPACITY, gal.	2.5	3.0	2.5	- -	- -	- -
USABLE OIL TANK CAPACITY, gal.	1.5	1.0	1.5	- -	- -	- -
PRINCIPAL DIMENSIONS, in.						
Length	72.62	79.89	72.09	66.76	72.09	66.76
Nominal diameter	18.29	- -	18.29	- -	- -	- -
Maximum radius (excluding exhaust ports)	12.84	15.44	12.84	- -	- -	- -
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6, -20, and PT6D-114A models only) and ignition power source)	459	622	487	443	489	449

II. MODELS (continued)	PT6A-45R	PT6A-50	PT6A-60, -60A	PT6A-61, -61A	PT6A-60AG	PT6A-52
CENTER OF GRAVITY (dry weight) (in.)						
Forward of mount plane	5.38	---	5.22	2.630	5.22	2.51
Aft of forward mount plane	---	See NOTE 17	---	---	---	---
Below engine centerline	0.12	See NOTE 17	.300	- -	- -	.260
Right of engine centerline	0.27	See NOTE 17	.28	.29	.28	.330

III. MODELS	PT6A-65B	PT6A-65R	PT6A-65AR	PT6A-65AG	
REDUCTION GEAR RATIO	.0568:1	- -	- -	- -	
RATINGS					
Maximum continuous at sea level					
Equivalent shaft hp.	1,249	- -	1,298	- -	
Shaft hp.	1,173	- -	1,220	- -	
Jet thrust, lb.	189	- -	194	- -	
Output rpm	1,700	- -	- -	- -	
Gas generator rpm	39,000	- -	- -	- -	
Takeoff (5 min.) at sea level					
Equivalent shaft hp.	1,249	1,459	1,509	1,381	
Shaft hp.	1,173	1,376	1,424	1,300	
Jet thrust, lb.	189	209	214	202	
Output rpm	1,700	- -	- -	- -	
Gas generator rpm	39,000	- -	- -	- -	
Alternative takeoff (5 min. at sea level)					
Equivalent shaft hp.	---	1,308	- -	---	
Shaft hp.	---	1,230	- -	---	
Jet thrust, lb.	---	195	- -	---	
Output rpm	---	1,700	- -	---	
Gas generator rpm	---	39,000	- -	---	
Maximum reverse					
Shaft hp.	900	- -	- -	- -	
Output rpm (max)	1,650	- -	- -	- -	
Output Shaft	Flanged 4.250" B.C., 8 holes .594 ± .005" diameter (See PWC Installation Drawing)	- -	- -	- -	
FUEL (See NOTE 8)	Fuels conforming to P&WC Spec. CPW204 & CPW46. For PT6-AG engine CPW381 also.	- -	- -	- -	
OIL	See NOTE 9	- -	- -	- -	
OIL TANK CAPACITY, gal.	2.5	- -	- -	- -	
USABLE OIL TANK CAPACITY, gal.	1.5	- -	- -	- -	
PRINCIPAL DIMENSIONS, in.					
Length	74.79	- -	- -	- -	
Nominal diameter	18.29	- -	- -	- -	
Maximum radius	12.84	- -	- -	- -	

III. MODELS (continued)	PT6A-65B	PT6A-65R	PT6A-65AR	PT6A-65ag	
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6,-20, and PT6D-114A models only) and ignition power source)	495	496	501	- -	
CENTER OF GRAVITY (dry weight) (in.)					
Forward of mount plane	3.75	- -	- -	- -	
Aft of forward mount plane	---	---	---	---	
Below engine centerline	.29	- -	- -	- -	
Right of engine centerline	.17	- -	- -	- -	

IV. MODELS	PT6B-9	PT6B-35F			
REDUCTION GEAR RATIO	.1889:1	.1875:1			
RATINGS					
Maximum continuous at sea level					
Equivalent shaft hp.	---	684			
Shaft hp.	500	650			
Jet thrust, lb.	124	---			
Output rpm	6,230	6,188			
Gas generator rpm	38,100	- -			
Takeoff (5 min.) at sea level					
Equivalent shaft hp.	---	684			
Shaft hp.	550	650			
Jet thrust, lb.	136	---			
Output rpm	6,230	6,188			
Gas generator rpm	38,100	- -			
Maximum reverse					
Shaft hp.	---	---			
Output rpm (max)	---	---			
OUTPUT SHAFT	SAE Aero Std. 84d Spline 1.5 in P.D.	36 teeth, 1.5 in. P.D. See Installation Manual			
FUEL (See NOTE 8)	Fuels conforming to P&WC Spec. CPW204 & CPW46.	- -			
OIL	See NOTE 9	- -			
OIL TANK CAPACITY, gal.	2.3	- -			
USABLE OIL TANK CAPACITY, gal.	1.5	- -			
PRINCIPAL DIMENSIONS, in.					
Length	58.68	- -			
Nominal diameter	18.06	- -			
Maximum radius (excluding exhaust ports)	10.85	12.6			
WEIGHT (DRY) (includes basic engine, fuel and ignition systems but excludes propeller governor (-6,-20, and PT6A-114A models only) and ignition power source)	255	305			

IV. MODELS (continued)

CENTER OF GRAVITY (dry weight) (in.)	PT6B-9	PT6B-35F			
Forward of mount plane	---	---			
Aft of forward mount plane	22.08	23.56 RH/23.3 LH*			
Below engine centerline	0.13	.52 RH/.63 LH			
Right of engine centerline	0.52	.16 RH/.15 LH			

CERTIFICATION BASIS Applicable to the following engines and serial numbers: FAR 21.29, CAR 13. (Except Serial numbers shown below which were certified under FAR 21.21, FAR 33-5 NOTE 19)

MODEL	S/N	DATE OF APPLICATION	DATE TYPE CERTIFICATE NO. E4EA ISSUED/REVISED
PT6A-6	All	June 4, 1962	December 31, 1963
PT6A-6A	All	April 6, 1965	May 28, 1965
PT6A-6B	All	November 30, 1967	December 20, 1967
PT6B-9	All	June 4, 1962	May 28, 1965
PT6A-11	All	August 19, 1977	September 16, 1977
PT6A-11AG	All	January 10, 1979	May 17, 1979
PT6A-15AG	All	January 9, 1978	January 27, 1978
PT6A-20	All	April 9, 1965	October 29, 1965
PT6A-20A	All except 024103-024160	February 19, 1973	March 9, 1973
PT6A-20B	All	August 20, 1973	October 2, 1973
PT6A-6/C20	All	February 19, 1973	March 9, 1973
PT6A-21	All	December 2, 1974	December 10, 1974
PT6A-25	All except 058013-058018 058025-058040 058042-058047 058049-058055 058059-058064 058068-058073 058077-058084 058089-058204	May 5, 1976	May 6, 1976
PT6A-25A	All	December 13, 1976	December 28, 1976
PT6A-25C	All	March 5, 1990	June 8, 1990
PT6A-27	All except 044878-040879 040883-040884 040894-040895 040899-040921 040929-040934 040937-040943 040946-040949 040982-040988 040993-040999 041006-041007 041015-041021 041027-041032 041036 041041-041044 041050-041053 041060-041063 041067-041098 041105-041110 041113-041146 041152-041156 041162-041175 041180-041194 041199-041201	November 15, 1966	December 20, 1967

PT6A-28	All except 050676-050925 050928-050934	January 27, 1969	March 11, 1969
PT6A-29	All	October 6, 1967	October 28, 1968
PT6A-34	All except 056071-056075 056080-056081 056086-056090 056098-056107	April 29, 1971	November 11, 1971
PT6A-34B	054011, 054012 only prior to 054007	July 20, 1976	August 4, 1976
PT6A-34AG	All	February 3, 1977	February 14, 1977
PT6A-35	All	October 24, 2001	May 29, 2002
PT6B-35F	All	August 10, 1979	March 26, 1982
PT6A-36	All	December 13, 1973	December 13, 1973
PT6A-38	079156, 079157 only prior to 079153	May 12, 1975	May 30, 1975
PT6A-40	All	April 19, 1983	July 13, 1983
PT6A-41	All	August 30, 1973	October 2, 1973
PT6A-41AG	All	December 21, 1978	May 17, 1979
PT6A-42	All	July 11, 1979	October 12, 1979
PT6A-42A	All	September 21, 1998	December 4, 1998
PT6A-45	All	May 12, 1975	May 30, 1975
PT6A-45A	All	March 25, 1976	April 22, 1976
PT6A-45B	All	March 2, 1979	March 29, 1979
PT6A-45R	All	June 25, 1980	August 1, 1980
PT6A-50	All	September 21, 1976	October 22, 1976
PT6A-60	All	April 20, 1982	March 15, 1983
PT6A-60A	All	April 19, 1983	November 7, 1983
PT6A-60AG	All	October 1, 1996	October 10, 1996
PT6A-61	All	April 20, 1982	March 15, 1983
PT6A-61A	All	January 6, 1984	May 1, 1985
PT6A-65B	All	April 20, 1982	September 17, 1982
PT6A-65R	All	April 20, 1982	September 17, 1982
PT6A-65AR	All	January 6, 1984	May 1, 1985
PT6A-65AG	All	July 23, 1987	August 19, 1987
PT6A-110	All	August 8, 1980	February 15, 1981
PT6A-112	All	October 12, 1978	October 30, 1978
PT6A-114	All	December 21, 1982	May 21, 1984
PT6A-114A	All	October 4, 1989	March 19, 1990
PT6A-116	All	October 4, 1984	May 1, 1985
PT6A-121	All	April 12, 1982	August 3, 1982
PT6A-135	All	September 9, 1977	September 12, 1977
PT6A-135A	All	February 3, 1982	April 29, 1982
PT6D-114A	All	October 30, 1996	September 22, 1997
PT6A-52	All	May 26, 2006	May 31, 2007

IMPORT REQUIREMENTS:

To be considered eligible for installation on U.S. registered aircraft, each engine to be exported to the United States shall be accompanied by a Certificate of Airworthiness for export or certifying statement endorsed by the exporting cognizant civil airworthiness authority which contains the following language:

(1) This engine conforms to its United States type design (Type Certificate Number E4EA) and is in a condition for safe operation.

(2) This engine has been subjected by the manufacturer to a final operational check and is in a proper state of airworthiness.

Reference FAR Section 21.500, which provides for the airworthiness acceptance of aircraft engines or propellers manufactured outside of the U.S. for which a U.S. type certificate has been issued.

Additional guidance is contained in FAA Advisory Circular 21.23, Airworthiness Certification of Civil Aircraft, Engines, Propellers and Related Products, Imported into the United States.

NOTES

NOTE 1. **Maximum permissible temperatures:**

	PT6A-20, -20A, -20B, -6/C20 PT6A-6, -6A, -6B, PT6A-28, -29	PT6B-9	PT6A-11, -11AG
	Measured Rated Turbine Temperature as Indicated by the Average of 24 Gas Temp. Thermocouples	Measured Rated Inter-Turbine Temperature as Indicated by the Average of 8 or 10 Gas Temp. Thermocouples	- -
Takeoff	1821°F (994°C) 1382ºF(750ºC) (PT6A-20,-20A,-20B,-6/C20)	1382°F (750°C)	1292°F (700°C)
Maximum Continuous	1745°F (952°C) 1382ºF(750ºC) (PT6A-20,-20A,-20B,-6/C20)	1382°F (750°C) 1319°F (715°C) (PT6B)	1292°F (700°C)
Starting Transient (2 sec.)	1900°F (1038°C) 1994ºF(1090ºC) (PT6A-20,-20A,-20B,-6/C20)	1994°F (1090°C)	- -

	PT6A-21	PT6A-25, -25A	PT6A-15AG, -27, -112, -121
	Measured Rated Inter-Turbine Temperature as Indicated by the Average of 8 or 10 Gas Temp. Thermocouples	- -	- -
Takeoff	1283°F (695°C)	1283°F (695°C)	1336°F (725°C)
Maximum Continuous	1283°F (695°C)	1283°F (695°C)	1336°F (725°C)
Starting Transient (2 sec.)	1994°F (1090°C)	- -	1994°F (1090°C)

	PT6A-34, -34B, -34AG, -25C	PT6A-35,-36,-114,-114A,-116,-135,-135A,-PT6B-35F,PT6D-114A	PT6A-110
	Measured Rated Inter-Turbine Temperature as Indicated by the Average 8 or 10 Gas Temp. Thermocouples	Measured Rated Inter-Turbine Temperature as Indicated by the Average of 8 Gas Temp. Thermocouples	- -
Takeoff	1454°F (790°C)	1481°F (805°C)	1265°F (685°C)
Maximum Continuous	1454°F (790°C)	1481°F (805°C)	1265°F (685°C)
Starting Transient (2 sec.)	1994°F (1090°C)	- -	- -

	PT6A-38	PT6A-41, -41AG	PT6A-45	PT6A-42, -42A, -45A,-45B, -50, -40
	Measured Rated Inter-Turbine Temperature as Indicated by the Average of 8 Gas Temp. Thermocouples	- -	- - (8 or 10)	- -
Takeoff	1301°F (705°C)	1382°F (750°C)	1400°F (760°C)	1472°F (800°C)
Maximum Continuous	1301°F (705°C)	1382°F (750°C)	1400°F (760°C)	1472°F (800°C)
Starting Transient (5 sec.)	1832°F (1000°C)	- -	- -	- -
Alternate Takeoff	---	---	---	---

NOTE 1.(continued)	PT6A-45R	PT6A-60	PT6A-61	PT6A-60A, -61A, -60AG, -52
	Measured Rated Inter-Turbine Temperature as Indicated by the Average of 8 Gas Temp. Thermocouples	Measured Rated Inter-Turbine Temperature as Indicated by the Average of 8 or 10 Gas Temp. Thermocouples	- -	- -
Takeoff	1553°F (845°C)	1472ºF (800ºC)	- -	1508ºF(820ºC)
Maximum Continuous	1494°F (812°C)	1472°F (800°C)	- -	1508°F (820°C) 1472ºF(775ºC)(-60AG)
Starting Transient (5 sec.)	1832°F (1000°C)	- -	- -	- -
Alternate Takeoff	1472°F (800°C)	---	---	---

	PT6A-65B	PT6A-65R	PT6A-65AR	PT6A-65AG
	Measured Rated Inter-Turbine Temperature as Indicated by the Average of 8 or 10 Gas Temp. Thermocouples	- -	- -	- -
Takeoff	1508ºF(820ºC)	1553ºF(845ºC)	1571°F (855°C)	1508°F (820°C
Maximum Continuous	1490°F (810°C)	1539°F (835°C)	1544°F (840°C)	1508°F (820°C)
Starting Transient	1832°F (1000°C)	- -	- -	- -
Alternate Takeoff	---	1490°F (810°C)	1508°F (820°C)	---

All except:PT6A-40,-41,-42,-42A,-45,-45A,-45B,-45R,-60, -60A,-60AG,-61,-61A,-65AG,-65AR,-65B, and -65R models, Oil Temperature Continuous minus 40°F (-40°C) to 210°F (99°C) except for MIL-L-7808 (where approved; See NOTE 9) for which the maximum allowable temperature is 185°F (85°C). Limited periods of 10 minutes of 220°F (104°C) are allowable, except on A-25, A-25A, A-25C, A-11 and A-11AG (5 minute maximum), and A-50 (15 minutes maximum).

PT6A-40,-41,-42,-42A, and -61A, Oil Temperature Continuous minus 40ºF(-40ºC) to 220ºF(104ºC). Maximum ground operation 230ºF(110ºC).

PT6A-45,-45A,-45B,-45R,-52, -60,-60A,-60AG, -61, -65AG,-65AR,-65B,-65R, Oil Temperature Continuous minus 40ºF(-40ºC) to 230ºF(110ºC).

Fuel temperature maximum fuel pump inlet of 135°F (57°C). Fuel temperature minimum fuel pump inlet of -65°F (-54°C) or 12 centistokes.

NOTE 2. **Fuel and Oil Pressure Limits:**

Fuel: Minimum pressure at inlet to the engine fuel system shall not be less than 5 p.s.i. above true vapor pressure of the fuel. For emergency operation, with airframe boost pump inoperative, it must be such that vapor liquid ratio does not exceed 0.1 for continuous operation and does not exceed 0.3 for more than 10 hours in a pump overhaul life.

Oil: Operating range

PT6A-6, -6A, -6B, -20, -20A, -20B, -6/C20, PT6B-9

28000 rpm gas generator speed and above: 65-85 p.s.i.g., 80 (max. B-9)
Below 28000 rpm gas generator speed: 40 p.s.i.g. (min.)

PT6A-11, -11AG, -15AG, -21, -27, -28, -29, -50, -110, -112, -121

27000 rpm gas generator speed and above, with an oil temperature of 140-158°F: 80-100 p.s.i.g.
Below 27000 rpm gas generator speed: 40 p.s.i.g. (min) 60 (-50)

NOTE 2. (Cont.) **Oil: Operating range**

PT6A-25, -25A, -25C

27000 rpm gas generator speed and above, with an oil temperature of 140-160°F:	65-85 p.s.i.g. (75-95(A-25C)
Below 27000 rpm gas generator speed:	40 p.s.i.g. (min)

PT6A-34, -34B, -34AG, -35,-135, -135A, -36, -114, -114A, -116, PT6B-35F, PT6D-114A

27000 rpm gas generator speed and above, with an oil temperature of 140-158°F:	85-105 p.s.i.g. (75-100(B-35F))
Below 27000 rpm gas generator speed:	40 p.s.i.g. (min)

PT6A-38, -40, -41, -41AG, -42, -42A

27000 rpm gas generator speed and above, with an oil temperature of 140-160°F:	85-135 p.s.i.g. (PT6A-38) 105-135 p.s.i.g. (PT6A-41, -41AG) 100-135 p.s.i.g. (PT6A-40, -42, -42A)
Below 27000 rpm gas generator speed:	60 p.s.i.g. (min)

PT6A-45, -45A, -45B, -45R,-52, -60, -61, -65B, -65R, -60A, -60AG, -61A, -65AR, -65AG

27000 rpm gas generator speed and above, with an oil temperature of 140-160°F:	90-135 p.s.i.g.
Below 27000 rpm gas generator speed:	60 p.s.i.g. (min)

NOTE 3. The engine ratings are based on static sea level condition 29.92 in Hg pressure, compressor intake screen installed, no external accessory loads and no airbleed. These ratings are available up to the following compressor inlet air (dry) temperatures.

	Maximum Continuous	Takeoff		Maximum Continuous	Takeoff
PT6A-6, -6A, -6B	64°F	70°F	PT6A-45R	92°F	73, 52(1)°F
PT6A-20, -20A, -20B, -6/C20	70	70	PT6A-50	90	59, 93(2)
PT6A-11, -	108	108	PT6A-60, -60A	77	77
PT6A-11AG	90	90			
PT6A-21	91	91	PT6A-60AG	63	79
PT6A-25, -25A	93	93	PT6A-61, -61A	115	115
PT6A-25C	87	87			
PT6A-15AG, -27	71	71	PT6A-65B	101	101
PT6A-28	70	70	PT6A-65R	101	82, 76(1)
PT6A-29	73	73	PT6A-65AR	101	82, 84(1)
PT6A-34, -34B, -34AG	86	86	PT6A-65AG	101	71
PT6A-35,-135A	93	93			
PT6A-36	97	97	PT6A-110	101	101
PT6A-38	102	102	PT6A-112	133	133
PT6A-40	135	135	PT6A-114	136	136
PT6A-41, -41AG, -42, -42A	106(86, -42A)	106	PT6A-114A	115	115

	Maximum Continuous	Takeoff		Maximum Continuous	Takeoff
PT6A-45	79	59	PT6A-116	105	105
PT6A-45A	79	46	PT6A-121	91	91
PT6A-45B	84	52	PT6A-135	85	85
			PT6B-9	72	77
			PT6B-35F	110	110
			PT6D-114A	104	104
			PT6A-52	142	142

1 Alternative Takeoff

2. Takeoff with Augmentation Fluid

NOTE 4. **Accessory Drive Provisions:** (All Models except -50)

The following accessory drive provisions are available and are included in the basic engine weight.

Driven by Gas Generator Turbine	Rotating Facing Drive Pad	Speed Ratio (to Turbine)	Maximum Torque		Maximum Overhang (in. - lbs.)
			Continuous	Static	
Tachometer, Accessory Gearbox	CC	0.112	7	100	10
Starter and/or Generator	C	0.293	170	1600 250 (38, 40, 41, 42, 42A,45, 45A, 45B, 45R, 52, 60, 60A, 60AG, 61, 61A, 65B, 65R, 65AR, 65AG, 114, 114A, B-35F, D-114A)	150
Vacuum Pump	CC	0.103	60	800	25
Hydraulic Pump	CC	0.203	150	800	25
Aircraft Accessory Drive	C	0.321	135	800	25

Driven by Power Turbine	Rotating Facing Drive Pad	Speed Ratio (to Turbine)	Maximum Torque		Maximum Overhang (in. - lbs.)
			Continuous	Static	

Tachometer (Tachometer and overspeed governor for PT6A-6,-6A,-6B and-20 only)	C	0.1264(PT6A-15AG, -25C,-27,-28,-29,-34,-34B,-34AG,-35,-36,-38,-40,-41,-41AG,-42,-42A,-52, -61,-61A) 0.1263 (B-35F); 0.1273(PT6A-6,-6A,-6B,-11,-11AG,-20,-20A,-20B,-6/C20,-21,-25,-25A,-110,-112 114, 114A, -116, 121,-135,-135A); 0.1405 (45, 45A, 45B, 45R, 60, 60A, 60AG, 65B, 65R, 65AR, 65AG)	7	100	10

NOTE 4. (Cont'd)

Driven by Power Turbine	Rotating Facing Drive Pad	Speed Ratio (to Turbine)	Maximum Torque Continuous	Maximum Torque Static	Maximum Overhang (in. - lbs.)
Propeller Governor and Overspeed Governor*	C	0.1264(PT6A-15AG, -25C,-27,-28,-29,-34,-34B,-34AG,-35,-36,-38,-40,-41,-41AG,-42,-42A,-52,-61,-61A) 0.1273(PT6A-6,-6A,-6B,-11,-11AG,-20,-20A,-20B,-6/C20,-21,-25,-25A,-110,-112 114, 114A, -116, 121,-135,-135A); 0.1405(PT6A-45, 45A, 45B, 45R, 60, 60A, 60AG, 65B, 65R, 65AR, 65AG)	50	850	25

* May be an optional drive, which is not included in the basic engine weight, is included.

The hydraulic pump drive requires the aircraft accessory drive to complete the train.

	Cabin pressurization may be provided by the approved combination of the Beech Aircraft Corporation Gearbox No. 50-9903 with the Godfrey Engineering type 9 cabin supercharger, mounted directly on the accessories gearbox. PT6A-38,-40,-41,-41AG,-42,-42A are approved for operation with an accessory mounted on the reduction gearbox and belt driven from the propeller assembly provided that the accessory is mounted and driven in accordance with the location dimensions and weight prescribed in Sheet 5 of Drawing Number 3018500, revision dated August 20, 1973. C = Clockwise CC = Counterclockwise

Accessory Drive Provisions: (PT6A-50 only)

Driven by Gas Generator Turbine	Rotating Facing Drive Pad	Speed Ratio (to Turbine)	Maximum Torque		Maximum Overhang (in. - lbs.)
			Continuous	Static	
Tachometer Accessory Gearbox	CC	0.112	7	100	10
Starter and/or Generator	C	0.293	170	1600	230
Hydraulic Pump*	CC	0.204	150	800	30
Driven by Power Turbine					
Tachometer	CC	0.1400	7	100	10
Alternator	C	0.529	120	1600	105
Prop. Governor	CC	0.1400	100	1700	40
Prop. Overspeed Governor	CC	0.1400	50	850	25

NOTE 5. External airbleed shall not exceed 5.25%, except as specified in specific installation manuals. A maximum of 1.5 lbs. Per minute may be bled during starting. Bleed air meets the requirements of Paragraph 3.18 of MIL-E-5007C.

NOTE 6. Maximum Allowable Torque:
The Maximum allowable steady state and acceleration torque, as measured by the torquemeter, are:

Model	**Continuous lb. Ft.**	**Transient Acceleration lb. Ft.**
PT6A-11, 11AG	1194	1500
PT6A-6, 6A, 6B, 20, 20A, 20B, 6/C20, 21 25, 25A	1315	1500
PT6A-15AG, 27	1628	2100
PT6A-28	1786	2100
PT6A-29, 34, 34B, 34AG, 35, 36, 25C	1970	2100
PT6A-38	1970	2750
PT6A-40	2230	2750
PT6A-41, 41AG, 42, 42A	2230	2750
PT6A-45, 45A, 45B	3625	5100
PT6A-45R	3625	5100
PT6A-50	4860	5900
PT6A-135, 135A	2080	2400
PT6B-9	464	---
PT6A-112	1480	1900
PT6A-110	1313	1700
PT6A-60, 60A, 60AG	3625	5100
PT6A-61, 61A	2230	2750
PT6A-65B	3625	5100
PT6A-65R	4250 (3800 Alternative Takeoff	5100
PT6A-114, 114A	1980	2400
PT6A-121	1710	2200
PT6B-35F	570	658
PT6A-65AR	4400(3800 Alternative Takeoff)	5100
PT6A-116	1940	2400
PT6A-65AG	3800	5100
PT6D-114A	610	740
PT6A-52	2230	2750

NOTE 7. The maximum output shaft overspeed limit is 110 percent (except 100% for PT6A-38, 41, 41AG, 42 and 42A only) at all ratings and may be employed for sustained periods in emergencies. The normal steady state output shaft operating limit speeds are defined as 2200 rpm (100%) for the PT6A-6, 6A, 6B, 6/C20, 11, 11AG, -15AG, -20, -20A, -20B, -21, -25, -25A, -25C, -27, -28, -29, -34, -34B, -34AG, -36, 2190 rpm (99.6%) for the PT6A-35, 2000 rpm (90.7%) for the PT6A-38, -40, -41, -41AG, -42, -42A, -52, -61, and -61A, 1900 rpm (100%) for the PT6A-45,-45A,-45B,-45R,-65B,-65R,-60,-60A,-60AG,-65AR,-65AG, -135, 135A, 110, 112, 114, 114A, 121, and 116, 1210 rpm (100%) for the PT6A-50, 6230 rpm (100%) for the PT6B-9 and 6188 rpm (100%) for the PT6B-35F and PT6D-114A and is the normal steady state operating limit. The normal steady state operating limit speed rises linearly as power is decreased, reaching a maximum of 105% at idle power for the PT6B-9.

100% gas generator speed is defined as 37,468 rpm. Unlimited and limited gas generator speeds are:

Model	Unlimited Speed, rpm	Limited Speed, rpm	Duration
PT6A-6,-6A,-6B,-11,-11AG,-20,-20A,-20B,-6/C20,-21,-25,-25A,-25C,-27,-28,-29,-34,-34B,-34AG,-36,-38,-41	38,100 (101.7%)	38,500 (102.8%)	10 Sec
PT6A-35,-110,-112,-114,-114A,-116,-121,-135,-135A,PT6D-114A	38,100 (101.7%)	38,500 (102.8%)	2 Sec
PT6A-50	38,500 (102.8%)	---	---
PT6A-40,-42,-42A	38,100 (101.7%)	39,000 (104.1%)	10 Sec
PT6A-45,-45A,-45B,-45R,-52, -60,-60A,-60AG,-61,-61A,-62,-65B,-65R,-65AR,-65AG	39,000 (104.1%)	---	---

NOTE 8. Emergency use of MIL-G-5572, Grades 80/07, 91/98, 100/130 and 115/145 is permitted for a total time period not exceeding 150 hours during any overhaul period. It is not necessary to purge the unused fuel from the system when switching fuel type.

NOTE 9. The following oils are eligible for these engines: PWC PT6 Engine Service Bulletin Nos. 1001, 1601, 3001, 4001, 12001 and 13001 list approved brand oils.

NOTE 10. These engines meet FAA requirements for operation in icing conditions when the intake system conforms with the PWC Installation Manual instruction for inertial separation of snow and icing particles; when the alternative approved alcohol system is used, flight in visible moisture is restricted as specified in the PWC Installation Manual. These engines also meet FAA requirements for adequate disk integrity and rotor blade containment and do not require external armoring.

NOTE 11. For reversing application the PT6A-6A and PT6A-20 engines must be equipped with Woodward Propeller Governor Type X210XXX.

NOTE 12. Fuel controls approved for each engine model are listed in the applicable Parts Catalog.

NOTE 13. The above models incorporate the following characteristics:

Model	**Characteristics**
PT6A-6	Basic model
PT6A-6A	Incorporates provisions for reversing propeller.
PT6A-6B	Incorporates provisions for reversing propeller, PT6A-20 mechanism.
PT6B-9	Single stage reduction gearing. (Output shaft speed 6,230 r.p.m.)
PT6A-20	Maximum continuous rating equal to takeoff. Provisions for reversing.
PT6A-20A	Similar to PT6A-20 except for exhaust port configuration and optional propeller reversing system.
PT6A-20B	Similar to PT6A-20 except for optional propeller reversing system.
PT6A-11	Similar to PT6A-21 except derated.

NOTE 13. (Cont.)

Model	Characteristics
PT6A-11AG	Similar to PT6A-11, intended for agricultural aviation. Permissible rotor component lives, overhaul, inspection intervals and fuel requirements are listed in PWC Engine Service Bulletin Nos. 12102, 12103, and12144 respectively.
PT6A-15AG	Similar to PT6A-27, intended for agricultural aviation. Permissible rotor component lives, overhaul inspection intervals and fuel requirements are listed in PWC Engine Service Bulletin Nos. 12102, 12103, and 12144 respectively.
PT6A-6/C20	Similar to PT6A-20 except this configuration previously PT6A-6 converted to PT6A-20 by service bulletin.
PT6A-21	Similar to PT6A-27 except derated.
PT6A-25	Similar to PT6A-27 except for modifications required for inverted flight optional torque controller, and aluminum alloy castings.
PT6A-25A	Similar to PT6A-25 except for magnesium alloy major castings in place of aluminum alloy.
PT6A-25C	Similar to PT6A-25A except for A-34 hot section; T-3B first stage compressor blades and long inducer propeller; A-100 large bore reduction gears; and A-25A installation features. Ratings and limits are the same as the A-34.
PT6A-27	Features higher ratings, revised engine parts and integrated propeller reversing control.
PT6A-28	Similar to PT6A-27 except for higher inter-turbine temperature limit.
PT6A-29	Features higher ratings, revised first stage reduction gearing.
PT6A-34	Similar to PT6A-27 except incorporates a compressor turbine similar to PT6T-3 for higher ratings.
PT6A-34B	Similar to PT6A-34, except for aluminum alloy major castings in place of magnesium alloy.
PT6A-34AG	Similar to PT6A-34, intended for agricultural aviation. Permissible rotor component lives, overhaul, inspection intervals and fuel requirements are listed in P&WACL Engine Service Bulletin Nos. 1302, 1303, and 1344 respectively.
PT6A-35	Similar to PT6A-135 but incorporating the reduction gearbox of the PT6A-34.
PT6A-36	Similar to PT6A-34 except for increased turbine inlet temperature limits.
PT6A-38	Similar to PT6A-41 except derated.
PT6A-40	Similar to PT6A-42 except for increased flat rating and manual fuel control override.
PT6A-41	Features an enlarged compressor and two stage power turbine for higher ratings.
PT6A-41AG	Similar to PT6A-41, intended for agricultural aviation.
PT6A-42	Similar to PT6A-41 except for increased cruise rating and increased inter-turbine temperature limits with improved compressor and reduced loss exhaust ducts.
PT6A-42A	Same as PT6A-42 except for addition of fuel control unit with manual override, compressor wash ring, accessory gearbox chip detector, P3 filter drain, and oil filler neck with check valve.
PT6A-45	Similar to PT6A-41 except for increased ratio reduction gearbox and higher ratings.
PT6A-45A	Similar to PT6A-45 except for increased takeoff rating and increased inter-turbine temperature limits.
PT6A-45B	Similar to PT6A-45A except for increased augmentation fluid flow for takeoff rating to a higher air inlet temperature.
PT6A-45R	Similar to PT6A-45B except for provision for automatic power increase from alternate takeoff power to takeoff power.
PT6A-50	Similar to PT6A-45A except for new reduction gearbox.
PT6A-112	Similar to PT6A-27 except incorporates PT6A-41 fuel system concepts and PT6A-135 reduction gearbox.
PT6A-114	Similar to PT6A-135 with a single port exhaust and PT6A-41 fuel system concepts and PT6A-135 reduction gearbox.
PT6A-114A	Throttle push version of -114 incorporating the -135A compressor, and a new strengthened propeller shaft.
PT6A-135	Similar to PT6A-36 except for new reduction gearbox and higher cruise rating.
PT6A-135A	Similar to PT6A-135 except for increased thermodynamic capability compressor.
PT6A-110	Similar to PT6A-11 except for incorporation of PT6A-135 reduction gearbox.
PT6A-65B	Similar to PT6A-45 except for additional axial compressor stage and increased diameter gas producer turbine wheel.
PT6A-65R	Identical to PT6A-65B except for reserve takeoff rating.

NOTE 13. (Cont'd)

Model	Characteristics
PT6A-65AR	Uprated maximum continuous power PT6A-65R.
PT6A-65AG	Similar to PT6A-65, intended for Agricultural Aviation. Ratings similar to the 65AR without automatic reserve power.
PT6A-60	Uprated PT6A-42, featuring new first stage compressor gas producer turbine from PT6A-65 and gearbox from PT6A-45.
PT6A-60A	Uprated altitude performance PT6A-60.
PT6A-60AG	Similar to PT6A-60A, but with derated max continuous power, and intended for agricultural aviation.
PT6A-61	Similar to PT6A-60 except for PT6A-42 gearbox.
PT6A-61A	Updated altitude performance PT6A-61.
PT6A-116	Similar to PT6A-135 except for reduced takeoff and maximum continuous power and torque limit with PT6A-121 externals.
PT6A-121	Similar to PT6A-21 except for a PT6A-135 reduction gearbox and a PT6A-112 power turbine.
PT6B-35F	Combines the aerodynamic components of the PT6A-135, the mechanical layout of the PT6A-34 and the PT6T-3 generator and exhaust case. Intended for remote drive propeller applications.
PT6D-114A	Based on the PT6A-114A with the main difference being the deletion of the second stage reduction gearing and output shaft. Intended for integration with a combining gearbox incorporated power turbine governors and a propeller output shaft.
PT6A-52	Similar to the PT6A-61 with the PT6A-60A thermal rating.

NOTE 14. Certain engine parts are life limited. These limits are listed in P&WC Engine Service Bulletin Nos. 1002, 1302, 1402, 1602,, 3002, 4002, 12002, 12102, 13002, and 13202 as revised. Permissible overhaul and inspection intervals are listed in PWC Engine Service Bulletin Nos. 1003, 1303, 1403, 1603, 1703, 1803, 3003, 3303, 4003, 12003, 12103, 13003, 13203, and 13303 as revised.

NOTE 15. Fuel anti-icing additives conforming to specifications 3GP526A PFA 55MB, MIL-I-27686E may be used, at a concentration not exceeding 0.15% by volume.

NOTE 16. For PT6A-34, PT6A-34B, PT6A-36, PT6A-45, PT6A-45A and PT6A-45B power may be restored in hot day conditions by means of water or water/methanol injection when accomplished in accordance with the requirements of the PWC Installation Manual.

NOTE 17. For PT6A-50 C.G. location (dry weight) is 27.69 in. behind forward mounting ring, 0.27 in. below horizontal centerline and 0.15 in. left of vertical centerline.

NOTE 18. Augmentation fluid, when used, must meet the requirements of PWC Specification CPW No. 328.

NOTE 19. This Type Certificate Data Sheet reflects the certification basis and approval for those serial numbered model PT6A, PT6B and PT6D series engines listed under "Certification Basis". Two Type Certificates have been issued for administrative purposes: E4EA under FAR 21.29 for engines produced in Canada and E2NE under FAR 21.21 for engines produced in the United States. The type design for each model engine, regardless of where produced, is identical. The information on this Type Certificate Data Sheet applies to all Pratt & Whitney model PT6A, PT6B and PT6D series engines, including:

(A) Those serial numbered engines listed on and certificated under FAA Type Certificate E2NE, originally issued to Pratt & Whitney Aircraft Division of United Technologies Corporation, East Hartford, Connecticut, U.S.A. and reissued to Pratt & Whitney of Canada Ltd. (Formerly United Aircraft of Canada, LTd.), Longueuil, Quebec, Canada.

(B) Those serial numbered engines listed above under "Certification Basis," certificated under this Type Certificate, E4EA, issued to Pratt & Whitney Canada Corp, Longueuil, Quebec, Canada.

NOTE 20. Service Bulletins, structural repair manuals, vendor manuals, aircraft flight manuals, and overhaul and maintenance manuals, which contain a statement that the document is Transport Canada approved, are accepted by the FAA and are considered FAA approved. These approvals pertain to the type design only.

----END----

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

P9NE
Revision 1
Hartzell
HC-B3M

July 24, 1985

TYPE CERTIFICATE DATA SHEET NO. P9NE

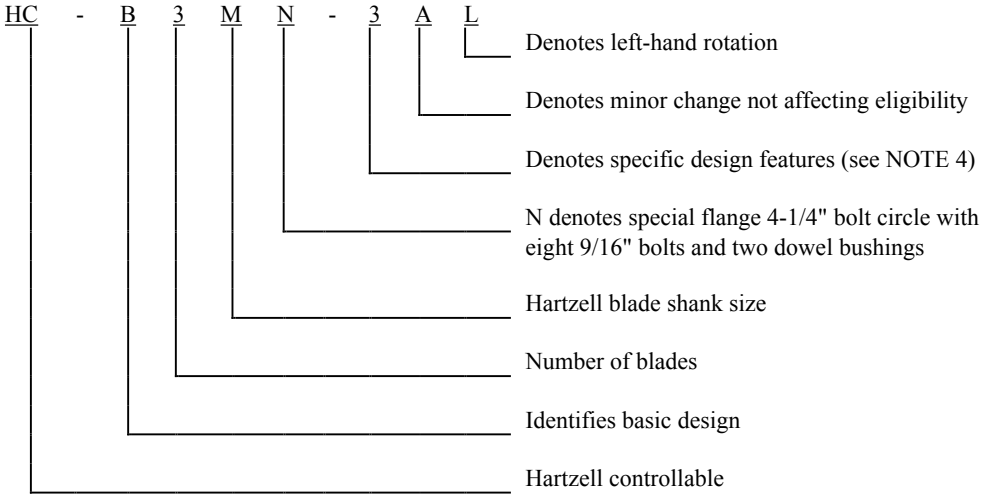
Propellers of models described herein conforming with this data sheet (which is part of Type Certificate No. P9NE) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and aplicable portions of the Federal Aviation Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder	Hartzell Propeller Inc. Piqua Ohio 45356
Type	Constant speed; hydraulic (see NOTES 3 and 4)
Engine shaft	Special flange 4¼" bolt circle with eight 9/19" bolts
Hub material	Alloy steel
Blade material	See below
Number of blades	Three
Hubs eligible	HC-B3MN-3

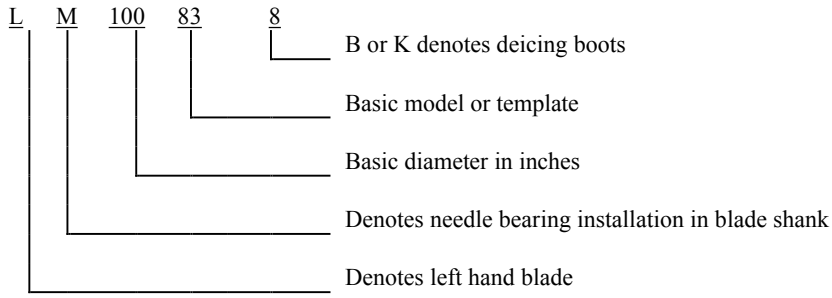
Blades Eligible (See Note 2)	Maximum Continuous HP	Maximum Continuous RPM	Takeoff HP	Takeoff RPM	Diameter Limits (See Note 2)	Approx. Max. Weight Complete (For reference only) (See Notes 3 & 7)	Blade Construction
M10083	600	2200	600	2200	100"	134 lb.	Aramid Composite

Certification basis	FAR Part 35 effective October 14, 1980, with amendments 1 through 5. Type Certificate No. P9NE issued August 29, 1984. Date of application for Type Certificate February 13, 1984
Production basis	Production Certificate No. 10

NOTE 1. Hub Model Designation



NOTE 2. Blade Model Designation



NOTE 3. Pitch Control. Eligible with the following governors:
Woodward Model x210xxx or x210 x-xxx
Maximum Output Pressure 500 PSI

NOTE 4. (1) Featherng. The -3 model incorporates feathering and unfeathering features.

(2) Reversing. The -3 model is eligible for installation as reversing propellers with appropriate reversing controls.

NOTE 5. Left-Hand Models. The left-hand version of an approved propeller model is approved at the same rating and diameter as listed for right-hand model. (See NOTES 1 and 2.)

NOTE 6. Interchangeable Blades. Not applicable.

NOTE 7. Accessories.

(a) Propeller Spinner
(1) Approved with Hartzell spinners (weight of spinners extra)

(b) Propeller Deicing
(1) Eligible with Goodrich 77-xxx or 65-xxx deicing kit when installed in accordance with manufacturer's instructions.

NOTE 8. Shank Fairings. Not applicable.

NOTE 9. Special Limits. Not applicable.

NOTE 10. Special Notes. Propeller installation must be approved as part of the aircraft Type Certificate and demonstrate compliance with the applicable aircraft airworthiness requirements.

NOTE 11. Retirement Time. There is no longer a mandatory retirement time for blade part number M10083 when installed on the Cessna model 208 airplane.

....END....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

P60GL
Revision 3
McCAULEY
3GFR34C(7--)
May 30, 2006

TYPE CERTIFICATE DATA SHEET NO. P60GL

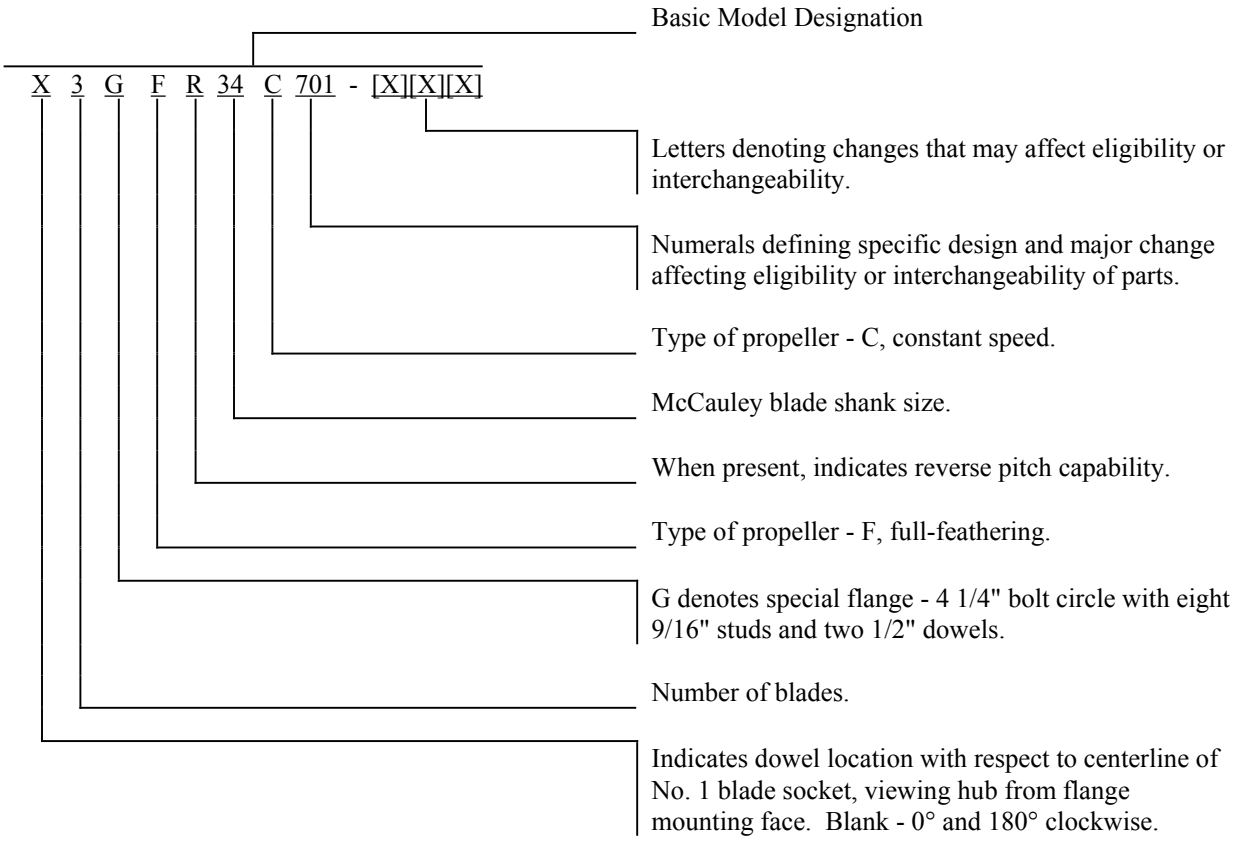
Propellers of models described herein conforming with this data sheet (which is part of Type Certificate No. P60GL) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with the pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder	McCauley Accessory Division Cessna Aircraft Company 7751 East Pawnee Wichita, KS 67207
Type	Constant speed, full feathering and reversing; hydraulic (see Note 4).
Engine Shaft	Special flange with 4.25" bolt circle [(8)-9/16" studs and (2)-1/2" dowels in engine flange].
Hub Material	Aluminum Alloy
Blade Material	Aluminum Alloy
No. of Blades	Three
Hubs Eligible	3GFR34C701, 3GFR34C702, 3GFR34C703, 3GFR34C704

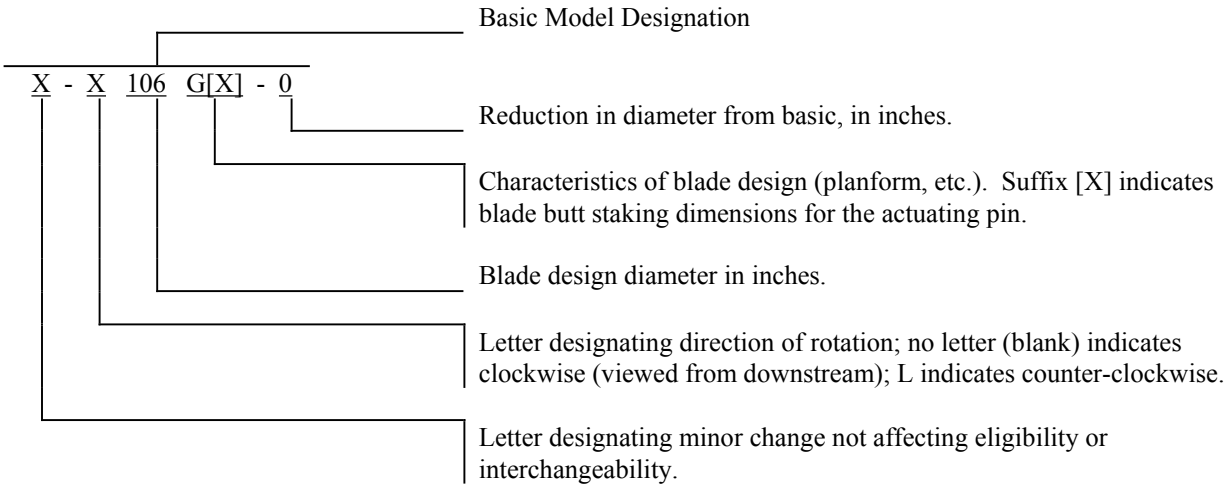
Blades Eligible (See NOTE 2)	Maximum Continuous HP	Maximum Continuous RPM	Take-Off HP	Take-Off RPM	Diameter Limits (See NOTE 2)	Approx. Max. Wt. Complete (Max. Dia.)
			Hub Model 3GFR34C701			
93K[X]-0 to 93K[X]-5	565	2200	565	2200	93" - 88" (-0 to -5)	120.0 Lbs.
			Hub Model 3GFR34C702			
100L[X]-0 to 100L[X]-5	850	2000	850	2000	100" - 95" (-0 to -5)	122.0 Lbs.
			Hub Model 3GFR34C703			
106G[X]-0 to 106G[X]-6	900	2000	900	2000	106" - 100" (-0 to -6)	117.0 Lbs.
			Hub Model 3GFR34C704			
93K[X]-0 to 93K[X]-5	850	2200	850	2200	93" - 88" (-0 to -5)	117.0 Lbs.

Certification Basis	Type Certificate No. P60GL issued January 30, 1981, under Delegation Option Authorization Provisions of Part 21, Subpart J, of the Federal Aviation Regulations. Date of Application for Type Certificate: November 11, 1980. Models 3GFR34C701, 3GFR34C702, 3GFR34C703, 3GFR34C704: Federal Aviation Regulations Part 35 including Amendments 35-1 through 35-5 (October 14, 1980) thereto.
Production Basis	Production Certificate No. 3

NOTE 1. Hub Model Designation.



NOTE 2. Blade Model Designation.



NOTE 3. Not applicable.

NOTE 4. Feathering. Feathering and unfeathering capability when installed with appropriate feather/unfeathering controls.

Reversing. For installation as reversing propeller with appropriate reversing controls.

NOTE 5. Left Hand Models. The left hand version of an approved model is eligible at the same rating and diameter limitations as listed for the right hand model.

NOTE 6. Not applicable.

NOTE 7. Accessories.

(a) Propeller Deicing

(1) Model 93KB blades with Goodrich deicer per Goodrich Report 59-728 and installed per McCauley drawing E-5128.

(2) Model 100LA blades with Safeway deicer B-40245-50 per McCauley Report MC-2611 and installed per McCauley drawing E-5423.

(3) Model 106GA blades with McCauley deicer B-40245-54 per McCauley Report MC-2611 and installed per McCauley drawing E-6368.

(b) Propeller Spinner

(1) Model 3GFR34C701/93KB and 3GFR34C704/93KB with spinner, reference McCauley drawing E-5146.

(2) Model 3GFR34C702/100LA with spinner; reference McCauley drawing E-5424.

(3) Model 3GFR34C703/106GA with spinner; reference McCauley drawing E-6383.

NOTE 8. Not applicable.

NOTE 9. Not applicable.

NOTE 10. Special Notes. Aircraft installation must be approved as part of the aircraft type certificate upon compliance with the applicable aircraft airworthiness requirements.

... END ...

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E-252
Revision 29

CONTINENTAL
C90-8F, -8FJ
C90-12F, -12FH, -12FJ, -12FP
C90-14F, -14FH, -14FJ, -16F
0-200-A, 0-200-B, 0-200-C

September 15, 1982

TYPE CERTIFICATE DATA SHEET NO. E-252

Engine of models described herein conforming with this data sheet (which is a part of type certificate No. 252) and other approved data on file with the Federal Aviation Agency, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Civil Air Regulations provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder — Teledyne Continental Motors
P.O. Box 90
Mobile, Alabama 36601

Model	C90-8F	C90-12F, -14F, -16F	0-200-A, -B, -C
Type	4HOA	- - -	- - -
Rating, standard atmosphere			
Max. continuous hp., r.p.m., at sea level pressure altitude	90-2475	- - -	100-2750
Takeoff hp., 5 min., r.p.m., full throttle, at sea level pressure alt	95-2625	- - -	100-2750
Fuel (min. grade aviation gasoline)	80/87	- - -	- - -
Lubricating oil, ambient air temp.	Oil Grade		
Below 40° F.	SAE 20	- - -	- - -
Above 40° F.	SAE 40	- - -	- - -
Bore and stroke, in.	4.062 x 3.875	- - -	- - -
Displacement, cu. in.	201	- - -	- - -
Compression ratio	7:1	- - -	- - -
Weight (dry), lb.	184	188	190
C.G. location (with accessories)			
Fwd. or rear face of mounting lugs, in.	6.2	4.6	- - -
Below crankshaft center line, in.	1.5	1.3	1.2
Propeller shaft, SAE No.	1 Flange	- - -	- - -
Carburetion (see NOTE 4 for injectors)	Marvel-Schebler MA-3SPA (CMC P/N 627367, 629175, 637101 or 637835)	- - -	Marvel-Schebler MA-3SPA
	Bendix-Stromberg NA-S3A1 (CMC P/N 530625, 530726, 531126, 530846, 531157)	- - -	(TCM P/N 627143, 640416 or 633028)
Ignition	2 Bendix-Scintilla S4RN-21 or -1227; or Slick -Electro 443 or 4003 magnetos or 1 ea. Bendix-Scintilla S4RN-200 and 204	2 Bendix-Scintilla S4LN-21 or -1227 or 1 ea. S4LN-200 and -204; Slick-Electro 447, 4001 or 4201 magnetos	- - -

Model	C90-8F	C90-12F, -14F, -16F	00-200-A, -B, -C
Timing, °BTC	26 Top, 28 Bottom	- - -	24 Top, 24 Bottom
Spark plugs	See NOTE 6	- - -	- - -
Oil sump capacity, qt.	5 or 6	- - -	- - -
NOTES	1 through 6	1, 2, 3, 4, 6	1, 2, 3, 4, 6

"- - -" indicates "same as preceding model"

Certification Basis — Part 13 of the Civil Air Regulations.
Type Certificate No. 252

Production Basis — Production Certificate No. 7
Production Certificate No. 508 (All models except C90-16F)

NOTE 1. Maximum permissible temperatures:

	C90 Series	0-200 Series	
Cylinder head	525° F.	525° F.	
Cylinder barrel	275° F.	290° F.	
Oil inlet	225° F.	225° F.	(Straight mineral)
		240° F.	(Detergent meeting MHS-24, See NOTE 6)

NOTE 2. Carburetor fuel inlet pressure lmits:

	Minimum	Maximum
MA-3SPA, TCM P/N 627143, 633028, 637101, 637835, 640416	5 In. Fuel Head	6 PSIG
MA-3SPA, TCM P/N 627367, 629175	6 In. Fuel Head	6 PSIG
MA-3SPA, TCM P/N 530625, 530726, 530846, 531126, 531157	6 In. Fuel Head	6 PSIG

Carburetor Air Intake Assembly, TCM A40793, used with MA-3SPA, Marvel-Schebler Carb.
Carburetor Air Intake Assembly, TCM A40522, used with NA-53A1, Stromberg Carburetor.

	C90 Series	0-200 Series
Oil pressure limits:	30 to 40 p.s.i.g.	30 to 60 p.s.i.g. Minimum idling with hot oil 10 p.s.i.g.

NOTE 3. The following accessory drive or mounting provisions are available.

Accessory	Direction of Rotation*	Speed Ratio to Crankshaft	Max. Torque Continuous	(in.-lb.) Static	Maximum Overhang Moment (in.-lb.)
Tachometer	C	0.500:1	7	50	25
Generator	CC	2.035:1	60	600	100
Starter	C	35.7:1			
** Vacuum Pump	CC	1.0:1	100	800	25
*** Fuel Pump (diaphragm)		0.500:1			

Accessories previously listed in NOTE 3 are satisfactory for continued use with C90 Series engines.

* C - Clockwise viewing drive pad; CC - Counterclockwise.
** C90-16F and 0-200 Series engines only.
*** CMC Eq. 5809 incorporating CMC P/N 40585 pump approved as part of type design of the 0-200 Series engine. AC fuel pump, CMC P/N 631391, available as optional equipment on C90-16F.

NOTE 4. The C90-8F is identical to the C90-12F model except that the accessory section does not incorporate porvisions for generator and starter drives.
The C90-14 models incorporate Lord type engine mounts which are not interchangeable with C90-12 models due to different machining of the engine mounting lugs on the engine crankcase.
The C90-16F is similar to the C90-12F except that vacuum pump drive provisions have been added.
The Model 0-200-B is similar to the 0-200A except for special crankshaft and crankcase providing for thrust application toward the engine only.

The Model 0-200-C is similar to the 0-200-A except for incorporation of provisions to supply oil pressure to a controllable pitch propeller through the crankshaft from an external boss on the crankcase.
Those C90 Series models listed in the heading of this data sheet, suffixed by letters H, J and P, differ from the basic model designation as follows:
"H" denotes a special SAE No. 1 flange crankshaft and special crankcase for the installation of a hydraulically operated controllable pitch propeller requiring oil supply through the crankshaft.
"J" denotes incorporation of Model B-46 Ex-Cell-O fuel injector, P/N 530499, or American Bosch Model PSC-4A-95A2, P/N 534505, at a weight increase of 4 lb. over the corresponding carburetor equipped engine.
"P" denotes pusher installation incorporating special crankshaft and thrust bearing. Oil sump gauge rods will be marked as per installer's requirements.

NOTE 5. Bendix-Stromberg NAS-3A1 carburetor, P/N 530726, eligible only on Piper PA-11 airplanes equipped with Piper mufflers.

NOTE 6. Detergent oil meeting Continental Specification MHS-24 reuqired when using 240° F oil inlet limits except during break-in period. Follow manufacturer's instructions for break-in or when changing oil types. marking or placards prescribing use of Continental Specification MHS-24 oil only shall be installed on or near the oil filler on installations using 240 ° F oil inlet temperatures.

NOTE 7. The following spark plugs are approved for use on engine models as indicated:

C90-8F, -12F, -14F, -16F

AC	HSR83IR, SR83IR, HSR83P, SR83P, A88, HS88, HSR88, S88, S88D, HSR88, SR88, SR88D, HSR93, SR93
Auto Lite	18A1, BR4, BR4S, BR4SB, SH15, H15, SH15R, SH20A, SH150, SH200A
BG	RB485S, 706, 706R, 706S, 706SR, 919SR5, RB955S
Champion	C26, C26S, C27, C27S, RC27S, REM38P, REM38W, RHM38P, RHM38W, REM40E, RHM40E, ED41N, D41N, EM41E, EM41N, HM41E, M41E, M41N, EM42E, M42E
Red Seal	SA190, SE190, SJ190, SE230, SJ230

0-200-A, -B, -C

AC	HSR83IR, SR83IR, HSR83P, SR83P, A88, HS88, HSR88, S88, S88D, SR88, SR88D, HSR93, SR93
Auto Lite	18A1, SH15, H15, SH15R, SH20A, SH150, SH200A, PH26
BG	RB485S, 706, 706S, 919SR5, RB955S
Champion	C27, C27S, RC27S, REM38P, REM38W, RHM38P, RHM38W, REM40E, RHM40E, ED41N, D41N, EM41E, EM41N, HM41E, M41E, M41N, EM42E, M42E
Red Seal	SA190, SE190, SJ190 SE230, SJ230

....END....

DEPARTME0NT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

2A13
Revision 48
Piper Aircraft, Inc

PA-28-140	PA-28-151
PA-28-150	PA-28-161
PA-28-160	PA-28-181
PA-28-180	PA-28R-201
PA-28-235	PA-28R-201T
PA-28S-160	PA-28-236
PA-28S-180	PA-28RT-201
PA-28R-180	PA-28RT-201T
PA-28R-200	PA-28-201T

August 7, 2006

TYPE CERTIFICATE DATA SHEET NO. 2A13

This data sheet, which is a part of Type Certificate 2A13, prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Piper Aircraft, Inc.
2926 Piper Drive
Vero Beach, Florida 32960

Type Certificate Holder Record — The New Piper Aircraft, Inc transferred TC 2A13 to Piper Aircraft, Inc on August 7, 2006.

I - Model PA-28-160 (Cherokee), 4 PCLM (Normal Category), Approved October 31, 1960, for S/N 28-03; 28-1 through 28-4377; and 28-1760A.

Engine — Lycoming O-320-B2B or O-320-D2A with carburetor setting 10-3678-32

Fuel — 91/96 minimum grade aviation gasoline

Engine Limits — For all operations, 2700 r.p.m. (160 hp)

Propeller and Propeller Limits — Sensenich M74DM or 74DM6 on S/N 28-1 through 28-1760, and 28-1760A.
Sensenich M74DMS or 74D6S5 on S/N 28-1761 through 28-4377.
Static r.p.m. at maximum permission throttle setting not over 2425 r.p.m., not under 2325 r.p.m.
No additional tolerance permitted.
Diameter: Not over 74", not under 72.5".

Propeller Spinner — Piper P/N 14422-00 on S/N 28-1 through 28-1760, and 28-1760A.
Piper P/N 63760-04 or P/N 65805-00 on S/N 28-1761 through 28-4377.
See NOTE 11.

Airspeed Limits

Never exceed	171 mph	(148 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering	129 mph	(112 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Revision No.	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Page No.	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Revision No.	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Page No.	37	38	39	40	41	42	43											
Revision No.	48	48	48	48	48	48	48											

Center of Gravity Range	(+84.0) to (+95.9) at 1650 lb. or less (+85.9) to (+95.9) at 1975 lb. (+89.2) to (+95.9) at 2200 lb. Straight line variation between points given.
Empty Weight C. G. Range	None
Maximum Weight	2200 lb.
No. of Seats	4 (2 at +85.5, 2 at +118.1)
Maximum Baggage	125 lb. at (+142.8) on S/N 28-1 through 28-1760, and 28-1760A. See NOTE 8. 200 lb. at (+142.8) on S/N 28-1761 through 28-4377.
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+32.5), 6 quarts usable See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(± 2°)	Up	0°	Down	40°
Ailerons	(± 2°)	Up	30°	Down	15°
Rudder	(± 2°)	Left	27°	Right	27°
Stabilator	(± 2°)	Up	18°	Down	2°
Stabilator Tab	(± 1°)	Up	3°	Down	12°

Nose Wheel Travel

(±1°) Left 30° Right 30°
(Effective on S/N 28-1 through 28-3377, and 28-1760A)
(±1°) Left 22° Right 22°
(Effective S/N 28-3378 through 28-4377)

Manufacturer's Serial Nos.	28-03; 28-1 through 28-4377; and 28-1760A.

II - Model PA-28-150 (Cherokee), 4 PCLM (Normal Category), Approved June 2, 1961, for S/N 28-03; 28-1 through 28-4377; and 28-1760A.

Engine	Lycoming O-320-A2B or O-320-E2A with carburetor setting 10-3678-32
Fuel	80/87 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (150 hp)
Propeller and Propeller Limits	Sensenich M74DM or 74DM6 on S/N 28-1 through 28-1760, and 28-1760A. Sensenich M74DMS or 74DM6S5 on S/N 28-1761 through 28-4377. Static r.p.m. at maximum permissible throttle setting not over 2375 r.p.m., not under 2275 r.p.m. No additional tolerance permitted. Diameter: Not over 74", not under 72.5".
Propeller Spinner	Piper P/N 14422-00 on S/N 28-1 through 28-1760, and 28-1760A. Piper P/N 63760-04 or 65805-00 on S/N 28-1761 through 28-4377. See NOTE 11.

Airspeed Limits

Never exceed	171 mph	(148 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering	129 mph	(112 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity Range	(+84.0) to (+95.9) at 1650 lb. or less (+85.9) to (+95.9) at 1975 lb. (+88.4) to (+95.9) at 2150 lb. Straight line variation between points given.
Empty Wt. C. G. Range	None
Maximum Weight	2150 lb.
No. of Seats	4 (2 at +85.5, 2 at +118.1)
Maximum Baggage	125 lb. at (+142.8) on S/N 28-1 through 28-1760, and 28-1760A. See NOTE 8. 200 lb. at (+142.8) on S/N 28-1761 through 28-4377.
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+32.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(± 2°)	Up	0°	Down	40°
Ailerons	(± 2°)	Up	30°	Down	15°
Rudder	(± 2°)	Left	27°	Right	27°
Stabilator	(± 1°)	Up	18°	Down	2°
Stabilator Tab	(± 1°)	Up	3°	Down	12°

Nose Wheel Travel

(± 2°) Left 30° Right 30°
(Effective on S/N 28-03; 28-1 through 28-3377; and 28-1760A)
(± 2°) Left 22° Right 22°
(Effective on S/N 28-3378 through 28-4377)

Manufacturer's Serial Nos. 28-03; 28-1 through 28-4377; and 28-1760A.

III - Model PA-28-180 (Cherokee), 4 PCLM (Normal Category), Approved August 3, 1962; 2 PCLM (Utility Category), Approved December 6, 1966, for S/N 28-03; 28-671 through 28-5859; and 28-7105001 through 28-7205318.

Engine	Lycoming O-360-A3A or 0-360-A4A with carburetor setting 10-3878 or 10-4164-1
Fuel	91/96 minimum grade aviation gasoline
Engine Limits	S/N 28-671 through 28-1760, and 28-1760A (except S/N 28-1571 and S/N 28-1573) (See NOTE 4): Maximum permissible takeoff, 2475 r.p.m. For all other operations, 2700 r.p.m. (180 hp) S/N 28-1571; 28-1573; 28-1761 through 28-5859; and 28-7105001 through 28-7205318: For all operations, 2700 r.p.m. (180 hp)
Propeller and Propeller Limits	Sensenich M76EMM or 76EM8 on S/N 28-671 through 28-1760, and 28-1760A (except S/N 28-1571 and S/N 28-1573). Sensenich M76EMMS or 76EM8S5 on S/N 28-1571, 28-1573; 28-1761 through 28-5859; and 28-7105001 through 28-7205318. Static r.p.m. at maximum permissible throttle setting not over 2450 r.p.m., not under 2275 r.p.m. No additional tolerance permitted. Diameter: Not over or under 76". See NOTE 10.

Propeller Spinner Piper P/N 14422-00 on S/N 28-671 through 28-1760, and 28-1760A.
Piper P/N 63760-04 or 65805-00 on S/N 28-1761 through 28-5859; and 28-7105001 through 28-7205318.
See NOTE 11.

Airspeed Limits

Never exceed	171 mph	(148 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering	129 mph	(112 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity Range

Utility Category (See NOTE 9)

(+84.0)	to	(+86.5)	at	1650 lb. or less
(+85.8)	to	(+86.5)	at	1950 lb.

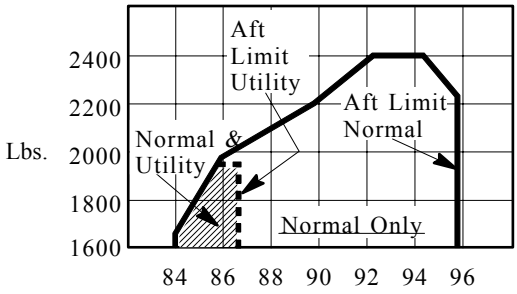
Normal Category (See NOTE 15)
(S/N 28-671 through 28-5859)

(+84.0)	to	(+95.9)	at	1650 lb. or less
(+85.9)	to	(+95.9)	at	1975 lb.
(+89.2)	to	(+95 9)	at	2200 lb.
(+92.1)	to	(+94.5)	at	2400 lb.

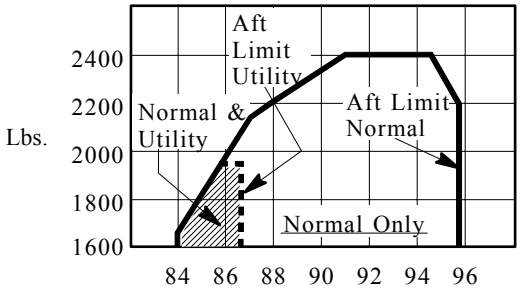
Normal Category
(S/N 28-7105001 through 28-7205318)

(+84.0)	to	(+95.9)	at	1650 lb. or less
(+87.0)	to	(+95.9)	at	2150 lb.
(+87.8)	to	(+95.9)	at	2200 lb.
(+91.0)	to	(+94.5)	at	2400 lb.

Straight Line Variation Between Points Given



Fuselage Station - Inches
(S/N 28-671 thru 28-5859)



Fuselage Station - Inches
(S/N 28-7105001 thru 28-7205318)

Empty Weight C. G. Range None

Maximum Weight

Normal Category: 2400 lb.
Utility Category: 1950 lb.

No. of Seats

Normal Category: 4 (2 at +85.5, 2 at +118.1)
Utility Category: 2 (2 at +85.5)

Maximum Baggage

Eligible Normal Category Only:
125 lb. at (+142.8) on S/N 28-671 through 28-1760, and 28-1760A. See NOTE 8.
200 lb. at (+142.8) on S/N 28-1761 through 28-5859, and 28-7105001 through 28-7205318.

Fuel Capacity

50 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity

8 quarts at (+32.5) (6 quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(± 2°)	Up	0°	Down	40°
Ailerons	(± 2°)	Up	30°	Down	15°
Rudder	(± 2°)	Left	27°	Right	27°
Stabilator	(± 1°)	Up	18°	Down	2°
Stabilator Tab	(± 1°)	Up	3°	Down	12°

Nose Wheel Travel

(± 2°) Left 30° Right 30°
(Effective on S/N 28-671 through 28-3377)
(± 2°) Left 22° Right 22°
(Effective on S/N 28-3378 through 28-5859, and 28-7105001 through 28-7205318)

Manufacturer's Serial Nos.

28-03; 28-671 through 28-5859; and 28-7105001 through 28-7205318.
The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers:

28-4704	28-4745	28-4754	28-4763	28-4776
28-4791	28-4795	28-4826	28-4834	28-4859
28-4875	28-4879	28-4891	28-4907	28-4919
28-4922	28-4935	28-4945	28-4946	28-4947
28-4955	28-4959	28-4961	27-4964	28-4967
28-4968	28-4971	28-4975	28-4977	28-4985
28-4995	28-4999	28-5004	28-5007	28-5015
28-5017	28-5018	28-5019	28-5020	28-5023
28-5026	28-5027	28-5028	28-5031	28-5039
28-5041	28-5046	28-5051	28-5053	28-5057
28-5060	28-5061	28-5062	28-5063	28-5064

28-5066 through 28-5859, and 28-7105001 through 28-7205318 under the delegation option provisions of FAR 21. See NOTE 17 and 20.

IV - Model PA-28S-160 (Cherokee), 4 PCSM (Normal Category), Approved February 25, 1963, for S/N 28-1 through 28-1760; and S/N 28-1760A.

Engine

Lycoming O-320-D2A with carburetor setting 10-3678-32 (See NOTE 18)

Fuel

100/130 minimum grade aviation gasoline

Engine Limits

For all operations, 2700 r.p.m. (160 hp)

Propeller and Propeller Limits

McCauley 1A175-GM
Static r.p.m. at maximum permissible throttle setting not over 2360 r.p.m., not under 2260 r.p.m.
No additional tolerance permitted.
Diameter: Not over 79", not under 78".

Propeller Spinner	Piper P/N 14422-00 spinner required.

Airspeed Limits				
Never exceed	153 mph	(133 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering	129 mph	(112 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity				
(+85.1)	to	(+93.5)	at	1850 lb. or less
(+87.0)	to	(+93.5)	at	2100 lb.
(+87.9)	to	(+93.5)	at	2140 lb.

Straight line variation between points given.

Empty Weight C. G. Range	None
Maximum Weight	2140 lb.
No. of Seats	4 (2 at +85.5, 2 at +118.1)
Maximum Baggage	125 lb. at (+142.8)
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+32.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements						
Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	30°	Down	15°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	18°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Manufacturer's Serial Nos.	28-03; 28-1 through 28-1760; and 28-1760A.

V - Model PA-28S-180 (Cherokee), 4 PCSM (Normal Category), Approved May 10, 1963, for S/N 28-671 through 28-5859, and 28-7105001 through 28-7105234.

Engine	Lycoming O-360-A3A or 0-360-A4A with carburetor setting 10-4164-1 See NOTE 19.
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	S/N 28-671 through 28-1760, and 28-1760A (except S/N 28-1571 and S/N 28-1573): Maximum permissible takeoff, 2350 r.p.m. For all other operations, 2700 r.p.m. (180 hp) See NOTE 4. S/N 28-1571; 28-1573; 28-1761 through 28-5859; and 28-7105001 through 28-7105234: For all operations, 2700 r.p.m. (180 hp)
Propeller and Propeller Limits	McCauley 1A200-FA8248 on S/N 28-671 to 28-1760, and 28-1760A. McCauley 1A200-DFA8248 on S/N 28-1761 through 28-5859, and 28-7105001 through 28-7105234. Static r.p.m. at maximum permissible throttle setting not over 2190 r.p.m., not under 2140 r.p.m. No additional tolerance permitted. Diameter: Not over 82", not under 81".

Propeller Spinner

Spinner required.
Piper P/N 14422-00 on S/N 28-671 through 28-1760, and 28-1760A.
Piper P/N 63760-04 or 65805-00 on S/N 28-1761 through 28-5859, and 28-7105001 through 28-7105234.

Airspeed Limits

Never exceed	153 mph	(133 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering	129 mph	(112 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity

(+85.1) to (+92.5) at 1850 lb. or less
(+87.0) to (+92.5) at 2100 lb.
(+89.8) to (+92.5) at 2222 lb.
Straight line variation between points given.

Empty Weight C. G. Range

None

Maximum Weight

2222 lb.

No. of Seats

4 (2 at +85.5, 2 at +118.1)

Maximum Baggage

125 lb. at (+142.8)

Fuel Capacity

50 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity

8 quarts at (+32.5) (6 quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	30°	Down	15°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	18°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Manufacturer's Serial Nos.

28-671 through 28-5859, and 28-7105001 through 28-7105234. See NOTE 3. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers:

28-4704	28-4745	28-4754	28-4763	28-4776
28-4791	28-4795	28-4826	28-4834	28-4859
28-4875	28-4879	28-4891	28-4907	28-4919
28-4922	28-4935	28-4945	28-4946	28-4947
28-4955	28-4959	28-4961	27-4964	28-4967
28-4968	28-4971	28-4975	28-4977	28-4985
28-4995	28-4999	28-5004	28-5007	28-5015
28-5017	28-5018	28-5019	28-5020	28-5023
28-5026	28-5027	28-5028	28-5031	28-5039
28-5041	28-5046	28-5051	28-5053	28-5057
28-5060	28-5061	28-5062	28-5063	28-5064

28-5066 through 28-5859, and 28-7105001 through 28-7105234 under the delegation option provisions of FAR 21. See NOTE 17 and 20.

VI - Model PA-28-235 (Cherokee Pathfinder), 4 PCLM (Normal Category), Approved July 15, 1963, for S/N 28-10001 through 28-11378, and 28-7110001 through 28-7210023.

Engine	Lycoming O-540-B2B5, O-540-B1B5, or O-540-B4B5 with carburetor setting 10-4404, 10-5042, or 10-5054. (Baffle P/N 68759 required with 10-5054 setting.)
Fuel	80/87 minimum grade aviation gasoline
Engine Limits	For all operations, 2575 r.p.m. (235 hp)
Propeller and Propeller Limits	McCauley 1P235PFA80 Static r.p.m. at maximum permissible throttle setting not over 2300 r.p.m., not under 2125 r.p.m. No additional tolerance permitted. Diameter: Not over 80", not under 78.5". or Hartzell HC-C2YK-1/8468A-4 or HC-C2YK-1( )F/F8468A-4 Pitch: High 27° ± 2°, Low 13.5° ± .2° at 30" station. Diameter: Not over 80", not under 80". Governor assembly: Hartzell F-4-3 ( ) or F-4-13 See NOTE 21. or Approved for Use with O-540-B4B5 Engine Only: Sensenich M80BMM or 80BM8 Pitch from 69" to 71". Static r.p.m. at maximum permissible throttle setting not over 2300 r.p.m., not under 2150 r.p.m. No additional tolerances permitted. Diameter: Not over 80", not under 78.5".
Propeller Spinner	Piper P/N 65209-00 or P/N 63760-03 with fixed pitch propeller. Spinner required. Piper P/N 65435-0 or P/N 68713 or P/N 66785 spinner tip and P/N 66786 spinner shell or P/N 67790-0 spinner, P/N 67791-0 bulkhead, P/N 67793-0 bulkhead and P/N 99499-0 plate. Two each P/N 67794-0 cuff, or Kit 760 452V with constant speed propeller. See NOTE 14.

Airspeed Limits

Never exceed	197 mph	(171 knots)	CAS
Maximum structural cruising	156 mph	(136 knots)	CAS
Maneuvering	138 mph	(120 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity Range

S/N 28-10001 through 28-11378 (See NOTE 16):

(+81.5)	to	(+93.5)	at	2100 lb. or less
(+91.5)	to	(+93.5)	at	2900 lb.

S/N 28-7110001 through 28-7210023:

(+85.1)	to	(+93.5)	at	2100 lb. or less
(+86.0)	to	(+93.5)	at	2600 lb.
(+91.5)	to	(+93.5)	at	2900 lb.

Straight line variation between points given.

Empty Weight C. G. Range	None
Maximum Weight	2900 lb.
No. of Seats	4 (2 at +85.5, 2 at +118.1)
Maximum Baggage	200 lb. at (+142.8)

Fuel Capacity — 84 gallons at (+95) (50 gallons in 2 wing tanks, 34 gallons in 2 tip tanks).
See NOTE 1 for data on system fuel.

Oil Capacity — 12 quarts at (+34.1)(9 ¼ quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	30°	Down	15°
Rudder	(+2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	18°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel — (±2°) Left 30° Right 30°
(Effective on S/N 28-10001 through 28-11039)
(±2°) Left 22° Right 22°
(Effective on S/N 28-11040 through 28-11378, and 28-7110001 through 28-7210023)

Manufacturer's Serial Nos. — 28-10001 through 28-11378, and 28-7110001 through 28-7210023. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-11063, 28-11064, 28-11070, 28-11072 through 28-11378, and 28-7110001 through 28-7210023 under the delegation option provisions of FAR 21. See NOTE 17 and 20.

VII - Model PA-28-140 (Cherokee Cruiser), 2 PCLM (Utility or Normal Category); 1950 lb. Maximum Weight, Approved February 14, 1964; 2150 lb. Maximum Weight, Approved June 17, 1965; for S/N 28-20001 through 28-26946, and 28-7125001 through 28-7725290.

Engine — Lycoming O-320-E2A with carburetor setting 10-3678-32 or O-320-E3D with carburetor setting 10-5009

Fuel — 80/87 minimum grade aviation gasoline

Engine Limits — For all operations 2700 r.p.m (150 hp)

Propeller and Propeller Limits — For 1950 lb. maximum weight - Normal Category; S/N 28-20001 through 28-20939; or Utility Category, S/N 28-20001 through 28-26946, and 28-7125001 through 28-7725290:
Sensenich M74DM or 74DM6
Static r.p.m. at maximum permissible throttle setting not over 2425 r.p.m., not under 2150 r.p.m.
No additional tolerance permitted.
Diameter: Not over 74", not under 72.5".

For 2150 lb. maximum weight - Normal Category; S/N 28-20940 through 28-26946, and 28-7125001 through 28-7725290:
Sensenich M74DM or 74DM6
Static r.p.m. at maximum permissible throttle setting not over 2425 r.p.m., not under 2275 r.p.m.
No additional tolerance permitted.
Diameter: Not over 74", not under 72.5".

Propeller Spinner — Piper P/N 14422-00.
See NOTE 11.

Airspeed Limits

Never exceed	171 mph (148 knots)	CAS
Maximum structural cruising	140 mph (121 knots)	CAS
Maneuvering	129 mph (112 knots)	CAS
Flaps Extended	115 mph (100 knots)	CAS

Center of Gravity Range

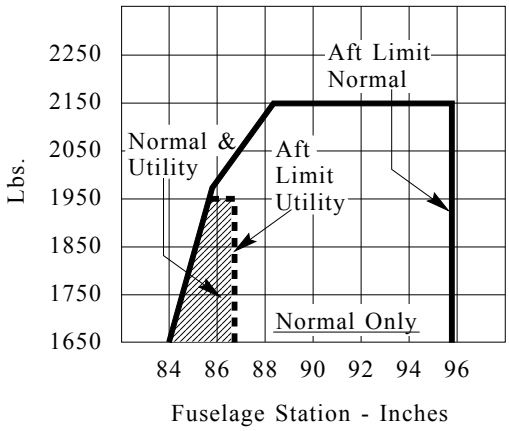
Utility Category

(+84.0)	to	(+86.5)	at	1650 lb. or less
(+85.8)	to	(+86.5)	at	1950 lb.

Normal Category

(+84.0)	to	(+95.9)	at	1650 lb. or less
(+85.9)	to	(+95.9)	at	1975 lb.
(+88.4)	to	(+95.9)	at	2150 lb.

Straight line variation between points given.



Empty Weight C. G. Range

None

Maximum Weight

Normal Category: 1950 lb. on S/N 28-20001 through 28-20939 (See NOTE 6).
2150 lb. on S/N 28-20940 through 28-26946, and 28-7125001 through 28-7725290.

Utility Category: 1950 lb. on S/N 28-20001 through 28-26946, and 28-7125001 through 28-7725290.

No. of Seats

2 at (+85.5)

Maximum Baggage

Eligible Normal Category Only:
100 lb. at (+117) on S/N 28-20001 through 28-20939 (See NOTE 12).
200 lb. at (+117) on S/N 28-20940 through 28-26946, and 28-7125001 through 28-7725290.
300 lb. at (+117 and +133) on S/N 28-20940 through 28-26946, and 28-7125001 through 28-7725290 (See NOTE 13).

Fuel Capacity

50 gallon at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity

8 quarts at (+32.5) (6 quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up 0°	Down 40°
Ailerons	(±2°)	Up 30°	Down 15°
Rudder	(±2°)	Left 27°	Right 27°
Stabilator	(±1°)	Up 18°	Down 2°
Stabilator Tab	(±1°)	Up 3°	Down 12°

Nose Wheel Travel

(±2°) Left 30° Right 30°
(Effective on S/N 28-20001 through 28-21845; 28-21931 through 28-21934; and 28-7425001 through 28-7725290)

(±2°) Left 22° Right 22°
(Effective on S/N 28-21846 through 28-21930; 28-21935 through 28-26946; and 28-7125001 through 28-7325674)

Manufacturer's Serial Nos. 28-20001 through 28-26946; and 28-7125001 through 28-7725290. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-24677, 28-24682, 28-24697, 28-24698, 28-24700, 28-24703, 28-24704, 28-24705, 28-24706, 28-24709, 28-24710, 28-24712, 28-24713, 28-24714, 28-24715 through 28-26946, and 28-7125001 through 28-7725290 under the delegation option provisions of FAR 21. See NOTE 17 and 20.

VIII - Model PA-28-140 (Cherokee Cruiser), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved June 17, 1965, for S/N 28-20001 through 28-26946, and 28-7125001 through 28-7725290.

Engine: Lycoming O-320-E2A with carburetor setting 10-3678-32 or 10-5009 or O-320-E3D with carburetor setting 10-5009

Fuel: 80/87 minimum grade aviation gasoline

Engine Limits: For all operations 2700 r.p.m.(150 hp)

Propeller and Propeller Limits: Sensenich M74DM or 74DM6
Static r.p.m. at maximum permissible throttle setting not over 2425 r.p.m., not under 2275 r.p.m.
No additional tolerance permitted.
Diameter: Not over 74", not under 72.5".

Propeller Spinner: Piper P/N 14422-00.
See NOTE 11.

Airspeed Limits

Never exceed	171 mph	(148 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering	129 mph	(112 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity Range

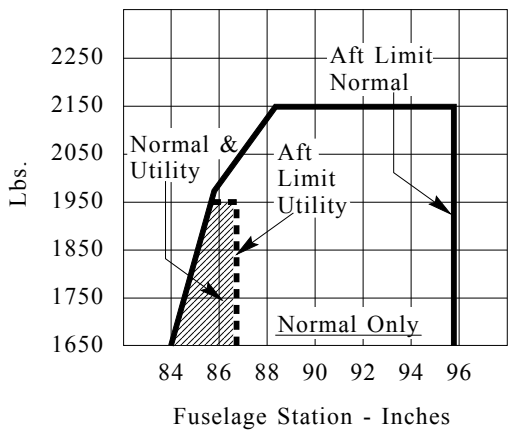
Utility Category

(+84.0)	to	(+86.5)	at	1650 lb. or less
(+85.8)	to	(+86.5)	at	1950 lb.

Normal Category

(+84.0)	to	(+95.9)	at	1650 lb. or less
(+85.9)	to	(+95.9)	at	1975 lb.
(+88.4)	to	(+95 9)	at	2150 lb.

Straight line variation between points given.



Empty Weight C. G. Range	None
Maximum Weight	Normal Category: 2150 lb. Utility Category: 1950 lb.
No. of Seats	Normal Category: 4 (2 at +85.5, 2 at +117) Utility Category: 2 (2 at +85.5)
Maximum Baggage	Eligible Normal Category only: 100 lb. at (+117) on S/N 28-20001 through 28-20939 (See NOTE 12). 200 lb. at (+117) on S/N 28-20940 through 28-26946; and 28-7125001 through 28-7725290. 300 lb. at (+117 and +133) on S/N 28-20940 through 28-26946; and 28-7125001 through 28-7725290 (See NOTE 13).
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+32.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	30°	Down	15°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	18°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel

(±2°) Left 30° Right 30°
(Effective on S/N 28-20940 through 28-21845; 28-21931 through 28-21934; and 28-7425001 through 28-7725290)

(± 2°) Left 22° Right 22°
(Effective on S/N 28-21846 through 28-21930; 28-21935 through 28-26946; and 28-7125001 through 28-7325674)

Manufacturer's Serial Nos. 28-20001 through 28-26946, and 28-7125001 through 28-7725290. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-24677, 28-24682, 28-24697, 28-24698, 28-24700, 28-24703, 28-24704, 28-24705, 28-24706, 28-24709, 28-24710, 28-24712, 28-24713, 28-24714, 28-24715 through 28-26946, and 28-7125001 through 28-7725290 under the delegation option provisions of FAR 21. See NOTE 17 and 20.

IX - Model PA-28R-180 (Arrow), 4 PCLM (Normal Category), Approved June 8, 1967, for S/N 28R-30002 through 28R-31270, and 28R-7130001 through 28R-7130013.

Engine	Lycoming IO-360-B1E
Injector	Bendix type RSA-5ADI Parts List No. 2524297
Fuel	100/130 minimum grade aviation gasoline
Engine limits	For all operations, 2700 r.p.m. (180 hp)
Propeller and Propeller Limits	Hartzell constant speed Model HC-C2YK-( )/7666A-0 or HC-C2YK-1( )F/F7666A Pitch: High 29.0° ± 1°, Low 13.0° ± .2° at 30" Station. Diameter: Not over 76", not under 74.5". Governor Assembly: Hartzell F-2-2 ( ) or F-2-7 ( ) Avoid continuous operation between 2000 - 2200 r.p.m.

Propeller Spinner

Piper P/N 68713 or P/N 66785 spinner tip and P/N 66786 spinner shell, or P/N 67790-0 spinner, P/N 67791-0 bulkhead, P/N 67793-0 bulkhead, and P/N 99499-0 plate. Two each P/N 67794-0 cuff or Kit 760 410V.
See NOTE 11.

Airspeed Limits

Never exceed	214 mph	(186 knots)	CAS
Maximum structural cruising	170 mph	(148 knots)	CAS
Maneuvering	134 mph	(116 knots)	CAS
Flaps extended	125 mph	(109 knots)	CAS
Maximum gear extension	150 mph	(130 knots)	CAS
Maximum gear retraction	125 mph	(109 knots)	CAS

Center of Gravity Range

(+81.0) to (+95.9) at 1925 lb. or less
(+91.0) to (+95.9) at 2500 lb.
Straight line variation between points given.
Moment due to retracting of landing gear (+819 in-lb.)

Empty Weight C. G. Range

None

Maximum Weight

2500 lb.

No. of Seats

4 (2 at +85.5, 2 at +118.1)

Maximum Baggage

200 lb. at (+142.8)

Fuel Capacity

50 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity

8 quarts at (+29.5) (6 quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up 0°	Down 40°
Ailerons	(±2°)	Up 30°	Down 15°
Rudder	(±2°)	Left 27°	Right 27°
Stabilator	(±1°)	Up 18°	Down 2°
Stabilator Tab	(±1°)	Up 3°	Down 12°

Nose Wheel Travel

(±2°) Left 30° Right 30°

Manufacturer's Serial Nos.

28R-30002 through 28R-31270, and 28R-7130001 through 28R-7130013. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers:

28R-30538	28R-30546	28R-30559	28R-30586	28R-30587
28R-30602	28R-30603	28R-30605	28R-30624	28R-30627
28R-30638	28R-30639	28R-30642	28R-30684	28R-30697
28R-30708	28R-30726	28R-30739	28R-30740	28R-30747
28R-30750	28R-30752	28R-30759	28R-30760	28R-30766
28R-30776	28R-30779	28R-30785	28R-30787	28R-30795
28R-30801	28R-30809	28R-30815	28R-30819	28R-30821
28R-30824	28R-30827	28R-30832	28R-30835	28R-30838
28R-30842	28R-30845	28R-30849	28R-30853	28R-30857
28R-30860	28R-30865	28R-30866	28R-30867	28R-30868
28R-30869	28R-30872	28R-30874	28R-30875	28R-30877

through 28R-31270, and 28R-7130001 through 28R-7130013 under the delegation option provisions of FAR 21. See NOTE 17 and 20.

X - Model PA-28R-200 (Arrow), 4 PCLM (Normal Category), Approved January 16, 1969, S/N 28R-35001 through 28R-35820 and 28R-7135001 through 28R-7135229.

Engine	Lycoming IO-360-C1C
Injector	Bendix Type RSA-5AD1, Parts List Number 2524450
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (200 hp)
Propeller and Propeller Limits	Hartzell constant speed Model HC-C2YK-1 ( )/7666A-2 or HC-C2YK-1 ( )F/F7666A Pitch: High 29.0° ±2°, Low 14.0° ±2° at 30 " Station Diameter: Not over 74", not under 72.5" Governor Assembly: Hartzell F-2-7 ( ) Avoid continuous operation between 2000 - 2350 r.p.m.
Propeller Spinner	Piper P/N 66785 spinner tip and P/N 66786 spinner shell or P/N 67790-0 spinner, P/N 67791-0 bulkhead, P/N 67793-0 bulkhead, and P/N 99499-0 plate. Two each P/N 67794-0 cuff or Kit 760 410V. See NOTE 11.

Airspeed Limits

Never exceed	214 mph	(186 knots)	CAS
Maximum structural cruising	170 mph	(148 knots)	CAS
Maneuvering	134 mph	(116 knots)	CAS
Flaps Extended	125 mph	(109 knots)	CAS
Maximum gear extension	150 mph	(130 knots)	CAS
Maximum gear retraction	125 mph	(109 knots)	CAS

Center of Gravity Range

(+81.0) to (+95.9) at 1925 lb. or less
(+90.0) to (+95.9) at 2600 lb.
Straight line variation between points given.
Moment due to retracting of landing gear (+819 in-lb.)

Empty Weight C. G. Range	None
Maximum Weight	2600 lb.
No. of Seats	4 (2 at +85.5, 2 at +118.1)
Maximum Cargo	200 lb. (at +142.8)
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+29.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	30°	Down	15°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	18°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel (±2°) Left 30° Right 30°

Manufacturer's Serial Numbers

28R-35001 through 28R-35820, and 28R-7135001 through 28R-7135229. The manufacturer is authorized to issue airworthiness certificates for airplanes serial numbers 28R-35001 through 28R-35820, and 28R-7135001 through 28R-7135229 under the delegation option provisions of FAR 21.

XI - Model PA-28R-200 (Arrow II), 4 PCLM (Normal Category), Approved December 2, 1971, for S/N 28R-7235001 through 28R-7635545.

This series differs from the basic PA-28R-200 (Item X) by the addition of a five-inch fuselage extension, larger horizontal tail, wing span increase, gross weight increase, and other minor changes.

Engine	Lycoming IO-360-C1C (See NOTE 22) Lycoming IO-360-C1C6 (See NOTE 23)
Injector	Bendix Type RSA-5AD1, Part List Number 2524450
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (200 hp)
Propeller and Propeller Limits	Hartzell Constant Speed Model HC-C2YK-1 ( ) or HC-C2YK-1( ) F Blade Model 7666A-2 or F7666A-2 (See NOTE 22) Pitch: High 29.0° ± 2°, Low 14.0° ± .2° at 30" Station. Diameter: Not over 74", not under 72.5". Governor Assembly: Hartzell F-2-7( ) Avoid continuous operation between 2000 - 2350 r.p.m. or McCauley Constant Speed Model B2D34C213, Blade Model 90DHA-16 (See NOTE 23) Pitch: High 27.5° ± .5°; Low 12.5° ± .2° at 30" Station. Diameter: Not over 74", not under 73". Governor Assembly: Hartzell F-2-7 ( ) Avoid continuous operation between 1500 and 1950 r.p.m. below 15" manifold pressure.
Propeller Spinner	For the Hartzell Propeller: Piper P/N 66785-00 spinner tip, P/N 66786 spinner shell and P/N 68734-0 bulkhead or P/N 99374-0 spinner installation (same as Kit No. 760 410V). See NOTE 11. For the McCauley Propeller: Piper P/N 66785 spinner tip and P/N 66786 spinner shell or P/N 67790-0 spinner, P/N 67791-0 bulkhead, P/N 67793-0 bulkhead, and P/N 99499-0 plate. Two each P/N 67794-0 cuff, or Kit 760 410V. Spinner and attachment plate installation P/N 35828-2. See NOTES 11 and 23.

Airspeed Limits				
Never exceed	214 mph	(186 knots)	CAS
Maximum structural cruising	170 mph	(148 knots)	CAS
Maneuvering	131 mph	(114 knots)	CAS
Flaps Extended	125 mph	(109 knots)	CAS
Maximum gear extension	150 mph	(130 knots)	CAS
Maximum gear retraction	125 mph	(109 knots)	CAS

Center of Gravity Range				
(+80.0)	to	(+93.0)	at	1800 lb. or less
(+82.0)	to	(+93.0)	at	2300 lb.
(+87.3)	to	(+93.0)	at	2650 lb.

Empty Weight C. G. Range	None
Maximum Weight	2650 lb.
No. of Seats	4 (2 at +80.5, 2 at +118.1)
Maximum Cargo	200 lb. (at +142.8)
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+24.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements	Wing flaps	(±2°)	Up	0°	Down	40°
	Ailerons	(±2°)	Up	30°	Down	15°
	Rudder	(±2°)	Left	27°	Right	27°
	Stabilator	(±1°)	Up	16°	Down	2°
	Stabilator Tab	(±1°)	Up	3°	Down	12°
Nose Wheel Travel		(±2°)	Left	30°	Right	30°

Manufacturer's Serial Numbers: 28R-7235001 through 28R-7635545. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28R-7235001 through 28R-7635545 under the delegation option provisions of FAR 21. See NOTE 20.

XII - Model PA-28-180 (Archer), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved May 22, 1972, for S/N 28- E13, and 28-7305001 through 28-7505260.

This series differs from the basic PA-28-180 (Item III) by the addition of a five inch fuselage extension, wing span increase, larger horizontal tail, gross weight increase and other minor changes.

Engine: Lycoming O-360-A4A or O-360-A4M with carburetor settings 10-3878 or 10-5193

Fuel: 100/130 minimum grade aviation gasoline

Engine Limits: For all operations, 2700 r.p.m. (180 hp)

Propeller and Propeller Limits: Sensenich or 76EM8S5 or M76EMMS
Static r.p.m. at maximum permissible throttle setting not over 2425 r.p.m., not under 2325 r.p.m.
No additional tolerance permitted.
Diameter: Not over or under 76".

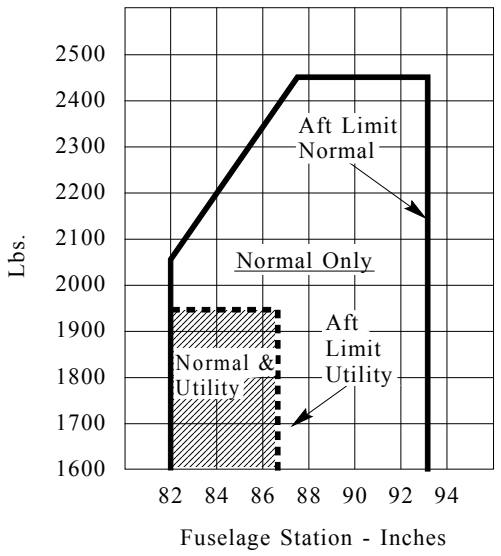
Propeller Spinner: Piper P/N 65805-00.
See NOTE 11.

Airspeed Limits				
Never exceed	171 mph	(148 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering	127 mph	(110 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity Range

Normal Category
(+82.0) to (+93.0) at 2050 lb. or less
(+87.4) to (+93.0) at 2450 lb.

Utility Category
(+82.0) to (+86.5) at 1950 lb. or less
Straight line variation between points given.



Empty Weight C. G. Range: None

Maximum Weight: Normal Category: 2450 lb.
Utility Category: 1950 lb.

No. of Seats: Normal Category: 4 (2 at +80.5 2 at +118.1)
Utility Category: 2 (2 at +80.5)

Maximum Baggage: 200 lb. at (+142.8)

Fuel Capacity: 50 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity: 8 quarts at (+27.5) (6 quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements:

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	30°	Down	15°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	14°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel: (±2°) Left 22° Right 22°
(S/N 28-E13, 28-7305001 through 28-7305601)
(±2°) Left 30° Right 30°
(S/N 28-7405001 through 28-7505260)

Manufacturer's Serial Numbers: 28-E13, and 28-7305001 through 28-7505260. The manufacturer is authorized to issue airworthiness certificates for airplanes serial numbers 28-7305001 through 28-7505260 under the delegation option provisions of FAR 21. See NOTE 20.

XIII - Model PA-28-235 (Cherokee Pathfinder), 4 PCLM (Normal Category), Approved June 9, 1972, for S/N 28E-11, and 28-7310001 through 28-7710089.

This series differs from the basic PA-28-235 (Item VI) by the addition of a five inch fuselage extension, larger horizontal tail, gross weight increase, and other minor changes.

Engine: Lycoming O-540-B4B5 with carburetor setting 10-5404

Fuel: 80/87 minimum grade aviation gasoline

Engine Limits	For all operations, 2575 r.p.m. (235 hp)
Propeller and Propeller Limits	Hartzell HC-C2YK-1( )F/F 8468A-4 Pitch: High 27° ± 2°, Low 13.5 ° ± .2° at 30" station. Diameter: Not over 80", not under 80". Governor Assembly: Hartzell F-4-3( ) or F-4-13 ( ). See NOTE 21.
Propeller Spinner	P/N 99374 Spinner Installation. Spinner required.

Airspeed Limits				
Never exceed	197 mph	(171 knots)	CAS
Maximum structural cruising	156 mph	(135 knots)	CAS
Maneuvering	138 mph	(119 knots)	CAS
Flaps Extended	115 mph	(99 knots)	CAS

Center of Gravity Range

(+79.0)	to	(+91.5)	at	1900 lb. or less
(+82.0)	to	(+91.5)	at	2500 lb.
(+88.0)	to	(+91.5)	at	3000 lb.

Straight line variation between points given.

Empty Weight C. G. Range	None
Maximum Weight	3000 lb.
No. of Seats	4 (2 at +80.5, 2 at +118.1)
Maximum Baggage	200 lb. at (+142.8)
Fuel Capacity	84 gallons (50 gallons in 2 wing tanks at (+95) and 34 gallons in 2 tip tanks at (+95)) See NOTE 1 for data on system fuel.
Oil Capacity	12 quarts at(+29.1) (9¼ quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements					
Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	30°	Down	15°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±2°)	Up	16°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel

(±2°)	Left	22°	Right	22°

(S/N 28-E11, 28-7310001 through 28-7310176)

(±2°)	Left	30°	Right	30°

(S/N 28-7410001 through 28-7710089)

Manufacturer's Serial Numbers	28-E11, and 28-7310001 through 28-7710089. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-E11, and 28-7310001 through 28-7710089 under the delegation option provisions of FAR 21. See NOTE 20.

XIV - Model PA-28-151 (Cherokee Warrior), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved August 9, 1973, for S/N 28-7415001 through 28-7715314.

Engine	Lycoming O-320-E3D with carburetor setting 10-5009, or 10-5009N, or 10-5135
Fuel	80/87 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (150 hp)

Propeller and Propeller Limits

Sensenich M74DM6
Static r.p.m. at maximum permissible throttle setting not over 2375 r.p.m., not under 2275 r.p.m.
No additional tolerance permitted.
Diameter: Not over 74", not under 72".
or
McCauley 1C160 EGM 7653
Static r.p.m. at maximum permissible throttle setting not over 2400 r.p.m., not under 2300 r.p.m.
No additional tolerance permitted.
Diameter: Not over 76", not under 74.5".

Propeller Spinner

Piper P/N 35323.
See NOTE 11.

Airspeed Limits

Never exceed	176 mph	(153 knots)	CAS
Maximum structural cruising	140 mph	(122 knots)	CAS
Maneuvering	111 mph	(108 knots)	CAS
Flaps Extended (S/N 28-7415001 through 28-7515449)	125 mph	(109 knots)	CAS
Flaps Extended (S/N 28-7615001 through 28-7715314)	115 mph	(100 knots)	CAS

Center of Gravity Range

Normal Category
(+83.0) to (+93.0) at 1950 lb. or less
(+87.0) to (+93.0) at 2325 lb.

Utility Category
(+83.0) to (+86.5) at 1950 lb. or less
Straight line variation between points given.

Empty Weight C. G. Range

None

Maximum Weight

Normal Category: 2325 lb.
Utility Category: 1950 lb.

No. of Seats

Normal Category: 4 (2 at +80.5, 2 at +118.1)
Utility Category: 2 (2 at +80.5)

Maximum Baggage

Eligible Normal Category only:
200 lb. at (+142.8)

Fuel Capacity

50 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity

8 quarts at (+27.5) (6 quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Wing Flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	23°	Down	17°
(S/N 28-7415001 through 28-7515449)					
Ailerons	(±2°)	Up	25°	Down	12.5°
(S/N 28-7615001 through 28-7715314)					
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	14°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel

(±1°) Left 30° Right 30°

Manufacturer's Serial Numbers: 28-7415001 through 28-7715314. The manufacturer is authorized to issue airworthiness certificates for airplanes serial numbers 28-7415001 through 28-7715314 under the delegation option provisions of FAR 21.

XV - A.- Model PA-28-181 (Archer II), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved July 8, 1975, for S/N 28-7690001 through 28-8690056; 28-8690061; 28-8690062; and 2890001 through 2890205.

Engine: Lycoming O-360-A4M with carburetor settings 10-3878 or 10-5193 or
Lycoming O-360-A4A with carburetor setting 10-5193.

Fuel: 100/130 minimum grade aviation gasoline

Engine Limits:
Applicable to S/N 28-7690001 through 28-7990589:
For all operations, 2700 r.p.m. (180 hp)
Applicable to S/N 28-8090001 through 28-8690056; 28-8690061; 28-8690062; and 2890001 through 2890205:
For takeoff 5 minutes at 2700 r.p.m. (180 hp)
For maximum continuous operation, 2650 r.p.m. (178 hp)

Propeller and Propeller Limits: Sensenich 76EM8S5
For S/N 28-7690001 through 28-7790607:
Static r.p.m. at maximum permissible throttle setting, not over 2425 r.p.m., not under 2325 r.p.m. at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.)
No additional tolerance permitted.
Diameter: Not over or under 76".
For S/N 28-7890001 through 28-8690056; 28-8690061; 28-8690062; and 2890001 through 2890205:
Static r.p.m. at maximum permissible throttle setting, not over 2340 r.p.m., not under 2240 r.p.m. at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.)
No additional tolerance permitted.
Diameter: Not over or under 76".

Propeller Spinner: Piper P/N 65805-00.
See NOTE 11.

Airspeed Limits:

Never exceed	171 mph	(148 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
For S/N 28-7690001 thru 28-7690467:			
Maneuvering	124 mph	(108 knots)	CAS
For S/N 28-7790001 thru 28-7790589, 28-8090001 through 28-8690056, 28-8690061, 28-8690062, and 2890001 through 2890205:			
Maneuvering @ 2550 lbs.	128 mph	(111 knots)	CAS
Maneuvering @ 1634 lbs.	102 mph	(89 knots)	CAS

Center of Gravity Range:
Normal Category
(+82.0) to (+93.0) at 2050 lb. or less
(+88.6) to (+93.0) at 2550 lb.

Utility Category
(+82.0) to (+93.0) at 2050 lb. or less
(+83.0) to (+93.0) at 2130 lb.
Straight line variation between points given.

Empty Weight C. G. Range: None

Maximum Weight: Normal Category: Ramp - 2558 lb. *

	Utility Category:	Takeoff - 2550 lb. Ramp - 2138 lb. * Takeoff - 2130 lb.

* - Ramp weights for S/N 28-8090001 through 28-8690056; 28-8690061; 28-8690062; and 2890001 through 2890205 only.

No. of Seats — Normal Category: 4 (2 at +80.5, 2 at +118.1)
Utility Category: 2 (2 at +80.5)

Maximum Baggage — 200 lb. at (+142.8)

Fuel Capacity — 50 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity — 8 quarts at (+27.5) (6 quarts usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	25°	Down	12.5°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	14°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel — (±2°) Left 30° Right 30°

Manufacturer's Serial Numbers — 28-7690001 through 28-8690056; 28-8690061; 28-8690062; and 2890001 through 2890205. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-7690001 through 28-8690056; 28-8690061; 28-8690062; and 2890001 through 2890205 under the delegation option provisions of FAR 21.
See NOTE 20.

XV - B.- Model PA-28-181 (Archer III), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved August 30, 1994, for S/N 2890206 through 2890231, and 2843001 and up.

Engine — Lycoming O-360-A4M with carburetor settings 10-6102 or 10-5193 for aircraft prior to S/N 2843501

Fuel — 100 or 100LL aviation grade fuel

Engine Limits — For all operations, 2700 r.p.m. (180 hp)

Propeller and Propeller Limits — Sensenich 76EM8S14-0-62
Static r.p.m. at maximum permissible throttle setting, not over 2340 r.p.m., not under 2240 r.p.m. at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.)
No additional tolerance permitted.
Diameter: Not over or under 76".

Propeller Spinner — Piper P/N 83349-12

Airspeed Limits

Never exceed	171 mph	(148 knots)	CAS
Maximum structural cruising	140 mph	(121 knots)	CAS
Maneuvering @ 2550 lbs.	128 mph	(111 knots)	CAS
Maneuvering @ 1634 lbs.	102 mph	(89 knots)	CAS
Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity Range	Normal Category (+82.0) to (+93.0) at 2050 lb. or less (+88.6) to (+93.0) at 2550 lb. Utility Category (+82.0) to (+93.0) at 2050 lb. or less (+83.0) to (+93.0) at 2130 lb. Straight line variation between points given.
Empty Weight C. G. Range	None
Maximum Weight	Normal Category: Ramp - 2558 lb. Takeoff - 2550 lb. Utility Category: Ramp - 2138 lb. Takeoff - 2130 lb.
No. of Seats	Normal Category: 4 (2 at +80.5, 2 at +118.1) Utility Category: 2 (2 at +80.5)
Maximum Baggage	200 lb. at (+142.8)
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+27.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements						
Wing flaps		Up	0° (±1°)	Down	10°, 25°, 40° (±2°)
Ailerons	(±2°)	Up	25°	Down	12.5°
Rudder	(±1°)	Left	28°	Right	28°
Stabilator	(±1°)	Up	14°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel					
	(±2°)	Left	30°	Right	30°
		(S/N 2890206 through 2890231)			
	(±1°)	Left	20°	Right	20°
		(S/N 2843001 & up)			

Manufacturer's Serial Numbers	2890206 through 2890231, and 2843001 and up. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 2890206 through 2890231, and 2843001 and up under the delegation option provisions of FAR 21.

XVI - A. - Model PA-28-161 (Warrior II), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved November 2, 1976, for S/N 28-7716001 through 28-8216300, and 2841001 through 2841365 (Cadet only)

Engine	Lycoming O-320-D3G with carburetor setting 10-5135, 10-5009 or 10-5217, or Lycoming O-320-D2A with carburetor setting 10-5135 or 10-5217.
Fuel	100 octane minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (160 hp)
Propeller and Propeller Limits	Sensenich 74DM6-0-60 Static r.p.m. at maximum permissible throttle setting not over 2430 r.p.m., not under 2330 r.p.m., at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.) No additional tolerance permitted. Diameter: Not over 74", not under 72".

Propeller and Propeller Limits

or
Sensenich 74DM6-0-58
Static r.p.m. at maximum permissible throttle setting not over 2465 r.p.m., not under 2365 r.p.m., at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.)
No additional tolerance permitted.
Diameter: Not over 74", not under 72".

Propeller Spinner

Piper P/N 35323 or P/N 36850.
See NOTE 11.

Airspeed Limits

Never exceed	160 KIAS
Maximum structural cruising	126 KIAS
Maneuvering at 2325 lb. gross weight	111 KIAS
Maneuvering at 1531 lb. gross weight	88 KIAS
Flaps Extended	103 KIAS

Center of Gravity Range

Normal Category
(+83.0) to (+93.0) at 1950 lb. or less
(+87.0) to (+93.0) at 2325 lb.
See NOTE 27.

Utility Category
(+83.0) to (+93.0) at 1950 lb. or less
(+83.8) to (+93.0) at 2020 lb.
Straight line variation between points given.

Empty Weight C.G. Range

None

Maximum Weight

Normal Category: 2325 lb.
Utility Category: 2020 lb.
Ramp: 2332 lb. (Cadet only) See NOTE 27.

No. of Seats

Normal Category: 4 (2 at +80.5, 2 at +118.1)
Utility Category: 2 (+2 at +80.5)

Maximum Baggage

Eligible Normal Category only:
200 lb. at(+142.8)
50 lb. (Cadet only)

Fuel Capacity

50 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity

8 quarts at (+27.5) (6 quarts usable)
See NOTE 1 for data system oil.

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	25°	Down	12.5°
Rudder	(±2°)	Left	27°	Right	27°
Stabilator	(±1°)	Up	14°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel

(±1°) Left 30° Right 30°

Manufacturer's Serial Numbers

28-7716001 through 28-8216300, and 2841001 through 2841365 (Cadet only). The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-7716001 through 28-8216300, and 2841001 through 2841365 under the delegation option provisions of FAR 21. See NOTE 20.

XVI - B. Model PA-28-161 (Warrior II), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved July 1, 1982, for S/N 28-8316001 through 28-8616057, and 2816001 through 2816109.

Engine	Lycoming O-320-D3G with carburetor setting 10-5135, 10-5009 or 10-5217, or Lycoming O-320-D2A with carburetor setting 10-5135 or 10-5217.
Fuel	100 octane minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (160 hp)
Propeller and Propeller Limits	Sensenich 74DM6-0-60 Static r.p.m. at maximum permissible throttle setting not over 2430 r.p.m., not under 2330 r.p.m. at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.) No additional tolerance permitted. Diameter: Not over 74", not under 72". or Sensenich 74DM6-0-58 Static r.p.m. at maximum permissible throttle setting not over 2465 r.p.m., not under 2365 r.p.m., at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.) No additional tolerance permitted. Diameter: Not over 74", not under 72".
Propeller Spinner	Piper P/N 36850. See NOTE 11.
Airspeed Limits	Never exceed 160 KIAS Maximum structural cruising 126 KIAS Maneuvering at 2440 lb. gross weight 111 KIAS See NOTE 26. Maneuvering at 1531 lb. gross weight 88 KIAS Flaps Extended 103 KIAS
Center of Gravity Range	Normal Category (+83.0) to (+93.0) at 1950 lb. or less (+88.3) to (+93.0) at 2440 lb. See NOTE 26. Utility Category (+83.0) to (+93.0) at 1950 lb. or less (+83.8) to (+93.0) at 2020 lb. Straight line variation between points given
Empty Weight C.G. Range	None
Maximum Weight	Normal Category: Ramp - 2447 lb. Takeoff - 2440 lb. See NOTE 26. Utility Category: Ramp - 2027 lb. Takeoff - 2020 lb.
No. of Seats	Normal Category: 4 (2 at +80.5, 2 at +118.1) Utility Category: 2 (2 at +80.5)
Maximum Baggage	Eligible Normal Category only: 200 lb. at (+142.8)
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.

Oil Capacity	8 quarts at (+27.5) (6 quarts usable) See NOTE 1 for data on system oil.					
Control Surface Movements	Wing flaps	(±2°)	Up	0°	Down	40°
	Ailerons	(±2°)	Up	25°	Down	12.5°
	Rudder	(±2°)	Left	27°	Right	27°
	Stabilator	(±1°)	Up	14°	Down	2°
	Stabilator Tab	(±1°)	Up	3°	Down	12°
Nose Wheel Travel		(±1°)	Left	30°	Right	30°
Manufacturer's Serial Nos.	28-8316001 through 28-8616057, and 2816001 through 2816109. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-8316001 through 28-8616057, and 2816001 through 2816109 under the delegation option provisions of FAR 21. See NOTE 20.					

XVI - C. Model PA-28-161 (Warrior III), 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved July 1, 1994, for S/N 2816110 through 2816119, and 2842001 and up.

Engine: Lycoming O-320-D3G with carburetor setting 10-5135, 10-5009 or 10-5217

Fuel: 100 or 100LL aviation grade gasoline

Engine Limits: For all operations, 2700 r.p.m. (160 hp)

Propeller and Propeller Limits: Sensenich 74DM6-0-60
Static r.p.m. at maximum permissible throttle setting not over 2430 r.p.m., not under 2330 r.p.m., at sea level, ISA conditions. (Reference aircraft Maintenance Manual for test procedure to determine approved static r.p.m. under nonstandard conditions.)
No additional tolerance permitted.
Diameter: Not over 74", not under 72".

Propeller Spinner: Piper P/N 36850.
See NOTE 11.

Airspeed Limits		
Never exceed	160 KIAS	
Maximum structural cruising	126 KIAS	
Maneuvering at 2440 lb. gross weight	111 KIAS	See NOTE 26.
Maneuvering at 1531 lb. gross weight	88 KIAS	
Flaps Extended	103 KIAS	

Center of Gravity Range:

Normal Category
(+83.0) to (+93.0) at 1950 lb. or less
(+88.3) to (+93.0) at 2440 lb.
See NOTE 26.

Utility Category
(+83.0) to (+93.0) at 1950 lb. or less
(+83.8) to (+93.0) at 2020 lb.
Straight line variation between points given

Empty Weight C.G. Range: None

Maximum Weight:

Normal Category:	Ramp -	2447 lb.	
	Takeoff -	2440 lb.	See NOTE 26.
Utility Category:	Ramp -	2027 lb.	
	Takeoff -	2020 lb.	

No. of Seats	Normal Category: 4 (2 at +80.5, 2 at +118.1) Utility Category: 2 (2 at +80.5)
Maximum Baggage	Eligible Normal Category only: 200 lb. at (+142.8)
Fuel Capacity	50 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+27.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps		Up	0° (±1°)	Down	10°, 25°, 40° (±2°)
Ailerons	(±2°)	Up	25°	Down	12.5°
Rudder	(±1°)	Left	28°	Right	28°
Stabilator	(±1°)	Up	14°	Down	2°
Stabilator Tab	(±1°)	Up	3°	Down	12°

Nose Wheel Travel

	(±1°)	Left	30°	Right	30°
		(S/N 2816110 through 2816119)			
	(±1°)	Left	20°	Right	20°
		(S/N 2842001 & up)			

Manufacturer's Serial Nos.	2816110 through 2816119, and 2842001 and up. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 2816110 through 2816119, and 2842001 and up under the delegation option provisions of FAR 21.

XVII - Model PA-28R-201 (Arrow III), 4 PCLM (Normal Category), Approved November 2, 1976, for S/N 28R-7737002 through 28R-7837317; 2837001 through 2837061; and 2844001 and up.

Engine	Lycoming IO-360-C1C6
Injector	Bendix Type RSA-5AD1, Part List Number 2524450 Precision Airmotive (PAC) formerly Bendix: Part List Number PAM 2524450-9
Fuel	100 or 100LL aviation grade gasoline
Engine Limits	For all operations, 2700 r.p.m. (200 hp)
Propeller and Propeller Limits	McCauley Constant Speed Hub Model B2D34C213, Blade Model 90 DHA-16 Pitch: High 27.5° ± .5°, Low 12.5° ± .2° at 30" station. Diameter: Not over 74", not under 73". Governor Assembly: Hartzell Model F-2-7 ( ) Avoid continuous operation between 1500 and 1950 r.p.m. below 15" manifold pressure. or Hartzell Constant Speed Hub Model HC-C2YK-1( )F, Blade Model F7666A-2R Pitch: High 29.0° ± 2°, Low 14.0° ± .2° at 30" station. Diameter: Not over 74", not under 72". Governor Assembly: F-2-7 ( )
Propeller Spinner	For McCauley propeller:Piper P/N 35828-2 For Hartzell propeller: Piper P/N 99374 See NOTE 11.

Airspeed Limits

Never exceed	183 KIAS
Maximum structural cruising	146 KIAS
Maneuvering	118 KIAS
Flaps Extended	103 KIAS
Maximum Gear Extension	129 KIAS
Maximum Gear Retraction	107 KIAS

Center of Gravity Range	(+82.0) to (+91.5) at 2375 lb. or less (+88.9) to (+91.5) at 2750 lb. Straight line variation between points given. Moment due to retraction of gear (+819 in-lb.)
Empty Weight C.G. Range	None
Maximum Weight	2750 lb.
No. of Seats	4 (2 at +80.5, 2 at +118.1)
Maximum Baggage	200 lb. at (+142.8)
Fuel Capacity	77 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+24.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements						
	Wing flaps		Up	0° (±1°)	Down	10°, 25°, 40° (±2°)
	Ailerons	(±2°)	Up	25°	Down	12.5°
	Rudder	(±1°)	Left	28°	Right	28°
	Stabilator	(±1°)	Up	16°	Down	2°
	Stabilator Tab	(±1°)	Up	3°	Down	12°
Nose Wheel Travel		(±2°)	Left	30°	Right	30°

Manufacturer's Serial Numbers	28R-7737002 through 28-7837317; 2837001 through 2837061; and 2844001 and up. The manufacturer is authorized to issue airworthiness certificates for airplanes serial numbers 28R-7737002 through 28-7837317; 2837001 through 2837061; and 2844001 and up under the delegation option provisions of FAR 21. See NOTE 20.

XVIII - Model PA-28R-201T (Turbo Arrow III), 4 PCLM (Normal Category), Approved November 2, 1976, for S/N 28R-7703001 through 28R-7803374, and 2803001 through 2803012.

Engine	Continental TSIO-360-F or TSIO-360-FB
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2575 r.p.m. at 41" Hg. manifold pressure (200 hp)
Propeller and Propeller Limits	1 Hartzell Hub Model BHC-C2YF-1BF, Blade Model F8459A-8R Pitch Setting at 30" Station: High: 29° ± 1.0°, Low: 14.4° ± 0.2°. Diameter: Not over 76", not under 75". Governor: Hartzell E-5 or Woodward G210681 Avoid continuous operation between 2000 and 2200 r.p.m. with engine manifold pressure above 32" Hg. Avoid continuous ground operation in cross and tail winds of over 10 knots between 1700 and 2100 r.p.m.
Propeller Spinner	Hartzell P/N C3568 Spinner Assembly. See NOTE 11.

Airspeed Limits	Never exceed	183 KIAS
	Maximum structural cruising	146 KIAS
	Maneuvering	119 KIAS
	Flaps Extended	103 KIAS
	Maximum Gear Retraction	107 KIAS
	Maximum Gear Extension	129 KIAS
	Maximum Gear Extended	129 KIAS

Center of Gravity Range
(+86.0) to (+90.0) at 2900 lb.
(+78.0) to (+90.0) at 2240 lb. or less
Straight line variation between points given.
Moment due to retraction of landing gear (+819 in-lb.)

Empty Weight C. G. Range
None

Maximum Weight
Ramp: 2912 lb.
Takeoff: 2900 lb.

No. of Seats
4 (2 at +80.5, 2 at +118.1)

Maximum Baggage
200 lb. at (+142.8)

Fuel Capacity
77 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity
8 quarts at (+13.5) (5 quarts usable)
See NOTE 1 for data on system oil.

Maximum Operating Altitude
20,000 feet

Control Surface Movements	Wing flaps	(±2°)	Up	0°	Down	40°
	Ailerons	(±2°)	Up	25°	Down	12.5°
	Rudder	(±1°)	Left	28°	Right	28°
	Stabilator	(±1°)	Up	16°	Down	2°
	Stabilator Tab	(±1°)	Up	3°	Down	12°
Nose Wheel Travel		(±2°)	Left	30°	Right	30°

Manufacturer's Serial Numbers
28R-7703001 through 28R-7803374, and 2803001 through 2803012. The manufacturer is authorized to issue airworthiness certificates for airplanes serial numbers 28R-7703001 through 28R-7803374, and 2803001 through 2803012 under the delegation option provisions of FAR 21. See NOTE 20.

XIX - Model PA-28-236 (Dakota), 4 PCLM (Normal Category), Approved June 1, 1978, for S/N 28-7911001 through 28-8611008; 2811001 through 2811050; and 2845001 and up.

Engine
Lycoming O-540-J3A5D with carburetor setting 10-5054

Fuel
100/130 minimum grade aviation gasoline

Engine Limits
For all operations, 2400 r.p.m. (235 hp)

Propeller and Propeller Limits
Hartzell HC-F2YR-1( )F/F 8468A-4R
Pitch: High 32° ±2°, Low 16.25° ± ¼°.
Diameter: Not over 80", not under 78".
Governor Assembly: Hartzell F-4-21( )

Propeller Spinner	Hartzell P/N C3568 Spinner Assembly. See NOTE 11.

Airspeed Limits				
	Never exceed	197 mph	(171 knots)	CAS
	Maximum structural cruising	156 mph	(135 knots)	CAS
	Maneuvering at 3000 lb.	140 mph	(122 knots)	CAS
	Maneuvering at 1761 lb.	108 mph	(94 knots)	CAS
	Flaps Extended	115 mph	(100 knots)	CAS

Center of Gravity Range	(+79.8) to (+92.0) at 1900 lb. or less (+82.5) to (+92.0) at 2500 lb. (+88.5) to (+92.0) at 3000 lb. Straight line variation between points given.
Empty Weight C. G. Range	None
Maximum Weight	3000 lb.
Number of Seats	4 (2 at +80.5, 2 at +118.1)
Maximum Baggage	200 lb. at (+142.8)
Fuel Capacity	77 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	12 quarts at (+29.1) (9 1/2 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements						
	Wing flaps	(±2°)	Up	0°	Down	40°
	Ailerons	(±2°)	Up	25°	Down	12.5°
	Rudder	(±1°)	Left	28°	Right	28°
	Stabilator	(±1°)	Up	16°	Down	2°
	Stabilator Tab	(±1°)	Up	3°	Down	12°
Nose Wheel Travel		(±1°)	Left	30°	Right	30°

Manufacturer's Serial Numbers	28-7911001 through 28-8611008; 2811001 through 2811050; and 2845001 and up. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-7911001 through 28-8611008; 2811001 through 2811050; and 2845001 and up under the delegation option provisions of FAR 21. See NOTE 20.

XX - A. Model PA-28RT-201 (Arrow IV), 4 PCLM (Normal Category), Approved November 13, 1978, for S/N 28R-7918001 through 28R-7918267.

Engine	Lycoming IO-360-C1C6
Injector	Bendix Type RSA-5AD1, Part List Number 2524450
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (200 hp)
Propeller and Propeller Limits	McCauley Constant Speed Hub Model B2D34C213, Blade Model 90 DHA-16 Pitch: High 27.5° ±.5°, Low 12.5° ±.2° at 30" station. Diameter: Not over 74", not under 73". Governor Assembly: Hartzell Model F-2-7 ( ) Avoid continuous operation between 1500 and 1950 r.p.m. below 15" manifold pressure.

Propeller and Propeller Limits	or Hartzell Constant Speed Hub Model HC-C2YK-1( )F, Blade Model F7666A-2R Pitch: High 29.0° ± 2°, Low 14.0° ± .2° at 30" station. Diameter: Not over 74", not under 72". Governor Assembly: Hartzell Model F-2-7( )
Propeller Spinner	For the McCauley propeller: Piper P/N 35828-2 For the Hartzell propeller: Piper P/N 99374 See NOTE 11.
Airspeed Limits	Never exceed 190 KIAS Maximum structural cruising 149 KIAS Flaps extended 108 KIAS Maximum gear extension 130 KIAS Maximum gear retraction 109 KIAS Maximum gear extended 130 KIAS Maneuvering at 2750 lb. 121 KIAS Maneuvering at 1863 lb. 96 KIAS
Center of Gravity Range	(+85.5) to (+93.0) at 2400 lb. or less (+90.0) to (+93.0) at 2750 lb. Straight line variation between points given. Moment due to retraction of gear (+819 in-lb.)
Empty Weight C. G. Range	None
Maximum Weight	2750 lb.
No. of Seats	4 (2 at +80.5, 2 at +118.1)
Maximum Baggage	200 lb. at (+142.8)
Fuel Capacity	77 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+24.5) 6 quarts usable See NOTE 1 for data on system oil.

Control Surface Movements						
	Wing flaps	(±2°)	Up	0°	Down	40°
	Ailerons	(±2°)	Up	25°	Down	12.5°
	Rudder	(±1°)	Left	33°	Right	33°
	Stabilator	(±1°)	Up	14°	Down	10°
	Stabilator Tab		Up	2.5° (±1°)	Down	10° (±.5°)
Nose Wheel Travel		(±2°)	Left	30°	Right	30°

Manufacturer's Serial Numbers	28R-7918001 through 28R-7918267. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28R-7918001 through 28R-7918267 under the delegation option provisions of FAR 21.

XX - B. Model PA-28RT-201 (Arrow IV), 4 PCLM (Normal Category), Approved November 13, 1978, for S/N 28R-8018001 through 28R-8218026.

Engine	Lycoming IO-360-C1C6
Injector	Bendix Type RSA-5AD1, Part List Number 2524450
Fuel	100/130 minimum grade aviation gasoline

Engine Limits	For 5-minute takeoff, 2700 r.p.m. (200 hp) For maximum continuous operation, 2650 r.p.m. (196 hp)
Propeller and Propeller Limits	McCauley Constant Speed Hub Model 2D34C215, Blade Model 90 DJA-14E Pitch: High 27.5° ± .5°; Low 12.5° ± .2° at 30" station. Diameter: Not over 76", not under 75". Governor Assembly: Hartzell Model F-2-7 ( ) Avoid continuous operation between 1400 and 1750 r.p.m. below 15" manifold pressure.
Propeller Spinner	Piper P/N 35828-2. See NOTE 11.

Airspeed Limits

Never exceed	190 KIAS
Maximum structural cruising	149 KIAS
Flaps Extended	108 KIAS
Maximum gear extension	130 KIAS
Maximum gear retraction	109 KIAS
Maximum gear extended	130 KIAS
Maneuvering at 2750 lb. gross weight	121 KIAS
Maneuvering at 1863 lb. gross weight	96 KIAS

Center of Gravity Range	(+85.5) to (+93.0) at 2400 lb. or less (+90.0) to (+93.0) at 2750 lb. Straight line variation between points given. Moment due to retraction of gear (+819 in-lb.)
Empty Weight C. G. Range	None
Maximum Weight	2750 lb.
Number of Seats	4 (2 at +80.5, 2 at +118.1)
Maximum Baggage	200 lb. at (+142.8)
Fuel Capacity	77 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+24.5) (6 quarts usable) See NOTE 1 for data on system oil.

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	25°	Down	12.5°
Rudder	(±1°)	Left	33°	Right	33°
Stabilator	(±1°)	Up	14°	Down	10°
Stabilator Tab		Up	2.5° (±1°)	Down	10° (±.5°)

Nose Wheel Travel (±2°) Left 30° Right 30°

Manufacturer's Serial Numbers	28R-8018001 through 28R-8218026. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28R-8018001 through 28R-8218026 under the delegation option provisions of FAR 21. See NOTE 20.

XXI - Model PA-28RT-201T (Turbo Arrow IV), 4 PCLM (Normal Category), Approved November 13, 1978, for S/N 28R-7931001 through 28R-8631005, and 2831001 through 2831038.

Engine	Continental TSIO-360-FB
Fuel	100/130 minimum grade aviation gasoline

Engine Limits

For all operations, 2575 r.p.m., 41" Hg. manifold pressure (200 hp)

Propeller and Propeller Limits

1 Hartzell Hub Model BHC-C2YF-1( )F, Blade Model F8459A-8R
Pitch: High 29° ± 1.0°, Low 14.4° ± .2° at 30" station.
Diameter: Not over 76", not under 75".
Governor: Hartzell E-5 or Woodward G210681
Avoid continuous operation between 2000 and 2200 r.p.m. with engine manifold pressure above 32" Hg.
Avoid continuous ground operation in cross and tail winds of over 10 knots between 1700 and 2100 r.p.m.
or
1 Hartzell Hub Model PHC-C3YF-1( )F, Blade Model F7663-2R
Pitch: High 33° ± 1°, Low 13.2° ± .2°.
Diameter: Not over 76", not under 72".
Governor: Hartzell E-5, Woodward G210681 or G210776

Propeller Spinner

For the Hartzell Hub Model BHC-C2YF-1( )F: Hartzell P/N C3568 Spinner Assembly
For the Hartzell Hub Model PHC-C3YF-1( )F: Piper PS50077-80 Spinner Assembly (Hartzell C3570)
See NOTE 11.

Airspeed Limits

Never exceed	193 KIAS
Maximum structural cruising	152 KIAS
Maneuvering at 2900 lb.	124 KIAS
Maneuvering at 1893 lb.	97 KIAS
Flaps Extended	108 KIAS
Maximum Gear Retraction	111 KIAS
Maximum Gear Extension	133 KIAS
Maximum Gear Extended	133 KIAS

Center of Gravity Range

(+89.0) to (+93.0) at 2900 lb.
(+85.0) to (+93.0) at 2240 lb. or less
Straight line variation between points given.
Moment due to retraction of landing gear (+819 in-lb.)

Empty Weight C. G. Range

None

Maximum Weight

Ramp: 2912 lb.
Takeoff: 2900 lb.

No. of Seats

4 (2 at +80.5, 2 at +118.1)

Maximum Baggage

200 lb. at (+142.8)

Fuel Capacity

77 gallons at (+95) (2 wing tanks)
See NOTE 1 for data on system fuel.

Oil Capacity

8 quarts at (+13.5) (5 quarts usable)
See NOTE 1 for data on system oil.

Maximum Operation Altitude

20,000 feet

Control Surface Movements

Wing flaps	(±2°)	Up	0°	Down	40°
Ailerons	(±2°)	Up	25°	Down	12.5°
Rudder	(±1°)	Left	33°	Right	33°
Stabilator	(±1°)	Up	14°	Down	10°
Stabilator Tab		Up	2.5° (±1°)	Down	10° (±.5°)

Nose Wheel Travel

(±2°) Left 30° Right 30°

Manufacturer's Serial Numbers	28R-7931001 through 28R-8631005, and 2831001 through 2831038. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28R-7931001 through 28R-8631005, and 2831001 through 2831038 under the delegation option provisions of FAR 21. See NOTE 20.

XXII - Model PA-28-201T (Turbo Dakota), 4 PCLM (Normal Category), Approved December 14, 1978, for S/N 28-7921001 through 28-7921095.

Engine	Continental TSIO-360-FB
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2575 r.p.m., 41" Hg. manifold pressure (200 hp)
Propeller and Propeller Limits	1 Hartzell Hub Model BHC-C2YF-1( )F, Blade Model F8459A-8R Pitch: High 29° ± 1.0°, Low 14.4° ± .2° at 30" station. Diameter: Not over 76", not under 75". Governor: Hartzell E-5 or Woodward G210681 Avoid continuous operation between 2000 and 2200 r.p.m. with engine manifold pressure above 32" Hg. Avoid continuous ground operation in cross and tail winds of over 10 knots between 1700 and 2100 r.p.m.
Propeller Spinner	Hartzell P/N C3568 Spinner Assembly. See NOTE 11.

Airspeed Limits		
	Never exceed	169 KIAS
	Maximum structural cruising	140 KIAS
	Maneuvering at 2900 lb.	122 KIAS
	Maneuvering at 1841 lb.	96 KIAS
	Flaps Extended	102 KIAS

Center of Gravity Range	(+86.0) to (+90.0) at 2900 lb. (+78.0) to (+90.0) at 2240 lb. or less Straight line variation between points given.
Empty Weight C. G. Range	None
Maximum Weight	2900 lb.
No. of Seats	4 (2 at +80.5, 2 at +118.1)
Maximum Baggage	200 lb. at (+142.8)
Fuel Capacity	77 gallons at (+95) (2 wing tanks) See NOTE 1 for data on system fuel.
Oil Capacity	8 quarts at (+13.5) (5 quarts usable) See NOTE 1 for data on system oil.
Maximum Operation Altitude	20,000 feet

Control Surface Movements						
	Wing flaps	(±2°)	Up	0°	Down	40°
	Ailerons	(±2°)	Up	25°	Down	12.5°
	Rudder	(±2°)	Left	27°	Right	27°
	Stabilator	(±1°)	Up	16°	Down	2°
	Stabilator Tab	(±1°)	Up	3°	Down	12°
Nose Wheel Travel		(±1°)	Left	30°	Right	30°

Manufacturer's Serial Numbers: 28-7921001 through 28-7921095. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 28-7921001 through 28-7921095 under the delegation option provisions of FAR 21. See NOTE 20.

DATA PERTINENT TO ALL MODELS

Datum: 78.4" forward of wing leading edge (straight wing only).
78.4" forward of inboard intersection of straight and tapered sections (semi-tapered wings).

Leveling Means: Two screws left side fuselage below window.

Certification Basis: Type Certificate No. 2A13 issued October 31, 1960.
Date of Application for Type Certificate, February 14, 1958.

Delegation Option Authorization granted per FAR 21, Subpart J, July 17, 1968.

PA-28-140 and PA-28-151: CAR 3 effective May 15, 1956, including Amendments 3-1, 3-2, and 3-4; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.955 and 23.959 as amended by Amendment 23-7 effective September 14, 1969; and FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977.

PA-28-150, PA-28-160, PA-28-180, PA-28-235, PA-28S-160, PA-28S-180, PA-28R-180, and PA-28R-200: CAR 3 effective May 15, 1956, including Amendments 3-1 and 3-2; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.955 and 23.959 as amended by Amendment 23-7 effective September 14, 1969; and FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977.

PA-28-161: CAR 3 effective May 15, 1956, including Amendments 3-1 and 3-2; paragraph 3.387(d) of Amendment 3-4; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.955 and 23.959 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977; and FAR 36 effective December 1, 1969, through Amendment 36-4.

For aircraft equipped with Piper factory installed optional Avidyne Entegra system and Mid-Continent Model 4300-411 Electric Attitude Indicator (See Piper Report VB-1892, Appendix E), the additional certification basis for installation specific items only is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.473, 23.561(b)(3), 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.955, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335 as amended by Amdt. 23-20; FAR 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323, 23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357, 23.1431 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition for HIRF (Docket # CE207), date July 30, 2004.

PA-28-181: CAR 3 effective May 15, 1956, including Amendments 3-2 and 3-4; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.207, 23.221, 23.955 and 23.959 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977; and FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977. FAR 36, Appendix G, Amendment 36-16 for the PA-28-181 (Archer III), S/N 2890206 through 2890231, and 2843001 and up.

For aircraft equipped with Piper factory installed optional Avidyne Entegra system and Mid-Continent Model 4300-411 Electric Attitude Indicator (See Piper Report VB-1892, Appendix E), the additional certification basis for installation specific items only is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.473, 23.561(b)(3), 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.955, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335 as amended by Amdt. 23-20; FAR 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323, 23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357, 23.1431 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition for HIRF (Docket # CE207), date July 30, 2004.

PA-28R-201: CAR 3 effective May 15, 1956, including Amendments 3-1 and 3-2; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.965 of FAR 23 effective February 1, 1965; FAR 23.221, 23.955, 23.959, and 23.1091 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.967(e)(2) as amended by Amendment 23-14 effective December 20, 1973; FAR 23.1093 as amended by Amendment 23-15 effective October 31, 1974; FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977; and FAR 36 effective December 1, 1969, through Amendment 36-4 (no acoustical change).

For aircraft equipped with Piper factory installed optional Avidyne Entegra system and Mid-Continent Model 4300-411 Electric Attitude Indicator (See Piper Report VB-1892, Appendix E), the additional certification basis for installation specific items only is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.473, 23.561(b)(3), 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.955, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335 as amended by Amdt. 23-20; FAR 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323, 23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357, 23.1431 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition for HIRF (Docket # CE207), date July 30, 2004.

PA-28R-201T: CAR 3 effective May 15, 1956, through Amendment 3-2 including paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.965 of FAR 23 effective February 1, 1965; FAR 23.221, 23.901, 23.909, 23.955, 23.959, 23.1041, 23.1043, 23.1047, 23.1143, and 23.1527 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.1441 as amended by Amendment 23-9 effective June 17, 1970; FAR 23.967(e)(2) as amended by Amendment 23-14 effective December 20, 1973; FAR 23.1305 as amended by Amendment 23-15 effective October 31, 1974; FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977; and FAR 36 effective December 1, 1969, through Amendment 36-4.

PA-28-236: CAR 3 effective May 15, 1956, through Amendment 3-2; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR23.221, 23.955, 23.959 and 23.1091 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.1093 as amended by Amendment 23-17 effective February 1, 1977; FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21 effective March 1, 1978; and applicable portions of FAR 36, as amended by Amendment 36-9 effective April 3, 1978.

PA-28RT-201: CAR 3, effective May 15, 1956, through Amendment 3-2; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.965 of FAR 23 effective February 1, 1965; FAR 23.207, 23.221, 23.955, 23.959, and 23.1091 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.201, 23.203, 23.427(c), and 23.967(e)(2) as amended by Amendment 23-14 effective December 20, 1973; FAR 23.1093 as amended by Amendment 23-15 effective October 31, 1974; FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21 effective March 1, 1978; and applicable portions of FAR 36 as amended by Amendment 36-10 effective July 31, 1978.

PA-28RT-201T: CAR 3 effective May 15, 1956, through Amendment 3-2; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.207, 23.221, 23.901, 23.909, 23.955, 23.959, 23.1041, 23.1043, 23.1047, 23.1091, 23.1143, and 23.1527 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.201, 23.203, 23.427(c), and 23.967(e)(2) as amended by Amendment 23-14 effective December 20, 1973; FAR 23.1093 and 23.1305 as amended by Amendment 23-15 effective October 31, 1974; FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21 effective March 1, 1978; and applicable portions of FAR 36 as amended by Amendment 36-10 effective July 31, 1978.
Compliance with FAR 23.1441 as amended by Amendment 23-9 effective June 17, 1970, will be established with optional oxygen equipment.

PA-28-201T: CAR 3 effective May 15, 1956, through Amendment 3-2; paragraphs 3.304 and 3.705 of Amendment 3-7 effective May 3, 1962; FAR 23.965 of FAR 23 effective February 1, 1965; FAR23.207, 23.221, 23.901, 23.909, 23.955, 23.959, 23.1041, 23.1043, 23.1047, 23.1091, and 23.1527 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.201 and 23.203 as amended by Amendment 23-14 effective December 20, 1973; FAR 23.1305 as amended by Amendment 23-15 effective October 31, 1974; FAR 23.1093 and 23.1143 as amended by Amendment 23-17 effective February 1, 1977; FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20 effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21 effective March 1, 1978; and applicable portions of FAR 36 as amended by Amendment 36-10 effective July 31, 1978.
Compliance with FAR23.1441 as amended by Amendment 23-9 effective June 17, 1970, will be established with optional oxygen equipment.

Equivalent Safety Finding: CAR 3.757 for Models PA-28-161, PA-28R-201, PA-28R-201T, PA-28-236, PA-28RT-201, PA-28RT-201T, and PA-28-201T only.

Production Basis

Production Certificate No. 206 issued and the manufacturer authorized to issue airworthiness certificates under the delegation option provisions of FAR 21.

Equipment

The basic required equipment as prescribed in the applicable airworthiness regulation (see Certification Basis) must be installed in the aircraft for certification.
In addition, the following documents are required:

MODEL	***AFM/POH***	***REPORT NO.***	***APPROVED***	***SERIAL EFFECTIVITY***
PA-28-140	AFM	VB-160	2/14/64	28-20001 through 28-26946, and 28-7125001 through 28-7125641
	AFM	VB-339	7/21/71	28-7225001 through 28-7325674
	AFM	VB-557	5/14/73	28-7425001 through 28-7625275
	POH	VB-770	6/16/76	28-7725001 through 28-7725290
PA-28-150	AFM	VB-166	6/2/61	28-1 through 28-4377
PA-28-151	AFM	VB-573	7/25/73	28-7415001 through 28-7615435
	POH	VB-780	6/18/80	28-7715001 through 28-7715314
PA-28-160	AFM	VB-168	10/25/60	28-1 through 28-4377, and 28-1760A
PA-28S-160	AFM	VB-177	2/25/63	28-1 through 28-1760, and 28-1760A
PA-28-161	POH	VB-880	12/16/76	28-7716001 through 28-8216300
	POH	VB-1180	7/1/82	28-8316001 through 28-8616057, and 2816001 through 2816119
	POH	VB-1610	7/12/95	2842001 and up
	POH Supp.	VB-1546	6/30/92	28-8316001 through 28-8616057, and 2816001 through 2816119 (See NOTE 28)
	POH	VB-1360	9/9/88	2841001 through 2841365
	POH Supp.	VB-1545	5/29/92	2841001 through 2841365 (See NOTE 28)
	POH	VB-1565	7/1/94	2816110 through 2816119
PA-28-180	AFM	VB-163	8/3/62	28-671 through 28-5600
	AFM	VB-210	4/22/69	28-5601 through 28-5859, and 28-7105001 through 28-7205091
	AFM	VB-355	9/1/71	28-7205092 through 28-7205318
	AFM	VB-437	5/22/72	28-7305001 through 28-7305601 and 28-E13
	AFM	VB-558	5/14/73	28-7405001 through 28-7505260
PA-28S-180	AFM	VB-179	5/10/63	28-671 through 28-5859, and 28-7105001 through 28-7105234
PA-28-181	POH	VB-760	8/15/75	28-7690001 through 28-7690467
	POH	VB-790	6/18/76	28-7790001 through 28-7990589
	POH	VB-1120	7/2/79	28-8090001 through 28-8690056, 28-8690061, 28-8690062, and 2890001 through 2890205
		VB-1611	7/12/95	2843001 and up
	POH	VB-1563	8/19/94	2890206 through 2890231
PA-28R-180	AFM	VB-173	6/8/67	28R-30001 through 28R-31270, and 28R-7130001 through 28R-7130013
PA-28R-200	AFM	VB-175	1/9/69	28R-35001 through 28R-35820, and 28R-7135001 through 28R-7135229
	AFM	VB-343	10/14/71	28R-7235001 through 28R-7335446
	AFM	VB-560	5/14/73	28R-7435001 through 28R-7635545
PA-28R-201	POH	VB-870	12/21/76	28R-7737001 through 28R-7837317
	POH	VB-1365	9/15/88	2837001 through 2837061
	POH	VB-1612	7/12/95	2844001 and up

(Continued)

MODEL	***AFM/POH***	***REPORT NO.***	***APPROVED***	***SERIAL EFFECTIVITY***
PA-28R-201T	POH	VB-800	12/20/76	28R-7703001 through 28R-7803374
	POH	VB-1370	11/9/89	2803001 through 2803012
PA-28-235	AFM	VB-170	7/15/63	28-10001 through 28-11378, and 28-7110001 through 28-7210023
	AFM Supp.	VB-357	8/25/71	28-10001 through 28-11378, and 28-7110001 through 28-7110023
	AFM	VB-442	6/9/72	28-7310001 through 28-7310176 and 28-E11
	AFM	VB-559	5/14/73	28-7410001 through 28-7610202
	POH	VB-810	1/21/77	28-7710001 through 28-7710089
PA-28-236	AFM	FT-124, App E. OR	6/1/78	28-7911001 through 28-8611008, and 2811001 through 2811050
	POH	VB-910	6/1/78	28-7911001 through 28-8611008, and 2811001 through 2811050
PA-28-236	POH	VB-1613	7/12/95	2845001 and up
PA-28RT-201	AFM	FT-121, App C. OR	11/7/78	28R-7918001 through 28R-8218026
	POH	VB-930	11/30/78	28R-7918001 through 28R-7918267
PA-28RT-201	POH	VB-1130	9/14/79	28R-8018001 through 28R-8218026
PA-28RT-201T	AFM	FT-130, App E. OR	11/7/78	28R-7931001 through 28R-8631005, and 2831001 through 2831013
	POH	VB-940	11/30/78	28R-7931001 through 28R-8631005, and 2831001 through 2831013
PA-28-201T	AFM	FT-126, App E. OR	12/14/78	28-7921001 through 28-7921095
		VB-920	1/25/79	28-7921001 through 28-7921095

NOTE 1: Current weight and balance report, including list of equipment included in certification empty weight and loading instructions, when necessary, must be provided for each aircraft at the same time of original certification.

The certificated empty weight and corresponding center of gravity location must include undrainable system oil (not included in the oil capacity) and unusable fuel as noted below.

Unusable Fuel and Oil Quantity	***Applicable Models and Serial Numbers***
Fuel 12.0 lb. at (+103.0)	PA-28R-180, PA-28R-200: all Serial Nos. PA-28-180: S/N 28-E13, and 28-7305001 through 28-7505260
Fuel 12.0 lb. at (+103.0)	PA-28-235: S/N 28-E11, and S/N 28-7310001 through 28-7710089
Fuel 12.0 lb. at (+103.0)	PA-28-151: S/N 28-7415001 through 28-7715314
Fuel 2.2 lb. at (+103.0)	PA-28-140, PA-28-150, PA-28-160: all Serial Nos.
Fuel 2.2 lb. at (+103.0)	PA-28-180: S/N 28-03, S/N 28-671 through 28-5859, and 28-7105001 through 28-7205318
Oil 1.8 lb. at (+27.5)	PA-28-140, PA-28-150, PA-28-160, PA-28-180: S/N 28-03, 28-1 through 28-1760, and 28-1760A
Oil 1.8 lb. at (+27.5)	PA-28-151: S/N 28-7415001 through 28-7715314

Unusable Fuel and Oil Quantity	***Applicable Models and Serial Numbers***
Oil 1.8 lb. at (+40.5)	PA-28-150, PA-28-160: S/N 28-1761 through 28-4377 PA-28-180: S/N 28-1761 through 28-5859, and 28-7105001 through 28-7205318
Oil 1.8 lb. at (+35.5)	PA-28-180: S/N 28-E13, 28-7305001 through 28-7505260
Oil 1.8 lb. at (+36.5)	PA-28R-180: all Serial Nos.
Oil 3.9 lb. at (+35.6)	PA-28R-200: S/N 28R-35001 through 28R-35820, and 28R-7135001 through 28R-7135229
Fuel 2.3 lb. at (+103.0) Oil 2.4 lb. at (+41.0)	PA-28-235: S/N 28-10001 through 28-11378, and 28-7110001 through 28-7210023
Oil 2.4 lb. at (+36.0)	PA-28-235: S/N 28-E11, and 28-7310001 through 28-7710089
Oil 3.9 lb. at (+30.6)	PA-28R-200: S/N 28R-7235001 through 28R-7635545
Oil 1.8 lb. at (+35.5) Fuel 12.0 lb. at (+103.0)	PA-28-181: S/N 28-7690001 through 28-8690056, 28-8690061, 28-8690062, and 2890001 through 2890231, and 2843001 and up
Fuel 30.0 lb. at (+103.0) Oil 3.9 lb. at (+30.6)	PA-28R-201: S/N 28R-7737001 through 28R-7837317, 2837001 through 2837061, and 2844001 and up
Fuel 30.0 lb. at (+103.0)	PA-28R-201T: S/N 28R-7703001 through 28R-7803369, 2831001 through 2831013
Oil 6.0 lb. at (+19.1)	PA-28-161 Cadet: S/N 2841001 through 2841365
Fuel 12.0 lb. at (+103.0) Oil 1.8 lb. at (+27.5)	PA-28-161: S/N 28-7716001 through 28-8616057, and 2816001 through 2816119 and 2842001 and up
Fuel 30.0 lb. at (+103.0) Oil 5.2 lb. at (+36.0)	PA-28-236: S/N 28-7911001 through 28-8611008, 2811001 through 2811050, and 2845001 and up
Fuel 30.0 lb. at (+103.0) Oil 3.9 lb. at (+30.6)	PA-28RT-201: S/N 28R-7918001 through 28R-8218026
Fuel 30.0 lb. at (+103.0) Oil 6.0 lb. at (+19.1)	PA-28RT-201T: S/N 28R-7931001 through 28R-8631005, 2831001 through 2831013
Fuel 30.0 lb. at (+103.0) Oil 6.0 lb. at (+19.1)	PA-28-201T: S/N 28-7921001 through 28-7921095

NOTE 2 The following placards must be displayed in clear view of the pilot:

In Normal Category Aircraft
"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUAL."

In aircraft certificated in both Normal and Utility Categories
"THIS AIRPLANE MAY BE OPERATED AS A NORMAL OR UTILITY CATEGORY AIRPLANE IN COMPLIANCE WITH OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUAL."

Reference AFM for additional required placards.

NOTE 3 The Models PA-28-160 and PA-28-180, S/N 28-508 to 28-1760, and 28-1760A may be converted to the seaplane configuration, PA-28S-160 and PA-28S-180, in accordance with Piper Drawing No. 62008.

The Model PA-28-180, S/N 28-1761 through 28-5859, and 28-7105001 through 28-7205318, may be converted to the seaplane configuration, PA-28S-180, in accordance with Piper Drawing No. 65680.

NOTE 4 Takeoff r.p.m. for Models PA-28-180 and PA-28S-180, S/N 28-671 through 28-1760, and 28-1760A, restricted due to fuel flow capability of the emergency pump.

NOTE 5 The Models PA-28-150, PA-28-160, PA-28-180; S/N 28-03, 28-1 through 28-5859, and 28-7105001 through 28-7205318 and PA-28-235; S/N 28-10001 through 28-11378, and 28-7110001 through 28-7210023, may be operated with the door removed in accordance with the FAA approved Airplane Flight Manual Supplement, Piper Report VB-182, dated September 3, 1963.

The Model PA-28-140 may be operated with the door removed in accordance with the FAA approved Airplane Flight Manual Supplement dated August 12, 1965.

NOTE 6 The Model PA-28-140, 2 PCLM (Normal Category Only), S/N 28-20001 through 28-20939 may be converted:

(a) To a maximum weight of 2150 lb. by the installation of Piper Kit 756 962 and Sensenich propeller M74DM58.

(b) To the four place, 4 PCLM (See Item VIII), configuration in accordance with Piper Drawing 65599.

NOTE 7 The Model PA-28-140, 2 PCLM, S/N 28-20940 through 28-26946, and 28-7125001 through 28-7725290, may be converted to the four place, 4 PCLM (See Item VIII), configuration by the installation of Piper Kit 756 941 and appropriate seats.

NOTE 8 The maximum cargo allowable of 125 lb. for S/N 28-1 through 28-1760, and 28-1760A may be increased to 200 lb. in accordance with Piper Service Spares Letter No. 242.

NOTE 9 The Model PA-28-180 (Normal Category), S/N 28-671 through 28-3832, may be operated in Utility Category in accordance with Service Spares Letter No. 258.

NOTE 10 All PA-28 models with Lycoming O-360-A3A engine and Sensenich propeller Model M76EMM-0, M76EMMS-0, 76EM8S5-0, or 76EM8-0 must avoid continuous operation between 2150 and 2350 r.p.m. Placards must be installed in accordance with Piper Service Letter No. 526, and Airplane Flight Manual Supplement No. 1, dated April 22, 1969.

NOTE 11 The Models PA-28-140, PA-28-150, PA-28-151, PA-28-160, PA-28-180; S/N 28-03, 28-1 through 28-5859, and 28-7105001 through 28-7205318; PA-28R-180 and PA-28R-200 may be operated with the spinner dome removed, or with the spinner dome and rear bulkhead removed. The PA-28-151, S/N 28-7415001 through 28-7715314, may be operated with the spinner dome removed, or with the spinner dome and front and rear bulkheads removed. The PA-28-180, S/N 28-7305001 through 28-7505260, and the PA-28-181; S/N 28-7690001 through 28-8690062, and 2890001 through 2890205, may be operated with the spinner dome removed. The PA-28R-201; S/N 28R-7737002 through 28R-7837317, 2837001 through 2837061, and 2844001 and up, may be operated with the spinner dome removed. The PA-28R-201T; S/N 28R-7703001 through 28R-7803374, and 2803001 through 2803012, may be operated with the spinner dome removed. The PA-28-161, S/N 28-7716001 through 28-8216300 may be operated with the spinner dome and front and rear bulkheads removed. The PA-28-161; S/N 28-8316001 through 28-8616057, 2816001 through 2816119, and PA-28-161 (Cadet), S/N 2841001 through 2841365, may be operated with the spinner dome removed, or with the spinner dome and front and rear bulkheads removed. The PA-28-236; S/N 28-7911001 through 28-8611008, 2811001 through 2811050, and 2845001 and up, may be operated with the spinner dome removed. The PA-28RT-201, S/N 28R-7918001 through 28R-8218026, may be operated with the spinner dome removed. The PA-28RT-201T; S/N 28R-7931001 through 28R-8631005, and 2831001 through 2831013, may be operated with the spinner dome removed. The PA-28-201T, S/N 28-7921001 through 28-7921095, may be operated with the spinner dome removed.

NOTE 12 Maximum baggage may be increased to 200 lb. at (+117) by the installation of Piper Kit 756 962 and Sensenich propeller M74DM-58 or 74DM6-0-58. Maximum baggage may be increased to 300 lb. (200 lb. at +117 and 100 lb. at +133) by the installation of Piper Kit 756 962, Sensenich propeller M74DM-58 or 74DM6-0-58 and when modified in accordance with Piper Drawing 66671.

NOTE 13 Maximum baggage may be increased to 300 lb. (200 lb. at +117 and 100 lb. at +133) when modified in accordance with Piper Drawing 66671.

NOTE 14 The Model PA-28-235; S/N 28-10001 through 28-11378, and 28-7110001 through 28-7210023, may be operated with the spinner dome removed, or with the spinner dome and rear bulkhead removed on the constant speed propeller installation only.

NOTE 15 The Model PA-28-180, S/N 28-671 through 28-5859, may be operated to the expanded C.G. envelope:

(a) For S/N 28-671 through 28-3072 by the installation of P/N 65280-00 tube - Landing Gear Strut Piston in accordance with Piper Service Letter 567 and in accordance with FAA approved Airplane Flight Manual Supplement No. 2, dated September 14, 1970, for Model PA-28-180 (Piper Report VB-261).
(b) For S/N 28-3073 through 28-5859 in accordance with FAA approved Airplane Flight Manual Supplement No. 2, dated September 14, 1970, for Model PA-28-180 (Piper Report VB-261).

NOTE 16 The Model PA-28-235, S/N 28-10001 through 28-11378, may be operated to the expanded C.G. envelope in accordance with FAA approved Airplane Flight Manual Supplement No. 1, dated September 14, 1970, for Model PA-28-235 (Piper Report VB-274).

NOTE 17 The following serial numbered aircraft are not eligible for import certification to the U.S.: 28-5035, 28-5047, 28-5178, 28-5262, 28-5397, 28-5435, 28-11077, 28-11101, 28-11140, 28-11180, 28-11200, 28-11212, 28-11227, 28-11254, 28-11255, 28-24660, 28-24701, 28R-30861, 28R-30952, 28R-30972, 28R-31043, and 28R-31091. These aircraft have identification plates stamped "Ensenblado en Colombia."

NOTE 18 Two propeller flange bushings must be replaced with Lycoming #72068S bushings at propeller blade positions corresponding to noncounterbored bolt holes in order to use the McCauley propeller.

NOTE 19 Two propeller flange bushings must be replaced with Lycoming #72060S index bushing and Lycoming #721061S bushing, at flange index mark and opposite, in order to use the McCauley propellers. A spacer, Piper P/N 79528-0, is also required between propeller and engine flange.

NOTE 20 The following model and serial number aircraft are not eligible for import certification to the U.S.:
PA-28-140:
28-24660, 28-24701, 28-7225490, 28-7225491, 28-7225492, 28-7225493, 28-7225494, 28-7225495, 28-7225496, 28-7225497, 28-7225498, 28-7225499, 28-7325238, 28-7325371, 28-7325372, 28-7325373, 28-7325374, 28-7325375, 28-7325376, 28-7325377, 28-7325378, 28-7325379, 28-7325508, 28-7325516, 28-7325525, 28-7325526, 28-7325555, 28-7325556, 28-7325557, 28-7325558, 28-7325580, 28-7325581, 28-7325599, 28-7325600, 28-7425217, 28-7425222, 28-7425224, 28-7425271, 28-7425272, 28-7425273, 28-7425274, 28-7425275, 28-7425276, 28-7425277, 28-7425278, 28-7425279, 28-7425304, 28-7425305, 28-7425306, 28-7425307, 28-7425344, 28-7425383, 28-7425384, 28-7525142, 28-7525144, 28-7525177, 28-7525180, 28-7525181, 28-7525182, 28-7525197, 28-7525201, 28-7525215, 28-7525216, 28-7525217, 28-7525218, 28-7525230, 28-7525238, 28-7525243, 28-7525244, 28-7525246, 28-7525247, 28-7625060, 28-7625061, 28-7625130, 28-7625144, 28-7625272, 28-7625273, 28-7625274, 28-7625275, 28-7725053, and 28-7725188.
PA-28-161:
28-7816330, 28-7916235, 28-8016266, 28-8116157, 28-8116158, 28-8316031, 28-8316032, 28-8616006, 28-8616007, 2816006, 2816020, 2816021, and 2816022.
PA-28-180:
28-5047, 28-5178, 28-5262, 28-5397, 28-5435, 28-7305315, 28-7305316, 28-7305499, 28-7405136, 28-7405137, 28-7405138, 28-7405139, 28-7405158, 28-7405160, 28-7405161, 28-7405167, 28-7405184, 28-7405185, 28-7405186, 28-7405187, 28-7405223, 28-7505138, 28-7505148, 28-7505159, 28-7505168, 28-7505169, 28-7505179, 28-7505189, and 28-7505260.

NOTE 20 (cont.)

PA-28-181:
28-7690362, 28-7790343, 28-7790344, 28-7790388, 28-7790533, 28-7790571, 28-7790605, 28-7890060, 28-7890185, 28-7890290, 28-7890351, 28-7890352, 28-7890406, 28-7890407, 28-7890463, 28-7890464, 28-7890465, 28-7890466, 28-7890480, 28-7890481, 28-7890507, 28-7890508, 28-7890509, 28-7890510, 28-7890534, 28-7890550, 28-7890551, 28-7990158, 28-7990251, 28-8090203, 28-8090243, 28-8090274, 28-8090349, 28-8190032, 28-8190098, 28-8190099, 28-8190174, 28-8190175, 28-8190200, 28-8190201, 28-8190261, 28-8190262, 28-8190317, 28-8190318, 28-8290020, 28-8290021, 28-8290022, 28-8290122, 28-8290123, 28-8290124, 28-8290125, 28-8290146, 28-8290147, 28-8290148, 28-8290149, 28-8390031, 28-8390032, 28-8390057, 28-8390058, 28-8390059, 28-8390060, 28-8690061, 28-8690062, 2890035, and 2890036.
PA-28-201T:
28-7921085
PA-28-235:
28-11077, 28-11101, 28-11140, 28-11180, 28-11200, 28-11212, 28-11227, 28-11254, 28-11255, 28-11370, 28-11371, 28-11372, 28-11373, 28-7310074, 28-7310152, 28-7310153, 28-7310172, 28-7410074, 28-7410078, 28-7410089, 28-7410090, 28-7510072, 28-7510073, 28-7610087, 28-7610168, 28-7710033, 28-7710068, and 28-7710089.
PA-28-236:
28-7911027, 28-7911028, 28-7911029, 28-7911030, 28-7911136, 28-7911219, 28-7911220, 28-7911221, 28-7911252, 28-8011020, 28-8011021, 28-8011062, 28-8011092, 28-8011093, 28-8011094, 28-8011107, 28-8111030, 28-8111038, 28-8111058, 28-8111068, 28-8111069, 28-8111070, 28-8111095, 28-8411021, 28-8411022, 28-8411023, 28-8411024, 28-8411026, 28-8411027, 28-8411028, and 28-8411029.
PA-28R-180:
28R-31091
PA-28R-200:
28R-7335201, 28R-7335202, 28R-7335326, 28R-7335328, 28R-7335377, 28R-7335387, 28R-7335395, 28R-7335397, 28-7435214, 28-7435229, 28-7435252, 28-7435253, 28R-7535146, 28R-7535149, 28R-7535167, 28R-7535168, 28R-7535214, 28R-7535217, and 28R-7635377.
PA-28R-201:
28R-7737119, 28R-7837076, 28R-7837148, 28R-7837149, 28R-7837188, 28R-7837189, 28R-7837225, 28R-7837226, 28R-7837248, 28R-7837249, 28R-7837273, 28R-7837274, 28R-7837294, 28R-7837316, and 28R-7837317.
PA-28R-201T:
28R-7703069, 28R-7703132, 28R-7703184, 28R-7703185, 28R-7703285, 28R-7703382, 28R-7803064, 28R-7803156, 28R-7803207, 28R-7803208, 28R-7803251, 28R-7803291, 28R-7803292, 28R-7803293, 28R-7803294, 28R-7803295, 28R-7803299, 28R-7803300, 28R-7803317, 28R-7803318, 28R-7803319, 28R-7803320, 28R-7803344, 28R-7803360, 28R-7803361, 28R-7803370, 28R-7803371, 28R-7803372, and 28R-7803373.
PA-28RT-201:
28R-8118029, 28R-8118054, 28R-8118078, 28R-8218015, and 28R-8218016.
PA-28RT-201T:
28R-7931122, 28R-7931205, 28R-7931206, 28R-7931262, 28R-7931296, 28R-7931297, 28R-8031062, 28R-8131029, 28R-8131083, and 28R-8131183.

In addition, aircraft having the following serial number are not eligible for import certification to the U.S.:

AR28-7325238, AR28-7325371, AR28-7325372, AR28-7325373, AR28-7325374, AR28-7325375, AR28-7325376, AR28-7325377, AR28-7325378, AR28-7325379, AR28-7305315, AR28-7305316, AR28-7335201, AR28-7335202, AR28-7325508, AR28-7325516, AR28-7325525, AR28-7325526, AR28-7310152, AR28-7310153, AR28-7325555, AR28-7325556, AR28-7325557, AR28-7325558, AR28-7305480, AR28-7305499, AR28-7335326, AR28-7335328, AR28-7325580, AR28-7325581, AR28-7325599, AR28-7325600, AR28-7335395, and AR28-7335397.

NOTE 21

Engines with serial numbers ending with "A" require the F-4-13 propeller governor assembly. Other engines require the F-4-3( ) propeller governor assembly.

NOTE 22

Hartzell Propeller HC-C2YK-1( )/7666A-2 or HC-C2YK-1( )F/F7666A-2 approved with IO-360-C1C engine only (S/N 28R-7235001 through S/N 28R-7635516).

NOTE 23 McCauley Propeller B2D34C213/90DHA-16 approved with IO-360-C1C6 engine only (S/N 28R-7635517 through 28R-7635545).

NOTE 24 On Models PA-28-161; S/N 28-7816001 through 28-8616057, and S/N 2816001 through 2816109, and PA-28-181; S/N 28-7890001 through 28-8690056, 28-8690061, 28-8690062, 2890001 through 2890231, and 2843001 and up, the wheel fairings but not the landing gear strut fairings may be removed.

NOTE 25 On Models PA-28-201T; S/N 28-7921001 through 28-7921095, and PA-28-236; S/N 28-7911001 through 28-8611008, 2811001 through 2811050, and 2845001 and up, the wheel fairings alone or the wheel fairings but not the landing gear strut fairings may be removed.

NOTE 26 With installation of Piper Kit 88050, PA-28-161 2325 lb. Maximum Gross Weight Modification, the following weights apply:

Normal Category: Ramp - 2332 lb.
Takeoff - 2325 lb.

Utility Category: Ramp - 2027 lb.
Takeoff - 2020 lb.

(See POH VB-1180 Supplement dated October 5, 1985.)

NOTE 27 With installation of Piper Kit 88168, PA-28-161 Cadet 2202 lb. Maximum Gross Weight Modification, the following weights apply:

Normal Category: Ramp - 2209 lb.
Takeoff - 2202 lb.

Utility Category: Ramp - 2027 lb.
Takeoff - 2020 lb.

(See POH VB-1410 dated March 14, 1990.)

NOTE 28 POH Supplement VB-1546 is applicable to POH VB-1180. POH Supplement VB-1545 is applicable to POH VB-1360. Supplements VB-1545 and VB-1546 restrict maximum r.p.m. limitation to 2600 r.p.m. for foreign countries requiring reduced noise level operation (Piper Kit No. 766 277 for PA-28-161 (Cadet) and Piper Kit No. 766 278 for PA-28-161 (Warrior II)).

...END...

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

	3A19
	Revision 45
	CESSNA
150	150J
150A	150K
150B	A150K
150C	150L
150D	A150L
150E	150M
150F	A150M
150G	152
150H	A152
	June 1, 2007

TYPE CERTIFICATE DATA SHEET NO. 3A19

"**WARNING**: Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage, and is therefore prohibited on Cessna airplanes."

This data sheet which is a part of type certificate No. 3A19 prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P.O. Box 7704
Wichita, Kansas 67277

I - Model 150, 2 PCLM (Utility Category), Approved July 10, 1958
Model 150A, 2 PCLM (Utility Category), Approved June 14, 1960
Model 150B, 2 PCLM (Utility Category), Approved June 20, 1961
Model 150C, 2 PCLM (Utility Category), Approved June 15, 1962

Engine — Continental O-200-A

*Fuel — 80/87 min. grade aviation gasoline

*Engine limits — For all operations, 2750 r.p.m. (100 hp.)

Propeller and propeller limits

1. Sensenich 69CK — 24 lb. (-32)
   Diameter: not over 69 in., not under 67.5 in.
   Static r.p.m. at maximum permissible throttle setting: not over 2470, not under 2320
   No additional tolerance permitted
2. McCauley 1A100/MCM — 21 lb. (-32)
   Diameter: not over 69 in., not under 67.5 in.
   Static r.p.m. at maximum permissible throttle setting: not over 2475, not under 2375
   No additional tolerance permitted
3. McCauley 1A101/DCM — 21 lb. (-32)
   Diameter: not over 69 in., not under 67.5 in.
   Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500
   No additional tolerance permitted

*Airspeed limits (CAS)

Never exceed	157 m.p.h.	(136 knots)
Maximum structural cruising	120 m.p.h.	(104 knots)
Maneuvering	106 m.p.h.	(92 knots)
Flaps extended	85 m.p.h.	(74 knots)

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Rev No.	45	43	43	41	42	41	41	41	41	41	41	38	39	30	30	32	32	45	44

I - Model 150, Model 150A, Model 150B, Model 150C (cont'd)

C.G. range	(+33.4) to (+36.0) at 1500 lb. (+32.2) to (+36.0) at 1250 lb. or less Straight line variation between points given
Empty weight C.G. range	None
Leveling means	Top edge of fuselage splice plate
*Maximum weight	1500 lb.
No. of seats	2 at (+39); (for child's optional jump seat refer to Equipment List)
Maximum baggage	80 lb. at (+65)
Fuel capacity	26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42) See NOTE 1 for data on system fuel
Oil capacity	6 qt. (-13.5; unusable 2 qt.) See NOTE 1 for data on system oil

Control Surface Movements

Wing flaps	Retracted	0°
	1st notch	10°
	2nd notch	20°
	3rd notch	30°
	4th notch	40°
Ailerons	Up 20°	Down 15°
Elevator	Up 25°	Down 15°
Elevator tab	Up 10°	Down 20°
Rudder	Right 16°	Left 16°

Serial Nos. eligible

Model 150:	617, 17001 through 17999, 59001 through 59018
Model 150A:	628, 15059019 through 15059350
Model 150B:	15059351 through 15059700
Model 150C:	15059701 through 15060087

II - Model 150D, 2 PCLM (Utility Category), Approved July 19, 1963
Model 150E, 2 PCLM (Utility Category), Approved June 18, 1964
Model 150F, 2 PCLM (Utility Category), Approved May 27, 1965

Engine	Continental O-200-A
*Fuel	80/87 min. grade aviation gasoline
*Engine limits	For all operations, 2750 r.p.m. (100 hp.)

Propeller and propeller limits

1.	Sensenich 69CK Diameter: not over 69 in., not under 67.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2470, not under 2320 No additional tolerance permitted	24 lb. (-32)
2.	McCauley 1A100/MCM Diameter: not over 69 in., not under 67.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2475, not under 2375 No additional tolerance permitted	21 lb. (-32)
3.	McCauley 1A101/DCM Diameter: not over 69 in., not under 67.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500 No additional tolerance permitted	21 lb. (-32)

II - Model 150D, Model 150E, Model 150F (cont'd)

*Airspeed limits (CAS)	Never exceed	162 m.p.h. (141 knots)		
	Maximum structural cruising	120 m.p.h. (104 knots)		
	Maneuvering	109 m.p.h. (95 knots)		
	Flaps extended	100 m.p.h. (87 knots)		
C.G. range	(+32.9) to (+37.5) at 1600 lb. (+31.5) to (+37.5) at 1280 lb. or less Straight line variation between points given			
Empty weight C.G. range	None			
Leveling means	Top of tailcone			
*Maximum weight	1600 lb.			
No. of seats	2 at (+39); (for child's optional jump seat refer to Equipment List)			
Maximum baggage	120 lb. at (+65) (150D, 150E) 120 lb. - Reference weight and balance data (150F)			
Fuel capacity	26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42) See NOTE 1 for data on system fuel			
Oil capacity	6 qt. (-13.5; unusable 2 qt.) See NOTE 1 for data on system oil			
Control Surface Movements	Wing flaps (150D, 150E)	Retracted	0°	
		1st Notch	10°	
		2nd Notch	20°	
		3rd Notch	30°	
		4th Notch	40°	
	Wing flaps (150°F)		Down 0°	-40° ±2°
	Ailerons	Up 20°	Down 15°	
	Elevator	Up 25°	Down 15°	
	Elevator tab	Up 10°	Down 20°	
	Rudder (150D, 150E)	Right 16°	Left 16°	
	(150F)	Right 23°	Left 23°	
		(measured parallel to chord)		
Serial Nos. eligible	Model 150D: 15060088 through 15060772			
	Model 150E: 644, 15060773 through 15061532			
	Model 150F: 15061533 through 15064532			

III - Model 150G, 2 PCLM (Utility Category), Approved May 5, 1966
2 PCSM (Utility Category), Approved August 12, 1966
Model 150H, 2 PCL-SM (Utility Category), Approved August 10, 1967
Model 150J, 2 PCL-SM (Utility Category), Approved May 2, 1968
Model 150K, 2 PCL-SM (Utility Category), Approved June 5, 1969

Engine	Continental O-200-A	
*Fuel	80/87 min. grade aviation gasoline	
*Engine limits	For all operations, 2750 r.p.m. (100 hp.)	
Propeller and propeller limits	1. Sensenich 69CK Diameter: not over 69 in., not under 67.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2470, not under 2320 No additional tolerance permitted	24 lb. (-32)

III - Model 150G, Model 150H, Model 150J, Model 150K (cont'd)

	2. McCauley 1A100/MCM Diameter: not over 69 in., not under 67.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2475, not under 2375 No additional tolerance permitted	21 lb. (-32)
	3. McCauley 1A90/CF (seaplane only) Diameter: not over 75 in., not under 73.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500 No additional tolerance permitted	24 lb. (-32)
	4. McCauley 1A101/DCM Diameter: not over 69 in., not under 67 in. Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500 No additional tolerance permitted	21 lb. (-32)

*Airspeed limits (CAS)	Never exceed	162 m.p.h. (141 knots)
	Maximum structural cruising	120 m.p.h. (104 knots)
	Maneuvering	109 m.p.h. (95 knots)
	Flaps extended	100 m.p.h. (87 knots)

C.G. range

Landplane
(+32.9) to (+37.5) at 1600 lb.
(+31.5) to (+37.5) at 1280 lb. or less
Seaplane
(+33.8) to (+36.5) at 1650 lb.
(+33.0) to (+36.5) at 1400 lb. or less
Straight line variation between points given

Empty weight C.G. range: None

Leveling means: Top of tailcone

*Maximum weight:
Landplane - 1600 lb.
Seaplane - 1650 lb. (Edo 88A-1650 floats)

No. of seats: 2 at (+39); (for child's optional jump seat, refer to Equipment List)

Maximum baggage: 120 lb. - Reference weight and balance data

Fuel capacity:
Landplane
26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42.0)
Seaplane
26 gal. (21.5 gal. usable, two 13 gal. tanks in wings at +42.0)
See NOTE 1 for data on system fuel

Oil capacity:
6 qt. (-13.5; unusable 2 qt.)
See NOTE 1 for data on system oil

Control surface movements

Wing flaps			Down	0° -40° ±2°
Ailerons	Up	20° +2°, -0°	Down	14° +2°, -0°
Elevator	Up	25° ±1°	Down	15° ±1°
Elevator tab	Up	10° ±1°	Down	20° ±1°
Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°

(measured perpendicularly to hinge line)

Serial Nos. eligible:
Model 150G: 15064533 through 15067198 (except 15064970)
Model 150H: 649, 15067199 through 15069308
Model 150J: 15069309 through 15071128
Model 150K: 15071129 through 15072003

IV - Model A150K, Aerobat, 2 PCLM (Acrobatic Category), Approved June 5, 1969

Engine	Continental O-200-A
*Fuel	80/87 min. grade aviation gasoline
*Engine limits	For all operations, 2750 r.p.m. (100 hp.)
Propeller and propeller limits	1. McCauley 1A101/DCM 21 lb. (-32) Diameter: not over 69 in., not under 67 in. Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500 No additional tolerance permitted
*Airspeed limits (CAS)	Never exceed 193 m.p.h. (168 knots) Maximum structural cruising 140 m.p.h. (122 knots) Maneuvering 118 m.p.h. (103 knots) Flaps extended 100 m.p.h. (87 knots)
C.G. range	(+32.9) to (+37.5) at 1600 lb. (+31.5) to (+37.5) at 1280 lb. or less
Empty weight C.G. range	None
Leveling means	Top of tailcone
*Maximum weight	1600 lb.
No. of seats	2 at (+39); (for child's optional jump seat, refer to Equipment List)
Maximum baggage	120 lb. - (reference weight and balance data)
Fuel capacity	26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42.0)
Oil capacity	6 qt. (-13.5; unusable 2 qt.) See NOTE 1 for data on system oil.

Control surface movements

Wing flaps			Down	0° -40° ±2°
Ailerons	Up	20° +2°, -0°	Down	14° +2°, -0°
Elevator	Up	25° ±1°	Down	15° ±1°
Elevator tab	Up	10° ±1°	Down	20° ±1°
Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°

(measured perpendicularly to hinge line)

Serial Nos. Eligible	Model A150K: A1500001 through A1500226

V - Model 150L, 2 PCLM (Utility Category), Approved June 8, 1970

Engine	Continental O-200-A	
*Fuel	80/87 min. grade aviation gasoline	
*Engine limits	For all operations, 2750 r.p.m. (100 hp.)	
Propeller and propeller limits	1. McCauley 1A101/GCM (1971, 1972, 1973 models) Diameter: not over 69 in., not under 67 in. Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500 No additional tolerance permitted	27.7 lb. (-34.5)
	2. McCauley 1A101/HCM (1972, 1973 and 1974 models) Diameter: not over 69 in., not under 67 in. Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500 No additional tolerance permitted	27.7 lb. (-34.5)
	3. McCauley 1A101/PCM (1974 model) Diameter: not over 69 in., not under 67 in. Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500 No additional tolerance permitted	27.0 lb. (-34.5)
Propeller and propeller limits (cont'd)	4. McCauley 1A102/OCM (1971 through 1974 models) Diameter: not over 69 in., not under 67.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2560, not under 2460 No additional tolerance permitted	27.0 lb. (-34.5)
*Airspeed limits (CAS)	Never exceed 162 m.p.h. (141 knots) Maximum structural cruising 120 m.p.h. (104 knots) Maneuvering 109 m.p.h. (95 knots) Flaps extended 100 m.p.h. (87 knots)	
C.G. range	(+32.9) to (+37.5) at 1600 lb. (+31.5) to (+37.5) at 1280 lb. or less Straight line variation between points given	
Empty weight C.G. range	None	
Leveling means	Jig located nut plates and screws at Stations +94.63 and +132.94 on left side of tailcone	
*Maximum weight	1600 lb.	
No. of seats	2 at (+39); (for child's optional jump seat refer to Equipment List)	
Maximum baggage	120 lb. - (Reference weight and balance data)	
Fuel capacity	26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42.0) See NOTE 1 for data on system fuel	
Oil capacity	6 qt. (-13.5; unusable 2 qt.) See NOTE 1 for data on undrainable oil	

V - Model 150L (cont'd)

Control surface movements	Wing flaps			Down	0° -40° ±2°
	Ailerons	Up	20° +2°, -0°	Down	14° +2°, -0°
	Elevator	Up	25° ±1°	Down	15° ±1°
	Elevator tab	Up	10° ±1°	Down	20° ±1°
	Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°
	(measured perpendicularly to hinge line)				

Serial Nos. eligible
15072004 through 15072628 (1971 Model)
15072629 through 15073658 (1972 Model)
15073659 through 15074850 (1973 Model)
15074851 through 15075781 (1974 Model)

VI - Model A150L, Aerobat, 2 PCLM (Acrobatic Category), Approved June 8, 1970

Engine: Continental O-200-A

*Fuel: 80/87 min. grade aviation gasoline

*Engine limits: For all operations, 2750 r.p.m. (100 hp.)

Propeller and propeller limits

1. McCauley 1A101/GCM (1971, 1972, 1973 models) — 27.7 lb. (-34.5)
   Diameter: not over 69 in., not under 67 in.
   Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500
   No additional tolerance permitted

Propeller and propeller limits (cont'd)

2. McCauley 1A101/HCM (1971, 1972, 1973 models) — 27.7 lb. (-34.5)
   Diameter: not over 69 in., not under 67 in.
   Static r.p.m. at maximum permissible throttle setting: not over 2600, not under 2500
   No additional tolerance permitted

3. McCauley 1A102/OCM (1974 model) — 27.0 lb. (-34.5)
   Diameter: not over 69 in., not under 67.5 in.
   Static r.p.m. at maximum permissible throttle setting: not over 2560, not under 2460
   No additional tolerance permitted

*Airspeed limits (CAS)

Never exceed	193 m.p.h.	(168 knots)
Maximum structural cruising	140 m.p.h.	(122 knots)
Maneuvering	118 m.p.h.	(103 knots)
Flaps extended	100 m.p.h.	(87 knots)

C.G. range: (+32.9) to (+37.5) at 1600 lb.
(+31.5) to (+37.5) at 1280 lb. or less

Empty weight C.G. range: None

Leveling means: Jig located nut plates and screws at Stations +94.63 and +132.94 on left side of tailcone

*Maximum weight: 1600 lb.

No. of seats: 2 at (+39); (for child's optional jump seat refer to Equipment List)

Maximum baggage: 120 lb. - (Reference weight and balance data)

VI - Model A150L (cont'd)

Fuel capacity	26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42.0) See NOTE 1 for data on unusable fuel				
Oil capacity	6 qt. (-13.5; unusable 2 qt.) See NOTE 1 for data on undrainable oil				
Control surface movements	Wing flaps			Down	0° -40° ±2°
	Ailerons	Up	20° +2°, -0°	Down	14° +2°, -0°
	Elevator	Up	25° ±1°	Down	15° ±1°
	Elevator tab	Up	10° ±1°	Down	20° ±1°
	Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°
	(measured perpendicularly to hinge line)				
Serial Nos. eligible	A1500227 through A1500276 (1971 Model) A1500277 through A1500342 (1972 Model) A1500343 through A1500429 (1973 Model) A1500430 through A1500523 (1974 Model) (Except A1500433)				

VII - Model 150M, 2 PCLM (Utility Category), Approved May 6, 1974

Engine	Continental O-200-A		
*Fuel	80/87 min. grade aviation gasoline		
*Engine limits	For all operations, 2750 r.p.m. (100 hp.)		
Propeller and propeller limits	1. McCauley 1A102/OCM Diameter: not over 69 in., not under 67 in. Static rpm at maximum permissible throttle setting: not over 2560, not under 2460 No additional tolerance permitted		27.7 lb. (-34.5)
*Airspeed limits (CAS)	15075782 through 15077005		
	Never exceed	162 m.p.h. (141 knots)	
	Maximum structural cruising	120 m.p.h. (104 knots)	
	Maneuvering	109 m.p.h. (95 knots)	
	Flaps extended	100 m.p.h. (87 knots)	
*Airspeed limits (IAS) (See Note 4 on use of (IAS)	15077006 through 15079405		
	Never exceed	141 knots	
	Maximum structural cruising	107 knots	
	Maneuvering	97 knots	
	Flaps extended	85 knots	
C.G. range	(+32.9) to (+37.5) at 1600 lb. (+31.5) to (+37.5) at 1280 lb. or less Straight line variation between points given		
Empty weight C.G. range	None		
Leveling means	Jig located nut plates and screws at Stations +94.63 and +132.94 on left side of tailcone		
*Maximum weight	1600 lb.		
No. of seats	2 at (+39); (for child's optional jump seat, refer to Equipment List)		
Maximum baggage	120 lb. (Reference weight and balance data)		

VII - Model 150M (cont'd)

Fuel capacity	26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42.0) See NOTE 1 for data on unusable fuel				
Oil capacity	6 qt. (-13.5; unusable 2 qt.) See NOTE 1 for data on undrainable oil				
Control surface movements	Wing flaps			Down	0° -40° ±2°
	Ailerons	Up	20° +2°, -0°	Down	14° +2°, -0°
	Elevator	Up	25° ±1°, -0°	Down	15° ±1°
	Elevator tab	Up	10° ±1°	Down	20° ±1°
	Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°
	(measured perpendicularly to hinge line)				
Serial Nos. eligible	15075782 through 15077005 (1975 Model) 15077006 through 15078505 (1976 Model) 15078506 through 15079405 (1977 Model)				

VIII - Model A150M, Aerobat, 2 PCLM (Acrobatic Category), Approved May 6, 1974

Engine	Continental O-200-A	
*Fuel	80/87 min. grade aviation gasoline	
*Engine limits	For all operations, 2750 r.p.m. (100 hp.)	
Propeller and propeller limits	1. McCauley 1A102/OCM Diameter: not over 69 in., not under 67.5 in. Static r.p.m. at maximum permissible throttle setting: not over 2560, not under 2460 No additional tolerance permitted	27.0 lb. (-34.5)

*Airspeed limits (CAS)	15064970, A1500524 through A1500609	
	Never exceed	193 m.p.h. (168 knots)
	Maximum structural cruising	140 m.p.h. (122 knots)
	Maneuvering	118 m.p.h. (103 knots)
	Flaps extended	100 m.p.h. (87 knots)
*Airspeed limits (IAS) (See NOTE 4 on Use of IAS)	A1500610 through A1500734	
	Never exceed	164 knots
	Maximum structural cruising	123 knots
	Maneuvering	105 knots
	Flaps extended	85 knots

C.G. range	(+32.9) to (+37.5) at 1600 lb. (+31.5) to (+37.5) at 1280 lb. or less Straight line variation between points given
Empty weight C.G. range	None
Leveling means	Jig located nut plates and screws at Stations +94.63 and +132.94 on left side of tailcone
*Maximum weight	1600 lb.
No. of seats	2 at (+39); (for child's optional jump seat, refer to Equipment List)
Maximum baggage	120 lb. - (Reference weight and balance data)
Fuel capacity	26 gal. (22.5 gal. usable, two 13 gal. tanks in wings at +42.0) See NOTE 1 for data on unusable fuel

VIII - Model A150M (cont'd)

Oil capacity	6 qt. (-13.5; unusable 2 qt.) See NOTE 1 for data on undrainable oil				
Control surface movements	Wing flaps			Down	0° -40° ±2°
	Ailerons	Up	20° +2°, -0°	Down	14° +2°, -0°
	Elevator	Up	23° ±1°, -0°	Down	15° ±1°
	Elevator tab	Up	10° ±1°	Down	20° ±1°
	Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°
	(measured perpendicularly to hinge line)				
Serial Nos. eligible	15064970, A1500524 through A1500609 (1975 Model) A1500610 through A1500684 (1976 Model) A1500685 through A1500734 (1977 Model)				

IX - Model 152, 2 PCLM (Utility Category), Approved March 16, 1977

Engine	S/N 15279406 through 15285594 Lycoming O-235-L2C S/N 15285595 and on aircraft reworked per SK152-15 or SK152-16 Lycoming O-235-N2C	
*Fuel	100LL/100 min. grade aviation gasoline	
*Engine limits	S/N 15279406 through 15285594 For all operations, 2550 r.p.m. (110 hp.) S/N 15285595 and on For all operations 2550 r.p.m. (108 hp.)	
Propeller and propeller limits	1. (a) McCauley 1A103/TCM Diameter: not over 69 in., not under 67.5 in. Static rpm at full throttle (carburetor heat off and mixture leaned to maximum r.p.m.) is 2280 to 2380 r.p.m. For allowable variations in static r.p.m. at non-standard temperatures, refer to the Service Manual. (b) Spinner: Dwg. 0450073	23.2 lb. (-36.5)
*Airspeed Limits (IAS) (See NOTE 4 on Use of IAS)	Never exceed 149 knots Maximum structural cruising 111 knots Maneuvering 104 knots Flaps extended 85 knots	
C.G. range	(+32.65) to (+36.5) at 1670 lb. (+31.0) to (+36.5) at 1350 lb. or less Straight line variation between points given	
Empty weight C.G. range	None	
Leveling means	Jig located nut plates and screws at Stations +94.63 and +132.94 on left side of tailcone	
*Maximum weight	1670 lb. 1675 lb. ramp weight (S/N 15282032 and on)	
No. of seats	2 at (+39); (for child's optional jump seat, refer to Equipment List)	
Maximum baggage	120 lb. (Reference weight and balance data)	

IX - Model 152 (cont'd)

Fuel capacity	26 gal. (24.5 gal. usable, two 13 gal. tanks in wings at +42.0) See NOTE 1 for data on unusable fuel				
Oil capacity	6 qt. (-14.7; unusable 2 qt.) See NOTE 1 for data on undrainable oil				
Control surface movements	Wing flaps			Down	0° -30° ±2°
	Ailerons	Up	20° ± 2°	Down	15° ± 1°
	(aileron travel measured from 1° ±.5° droop)				
	Elevator	Up	25° ±1°	Down	18° ±1°
	Elevator tab	Up	10° ±1°	Down	20° ±1°
	Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°
	(measured perpendicularly to hinge line)				
Serial Nos. eligible	15279406 through 15282031 (1978 Model) 15282032 through 15283591 (1979 Model) 15283592 through 15284541 (1980 Model) 15284542 through 15285161 (1981 Model) 15285162 through 18285594 (1982 Model) 15285595 through 15285833 (1983 Model) 15285834 through 15285939 (1984 Model) 15285940 through 15286033 (1985 Model)				

X - Model A152, Aerobat, 2 PCLM (Acrobatic Category), Approved March 16, 1977

Engine	S/N A1500433, A1520735, 681 through A521014 Lycoming O-235-L2C	
	S/N A1521015 and on aircraft reworked per SK152-15 or SK152-16 Lycoming O-235-N2C	
*Fuel	100LL/100 min. grade aviation gasoline	
*Engine limits	S/N A1500433, A1520735, 681 through A1521014 For all operations, 2550 r.p.m. (110 hp.)	
	S/N A1521015 and on For all operations 2550 r.p.m. (108 hp.)	
Propeller and propeller limits	1. (a) McCauley 1A103/TCM Diameter: not over 69 in., not under 67.5 in. Static rpm at full throttle (carburetor heat off and mixture leaned to maximum r.p.m.) is 2280 to 2380 r.p.m. For allowable variations in static r.p.m. at non-standard temperatures, refer to the Service Manual. (b) Spinner: Dwg. 0450073	23.2 lb. (-36.5)
*Airspeed Limits (IAS) (See NOTE 4 on Use of IAS)	Never exceed 172 knots Maximum structural cruising 125 knots Maneuvering 108 knots Flaps extended 85 knots	
C.G. range	(+32.65) to (+36.5) at 1670 lb. (+31.0) to (+36.5) at 1350 lb. or less	
Empty weight C.G. range	None	
Leveling means	Jig located nut plates and screws at Stations +94.63 and +132.94 on left side of tailcone	

X - Model A152 (cont'd)

*Maximum weight	1670 lb. 1675 lb. ramp weight (S/N 681, A1520809 and on)
No. of seats	2 at (+39); (for child's optional jump seat, refer to Equipment List)
Maximum baggage	120 lb. (Reference weight and balance data)
Fuel capacity	26 gal. (24.5 gal. usable, two 13 gal. tanks in wings at +42.0) See NOTE 1 for data on unusable fuel
Oil capacity	6 qt. (-14.7; unusable 2 qt.) See NOTE 1 for data on undrainable oil

Control surface movements

Wing flaps			Down	0° -30° ±2°
Ailerons	Up	20° ± 1°	Down	15° ± 1°
(aileron travel measured from 1° ±.5° droop)				
Elevator	Up	25° ±1°	Down	18° ±1°
Elevator tab	Up	10° ±1°	Down	20° ±1°
Rudder	Right	23° +0°, -2°	Left	23° +0°, -2°
(measured perpendicularly to hinge line)				

Serial Nos. eligible

A1500433, A1520735 through A1520808	(1978 Model)
681, A1520809 through A1520878	(1979 Model)
A1520879 through A1520943	(1980 Model)
A1520944 through A1520983	(1981 Model)
A1520984 through A1521014	(1982 Model)
A1521015 through A1521025	(1983 Model)
A1521026 through A1521027	(1984 Model)
A1521028 through A1521049	(1985 Model)

Data Pertinent to All Models

Datum: Fuselage station 0.0 front face of firewall

Certification basis: Part 3 of the Civil Air Regulations dated May 15, 1956, as amended by 3-4. In addition, effective S/N 15282032 and on for 152 and S/N 681, A1520809 and on for A152, FAR 23.1559 effective March 1, 1978. FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-5 for 152 and A152 only. In addition, effective S/N 15285940 and on, and S/N A1521028 and on, FAR 23.1545(a), Amendment 23-23 dated December 1, 1978.

Application for Type Certificate dated August 13, 1956.

Type Certificate No. 3A19 issued July 10, 1958, obtained by the manufacturer under delegation option procedures.

Equivalent Safety Items	S/N 15077006 through 15079405 S/N 15279406 and on S/N A1500610 through A1500734 S/N 681, A1500433, A1520735 and on
Airspeed Indicator	CAR 3.757 (See NOTE 4) (S/N 15279406 through 15285939 and 681, A1500433, A1520735 through A1521027)
Operating Limitations	CAR 3.778(a)

Production basis: Production Certificate No. 4. Delegation Option Manufacturer No. CE-1 authorized to issue airworthiness certificates under delegation option provisions of Part 21 of the Federal Aviation Regulations.

X - Model A152 (cont'd)

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Airplane Flight Manual effective S/N 15282032 and on, S/N 681, and S/N A1520809 and on. In addition, the following item of equipment is required:

1. Stall warning indicator, audible, Cessna Dwg. 0511062 (Model 150 through 150E)

2. Stall warning indicator, audible, Cessna Dwg. 0413029 (Model 150F through 150M, 1977 Model) (A150K through A150M, 1977 Model) (152 and on, A152 and on)

NOTE 1. Current weight and balance report together with list of equipment included in certificated empty weight, and loading instructions, when necessary, must be provided for each aircraft at the time of original certification.

Serial Nos. 17001 through 17999, 59001 through 59018, 15059019 through 15077005 and A1500001 through A1500609
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 21 lb. at (+40) for landplanes or 27 lb. at (+40) for seaplanes and an undrainable oil of (0) lb. at (-13.5) for both landplane and seaplane.

Serial Nos. 15077006 through 15079405 and A1500610 through A1500734
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 21 lb. at (+40) and full oil of 11.3 lb. at (-13.5) for landplane.

Serial Nos. 15279406 and on, and 681, A1500433, A1520735 and on
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 9 lb. at (+40) and full oil of 11.3 lb. at (-14.7) for landplane.

NOTE 2. The following information must be displayed in the form of composite or individual placards.

A. In full view of the pilot:
(1) "This airplane must be operated in compliance with the operating limitations stated in the form of placards, markings and manuals."

(2) (a) Model 150, 150A, 150B and 150C
"Acrobatic maneuvers are limited to the following:

Maneuver	Entry Speed
Chandelle	106 m.p.h. (92 knots)
Steep turns	106 m.p.h. (92 knots)
Lazy eights	106 m.p.h. (92 knots)
Stalls (except whip)	Use slow deceleration
Spins	Use slow deceleration

Spin recovery - opposite rudder-neutral elevator
Intentional spins with flaps extended prohibited
Design maneuvering speed 106 m.p.h. (92 knots)"

(b) Model 150D, 150E, 150F, 150G, 150H, 150J, 150K
"Acrobatic maneuvers are limited to the following:

Maneuver	Entry Speed
Chandelle	109 m.p.h. (95 knots)
Steep turns	109 m.p.h. (95 knots)
Lazy eights	109 m.p.h. (95 knots)
Stalls (except whip)	Use slow deceleration
Spins	Use slow deceleration

Data Pertinent to All Models (cont'd)

NOTE 2. (cont'd)

Intentional spins with flaps extended prohibited
Spin recovery - opposite rudder-forward elevator
Maximum design weight - Landplane 1600 lb.
Seaplane 1650 lb.
Maximum maneuvering speed 109 m.p.h. (95 knots)
Maximum flight maneuvering load factors
Flaps Up +4.4 -1.76
Flaps Down +3.5"

(3) Model A150K
"This airplane must be operated as an Acrobatic Category airplane in compliance with the operating limitations stated in the form of placards, markings and manuals.

Acrobatic Category

Maximum design weight	1600 lb.
Maximum maneuvering speed	118 m.p.h. (103 knots)

Refer to weight and balance data for loading instructions
Flight maneuvering load factors: Flaps up +6.0 -3.0 Flaps down: +3.5
Aerobatic maneuvers with flaps extended are prohibited.
Inverted flight is prohibited.

NOTE 2. (cont'd) A. In full view of the pilot:
(3) (cont'd)
Child's seat and/or baggage compartment must not be occupied during aerobatic maneuvering. Spin recovery: Apply opposite rudder, followed by forward elevator for normal recovery.

The following aerobatic maneuvers are approved:

Maneuver	Entry Speed		Maneuver	Entry Speed	
Chandelle	120 m.p.h.	(104 knots)	Lazy eights	120 m.p.h.	(104 knots)
Steep turns	110 m.p.h.	(96 knots)	Spins	Slow deceleration	
Barrel rolls	130 m.p.h.	(113 knots)	Aileron rolls	130 m.p.h.	(113 knots)
Snap rolls	90 m.p.h.	(78 knots)	Immelmanns	145 m.p.h.	(126 knots)
Loops	130 m.p.h.	(113 knots)	Cuban eights	145 m.p.h.	(126 knots)
Vertical reversements	90 m.p.h.	(78 knots)	Stalls (except whip stalls)	Slow deceleration"	

(4) Model 150L and 150M (1971 Model through 1975 Model)
"This airplane is approved in the utility category and must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

	Maximums
Maneuvering speed	109 m.p.h. CAS (95 knots)
Gross weight	1600 lb.
Flight load factor	
Flaps Up	+4-4, -1.76
Flaps Down	+3.5

Maneuver	Max. Entry Speed	Maneuver	Max. Entry Speed
Chandelles	109 m.p.h. (95 knots)	Spins	Slow deceleration
Lazy eights	109 m.p.h. (95 knots)	Stalls (except whip stalls)	Slow deceleration
Steep turns	109 m.p.h. (95 knots)		

Spin Recovery: opposite rudder - forward elevator - neutralize controls.
Intentional spins with flaps extended are prohibited. Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
(DAY - NIGHT - VFR - IFR)" (AS APPLICABLE)

Data Pertinent to All Models (cont'd)

NOTE 2. (cont'd)

(5) Model A150L and A150M (1971 Model through 1975 Model)
"This airplane is approved in the utility category and must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

	Maximums	
Maneuvering speed		118 m.p.h. (CAS (103 knots)
Gross weight		1600 lb.
Flight load factor	Flaps up	+6.0, -3.0
	Flaps Down	+3.5

Aerobatic maneuvers with flaps extended are prohibited.
Inverted flight is prohibited.
Child's seat and/or baggage compartment must not be occupied during aerobatics.

Maneuver	Max. Entry Speed	Maneuver	Max. Entry Speed
Chandelle	120 m.p.h. (104 knots)	Lazy eights	120 m.p.h. (104 knots)
Steep turns	110 m.p.h. (96 knots)	Spins	Slow deceleration
Barrell rolls	130 m.p.h. (113 knots)	Aileron rolls	130 m.p.h. (113 knots)
Snap rolls	90 m.p.h. (78 knots)	Immelmanns	145 m.p.h. (126 knots)
Loops	130 m.p.h. (113 knots)	Cuban eights	145 m.p.h. (126 knots)
Vertical reversements	90 m.p.h. (78 knots)	Stalls (except whip stalls)	Slow deceleration

In full view of the pilot:

Spin Recovery: opposite rudder - forward elevator - neutralize controls.
Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
(DAY - NIGHT - VFR - IFR)" (As Applicable)

(6) Model 150M (1976 and 1977 Model)
"This airplane is approved in the utility category and must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

	Maximums	
Maneuvering speed		97 knots
Gross weight		1600 lb.
Flight load factor	Flaps up	+4.4, -1.76
	Flaps Down	+3.5

NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED BELOW

Maneuver	Max. Entry Speed	Maneuver	Max. Entry Speed
Chandelles	95 knots	Spins	Slow deceleration
Lazy eights	95 knots	Stalls (except whip stalls)	Slow deceleration
Steep turns	95 knots		

Abrupt use of controls prohibited above 97 knots.
Spin Recovery: opposite rudder - forward elevator - neutralize controls.
Intentional spins with flaps extended are prohibited. Flight into known icing conditions prohibited.
This airplane is certified for the following flight operations as of date of original airworthiness certificate:
(DAY - NIGHT - VFR - IFR)" (As applicable)

(7) A150M (1976 and 1977 Model)
"This airplane is approved in the acrobatic category and must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

Data Pertinent to All Models (cont'd)

NOTE 2. (cont'd)

		Maximums
Maneuvering speed (IAS)		105 knots
Gross weight		1600 lb.
Flight load factor -	Flaps up	+6.0, -3.0
	Flaps Down	+3.5

Aerobatic maneuvers with flaps extended are prohibited. Inverted flight is prohibited. Baggage compartment and/or child's seat must not be occupied during aerobatics.

THE FOLLOWING AEROBATIC MANEUVERS ARE APPROVED

Maneuver	Recm. Entry Speed	Maneuver	Recm. Entry Speed
Chandelles	105 knots	Lazy eights	105 knots
Steep turns	100 knots	Spins	Slow deceleration
Barrel rolls	115 knots	Aileron rolls	115 knots
Snap rolls	80 knots	Immelmanns	130 knots
Loops	115 knots	Cuban eights	130 knots
Vertical reversements	80 knots	Stalls (except whip stalls)	Slow deceleration

Abrupt use of controls prohibited above 105 knots.
Spin Recovery: opposite rudder - forward elevator - neutralize controls.
Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

(DAY - NIGHT - VFR - IFR)" (As Applicable)

A. In full view of the pilot:

(8) Model 152 (1978 Model)

"This airplane is approved in the utility category and must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

		Maximums
Maneuvering speed (IAS)		104 knots
Gross weight		1670 lbs.
Flight load factor	Flaps up	+4.4, -1.76
	Flaps Down	+3.5

NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED BELOW

Maneuver	Recm. Entry Speed	Maneuver	Recm. Entry Speed
Chandelles	95 knots	Spins	Slow deceleration
Lazy eights	95 knots	Stalls (except whip stalls)	Slow deceleration
Steep turns	95 knots		

Abrupt use of controls prohibited above 104 knots.
Intentional spins with flaps extended are prohibited. Altitude loss in a stall recovery -- 160 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
(DAY - NIGHT - VFR - IFR)" (As applicable)

(9) Model A152 (1978 Model and A1500433)

"This airplane is approved in the acrobatic category and must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

		Maximums
Maneuvering speed (IAS)		108 knots
Gross weight		1670 lb.
Flight load factor	Flaps Up	+6.0, -3.0
	Flaps Down	+3.5

Data Pertinent to All Models (cont'd)
NOTE 2. (cont'd)

Aerobatic maneuvers with flaps extended are prohibited. Inverted flight is prohibited. Baggage compartment and/or child's seat must not be occupied during aerobatics.

THE FOLLOWING AEROBATIC MANEUVERS ARE APPROVED

Maneuver	Recm. Entry Speed	Maneuver	Recm. Entry Speed
Chandelles	105 knots	Lazy eights	105 knots
Steep turns	100 knots	Spins	Slow deceleration
Barrel rolls	115 knots	Aileron rolls	115 knots
Snap rolls	80 knots	Immelmanns	130 knots
Loops	115 knots	Cuban eights	130 knots
Vertical reversements	80 knots	Stalls (except whip stalls)	Slow deceleration

Abrupt use of controls prohibited above 108 knots.
Altitude loss in a stall recovery -- 160 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
(DAY - NIGHT - VFR - IFR)" (As Applicable)

B. On the flap handle:
(1) Models 150, 150A, 150B, 150C
"Flaps - Pull to extend
Retracted 0°
Takeoff - 1st Notch 10°
2nd Notch 20°
3rd Notch 30°
Landing - 4th Notch 40°"

On the flap handle:
(2) Models 150D, 150E
"Flaps - Pull to extend
Takeoff - Retracted 0°
Landing - 0°-40°"

C. In the baggage compartment
(1) Models 150, 150A, 150B, 150C
"Baggage - 80 lb. maximum."
(2) Model 150D, 150E
"Baggage - 120 lb. maximum."
(3) S/N 15279406 through 15282031, A1500433, A15200735 through A1520808
"120 lb. maximum baggage and/or auxiliary seat passenger. For additional loading instructions see Weight and Balance Data."

D. On the instrument panel
(1) Models 150K, A150K; 1971 Models 150L, A150L
"Do not turn off alternator in flight except in emergency."

E. Near fuel shut-off valve
(1) Models 150 through 150M (1977 Model) and A150K through A150M (1977 Model)
"Fuel 22.5 gals. ON-OFF."
(2) S/N 15279406 through 15282031, A1500433, A15200735 through A1520808
"Fuel 24.5 gals. ON-OFF."

F. On front door posts
(1) S/N A15200735 through A1520808, A1500433
"Emergency door release
1. Unlatch door
2. Pull 'D' ring."

Data Pertinent to All Models (cont'd)
NOTE 2. (cont'd)

G. On door near window latch
(1) Model A150K through A150M (1975 Model)
"Do not open window above 165 m.p.h."
(2) Model A150M (1976 and 1977 Model) (1978 Model A152)
"Do not open window above 143 knots IAS."

H. On the instrument panel near overvoltage light (Model 150L through 150M, and A150L through A150M, 1978 Model 152 and A152, and A1500433)
(1) "High Voltage"

I. On left hand instrument panel
(1) S/N 15279406 through 15282031, A1500433, A1520735 through A1520808
"Spin Recovery
1. Verify ailerons are neutral and throttle is closed.
2. Apply full opposite rudder.
3. Move control wheel briskly forward to break stall."

J. S/N 15282032 and on, S/N 681, and S/N A1520809 and on
All placards required in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be installed in the appropriate locations.

NOTE 3. Reserved

NOTE 4. The markings of the airspeed indicator with IAS provides an equivalent level of safety to CAR 3.757 when the approved airspeed calibration data presented in Section V of the Pilot's Operating Handbooks listed below is available to the pilot:

150M,	Cessna P/N D1055-13	(S/N 15077006 through 15078505)
A150M,	Cessna P/N D1056-13	(S/N A1500610 through A1500684)
150M,	Cessna P/N D1080-13	(S/N 1507506 through 15079405)
A150M,	Cessna P/N D1081-13	(S/N A1500685 through A1500734)
152,	Cessna P/N D1107-13	(S/N 15279406 through 15282031)
A152,	Cessna P/N D1108-13	(S/N A1500433 through A1520735 through A1520808)
152,	Cessna P/N D1136-13PH	(S/N 15282032 through 15283591)
A152,	Cessna P/N D1137-13PH	(S/N 681, A1520809 through A1520878)
152,	Cessna P/N D1170-13PH	(S/N 15283592 through 15284541)
A152,	Cessna P/N D1171-13PH	(S/N A1520879 through A1520943)
152,	Cessna P/N D1190-13PH	(S/N 15284542 through 15285161)
A152,	Cessna P/N D1191-13PH	(S/N A1520944 through A1520983)
152,	Cessna P/N D1210-13PH	(S/N 15285162 through 15285594)
A152,	Cessna P/N D1211-13PH	(S/N A1520984 through A1521014)
152,	Cessna P/N D1229-13PH	(S/N 15285595 through 15285833)
A152,	Cessna P/N D1230-13PH	(S/N A1521015 through A1521025)
152,	Cessna P/N D1249-13PH	(S/N 15285834 through 15285939)
A152,	Cessna P/N D1250-13PH	(S/N A1521026 through A1521027)

NOTE 5. Near fuel tank filler
A. 150 series through S/N 15079405 and A150 series through S/N A1500734 except A1500433:
"FUEL
80/87 min. grade aviation gasoline
Cap. 13.0 U.S. Gal."
B. S/N 15279406 through 15282031, A1500433, A1520735 through A1520808
"FUEL
100LL/100 min. grade aviation gasoline
Cap. 13.0 U.S. Gal."

Data Pertinent to All Models (cont'd)

NOTE 6. 14-volt electrical system
(150 series through S/N 15079405 and A150 series through S/N A1500734 except A1500433)

28-volt electrical system
(S/N 15279406 and on, S/N 681, A1500433, A/N A1520735 and on)

In addition to the placards specified above the prescribed operating limitations indicated by an asterisk (*) under Sections I through X of this data sheet must also be displayed by permanent markings.

NOTE 7. For Models 150, A150, 152:

"**WARNING**: Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage, and is therefore prohibited on Cessna airplanes."

...END...

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E-295
Revision 14
Lycoming Engines
O-540-A1A, -A1A5, -A1B5, -A1C5, -A1D, -A1D5, -A2B, -A3D5, -A4A5, -A4B5, -A4C5, -A4D5,
O-540-B1A5, -B1B5, -B1D5, -B2A5, -B2B5, -B2C5, -B4A5, -B4B5,
O-540-D1A5,
O-540-E4A5, -E4B5, -E4C5,
O-540-F1A5, -F1B5,
O-540-G1A5, -G2A5,
O-540-H1A5, -H2A5, -H1A5D, -H2A5D, -H1B5D, -H2B5D,
O-540-J1A5D, -J2A5D, -J1B5D, -J2B5D, -J3A5D, -J1C5D, -J2C5D, -J1D5D, -J2D5D, -J3C5D, -L3C5D

December 17, 2003

TYPE CERTIFICATE DATA SHEET NO. E-295

Engines of models described herein conforming with this data sheet (which is a part of Type Certificate No. 295) and other approved data on file with the Federal Aviation Administration meet the minimum standards for use in certificate aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Civil Air Regulations/Federal Aviation Regulations provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder	Lycoming Engines An Operating Division of AVCO Corporation Williamsport, Pennsylvania 17701
Type Certificate Holder Record	Avco Lycoming Williamsport Div., AVCO Corporation transferred TC E-295 to Lycoming Engines, An Operating Division of AVCO Corporation on December 17, 2003

Model	Lycoming O-540	-A1A, -A1A5, -A1B5, -A1C5, -A1D, -A1D5, -A2B, -A3D5, -A4A5, -A4B5, -A4C5, -A4D5, -D1A5	-B1A5, -B1B5, -B1D5, -B2A5, -B2B5, -B2C5, -B4A5, -B4B5	-E4A5, -E4B5, -E4G5, -G1A5, -G2A5, -H1A5, -H2A5, -H1A5D, -H2A5D, -H1B5D, -H2B5D	-F1A5, -F1B5
Type	6H0A	Direct Drive	- -	- -	- -
Rating					
Maximum continuous, hp., r.p.m, in. Hg., at:					
Critical pressure altitude (ft.)		—	—	—	235-2800-25.0.4000
Sea level pressure altitude		250-2575-F.T.-S.L.	235-2575-F.T.-S.L.	260-2700-F.T.-S.L.	235-2800-26.0-S.L.
Takeoff (5 min.), hp., r.p.m., in. Hg., at:					
Critical pressure altitude (ft.)		—	—	—	260-2800-27.5-800
Sea level pressure altitude		250-2575-F.T.-S.L.	235-2575-F.T.-S.L.	260-2700-F.T.-S.L.	260-2800-28.0-S.L.
Fuel (Minimum grade aviation gasoline)		See NOTE 8	- -	- -	- -

"- -" indicates "same as preceding model"
"—" indicates "does not apply"

Page No.	01	02	03	04	05	06	07	08
Rev. No.	14	11	11	11	11	11	11	11

Model Lycoming O-540	-A1A, -A1A5, -A1B5, -A1C5, -A1D, -A1D5, -A2B, -A3D5, -A4A5, -A4B5, -A4C5, -A4D5, -D1A5	-B1A5, -B1B5, -B1D5, -B2A5, -B2B5, -B2C5, -B4A5, -B4B5	-E4A5, -E4B5, -E4G5, -G1A5, -G2A5, -H1A5, -H2A5, -H1A5D, -H2A5D, -H1B5D, -H2B5D	-F1A5, -F1B5
Lubricating oil (lubricants which conform to the specifications as listed or to subsequent revision thereto.)	No. 301-F	- -	- -	- -
Bore and stroke. in.	5.125 X 4.375	- -	- -	- -
Displacement, cu. in.	541.5	- -	- -	- -
Compression ratio	See NOTE 8	- -	- -	- -
Weight (dry)	See NOTE 5	- -	- -	- -
C.G. location (dry)	See NOTE 5	- -	- -	- -
From front face of prop shaft flange, in	17.9	- -	- -	- -
Off propeller shaft C.L., in.	1.21 below 0.15 left	- -	- -	- -
Propeller shaft-AS-127	Type 2 flange modified	- -	- -	- -
Carburetion	Marvel-Schebler MA-4-5	- -	- -	- -
Ignition, dual	See NOTE 8	- -	- -	- -
Timing, °BTC	25	- -	- -	- -
Spark plugs	See NOTE 7	- -	- -	- -
Oil sump capacity, qt.	12	- -	- -	- -
Crankshaft dampers	See NOTE 5 & 6	- -	- -	- -
Minimum safe oil quantity qts.				
20°nose up or down attitude	2-3/4	- -	- -	- -
30°nose up attitude	4	- -	- -	- -
NOTES - As applicable	1 through 8, 10, 11	- -	- -	1 through 11

Model Lycoming O-540	-J1A5D, -J2A5D, -J1B5D, -J2B5D, -J3A5D	-J1C5D, -J2C5D, -J3C5D, -J1D5D, -J2D5D	-L3C5D (See NOTE 12)
Type 6H0A	Direct Drive	- -	- -
Rating			
Maximum continuous, hp., r.p.m, in. Hg., at:			
Critical pressure altitude (ft.)	—	—	—
Sea level pressure altitude	235-2400-F.T.-S.L.	235-2400-F.T.-S.L.	235-2400-F.T.-S.L.
Takeoff (5 min.), hp., r.p.m., in. Hg., at:			
Critical pressure altitude (ft.)	—	- -	- -
Sea level pressure altitude	235-2400-F.T.-S.L.	235-2400-F.T.-S.L.	235-2400-F.T.-S.L.
Fuel (Minimum grade aviation gasoline)	See NOTE 8	- -	- -
Lubricating oil (lubricants which conform to the specifications as listed or to subsequent revision thereto.)	No. 301-F	- -	- -

"- -" indicates "same as preceding model"
"—" indicates "does not apply"

Model Lycoming O-540	-J1A5D, -J2A5D, -J1B5D, -J2B5D, -J3A5D	-J1C5D, -J2C5D, -J3C5D, -J1D5D, -J2D5D	-L3C5D (See NOTE 12)
Bore and stroke. in.	5.125 X 4.375	- -	- -
Displacement, cu. in.	541.5	- -	- -
Compression ratio	See NOTE 8	- -	- -
Weight (dry)	See NOTE 5	- -	- -
C.G. location (dry)	See NOTE 5	- -	- -
From front face of prop shaft flange, in	17.75	17.94	18.10
Off propeller shaft C.L., in.	0.75 below 0.19 left	0.69 below 0.19 left	0.59 below 0.34 left
Propeller shaft-AS-127	Type 2 flange modified	- -	- -
Carburetion	Marvel Schebler HA-6	- -	- -
Ignition dual	See NOTE 8	25	- -
Timing, °BTC	23	- -	- -
Spark plugs	See NOTE 7	- -	- -
Oil sump capacity, qts.	12	- -	- -
Crankshaft dampers	See NOTE 5 & 6	- -	- -
Minimum safe oil quantity qts.	- -	- -	- -
20°nose up or down attitude	2-3/4	- -	- -
30°nose up attitude	2	- -	- -
		- -	
NOTES - As applicable	1 through 8, 10, 11		1 through 8, 10, 11, 12, 13

"- -" indicates "same as preceding model"
"—" indicates "does not apply"

Certification basis:

Regulations and Amendments		Model	Date of Application	Date Type Certificate No. E-295 Issued/Revised
CAR 13 Effective June 15, 1956		O-540-A1A	July 2, 1957	October 31, 1957
As Amended By 13-1 & 13-2		O-540-A1A5	June 3, 1958	June 18, 1958
		O-540-A2P	July 24, 1958	July 24, 1958
		O-540-D1A5	October 21, 1958	August 12, 1959
		O-540-A1B5	January 21, 1959	February 10, 1959
		O-540-A1C5	March 16, 1959	April 2, 1959
		O-540-F1A5, -F1B5	April 3, 1959	August 12, 1959
		O-540-A1D, -A1D5	January 21, 1960	March 17, 1960
	13-3	O-540-A3D5	May 17, 1960	June 22, 1960
		O-540-B1A5, -B2A5	November 30, 1960	May 3, 1961
		O-540-B1B5	April 17, 1961	May 3, 1961
		O-540-B2B5	December 8, 1961	December 26, 1961
	13-4	O-540-A4A5, -A4B5, -A4C5, -A4D5, -B4A5, -B4B5	October 3, 1963	October 9, 1963
		O-540-E4A5, -E4B5	April 1, 1964	May 4, 1964
		O-540-E4C5	March 3, 1966	March 23, 1966
		O-540-B1D5, -B2C5	November 23, 1966	December 2, 1966
		O-540-G2A5	March 31, 1967	April 4, 1967
		O-540-G1A5	October 6, 1967	October 9, 1967
		O-540-H1A5, -H2A5	January 16, 1970	January 22, 1970
		O-540-H1B5D, H2B5D	July 30, 1971	August 4, 1971
		O-540-H1A5D, -H2A5D	July 27, 1971	October 21, 1971

Certification basis: (cont'd)

Date Type Certificate No. E-295

Regulations and Amendments	Model	Date of Application	Issued/Revised
13-4	-J1B5D, -J2B5D O-540-J1C5D, -J2C5D -J1D5D, -J2D5D	August 25, 1976	October 4, 1976
	O-540-J3C5D	February 4, 1977	February 15, 1977
	O-540-J3A5D	November 23, 1977	November 30, 1977
	O-540-L3C5D	July 21, 1977	June 19, 1978

Production basis: Production Certificate No. 3

NOTE 1. Maximum permissible temperatures are as follows:

Cylinder Head (well type)	Cylinder Base	Oil Inlet
500°F	325°F	245°F

NOTE 2. Pressure limits - p.s.i.

	Minimum	Maximum
	0.5	30.0 (O-540-L3C5D: See NOTE No. 13)
Fuel	0.5	8.0
Oil (Normal operation)	55.0	95.0
(Idle)	25.0	—
(Starting and warm-up)	—	115.0

NOTE 3. The following accessory provisions are incorporated:

Accessory	-A1A, -A1A5, -A1B5, -A1C5, -A1D, -A1D5, -A4A5, -A4B5, -A4C5, -A4D5 -E4A5, -E4B5 -E4C5	A3D5	-A2B -B2A5 -B2B5 -B2C5	-B1A5 -B1B5 -B1D5, -B4A5 -B4B5, -G1A5	-D1A5	-G2A5	-H1A5 -H2A5	-F1A5 -F1B5
Starter	*	*	*	*	*	*	*	—
Starter	—	—	—	—	—	—	—	*
Generator	*	*	*	*	*	*	—	*
Generator	**	**	**	**	**	**	—	—
Alternator	**	**	**	**	—	**	*	—
Alternator	**	**	**	**	**	**	**	**
Vacuum Pump	*	*	*	*	*	*	*	*
Hydraulic Pump	*	*	*	*	*	*	*	*
Hydraulic Pump	—	—	—	—	—	—	—	—
Tachometer	*	*	*	*	*	*	*	*
Propeller Governor	*	*	—	*	*	—	*	—
Propeller Governor	—	—	—	—	—	—	—	—
Fuel Pump	**	**	**	**	**	**	**	**
Fuel Pump (plunger)	**	*	**	**	**	**	**	**

Accessory	-L3C5D	-H1A5D -H2A5D -H1B5D -H2B5D	-J2D5D -J2C5D	-J1A5D -J2A5D -J3A5D -J1B5D -J2B5D -J3C5D -J1D5D -J1C5D	All Models Rotation Facing Drive Pad	Speed Ratio to Crankshaft	Maximum Torque (in. -lb.) Cont.	 Static	Max. Overhang Moment (in. -lb.)
Starter	*	*	*	*	CC	16.556:1	—	450	150
Starter	—	—	—	—	CC	13.556:1	—	450	150
Generator	—	—	—	—	C	1.010:1	60	120	175
Generator	—	—	—	—	C	2.500:1	60	120	175
Alternator	*	*	*	*	C	3.250:1	60	120	175
Alternator	**	**	**	—	C	3.630:1	60	120	175
Vacuum Pump	*	*	*	*	CC	1.300:1	70	450	25
Hydraulic Pump	—	—	—	—	C	1.385:1	100	800	40
Hydraulic Pump	*	*	*	*	C	1.300:1	100	800	40
Tachometer	*	*	*	*	C	1.500:1	7	50	5
Propeller Governor	—	—	—	—	C	0.895:1	125	1200	25
Propeller Governor	*	*	—	*	C	0.947:1	125	1200	25
Fuel Pump	—	**	—	—	CC	1.000:1	25	—	25
Fuel Pump (plunger)	*	**	**	**	—	0.500:1	—	—	10

"C" - Clockwise "CC" - Counter clockwise
* - Standard
** - Optional

NOTE 4. These engines incorporate provisions for absorbing propeller thrust in both tractor and pusher type installations.

NOTE 5. These models incorporate additional characteristics as follows:

O-540-Models	Wt. dry, lb.	Characteristics
-A1A	374	Basic model, direct drive, six cylinder, horizontally opposed, air cooled engine with one each S6LN-20 and -21 Magnetos and two 6th order dampers.
-A1A5	374	Same as -A1A except has one fifth and one sixth order dampers.
-A1B5	375	Same as -A1A5 except has propeller governor pad with short studs to accommodate AN type governor.
-A1C5	375	Same as -A1A5 except has two S6LN-21 impulse coupling magnetos.
-A1D	375	Similar to -A1B5 except has one each S6LN-200 and S6LN-204 magnetos and two sixth order crankshaft torsional dampers.
-A1D5	375	Similar to -A1D except has one fifth and one sixth order crankshaft torsional dampers.
-A2B	374	Same as -A1B5 except for crankshaft damper arrangement and propeller flange has propeller locating bushings displaced 60° clockwise, viewed facing propeller.
-A3D5	373	Similar to -A1D5 except has provisions for Goodrich propeller deicing equipment.
-A4A5	374	Similar to -A1A5 except has heavier fifth and sixth order crankshaft counterweights.
-A4B5	375	Similar to -A1B5 except has heavier fifth and sixth order crankshaft counterweights.
-A4C5	375	Similar to -A1C5 except has heavier fifth and sixth order crankshaft counterweights.
-A4D5	375	Similar to -A1D5 except has heavier fifth and sixth order crankshaft counterweights.
-B1A5	366	Same as -A1D5 except has lower compression ratio and performance.
-B1B5	366	Field conversion of -A1A5, -A1B5, or -A1C5 to lower compression ratio.
-B1D5	367	Same as -B1A5 except for incorporation of Bendix 1200 series magnetos.
-B2A5	366	Similar to -B1A5 except does not have provisions for controllable pitch propeller.
-B2B5	366	Same as -B2A5 except has S6LN-20 and S6LN-21 magnetos.

NOTE 5. These models incorporate additional characteristics as follows: cont.

-B2C5	368	Same as -B2B5 except for incorporation of Bendix 1200 series magnetos and does not include generator as part of the engine.
-B4A5	366	Similar to -B1A5 except has heavier fifth and sixth order crankshaft counterweights.
B4B5	366	Similar to -B1B5 except has heavier fifth and sixth order crankshaft counterweights.
-D1A5	369	Same as -A1A5 except has increased strength crankcase.
-F4A5	368	Similar to -A4D5 except has hybrid camshaft permitting higher 260 hp. @ 2700 r.p.m.
-E4B5	369	Similar to -A4D5 except for left magneto S6LN-21 and minor difference in weight and length.
-E4C5	370	Same as model -E4B5 except has S6LN-1227 and S6LN-1209 magnetos.
-F1A5	367	Same as -A1A5 except rated for helicopter application and incorporates prototype bed mounting.
-F1B5	369	Same as -D1A5 except rated for helicopter application and incorporates provisions for either bed or dynafocal type mounting.
-G1A5	386	Similar to -E4C5 except incorporates heavier crankshaft, different crankcase and -A1D5 counterweights.
-G2A5	386	Similar to -G1A5 except does not provide for use of constant speed propeller.
-H1A5	385	Similar to -G1A5 except has different magnetos and incorporates piston cooling oil jets.
-H2A5	385	Similar to -G2A5 except has different magnetos and incorporates piston cooling oil jets.
-H1A5D	381	Similar to -H1A5 except incorporates dual magneto (impulse coupling).
-H2A5D	381	Similar to -H1A5D except does not have provision for controllable propeller.
-H1B5D	381	Similar to -H1A5 except incorporates dual magneto (retard).
-H2B5D	381	Similar to -H1B5D except does not have provision for controllable propeller.
-J1A5D	356	Similar to -A1A5 except incorporates dual magneto (impulse coupling), less weight and rated at 235 h.p. @ 2400 r.p.m.
-J2A5D	356	Similar to -J1A5D except does not have provision for controllable propeller.
-J1B5D	356	Similar to -A1A5 except incorporates dual magneto (retard), less weight and rated at 235 h.p. @ 2400 r.p.m.
-J2B5D	356	Similar to -J1B5D except does not have provision for controllable propeller.
-J1C5D	356	Same as -J1A5D except has horizontal carburetor and induction housing.
-J2C5D	356	Same as -J1C5D except has no provision for controllable propeller.
-J1D5D	356	Same as -J1C5D but with D6LN-3230 retard breaker dual magneto.
-J2D5D	356	Same as -J1D5D except does not have provision for controllable propeller.
-J3C5D	357	Same as -J1C5D except has heavier counterweights for use with McCauley controllable propeller.
-J3A5D	357	Same as -J1A5D except has heavier counterweights (same as O-540-J3C5D).
-L3C5D	367	Same as -J3C5D except for features to make engine suitable for turbocharging.

NOTE 6. These engines incorporate crankshafts with two sixth order dampers unless a "5" is part of the model designation, i.e., -A1A5. Engines so designated have one fifth order damper and one sixth order damper instead of two sixth order dampers.

NOTE 7. Spark plugs approved for use on these engines are listed in the latest revision of AVCO Lycoming Service Instruction No. 1042.

NOTE 8. Fuel grade, compression and ignition:

O-540-Models	Fuel - Aviation Gasoline	Compression Ratio	Ignition, Dual Bendix Models
-A1A	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-A1A5	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-A1B5	100 or 100 LL	8.50:1	S6LN-21, S6LN-21
-A1C5	100 or 100 LL	8.50:1	S6LN-21, S6LN-21
-A1D	100 or 100 LL	8.50:1	S6LN-204, S6LN-200
-A1D5	100 or 100 LL	8.50:1	S6LN-204, S6LN-200
-A2B	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-A3D5	100 or 100 LL	8.50:1	S6LN-204, S6LN-200
-A4A5	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-A4B5	100 or 100 LL	8.50:1	S6LN-21, S6LN-21
-A4C5	100 or 100 LL	8.50:1	26LN-21, S6LN-21
-A4D5	100 or 100 LL	8.50:1	26LN-204, S6LN-200
-B1A5	100 or 100 LL	7.20:1	S6LN-204, S6LN-200
-B1B5	100 or 100 LL	7.20:1	S6LN-20, S6LN-21
-B1D5	100 or 100 LL	7.20:1	S6LN-1209, S6LN-1208
-B2A5	100 or 100 LL	7.20:1	S6LN-204, S6LN-200
-B2B5	100 or 100 LL	7.20:1	S6LN-20, S6LN-21
-B2C5	100 or 100 LL	7.20:1	S6LN-1209, S6LN-1227
-B4A5	100 or 100 LL	7.20:1	S6LN-204, S6LN-200
-B4B5	100 or 100 LL	7.20:1	S6LN-20, S6LN-21
-D1A5	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-E4A5	100 or 100 LL	8.50:1	S6LN-204, S6LN-200
-E4B5	100 or 100 LL	8.50:1	S6LN-204, S6LN-200
-E4C5	100 or 100 LL	8.50:1	S6LN-204, S6LN-200
-F1A5	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-F1B5	100 or 100 LL	8.50:1	S6LN-204, S6LN-200
-G1A5	100 or 100 LL	8.50:1	S6LN-1227, S6LN-1209
-G2A5	100 or 100 LL	8.50:1	S6LN-1227, S6LN-1209
-H1A5	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-H2A5	100 or 100 LL	8.50:1	S6LN-20, S6LN-21
-H1A5D	100 or 100 LL	8.50:1	D6LN-3031
-H2A5D	100 or 100 LL	8.50:1	D6LN-3031
-H1B5D	100 or 100 LL	8.50:1	D6LN-3230
-H2B5D	100 or 100 LL	8.50:1	D6LN-3230
-J1A5D	100 or 100 LL	8.50:1	D6LN-3031
-J2A5D	100 or 100 LL	8.50:1	D6LN-3031
-J1B5D	100 or 100 LL	8.50:1	D6LN-3230
-J2B5D	100 or 100 LL	8.50:1	D6LN-3230
-J1C5D	100 or 100 LL	8.50:1	D6LN-3031
-J2C5D	100 or 100 LL	8.50:1	D6LN-3031
-J1D5D	100 or 100 LL	8.50:1	D6LN-3230
-J2D5D	100 or 100 LL	8.50:1	D6LN-3230
-J3C5D	100 or 100 LL	8.50:1	D6LN-3031
-J3A5D	100 or 100 LL	8.50:1	D6LN-3031

All models equipped with one impulse coupling magneto may use two impulse coupling magnetos as optional equipment.

NOTE 9. Engine models O-540-F1A5 and -F1B5 are approved for helicopter application and operation in a horizontal installation.

NOTE 10. Models O-540-A4A5, -A4B5, -A4C5, -A4D5, -B4A5, -B4B5, -E4B5, -E4A5, and -E4C5 are equipped with fifth and sixth order crankshaft counterweights which are heavier than the usual fifth and sixth order counterweights employed in other O-540 engine models.

NOTE 11. Starters, generators, and alternators approved for use on these engines are listed in the latest revision of AVCO Lycoming Service Instruction No. 1154.

NOTE 12. When equipped in accordance with Cessna Dwg. 2250065, this engine is certified for operation at a maximum manifold pressure of 31.0 in. Hg at 2400 r.p.m.

NOTE 13. When complying with Lycoming Service Instruction No. 1398, the minimum permissible fuel pressure increase from 0.5 psi to 3 psi. Therefore, revised fuel pressure gage marking indicating a minimum red line of 3 psi is required.

.....END.....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

	A7CE Revision 45 CESSNA
401	411A
401A	414
401B	414A
402	421
402A	421A
402B	421B
402C	421C
411	425
	July 12, 2002

TYPE CERTIFICATE DATA SHEET NO. A7CE

This data sheet which is part of Type Certificate No. A7CE prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P. O. Box 7704
Wichita, Kansas 67277

I - Model 411 (Normal Category), Approved August 17, 1964
Model 411A (Normal Category), Approved January 26, 1967

Engines — Two Continental GTSIO-520-C, reduction gear ratio .750:1

Fuel — Grade 100 or 100LL aviation gasoline

Engine Limits — For all operations, 2400 propeller r.p.m. (340 hp.)
34.5 in. Hg. Mp. up to critical altitude of 16,000 ft. in standard atmosphere. Above 16,000 ft. the following maximum Mp. applies for maximum r.p.m.

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
16,000	34.5
18,000	31.2
20,000	29.0
22,000	26.4
24,000	24.3
26,000	22.2
28,000	20.2
30,000	18.5

Propeller and Propeller Limits

1. Model 411 only
Two Hartzell full-feathering 3-bladed propeller installations
   (a) Hartzell Hub HC-A3VF-2D with V8833 blades
   Diameter: not over 88.4 in., not under 86.4 in.
   (no further reduction permitted)
   Pitch settings at 30 in. station:
   low 14.0°, +0°, -2°
   feathered 84.0°, +2°, -0°
   (b) Hydraulic Governor Woodward A210444, 210439, C210446 or B210529
   (c) Propeller spinner and bulkhead assembly, Hartzell 835-20

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Rev. No.	45	41	43	43	42	40	40	41	43	41	40	44	41	40	43	41	41	40	41	40
Page No.	21	22	23	24																
Rev. No.	41	40	45	45																

Propeller and Propeller Limits	or	2. Models 411 and 411A Two McCauley full-feathered 3-bladed propeller installations (a) McCauley hub 3AF34C74 with 90LF-0 blades or McCauley hub 3AF37C510 with 90LFB blades Diameter: not over 90 in., not under 84.0 in. with 90LF-0 blades or not under 88.0 in. with 90LFB-0 blades. (no further reduction permitted) Pitch settings at 30 in. station: low 14.0°, ±0.2° feathering 84.5°, ±0.3° (b) Hydraulic governor Woodward A210444, 210439, C210446 or B210529 (c) Propeller spinner and bulkhead assembly, McCauley D-3574 or D-3732 for use with C74 Model Propeller, or McCauley D-7229 for use with C510 Model Propeller.

Airspeed Limits (CAS)		
	Maneuvering	180 m.p.h. (156 knots)
	Maximum structural cruising	230 m.p.h. (200 knots)
	Never exceed	266 m.p.h. (231 knots)
	Landing gear operating	160 m.p.h. (139 knots)
	Landing gear extended	160 m.p.h. (139 knots)
	Flaps extended 15°	180 m.p.h. (156 knots)
	Flaps extended 45°	160 m.p.h. (139 knots)
	Minimum control	103 m.p.h. (90 knots)

C.G. Range (Landing Gear Extended)	(+150.6) to (+155.5) at 6500 lb. (+155.7) at 6100 lb. or less (+144.3) at 5200 lb. or less Straight line variation between points given Landing gear retracted moment change: +837 in.-lb.
Empty Wt. C.G. Range	None
Leveling Means	External screw heads on right side of fuselage at stations +213.65 and +238.00 on W.L. +93.80
Maximum Weight	Landing 6500 lb., takeoff 6500 lb.
No. of Seats	6, 7 or 8 (2 at +137.0, 2 at +175.5, 2 at +215.5, 1 or 2 at +238.0) (See manufacturer's equipment list for optional seating arrangements)
Maximum Baggage	Model 411: 120 lb. (+58.0), 240 lb. (+186.0), 340 lb. (+246.5) Model 411A: 350 lb. (+71.0), 240 lb. (+186.0), 340 lb. (+246.5)
Fuel Capacity	175 gal. (2 wing tip tanks, 51 gal. ea., 50 gal. usable at +152.0 and 2 wing tanks, 36.5 gal. ea., 35 gal. usable at +164.0) See NOTE 1 for data on unusable fuel
Oil Capacity	26 qt. (13 qt. in ea. engine at +115.4; usable 7.0 qt. per engine) See NOTE 1 for undrainable oil

I - Model 411, Model 411A (cont'd)

Control Surface Movements

Wing flaps				Down	45°, +1°, -0°
Main surfaces					
Aileron	Up	20°, +1°, -0°		Down	20°, +1°, -0°
Elevator	Up	25°, +1°, -0°		Down	15°, +1°, -0°
Rudder	Right	32°, +1°, -0°		Left	32°, +1°, -0°
(Read degrees normal to rudder hinge line)					
Tab (main surface in neutral)					
Aileron	Up	20°, +1°, -0°		Down	20°, +1°, -0°
Elevator	Up	10°, +1°, -0°		Down	26°, +1°, -0°
Rudder	Right	17°, +1°, -0°		Left	22°, +1°, -0°
(Read degrees normal to rudder hinge line)					

Serial Nos. Eligible

Model 411: 411-0001 through 411-0250
Model 411A: 411-0251 through 411-0300

II - Model 401 (Normal Category), Approved September 20, 1966
Model 401A (Normal Category), Approved October 29, 1968
Model 401B (Normal Category), Approved November 12, 1969

Engines

Two Continental TSIO-520-E or TSIO-520-EB (In any combination)

Fuel

Grade 100 or 100LL aviation gasoline

Engine Limits

For all operations, 2700 r.p.m. (300 hp.) 34.5 in. Hg. Mp. up to critical altitude of 16,000 ft. in standard atmosphere. Above 16,000 ft. the following maximum Mp. applies for maximum r.p.m.

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
16,000	34.5
18,000	31.8
20,000	29.5
22,000	27.3
24,000	25.1
26,000	23.0
28,000	22.0
30,000	19.0

Propeller and Propeller Limits

Two McCauley full-feathered 3-bladed propeller installations

(a) McCauley hub 3AF32C87 with 82NC-5.5 blades or McCauley hub 3AF32C504 with 82NEA-5.5 blades
Diameter: not over 76.5 in., not under 74.0 in.
(no further reduction permitted)
Pitch settings at 30 in. station:
low 14.2°, ±0.2°
feathered 81.2°, ±0.3°

(b) Model 401: Hydraulic Governor Woodward B210444, C210439, B210446 or A210529F
Model 401A and 401B: Hydraulic Governor Woodward B210444, C210439, B210446, or A210529F; McCauley DCF290D1/T3, DCF290D2/T3, DCF290D7/T3, DCFU290D1/T3, DCFU290D2/T3, DCFU290D7/T3, DCFU290D13/T3, DCFS290D1/T3, DCFS290D2/T3, DCFS290D7/T3, DCFUS290D1/T3, DCFUS290D2/T3, DCFUS290D7/T3, DCFUS290D13/T3.

(c) Propeller spinner and bulkhead assembly, McCauley D-3534/D-3537, D-3534/D-3796, and D-5212/D5214.

II - Model 401, Model 401A, Model 401B (cont'd)

Airspeed Limits (CAS)	Maneuvering	180 m.p.h. (156 knots)
	Maximum structural cruising	230 m.p.h. (200 knots)
	Never exceed	266 m.p.h. (231 knots)
	Landing gear operating	160 m.p.h. (139 knots)
	Landing gear extended	160 m.p.h. (139 knots)
	Flaps extended 15°	180 m.p.h. (156 knots)
	Flaps extended 45°	160 m.p.h. (139 knots)
	Minimum control	95 m.p.h. (83 knots)

C.G. Range (Landing Gear Extended)
(+150.8) to (+158.1) at 6300 lb.
(+158.5) at 5900 lb. or less
(+147.5) at 5000 lb. or less
Straight line variation between points given
Landing gear retracted moment change: +837 in.-lb.

Empty Wt. C.G. Range
None

Leveling Means
External screw heads on right side of fuselage at stations +213.65 and +238.00 on W.L. +93.80

Maximum Weight
Landing 6200 lb., takeoff 6300 lb.

No. of Seats
6, 7 or 8 (2 at +137.0, 2 at +175.6, 2 at +215.5, 1 or 2 at +238.0)
(See manufacturer's equipment list for optional seating arrangements)

Maximum Baggage
350 lb. (+71.0), 240 lb. (+186.0), 340 lb. (+246.5)

Fuel Capacity
102 gal. (2 wing tip tanks, 51 gal. ea., 50 gal. usable at +152.0)
See NOTE 1 for data on unusable fuel

Oil Capacity
26 qt. (13 qt. in ea. engine at +113.5; usable 6.5 qt. per engine)
See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps			Down	45°, +1°, -0°
Main surfaces				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	32°, +1°, -0°	Left	32°, +1°, -0°
(Read degrees normal to rudder hinge line)				
Tab (main surface in neutral)				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	5°, +1°, -0°	Down	30°, +1°, -0°
Rudder	Right	7°, +1°, -0°	Left	9°, +1°, -0°
(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible
Model 401: 401-0001 through 401-0322
Model 401A: 401A0001 through 401A0132
Model 401B: 401B0001 through 401B0221

III - Model 402 (Normal Category), Approved September 20, 1966
Model 402A (Normal Category), Approved January 3, 1969
Model 402B (Normal Category), Approved November 12, 1969

Engines
Two Continental TSIO-520-E or TSIO-520-EB (In any combination)

Fuel
Grade 100 or 100LL aviation gasoline

III - Model 402, Model 402A, Model 402B (cont'd)

Engine Limits

For all operations, 2700 r.p.m. (300 hp.)
34.5 in. Hg. Mp. up to critical altitude of 16,000 ft. in standard atmosphere. Above 16,000 ft. the following maximum Mp. applies for maximum r.p.m.

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
16,000	34.5
18,000	31.8
20,000	29.5
22,000	27.3
24,000	25.1
26,000	23.0
28,000	22.0
30,000	19.0

Propeller and Propeller Limits

Two McCauley full-feathered 3-bladed propeller installations

(a) McCauley hub 3AF32C87 with 82NC-5.5 blades or McCauley hub 3AF32C504 with 82NEA-5.5 blades
Diameter: not over 76.5 in., not under 74.0 in.
(no further reduction permitted)
Pitch settings at 30 in. station:
low 14.2°, ±0.2°
feathering 81.2°, ±0.3°

(b) Model 402, 402A and 402B, S/N 402B0001 thru 402B1200
Hydraulic governor, Woodward B210444, C210439, B210446F or A210529H; McCauley DCF290D1/T3, DCF290D2/T3, DCFS290D1/T3, DCFS290D2/T3, DCFU290D1/T3, DCFU290D2/T3, DCFUS290D1/T3, DCFUS290D2/T3, DCF290D7/T3, DCFS290D7/T3,DCFU290D7/T3, DCFU290D13/T3, DCFUS290D7/T3, or DCFUS290D13/T3.

Model 402B, S/N 402B1201 through 402B1300
Hydraulic governor, Woodward B210444, C210439; McCauley DCF290D1/T3, DCF290D2/T3, DCFU290D1/T3, DCFU290D2/T3, DCFS290D4/T3, DCFUS290D4/T3, DCFS290D5/T3, DCFUS290D5/T3, DCF290D7/T3, DCFU290D7/T3, DCFS290D7/T3, DCFUS290D7/T3, DCFU290D13/T3, or DCFUS290D13/T3.

Model 402B, S/N 402B1301 and up
Hydraulic governor, Woodward B210444, C210439; McCauley DCF290D1/T3, DCF290D2/T3, DCFU290D1/T3, DCFU290D2/T3, DCFS290D4/T3, DCFUS290D4/T3, DCFS290D6/T3, DCFUS290D6/T3, DCF290D7/T3, DCFU290D7/T3, DCFS290D7/T3, DCFUS290D7/T3, DCFS290D8/T3, DCFUS290D8/T3, DCFU290D13/T3, DCFUS290D12/T3, or DCFUS290D13/T3.

(c) Propeller spinner and bulkhead assembly, McCauley D-3534/D-3537, D-3534/D-3796, or D-5212/D5214.

III - Model 402, Model 402A, Model 402B (cont'd)

Airspeed Limits (CAS)	Model 402, S/N 402-0001 and up Model 402A, S/N 402A0001 and up Model 402B, S/N 402B0001 through 402B0500	
	Maneuvering	180 m.p.h. (156 knots)
	Maximum structural cruising	230 m.p.h. (200 knots)
	Never exceed	266 m.p.h. (231 knots)
	Landing gear operating	160 m.p.h. (139 knots)
	Landing gear extended	160 m.p.h. (139 knots)
Airspeed Limits (Cont.) (CAS)	Flaps extended 15°	180 m.p.h. (156 knots)
	Flaps extended 45°	160 m.p.h. (139 knots)
	Minimum control	95 m.p.h. (83 knots)
	Model 402B, S/N 402B0501 through 402B1000	
	Maneuvering	156 KCAS (180 m.p.h.)
	Maximum structural cruising	200 KCAS (230 m.p.h.)
	Never exceed	231 KCAS (266 m.p.h.)
	Landing gear operating	140 KCAS (161 m.p.h.)
	Landing gear extended	140 KCAS (161 m.p.h.)
	Flaps extended 15°	160 KCAS (184 m.p.h.)
	Flaps extended 45°	140 KCAS (161 m.p.h.)
	Minimum control	83 KCAS (95 m.p.h.)
(IAS)	Model 402B, S/N 402B1001 and up	
	Maneuvering	156 KIAS (180 m.p.h.)
	Maximum structural cruising	199 KIAS (229 m.p.h.)
	Never exceed	230 KIAS (265 m.p.h.)
	Landing gear operating	140 KIAS (161 m.p.h.)
	Landing gear extended	140 KIAS (161 m.p.h.)
	Flaps extended 15°	160 KIAS (184 m.p.h.)
	Flaps extended 45°	140 KIAS (161 m.p.h.)
	Minimum control	82 KIAS (94 m.p.h.)

C.G. Range (Landing Gear Extended)
(+150.8) to (+159.7) at 6300 lb.
(+160.2) at 5900 lb. or less
(+147.5) at 5000 lb. or less
Straight line variation between points given
Landing gear retracted moment change: +837 in.-lb.

Empty Wt. C.G. Range
None

Leveling Means
External screw heads on right side of fuselage at stations +213.65 and +238.00 on W.L. +93.80

Maximum Weight
Models 402, 402A, 402B, S/N 402B0001 through 402B1300
Landing 6200 lb., takeoff 6300 lb.

Model 402B, S/N 402B1301 and up
Landing 6200 lb., ramp 6335 lb., takeoff 6300 lb.

No. of Seats
Model 402
9 (2 at +137.0, 2 at +166.0, 2 at +193.0, 2 at +220.0, 1 at +247.0)

Model 402A and 402B, S/N 402B0001 through 402B0300
9 or 10 (2 at +137.0, 2 at +166.0, 2 at +193.0, 2 at +220.0, 1 or 2 at +247.0)

III - Model 402, Model 402A, Model 402B (cont'd)

Model 402B, S/N 402B0301 and up
6, 7 or 8 (2 at +137.0, 2 at +175.0, 2 at +218.0, 1 or 2 at +261.0)
9 (with photographic provisions option) (2 at +137.0, 2 at +162.0, 2 at +190.0, 2 at +218.0, 1 at +246.0)
10 (2 at +137.0, 2 at +162.0, 2 at +190.0, 2 at +218.0, 2 at +246.0)
(See manufacturer's equipment list for optional seating arrangements)

Maximum Baggage

Models 402, 402A and 402B, S/N 402B0001 through 402B0300
350 lb. (+71.0), 240 lb. (+186.0), 170 lb. (+247.0)

Model 402B, S/N 402B0301 and up
250 lb. (+32.0), 350 lb. (+71.0), 240 lb. (+186.0), 400 lb. (+266.0), 100 lb. (+282.0)

Fuel Capacity

102 gal. (2 wing tip tanks, 51 gal. ea., 50 gal. usable at +152.0)
See NOTE 1 for data on unusable fuel

Oil Capacity

26 qt. (13 qt. in ea. engine at +113.5; usable 6.5 qt. per engine)
See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps			Down	45°, +1°, -0°
Main surfaces				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	32°, +1°, -0°	Left	32°, +1°, -0°
(Read degrees normal to rudder hinge line)				
Tab (main surface in neutral)				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	5°, +1°, -0°	Down	30°, +1°, -0°
Rudder	Right	7°, +1°, -0°	Left	9°, +1°, -0°
(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible

Model 402: 402-0001 through 402-0322
Model 402A: 402A0001 through 402A0129
Model 402B: 402B0001 through 402B1384

IV - Model 421 (Normal Category), Approved May 1, 1967
Model 421A (Normal Category), Approved November 19, 1968

Engines

Two Continental GTSIO-520-D, reduction gear ratio .667:1

Fuel

Grade 100 or 100LL aviation gasoline

Engine Limits

For all operations, 2275 propeller r.p.m. (375 hp.)
39.5 in. Hg. Mp. up to critical altitude of 16,000 ft. in standard atmosphere. Above 16,000 ft. the following maximum Mp. applies for maximum r.p.m.

Model 421		Model 421A	
Altitude (ft.)	Max. Allowable Mp. (in. Hg.)	Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
16,000	39.5	16,000	39.5
18,000	32.5	18,000	37.5
20,000	32.5	20,000	35.5
22,000	30.0	22,500	32.5
24,000	27.0	24,000	30.5
26,000	24.5	26,000	28.0
28,000	22.0	28,000	25.5
30,000	20.0	30,000	23.0

IV - Model 421, Model 421A (cont'd)

Propeller and Propeller Limits

Two McCauley full-feathered 3-bladed propeller installations

(a) McCauley hub 3AF34C92 with 90LF-0 blades or McCauley hub 3AF37C516 with 90LFB-0 blades.
Diameter: not over 90.0 in., not under 88.0 in.
(no further reduction permitted)
Pitch settings at 30 in. station:
low 16.9°, ±0.2°
feathering 84.5°, ±0.3°,

(b) Hydraulic Governor Woodward 210594, 210595, 210596, or 210597.

(c) Propeller spinner and bulkhead assembly, McCauley D-3573/D-3576, for use with C92 Model propeller, or McCauley D-7229 spinner and bulkhead assembly for use with C516 Model propeller.

Airspeed Limits (CAS)

Maneuvering	184 m.p.h. (160 knots)
Maximum structural cruising	230 m.p.h. (200 knots)
Never exceed	272 m.p.h. (236 knots)
Landing gear operating	165 m.p.h. (143 knots)
Landing gear extended	165 m.p.h. (143 knots)
Flaps extended 15°	180 m.p.h. (156 knots)
Flaps extended 45°	165 m.p.h. (143 knots)
Minimum control	106.5 m.p.h. (93 knots)

C.G. Range (Landing Gear Extended)

Model 421	Model 421A
(+151.9) to (+155.5) at 6800 lb.	(+152.1) to (+155.5) at 6840 lb.
(+155.7) at 6400 lb. or less	(+155.7) at 6500 lb. or less
(+144.3) at 5200 lb. or less	(+144.3) at 5200 lb. or less

Straight line variation between points given
Landing gear retracted moment change: +889 in.-lb.

Empty Wt. C.G. Range

None

Leveling Means

External screw heads on right side of fuselage at stations +213.29 and +238.55 on W.L. +93.80

Maximum Weight

Model 421
Landing 6500 lb., takeoff 6800 lb. (See NOTE 4 for takeoff 6840 lb.)

Model 421A
Landing 6500 lb., takeoff 6840 lb.

No. of Seats

Model 421
6 (2 at +137.0, 2 at +175.5, 2 at +215.5)

Model 421A
6 or 7 (2 at +137.0, 2 at +175.5, 2 at +215.5, 1 at +246.5)
(See manufacturer's equipment list for optional seating arrangement)

Maximum Baggage

350 lb. (+71.0), 240 lb. (+186.0), 340 lb. (+246.5)

Fuel Capacity

175 gal. (2 wing tip tanks, 51 gal. ea., 50 gal. usable at +152.0 and 2 wing tanks, 36.5 gal. ea., 35 gal. usable at +164.0)
See NOTE 1 for data on unusable fuel

Oil Capacity

26 qt. (13 qt. in ea. engine at +115.4; usable 7.0 qt. per engine)
See NOTE 1 for data on undrainable oil

IV - Model 421, Model 421A (cont'd)

Control Surface Movements

Wing flaps				Down	45°, +1°, -0°
Main surfaces					
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°	
Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°	
Rudder	Right	25°, +1°, -0°	Left	25°, +1°, -0°	
(Read degrees normal to rudder hinge line)					
Tab (main surface in neutral)					
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°	
Elevator	Up	10°, +1°, -0°	Down	26°, +1°, -0°	
Rudder	Right	11°, +1°, -0°	Left	16°, +1°, -0°	
(Read degrees normal to rudder hinge line)					

Serial Nos. Eligible

Model 421: 421-0001 through 421-0200
Model 421A: 421A0001 through 421A0158

V - Model 414 (Normal Category), Approved September 24, 1969

Engines

Two Continental TSIO-520-J or TSIO-520-JB (In any combination)
(S/N 414-0001 through 414-0800)

Two Continental TSIO-520-N or TSIO-520-NB (In any combination)
(S/N 414-0801 and up)

Fuel

Grade 100 or 100LL aviation gasoline

Engine Limits

For all operations, 2700 r.p.m. (310 hp.)
36.0 in. Hg. Mp. (S/N 414-0001 through 414-0800) 38.0 in. Hg. Mp.
(S/N 414-0801 and up) up to critical altitude of 20,000 ft. in standard atmosphere.
Above 20,000 ft. the following maximum Mp. applies for maximum r.p.m.

S/N 414-0001 through 414-0800

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
20,000	36.0
22,000	33.6
24,000	31.2
26,000	28.8
28,000	26.4
30,000	24.0

S/N 414-0801 and up

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
20,000	38.0
22,000	35.2
24,000	32.3
26,000	29.8
28,000	27.4
30,000	25.0

Propeller and Propeller Limits

Two McCauley full-feathered 3-bladed propeller installations
(a) McCauley hub 3AF32C93 with 82NC-5.5 blades or McCauley hub 3AF32C505 with 82NEA-5.5 blades
Diameter: not over 76.5 in., not under 74.5 in. (S/N 414-0001 through S/N 414-0800), not under 75.0 in. (S/N 414-0801 and up)
(no further reduction permitted)
Pitch settings at 30 in. station:
low 14.9°, ±0.2°, feathering 81.2°, ±0.3°

V - Model 414 (Normal Category), Approved September 24, 1969

Propeller and Propeller Limits	(b) Model 414 S/N 414-0001 thru 414-0800 Hydraulic governor, Woodward B210444, C210439, B210446F, or A210529H McCauley DCF290D1/T3,DFC290D2/T3, DCF290D7/T3, DCFU290D1/T3, DCFS290D1/T3, DCFUS290D1/T3, DCFS290D2/T3, DCFU290D2/T3, DCFU290D7/T3, DCFU290D13/T3, DCFS290D7/T3, DCFUS290D2/T3, DCFUS290D7/T3 or DCFUS290D13/T3 Model 414 S/N 414-0801 and up McCauley DCFS290D4/T3, DCFUS290D4/T3, DCFS290D5/T3, DCFUS290D5/T3, DCFS290D7/T3, or DCFUS290D7/T3, DCFS290D8/T3, DCFUS290D8/T3, DCFUS290D12/T3, or DCFUS290D13/T3 (c) Propeller spinner and bulkhead assembly, McCauley D-3534/D-3537, D-3534/D-3796, or D-5212/D-5214.	
Airspeed Limits (CAS)	S/N 414-0001 through 414-0450	
	Maneuvering	180 m.p.h. (156 knots)
	Maximum structural cruising	230 m.p.h. (200 knots)
	Never exceed	266 m.p.h. (231 knots)
	Flaps extended 15°	180 m.p.h. (157 knots)
	Flaps extended 45°	160 m.p.h. (139 knots)
	Landing gear operating	160 m.p.h. (139 knots)
	Landing gear extended	160 m.p.h. (139 knots)
	Minimum control	97 m.p.h. (84 knots)
	S/N 414-0451 through 414-0800	
	Maneuvering	156 KCAS (180 m.p.h.)
	Maximum structural cruising	200 KCAS (230 m.p.h.)
	Never exceed	231 KCAS (266 m.p.h.)
	Flaps extended 15°	160 KCAS (184 m.p.h.)
	Flaps extended 45°	140 KCAS (161 m.p.h.)
	Landing gear operating	140 KCAS (161 m.p.h.)
	Landing gear extended	140 KCAS (161 m.p.h.)
	Minimum control	84 KCAS (97 m.p.h.)
(IAS)	S/N 414-0801 and up	
	Maneuvering	160 KIAS (184 m.p.h.)
	Maximum structural cruising	205 KIAS (236 m.p.h.)
	Never exceed	236 KIAS (272 m.p.h.)
	Flaps extended 15°	164 KIAS (189 m.p.h.)
	Flaps extended 45°	147 KIAS (169 m.p.h.)
	Landing gear operating	143 KIAS (165 m.p.h.)
	Landing gear extended	143 KIAS (165 m.p.h.)
	Minimum control	82 KIAS (94 m.p.h.)
C.G. Range (Landing Gear Extended)	(+150.9) to (+159.7) at 6350 lb. (+160.2) at 5950 lb. or less (+147.5) at 5000 lb. or less Straight line variation between points given Landing gear retracted moment change: +837 in.-lb.	
Empty Wt. C.G. Range	None	
Leveling Means	External screw heads on right side of fuselage at stations +213.29 and +238.55 on W.L. +93.80	

V - Model 414 (cont'd)

Maximum Weight: Landing 6200 lb., takeoff 6350 lb.

No. of Seats:

S/N 414-0001 through 414-0350
6 or 7 (2 at +137.0, 2 at +175.5, 2 at +215.5, 1 at +246.5)

S/N 414-0351 and up
6 (2 at +137.0, 2 at +175.0, 2 at +218.0)
7 (with toilet option) (2 at +137.0, 2 at +175.0, 2 at +218.0, 1 at +250.0)
(See manufacturer's equipment list for optional seating arrangements)

Maximum Baggage:

S/N 414-0001 through 414-0350
350 lb. (+71.0), 240 lb. (+186.0), 340 lb. (+246.5)
S/N 414-0351 and up
350 lb. (+71.0), 240 lb. (+186.0), 400 lb. (+266.0), 100 lb. (+282.0)

Fuel Capacity: 102 gal. (2 wing tip tanks, 51 gal. ea., 50 gal. usable at +152.0)
See NOTE 1 for data on unusable fuel

Oil Capacity: 26 qt. (13 qt. in ea. engine at +113.5; usable 6.5 qt. per engine)
See NOTE 1 for data on undrainable oil

Control Surface Movements:

Wing flaps			Down	45°, +1°, -0°
Main surfaces				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	32°, +1°, -0°	Left	32°, +1°, -0°
(Read degrees normal to rudder hinge line)				
Tab (main surface in neutral)				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	5°, +1°, -0°	Down	30°, +1°, -0°
Rudder	Right	11°, +1°, -0°	Left	16°, +1°, -0°
(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible: 414-0001 through 414-0965

VI - Model 421B, Golden Eagle, (Normal Category), Approved April 28, 1970

Engines: Two Continental GTSIO-520-H reduction gear ratio .667:1

Fuel: Grade 100 or 100LL aviation gasoline

Engine Limits: For all operations, 2275 propeller r.p.m. (375 hp.)
39.5 in. Hg. Mp. up to critical altitude of 18,000 ft. in standard atmosphere. Above 18,000 ft. the following maximum Mp. applies for maximum r.p.m.:

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
18,000	39.5
20,000	37.5
22,000	35.5
24,000	33.5
25,000	32.5
26,000	31.3
28,000	28.5
30,000	25.5

VI - Model 421B (cont'd)

Propeller and Propeller Limits

Two McCauley full-feathered 3-bladed propeller installations
(a) McCauley hub 3AF34C92 with 90LF-0 blades or
McCauley hub 3AF37C516 with 90LFB-0 blades
Diameter: not over 90.0 in., not under 88.0 in.
(no further reduction permitted)
Pitch settings at 30 in. station:
low 16.9°, ±0.2°
feathering 84.5°, ±0.3°
(b) Model 421B S/N 421B0001 thru 421B0500
Hydraulic governor Woodward 210594, 210595, 210596 or 210597
Model 421B S/N 421B0501 and up
McCauley DCF290D2/T4, DFC7290D2/T4, DCFS290D2/T4, DCFUS290D2/T4, DCF290D7/T4, DCFU290D7/T4, DCFS290D7/T4, DCFUS290D7/T4, DCFU290D13/T4 or DCFUS290D13/T4.
(c) Propeller spinner and bulkhead assembly, McCauley D-3534/D-3796.

Airspeed Limits (CAS)

Model 421B: S/N 421B0001 through 421B0500

Maneuvering	175 m.p.h. (152 knots)
Maximum structural cruising	230 m.p.h. (200 knots)
Never exceed	274 m.p.h. (238 knots)
Landing gear operating	165 m.p.h. (143 knots)
Landing gear extended	165 m.p.h. (143 knots)
Flaps extended 15° (S/N 421B0001 through 421B0200)	180 m.p.h. (156 knots)
Flaps extended 15° (S/N 421B0201 through 421B0500)	200 m.p.h. (174 knots)
Flaps extended 45°	165 m.p.h. (143 knots)
Minimum control	100 m.p.h. (87 knots)

Model 421B: S/N 421B0501 and up

Maneuvering	152 KCAS (175 m.p.h.)
Maximum structural cruising	200 KCAS (230 m.p.h.)
Never exceed	238 KCAS (274 m.p.h.)
Landing gear operating	145 KCAS (167 m.p.h.)
Landing gear extended	145 KCAS (167 m.p.h.)
Flaps extended 15°	175 KCAS (202 m.p.h.)
Flaps extended 45°	145 KCAS (167 m.p.h.)
Minimum control (S/N 421B0501 through 421B0800)	87 KCAS (100 m.p.h.)
Minimum control (S/N 421B0801 and up)	82 KCAS (94 m.p.h.)

C.G. Range (Landing Gear Extended)

S/N 421B0001 through 421B0200

6, 7, or 8 Place	10 Place
(+151.8) to (+156.4) at 7250 lb.	(+151.8) to (+157.7) at 7250 lb.
(+156.7) at 6850 lb. or less	(+158.0) at 6850 lb. or less
(+147.1) at 6100 lb. or less	(+147.1) at 6100 lb. or less

S/N 421B0201 and up

(+152.6) to (+156.5) at 7450 lb.	(+152.6) to (+157.8) at 7450 lb.
(+156.7) at 7050 lb. or less	(+158.0) at 7050 lb. or less
(+147.1) at 6100 lb. or less	(+147.1) at 6100 lb. or less

Straight line variation between points given
Landing gear retracted moment change: +889 in.-lb.

VI - Model 421B (cont'd)

Empty Wt. C.G. Range	None
Leveling Means	External screw heads on right side of fuselage at stations +213.9 and +238.55 on W.L. +93.80
Maximum Weight	Landing 7200 lb., takeoff 7250 lb. (S/N 421B0001 through 421B0200) Landing 7200 lb., takeoff 7450 lb. (S/N 421B0201 and up)
No. of Seats	S/N 421B0001 through 421B0300 6, 7, or 8 (2 at +137.0, 2 at +175.5, 2 at +215.5, 2 at +245.7) or 10 (2 at +137.0, 2 at +161.0, 2 at +190.0, 2 at +218.0, 2 at +249.0) S/N 421B0301 and up 6, 7, or 8 (2 at +137.0, 2 at +175.0, 2 at +218.0, 2 at +261.0) or 10 (2 at +137.0, 2 at +162.0, 2 at +190.0, 2 at +218.0, 2 at +246.0) (See manufacturer's equipment list for optional seating arrangements)
Maximum Baggage	S/N 421B0001 through 421B0300 250 lb. (+32.0), 350 lb. (+71.0), 400 lb. (+186.0), 340 lb. (+246.5) S/N 421B0301 and up 250 lb. (+32.0), 350 lb. (+71.0), 400 lb. (+186.0), 400 lb. (+266.0), 100 lb. (+282.0)
Fuel Capacity	175 gal. (2 wing tip tanks, 51 gal. ea., 50 gal. usable at +152.0 and 2 wing tanks, 36.5 gal. ea., 35 gal. usable at +164.0) See NOTE 1 for data on unusable fuel
Oil Capacity	26 qt. (13 qt. in ea. engine at +115.4; usable 7.0 qt. per engine) See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps			Down	45°, +1°, -0°
Main surfaces				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	25°, +1°, -0°	Left	25°, +1°, -0°
				(S/N 421B0001 through 421B0800)
	Right	32°, +1°, -0°	Left	32°, +1°, -0°
				(S/N 421B0801 and up)
(Read degrees normal to rudder hinge line)				
Tab (main surface in neutral)				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	12°, +1°, -0°	Down	20°, +1°, -0°
Rudder	Right	11°, +1°, -0°	Left	16°, +1°, -0°
(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible	421B0001 through 421B0970

VII - Model 421C, Golden Eagle, (Normal Category), Approved October 28, 1975

Engines	Two Continental GTSIO-520-L reduction gear ratio .667:1 (S/N 421C0001 through 421C1000) Two Continental GTSIO-520-N reduction gear ratio .667:1 (S/N 421C1001 and up)
Fuel	Grade 100 or 100LL aviation gasoline

VII - Model 421C (cont'd)

Engine Limits

For all operations, 2235 propeller r.p.m. (375 hp.)
39.0 in. Hg. Mp. up to critical altitude of 20,000 ft. in standard atmosphere. Above 20,000 ft. the following maximum Mp. applies for maximum r.p.m.:

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
20,000	39.0
22,000	36.5
24,000	34.0
25,000	32.5
26,000	31.0
28,000	28.0
30,000	25.0

Propeller and Propeller Limits

Two McCauley full-feathering 3-bladed propeller installations
(a) McCauley hub 3FF32C501 with 90UMB-0 blades
Diameter: not over 90.0 in., not under 88.0 in.
(no further reduction permitted)
Pitch settings at 30 in. station:
low 16.6°, ±0.2°, feathering 84.6°, ±0.3°
(b) S/N 421C0001 through 421C0800
Hydraulic Governor McCauley DCF290D2/T6, DCFU290D2/T6, DCFS290D2/T6, DCFUS290D2/T6, DCF290D7/T6, DCFU290D7/T6 or DCFU290D13/T6, DCFS290D7/T6, DCFUS290D7/T6 or DCFUS290D13/T6
S/N 421C0801 and up
Hydraulic Governor McCauley DCF290D7/T6, DCFU290D7/T6 or DCFU290D13/T6, DCFS290D9/T6, DCFUS290D9/T6
(c) Propeller spinner and bulkhead assembly, McCauley D-3534/D-4506 or McCauley D-5212/D-5217

Airspeed Limits (IAS)

Maneuvering	151 KIAS (174 m.p.h.)
Maximum structural cruising	201 KIAS (231 m.p.h.)
Never exceed	240 KIAS (276 m.p.h.)
Landing gear operating	176 KIAS (203 m.p.h.)
Landing gear extended	176 KIAS (203 m.p.h.)
Flaps extended 15°	176 KIAS (203 m.p.h.)
Flaps extended 45°	146 KIAS (168 m.p.h.)
Minimum control	80 KIAS (92 m.p.h.)

C.G. Range (Landing Gear Extended)

6, 7, 8, 9 or 10 Place
(+152.6) to (+158.0) at 7450 lb.
(+147.1) at 6100 lb. or less
Straight line variation between points given
Landing gear retracted moment change:
+917 in.-lb. (S/N 421C0001 through 421C0800)
+1318 in.-lb. (S/N 421C0801 and up)

Empty Wt. C.G. Range

None

Leveling Means

External screw heads on right side of fuselage at stations +213.9 and +238.55 on W.L. +93.80

Maximum Weight

S/N 421C0001 through 421C0400
Landing 7200 lb., takeoff 7450 lb.

S/N 421C0401 and up
Landing 7200 lb., takeoff 7450 lb., ramp 7500 lb.

VII - Model 421C (cont'd)

No. of Seats
6, 7 or 8 (2 at +137.0, 2 at +175.0, 2 at +218.0, 1 at +261.0)
or 10 (2 at +137.0, 2 at +162.0, 2 at +190.0, 2 at +218.0, 2 at +246.0)
(See manufacturer's equipment list for optional seating arrangements)

Maximum Baggage
250 lb. (+32.0), 350 lb. (+71.0), 400 lb. (+186.0), 400 lb. (+266.0), 100 lb. (+282.0)

Fuel Capacity
213.4 gal. (2 wing tanks, 106.7 gal. ea., 103.0 gal. usable at +161.0)
See NOTE 1 for data on unusable fuel

Oil Capacity
26 qt. (13 qt. in ea. engine at +115.4; usable 7.0 qt. per engine)
See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps			Down	45°, +1°, -0°
Main surfaces				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	32°, +1°, -0°	Left	32°, +1°, -0°
(Read degrees normal to rudder hinge line)				
Tab (main surface in neutral)				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	12°, +1°, -0°	Down	20°, +1°, -0°
Rudder	Right	11°, +1°, -0°	Left	16°, +1°, -0°
(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible
421C0001 through 421C1807

VIII - Model 414A, Chancellor, (Normal Category), Approved September 30, 1977

Engines
Two Continental TSIO-520-N or TSIO-520-NB (In any combination)
(S/N 414A0001 through 414A0200)

Two Continental TSIO-520-NB (S/N 414A0201 and up)

Fuel
Grade 100 or 100LL Aviation Gasoline

Engine Limits
For all operations, 2700 r.p.m., 310 hp., 38.0 in. Hg. Mp. up to
critical altitude of 20,000 ft. in standard atmosphere.
Above 20,000 ft. the following maximum Mp. applies for maximum r.p.m.:

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
20,000	38.0
22,000	35.2
24,000	32.3
26,000	29.8
28,000	27.4
30,000	25.0

Propeller and Propeller Limits
Two McCauley full-feathering three-bladed propeller installations
(a) McCauley hub 3AF32C93 with 82NC-5.5 blades or McCauley hub 3AF32C505 with 82NEA-5.5 blades
Diameter: not over 76.5 in., not under 75.0 in.
(no further reduction permitted)
Pitch settings at 30 in. station:
low 14.9°, ±0.2°, feathering 81.2°, ±0.3°

or (b) McCauley hub 3AF32C93 with 82NC-5.5 blades or McCauley hub 3AF32C505 with 82NEA-5.5 blades
Diameter: not over 75.5 in., not under 75 in.
Pitch settings at 30 in. station:
low 15.2°, ±0.2°
feathered 81.2°, ±0.3°

VIII - Model 414A (cont'd)

Propeller and Propeller Limits

(c) S/N 414A0001 through 414A0801
Hydraulic governor McCauley DCF290D2/T3, DCFU290D2/T3, DCFS290D4/T3, DCFUS290D4/T3, DCFS290D6/T3, DCFUS290D6/T3, DCF290D7/T3, DCFU290D7/T3, DCFU290D13/T3, DCFS290D7/T3, DCFUS290D7/T3, DCFUS290D13/T3, DCFS290D8/T3, DCFUS290D8/T3 or DCFUS290D12/T13

S/N 414AC0801 and up
Hydraulic governor McCauley DCF290D2/T3, DCFU290D2/T3, DCF290D7/T3, DCFU290D7/T3 or DCFU290D13/T3, DCFS290D9/T3, DCFUS290D9/T3

(d) Propeller spinner and bulkhead assembly, McCauley D-3534/D-3796, or McCauley D-5212/D-5214

Airspeed Limits (IAS)

Maneuvering	145 KIAS (167 m.p.h.)
Max. structural cruising	203 KIAS (234 m.p.h.)
Never exceed	237 KIAS (273 m.p.h.)
Landing gear operating	177 KIAS (204 m.p.h.)
Landing gear extended	177 KIAS (204 m.p.h.)
Flaps extended 15°	177 KIAS (204 m.p.h.)
Flaps extended 45°	146 KIAS (168 m.p.h.)
Minimum control	79 KIAS (91 m.p.h.)

C.G. Range (Landing Gear Extended)

(+151.3) to (+160.0) at 6750 lb.
(+147.8) at 5800 lb. or less
Straight line variation between points given
Landing gear retracted moment change: +917 in.-lb.

Empty Wt. C.G. Range

None

Leveling Means

External screw heads on right side of fuselage at stations +213.29 and +238.55 on W.L. +93.80

Maximum Weight

Ramp 6785 lb., takeoff and landing 6750 lb.

No. of Seats

6, 7 or 8 (2 at +137.0, 2 at +175.0, 2 at +218.0, Optional: 1 or 2 at +261.0 or with toilet option, 1 at +250.0)
(See manufacturer's equipment list for optional seating arrangements)

Maximum Baggage

250 lb. (+32.0), 350 lb. (+71.0), 400 lb. (+186.0), 400 lb. (+266.0), 100 lb. (+282.0)

Fuel Capacity

S/N 414A0001 through 414A0200
213.4 gal. (2 wing tanks, 106.7 gal. ea., 103.0 gal. usable at +161.0)
See NOTE 1 for data on unusable fuel

S/N 414A0201 through 414A0400
213.4 gal. (2 wing tanks, 106.7 gal. ea., 102.0 gal. usable at +161.0)
See NOTE 1 for data on unusable fuel

S/N 414A0401 and up
213.4 gal. (2 wing tanks, 106.7 gal. ea., 103.0 gal. usable at +161.0)
See NOTE 1 for data on unusable fuel

Oil Capacity

26 qt. (13 qt. in ea. engine at +110.9; usable 6.5 qt. per engine)
See NOTE 1 for data on undrainable oil

VIII - Model 414A (cont'd)

Control Surface Movements	Wing flaps			Down	45°, +1°, -0°
	Main surfaces				
	Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
	Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°
	Rudder	Right	32°, +1°, -0°	Left	32°, +1°, -0°
	(Read degrees normal to rudder hinge line)				
	Tab (main surface in neutral)				
	Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
	Elevator	Up	12°, +1°, -0°	Down	20°, +1°, -0°
	Rudder	Right	11°, +1°, -0°	Left	16°, +1°, -0°
	(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible: 414A0001 through 414A1212

IX - Model 402C, Businessliner/Utililiner, (Normal Category), Approved September 25, 1978

Engines: Two Continental TSIO-520-VB rated at 325 hp.

Fuel: Grade 100 or 100LL aviation gasoline

Engine Limits: Takeoff and engine inoperative, 2700 r.p.m., 39.0 in. Hg. Mp. up to 12,000 ft. Above 12,000 ft. the following maximum Mp. applies for maximum r.p.m.

Altitude (ft.)	Max. Allowable Mp. (in. Hg.)
S.L. to 12,000	39.0
14,000	37.2
16,000	37.2
18,000	32.0
20,000	29.5
22,000	27.0
24,000	25.0
26,000	23.0
28,000	21.0
30,000	19.0

Propeller and Propeller Limits: Two McCauley full-feathering three-bladed propeller installations

(a) McCauley hub 3AF32C93 with 82NC-5.5 blades or McCauley hub 3AF32C505 with 82NEA-5.5 blades
Diameter: not over 76.5 in., not under 75.0 in.
(no further reduction permitted)
Pitch settings at 30 in. station:
low 14.9°, ±0.2°, feathering 82.2°, ±0.3°

or (b) McCauley hub 3AF32C93 with 82NC-6.5 blades or McCauley hub 3AF32C505 with 82NEA-6.5 blades
Diameter: not over 75.5 in., not under 75.0 in.
Pitch settings at 30 in. station:
low 15.2°, ±0.2°, feathering 82.2°, ±0.3°

(c) S/N 402C0001 through 402C0600
Hydraulic governor, Woodward B210444, C210439; McCauley DCF290D7/T3, DCFUS290D7/T3, DCFU290D13/T3, DCFS290D7/T3, DCFUS290D7/T3, DCFUS290D13/T3, DCFUS290D8/T3, or DCFUS290D12/T3
S/N 689, and 402C0601 and up
Hydraulic governor, Woodward B210444, C210439; McCauley DCF290D7/T3, DCFU290D7/T3 or DCFU290D13/T3, DCFS290D9/T3, DCFUS290D9/T3

(d) Propeller spinner and bulkhead assembly; McCauley D-3534/D-3537, D-3534/D-3796, or D-5212/D-5214

IX - Model 402C (cont'd)

Airspeed Limits (IAS)	Maneuvering	150 KIAS (173 m.p.h.)
	Max. structural cruising	205 KIAS (236 m.p.h.)
	Never exceed	235 KIAS (270 m.p.h.)
	Landing gear operating	180 KIAS (207 m.p.h.)
	Landing gear extended	180 KIAS (207 m.p.h.)
	Flaps extended 15°	180 KIAS (207 m.p.h.)
	Flaps extended 45°	149 KIAS (172 m.p.h.)
	Minimum control	80 KIAS (92 m.p.h.)

C.G. Range (Landing Gear Extended)
(+151.58) to (+160.67) at 6850 lb.
(+149.08) at 5800 lbs. or less
Straight line variation between points given
Landing gear retracted moment change: +917 in.-lb.

Empty Wt. C.G. Range
None

Leveling Means
External screw heads on right side of fuselage at stations +213.65 and +238.00 on W.L. +93.80

Maximum Weight
Ramp, 6885 lbs., takeoff and landing 6850 lbs.

No. of Seats
6, 7 or 8 (2 at +137.0, 2 at +175.0, 2 at +218.0, 1 or 2 at +261.0)
9 (with photographic provisions option) (2 at +137.0, 2 at +162.0, 2 at +190.0, 2 at +218.0, 1 at +246.0)
10 (2 at +137.0, 2 at +162.0, 2 at +190.0, 2 at +218.0, 2 at +246.0)
(See manufacturer's equipment list for optional seating arrangements)

Maximum Baggage
250 lbs. (+32.0), 350 lbs. (+71.0), 400 lbs. (+186.0), 400 lbs. (+266.0), 100 lbs. (+282.0)

Fuel Capacity
S/N 402C0001 through 402C0200
213.4 gal. (2 wing tanks, 106.7 gal. ea., 102 gal. usable at +161.0)
See NOTE 1 for data on unusable fuel

S/N 689, and 402C0201 and up
213.4 gal. (2 wing tanks, 106.7 gal. ea., 103 gal. usable at +161.0)
See NOTE 1 for data on unusable fuel

Oil Capacity
26 qt. (13 qt. in ea. engine at +110.9; usable 6.5 qt. per engine)
See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps			Down	45°, +1°, -0°
Main surfaces				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	25°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	32°, +1°, -0°	Left	32°, +1°, -0°
(Read degrees normal to rudder hinge line)				
Tab (main surface in neutral)				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	12°, +1°, -0°	Down	20°, +1°, -0°
Rudder	Right	11°, +1°, -0°	Left	16°, +1°, -0°
(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible
689, 402C0001 through 402C1020

X - Model 425, Corsair or Conquest I (See NOTE 7), (Normal Category), Approved July 1, 1980

Engines: Two Pratt & Whitney Aircraft of Canada, Ltd., PT6A-112 turboprop

Fuel: Aviation turbine fuel Jet A, Jet A-1, or Jet B, JP-4, JP-5 or JP-8. For required use of anti-icing additives and emergency use of aviation gasoline, refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Engine Limits

	Operating Limits				
	Shaft Horsepower Power	Ng Gas Generator Speed (% rpm)	Indicated Torque (ft.-lbs.)	Prop. Shaft Speed (rpm)	Maximum Permissible Interturbine Temp. (°C.)
Takeoff static & max. continuous	450*	101.6	1244	1900	725
Starting (2 sec.)	- -	- -	- -	- -	1090
Maximum reverse	430	101.6	1244	1815	725

*Flat Rated:
The engines may produce more power than that for which the airplane has been certificated. Under these conditions, the placarded torquemeter, ITT, or Ng limitations shall not be exceeded.

Propeller and Propeller Limits

(1) Two Hartzell three-bladed, full-feathered, reversible
Hub: HC-B3TN-3C
Blade: T10178B-8R
Diameter: Not over 93-3/8 in., not under 91 inches; no further reduction permitted
Pitch at 30-inch station:
Low pitch 20.2°
Feathered 86.7°
Reverse -10.9°

(2) Two McCauley three-bladed, full-feathered, reversible
Hub: 3GFR34C701
Blade: 93KB-0
Diameter: Not over 93 inches, not under 90-5/8 inches; no further reduction permitted
Pitch at 30-inch station:
Low pitch 18.5°
Feathered 85.5°
Reverse -13.5°

Propellers may be interchanged in any combination.

Airspeed Limits (IAS)

V_{MO} (Max Operating) Sea level to 21,800 ft.	230 knots 265 m.p.h.
M_{MO} Above 21,800 ft.	.52 mach
V_A (Maneuvering) at 8200 lbs.	154 knots 177 m.p.h.
V_A (Maneuvering) at 8600 lbs.	157 knots 181 m.p.h.
V_{FE} (Flaps extended)	
45° (Landing)	145 knots 169 m.p.h.
15° (Takeoff & Approach)	175 knots 201 m.p.h.
V_{MCA} (Min. control speed) Air at 8200 lbs.	90 knots 104 m.p.h.
V_{MCA} (Min. control speed) Air at 8600 lbs.	92 knots 106 m.p.h.
V_{LE} (Landing gear extended)	175 knots 201 m.p.h.

X - Model 425 (cont'd)

C.G. Range (Landing Gear Extended)

S/N 425-0001 through 425-0176 (See NOTE 7)
(155.66) to (160.04) at 8200 lbs.
(150.65) to (160.04) at 6478 lbs. or less

S/N 425-0177 and up
(156.81) to (160.04) at 8600 lbs.
(150.65) to (160.04) at 6478 lbs. or less

Straight line variation between points given
Moment change due to retracting landing gear (+1448 in.-lb.)

Empty Wt. C.G. Range: None

Leveling Means: External screw heads on right side of fuselage at stations +213.9 and +238.55 on W.L. +93.80

Maximum Weight

	S/N 425-0001 through 425-0176 (See NOTE 7)	S/N 425-0177 and up
Takeoff	8200 lbs.	8600 lbs.
Landing	8000 lbs.	8000 lbs.
Zero fuel	6740 lbs.	7000 lbs.
Ramp	8275 lbs.	8675 lbs.

No. of Seats: 6, 7 or 8 (2 at +137.0, 2 at +175.0, 2 at +218.0, 2 at +261.0)
See manufacturer's equipment list for optional seating arrangements

Maximum Baggage: 250 lb. (+32.0), 350 lb. (+71.0), 400 lb. (+266.0), 100 lb. (+282.0)

Fuel Capacity: 2497.8 lb. (372.8 gal.) total in two wing tanks, 1248.9 lb. (186.4 gal.) each; 2452.2 lb. (366.0 gal.) usable total, 1226.1 lb. (133 gal.) in each tank at +163.3. Fuel weight based on 6.70 lb./gal. See NOTE 1 for data on unusable fuel.

Oil Capacity: 5.28 gal. total, 5.28 gal. usable (2.3 gal. in each engine-mounted tank at +125.3).
See NOTE 1 for data on undrainable oil.

Maximum Operating Altitude: 30,000 ft.

Control Surface Movements

Wing flaps			Down	45°, +1°, -0°
Main surfaces				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	19°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	32°, +1°, -0°	Left	32°, +1°, -0°
(Read degrees normal to rudder hinge line)				
Tab (main surface in neutral)				
Aileron	Up	20°, +1°, -0°	Down	20°, +1°, -0°
Elevator	Up	6°, +1°, -0°	Down	15°, +1°, -0°
Rudder	Right	11°, +1°, -0°	Left	16°, +1°, -0°
(Read degrees normal to rudder hinge line)				

Serial Nos. Eligible: 425-0001 through 425-0236

Data Pertinent to All Models

Datum: 100.00 in. forward face of fuselage bulkhead forward of rudder pedals.

X - Model 425 (cont'd)

Certification Basis

Models 401, 401A, 401B, 402, 402A, 402B, 411, 411A, 414, 421, 421A:
Part 3 of the Civil Air Regulations dated May 15, 1956, as amended by 3-1 through 3-5 and 3-8.

Model 421B:
Part 3 of the Civil Air Regulations dated May 15, 1956, except Subpart B, as amended by 3-1 through 3-5 and 3-8; Subpart B, paragraphs 23.25 through 23.253 of the Federal Aviation Regulations dated February 1, 1965, as amended by 23-1 through 23-7.

Models 414A and 421C:
Part 3 of the Civil Air Regulations dated May 15, 1956, as amended by 3-1 through 3-5 and 3-8, excluding the following portions:
Subpart B and paragraphs 3.356, 3.357, 3.358, 3.359, 3.411, 3.429, 3.433, 3.434, 3.435, 3.436, 3.437, 3.445, 3.581, 3.582, 3.583, 3.584, 3.585, 3.587, 3.628, 3.666, 3.672, 3.673, 3.674, 3.675, 3.700(c), 3.728, 3.767(a) and 3.767(b). Include the following portions of FAR 23 dated February 1, 1965, as amended by 23-1 through 23-14;
Subpart B and paragraphs 23.729, 23.901, 23.909, 23.951, 23.954, 23.955, 23.959, 23.973, 23.1041, 23.1043, 23.1047, 23.1143, 23.1305, 23.1387(e), 23.1435 and 23.1557(c); as amended by 23-1 through 23-21, paragraph 23.1385(c); as amended by 23-1 through 23-23, paragraph 23.1327. Add paragraph 23.1559(b) for Model 414A only. Findings of Equivalent Level of Safety were made for CAR 3.637, 3.757, and 3.778(a).

Model 402C:
Part 3 of the Civil Air Regulations dated May 15, 1956, as amended by 3-1 through 3-5 and 3-8, excluding the following portions: Subpart B and paragraphs 3.356, 3.357, 3.358, 3.359, 3.411, 3.429, 3.433, 3.434, 3.435, 3.436, 3.437, 3.445, 3.581, 3.582, 3.583, 3.584, 3.585, 3.587, 3.628, 3.666, 3.672, 3.673, 3.674, 3.675, 3.700(c), 3.728, 3.767(a) and 3.767(b). Include the following portions of FAR 23 dated February 1, 1965, as amended by 23-1 through 23-14: Subpart B and paragraphs 23.729, 23.901, 23.909, 23.951, 23.954, 23.955, 23.959, 23.973, 23.1041, 23.1043, 23.1047, 23.1143, 23.1305, 23.1387(e), 23.1435, 23.1557(c), and 23.1559(b); as amended by 23-1 through 23-21, paragraph 23.1385(c); as amended by 23-1 through 23-23, paragraph 23.1327. Part 36 of the Federal Aviation Regulations dated December 1, 1969, as amended by 36-1 through 36-7. Findings of Equivalent Level of Safety were made for CAR 3.637, 3.757, and 3.778(a).

Model 425:
Part 3 of the Civil Air Regulations dated May 15, 1956, as amended by 3-1 through 3-6 and 3-8 as follows: Paragraphs 3.0 through 3.20, 3.291 through 3.307, 3.317 through 3.347, 3.371 through 3.401, 3.651, 3.652, 3.655(c) and (d), 3.661, 3.662, 3.668, 3.686 through 3.699, 3.711 through 3.728, 3.749, 3.791, and 3.792; the following portions of FAR 23 dated February 1, 1965, as amended by 23-1 through 23-21: Paragraphs 23.21 through 23.33, 23.45(a) through (d), 23.49 through 23.179, 23.181(a), 23.201 through 23.572, 23.629, 23.723 through 23.735, 23.865, 23.867, 23.901 through 23.1017, 23.1019(a)(1) and (2), 23.1019(a)(4) and (5), 23.1019(b), 23.1021 through 23.1203, 23.1303(a) through (d), 23.1305(a) through (u) and (w), 23.1323, 23.1325, 23.1327, 23.1329, 23.1335, 23.1337, 23.1351 through 23.1357, 23.1385 through 23.1401, 23.1441 through 23.1449, 23.1501 through 23.1521, 23.1524, 23.1525, 23.1527(b), and 23.1529 through 23.1589; Paragraph 25.831(d) of FAR 25 dated February 1, 1965, as amended by 25-1 through 25-43; FAR 36 dated December 1, 1969, as amended by 36-1 through 36-10; SFAR No. 27, Fuel Venting and Exhaust Emission Requirements for Turbine Engine Powered Airplanes, effective February 1, 1974, as amended by SFAR's 27-1, 27-2, and 27-3; plus Special Conditions 23-93-CE-12 as amended by Amendment No. 1 dated June 25, 1980. (See NOTE 3.)

X - Model 425 (cont'd)

Certification Basis

Model 414A (S/N 414A0401 and up, Model 421C (S/N 421C0801 and up)
In addition to the above certification basis, compliance with FAR 36, dated December 1, 1969, as amended by 36-1 through 36-10 (414A only) and 36-1 through 36-4 (421C only) has been demonstrated.

Model 402B, S/N 402B0501 and up
Model 402C
Model 414, S/N 414-0451 and up
Model 414A
Model 421B, S/N 421B0501 and up
Model 421C
Model 425
Markings, placards and manuals are primarily in knots instead of m.p.h. as required by CAR 3, but permitted by FAR 23, Amendment 23-7.

Model 402B, S/N 402B1001 and up
Model 414, S/N 414-0801 and up
Findings of equivalent level of safety were made for CAR 3.757 and 3.778(a).

Model 402B, S/N 402B0801 and up
Model 402C
Model 414, S/N 414-0601 and up
Model 414A
Model 421B, S/N 421B0801 and up
Model 421C
Model 425
In addition to the above certification basis, compliance with ice protection has been demonstrated in accordance with FAR 23.1419 of Amendment 23-14 effective December 20, 1973, when ice protection equipment is installed in accordance with Cessna Drawing 5914105 for 425, 5114400 for all other models, Factory Kit (FK) No. 194, Pilot's Operating Handbook and/or FAA Approved Airplane Flight Manual. Aircraft which have been modified in compliance with Accessory Kit (AK) No. 421-106 are considered to be equivalent to those with Factory Kit (FK) No. 194.

Application for Type Certificate dated September 18, 1961. Type Certificate No. A7CE issued August 17, 1964, obtained by the manufacturer under delegation option procedures.

Production Basis

Production Certificate No. 312 issued and Delegation Option Manufacturer No. CE-3 authorized to issue airworthiness certificates under delegation option provisions of Part 21 of the Federal Aviation Regulations. Effective February 15, 1985, and on, Production Certificate No. 4 is applicable to all spares production. See NOTE 8 for specific effectivity of P.C. 4 on new airplane serials.

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. In addition, the following item of equipment is required.

1. Stall warning indicator, Cessna dwg. 5018100 (401, 402, 411, 411A)
   Stall warning indicator, Cessna dwg. 5118000 (421)
   Stall warning indicator, Cessna dwg. 5618002 (414)
   Stall warning indicator, Cessna dwg. 5218016 (401A, 402A, 401B, 402B0001 through 402B0300)
   Stall warning indicator, Cessna dwg. 5118310 (421A)
   Stall warning indicator, Cessna dwg. 5118402 (421B0001 through 421B0300)
   Stall warning indicator, Cessna dwg. 5618021 (414-0351 and up, 421B0301 and up)
   Stall warning indicator, Cessna dwg. 5218031 (402B0301 and up)
   Stall warning indicator, Cessna dwg. 5118627 (421C)
   Stall warning indicator, Cessna dwg. 5618041 (402C, 414A, 425)

or Angle of Attack Indicator System, Cessna Dwg. 0800302, Model 402B, 402C, 414, 414A, 421B, 421C.

NOTE 1. Current weight and balance report together with list of equipment included in certificated empty weight and loading instructions when necessary must be provided for each aircraft at the time of original certification.

The certificated empty weight and corresponding center of gravity location must include undrainable oil (not included in oil capacity) and unusable fuel as follows:

(a) Fuel. 12 lb. (tip) at (+152.0) (401, 401A, 401B, 402, 402A, 402B, 411, 411A, 414, 421, 421A, 421B)
18 lb. (wing, standard 73 gal. at +164.0) (411, 411A, 421, 421A, 421B)
24 lb. (wing, optional 100 gal. at +164.0) (411, 411A, 421, 421A, 421B, 402A, 402B, 414)
6 lb. (wing, optional 63 gal. at +164.0) (402B0301 and up and 414-0351 and up)
44 lb. (wing, 7.4 gal. at +165.2) (402C, S/N 689, and 402C0201 and up; 414A, S/N 414A0401 and up; 421C)
68 lb. (wing, 11.4 gal. at +165.2) (414A, S/N 414A0001 through S/N 414A0200)
56 lb. (wing, 9.4 gal. at +165.0) (402C, S/N 402C0001 through 402C0200; 414A, S/N 414A0201 through 414A0400)
45.6 lb. (wing, 6.8 gal. at +166.2) (425)

(b) If optional wing locker transfer tanks are installed 3.0 lb. (each 26 gal. tank) at (+176.0) (411, 411A, 421, 421A, 421B)
3.0 lb. (each 20 gal. tank) at (+175.0) (401, 401A, 401B, 402, 402A, 402B, 414)
2.0 lb. (each 28 gal. tank) at (+176.0) (421C0001 and up)

(c) Oil - 0.0 lb.

NOTE 2. The placards specified in the FAA Approved Airplane Flight Manual must be displayed.

NOTE 3. Service information
The appropriate airplane service manual contains structural retirement lives, which may not be changed without FAA Engineering approval, for the following components:

	Part Number	Hours	Model
Windshield	5111604-1 & -2	13,200	414, 414A, 421A, 421B, 421C, 425
Windshield, heated	9910013-1	13,200	421, 421A (S/N 421A0001 through 421A0117)
Windshield, heated	9910071-1	13,200	414, 421A, 421B S/N 414-0001 through 414-0600, 421A0118 through 421B0800)
Windshield, heated	9910214-1 & -2	13,200	414, 414A, 421B, 421C (S/N 414-0601 and up, 421B0801 through 421C0800)
Windshield, heated	9910460-1 & -200	13,200	421C (S/N 421C0801 and up), 425
Upper cabin door latch pins	5111545-3	8,000	421 (S/N 421-0001 through 421-0079)
Upper cabin door latch pins	5111545-6	8,000	421 (S/N 421-0080 and up), 421A
Wing	5922125 not modified by SK425-48	10,200	425 (S/N -0002 thru -0176 except airplanes incorporating SK425-17)
Wing	5922125 not modified by SK425-48	9,300	425 (S/N -0177 and On and airplanes -0002 thru -0176 incorporating SK425-17)
Wing	5922125 modified by SK425-48	30,000	425
Wing carry-thru	5911004, 5111225	30,000	425

NOTE 3. (cont'd.)

For Model 425 aircraft that have exceeded the structural retirement life prior to the availability of Cessna Service Kit SK425-48, the service kit is to be installed according to the following schedule:

A. For airplanes 425-0177 and on, and airplanes 425-0002 through 425-0176 incorporating SK425-17:

Exceeding 12, 500 hours, accomplish SK425-48 within 100 hours or 12 months after SK 425-48 was issued, whichever comes first.

Exceeding 9,300 hours but less than 12,500 hours, accomplish SK425-48 within 400 hours or 24 months after SK425-48 was issued whichever comes first.

Between 8,900 and 9,300 hours when SK425-48 was issued, accomplish within 400 hours of operation. For airplanes with less than 8,900 hours when SK425-48 was issued, accomplish at 9,300 hours.

B. For airplanes -0002 through -0176, except airplanes incorporating SK425-17:

Exceeding 12,500 hours, accomplish SK425-48 within 100 hours or 12 months after SK425-48 was issued whichever comes first.

Exceeding 10, 200 hours but less than 12,500 hours, accomplish SK425-48 within 400 hours or 24 months after SK425-48 was issued whichever comes first.

Between 9,800 and 10,200 hours when SK425-48 was issued, accomplish within 400 hours of operation. For airplanes with less than 9,800 hours when SK425-48 was issued, accomplish 10,200 hours.

Model 425 Special Conditions 23-93-CE-12, required, in part, that Cessna establish mandatory inspections of the Horizontal Tail Assembly in order to maintain continued structural integrity. Therefore, inspections are required for the horizontal stabilizer, elevators, elevator tab and tab actuator system. In order to comply with these requirements, airplanes must be inspected in accordance with inspection Item Codes A273002, A273101, A273102, B273109 and A551001 as contained in Model 425 Maintenance Manual, Part Number D2535-3-13, Revision 3 (or later revision). These inspection criteria are contained in Chapter 5, Subsection 5-10-01, and are applicable to Zones 331 and 332. All approved airplane inspection programs must include these mandatory inspections.

NOTE 4. Model 421, Serial Nos. 421-0001 and up, approved for 6840 lb. takeoff weight with C.G. range as follows when appropriate airplane flight manual, pilot's checklist, weight and balance form, and other documents are provided as specified in Cessna Service Kit SK421-12.

C.G. Range (Landing Gear Extended)	(+152.1) to (+155.5) at 6840 lb.
	(+155.7) at 6500 lb.
	(+144.3) to (+155.7) at 5500 lb.

Straight line variation between points given

NOTE 5. McCauley propellers with 3AF32C87 and 3AF32C504 hubs may be interchanged in any combination. This also applies to propellers with 3AF32C93 and 3AF32C505m hubs; 3AF34C92 and 3AF37C516 hubs; 3AF34C74 and 3AF37C510 hubs.

NOTE 6. Model 425 aircraft in compliance with Cessna Drawing 5700018 are eligible for certification in The Netherlands.

NOTE 7. Model 425 S/N 425-0001 through 425-0176 (Corsair) are eligible for the maximum weights and C.G. range applicable to S/N 425-0177 and up (Conquest I), when modified in accordance with Cessna Service Kit SK425-17, and will be renamed Conquest I.

NOTE 8. Production Certificate No. 4 effective at Serials 402C1005 and on, 414A1208 and on, 421C1801 and on, and 425-0228 and on.

.....END.....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

	3A13
	Revision 66
	CESSNA
182	182K
182A	182L
182B	182M
182C	182N
182D	182P
182E	182Q
182F	182R
182G	R182
182H	T182
182J	TR182
182S	T182T
182T	
	November 3, 2006

TYPE CERTIFICATE DATA SHEET NO. 3A13

This data sheet which is part of Type Certificate No. 3A13 prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P. O. Box 7704
Wichita, Kansas 67277

WARNING: Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage, and is therefore prohibited on Cessna airplanes.

I - Model 182, Skylane, 4 PCLM (Normal Category), Approved March 2, 1956

Engine — Continental O-470-L

*Fuel — 80 minimum grade aviation gasoline

*Engine Limits — For all operations, 2600 r.p.m. (230 hp.)

Propeller and Propeller Limits

1. Hartzell constant speed
   (a) Hub HC82XF-1 or HCA2XF-1 or BHCA2XF-1 with 8433-2 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 12°, high 24°
   (b) Cessna spinner 0752006
   (c) Woodward governor 210065, 210105, 210155 or 210340
2. McCauley constant speed
   (a) Hub 2A36C with blades 90M-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.5°, high 22°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345 or 210452, or McCauley C290D2/T1 or C290D3/T1

Page No..	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Rev. No.	66	59	59	59	59	59	59	59	39	39	39	60	49	62	61	51	51	50
Page No..	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Rev. No.	51	51	51	51	51	51	43	51	43	51	51	51	55	58	66	66	65	66
Page No..	37																	
Rev. No.	66																	

I - Model 182 (Cont'd)

Propeller and Propeller Limits (cont'd)	3. Hartzell constant speed (a) Hub BHC-C2YF-1 with 8468-2 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 13°, high 24° (b) Cessna spinner 0752619 (c) Woodward governor 210105AF, 210340 or 210451 4. McCauley constant speed (a) Hub 2A34C with 90A-8 or 90AT-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 21.5° (b) Cessna spinner 0752004 (c) Woodward governor 210065, 210105, 210155, 210345 or 210452 or McCauley C290D2/T1 or C290D3/T1 5. Aircraft reworked per Cessna Service Kit SK182-121: McCauley constant speed (Threadless) (a) Hub 2A34C203/90DCA-8 blades Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 12.5°, high 25.0° (b) Cessna spinner 0752004 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1

*Airspeed Limits (CAS)	Maneuvering	122 m.p.h. (106 knots)
	Maximum structural cruising	160 m.p.h. (139 knots)
	Never exceed	184 m.p.h. (160 knots)
	Flaps extended	100 m.p.h. (87 knots)

C.G. Range	(+39.5) to (+45.8) at 2550 lb. (+35.0) to (+45.8) at 2050 lb. or less Straight line variation between points given
Empty Wt. C.G. Range	None
*Maximum Weight	2550 lb.
No. of Seats	4 (2 at +36, 2 at +70)
Maximum Baggage	120 lb. (+95)
Fuel Capacity	60 gal. (55 gal. usable); two 30 gal. tanks in wings at +48. See NOTE 1 for data on unusable fuel
Oil Capacity	12 qt. (-15) (6 qt. usable) See NOTE 1 for data on undrainable oil

Control Surface Movements	Wing flaps	Takeoff		Retracted	0°
				1st notch	10°
				2nd notch	20°
		Landing		3rd notch	30°
				4th notch	40°
	Ailerons	Up	20° ± 2°	Down	14° ± 2°
	Adj. stabilizer	Up	1° 50' ± 15	Down	8° 20' ± 15'
	Elevator (With stabilizer full down)	Up	25° ± 1°	Down	22° 50' ± 1°
	Rudder	Right	24° ± 1°	Left	24° ± 1°

Serial Nos. Eligible	Model 182: 613 and 33000 through 33842 (1956 Model)

II - Model 182A, Skylane, 4 PCLM (Normal Category), Approved December 7, 1956

Engine	Continental O-470-L
*Fuel	80 minimum grade aviation gasoline
*Engine Limits	For all operations, 2600 r.p.m. (230 hp.)
Propeller and Propeller Limits	1. Hartzell constant speed (a) Hub HC82XF-1 or HCA2XF-1 or BHCA2XF-1 with 8433-2 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 12°, high 24° (b) Cessna spinner 0752006 (c) Woodward governor 210065, 210105, 210155 or 210340 2. McCauley constant speed (a) Hub 2A36C with 90M-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 22° (b) Cessna spinner 0752004 (c) Woodward governor 210065, 210105, 210155 or 210452, or McCauley C290D2/T1 or C290D3/T1 3. Hartzell constant speed (a) Hub BHC-C2YF-1 with 8468-2 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 13°, high 24° (b) Cessna spinner 0752619 (c) Woodward governor 210105AF, 210340 or 210451 4. McCauley constant speed (a) Hub 2A34C with 90A-8 or 90AT-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 21.5° (b) Cessna spinner 0752004 (c) Woodward governor 210065, 210105, 210155, 210345, 210452, or McCauley C290D2/T1 or C290D3/T1 5. Aircraft reworked per Cessna Service Kit SK182-121: McCauley constant speed (Threadless) (a) Hub 2A34C203/90DCA-8 blades Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 12.5°, high 25.0° (b) Cessna spinner 0752004 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1
*Airspeed Limits (CAS)	Maneuvering 122 m.p.h. (106 knots) Maximum structural cruising 160 m.p.h. (139 knots) Never exceed 184 m.p.h. (160 knots) Flaps extended 100 m.p.h. (87 knots)
C.G. Range	(+40.0) to (+45.8) at 2650 lb. (+33.5) to (+45.8) at 2100 lb. or less Straight line variation between points given
Empty Wt. C.G. Range	None
*Maximum Weight	2650 lb.
No. of Seats	4 (2 at +36, 2 at +70)

II - Model 182A (cont'd)

Maximum Baggage	120 lb. (+95)				
Fuel Capacity	65 gal. (55 gal. usable); two 32.5 gal. tanks in wings at +48 See NOTE 1 for data on unusable fuel				
Oil Capacity	12 qt. (-15) (6 qt. usable) See NOTE 1 for data on undrainable oil				
Control Surface Movements	Wing flaps	Takeoff		Retracted	0°
				1st notch	10°
				2nd notch	20°
		Landing		3rd notch	30°
				4th notch	40°
	Ailerons	Up	20° ± 2°	Down	14° ± 2°
	Adj. stabilizer	Up	1° 50' ± 15'	Down	8° 20' ± 15'
	Elevator (With stabilizer full down)	Up	25° ± 1°	Down	22° 50' ± 1°
	Rudder	Right	24° ± 1°	Left	24° ± 1°
Serial Nos. Eligible	Model 182A: 33843 through 34753 (1957 Model) Model 182A: 34755 through 34999 and 51001 through 51556 (1958 Model)				

III - Model 182B, Skylane, 4 PCLM (Normal Category), Approved August 22, 1958

Engine	Continental O-470-L
*Fuel	80 minimum octane aviation gasoline
*Engine Limits	For all operations, 2600 r.p.m. (230 hp.)
Propeller and Propeller Limits	1. Hartzell constant speed (a) Hub HC82XF-1 or HCA2XF-1 or BHCA2XF-1 with 8433-2 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 12°, high 24° (b) Cessna spinner 0752006 (c) Woodward governor 210065, 210105, 210155, or 210340 2. McCauley constant speed (a) Hub 2A36C with 90M-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 22° (b) Cessna spinner 0752004 (c) Woodward governor 210065, 210105, 210155, 210345, 210452, or McCauley C290D2/T1 or C290D3/T1 3. Hartzell constant speed (a) Hub BHC-C2YF-1 with 8468-2 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 13°, high 24° (b) Cessna spinner 0752619 (c) Woodward governor 210105AF, 210340, or 210451 4. McCauley constant speed (a) Hub 2A34C with 90A-8 or 90AT-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 21.5° (b) Cessna spinner 0752004 (c) Woodward governor 210065, 210105, 210155, 210345, 210452, or McCauley C290D2/T1 or C290D3/T1

III - Model 182B, Skylane (Cont'd)

5. Aircraft reworked per Cessna Service Kit SK182-121:
   McCauley constant speed (Threadless)
   (a) Hub 2A34C203/90DCA-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.:
   low 12.5°, high 25.0°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1

*Airspeed Limits (CAS)	Maneuvering	122 m.p.h. (106 knots)
	Maximum structural cruising	160 m.p.h. (139 knots)
	Never exceed	184 m.p.h. (160 knots)
	Flaps extended	100 m.p.h. (87 knots)

C.G. Range: (+40.0) to (+45.8) at 2650 lb.
(+33.5) to (+45.8) at 2100 lb. or less
Straight line variation between points given

Empty Wt. C.G. Range: None

*Maximum Weight: 2650 lb.

No. of Seats: 4 (2 at +36, 2 at +70)

Maximum Baggage: 120 lb. (+95)

Fuel Capacity: 65 gal. (55 gal. usable); two 32.5 gal. tanks in wings at +48
See NOTE 1 for data on unusable fuel

Oil Capacity: 12 qt. (-15) (6 qt. usable)
See NOTE 1 for data on undrainable oil

Control Surface Movements	Wing flaps	Takeoff			Retracted	0°
					1st notch	10°
					2nd notch	20°
		Landing			3rd notch	30°
					4th notch	40°
	Ailerons		Up	20° ±2°	Down	14° ±2°
	Adj. stabilizer		Up	1° 50' ±15'	Down	8° 20' ±15'
	Elevator (With stabilizer full down)		Up	25° ±1°	Down	22° 50' ±1°
	Rudder		Right	24° ±1°	Left	24° ±1°

Serial Nos. Eligible: Model 182B: 34754, 51557 through 52358 except 51623 (1959 Model)

IV - Model 182C, Skylane, 4 PCLM (Normal Category), Approved July 8, 1959
Model 182D, Skylane, 4 PCLM (Normal Category), Approved June 14, 1960

Engine: Continental O-470-L

*Fuel: 80 minimum octane aviation gasoline

*Engine Limits: For all operations, 2600 r.p.m. (230 hp.)

IV - Model 182C, Model 182D (cont'd)

Propeller and Propeller Limits

1. Hartzell constant speed
   (a) Hub HC82XF-1 or HCA2XF-1 or BHCA2XF-1 with 8433-2 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 12°, high 24°
   (b) Cessna spinner 0752006
   (c) Woodward governor 210065, 210105, 210155, or 210340
2. McCauley constant speed
   (a) Hub 2A36C with 90M-8 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.5°, high 22°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345, 210452, or McCauley C290D2/T1 or C290D3/T1
3. Hartzell constant speed
   (a) Hub BHC-C2YF-1 with 8468-2 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 13°, high 24°
   (b) Cessna spinner 0752619
   (c) Woodward governor 210105AF, 210340, or 210451
4. McCauley constant speed
   (a) Hub 2A34C with 90A-8 or 90AT-8 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.5°, high 21.5°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345, 210452, or McCauley C290D2/T1 or C290D3/T1
5. Aircraft reworked per Cessna Service Kit SK182-121:
   McCauley constant speed (Threadless)
   (a) Hub 2A34C203/90DCA-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.: low 12.5°, high 25.0°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1

*Airspeed Limits (CAS)	Maneuvering	122 m.p.h. (106 knots)
	Maximum structural cruising	160 m.p.h. (139 knots)
	Never exceed	184 m.p.h. (160 knots)
	Flaps extended	100 m.p.h. (87 knots)

C.G. Range
(+40.0) to (+45.8) at 2650 lb.
(+33.5) to (+45.8) at 2100 lb. or less
Straight line variation between points given

Empty Wt. C.G. Range
None

***Maximum Weight**
2650 lb.

No. of Seats
4 (2 at +36, 2 at +70)

Maximum Baggage
120 lb. (+95)

Fuel Capacity
65 gal. (55 gal. usable); two 32.5 gal. tanks in wings at +48
See NOTE 1 for data on unusable fuel

Oil Capacity
12 qt. (-15) (6 qt. usable)
See NOTE 1 for data on undrainable oil

IV - Model 182C, Model 182D (cont'd)

Control Surface Movements	Wing flaps	Takeoff			0°, 10°, 20°
		Landing			30°, 40°
	Ailerons	Up	20° ±2°	Down	14° ±2°
	Adj. stabilizer	Up	0° 45' ±15'	Down	8° 45' ±15'
	Elevator (With stabilizer full down)	Up	25° ±1°	Down	22° 50' ±1°
	Rudder (measured parallel to 0.0.W.L.)	Right	24° ±1°	Left	24° ±1°

Serial Nos. Eligible

Model 182C: 631, 52359 through 53007 (1960 Model)
Model 182D: 51623, 18253008 through 18253598 (1961 Model)

V - Model 182E, Skylane, 4 PCLM (Normal Category), Approved June 27, 1961
Model 182F, Skylane, 4 PCLM (Normal Category), Approved August 1, 1962
Model 182G, Skylane, 4 PCLM (Normal Category), Approved July 19, 1963

Engine

Continental O-470-L or 0-470-R

*Fuel

80/87 minimum grade aviation gasoline

*Engine Limits

For all operations, 2600 r.p.m. (230 hp.)

Propeller and Propeller Limits

1. Hartzell constant speed
   (a) Hub HC82XF-1 or HCA2XF-1 or BHCA2XF-1 with 8433-2 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 12°, high 24°
   (b) Cessna spinner 0752006
   (c) Woodward governor 210065, 210105, 210155, or 210340
   (Not eligible on O-470-R engine installation)
2. McCauley constant speed
   (a) Hub 2A36C with 90M-8 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.5°, high 22°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or McCauley C290D2/T1 or C290D3/T1
3. Hartzell constant speed
   (a) Hub BHC-C2YF-1 with 8468-2 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 13°, high 24°
   (b) Cessna spinner 0752619
   (c) Woodward governor 210105AF, 210340, or 210451
4. McCauley constant speed
   (a) Hub 2A34C with 90A-8 or 90AT-8 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.5°, high 21.5°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1

V - Model 182E, Model 182F, Model 182G (cont'd)

5. Aircraft reworked per Cessna Service Kit SK182-121:
   McCauley constant speed (Threadless)
   (a) Hub 2A34C203/90DCA-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.:
   low 12.5°, high 25.0°
   (b) Cessna spinner 0752004
   (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1

*Airspeed Limits (CAS)	Maneuvering	128 m.p.h. (111 knots)
	Maximum structural cruising	160 m.p.h. (139 knots)
	Never exceed	193 m.p.h. (168 knots)
	Flaps extended	110 m.p.h. (96 knots)

C.G. Range
(+38.4) to (+47.4) at 2800 lb.
(+33.0) to (+47.4) at 2250 lb. or less
Straight line variation between points given

Empty Wt. C.G. Range
None

*Maximum Weight
2800 lb.

No. of Seats
4 (2 at +36, 2 at +71)

Maximum Baggage
120 lb. (+97)

Fuel Capacity
65 gal. (60 gal. usable); two 32.5 gal. tanks in wings at +48
See NOTE 1 for data on unusable fuel

Oil Capacity
12 qt. (-15) (6 qt. usable)
See NOTE 1 for data on undrainable oil

Control Surface Movements	Wing flaps				40° +1°, -2°
	Elevator tab	Up	25° ±2°	Down	15° ±1°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator (relative to stabilizer)	Up	26° ±1°	Down	17° ±1°
	Rudder	Right	24° ±1°	Left	24° ±1°

Serial Nos. Eligible
Model 182E: 18253599 through 18254423 (1962 Model)
Model 182F: 18254424 through 18255058 (1963 Model)
Model 182G: 18255059 through 18255844 (1964 Model)

VI - Model 182H, Skylane, 4 PCLM (Normal Category), Approved September 17, 1964
Model 182J, Skylane, 4 PCLM (Normal Category), Approved October 20, 1965
Model 182K, Skylane, 4 PCLM (Normal Category), Approved August 3, 1966
Model 182L, Skylane, 4 PCLM (Normal Category), Approved July 28, 1967

Engine
Continental O-470-R

*Fuel
80/87 minimum grade aviation gasoline

*Engine Limits
For all operations, 2600 r.p.m. (230 hp.)

VI - Model 182H, Model 182J, Model 182K, Model 182L (cont'd)

Propeller and Propeller Limits	1. McCauley constant speed (a) Hub 2A34C66/90AT-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 22° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1 2. Aircraft reworked per Cessna Service Kit SK182-121: McCauley constant speed (Threadless) (a) Hub 2A34C203/90DCA-8 blades Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 12.5°, high 25.0° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1					
*Airspeed Limits (CAS)	Maneuvering	128 m.p.h. (111 knots)				
	Maximum structural cruising	160 m.p.h. (139 knots)				
	Never exceed	193 m.p.h. (168 knots)				
	Flaps extended	110 m.p.h. (96 knots)				
C.G. Range	(+38.4) to (+47.4) at 2800 lb. (+33.0) to (+47.4) at 2250 lb. or less Straight line variation between points given					
Empty Wt. C.G. Range	None					
*Maximum Weight	2800 lb.					
No. of Seats	4 (2 at +36, 2 at +71)					
Maximum Baggage	120 lb. (+97)					
Fuel Capacity	65 gal. (60 gal. usable); two 32.5 gal. tanks in wings at +48 See NOTE 1 for data on unusable fuel					
Oil Capacity	12 qt. (-15) (6 qt. usable) See NOTE 1 for data on undrainable oil					
Control Surface Movements	Wing flaps					40° +1°, -2°
	Elevator tab	Up	25° ±2°	Down	15° ±1°	
	Ailerons	Up	20° ±2°	Down	15° ±2°	
	Elevator(relative to stabilizer)	Up	26° ±1°	Down	17° ±1°	
	Rudder	Right	24° ±1°	Left	24° ±1°	
Serial Nos. Eligible	Model 182H: 634, 18255846 through 18256684 (1965 Model) Model 182J: 18256685 through 18257625 (1966 Model) Model 182K: 18255845, 18257626 through 18257698, 18257700 through 18258505 (1967 Model) Model 182L: 18258506 through 18259305 (1968 Model)					

VII - Model 182M, Skylane, 4 PCLM (Normal Category), Approved September 19, 1968

Engine	Continental O-470-R
*Fuel	80/87 minimum grade aviation gasoline
*Engine Limits	For all operations, 2600 r.p.m. (230 hp.)

VII - Model 182M (cont'd)

Propeller and Propeller Limits	1. McCauley constant speed (a) Hub 2A34C66/90AT-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 22° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1 2. McCauley constant speed (a) Hub 2A34C201/90DA-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 13°, high 24.5° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1 3. McCauley constant speed (a) Hub 2A34C203/90DCA-8 blades Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 12.5°, high 25° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1

*Airspeed Limits (CAS)	Maneuvering	128 m.p.h. (111 knots)
	Maximum structural cruising	160 m.p.h. (139 knots)
	Never exceed	193 m.p.h. (168 knots)
	Flaps extended	110 m.p.h. (96 knots)

C.G. Range	(+38.4) to (+47.4) at 2800 lb. (+33.0) to (+47.4) at 2250 lb. or less Straight line variation between points given
Empty Wt. C.G. Range	None
*Maximum Weight	2800 lb.
No. of Seats	4 (2 at +36, 2 at +71)
Maximum Baggage	120 lb. (+97)
Fuel Capacity	65 gal. (60 gal. usable); two 32.5 gal. tanks in wings at +48 See NOTE 1 for data on unusable fuel
Oil Capacity	12 qt. (-15) (6 qt. usable) See NOTE 1 for data on undrainable oil

Control Surface Movements	Wing flaps				40° +1°, -2°
	Elevator tab	Up	25° ±2°	Down	15° ±1°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator(relative to stabilizer)	Up	26° ±1°	Down	17° ±1°
	Rudder	Right	24° ±1°	Left	24° ±1°

Serial Nos. Eligible	Model 182M: 18257699, 18259306 through 18260055 (1969 Model)

VIII - Model 182N, Skylane, 4 PCLM (Normal Category), Approved September 17, 1969

Engine	Continental O-470-R Continental O-470-S (See NOTE 4)	
*Fuel	80/87 minimum grade aviation gasoline	
*Engine Limits	For all operations, 2600 r.p.m. (230 hp.)	
Propeller and Propeller Limits	1. McCauley constant speed (a) Hub 2A34C201/90DA-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 13°, high 24.5° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or A210452, or Garwin 34-828-01-2A, or McCauley C290D2/T1 or C290D3/T1 2. McCauley constant speed (a) Hub 2A34C66/90AT-8 blades Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.5°, high 22° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1 3. McCauley constant speed (a) Hub 2A34C203/90DCA-8 blades Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 12.5°, high 25° (b) Cessna spinner 0752637 (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1	
*Airspeed Limits (CAS)	Maneuvering Maximum structural cruising Never exceed Flaps extended	131 m.p.h. (114 knots) 160 m.p.h. (139 knots) 198 m.p.h. (172 knots) 110 m.p.h. (96 knots)
C.G. Range	(+39.9) to (+47.4) at 2950 lb. (+38.4) to (+47.4) at 2800 lb. (+33.0) to (+47.4) at 2250 lb. or less Straight line variation between points given	
Empty Wt. C.G. Range	None	
*Maximum Weight	2950 lb. takeoff only, 2800 lb. landing	
No. of Seats	4 Front standard (2 at +36 to +49) Optional (2 at +32 to +44) Rear (2 at +74)	
Maximum Baggage	120 lb. (+97) (S/N 18260056 through 18260445) 120 lb. (+97) and 80 lb. (+117) (S/N 18260446 and up)	
Fuel Capacity	65 gal. (60 gal. usable); two 32.5 gal. tanks in wings at +48 See NOTE 1 for data on unusable fuel	
Oil Capacity	12 qt. (-15) (6 qt. usable) See NOTE 1 for data on undrainable oil	

VIII - Model 182N (cont'd)

Control Surface Movements	Wing flaps			Down	40° +1°, -2°
	Elevator tab	Up	25° ±2°	Down	15° ±1°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator(rel. to stabilizer)	Up	26° ±1°	Down	17° ±1°
	Rudder (parallel to 0.00 W.L.)	Right	24° ±1°	Left	24° ±1°
	(Perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°

Serial Nos. Eligible — Model 182N: 18260056 through 18260445 (1970 Model) 18260446 through 18260825 (1971 Model)

IX - Model 182P, Skylane, 4 PCLM (Normal Category), Approved October 8, 1971

Engine — Continental O-470-R, Aircraft S/N 18260826 through 18263475
Continental O-470-S, Aircraft S/N 18260826 and up (See NOTE 4)

*Fuel — 80/87 minimum grade aviation gasoline

*Engine Limits — For all operations, 2600 r.p.m. (230 hp.)

Propeller and Propeller Limits

1. McCauley constant speed
   (a) Hub 2A34C201/90DA-8 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 13°, high 24.5°
   (b) Cessna spinner 0752637
   (c) Woodward governor 210065, 210105, 210155, 210345, or A210452, or Garwin 34-828-01-2A, or McCauley C290D2/T1 or C290D3/T1
2. McCauley constant speed
   (a) Hub 2A34C66/90AT-8 blades
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.5°, high 22°
   (b) Cessna spinner 0752637
   (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1
3. McCauley constant speed
   (a) Hub 2A34C203/90DCA-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.:
   low 12.5°, high 25°
   (b) Cessna spinner 0752637
   (c) Woodward governor 210065, 210105, 210155, 210345, or 210452, or Garwin 34-828-01, or McCauley C290D2/T1 or C290D3/T1

*Airspeed Limits (CAS) — (S/N 675, 18260826 through 18264295)

Maneuvering	126 m.p.h. (109 knots)
Maximum structural cruising	160 m.p.h. (139 knots)
Never exceed	198 m.p.h. (172 knots)
Flaps extended	110 m.p.h. (96 knots)

*Airspeed Limits (IAS) (See NOTE 5 on use of IAS) — (S/N 18264296 through 18265175)

Maneuvering	110 knots
Maximum structural cruising	141 knots
Never exceed	176 knots
Flaps extended	95 knots

C.G. Range — (+39.5) to (+48.5) at 2950 lb.
(+33.0) to (+48.5) at 2250 lb. or less
Straight line variation between points given

IX - Model 182P, Skylane (Cont'd)

Empty Wt. C.G. Range	None
*Maximum Weight	2950 lb.
No. of Seats	4 (2 front at +32.0 to +50.0) (2 rear at +74)
Maximum Baggage	Serial Numbers 18260826 through 18263475 200 lb. (120 lb. at + 82.0 to +108.0) (80 lb. at +108.0 to +124.0) Serial Numbers 675 and 18263476 through 18265175 200 lb. (120 lb. at + 82.0 to +108.0) (80 lb. at +108.0 to +136.0)
Fuel Capacity	(S/N 675, 18260826 through 18262250) Standard Range Tanks: 65 gal. (60 gal. usable); two 32.5 gal. tanks in wings at +48 Long Range Tanks: 84 gal. (79 gal. usable); two 42.0 gal. tanks in wings at +48 (S/N 18262251 through 18265175) Standard Range Tanks: 61 gal. (56 gal. usable); two 29 gal. tanks in wings at +48 Long Range Tanks: 80 gal. (75 gal. usable); two 37 gal. tanks in wings at +48 See NOTE 1 for data on unusable fuel
Oil Capacity	12 qt. (-15) (6 qt. usable) See NOTE 1 for data on undrainable oil

Control Surface Movements					
Wing flaps				Down	40° +1°, -2°
Elevator tab	Up	25° ±2°		Down	15° ±1°
Ailerons	Up	20° ±2°		Down	15° ±2°
Elevator (rel. to stabilizer)	Up	26° ±1°		Down	17° ±1°
Rudder(parallel to 0.00 W.L.)	Right	24° ±1°		Left	24° ±1°
(perpendicular to hinge line)	Right	27° 13' ±1°		Left	27° 13' ±1°

Serial Nos. Eligible	Model 182P: 18260826 through 18261425 (1972 Model) 18261426 through 18262465 (1973 Model) 18262466 through 18263475 (1974 Model) 675, 18263476 through 18264295 except 18263479 (1975 Model) 18264296 through 18265175 (1976 Model)

X - Model 182Q, Skylane, 4 PCLM (Normal Category), Approved July 28, 1976

Engine	Continental O-470-U
*Fuel	100/130 minimum aviation grade gasoline (S/N 18265176 through 18265965) 100LL/100 aviation grade gasoline (S/N 18265966 through 18267715)
*Engine Limits	For all operations, 2400 r.p.m. (230 hp.)
Propeller and Propeller Limits	McCauley constant speed (a) Hub C2A34C204/90DCB-8 blades Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 15°, high 29.4° (b) Cessna spinner 0752637 (c) McCauley governor C290D3/T14

X - Model 182Q (cont'd)

*Airspeed Limits (IAS) (See NOTE 5 on use of IAS)	Maneuvering	111 knots
	Maximum structural cruising	143 knots
	Never exceed	179 knots
	Flaps extended	95 knots

C.G. Range
(+39.5) to (+48.5) at 2950 lb.
(+33.0) to (+48.5) at 2250 lb. or less
Straight line variation between points given

Empty Wt. C.G. Range
None

*Maximum Weight
2950 lb.

No. of Seats
4 (2 front at +32.0 to +50.0)
(2 rear at +74)

Maximum Baggage
200 lb. (120 lb. at +82.0 to +108.0)
(80 lb. at +108.0 to +136.0)

Fuel Capacity
Standard Range Tanks:
61 gal. (56 gal. usable); two 30.5 gal. tanks in wings at +48
(S/N 18263479, 18265176 through 18266590)

Long Range Tanks:
80 gal. (75 gal. usable); two 40.0 gal. tanks in wings at +48
(S/N 18263479, 18265176 through 18266590)

92 gal. (88 gal. usable); two 46.0 gal. integral tanks in wings at +46.5
(S/N 18266591 through 18267715)

See NOTE 1 for data on unusable fuel

Oil Capacity
12 qt. (-15.0) (6 qt. usable)
See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps			Down	40° +1°, -2°
Elevator tab	Up	25° ±2°	Down	15° ±1°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator (rel. to stabilizer)	Up	26° ±1°	Down	17° ±1°
Rudder (parallel to 0.00 W.L.)	Right	24° ±1°	Left	24° ±1°
(perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°

Serial Nos. Eligible

Model 182Q:	18265176 through 18265965	(1977 Model)
	18263479, 18265966 through 18266590	(1978 Model)
	18266591 through 18267300	(1979 Model)
	18267301 through 18267715, except 18267302	(1980 Model)

XI - Model R182, Skylane RG, 4 PCLM (Normal Category), Approved July 7, 1977
Model TR182, Turbo Skylane RG, 4 PCLM (Normal Category), Approved September 12, 1978

Model R182

Engine
Lycoming O-540-J3C5D, rated at 235 hp.

*Fuel
100LL/100 aviation grade gasoline

*Engine Limits
Full throttle for all operations, 2400 r.p.m.

XI - Model R182, Model TR182, Turbo Skylane RG (cont'd)

Propeller and Propeller Limits

1. McCauley constant speed (S/N R18200002 through R18201313)
   (a) Hub B2D34C214/90DHB-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.:
   low 15.8°, high 29.4°
   (b) Cessna prop & spinner installation 2250003
   Cessna spinner installation 1750050
   (c) McCauley governor C290D3/T16
2. McCauley constant speed (S/N R18201314 and on)
   (a) Hub B2D34C218/90DHB-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.:
   low 15.8°, high 29.4°
   (b) Cessna prop & spinner installation 2250124
   Cessna spinner installation 2250123
   (c) McCauley governor C290D3/T22
   (d) McCauley governor DC290D1/T8
3. McCauley constant speed (S/N R18201629 through R18202041 and aircraft reworked per SK182-71)
   (a) Hub B3D32C407/82NDA-3 blades
   Diameter: not over 79 in., not under 78 in.
   Pitch settings at 30 in. sta.:
   low 16.0°, high 31.7°
   (b) Cessna prop & spinner installation 2252076
   Cessna spinner installation 2252074
   (c) McCauley governor C290D3/T22
   (d) McCauley governor DC290D1/T8

Model TR182

Engine: Lycoming O-540-L3C5D, rated at 235 hp.
(Turbocharged in accordance with Cessna Drawing No. 2250065)

*Fuel: 100LL/100 aviation grade gasoline

*Engine Limits: For all operations, 2400 r.p.m., 31 in. hg. mp.

Propeller and Propeller Limits

1. McCauley constant speed (S/N R18200001, R18200584 through R18201313)
   (a) Hub B2D34C217/90DHB-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.:
   low 15.8°, high 31.9°
   (b) Cessna prop & spinner installation 2250003
   Cessna spinner installation 1750050
   (c) McCauley governor C290D3/T21
2. McCauley constant speed (S/N R18201314 and on)
   (a) Hub B2D34C219/90DHB-8 blades
   Diameter: not over 82 in., not under 80.5 in.
   Pitch settings at 30 in. sta.:
   low 15.8°, high 31.9°
   (b) Cessna prop & spinner installation 2250124
   Cessna spinner installation 2250123
   (c) McCauley governor C290D3/T22
   (d) McCauley governor DC290D1/T8

Model TR182 (cont'd)

Propeller and Propeller Limits (cont'd)

3. McCauley constant speed (S/N R18201315, R18201629 and on and aircraft reworked per SK182-71 or SK182-72)
   (a) Hub B3D32C407/82NDA-3 blades
   Diameter: not over 79 in., not under 78 in.
   Pitch settings at 30 in. sta.:
   low 16.0°, high 31.7°
   (b) Cessna prop & spinner installation 2252076
   Cessna spinner installation 2252074
   (c) McCauley governor C290D3/T22
   (d) McCauley governor DC290D1/T8

Models R182, TR182

*Airspeed Limits (IAS)
(See NOTE 5 on use of IAS)

1978 Model R182	Maneuvering	112 knots
	Maximum structural cruising	143 knots
	Never exceed	182 knots
	Flaps extended	95 knots
	Landing gear extension	140 knots
1979 Model R182	Maneuvering	112 knots
	Maximum structural cruising	160 knots
	Never exceed	182 knots
	Flaps extended	95 knots
	Landing gear extension	140 knots
Model TR182	Maneuvering	112 knots
	Maximum structural cruising	157 knots
	Never exceed	179 knots
	Flaps extended	95 knots
	Landing gear extension	140 knots
1980 and up Model R182	Maneuvering	112 knots
	Maximum structural cruising	159 knots
	Never exceed	181 knots
	Flaps extended	95 knots
	Landing gear extension	140 knots
Model TR182	Maneuvering	112 knots
	Maximum structural cruising	157 knots
	Never exceed	178 knots
	Flaps extended	95 knots
	Landing gear extension	140 knots

C.G. Range

(a) S/N R18200001 through R18201628 except R18200975 & R18201315
(+40.9) to (+47.0) at 3100 lb.
(+35.5) to (+47.0) at 2700 lb.
(+33.0) to (+47.0) at 2250 lb. or less
Straight line variation between points given
Moment change due to retracting gear (+3052 in.-lb.)

(b) S/N R18200975, R18201315, R18201629 through R18202041
(+40.9) to (+46.0) at 3100 lb.
(+35.5) to (+46.0) at 2700 lb.
(+33.0) to (+46.0) at 2250 lb. or less
Straight line variation between points given
Moment change due to retracting gear (+3052 in.-lb.)

Empty Wt. C.G. Range: None

*Maximum Weight: 3100 lb.

No. of Seats: 4 (2 front at +32.0 to +50.0)
(2 rear at +74.0)

Maximum Baggage: 200 lb. (120 lb. at +82.0 to +110.0)
(80 lb. at +110.0 to +134.0)

XI - Model R182, Model TR182 (cont'd)

Fuel Capacity

(a) S/N R18200002 through R18200583
Standard Range Tanks:
61 gal. (56 gal. usable); two 30.5 gal. tanks in wings at +48
Long Range Tanks:
80 gal. (75 gal. usable); two 40.0 gal. tanks in wings at +48

(b) S/N R18200001, R18200584 through R18202041
92 gal. (88 gal. usable); two 46.0 gal. integral tanks in wings at +46.5

See NOTE 1 for data on unusable fuel

Oil Capacity

9 qt. (-14.8)
See NOTE 1 for data on oil

Control Surface Movements

(a) S/N R18200001 through R18201628 except R18200975 & R18201315

Wing flaps			Down	40° +1°, -2°
Elevator tab	Up	25° ±2°	Down	15° ±1°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator (rel. to stabilizer)	Up	28° ±1°	Down	17° ±1°
Rudder (parallel to 0.00 W.L.)	Right	24° ±1°	Left	24° ±1°
(Perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°

(b) S/N R18200975, R18201629 through R18201798

Wing flaps			Down	40° +1°, -2°
Elevator tab	Up	24° ±2°	Down	15° ±1°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator (rel. to stabilizer)	Up	28° ±1°	Down	21° ±1°
Rudder (parallel to 0.00 W.L.)	Right	24° +0°, -1°	Left	24° +0°, -1°
(Perpendicular to hinge line)	Right	27° 13' +0°, -1°	Left	27° 13' +0°, -1°

(c) S/N R18201315, R18201799 through R18202041

Wing flaps			Down	38° +0°, -1°
Elevator tab	Up	24° ±2°	Down	15° ±1°
Ailerons	Up	20° ±1°	Down	15° ±2°
Elevator (rel. to stabilizer)	Up	28° ±1°	Down	21° ±1°
Rudder (parallel to 0.00 W.L.)	Right	24° +0°, -1°	Left	24° +0°, -1°
(Perpendicular to hinge line)	Right	27° 13' +0°, -1°	Left	27° 13' +0°, -1°

Serial Nos. Eligible

Model	R182:	R18200002 through R18200583	(1978 Model)
Model	R182/TR182:	R18200001, R18200584 through R18201313	(1979 Model)
Model	R182/TR182:	R18201314 through R18201628 except R18201315	(1980 Model)
Model	R182/TR182:	R18201629 through R18201798	(1981 Model)
Model	R182/TR182:	R18201799 through R18201928	(1982 Model)
Model	R182/TR182:	R18201929 through R18201973	(1983 Model)
Model	R182/TR182:	R18201974 through R18201999	(1984 Model)
Model	R182/TR182:	R18201315, R18202000 through R18202031	(1985 Model)
Model	R182/TR182:	R18202032 through R18202041	(1986 Model)

XII - Model 182R, 4 PCLM (Normal Category), Approved August 29, 1980
Model T182, 4 PCLM (Normal Category), Approved August 15, 1980

Model 182R

Engine: Continental O-470-U

*Fuel: 100LL/100 aviation grade gasoline

*Engine Limits: For all operations, 2400 r.p.m. (230 hp.)

Model 182R (cont'd)

Propeller and Propeller Limits	McCauley constant speed (a) Hub C2A34C204/90DCB-8 Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 15°, high 29.4° (b) Cessna spinner 0752637 (c) McCauley governor C290D3/T14

Model T182

Engine	Lycoming 0-540-L3C5D, rated at 235 hp. (Turbocharged in accordance with Cessna Drawing No. 2250065)
*Fuel	100LL/100 aviation grade gasoline
*Engine Limits	For all operations, 2400 r.p.m., 31 in. Hg. mp.
Propeller and Propeller Limits	1. McCauley constant speed (a) Hub B2D34C219/90DHB-8 Diameter: not over 82 in., not under 80.5 in. Pitch settings at 30 in. sta.: low 15.8°, high 31.9° (b) Cessna spinner 2250124 (c) McCauley governor C290D3/T22 2. McCauley constant speed (a) Hub B3D32C407/82NDA-3 Diameter: not over 79 in., not under 78 in. Pitch settings at 30 in. sta.: low 16.0°, high 31.7° (b) Cessna spinner 2252076 (c) McCauley governor C290D3/T22

*Airspeed Limits (IAS) (See NOTE 5 on Use of IAS)	Model 182R	Maneuvering	111 knots
		Maximum structural cruising	143 knots
		Never exceed	179 knots
		Flaps extended	95 knots
	Model T182	Maneuvering	111 knots
		Maximum structural cruising	140 knots
		Never exceed	178 knots
		Flaps extended	95 knots

C.G. Range	Model 182R	(+40.9) to (+46.0) at 3100 lb. (+33.0) to (+46.0) at 2250 lb. or less Straight line variation between points given
	Model T182	(+40.9) to (+46.0) at 3100 lb. (+35.5) to (+46.0) at 2700 lb. (+33.0) to (+46.0) at 2250 lb. or less Straight line variation between points given
Empty Wt. C.G. Range	None	
*Maximum Weight	3100 lb. takeoff/flight 2950 lb. landing	
No. of Seats	4 (2 front at +32.0 to +50.0) (2 rear at +74.0)	
Maximum Baggage	200 lb. (120 lb. at +92.0 to +108.0) (80 lb. at +108.0 to +136.0)	
Fuel Capacity	92 gal. (88 gal. usable); two 46 gal. integral tanks in wings at +46.5 See NOTE 1 for data on unusable fuel	

XII - Model 182R, Model T182 (cont'd)

Oil Capacity

Model 182R	Model T182
12 qt. (-15.0) (6 qt. usable) (through S/N 18268055) 12 qt. (-14.1) (6 qt. usable) (S/N 18268056 and on) See NOTE 1 for data on oil	9 qt (-14.8) (6 qt. usable) See NOTE 1 for data on oil

Control Surface Movements

(a) S/N 18267716 through 18268055

Wing flaps			Down	40° +1°, -2°
Elevator tab	Up	24° ±2°	Down	15° ±1°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator (rel. to stabilizer)	Up	28° ±1°	Down	21° ±1°
Rudder (parallel to 0.00 W.L.)	Right	24° +0°, -1°	Left	24° +1°, -0°
(Perpendicular to hinge line)	Right	27° 13' +0°, -1°	Left	27° 13' +0°, -1°

(b) S/N 18268056 through 18268586

Wing flaps			Down	38° +0°, -1°
Elevator tab	Up	24° ±2°	Down	15° ±1°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator (rel. to stabilizer)	Up	28° ±1°	Down	21° ±1°
Rudder (parallel to 0.00 W.L.)	Right	24° +0°, -1°	Left	24° +0°, -1°
(Perpendicular to hinge line)	Right	27° 13' +0°, -1°	Left	27° 13' +0°, -1°

Serial Nos. Eligible

Model 182R/T182:	18267302,	18267716 through 18268055	(1981 Model)
Model 182R/T182:	18268056	through 18268293	(1982 Model)
Model 182R/T182:	18268294	through 18268368	(1983 Model)
Model 182R/T182:	18268369	through 18268434	(1984 Model)
Model 182R/T182:	18268435	through 18268541	(1985 Model)
Model 182R:	18268542	through 18268586	(1986 Model)

(1986 Model)

Data Pertinent to Model Items I through XII

Datum: Front face of firewall

Leveling Means: Upper door sill. Top surface centerline of tailcone (S/N 18253599 through 18265965) Jig located nutplates and screws on left of tailcone (S/N 18263479, 18265966 through 18268586) (S/N R18200001 through 18202041)

Certification Basis

182 Series

Part 3 of the Civil Air Regulations dated November 1, 1949, as amended by 3-1 through 3-12 and Paragraph 3.112 as amended October 1, 1959, for the Model 182E and on. In addition, effective S/N 18266591 through 18268586, FAR 23.1559 effective March 1, 1978. FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-6 for Model 182Q and on. In addition, effective S/N 18268435 through 18268586, FAR 23.1545(a) Amendment 23-23 dated December 1, 1978.

Data Pertinent to Model Items I through XII, continued

Model T182

Part 3 of the Civil Air Regulations dated November 1, 1949, as amended by 3-1 through 3-12 and Paragraph 3.112 as amended October 1, 1959; and Sections 23.901, 23.909, 23.1041, 23.1043, 23.1143, and 23.1305 of the Federal Aviation Regulations dated February 1, 1965, as amended February 14, 1975; FAR 23.1559 effective March 1, 1978; FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-10. In addition, effective S/N 18268435 through 18268541, FAR 23.1545(a) Amendment 23-23 dated December 1, 1978.

Model R182

Part 3 of the Civil Air Regulations dated November 1, 1949, as amended by 3-1 through 3-12 and Paragraph 3.112 as amended October 1, 1959; and Sections 23.729, 23.777(e), 23.781, 23.1555(e)(1) and (2), and 23.1563 of the Federal Aviation Regulations dated February 1, 1965, as amended February 14, 1975. In addition, effective S/N R18200001, R18200584 and up, FAR 23.1559 effective March 1, 1978. FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-6. In addition, effective S/N R18202000 through R18202041, FAR 23.1545(a) Amendment 23-23 dated December 1, 1978.

Model TR182

Part 3 of the Civil Air Regulations dated November 1, 1949, as amended by 3-1 through 3-12 and Paragraph 3.112 as amended October 1, 1969; and Sections 23.729, 23.777(e), 23.781, 23.901, 23.909, 23.1041, 23.1043, 23.1143, 23.1305, 23.1555(e)(1) and (2), and 23.1563 of the Federal Aviation Regulations dated February 1, 1965, as amended February 14, 1975; FAR 23.1559 effective March 1, 1978; FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-9. In addition, effective S/N R18202000 through R18202041, FAR 23.1545(a) Amendment 23-23 dated December 1, 1978.

Application for Type Certificate dated July 11, 1955.

Type Certificate No. 3A13 issued March 2, 1956, obtained by the manufacturer under delegation option procedures.

Equivalent Safety Items:

S/N 18263479, 18264296 through 18267715

Airspeed Indicator	CAR 3.757 (See NOTE 5 on use of IAS)
Operating Limitations	CAR 3.778(a)

S/N 18267716 through 18268586

Airspeed Indicator	CAR 3.757 (See NOTE 5 on use of IAS) (S/N 18267716 through 18268434)
Operating Limitations	CAR 3.778(a)
Fuel System	CAR 3.430

S/N R18200001 through R18202041

Airspeed Indicator	CAR 3.757 (See NOTE 5 on use of IAS) (S/N R18200001 through R18201999)
Operating Limitations	CAR 3.778(a)
Fuel System	CAR 3.430

Production Basis

Production Certificate No. 4. Delegation Option Manufacturer No. CE-1 authorized to issue airworthiness certificates under delegation option provisions of Part 21 of the Federal Aviation Regulations.

Equipment:

The basic required equipment as prescribed in the applicable airworthiness requirements (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Airplane Flight Manual effective S/N 18266591 through 18268586 and R18200584 through R18202041. In addition, the following item of equipment is required:

Data Pertinent to Model Items I through XII, continued

1. Stall warning indicator, Cessna Dwg. S1672-5.

The equipment portion of Aircraft Specification 3A13, Revision 15, or Cessna Publication TS3000-13 should be used for equipment references on all aircraft prior to the Model 182G. Refer to the applicable Equipment List for the Model 182G and subsequent models.

NOTE 1. Current weight and balance report including list of equipment included in certificated empty weight, and loading instructions when necessary must be provided for each aircraft at the time of original certification.

Serial Numbers 613 and 33000 through 34999
631 and 51001 through 53007
18253008 through 18264295 except 18263479

The certificated empty weight and corresponding center of gravity location must include unusable fuel of 30 lb. (+46) on Models 182, 182E, 182F, 182G, 182H, 182J, 182K, 182L, 182M, 182N and 182P through 18264295 and 60 lb. (+46) on Models 182A, 182B, 182C and 182D and undrainable oil of 0 lb.

Serial Numbers 18263479, 18264296 through 18266590
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 30 lb. (+46) and full oil of 22.5 lb. at (-15.0).

Serial Numbers 18266591 through 18268055
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 24 lb. at (+48) and full oil of 22.5 lb. at (-15.0) for the 182Q, 182R Model, and include oil of 16.9 lb. at (-14.8) for the T182 Model.

Serial Numbers 18268056 through 18268586
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 24 lb. at (+48) and full oil of 24.4 lb. at (-14.1) for the 182R, and include oil of 16.9 lb. at (-14.8) for the T182.

Serial Numbers R18200002 through R18200583
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 30 lb. (+46) and include oil of 16.9 lb. (-15.7).

Serial Numbers R18200001, R18200584 through R18202041
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 24 lb. (+48) and include oil of 16.9 lb. (-14.8).

NOTE 2. The following placards must be displayed in locations as indicated:

A. Applicable to Model 182 only:

(1) In full view of the pilot:

(a) "This airplane must be operated as a normal category airplane in compliance with operating limitations stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved.
Flight Maneuvering Load Factors
Flaps Up +3.8 -1.52
Flaps Down +3.5
Maximum design weight 2550 lb.
Reference weight and balance data for loading instructions."

(b) "Both tanks on for takeoff and landing."

(c) "Flaps - Pull to extend

Takeoff	Retracted	0°
	1st Notch	10°
	2nd Notch	20°
Landing	3rd Notch	30°
	4th Notch	40°

Data Pertinent to Model Items I through XII, continued

(2) In baggage compartment
"Maximum baggage 120 lb. For additional loading instructions see weight and balance data."

B. Applicable to Models 182A, 182B, 182C and 182D

(1) In full view of the pilot:

(a) "This airplane must be operated as a normal category airplane in compliance with operating limitations stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved.

Flight Maneuvering Load Factors

Flaps Up +3.8 -1.52

Flaps Down +3.5

Maximum design weight 2650 lb.

Reference weight and balance data for loading instructions."

(b) "Both tanks on for takeoff and landing."

(c) "Flaps - Pull to extend

Takeoff	Retracted	0°
	1st Notch	10°
	2nd Notch	20°
Landing	3rd Notch	30°
	4th Notch	40°"

(2) In baggage compartment
"Maximum baggage 120 lb. For additional loading instructions see weight and balance data."

C. Applicable to Models 182E, 182F, 182G, 182H, 182J, 182K, 182L, 182M

(1) In full view of the pilot:

(a) "This airplane must be operated as a normal category airplane in compliance with operating limitations stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved.

Flight Maneuvering Load Factors

Flaps Up +3.8 -1.52

Flaps Down +3.5

Maximum design weight 2800 lb.

Reference weight and balance data for loading instructions."

(2) On the fuel selector valve plate:
"Both off. Left tank level flight only 31 gal. Both on for landing and takeoff all flight attitudes 60 gal. Right tank level flight only 31 gal."

(3) On the control lock:
"Control lock - Remove before starting engine."

(4) On the baggage door:
"120 lb. maximum baggage and/or auxiliary seat passengers. For additional loading instructions, see weight and balance data."

D. Applicable to Models 182N:

(1) In full view of the pilot:

(a) Serial Numbers 18260056 through 18260445
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

No acrobatic maneuvers, including spins, approved

	Maximums	
Design weight	2950 lb. takeoff	Alt. loss in stall recovery-160 ft.
	2800 lb. landing	Flight Maneuvering Load Factors
Maneuvering speed	131 m.p.h.-CAS	Flaps up +3.8, -1.52, Flaps down +3.5

Reference weight and balance data for loading instructions"

(b) Serial Numbers 182670446 through 18260825
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

Data Pertinent to Model Items I through XII, continued

D. Applicable to Models 182N, continued:

	Maximums	
Maneuvering speed	131 m.p.h. CAS (114 knots)	
Gross weight	Takeoff 2950 lb.	
	Landing 2800 lb.	
Flight load factor	Flaps up	+3.8, -1.52
	Flaps down	+3.5

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery 160 ft. Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR" (as applicable)

(2) On the fuel selector valve plate:
"Both off. Left tank level flight only 31 gal. Both on for landing and takeoff all flight attitudes, 60 gal. Right tank level flight only 31 gal."

(3) On the control lock:
"Control lock - Remove before starting engine."

(4) On the baggage door:
(a) "120 lb. maximum baggage and/or auxiliary seat passengers. For additional loading instructions, see weight and balance data."
Applicable to Models 182N, S/N 18260056 through 18260445.
(b) "120 lb. maximum baggage and/or auxiliary passenger forward of baggage door latch, and 80 pounds maximum baggage aft of baggage door latch. Maximum 200 lb. combined. For additional loading instructions see weight and balance data." Applicable to Models 182N, S/N 18260446 and up.

(5) On flap control indicator:
(a) "0° to 20° - T.O."
(b) "10° - 20° - Full.
(Indices at these positions with blue color code and 160 m.p.h. callout, and white color code with 110 m.p.h. callout; mechanical detent at 10° and 20°)"

E. Applicable to Models 182P:

(1) In full view of the pilot:
(S/N 675, 18260826 through 18264295)
(a) "This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

	Maximums
Maneuvering speed	126 m.p.h. CAS (109 knots)
Gross weight	2950 lb.
Flight load factor	Flaps up +3.8, -1.52
	Flaps down +2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery 160 ft. Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR." (as applicable)

(S/N 18264296 through 18265175)
(b) "This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

Data Pertinent to Model Items I through XII, continued

E. Applicable to Models 182P, continued:

Maximums	
Maneuvering speed (IAS)	110 knots
Gross weight	2950 lb.
Flight load factor	Flaps up +3.8, -1.52 Flaps down +2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery 160 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR" (as applicable)

(2) On the fuel selector valve plate: (S/N 675, 18260826 through 18262250)
Standard range tanks: "Off. Left tank level flight only 31 gal. Both on for landing and takeoff all flight attitudes, 60 gal. Right tank level flight only 31 gal."
Long range tanks: "Off. Left tank level flight only 39 gal. Both on for landing and takeoff all flight attitudes, 79 gal. Right tank level flight only 39 gal."
On the fuel selector valve plate: (S/N 182622251 through 18265175)
Standard range tanks: "Off. Left tank level flight only 29 gal. Both on for landing and takeoff all flight attitudes, 56 gal. Right tank level flight only 29 gal."
Long range tanks: "Off. Left tank level flight only 37 gal. Both on for landing and takeoff all flight attitudes, 75 gal. Right tank level flight only 37 gal."

(3) On the control lock: "Control lock - remove before starting engine."

(4) On the baggage door: (S/N 18260826 through 18263475)
"120 lb. maximum baggage and/or auxiliary passenger forward of baggage door latch, and 80 lb. maximum baggage aft of baggage door latch. Maximum 200 lb. combined. For additional loading instructions, see weight and balance data."

On the baggage door: (S/N 675, 18263476 through 18265175)
"Forward of baggage door latch, 120 lb. maximum baggage and/or auxiliary passenger. Aft of baggage door latch, 80 lb. maximum baggage including 25 lb. maximum in baggage wall hat shelf. Maximum 200 lb. combined. For additional loading instructions see weight and balance data."

(5) On flap control indicator: (S/N 675, 18260826 through 18264295)
"(a) 0° to 10° - (Blue color code and 160 m.p.h. callout; also, mechanical detent at 10°)
(b) 10° to 20°- Full (Indices at these positions with white color code and 110 m.p.h. callout; also, mechanical detent at 10° and 20°)"

On flap control indicator (S/N 18264296 through 18265175)
"(a) 0° to 10° - (Blue color code and 140 KTS callout; also, mechanical detent at 10°)
(b) 10° to 20°- Full (Indices at these positions with white color code and 95 KTS callout; also, mechanical detent at 10° and 20°)"

(6) Forward of the filler cap on the wing surface: (S/N 675, 18260826 through 18262250)
Standard range tanks: "Service this airplane with 80/87 minimum aviation grade gasoline. Capacity 32.5 gal."
Long range tanks: "Service this airplane with 80/87 minimum aviation grade gasoline. Capacity 42.0 gal."

Data Pertinent to Model Items I through XII, continued

E. Applicable to Models 182P, continued:

Forward of the filler cap on the wing surface: (S/N 18262251 through 18265175)
Standard range tanks: "Service this airplane with 80/87 minimum aviation grade gasoline. Capacity 30.5 gal."
Long range tanks: "Service this airplane with 80/87 minimum aviation grade gasoline. Capacity 40.0 gal."

(7) On aft panel of baggage compartment:
"Oxygen refill." (All models with oxygen)

(8) Adjacent to overvoltage light:
"High voltage."

(9) Above the left fuel gauge:
"Do not turn off alternator in flight except in emergency."
(Model 182P, S/N 18260826 through 18261425)

F. Applicable to Models 182Q:

(1) In full view of the pilot:

(a) S/N 18263479, 18265176 through 18266590
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

	Maximums
Maneuvering speed (IAS)	111 knots
Gross weight	2950 lb.
Flight load factor	Flaps up +3.8, -1.52 Flaps down +2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery 160 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR." (as applicable)

S/N 18266591 through 18267715
"The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, approved. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR." (as applicable)

(b) Near airspeed indicator:
S/N 18266591 through 18267715
"Maneuver Speed
111 KIAS"

(2) On the fuel selector valve plate:
S/N 18263479, 18265176 through 18266590
Standard range tanks: "Off.
Left - 29 gal. Level flight only.
Both - 56 gal. All flight attitudes.
Both on for takeoff and landing.
Right - 29 gal. Level flight only."

Long range tanks: "Off.
Left - 37 gal. Level flight only.
Both - 75 gal. All flight attitudes.
Both on for takeoff and landing.
Right - 37 gal. Level flight only."

S/N 18266591 through 18267715
"Take Off - Both - Landing,
All Flight - 88.0 Gal. - Attitudes
Left - 44.0 Gal. Level Flight Only
Right - 44.0 Gal. Level Flight Only
Off."

(3) On the control lock: "Control lock - remove before starting engine."

(4) On the baggage door: "Forward of baggage door latch, 120 pounds maximum baggage and/or auxiliary passenger. Aft of baggage door latch, 80 pounds maximum baggage including 25 pounds maximum in baggage wall hat shelf. Maximum 200 pounds combined. For additional loading instructions, see weight and balance data."

(5) On flap control indicator:
"0° to 10° - (Blue color code and 140 KTS callout;
also, mechanical detent at 10°)"
"0° to 20° - Full (Indices at these positions with white color code and 95 KTS callout; also, mechanical detent at 10° and 20°)"

(6) Forward of the filler cap on the wing surface:
S/N 18265176 through 18265965
Standard range tanks: "Service this airplane with 100/130 minimum aviation grade gasoline. Capacity 30.5 gal."

Long range tanks: "Service this airplane with 100/130 minimum aviation grade gasoline. Capacity 40.0 gal."

S/N 18263479, 18265966 through 18266590
Standard range tanks: "Service this airplane with 100LL/100 aviation grade gasoline. Capacity 30.5 gal."

Long range tanks: "Service this airplane with 100LL/100 aviation grade gasoline. Capacity 40.0 gal."

S/N 18266591 through 18267715
"Fuel 100LL/100 minimum grade aviation gasoline.
Capacity 46 U.S. gal. Capacity 34.5 U.S. gal.
to bottom of filler collar."

(7) On aft panel of baggage compartment:
"Oxygen refill." (All models with oxygen)

(8) Adjacent to overvoltage light:
S/N 18263479, 18265176 through 18266590
"High Voltage"

S/N 18266591 through 18267715
"Low Voltage"

Data Pertinent to Model Items I through XII, continued

G. Applicable to Models R182 and TR182, S/N R18200001 through R18201928:

(1) In full view of the pilot:

(a) S/N R18200002 through R18200583

"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

	Maximums
Gross weight	3100 lb.
Flight load factor	Flaps up +3.8, -1.52 Flaps down +2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery 240 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR." (as applicable)

(b) S/N R18200001, R18200584 through R18202041

"The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, approved. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR." (as applicable)

(c) Near Airspeed Indicator:

"MAX SPEED - KIAS	
Maneuver	112
Gear Oper	140
Gear Down	140"

(2) On the fuel selector valve plate:

(a) S/N R18200002 through R18200583

Standard range tanks:	"Off Left - 29 gal. Level flight only. Both - 56 gal. All flight attitudes. Both on for takeoff and landing. Right - 29 gal. Level flight only."
Long range tanks:	"Off Left - 37 gal. Level flight only. Both - 75 gal. All flight attitudes. Both on for takeoff and landing. Right - 37 gal. Level flight only."

(b) S/N R18200001, R18200584 through R18201798

"Take Off - Both - Landing,
All Flight - 88.0 Gal. - Attitudes
Left - 44.0 Gal. Level Flight Only
Right - 44.0 Gal. Level Flight Only
Off."

(c) S/N R18201799 through R18202041

"Both - 88.0 Gal. - Take Off - Landing - All Flight Attitudes; Left - 44.0 Gal. - Level Flight Only
Right - 44.0 Gal. - Level Flight Only
Off - Off."

(3) On the control lock:
(a) S/N R18200001 through R18201798
"Control lock - Remove before starting engine."
(b) S/N R18201799 through R18202041
"Caution! Control Lock - Remove before starting engine."

G. Applicable to Models R182 and TR182, S/N R18200001 through R18201928, continued:

(4) On the baggage door: "120 Pounds Maximum
Baggage And/Or Auxiliary Passenger
Forward of Baggage Door Latch And
80 Pounds Maximum
Baggage Aft of Baggage Door Latch
Maximum 200 Pounds Combined
For Additional Loading Instructions See Weight and Balance Data"

(5) On the flap control indicator:
"0° to 10° - (Blue color code and 140 KTS callout;
also, mechanical detent at 10°)"

"0° to 20° - Full (Indices at these positions with white color code and 95 KTS
callout; also, mechanical detent at 10° and 20°)"

(6) Forward of the filler cap on the wing surface:
(a) S/N R18200002 through R18200583
Standard range tanks: "Service this airplane with 100LL/100 aviation grade gasoline.
Capacity 30.5 gal."

Long range tanks: "Service this airplane with 100LL/100 aviation grade gasoline.
Capacity 40.0 gal."

(b) S/N R18200001, R18200584 through R18202041
Fuel 100LL/100 minimum grade aviation gasoline.
Capacity 46 U.S. gal. Capacity 34.5 U.S. gal. to
bottom of filler collar."

(7) Adjacent to overvoltage light:
(a) S/N R18200002 through R18200583
"High Voltage"

(b) S/N R18200001, R18200584 through R18202041
"Low Voltage"

(8) Near gear hand pump:
"Manual Gear Extension
1. Select Gear Down
2. Pull Handle Fwd.
3. Pump Vertically
CAUTION
Do Not Pump With Gear
Up Selected"

(9) Forward of each fuel filler cap:
"Fuel Cap Forward - Arrow Alignment, Cap Must Not Rotate During Closing."

Data Pertinent to Model Items I through XII, continued

H. Applicable to Models 182R and T182, S/N 18267302, 18267716 through 18268293: (continued)

(1) In full view of the pilot:

(a) "The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, approved. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-NIGHT-VFR-IFR." (as applicable).

(b) Near airspeed indicator:
"Maneuver Speed
111 KIAS"

(2) On the fuel selector valve plate:

(a) S/N 18267716 through 18268055
"Take Off - Both - Landing, -
All Flight - 88.0 Gal. - Attitudes
Left - 44.0 Gal. Level Flight Only
Right - 44.0 Gal. Level Flight Only
Off."

(b) S/N 18268056 through 18268586
"Both - 88.0 Gal. - Takeoff - Landing - All Flight Attitudes
Left - 44.0 Gal. - Level Flight Only
Right - 44.0 Gal. - Level Flight Only
Off - Off."

(3) On the control lock:

(a) S/N 18267716 through 18268055
"Control Lock - Remove before starting engine."

(b) S/N 18268056 through 18268586
"Caution! Control Lock - Remove before starting engine."

(4) On baggage door:
"120 Pounds Maximum
Baggage And/Or Auxiliary Passenger
Forward of Baggage Door Latch and 80 Pounds Maximum
Baggage Aft of Baggage Door Latch
Maximum 200 Pounds Combined

For Additional Loading Instructions see Weight and Balance Data"

(5) On flap control indicator:
"0° to 10° - (Blue color code and 140 KTS callout;
also, mechanical detent at 10°)"
"0° to 20° - Full (Indices at these positions with white color code and 95 KTS
calout; also mechanical detent at 10° and 20°)"

(6) Forward of the filler cap on the wing surface:
"Fuel 100LL/100 minimum grade aviation gasoline. Capacity 46 U.S. gal.
Capacity 34.5 U.S. gal. to bottom of filler collar."

(7) Forward of each fuel filler cap:
"Fuel cap fwd - arrow alignment, cap must not rotate during closing."

(8) Adjacent to overvoltage light:
"Low Voltage"

Data Pertinent to Model Items I through XII, continued

I. Applicable to Models R182 and TR182, S/N R18201929 through R18202041:

All placards required in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be installed in the appropriate locations.

J. Applicable to Models 182R and T182, S/N 18268294 through 18268586:

All placards required in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be installed in the appropriate locations.

NOTE 3. The cylinder head thermistors must be installed as follows:

Model	Engine and Cylinder Head Number				
	O-470-R	O-470-S	O-470-U	O-540-J	O-540-L
182N (1970 and 1971 Model)	3	3	N/A	N/A	N/A
182P (1972 and 1973 Model)	2	3	N/A	N/A	N/A
182P (1974 Model)	1	3	N/A	N/A	N/A
182P (1975 and 1976 Model)	N/A	3	N/A	N/A	N/A
182Q (1977 through 1980 Model)	N/A	N/A	3	N/A	N/A
182R (1981 Model through 18268160)	N/A	N/A	5	N/A	N/A
182R (18268161 through 18268586)	N/A	N/A	3	N/A	N/A
T182 (1981 Model through 1985 Model)	N/A	N/A	N/A	N/A	1
R182 (1978 and 1979 Model)	N/A	N/A	N/A	5	N/A
R182 (1980 Model through 1986 Model)	N/A	N/A	N/A	4	N/A
TR182 (1979 Model)	N/A	N/A	N/A	N/A	3
TR182 (1980 Model through 1986 Model)	N/A	N/A	N/A	N/A	5

NOTE 4. The installation of the 0-470-S engine in Model 182N and Model 182P (1970 through 1974) will require a change of the oil temperature gauge. Reference Cessna Service Letter SE75-2 for information and instructions for this change.

NOTE 5. The marking of the airspeed indicator with IAS provides an equivalent level of safety to CAR 3.757 when the approved airspeed calibration data presented in Section V of the Pilot's Operating Handbooks listed below is available to the pilot:

182P, Cessna P/N D1062-13	(S/N 18264296 through 18265175)
182Q, Cessna P/N D1087-13	(S/N 18265176 through 18265965)
182Q, Cessna P/N D1114-13	(S/N 18263479, 18265966 through 18266590)
182Q, Cessna P/N D1141-13PH	(S/N 18266591 through 18267300)
182Q, Cessna P/N D1176-13PH	(S/N 18267301 through 18267715)
182R, Cessna P/N D1196-13PH	(S/N 18267716 through 18268055)
182R, Cessna P/N D1215-13PH	(S/N 18268056 through 18268293)
182R, Cessna P/N D1233-13PH	(S/N 18268294 through 18268368)
182R, Cessna P/N D1254-13PH	(S/N 18268369 through 18268434)
T182, Cessna P/N D1197-13PH	(S/N 18267302, 18267716 through 18268055)
T182, Cessna P/N D1216-13PH	(S/N 18268056 through 18268293)
T182, Cessna P/N D1234-13PH	(S/N 18268294 through 18268368)
T182, Cessna P/N D1234R1-13PH	(Special) (S/N 18268365)
T182, Cessna P/N D1255-13PH	(S/N 18268369 through 18268434)
R182, Cessna P/N D1115-13	(S/N R18200002 through R18200583)
R182, Cessna P/N D1142-13PH	(S/N R18200584 through R18201313)
R182, Cessna P/N D1177-13PH	(S/N R18201314 through R18201628)
R182, Cessna P/N D1198-13PH	(S/N R18201629 through R18201798)
R182, Cessna P/N D1217-13PH	(S/N R18201799 through R18201928)
R182, Cessna P/N D1235-13PH	(S/N R18201929 through R18201973)
R182, Cessna P/N D1256-13PH	(S/N R18201974 through R18201999)
R182, Cessna P/N D1277-13PH	(S/N R18202000 through R18202031)
R182, Cessna P/N D1299-13PH	(S/N R18202032 through R18202041)
TR182, Cessna P/N D1143-13PH	(S/N R18200001, R18200584 through R18201313 except R18200975)
TR182, Cessna P/N D1143-2-13PH	(Special) (S/N R18200975)
TR182, Cessna P/N D1178-13PH	(S/N R18201314 through R18201628 except R18201315)

TR182, Cessna P/N D1199-13PH	(S/N R18201629 through R18201798)
TR182, Cessna P/N D1218-13PH	(S/N R18201799 through R18201928)
TR182, Cessna P/N D1236-13PH	(S/N R18201929 through R18201973)
TR182, Cessna P/N D1257-13PH	(S/N R18201974 through R18201999)
TR182, Cessna P/N D1278-13PH	(S/N R18201315, R18202000 through R18202031)
TR182, Cessna P/N D1300-13PH	(S/N R18202032 through R18202041)

NOTE 6. 14-volt electrical system
(182 series through S/N 18265965 except 18263479)
28-volt electrical system
(182 series S/N 18263479, 18265966 through 18268586)
(R182 and TR182 series S/N R18200001 through R18202041)

NOTE 7: Special Ferry Flight Authorization. Flight Standards District Offices are authorized to issue Special overweight ferry flight authorizations. These airplanes are structurally satisfactory for ferry flight if maintained within the following limits: (1) Takeoff weight must not exceed 130% of the maximum weight for Normal Category; and (2) The Never Exceed Airspeed (VNE) and Maximum Structural Cruising Speed (VC) must be reduced by 30%; and (3) Forward and aft center of gravity limits may not be exceeded; and (4) Structural load factors of +2.5 g. to -1.0 g. may not be exceeded. Requirements for any additional engine oil should be established in accordance with Advisory Circular AC23.1011-1. Increased stall speeds and reduced climb performance should be expected for the increased weights. Flight characteristics and performance at the increased weights have not been evaluated. Procedures for issuing a Flight Permit for operations of overweight aircraft may be found in Advisory Circular AC21-4B

In addition to the above specified placards, the prescribed operating limitations indicated by an asterisk (*) under Sections I through XII must also be displayed by permanent markings.

XIII - Model 182S, Skylane, 4 PCLM (Normal Category), Approved 03 October 1996.
Model 182T, Skylane, 4 PCLM (Normal Category), Approved 23 February 2001.

Engine: Lycoming IO-540-AB1A5. Rated 230 Horsepower

Fuel: 100/100LL minimum grade aviation gasoline

Engine Limits: For all operations, 2400 RPM

Propeller Limits:

(1) McCauley Constant Speed (182S)
- (1) McCauley Constant Speed
- (a) Propeller: B2D34C235/90DKB-8 (2 blades)
  Diameter: not over 82 in., not under 80.5 in.
  Pitch settings at 30 in. sta.: Low 17.0º, High 31.8º
- (b) McCauley Spinner: D-7267-2
- (c) McCauley Governor: DC290D1/T8

(2) McCauley Constant Speed (182S, 182T)
- (a) Propeller: B3D36C431/80VSA-1 (3 blades)
  Diameter: not over 79 in., not under 77.5 in.
  Pitch settings at 30 in. sta.: Low 14.9º, High 31.7º
- (b) McCauley Spinner: D-7261-2
- (c) McCauley Governor: DC290D1/T8

Propeller limits: Static RPM at full throttle: Not over 2400; Not Under 2300

Airspeed Limits (182S):

Maneuvering	110 Knots IAS	(108 Knots CAS)
Max Structural Cruising	140 Knots IAS	(138 Knots CAS)
Never Exceed	175 Knots IAS	(170 Knots CAS)
Flaps Extended	100 Knots IAS	(99 Knots CAS)

XIII - Models 182S and 182T Cont.

Airspeed Limits (182T):	Maneuvering	110 Knots IAS	(108 Knots CAS)
	Max Structural Cruising	140 Knots IAS	(136 Knots CAS)
	Never Exceed	175 Knots IAS	(171 Knots CAS)
	Flaps Extended	100 Knots IAS	(99 Knots CAS)

C.G. Range (182S): Normal Category
(1) Aft Limits: 46.0 inches aft of datum at 3100 lbs. or less.
(2) Forward Limits: Linear variation from 40.9 inches aft of datum at 3100 pounds to 33.0 inches aft of datum at 2250 lbs.; 33.0 inches aft of datum at 2250 lbs. or less.

C.G. Range (182T): Normal Category
(1) Aft Limits 46.0 inches aft of datum at 3,100 pounds or less.
(2) Forward Limits Linear variation from 40.9 inches aft of datum at 3,100 pounds, to 35.5 inches aft of datum at 2,700 pounds, to 33.0 inches aft of datum at 2,250 pounds; 33.0 inches aft of datum at 2,250 pounds or less.

Empty Wt. C.G. Range: None

Reference Datum: Lower portion of front face of firewall

MAC: 58.8 inches; Leading edge of MAC 25.98 inches aft of datum

Leveling Means: Left side of Tailcone at 139.65 inches and 171.65 inches aft of datum

Maximum Weights (see Note 5) Normal Category

Maximum Ramp	3,110 pounds
Maximum Takeoff	3,100 pounds
Maximum Landing	2,950 pounds

No. of Seats: 4 (2 at 32.0 to 50.0 inches aft of datum; 2 at 74.0 inches aft of datum)

Maximum Baggage: 120 pounds at 82.0 to 109.0 inches aft of datum
80 pounds at 109.0 to 134.0 inches aft of datum
(Max. combined weight capacity for baggage areas is 200 pounds)

Fuel Capacity (Gal.): 182S: 92 gallons total: 88 gallons usable
182T: 92 gallons total; 87 gallons usable
(Two 46 gallon tanks in wings at 46.5 inches aft of datum)
See NOTE 1 for data on usable fuel.

Oil Capacity (Gal.): 9.0 quarts at 14.8 inches forward of datum
5.0 quarts usable

Control surface movements

Wing flaps			Down	38° +0°, -1°
Elevator tab	Up	24° ± 2°	Down	15° ± 1°
Ailerons	Up	20° ± 2°	Down	15° ± 2°
Elevator	Up	28° ± 1°	Down	21° ± 1°

(Relative to stabilizer)
Rudder: Right: 24° +0°, -1° Left: 24° +0°,-1°
(Parallel to 0.00 W.L.)
Right: 27°13' +0°, -1° Left: 27°13' +0°,-1°
(Perpendicular to hinge line)

Serial numbers eligible: 182S: 18280001 through 18280944
182T: 18280945 and On

Data Pertinent to Model 182S and 182T

Certification Basis

Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by 23-1 through 23-6, except as follows:

FAR 23.423; 23.611; 23.619; 23.623; 23.689; 23.775; 23.871; 23.1323; and 23.1563 as amended by Amendment 23-7. FAR 23.807 and 23.1524 as amended by Amendment 23-10. FAR 23.507; 23.771; 23.853(a),(b) and (c); and 23.1365 as amended by Amendment 23-14. FAR 23.951 as amended by Amendment 23-15. FAR 23.607; 23.675; 23.685; 23.733; 23.787; 23.1309 and 23.1322 as amended by Amendment 23-17. FAR 23.1301 as amended by Amendment 23-20. FAR 23.1353; and 23.1559 as amended by Amendment 23-21. FAR 23.603; 23.605; 23.613; 23.1329 and 23.1545 as amended by Amendment 23-23. FAR 23.441 and 23.1549 as amended by Amendment 23-28. FAR 23.779 and 23.781 as amended by Amendment 23-33. FAR 23.1; 23.51 and 23.561 as amended by Amendment 23-34. FAR 23.301; 23.331; 23.351; 23.427; 23.677; 23.701; 23.735; and 23.831 as amended by Amendment 23-42. FAR 23.961; 23.1093; 23.1143(g); 23.1147(b); 23.1303; 23.1357; 23.1361 and 23.1385 as amended by Amendment 23-43. FAR 23.562(a), 23.562(b)2, 23.562(c)1, 23.562(c)2, 23.562(c)3, and 23.562(c)4 as amended by Amendment 23-44. FAR 23.33; 23.53; 23.305; 23.321; 23.485; 23.621; 23.655 and 23.731 as amended by Amendment 23-45.

FAR 36 dated December 1, 1969, as amended by Amendments 36-1 through 36-21.

Equivalent Safety Items, 182S:

(1)	Induction System Icing Protection	FAR § 23.1093.
(2)	Throttle Control	FAR § 23.1143(g)
(3)	Mixture Control	FAR § 23.1147(b)

Date of Application for Amended Type Certificate was January 22, 1996.
Type Certificate No. 3A13 was amended October 3, 1996.

Equivalent Safety Items, 182T:

(1) Induction System Icing Protection	FAR § 23.1093; Refer to FAA letter dated 12/19/00
(3) (2) Throttle Control	FAR § 23.1143(g); Refer to FAA letter dated 12/19/00
(5) (3) Mixture Control	FAR § 23.1147(b); Refer to FAA letter dated 12/19/00
(7) (4) Anti-collision Lights	FAR § 23.1401(d); Refer to FAA letter dated 2/20/01

Additions for the Garmin G1000 Integrated Cockpit System (ICS) Only:

14 CFR 23.303; 23.307; 23.601; 23.1163(a)(1)(2); 23.1367 and 23.1381 as amended by Amendment 23-N/C. 14 CFR 23.1589 as amended by Amendment 23-13. 14 CFR 23.771(a) as amended by Amendment 23-14. 14 CFR 23.607 and (Electrical System) 23.1309(a)(1)(2), (c) as amended by Amendment 23-17. 14 CFR 23.1301; 23.1327 and 23.1547(e) as amended by Amendment 23-20. 14 CFR 23.1501 and 23.1541(a)(1), (a)(2), (b)(1), (b)(2) as amended by Amendment 23-21. 14 CFR 23.603 and 23.605 as amended by Amendment 23-23. 14 CFR 23.1529 as amended by Amendment 23-26. 14 CFR 23.561(e); 23.1523; 23.1581(a)(2); 23.1583(a)(1), (a)(2), (b)(h) and 23.1585(a)(b)(d) as amended by Amendment 23-34. 14 CFR 23.301 as amended by Amendment 23-42. 14 CFR 23.1322; 23.1331 and 23.1357(a)(b)(c)(d) as amended by Amendment 23-43. 14 CFR 23.305; 23.773(a)(1), (a)(2); 23.1525 and 23.1549 as amended by Amendment 23-45. 14 CFR 23.1303(a)(b)(c)(f); 23.1309(a)(1)(i), (a)(1)(ii), (a)(2), (b)(1), (b)(2)(i), (b)(2)(ii), (b)(3), (b)(4)(i), (b)(4)(ii), (b)(4)(iii), (b)(4)(iv), (c)(1), (c)(2)(iii), (c)(3), (d), (e), (f)(1); 23.1311; 23.1321(a)(c)(d)(e); 23.1323(a), (b)(1), (b)(2), (c); 23.1329(g)(h); 23.1351(a)(1), (a)(2)(i), (b)(1)(iii), (b)(2)(3), (c)(4), (d)(1); 23.1353(a)(b)(c)(d)(e); 23.1359(c); 23.1361; 23.1365(a)(b)(d)(e)(f) and 23.1431(a)(b)(d)(e) as amended by Amendment 23-49. 14 CFR 23.1325(a), (b)(1), (b)(2)(i), (b)(3), (c)(d)(e); 23.1543(b)(c); 23.1545(a), (b)(1), (b)(2), (b)(3), (b)(4); 23.1553; 23.1555(a)(b); 23.1563(a) and 23.1567(a) as amended by Amendment 23-50. 14 CFR 23.777(a)(b); 23.955(a)(2); 23.1337(a)(1), (a)(2), (b)(1), (c) as amended by Amendment 23-51. 14 CFR 23.1305(a)(1), (a)(2), (a)(3), (b)(2), (b)(3)(i), (b)(4)(i), (b)(5), (b)(6)(i) as amended by Amendment 23-52. 14 CFR 23.901(a)(b) as amended by Amendment 23-53.

Additions for the Garmin GFC-700 Automatic Flight Control System (AFCS) Only:

14 CFR 23.1335 as amended by Amendment 23-20, 14 CFR 23.1309 (a)(3), (a)(4), (f)(2); 23.1329 (a)(c)(d)(e)(f); 23.1351 (a)(2)(ii); 23.1431 (c) as amended by Amendment 23-49.

Special Conditions as follows:

No. 23-146-SC, "Special Conditions: Cessna Aircraft Company; Cessna Model 182T/T182T Airplane; Installation of Electronic Flight Instrument System and the Protection of the System From High Intensity Radiated Fields (HIRF).

Production Basis (Model 182S)
Production Basis (Model 182S)

Production Certificate No. PC-4 issued June 30, 1997. Applies to airplane serial numbers 18280013, 18280016, 18280017, 18280019 and on. Airplane serial numbers not listed were produced under Type Certificate only. Cessna is authorized to issue airworthiness certificates under the delegation provisions of Delegation Option Authorization No. CE-1 in accordance with Part 21 of the Federal Aviation Regulations.

Production Basis (Model 182T)
Production Certificate No. 4 issued March 8, 2001. Applies to airplane serial numbers 18280945 and on. Cessna is authorized to issue airworthiness certificates under the delegation provisions of Delegation Option Authorization No. DOA-100129-CE in accordance with Part 21 of the Federal Aviation Regulations.

Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the airplane for certification.

NOTE 1: Weight and Balance:

Serial Nos. 18280001 Through 18280944; (Model 182S)
The certificated basic empty weight and corresponding center of gravity location must include unusable fuel of 24 lbs. at 48 inches aft of datum, and full oil of 16.2 lb. at 14.8 inches forward of datum.

Serial Nos. 18280945 and On; (Model 182T)
The certificated basic empty weight and corresponding center of gravity location must include unusable fuel of 30 lbs. at 48 inches aft of datum, and full oil of 16.2 lb. at 14.8 inches forward of datum.

NOTE 2: FAA Approved Airplane Flight Manual (AFM): Part Number 182SPHUS00 (or later FAA approved revisions) are applicable to the Model 182S. The Airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

FAA Approved Airplane Flight Manual (AFM): Part number 182TPHUS00 (or later FAA approved revision) is applicable to the Model 182T. The Airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

FAA Approved Airplane Flight Manual (AFM): Part Number 182TPHAUS-00 (or later FAA approved revisions) are applicable to the Model 182T equipped with Garmin G1000 Integrated Cockpit System. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM."

FAA Approved Airplane Flight Manual (AFM): Part Number 182TPHBUS-00 (or later FAA approved revisions) are applicable to the Model 182T equipped with Garmin G1000 Integrated Cockpit System and Garmin GFC-700 AFCS. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

NOTE 3: The CHT probe must be installed on Head #1 (182S) or #3 (182T).

NOTE 4: Special Ferry Flight Authorization. Flight Standards District Offices are authorized to issue Special overweight ferry flight authorizations. This airplane is structurally satisfactory for ferry flight if maintained within the following limits: (1) Takeoff weight must not exceed 130% of the maximum weight for Normal Category; and (2) The Never Exceed Airspeed (VNE) and Maximum Structural Cruising Speed (VC) must be reduced by 30%; and (3) Forward and aft center of gravity limits may not be exceeded; and (4) Structural load factors of +2.5 g. to -1.0 g. may not be exceeded. Requirements for any additional engine oil should be established in accordance with Advisory Circular AC23.1011-1. Increased stall speeds and reduced climb performance should be expected for the increased weights. Flight characteristics and performance at the

increased weights have not been evaluated. Procedures for issuing a Flight Permit for operations of overweight aircraft may be found in Advisory Circular AC21-4B

NOTE 5: Model 182S airplane serial numbers 18280617 through 18280670 may differ structurally and are, therefore, not eligible for any weight increases above the approved maximum takeoff weight limit of 3,100 pounds. Any exceptions must first be coordinated with the Wichita Aircraft Certification Office. Exceptions to this limitation have been inspected and found to comply with type data for the Model 182S, and include the following serial number aircraft: 18280620.

XIV - Model T182T, Skylane, 4 PCLM (Normal Category), Approved 23 February 2001.

Engine	Lycoming TIO-540-AK1A. Rated 235 Horsepower		
Fuel	100/100LL minimum grade aviation gasoline		
Engine Limits	For all operations, 2,400 RPM		
Propeller	McCauley Constant Speed (a) McCauley Model B3D36C442/80VSB-1 Diameter: not over 79 inches; not under 77.5 inches Pitch settings at 30 in. sta.: Low 15.1º, High 35.4º (b) McCauley Spinner: D-7261-2 (d) (c) McCauley Governor: DC290D1/T8		
Propeller limits	Static RPM at full throttle: Not over 2400; Not Under 2300		
Airspeed Limits	Maneuvering	110 Knots IAS	(110 Knots CAS)
	Max Structural Cruising	140 Knots IAS	(137 Knots CAS)
	Never Exceed	175 Knots IAS	(170 Knots CAS)
	Flaps Extended	100 Knots IAS	(100 Knots CAS)
C.G. Range	Normal Category (1) Aft Limits	46.0 inches aft of datum at 3,100 pounds or less.	
	(2) Forward Limits	Linear variation from 40.9 inches aft of datum at 3,100 pounds, to 35.5 inches aft of datum at 2,700 pounds, to 33.0 inches aft of datum at 2,250 pounds; 33.0 inches aft of datum at 2,250 pounds or less.	
Empty Wt. C.G. Range	None		
Reference Datum	Lower portion of front face of firewall		
MAC	58.8 inches; Leading edge of MAC 25.98 inches aft of datum		
Leveling Means	Left side of Tailcone at 139.65 inches and 171.65 inches aft of datum		
Maximum Weights	Normal Category		
	Maximum Ramp	3,110 pounds	
	Maximum Takeoff	3,100 pounds	
	Maximum Landing	2,950 pounds	
No. of Seats	4 (2 at 32.0 to 50.0 inches aft of datum; 2 at 74.0 inches aft of datum)		
Maximum Baggage	120 pounds at 82.0 to 109.0 inches aft of datum 80 pounds at 109.0 to 134.0 inches aft of datum (Max. combined weight capacity for baggage areas is 200 pounds)		
Fuel Capacity (Gal.)	92 gallons total; 87 gallons usable (Two 46 gallon tanks in wings at 46.5 inches aft of datum) See NOTE 1 for data on usable fuel.		

Oil Capacity (Qts.)	9.0 quarts at 14.8 inches forward of datum 5.0 quarts usable				
Control surface movements	Wing flaps			Down	38° +0°, -1°
	Elevator tab	Up	24° ± 2°	Down	15° ± 1°
	Ailerons	Up	20° ± 2°	Down	15° ± 2°
	Elevator	Up	28° ± 1°	Down	21° ± 1°
	(Relative to stabilizer)				
	Rudder:	Right:	24° +0°, -1°	Left:	24° +0°, -1°
		(Parallel to 0.00 W.L.)			
		Right:	27°13' +0°, -1°	Left:	27°13' +0°, -1°
		(Perpendicular to hinge line)			
Serial numbers eligible	T18208001 and On				

Data Pertinent to Model T182T

Certification Basis

Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by 23-1 through 23-6, except as follows:

FAR 23.423; 23.611; 23.619; 23.623; 23.689; 23.775; 23.871; 23.1323; and 23.1563 as amended by Amendment 23-7. FAR 23.807 and 23.1524 as amended by Amendment 23-10. FAR 23.507; 23.771; 23.853(a),(b) and (c); and 23.1365 as amended by Amendment 23-14. FAR 23.951 as amended by Amendment 23-15. FAR 23.607; 23.675; 23.685; 23.733; 23.787; 23.1309 and 23.1322 as amended by Amendment 23-17. FAR 23.1301 as amended by Amendment 23-20. FAR 23.1353; and 23.1559 as amended by Amendment 23-21. FAR 23.603; 23.605; 23.613; 23.1329 and 23.1545 as amended by Amendment 23-23. FAR 23.441 and 23.1549 as amended by Amendment 23-28. FAR 23.779 and 23.781 as amended by Amendment 23-33. FAR 23.1; 23.51 and 23.561 as amended by Amendment 23-34. FAR 23.301; 23.331; 23.351; 23.427; 23.677; 23.701; 23.735; and 23.831 as amended by Amendment 23-42. FAR 23.961; 23.1093; 23.1143(g); 23.1147(b); 23.1303; 23.1357; 23.1361 and 23.1385 as amended by Amendment 23-43. FAR 23.562(a), 23.562(b)2, 23.562(c)1, 23.562(c)2, 23.562(c)3, and 23.562(c)4 as amended by Amendment 23-44. FAR 23.33; 23.53; 23.305; 23.321; 23.485; 23.621; 23.655 and 23.731 as amended by Amendment 23-45.

FAR 36 dated December 1, 1969, as amended by Amendments 36-1 through 36-22.

Equivalent Level of Safety Items:

(1) Throttle Control	FAR § 23.1143(g); Refer to FAA letter dated 12/19/00
(3) (2) Mixture Control	FAR § 23.1147(b); Refer to FAA letter dated 12/19/00
(5) (3) Anti-collision Lights	FAR § 23.1401(d); Refer to FAA letter dated 02/20/01

Additions for the Garmin G1000 Integrated Cockpit System (ICS) Only:

14 CFR 23.303; 23.307; 23.601; 23.1163(a)(1)(2); 23.1367 and 23.1381 as amended by Amendment 23-N/C. 14 CFR 23.1589 as amended by Amendment 23-13. 14 CFR 23.771(a) as amended by Amendment 23-14. 14 CFR 23.607 and (Electrical System) 23.1309(a)(1)(2), (c) as amended by Amendment 23-17. 14 CFR 23.1301; 23.1327 and 23.1547(e) as amended by Amendment 23-20. 14 CFR 23.1501 and 23.1541(a)(1), (a)(2), (b)(1), (b)(2) as amended by Amendment 23-21. 14 CFR 23.603 and 23.605 as amended by Amendment 23-23. 14 CFR 23.1529 as amended by Amendment 23-26. 14 CFR 23.561(e); 23.1523; 23.1581(a)(2); 23.1583(a)(1), (a)(2), (b)(h) and 23.1585(a)(b)(d) as amended by Amendment 23-34. 14 CFR 23.301 as amended by Amendment 23-42. 14 CFR 23.1322; 23.1331 and 23.1357(a)(b)(c)(d) as amended by Amendment 23-43. 14 CFR 23.305; 23.773(a)(1), (a)(2); 23.1525 and 23.1549 as amended by Amendment 23-45. 14 CFR 23.1303(a)(b)(c)(f); 23.1309(a)(1)(i), (a)(1)(ii), (a)(2), (b)(1), (b)(2)(i), (b)(2)(ii), (b)(3), (b)(4)(i), (b)(4)(ii), (b)(4)(iii), (b)(4)(iv), (c)(1), (c)(2)(iii), (c)(3), (d), (e), (f)(1); 23.1311; 23.1321(a)(c)(d)(e); 23.1323(a), (b)(1), (b)(2), (c); 23.1329(g)(h); 23.1351(a)(1), (a)(2)(i), (b)(1)(iii), (b)(2)(3), (c)(4), (d)(1); 23.1353(a)(b)(c)(d)(e); 23.1359(c); 23.1361; 23.1365(a)(b)(d)(e)(f) and 23.1431(a)(b)(d)(e) as amended by Amendment 23-49. 14 CFR 23.1325(a), (b)(1), (b)(2)(i), (b)(3), (c)(d)(e); 23.1543(b)(c); 23.1545(a), (b)(1), (b)(2), (b)(3), (b)(4); 23.1553; 23.1555(a)(b); 23.1563(a) and 23.1567(a) as amended by Amendment 23-50. 14 CFR 23.777(a)(b); 23.955(a)(2); 23.1337(a)(1), (a)(2), (b)(1), (c) as amended by Amendment 23-51. 14 CFR 23.1305(a)(1), (a)(2), (a)(3), (b)(2), (b)(3)(i), (b)(4)(i), (b)(5), (b)(6)(i) as amended by Amendment 23-52. 14 CFR 23.901(a)(b) as amended by Amendment 23-53.

Additions for the Garmin GFC-700 Automatic Flight Control System (AFCS) Only:

14 CFR 23.1335 as amended by Amendment 23-20, 14 CFR 23.1309 (a)(3), (a)(4), (f)(2); 23.1329 (a)(c)(d)(e)(f); 23.1351 (a)(2)(ii); 23.1431 (c) as amended by Amendment 23-49.

Special Conditions as follows:

No. 23-146-SC, "Special Conditions: Cessna Aircraft Company; Cessna Model 182T/T182T Airplane; Installation of Electronic Flight Instrument System and the Protection of the System From High Intensity Radiated Fields (HIRF).

Production Basis (Model T182T)
Production Certificate No. 4 issued March 8, 2001. Applies to airplane serial numbers T18208001 and on. Cessna is authorized to issue airworthiness certificates under the delegation provisions of Delegation Option Authorization No. DOA-100129-CE in accordance with Part 21 of the Federal Aviation Regulations.

Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the airplane for certification.

NOTE 1: Weight and Balance:

Serial Nos. T18208001 and On (Model T182T)
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 30 lbs. at 48 inches aft of datum, and full oil of 16.2 lb. at 14.8 inches forward of datum.

NOTE 2: Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (AFM): part number T182TPHUS00 (or later approved revision) is applicable to Model T182T. The airplane must be operated according to the appropriate POH/AFM. Required placards are included in the AFM.

FAA Approved Airplane Flight Manual (AFM): Part Number T182TPHAUS-00 (or later FAA approved revisions) are applicable to the Model 182T equipped with Garmin G1000 Integrated Cockpit System. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

FAA Approved Airplane Flight Manual (AFM): Part Number T182TPHBUS-00 (or later FAA approved revisions) are applicable to the Model T182T equipped with Garmin G1000 Integrated Cockpit System and Garmin GFC-700 AFCS. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

NOTE 3: The CHT probe must be installed on Head #4.

NOTE 4: Special Ferry Flight Authorization. Flight Standards District Offices are authorized to issue Special overweight ferry flight authorizations. This airplane is structurally satisfactory for ferry flight if maintained within the following limits: (1) Takeoff weight must not exceed 130% of the maximum weight for Normal Category; and (2) The Never Exceed Airspeed (VNE) and Maximum Structural Cruising Speed (VC) must be reduced by 30%; and (3) Forward and aft center of gravity limits may not be exceeded; and (4) Structural load factors of +2.5 g. to -1.0 g. may not be exceeded. Requirements for any additional engine oil should be established in accordance with Advisory Circular AC23.1011-1. Increased stall speeds and reduced climb performance should be expected for the increased weights. Flight characteristics and performance at the increased weights have not been evaluated. Procedures for issuing a Flight Permit for operations of overweight aircraft may be found in Advisory Circular AC21-4B.

……END……

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

A7SO
Revision 17
Piper Aircraft, Inc
PA-34-200
PA-34-200T
PA-34-220T

August 7, 2006

TYPE CERTIFICATE DATA SHEET NO. A7SO

This data sheet which is a part of type certificate No. A7SO, prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder	Piper Aircraft, Inc. 2926 Piper Drive Vero Beach, Florida 32960
Type Certificate Holder Record	The New Piper Aircraft, Inc transferred TC A7SO to Piper Aircraft, Inc on August 7, 2006

I. - Model PA-34-200 (Seneca), 7 PCLM (Normal Category), Approved 7 May 1971.

Engines	S/N 34-E4, 34-7250001 through 34-7250214: 1 Lycoming LIO-360-C1E6 with fuel injector, Lycoming P/N LW-10409 or LW-12586 (right side); and 1 Lycoming IO-360-C1E6 with fuel injector, Lycoming P/N LW-10409 or LW 12586 (left side). S/N 34-7250215 through 34-7450220: 1 Lycoming LIO-360-C1E6 with fuel injector, Lycoming P/N LW-12586 (right side); and 1 Lycoming IO-360-C1E6 with fuel injector, Lycoming P/N LW-12586 (left side).
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (200 hp)
Propeller and Propeller Limits	Left Engine 1 Hartzell, Hub Model HC-C2YK-2 ( ) E, Blade Model C7666A-0; 1 Hartzell, Hub Model HC-C2YK-2 ( ) EU, Blade Model C7666A-0; 1 Hartzell, Hub Model HC-C2YK-2 ( ) EF, Blade Model FC7666A-0; 1 Hartzell, Hub Model HC-C2YK-2 ( ) EFU, Blade Model FC7666A-0; 1 Hartzell, Hub Model HC-C2YK-2CG (F), Blade Model (F) C7666A (This model includes the Hartzell damper); or 1 Hartzell, Hub Model HC-C2YK-2CGU (F), Blade Model (F) C7666A (This model includes the Hartzell damper). Note: HC-( )2YK-( ) may be substituted by HC-( )2YR-( ) per Hartzell Service Advisory 61.

Propeller and Propeller Limits (continued)

Right Engine
1 Hartzell, Hub Model HC-C2YK-2 ( ) LE, Blade Model JC7666A-0;
1 Hartzell, Hub Model HC-C2YK-2 ( ) LEU, Blade Model JC7666A-0;
1 Hartzell, Hub Model HC-C2YK-2 ( ) LEF, Blade Model FJC7666A-0;
1 Hartzell, Hub Model HC-C2YK-2 ( ) LEFU, Blade Model FJC7666A-0;
1 Hartzell, Hub Model HC-C2YK-2CLG (F), Blade Model (F) JC7666A
(This model includes the Hartzell damper); or
1 Hartzell, Hub Model HC-C2YK-2CLGU (F), Blade Model (F) JC7666A
(This model includes the Hartzell damper).

Note: HC-( )2YK-( ) may be substituted by HC-( )2YR-( ) per Hartzell Service Advisory 61.

Pitch setting: High 79° to 81°, Low 13.5° at 30" station.
Diameter: Not over 76", not under 74".
No further reduction permitted.

Spinner: Piper P/N 96388 Spinner Assembly and P/N 96836 Cap Assembly, or P/N 78359-0 Spinner Assembly and P/N 96836-2 Cap Assembly (See NOTE 4)

Governor Assembly:
1 Hartzell hydraulic governor, Model F-6-18AL (Right);
1 Hartzell hydraulic governor, Model F-6-18A (Left).

Avoid continuous operation between 2200 and 2400 r.p.m. unless aircraft is equipped with Hartzell propellers which incorporates Hartzell damper on both left and right engine as noted above.

Airspeed Limits

V_{NE} (Never exceed)	217 m.p.h.	(188 knots)
V_{NO} (Maximum structural cruise)	190 m.p.h	(165 knots)
V_A (Maneuvering, 4200 lb.)	146 m.p.h.	(127 knots)
V_A (Maneuvering, 4000 lb.)	146 m.p.h.	(127 knots)
V_A (Maneuvering, 2743 lb.)	133 m.p.h	(115 knots)
V_{FE} (Flaps extended)	125 m.p.h	(109 knots)
V_{LO} (Landing gear operating)		
Extension	150 m.p.h.	(130 knots)
Retract	125 m.p.h.	(109 knots)
V_{LE} (Landing gear extended)	150 m.p.h	(130 knots)
V_{MC} (Minimum control speed)	80 m.p.h.	(69 knots)

C.G. Range (Gear Extended)

S/N 34-E4, 34-7250001 through 34-7250214 (See NOTE 3):
(+86.4) to (+94.6) at 4000 lb.
(+82.0) to (+94.6) at 3400 lb.
(+80.7) to (+94.6) at 2780 lb.

S/N 34-7250215 through 34-7450220:
(+87.9) to (+94.6) at 4200 lb.
(+82.0) to (+94.6) at 3400 lb.
(+80.7) to (+94.6) at 2780 lb.
Straight line variation between points given.
Moment change due to gear retracting landing gear (-32 in.-lb.)

Empty Weight C.G. Range

None

Maximum Weight

S/N 34-E4, 34-7250001 through 34-7250214:
4000 lb.- Takeoff
4000 lb. - Landing
See NOTE 3.

Maximum Weight

S/N 34-7250215 through 34-7450220:
4200 lb. - Takeoff
4000 lb. - Landing

No. of Seats

7 (2 at +85.5, 3 at +118.1, 2 at +155.7)

Maximum Baggage

200 lb. (100 lb. at +22.5, 100 lb. at +178.7)

Fuel Capacity

98 gallons (2 wing tanks) at (+93.6) (93 gallons usable)
See NOTE 1 for data on system fuel.

Oil Capacity

8 qts. per engine (6 qts. per engine usable)
See NOTE 1 for data on system oil.

Control Surface Movements

Ailerons	(±2°)	Up	30°	Down	15°
Stabilator		Up	12.5° (+0, –1°)	Down	7.5° (±1°)
Rudder	(±1°)	Left	35°	Right	35°
Stabilator Trim Tab (Stabilator neutral)	(±1°)	Down	10.5°	Up	6.5°
Wing Flaps	(±2°)	Up	0°	Down	40°
Rudder Trim Tab (Rudder neutral)	(±1°)	Left	17°	Right	22°
Nose Wheel	S/N 34-E4, 34-7250001 through 34-7350353:				
Travel	(±1°)	Left	21°	Right	21°
Nose Wheel	S/N 34-7450001 through 34-7450220:				
Travel	(±1°)	Left	27°	Right	27°

Manufacturer's Serial Number

34-E4, 34-7250001 through 34-7450220 (See NOTE 7).

II. - Model PA-34-200T (Seneca II), 7 PCLM (Normal Category), Approved July 18, 1974.

Same as Model PA-34-200 series except engine installation, maximum gross weight, and other minor changes.

Engines

1 Teledyne Continental TSIO-360-E or TSIO-360-EB (left engine),
1 Teledyne Continental LTSIO-360-E or LTSIO-360-EB (right engine).

Fuel

100/130 minimum grade aviation gasoline

Engine Limits

For all operations, 2575 r.p.m. and 40" Hg.
Manifold pressure, 200 hp @ S.L. and 215 hp @ 12,000 ft.

Propeller and Propeller Limits

Left engine
1 Hartzell, Hub Model BHC-C2YF-2 ( )F (See NOTE 10)
or BHC-C2YF-2 ( )UF; Blade Model FC8459-8R or FC8459B-8R.

Right engine
1 Hartzell, Hub Model BHC-C2YF-2 ( )L ( )F (See NOTE 10)
or BHC-C2YF-2 ( )L ( )UF; Blade Model FJC8459-8R or FJC8459B-8R.

Pitch setting at 30" station:
Hub Serial Numbers prior to AN3943:
High 79.3° ± 2.0°, Low 14.4° ± 0.2° or High 80.0° to 81.5°, Low 14.4° ± 0.2°.
Hub Serial Numbers AN3943 and subsequent:
High 80.0° to 81.5°, Low 14.4° ± 0.2°.

Propeller and Propeller Limits (continued)

Diameter: Not over 76", not under 75".
No further reduction permitted.

Spinner: Piper P/N 37138-0 Spinner Assembly (left hand),
Piper P/N 37138-1 Spinner Assembly (right hand) (See NOTE 4).

Governor Assembly:
1 Woodward hydraulic governor, Model C210659 (left),
1 Woodward hydraulic governor, Model 210658 (right); or
1 Hartzell hydraulic governor, Model E-3 (left) and
1 Hartzell hydraulic governor, Model E-3L (right); or
1 Hartzell hydraulic governor, Model E-8L (right)
(E-8L Governor used with Synchrophaser).

Avoid continuous operation between 2000 and 2200 r.p.m. with engine manifold pressure above 32" Hg.

Avoid continuous ground operation in cross and tail winds over 10 knots between 1700 and 2100 r.p.m..

S/N 34-7970001 through 34-8170092:
Left Engine
1 McCauley, Hub Model 3AF34C502, Blade Model 80 HA-4
Right Engine
1 McCauley, Hub Model 3AF34C503, Blade Model L80 HA-4

Pitch setting: High 81.0° to 83.5°, Low 12.0° ± .2° at 30" station.
Diameter: Not over 76", not under 75".
No further reduction permitted.

Spinner: Piper P/N PS50077-49 Spinner Assembly See NOTE 4.

Governor Assembly:
1 Woodward hydraulic governor, Model C210659 (left),
1 Woodward hydraulic governor, Model 210658 (right);
1 Hartzell hydraulic governor, Model E-3 (left),
1 Hartzell hydraulic governor, Model E-3L (right); or
1 Hartzell hydraulic governor, Model E-8L (right)
(E-8L Governor used with Synchrophasers).

Synchrophaser for S/N 34-7970001 through 34-8170092:
Piper Drawing No. 36890 Synchrophaser Installation

Airspeed Limits

V_{NE} (Never exceed)	224 m.p.h.	(195 knots)
V_{NO} (Maximum structural cruise)	190 m.p.h.	(165 knots)
V_A (Maneuvering)	140 m.p.h.	(122 knots)
V_{FE} (Flaps extended)	125 m.p.h.	(109 knots)
V_{LO} (Landing gear operating)		
Extension	150 m.p.h.	(130 knots)
Retract	125 m.p.h.	(109 knots)
V_{LE} (Landing gear extended)	150 m.p.h.	(130 knots)
V_{MC} (Minimum control speed)	80 m.p.h.	(69 knots)

C.G. Range (Gear Extended)

(+90.6) to (+94.6) at 4570 lb.
(+82.0) to (+94.6) at 3400 lb.
Straight line variation between points given.
Moment change due to retracting landing gear (-32 in.-lb.).

Empty Weight C.G. Range

None

Maximum Weight	4570 lb. - Takeoff 4342 lb. - Landing (All weight in excess of 4000 lb. must be fuel) Zero fuel weight may be increased up to a maximum of 4077.7 lb. when approved wing options are installed. See NOTE 11 for optional weights.
No. of Seats	7 (2 at +85.5, 3 at +118.1, 2 at +155.7) 7 (2 at +85.5, 3 at +118.1, 2 at +157.6) 6 (2 at +85.5, *2 at +119.1, 2 at +157.6) * - Optional Club Seats
Maximum Baggage	200 lb. (100 lb. at +22.5, 100 lb. at +178)
Fuel Capacity	98 gallons (2 wing tanks) at (+93.6) (93 gallons usable) * 128 gallons (2 wing tanks) at (+93.6) (123 gallons usable) * - Optional for S/N 34-7570001, 34-7670114 through 34-8170092. See NOTE 1 for data on system fuel.
Oil Capacity	8 qts. per engine (5 qts. per engine usable) See NOTE 1 for data on system oil.
Maximum Operating Altitude	25,000 feet

Control Surface Movements						
	Ailerons	(±2°)	Up	35°	Down	20°
	Stabilator		Up	12.5° (+0°, –1°)	Down	7.5° (±1°)
	Rudder	(±1°)	Left	35°	Right	35°
	Stabilator Trim Tab (Stabilator neutral)	(±1°)	Down	10.5°	Up	6.5°
	Wing Flaps	(±2°)	Up	0°	Down	40°
	Rudder Trim Tab (Rudder neutral)	(±1°)	Left	25°	Right	25°
	Nose Wheel Travel	(±1°)	Left	27°	Right	27°

Manufacturer's Serial Number	34-7570001 through 34-8170092 (See NOTE 7).

IIIA. - Model PA-34-220T (Seneca III), 7 PCLM (Normal Category), Approved December 17, 1980.
Same as model PA-34-200T series except engines, windshield, instrument panel, landing gear, maximum gross weight and other minor changes.

Engines	1 Teledyne Continental TSIO-360-KB (left engine), 1 Teledyne Continental LTSIO-360-KB (right engine).
Fuel	100/100LL minimum grade aviation gasoline
Engine Limits	Takeoff, 5 minutes, 2800 r.p.m. and 40" Hg. manifold pressure (220 hp) Max. Continuous, 2600 r.p.m. and 40" Hg. manifold pressure (200 hp)
Propeller and Propeller Limits	Left Engine 1 Hartzell, Hub Model BHC-C2YF-2 ( ) UF, Blade Model FC8459-8R. Right Engine 1 Hartzell, Hub Model BHC-C2YF-2 ( )L ( )UF, Blade Model FJC8459-8R.

Propeller and Propeller Limits (cont'd)

Pitch setting: High 80.0° to 81.5°, Low 12.6° ± 0.2° at 30" station.
Diameter: Not over 76", not under 75".
No further reduction permitted.

Spinner: Piper P/N 37138-0 assembly (left hand),
Piper P/N 37138-1 assembly (right hand).
See NOTE 4.

Governor Assembly:
1 Hartzell hydraulic governor; Model E-3-7 (left),
1 Hartzell hydraulic governor; Model E-3-7L (right); or
1 Hartzell hydraulic governor; Model E-8-7L (14V) or E-8-8L (28V) (right)
with Synchrophaser Installation, Piper Drawing 36890 or 87719.

Avoid continuous ground operation in cross and tail winds of over 10 knots between 1700 and 2100 r.p.m.

Avoid continuous operation between 2000 and 2200 r.p.m. with manifold pressure above 32" Hg.

Left Engine
1 McCauley, Hub Model 3AF32C508, Blade Model 82NFA-6,
Right Engine
1 McCauley, Hub Model 3AF32C509, Blade Model L82NFA-6.

Pitch setting: High 81.0° to 83.5°, Low 11.0° ± 0.2° at 30" station.
Diameter: Not over 76", not under 75".
No further reduction permitted.

Spinner: Piper P/N PS50077-49 or P/N PS50077-78 Assembly
See NOTE 4.

Governor Assembly:
1 Hartzell hydraulic governor; Model E-3-7 (left),
1 Hartzell hydraulic governor; Model E-3-7L (right); or
1 Hartzell hydraulic governor; Model E-8-7L (14V) or E-8-8L (28V) (right) with Synchrophaser Installation, Piper Drawing No. 36890 or 87719.

Airspeed Limits (IAS)

V_{NE} (Never exceed)	205 knots
V_{NO} (Maximum structural cruise)	166 knots
V_A (Maneuvering) at 4750 lb.	140 knots
V_{FE} (Flaps extended)	115 knots
V_{LO} (Landing gear retracting)	108 knots
V_{LO} (Landing gear extending)	130 knots
V_{LE} (Landing gear extended)	130 knots
V_{MC} (Minimum control speed)	66 knots

C.G. Range (Gear Extended)

(+90.6) to (+94.6) at 4750 lb.
(+86.7) to (+94.6) at 4250 lb.
(+82.0) to (+94.6) at 3400 lb.
Straight line variation between points given.
Moment change due to retracting landing gear (-32 in.-lb.)

Empty Weight C.G. Range

None

Maximum Weight
4773 lb. - Ramp
4750 lb. - Takeoff
4513 lb. - Landing
4470 lb. - Zero Fuel
See NOTE 12 and 13 for optional weights.

No. of Seats
7 (2 at +85.5, 3 at +118.1, 2 at +157.6)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6)
* - Optional Club Seats

Maximum Baggage
200 lb. (100 lb. at +22.5, 100 lb. at +178.7)

Fuel Capacity
98 gallons (2 wing tanks) at (+93.6) (93 gallons usable)
* 128 gallons (2 wing tanks) at (+93.6) (123 gallons usable)
* - Optional installation
See NOTE 1 for data on system fuel.

Oil Capacity
8 qts. per engine (5 qts. per engine usable)
See NOTE 1 for data on system oil.

Maximum Operating Altitude 25,000 feet

Control Surface Movements

Ailerons	(±2°)	Up	35°	Down	20°
Stabilator		Up	12.5° (+0°, –1°)	Down	7.5° (±1°)
Rudder	(±1°)	Left	35°	Right	35°
Stabilator Trim Tab (Stabilator neutral)	(±1°)	Down	10.5°	Up	6.5°
Wing Flaps	(±2°)	Up	0°	Down	40°
Rudder Trim Tab (Rudder neutral)	(±1°)	Left	25°	Right	25°
Nose Wheel Travel	(±1°)	Left	27°	Right	27°

Manufacturer's Serial Number
34-8133001 through 34-8633031 (14V); 3433001 through 3433172 (14V); and 3448001 through 3448037 (28V) (See NOTE 7).

IIIB. - Model PA-34-220T (Seneca IV), 6 PCLM (Normal Category), Approved November 17, 1993.
Same as Model PA-34-220T (Seneca III) except nose bowl assembly, instrument panel, interior and other minor changes.

Engines
1 Teledyne Continental TSIO-360-KB (left engine),
1 Teledyne Continental LTSIO-360-KB (right engine).

Fuel
100/100LL minimum grade aviation gasoline

Engine Limits
Takeoff, 5 minutes, 2800 r.p.m. and 40" Hg. manifold pressure (220 hp)
Max. Continuous, 2600 r.p.m. and 40" Hg. manifold pressure (200 hp)

Propeller and Propeller Limits
Left Engine
1 Hartzell, Hub Model BHC-C2YF-2 ( ) UF, Blade Model FC8459-8R.
Right Engine
1 Hartzell, Hub Model BHC-C2YF-2 ( )L ( )UF, Blade Model FJC8459-8R.

Pitch setting: High 80.0° to 81.5°, Low 12.6° ± 0.2° at 30 " station.
Diameter: Not over 76", not under 75".
No further reduction permitted.

Propeller and Propeller Limits (cont'd)

Spinner: Piper P/N 37138-0 Assembly (left hand),
Piper P/N 37138-1 Assembly (right hand).
Governor Assembly:
1 Hartzell hydraulic governor; Model E-3-7 (left),
1 Hartzell hydraulic governor; Model E-3-7L (right); or
1 Hartzell hydraulic governor; Model E-8-8L (right) with Synchrophaser Installation, Piper Drawing No. 87719.

Avoid continuous ground operation in cross and tail winds between 1700 and 2100 r.p.m..
Avoid continuous operation between 2000 and 2200 r.p.m. with manifold pressure above 32" Hg.

Left Engine
1 McCauley, Hub Model 3AF32C508, Blade Model 82NFA-6.
Right Engine
1 McCauley, Hub Model 3AF32C509, Blade Model L82NFA-6.

Pitch setting: High 81.0° to 83.5°, Low 11.0° ± 0.2° at 30" station.
Diameter: Not over 76", not under 75".
No further reduction permitted.

Spinner: Piper P/N PS50077-78 Assembly

Governor Assembly:
1 Hartzell hydraulic governor; Model E-3-7 (left),
1 Hartzell hydraulic governor; Model E-3-7L (right); or
1 Hartzell hydraulic governor; Model E-8-8L (right) with Synchrophaser Installation, Piper Drawing No. 87719.

Airspeed Limits (IAS)

V_{NE} (Never exceed)	205 knots
V_{NO} (Maximum structural cruise)	166 knots
V_A (Maneuvering) at 4750 lb.	140 knots
V_{FE} (Flaps extended)	115 knots
V_{LO} (Landing gear retracting)	108 knots
V_{LO} (Landing gear extending)	130 knots
V_{LE} (Landing gear extended)	130 knots
V_{MC} (Minimum control speed)	66 knots

C.G. Range (Gear Extended)

(+90.6) to (+94.6) at 4750 lb.
(+86.7) to (+94.6) at 4250 lb.
(+82.0) to (+94.6) at 3400 lb.
Straight line variation between points given.
Moment change due to retracting landing gear (-32 in.-lb.)

Empty Weight C.G. Range

None

Maximum Weight

4773 lb. - Ramp
4750 lb. - Takeoff
4513 lb. - Landing
4470 lb. - Zero Fuel
See NOTE 14 and 15 for optional weights.

No. of Seats

6 (2 at +85.5, 2 at +119.1, 2 at +157.6)

Maximum Baggage

200 lb. (100 lb. at +22.5, 100 lb. at +178.7)

Fuel Capacity

128 gallons (2 wing tanks) at (+93.6) (123 gallons usable)
See NOTE 1 for data on system fuel.

Oil Capacity: 8 qts. per engine (5 qts. per engine usable)
See NOTE 1 for data on system oil.

Maximum Operating Altitude: 25,000 feet

Control Surface Movements

Ailerons	(±2°)	Up	35°	Down	20°
Stabilator		Up	12.5° (+0°, –1°)	Down	7.5° (±1°)
Rudder	(±1°)	Left	35°	Right	35°
Stabilator Trim Tab (Stabilator neutral)	(±1°)	Down	10.5°	Up	6.5°
Wing Flaps	(±2°)	Up	0°	Down	40°
Rudder Trim Tab (Rudder neutral)	(±1°)	Left	25°	Right	25°
Nose Wheel Travel	(±1°)	Left	27°	Right	27°

Manufacturer's Serial Number: 3448038 through 3448079, and 3447001 through 3447029.

IIIC. - Model PA-34-220T (Seneca V), 6 PCLM (Normal Category), Approved December 11, 1996.
Same as Model PA-34-220T (Seneca IV) except engine installation, instrument panel, interior and other minor changes.

Engines: 1 Teledyne Continental TSIO-360-RB (left engine),
1 Teledyne Continental LTSIO-360-RB (right engine).

Fuel: 100/100LL minimum grade aviation gasoline

Engine Limits: Takeoff and Maximum Continuous Operation, 2600 r.p.m. and 38" Hg. manifold pressure (220 hp)

Propeller and Propeller Limits

Left Engine
1 Hartzell, Hub Model BHC-J2YF-2CUF, Blade Model FC8459(B)-8R.
Right Engine
1 Hartzell, Hub Model BHC-J2YF-2CLUF, Blade Model FJC8459(B)-8R.

Pitch setting: High 80.0° to 81.5°, Low 14.6° ± 0.2° at 30" station.
Diameter: Not over 76", not under 75".
No further reduction permitted.

Spinner: Piper P/N 37138-6 Assembly (left hand),
Piper P/N 37138-7 Assembly (right hand).

Governor Assembly:
1 Hartzell hydraulic governor; Model E-3-9 (left),
1 Hartzell hydraulic governor; Model E-3-9L (right); or
1 Hartzell hydraulic governor; Model E-8-9L (right) with Synchrophaser Installation.

Avoid continuous ground operation in cross and tail winds between 1600 and 2100 r.p.m..

Avoid continuous operation between 1900 and 2100 r.p.m. with manifold pressure above 32" Hg.

Propeller and Propeller Limits (continued)

Left Engine
1 McCauley, Hub Model 3AF32C522, Blade Model 82NJA-6.
Right Engine
1 McCauley, Hub Model 3AF32C523, Blade Model L82NJA-6.

Pitch setting: Feather 82.1° ± 0.5°, Low 12.6° ± 0.2° at 30" station.
Diameter: Not over 76", not under 75".
No further reduction permitted.

Spinner: Piper P/N 100738-2 Assembly

Governor Assembly:
1 Hartzell hydraulic governor; Model E-3-9 (left),
1 Hartzell hydraulic governor; Model E-3-9L (right); or
1 Hartzell hydraulic governor; Model E-8-9L (right) with Synchrophaser Installation.

Airspeed Limits (IAS)

V_{NE} (Never exceed)	204 knots
V_{NO} (Maximum structural cruise)	164 knots
V_A (Maneuvering) at 4750 lb.	139 knots
V_{FE} (Flaps extended)	113 knots
V_{LO} (Landing gear retracting)	107 knots
V_{LO} (Landing gear extending)	128 knots
V_{LE} (Landing gear extended)	128 knots
V_{MC} (Minimum control speed)	66 knots

C.G. Range (Gear Extended)

(+90.6) to (+94.6) at 4750 lb.
(+86.7) to (+94.6) at 4250 lb.
(+82.0) to (+94.6) at 3400 lb.
Straight line variation between points given.
Moment change due to retracting landing gear (-32 in.-lb.)

Empty Weight C.G. Range

None

Maximum Weight

4773 lb. - Ramp
4750 lb. - Takeoff
4513 lb. - Landing
4479 lb. - Zero Fuel
See NOTE 16 for optional weights.

No. of Seats

6 (2 at +85.5, 2 at +119.1, 2 at +157.6)

Maximum Baggage

185 lb. (100 lb. at +22.5, 85 lb. at + 178.7) (S/N 3449001 through 3449310 and 3449312 through 3449322)
200 lb. (100 lb. at +22.5, 100 lb. at + 178.7) (S/N 3449311 and 3449323 and up)

Fuel Capacity

128 gallons (2 wing tanks) at (+93.6) (122 gallons usable)
See NOTE 1 for data on system fuel.

Oil Capacity

8 qts. per engine (5 qts. per engine usable)
See NOTE 1 for data on system oil.

Maximum Operating Altitude 25,000 feet

Control Surface Movements	Ailerons	(±2°)	Up	35°	Down	20°
	Stabilator		Up	12.5° (+0°, −1°)	Down	7.5° (±1°)
	Rudder	(±1°)	Left	35°	Right	35°
	Stabilator Trim Tab (Stabilator neutral)	(±1°)	Down	10.5°	Up	6.5°
	Wing Flaps		Up	0° (±1°)	Down	40° (±2°)
	Rudder Trim Tab (Rudder neutral)	(±1°)	Left	26°	Right	26°
	Nose Wheel Travel (Maximum)		Left	27°	Right	27°

Manufacturer's Serial Number 3449001 and up.

DATA PERTINENT TO ALL MODELS

Datum 78.4" forward of wing leading edge from the inboard edge of the inboard fuel tank.

Leveling Means Two screws left side fuselage below window.

Certification Basis Type Certificate No. A7SO issued May 7, 1971, obtained by the manufacturer under the delegation option authorization.
Date of Type Certificate application July 23, 1968.

Model PA-34-200 (Seneca I):
FAR 23 as amended by Amendment 23-6 effective August 1, 1967; FAR 23.959 as amended by Amendment 23-7 effective September 14, 1969; and FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977. Compliance with FAR 23.1419 as amended by Amendment 23-14 effective December 20, 1973, has been established with optional ice protection provisions.

Model PA-34-200T (Seneca II):
FAR 23 as amended by Amendment 23-6 effective August 1, 1967; FAR 23.901, 23.909, 23.959, 23.1041, 23.1043, 23.1047, 23.1143, 23.1305(b)(c)(h)(p) and 23.1527(b) as amended by Amendment 23-7 effective September 14, 1969; and FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977.

Model PA-34-220T (Seneca III and IV):
FAR 23 as amended by Amendment 23-6 effective August 1, 1967; FAR 23.207, 23.901, 23.909, 23.959, 23.1041, 23.1043, 23.1047, 23.1143, 23.1305(b)(c)(h)(p) and 23.1527 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.201 and 23.203 as amended by Amendment 23-14 effective December 20, 1973; FAR 23.1557(c)(1) as amended by Amendment 23-18 effective May 2, 1977; FAR 23.175(a) and 23.1581(b)(2) as amended by Amendment 23-21 effective March 1, 1978; FAR 23.1545(a) as amended by Amendment 23-23 effective December 1, 1978; and FAR 36 through Amendment 36-9 effective January 15, 1979.

Certification Basis (continued)

Model PA-34-220T (Seneca V):
FAR 23 as amended by Amendment 23-6 effective August 1, 1967; FAR 23.901, 23.909, 23.1041, 23.1043, 23.1047, 23.1143, 23.1305(b)(c)(h)(p) and 23.1527 as amended by Amendment 23-7 effective September 14, 1969; FAR 23.959 as amended by Amendment 23-18 effective May 2, 1977; FAR 23.175(a), 23.201, 23.203, 23.1557(c)(1) and 23.1581 as amended by Amendment 23-21 effective March 1, 1978; FAR 23.1545(a) as amended by Amendment 23-23 effective December 1, 1978; FAR 23.1529 as amended by Amendment 23-26 effective October 14, 1980: FAR 23.1322 as amended by Amendment 23-43 effective May 10, 1993; FAR 23.207 as amended by Amendment 23-45 effective September 7, 1993; Removal of FAR 23.205 per Amendment 23-50 effective March 11, 1996; FAR 23.1305(b)(4)(ii) as amended by Amendment 23-52 effective July 25, 1996; and FAR 36, Appendix G through Amendment 36-16 effective December 18, 1988.

Compliance with the requirements of FAR 23.1419 as amended by Amendment 23-14 effective December 20, 1973, and FAR 23.1441 as amended by Amendment 23-9 effective June 17, 1970, has been established with optional ice protection provisions and optional supplemental oxygen equipment, respectively.

For aircraft equipped with Piper factory installed Avidyne Entegra Systems, the additional certification basis for installation specific items only is: FAR 23.395(a)(b)(c), 23.683(a)(1)(2)(3)(b)(1) and 23.867(b)(1)(2) as amended by Amendment 23-7 effective September 14, 1969; FAR 23.771(a) as amended by Amendment 23-14 effective December 20, 1973; FAR 23.1301 and 23.1327 as amended by Amendment 23-20 effective September 1, 1977; FAR 23.1501 and 23.1541(a)(1)(2)(b)(1)(2) as amended by Amendment 23-21 effective March 1, 1978; FAR 23.603 and 23.605(a) as amended by Amendment 23-23 effective October 10, 1978; FAR 23.1523 as amended by Amendment 23-34 effective February 17, 1987; FAR 23.1322, 23.1331 and 23.1357(a)(2)(b)(c)(d) as amended by Amendment 23-43 effective May 10, 1993; FAR 23.305, 23.397(a)(b), 23.613, 23.773(a)(1)(2), 23.1525 and 23.1549(a)(b)(c)(d) as amended by Amendment 23-45 effective September 7, 1993; FAR 23.301, 23.337(a)(1)(b)(1), 23.341(a), 23.473, 23.561(b)(3)(e), 23.607 and 23.611 as amended by Amendment 23-48 effective March 11, 1996; FAR 23.1303(a)(b)(f), 23.1309(a)(1)(3)(b)(c)(1)(2)(i)(iii)(3)(d)(e), 23.1311(a)(2)(3)(4)(5)(6)(7)(b)(c), 23.1321(a)(b)(c)(d)(e), 23.1323(a)(c), 23.1329(d)(e)(f)(g)(h), 23.1351(a)(1)(2)(i)(b)(1)(i)(2)(3)(d), 23.1353(d)(h), 23.1359(c), 23.1361(a)(b)(1)(2)(3), 23.1365(a)(b)(d)(e)(f) and 23.1431(a)(b)(d)(e) as amended by Amendment 23-49 effective March 11, 1996; FAR 23.1325(a)(b)(1)(2)(ii), 23.1543(b)(c), 23.1545(a)(b)(1)(2)(3)(4)(5)(6)(c), 23.1555(a)(b)(c)(d), 23.1563(a)(b), 23.1581(a)(b)(2)(3)(f), 23.1583(m) and 23.1585(j) as amended by Amendment 23-50 effective March 11, 1996; FAR 23.777(a)(b), 23.955(a)(3) and 23.1337 as amended by Amendment 23-51 effective March 11, 1996; 23.1305(a)(b) as amended by Amendment 23-52 effective July 25, 1996; and Special Condition for HIRF (Docket No. CE235, Special Condition 23-175-SC), date December 1, 2005 . Eligible Serial Numbers 3449311 and 3449323 and up.

Production Basis

Production Certificate No. 206.
Production Limitation Record issued and the manufacturer is authorized to issue an airworthiness certificate under the delegation option provisions of FAR 21.

Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. In addition, the following items of equipment are required:

MODEL	***AFM/POH***	***REPORT NO.***	***APPROVED***	***SERIAL EFFECTIVITY***
PA-34-200 (Seneca)	AFM	VB-353	7/2/71	34-E4, 34-7250001 through 34-7250214
	AFM	VB-423	5/20/72	34-7250001 through 34-7250189 when Piper Kit 760-607 is installed; 34-7250190 through 34-7250214 when Piper Kit 760-611 is installed; and 34-7250215 through 34-7350353
	AFM	VB-563	5/14/73	34-7450001 through 34-7450220
	AFM Supp.	VB-588	7/20/73	34-7250001 through 34-7450039 when propeller with dampers are installed
	AFM Supp.	VB-601	11/9/73	34-7250001 through 34-745017 when ice protection system is installed
PA-34-200T (Seneca II)	AFM	VB-628	7/18/74	34-7570001 through 34-7670371
	POH	VB-850	8/23/76	34-7770001 through 34-8170092
	POH	VB-1140	6/30/80	34-7770001 through 34-8170092 when Piper Kit 764-048V is installed
	AFM	VB-1245	3/9/84	34-7570001 through 34-7670371 when Piper Kit 765-110 is installed

MODEL	***AFM/POH***	***REPORT NO.***	***APPROVED***	***SERIAL EFFECTIVITY***
PA-34-220T (Seneca III)	POH	VB-1110	1/8/81	34-8133001 through 34-8633031, and 3433001 through 3433172
	POH	VB-1150	2/20/81	34-8133001 through 34-8633031, and 3433001 through 3433172 when Piper Kit 764-099V is installed
	POH	VB-1257	10/20/89	3448001 through 3448037
	POH	VB-1259	11/20/89	3448001 through 3448037 when Piper Kit 766-203 is installed
PA-34-220T (Seneca IV)	POH	VB-1556	11/5/93	3448038 through 3448079
	POH	VB-1558	12/6/93	3448038 through 3448079 when Piper Kit 766-283 is installed
	POH	VB-1615	7/12/95	3447001 through 3447029
	POH	VB-1620	7/12/95	3447001 through 3447029 when Piper Kit 766-608 is installed
PA-34-220T (Seneca V)	POH	VB-1638	12/6/96	3449001 and up
	POH	VB-1649	1/23/97	3449001 and up when Piper Kit 766-632 is installed
	POH	VB-1930	10/25/05	3449311 and 3449323 and up when Avidyne Entegra System is installed.

NOTE 1 Current Weight and Balance Report, including list of equipment included in certificated empty weight, and loading instructions when necessary, must be provided for each aircraft at the time of original certification.

The certificated empty weight and corresponding center of gravity locations must include undrainable system oil (not included in oil capacity) and unusable fuel as noted below:

Fuel: 30.0 lb. at (+103.0) for PA-34 series, except Model PA-34-220T (Seneca V), S/N 3449001 and up
Fuel: 36.0 lb. at (+103.0) for Model PA-34-220T (Seneca V), S/N 3449001 and up
Oil: 6.2 lb. at (+ 39.6) for Model PA-34-200
Oil: 12.0 lb. at (+ 43.7) for Models PA-34-200T and PA-34-220T

NOTE 2 All placards required in the approved Airplane Flight Manual or Pilot's Operating Handbook and approved Airplane Flight Manual of Pilot's Operating Handbook supplements must be installed in the appropriate location.

NOTE 3 The Model PA-34-200; S/N 34-E4, 34-7250001 through 34-7250189, may be operated at a maximum takeoff weight of 4200 lb. when Piper Kit 760-607 is installed. S/N 34-7250190 through 34-7250214 may be operated at a maximum takeoff weight of 4200 lb. when Piper Kit 760-611 is installed.

NOTE 4 The Model PA-34-200; S/N 34-E4, 34-7250001 through 34-7250189, may be operated without spinner domes or without spinner domes and rear bulkheads when Piper Kit 760-607 has been installed. S/N 34-7250190 through 34-7250214 may be operated without spinner domes or without spinner domes and rear bulkhead when Piper Kit 760-611 has been installed. The Model PA-34-200; S/N 34-7250215 through 34-7450220, and the Model PA-34-200T; S/N 34-7570001 through 34-8170092, may be operated without spinner domes or without spinner domes and rear bulkheads.

The Model PA-34-200T; S/N 34-7970001 through 34-8170092, equipped with McCauley three-bladed propellers, may be operated with spinner dome and rear bulkhead removed. The Model PA-34-220T; S/N 34-8133001 through 34-8633031, 3433001 through 3433172, and 3448001 through 3448037, with two-bladed Hartzell propellers may be operated without spinner domes or without spinner domes and rear bulkheads. With three-bladed McCauley propellers, this model may be operated without spinner dome and rear bulkhead.

NOTE 5

The Model PA-34-200 may be operated in known icing conditions when equipped with spinner assembly and the following kits:
(a) S/N 34-E4, 34-7250001 through 34-7250189: Piper Kit 760-781V and Piper Kit 760-607 (See NOTE 3).
(b) S/N 34-7250190 through 34-7250214: Piper Kit 760-781V and Piper Kit 760-611 (See NOTE 3).
(c) S/N 34-7250215 through 34-7450220: Piper Kit 760-781V.

NOTE 6

Model PA-34-200T; S/N 34-7570001 through 34-8170092, may be operated in known icing conditions when equipped with deicing equipment installed per Piper Drawing No. 37700 and spinner assembly.

NOTE 7

The following serial numbers are not eligible for import certification to the U.S.:
PA-34-200:
34-7350283, 34-7350299, 34-7350300, and 34-7450187.

PA-34-200T:
34-7570074, 34-7570136, 34-7570193, 34-7570292, 34-7670045, 34-7670071, 34-7670072, 34-7670168, 34-7670261, 34-7670312, 34-7770037, 34-7770137, 34-7770206, 34-7770288, 34-7770316, 34-7770357, 34-7770367, 34-7770368, 34-7770406, 34-7870069, 34-7870098, 34-7870133, 34-7870157, 34-7870171, 34-7870172, 34-7870173, 34-7870174, 34-7870212, 34-7870213, 34-7870214, 34-7870215, 34-7870216, 34-7870217, 34-7870252, 34-7870257, 34-7870258, 34-7870313, 34-7870314, 34-7870367, 34-7870368, 34-7870369, 34-7870410, 34-7870411, 34-7870443, 34-7870444, 34-7870445, 34-7870446, 34-7870473, 34-7870474, 34-7970021, 34-7970051, 34-7970052, 34-7970087, 34-7970088, 34-7970131, 34-7970132, 34-7970133, 34-7970205, 34-7970206, 34-7970207, 34-7970374, 34-7970375, 34-7970376, 34-7970472, 34-7970473, 34-7970474, 34-7970475, 34-7970512, 34-7970513, 34-7970514, 34-8070045, 34-8070096, 34-8070097, 34-8070098, 34-8070099, 34-8070132, 34-8070202, 34-8070203, 34-8070204, 34-8070205, 34-8070276, 34-8070277, 34-8070278, 34-8070279, 34-8070280, 34-8070298, 34-8070299, 34-8070300, 34-8070301, 34-8170012, 34-8170013, 34-8170014, and 34-8170015.

PA-34-220T:
34-8133039, 34-8133083, 34-8133125, 34-8133126, 34-8133127, 34-8133128, 34-8133129, 34-8133169, 34-8133208, 34-8133209, 34-8133210, 34-8133211, 34-8133212, 34-8133240, 34-8133241, 34-8133242, 34-8133243, 34-8133244, 34-8133261, 34-8133262, 34-8133263, 34-8133264, 34-8233129, 34-8233130, 34-8233131, 34-8233132, 34-8233158, 34-8233159, 34-8233160, 34-8233161, 34-8233196, 34-8233197, 34-8233198, 34-8233199, 34-8333014, 34-8333015, 34-8333016, 34-8333017, 34-8333034, 34-8333035, 34-8333036, 34-8333037, 34-8333081, 34-8333082, 34-8333083, 34-8333084, 34-8333121, 34-8333122, 34-8333123, 34-8333124, 34-8433010, 34-8433011, 34-8433012, 34-8433013, 34-8433042, 34-8433043, 34-8433044, 34-8433045, 34-8433084, 34-8433088, 34-8533014, 34-8533015, 34-8533016, 34-8533017, 34-8633018, 3433013, 3433014, 3433015, 3433026 through 3433036, 3433039, 3433040, 3433045 through 3433088, 3433092 through 3433101, 3433103 through 3433110, 3433116 through 3433119, 3433124 through 3433127, 3433134, 3433135, 3433141 through 3433150, and 3433162 through 3433167.

NOTE 8 Model PA-34-200; S/N 34-E4, S/N 34-7250001 through 34-7450220, and Model PA-34-200T; S/N 34-7570001 through 34-8170092, and Model PA-34-220T may be operated subject to the limitations listed in the Airplane Flight Manual or Pilot's Operating Handbook with rear cabin and cargo door removed.

NOTE 9 In the following serial numbered aircraft, rear seat location is farther aft as shown and the center seats may be removed and replaced by CLUB SEAT INSTALLATION, which has a more aft C.G. location as shown in "No. of Seats," above:

PA-34-200T: S/N 34-7770001 through 34-8170092.

NOTE 10 These propellers are eligible on Teledyne Continental L/TSIO-360-E only.

NOTE 11 With Piper Kit 764-048V installed weights are as follows:
4407 lb. - Takeoff
4342 lb. - Landing (All weight in excess of 4000 lb. must be fuel)
Zero fuel weight may be increased to a maximum of 4077.7 lb. when approved wing options are installed (See POH VB-1140).

NOTE 12 With Piper Kit 764-099V installed, weights are as follows:
4430 lb. - Ramp
4407 lb. - Takeoff, Landing, and Zero Fuel (See POH VB-1150).

NOTE 13 With Piper Kit 766-203 installed, weights are as follows:
4430 lb. - Ramp
4407 lb. - Takeoff, Landing and Zero Fuel (See POH VB-1259).

NOTE 14 With Piper Kit 766-283 installed, weights are as follows:
4430 lb. - Ramp
4407 lb. - Takeoff, Landing and Zero Fuel (See POH VB-1558).

NOTE 15 With Piper Kit 766-608 installed, weights are as follows:
4430 lb. - Ramp
4407 lb. - Takeoff, Landing and Zero Fuel (See POH VB-1620).

NOTE 16 With Piper Kit 766-632 installed, weights are as follows:
4430 lb. - Ramp
4407 lb. - Takeoff, Landing and Zero Fuel (See POH VB-1649).

NOTE 17 The bolt and stack-up that connect the upper drag link to the nose gear trunnion are required to be replaced every 500 hours time-in-service. The part numbers are as follows:
1. Piper P/N 400 274 (AN7-35) bolt or Piper P/N 693 215 (NAS6207-50D) bolt;
2. Piper P/N 407 591 (AN960-716L) washer, as applicable;
3. Piper P/N 407 568 (AN 960-716) washer, as applicable;
4. Piper P/N 404 396 (AN 320-7) nut; and
5. Piper P/N 424 085 cotter pin.

---END---

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

A11EA
Revision 10

Tiger Aircraft LLC
(American General)
AA-1
AA-1A
AA-1B
AA-1C

May 12, 2000

TYPE CERTIFICATE DATA SHEET NO. A11EA

This data sheet, which is a part of Type Certificate No. A11EA, prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Tiger Aircraft LLC
226 Pilot Way
Martinsburg, West Virginia 25401

I. - Model AA-1, Yankee, 2 PCLM, Utility Category, Approved August 29, 1967, Normal Category Approved July 16, 1968.

Engine — Lycoming O-235-C2C (Carburetor Setting 10-4953 or 10-3103-1)

Fuel — 80/87 minimum grade aviation gasoline

Engine limits — For all operations 2600 r.p.m. (108 h.p.)

Propeller and propeller limits

1. McCauley Model 1A105/SCM-7157 fixed pitch propeller. Static r.p.m. at maximum permissible throttle setting; not over 2300; not under 2150. Diameters: not over 71 inches, not under 69.5 inches.

2. McCauley Model 1A105/SCM-7153 and 1A105/SCM-7154 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2400; not under 2250. Diameter: not over 71 inches, not under 69.5 inches.

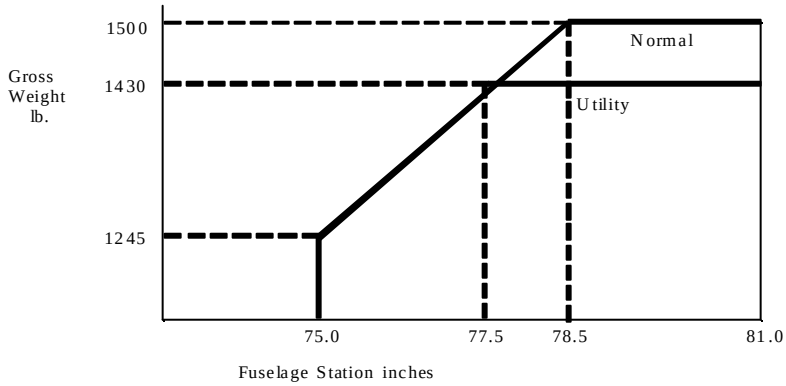
3. McCauley Model 1A106/NCM-7157 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2400; not under 2300. Diameter: not over 71 inches, not under 69.5 inches.

4. McCauley Model 1A106/NCM-7153 hub and fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2475; not under 2375. Diameter: not over 71 inches, not under 69.5 inches.

Airspeed limits (CAS)

V_{ne}	Never exceed	195 m.p.h. (169 knots)
V_{no}	Maximum structural cruising	144 m.p.h. (125 knots)
V_a	Maneuvering (Utility Category)	132 m.p.h. (115 knots)
V_a	Maneuvering (Normal Category)	125 m.p.h. (109 knots)
V_{fe}	Flaps extended	100 m.p.h. (87 knots)
	Canopy half open	130 m.p.h. (113 knots)

Center of gravity (C.G) range
(+78.5) to (+81.0) at 1500 lb.
(+77.5) to (+81.0) at 1430 lb.
(+75.0) to (+81.0) at 1245 lb.
Straight line variation between points given.



Empty weight C.G. range
None

Maximum weight
1430 lb. (Utility Category)
1500 lb. (Normal Category)

Number of seats
2 at (+92.5) (For optional child's seat refer to Equipment List.)

Maximum baggage
100 lb. at (+120)

Fuel capacity
24 gal. (2 wing tanks) at (+84.5) (See Note 1 for unusable fuel)

Oil capacity
6 qt. at (+39) (2 qt. minimum)

Control surface movements

Elevator	25° ± 2°	up	15° ± 2°	down
Rudder		25° ± 2°	left	25° ± 2° right
Ailerons	25° ± 2°	up	20° ± 2°	down
Flaps			30° ± 2°	down
Elevator tab trim	21.5° ± 2°	up	11° ± 2°	down

Serial numbers eligible
AA1-0001 and up (Normal and Utility Category)

II - Model AA-1A, Trainer, 2 PCLM, Utility Category, Approved January 14, 1971, Normal Category Approved January 14, 1971.

Engine
Lycoming O-235-C2C (Carburetor Setting 10-4953 or 10-3103-1)

Fuel
80/87 minimum grade aviation gasoline

Engine limits
For all operations 2600 r.p.m. (108 h.p.)

Propeller and propeller limits

1. McCauley Model 1A105/SCM-7157 fixed pitch propeller. Static r.p.m. at maximum permissible throttle setting; not over 2300; not under 215C. Diameter: not over 71 inches, not under 69.5 inches.

2. McCauley Model 1A105/SCM-7153 and 1A105/SCM-7154 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2400; not under 2250. Diameter: not over 71 inches, not under 69.5 inches.

3. McCauley Model 1A106/NCM-7157 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2400; not under 2300. Diameter: not over 71 inches, not under 69.5 inches.

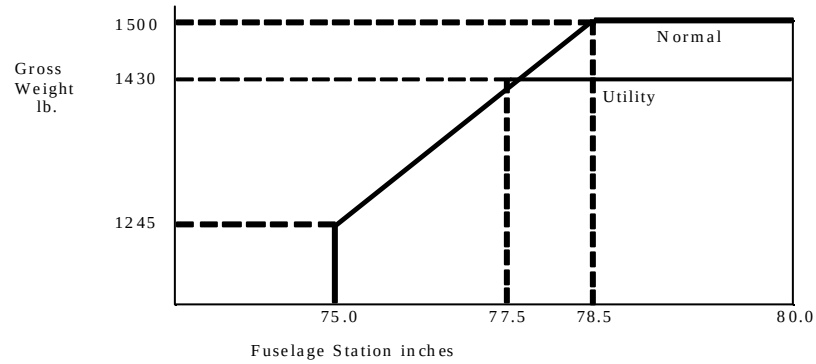
4. McCauley Model 1A106/NCM-7153 hub and fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2475; not under 2375. Diameter: not over 71 inches, not under 69.5 inches.

Airspeed limits (CAS)

V_{ne}	Never exceed	195 m.p.h. (169 knots)
V_{no}	Maximum structural cruising	144 m.p.h. (125 knots)
V_a	Maneuvering (Utility Category)	127 m.p.h. (110 knots)
V_a	Maneuvering (Normal Category)	120 m.p.h. (104 knots)
V_{fe}	Flaps extended	115 m.p.h. (100 knots)
	Canopy half open	130 m.p.h. (113 knots)

Center of gravity (C.G) range

(+78.5) to (+80.0) at 1500 lb.
(+77.5) to (+80.0) at 1430 lb.
(+75.0) to (+80.0) at 1245 lb.
Straight line variation between points given.



Empty weight C.G. range

None

Maximum weight

1430 lb. (Utility Category)
1500 lb. (Normal Category)

Number of seats

2 at (+92.5) (For optional child's seat refer to Equipment List.)

Maximum baggage

100 lb. at (+120)

Fuel capacity

24 gal. (2 wing tanks) at (+84.5) (See Note 1 for unusable fuel)

Oil capacity

6 qt. at (+39) (2 qt. minimum)

Control surface movements

Elevator	25° ± 2°	up	15° ± 2°	down	
Rudder		25° ± 2°	left	25° ± 2°	right
Ailerons	25° ± 2°	up	20° ± 2°	down	
Flaps			30° ± 2°	down	
Elevator tab trim	14.5° ± 2°	up	18° ± 2°	down	

Serial numbers eligible

AA1A-0001 and up (Normal and Utility Category)

III - Model AA-1B, Trainer/TR-2, 2 PCLM, Utility Category, Approved June 30, 1972

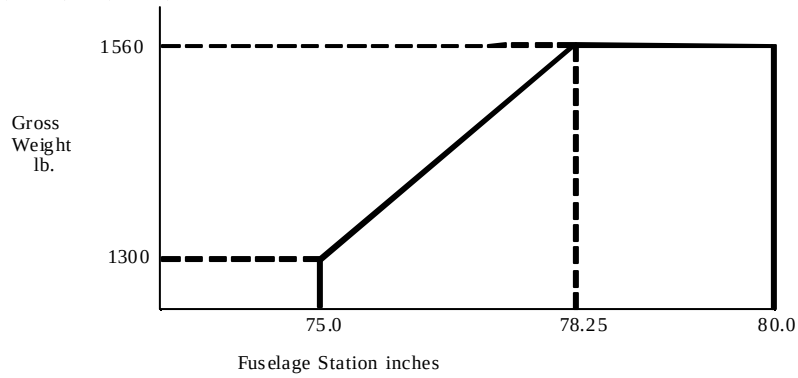
Engine	Lycoming O-235-C2C (Carburetor Setting 10-4953 or 10-3103-1)
Fuel	80/87 minimum grade aviation gasoline
Engine limits	For all operations 2600 r.p.m. (108 h.p.)
Propeller and propeller limits	1. McCauley Model 1A105 with 1A105/SCM hub and 7157 blades. Static r.p.m. at maximum permissible throttle setting; not over 2300; not under 2150. Diameter: not over 71 inches, not under 69.5 inches. 2. McCauley Model 1A105/SCM-7153 and 1A105/SCM-7154 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2400; not under 2250. Diameter: not over 71 inches, not under 69.5 inches. 3. McCauley Model 1A106/NCM-7153 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2400; not under 2300. Diameter: not over 71 inches, not under 69.5 inches. 4. McCauley Model 1A106/NCM-7157 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2475; not under 2375. Diameter: not over 71 inches, not under 69.5 inches.

Airspeed limits (CAS)

V_{ne}	Never exceed	195 m.p.h. (169 knots)
V_{no}	Maximum structural cruising	144 m.p.h. (125 knots)
V_a	Maneuvering	135 m.p.h. (117 knots)
V_{fe}	Flaps extended	115 m.p.h. (100 knots)
	Canopy half open	130 m.p.h. (113 knots)

Center of gravity (C.G) range

(+78.25) to (+80.0) at 1560 lb.
(+75.0) to (+80.0) at 1300 lb.



Empty weight C.G. range	None
Maximum weight	1560 lb.
Number of seats	2 at (+92.5) (For optional child's seat refer to Equipment List.)
Maximum baggage	100 lb. at (+120)
Fuel capacity	24 gal. (2 wing tanks) at (+84.5) (See Note 1 for unusable fuel)

Oil capacity	6 qt. at (+39) (2 qt. minimum)					
Control surface movements	Elevator	25° ± 2°	up	15° ± 2°	down	
	Rudder		25° ± 2°	left	25° ± 2°	right
	Ailerons	25° ± 2°	up	20° ± 2°	down	
	Flaps			30° ± 2°	down	
	Elevator tab trim	14.5° ± 2°	up	18° ± 2°	down	
Serial numbers eligible	AA1B-0001 and up (Utility Category)					

IV - Model AA-1C, T-Cat/Lynx, 2 PCLM, Utility Category, Approved December 21, 1976. (Same as AA-1B except for engine, propeller, engine mount/baffles, and AA-5 elevator).

Engine: Lycoming O-235-L2C (Carburetor Setting 10-4953 or 10-3103-1)

Fuel: 100/130 minimum grade aviation gasoline

Engine limits: For all operations 2700 r.p.m. (115 h.p.)

Propeller and propeller limits:

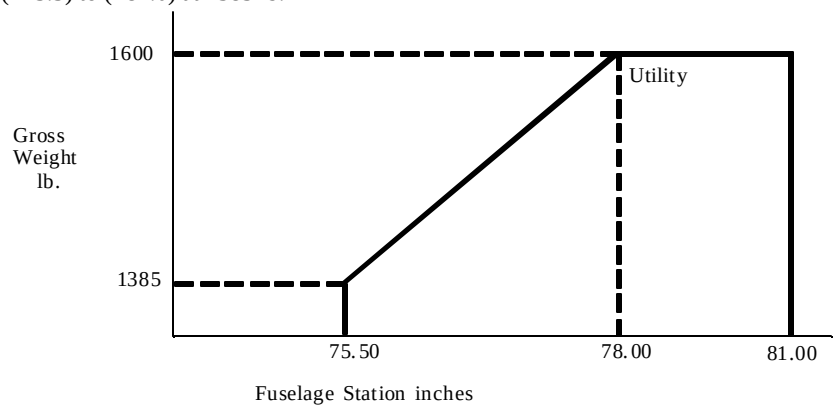
1. Sensenich Model 72CK-0-56 fixed pitch propeller. Static r.p.m. at maximum permissible throttle setting; not over 2275; not under 2125. No additional tolerance permitted. Diameter: not over 72 inches, not under 70.5 inches.

2. Sensenich Model 72CK-0-52 fixed pitch propellers. Static r.p.m. at maximum permissible throttle setting; not over 2475; not under 2325. No additional tolerance permitted. Diameter: not over 72 inches, not under 70.5 inches.

Airspeed limits (CAS)

V_{ne}	Never exceed	195 m.p.h. (169 knots)
V_{no}	Maximum structural cruising	144 m.p.h. (125 knots)
V_a	Maneuvering	135 m.p.h. (117 knots)
V_{fe}	Flaps extended	115 m.p.h. (100 knots)
	Canopy half open	130 m.p.h. (113 knots)

Center of gravity (C.G) range: (+78.00) to (+81.0) at 1600 lb.
(+75.5) to (+81.0) at 1385 lb.



Empty weight C.G. range: None

Maximum weight: 1600 lb.

Number of seats: 2 at (+92.5) (For optional child's seat refer to Equipment List.)

Maximum baggage: 100 lb. at (+120)

Fuel capacity	24 gal. (2 wing tanks) at (+84.5) (See Note 1 for unusable fuel)				
Oil capacity	6 qt. at (+39) (2 qt. minimum)				
Control surface movements	Elevator	12° ± 1°	up	28° ± 2°	down
	Rudder		25° ± 2°	left	25° ± 2° right
	Ailerons	25° ± 2°	up	20° ± 2°	down
	Flaps			30° ± 2°	down
	Elevator tab trim	15° ± 4°	up	15° ± 2°	down
Serial numbers eligible	AA1B-0601 and AA1C-0001 and up (Utility Category)				

DATA PERTINENT TO ALL MODELS:

Datum	50.0 inches forward of front face of firewall (wing chord 48 inches for Model AA-1 and 49.32 inches for Models AA-1A, AA-1B, and AA-1C).
Leveling means	Top of fuselage canopy slide rail.
Certification basis	FAR 23 effective February 1, 1965, and amendments 23-1 and 23-2; and FAR 36 amended through 36-4 for the Model AA-1C. Type Certificate No. A11EA issued August 29, 1967. Data of Application for Type Certificate October 22, 1965.
Production basis	None. Prior to original certification of each aircraft manufactured subsequent to May 12, 2000, an FAA representative must perform a detailed inspection for workmanship, materials and conformity with the approved technical data and a check of the flight characteristics.
Equipment	The basic required equipment prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the airplane for certification. In addition, equipment for the particular operation must be installed.

NOTE 1. Current weight and balance report including a list of equipment included in the certificated empty weight, and loading instructions when necessary must be provided for each aircraft at the time of original certification.

The certificated empty weight and corresponding center of gravity location must include 12 lb. (2 gal.) at (+84.5) of unusable fuel.

NOTE 2. The following placards must be installed in full view of the pilot:

(a) Models AA-1 and AA-1A:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL OR UTILITY CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS."

NORMAL CATEGORY	AA-1	AA-1A
Maximum Design Weight	1500 lb.	1500 lb.
Design Maneuvering Speed, V_a	125 mph CAS	120 mph CAS
Flight Load Factors:		
Flaps Up	+3.8, -1.52	+3.8, -1.52
Flaps Down	+2.0	+3.5

NO ACROBATIC MANEUVERS INCLUDING SPINS APPROVED (AA-1 and AA-1A)

UTILITY CATEGORY	AA-1	AA-1A
Maximum Design Weight	1430 lb.	1430 lb.
Design Maneuvering Speed, V_a	130 mph CAS	127 mph CAS
Flight Load Factors:		
Flaps Up	+4.4, -1.76	+4.4, -1.76
Flaps Down	+2.0	+3.5

ACROBATIC MANEUVERS ARE LIMITED TO THE FOLLOWING:

MANEUVER	ENTRY SPEED (MPH, CAS)	
	AA-1	AA-1A
Chandelles	132	127
Lazy Eights	132	127
Steep Turns	132	127
Stalls (Except Whip Stalls)	Slow Deceleration	Slow Deceleration

Models AA-1B and AA-1C:

"THIS AIRPLANE MUST BE OPERATED AS A UTILITY CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS."

	AA-1B	AA-1C
Maximum Design Weight	1560 Lb.	1600 Lb.
Design Maneuvering Speed, V_a	135 Mph Cas	117 Knots Cas
Flight Load Factors:		
Flaps Up	+4.4, -1.76	+4.4, -1.76
Flaps Down	+3.5	+3.5

ACROBATIC MANEUVERS ARE LIMITED TO THE FOLLOWING:

MANEUVER	ENTRY SPEED (MPH, CAS)	ENTRY SPEED (KNOTS, CAS)
	AA-1B	AA-1C
Chandelles	135	117
Lazy Eights	135	117
Steep Turns	135	117
Stalls (Except Whip Stalls)	Slow Deceleration	Slow Deceleration

Maximum Altitude Loss In Stalls
300 Feet (AA-1)
250 Feet (AA-1A)
300 Feet (AA-1B)
200 Feet (AA-1C)

Demonstrated Crosswind Velocity
15 Mph (AA-1)
13 mph (AA-1A)
18 mph (AA-1B)
16 knots (AA-1C)

KNOWN ICING CONDITIONS TO BE AVOIDED. (Models AA-1, AA-1A, and AA-1B)

THIS AIRPLANE NOT APPROVED FOR FLIGHT IN ICING CONDITIONS. (Model AA-1C)

All Models:

THIS AIRPLANE IS CERTIFICATED FOR THE FOLLOWING OPERATIONS AS OF DATE OF ORIGINAL AIRWORTHINESS CERTIFICATE: IFR, VFR, DAY, NIGHT. (When properly equipped per FAR 91)

REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS.

READ FUEL GAGES IN LEVEL FLIGHT ONLY.

FOR NORMAL OPERATION, MAINTAIN FUEL BALANCE.

DEMONSTRATED FUEL UNBALANCE 7 GAL.

(b) On left side of cabin:

"130 MPH MAX WITH CANOPY OPEN TO HERE. NO FLIGHT WITH CANOPY OPEN BEYOND THIS POINT." Placard Part No. 5803007-22 or equivalent. (Models AA-1, AA-1A, AA-1B)

"113 KNOTS MAX WITH CANOPY OPEN TO HERE. NO FLIGHT WITH CANOPY OPEN BEYOND THIS POINT." Placard Part No. 5803007-51 or equivalent. (Model AA-1C).

(c) In baggage compartment (All Models):

"BAGGAGE CAPACITY 100 LBS. MAX." Placard Part No. 803007-40 or equivalent.

(d) On instrument panel in full view of pilot (All Models):

"SPINS PROHIBITED." Placard Part No. 803007-56 or equivalent.

(e) On instrument panel near the airspeed indicator stall speed vs. bank angle placard.

Placard Part No. 803007-53 (Model AA-1), 803007-54 (Model AA-1A), 803007-55 (Model AA-1B), 803007-67 (Model AA-1C).

NOTE 3. Deleted

....END....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

1A6
Revision 34
Piper Aircraft, Inc

PA-22
PA-22-108
PA-22-135
PA-22S-135
PA-22-150
PA-22S-150
PA-22-160
PA-22S-160

August 7, 2006

AIRCRAFT SPECIFICATION NO. 1A6

Type Certificate Holder — Piper Aircraft, Inc.
2926 Piper Drive
Vero Beach, Florida 32960

Type Certificate Holder Record — The New Piper Aircraft, Inc transferred TC 1A6 to Piper Aircraft, Inc on August 7, 2006.

I - Model PA-22, 4 PCLM (Normal Category Only), Approved December 20, 1950

Engine — Lycoming O-290-D

Fuel — 80/87 minimum grade aviation gasoline

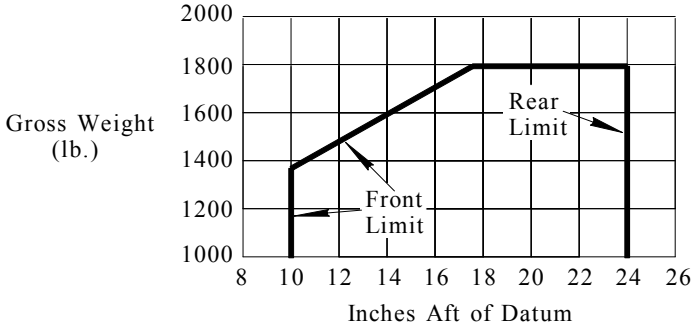
Engine Limits — For all operations, 2600 rpm (125 hp)

Airspeed Limits CAS

V_{ne}	(never exceed)	158 mph	(137 knots)
V_{no}	(maximum structural cruising)	126 mph	(110 knots)
V_p	(maneuvering)	106 mph	(92 knots)
V_{fe}	(flaps extended)	80 mph	(70 knots)

C. G. Range

(+17.5) to (+24.0) at 1800 lb.
(+10.0) to (+24.0) at 1380 lb. or less
Straight line variation between points given.



Empty Weight C. G. Range — None

Maximum Weight — 1800 lb.

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Rev. No.	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33

Number Seats 4 (2 at +19.5 and 2 at +49)

Maximum Baggage 50 lb. (+67)

Fuel Capacity 36 gallons (2 Wing tanks at +24)

Oil Capacity 2 gallons (-29)

Control Surface Movements

Stabilizer	1°	Up	6½°	Down
Elevator	24°	Up	12°	Down
Aileron	15°	Up	15°	Down
Rudder	16°	Right	16°	Left
Flap	40°	Down		

Serial Numbers Eligible 22-1 and up.

Required Equipment In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed:
Items 1, 101, 201(a), 202, 205(a), 206, and 401(a).

II. Model PA-22-135, 4 PCLM (Normal Category), Approved May 5, 1952

Engine Lycoming O-290-D2

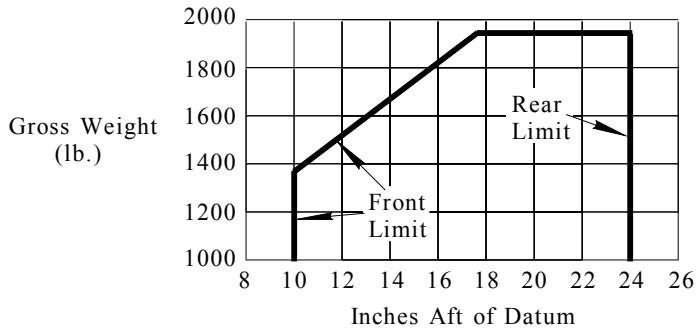
Fuel 80/87 minimum grade aviation gasoline

Engine Limits For all operations, 2600 rpm (135 hp)

Airspeed Limits (CAS)

V_{ne} (never exceed)	158 mph	(137 knots)
V_{no} (maximum structural cruising)	126 mph	(110 knots)
V_p (maneuvering)	106 mph	(92 knots)
V_{fe} (flaps extended)	80 mph	(70 knots)

C. G. Range (+17.5) to (+24.0) at 1950 lb.
(+10.0) to (+24.0) at 1380 lb. or less
Straight line variation between points given.



Empty Weight C. G. Range None

Maximum Weight 1950 lb.

Number of Seats 4 (2 at +21 and 2 at +49)

Maximum Baggage 50 lb. (+67) May be increased to 100 lb. provided:
(a) Baggage compartment placard is changed to "Maximum Baggage 100 Pounds."
(b) Airplane Flight Manual, Item 401(c), is available in the airplane.

Fuel Capacity: 36 gallons (2 wing tanks at +24). See Item 104 for reserve tank.

Oil Capacity: 2 gallons (-29)

Control Surface Movements

Stabilizer	1° Up	6½° Down
Elevator	24° Up	12° Down
Aileron	15° Up	15° Down
Rudder	16° Right	16° Left
Flap	40° Down	

Serial Numbers Eligible: 22-534 and up.

Required Equipment: In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed:
Items 1, 103, 201(a), 202, 205(a), 206, and 401(b).

III - Model PA-22S-135, 3 PCSM (Normal Category), Approved May 14, 1954

Engine: Lycoming O-290-D2

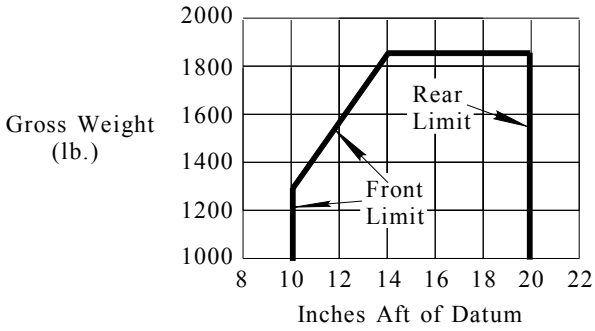
Fuel: 80/87 minimum grade aviation gasoline

Engine Limits: For all operations, 2600 r.p.m. (135 hp)

Airspeed Limits CAS

V_{ne}	(never exceed)	140 mph	(122 knots)
V_{no}	(maximum structural cruising)	117 mph	(102 knots)
V_p	(maneuvering)	105 mph	(91 knots)
V_{fe}	(flaps extended)	80 mph	(70 knots)

C. G. Range: (+14.0) to (+20.0) at 1850 lb.
(+10.0) to (+20.0) at 1300 lb. or less
Straight line variation between points given.



Empty Weight C. G. Range: None

Maximum Weight: 1850 lb.

Number of Seats: 4 (2 at +21 and 2 at +49)

Maximum Baggage: 50 lb. (+67)

Fuel Capacity — 36 gallons (2 wing tanks at +24). See Item 104 for reserve tank.

Oil Capacity — 2 gallons (-29)

Control Surface Movements

Stabilizer	1° Up	6½° Down
Elevator	24° Up	12° Down
Aileron	15° Up	15° Down
Rudder	16° Right	16° Left
Flap	40° Down	

Serial Numbers Eligible — 22-534 and up.

Required Equipment — In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed:
Items 2, 103, 209, and 401(g).

IV - Model PA-22-150, 4 PCLM (Normal Category), Approved September 3, 1954.
Model PA-22-150, 2 PCLM (Utility Category), Approved May 24, 1957 (See NOTE 3 for limitations)

Engine — Lycoming O-320-A2A or O-320-A2B (Carburetor setting #10-3678-11, #10-3678-12 or #10-3678-32) (See Item 106 for optional engines)

Fuel — 80/87 minimum grade aviation gasoline

Engine Limits — For all operations, 2700 r.p.m. (150 hp)

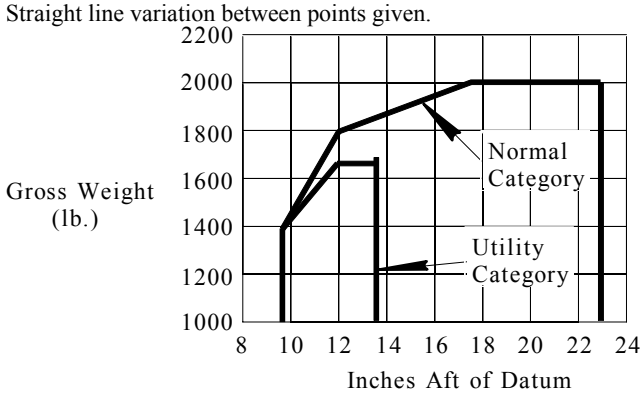
Airspeed Limits
CAS

V_{ne}	(never exceed)	170 mph	(148 knots)
V_{no}	(maximum structural cruising)	135 mph	(117 knots)
V_p	(maneuvering)	112 mph	(97 knots)
V_{fe}	(flaps extended)	95 mph	(82 knots)

C. G. Range

Normal Category:	(+17.5)	to	(+23.0)	at	2000 lb.
	(+12.0)	to	(+23.0)	at	1800 lb.
	(+9.5)	to	(+23.0)	at	1400 lb. or less
Utility Category:			(+13.5)	at	1680 lb.
	(+12.0)	to	(+13.5)	at	1665 lb.
	(+9.5)	to	(+13.5)	at	1400 lb. or less

Straight line variation between points given.



Empty Weight C. G. Range — None

Maximum Weight — Normal Category: 2000 lb.
Utility Category: 1680 lb.

Number of Seats — 4 (2 at +21 and 2 at +49)
Rear seats not to be used when operating in the Utility Category.

Maximum Baggage — 100 lb. (+67) (No baggage allowed when operating in the Utility Category)

Fuel Capacity	36 gallons	(2 wing tanks at +24) See Item 104 for reserve tank.			
Oil Capacity	2 gallons	(-29)			
Control Surface Movements	Stabilizer	1°	Up	6½°	Down
	Elevator	24°	Up	12°	Down
	Aileron	15°	Up	15°	Down
	Rudder	16°	Right	16°	Left
	Flap	40°	Down		

Serial Numbers Eligible: 22-2378, 22-2425 and up (Normal Category). See NOTE 3 for Utility Category.

Required Equipment: In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed:
Normal Category: Items 5, 103, 201(a), 202, 205(a), 206, and 401(h).
Normal and Utility Category: Items 5, 103, 201(a), 202, 205(a), 206, 401(h), 401(r), and 407.

V. - Model PA-22S-150, 3 PCSM (Normal Category), Approved September 3, 1954

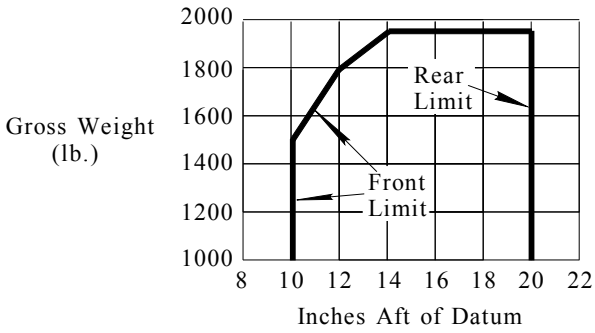
Engine: O-320-A2A Lycoming (Carburetor setting #10-3678-11, #10-3678-12) or O-320-A2B (Carburetor setting #10-3678-32) (See Item 106 for optional engines)

Fuel: 80/87 minimum grade aviation gasoline

Engine Limits: For all operations, 2700 r.p.m. (150 hp)

Airspeed Limits CAS				
V_{ne}	(never exceed)	158 mph	(137 knots)	
V_{no}	(maximum structural cruising)	126 mph	(109 knots)	
V_p	(maneuvering)	111 mph	(96 knots)	
V_{fe}	(flaps extended)	80 mph	(70 knots)	

C. G. Range:
(+14.0) to (+20.0) at 1950 lb.
(+12.0) to (+20.0) at 1800 lb.
(+10.0) to (+20.0) at 1500 lb. or less
Straight line variation between points given.



Empty Weight C. G. Range: None

Maximum Weight: 1950 lb.

Number Seats: 4 (2 at +21 and 2 at +49)

Maximum Baggage: 100 lb. (+67)

Fuel Capacity: 36 gallons (2 wing tanks at +24). See Item 104 for reserve tank.

Oil Capacity 2 gallons (-29)

Control Surface Movements

Stabilizer	1° Up	6½° Down
Elevator	24° Up	12° Down
Aileron	15° Up	15° Down
Rudder	16° Right	16° Left
Flap	40° Down	

Serial Numbers Eligible: 22-2378, 22-2425 and up.

Required Equipment: In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed:
Items 5, 103, 209 and 401(i).

VI - Model PA-22-160, 4 PCLM (Normal Category), Approved August 27, 1957
Model PA-22-160, 2 PCLM (Utility Category), Approved August 27, 1957 (See NOTE 3)

Engine: Lycoming O-320-B2A or O-320-B2B (Carburetor setting #10-3678-11, #10-3678-12 or #10-3678-32).

Fuel: 91/96 minimum grade aviation gasoline

Engine Limits: For all operations, 2700 r.p.m. (160 hp)

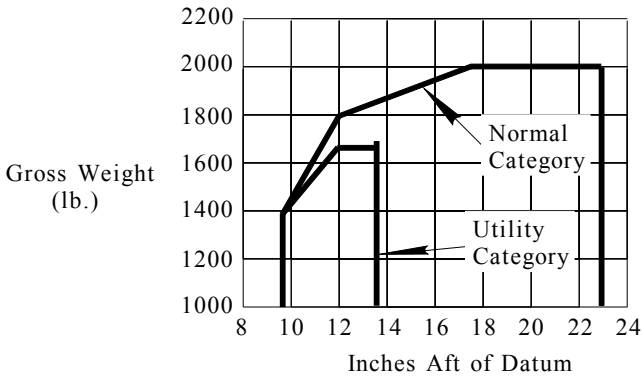
Airspeed Limits (CAS)

V_{ne}	(never exceed)	170 mph	(148 knots)
V_{no}	(maximum structural cruising)	135 mph	(117 knots)
V_p	(maneuvering)	112 mph	(97 knots)
V_{fe}	(flaps extended)	95 mph	(82 knots)

C. G. Range

Normal Category:	(+17.5)	to	(+23.0)	at	2000 lb.
	(+12.0)	to	(+23.0)	at	1800 lb.
	(+9.5)	to	(+23.0)	at	1400 lb. or less
Utility Category:			(+13.5)	at	1680 lb.
	(+12.0)	to	(+13.5)	at	1665 lb.
	(+9.5)	to	(+13.5)	at	1400 lb. or less

Straight line variation between points given.



Empty Weight C. G. Range: None

Maximum Weight: Normal Category: 2000 lb.
Utility Category: 1680 lb.

Number of Seats: 4 (2 at +21 and 2 at +49)
Rear seats not to be used when operating in the Utility Category.

Maximum Baggage: 100 lb. (+67) No baggage allowed when operating in the Utility Category.

Fuel Capacity	36 gallons	(2 wing tanks at +24). See Item 104 for reserve tank.			
Oil Capacity	2 gallons	(-29)			
Control Surface Movements	Stabilizer	1°	Up	6½	Down
	Elevator	24°	Up	12°	Down
	Aileron	15°	Up	15°	Down
	Rudder	16°	Right	16°	Left
	Flap	40°	Down		
Serial Numbers Eligible	22-2378, 22-2425 and up (Normal Category). See NOTE 3 for Utility Category.				
Required Equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed:				
	Normal Category:	Items 7, 103, 201(a), 202, 205(a), 206, and 401(s).			
	Normal and Utility Category:	Items 7, 103, 201(a), 202, 205(a), 206, 401(s), 401(t), and 407.			

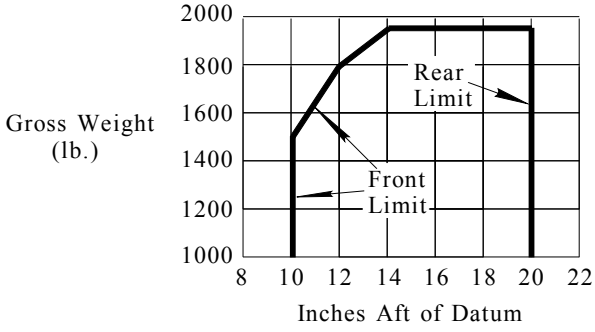
VII - Model PA-22S-160, 3 PCSM (Normal Category), Approved October 25, 1957

Engine	Lycoming O-320-B2A (Carburetor setting #10-3678-11, #10-3678-12) or O-320-B2B (Carburetor setting #10-3678-32).			
Fuel	91/96 minimum grade aviation gasoline			
Engine Limits	For all operations, 2700 r.p.m. (160 hp)			
Airspeed Limits	V_{ne}	(never exceed)	158 mph	(137 knots)
	V_{no}	(maximum structural cruising)	126 mph	(109 knots)
	V_p	(maneuvering)	111 mph	(96 knots)
	V_{fe}	(flaps extended)	80 mph	(70 knots)

C. G. Range

(+14.0)	to	(+20.0)	at	1950 lb.
(+12.0)	to	(+20.0)	at	1800 lb.
(+10.0)	to	(+20.0)	at	1500 lb. or less

Straight line variation between points given.



Empty Weight C. G. Range	None	
Maximum Weight	1950 lb.	
Number of Seats	4	(2 at +21 and 2 at +49)
Maximum Baggage	100 lb.	(+67)
Fuel Capacity	36 gallons	(2 wing tanks at +24). See Item 104 for reserve tank.

Oil Capacity	2 gallons (-29)			
Control Surface Movements	Stabilizer	1°	Up	6½° Down
	Elevator	24°	Up	12° Down
	Aileron	15°	Up	15° Down
	Rudder	16°	Right	16° Left
	Flap	40°	Down	
Serial Numbers Eligible	22-2378, 22-2425 and up.			
Required Equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed: Items 7, 103, 209, and 401(v).			

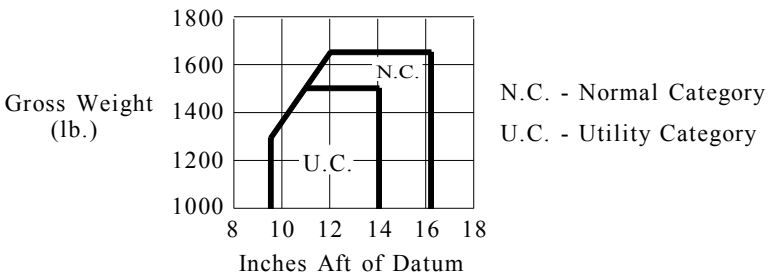
VIII - Model PA-22-108, 2 PCLM (Normal and Utility Category), Approved October 21, 1960

Engine	Lycoming O-235-C1 or O-235-C1B (Carburetor setting #10-3103-1)			
Fuel	80/87 minimum grade aviation gasoline			
Engine Limits	For all operations, 2600 r.p.m. (108 hp)			
Airspeed Limits (CAS)	V_{ne} (never exceed)	138 mph	(120 knots)	
	V_{no} (maximum structural cruising)	110 mph	(96 knots)	
	V_p (maneuvering)	104 mph	(90 knots)	

C. G. Range

Normal Category:	(+12.0)	to	(+16.25)	at	1650 lb.
	(+9.5)	to	(+16.25)	at	1300 lb. or less
Utility Category:	(+10.9)	to	(+14.00)	at	1500 lb.
	(+9.5)	to	(+14.00)	at	1300 lb. or less

Straight line variation between points given.



Empty Weight C. G. Range	None			
Maximum Weight	Normal Category: 1650 lb. Utility Category: 1500 lb.			
Number of Seats	2 at (+21)			
Maximum Baggage	100 lb. (+45) (Normal category only)			
Fuel Capacity	18 gallons (+24) (See Item 108 for auxiliary tank)			
Oil Capacity	1.5 gallons (-29)			
Control Surface Movements	Stabilizer	1°	Up	6½° Down
	Elevator	24°	Up	12° Down
	Aileron	15°	Up	15° Down
	Rudder	16°	Right	16° Left
Serial Numbers Eligible	22-8000 and up.			

Required Equipment — In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed:
Items 8, 201(a) or 211(a), 202, 205(a), 206, and 401(y).

Specifications Pertinent to All Models

Datum — Wing leading edge

Leveling Means — Plumb from hole in upper channel of front door to center punch mark on front seat cross tube.

Certification Basis — CAR 3, effective November 1, 1949, and Amendments 3-1 through 3-6, effective June 4, 1951.
Type Certificate No. 1A6 issued December 20, 1950.
Date of Application for Type Certificate September 13, 1950.

Production Basis — Approved for manufacture of spare parts only under Production Certificate No. 206.

Equipment — A plus (+) or minus (-) sign preceding the weight of an Item of equipment indicates net weight change when that Item is installed.

Approval for the installation of all Items of equipment listed herein has been obtained by the aircraft manufacturer except those Items preceded by an asterisk (*). The asterisk denotes that approval has been obtained by someone other than the aircraft manufacturer. An Item marked with an asterisk may not have been manufactured under an FAA monitored or approved quality control system, and therefore conformity must be determined if the Item is not identified by a Form FAA-186, PMA or other evidence or FAA production approval.

Propeller and Propeller Accessories

The following propellers are eligible at the limits shown for diameter and static r.p.m. at maximum permissible throttle setting, no additional tolerance permitted:

1. Propeller (with Lycoming O-290D or O-290-D2 engine)
   Sensenich 74FM59 or any other fixed pitch wood propeller which is rated for the engine power and speed: +11 lb. (-50)
   Static r.p.m.: Not over 2400, not under 2200.
   Diameter: Not over 74 inches, not under 70.5 inches
2. Propeller (with Lycoming O-290D or O-290-D2 engine) - fixed pitch metal
   (a) Sensenich M76AM-2 or +25 lb. (-50)
   (b) Sensenich M74DM +30 lb. (-50)
   Airplane Flight Manual shall be revised to reflect the subject propeller and limits.
   Landplane:
   Static r.p.m.: Not over 2450, not under 2150
   Diameter: Not over 74 inches, not under 72.5 inches
   Seaplane:
   Static r.p.m.: Not over 2450, not under 2350
   Diameter: Not over 74 inches, not under 72.5 inches
3. Propeller (with Lycoming O-290D or O-290-D2 engine)
   Koppers Aeromatic, F200-H/00-74E +34 lb. (-50)
   Parts List Assembly No. 4394H-1. Installation and operation must be accomplished in accordance with Koppers "Adjustment Instructions and Operation Limitations No. 58."
   Low pitch setting 14° at 24 in sta.
   Static r.p.m.: Not over 2600, not under 2550.
   Diameter: Not over 74 inches, not under 72.5 inches

4.	Propeller (with Lycoming O-290D or O-290-D2 engine) Sensenich hub CS3FM-4, blades PC374A7 or C374E, two position controllable. Propeller control installation required as per Sensenich Dwg. D-3028, Revision E. Blade pitch setting at 3/4 radius (27.75 in. station): Low 13°, high 16.6° Diameter: Not over 74 inches, not under 72.5 inches	+34 lb.	(-50)
5.	Propeller (with Lycoming O-320-A2A or O-320-A2B engine) - Fixed pitch metal Sensenich M74DM Landplane: Static r.p.m.: Not over 2480, not under 2250. Diameter: Not over 74 inches, not under 72.5 inches Seaplane: Static r.p.m.: Not over 2500, not under 2400 Diameter: Not over 74 inches, not under 72.5 inches	+30 lb.	(-50)
6.	Propeller (with Lycoming O-320-A1A or O-320-A1B engine) - constant speed controllable Hartzell hub HC82XG-6, blades 7636D-4 Installed per Piper Dwg. No. 14747 when Item 105 (vacuum pump) is installed, or per Piper Dwg. No. 14792, without vacuum pump. Not eligible when Item 407 is installed. Note 2(f) placard required. Blade pitch settings at 30 in. sta.: Low 12°, high 26°. Diameter: Not over 72 inches, not under 70 inches Eligible only on Models PA-22-150 and PA-22S-150, Serial Nos. 22-3218, 22-3387 and up. When this propeller is used on Model PA-22S-150, the engine side cowls shall be installed per Piper Dwg. No. 14450.	+54 lb.	(-50)
7.	Propeller (with Lycoming O-320-B2A or O-320-B2B engine) - fixed pitch metal Sensenich M74DM Landplane: Static r.p.m.: Not over 2450, not under 2250 Diameter: Not over 74 inches, not under 72 inches Seaplane: Static r.p.m.: Not over 2500, not under 2400 Diameter: Not over 74 inches, not under 72 inches Applicable Airplane Flight Manual shall be revised by the Modifier and approved by the applicable FAA Aircraft Certification Office to reflect this installation change.	+34 lb.	(-50)
8.	Propeller (with Lycoming O-235-C1 or O-235-C1B engine) - fixed pitch metal Sensenich M76AM-2 Static r.p.m.: Not over 2450, not under 2200 Diameter: Not over 74 inches, not under 72.5 inches	+25 lb.	(-50)
	Engines and Engine Accessories - Fuel and Oil Systems		
101.	Oil cooler - Harrison No. AP06CJ04-02 or AP06CU04-2 and Piper Air Duct	+3 lb.	(-18)
102.	Oil filter, Fram PB-5, Kit No. K-520, Fram Dwg. No. 62832 and Instruction Sheet No. 62831 (weight includes 1 quart oil)	+5 lb.	(-18.5)
103.	Oil Cooler Harrison No. AP13SJ03-01 or AP12CU03-01 installed in accordance with Piper Dwg. 13724 or 14368	+6 lb.	(-46)
104.	Reserve 8 gallons fuel tank with electric transfer fuel pump installed in accordance with Piper Dwg. 14454. When installed on Models PA-22S-135, PA-22S-150 or PA-22S-160, fuselage reinforcement channel, Part No. 14725, also required. NOTE 2(e) placard required. Airplane Flight Manual Supplement required: Item 401(j), Model PA-22-150 Item 401(k) Model PA-22-135 (Serial Nos. 22-534 and up eligible), Item 401(p) Model PA-22S-135 (Serial Nos. 22-807 and up eligible), Item 401(q) Model PA-22S-150 (Serial Nos. 22-2378, 22-2425 and up eligible), Item 401(u) Model PA-22-160 (Serial Nos. 22-2378, 22-2425 and up eligible), or Item 401(w) Model PA-22S-160 (Serial Nos. 22-2378, 22-2425 and up eligible).	+12 lb.	(+46)

105.	Vacuum pump			
	(a) Pesco Model 3P-194-F, Type B-11		+4 lb.	(-25)
	(b) Airborne Mechanisms Model 113A1 installed in accordance with Piper Dwg. 15163. (PA-22-108 only).		+4 lb.	(-25)
	(c) Airborne Mechanisms Model 113A5 installed in accordance with Piper Dwg. 15163 or 15208. (PA-22-108 only).		+4 lb.	(-25)
106.	Optional Engines			
	A. Model PA-22-150			
	(1) Lycoming O-320			
	(2) Lycoming O-320-A1A			
	(3) Lycoming O-320-A1B			
	B. Model PA-22S-150			
	(1) Lycoming O-320			
	(2) Lycoming O-320-A1A			
	(3) Lycoming O-320-A1B			
107.	Starter, Delco Remy Model 1109657 (12 v.)		+17 lb.	(-40)
108.	Auxiliary 18 gallons fuel tank installed in accordance with Piper Dwg. 15147 (PA-22-108 only). NOTE 2(j) placard required.		+25 lb.	(+24)
Landing Gear				
201.	Two main wheel-brake assemblies, 6.00-6, Type III		+14 lb.	(+31.5)
	(a) Cleveland Aircraft Products Model 6:00 DHB-3			
	Wheel Assembly No. C-38500H			
	Brake Assembly No. C-2000H			
202.	Two main 4-ply rating tires, 6.00-6, Type III, with regular tubes		+17 lb.	(+31.5)
205.	One nose wheel, 6.00-6, Type III		+5 lb.	(-36)
	(a) Cleveland Aircraft Products Wheel Assembly No. C-38500H (less brake-drum)			
	(b) Cleveland Aircraft Products Wheel Assembly No. 38501			
206.	One nose wheel 4-ply rating, tire, 6.00-6, Type III, with regular tube		+9 lb.	(-36)
*207.	Nose wheel centering kit installed according to Javelin Aircraft Company (Wichita, Kansas) Dwg. 723 and Installation Instructions dated April 15, 1953.		+2. lb.	(-29)
208.	Skis:		Use Actual Weight Change	
	*(a) Federal A-2000A main skis and NA-1200A nose ski, per Federal Dwg. 11R951, Change E.			
	*(b) Federal AWB-2100 main skis and AWN-1200 nose ski, per Federal Dwg. 11R1117.			
	The following placard is required with this installation: "Do not extend or retract skis while in motion on the ground."			
209.	Edo Model 89-2000 floats with water rudder installed in accordance with Edo Dwg. No. 16270. Piper modifications must be made and installed in accordance with Piper Dwg. 14375 (Model PA-22S-135, Serial Nos. 22-534 to 22-2377, 22-2379 to 22-2424, inclusive) and Piper Dwg. 14450 (Model PA-22S-150 and PA-22S-160, Serial Nos. 22-2378, 22-2425 and up.) Serial Nos. 22-534 to 22-806, inclusive, require a fuselage reinforcement brace, Piper Part No. 12480.			
210.	(a) Doyn Fiberglass wheel fairings installed in accordance with Doyn Dwg. No. 1300 and Doyn Process Specification for Fiberglass Part No. PS-100	Nose Fairing Main Fairing	+5.5 lb. +15.0 lb.	(-36) (+31.5)
or	(b) Piper wheel fairings installed in accordance with Piper Dwg. 15054 and 15058	Nose Fairing Main Fairing	+5.5 lb. +15.0 lb.	(-36) (+31.5)
or	(c) Piper wheel fairings installed in accordance with Piper Dwg. 15083	Nose Fairing Main Fairing	+5.5 lb. +15.0 lb.	(-36) (+31.5)
211.	Two Main Wheel-Brake Assemblies, 6.00-6, Type III			
	(a) Cleveland Aircraft Products, Model 20-6 (Model PA-22-108 only)		+ 14.5 lb.	(+31.5)
	Wheel Assembly No. 40-28			
	Brake Assembly No. 30-18			

Electrical Equipment

301.	Battery - Reading S24-12V	+25 lb.	(+21)
302.	Landing lights in wing leading edge per Piper Dwg. No. 12534 (Serial Nos. 22-534 to 22-2377, 22-2379 to 22-2424, inclusive) Piper Dwg. No. 14442 (Serial Nos. 22-2378, 22-2425 and up).	+4 lb.	(+5)
303.	Battery - Reading R33-12V Serial Nos. 22-267, 22-340, 22-349, 22-350, 22-351, 22-354 through 22-7999.	+28 lb.	(+21)

Interior Equipment

401. (a) CAA (FAA) approved Airplane Flight Manual dated December 20, 1950, for airplanes equipped with Lycoming O-290-D engines. (Required with 100 lb. baggage allowance.)
(b) FAA-DOA approved Airplane Flight Manual dated May 5, 1952, for airplanes equipped with Lycoming O-290-D2 engines.
(c) FAA-DOA approved Airplane Flight Manual dated October 23, 1952, for airplanes equipped with Lycoming O-290-D2 engines.
*(d) Supplement to Airplane Flight Manual dated January 17, 1952. (Required with Item 402(a) without altitude controller.)
*(e) Revised Supplement to Airplane Flight Manual dated January 19, 1953. (Required with Item 402(a) without altitude controller.)
*(f) Revised Supplement to Airplane Flight Manual dated November 18, 1953. (Required with Item 402(b) with approach coupler.)
(g) FAA-DOA approved Airplane Flight Manual dated May 14, 1954, for Model PA-22S-135 seaplanes equipped with Edo Model 89-2000 floats.
(h) FAA-DOA approved Airplane Flight Manual dated September 3, 1954, for Model PA-22-150.
(i) FAA-DOA approved Airplane Flight Manual dated September 3, 1954, for Model PA-22S-150 seaplanes equipped with Edo Model 89-2000 floats.
(j) FAA-DOA approved Supplement No. 1 to Airplane Flight Manual dated September 3, 1954, (Required with Item 104 Auxiliary Fuel System) for Model PA-22-150.
(k) FAA-DOA approved Supplement No. 1 to Airplane Flight Manual dated October 23, 1952, (Required with Item 104 Auxiliary Fuel System) for Model PA-22-135, Serial No. 22-534 and up.
*(l) Supplement to Airplane Flight Manual dated November 17, 1954. (Required with Item 404).
*(m) Supplement to Airplane Flight Manual dated April 20, 1955. (Required with Item 405).
(n) FAA-DOA approved Supplement to Airplane Flight Manual dated September 3, 1954, for Model PA-22-150 (Required with Item 6).
(o) FAA-DOA approved Supplement to Airplane Flight Manual dated September 3, 1954, for Model PA-22S-150 (Required with Item 6).
(p) FAA-DOA approved Supplement No. 1 to Airplane Flight Manual dated October 23, 1952, (Required with Item 104 Auxiliary Fuel System) for Model PA-22S-135.
(q) FAA-DOA approved Supplement No. 1 to Airplane Flight Manual dated September 3, 1954, (Required with Item 104 Auxiliary Fuel System) for Model PA-22S-150.
(r) FAA-DOA approved Supplement No. 3 to Airplane Flight Manual dated September 3, 1954, for Model PA-22-150 (Required with Item 407.).
(s) FAA-DOA approved Airplane Flight Manual dated August 27, 1957, for airplanes equipped with Lycoming O-320-B2A or O-320-B2B engines.
(t) FAA-DOA approved Supplement No. 1 to Airplane Flight Manual dated August 27, 1957, for Model PA-22-160 (Required with Item 407).
(u) FAA-DOA approved Supplement No. 2 to Airplane Flight Manual dated August 27, 1957, for Model PA-22-160 (Required with Item 104 Auxiliary Fuel System).
(v) FAA-DOA approved Airplane Flight Manual dated October 25, 1957, for Model PA-22S-160 seaplanes equipped with Edo Model 89-2000 floats.

(w) FAA-DOA approved Supplement No. 1 to Airplane Flight Manual dated October 25, 1957, for Model PA-22S-160 (Required with Item 104 Auxiliary Fuel System).

(x) FAA-DOA approved Supplement No. 3 to Airplane Flight Manual dated August 27, 1957 (Model PA-22-160); or FAA-DOA approved Supplement No. 4 to Airplane Flight Manual dated September 3, 1954 (Model PA-22-150) (Required with Item 408 Piper AutoControl, Mitchell Model AKO-64, Automatic Pilot) for Models PA-22-150 and PA-22-160, Serial No. 22-6328, 22-6344, 22-6352 and up.

(y) FAA-DOA approved Airplane Flight Manual dated October 21, 1960, revised November 22, 1960, for Model PA-22-108.

(z) FAA-DOA approved Supplement No. 1 to Airplane Flight Manual dated October 21, 1960, (Required with Item 409 Piper AutoControl, Mitchell Model AKO-64, Automatic Pilot) for Model PA-22-108, Serial No. 22-8000 and up.

(aa) FAA-DOA approved Supplement to Airplane Flight Manual dated December 20, 1950, for Model PA-22 (Required when rear door removed under provisions of NOTE 4).

(ab) FAA-DOA approved Supplement No. 3 to Airplane Flight Manual dated October 23, 1952, for Model PA-22-135 (Required when rear door removed under provisions of NOTE 4).

(ac) FAA-DOA approved Supplement No. 5 to Airplane Flight Manual dated September 3, 1954, for Model PA-22-150 (Required when rear door removed under provisions of NOTE 4).

(ad) FAA-DOA approved Supplement No. 4 to Airplane Flight Manual dated August 27, 1957 for Model PA-22-160 (Required when rear door removed under provisions of NOTE 4).

*402. Lear L-2B Automatic Pilot:
(An approved vacuum system to operate automatic pilot gyros and a 35 ampere generator meeting requirements of Aircraft Engine Specification E-229 are required. Servo pitch drum diameter for all three axes 1.375 inches.)

(a) Automatic pilot and altitude controller (optional equipment) installed in accordance with Lear Dwg. 95650. +51 lb. (+63)
Servo slip clutch stall torque, +0, -5 in.-lb. tolerance:
Aileron 40 in.-lb.
Elevator 25 in.-lb.
Rudder 50 in.-lb.
Items 401(d) or 401(e) and the following placard, installed in clear view of pilot, are required with this installation:
"Do not use Autopilot in normal operation below 75 feet above terrain including take-off, approach and landing."

(b) Automatic pilot and approach coupler (optional equipment) and altitude control (optional equipment) installed in accordance with Lear Dwg. 95650, Revision D. +7 lb. (+74)
Servo slip clutch stall torque + 0, - 5 in.-lb tolerance:
Aileron 40 in.-lb.
Elevator 40 in.-lb.
Rudder 50 in.-lb.
Item 401(f) and the following placards, installed in clear view of the pilot, are required with this installation:
"Do no use Autopilot in normal operation below 300 feet above terrain except during take-off, approach and landing."
"During take-off, approach and landing, do not use Autopilot below 75 feet above terrain."
"Do not use transmitter #1 during an automatic approach."

*403. Javelin A2 single axis automatic pilot installed in accordance with Javelin Dwg. 721 and Instructions dated June 15, 1954. Item 207 required with this installation. +18 lb. (+94)

*404. Lear Arcon (Automatic rudder control) installed in accordance with Lear Dwg. 701944. Item 401(1) required with this installation. Model PA-22-135 only. +12 lb. (+65)

*405.	Ross Control System Conversion Kit Model 10 installed in accordance with Ross (F. W. Ross, 755 Kalamath Drive, Del Mar, California) Dwgs. 10R100 through 9A114 on Drawing List dated November 5, 1955, and Installation Instructions dated November 5, 1955. Placard required on instrument panel: "Equipped with Ross Control System - See Flight Manual Supplement." Item 401(m) required with this installation.	Use Actual Weight and Balance Change	
*406.	Deleted - November 26, 1957. Now covered by Supplemental Type Certificate No. SA1-108		
407.	Control modification kit (eliminating rudder and aileron interconnection) per Piper Dwg. No. 14926. Item 401(r) or 401(t) and NOTE 2(g) placard required. See limitations in NOTE 3.		
408.	Piper AutoControl (Mitchell Model AKO-64) Automatic Pilot installed in accordance with Piper Dwg. No. 14970. Item 105 and 401(x), and NOTE 2(h) placard required. (Models PA-22-150 and PA-22-160)	+5 lb.	(-10)
409.	Piper Autocontrol (Mitchell Model AKO-64) Automatic Pilot installed in accordance with Piper Dwg. No. 14970. Item 105(b) or 105(c), and 401(z), and NOTE 2(h) placards required. (Model PA-22-108)	+5 lb.	(-10)

NOTE 1. Current weight and balance report including list of equipment included in certificated empty weight, and loading instructions when necessary, must be provided for each aircraft at the time of original certification.

NOTE 2. The following placards must be displayed:

(a) On the instrument panel in full view of the pilot (For all Models except PA-22-108):
  (1) "Operate in Normal Category in compliance with approved Flight Manual. Acrobatics (including spins) prohibited."

(b) On the baggage compartment (Serial Nos. 22-534 to 22-2377, 22-2379 to 22-2424):
  (1) "Maximum Baggage 50 Pounds." or
  (2) "Maximum Baggage 100 Pounds." (For Model PA-22-135 when Airplane Flight Manual, Item 401(c), is available in the airplane.)

(c) On the baggage compartment (Serial Nos. 22-2378, 22-2425 and up):
  (1) "Maximum Baggage 100 Pounds."

(d) Deleted, December 30, 1955.

(e) Adjacent to reserve tank selector valve when Item 104 is installed in aircraft:
  (1) "Reserve fuel
  pull on
  transfer fuel level flight only
  operate only in accordance with flight manual."

(f) Adjacent to the propeller pitch control when Item 6 is installed:
  (1) "Propeller-Push Increase R.P.M."

(g) On the instrument panel in full view of the pilot when Item 407 is installed:
  (1) "Operate in Normal or Utility Category in compliance with the approved Flight Manual. Airplane marked for Normal Category. Acrobatics (including spins) prohibited in Normal Category."

(h) When Item 408 or 409 is installed:
  (1) On left side of circuit breaker panel:
  "Piper Autocontrol
  Push to Engage
  Disengage During Take-off and Landing."
  (2) Between Directional Gyro and Gyro Horizon:
  "Turn Control
  Pull For Direction Control
  On 0° Heading Only"

(3) On left side window channel in full view of the pilot:
"Piper Autocontrol
To Engage: Push turn control at D. G. in and center knobs then push in engaging control, rocking heel if necessary.
To Turn: Move turn control in desired direction.
For Heading
Lock: Set D. G. at 0° pull put turn control knob, use trim knob to maintain exact 0° heading."

(i) On the instrument panel in full view of the pilot (For Model PA-22-108 only):
"This airplane must be operated as a normal or utility category airplane in compliance with approved Airplane Flight Manual. All markings and placards on this airplane apply to its operation as a normal category airplane. For utility category operation, refer to the Airplane Flight Manual. No acrobatics maneuvers (including spins) are approved for normal category operation."

(j) On the instrument panel in full view of the pilot (When Item 108 is installed):
"Right tank level flight only."

(k) On right fuel quantity gauge (Serial Nos. 22-1 to 22-7642)
"No take-off on right tank with less than 1/3 tank."

NOTE 3. Serial Nos. 22-3218, 22-3387 and up, of Model PA-22-150 or PA-22-160, are eligible to be operated as a Normal or Utility Category Airplane in compliance with the approved Airplane Flight Manual provided Item 407 (Control modification kit) is installed. Propeller Item 6 is not eligible when Item 407 is installed.

NOTE 4. Serial Nos. 22-1 through 22-7999 of Models PA-22, PA-22-135, PA-22-150, and PA-22-160, are eligible to be operated in the Normal Category with the rear door removed in compliance with the pertinent approved Flight Manual. Item 401(aa) for the PA-22; Item 401(ab) for the PA-22-135; Item 401(ac) for the PA-22-150; or Item 401(ad) for the PA-22-160, must be in each aircraft operated in this configuration.

(a) Airspeed Limits (CAS)

V_{ne}	(never exceed)	128 mph	(111 knots)
V_{no}	(max. structural cruising)	100 mph	(87 knots)
V_{p}	(maneuvering)	100 mph	(87 knots)
V_{fe}	(flaps extended)	80 mph	(70 knots)

(b) When the rear door is removed the following placards must be displayed in full view of the pilot:
(1) "Airplane maneuvers are limited to normal take-offs, climbs, banks not to exceed 30°, glides and landings at speeds not in excess of 128 mph."
(2) "No smoking permitted."

(c) No baggage may be carried when the aircraft is flown with the rear door removed.

.....END.....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E-273
Revision 36

CONTINENTAL

O-470-A, -B, -E, -G, -H, -J, -K, -L, -M, -N, -P, -R, -S, -T, -U
O-470-B-CI, -G-CI, K-CI, L-CI, M-CI (NOTE 6)
IO-470-A, -C

September 29, 1995

TYPE CERTIFICATE DATA SHEET NO. E-273

Engines of models described herein conforming with this data sheet (which is part of type certificate No. 273) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Civil Air Regulations provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder — Teledyne Continental Motors
P.O. Box 90
Mobile, Alabama 36601

Model	O-470-A	O-470-E	O-470-J	O-470-K, -L, -R, -S	O-470-B, -M, -N
Type	6HOA	- - -	- - -	- - -	- - -
Rating, ICAO or ARDC standard atmosphere					
Max. continuous hp, rpm, at sea level pressure altitude	225-2600	225-2600	225-2550	230-2600	240-2600
Takeoff hp, 5 min., rpm, full throttle at sea level pressure altitude	225-2600	225-2600	225-2550	230-2600	240-2600
Fuel, (aviation gasoline, minimum grade)	80/87	- - -	- - -	- - -	91/96
Lubricating oil, ambient air	See NOTE 9	- - -	- - -	- - -	- - -
temperature: Above 40° F.	Oil Grade SAE 50	- - -	- - -	- - -	- - -
Below 40° F.	Oil Grade SAE 30	- - -	- - -	- - -	- - -
Bore and stroke, in.	5.00 x 4.00	- - -	- - -	- - -	- - -
Displacement, cu. in.	471	- - -	- - -	- - -	- - -
Compression ratio	7:1	- - -	- - -	- - -	- - -
Weight (dry), lb.	378	390	378	404 (-K, -L) 401 (-R, -S)	410
C.G. location (basic engine)					
Fwd. of rear face, engine					
Accessory case, in.	12.8	- - -	- - -	12.0	11.3
Below crankshaft center line, in.	0.1	- - -	- - -	0.3	0.5
Beside crankshaft center line, toward 1-3-5 side, in.	===	===	===	===	0.2

Model	O-470-A	O-470-E	O-470-J	O-470-K, -L, -R, -S	O-470-B, -M, -N
Propeller Shaft	Special integral flange 4 7/8 in. o.d. with six ½ in. bolt holes in 4 in. diameter circle	- - -	- - -	- - -	- - -
Carburetion or Fuel Injection	Marvel-Schebler MA-4-5 (TCM #535207 or 538872)	Bendix-Stromberg PSD-5C (TCM #536911)	Marvel-Schebler MA-4-5 (TCM #535207 or 538872)	Marvel-Schebler M-4-5 (TCM #539883) (-L, -K) 641139 (-S, -R)	Bendix-Stromberg PSD-5C (TCM #535503)
Ignition, dual magnetos	NOTE 13	- - -	- - -	- - -	- - -
Timing, ° BTC	26	- - -	20	22	24
Spark plugs	See NOTE 11	- - -	- - -	- - -	- - -
Oil sump capacity, qt.	12; 6 usable at 15° noseup and nosedown attitudes; 7 usable at 10° noseup and nosedown attitudes	- - -	- - -	- - -	- - -
NOTES	1, 2, 3, 4, 9, 10, 11	1, 2, 3, 4, 5, 9, 10, 11	1, 2, 3, 4, 5, 9, 10, 11	1, 2 ,3, 4, 5, 6, 9, 10, 11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

Model	O-470-H	O-470-G, -P	IO-470-A	IO-470-C	O-470-T, -U
Type	6HOA	- - -	- - -	- - -	- - -
Rating, ICAO or ARDC standard atmosphere					
Max. continuous hp, rpm, at sea level pressure altitude	240-2600	240-2600	240-2600	250-2600	230-2400
Takeoff hp, 5 min., rpm, full throttle at sea level pressure altitude	240-2600	240-2600	240-2600	250-2600	230-2400
Fuel, (aviation gasoline, minimum grade)	91/96	- - -	- - -	- - -	100, 100LL or B95/130 CIS
Lubricating oil, ambient air temperature: Above 40° F.	See NOTE 9	- - -	- - -	- - -	- - -
Below 40° F.	Oil Grade SAE 50	- - -	- - -	- - -	- - -
	Oil Grade SAE 30	- - -	- - -	- - -	- - -
Bore and stroke, in.	5.00 x 4.00	- - -	- - -	- - -	- - -
Displacement, cu. in.	471	- - -	- - -	- - -	- - -
Compression ratio	8:1	- - -	- - -	- - -	8.6:1
Weight (dry), lb.	495	432	410	432	410 (-T) 412 (-U)
C.G. location (basic engine)					
Fwd. of rear face, engine Accessory case, in.	14.2	12.0	11.3	12.0	11.76 (U-T) 12.07 (-U)
Below crankshaft center line, in.	1.0	1.2	0.5	1.2	.88 (-T) .31(-U)
Beside crankshaft center line, toward 1-3-5 side, in.	0.2	0.5	0.2	0.5	.35 (-T), .11 (-U)
Propeller Shaft	SAE 20 Spline Extension	Special integral flange 4 7/8 in. o.d. with six ½ in. bolt holes in 4 in. diameter circle	- - -	- - -	- - -

Model	O-470-H	O-470-G, -P	IO-470-A	IO-470-C	O-470-T, -U
Carburetion or Fuel Injection	Berndix-Stromberg PSD-5C (TCM#535503)	Bendix-Stromberg PSH-5BO (TCM#625203)	TCM Injector Eq #5580	TCM Injector Eq. #5620 or 5827	Marvel-Schebler MA-4-5 (TCM #641860)
Ignition, dual magnetos	NOTE 13	- - -	- - -	- - -	- - -
Timing, ° BTC	24	- - -	- - -	26	24
Spark plugs	See NOTE 11	- - -	- - -	- - -	- - -
Oil sump capacity, qt.	12; 6 usable at 15° noseup and nosedown attitudes; 7 usable at 10° noseup and nosedown attitudes	12; 10 usable at 18° noseup and 14° nosedown attitudes	12; 6 usable at 15° noseup and nosedown attitudes; 7 usable at 10° noseup and nosedown attitudes	12; 9 usable at 34° noseup and 27° nosedown attitudes; 10 usable at 28° noseup and nosedown attitudes; 11 usable at 16° noseup and nosedown attitudes	12; 6 usable at 15° noseup and nosedown attitudes
NOTES	1, 2, 3, 5, 9, 10, 11	1, 2, 3, 5, 6, 9, 10, 11	1, 2, 3, 5, 9, 10, 11	1, 2, 3, 5, 9, 10, 11	1, 2, 3, 4, 5, 9, 10, 11

" - - -" indicates "same as preceding model."
"===" indicates "does not apply."

Certification Basis CAR 13
Type Certificate No. 273 issued December 4, 1952.

Production Basis P.C. 508

NOTE 1. Maximum permissible temperatures:

Cylinder head		
(Spark plug gasket)		
All engines except	O-470-G, -N	525° F.
	O-470-G, -N	500° F.
(Bayonet thermocouple)	O-470-A, -E, -J, -N	450° F.
	O-470-B, -H, -IO-470-A	475° F.
	O-470-G, -K, -L, -P, -R, -S, -R, -T, -U; IO-470-C	460° F.
Cylinder barrel		290° F.
Oil inlet		225° F., 240° F. (-S, -T, -U)"

NOTE 2. Fuel inlet and oil pressure limits:

Model		Minimum		Maximum
-A, -J, -K, -L		0.5 p.s.i.		6.0 p.s.i
-B, -E, -G, -H, -M, -N		9.0 p.s.i.		15.0 p.s.i.
IO-470-A, O-470-B-CI, -M-CI	minus	0.75 p.s.i	plus	1.50 p.s.i.
-G-CI	minus	2.25 p.s.i	plus	10.0 p.s.i.
-K-CI, -L-CI	minus	1.0 p.s.i.	plus	12.0 p.s.i.
IO-470-C	minus	2.0 p.s.i.	plus	10.0 p.s.i.
O-470-R,-S		15.5 in.	gasoline	6.0 p.s.i.
O-470-T, -U		14.0 in.	gasoline	6.0 p.s.i.

Oil pressure limits: 2-4-6 side (normal) 30 to 60 p.s.i. (idle 10 p.s.i. min.)

NOTE 3. The following accessory drive or mounting provisions are available:

Original Accessory	**Direction of Rotation	Speed Ratio to Crankshaft	Max. Torque Continuous	(in.-lb.) Static	Maximum Overhang Moment (in.-lb.)
Governor	C	1.0:1	29	825	50
****Tachometer	CC	.5:1			25
Optional (2)					
Left & Right Hand	C	1.5:1	***100	800	40
Generator (Belt driven)	CC	2:1	100	800	100
Alternator (Gear driven)	CCW	3:1	150	800	150
*Fuel pump	C	1.0:1	25	680	60
Oil cooler	===	===	===	===	65
Starter:	CC	32:1	200	400	60

O-470-B, -B-CI engines eligible with TCM P/N 537241.
All others eligible with TCM P/N 535856, 539910, 626960, 627842, 628482, or 637847.

* Special equipment on O-470-A, -J, -K, and -L models.
** "C" indicates clockwise viewing drive pad; "CC" counter clockwise.
*** One drive eligible at 160 in.-lb. continuous torque load provided the other drive does not exceed 100 in.-lb. continuous torque load.
****O-470-G clockwise; O-470-V and -VO optional rotation.

NOTE 4. Crankshaft damper configuration: O-470-A, S/N 41000 and up, and -E, -J, -R, -S, and -T engines are equipped with one 5th and one 6th order damper.
O-470-B, -H, and -N have two 6-½ order dampers.
O-470-K, -L, -M, -P and IO-470-A and -C have four 6th order dampers.
O-470-G has one 6-½ and one 9th order damper.
O-470-A, S/N 40001 through 40655, and -P, have two 6th order dampers.
O-470-U has two 6th, one 5th, and one 4½ order dampers.

NOTE 5. The following similarities and differences exist between the various models:
O-470-B is similar to O-470-A except for increased power rating, different damper configuration, incorporation of inclined valve cylinders, downdraft pressure carburetor and related induction system changes.
O-470-E is same as O-470-A except for incorporation of downdraft pressure carburetor and related induction system changes.
O-470-G is similar to O-470-M except for crankshaft damper configuration, revised oil sump integral cast intake air passage and mounting brackets.
O-470-J is same as O-470-A except for reduced rated speed and minor changes in induction system risers, manifold and balance tube.
O-470-K is similar to O-470-J except for ratings, crankshaft damper configuration and incorporation of shell-molded cylinder heads and revised mounting brackets.
O-470-L is same as O-470-K except for relocated carburetor and revised intake manifold oil sump.
O-470-M is same as O-470-B except for crankshaft damper configuration and incorporation of shell-molded cylinder heads.
O-470-N is same as O-470-M except for crankshaft damper configuration.
O-470-P is identical to O-470-G except for crankshaft damper configuration.
IO-470-A is same as O-470-M except incorporates CMC continuous flow fuel injection system instead of Bendix carburetor.
IO-470-C is same as O-470-G except for crankshaft damper configuration and incorporation of CMC continuous flow fuel injection system instead of Bendix carburetor.
O-470-H is same as O-470-B except incorporates extension propeller shaft and is approved for pusher operation.
O-470-R is same as O-470-L except for crankshaft damper configuration.
O-470-S is same as O-470-R except for piston oil cooling and semi-keystone piston rings.
O-470-T is similar to the O-470-S except for crankcase design and rating.
O-470-U is similar to the O-470-S except for rating and crankshaft damper configuration.

NOTE 6. O-470-B, -G, -K, -L, and -M engines are eligible for incorporation of TCM continuous flow fuel injection system (Eq. No. 5580 for -B, -M; Eq. No. 5701 or 5702 for -G; Eq. No. 5613 for -K, -L) replacing carburetion system with no change in weight. When this modification is accomplished the engines will be designated as O-470-B-CI, O-470-G-CI, O-470-K-CI, O-470-L-CI and O-470-M-CI and the nameplate changed accordingly.

NOTE 7. O-470-B engine mounting brackets are eligible for use with O-470-M engines.

NOTE 8. O-470-M engines with S/N's suffixed with the letter "P" are approved for pusher type installation.

NOTE 9. Straight mineral or ashless disperant oil meeting TCM Spec. MHS #24 is approved for use in engines, except the O-470-S, -T, and -U which must use ashless disperant oil conforming to MHS-24. TCM instructions should be followed when changing types of oil.

NOTE 10. A full flow oil filter may be used with these engines if the installation incorporates a filter bypass valve which opens between 12 and 16 p.s.i. Oil sump housing is eligible for direct mounting of oil filter having a maximum weight of 6 lb. and overhang moment of 25 in.-lb.

NOTE 11. The following spark plugs are approved on these engines:

Models O-470-A, -E, -J, -K, -L, -R, -S

AC	HSR83IR, SR83IR, HSR83P, SR83P, HSR87, SR87, A88, S88, HSR88, HS88, SR88, S88D, SR88D
Auto Lite	SH2M, SH15, SH15R, SH20, SH20A, SH200A, SH150
BG	RB485S, 706S, RB919SR, 919SR5, RB955S
Champion	RC26S, C27S, REM38P, RHM38P, RED39N, RHD39N, REM39N, RHM39N, REM40E, RHM40E, D41N, ED41N, EM41N, EM42E
Red Seal	SE190, SE230, SJ190, SJ230

Models O-470-B, -G, -H, -M, -N, -P; IO-470-A

AC	SR83IR, HSR83IR, HSR83P, SR83P, S86R, SR86, HSR86, SR87, HSR87
Auto Lite	SH20A, SH200A, SH26, SH260, PH26, PH260
BG	RB485S, RB955S
Champion	RC26S, REM38E, REM38P, RHM38E, RHM38P, RED39N, REM39N, RHD39N, RHM39N, REM40E, RHM40E
Red Seal	SE230, SJ230, SE270, SJ270

Model IO-470-C

AC	SR83IR, HSR83IR, HSR83P, SR83P, SR86, HSR86, S86R, HSR87, SR87
Auto Lite	SH26, SH260, PH26, PH260
Champion	R25S, RC26CS, RED37N, REM37N, RHD37N, REM38E, REM38P, RHM38E, RHM39P, RED39N, RHD39N, RHM39N, REM40E, RHM40E, RHM37N, REM39N
Red Seal	SE270, SJ270

Model O-470-T, -U

AC	SR86L, HSR86L, HSR87LIR HSR87LP, 171, 181, 271, 273, 281, 281IR, 283, 283IR
Auto Lite	SL350
Champion	RHA32N, RHB32N, RHB32E, RHB33E, RHB36P, RHB37E, REA37N, REB37N, RHA37N, RHB37N, RHB38E, R115
Red Seal	LE310, LJ8310

NOTE 12. Teledyne Crittenden Alternator P/N 642056 and Drive Coupling P/N 642362 eligible for use with Model O-470-T engine. Alternator compatibility with aircraft must be accomplished by installer.

NOTE 13. The following magnetos equipped with an appropriate harness are eligible on these engines at the Indicated Weight Changes:

Two TCM/Bendix S6RN-25	None
One Ea. TCM/Bendix S6RN-201 & S6RN-205	-2 lb.
Two Bendix Scintilla 1225	-1 lb.
Two TCM S6RSC-25	None
One Ea. TCM S6RSC-201(L) & S6RSC-205(R)	None
Two Slick Electro 662	None
Two Slick Electro 680	None
Two Slick Electro 6210	-5 lb.
Two Slick model 6310	-5 lb.

.....END.....

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

P57GL
REVISION 10
McCAULEY
3AF32C(5--)
3AF34C(5--)
3AF36C(5--)
3AF37C(5--)
B3DF36C(5--)
December 7, 2004

TYPE CERTIFICATE DATA SHEET NO. P57GL

Propellers of models described herein conforming with this data sheet, which is part of Type Certificate No. P57GL and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with the pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder	McCauley Accessory Division 7751 East Pawnee Wichita, KS 67207
Type	Constant speed; hydraulic (see Notes 3 and 4)
Engine Shaft	Special flange 4.00 inch B.C.
Hub Material	Aluminum Alloy
Blade Material	Aluminum Alloy
No. of Blades	Three
Hub Models	3AF34C502, 3AF34C503, 3AF32C504, 3AF32C505, 3AF32C506, 3AF32C507, 3AF32C508, 3AF32C509, 3AF37C510 3AF32C511, 3AF32C512, 3AF36C514, 3AF32C515, 3AF37C516, 3AF32C521, 3AF32C522, 3AF32C523, 3AF32C524, 3AF36C525, B3DF36C526, B3DF36C527, and 3AF32C528.

Blades (See Note 2)	Maximum Continuous HP	Maximum Continuous RPM	Take-Off HP	Take-Off RPM	Diameter Limits (See Note 2)	Approx. Max. Wt. Complete (For Ref. Only)
			Hub Model 3AF34C502			
80H[X]-0 to 80H[X]-8	215	2575	215	2575	80" - 72" (-0 to -8)	76.0 Lbs.
			Hub Model 3AF34C503			
L80H[X]-0 to L80H[X]-8	215	2575	215	2575	80" - 72" (-0 to -8)	76.0 Lbs.
			Hub Models 3AF32C504, 3AF32C505, 3AF32C511, 3AF32C512, and 3AF32C528			
82NE[X]-2 to 82NE[X]-8	325	2700	325	2700	80" - 74" (-2 to -8)	70.0 Lbs. 75.8 Lbs.* 73.0 Lbs.**

Blades (See Note 2)	Maximum Continuous HP	RPM	Take-Off HP	RPM	Diameter Limits (See Note 2)	Approx. Max. Wt. Complete (For Ref. Only)
			Hub Model 3AF32C506			
82NE[X]-2 to 82NE[X]-10	250	2400	250	2400	80" - 72" (-2 to -10)	71.5 Lbs.
			Hub Model 3AF32C507			
L82NE[X]-2 to L82NE[X]-10	250	2400	250	2400	80" - 72" (-2 to -10)	71.5 Lbs.
			Hub Model 3AF32C508			
82NF[X]-2 to 82NF[X]-8	220	2800	220	2800	80" - 74" (-2 to -8)	69.5 Lbs.
			Hub Model 3AF32C509			
L82NF[X]-2 to L82NF[X]-8	220	2800	220	2800	80" - 74" (-2 to -8)	69.5 Lbs.
			Hub Model 3AF37C510			
90LF[X]-0 to 90LF[X]-10	375	2400	375	2400	90" - 80" (-0 to -10)	86.9 Lbs.
			Hub Model 3AF36C514 and 3AF36C525			
80VMF[X]-0 to 80VMF[X]-6	350	2700	350	2700	80" - 74" (-0 to -6)	70.0 Lbs. 75.8 Lbs***.
			Hub Model 3AF32C515			
82NL[X]-2 to 82NL[X]-8	350	2700	350	2700	80" - 74" (-2 to -8)	74.0 Lbs.
			Hub Model 3AF37C516			
90LF[X]-0 to 90LF[X]-6	375	2275	375	2275	90" - 84" (-0 to -6)	86.9 Lbs.
			Hub Model 3AF32C521			
82NL[X]-4 to 82NL[X]-10	350	2700	350	2700	78" - 72" (-4 to -10)	80.5 Lbs.
			Hub Model 3AF32C522			
82NJ[X]-2 to 82NJ[X]-8	220	2800	220	2800	80" - 74" (-2 to -8)	69.5 Lbs.
			Hub Model 3AF32C523			
L82NJ[X]-2 to L82NJ[X]-8	220	2800	220	2800	80" - 74" (-2 to -8)	69.5 Lbs.
			Hub Model 3AF32C524			
90UM[X]-0 to 90UM[X]-8	375	2275	375	2275	90" - 74" (-0 to -16)	118.5 Lbs.

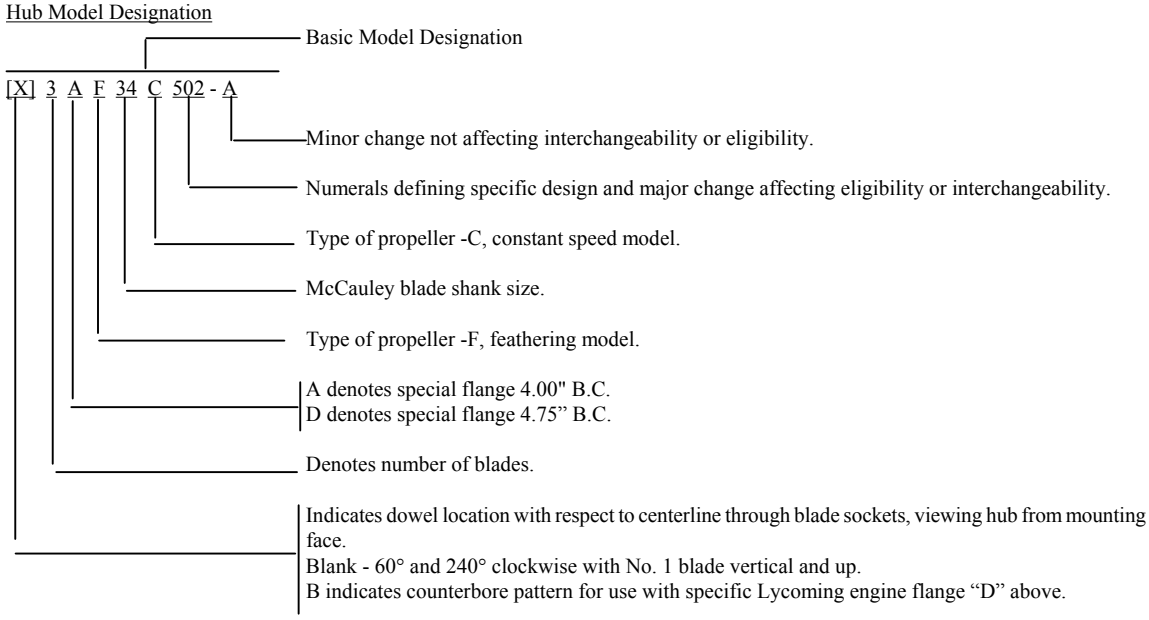
Blades (See Note 2)	Maximum Continuous HP	RPM	Take-Off HP	RPM	Diameter Limits (See Note 2)	Approx. Max. Wt. Complete (For Ref. Only)
			Hub Model B3DF36C526			
80HJ[X]-0 to 80HJ[X]-8	350	2575	350	2575	80" - 72" (-0 to -8)	96.0 Lbs.
			Hub Model B3DF36C527			
L80HJ[X]-0 to L80HJ[X]-8	350	2575	350	2575	80" - 72" (-0 to -8)	96.0 Lbs.

*Higher Weight applies to –C511 model only. **Higher Weight applies to –C528 model only. ***Higher Weight applies to –C514 model only.

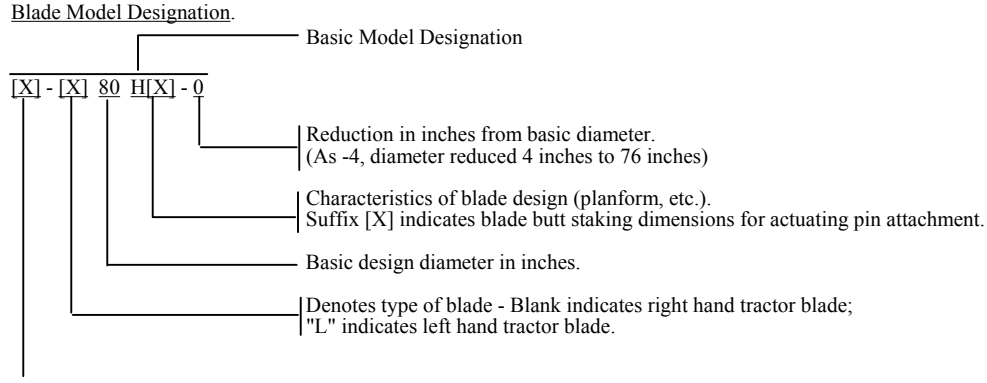
Certification Basis Type Certificate No. P57GL issued July 17, 1978, under Delegation Option Authorization Provisions of 14 CFR Part 21, Subpart J.
Date of application for Type Certificate, July 12, 1978.
Models 3AF34C502, 3AF34C503, 3AF32C504, 3AF32C505, 3AF32C508, 3AF32C509:
14 CFR Part 35 including Amendments 35-1 through 35-4 (May 2, 1977) thereto.
Models 3AF32C506, 3AF32C507, 3AF32C511, 3AF32C512, 3AF36C514:
14 CFR Part 35 including Amendments 35-1 though 35-5 (October 14, 1980) thereto.
Models 3AF37C510, 3AF32C515, 3AF37C516, 3AF32C521, 3AF32C522, 3AF32C523, 3AF32C524, 3AF36C525, B3DF36C526, B3DF36C527, 3AF32C528:
14 CFR Part 35 including Amendments 35-1 through 35-6 (August 18, 1990) thereto.

Production Basis Production Certificate No. 3

NOTE 1. Hub Model Designation



NOTE 2. Blade Model Designation.



——————————— Minor change not affecting interchangeability or eligibility.

NOTE 3. Pitch Control. With the following governors:

McCauley Model DCF290D[X]/T[X]	Wt. 3.0 lbs.
McCauley Model DCFU290D[X]/T[X]	Wt. 3.0 lbs.
McCauley Model DCFS290D[X]/T[X]	Wt. 3.0 lbs.
McCauley Model DCFUS290D[X]/T[X]	Wt. 3.0 lbs.
Hartzell Model E-[X]-[X]	Wt. 4.5 lbs.
Hartzell Model E-[X]-[X]L	Wt. 4.5 lbs.
Hartzell Model U-[X]-[X]	Wt. 4.5 lbs.
Hartzell Model U-[X]-[X]L	Wt. 4.5 lbs.
Woodward Model [X]2106[X][X]	Wt. 3.5 lbs.

NOTE 4. Feathering. With full feathering control installed in accordance with the propeller manufacturer's instructions. Controls may include unfeathering, synchronizing or synchrophasing features.

NOTE 5. Not applicable.

NOTE 6. Not applicable.

NOTE 7. Accessories

a. Propeller Anti-icing/Deicing

(1) Model 80HA, L80HA, 82NFA, and L82NFA blades per Goodrich installation drawing 7E1391.

(2) Model -C504/82NEA and -C505/82NEA blades per McCauley assembly drawing E-5186.

(3) Model -C511/82NEA and -C512/82NEA blades per McCauley assembly drawing E-5358.

(4) Model 82NEB or L82NEB blades per McCauley assembly drawing E-5203.

(5) Model 80VMF blades per McCauley assembly drawing E-6312, and deice installation drawing D-40486.

(6) Model 3AF32C515/82NLA per McCauley assembly drawing E-5186 and deice installation drawing C-40219.

(7) Model 3AF37C516/90LFB per McCauley assembly drawing E-7110.

(8) Model 3AF37C510/90LFB per McCauley assembly drawing E-7272.

(9) Model 3AF32C524/90UMB per McCauley assembly drawing E-7549.

(10) Model 3AF36C525/80VMF[X] per McCauley assembly drawing E-7507.

(11) Model B3DF36C526/80HJ[X] per McCauley assembly drawing E-7527.

(12) Model B3DF36C527/L80HJ[X] per McCauley assembly drawing E-7528.

(13) Model 3AF32C528/82NE[X] per McCauley assembly drawing E-7552.

b. Propeller Spinners

(1) Model 3AF34C502/80HA or 3AF34C503/L80HA with plain or electric deice spinner; reference D-4986 Dome, D-4984 Bulkhead and D-4987 Installation.

(2) Model 3AF32C504/82NEA or 3AF32C505/NEA with plain or electric deice spinner; reference D-3651 Dome, D-3925 Bulkhead and D-4042 Installation.

(3) Model 3AF32C506/82NEB or 3AF32C507/L82NEB with plain or electric deice spinner; reference D-5285 Dome, D-5274 Bulkhead and D-5275 Installation.

(4) Model 3AF32C508/82NFA or 3AF32C509/L82NFA with plain or electric deice spinner; reference D-4986 Dome, D-4984 Bulkhead and D-4987 Installation.

(5) Model 3AF32C511/82NEA with plain or electric deice spinner; reference D-5370 Dome, D-5371-2 Bulkhead and D-5311 Installation.

(6) Model 3AF32C512/82NEA with plain or electric deice or liquid anti-ice spinner; reference D-5370 Dome, D-5499-1 and -3 Bulkhead and D-5309 and D-5310 Installation.

(7) Model 3AF36C514/80VMFA with plain or electric deicing spinner; reference E-6190 Dome, E-6178 Bulkhead and D-6176 Installation.

(8) Model 3AF32C515/82NLA with electric deice spinner; reference D-5215 Installation.

(9) Model 3AF37C516/90LFB per assembly drawing E-7110.

(10) Model 3AF37C510/90LFB per assembly drawing E-7272.

(11) Model 3AF32C522/82NJA per assembly drawing E-7315.

(12) Model 3AF32C523/L82NJA per assembly drawing E-7316.

(13) Model 3AF32C524/90UMB per assembly drawing E-7549.

(14) Model 3AF36C525/80VMF[X] per assembly drawing E-7507.

(15) Model B3DF36C526/80HJ[X] per assembly drawing E-7527.

(16) Model B3DF36C527/L80HJ[X] per assembly drawing E-7528.

(17) Model 3AF32C528/82NE[X] per assembly drawing E-7552.

NOTE 8. Not applicable.

NOTE 9. Not applicable.

NOTE 10. Special Notes. Aircraft installation must be approved as part of the aircraft type certificate upon compliance with the applicable aircraft airworthiness requirements.

...END...

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

P-920
Revision 29
Hartzell
HC-C2Y, BHC-C2Y,
CHC-C2Y, DHC-C2Y
January 24, 2007

TYPE CERTIFICATE DATA SHEET NO. P-920

Propellers of models described herein conforming with this data sheet (which is part of Type Certificate No. P-920) and other approved data on file with the Federal Aviation Administration meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder	Hartzell Propeller Inc. Piqua, OH 45356
Type	Constant speed; hydraulic (see Notes 3 and 4)
Engine shaft	Special flange (see Note 1)
Hub material	Aluminum Alloy
Blade material	See Below
Number of blades	Two
Hub models	HC-C2YF-1, -2, -4; BHC-C2YF-1, -2, -4; CHC-C2YF-1, -2; DHC-C2YF-1, -2; HC-C2YK-1, -2, -4; HC-C2YL-1, -2, -4; HC-C2YR-1, -2, -4 (See Notes 1 and 4)

Blades (see Note 2)	Maximum Continuous HP	Maximum Continuous RPM	Takeoff HP	Takeoff RPM	Diameter Limits (see Note 2)	Approx. Max. Wt. Complete (For Reference Only) (see Notes 3 and 7)	Blade Construction (See Note 10)
Non-Counterweighted Blades - Hub models: all -1 and -2							
7068-0 to 7068-10	300	2700	300	2700	70" to 60" (-0 to -10)	53.0 lb.	Aluminum Alloy
7280+ ½ to 7280-7	250	2700	250	2700	72 ½" to 65" (+½ to -7)	51.0 lb.	Aluminum Alloy
7495-0 to 7495-6	250	2700	250	2700	74" to 68" (-0 to -6)	50.0 lb.	Aluminum Alloy
7496-0 to 7496-6	250	2700	250	2700	74" to 68" (-0 to -6)	50.0 lb.	Aluminum Alloy
7497-0 to 7497-6	250	2700	250	2700	74" to 68" (-0 to -6)	51.8 lb.	Aluminum Alloy
7663-0 to 7663-8	210	2800	210	2800	76" to 68" (-0 to -8)	46.0 lb.	Aluminum Alloy
7666-0 to 7666-8	180 or 250	2900 2700	180 or 250	2900 2700	76" to 68" (-0 to -8)	51.0 lb.	Aluminum Alloy
7681-0 to 7681-8	250	2700	250	2700	76" to 68" (-0 to -8)	51.0 lb.	Aluminum Alloy
7692-0 to 7692-8	180 or 250	2900 2700	180 or 250	2900 2700	76" to 68" (-0 to -8)	46.0 lb.	Aluminum Alloy
7694-0 to 7694-10	210	2800	210	2800	76" to 66" (-0 to -10)	49.5 lb.	Aluminum Alloy
7694-4 to 7694-10	310	2700	310	2700	72" to 66" (-4 to -10)	49.5 lb.	Aluminum Alloy
8052-0 to 8052-8	310	2600	310	2600	80" to 72" (-0 to -8)	50.5 lb.	Aluminum Alloy

Blades (see Note 2)	Maximum Continuous HP	RPM	Takeoff HP	RPM	Diameter Limits (See Note 10)	Approx. Max. Wt. Complete (For Reference Only) (see Notes 3 and 7)	Blade Construction (See Note 10)
8068-0 to 8068-8	285	2700	285	2700	80” to 72” (-0 to -8)	50.0 lb.	Aluminum Alloy
8459-0 to 8459-18	260	2800	260	2800	84” to 66” (-0 to -18)	48.0 lb.	Aluminum Alloy
8465-0 to 8465-14	315	2575	315	2575	84” to 70” (-0 to -14)	50.0 lb.	Aluminum Alloy
8467-0 to 8467-12	285	2700	285	2700	84” to 72” (-0 to -12)	52.0 lb.	Aluminum Alloy
8468-0 to 8468-12	285	2700	285	2700	84” to 72” (-0 to -12)	50.0 lb.	Aluminum Alloy
8470-0 to 8470-8	260	2700	260	2700	84” to 76” (-0 to -8)	49.0 lb.	Aluminum Alloy
8475+2 to 8475-4	310	2700	310	2700	86” to 80” (+2 to -4)	52.0 lb.	Aluminum Alloy
8475-4 to 8475-6	350	2700	350	2700	80” to 78” (-4 to -6)	51.0 lb.	Aluminum Alloy
8475-6 to 8475-14	310	2700	310 or 300	2700 or 2850	78” to 70” (-6 to -14)	50.0 lb.	Aluminum Alloy
8477-0 to 8477-4	310 or 260	2575 or 2700	310 or 260	2575 or 2700	84” to 80” (-0 to -4)	54.0 lb.	Aluminum Alloy
8477-4 to 8477-6	350	2700	350	2700	80” to 78” (-4 to -6)	53.0 lb.	Aluminum Alloy
8477-6 to 8477-14	310	2700	310 or 300	2700 or 2850	78” to 70” (-6 to -14)	52.0 lb.	Aluminum Alloy
9587-0 to 9587-2	320	2200	320	2200	95” to 93” (-0 to -2)	49.5 lb.	Aluminum Alloy
9587-2 to 9587-20	320 or 300	2200 or 2400	320 or 300	2200 or 2400	93” to 75” (-2 to -20)	50.0 lb.	Aluminum Alloy
			Non-Counterweighted Blades - Hub model HC-C2YR-1				
N7605-0 to N7605-10	215	2700	215	2700	76” to 66” (-0 to -10)	43.0 lb.	Composite
			Counterweighted Blades - Hub models: all -2 and -4				
C7068-0 to C7068-10	300	2700	300	2700	70” to 60” (-0 to -10)	57.0 lb.	Aluminum Alloy
C7495-0 to C7495-6	250	2700	250	2700	74” to 68” (-0 to -6)	54.0 lb.	Aluminum Alloy
C7496-0 to C7496-6	250	2700	250	2700	74” to 68” (-0 to -6)	54.0 lb.	Aluminum Alloy
C7663-0 to C7663-8	210	2800	210	2800	76” to 68” (-0 to -8)	50.0 lb.	Aluminum Alloy

Blades (see Note 2)	Maximum Continuous HP	RPM	Takeoff HP	RPM	Diameter Limits (See Note 10)	Approx. Max. Wt. Complete (For Reference Only) (see Notes 3 and 7)	Blade Construction (See Note 10)
C7666-0 to C7666-8	180 or 250	2850 or 2700	180 or 250	2850 or 2700	76” to 68” (-0 to -8)	55.0 lb.	Aluminum Alloy
C7681-0 to C7681-8	250	2700	250	2700	76” to 68” (-0 to -8)	55.0 lb.	Aluminum Alloy
C7692-0 to C7692-8	180 or 250	2900 or 2700	180 or 250	2900 or 2700	76” to 68” (-0 to -8)	50.0 lb.	Aluminum Alloy
C8052-0 to C8052-8	310	2600	310	2600	80” to 72” (-0 to -8)	54.4 lb.	Aluminum Alloy
C8459-0 to C8459-12	260	2800	260	2800	84” to 72” (-0 to -12)	52.0 lb.	Aluminum Alloy
C8465-0 to C8465-14	315	2575	315	2575	84” to 70” (-0 to -14)	54.0 lb.	Aluminum Alloy
C8465-6 to C8465-14	260	2700	260	2700	78” to 70” (-6 to -14)	53.0 lb.	Aluminum Alloy
C8467-0 to C8467-12	285	2700	285	2700	84” to 72” (-0 to -12)	56.0 lb.	Aluminum Alloy
C8468-0 to C8468-12	260	2700	260	2700	84” to 72” (-0 to -12)	54.0 lb.	Aluminum Alloy
C8470-0 to C8470-8	260	2700	260	2700	84” to 76” (-0 to -8)	53.0 lb.	Aluminum Alloy
C8475+2 to C8475-4	310	2700	310	2700	86” to 80” (+2 to -4)	56.0 lb.	Aluminum Alloy
C8475-4 to C8475-6	350	2700	350	2700	80” to 78” (-4 to -6)	55.0 lb.	Aluminum Alloy
C8475-6 to C8475-14	310	2700	310 or 300	2700 or 2850	78” to 70” (-6 to -14)	54.0 lb.	Aluminum Alloy
C8477-0 to C8477-4	310 or 260	2575 or 2700	310 or 260	2575 or 2700	84” to 80” (-0 to -4)	58.0 lb.	Aluminum Alloy
C8477-4 to C8477-6	350	2700	350	2700	80” to 78” (-4 to -6)	57.0 lb.	Aluminum Alloy
C8477-6 to C8477-14	310	2700	310 or 300	2700 or 2850	78” to 70” (-6 to -14)	56.0 lb.	Aluminum Alloy
C9587-0 to C9587-2	320	2200	320	2200	95” to 93” (-0 to -2)	54.0 lb.	Aluminum Alloy
C9587-2 to C9587-20	320 or 300	2200 or 2400	320 or 300	2200 or 2400	93” to 75” (-2 to -20)	54.0 lb.	Aluminum Alloy

* Weights apply to -1 constant speed hub with “F” flange. Add 1.2 lb. for “L”, “K” and “R” flanges, 3.0 lb. for feathering -2 hubs, 5.5 lb. for feathering -2R hubs, and 4.0 lb. for -4 model.

Certification Basis:	Civil Air Regulations Part 14 effective December 15, 1956 Type Certificate No. P-920 issued July 24, 1961. Models added on or after September 27, 1967 were approved under Delegated Option Authorization provisions of 14 CFR Part 21 Subpart J. Date of application for Type Certificate: March 24, 1959. The following models were included under the original certification basis: HC-C2YF-(1,2); HC-C2YK-(1,2); HC-C2YL-(1,2); BHC-C2YF-(1,2); CHC-C2YF-(1,2); DHC-C2YF-(1,2); HC-C2YR-(1,2) The following models were added, updated or revised in accordance with 14 CFR Part 35 with amendments 35-1 and 35-2 effective April 3, 1967: HC-C2YF-(1,2,4); HC-C2YK-(1,2,4); HC-C2YL-(1,2,4); HC-C2YR-(1,2,4); BHC-C2YF-(1,2,4); CHC-C2YF-(1,2); DHC-C2YF-(1,2) The following models were added, updated or revised in accordance with 14 CFR Part 35 with amendments 35-1 through 35-5 effective October 14, 1980: HC-C2YF-(1,2,4); HC-C2YK-(1,2,4); HC-C2YL-(1,2,4); HC-C2YR-(1,2,4); BHC-C2YF-(1,2,4); CHC-C2YF-(1,2); DHC-C2YF-(1,2) The following models were added, updated or revised in accordance with 14 CFR Part 35 with amendments 35-1 through 35-6 effective August 1, 1990: HC-C2YF-(1,2,4); HC-C2YK-(1,2,4); HC-C2YL-(1,2,4); HC-C2YR-(1,2,4); BHC-C2YF-(1,2,4); CHC-C2YF-(1,2); DHC-C2YF-(1,2)
Production Basis:	Production Certificate no. 10

Note 1: Hub Model Designation (See Notes 2, 4, 5 and 6)

B HC - C 2 Y F - 1 RAF

RAF:
- B denotes modified pitch change system
- C denotes spinner arrangement
- F denotes modified pitch change knob
- G denotes Hartzell damper system
- H denotes spinner mounting kit
- L when used denotes left hand rotation
- N indicates compatibility with N shank blades
- P when used denotes a hub unit with a "B" suffix serial number
- R when used denotes a large piston area
- U denotes feather assist spring assembly kit installed within cylinder
- Any other character denotes a minor change not affecting eligibility

1:
- Denotes specific design features as:
- -1: non-feathering, no counterweights, governor oil pressure increases pitch
- -2: feathering with or without counterweights, governor oil pressure decreases pitch
- -4: non-feathering, counterweights, governor oil pressure decreases pitch

F:
- F: special flange with six 1/2" bolts and two 1/2" dowels on a 4" bolt circle
- K: SAE # 2 flange with six 1/2" bolts and four 3/4" drive bushings on a 4-3/4" bolt circle
- L: SAE # 2 flange with six 7/16" bolts and four 5/8" drive bushings on a 4-3/4" bolt circle
- R: SAE # 2 flange with six 1/2" bolts and five 3/4" drive bushings on a 4-3/4" bolt circle

Y: Hartzell blade shank size

2: Number of blades

C: Identifies basic design - C denotes no integral shaft extension

HC: Hartzell Controllable

B: Indicates dowel location with respect to centerline through blade sockets when viewing hub from flange mounting face
- Blank: 90 & 270 deg. clockwise
- B: 30 & 210 deg. clockwise
- C: 150 & 330 deg. clockwise
- D: 60 & 240 deg. clockwise

Note 2: Blade Model Designation (See Note 6)

L C 76 66 D - 3R

- 3R: Number when used indicates inches cut off from (or added to if +) basic diameter; Q when used denotes special 1" x 90 deg. factory-bent tip; R when used denotes specifically rounded tip
- D: D denotes a dimensional modification from the original design; B or K denotes deicing boots; R when used denotes a rounded tip for the basic diameter; S when used denotes a square tip for the basic diameter *; Any other character denotes a minor modification not affecting eligibility
- 66: Basic blade model
- 76: Basic diameter in inches
- C: Denotes counterweighted blades
- L: Denotes blade configuration: right-hand tractor unless otherwise noted; F denotes a large pitch change knob; J denotes left-hand tractor; L denotes left-hand pusher; N denotes composite blade shank type

* Blades may incorporate either round or square tips, yet may not be marked with an "R" or "S" in their model designation. This character is used to distinguish between two or more tip shapes available at the same diameter. Certain blades use "S" to denote shot peening of the exterior surface.

Note 3: Pitch Control (See Notes 4, 6 and 10)

(a) Approved with Hartzell governors per drawings C-4770, C-4771 and C-4772. Wt.: 4.5 lb.

D - 1 - 4 Z Governor Model Designation

- Z: L when used indicates left hand rotation; Z when used indicates drive coupling type; Any other character denotes a minor change not affecting eligibility
- 4: Minor adjustment not affecting eligibility
- 1: Minor adjustment to obtain engine/propeller/governor compatibility
- D: Basic body and major parts modification

(b) The -2 and -4 models have counterweighted blades and use oil to decrease pitch. The -1 models do not have counterweighted blades and use oil to increase pitch.

(c) Maximum governor output pressure: 350 psi for all propeller models

(d) All governors must be approved as part of the aircraft installation regardless of manufacturer.

Note 4:

(a) Feathering — The -1 and -4 models do not feather. The -2 models incorporate feathering and unfeathering features.

(b) Reversing — Not applicable

(c) Piston size — The -2R model differs from the -2 model in that the -2R model has a piston area of 20.2 sq. in. and the -2 has a piston area of 16.25 sq. in.

Note 5: Left-Hand Models (see Notes 1 and 2)

The left-hand version of an approved propeller model is approved at the same rating and diameter as listed for the right-hand model.

Note 6: Interchangeability (See Notes 1, 2 and 3)

(a) Blades

Blades with counterweights (having "C" prefix) can replace non-counterweighted blades on feathering propellers (hub model suffix -2 or -2R) only, provided the air charge is reduced to 80 psi at 70°F. Attached decal specifying air charge must be changed accordingly.

Shot-peened blades may replace non shot-peened blades either individually or as a set

(b) Propellers

"F" type propellers with large pitch change knobs are interchangeable with corresponding propellers with the standard pitch change system.

Propeller models containing a "P" suffix, for example HC-C2YR-1BFP, may replace corresponding models without the "P" suffix, for example HC-C2YR-1BF. Propeller models without the "P" suffix may not replace those containing the "P" suffix.

(c) Governors

Hartzell governors with a "Z" suffix in their model designation may be used interchangeably with corresponding governors without the "Z". For example, the F-6-24Z is a replacement for the F-6-24 and the F-6-24 is a replacement for the F-6-24Z.

(d) Ice protection systems

Refer to Hartzell Service Letter HC-SL-30-260 for ice protection system component interchangeability.

Note 7: Accessories (See Note 10)

(a) Propeller anti-icing (weight of anti-icing system extra)

(1) Approved with fluid feed boots listed on Hartzell approved type design data when installed in accordance with Hartzell specification H-S-2 or Hartzell Manual no. 133( ).

(2) Approved with fluid feed equipment listed in Hartzell approved type design data on propeller models for which equipment is available.

(b) Propeller deicing (weight of deicing equipment extra)

(1) Approved with Goodyear Ice Guards (electrical propeller deicer) when installed in accordance with instructions outlined in Goodyear Report no. AP-147 dated October 23, 1961.

(2) Approved with Goodrich electrical deicing kit 5EXXXX-X, 7EXXXX-X, 77-XXX, 67-XXX, or 65-XXX when the specific kit number is listed on Hartzell type design data and installed in accordance with Goodrich Report no. ATA 30-60-07.

(3) Approved with ice protection equipment when listed on Hartzell type design data.

(c) Propeller spinner (weight of spinner extra)

(1) Approved with Hartzell and other manufacturer's spinners when listed on Hartzell approved type design data.

(d) Propeller Damper C-1576

(1) Approved for use with Hartzell Propeller model HC-C2Y( ). Wt: 8.0 lb.

Note 8: Shank Fairings Not applicable.

Note 9: Special Limits

Table of Propeller - Engine Combinations
Approved Vibrationwise for Use on Normal Category Single Engine Tractor Aircraft

The maximum and minimum propeller diameters that can be used from a vibration standpoint are shown below. No reduction below the minimum diameter listed is permissible, since this figure includes the diameter reduction allowable for repair purposes.

The engine models listed below are the configurations on the engine type certificate unless specifically stated otherwise. Modifications to the engine or airframe that alter the power of the engine models listed below during any phase of operation have the potential to increase propeller stresses and are not approved by this list. Such modifications include, but are not limited to, the addition of a turbocharger or turbonormalizer, increased boost pressure, increased compression ratio, increased RPM, altered ignition timing, electronic ignition, full authority digital engine controls (FADEC), or tuned induction or exhaust. Also, any change to the mass or stiffness of the crankshaft/counterweight assembly is not approved by this list.

Hub Model	Blade Model	Engine Model	Max. Dia. (inches)	Min. Dia. (inches)	Placards
HC-C2YR	F7068-( )	LYC IO-360-B1A, -B1B, -B1C, -B1D, -B1E, -B1F, -E1A, -F1A, LYC O-360-A1A, -A1AD, -A1C, -A1D, -A1F, -A1G, -A1H, -A1LD	68	67	Stabilized operation is prohibited above 25 inches manifold pressure between 2300-2350 RPM and below 15 inches manifold pressure above 2600 RPM
HC-C2YR	F7068	LYC O-360-A1F6, -A1F6D, -A1G6, -A1G6D, -A1H6, -F1A6, -G1A6 LYC IO-360-A1B6, -A1B6D, -A1D6, -A1D6D, -B1F6, -C1C6, -C1D6, -C1E6, -C1E6D	68	66	none
HC-C2YR-1BFP	F7497	LYC O-360-A1A, -A1C, -A1D, -A1F, -A1G, -A1H, -A1P	74	72	none
HC-C2YR-1BFP	F7497	LYC IO-360-A1A, -A1B, -A1C, -A1D, -C1A, -C1B, -C1C, -C1F, -D1A	74	72	Continuous operation is prohibited above 24 inches manifold pressure between 2350 and 2550 RPM
HC-C2YR-1BFP	F7497	LYC IO-360-A1B6, -A1B6D, -A1D6, -A1D6D, -C1C6, -C1D6, -C1E6, -C1E6D	74	72	none
BHC-C2YF	7663	TCM O-300-A, -B, -C, -D, -E	72	70	none
HC-C2YF	7663	TCM IO-346-B	76	76	none
BHC-C2YF	7663	TCM IO-360-A, -B, -C, -D, -E	76	72	none
BHC-C2YF	F7663( )	TCM IO-360-H, -HB	76	72	none
HC-C2YL	7663	LYC O-290-D2A	72	70	none
HC-C2YL	7663	LYC O-320-A3A, -A3B, -A3C, -B3A, -B3B, -B3C, -C3A, -C3B, -C3C, -D1A, -D1B, -D1D, -D1F, -E1A, -E1B, -E1C, -E1F, -E1J	72	70	none
HC-C2YL	7663	LYC IO-320-A1A, -B1A, -B1B, -B1C, -B1D, -B1E, -C1A, -C1B, -D1A, -D1B, -D1C, -E1A, -E1B, -F1A	72	70	none
HC-C2YK HC-C2YR	7666 F7666	LYC O-360-A1A, -A1AD, -A1C, -A1D, -A1F, -A1G, -A1LD, -B1A, -B1B, -C1A, -C1C, -C1F, -C1G, -D1A	76	72	Avoid continuous operation between 2000 and 2250 RPM

Hub Model	Blade Model	Engine Model	Max. Dia. (inches)	Min. Dia. (inches)	Placards
HC-C2YK HC-C2YR	7666 F7666A	LYC O-360-C1E, -C1F	76	72	Avoid continuous operation between 2000 and 2350 RPM
HC-C2YK HC-C2YR	F7666A-2Q	LYC O-360-A1A, -A1C, -A1D, -A1F, -A1G, -B1A, -B1B, -C1A, -C1C, -C1F, -D1A	74	74	Avoid continuous operation between 2000 and 2250 RPM
HC-C2YK	7666	LYC IO-360-A1A, -A1B, -A1C, -C1A, -C1B, -C1C, -D1A	74	72	Avoid continuous operation between 2000 and 2350 RPM
HC-C2YK	7666	LYC IO-360-B1A, -B1C	74	72	Avoid continuous operation between 2000 and 2250 RPM
HC-C2YK HC-C2YR	F7666( )-3Q	LYC IO-360-A3B6D	73	73	none
HC-C2YK HC-C2YR	F7666 F7666A	LYC O-360-E1A6D	74	72	none
HC-C2YK HC-C2YR	F7666A-2	LYC O-360-A1F6D	74	73	none
HC-C2YR	F7666A-( )R	LYC TO-360-E1A6D	74	72	none
( )HC-C2YK ( )HC-C2YR	( )7666( )-4Q	LYC IO-360-B1A, -B1B, -B1D, -B1E, -B1F, -E1A, -F1A	72	72	Avoid continuous operation between 2000 and 2250 RPM
HC-C2YK HC-C2YR	F7666A-4Q	LYC O-360-A1A, -A1C, -A1D, -A1F, -A1G, -B1A, -B1B, -C1A, -C1C, -D1A	72	72	Avoid continuous operation between 2000 and 2250 RPM
HC-C2YK	F7666A-4Q	LYC IO-360-A1B6	72	72	none
HC-C2YK HC-C2YR	7666-4Q	LYC IO-360-A1A, -A1B, -A1C, -C1A, -C1B, -C1C, -D1A	72	72	Avoid continuous operation between 2000 and 2350 RPM
HC-C2YK	7666	LYC IO-360-B1A, -B1B, -B1C, -B1D, -B1E, -B1F, -E1A, -F1A	74	72	Avoid continuous operation between 2000 and 2250 RPM
HC-C2YK	7666	LYC IO-360-B1A, -B1B, -B1C, -B1D, -B1E, -B1F, -E1A, -F1A	76	74 1/2	Avoid continuous operation between 2000 and 2250 RPM
HC-C2YK HC-C2YR	7666	LYC IO-360-A1B6, -A1D6, -C1C6, -C1E6	76	76	None when used with Hartzell C-1576 damper
HC-C2YK HC-C2YR	7666	LYC IO-360-A1B6, -A1D6, -C1C6, -C1E6	76	76	Avoid continuous operation between 2000 and 2400 RPM
HC-C2YK HC-C2YR	7666	LYC O-360-F1A6	74	72	none
HC-C2YK HC-C2YR	( )7666	LYC IO-360-A1B6D	74	72	none
HC-C2YK HC-C2YR	7666A F7666A	LYC IO-360-C1C	74	72 1/2	Avoid continuous operation between 2000 and 2350 RPM

Hub Model	Blade Model	Engine Model	Max. Dia. (inches)	Min. Dia. (inches)	Placards
HC-C2YK HC-C2YR	F7666A	LYC TIO-360-C1A6D LYC TO-360-C1A6D	76	75	Do not operate above 36 inches manifold pressure at engine speeds below 2400 RPM
HC-C2YK HC-C2YR	F7666	LYC IO-360-A1B6, -A1D6, -C1C6, -C1E6	74	72	none
BHC-C2YF	8052	TCM TSIO-520-BE	80	78	none
HC-C2YR-1BFP	F8068	LYC IO-540-D4A5, -D4B5, -D4C5, -T4A5D, -T4B5, -T4B5D, -T4C5D, O-540-E4A5, -E5B5, -E4C5	80	78	none
BHC-C2YF	F8459	TCM TSIO-360-E, -EB, -KB	76	75	Avoid continuous operation between 2000 and 2200 RPM with engine manifold pressure above 32 inches. Avoid continuous ground operation in cross and tail winds of over 10 knots between 1700 and 2100 RPM.
BHC-C2YF	F8459-( )R	TCM TSIO-360-F, -FB, -G	76	75	Avoid continuous operation between 2000 and 2200 RPM with engine manifold pressure above 32 inches. Avoid continuous ground operation in cross and tail winds of over 10 knots between 1700 and 2100 RPM.
BHC-C2YF	F8459( )-( )R	TCM IO-360-ES	76	75	Avoid continuous ground operation between 1700 and 2100 RPM in cross and tail winds of over 10 knots.
HC-C2YF	8459	Franklin 6A-350-C1, -C2	80	76	none
HC-C2YL	8459	LYC O-320-A3A, -A3B, -A3C, -B3A, -B3B, -B3C, -C3A, -C3B, -C3C, -D1A, -D1B, -E1A, -E1B, -E1C, -E1F	66	66	none
HC-C2YL	8459	LYC IO-320-A1A, -B1A, -B1B, -B1C, -B1D, -B1E, -C1A, -C1B, -D1A, -D1B, -E1A, -E1B, -F1A	66	66	none
BHC-C2YF CHC-C2YF DHC-C2YF	8465	TCM IO-470-L, -LO	78	76	none
HC-C2YK HC-C2YR	8467	LYC IO-540-D4A5	77	75	Avoid continuous operation between 2500 and 2600 RPM above 25 inches manifold pressure.

Hub Model	Blade Model	Engine Model	Max. Dia. (inches)	Min. Dia. (inches)	Placards
HC-C2YK HC-C2YR	F8467-8R	LYC IO-540-E4A5	76	76	Avoid continuous operation between 2500 and 2600 RPM above 25 inches manifold pressure.
HC-C2YK HC-C2YR	F8467	LYC IO-540-R1A5 with RayJay turbocharger (up to 29 inches manifold pressure absolute)	77	75	none
HC-C2YK HC-C2YR	8467-( )R	LYC O-540-B4A5, -B4B5, -E4A5, -E4B5, -E4C5	77	75	Avoid continuous operation between 2500 and 2600 RPM above 25 inches manifold pressure.
HC-C2YK HC-C2YR	8467-( )R	LYC IO-540-T4A5D	77	75	none
HC-C2YF BHC-C2YF	8468	TCM O-470-R	84	80	none
HC-C2YF	8468	TCM IO-470-D, -E, -F, -G, -H, -M, -N, -R, -S	84	84	Avoid continuous operation between 2100 and 2225 RPM.
HC-C2YF	8468	TCM IO-470-D, -E, -F, -G, -H, -M ,-N, -R, -S	82	80	none
HC-C2YF	8468	TCM IO-470-D, -E, -F, -G, -H, -M ,-N, -R, -S	78	78	Do not exceed 23 inches manifold pressure below 2300 RPM.
BHC-C2YF	8468R	TCM IO-520-BA	84	84	none
BHC-C2YF	F8468R F8468AR	TCM IO-520-BB	84	84	none
HC-C2YL	8468 F8468 F8468R F8468AR	LYC O-320-A3A, -A3B, -A3C, -B3A, -B3B, -B3C, -C3A, -C3B, -C3C, -D1A, -D1B, -E1A, -E1B, -E1C, -E1F	80	74	none
HC-C2YL	8468-6Q	LYC O-320-A3A, -A3B, -A3C, -B3A, -B3B, -B3C, -C3A, -C3C, -D1A, -D1B, -E1A, -E1B, -E1C, -E1F	78	78	none
HC-C2YK	8468-10R	LYC TIO-360-A1A, -A1B	74	74	Avoid continuous operation between 1975 and 2200 RPM.
HC-C2YK HC-C2YR	8468	LYC O-540-B4A5, -B4B5	84	77	none
HC-C2YR	F8468AR	LYC O-540-B4B5, -J1A5D, -J3A5, LYC IO-540-W1A5, -W1A5D	81	77	none

Hub Model	Blade Model	Engine Model	Max. Dia. (inches)	Min. Dia. (inches)	Placards
HC-C2YF	8475	TCM IO-520-A, -J, TCM TSIO-520-A, -C, -G, -H	80	77	none
HC-C2YF	8475	TCM IO-520-D, -E, -F, -K, -L	78	77	none
BHC-C2YF	8475	TCM IO-520-B, -C, -CB, TCM TSIO-520-B, -D	80	77	none
BHC-C2YF	8475	TCM TSIO-520-E	78	77	none
HC-C2YK HC-C2YR	8475R	LYC IO-540-K1B5, -K1C5, -L1A5, -M1A5	84	84	none
HC-C2YK HC-C2YR	8475R	LYC IO-540-K1A5, -K1D5, -K1G5	84	78	none
HC-C2YK HC-C2YR	8475D	LYC IO-540-K1A5, -K1G5, -K1A5D, -K1G5D	83	78	none
HC-C2YK HC-C2YR	8475	LYC IO-540-K1A5, -K1B5, -K1C5, -L1A5, -M1A5	83	78	none
HC-C2YK HC-C2YR	8475	LYC TIO-540-A1A	80	80	none
HC-C2YK HC-C2YR	8475+2	LYC IO-540-K1A5, -K1B5, -K1C5, -K1D5, -L1A5, -M1A5	86	86	Do not exceed 24 inches manifold pressure between 2300 and 2475 RPM.
HC-C2YR	F8477( )	LYC O-360-A1F6, -A1F6D, -A1G6, -A1G6D, -A1H6, -F1A6, -G1A6 LYC IO-360-A1B6, -A1B6D, -A1D6, -A1D6D, -B1F6, -C1C6, -C1D6, -C1E6, -C1E6D	84	78	none
HC-C2YR	F8477	LYC IO-360-A1A, -A1B, -A1C, -A1D, -B1A, -B1B, -B1D, -B1E, -B1F, -C1A, -C1B, -C1C, -C1F, -D1A LYC O-360-A1A, -A1C, -A1D, -A1F, -A1G, -A1H, -A1P, -C1A, -C1C, -C1E, -C1F, -C1G	80	78	Propeller must be equipped with Hartzell model C-1576 damper assembly.
HC-C2YK HC-C2YR	F8477-6Q	LYC IO-540-D4A5, -D4B5, -D4C5	78	78	none
HC-C2YK HC-C2YR	8477	LYC O-540-A4A5, -A4B5, -A4C5, -A4D5, -E4A5, -E4B5, -E4C5	84	76	none
HC-C2YK HC-C2YR	8477-8R	LYC O-540-A4A5, -A4B5, -A4C5, -A4D5, -E4A5, -E4B5, -E4C5	76	76	none
HC-C2YK HC-C2YR	8477	LYC O-540-G1A5	84	83	none
HC-C2YK HC-C2YR	8477	LYC IO-540-C4B5, -C4C5, -D4A5, -D4B5	84	76	none
HC-C2YK HC-C2YR	F8477D-( )R	LYC O-540-A4A5, -A4B5, -A4C5, -A4D5, -E4A5 LYC IO-540-C4B5, -D4A5	84	76	none

Hub Model	Blade Model	Engine Model	Max. Dia. (inches)	Min. Dia. (inches)	Placards
HC-C2YK HC-C2YR	8477	LYC IO-540-V4A5, -V4A5D, -T4A5D, T4B5D, -T4C5D	84	76	none
HC-C2YK HC-C2YR	8477	LYC IO-540-K1A5, -K1B5, -K1C5, -K1D5, -L1A5, -M1A5	80	80	Do not exceed 23 inches manifold pressure below 2200 RPM.
HC-C2YK HC-C2YR	F8477A	LYC IO-540-K1D5	80	78	Do not exceed 23 inches manifold pressure below 2200 RPM.
HC-C2YR	F8477-4	LYC TIO-540-AB1AD	80	78	none
HC-C2YF	9587A	TCM 6-285-B, -C	95	93	Avoid continuous operation on the ground between 1900 and 2300 engine RPM in winds above 15 MPH.

Note 10: Propeller installation must be approved as part of the aircraft Type Certificate and demonstrate compliance with the applicable aircraft airworthiness requirements.

Propeller models listed herein consist of basic hub and blade models. Most propeller models include additional characters to denote minor changes and specific features as explained in Notes 1 and 2. Refer to the aircraft Type Certificate Data Sheet for the specific propeller model applicable to the installation.

Propellers with composite blades must be evaluated for bird impact resistance prior to approval on any type aircraft. Hartzell Propeller must perform tests and/or analyses based on aircraft configuration and operating conditions to determine the potential hazard as a result of a bird strike.

Note 11: Retirement Time

(a) Life Limits and Mandatory Inspections

(1) Airworthiness limitations, if any, are specified in Hartzell Manuals 113( ) or 117( )

Note 12: Special Notes

(a) Refer to Hartzell Manual no. 202( ) for overspeed and overtorque limits.

(b) Refer to Hartzell Service Letter HC-SL-61-61( ) for overhaul periods.

END

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

2A4
Revision 46
Twin Commander

560-F	681
680	690
680E	685
680F	690A
720	690B
680FL	690C
680FL(P)	690D
680T	695
680V	695A
680W	695B

April 3, 2000

TYPE CERTIFICATE DATA SHEET NO.2A4

This data sheet, which is a part of Type Certificate No. 2A4 prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the Civil Air Regulations.

Type Certificate Holder: Twin Commander Aircraft Corporation
19003 - 59th Drive N.E.
Arlington, Washington 98223

I - Model 680, 7 PCLM (Normal Category), Approved October 14, 1955 (See NOTE 3 for RL-26-D (See NOTE 7 for conversion to Model 680E)

Engines: 2 Lycoming GSO-480-A1A6, Carburetor Bendix PS-7BD, Part Listing No. 391663-3, -4, -5, -6, or -7, or GSO-480-B1A6 (See NOTE 4).

Fuel: 100/130 minimum grade aviation gasoline.

Engine Limits: (Straight line manifold pressure variation with altitudes shown)

	HP.	R.P.M.	M.P.	ALT.
Takeoff	340	3400	48.0	S.L.
Takeoff	340	3400	44.5	8000
Maximum continuous	320	3200	45.0	S.L.
Maximum continuous	320	3200	43.0	8000

Propeller and Propeller Limits: 2 Hartzell 3-Bladed feathering propellers

a. H.C.-83x20-2 Hubs with 9333c blades
Pitch settings at 30 in. Station: Low 17°, Feather 83°
Diameter: 93 in., no cutoff permitted
NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization, hubs with different numbers should not be combined on the same aircraft.

b. Spinner: 2 Hartzell, Dome C-888-3, Bulkhead C-807-3 or 2 Hartzell 835-10 assemblies or 2 Hartzell 836-7A assemblies (installed with alcohol anti-icing system per P/N 5890047).

c. Governor: 2 Woodward 210075

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Rev. No.	46	45	45	45	45	45	45	45	45	45	45	45	45
Page No.	14	15	16	17	18	19	20	21	22	23	24	25	26
Rev.No.	45	45	45	45	45	45	45	45	45	45	45	45	45
Page No.	27	28	29	30	31	32	33	34					
Rev.No.	45	46	45	45	45	45	45	46					

I - Model 680 (cont'd)

Airport Limits	Maneuvering	160 m.p.h.	(139K) True Ind.
	Max. Struc. cruising	210 m.p.h.	(182K) True Ind.
	Never exceed	270 m.p.h.	(235K) True Ind.
	Flaps extended - half	150 m.p.h.	(230K) True Ind.
	Flaps extended - full	130 m.p.h.	(113K) True Ind.
	Landing gear extended	180 m.p.h.	(156K) True Ind.

C.G. range: (+166.4) to +175.8) (Gear extended)
Effect of retracting landing gear +6655 in.-lb.

Empty Weight C.G. range: None

Datum: 152 in. forward of wing landing edge at center section.

Leveling means: Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams a: front or rear of baggage compartment floor.

Maximum weight: 7000 lb.

No. of seats: 7 (2 at +95, 2 at +128, and 3 at +168)

Maximum baggage: 350 lb. (+200)

Fuel capacity: Center tank 158.5 gal. (+187), usable fuel 156 gal. Outboard tanks 33.5 gal. each (+178), usable fuel 33.5 gal. each.
Total capacity 225.5 gal., usable fuel 223 gal.
(See NOTE 1 for system fuel)

Oil capacity: 8.5 gal. total (4.25 gal. each tank) (+191)
8.5 gal. usable (See NOTE 1 for system oil)

Control surface

Elevator	Up	20° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	20° ± 2 0	Down	20° ± 2 0
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

Serial Nos. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to approve design and production charges on airplane serial numbers 680-244-2 to 680-658-255. (See NOTES 15 and 22)

II. - Model 680-E, 7 PCLM (Normal Category) Approved June 19, 1958

(Same as Model 680 except for extended wing and increased maximum weight)

Engines: 2 Lycoming GSO-480-B1A6, Carburetor Bendix PA-7 BD, Part Listing No. 391663-3, -4, -5, -6, and -7.

Fuel: 100/130 minimum grade aviation gasoline.

II. - Model 680-E (cont'd)

Engine limits

(Straight line manifold pressure variation with altitudes shown)

	HP.	R.P.M.	M.P.	ALT.
Takeoff	340	3400	48.0	S.L.
Takeoff	340	3400	44.5	8000
Maximum continuous 320	3200	45.0	S.L.	
Maximum continuous 320	3200	43.0	8000	

Propeller and Propeller Limits

2 Hartzell 3-Bladed feathering propellers

a. HC-83x20-2 or HC-A3x20-2 Hubs with 9333c blades.
Pitch settings at 30 in. Station: Low 17°, Feather 83°
Diameter: 93 in., no cutoff permitted
NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization hubs with different numbers should not be combined on the same aircraft.

b. Spinner: 2 Hartzell, Dome C-888-3, Bulkhead C-807-3 or 2 Hartzell 835-10 assemblies or 2 Hartzell 836-7A assemblies (installed with alcohol anti-icing system per P/N 5890047) or 2 Hartzell 836-22S assemblies (installed with alcohol anti-icing system per P/N 5890047).

c. Governor: 2 Woodward 210075

Airspeed Limits

Maneuvering	160 m.p.h.	(139K) True Ind.
Max. Struc. cruising	210 m.p.h.	(182K) True Ind.
Never exceed	270 m.p.h.	(235K) True Ind.
Flaps extended - half	150 m.p.h.	(130K) True Ind.
Flaps extended - full	135 m.p.h.	(117K) True Ind.
Landing gear extended	180 m.p.h.	(156K) True Ind.

C.G. range

(+166.0) to (+175.1) (Gear extended)
Effect of retracting landing gear +6655 in.-lb.

Empty Weight C.G. Range

None

Datum

152 in. forward of wing leading edge at center section.

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral: Transverse beams at front or rear of baggage compartment floor.

Maximum Weight

7500 lb.

No. of seats

7 (2 at +94, 2 at +128, and 3 at +168)

Maximum baggage

350 lb. (+200)

Fuel capacity

Center tank 158.5 gal. (+187), usable fuel 156 gal.
Outboard tanks 33.5 gal. each (+178), usable fuel 33.5 gal. ea.
total capacity 225.5 gal., usable fuel 223 gal.
(See NOTE 1 for system fuel)

Oil capacity

8.5 gal. total (4.25 gal. each tank) (+191)
8.5 gal. usable (See NOTE 1 for system oil)

II. - Model 680-E (cont'd)

Control surface movements

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator Tab	Up	2 1/2° ± 2 1/2	Down	20° ± 2 0
Rudder	Right	20° ± 2 0	Left	20° + 2 0
Rudder tab	Right	26° ± 2 0	Left	26° + 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

Serial Nos. eligible

Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to approve design and production changes on airplane serial numbers 680-E-242-102, 680-E-623-1 to 680-E-892-100. (See NOTES 15 and 22.)

III. - Model 720, 6 PCLM (Normal Category), Approved December 5, 1958

(Same as Model 680 except for pressurized cabin, structural modifications to the fuselage, extended wing and increased maximum weight)

Engines

2 Lycoming GSO-480-B1A6, AMC Carburetor Bendix PS-7BD, Part Listing Nos. 391714-1, -2, -3, and -4.

Fuel

100/130 minimum grade aviation gasoline.

Engine limits

(Straight line manifold pressure variation with altitudes shown)

	HP	R.P.M.	M.P.	ALT.
Takeoff	340	3400	48.0	S.L.
Takeoff	340	3400	44.5	8000
Maximum continuous	320	3200	45.0	S.L.
Maximum continuous	320	3200	43.0	8000

Propeller and Propeller Limits

2 Hartzell 3-Bladed feathering propellers

a. HC-83x20-2 Hubs with 9333c blades
Pitch settings at 30 in. Station: Low 17°, Feather 83°
Diameter: 93 in., no cutoff permitted
NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization hubs with different numbers should not be combined on the same aircraft.

b. Spinner: 2 Hartzell, Dome C-888-3, Bulkhead C-807-3 or 2 Hartzell 835-10 assemblies or 2 Hartzell 836-7A assemblies (installed with alcohol anti-icing system per P/N 5890047).

c. Governor: 2 Woodward 210075

Airspeed Limits

Maneuvering	160 m.p.h.	(139K) True Ind.
Max. Struc. cruising	210 m.p.h.	(182K) True Ind.
Never exceed	270 m.p.h.	(235K) True Ind.
Flaps extended - half	150 m.p.h.	(130K) True Ind.
Flaps extended - full	135 m.p.h.	(117K) True Ind.
Landing gear extended	180 m.p.h.	(156K) True Ind.

C.G. Range

(+166.0) to (+175.1) (Gear extended)
Effect of retracting landing gear +6655 in.-lb.

Empty Weight C.G. Range

None

Datum

152 in. forward of wing leading edge at center section.

III. - Model 720 (cont'd)

Leveling means: Longitudinal - top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front or rear of baggage compartment floor.

Maximum weight: 7500 lb.

No. of seats: 6 (2 at +94, 2 at +128, and 3 at +168)

Maximum baggage: 175 lb. (+200)

Fuel capacity: Center tank 158.5 gal. (+187), usable fuel 156 gal.
Outboard tanks 33.5 gal. each (+178), usable fuel 33.5 gal. ea.
Total capacity 225.5 gal., usable fuel 223 gal.
(See NOTE 1 for system fuel)

Oil capacity: 8.5 gal. total (4.25 gal. each tank) (+191)
8.5 gal. usable (See NOTE 1 for system oil)

Control surface movements:

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	2 1/2° ± 2 1/2	Down	20° ± 2 0
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

Serial Nos. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to approve design and production changes on airplane serial numbers 720-501-1 to 720-850. (See NOTES 15 and 22).

IV - MODEL 680-F, 7 PCLM (Normal Category), Approved August 23, 1960

(Same as 680-E, except for fuel injection engine, new nacelles, new main gear and increased maximum weight.)
(See NOTE 5 for pressurized version).

Engines: 2 Lycoming IGSO-540-B1A or IGSO-540-B1C, fuel injector Simmonds Model 580, Parts Listing No. 580056-B or Model 582 Parts Listing No. 582025 or Model 582, Parts Listing No. 582026.

Fuel: 100/130 minimum grade aviation gasoline.

Engine limits: (Straight line manifold pressure variation with altitudes shown)

		HP	R.P.M	M.P.	ALT.
Takeoff (2 min.limit)	380	3400	47.0	S.L.	
Takeoff (2 min. limit)	380	3400	43.5	12,000	
Maximum continuous	360	3200	45.0	S.L.	
Maximum continuous	360	3200	40.5	11,500	

Propeller and Propeller Limits: 2 Hartzell 3-Bladed feathering propellers

a. HC-B3Z-30-2 Hubs with 9349 or 9349-6.5 propellers
Pitch settings at 30 in. Station: Low 18°, Feather 86°
Diameter: (For 9349) 93.5 in.
(For 9349-6.5) 87.0 in., no cutoff permitted
NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization hubs with different numbers should not be combined on the same aircraft.

IV - MODEL 680-F (cont'd)

b. Spinner: 2 Hartzell C2504 assemblies or 2 Hartzell C2535 assemblies (installed with alcohol anti-icing system per P/N 5890047).
c. Governor: 2 Woodward B210310 or 2 Woodward B210410 (when propeller unfeathering system, Drawing 5640030, is installed). NOTE: Prefix B on part number or type number denotes based orientation only and may or may not be stamped on the nameplate. Governor part numbers may differ from governor type numbers. For best synchronization, governors with different part numbers should not be combined on the same aircraft.

Airspeed Limits

Maneuvering	157 m.p.h.	(137K) True Ind.
Max. Struc. cruising	230 m.p.h.	(200K) True Ind.
Never exceed	288 m.p.h.	(250K) True Ind.
Flaps extended - half	150 m.p.h.	(130K) True Ind.
Flaps extended - full	136 m.p.h.	(118K) True Ind.
Landing gear extended	180 m.p.h.	(156K) True Ind.

C.G. Range

(+167.4) to (+174.4) (Gear extended)
Effect of retracting landing gear +10,073 in.-lb.

Empty Weight C.G. Range

None

Datum

152 in. forward of wing leading edge at center section.

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front or rear of baggage compartment floor.

Maximum weight

8000 lb.

No. of seats

7 (2 at +94, 2 at +128, and 3 at +168)

Maximum baggage

350 lb. (+200)

Fuel capacity

Center tank 158.5 gal. (+187), usable fuel 156 gal.
Outboard tanks 33.5 gal. each (+187), usable fuel 33.5 gal. ea.
Total capacity 225.5 gal., usable fuel 223 gal.
(See NOTE 1 for system fuel)

Oil capacity

10 gal. total (5.00 gal. each tank) (+191)
9.12 gal. usable (See NOTE 1 for system oil)

Control surface

Elevator	Up	30° + 1 0	Down	10° + 2 0
Elevator tab	Up	2 1/2° + 2 0	Down	20° + 2 0
Rudder	Right	20° + 2 0	Left	20° + 2 0
Rudder tab	Right	26° + 2 0	Left	26° + 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2
*Elevator tab 680-F-971 and up		Down	26° ± 2	0

Serial Nos. eligible

Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to approve design and production changes on airplane serial numbers 680-F-871-1, 680-F-820-2 to 680-F-1447-152. (See NOTES 15 and 22.)

V - Model 560-F, 7 PCLM (Normal Category), Approved February 8, 1961

(Same as Model 680-F except unsupercharged engine and reduced gross weight)

Engine

2 Lycoming IGO-B1A or 2 Lycoming IGO-540 B1C with Aero Commander Vapor Separator 4630193 installed, fuel injector Bendix Model RS10ED2, Parts Lifting No. 391825-1 (or any combination of these installations).

Fuel

100/130 minimum grade aviation gasoline.

Engine limits

	HP.	R.P.M.
Takeoff (2 min.)	350	3400
Minimum continuous	325	3000

Propeller and Propeller Limits

1. 2 Hartzell 3-Bladed feathering propellers
   a. HC-B3Z-20-2 Hubs with 9349 blades
      Pitch settings at 30 in. Station: Low 15°, Feather 87°
      Diameter: 93.5 in., no cutoff permitted
      NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization hubs with different numbers should not be combined on the same aircraft.
   b. Spinner: 2 Hartzell C2504 assemblies or 2 Hartzell C2535 assemblies (installed with alcohol anti-icing system per P/N 5890047).
   c. Governor: 2 Woodward B210310 or 2 Woodward B210410 (when propeller unfeathering system, Drawing 5640030, is installed). NOTE: Prefix B on part number or type number denotes based orientation only and may or may not be stamped on the nameplate. Governor part numbers may differ from governor type numbers. For best synchronization, governors with different part numbers should not be combined on the same aircraft.
2. 2 Hartzell 3-Bladed feathering propellers
   a. HC-B3Z-30-2 Hubs with 9349-6.5 blades
      Pitch settings at 30 in. Station: Low 18°, Feather 86°
      Diameter: 87.0 in., no cutoff permitted
      NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization hubs with different numbers should not be combined on the same aircraft.
   b. Spinner: 2 Hartzell C2504 assemblies or 2 Hartzell C2535 assemblies (installed with alcohol anti-icing system per P/N 5890047).
   c. Governor: 2 Woodward B210310 or 2 Woodward B210410 (when propeller unfeathering system, Drawing 5640030, is installed). NOTE: Prefix B on part number or type number denotes based orientation only and may or may not be stamped on the nameplate. Governor part numbers may differ from governor type numbers. For best synchronization, governors with different part numbers should not be combined on the same aircraft.

Airspeed Limits

Maneuvering	155 m.p.h.	(135K) True Ind.
Max. Struc. cruising	230 m.p.h.	(200K) True Ind.
Never exceed	288 m.p.h.	(250K) True Ind.
Flaps extended - half	150 m.p.h.	(130K) True Ind.
Flaps extended - full	136 m.p.h.	(118K) True Ind.
Landing gear extended	180 m.p.h.	(156K) True Ind.

C.G. Range

(+167.4) to (+174.4) (Gear extended)
Effect of retracting landing gear +10,073 in.-lb.

Empty Weight C.G. Range

None

Datum

152 in. forward of wing leading edge at center section.

V - Model 560-F (cont'd)

Leveling means
Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front or rear of baggage compartment floor.

Maximum weight
7500 lb.

No. of seats
7 (2 at +94, 2 at +128, and 3 at +168)

Maximum baggage
350 lb. (+200)

Fuel capacity
Center tank 158.5 gal. (+187), usable fuel 156 gal.
Outboard tanks 33.5 gal. each (+178), usable fuel 33.5 gal. ea.
Total capacity 225.5 gal., usable fuel 223 gal.
(See NOTE 1 for system fuel)

Oil capacity
10 gal. total (5.0 gal. each tank) (+191)
9.12 gal. usable (See NOTE 1 for system oil)

Control surface movements

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	2 1/2° ± 2 1/2	Down	26° ± 2 0
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

Serial Nos. eligible
Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to approve design and production changes on airplane serial numbers 560-F-951-1 to 560-F-1496-73. (See NOTES 15 and 22).

VI - MODEL 680-FL, 11 PCLM (Normal Category), Approved May 24, 1963

(Same as 680-F, except extended fuselage)

Engines
2 Lycoming IGSO-540-B1A or IGSO-540-B1C, fuel injector Simmonds Model 580, Parts Listing No. 580056-B or Model 582 Parts Listing No. 582025 or Model 582 Parts Listing No. 582026. (582026 required for 8500 lb. aircraft.)

Fuel
100/130 minimum grade aviation gasoline

Engine limits
(Straight line manifold pressure variation with altitudes shown)

	HP	R.P.M.		M.P.	ALT.
Takeoff (2 min. limit)	380	3400	47.0	S.L.	
Takeoff (2 min. limit)	380	3400	43.5	12,000	
Maximum continuous	360	3200	45.0	S.L.	
Maximum continuous	360	3200	40.5	11,500	

Propeller and Propeller Limits
2 Hartzell 3-Bladed feathering propellers
a. HC-B3Z-30-2 Hubs with 9349 or 9349-6.5 propellers
Pitch settings at 30 in. Station: Low 28°, Feather 86°
Diameter: (For 9349) 93.5 in.
(For 9349-6.5) 87.0 in., no cutoff permitted
NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization hubs with different numbers should not be combined on the same aircraft.

VI - Model 680-FL (cont'd)

b. Spinner: 2 Hartzell C2504 assemblies
c. Governor: 2 Woodward B210310 or 2 Woodward B210410 (when propeller unfeathering system, Drawing 5640030, is installed). NOTE: Prefix B on part number or type number denotes based orientation only and may or may not be stamped on the nameplate. Governor part numbers may differ from governor type numbers. For best synchronization, governors with different part numbers should not be combined on the same aircraft.

Airspeed Limits

Maneuvering	157 m.p.h. (137K) True Ind. @ 8000 lb. 161 m.p.h. (140K) True Ind. @ 8500 lb.
Max. Struc. cruising	230 m.p.h. (200K) True Ind. @ 8000 lb. and 8500 lb.
Never exceed	288 m.p.h. (250K) True Ind. @ 8000 lb. and 8500 lb.
Flaps extended - half	150 m.p.h. (130K) True Ind. @ 8000 lb. and 8500 lb.
Flaps extended - full	136 m.p.h. (118K) True Ind. @ 8000 lb. 146 m.p.h. (127K) True Ind. @ 8500 lb.
Landing gear extended	180 m.p.h. (156K) True Ind. @ 8000 lb. and 8500 lb.

C.G.Range (Gear extended)

Weight	Fwd.		Aft.	
lb.	Sta.(in)	% MAC	Sta.(in)	% MAC
Up to 7000	203.0	l0	218.4	32
8000	206.5	15	218.4	32
8500	208.3	17.5	218.4	32

Straight line variation between points given
Effect of retracting landing gear +10,073 in.-lb.

Empty Weight C.G. Range: None

Datum: 196 in. forward of wing leading edge at center section.

Leveling means: Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front or rear of baggage compartment floor.

Maximum weight: (See NOTE 6)

No. of seats: 11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)

Maximum baggage (std): 400 lb. (+258)

Maximum baggage (with extended baggage compartment): 600 lbs. (+258)

Fuel capacity: Center tank 158.5 gal. (+231), usable fuel 156 gal.
Outboard tanks 33.5 gal. each (+222), usable fuel 33.5 gal. ea.
Total capacity 225.5 gal., usable fuel 223 gal. (See NOTE 1 for system fuel)

Oil capacity: 10 gal. total (5.00 gal. each tank) (+235)
9.12 gal. usable (See NOTE 1 for system oil)

Control surface movements

Elevator	Up	30° ± 1	Down	10° ± 2
		0		0
Elevator tab	Up	2 1/2° ± 2	Down	26° ± 2
		1/2		0
Rudder	Right	20° ± 2	Left	20° ± 2
		0		0
Rudder tab	Right	26° ± 2	Left	26° ± 2
		0		0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

VI - Model 680-FL (cont'd)

Serial Nos. eligible

(See NOTE 6). Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates for airplane serial numbers 680-FL-1553-107 and up; and approve design and production changes on airplane serial numbers 680-FL-1261 through 1853-157. (See NOTES 15 and 22).

VII - MODEL 680-FL(P), 11 PCLM (Normal Category), approved October 8, 1964

(Same as 680-FL, S/N 1461 and up, except pressurization)

Engines

2 Lycoming IGSO-540-B1A or IGSO-540-B1C, fuel injector Simmonds Model 582, Parts Listing No. 582026.

Fuel

100/130 minimum grade aviation gasoline.

Engine limits

(Straight line manifold pressure variation with altitudes shown)

	HP.	R.P.M	M.P.	ALT.
Takeoff (2 min. limit)	380	3400	47.0	S.L.
Takeoff (2 min. limit)	380	3400	43.5	12,000
Maximum continuous	360	3200	45.0	S.L.
Maximum continuous	360	3200	40.5	11,500

Propeller and Propeller limits

2 Hartzell 3-Bladed feathering propellers

a. HC-B3Z-30-2 Hubs with 9349-6.5 blades
   Pitch settings at 30 in. Station: Low 18°, Feather 86°
   Diameter: 87.0 in., no cutoff permitted
   NOTE: Letters appearing after the dash numbers of the above listed hub model do not affect eligibility; however, for best synchronization hubs with different numbers should not be combined on the same aircraft.
b. Spinner: 2 Hartzell C2504 assemblies
c. Governor: 2 Woodward B210310 or 2 Woodward B210410 (when propeller unfeathering system, Drawing 5640030, is installed). NOTE: Prefix B on part number or type number denotes based orientation only and may or may not be stamped on the nameplate. Governor part numbers may differ from governor type numbers. For best synchronization, governors with different part numbers should not be combined on the same aircraft.

Airspeed Limits

Maneuvering	161 m.p.h. (140K) True Ind.
Max. Struc. cruising	230 m.p.h. (200K) True Ind.
Never exceed	288 m.p.h. (250K) True Ind.
Flaps extended - half	150 m.p.h. (130K) True Ind.
Flaps extended - full	146 m.p.h. (127K) True Ind.
Landing gear extended	180 m.p.h. (156K) True Ind.

C.G. Range (Gear extended)

Weight	Fwd.		Aft.	
lb.	Sta.(in)	% MAC	Sta.(in)	% MAC
Up to 7000	203.0	l0	218.4	32
8500	208.3	17.5	218.4	32

Straight line variation between points given.
Effect of retracting landing gear +10,073 in.-lb.

Empty Weight C.G. Range

None

Datum

196 in. forward of wing leading edge at center section

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front or rear of baggage compartment floor.

Maximum weight

8500 lb.

VII - MODEL 680-FL(P) (cont'd)

Maximum No. of seats: 11 (Pilot - 10 passengers; pilot, co-pilot +9 passengers)

Maximum baggage: 400 lb. (+258)

Fuel capacity: Center tank 158.5 gal. (+231), usable fuel 156 gal.
Outboard tanks 33.5 gal. each (+222), usable fuel 33.5 gal. ea.
Total capacity 225.5 gal. usable fuel 223 gal. (See NOTE 1 for system fuel)

Oil capacity: 10 gal. total (5.00 gal. each tank) (+235)
9.12 gal. usable (See NOTE 1 for system oil)

Control surface movements:

Elevator	Up	30° ± 1	Down	10° ± 2
		0		0
Elevator tab	Up	6 1/2° ± 1	Down	24° ± 1
Rudder	Right	20° ± 2	Left	20° ± 2
		0		0
Rudder tab	Right	26° ± 2	Left	26° ± 2
		0		0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

Serial No. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates for airplane serial numbers 680-FLP-1559-25 and up; and approve design and production changes on airplane serial numbers 680-FLP-1471-2 through 1854-38. (See NOTES 15 and 22)

VIII - MODEL 680-T - 11 PCLM (Normal Category), approved September 15, 1965
(See NOTE 9 conversion to Model 680V)

Engines: 2 AiResearch Model TPE-331-43 Turboprop engines (Rockwell P/N 6610400-501) or TPE-331-43A (Rockwell P/N 6610400-505) (See NOTE 11 for requirements)

Fuel: Aviation turbine fuels ASTM designation D1655-63T, Types Jet A, Jet B, and Jet A-1; and MIL-J-5624G(1), Grades JP-4 & JP-5 and MIL-F-5516-1, JP-1 (See Aerocom Serv. Ltr. 170)

Oil: BRACO 880F (MIL-L-7808D) and Sinclair Turbo S Oil 15 (MIL-L-7808D&E) (See Aerocom Service Letter 170)

Engine limits:

	HP.	R.P.M.	EGT
Takeoff	575	100%	576°C
Maximum continuous	500	100%	550°C

Propeller and Propeller Limits: 2 Hamilton Standard 3-bladed feathering and reversing propellers Rockwell Assembly No. 640050.

a. 33LF-325 Hubs with 1033A-O Blades
Pitch settings at 30 in. Station: Flt. Idle 9.0° ± 0.2°,
Feather 86.5° ± 0.5°, Reverse -9.5° ± 1.5°
Diameter: 90 in., no cutoff permitted.
NOTE: Use AiResearch oil transfer tube No. 866678-2.
b. Spinner: 2 Rockwell 2640050-7
c. Governor: 2 AiResearch 865423-4 or 865423-5-1

VIII - MODEL 680-T (cont'd)

Airspeed Limits	Maneuvering	164 m.p.h. ((143K) CAS
	Maximum Operating	250 m.p.h. (217K) CAS
	Flaps extended - half	150 m.p.h. (130K) CAS
	Flaps extended - full	146 m.p.h. (127K) CAS
	Landing gear extended	180 m.p.h. (156K) CAS

C.G. range	Rear:	217.78 (30.19%)	8950 lbs. (Gear down
		216.94 (29.02%)	5300 lbs. (Gear down)
	Fwd:	208.14 (16.83%)	8950 lbs. (Gear down)
		203.50 (10.40%)	7500 lbs. (Gear down)

Straight line variation between points given.
Effect of retracting landing gear +10,073 in.-lb.

Datum: 196 in. forward of wing landing edge at center section

Leveling means: Longitudinal - Top of fuselage aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

Maximum weight: Maximum takeoff 8950 lbs. (ramp weight 9000 lbs.)
Maximum landing 8500 lbs.

Maximum operating altitude: 25,000 feet

Maximum No. of seats: 11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)

Maximum baggage: 400 lb. (+258)

Fuel capacity: Center tank 221.5 gal. (+231), usable fuel 219.5 gal.
Outboard tanks 33.5 gal. each (+222), usable fuel 33.5 gal. ea.
Total capacity 288.5 gal., usable fuel 286.5 gal.
(See NOTE 1 for system fuel) (See NOTE 12 for auxiliary fuel)

Oil capacity: 15.0 qts. total (7.5 qts. each tank) (+188)
11.8 qts. usable (See NOTE 1 for system oil)

Control surface movements

Elevator	Up	30° ± 1 0	Down	10° ± 2 0	
Elevator tab	Up	6 1/2° ± 1	Down		24° ± 1
Rudder	Right	20° ± 2 0	Left	20° ± 2 0	
Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0	
Aileron	Up	23° ± 2	Down	15° ± 2	
Flap outboard			Down	40° ± 2	
Flap inboard			Down	40° ± 2	

Serial Nos. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates for airplane serial numbers 680-T-1473, 680-T-1519, 680-T-1532, 680-T-1536, and 680-T-1550-11 and up; and approve design and production changes on airplane serial numbers 680-T-1473 through 1720. (See NOTES 15 and 22).

IX - MODEL 680-V, 11 PCLM (Normal Category), Approved June 13, 1967

Engines	2 AiResearch Model TPE-331-43 Turboprop engines (Rockwell P/N 6610400-501) or TPE-331-43A (Rockwell P/N 6610400-505) (See NOTE 11 for requirements).
Fuel	Aviation turbine fuels ASTM designation D1655-63T, Types Jet A, Jet B, and Jet A-1; and MIL-J-5624G(1), Grades JP-4 & JP-5 and MIL-F-5616-1, JP-1. (See Aerocom Serv. Ltr. 170)
Oil	BRACO 880F (MIL-L-7808D) and Sinclair Turbo S Oil 15 (MIL-L-7808D&E) (See Aerocom Service Letter 170)

Engine Limits

	HP.	R.P.M.	EGT
Takeoff	575	100%	576°C
Maximum continuous	500	100%	550°C

Propeller and Propeller Limits

2 Hamilton Standard 3-bladed feathering and reversing propellers.
Rockwell Assembly No. 640050.

a. 33LF-325 Hubs with 1033A-0 blades
   Pitch settings at 30 in. Station: Flt. Idle 9.0° ± 0.2°
   Feather 86.5° ± 0.5°, Reverse -9.5° ± 1.5°
   Diameter: 90 in., no cutoff permitted
   NOTE: Use AiResearch oil transfer tube No. 866678-2.
b. Spinner: 2 Rockwell 2640050-7
c. Governor: 2 AiResearch 865423-4 or 865423-5-1

Airspeed Limits

Maneuvering	164 m.p.h. (143K) CAS
Maximum Operating	250 m.p.h. (217K) CAS
Flaps extended - half	150 m.p.h. (130K) CAS
Flaps extended - full	146 m.p.h. (127K) CAS
Landing gear extended	180 m.p.h. (156K) CAS

C.G. Range

Rear: 215.68 (27.28%) 9450 lbs. (Gear down)
216.73 (28.73%) 9400 lbs. (Gear down)
217.87 (30.31%) 9346 lbs. (Gear down)
216.94 (29.02%) 5300 lbs. (Gear down)
Fwd: 209.74 (19.04%) 9450 lbs. (Gear down)
209.60 (18.83%) 9400 lbs. (Gear down)
203.50 (10.40%) 7500 lbs. (Gea down)
Straight line variation between points given.
Effect of retracting landing gear +10,073 in.-lb.

Datum: 196 in. forward of wing leading edge at center section.

Leveling means: Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

Maximum weight: Maximum takeoff 9400 lbs. (ramp weight 9450 lbs.)
Maximum landing 9000 lbs.
Zero fuel 8000 lbs.

Maximum operating altitude: 25,000 feet

Maximum No. of seats: 11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)

Maximum baggage: 500 lb. (+258)

Fuel capacity: Center tank 221.5 gal. (+231), usable fuel 219.5 gal.
Outboard tanks 33.5 gal. each (+222), usable fuel 33.5 gal. ea.
Total capacity 288.5 gal., usable fuel 286.5 gal.
(See NOTE 1 for system fuel) (See NOTE 12 for auxiliary fuel).

IX - MODEL 680-V, 11 PCLM (Normal Category), Approved June 13, 1967

Oil capacity: 15.0 qts. total (7.5 qts. each tank) (+188)
11.8 qts. usable (See NOTE 1 for system oil)

Control surface movements

Elevator	Up	30° + 1 0	Down	10° + 2 0
Elevator tab	Up	6 1/2° ± 1	Down	24° ± 1
Rudder	Right	20° + 2 0	Left	20° + 2 0
Rudder tab	Right	26° + 2 0	Left	26° + 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

Serial Nos. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates for airplane serial numbers 680-V-1550 through 680-V-1725; and approve design and production changes on airplane serial numbers 680-V-1473 through 1720. (See NOTES 15 and 22).

X - MODEL 680-W, 11 PCLM (Normal Category), approved February 5, 1968

Engines: 2 AiResearch Model TPE-331-43BL Turboprop engines (Rockwell P/N 6610400-503)

Fuel: Aviation turbine fuels ASTM designation D1655-63T, Types A, Jet B, and Jet A-1; and MIL-J-5624G(1), Grades JP-4 & JP-5; and MIL-F-5616-1, JP-1, (See Aerocom Serv. Ltr. 170)

Oil: BRACO 880F (MIL-L-7808D) and Sinclair Turbo S Oil 15 (MIL-L-7808D&E) (See Aerocom Service Letter 170)

Engine limits

	HP.	R.P.M.	EGT
Takeoff	575	100%	576°C
Maximum continuous	500	100%	550°C

Propeller and Propeller Limits: 2 Hamilton Standard 3-bladed feathering and reversing propellers. Rockwell Assembly No. 640050.

a. 33LF-325 Hubs with 1033A-0 Blades
Pitch settings at 30 in. Station: Flt. Idle 9.0° ± 0.2°,
Feather 86.5° ± 0.5°, Reverse -9.5° ± 1.5°.
Diameter: 90 in., no cutoff permitted.
NOTE: Use AiResearch oil transfer tube No. 866678-2.
b. Spinner: 2 Rockwell 2640050-7
c. Governor: 2 AiResearch 869132-2-1

Airspeed Limits

Maneuvering	164 m.p.h. (143K) CAS
Maximum Operating	250 m.p.h. (217K) CAS
Flaps extended - half	150 m.p.h. (130K) CAS
Flaps extended - full	146 m.p.h. (127K) CAS
landing gear extended	180 m.p.h. (156K) CAS

C.G. Range

Rear: 215.68 (27.28%) 9450 lbs. (Gear down)
216.73 (28.73%) 9400 lbs. (Gear down)
217.87 (30.31%) 9346 lbs. (Gear down)
216.94 (29.02%) 5300 lbs. (Gear down)
Fwd.: 209.74 (19.04%) 9450 lbs. (Gear down)
209.60 (18.83%) 9400 lbs. (Gear down)
203.50 (10.40%) 7500 lbs. (Gear down)
Straight line variation between points given.
Effect of retracting landing gear +10,073 in.-lb.

X - MODEL 680-W (cont'd)

Datum	196 in. forward of wing leading edge at center section.
Leveling means	Longitudinal - Top of fuselage on centerline aft of wing trailing edge. Lateral - Transverse beams at front of each baggage compartment floor.
Maximum weight	Maximum takeoff 9400 lbs. (ramp weight 9450 lbs.) Maximum landing 9000 lbs. Zero fuel 8000 lbs.
Maximum operating altitude	25,000 feet
Maximum No. of seats	11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)
Maximum baggage	500 lb. (+258) Serial numbers eligible for Model 680-W-1721 through 1850.
Fuel capacity	Center tank 221.5 gal. (+231), usable fuel 219.5 gal. Outboard tanks 33.5 gal. each (+222), usable fuel 33.5 gal. ea. Total capacity 288.5 gal., usable fuel 286.5 gal. (See NOTE 1 for system fuel.) (See NOTE 12 for auxiliary fuel.)
Oil capacity	15.0 qts. total (7.5 qts. each tank) (+188) 11.8 qts. usable (See NOTE 1 for system oil)

Control surface movements

Elevator	Up	30° ± 1	Down	10° ± 2
		0		0
Elevator tab	Up	6 1/2° ± 1	Down	24° ± 1
Rudder	Right	20° ± 2	Left	20° ± 2
		0		0
Rudder tab	Right	26° ± 2	Left	26° ± 2
		0		0
Aileron	Up	23° ± 2	Down	15° ± 2
Flap outboard			Down	40° ± 2
Flap inboard			Down	40° ± 2

Serial Nos. eligible	Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 680-W-1721 through 1850, (See NOTES 15 and 22).

XI - MODEL 681, 11 PCLM (Normal Category), Approved March 20, 1969

Engines	2 AiResearch Model TPE-331-43BL Turboprop engines (Rockwell P/N 6610400-507)
Fuel	Aviation turbine fuels ASTM designation D1655-64T, Types Jet A, Jet B, and Jet A-1; and MIL J-5624G(1), Grades JP-4 & JP-5. (See Aerocom Service Letter 170)
Oil	BRACO 880F (MIL-L-7808D) and Sinclair Turbo S Oil 15 (MIL-L-7808D&E) (See Aerocom Service Letter 170)

Engine limits

	HP.	R.P.M.	EGT
Takeoff	575	100%	576°C
Maximum continuous	500	100%	550°C

XI - MODEL 681 (cont'd)

Propeller and Propeller limits	2 Hamilton Standard 3-bladed feathering and reversing propellers Rockwell Assembly No. 640050. a. 33LF-325 Hubs with 1033 A-0 Blades Pitch settings at 30 in. Station: Flt. Idle 9.0° ± 0.2° Feather 86.5° ± 0.5°, Reverse -9.5 ° ± 1.5° Diameter: 90 in., no cutoff permitted. NOTE: Use AiResearch oil transfer tube No. 866678-2. b. Spinner: 2 Rockwell 2640050-7 c. Governor: 2 AiResearch 869132-2-1

Airspeed Limits		
	Maneuvering	164 m.p.h. (143K) CAS
	Maximum Operating	250 m.p.h. (217K) CAS
	Flaps extended - half	150 m.p.h. (130K) CAS
	Flaps extended - full	149 m.p.h. (129K) CAS
	Landing gear extended	180 m.p.h. (156K) CAS

C.G. Range	
	Rear: 215.68 (27.28%) 9450 lbs. (Gear down)
	216.73 (28.73%) 9400 lbs. (Gear down)
	217.87 (30.31%) 9346 lbs. (Gear down)
	216.94 (29.02%) 5300 lbs. (Gear down)
	Fwd.: 209.74 (19.04%) 9450 lbs. (Gear down)
	209.60 (18.83%) 9400 lbs. (Gear down)
	203.50 (10.40%) 7500 lbs. (Gear down)
	Straight line variation between points given.
	Effect of retracting landing gear +10,073 in.-lb.

Datum	196 in. forward of wing leading edge at center section
Leveling means	Longitudinal - Top of fuselage on centerline aft of wing trailing edge. Lateral - Transverse beams at front of rear baggage compartment floor.
Maximum weight	Maximum takeoff 9400 lbs. (ramp weight 9450 lbs.) Maximum landing 9000 lbs. Zero fuel 8500 lbs.
Maximum operating altitude	25,000 feet
Maximum No. of seats	11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)
Maximum baggage	500 lb. (+258)
Fuel capacity	Center tank 221.5 gal. (+231), usable fuel 219.5 gal. Outboard tanks 33.5 gal. each (+222), usable fuel 33.5 gal. ea. Total capacity 288.5 gal., usable fuel 286.5 gal. (See NOTE 1 for system fuel) (See NOTE 12 for auxiliary fuel)
Oil capacity	15.0 qts. total (7.5 qts. each tank) (+188) 11.8 qts. usable (See NOTE 1 for system oil)

Control surface movements					
	Elevator	Up	30° ± 1 0	Down	10° ± 2 0
	Elevator tab	Up	6 1/2° ± 1	Down	24° ± 1
	Rudder	Right	20° ± 2 0	Left	20° ± 2 0
	Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
	Aileron	Up	23° ± 2	Down	15° ± 2
	Flap outboard			Down	40° ± 2
	Flap inboard			Down	40° ± 2

XI - MODEL 681 (cont'd)

Serial Nos. eligible

Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 681-6001 through 6072. (See NOTES 15 and 22).

XII - MODEL 690, 11 PCLM (Normal Category), approved July 19, 1971

Engines

2 AiResearch Model TPE-331-5-251K Turboprop engines (Rockwell P/N 610495)

Fuel

Aviation turbine fuels ASTM designation D1655-68, Types Jet A, Jet B, and Jet A-1; and MIL-T-5624G(1), Grades JP-4 & JP-5. (See Rockwell Service Letter 170H)

Oil

MIL-L-23699A and MIL-L-7808G. (See Rockwell Service Letter 170H)

Engine limits

	HP.	R.P.M.	I.T.T.
Takeoff	717.5	101%	923°C
Maximum continuous	717.5	101%	923°C

Propeller and Propeller limits

2 Hartzell 3-bladed feathering and reversing propellers.
Rockwell Assembly No. 640053.

a. HC-B3TN-5FL Hubs with LT10282H-4 or LT10282H(B)+4 or LT10282+4 or LT10282(B)+4 or LT10282A+4 or LT10282AB+4 blades

OR HC-B3TN-5DL or HC-B3TN-5NL hubs with LT10282A+4 or LT10282AB+4 blades.

Pitch settings at 30 in. Station: Low 13.5° ± 0.2°,
Feather 90.0° ± 0.5°, Reverse -8.0° ± 0.5°,
Start Locks +2.5° ± 0.2°
Diameter: 106 in, 1/2 in. reduction per blade allowed.
NOTE: Use AiResearch oil transfer tube No. 866533-3.
See NOTE 16.

b. Spinner: 2 Hartzell 836-57
c. Governor: 2 AiResearch 895490-1 or 895490-3.

Airspeed Limits

Maneuvering	167 m.p.h. (145K) CAS
Maximum Operating	280 m.p.h. (234K) CAS
Flaps extended - half	180 m.p.h. (156K) CAS
Flaps extended - full	157 m.p.h. (136K) CAS
Landing gear extended	230 m.p.h. (200K) CAS

C.G. Range

Forward
212.93 inches aft of datum (22.72% MAC) at 10,250 lbs.
203.75 inches aft of datum (10.40% MAC) at 7,500 lbs.
203.75 inches aft of datum (10.40% MAC) at 5,750 lbs.
Straight line variation between points.

Aft
218.70 inches aft of datum (30.47% MAC) at 10,250 lbs.
217.81 inches aft of datum (29.28% MAC) at 5,750 lbs.
Variation between points:
Inches aft of datum = 219.84 - (11653/Weight)

Datum

196 in. forward of wing leading edge at center section.

Leveling means

Longitudinal - top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beam at front of rear baggage compartment floor.

XII - MODEL 690 (cont'd)

Maximum weight	Maximum takeoff 10,250 lbs. (ramp weight 10,300 lbs.) Maximum loading 9600 lbs. Zero fuel 8750 lbs.
Maximum operating altitude	25,000 feet
Maximum No. of seats	11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)
Maximum baggage	600 lbs. (+260)
Fuel capacity	Total capacity 389.0 gal., usable fuel 384.0 gal. (see NOTE 1 for system fuel)
Oil capacity	Oil capacity per engine @ +188 AiResearch Tank No. 896062-1 6.25 qt. total 5.25 qt. usable AiResearch Tank No. 896417-1 6.00 qt. total 5.00 qt. usable (See NOTE 1 for system oil)

Control surface movements

Elevator	Up	30° + 1 0	Down	10° + 2 0
Elevator tab	Up	1/2° ± 1	Down	4° ± 1
Rudder	Right	0° ± 2 0	Left	0° ± 2 0
Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flaps			Down	40° ± 2
Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°

Serial Nos. eligible	Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificate and approve design and production changes on airplane serial numbers 690-11001 through 11099. (See NOTES 15 and 22).

XIII - MODEL 685, 9 PCLM (Normal Category), Approved September 17, 1971

Engines	2 Continental Model GTSIO-520-F or GTSIO-520-K Turbosupercharged engines (See NOTE 14) (Rockwell P/N 610503)
Fuel	Aviation gasoline, 100/130 octane.
Oil	Teledyne Continental Specification MHS-24A.

Engine limits

	HP	R.P.M.	M.A.P.
Takeoff	435	3400	44.5 In.Hg
Maximum continuous	435	3400	44.5 In.Hg

Propeller and Propeller limits

2 Hartzell 3-bladed feathering propellers
Rockwell Drawing No. 610505

a. HC-H3YN-2 or HC-H3YN-2F Hubs with C8475+2, FC8475+2, or FC8475B+2 blades.
   Pitch settings at 30 in. Station: Low 18.1° ± 1.0°
   Feathered 83.5° ± 1.0°
   Diameter: 88 in., 1/2 in. reduction per blade allowed.
b. Spinner: 2 Hartzell D-3273-1
c. Governor: 2 Rockwell 610445-1, 610445-501, or 610445-503

XIII - MODEL 685 (cont'd)

Airspeed Limits	Maneuvering	156 m.p.h. (136K) CAS
	Never exceed	290 m.p.h. (252K) CAS
	Never exceed Mach	0.554
	Flaps extended - half	180 m.p.h. (156K) CAS
	Flaps extended - full	149 m.p.h. (130K) CAS
	Landing gear extended	230 m.p.h. (200K) CAS
	Max structural cruise	258 m.p.h. (224K)
	Max. structural cruise Mach	0.493

C.G.Range

Rear: 216.88 (28.0%) 9,000 lbs. (Gear down)
216.18 (27.1%) 5, 850 lbs. (Gear down)
Variation between points: inches = 218.15 - (11653/Weight)
Fwd: 208.67 (17.0%) 9,000 lbs. (Gear down)
203.45 (10.0%) 7,500 lbs. (Gear down)
203.45 (10.0%) 5,850 lbs. (Gear down)
Straight line variation between points given. Effect of retracting landing gear +11,653 in.-lb.

Datum

196 in. forward of wing leading edge at center section.

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

Maximum weight

Maximum takeoff 9000 lbs. (ramp weight 9050 lbs.)
Maximum landing 9000 lbs.

Maximum operating altitude

25,000 feet

Maximum number of seats

9 (Pilot + 8 passengers; pilot, co-pilot + 7 passengers)

Maximum baggage

600 lb. (+260)

Fuel capacity

Total capacity 261.0 gal., usable fuel 256.0 gal.
Auxiliary (option) 66.0 gal. total usable 322.0 gal.
Total undrainable 10.7 lbs. (without auxiliary option)
total undrainable 13.0 lbs. (with auxiliary option)

Oil capacity

24.0 qts. total (12.0 qts. each engine, 9.0 qts. usable - (See NOTE 1 for system oil) (+188)
Auxiliary with optional fuel 27.2 qts. total (13.6 qts. each engine, 10.6 qts. usable) (+188)

Control surface movements

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	6 1/2° ± 1	Down	24° ± 1
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flaps			Down	40° ± 2
Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°

Serial Nos. eligible

Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 685-12000 through 12066. (See NOTES 15 and 22).

XIV - MODEL 690A, 11 PCLM (Normal Category), Approved April 25, 1973

Engines	2 AiResearch Model TPE-331-5-251K Turboprop engines (Rockwell P/N 610495)
Fuel	Aviation turbine fuels ASTM designation D1655-68, Types Jet A, Jet B, and Jet A-1; and MIL-T-5624G(1), Grades JP-4 & JP-5. (See Rockwell Service Letter 170H) (See Mfg. Data Part V Approved F/M for List of Approved Fuels)
Oil	MIL-L-23699A and MIL-L-7808G. (See Mfg. Data Part V Approved F/M for List of Approved Lubricants)

Engine limits

	HP.	R.P.M.	I.T.T.
Takeoff	717.5	101%	923°C
Maximum continuous	717.5	101%	923°C

Propeller and Propeller Limits

2 Hartzell 3-bladed feathering and reversing propellers.
Rockwell Assembly No. 640053.

a. HC-B3TN-5FL Hubs with LT10282H-4 or LT10282H(B)+4 or LT10282+4 or LT10282(B)+4 or LT10282+4 or LT10282AB+4 blades

OR HC-B3TN-5DL or HC-B3TN-5NL hubs with LT10282A+4 or LT10282AB+4 blades.

Pitch settings at 30 in. Station: Low 13.5° ± 0.2°
Feather 90.0° ± 0.5°, Reverse -8.0° ± 0.5°
Start Locks +2.5° ± 0.2°
Diameter: 106 in, 1/2 in. reduction per blade allowed.
NOTE: Use AiResearch oil transfer tube No. 866533-3.
(See NOTE 16)

b. Spinner: 2 Hartzell 836-57P
c. Governor: 2 AiResearch 895490-1 or 895490-3

Airspeed Limits

Maneuvering	167 m.p.h. (145K) CAS	
Maximum Operating	280 m.p.h. (243K) CAS	.52 MACH
Flaps extended - half	207 m.p.h. (180K) CAS	
Flaps extended - full	161 m.p.h. (140K) CAS	
Landing gear extended	230 m.p.h. (200K) CAS	

C.G. Range

Forward
212.93 inches aft of datum (22.72% MAC) at 10,250 lbs.
203.75 inches aft of datum (10.40% MAC) at 7,500 lbs.
203.75 inches aft of datum (10.40% MAC) at 6,749 lbs.
214.58 inches aft of datum (24.93% MAC) at 6,000 lbs.
Straight line variation between points
Aft
218.70 inches aft of datum (30.47% MAC) at 10,250 lbs.
217.98 inches aft of datum (29.50% MAC) at 6,278 lbs.
Variation between points:
Inches aft of datum = 219.84 - (11653/Weight)

Datum	196 in forward of wing leading edge at center section
Leveling means	Longitudinal - top of fuselage on centerline aft of wing trailing edge. Lateral - Transverse beams at front of rear baggage compartment floor.
Maximum weight	Maximum takeoff 10,250 lbs. (ramp weight 10,300 lbs.) Maximum landing 9600 lbs. Zero fuel 8750 lbs.
Maximum operating altitude	31,000 feet
Maximum No. of seats	11 (Pilot +10 passengers; pilot, co-pilot + 9 passengers)

XIV - MODEL 690A (cont'd)

Maximum baggage	600 lb. (+260)				
Fuel capacity	Total capacity 389.0 gal., usable fuel 384.0 gal. (See NOTE 1 for system fuel)				
Oil capacity	12.0 qts. total (6.0 qts. total each tank) (+188) 10.0 qts. usable (See NOTE 1 for system oil)				
Control surface movements	Elevator	Up	30° ± 1 0	Down	10° ± 2 0
	Elevator tab	Up	6 1/2° ± 1	Down	24° ± 1
	Rudder	Right	20° ± 2 0	Left	20° ± 2 0
	Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
	Aileron	Up	23° ± 2	Down	15° ± 2
	Flaps			Down	40° ± 2
	Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°
Serial Nos. eligible	Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 690A-11100 through 11349. (See NOTES 15 and 22).				

XV - MODEL 690B, 10 PCLM (Normal Category), Approved October 5, 1976

Engines

2 AiResearch Model TPE-331-5-251K Turboprop engines (Rockwell P/N 610495), S/N 11350 through 11542
2 AiResearch Model TPE-331-5-252K Turboprop engines (Rockwell P/N 610495), S/N 11431, S/N 11543 and subs.

Fuel

Aviation turbine fuels ASTM designation D1655-68, Types Jet A, Jet B, and Jet A-1; and MIL-T-5624G(1), Grades JP-4 & JP-5. (See Rockwell Services Letter 170H) (See Mfg. Data Part V Approved F/M for List of Approved Fuels).

Oil

MIL-L-23699A and MIL-L-7808G (See Mfg. Data Part V Approved F/M for List of Approved Lubricants).

Engine limits

	HP.	R.P.M.	I.T.T.
Takeoff	717.5	101%	923°C
Maximum continuous	717.5	101%	923°C

Propeller and Propeller Limits

2 Hartzell 3-bladed feathering and reversing propellers.
Rockwell Assembly No. 640053.

a. HC-B3TN-5FL Hubs with LT10282H-4 or LT10282H(B)+4 or LT10282+4 or LT10282(B)+4 or LT10282+4 or LT10282AB+4 blades

OR HC-B3TN-5DL or HC-B3TN-5NL hubs with LT10282A+4 or LT10282AB+4 blades.

Pitch settings at 30 in. Station: Low 13.5° ± 0.2°
Feather 90.0° ± 0.5°, Reverse -8.0° ± 0.5°
Start Locks +2.5° ± 0.2°
Diameter: 106 in, 1/2 in. reduction per blade allowed.
NOTE: Use AiResearch oil transfer tube No. 866533-3.
(See NOTE 16)

b. Spinner: 2 Hartzell 836-57P

c. Governor: 2 AiResearch 895490-1 or 895490-3 (for aircraft with TPE 331-5-251K engines)
2 AiResearch 895490-5 (for aircraft with TPE 331-5-252K engines)

XV - MODEL 690B (cont'd)

Airspeed Limits	Maneuvering	171 m.p.h. (149K) CAS
	Maximum Operating	280 m.p.h. (243K) CAS .52 MACH
	Flaps extended - half	207 m.p.h. (180K) CAS
	Flaps extended - full	161 m.p.h. (140K) CAS
	Landing gear extended	230 m.p.h. (200K) CAS

C.G. Range

Forward
213.14 inches aft of datum (23.00% MAC) at 10,325 lbs.
203.75 inches aft of datum (10,40% MAC) at 7,500 lbs.
203.75 inches aft of datum (10.40% MAC) at 6,749 lbs.
214.58 inches aft of datum (24.93% MAC) at 6,000 lbs.
Straight line variation between points.
Aft
218.64 inches aft of datum (30.39% MAC) at 10,325 lbs.
217.85 inches aft of datum (29.33% MAC) at 6,267 lbs.
Variation between points.
Inches aft of datum = 219.84 - (12444/Weight)

Datum: 196 in. forward of wing leading edge at center section.

Leveling means: Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

Maximum weight: Maximum takeoff 10,325 lbs. (ramp weight 10,375 lbs.)
Maximum landing 9675 lbs.
Zero fuel 8750 lbs.

Maximum operating altitude: 31,000 feet

Maximum No. of seats: 10 (Pilot + 9 passengers; pilot, co-pilot + 8 passengers)

Maximum baggage: 600 lb. (+260)

Fuel capacity: Total capacity 389.0 gal., usable fuel 384.0 gal.
(See NOTE 1 for systems fuel)

Oil capacity: 12.0 qts. total (6.0 qts. total each tank) (+188)
10.0 qts. usable (See NOTE 1 for system oil)

Control surface movements

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	6 1/2° ± 1	Down	24° ± 1
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	26° ± 2 0	Left	26° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flaps			Down	40° ± 2
Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°

Serial Nos. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 690B-11350 through 11566. (See NOTES 15 and 22).

XVI - MODEL 690C, 11 PCLM (Normal Category), Approved September 7, 1979

Engines	2 AiResearch Model TPE-331-5-254K Turboprop engines (Rockwell P/N 610495).
Fuel	Aviation turbine fuels ASTM designation D1655-68, Types Jet A, Jet A-1, and Jet B; MIL-T-5624G-1, Grades JP-4 and JP-5; MIL-T-83133, Grade JP-8 and MIL-F-46005A(MR)-1, Types I and II.
Oil	MIL-L-23699B Type II, MIL-L-7808G Type I (See Mfg. Data Part VIII Approved POH for List of Approved Lubricants).

Engine limits

	HP.	R.P.M.	I.T.T.
Takeoff	717.5	101%	923°C
Maximum continuous	717.5	101%	923°C

Propeller and Propeller Limits

2 Dowty-Rotol Ltd. 3-bladed feathering and reversing propellers.
Rockwell Assembly No. 640080.

a. Dowty-Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP2926 includes B. F. Goodrich propeller de-icing kit No. 65-330-1 or Dowty Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP 3027 includes Dowty Rotol Drice Boots 660709275 as B. F. Goodrich De-Ice Boots 4E 2598-10. See NOTE 17.
   Dowty-Rotol Propeller Blade Assembly P/N 660706330-XX
   Pitch settings at .7 radius station:
   Feather 83 10' ± 20", Reverse -13.75° ± 1.0°
   Start Locks -1.25° ± 1.0°, Flight Idle 6.0° ± 0.5°
   Diameter: 106 in., 1/2 in. reduction per blade allowed.
   NOTE: Use AiResearch oil transfer tube No. 897458-2.
   NOTE: All engine ground running for maintenance test purposes with the airplane stationary, must be done with the airplane headed into the wind.
b. Spinner: 2 Dowty-Rotol Ltd. Type No. (C)SB7/3/1
c. Governor: 2 AiResearch P/N 895490-5, 897410-2B, or 897410-4

Airspeed Limits

Maneuvering	158 m.p.h. (137K) CAS
Maximum Operating	280 m.p.h. (234K) CAS .52 MACH
Flaps extended - half	207 m.p.h. (180K) CAS (S/N 11600-11729)
	230 m.p.h. (200K) CAS (S/N 11730-11999)
Flaps extended - full	161 m.p.h. (140K) CAS (S/N 11600-11729)
	184 m.p.h. (160K) CAS (S/N 11730-11999)
Landing gear extended	230 m.p.h. (200K) CAS

C.G. Range

Forward
210.51 inches aft of datum (20.06% MAC) at 10,325 lbs.
204.70 inches aft of datum (12.03% MAC) at 7,500 lbs.
204.70 inches aft of datum (12.03% MAC) at 6,798 lbs.
215.10 inches aft of datum (26.42% MAC) at 6,240 lbs.
Straight line variation between points.
Aft
218.67 inches aft of datum (31.35% MAC) at 10,325 lbs.
217.88 inches aft of datum (30.25% MAC) at 6,332 lbs.
Variation between points:
Inches aft of datum = 219.93 - (13029/Weight)

Datum

196 in. forward of wing leading edge at center section

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

Maximum weight

Maximum takeoff 10,325 lbs. (ramp weight 10,375 lbs.)
Maximum landing 9675 lbs.
Zero fuel 8800 lbs.

XVI - MODEL 690C (cont'd)

Maximum operating altitude: 31,000 feet

Maximum No. of seats: 11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)

Maximum baggage: 600 lb. (+260)

Fuel capacity: Total standard capacity 430 gal., usable 425 gal.
Total capacity with optional system 482 gal., usable 474 gal.
(See NOTE 1 for systems fuel.)

Oil capacity: 12.0 qts. total (6.0 qts. total each tank) (+188)
10.0 qts. usable (See NOTE 1 for system oil)

Control surface movements:

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	3° ± 1	Down	24° ± 1
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	20° ± 2 0	Left	20° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flaps			Down	40° ± 2
Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°

Serial Nos. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certifictes and approve design and production changes on airplane serial numbers 11600 through 11735. (See NOTE 22)

XVII - MODEL 695, 11 PCLM (Normal Category), Approved November 1, 1979

Engines: 2 AiResearch Model TPE-331-10-501K Turboprop Engines (Rockwell P/N 610653) or 2 Garrett Model TPE-331-10-511K Turboprop Engines (Gulfstream P/N 610653) See NOTE 19.

Fuel: Aviation turbine fuel ASTM designation D1655-68, Types Jet A and Jet A-1, and Jet B; MIL-T-5624G-1, Grades JP-4 and JP-5; MIL-T-83133, Grade JP-8, MIL-F-46005A(MR)-1, Types I and II.

Oil: MIL-L-23699B Type II, MIL-L-7808G Type I (See Mfg. Data Part VIII Approved POH for List of Approved Lubricants).

Engine Limits:

	HP	R.P.M.	E.G.T.
Takeoff	733	101%	650°C
Maximum continuous	733	101%	650°C

Propeller and Propeller Limits: 2 Dowty-Rotol Ltd. 3-bladed feathering and reversing propellers.
Rockwell Assembly No. 640080.

a. Dowty-Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP2926 includes B. F. Goodrich propeller de-icing kit No. 65-330-1 or Dowty Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP 3027 includes Dowty Rotol Deice Boots 660709275 as B. F. Goodrich De-Ice Boots 4E 2598-10. See NOTE 17.
Dowty-Rotol Propeller Blade Assembly P/N 660706330-XX
Pitch settings at .7 radius station:
Feather 83 10' ± 20', Reverse -13.75° ± 1.0°,
Start Locks -1.25° ± 1.0°, Flight Idle 6.0° ± 0.5°.
Diameter: 106 in., 1/2 in. reduction per blade allowed.
NOTE: Use AiResearch oil transfer tube Part No. 897458-2.
NOTE: Downwind ground operation above taxi power is prohibited when airplane is stationary.

XVII - MODEL 695 (cont'd)

Propeller and Propeller Limits (cont'd)

b. Spinner: 2 Dowty-Rotol Ltd. Type No. (C)SB7/3/1
c. Governor: 2 AiResearch P/N 897410-2B or 897410-4.

Airspeed Limits

Maneuvering	158 m.p.h. (137K) CAS
Maximum Operating	280 m.p.h. (143K) CAS .52 MACH
Flaps extended - half	207 m.p.h. (180K) CAS
Flaps extended - full	161 m.p.h. (140k) CAS
Landing gear extended	230 m.p.h. (200K) CAS

C.G. Range

Forward
210.51 inches aft of datum (20.06% MAC) at 10,325 lbs.
204.70 inches aft of datum (12.03% MAC) at 7,500 lbs.
204.70 inches aft of datum (12.03% MAC) at 6,798 lbs.
215.10 inches aft of datum (26.42% MAC) at 6,240 lbs.
Straight line variation between points.
Aft
218.67 inches aft of datum (31.35% MAC) at 10,325 lbs.
217.88 inches aft of datum (30.25% MAC) at 6,332 lbs.
Variation between points:
Inches aft of datum = 219.93 - (13029/Weight)

Datum

196 in. forward of wing leading edge at center section

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

Maximum weight

Maximum takeoff 10,325 lbs. (ramp weight 10,375 lbs.)
Maximum landing 9,675 lbs.
Zero fuel 8,800 lbs.

Maximum operating altitude

31,000 feet

Maximum No. of seats

11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)

Maximum baggage

600 lb. (+260)

Fuel capacity

Total standard capacity 430 gal., usable 425 gal. (S/N 95000 thru 95040).
Total standard capacity 482 gal., usable 474 gal. (S/N 95041 thru 95999).
(See NOTE 1 for systems fuel.)

Oil capacity

12.0 qts. total (6.0 qts. total each tank) (+188)
10.0 qts. usable (See NOTE 1 for system oil).

Control Surface movements

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	3° ± 1	Down	24° ± 1
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	20° ± 2 0	Left	20° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flaps	Down	40° ± 2		
Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°

Serial Nos. eligible

Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 95000 through 95084. (See NOTE 22.)

XVIII - MODEL 695A, 11 PCLM (Normal Category), Approved April 30, 1981

Engines

2 AiResearch Model TPE-331-10-501K Turboprop Engines (Rockwell P/N 610653) or 2 Garrett Model TPE-331-10-511K Turboprop Engines (Gulfstream P/N 610653) See NOTE 19.

Fuel

Aviation turbine fuels ASTM designation D1655-68, Types Jet A, Jet A-1, and Jet B; MIL-T-5624G-1, Grades JP-4 and JP-5; MIL-T-83133, Grade JP-8, and MIL-F-46005A(MR)-1, Types I and II.

Oil

MIL-L-23699B Type II (See Mfg. Data Part VIII Approved POH for List of Approved Lubricants).

Engine Limits

	Torque	RPM	EGT
Takeoff and Maximum continuous	102.5%(820)	101.0%	650°C

Propeller and Propeller Limits

2 Dowty-Rotol Ltd. 3-bladed feathering and reversing propellers.
Rockwell Assembly No. 640080.

a. Dowty-Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP2926 includes B. F. Goodrich propeller de-icing kit No. 65-330-1 or Dowty Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP 3027 includes Dowty Rotol Deice Boots 660709275 as B. F. Goodrich De-Ice Boots 4E 2598-10. See NOTE 17.
   Dowty-Rotol Propeller Blade Assembly P/N 660706330-XX
   Pitch settings at .7 radius station:
   Feather 83 10' ± 20', Reverse -13.75° ± 1.0°,
   Start Locks -1.25° ± 1.0°, Flight Idle 6.0° ± 0.5°.
   Diameter: 106 in., 1/2in. reduction per blade allowed.
   NOTE: Use AiResearch oil transfer tube Part No. 897458-2.
   NOTE: Downwind ground operation above taxi power is prohibited when airplane is stationary, must be done with the airplane headed into the wind.
b. Spinner: 2 Dowty-Rotol Ltd. Type No. (C)SB7/3/1
c. Governor: 2 AiResearch P/N 897410-2B or 897410-4.

Airspeed Limits

Maneuvering	162 m.p.h. (141K) CAS
Maximum Operating	290 m.p.h. (252K) CAS .60 MACH
Flaps extended - half	207 m.p.h. (180K) CAS (S/N 96000-96055)
	230 m.p.h. (200K) CAS (S/N 96056-96999)
Flaps extended- full	161 m.p.h. (140K) CAS (S/N 96000-96055)
	184 m.p.h. (160K) CAS (S/N 96056-96999)
Landing gear extended	230 m.p.h. (200K) CAS

C.G. Range

Forward
209.78 inches aft of datum (19.1% MAC) at 11,200 lbs.
204.34 inches aft of datum (11.5% MAC) at 8,500 lbs.
204.34 inches aft of datum (11.5% MAC) at 7,010 lbs.
214.18 inches aft of datum (25.1% MAC) at 6,466 lbs.
Straight line variation between points
Aft
218.77 inches aft of datum (31.5% MAC) at 11,200 lbs.
217.95 inches aft of datum (30.4% MAC) at 6,582 lbs.
Variation between points:
Inches aft of datum = 219.93 - (13029/Weight)

Datum

196 in forwad of wing leading edge at center section.

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

XVIII - MODEL 695A (cont'd)

Maximum weight	Maximum takeoff	11,200 lbs. (ramp weight 11,250 lbs.)			
	Maximum landing	10,550 lbs.			
	Zero fuel	9,500 lbs.			
Maximum operating altitude	35,000 feet				
Maximum No. of seats	11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)				
Maximum baggage	600 lb. (+290) Non pressurized compartment (See NOTE 18) 100 lb. (+245) Pressurized compartment				
Fuel capacity	Total standard capacity 482 gal., usable 474 gal. (See Note 1 for systems fuel)				
Oil capacity	12.0 qts. total (6.0 qts. total each tank) (+188) 10.0 qts. usable (See Note 1 for system oil)				
Control Surface movements	Elevator	Up	30° ± 1 0	Down	10° ± 2 0
	Elevator tab	Up	3° ± 1	Down	24° ± 1
	Rudder	Right	20° ± 2 0	Left	20° ± 2 0
	Rudder tab	Right	20° ± 2 0	Left	20° ± 2 0
	Aileron	Up	23° ± 2	Down	15° ± 2
	Flaps			Down	40° ± 2
	Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°
Serial Nos. eligible	Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 96000 through 96100. (See Note 21 and 22)				

XIX - MODEL 690D, 11 PCLM (Normal Category) Approved December 2, 1981

Engines	2 AiResearch Model TPE 331-5-254K Turboprop Engines (Gulfstream P/N 610495).			
Fuel	Aviation turbine fuels ASTM designation D1655-68, types Jet A, Jet A-1 and Jet B; MIL-T-5624G-1, Grades JP-4 and JP-5; MIL-T-83133, Grade JP-8 and MIL-F-46005A(MR)-1, Types I and II.			
Oil	MIL-L-23699B Type II or MIL-L-7808G type I (See Mfg. Data Part VIII Approved POH for List of Approved Lubricants).			
Engine limits		HP	R.P.M.	ITT
	Takeoff and Maximum continuous	748	101.0%	923°
Propeller and Propeller Limits	2 Dowty-Rotol Ltd. 3-bladed feathering and reversing propellers. Rockwell Assembly No. 640080. a. Dowty-Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP2926 includes B. F. Goodrich propeller de-icing kit No. 65-330-1 or Dowty Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP 3027 includes Dowty Rotol Deice Boots 660709275 as B. F. Goodrich De-Ice Boots 4E 2598-10. See NOTE 17. Dowty-Rotol Propeller Blade Assembly P/N 660706330-XX Pitch settings at .7 radius station:			

XIX - MODEL 690D (cont'd)

Propeller and Propeller Limits (cont'd)	Feather 83° 10' ± 20', Reverse -13.75° ± 1.0° Start Locks -1.25° ± 1.0°, Flight Idle 6.0° ± 0.5°. Diameter: 106 in., 1/2in. reduction per blade allowed. NOTE: Use AiResearch oil transfer tube Part No. 897458-2. NOTE: All engine ground running for maintenance test purposes, with the airplane stationary, must be done with the airplane head into the wind. b. Spinner: 2 Dowty-Rotol Ltd. Type No. (C)SB7/3/1 c. Governor: 2 AiResearch P/N 897410-2B or -4.
Airspeed Limits	Maneuvering 160 m.p.h. (139K) CAS Maximum Operating 290 m.p.h. (252K) CAS .60 MACH Flaps extended - half 207 m.p.h. (180K) CAS (S/N 15000-15024) 230 m.p.h. (200K) CAS (S/N 15025-15999) Flaps extended - full 161 m.p.h. (140K) CAS (S/N 15000-15024) 184 m.p.h. (160K) CAS (S/N 15025-15999) landing gear extended 230 m.p.h. (200K) CAS
C.G. Range	Forward 208.77 inches aft of datum (17.7% MAC) at 10,700 lbs. 204.34 inches aft of datum (11.5% MAC) at 8,500 lbs. 204.34 inches aft of datum (11.5% MAC) at 7,010 lbs. 214.18 inches aft of datum (25.1% MAC) at 6,466 lbs. Straight line variation between points. Aft 218.72 inches aft of datum (31.4% MAC) at 10,700 lbs. 217.94 inches aft of datum (30.4% MAC) at 6,582 lbs. Variation between points Inches aft of datum = 219.93 - (13029/Weight)
Datum	196 in. forward of wing leading edge at center section
Leveling means	Longitudinal - Top of fuselage on centerline aft of wing trailing edge. Lateral - Transverse beams at front of rear baggage compartment floor.
Maximum weight	Maximum takeoff 10,700 lbs. (ramp weight 10,775 lbs.) Maximum landing 10,550 lbs. Zero fuel 9,500 lbs.
Maximum operating altitude	31,000 feet (see note 23 for modification to increase to 35,000 feet)
Maximum No. of seats	11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)
Maximum baggage	600 lb. (+290) Non pressurized compartment 100 lb. (+245) Pressurized compartment
Fuel capacity	Total standard capacity 430 gal., usable fuel 425.0 gal. Total capacity with optional system 482 gal., usable 474 gal. (See NOTE 1 for systems fuel).
Oil capacity	12.0 qts. total (6.0 qts. total each tank) (+188) 10.0 qts. usable (See NOTE 1 for system oil)

XIX - MODEL 690D (cont'd)

Control Surface movements	Elevator	Up	30° + 1 0	Down	10° + 2 0
	Elevator tab	Up	3° ± 1	Down	24° ± 1
	Rudder	Right	20° + 2 0	Left	20° + 2 0
	Rudder tab	Right	20° + 2 0	Left	20° + 2 0
	Aileron	Up	23° ± 2	Down	15° ± 2
	Flaps			Down	40° ± 2
	Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°

Serial Nos. eligible: Under the delegation option, provisions of Part 21 of the Federal Aviation Regulations, Delegation Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane serial numbers 15000 through 15042. (See Notes 21 and 22.)

XX - MODEL 695B, 11 PCLM (Normal Category), Approved February 15, 1984

Engines: 2 Garrett Model TPE 331-10-511K Turboprop engines (Gulfstream P/N 610653).

Fuel: Aviation Turbine fuels ASTM designation D1655-68, types Jet A, Jet A-1, and Jet B; MIL-T-5624G-1, Grades JP-4 and JP-5; MIL-T-83133, Grade JP-8; and MIL-F-46005A(MR)-1, Types I and II; British D.ENG.R.D. 2486 Issue 2; British D.ENG.R.D. 2494 Issue 4; and NATO Equivalents.

Oil: MIL-L-23699B type II (See Mfg. Data Part VIII Approved POH for List of approved lubricants.)

Engine Limits

	Torque (HP)	RPM	EGT
Takeoff and Maximum Continuous	102.5% (820)	101.0%	650°C

Propeller and Propeller Limits:
2 Dowty-Rotol Ltd. 3-bladed feathering and reversing propellers.
Gulfstream Assembly No. 640080

a. Dowty-Rotol Ltd. Type No. (C) R306/3-82-F/7-(c) VP 3027 includes
Dowty-Rotol Deice Boots 660709275 or B. F. Goodrich De-ice Boots 4E2498-10.
Dowty-Rotol Propeller Blade Assembly P/N 660706330-XX
Pitch settings at .7 radius stations:
Feather 83° 10'± 20', Reverse -13.75° ± 1.0°
Start Locks -1.25° ± 1.0°, Flight Idle 6.0° ± 0.5°
Diameter: 106 In., 1/2 in. reduction per blade allowed.
NOTE: Use Garrett oil transfer tube Part No. 897458-2.
NOTE: All engine ground running for maintenance and test purposes, with the airplane stationary, must be done with the airplane headed into the wind.
b. Spinner: 2 Dowty-Rotol Ltd. Type No. (C) SB7/3/1
c. Governor: 2 Garrett P/N 897410-4

Airspeed Limits

Maneuvering	182 m.p.h. (158K) CAS
Maximum Operating	290 m.p.h. (252K) CAS .60 MACH
Flaps extended - half	230 m.p.h. (200K) CAS
Flaps extended - full	184 m.p.h. (160K) CAS
Landing gear extemded	230 m.p.h. (200K) CAS

XX - MODEL 695B (cont'd)

C.G. Range

Forward
210.91 inches aft of datum (20.6% MAC) at 11,750 lbs.
204.34 inches aft of datum (11.5% MAC) at 8,500 lbs.
204.34 inches aft of datum (11.5% MAC) at 6,836 lbs.
211.56 inches aft of datum (21.5% MAC) at 6,410 lbs.
Straight line variation between points.
Aft
217.03 inches aft of datum (29.1% MAC) at 11,750 lbs.
218.71 inches aft of datum (31.4% MAC) at 11,628 lbs.
217.85 inches aft of datum (30.2% MAC) at 6,639 lbs.
Straight line variation except between 11,628 lbs. and 6,639 lbs.
Inches aft of datum = 219.87 - (13402/weight)

Datum

196 In. forward of wing leading edge at center section

Leveling means

Longitudinal - Top of fuselage on centerline aft of wing trailing edge.
Lateral - Transverse beams at front of rear baggage compartment floor.

Maximum Weight

Maximum takeoff 11,750 lbs. (Maximum Ramp 11,800 lbs.)
Maximum landing 11,000 lbs.
Zero Fuel 9,800 lbs.

Maximum operating altitude

35,000 feet

Maximum No. of seats

11 (Pilot + 10 passengers; pilot, co-pilot + 9 passengers)

Maximum baggage

750 lb. (+290) Nonpressurized compartment
100 lb. (+245) Pressurized compartment

Fuel capacity

Total standard capacity 482 gal., usable 474 gal.
(See NOTE 1 for systems fuel).

Oil capacity

12.0 qts. total (6.0 qts. total each tank) (+188)
10.0 qts. usable (See NOTE 1 for system oil).

Control Surface movements

Elevator	Up	30° ± 1 0	Down	10° ± 2 0
Elevator tab	Up	3° ± 1	Down	24° ± 1
Rudder	Right	20° ± 2 0	Left	20° ± 2 0
Rudder tab	Right	20° ± 2 0	Left	20° ± 2 0
Aileron	Up	23° ± 2	Down	15° ± 2
Flaps			Down	40° ± 2
Aileron tab	Up	17° ± 2.5°	Down	17° ± 2.5°

Serial Nos. eligible

Under the Delegation Option Provisions of Part 21 of the Federal Aviation Regulations, Delegaton Option Manufacturer No. SW-2 is authorized to: Issue Airworthiness Certificates and approve design and production changes on airplane Serial Numbers 96201 thru 96208 (See NOTES 20 and 22).

Specifications Pertinent to All Models

Certification basis Type Certificate No. 2A4

Models 680, 680E:	**CAR 3** effective Nov. 1, 1949, through Amdt. 3-12 dated May 18, 1954.
Model 720:	**CAR 3** effective Nov. 1, 1949, through Amdt. 3-12 dated May 18, 1954, and 3.197, 3.395, 3.396 of Amdt. 3-2 dated August 12, 1957.
Models 560, 680F, 680FL:	**CAR 3** effective May 15, 1956, including Amdts. 3-3 dated May 17, 1958, and 3-4 dated October 6, 1958.
Models 680F (Pressurized) 680 FL (Pressurized):	**CAR 3** effective May 15, 1956, including 3.197, 3.395, 3.396 of Amd. 3-2 dated Aug.12, 1957, and Amdt. 3-3 dated May 17, 1958, and 3-4 dated October 6, 1958.
Model 680T:	**CAR 3** effective May 15, 1956, including 3.197, 3.395, 3.396 of Amdt. 3-2 dated August 12, 1957, and Amdts. 3-3 dated May 17, 1958, 3-4 dated Oct. 6, 1958, Amdt. 3-6 dated Sept.13, 1961, plus Special Conditions dated April 1, 1965.
Models 680V, 680W, 681:	**CAR 3** effective May 15, 1956, including 3.197, 3.270, 3.395, 3.396 of Amdt. 3-2 dated August 12, 1957, and Amdts. 3-3 dated May 17, 1958, 3-4 dated Oct.6, 1958, Amdt. 3-6 dated Sept.13, 1961, plus Special Conditions dated April 1, 1965.
Models 690, 690A, 690B	**CAR 3** dated May 15, 1956, including Pars. 3.197, 3.270, 3.395, and 3.396 of Amdt. 3-2 dated Aug.12, 1957, and Amdt. 3-3 dated May 17, 1958, 3-4 dated Oct.6, 1958, 3-6 dated Sept.13, 1961, Par. 23.473, 23.479, 23.481, and 23.483 of FAR 23, Amdt. 23-7 dated Sept.14, 1969, plus Special Conditions dated April 1, 1965, and August 12, 1970; Docket #10506
Model 685:	**CAR 3** dated May 15, 1956, including Pars. 3.197, 3.270, 3.395, and 3.396 of Amdt. 3-2 dated August 12, 1957, and Amdt. 3-3 dated May 17, 1958, 3-4 dated Oct.6, 1958, 3-6 dated Sept. 13, 1961.
Models 690C, 695	**CAR 3** dated May 15, 1956, including Pars. 3.197, 3.270, 3.395, and 3.396 of Amdt. 3-2 dated August 12, 1957, and Amdt. 3-3 dated May 17, 1958, 3-4 dated Oct.6, 1958, 3-6 dated Sept. 13, 1961, Pars. 23.473, 23.479, 23.481, and 23.483 of FAR 23, Amdt. 23-7 dated Sept. 14, 1969, plus Special Conditions dated April 1, 1965, and Aug.12, 1970; Docket #10506, and FAR 36 dated Dec.1, 1969, through Amdt. 36-6 dated Jan.24, 1977.
Model 695A, 690D	**CAR 3** dated May 15, 1956, including Pars. 3.197, 3.270, 3.395, and 3.396 of Amdt. 3-2 dated August 12, 1957, and Amdt. 3-3 dated May 1, 1958, 3-4 dated Oct. 6, 1958, 3-6 dated Sept. 13, 1961, Pars. 23.253, 23.335(b)(4), 23.473, 23.479, 23.481, 23.483, 23.571(a), 23.572(a)(1), and 23.1505(c) of FAR 23, Amdt. 23-7 dated Sept. 14, 1969, FAR 23.1303(e)(2) of Amdt. 23-17 dated Feb. 1, 1977, plus special Conditions dated April 1, 1965, and August 12, 1970, Docket No. 10506, and FAR 36 dated December 1, 1969, through Amdt. 36-6 dated Jan.24, 1977.
Model 695B	**CAR 3** dated May 15, 1956, including Pars. 3.395 and 3.396 of Amdt.3-2 dated August 12, 1957, and Amdt. 3-3 dated May 1, 1958, 3-4 dated Oct. 6, 1958, 3-6 dated Sept.13, 1961, except for Subpart C, plus Pars. 23.253, 23.1303(e)(2), and 23.1505(c), and Subpart C of FAR 23 as amended thru Change 17 dated Sept.13, 1982, plus Special Conditions dated April 1, 1965, and Aug.12, 1970, Docket No. 10506 and FAR 36 dated December 1, 1969, through Amdt. 36-6 dated January 24, 1977.

Production basis Production Certificate No. 203

Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Airplane Flight Manual except for Models 690B, 690C, 690D, 695, 695A, and 695B which require a current Pilot's Operating Handbook.

In addition, the following item(s) are required:

1. Stall warning system:
   Models 560F, 680F, 680F(P), 680FL, 680FLP, 680T, 680W, 681, 690, 685, 690A (throuogh S/N 11268 except 11249) - Gulfstream Dwgs. 850016 and 850195.
   Models 690A (11249, 11269 through 11349), 690B - Gulfstream Dwgs. 850016 and 8000644
   Model 690C, 690D and 695 - Gulfstream Dwgs. 200036 and 800644.
   Model 695A and 695B - Gulfstream Dwgs. 200036, 800644 and 800746.

2. Outside Air Temperature Thermometer
   Models 680T, 680V, 680W, 681 - Gulfstream Dwg. 850295
   Models 690, 690A, 690B, 690C, 690D, 695, 695A, and 695B - Gulfstream Dwg. 850478.

3. EGT System
   Model 685 (with Service Letter 300 installed) Gulfstream Dwg. 890412.

NOTE 1: Current weight and balance report, including list of equipment, included in certificated empty weight and loading instructions must be in each aircraft at the time of original airworthiness certification and at all times thereafter (except in the case of air carrier operators having an approved weight control system.)

The certificated empty weight and corresponding center of gravity location must include unusable fuel (included in total fuel capacity and undrainable oil (included in total oil capacity) as follows:

Model	680	680-E	720	680-F & 680-F Press	680-FL & 680-FL(P)
Fuel	15.5 lb.(+187)	15.5 lb.(+187)	15.5 lb.(+187)	15.5 lb.(+187)	15.5 lb.(+231)
Oil	15.0 lb.(+191)	15.0 lb.(+191)	15.0 lb.(+191)	17.4 lb.(+150)	17.4 lb.(+194)

Model	560-F	680W, 681 680T, 680V	690, 690A 690B	685
Fuel	15.5 lb.(+187)	13 lb. (+231)	31 lb.(+231)	27 lb.(+231)
Oil	17.4 lb.(+191)	6.5 lb.(+188)	4 lb.(+188)	0 lb.(+188)

Model	690C, 690D		695		695A, 695B
	Standard	Std + Optional	(SN 95000-95040)	(95041-95999)	
Fuel	33.5 lb.(+230)	53.6 lb.(+230)	33.6 lb.(+230)	53.6 lb.(+230)	53.6 lb.(+230)
Oil	4.0 lb.(+188)	4.0 lb.(+188)	4.0 lb.(+188)	4.0 lb.(+188)	4.0 lb.(+188)

NOTE 2: The placards specified in the Airplane Flight Manual must be displayed in front of and in clear view of the pilots.

NOTE 3: Serial Numbers 466, 471, 529, and 530 of Military RL-26-D as defined by Aero Commander Dwg. 6100012-A are eligible as Model 680 airplanes.

NOTE 4: When Lycoming GSO-480-B1A6 engines are installed, the following pertains: The oil cooler outlet gills must be relocated in accordance with Service Letter No. 62 and oil temperature gage markings changed per Service Letter No. 63. Engines must be operated in accordance with Airplane Flight Manual.

NOTE 5: An optional pressurized version of the Model 680-F designated "680-F (Pressurized)" was approved June 29, 1962. This model is a standard 680-F incorporating a factory modification per Aero Commander Dwg. 610021. Note the special required equipment list and the special equipment column for this modified 680-F in Revision No. 24 or Service Information SI-118.

NOTE 6: Model 680FL S/N 1471 and up are manufactured as 8500 lb. gross weight aircraft. Serial Numbers 1261 through 1470 are manufactured as 8000 lb. gross weight aircraft and become 8500 lb. aircraft when modified per Aero Commander Dwg. 6100028. Serial Number 1441through 1470 were modified per Rockwell Dwg. 6100028 at the factory.

NOTE 7: The Model 680 is eligible as a Model 680E when modified in accordance with Aero Commander Report G10-163.

NOTE 8: All Model 680T aircraft are to be modified or manufactured per Aero Commander Report G10-227 and are to be 8950 lb. gross weight aircraft.

NOTE 9: The Model 680T is eligible as a Model 680V when modified in accordance with Aero Commander Dwg. 6100034.

NOTE 10: Icing Approval:

a. The Models 680T, 680V, 680W, and 681 may be flown through known icing conditions when equipped in accordance with Aero Caommander Service Letter No. 196.
b. The Model 690 may be flown through known icing conditions when equipped in accordance with Aero Commander Service Letter No. 241A or Drawing 890338. Flight Manual Supplement 4 dated 6/10/71 is required.
c. Models 690A and 690B are fully equipped and approved for flight into known icing. See Flight Manual (Pilots Operating Handbook) for list of required operable equipment. Safe Flight P/N C-01426 and C-01427 required to provide stall warning.
d. Model 690C Serial Numbers 11600 thru 11619 approved for flight into known icing after compliance with Rockwell Service Letter No. 329. Serial Numbers 11620 and Subs are fully equipped for flight into known icing. See Pilots Operating Handbook for list of required operable equipment.
e. Model 695, 695A, 695B and690D are fully equipped for flight into known icing. See Pilots Operating Handbook for list of required operable equipment.

NOTE 11: The Models 680T and 680V may have the AiResearch engines TPE-331-43A installed as a product improvement item and in accordance with Aero Commander Service Letter No. 208.

NOTE 12: The Models 680T, 680V, 680W, and 681 may have auxiliary fuel tanks installed in accordance with Aero Commander Drawing 890326. These provide 25.5 usable gals. each side. (51 gal. total) Unusable added is negligible.

NOTE 13: The Model 685 may be approved for flight into known icing coorditions when equipped in accordance with Aero Commander Service Letter No. 241 or Drawing No. 890338. Flight Manual Supplement 5 dated April 15, 1972, is required.

NOTE 14: With GTS10-520-K engine installed, 2 Alcor turbine inlet temperature indicators must be installed per Rockwell Service Letter 300. Flight Manual Revision No. 5.

NOTE 15: In some cases, the serial number contains the basic number plus a dash followed by a second set of numbers. This second number is a model unit number and the basic serial number applies with or without the second number. Example as follows: 680FL-1779-148 can be referred to as S/N 1779-148 or by S/N 1779.

NOTE 16: If blades LT10673 or LT10673B are installed per STC SA546GL, propeller blade angles at the 42 inch station are: Reverse 14.0° ± .5°, Start Locks -8.7° ± .5°; Low 6.0° ± .5°, and Feather 77.9° ± .5°.

NOTE 17: Airframe electrical modifications per 800 788 required when installing Dowty Rotol boots 660709275 or B. F. Goodrich boots 4E2498-10 in place of previously installed B. F. Goodrich de-ice Kit 65-330-1.

NOTE 18: Maximum Baggage Weight increased to 750 pounds for Model 695A Serial Numbers 96063, 96069, 96075, 96078, and 96085.

NOTE 19: TPE 331-10-501K effective on Models 695 S/N 95000 through 95084, 695A S/N 96001through 96071 except those complying with Service Information Letter 189. TPE 331-1Q-511K effective on Models 695 S/N 95087 and Subs. 695A S/N 96000, 96072 and Subs. plus those complying with Service Information Letter 189. It is acceptable to have one each -501K and -511K engine installed.

NOTE 20: Model 695A Serial Numbers 96062, 96063, 96069, 96075, and 96078, and 96085 are eligible as a Model 695B when modified in accordance with Gulfstream Aerospace Drawing 100062 Rework EO No. 3 except that the maximum value of zero fuel weights is limited to 9500 pounds.

NOTE 21: Model 690D airplanes, Serial Numbers 15000 through 15042, are eligible for conversion to Model 695A when modified in accordance with Gulfstream Drawing 100068.

NOTE 22: Delegation Option Authorization No. SW-2 expired July 17, 1986.

NOTE 23: Model 690D maximum operating altitude may be increased to 35,000 feet through the installation of Twin Commander Aircraft Corporation Custom Kit No. 149.

...END...

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E-284
Revision 9
Textron Lycoming
GSO-480-A1A6, -A1C6, -A2A6
GSO-480-B1A6, -B1B6 (O-480-1), -B1C6, -B1E6 -B1F6, -B1G6, -B1J6, -B2C6, -B2D6, -B1B3, -B2G6, -B2H6
IGSO-480-A1A6 (0-480-3), -A1B6, -A1C6, -A1D6, -A1E6, -A1F3-A1F6, -A1G6

May 15, 1988

TYPE CERTIFICATE DATA SHEET NO. E-284

Engines of models described herein conforming with this data sheet (which is a part of type certificate No. 284) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Civil Air Regulations/Federal Air Regulations provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder — Textron Lycoming/Subsidiary of Textron, Inc.
Williamsport Plant
Williamsport, Pennsylvania 17701

Model Lycoming	**GSO**-480-A1A6, -A1C6, -A2A6, -B1A6, -B1B6, -B1C6, -B1E6, -B1F6, -B1G6, -B1J6, -B2C6, -B2D6, -B2G6, -B2H6, -B1B3	**IGSO**-480-A1A6, -A1B6, -A1C6, -A1D6, -A1E6, -A1F6, -A1G6, -A1F3
Type 6HOA-Reduction Gear Ratio	77:120	- -
Rating		
Max. continuous, hp, r.p.m., in Hg., at:		
Rated pressure alt. (ft.)	320-3200-43.3-8000	320-3200-41.3-11,000
Sea level pressure alt. (ft.)	320-3200-45.0-S.L.	320-3200-45.0-S.L.
Takeoff (5 min.), hp, r.p.m. in. Hg., at:		
Rated pressure alt. (ft.)	340-3400-45.8-8000	340-3400-44.0-11,000
Sea level pressure alt. (ft.)	340-3400-48.0-S.L.	340-3400-48.0-S.L.
Fuel (min. grade aviation gasoline)*	100/130	- -
Lubricating Oil		
(lubricant should conform to the	Lycoming Spec. No. 301-F	- -
specifications as listed or to subsequent	and Service Instruction No. 1014	- -
revisions thereto)		
Bore and stroke, in.	5.125 x 3.875	- -
Displacement, cu. in.	479.7	- -
Supercharging ratio	11.27:1	- -
Compression ratio	7.3:1	- -
Weight (dry) lb.	See NOTE No. 8	- -
C.G. location (dry)	See NOTE No. 8	- -
Propeller shaft, SAE No.	See NOTE No. 8	- -
Carburetion	See NOTE No. 8	- -
Ignition, dual	See NOTE No. 8	- -
Timing °BTC	25	- -
Spark Plugs	See NOTE No. 9	- -
Oil Sump - capacity	Dry Sump	- -
Notes 1 through 9 as applicable	1,2,3,4,5,6,7,8,9	- -

"- -" indicates "same as preceding model"
"#" indicates "does not apply"
"" See latest revision of Lycoming Service Instruction No. 1070 for alternate fuel grades.*

Page No.	1	2	3	4
Rev. No.	9	9	9	9

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Certification basis:

Regulations & Amendments	Model	Date of Application	Date of Type Certificate No. 284 Issued/Revised
CAR 13 Effective March 5, 1952			
As Amended by 13-1 and 13-2	GS0-480-A1A6	December 13, 1954	June 30, 1955
CAR 13 Effective June 15, 1956	0-480-1	November 27, 1956	December 5, 1956
	GSO-480-B1A6	April 26, 1957	May 9, 1957
	GSO-480-B1B6	April 26, 1957	May 9, 1957
	GSO-480-B1C6	April 26, 1957	May 9, 1957
	GSO-480-A1C6	June 18, 1957	June 27, 1957
As Amended by 13-1	IGSO-480-A1A6	January 10, 1958	May 14, 1958
	GSO-480-B2D6	February 21, 1958	March 6, 1958
CAR 13 Effective June 15, 1956			
As Amended by 13-1, 13-2, 13-3	GSO-480-A2A6	April 13, 1960	May 3, 1960
	IGSO-480-A1B6	June 11, 1960	August 25, 1960
	GSO-480-B1E6	May 26, 1961	June 19, 1961
	GSO-480-B1F6	May 26, 1961	June 19, 1961
	GSO-480-B1G6	May 26, 1961	June 19, 1961
	GSO-480-B2H6	May 26, 1961	June 19, 1961
	GSO-480-B2C6	June 1, 1961	June 19, 1961
	GSO-480-B2G6	June 1, 1961	June 19, 1961
	O-480-3	June 26, 1961	June 14, 1961
	IGSO-480-A1C6	September 13, 1961	October 17, 1961
	IGSO-480-A1D6	May 2, 1962	May 6, 1963
And 13-4	IGSO-480-A1F6	July 6, 1962	August 16, 1962
	IGSO-480-A1E6	August 27, 1964	October 23, 1964
	IGSO-480-A1G6	August 16, 1966	August 26, 1966
	IGSO-480-B1J6	January 5, 1967	January 21, 1967
	GSO-480-B1B3	June 21, 1971	July 7, 1971
	IGSO-480-A1F3	January 28, 1980	February 21, 1980

Production basis: Production Certificate No. 3

NOTE 1. Maximum permissible temperatures:

Cylinder Head Well type	Cylinder Base*	Oil Inlet
500°F	350°F	225°F - GSO-480-A1A6, -A2A6, -A1C6 245°F - All others

*This parameter dispensed with where pistons are internally cooled by oil jets.

NOTE 2.

	Minimum	Maximum
Fuel Pressure Limits:	9 p.s.i.	15 p.s.i. (17 p.s.i. min., 65 p.s.i. max. for IGSO-480-A1E6, -A1D6, -A1G6)
Oil Pressure Limits:		
(Normal Operations)	55 p.s.i.	85 p.s.i.
(Idling)	25 p.s.i. (35 p.s.i. for IGSO-480-A1A6, -A1B6, -A1C6, -A1F6, -A1F3)	

NOTE 3. The following accessory provisions are made:

Accessory	Rotation Facing Drive Pad	Speed Ratio to Crankshaft	Maximum Torque (in. -lb.) Continuous	Maximum Torque (in. -lb.) Static	Maximum Overhang Moment (in. -lb.)
Starter	C	1.000:1	#	12000	300
Generator	C	2.600:1	500	2200	400
Fuel Pump	CC	.803:1	25	450	25
Vacuum Pump	C	1.219:1	200	800	25
Hydraulic Pump	C	1.083:1	400	1650	175
Tachometer	CC	.500:1	7	50	#
Propeller Governor	C	.801:1	125	1200	25

"C" - Clockwise, "CC" - Counter-Clockwise
"#" Indicates "does not apply"

NOTE 4. The "6" in the engine model designation indicates the crankshaft has five 3rd order and one 6th order torsional vibration dampers. The IGSO-480-A1F3 and GSO-480-B1B3 have four heavy 3rd order and two 6th order torsional vibration dampers.

NOTE 5. All engines incorporate provisions for absorbing propeller thrust in both tractor and pusher type installations.

NOTE 6. Military Models 0-480-1 and -3 are identical to the corresponding civil designated engines except for ignition, which are the Scintilla S6LN-22 and S6RN-23 with AN 3105, primary ground terminal. When installed in certificate aircraft, the corresponding commercial model designations and type certificate number should be added to the engine data plate.

NOTE 7. The above models incorporate additional characteristics as follows:

Models	Characteristics
GSO-480-A1A6	Basic model. Geared drive, six cylinder, horizontally opposed, supercharged, dry sump, aircooled engine with side mounted accessory drives and accessories.
GSO-480-A1C6	Similar to GSO-480-A1A6 except has provisions for a supercharger bearing thermocouple.
GSO-480-A2A6	Similar to GSO-480-A1A6 except has flange type propeller shaft with 2-way oil for reversible propeller.
GSO-480-B1A6	Similar to GSO-480-A1C6 except incorporates crankcase oil jets for increased piston cooling, provisions for supercharger inlet and an updraft carburetor.
GSO-480-B1B6	Similar to GSO-480-B1A6 except has a horizontal elbow and carburetor under the engine.
GSO-480-B1B3	Same as GSO-480-B1B6 except that the torsional damper system has been modified. (SEE NOTE 4)
GSO-480-B1C6	Similar to GSO-480-B1A6 except has a horizontal carburetor mounted directly on a straight-through air inlet supercharger housing.
GSO-480-B1E6	Similar to GSO-480-B1A6 excepting magnetos.
GSO-480-B1F6	Similar to GSO-480-B1B6 excepting magnetos.
GSO-480-B1G6	Similar to GSO-480-B1C6 excepting magnetos.
GSO-480-B1J6	Same as GSO-480-B1A6 except incorporates 1200 series Bendix magnetos.
GSO-480-B2C6	Similar to GSO-480-B1C6 except has flanged propeller shaft and provision for reversible propeller.
GSO-480-B2D6	Similar to GSO-480-A2A6 except has internal piston cooling, special supercharger inlet for down-draft carburetor and is also similar to the -B1 series engines except incorporates a flange type propeller shaft.
GSO-480-B2G6	Similar to GSO-480-B2C6 excepting magnetos.
GSO-480-B2H6	Similar to GS-470-B2D6 excepting magnetos.
IGSO-480-A1A6	Basic fuel injection model.
IGSO-480-A1B6	Similar to IGSO-480-A1A6 except has retard breaker magnetos.
IGSO-480-A1C6	Similar to IGSO-480-A1A6 except has horizontal air inlet housing and throttle.
IGSO-480-A1D6	Similar to GSO-480-B1A6, except for incorporation of service kit which included Bendix RS10-FB1 fuel injector and supercharger air inlet housing assembly, P/N 74323.
IGSO-480-A1E6	Similar to IGSO-480-A1D6 except for different configuration of supercharger air inlet housing and incorporation of retard breaker magnetos.
IGSO-480-A1F3	Similar to IGSO-480-A1F6 except that it has two 6th and four heavy 3rd order dynamic counterweights.
IGSO-480-A1F6	Similar to IGSO-480-A1C6 except has retard breaker magnetos in place of impulse type magnetos.
IGSO-480-A1G6	Same as IGSO-A1E6 with 1200 series magnetos but without the Bendix modulator unit.

NOTE 8. For all models - weights, carburetion, ignition, C.G. location and propeller shaft SAE designations.

Models	Weight (dry) lb.	Carburetion	Ignition, dual	C.G. Location, Dry: From front face of thrust nut, in.	C.G. Location, Dry: Off propeller shaft C.L. in. lateral	C.G. Location, Dry: Off propeller shaft C.L. in. vertical	Propeller shaft, SAE No.
GSO-480-A1A6	498	Bendix PS-7BD Bendix S6	Bendix S6LN-20, S6RN-21	21.74	0.22 left	0.59 above	20 spline
-A1C6	498	Bendix PS-7BD	Bendix S6LN-20, S6RN-21	21.74	0.22 left	0.59 above	20 spline
-A2A6	498	Bendix PS-7BD	Bendix S6LN-20, S6RN-21	21.74	0.22 left	0.59 above	flange, ARP 502
-B1A6	513	Bendix PS-7BD	Bendix S6LN-20, S6RN-21	22.32	0.18 left	0.22 above	20 spline
-B1B6	515	Bendix PSH-7BD	Bendix S6LN-20, S6RN-21	22.18	0.18 left	0.01 below	20 spline
*O-480-1							
-B1B3	517	Bendix PSH-7BD	Bendix S6LN-20, S6RN-21	22.18	0.18 left	0.01 below	20 spline
GSO-480-B1C6	512	Bendix PSH-7BD	Bendix S6LN-20, S6RN-21	22.54	0.16 left	0.59 above	20 spline
-B1E6	513	Bendix PS-7BD	Bendix S6LN-204, S6RN-200 or S6LN-604, S6RN-600	22.32	0.18 left	0.22 above	20 spline
-B1F6	515	Bendix PSH-7BD	Bendix S6LN-204, S6RN-200 or S6LN-604, S6RN-600	22.18	0.18 left	0.01 below	20 spline
-B1G6	512	Bendix PSH-7BD	Bendix S6LN-204, S6RN-200 or S6LN-604, S6RN-600	22.54	0.16 left	0.59 above	20 spline
-B1J6	515	Bendix PS-7BD	Bendix S6LN-1209, S6RN-1227	22.29	0.18 left	0.22 above	20 spline
-B2C6	512	Bendix PSH-7BD	Bendix S6LN-20, S6RN-21	22.54	0.16 left	0.59 above	flange, ARP 502
GSO-480-B2D6	513	Bendix PSD-7BD	Bendix S6LN-20, S6RN-21	22.39	0.25 left	0.71 above	flange, ARP 502
-B2G6	512	Bendix PSH-7BD	Bendix S6LN-20, S6RN-21, S6LN-204, S6RN-200, S6LN-604, S6RN-600	22.54	0.16 left	0.59 above	flange, ARP 502
-B2H6	513	Bendix PSD-7BD	Bendix S6LN-204, S6RN-200, S6LN-604, S6RN-600	22.39	0.25 left	0.71 above	flange, ARP 502
IGSO-480-A1A6	512	Fuel Injector Simmonds Type 570	Bendix S6LN-20, S6RN-21	22.00	0.34 left	0.71 above	20 spline
*O-480-3							
IGSO-480-A1B6	512	Simmonds Type 570	Bendix S6LN-204, S6RN-200, S6LN-604, S6RN-600	22.00	0.34 left	0.71 above	20 spline
-A1C6	513	Simmonds Type 570	Bendix S6LN-20, S6RN-21	22.00	0.34 left	0.71 above	20 spline
-A1D6	514	Bendix RS10-FB1	Bendix S6LN-20, S6RN-21	22.29	0.21 left	0.35 above	20 spline
-A1E6	514	Bendix RS10-FB1	Bendix S6LN-204, S6RN-200	22.29	0.21 left	0.35 above	20 spline
-A1F6	513	Simmonds Type 570	Bendix S6LN-204, S6RN-200, S6LN-604, S6RN-600	22.00	0.34 left	0.71 above	20 spline
-A1G6	515	Bendix RS10-FB1	Bendix S6LN-1209, S6RN-1208	22.29	0.21 left	0.35 above	20 spline
-A1F3	517	Simmonds Type 570	Bendix S6LN-204 S6RN-200	22.00	0.34 left	0.71 above	20 spline

* See NOTE No. 6.

NOTE 9. Spark Plugs: See latest revision of Lycoming Service Instruction No. 1042 for approved equipment.

.....END.....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

	A9CE
	Revision 27
	CESSNA
188	A188A
188A	A188B
188B	T188C
A188	
	March 31, 2003

TYPE CERTIFICATE DATA SHEET NO. A9CE

This data sheet which is part of Type Certificate A9CE prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P O Box 7704
Wichita KS 67277

I. Model 188, AGwagon 230, 1 PCLM (Normal and Restricted Category), approved February 14, 1966

Engine — Continental O-470-R

*Fuel — 80/87 minimum grade aviation gasoline

*Engine limits — For all operations, 2600 rpm (230 hp)

Propeller and propeller limits

1. (a) McCauley 1A200/AOM fixed pitch
   Static rpm at max. permissible throttle setting:
   not over 2300, not under 2200
   No additional tolerance permitted
   Diameter: not over 90 in., not under 88 in.
2. (a) McCauley constant speed, 2A34C50 hub with 90A-2 blades
   Diameter: not over 88 in., not under 86 in.
   Pitch settings at 36 in. sta.: low 8°, high 22°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T1 or C290D3/T1, or Woodward A210452
3. (a) McCauley constant speed, 2A34C66 hub with 90AT-2 blades
   Diameter: not over 88 in., not under 86 in.
   Pitch settings at 36 in. sta.: low 8°, high 22°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T1 or C290D3/T1, or Woodward A210452
4. (a) McCauley constant speed, 2A34C201 hub with 90DA-2 blades
   Diameter: not over 88 in., not under 86.5 in.
   Pitch settings at 30 in. sta.: low 10.5°, high 24.5°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T1 or C290D3/T1, or Woodward A210452
5. (a) McCauley constant speed, 2A34C203 hub with 90DCA-2 blades
   Diameter: not over 88 in., not under 86.5 in.
   Pitch settings at 30 in. sta.:
   Low 10.0°, high 24.5°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T1 or C290D3/T1, or Woodward A210452

*Airspeed Limits (CAS) (Normal Category)

Never exceed	181 mph (157 knots)
Maximum structural cruising	144 mph (125 knots)
Maneuvering	127 mph (110 knots)
Flaps extended	110 mph (96 knots)

(See Additional Limitation for Restricted Category.)

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Rev. No.	27	21	21	21	19	21	21	25	25	22	26	26	26	25	26	26	27

I. Model 188, AGwagon 230 (cont'd)

C.G. Range	(+39.0) to (+45.5) at 2300 lb. or less
(Normal Category)	(+41.0) to (+45.5) at 3300 lbs.
	Straight line variation between points given.
Empty weight C.G. range	None
*Maximum weight	3300 lb. (Normal Category)
Number of Seats (Max.)	1 (at +91 to +95)
Maximum Baggage	100 lb. (+12.0) (optional)
Fuel Capacity	37 gal. (+11.0; 36.5 gal. usable) *See Note 1 for data on unusable fuel.*
Oil Capacity	12 qt. (-17.0; includes 9 lb. unusable) *See Note 1 for data on undrainable oil.*

Control surface movements

Wing flaps (S/N 188-0001 through 188-0293)			0° -	28° ± 2°
Wing flaps (S/N 188-0294 and on)			0° -	20° ± 1°
Ailerons (from neutral)	Up	18° ± 1°	Down	10° ± 1°
Elevators	Up	26° 30' ± 1°	Down	21° ± 1°
Elevator tab	Up	12° ± 1°	Down	27° ± 1°
Rudder	Right	24° + 0°, -1°	Left	24° + 0°, -1°

(Neutral aileron is rigged with trailing edge 3° ± 30' below trailing edge of wing.)

Additional Limitations for Restricted Category

*Airspeed limits (CAS)	Maximum operating speed in agricultural operations	120 mph (104 knots)
*C.G. Range	(+39.0) to (+45.5) at 2300 lbs. or less (+42.0) to (+45.5) at 3800 lbs.	
*Maximum Weight	3800 lb. *(See Note 3.)*	
Serial numbers eligible	653, 188-0001 through 188-0572	

II. Model A188, AGwagon 300, 1 PCLM (Normal and Restricted Category), approved February 14, 1966

Engine	Continental IO-520-D
*Fuel	100/130 minimum grade aviation gasoline
*Engine limits	Takeoff (5 min.) at 2850 rpm (300 hp) For all other operations, 2700 rpm (285 hp)

Propeller and propeller limits

1. (a) McCauley D2A34C58 hub or D2A34C58-0 (oil filled) hub with 90AT-4 blades
   Diameter: not over 86 in., not under 84 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 25°
   (b) Governor: Garwin 34-828-01 or McCauley C290D2/T9 or C290D3/T9, or Woodward A210462
   (c) Spinner, Cessna 0752040 (optional)
2. (a) McCauley F2A34C58 hub with 90AT-4 blades
   Diameter: not over 86 in., not under 84 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 25°

II. Model A188, AGwagon 300 (cont'd)

(b) Governor: Garwin 34-828-01 or McCauley C290D2/T9 or C290D3/T9, or Woodward A210462

3. (a) McCauley D2A34C58/90AT-8 or D2A34C58-0/90AT-8 (oil filled)
Diameter: not over 82 in., not under 80 in.
Pitch settings at 36 in. sta.:
Low 8.8°, high 25.8°
(b) Governor: Garwin 34-828-01, McCauley C290D2/T9 or C290D3/T9, or Woodward A210462

4. (a) McCauley D2A34C98/90AT-8 or D2A34C98-0/90AT-8 (oil filled)
Diameter: not over 82 in., not under 80 in.
Pitch settings at 36 in. sta.:
Low 8°, high 25°
(b) Governor: Garwin 34-828-01, McCauley C290D2/T9 or C290D3/T9, or Woodward A210462
(c) Spinner, Cessna 0752040 (optional)

*Airspeed Limits (CAS) (Normal Category)	Never exceed	181 mph (157 knots)
	Maximum structural cruising	144 mph (125 knots)
	Maneuvering	127 mph (110 knots)
	Flaps extended	110 mph (96 knots)
	(See Additional Limitation for Restricted Category.)	

C.G. Range (Normal Category): (+39.0) to (+45.0) at 2300 lbs. or less; (+41.0) to (+45.5) at 3300 lbs. Straight line variation between points given.

Empty weight C.G. range: None

*Maximum weight: 3300 lbs. (normal category)

Number of seats (maximum): 1 (at +91 to +95)

Maximum baggage: 100 lb. (+12.0) (optional)

Fuel capacity: 37 gal. (+11.0; 36.5 gal. usable)
See Note 1 for data on unusable fuel.

Oil capacity: 12 qt. (-17.0; includes 9 lb. usable)
See Note 1 for data on undrainable oil.

Control surface movements:

Wing flaps (S/N 188-0001 through 188-0293)				0° - 28° ± 2°
Wing flaps (S/N 188-0294 and on)				0° - 20° ± 1°
Ailerons (from neutral)	Up	18° ± 1°	Down	10° ± 1°
Elevators	Up	26° 30' ± 1°	Down	21° ± 1°
Elevator tab	Up	12° ± 1°	Down	27° ± 1°
Rudder	Right	24° + 0°, -1°	Left	24° + 0°, -1°

(Neutral aileron is rigged with trailing edge 3° ± 30' below trailing edge of wing.)

Additional Limitations for Restricted Category

*Airspeed limits (CAS): Maximum operating speed in agricultural operations 120 mph (104 knots)

C.G. range: (+39.0) to (+45.5) at 2300 lbs. or less; (+42.4) to (+45.5) at 4000 lbs.

*Maximum weight: 4000 lbs. (*See Note 3.*)

Serial numbers eligible: 653, 188-0001 through 188-0572

III. Model 188A, AGwagon "A" & "B", 1 PCLM (Normal and Restricted Category), approved September 26, 1969

Engine	Continental O-470-R
*Fuel	80/87 minimum grade aviation gasoline
*Engine limits	For all operations, 2600 rpm (230 hp)
Propeller and propeller limits	1. (a) McCauley 1A200/AOM fixed pitch Static rpm at maximum permissible throttle setting: Not over 2300, not under 2200 No additional tolerance permitted. Diameter: not over 90 in., not under 88 in. 2. (a) McCauley constant speed, 2A34C50 hub with 90A-2 blades Diameter: not over 88 in., not under 86 in. Pitch settings at 36 in. sta.: low 8°, high 22° (b) Governor: Woodward A210452, Garwin 34-828-01, McCauley C290D2/T1 or C290D3/T1 3. (a) McCauley constant speed, 2A34C66 hub with 90AT-2 blades Diameter: not over 88 in., not under 86 in. Pitch settings at 36 in. sta.: low 8°, high 22° (b) Governor: Woodward A210452, Garwin 34-828-01, McCauley C290D2/T1 or C290D3/T1 4. (a) McCauley constant speed, 2A34C201 hub with 90DA-2 blades Diameter: not over 88 in., not under 86.5 in. Pitch settings at 30 in. sta.: low 10.5°, high 24.5° (b) Governor: Woodward A210452, Garwin 34-828-01, McCauley C290D2/T1 or C290D3/T1 5. (a) McCauley constant speed 2A34C203 hub with 90 DCA-2 blades Diameter: not over 88 in., not under 86.5 in. Pitch settings at 30 in. sta.: low 10.0°, high 24.5° (b) Governor: Woodward A210452, Garwin 34-828-01 McCauley C290D2/T1 or C290D3/T1
*Airspeed Limits (CAS)	Never exceed 181 mph (157 knots) Maximum structural cruising 144 mph (125 knots) Maneuvering 127 mph (110 knots) Flaps extended 110 mph (96 knots) *(See Additional Limitation for Restricted Category.)*
C.G. range (normal category)	(+39.0) to (+45.5) at 2300 lbs. or less (+41.0) to (+45.5) at 3300 lbs. Straight line variation between points given.
Empty weight C.G. range	None
*Maximum weight	3300 lbs. (normal category)
Number of seats (max.)	1 (at +91 to 95)
Maximum baggage	100 lb. (+12.0) (optional)
Fuel capacity	37 gal. (+11.0; 36.5 usable) *See Note 1 for data on unusable fuel.*

III. Model 188A, AGwagon "A" & "B" (cont'd)

Oil capacity	12 qt. (-17.0; includes 9 lb. unusable) *See Note 1 for data on undrainable oil.*				
Control surface movements	Wing flaps			Down	20° ± 1°
	Ailerons (from neutral)	Up	18° ± 1°	Down	10° ± 1°
	Elevators	Up	26° ± 1°	Down	21° ± 1°
	Elevator tab	Up	12° ± 1°	Down	27° ± 1°
	Rudder	Right	24° + 0°, -1°	Left	24° + 0°, -1°
	(Neutral aileron is rigged with trailing edge 3° ± 30' below trailing edge of wing.)				

Additional Limitations for Restricted Category

*Airspeed limits (CAS)	Maximum operating speed in agricultural operations 120 mph (104 knots)
C.G. range	(+39.0) to (+45.5) at 2300 lbs. or less (+42.0) to (+45.5) at 3800 lbs. Straight line variation between points given.
*Maximum weight	*See Note 3.*
Serial numbers eligible	18800573 through 18800832

IV. Model A188A, AGwagon "A" & "B", 1 PCLM (Normal and Restricted Category), approved September 26, 1969

Engine	Continental IO-520-D
*Fuel	100/130 minimum grade aviation gasoline
*Engine limits	Takeoff (5 min.) at 2850 rpm (300 hp) For all other operations, 2700 rpm (285 hp)

1. (a) McCauley D2A34C58 hub or D2A34C58-0 (oil filled) hub with 90AT-4 blades
   Diameter: not over 86 in., not under 84 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 25°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T9 or C290D3/T9, or Woodward A210462
2. (a) McCauley F2A34C58 hub with 90AT-4 blades
   Diameter: not over 86 in., not under 84 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 25°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T9 or C290D3/T9, or Woodward A210462
3. (a) McCauley D2A34C58/90AT-8 or D2A34C58-0/90AT-8 (oil filled)
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   Low 8.8°, high 25.8°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T9 or C290D3/T9, or Woodward A210462
4. (a) McCauley D2A34C98/90AT-4 or D2A34C98-0/90AT-4 (oil filled)
   Diameter: not over 86 in., not under 84 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 25°
   (b) Governor: Garwin 34-828-01, McCauley C290D2/T9 or C290D3/T9

IV. Model A188A, AGwagon "A" & "B" (cont'd)

5. (a) McCauley D2A34C98/90AT-8 or D2A34C98-0/90AT-8 (oil filled)
Diameter: not over 82 in., not under 80 in.
Pitch settings at 36 in. sta.:
Low 8.8°, high 25.8°
(b) Governor: Garwin 34-828-01, McCauley C290D2/T9 or C290D3/T9

*Airspeed Limits (CAS)	Never exceed	181 mph (157 knots)
	Maximum structural cruising	144 mph (125 knots)
	Maneuvering	127 mph (110 knots)
	Flaps extended	110 mph (96 knots)
	(See Additional Limitation for Restricted Category.)	

C.G. Range (Normal Category): (+39.0) to (+45.5) at 2300 lbs. or less; (+41.0) to (+45.5) at 3300 lbs. Straight line variation between points given.

Empty weight C.G. Range: None

*Maximum weight: 3300 lbs. (normal category)

Number of seats (max.): 1 (at +91 to +95)

Maximum baggage: 100 lb. (+12.0) (Optional)

Fuel capacity: 37 gal. (+11.0; 36.5 gal. usable)
See Note 1 for data on unusable fuel.

Oil capacity: 12 qt. (-17.0; includes 9 lbs. unusable)
See Note 1 for data on undrainable oil.

Control surface movements:

Wing flaps			Down	20° ± 1°
Ailerons (from neutral)	Up	18° ± 1°	Down	10° ± 1°
Elevators	Up	26° ± 1°	Down	21° ± 1°
Elevator tab	Up	12° ± 1°	Down	27° ± 1°
Rudder	Right	24° + 0°, -1°	Left	24° + 0°, -1°

(Neutral aileron is rigged with trailing edge 3° ± 30' below trailing edge of wing.)

Additional Limitations for Restricted Category

*Airspeed Limits (CAS): Maximum operating speed in agricultural operations 120 mph (104 knots)

C.G. Range: (+39.0) to (+47.5) at 2300 lbs. or less; (+39.4) to (+47.5) at 2500 lbs.; (+42.4) to (+45.5) at 4000 lbs. Straight line variation between points given.

*Maximum weight: *See Note 3.*

Serial numbers eligible: 18800573 through 18800832

V. Model 188B, AGpickup, 1 PCLM (Restricted Category), approved December 20, 1971
Model 188B, AGpickup, 1 PCLM (Normal Category) (See required equipment, item 2), approved December 20, 1971

Engine: Continental O-470-R (S/N 18800833 through 18801824)
Continental O-470-S (S/N 18801825 and up) *(See Note 6.)*

*Fuel: 80/87 minimum grade aviation gasoline

V. Model 188B, AGpickup (cont'd)

*Engine limits: For all operations, 2600 rpm (230 hp)

Propeller and propeller limits:

1. (a) McCauley 1A200/AOM Fixed Pitch
   Static rpm at max. permissible throttle setting:
   Not over 2300, not under 2200
   No additional tolerance permitted.
   Diameter: not over 90 in., not under 88 in.
2. (a) McCauley Constant Speed, 2A34C50 hub with 90A-2 blades
   Diameter: not over 88 in., not under 86 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 22°
   (b) Governor: Woodward A210452, Edo-Aire 34-828-01 or McCauley C290D2/T1 or C290D3/T1
3. (a) McCauley constant speed, 2A34C66 hub with 90AT-2 blades
   Diameter: not over 88 in., not under 86 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 22°
   (b) Governor: Woodward A210452, Edo-Aire 34-828-01 or McCauley C290D2/T1 or C290D3/T1
4. (a) McCauley constant speed, 2A34C201 hub with 90DA-2 blades
   Diameter: not over 88 in., not under 86.5 in.
   Pitch settings at 30 in. sta.:
   Low 10.5°, high 24.5°
   (b) Governor: Woodward 4210452, Edo-Aire 34-828-01 or McCauley C290D2/T1 or C290D3/T1
5. (a) McCauley constant speed, 2A34C203 hub with 90DCA-2 blades
   Diameter: not over 88 in., not under 86.5 in.
   Pitch settings at 30 in. sta.:
   Low 10.0°, high 24.5°
   (b) Governor: Woodward A210452, Edo-Aire 34-828-01, McCauley C290D2/T1 or C290D3/T1

*Airspeed Limits (CAS)

Never exceed	181 mph (157 knots)
Maximum structural cruising	144 mph (125 knots)
Maneuvering	116 mph (101 knots)
Flaps extended (5°)	120 mph (104 knots)
(10° - 20°)	110 mph (96 knots)

C.G. Range (normal category): (+39.0) to (+45.5) at 2300 lbs. or less
(+41.0) to (+45.5) at 3300 lbs.
Straight line variation between points given.

Empty weight C.G. range: None

*Maximum weight: 3300 lbs. (normal category)

Number of seats (max.): 1 (at +91 to +95)

Maximum cargo: 26.7 cubic feet within operational gross weight

Fuel capacity: 37 gal. (+11.0, 36.5 usable)
See Note 1 for data on unusable fuel.

Oil capacity: 12 qt. (-17.0; includes 9 lb. unusable)
See Note 1 for data on undrainable oil.

V. Model 188B, AGpickup (cont'd)

Control surface movements	Wing flaps			Down	20° ± 1°
	Ailerons (from neutral)	Up	18° ± 1°	Down	10° ± 1°
	Elevators	Up	26° ± 1°	Down	21° ± 1°
	Elevator tab	Up	12° ± 1°	Down	27° ± 1°
	Rudder	Right	24° + 0°, -1°	Left	24° + 0°, -1°

(Neutral aileron is rigged with trailing edge 3° ± 30' below trailing edge of wing.)

Additional Limitations for Restricted Category

*Airspeed limits (CAS) Maximum operating speed in agricultural operations 120 mph (104 knots)

C.G. Range (+39.0) to (+45.5) at 2300 lbs. or less
(+42.0) to (+45.5) at 3800 lbs.
Straight line variation between points given.

*Maximum Weight *See Note 3.*

Serial numbers eligible 18800833 through 18802348

VI. Model A188B, AGwagon"C" and AGtruck, 1 PCLM (Restricted Category), approved December 20, 1971, Model A188B, Agwagon "C" and AGtruck, 1 PCLM (Normal Category), (see required equipment, Item 2), approved December 20, 1971

Engine Continental IO-520-D

*Fuel 100/130 minimum grade aviation gasoline (S/N 18800833 through 18803046)
100LL/130 minimum grade aviation gasoline (S/N 678T, 18803047 and on)

*Engine limits Takeoff (5 min.) at 2850 rpm (300 hp)
For all other operations, 2700 rpm (285 hp)

Propeller and propeller limits

1. S/N 678T, 18800833 through 18803721
   (a) McCauley D2A34C58/90AT-8 or D2A34C98/90AT-8 or D2A34C58-0/90AT-8 (oil filled) or D2A34C98-0/90AT-8 (oil filled)
   Diameter: not over 82 in., not under 80 in.
   Pitch setting at 36 in. sta.:
   Low 8.8°, high 25.8°
   (b) Governor: Edo-Aire 34-828-01-1, McCauley C290D2/T9 or C290D3/T9, or Woodward A210462
2. S/N 678T, 18800833 through 18803721
   (a) McCauley D2A34C58/90AT-4 or D2A34C98/90AT-4 or D2A34C58-0/90AT-4 (oil filled) or D2A34C98-0/90AT-4 (oil filled)
   Diameter: not over 86 in., not under 84 in.
   Pitch settings at 36 in. sta.:
   Low 8°, high 25°
   (b) Governor: Edo-Aire 34-828-01-1, McCauley C290D2/T9 or C290D3/T9, or Woodward A210462
3. S/N 678T, 18802002 through 18803721 and those aircraft reworked per SE75-4
   (a) McCauley D3A32C90/82NC-2 or D3A32C90-N/82NC-2 (oil filled)
   Diameter: not over 80 in., not under 78.5 in.
   Pitch setting at 30 in. sta.:
   Low 10.4°, high 28.1°
   (b) Governor: McCauley C290D2/T9 or C290D3/T9, Edo-Aire 34-828-01-1 or Woodward A210462

VI. Model A188B (cont'd)

4. S/N 18803722 and on and those aircraft reworked per Cessna Service Kit SK188-76 or SK188-77
   (a) McCauley B2A34C205/90DHA-4
   Diameter: not over 86 in., not under 84.5 in.
   Pitch setting at 30 in. sta.:
   Low 9.7°, high 28.5°
   (b) Governor: McCauley C290D3/T9
5. S/N 18803722 and on
   (a) McCauley D3A32C408/82NDA-2
   Diameter: not over 80 in., not under 78.5 in.
   Pitch setting at 30 in. sta.:
   Low 10.4°, high 28.1°
   (b) Governor: McCauley C290D3/T9

*Airspeed limits (CAS)

(S/N 18800833 through 18802348)

Never exceed	181 mph	(157 knots)
Maximum structural cruising	144 mph	(125 knots)
Maneuvering	116 mph	(101 knots)
Flaps extended (5°	120 mph	(104 knots)
(10° - 20°)	110 mph	(96 knots)

(IAS)
(See Note 7 on use of IAS)

(S/N 678T, 18802349 through 18803721)

Never exceed	182 mph	(158 knots)
Maximum structural cruising	146 mph	(126 knots)
Maneuvering	118 mph	(103 knots)
Flaps extended (5°)	121 mph	(105 knots)
(10° - 20°)	109 mph	(95 knots)

(IAS)
(See Note 7 on use of IAS)

(S/N 18803722 and on)

Never exceed	179 mph	(156 knots)
Maximum structural cruising	144 mph	(125 knots)
Maneuvering	118 mph	(102 knots)
Flaps extended (5°)	122 mph	(106 knots)
(10° - 20°)	112 mph	(97 knots)

C.G. Range
(Normal Category)

(+39.0) to (+45.5) at 2300 lbs. or less
(+41.0) to (+45.5) at 3300 lbs.
Straight line variation between points given.

Empty weight C.G. Range

None

*Maximum weight

3300 lbs. (Normal Category)

Number of seats (maximum)

1 at (+91) to (+95)

Maximum cargo

1670 lb. at +43.0 sta. *(see Note 5)*

Fuel capacity

37 gal. (+11.0); (36.5 gal. usable) fuselage tank (through S/N 18802745)
56 gal. (+48.0); (54 gal. usable) wing tanks (through S/N 18801346)
54 gal. (+48.0); (52 gal. usable) wing tanks (S/N 678T, 18801347 and on)
See Note 1 for data on unusable fuel.

Oil capacity

12 qt. (-17.0; includes 9 lb. unusable through S/N 18803856)
13 qt. (-15.9) (9 lb. unusable) (S/N 18803857T and on)
See Note 1 for data on undrainable oil.

VI. Model A188B (cont'd)

Control surface movements	Wing flaps			Down	20° ± 1°
	Ailerons (from neutral)	Up	18° ± 1°	Down	10° ± 1°
	Elevators	Up	26° ± 1°	Down	21° ± 1°
	Elevator tab	Up	12° ± 1°	Down	27° ± 1°
	Rudder	Right	24° + 0°, -1°	Left	24° + 0°, -1°

(Neutral aileron is rigged with trailing edge 3° ± 30' below trailing edge of wing.)

Additional Limitations for Restricted Category

*Airspeed Limits (CAS)	Max. operation speed in agricultural operations (S/N 18800833 through 18802348)	120 mph (104 knots)
	Max. operation speed in agricultural operations (S/N 678T, 18802349 through 18803721)	121 mph (105 knots)
	Max. operation speed in agricultural operations (S/N 18803722 and on)	130 mph (113 knots)
C.G. Range	(+39.0) to (+47.5) at 2300 lbs. or less (+39.4) to (+47.5) at 2500 lbs. (+41.0) to (+46.4) at 3300 lbs. (+39.3) to (+45.2) at 4200 lbs. (see Note 3) Straight line variation between points given.	
*Maximum Weight	*See Note 3.*	
Serial numbers eligible	678T, 18800833 through 18803973 *(See Note 5.)*	

VII. Model T188C, Aghusky, 1 PCLM (Restricted Category), approved September 8, 1978

Engine	Continental TSIO-520-T	
*Fuel	100LL/100 minimum grade aviation gasoline	
*Engine limits	310 hp at 2700 rpm and 39.5 in. Hg. for all operations	
Propeller and propeller limits	1. (a) McCauley D3A34C402/90DFA-10 Diameter: not over 80 in., not under 78.5 in. Pitch settings at 30 in. sta.: Low 12.4°, high 28.5° Avoid continuous operation between 2000 and 2250 rpm above 27 in. mp. (b) Cessna spinner 0750286 (c) McCauley hydraulic governor C161031-0110	
*Airspeed limits (IAS) *(See Note 7 on use of IAS.)*	Maximum operational speed in agricultural operations Flaps extended (5°) (10° - 20°)	130 mph (113 knots) 121 mph (105 knots) 109 mph (95 knots)
C.G. Range (Normal Category)	(+39.0) to (+45.9) at 2300 lbs. or less (+39.7) to (+45.9) at 3300 lbs. (+40.0) to (+45.5) at 3300 lbs. (+39.2) to (+44.0) at 4400 lbs. *(See Note 3.)* Straight line variation between points given	
Empty weight C.G. Range	None	
*Maximum weight	3300 lbs. *(See Note 3.)*	

VII. Model T188C (cont'd)

Number of seats (Maximum)	1 at (+91) to (+95)
Maximum cargo	*See Note 5*.
Fuel capacity	54 gal. (+48.0); 52 gal. usable *See Note 1 for data on unusable fuel.*
Oil capacity	13 qt. (-18.7; includes 9 lb. unusable) *See Note 1*.
Maximum operating altitude	14,000 MSL

Control surface movements

Wing flaps			Down	20° ± 1°
Ailerons (from neutral)	Up	18° ± 1°	Down	10° ± 1°
Elevators	Up	26° ± 1°	Down	21° ± 1°
Elevator tab	Up	12° ± 1°	Down	27° ± 1°
Rudder	Right	24° + 0°, -1°	Left	24° + 0°, -1°

(Neutral aileron is rigged with trailing edge 3° ± 30' below trailing edge of wing.)

Serial numbers eligible: T18802839T, T18803307T, T18803308T, T18803325T through T18803974T

Data Pertinent to All Models

Datum	Fuselage station 0.0 (front face of firewall)
Leveling means	Two jig located nutplates and screws on left of tailcone
Certification basis	Part 21 of the Federal Aviation Regulations dated February 1, 1965, for Restricted Category. Part 23 of the Federal Aviation Regulations dated February 1, 1965, for Normal Category. In addition, (S/N 18803297 and on) FAR 23.1559 effective March 1, 1978, for Normal Category. For the T188C only, Part 21 of the Federal Aviation Regulations dated February 1, 1965, and Part 23 of the Federal Aviation Regulations dated February 1, 1965, with exception to 23.221 per 21.25(a)(1). In addition, FAR 23.1559 effective March 1, 1978. Application for Type Certificate dated April 7, 1965. Type Certificate NO. A9CE issued February 14, 1966, obtained by the manufacturer under delegation option procedures.

Equivalent Safety Items	S/N 678T, 18802349 and on S/N T18802839T, T18803307T, T18803308T, T18803325T and on
Airspeed Indicator	FAR 23.1545 *(See Note 7 on use of IAS.)*
Airspeed Limitations	FAR 23.1583(a)(1)

Production Basis	Production Certificate No. 4. Delegation Option Manufacturer No. CE-1 authorized to issue airworthiness certification under delegation option provisions of Part 21 of the Federal Aviation Regulations.

Equipment: The basic required equipment as specified in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Airplane Flight Manual effective S/N 678T, 18803297 and on and T18802839T and T18803307T, T18803308T, and T18803325T and on. In addition, the following items of equipment are required:

(1) Stall Warning Indicator, Cessna Dwg. 1670056.
(2) Model 188B and A188B eligible for normal category certification when Cessna spring 1660206-3 replaces 1660206-2.

NOTE 1. Current weight and balance report together with list of equipment included in the certificated empty weight, and loading instructions when necessary, must be provided for each aircraft at the time of original certification.

The certificated empty weight and corresponding center of gravity location must include unusable fuel of 3 lbs. at +6.0 with the fuselage tank, or 42 lbs. at +48.0 Serials 188-0446 through 188-0572 (or 12 lbs. at +37.3 Serials 18800573 and on) when wing tanks are installed, and undrainable oil of 0.0 lb. at -17.0 through S/N 18802348, or full oil of 22.5 lb. at -17.5 S/N 678T, 18802349 through S/N 18803856; 24.4 lb. at -15.9 S/N 18803857T and on; 24.4 lb. at -18.7 S/N T18802389T, T18803307T, T18803308T, T18803325T and on.

NOTE 2. The following information must be displayed in the form of composite or individual placards.

(a) In full view of the pilot: (S/N 188-0001 through 188-0572 and 18800573 through 18800832)

(1) "This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals. For restricted category operations, refer to additional placards and limitations."

(2) "No acrobatic maneuvers including spins approved."

(3) "Maximum design weight - 3300 lb. (Reference weight and balance data for loading instructions)."

(4) "Maximum maneuvering speed - 127 mph, CAS."

(5) "Maximum altitude loss in stall recovery - 200 ft."

(6) "Maximum flight maneuvering load factors:

Flaps Up +3.8, -1.52
Flaps Down +3.0"

(7) Maximum flap extension speed - 110 mph, CAS."

(8) "Airplane controllable in 15 knot crosswind."

(9) "VFR - DAY" or

(10) "VFR - DAY - NIGHT."

(b) (1) In full view of the pilot: (S/N 18800833 through 18802348)
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals. For restricted category operations refer to additional placards and limitations.

MAXIMUMS		
Maneuvering speed		116 mph CAS (101 knots)
Gross weight (normal category)		3300 lb.
Altitude loss in stall recovery		140 ft.
Demonstrated crosswind		15 knots
Flight load factor	Flaps Up	+3.8, -1.52
	Flaps Down 5°	+2.5
	Flaps Down 10° - 20°	+2.0

Reference weight and balance data for loading instructions. No acrobatic maneuvers, including spins, approved. Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate.
VFR - DAY - NIGHT" (as applicable)

(2) In full view of the pilot: (S/N 18802349 through S/N 18803296)
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals. For restricted category operations refer to additional placards and limitations.

MAXIMUMS		
Maneuvering speed		118 mph IAS
Gross weight (normal category)		3300 lb.
Altitude loss in stall recovery		140 ft.
Demonstrated crosswind		15 knots
Flight load factor	Flaps Up	+3.8, -1.52
	Flaps Down 5°	+2.5
	Flaps Down 10° - 20°	+2.0

Reference weight and balance data for loading instructions. No acrobatic maneuvers, including spins, approved. Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate.

VFR - DAY - NIGHT" (as applicable)

(3) In full view of the pilot: (S/N 678T, 18803297 and on)
"The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category or in the Restricted Category are contained in the Airplane Flight Manual.

Refer to weight and balance data for loading instructions.
No acrobatic maneuvers, including spins, approved.
Flight into known icing conditions prohibited.

This airplane is certified for the following flight operations as of date of original airworthiness certificate.

DAY - NIGHT - VFR" (as applicable)

(4) In full view of the pilot: (S/N T18802839T, T18803307T, T18803308T, T18803325T and on)
"The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Restricted Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Airplane Flight Manual. Reference weight and balance data for loading instructions. No acrobatic maneuvers, including spins, approved. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate.

VFR - DAY - NIGHT" (as applicable)

(c) (1) On crash pad: (S/N 188-0001 through 18802348)
Flaps 5° 120 mph
Flaps 10° and 20° 110 mph

(2) On crash pad: (S/N 18802349 through 18803296)
Flaps 5° 121 mph IAS
Flaps 10° and 20° 109 mph IAS

(3) On crash pad: (effective S/N 678T, 18803297 through 18803721)

MAXIMUM AIRSPEEDS	
Maneuver	118 MIAS
Flaps 5°	121 MIAS
Flaps 10° and 20°	109 MIAS
Agricultural operations	121 MIAS

(4) On crash pad: (effective S/N 18803722 and on)

MAXIMUM AIRSPEEDS - MIAS	
Maneuver (3300 lbs.)	118
Flaps 5°	122
Flaps 10° and 20°	112
Agricultural operations	130

(d) (1) On flap handle: (S/N 188-0001 through 188-0293)
"FLAPS - WARNING Avoid slips with flaps extended."
"FLAPS - PULL TO EXTEND

Takeoff	Retracted
	1st Notch 10°
	2nd Notch 20°
Landing	0 to 3rd Notch 30° "

(2) On flap handle: (S/N 188-0294 through 188-0572 and 18800573 through 18800832)
"FLAPS - PULL TO EXTEND

Takeoff and Landing	Retracted	0°
	1st Notch	10°
	2nd Notch	20°

(3) On flap handle: (S/N 678T, 18800833 and on)
"FLAPS - PULL TO EXTEND

Takeoff	Retracted	0°
	1st Notch	5°
and	2nd Notch	10°
Landing	3rd Notch	20° "

(e) (1) Adjacent to the fuel valve control:
"Fuel Valve Push-on; 36.5 gals. usable." (through S/N 18802745)
(2) Adjacent to the fuel valve control for models equipped with wing fuel tanks:
"Fuel Valve Push-on; 49 gals. usable." (S/N 188-0446 through 188-0572)
"Fuel Valve Push-on; 54 gals. usable." (S/N 18800573 through 18801346)
"Fuel Valve Push-on; 52 gals. usable." (S/N 678T, 18801347 and on)

(f) On Doors:
"Do not open doors in flight."

(g) On Baggage Door: (S/N 188-0001 through 188-0572 and S/N 18800573 through 18800832)
"Maximum baggage capacity 100 lb., articles stowed in this compartment to be securely tied down." Refer to Owner's Manual for details.

(h) On Instrument Panel:
"No Smoking." (Except with optional ash tray installation)

(i) On Hopper Lid:
(1) "Hopper capacity 200 U.S. Gal."
Serial 188-0001 through 18801040
"Maximum allowable hopper load - 1670 lb. See Weight and Balance Data."
Serial 18801041 and on
(2) "Max. allowable hopper load - 1800 lb. See Weight and Balance Data."
(On aircraft serials with "T" suffix)
(3) "Max. allowable hopper load - 1900 lb. See Weight and Balance Data."
(On aircraft serials with prefix and suffix "T")

(j) Adjacent to the master switch: (S/N 18800573 through 18801040)
(1) "Do not turn off alternator in flight except in emergency."

(k) Below the fuel flow gauge: (A188, A188A, and A188B through S/N 18802745)
"Fuel Flows at Full Throttle

	2850 rpm	2700 rpm
S.L.	24	23
4000 ft.	22	21
8000 ft.	20	19"

A188B (S/N 678T, 18802746 through 18803296)
"Max. Power Settings and Fuel Flow Takeoff (5 min. only) 2850 rpm
Max. Continuous Power 2700 rpm

Fuel Flows at Full Throttle

	2700 rpm	2850 rpm
S.L.	23 gph	24 gph
4,000 ft.	21 gph	22 gph
8,000 ft.	19 gph	20 gph"

A188B (S/N 18803297 and on)
"Min. Fuel Flows at Full Throttle

RPM	S.L.	4000	8000	12,000
2700	23 GPH	21 GPH	19 GPH	17 GPH
2850	24 GPH	22 GPH	20 GPH	18 GPH"

T188C (S/N T18802839T, T18803307T, T18803308T, T18803325T and on)
"Maximum Allowable Manifold Pressure

Press Alt.	MP. in. Hg.
S.L.	39.5
2500	38.8
5000	38.1
7500	37.3"

(l) (1) Adjacent to or on the fuel filler cap as applicable (fuselage tank)
"80/87 Octane 37 U.S. Gal. Cap." (O-470 engine)
"100/130 Octane 37 U.S. Gal. Cap." (IO-520 engine)
(2) Adjacent to or on the fuel filler caps (wing tanks)
"100/130 Octane 28 U.S. Gal. Cap." (through S/N 18801346)
"100/130 Octane 27 U.S. Gal. Cap." (S/N 18801347 through 18803046)
"Service this airplane with 100LL/100 Min.
Aviation Grade Gasoline - Capacity 27.0 Ga." (S/N 678T, 18803047 and on)

(m) Near tailwheel lock control: (S/N 678T, 18800833 and on) (except for serials with "T" prefix) "Lock for flight."

(n) On outside of cockpit doors:
"For emergency door removal pull out hinge pins."

(o) Below each door sill on inside of cockpit:
"Pull - Emergency Door Release."

(p) On Control Lock:
"Control Lock - Unlock before starting engine."

(q) On Crash Pad (T18802839T, T18803307T, T18803308T, T18803325T and on)
"Avoid Continuous Operation above 27 in. M.P. between 2000 and 2250 rpm."

NOTE 3. When operating in restricted category, operators may approve higher maximum weights as permitted by FAA Advisory Circular No. 20-33B and Civil Aeronautics Manual 8. With respect to this action, these aircraft have demonstrated satisfactory operation in the restricted category envelope given at 1500 ft. altitude and standard day at the following restricted gross weights:

188 Series		3800 lb.
A188 Series	(Serials 188-0001 and on)	4000 lb.
	(Serials 18800967T through 18801374T)	4000 lb.
	(Serials 678T, 18801375T and on)	4200 lb.
T188C Series	(Serials T18802839T, T18803307T, T18803308T, T18803325T and on)	4400 lb.

The following additional information must be displayed in the form of placards when operating in the Restricted Category:

(a) On Instrument Panel in full view of the pilot:
  (1) "Maximum operating speed in agricultural operations - 120 mph (104 knots)" (S/N 188-0001 through 18802348)
  (2) "Maximum operating speed in agricultural operations - 121 mph IAS. (105 knots IAS)." (S/N 18802349 through 18803296)
  (3) T188C (Serials T18802839T, T18803307T, T18803308T, T18803325T and on)

MAXIMUM AIRSPEEDS	
Maneuver (3300 lbs.)	117 MIAS
Flaps 5°	121 MIAS
Flaps 10° to 20°	109 MIAS
Agricultural Operation	130 MIAS"

  (4) "Hopper Dump - Pull"
  (S/N 188-0001 through 18801374) (Airplanes with Transland dump plate assembly)
  "Hopper Dump - - - - - - - →"
  (S/N 188-0390 and on) (on dump handle) (Airplanes with Transland or Cessna gate box assembly)
  "Dump"
  (S/N 18802311 and on) (Airplanes with Transland P/N 21767 Australian dump plate assembly)

(b) On canopy, side, window or fuselage side panel:
  "RESTRICTED"

NOTE 4. Cylinder head probe location No. 1 cylinder through S/N 18803046; S/N 18803722 and on. No. 5 cylinder S/N 678T, S/N 18803047 through S/N 18803721. No. 2 cylinder S/N T18802839T, T18803307T, T18803308T, T18803325T and on.

NOTE 5. The letter "T" suffix after the serial number indicates an A188 series aircraft with an 1800 lb. maximum capacity hopper (Ex: 18800967T). Serial numbers with prefix "T" and suffix "T" indicate T188C aircraft with 1900 lb. maximum capacity hopper. (Ex: T18803329T)

NOTE 6. The installation of the O-470-S engine in Model 188B (1972 through 1974) will require a change of the oil temperature gauge. Reference Cessna Service Letter SE 75-2 for this change.

NOTE 7. (a) The marking of the airspeed indicator with IAS provides an equivalent level of safety to FAR 23.1545 when the approved airspeed calibration data presented in Section VI of the Owner's Manual listed below is available to the pilot:

A188B	Cessna P/N D1064-13	(S/N 18802349 through S/N 18802745)
A188B	Cessna P/N D1089-13	(S/N 18802746 through S/N 18803046)
A188B	Cessna P/N D1117-13	(S/N 18803047 through S/N 18803296)

(b) The marking of the airspeed indicator with IAS provides an equivalent level of safety to FAR 23.1545 when the approved airspeed calibration data presented in the FAA approved Airplane Flight Manual listed below is available to the pilot:

A188B	Cessna P/N D1166-13	(S/N 678T, 18803297 through S/N 18803521)
T188C	Cessna P/N D1168-13	(S/N T18803307T, T18803308T, T18803325T through S/N T18803521T)
A188B	Cessna P/N D1180-13FM	(S/N 18803522 through S/N 18803721)
T188C	Cessna P/N D1181-13FM	(S/N T18803522T through T18803721T)
A188B	Cessna P/N D1201-13FM	(S/N 18803722 through 18803856)
T188C	Cessna P/N D1202-13FM	(S/N T18803722T through T18803856T)
A188B	Cessna P/N D1220-13FM	(S/N 18803857T through 18803926T)
T188C	Cessna P/N D1221-13FM	(S/N T18803857T through T18803926T
A188B	Cessna P/N D1238-13FM	(S/N 18803927T through 18803973T)
T188C	Cessna P/N D1239-13FM	(S/N T18802839T, T18803927T through T18803974T)

NOTE 8. 14 volt electrical system
188/A188 series through Serial 18803046

28 volt electrical system
A188 Series, Serial 678T, 18803047 and on
T188 Series, Serial T18803307T, T18803308T, T18803325T and on

In addition to the placards specified above, the prescribed operating limitations indicated by an asterisk (*) under Sections I through VII of this data sheet must also be displayed by permanent markings.

Note: For 188, A188, and T188:

"WARNING": Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage, and is therefore prohibited on Cessna airplanes."

....END....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

	3A12
	Revision 77
	CESSNA
172	172I
172A	172K
172B	172L
172C	172M
172D	172N
172E	172P
172F (USAF T-41A)	172Q
172G	172R
172H (USAF T-41A)	172S
	June 18, 2008

"**WARNING**: Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage, and is therefore prohibited on Cessna airplanes."

TYPE CERTIFICATE DATA SHEET NO. 3A12

This data sheet which is part of Type Certificate No. 3A12 prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P.O. Box 7704
Wichita, Kansas 67277

I. Model 172, 4 PCLM (Normal Category), approved November 4, 1955; 2 PCLM (Utility Category), approved December 14, 1956

Engine — Continental O-300-A or O-300-B

*Fuel — 80/87 minimum grade aviation gasoline

*Engine Limits — For all operations, 2700 rpm (145 hp)

Propeller and Propeller Limits

1. Propeller
   (a) McCauley 1A170
   Static rpm at maximum permissible throttle setting:
   Not over 2360, not under 2230
   No additional tolerance permitted
   Diameter: not over 76 in., not under 74.5 in.
   (b) Spinner, Dwg. 0550162
2. Propeller
   (a) Sensenich M74DR or 74DR
   Static rpm at maximum permissible throttle setting:
   Not over 2430, not under 2300
   No additional tolerance permitted
   Diameter: not over 74 in., not under 72.0 in.
   (b) Spinner, Dwg. 0550162

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Rev. No.	77	60	60	60	60	57	64	60	64	60	51	60	67	60	59	59	50	50	55	55
Page No.	21	22	23	24	25	26	27	28	29	30	31									
Rev. No.	50	72	59	65	77	70	76	77	77	75	76									

I. Model 172 (cont'd)

Propeller and Propeller Limits (cont'd)	3. Propeller (a) McCauley 1C172/MDM 7652, 53, or 55 30 lb. (-39.0) Static rpm at maximum permissible throttle setting: Not over 2350, not under 2250 No additional tolerance permitted Diameter: not over 76 in., not under 74.5 in. (b) Spinner, Dwg. 0550216	
*Airspeed Limits (CAS)	Maneuvering	115 mph (100 knots)
	Maximum structural cruising	140 mph (122 knots)
	Never exceed160 mph (139 knots)	
	Flaps extended	100 mph (87 knots)
C.G. Range	Normal	(+40.8) to (+46.4) at 2200 lbs. (+36.4) to (+46.4) at 1733 lbs.
	Utility category	(+38.4) to (+40.3) at 1950 lbs. (+36.4) to (+40.3) at 1733 lbs. or less
	Straight line variation between points given.	
Empty Weight C.G. Range	None	
*Maximum Weight	Normal category 2200 lbs. Utility category 1950 lbs.	
Number of Seats	4 (2 at +36, 2 at +70) (For child's optional jump seat, refer to Equipment List.)	
Maximum Baggage	120 lbs. (+95)	
Fuel Capacity	42 gal. total, 37 gal. usable (two 21 gal. tanks in wings at +48) *See Note 1 for weight of unusable fuel and oil.*	
Oil capacity	2 gal. (-20), includes 1 gal. unusable	

Control Surface Movements					
	Wing flaps	Takeoff		Retracted	0°
				1st notch	10°
		Landing		2nd notch	20°
				3rd notch	30°
				4th notch	40°
	Ailerons	Up	20°	Down	14°
	Elevator tab	Up	28°	Down	13°
	Elevator	Up	28°	Down	26°
	Rudder	Right	16°	Left	16°

Serial Numbers Eligible	610, 612, 615, 28000 through 29999, 36000 through 36999 and 46001 through 46754

II. Model 172A, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved July 16, 1959;
Model 172B, Skyhawk, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved June 14, 1960

Engine	Continental O-300-C or O-300-D
*Fuel	80/87 minimum grade aviation gasoline
*Engine Limits	For all operations, 2700 rpm (145 hp)

II. Model 172A, Model 172B (cont'd)

Propeller and Propeller Limits	1. Propeller (a) McCauley 1C172/EM 7652, 53, or 55 Static rpm at maximum permissible throttle setting: Not over 2350, not under 2230 No additional tolerance permitted Diameter: not over 76 in., not under 74.5 in. (b) Spinner, Dwg. 0550216, 0550221 or 0550228 2. Propeller (seaplane only) (a) McCauley 1A175/SFC 8040 Static rpm at maximum permissible throttle setting: Not over 2480, not under 2380 No additional tolerance permitted Diameter: not over 80 in., not under 78.4 in. (b) Spinner, Dwg. 0550216 or 0550221 3. Propeller (a) Sensenich 74DC-0-56 Static rpm at maximum permissible throttle setting: Not over 2420, not under 2300 No additional tolerance permitted Diameter: not over 74 in., not under 72.5 in.	
*Airspeed Limits (CAS)	Maneuvering	115 mph (100 knots)
	Maximum structural cruising	140 mph (122 knots)
	Never exceed	160 mph (139 knots)
	Flaps extended	100 mph (87 knots)
C.G. Range	Landplane (Model 172A):	
	Normal category	(+40.8) to (+46.4) at 2200 lbs. (+36.4) to (+46.4) at 1733 lbs. or less
	Utility category	(+38.4) to (+40.3) at 1950 lbs. (+36.4) to (+40.3) at 1733 lbs. or less
	Straight line variation between points given.	
	Landplane (Model 172B):	
	Normal category	(+40.4) to (+46.4) at 2200 lbs. (+36.4) to (+46.4) at 1850 lbs. or less
	Utility category	(+37.4) to (+40.3) at 1950 lbs. (+36.4) to (+40.3) at 1850 lbs. or less
	Seaplane (Models 172A and 172B):	
	Normal category	(+39.8) to (+45.5) at 2220 lbs. (+36.4) to (+45.5) at 1825 lbs. or less
	Straight line variation between points given.	
Empty Weight C.G. Range	None	
*Maximum Weight	Landplane:	
	Normal category	2200 lb.
	Utility category	1950 lb.
	Seaplane:	
	Normal category	2220 lb.
Number of Seats	4 (2 at +36, 2 at +70) (For child's optional jump seat, refer to Equipment List.)	
Maximum Baggage	120 lb. (+95)	
Fuel Capacity	42 gal. total, 37 gal. usable (172A); 39 gal. usable (172B) (two 21 gal. tanks in wings at +48) *See Note 1 for weight of unusable fuel and oil.*	
Oil Capacity	2 gal. (-20), 1 gal. usable	

II. Model 172A, Model 172B (cont'd)

Control Surface Movements	Wing flaps	Takeoff		Retracted	0°
				1st notch	10°
		Landing		2nd notch	20°
				3rd notch	30°
				4th notch	40°
	Ailerons	Up	20°	Down	15°
	Elevator tab	Up	28°	Down	13°
	Elevator	Up	28°	Down	26°
	Rudder (landplane)	Right	16°	Left	16°
	(seaplane)	Right	19°	Left	15°

(Measured parallel to W.L.)

Serial Numbers Eligible

Model 172A: 622, 625, 46755 through 47746
Model 172B: 630, 17247747 through 17248734

III. Model 172C, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved July 18, 1961

Engine

Continental O-300-C or O-300-D

*Fuel

80/87 minimum grade aviation gasoline

*Engine Limits

For all operations, 2700 rpm (145 hp)

Propeller and Propeller Limits

1. Propeller
   (a) McCauley 1C172/EM 7652, 53, or 55
   Static rpm, at maximum permissible throttle setting:
   Not over 2350, not under 2230
   No additional tolerance permitted
   Diameter: not over 76 in., not under 74.5 in.
   (b) Spinner, Dwg. 0550216, 0550221 or 0550228
2. Propeller (seaplane only)
   (a) McCauley 1A175/SFC 8040
   Static rpm, at maximum permissible throttle setting:
   Not over 2480, not under 2380
   No additional tolerance permitted
   Diameter: not over 80 in., not under 78.4 in.
   (b) Spinner, Dwg. 0550216 or 0550221
3. Propeller
   (a) Sensenich 74DC-0-56
   Static rpm at maximum permissible throttle setting:
   Not over 2420, not under 2300
   No additional tolerance permitted
   Diameter: not over 74 in., not under 72.5 in.

*Airspeed Limits (CAS)

Maneuvering	115 mph (100 knots)
Maximum structural cruising	140 mph (122 knots)
Never exceed	160 mph (139 knots)
Flaps extended	100 mph (87 knots)

C.G. Range

Landplane

Normal category	(+40.5) to (+46.4) at 2250 lbs.
	(+36.4) to (+46.4) at 1850 lbs. or less
Utility category	(+37.4) to (+40.3) at 1950 lbs.
	(+36.4) to (+40.3) at 1850 lbs. or less

Seaplane

Normal category	(+39.8) to (+45.5) at 2220 lbs.
	(+36.4) to (+45.5) at 1825 lbs. or less

Straight line variation between points given.

III. Model 172C (cont'd)

Empty Weight C.G. Range	None
*Maximum Weight	Landplane Normal category 2250 lbs. Utility category 1950 lbs. Seaplane Normal category 2220 lbs.
Number of Seats	4 (2 at +36, 2 at +70) (For child's optional jump seat, refer to Equipment List.)
Maximum Baggage	120 lbs. (+95)
Fuel Capacity	39 gal. total, 36 gal. usable (two 19.5 gal. tanks in wings at +48) *See Note 1 for weight of unusable fuel and oil.*
Oil Capacity	2 gal. (-20), includes 1 gal. unusable

Control Surface Movements

Wing flaps	Takeoff		Retracted	0°
			1st notch	10°
	Landing		2nd notch	20°
			3rd notch	30°
			4th notch	40°
Ailerons	Up	20°	Down	15°
Elevator tab	Up	28°	Down	13°
Elevator	Up	28°	Down	26°
Rudder (Landplane)	Right	16°	Left	16°
(Seaplane)	Right	19°	Left	15°

(Measured parallel to W.L.)

Serial Numbers Eligible	17248735 through 17249544

IV. Model 172D, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved June 19, 1962
Model 172E, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved June 27, 1963
Model 172F (USAF T-41A), 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved April 21, 1964
Model 172G, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved June 15, 1965
Model 172H (USAF) T-41A), 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved June 7, 1966

Engine	Continental O-300-C or O-300-D
*Fuel	80/87 minimum octane aviation gasoline
*Engine Limits	For all operations, 2700 rpm (145 hp)

Propeller and Propeller Limits

1. Propeller
   (a) McCauley 1C172/EM 7652, 53
   Static rpm at maximum permissible throttle setting:
   Not over 2420, not under 2230
   No additional tolerance permitted
   Diameter: not over 76 in., not under 74.5 in.
   (b) Spinner
   Model 172D, E, F, Dwg. 0550216, 0550221 or 0550228
   Model 172G, H, Dwg. 0550236
2. Propeller (seaplane only)
   (a) McCauley 1A175/SFC 8040
   Static rpm at maximum permissible throttle setting:
   Not over 2480, not under 2380
   No additional tolerance permitted
   Diameter: not over 80 in., not under 78.4 in.

IV. Model 172D, Model 172E, Model 172F, Model 172G, Model 172H (cont'd)

Propeller and Propeller Limits (cont'd)	2. Propeller (seaplane only) (cont'd) (b) Spinner Model 172D, E, F, Dwg. 0550216, 0550221 Model 172G, H, Dwg. 0550236	
*Airspeed Limits (CAS)	Maneuvering	122 mph (106 knots)
	Maximum structural cruising	142 mph (122 knots)
	Never exceed	174 mph (151 knots)
	Flaps extended	100 mph (87 knots)
C.G. Range	Landplane	
	Normal category	(+38.5) to (+47.3) at 2300 lbs. (+35.0) to (+47.3) at 1950 lbs. or less
	Utility category	(+35.5) to (+40.5) at 2000 lbs. (+35.0) to (+40.5) at 1950 lbs. or less
	Seaplane	
	Normal category	(+39.8) to (+45.5) at 2220 lbs. (+36.4) to (+45.5) at 1825 lbs. or less
	Straight line variation between points given.	
Empty Weight C.G. Range	None	
*Maximum Weight	Landplane:	
	Normal category	2300 lbs.
	Utility category	2000 lbs.
	Seaplane:	
	Normal category	2220 lbs.
Number of Seats	4 (2 at +36, 2 at +70) (For child's optional jump seat, refer to Equipment List.)	
Maximum Baggage	120 lbs. (+95)	
Fuel Capacity	39 gal. total, 36 gal. usable (two 19.5 gal. tanks in wings at +48) *See Note 1 for weight of unusable fuel and oil.*	
Oil Capacity	2 gal. (-20), 1 gal. usable	

Control Surface Movements

Wing flaps	Takeoff		Retracted	0°
			1st notch	10°
	Landing		0°	40°
Ailerons	Up	20°	Down	15°
Elevator tab	Up	28°	Down	13°
Elevator	Up	28°	Down	23°
(Neutral position is with bottom of balance area flush with bottom of stabilizer.)				
Rudder (landplane)	Right	16°	Left	16°
(seaplane)	Right	19°	Left	15°

Serial Numbers Eligible

Model 172D:	17249545 through 17250572
Model 172E:	639, 17250573 through 17251822
Model 172F:	17251823 through 17253392
Model 172G:	17253393 through 17254892
Model 172H:	638, 17254893 through 17256512 (except 17256493)

V. Model 172I, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved December 15, 1967
Model 172K, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved May 9, 1968

Engine	Lycoming O-320-E2D
*Fuel	80/87 minimum grade aviation gasoline
*Engine Limits	For all operations, 2700 rpm (150 hp)
Propeller and Propeller Limits	1. Propeller (a) McCauley 1C172/MTM 7653 Static rpm at maximum permissible throttle setting: Not over 2360, not under 2260 No additional tolerance permitted (see Note 3) Diameter: not over 76 in., not under 74 in. (b) Spinner, Dwg. 0550320 2. Propeller (seaplane only) (a) McCauley 1A175/ATM 8042 Static rpm at maximum permissible throttle setting: Not over 2480, not under 2380 No additional tolerance permitted (see Note 3) Diameter: not over 80 in., not under 78.4 in. (b) Spinner, Dwg. 0550320 3. Propeller (a) McCauley 1C160/CTM 7553 Static rpm at maximum permissible throttle setting: Not over 2370, not under 2270 No additional tolerance permitted (see Note 3) Diameter: not over 75 in., not under 74 in. (b) Spinner, Dwg. 0550320 4. Propeller (seaplane only) (a) McCauley 1A175/ETM 8042 Static rpm at maximum permissible throttle setting: Not over 2480, not under 2380 No additional tolerance permitted (see Note 3) Diameter: not over 80 in., not under 78.4 in. (b) Spinner, Dwg. 0550321 5. Propeller (a) McCauley 1C160/DTM 7553 Static rpm at maximum permissible throttle setting: Not over 2370, not under 2270 No additional tolerance permitted (see Note 3) Diameter: not over 75 in., not under 74 in. (b) Spinner, Dwg. 0550320

*Airspeed Limits (CAS)	Maneuvering	122 mph (106 knots)
	Maximum structural cruising	140 mph (122 knots)
	Never exceed	174 mph (151 knots)
	Flaps extended	100 mph (87 knots)

C.G. Range	Landplane	
	Normal category	(+38.5) to (+47.3) at 2300 lbs.
		(+35.0) to (+47.3) at 1950 lbs. or less
	Utility category	(+35.5) to (+40.5) at 2000 lbs.
		(+35.0) to (+40.5) at 1950 lbs. or less
	Seaplane (Edo 89-2000 or 89A2000 floats)	
	Normal category	(+39.8) to (+45.5) at 2220 lbs.
		(+36.4) to (+45.5) at 1825 lbs. or less

Straight line variation between points given.

V. Model 172I, Model 172K (cont'd)

Empty Weight C.G. Range	None
*Maximum Weight	Landplane: Normal category 2300 lbs. Utility category 2000 lbs. Seaplane: Normal category 2220 lbs.
Number of Seats	4 (2 at +34 to +46, 2 at +73) (Occupant on child's optional jump seat at +93)
Maximum Baggage	120 lb. at +95
Fuel Capacity	42 gal. total, 38 gal. usable (two 21 gal. tanks in wings at +48) *See Note 1 for weight of unusable fuel and oil.*
Oil Capacity	2 gal. (-14.0), 1-1/2 gal. usable
Control Surface Movements	Wing flaps Takeoff 0° - 10° Landing 0° - 40° ±2° Ailerons Up 20° ±1° Down 15° ±1° Elevator tab Up 28° +1°, -0° Down 13° +1°, -0° Elevator Up 28° +1°, -0° Down 23° +1°, -0° (Neutral position is with bottom of balance area flush with bottom of stabilizer.) Rudder (landplane) Right 16° ±1° Left 16° ±1° (seaplane) Right 19° ±1° Left 15° ±1° (Measured parallel to W.L.)
Serial Numbers Eligible	Model 172I: 17256513 through 17257161 Model 172K: 17257162 through 17258486 (1969 model) 17258487 through 17259223 (1970 model)

VI. Model 172L, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved May 13, 1970

Engine	Lycoming O-320-E2D
*Fuel	80/87 minimum grade aviation gasoline
*Engine Limits	For all operations, 2700 rpm (150 hp)
Propeller and Propeller Limits	1. Propeller (a) McCauley 1C172/MTM 7653 Static rpm at maximum permissible throttle setting: Not over 2360, not under 2260 No additional tolerance permitted (see Note 3) Diameter: not over 76 in., not under 74 in. (b) Spinner, Dwg. 0550320 2. Propeller (seaplane only) (a) McCauley 1A175/ATM 8042 Static rpm at maximum permissible throttle setting: Not over 2480, not under 2380 No additional tolerance permitted (see Note 3) Diameter: not over 80 in., not under 78.4 in. (b) Spinner, Dwg. 0550320

VI. Model 172L (cont'd)

Propeller and Propeller Limits (cont'd)	3. Propeller (a) McCauley 1C160/CTM 7553 Static rpm at maximum permissible throttle setting: Not over 2370, not under 2270 No additional tolerance permitted (see Note 3) Diameter: not over 75 in., not under 74 in. (b) Spinner, Dwg. 0550320 4. Propeller (a) McCauley 1A160/DTM 7553 Static rpm at maximum permissible throttle setting: Not over 2370, not under 2270 No additional tolerance permitted (see Note 3) Diameter: not over 75 in., not under 74 in. (b) Spinner, Dwg. 0550320 5. Propeller (Seaplane only) (a) McCauley 1A175/ETM 8042 Static rpm at maximum permissible throttle setting: Not over 2480, not under 2380 No additional tolerance permitted (see Note 3) Diameter: not over 80 in., not under 78.4 in. (b) Spinner, Dwg. 0550321 6. Propeller (a) McCauley 1C160/DTM 7553 Static rpm at maximum permissible throttle setting: Not over 2370, not under 2270 No additional tolerance permitted (see Note 3) Diameter: not over 75 in., not under 74 in. (b) Spinner, Dwg. 0550320	
*Airspeed Limits (CAS)	Maneuvering Maximum structural cruising Never exceed Flaps extended	122 mph (106 knots) 140 mph (122 knots) 174 mph (151 knots) 100 mph (87 knots)
C.G. Range	Landplane Normal category Utility category Straight line variation between points given. Seaplane (Edo 89-2000 or 89A2000 floats) Normal category Straight line variation between points given.	(+38.5) to (+47.3) at 2300 lbs. (+35.0) to (+47.3) at 1950 lbs. or less (+35.5) to (+40.5) at 2000 lbs. (+35.0) to (+40.5) at 1950 lbs. or less (+39.8) to (+45.5) at 2220 lbs. (+36.4) to (+45.5) at 1825 lbs. or less
Empty Weight C.G. Range	None	
*Maximum Weight	Landplane: Normal category Utility category Seaplane: Normal category	 2300 lbs. 2000 lbs. 2220 lbs.
Number of Seats	4 (2 at +34 to +46, 2 at +73) (Occupant on child's optional jump seat at +96)	
Maximum Baggage	120 lb. at +95	
Fuel Capacity	42 gal. total, 38 gal. usable (two 21 gal. tanks in wings at +48) *See Note 1 for weight of unusable fuel.*	

VI. Model 172L (cont'd)

Oil Capacity	2 gal. (-14.0), 1-1/2 gal. usable *See Note 1 for data on undrainable oil.*					
Control Surface Movements	Wing flaps			Takeoff	0° - 10°	
				Landing	0° - 40°	±2°
	Ailerons	Up	20° ±1°	Down	15°	±1°
	Elevator tab	Up	28° +1°, -0°	Down	13°	+1°, -0°
	Elevator	Up	28° +1°, -0°	Down	23°	+1°, -0°
	(Neutral position is with bottom of balance area flush with bottom of stabilizer.)					
	Rudder (landplane)	Right	16° ±1°	Left	16°	±1°
	(seaplane)	Right	19° ±1°	Left	15°	±1°
	(Measured parallel to W.L.)					
Serial Numbers Eligible	Model 172L: 17259224 through 17259903 (1971 model) Model 172L: 17259904 through 17260758 (1972 model)					

VII. Model 172M, Skyhawk, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category, approved May 12, 1972

Engine: Lycoming O-320-E2D

*Fuel: 80/87 minimum grade aviation gasoline

*Engine Limits: For all operations, 2700 rpm (150 hp)

Propeller and Propeller Limits:

1. Propeller
   (a) McCauley 1C160/CTM 7553
   Static rpm at maximum permissible throttle setting:
   Not over 2370, not under 2270
   No additional tolerance permitted (see Note 3)
   Diameter: not over 75 in., not under 74 in.
   (b) Spinner: Dwg. 0550320
2. Propeller
   (a) McCauley 1C160/DTM 7553
   Static rpm at maximum permissible throttle setting:
   Not over 2370, not under 2270
   No additional tolerance permitted (see Note 3)
   Diameter: not over 75 in., not under 74 in.
   (b) Spinner, Dwg. 0550320
3. Propeller (seaplane only)
   (a) McCauley 1A175/ATM 8042
   Static rpm at maximum permissible throttle setting:
   Not over 2545, not under 2445
   No additional tolerance permitted (see Note 3)
   Diameter: not over 80 in., not under 78.4 in.
   (b) Spinner, Dwg. 0550320
4. Propeller (seaplane only)
   (a) McCauley 1A175/ETM 8042
   Static rpm at maximum permissible throttle setting:
   Not over 2545, not under 2445
   No additional tolerance permitted (see Note 3)
   Diameter: not over 80 in., not under 78.4 in.
   (b) Spinner, Dwg. 0550320

*Airspeed Limits (CAS): 17256493, 17260759 through 17265684

Maneuvering	112 mph (97 knots)
Maximum structural cruising	145 mph (126 knots)
Never exceed	182 mph (158 knots)
Flaps extended	100 mph (87 knots)

VII. Model 172M (cont'd)

*Airspeed Limits (CAS) (See Note 4 on use of CAS)	17265685 through 17267584	
	Maneuvering	97 knots
	Maximum structural cruising	128 knots
	Never exceed	160 knots
	Flaps extended	85 knots
C.G. Range	Landplane:	
	Normal category	(+38.5) to (+47.3) at 2300 lbs.
		(+35.0) to (+47.3) at 1950 lbs. or less
	Utility category	(+35.5) to (+40.5) at 2000 lbs.
		(+35.0) to (+40.5) at 1950 lbs. or less
	Seaplane: (Edo 89-2000 or 89A2000 floats)	
	Normal category	(+39.8) to (+45.5) at 2220 lbs.
		(+36.4) to (+45.5) at 1825 lbs. or less
	Straight line variation between points given.	
Empty Weight C.G. Range	None	
*Maximum Weight	Normal category: 2300 lb. (landplane); 2220 lb. (seaplane)	
	Utility category: 2000 lb. (landplane)	
Number of Seats	4 (2 at +34 to +46, 2 at +73) (Occupant on child's optional jump seat at +96)	
Maximum Baggage	120 lb. at +95	
Fuel Capacity	42 gal. total, 38 gal. usable (two 21 gal. tanks in wings at +48)	
	See Note 1 for data on unusable fuel.	
Oil Capacity	2 gal. (-14.0), 1-1/2 gal. usable	
	See Note 1 for data on undrainable oil.	
Control Surface Movements	Wing flaps Takeoff 0° - 10° (landplane) (seaplane)	
	Landing 0° - 40° +0°, -2° (landplane)	
	0° - 30° ±2° (seaplane)	
	Ailerons Up 20° ±1° Down 15° ±1°	
	Elevator tab Up 28° +1°, -0° Down 13° +1°, -0°	
	Elevator Up 28° +1°, -0° Down 23° +1°, -0°	
	(Neutral position is with bottom of balance area flush with bottom of stabilizer.)	
	Rudder (landplane) Right 16° ±1° Left 16° ±1° (landplane)	
	(seaplane) Right 19° ±1° Left 15° ±1° (seaplane)	
	(Measured parallel to W.L.)	
Serial Numbers Eligible	17256493, 17260759 through 17261898 (1973 model) (except 17261445 and 17261578)	
	17261899 through 17263458 (1974 model)	
	17263459 through 17265684 (1975 model)	
	17265685 through 17267584 (1976 model)	

VIII. Model 172N, Skyhawk, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved May 17, 1976

Engine	Lycoming O-320-H2AD
*Fuel	100/130 minimum grade aviation gasoline (S/N 17261445, 17267585 through 17269309)
	100LL/100 minimum grade aviation gasoline (S/N 17261578, 17269310 through 17274009)

VIII. Model 172N (cont'd)

*Engine Limits	For all operations, 2700 rpm (160 hp)
Propeller and Propeller Limits	1. Propeller (a) McCauley 1C160/DTM 7557 Static rpm at maximum permissible throttle setting: Not over 2400, not under 2280 No additional tolerance permitted Diameter: not over 75 in., not under 74 in. (b) Spinner: Dwg. 0550320 2. Propeller (seaplane only) (a) McCauley 1A175/ETM 8042 Static rpm at maximum permissible throttle setting: Not over 2570, not under 2470 No additional tolerance permitted Diameter: not over 80 in., not under 78.5 in. (b) Spinner: Dwg. 0550320
*Airspeed Limits (CAS) (See Note 4 on use of CAS)	1977 Model through 1979 Model: Maneuvering 97 knots Maximum structural cruising 128 knots Never exceed 160 knots Flaps extended 85 knots 1980 Model: Maneuvering 97 knots Maximum structural cruising 127 knots Never exceed 158 knots Flaps extended 85 knots
C.G. Range	Landplane: Normal category (+38.5) to (+47.3) at 2300 lbs. (+35.0) to (+47.3) at 1950 lbs. or less Utility category (+35.5) to (+40.5) at 2000 lbs. (+35.0) to (+40.5) at 1950 lbs. or less Seaplane: (Edo 89-2000 or 89A2000 floats) Normal category (+39.8) to (+45.5) at 2220 lbs. (+36.4) to (+45.5) at 1825 lbs. or less Straight line variation between points given.
Empty Weight C.G. Range	None
*Maximum Weight	Normal category: 2300 lb. (landplane); 2220 lb. (seaplane) Utility category: 2000 lb. (landplane)
Number of Seats	4 (2 at +34 to +46, 2 at +73) (Occupant on child's optional jump seat at +96)
Maximum Baggage	120 lb. at +95
Fuel Capacity	42 gal. total, 40 gal. usable (two 21.5 gal. tanks in wings at +48) *See Note 1 for data on unusable fuel.*
Oil Capacity	1.5 gal. (-14.0), 1.0 gal. usable

VIII. Model 172N (cont'd)

Control Surface Movements	Wing flaps	Takeoff	0° - 10° (landplane) (seaplane)		
		Landing	0° - 40° +0°, -2° (landplane)		
			0° - 30° ±2° (seaplane)		
	Ailerons	Up	20° ±1°	Down	15° ±1°
	Elevator tab	Up	28° +1°, -0°	Down	13° +1°, -0°
	Elevator	Up	28° +1°, -0°	Down	23° +1°, -0°
	(Neutral position is with bottom of balance area flush with bottom of stabilizer.)				
	Rudder (landplane)	Right	16° ±1°	Left	16° ±1° (landplane)
	(seaplane)	Right	19° ±1°	Left	15° ±1° (seaplane)
	(Measured parallel to W.L.)				

Serial Numbers Eligible

17261445, 17267585 through 17269309 (1977 model)
17261578, 17269310 through 17271034 (1978 model) (except 17270050)
17271035 through 17272884 (1979 model)
17270050, 17272885 through 17274009 (1980 model)

IX. Model 172P, Skyhawk, 4 PCL-SM (Normal Category), 2 PCLM (Utility Category), approved May 13, 1980

Engine

Lycoming O-320-D2J

*Fuel

100LL/100 minimum grade aviation gasoline

*Engine Limits

For all operations, 2700 rpm (160 hp)

Propeller and Propeller Limits

1. Propeller
   (a) McCauley 1C160/DTM 7557
   Static rpm at maximum permissible throttle setting:
   Not over 2420, not under 2300
   No additional tolerance permitted
   Diameter: not over 75 in., not under 74 in.
   (b) Spinner: Dwg. 0550320
2. Propeller (floatplane only)
   (a) McCauley 1A175/ETM 8043
   Static rpm at maximum permissible throttle setting:
   Not over 2570, not under 2470
   No additional tolerance permitted
   Diameter: not over 80 in., not under 78.5 in.
   (b) Spinner: Dwg. 0550320

*Airspeed Limits (CAS)
(See Note 4 on use of CAS)

Maneuvering	99 knots (landplane)
	96 knots (floatplane)
Maximum structural cruising	127 knots
Never exceed	158 knots
Flaps extended	85 knots

C.G. Range

Landplane:

Normal category	(+39.5) to (+47.3) at 2400 lbs.
	(+35.0) to (+47.3) at 1950 lbs. or less
Utility category	(+36.5) to (+40.5) at 2100 lbs.
	(+35.0) to (+40.5) at 1950 lbs. or less

Seaplane: (Edo 89-2000 or 89A2000 floats)

Normal category	(+39.8) to (+45.5) at 2220 lbs.
	(+36.4) to (+45.5) at 1825 lbs. or less

Straight line variation between points given.

Empty Weight C.G. Range

None

IX. Model 172P (cont'd)

*Maximum Weight	Normal category: 2400 lb. (landplane); 2220 lb. (seaplane) Utility category: 2100 lb. (landplane)
Number of Seats	4 (2 at +34 to +46, 2 at +73) (Occupant on child's optional jump seat at +96)
Maximum Baggage	120 lb. at +95
Fuel Capacity	42 gal. total, 40 gal. usable (two 21.5 gal. tanks in wings at +48) *See Note 1 for data on unusable fuel.*
Oil Capacity	2 gal. (-13.1), 3.5 gal. usable

Control Surface Movements

Wing flaps			Takeoff	0° - 10°
			Landing	0° - 30° +0°, -2°
Ailerons	Up	20° ±1°	Down	15° ±1°
Elevator tab	Up	28° +1°, -0°	Down	13° +1°, -0° (floatplane)
	Up	22° +1°, -0°	Down	19° +1°, -0° (landplane)
Elevator	Up	28° +1°, -0°	Down	23° +1°, -0°

(Neutral position is with bottom of balance area flush with bottom of stabilizer.)

Rudder (landplane)	Right	16° ±1°	Left	16° ±1° (landplane)
(seaplane)	Right	19° ±1°	Left	15° ±1° (seaplane)

(Measured parallel to W.L.)

Serial Numbers Eligible

17274010 through 17275034 (1981 model)
17275035 through 17275759 (1982 model)
17275760 through 17276079 (1983 model)
17276080 through 17276259 (1984 model)
17276260 through 17276516 (1985 model)
17276517 through 17276654 (1986 model)

X. Model 172Q, Cutlass, 4 PCLM (Normal Category), approved October 15, 1982

Engine	Lycoming O-360-A4N
*Fuel	100LL/100 minimum grade aviation gasoline
*Engine Limits	For all operations, 2700 rpm (180 hp)

Propeller and Propeller Limits

1. Propeller
   (a) McCauley 1A170E/JFA 7658
   Static rpm at maximum permissible throttle setting:
   Not over 2450, not under 2350
   No additional tolerance permitted
   Diameter: not over 76 in., not under 74.5 in.
   (b) Spinner: Dwg. 0509077

*Airspeed Limits

Maneuvering	105 knots
Maximum structural cruising	127 knots
Never exceed	158 knots
Flaps extended	85 knots

C.G. Range

Normal category (+41.0) to (+47.3) at 2550 lbs.
(+35.0) to (+47.3) at 1950 lbs. or less
Straight line variation between points given.

Empty Weight C.G. Range	None
*Maximum Weight	Normal category: 2550 lb.

X. Model 172Q (cont'd)

Number of Seats	4 (2 at +34 to +46, 2 at +73) (Occupant on optional child's seat at +96)
Maximum Baggage	120 lbs. at +95
Fuel Capacity	54 gal. total, 50 gal. usable (two 27 gal. tanks in wings at +48) *See Note 1 for data on unusable fuel.*
Oil Capacity	9 qt. at -15.5, 2 qt. unusable

Control Surface Movements

Wing flaps			Takeoff	0° - 10°
			Landing	0° - 30° +0°, -2°
Ailerons	Up	20° ±1°	Down	15° ±1°
Elevator tab	Up	22° +1°, -0°	Down	19° +1°, -0°
Elevator	Up	28° +1°, -0°	Down	23° +1°, -0°

(Neutral position is with bottom of balance area flush with bottom of stabilizer.)

Rudder	Right	16° ±1°	Left	16° ±1°

(Measured parallel to W.L.)

Serial Numbers Eligible: 17275869 through 17276054 (1983 model)
17276101 through 17276211 (1984 model)

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q

Datum: Front face of firewall (28000 through 47746)
Lower front face of firewall (17247747 through 17276654)

Leveling Means: Upper doorsill

Certification Basis:

Models 172 through 172P
Part 3 of the Civil Air Regulations effective November 1, 1949, as amended by 3-1 through 3-12. In addition, effective S/N 17271035 and on, FAR 23.1559 effective March 1, 1978. FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-5 for Model 172N; FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-12 for Model 172P through 172Q. In addition, effective S/N 17276260 and on, FAR 23.1545(a), Amendment 23-23 dated December 1, 1978.

Equivalent Safety Items	17261445, 17261578, 17265685
Airspeed Indicator	CAR 3.757 (see Note 4 on use of CAS) (17261445, 17261578, 17265685 through 17276259)
Operating Limitations	CAR 3.778(a)

Model 172Q
Part 3 of the Civil Air Regulations dated November 1, 1949, as amended by 3-1 through 3-12. In addition, FAR 23.1559 effective March 1, 1978; FAR 25.951(b)(2), Amendment 23-15 effective October 31, 1974; and FAR 23.1545(a), Amendment 23-23 effective December 1, 1978. FAR 36 dated December 1, 1969, plus amendments 36-1 through 36-12.

Application for Type Certificate dated July 11, 1955. Type Certificate No. 3A12 issued November 4, 1955, obtained by the manufacturer under Delegation Option Procedures.

Production Basis: Production Certificate No. 4. Delegation Option Manufacturer No. CE-1 authorized to issue airworthiness certificates under delegation option provisions of Part 21 of the Federal Aviation Regulations.

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

Equipment: The basic required equipment as prescribed in the applicable airworthiness requirements (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Airplane Flight Manual effective S/N 17271035 and on.

1. Model 172 through 172G: Stall warning indicator, Dwg. 0511062.
2. Model 172H and on: Stall warning indictor, Dwg. 0523112.

The equipment portion of Aircraft Specification 3A12, Revision 17, or Cessna Publication TS1000-13 should be used for equipment references on all aircraft prior to the Model 172E. Refer to applicable equipment list for the Model 172E and subsequent models.

NOTE 1: Current weight and balance report including list of equipment included in certificated empty weight, and loading instructions when necessary must be provided for each aircraft at the time of original certification.

Serial Nos. 28000 through 29999, 36000 through 36999 and 46001 through 47746, 17247747 through 17265684
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 30 lbs. at (+46) on Models 172 and 172A, or 18 lbs. at (+46) for Models 172B through 172H, or 24 lbs. at (+46) for Models 172I through 172M (17265684) and undrainable oil of (0) lb. at -20) for 172 through 172H and (0) lb. at (-14) for 172I through 172M (17265684).

Serial Nos. 17261578, 17261445, 17265685 through 17274009
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 24 lbs. at (+46) through 172M (17267584) or 18 lbs. at (+46) 17267585 and on and full oil of 11.3 lb. at (-14).

Serial Nos. 17274010 through 17276654: (Model 172P)
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 18 lb. at (+46) and full oil of 15 lb. at (-13.1).

Serial Nos. 17275869 through 17276211; (Model 172Q)
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 24 lb. at (+46) and full oil of 16.88 lb. at (-15.5).

NOTE 2. The following placards must be displayed as indicated:

A. In full view of the pilot:
(1) Models 172, 172A and 172B
"This airplane must be operated in compliance with the operating limitations stated in the form of placards, markings, and manuals.

NORMAL CATEGORY

Maximum design weight	2200 lbs.		
Refer to weight and balance data for loading instructions.			
Flight maneuvering load factors	Flaps up	+3.8	-1.52
	Flaps down	+3.5	
No acrobatic maneuvers including spins approved.			

UTILITY CATEGORY

Maximum design weight	1950 lbs.		
Baggage compartment and rear seat must not be occupied			
Flight maneuvering load factors	Flaps up	+4.4	-1.76
	Flaps down	+3.5	

No acrobatic maneuvers approved except those listed below.

Maneuver	Entry speed
Chandelles	115 mph (100 knots)
Lazy eights	115 mph (100 knots)
Steep turns	115 mph (100 knots)
Spins	Slow deceleration
Stalls (except whip stalls)	Slow deceleration"

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 2. (cont'd)

A. (2) Model 172C

"This airplane must be operated in compliance with the operating limitations stated in the form of placards, markings, and manuals.

NORMAL CATEGORY

Maximum design weight	2250 lbs.		
Refer to weight and balance data for loading instructions.			
Flight maneuvering load factors	Flaps up	+3.8	-1.52
	Flaps down	+3.5	

No acrobatic maneuvers including spins approved.

UTILITY CATEGORY

Maximum design weight	1950 lbs.		
Baggage compartment and rear seat must not be occupied.			
Flight maneuvering load factors	Flaps up	+4.4	-1.76
	Flaps down	+3.5	

No acrobatic maneuvers approved except those listed below.

Maneuver	Entry speed
Chandelles	115 mph (100 knots)
Lazy eights	115 mph (100 knots)
Steep turns	115 mph (100 knots)
Spins	Slow deceleration
Stalls (except whip stalls)	Slow deceleration"

(3) Models 172D, 172E, 172F, 172G, 172H, 172I, and 172K

"This airplane must be operated in compliance with the operating limitations stated in the form of placards, markings, and manuals.

NORMAL CATEGORY

Maximum design weight	2300 lbs.		
Refer to weight and balance data for loading instructions.			
Flight maneuvering load factors	Flaps up	+3.8	-1.52
	Flaps down	+3.5	

No acrobatic maneuvers including spins approved.

UTILITY CATEGORY

Maximum design weight	2000 lbs.		
Baggage compartment and rear seat must not be occupied.			
Flight maneuvering load factors	Flaps up	+4.4	-1.76
	Flaps down	+3.5	

No acrobatic maneuvers except those listed below.

Maneuver	Max. Entry speed
Chandelles	122 mph (106 knots)
Lazy eights	122 mph (106 knots)
Steep turns	122 mph (106 knots)
Spins	Slow deceleration
Stalls (except whip stalls)	Slow deceleration"

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 2. (cont'd)

A. (4) Model 172L (1971 model)

"This airplane must be operated in compliance with the operating limitations stated in the form of placards, markings, and manuals.

	MAXIMUMS			
	Normal Category		Utility Category	
Maneuvering speed (CAS)	122 mph (106 knots)		122 mph (106 knots)	
Gross weight	2300 lbs.		2000 lbs.	
Flight load factor				
Flaps up	+3.8	-1.52	+4.4	-1.76
Flaps down	+3.5		+3.5	

Normal category - No acrobatic maneuvers including spins approved
Utility category - Baggage compartment and rear seat must not be occupied.

No acrobatic maneuvers approved except those listed below.

Maneuver	Entry speed
Chandelles	122 mph (106 knots)
Lazy eights	122 mph (106 knots)
Steep turns	122 mph (106 knots)
Spins	Slow deceleration
Stalls (except whip stalls)	Slow deceleration"

Spin recovery: opposite rudder - forward elevator - neutralize controls

Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

(DAY NIGHT VFR IFR)" (as applicable)

(5) Model 172L (1972 model)

"This airplane must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals:

	MAXIMUMS			
	Normal Category		Utility Category	
Maneuvering speed (CAS)	122 mph (106 knots)		122 mph (106 knots)	
Gross weight	2300 lbs.		2000 lbs.	
Flight load factor				
Flaps up	+3.8	-1.52	+4.4	-1.76
Flaps down	+3.5		+3.5	

Normal category - No acrobatic maneuvers including spins approved
Utility category - Baggage compartment and rear seat must not be occupied.

No acrobatic maneuvers approved except those listed below.

Maneuver	Max. Entry speed
Chandelles	122 mph (106 knots)
Lazy eights	122 mph (106 knots)
Steep turns	122 mph (106 knots)
Spins	Slow deceleration
Stalls (except whip stalls)	Slow deceleration"

Spin recovery: opposite rudder - forward elevator - neutralize controls. Intentional spins with flaps extended are prohibited. Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

(DAY NIGHT VFR IFR)" (as applicable)

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 2. (cont'd)

A. (6) Model 172M (Landplane) 17256493, 17260759 through 17265684 except 17261445 and 17261578

"This airplane must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

	MAXIMUMS			
	Normal Category		Utility Category	
Maneuvering speed (CAS)	112 mph (97 knots)		112 mph (97 knots)	
Gross weight	2300 lbs.		2000 lbs.	
Flight load factor				
Flaps up	+3.8	-1.52	+4.4	-1.76
Flaps down	+3.0		+3.0	

Normal category - No acrobatic maneuvers including spins approved
Utility category - Baggage compartment and rear seat must not be occupied.

No acrobatic maneuvers approved except those listed below.

Maneuver	Recommended Entry speed	Maneuver	Recommended Entry Speed
Chandelles	120 mph (104 knots)	Spins	Slow deceleration
Lazy eights	120 mph (104 knots)	Stalls (except whip stalls)	Slow deceleration
Steep turns	112 mph (97 knots)		

Altitude loss in stall recovery -- 180 feet.
Abrupt use of the controls prohibited above 112 mph
Spin recovery: opposite rudder -- forward elevator -- neutralize controls
Intentional spins with flaps extended are prohibited. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

(DAY - NIGHT - VFR - IFR)" (as applicable)

Model 172M (Floatplane) 17256493, 17260759 through 17265684 except 17261445 and 17261578

"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

	MAXIMUMS	
Maneuvering speed	110 mph (96 knots) (CAS)	
Gross weight	2220 lbs.	
Flight load factor	Flaps up	+3.8, -1.52
	Flaps down	+3.0

WATER RUDDER: Extend for taxi; retract for takeoff, flight, and landing.

No acrobatic maneuvers, including spins approved. Altitude loss in a stall recovery - 200 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

(DAY - NIGHT - VFR - IFR)" (as applicable)

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 2. (cont'd)

A. (7) Model 172M and 172N (Landplane) (17261445, 17261578, 17265685 through 17271034 except 17270050)

"This airplane must be operated in compliance with the operating limitations stated in the form of placards, markings, and manuals.

	MAXIMUMS			
	Normal Category		Utility Category	
Maneuvering speed (CAS)	97 knots		97 knots	
Gross weight	2300 lbs.		2000 lbs.	
Flight load factor				
Flaps up	+3.8	-1.52	+4.4	-1.76
Flaps down	+3.0		+3.0	

Normal category - No acrobatic maneuvers including spins approved.
Utility category - Baggage compartment and rear seat must not be occupied.

NO ACROBATIC MANEUVERS EXCEPT THOSE LISTED BELOW:

Maneuver	Recommended Entry speed	Maneuver	Recommended Entry Speed
Chandelles	105 knots	Spins	Slow deceleration
Lazy eights	105 knots	Stalls (except	Slow deceleration
Steep turns	95 knots)	whip stalls)	

Altitude loss in stall recovery - 180 feet.
Abrupt use of the controls prohibited above 97 knots

Spin recovery: opposite rudder - forward elevator - neutralize controls. Intentional spins with flaps extended are prohibited. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate.

(DAY - NIGHT - VFR - IFR)" (as applicable)

Model 172M and 172N (Floatplane) (17265685 through 17271034)

FLOATPLANE

"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

	MAXIMUMS	
Maneuvering speed (CAS)	96 knots	
Gross weight	2220 lbs.	
Flight load factor	Flaps up	+3.8, -1.52
	Flaps down	+3.0

Water Rudder: Extend for taxi; retract for takeoff, flight and landing.

No acrobatic maneuvers, including spins approved. Altitude loss in a stall recovery - 200 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

(DAY - NIGHT - VFR - IFR)" (as applicable)

B. Forward of fuel selector valve: (All models through S/N 17265684 except 17261445 and 17261578)

"Both tanks on for takeoff and landing."

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 2. (cont'd)

C. On the fuel selector valve (at appropriate location)

(1) Model 172 and 172A
"Both - 37 gal.
Left - 18.5 gal.
Right - 18.5 gal.
Off"

(2) Model 172B
"Both - 39 gal.
Left - 19.5 gal.
Right - 19.5 gal.
Off"

(3) Model 172C, 172D, 172E, 172F, 172G, and 172H
"Both - 36 gal.
Left - 18 gal.
Right - 18 gal.
Off"

(4) Model 172I through 172M (except 17261445 and 17261578)
"Both - 38 gal. (all flight attitudes)
Left - 19 gal. (level flight only)
Right - 19 gal. (level flight only)
Off"

(5) Model 172N (17261445, 17261578, 17267585 through 17271034, excluding 17270050)
"Both - 40 gal. (all flight altitudes) (Takeoff-landing)
Left - 20 gal. (level flight only)
Right - 20 gal. (level flight only)
Off"

D. On flap handle, Models 172 through 172E
(1) "Flaps - Pull to extend
Takeoff Retract 0°
1st notch 10°
Landing 0° - 40°
(2) "Avoid slips with flaps down."

E. Near flap indicator Models 172F (electric flaps) through 17271034, excluding 17270050)
"Avoid slips with flaps extended."

F. In baggage compartment:
(1) Models 172 through 172B
"Maximum baggage 120 lb. For additional loading instructions, see weight and balance data."
(2) Model 172C through 172M (1973 model)
"120 lb. maximum baggage and/or auxiliary seat passenger. For additional loading instructions see weight and balance data."
(3) 17261899 through 17271034, excluding 17270050
"120 lb. maximum baggage and/or auxiliary passenger forward of baggage door latch."
"50 lb. maximum baggage aft of baggage door latch maximum 120 lb. combined.
For additional loading instructions see weight and balance data."

G. Near ammeter (Models 17258487 through 17259903)
"Do not turn off alternator in flight except in emergency."

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 2. (cont'd)

H. Additional placards required in seaplane.

(1) Model 172A through 172I in full view of the pilot.

"Operate as normal category airplane except:
Maximum weight 2220 lbs.
Maximum altitude loss in stall recovery 120 ft.
Flaps - takeoff - 1st notch -10°
Water rudder - pull to extract
Retract - takeoff, flight and landing
Extend - taxi."

(2) Model 172K in full view of the pilot:

"THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS AS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS

NORMAL CATEGORY - FLOATPLANE

Maximum weight	2220 lb.	
Refer to weight and balance data for loading instructions.		
Flight maneuvering load factors	Flaps up	+3.8, -1.52
	Flaps down	+3.5

No acrobatic maneuvers including spins approved.
Maximum altitude loss in stall recovery - 120 ft.
Flaps: Takeoff - 10° . . . Water rudder: Pull to retract . . .
Retract: Takeoff, flight and landing . . . . Extend: Taxi."

(3) Model 172F through 17271034, excluding 17270050, in full view of the pilot.

"Floatplane Max. Flaps - 30°."

(4) Model 172L in full view of the pilot:

"FLOATPLANE
THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS AS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS.

"MAXIMUMS

Maneuvering speed		122 mph CAS (106 knots)
Gross weight		2220 lbs.
Flight load factor	Flaps up	+3.8, -1.52
	Flaps down	+3.5

WATER RUDDER: Extend for taxi; retract for takeoff, flight and landing.

FLAPS: 10° for takeoff

No acrobatic maneuvers, including spins, approved. Altitude loss in stall recovery - 120 ft. Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY NIGHT VFR IFR" (as applicable)

I. Near tachometer on Models 172I, 172K and 172L (with IC172/MTM propeller):

"Avoid continuous operation
1. Above 75 percent power in cruise
2. Above 2500 rpm in full throttle climb."

J. Near ammeter and adjacent to overvoltage light:

(1) Model 172L (1972) through Model 172N (1978)

"High Voltage"

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 2. (cont'd)

K. Near fuel selector valve on models with serial numbers 28000 through 17258855, except those with Cessna Kit No. SK-172-31B or SK-172-32 installed:

"SWITCH TO SINGLE TANK OPERATION IMMEDIATELY UPON REACHING CRUISE ALTITUDES ABOVE 5000 FEET."

L. Near fuel tank filler

(1) Model 172, 172A and 172B

"FUEL
80/87 min. grade aviation gasoline
Cap. 21 U.S. gal."

(2) Model 172C, 172D, 172E, 172F, 172G, and 172H

"FUEL
80/87 min. grade aviation gasoline
Cap. 19.5 U.S. gal."

(3) Model 172I through 172M (except 17261445 and 17261578)

"FUEL
80/87 min. grade aviation gasoline
Cap. 21 US. gal."

(4) Model 172N (17261445, 17267585 through 17269309)

"FUEL
100/130 min. grade aviation gasoline
Cap. 21.5 US. gal."

(5) Model 172N (17261578, 17269310 through 17271034, excluding 17270050)

"FUEL
100LL/100 min. grade aviation gasoline
Cap. 21.5 US. gal."

M. Effective 17270050, 17271035 through 17276654

All placards required in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be installed in the appropriate locations.

NOTE 3. Compliance with Service Letter SE74-16 - Carburetor Nozzle Replacement - allows rpm's as follows:

Landplane: not over 2420, not under 2300
Seaplane: not over 2570, not under 2445

NOTE 4. The marking of the airspeed indicator in CAS provides an equivalent level of safety to CAR 3.757 when approved airspeed calibration data presented in Section V of the Pilot's Operating Handbooks listed below is available to the pilot (TIAS is exactly equal to CAS):

172M, Cessna P/N D1057-13	(S/N 17265685 through 17267584)
172N, Cessna P/N D1082-13	(S/N 17261445, 17267585 through 17269309)
172N, Cessna P/N D1109-13	(S/N 17261578, 17269310 through 17271034 except 17270050)
172N, Cessna P/N D1138-13PH	(S/N 17271035 through 17272884)
172N, Cessna P/N D1172-13PH	(S/N 17270050, 17272885 through 17274009)
172P, Cessna P/N D1192-13PH	(S/N 17274010 through 17275034)
172P, Cessna P/N D1212-13PH	(S/N 17275035 through 17275759)
172P, Cessna P/N D1231-13PH	(S/N 17275760 through 17276079)
172P, Cessna P/N D1251-13PH	(S/N 17276080 through 17276259)

NOTE 5. 14-volt electrical system
(172 series through S/N 17269309, except 17258105 through 17258112 and 17261578)

28-volt electrical system
(S/N 17258105 through 17258112, 17261578 and 17269310 through 17276654)

DATA PERTINENT TO ALL MODELS 172 THROUGH 172Q (cont'd)

NOTE 6: Special Ferry Flight Authorization. Flight Standards District Offices are authorized to issue Special overweight ferry flight authorizations. These airplanes are structurally satisfactory for ferry flight if maintained within the following limits: (1) Takeoff weight must not exceed 130% of the maximum weight for Normal Category; and (2) The Never Exceed Airspeed (V_{NE}) and Maximum Structural Cruising Speed (V_C) must be reduced by 30%; and (3) Forward and aft center of gravity limits may not be exceeded; and (4) Structural load factors of +2.5 g. to -1.0 g. may not be exceeded. Requirements for any additional oil should established in accordance with Advisory Circular AC23.1011-1. Increased stall speeds and reduced climb performance should be expected for the increased weights. Flight characteristics and performance at the increased weights have not been evaluated. Flight Permit for operations of overweight aircraft may be found in Advisory Circular AC21-4B

In addition to the placards specified above, the prescribed operating limitations indicated by an asterisk (*) under Sections I through X of this data sheet must also be displayed by permanent markings.

XI - Model 172R, Skyhawk, 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved June 21, 1996

Engine	Lycoming IO-360-L2A, Rated 160 Horsepower		
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4) Lycoming IO-360-L2A, Rated 180 Horsepower		
Fuel	100/100LL minimum grade aviation gasoline		
Engine Limits	For all operations, 2,400 RPM		
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4) For all operations, 2,700 RPM		
Propeller	(a) McCauley Model IC235/LFA7570 (b) Spinner: Drawing No. 0550236		
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4) (a) McCauley Model 1A170E/JHA7660 (b) Spinner: Drawing No. 0550236		
Propeller Limits	Static RPM at full throttle: Not over 2,165; Not Under 2,065 No Additional Tolerance Permitted Diameter: Not over 75 inches; not under 74 inches		
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4) Static RPM at full throttle: Not over 2,400; Not Under 2,300 No Additional Tolerance Permitted Diameter: Not over 76 inches; not under 75 inches		
Airspeed Limits	Maneuvering	99 Knots IAS	(97 Knots CAS)
	Max Structural Cruising	129 Knots IAS	(126 Knots CAS)
	Never Exceed	163 Knots IAS	(160 Knots CAS)
	Flaps Extended	85 Knots IAS	(84 Knots CAS)
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4)		
	Maneuvering	105 Knots IAS	(102 Knots CAS)
	Max Structural Cruising	129 Knots IAS	(126 Knots CAS)
	Never Exceed	163 Knots IAS	(160 Knots CAS)
	Flaps Extended	85 Knots IAS	(84 Knots CAS)

XI - Model 172R (cont'd)

C.G. Range	Normal Category	
	(1) Aft Limits	47.3 inches aft of datum at 2,450 pounds or less.
	(2) Forward Limits	Linear variation from 40.0 inches aft of datum at 2,450 pounds to 35.0 inches aft of datum at 1,950 pounds; 35.0 inches aft of datum at 1,950 pounds or less.
	Utility Category	
	(1) Aft Limits	40.5 inches aft of datum at 2,100 pounds or less.
	(2) Forward Limits	Linear variation from 36.5 inches aft of datum at 2,100 pounds to 35.0 inches aft of datum at 1,950 pounds; 35.0 inches aft of datum at 1,950 pounds or less.
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4)	
	Normal Category	
	(1) Aft Limits	47.3 inches aft of datum at 2,550 pounds or less.
	(2) Forward Limits	Linear variation from 41.0 inches aft of datum at 2,550 pounds to 35.0 inches aft of datum at 1,950 pounds; 35.0 inches aft of datum at 1,950 pounds or less.
	Utility Category	
	(1) Aft Limits	40.5 inches aft of datum at 2,200 pounds or less.
	(2) Forward Limits	Linear variation from 37.5 inches aft of datum at 2,200 pounds to 35.0 inches aft of datum at 1,950 pounds; 35.0 inches aft of datum at 1,950 pounds or less.
Empty Wt. C.G. Range	None	
Reference Datum	Lower portion of front face of firewall	
MAC	58.8 inches; Leading edge of MAC 25.9 inches aft of datum	
Leveling Means	Left side of Tailcone at 108.0 inches and 142.0 inches aft of datum	
Maximum Weights	Normal Category	
	Maximum Ramp	2,457 pounds
	Maximum Takeoff and Landing	2,450 pounds
	Utility Category	
	Maximum Ramp	2,207 pounds
	Maximum Takeoff and Landing	2,200 pounds
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4)	
	Normal Category	
	Maximum Ramp	2,558 pounds
	Maximum Takeoff and Landing	2,550 pounds
	Utility Category	
	Maximum Ramp	2,208 pounds
	Maximum Takeoff and Landing	2,200 pounds
No. of Seats	4 (2 at 34.0 to 46.0 inches aft of datum; 2 at 73.0 inches aft of datum)	
Maximum Baggage	120 pounds at 95.0 inches aft of datum	
	When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4)	
	120 pounds at 82.0 to 108.0 inches aft of datum	
	50 pounds at 108.0 to 142.0 inches aft of datum	
	(Maximum combined weight capacity for baggage areas is 120 pounds.)	
Fuel Capacity (Gal.)	56 gallons total; 53 gallons usable	
	(Two 28 gallon tanks in wings at 48.0 inches aft of datum)	
	See NOTE 1 for data on unusable fuel.	

XI - Model 172R (cont'd)

Oil Capacity (Gal.)

2.0 gallons at 13.1 inches forward of datum
3.5 quarts usable

When Modified by Cessna Modification Kit MK172-72-01 (See NOTE 4)
2.0 gallons at 13.1 inches forward of datum
3.0 quarts usable

Control Surface Movements

Wing flaps	Takeoff	0º - 10º			
	Landing	0º - 30º + 0°/-2°			
Ailerons	Up	20° ± 1°	Down	15° ± 1°	
Elevator tab	Up	22° + 1°/-0°	Down	19° + 1°/-0°	
Elevator	Up	28° + 1°/-0°	Down	23° + 1°/-0°	

(Neutral position is with bottom of balance area flush with bottom of stabilizer)
Rudder (Measured parallel to W.L.): Right 16° 10'± 1° Left 16° 10' ± 1°
Rudder (Measured perpendicular to Hinge: Right 17° 44' ± 1° Left 17° 44' ± 1°

Certification Basis

Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by 23-1 through 23-6, except as follows:
FAR 23.423; 23.611; 23.619; 23.623; 23.689; 23.775; 23.871; 23.1323; and 23.1563 as amended by Amendment 23-7. FAR 23.807 and 23.1524 as amended by Amendment 23-10. FAR 23.507; 23.771; 23.853(a),(b) and (c); and 23.1365 as amended by Amendment 23-14. FAR 23.951 as amended by Amendment 23-15. FAR 23.607; 23.675; 23.685; 23.733; 23.787; 23.1309 and 23.1322 as amended by Amendment 23-17. FAR 23.1301 as amended by Amendment 23-20. FAR 23.1353; and 23.1559 as amended by Amendment 23-21. FAR 23.603; 23.605; 23.613; 23.1329 and 23.1545 as amended by Amendment 23-23. FAR 23.441 and 23.1549 as amended by Amendment 23-28. FAR 23.779 and 23.781 as amended by Amendment 23-33. FAR 23.1; 23.51 and 23.561 as amended by Amendment 23-34. FAR 23.301; 23.331; 23.351; 23.427; 23.677; 23.701; 23.735; and 23.831 as amended by Amendment 23-42. FAR 23.961; 23.1093; 23.1143(g); 23.1147(b); 23.1303; 23.1357; 23.1361 and 23.1385 as amended by Amendment 23-43. FAR 23.562(a), 23.562(b)2, 23.562(c)1, 23.562(c)2, 23.562(c)3, and 23.562(c)4 as amended by Amendment 23-44. FAR 23.33; 23.53; 23.305; 23.321; 23.485; 23.621; 23.655 and 23.731 as amended by Amendment 23-45.

FAR 36 dated December 1, 1969, as amended by Amendments 36-1 through 36-21.

Additions for the Garmin G1000 Integrated Cockpit System (ICS) Only:

14 CFR 23.303; 23.307; 23.601; 23.1163(a); 23.1367 and 23.1381 as amended by Amendment 23- N/C. 14 CFR 23.1589 as amended by Amendment 23-13. 14 CFR 23.771(a) as amended by Amendment 23-14. 14 CFR 23.607 and (Electrical System) 23.1309(a)(1)(2), (c) as amended by Amendment 23-17. 14 CFR 23.1301; 23.1327 and 23.1547(e) as amended by Amendment 23-20. 14 CFR 23.1501 and 23.1541(a)(1), (a)(2), (b)(1), (b)(2) as amended by Amendment 23-21. 14 CFR 23.603 and 23.605 as amended by Amendment 23-23. 14 CFR 23.1529 as amended by Amendment 23-26. 14 CFR 23.561(e); 23.1523; 23.1581(a)(2); and 23.1583(a), (c), (d), (f) as amended by Amendment 23-34. 14 CFR 23.301 as amended by Amendment 23-42. 14 CFR 23.1322; 23.1331 and 23.1357(a)(b)(c)(d) as amended by Amendment 23-43. 14 CFR 23.305; 23.773(a)(1), (a)(2); 23.1525and 23.1549 as amended by Amendment 23-45. 14 CFR 23.1303(a)(b)(c)(f); 23.1309(a)(1)(i), (a)(1)(ii), (a)(2), (b)(1), (b)(2)(i), (b)(2)(ii), (b)(3),(b)(4)(i), (b)(4)(ii), (b)(4)(iii), (b)(4)(iv), (c)(1), (c)(2)(iii), (c)(3), (d), (e), (f)(1); 23.1311; 23.1321 (a)(c)(d)(e); 23.1323(a), (b)(1), (b)(2), (c); 23.1329 (g)(h); 23.1351(a)(1), (a)(2)(i), (b)(1)(iii), (b)(2)(3), (c)(4), (d)(1); 23.1353(a)(b)(c)(d)(e); 23.1359(c); 23.1361; 23.1365(a)(b)(d)(e)(f) and 23.1431(a)(b)(d)(e) as amended by Amendment 23-49. 14 CFR 23.1325(a), (b)(1), (b)(2)(i), (b)(3), (c)(d)(e); 23.1543(b)(c); 23.1545(a), (b)(1), (b)(2), (b)(3), (b)(4); 23.1553; 23.1555(a)(b); 23.1563(a) and 23.1567(a) as amended by Amendment 23-50. 14 CFR 23.777(a)(b); 23.955(a)(2); 23.1337(a)(1), (a)(2), (b)(1), (c) as amended by Amendment 23-51. 14 CFR 23.1305(a)(1), (a)(2), (a)(3), (b)(2), (b)(3)(i), (b)(4)(i), (b)(5), (b)(6)(i) as amended by Amendment 23-52. 14 CFR 23.901(a)(b) as amended by Amendment 23-53.

XI - Model 172R (cont'd)

Certification Basis (cont'd) Additions for the Garmin GFC-700 Automatic Flight Control System (AFCS) only:

14 CFR 23.1335 as amended by Amendment 23-20, 14 CFR 23.1329 (a)(c)(d)(e)(f) as amended by Amendment 23-49.

Equivalent Safety Items

(1)	Induction System Icing Protection	FAR § 23.1093; Refer to FAA letter dated 5/3/96
(2)	Throttle Control	FAR § 23.1143(g); Refer to FAA letter dated 3/22/96
(3)	Mixture Control	FAR § 23.1147(b); Refer to FAA letter dated 3/22/96
(4)	Anti-Collision Light System	14 CFR § 23.1401(d); Refer to ACE-07-09, FAA letter dated 10/12/07
(5)	Aviation White Color Reqmt	14 CFR § 23.1397(c); Refer to ACE-07-10, FAA letter dated 11/29/07

Date of Application for Amended Type Certificate was September 25, 1995.
Type Certificate No. 3A12 was amended June 21, 1996.

Serial Numbers Eligible 17280001 and On

Special Conditions as follows:
No. 23-159-SC, "Special Conditions: Cessna Aircraft Company; Cessna Model 172R Airplane; Installation of Electronic Flight Instrument System and and the Protection of the System From High Intensity Radiated Fields (HIRF)."

Data Pertinent to Model 172R:

Production Basis
Production Certificate No. PC-4 issued March 28, 1997. Applies to airplane serial numbers 17280014, 17280015, 17280017, 17280021 through 17280029, and 17280031 and on. Airplane serial numbers not listed were produced under Type Certificate only. Cessna is authorized to issue airworthiness certificates under the delegation provisions of Delegation Option Authorization No. CE-1 in accordance with Part 21 of the Federal Aviation Regulations.

Equipment
The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the airplane for certification.

NOTE 1: Weight and Balance:

Serial Nos. 17280001 and On
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 18 pounds at 46.0 inches aft of datum, and full oil of 15.0 pounds at 13.1 inches forward of datum.

NOTE 2: The airplane must be operated according to the appropriate Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM). POH/AFM part number 172RPHUS00 (or later approved revision) is applicable to Production Model 172R. POH/AFM part number 172R180PH00 (or later approved revision) is applicable to Production Model 172R airplanes when modified by Cessna Modification Kit MK172-72-01. All POH/AFM Supplements approved for part number 172RPHUS00, are also applicable to part number 172R180PH00, unless specifically noted otherwise in the Supplement. All FAA required placards are included in Section 2 of the applicable POH/AFM. Placards may also be found in the Maintenance Manual, part number 172RMM00 (or later revision) , Chapter Eleven (11), "Placards and Markings."

FAA Approved Airplane Flight Manual (AFM): Part Number 172RPHAUS-00 (or later FAA approved revisions) is applicable to the Model 172R equipped with Garmin G1000 Integrated Cockpit System. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

FAA Approved Airplane Flight Manual (AFM): Part Number 172RPHBUS-00 (or later FAA approved revisions) are applicable to the Model 172R equipped with Garmin G1000 Integrated Cockpit System and Garmin GFC-700 AFCS. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

Data Pertinent to Model 172R: (cont'd)

NOTE 3: Special Ferry Flight Authorization. Flight Standards District Offices are authorized to issue Special overweight ferry flight authorizations. This airplane is structurally satisfactory for ferry flight if maintained within the following limits: (1) Takeoff weight must not exceed 130% of the maximum weight for Normal Category; and (2) The Never Exceed Airspeed (V_{NE}) and Maximum Structural Cruising Speed (V_C) must be reduced by 30%; and (3) Forward and aft center of gravity limits may not be exceeded; and (4) Structural load factors of +2.5 g. to -1.0 g. may not be exceeded. Requirements for any additional oil should be established in accordance with Advisory Circular AC23.1011-1. Increased stall speeds and reduced climb performance should be expected for the increased weights. Flight characteristics and performance at the increased weights have not been evaluated. Flight Permit for operations of overweight aircraft may be found in Advisory Circular AC21-4B.

NOTE 4: Only certain Model 172R airplane serial numbers are eligible for modification by Cessna Modification Kit MK172-72-01. Applicable serial numbers are as follows:

17280159	17280242	17280251	17280253	17280257
17280262	17280281	17280292	17280301	17280305
17280426	17280488	17280606	17280607	17280608
17280609	17280610	17280613	17280614	17280616
17280621	17280622	17280623	17280624	17280631
17280632	17280633	17280634	17280638	17280639
17280640	17280646	17280647	17280648	17280652
17280653	17280659	17280660	17280661	17280662
17280664	17280667	17280668	17280669	17280670
17280672	17280673	17280674	17280675	17280701
17280707				

XII - Model 172S, Skyhawk SP, 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved May 1, 1998

Engine	Lycoming IO-360-L2A, Rated 180 Horsepower		
Fuel	100/100LL minimum grade aviation gasoline		
Engine Limits	For all operations, 2,700 RPM		
Propeller	(a) McCauley Model 1A170E/JHA7660 (b) Spinner: Drawing No. 0550236		
Propeller Limits	Static RPM at full throttle: Not over 2400; Not Under 2300 Diameter: Not over 76 inches; not under 75 inches		
Airspeed Limits	Maneuvering	105 Knots IAS	(102 Knots CAS)
	Max Structural Cruising	129 Knots IAS	(126 Knots CAS)
	Never Exceed	163 Knots IAS	(160 Knots CAS)
	Flaps Extended	85 Knots IAS	(85 Knots CAS)
C.G. Range	Normal Category		
	(1) Aft Limits	47.3 inches aft of datum at 2,550 pounds or less.	
	(2) Forward Limits	Linear variation from 41.0 inches aft of datum at 2,550 pounds to 35.0 inches aft of datum at 1,950 pounds; 35.0 inches aft of datum at 1,950 pounds or less.	
	Utility Category		
	(1) Aft Limits	40.5 inches aft of datum at 2,200 pounds or less.	
	(2) Forward Limits	Linear variation from 37.5 inches aft of datum at 2,200 pounds to 35.0 inches aft of datum at 1,950 pounds; 35.0 inches aft of datum at 1,950 pounds or less.	
Empty Wt. C.G. Range	None		

XII - Model 172S (cont'd)

Reference Datum	Lower portion of front face of firewall
MAC	58.8 inches; Leading edge of MAC 25.9 inches aft of datum
Leveling Means	Left side of Tailcone at 108.0 inches and 142.0 inches aft of datum
Maximum Weights	Normal Category Maximum Ramp 2,558 pounds Maximum Takeoff and Landing 2,550 pounds Utility Category Maximum Ramp 2,208 pounds Maximum Takeoff and Landing 2,200 pounds
No. of Seats	4 (2 at 34.0 to 46.0 inches aft of datum; 2 at 73.0 inches aft of datum)
Maximum Baggage	120 pounds at 82.0 to 108.0 inches aft of datum 50 pounds at 108.0 to 142.0 inches aft of datum (Max. combined weight capacity for baggage areas is 120 pounds)
Fuel Capacity (Gal.)	56 gallons total; 53 gallons usable (Two 28 gallon tanks in wings at 48.0 inches aft of datum) See NOTE 1 for data on unusable fuel.
Oil Capacity (Gal.)	8.0 quarts at 13.1 inches forward of datum 3.0 quarts usable
Control Surface Movements	Wing flaps Takeoff 0º - 10º Landing 0º - 30º + 0°/-2° Ailerons Up 20° ± 1° Down 15° ± 1° Elevator tab Up 22° + 1°/-0° Down 19° + 1°/-0° Elevator Up 28° + 1°/-0° Down 23° + 1°/-0° (Neutral position is with bottom of balance area flush with bottom of stabilizer) Rudder (Measured parallel to W.L.): Right 16° 10'± 1° Left 16° 10' ± 1° Rudder (Measured perpendicular to Hinge: Right 17° 44' ± 1° Left 17° 44' ± 1°
Certification Basis	Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by 23-1 through 23-6, except as follows: FAR 23.423; 23.611; 23.619; 23.623; 23.689; 23.775; 23.871; 23.1323; and 23.1563 as amended by Amendment 23-7. FAR 23.807 and 23.1524 as amended by Amendment 23-10. FAR 23.507; 23.771; 23.853(a),(b) and (c); and 23.1365 as amended by Amendment 23-14. FAR 23.951 as amended by Amendment 23-15. FAR 23.607; 23.675; 23.685; 23.733; 23.787; 23.1309 and 23.1322 as amended by Amendment 23-17. FAR 23.1301 as amended by Amendment 23-20. FAR 23.1353; and 23.1559 as amended by Amendment 23-21. FAR 23.603; 23.605; 23.613; 23.1329 and 23.1545 as amended by Amendment 23-23. FAR 23.441 and 23.1549 as amended by Amendment 23-28. FAR 23.779 and 23.781 as amended by Amendment 23-33. FAR 23.1; 23.51 and 23.561 as amended by Amendment 23-34. FAR 23.301; 23.331; 23.351; 23.427; 23.677; 23.701; 23.735; and 23.831 as amended by Amendment 23-42. FAR 23.961; 23.1093; 23.1143(g); 23.1147(b); 23.1303; 23.1357; 23.1361 and 23.1385 as amended by Amendment 23-43. FAR 23.562(a), 23.562(b)2, 23.562(c)1, 23.562(c)2, 23.562(c)3, and 23.562(c)4 as amended by Amendment 23-44. FAR 23.33; 23.53; 23.305; 23.321; 23.485; 23.621; 23.655 and 23.731 as amended by Amendment 23-45. FAR 36 dated December 1, 1969, as amended by Amendments 36-1 through 36-21.

XII - Model 172S (cont'd)

Certification Basis (cont'd)

Additions for the Garmin G1000 Integrated Cockpit System (ICS) Only: Additions for the Garmin G1000 Integrated Cockpit System (ICS) Only:

14 CFR 23.303; 23.307; 23.601; 23.1163(a); 23.1367 and 23.1381 as amended by Amendment 23- N/C. 14 CFR 23.1589 as amended by Amendment 23-13. 14 CFR 23.771(a) as amended by Amendment 23-14. 14 CFR 23.607 and (Electrical System) 23.1309(a)(1)(2), (c) as amended by Amendment 23-17. 14 CFR 23.1301; 23.1327 and 23.1547(e) as amended by Amendment 23-20. 14 CFR 23.1501 and 23.1541(a)(1), (a)(2), (b)(1), (b)(2) as amended by Amendment 23-21. 14 CFR 23.603 and 23.605 as amended by Amendment 23-23. 14 CFR 23.1529 as amended by Amendment 23-26. 14 CFR 23.561(e); 23.1523; 23.1581(a)(2); and 23.1583(a), (c), (d), (f) as amended by Amendment 23-34. 14 CFR 23.301 as amended by Amendment 23-42. 14 CFR 23.1322; 23.1331 and 23.1357(a)(b)(c)(d) as amended by Amendment 23-43. 14 CFR 23.305; 23.773(a)(1), (a)(2); 23.1525 and 23.1549 as amended by Amendment 23-45. 14 CFR 23.1303(a)(b)(c)(f); 23.1309(a)(1)(i), (a)(1)(ii), (a)(2), (b)(1), (b)(2)(i), (b)(2)(ii), (b)(3),(b)(4)(i), (b)(4)(ii), (b)(4)(iii), (b)(4)(iv), (c)(1), (c)(2)(iii), (c)(3), (d), (e), (f)(1); 23.1311; 23.1321 (a)(c)(d)(e); 23.1323(a), (b)(1), (b)(2), (c); 23.1329 (g)(h); 23.1351(a)(1), (a)(2)(i), (b)(1)(iii), (b)(2)(3), (c)(4), (d)(1); 23.1353(a)(b)(c)(d)(e); 23.1359(c); 23.1361; 23.1365(a)(b)(d)(e)(f) and 23.1431(a)(b)(d)(e) as amended by Amendment 23-49. 14 CFR 23.1325(a), (b)(1), (b)(2)(i), (b)(3), (c)(d)(e); 23.1543(b)(c); 23.1545(a), (b)(1), (b)(2), (b)(3), (b)(4); 23.1553; 23.1555(a)(b); 23.1563(a) and 23.1567(a) as amended by Amendment 23-50. 14 CFR 23.777(a)(b); 23.955(a)(2); 23.1337(a)(1), (a)(2), (b)(1), (c) as amended by Amendment 23-51. 14 CFR 23.1305(a)(1), (a)(2), (a)(3), (b)(2), (b)(3)(i), (b)(4)(i), (b)(5), (b)(6)(i) as amended by Amendment 23-52. 14 CFR 23.901(a)(b) as amended by Amendment 23-53.

Additions for the Garmin GFC-700 Automatic Flight Control System (AFCS) only:

14 CFR 23.1335 as amended by Amendment 23-20, 14 CFR 23.1329 (a)(c)(d)(e)(f) as amended by Amendment 23-49.

Equivalent Safety Items

(1)	Induction System Icing Protection	FAR § 23.1093; Refer to FAA letter dated 5/1/98
(2)	Throttle Control	FAR § 23.1143(g); Refer to FAA letter dated 5/1/98
(3)	Mixture Control	FAR § 23.1147(b); Refer to FAA letter dated 5/1/98
(4)	Anti-Collision Light System	14 CFR § 23.1401(d); Refer to ACE-07-09, FAA letter dated 10/12/07
(5)	Aviation White Color Reqmt	14 CFR § 23.1397(c); Refer to ACE-07-10, FAA letter dated 11/29/07

Date of Application for Amended Type Certificate for the 172S was November 13, 1997.
Type Certificate No. 3A12 was amended May 1, 1998 for the Model 172S.

Serial Numbers Eligible 172S8001 and on

Special Conditions as follows:
No. 23-159-SC, "Special Conditions: Cessna Aircraft Company; Cessna Model 172S Airplane; Installation of Electronic Flight Instrument System and the Protection of the System From High Intensity Radiated Fields (HIRF)."

Data Pertinent to Model 172S:

Production Basis
Production Certificate No. PC-4 issued August 27, 1998. Applies to airplane serial numbers 172S8003 and on. Airplane serial numbers not listed were produced under Type Certificate only. Cessna is authorized to issue airworthiness certificates under the delegation provisions of Delegation Option Authorization No. CE-1 in accordance with Part 21 of the Federal Aviation Regulations.

Equipment
The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the airplane for certification.

Data Pertinent to Model 172S: (cont'd)

NOTE 1: Weight and Balance:

Serial Nos. 172S8001 and On
The certificated empty weight and corresponding center of gravity location must include unusable fuel of 18 pounds at 46.0 inches aft of datum, and full oil of 15.0 pounds at 13.1 inches forward of datum.

NOTE 2: Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM): part number 172SPHUS00 (or later approved revision) is applicable to the Model 172S. The airplane must be operated according to the appropriate POH/AFM. All FAA required placards are included in Section 2 of the POH/AFM. Placards may also be found in the Maintenance Manual, part number 172RMM02 (or later revision) for the Model 172S, Chapter 11, Placards and Markings."

FAA Approved Airplane Flight Manual (AFM): Part Number 172SPHAUS-00 (or later FAA approved revisions) is applicable to Model 172S equipped with Garmin G1000 Integrated Cockpit System. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

FAA Approved Airplane Flight Manual (AFM): Part Number 172SPHBUS-00 (or later FAA approved revisions) are applicable to the Model 172S equipped with Garmin G1000 Integrated Cockpit System and Garmin GFC-700 AFCS. The airplane must be operated according to the appropriate AFM. Required placards are included in the AFM.

NOTE 3: Special Ferry Flight Authorization. Flight Standards District Offices are authorized to issue Special overweight ferry flight authorizations. This airplane is structurally satisfactory for ferry flight if maintained within the following limits: (1) Takeoff weight must not exceed 130% of the maximum weight for Normal Category; and (2) The Never Exceed Airspeed (V_{NE}) and Maximum Structural Cruising Speed (V_C) must be reduced by 30%; and (3) Forward and aft center of gravity limits may not be exceeded; and (4) Structural load factors of +2.5 g. to -1.0 g. may not be exceeded. Requirements for any additional oil should be established in accordance with Advisory Circular AC23.1011-1. Increased stall speeds and reduced climb performance should be expected for the increased weights. Flight characteristics and performance at the increased weights have not been evaluated. Flight Permit for operations of overweight aircraft may be found in Advisory Circular AC21-4B

.....END....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

A16CE
CESSNA
Revision 21
207 T207
207A T207A

March 31, 2003

TYPE CERTIFICATE DATA SHEET NO. A16CE

This data sheet which is part of Type Certificate A16CE prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P. O. Box 7704
Wichita, Kansas 67277

I - Model 207/T207, Skywagon/Turbo Skywagon, 7 PCLM (Normal Category), Approved December 31, 1968

Model 207

Engine — Continental IO-520-F

*Fuel — 100/130 minimum grade aviation gasoline

*Engine Limits — Takeoff (5 min.) at 2850 r.p.m. (300 hp.)
For all other operations, 2700 r.p.m. (285 hp.)

Propeller and Propeller Limits — Landplane

1. (a) McCauley D2A34C58/90AT-8 (C161004-0106)
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 9.5°, high 25.8°
   (b) Cessna spinner dome 1250909-3
   (c) Woodward hydraulic governor 210462
   (d) McCauley hydraulic governor C290D2/T4 or C290D4/T4
2. (a) McCauley D3A32C90/82NC-2 (C161006-0205)
   Diameter: not over 80 in., not under 78 in.
   Pitch settings at 30 in. sta.:
   low 11.5°, high 28.1°
   (b) Cessna spinner dome 1250909-8
   (c) Woodward hydraulic governor 210462
   (d) McCauley hydraulic governor C290D2/T4 or C290D4/T4

Model T207

Engine — Continental TSIO-520-G

*Fuel — 100/130 minimum grade aviation gasoline

*Engine Limits — Takeoff (5 min.) at 2700 r.p.m. (300 hp.)
For all other operations, 2600 r.p.m. (285 hp.)

Propeller and Propeller Limits	Landplane 1. (a) McCauley D2A34C78/90AT-8.5 (C161004-0108) Diameter: not over 81.5 in., not under 80.5 in. Pitch settings at 36 in. sta.: low 11.8°, high 32.0° (b) Cessna spinner dome 1250909-3 (c) Woodward hydraulic governor G210452 (d) McCauley hydraulic governor C290D2/T2 or C290D4/T2 2. (a) McCauley D3A32C90/82NC-2 (C161006-0204) Diameter: not over 80 in., not under 79 in. Pitch settings at 30 in. sta.: low 14°, high 33° (b) Cessna spinner dome 1250909-8 (c) Woodward hydraulic governor G210452 (d) McCauley hydraulic governor C290D2/T2 or C290D4/T2

Models 207 & T207

*Airspeed Limits (CAS)	S/N 20700001 through 20700314		
	Never exceed	210 m.p.h.	(182 knots)
	Maximum structural cruising	170 m.p.h.	(148 knots)
	Maneuvering (3800 lb. landplane)	148 m.p.h.	(129 knots)
	Flaps extended 0° - 10°	160 m.p.h.	(139 knots)
	10° - 30°	110 m.p.h.	(96 knots)
(IAS) (See NOTE 5 on Use of IAS)	S/N 20700315 and up		
	Never exceed		186 knots
	Maximum structural cruising		151 knots
	Maneuvering (3800 lb. landplane)		132 knots
	Flaps extended 0° - 10°		140 knots
	10° - 30°		100 knots

*C.G. Range	Landplane (+43.0) to (+50.5) at 3800 lb. (+31.0) to (+50.5) at 2600 lb. or less Straight line variation between points given
Empty Wt. C.G. Range	None
*Maximum Weight	Landplane 3800 lb.
No. of Seats	(S/N 20700001 through 20700148) 7 (2 at +35 to +47, 2 at +68 to +78, 2 at +99 to +109, 1 at +130) (S/N 20700149 and on) 7 (2 at +34 to +48, 2 at +69 to +79, 2 at +100 to +110, 1 at +124 to +130)
Maximum Baggage	Reference weight and balance data
Fuel Capacity	(S/N 20700001 through 20700225) 65 gal. (58 gal. usable), two 32.5 gal. tanks in wings at +48 (S/N 20700226 and on) 61 gal. (54 gal. usable), two 30.5 gal. tanks in wings at +48 See NOTE 1 for data on unusable fuel
Oil Capacity	12 qt. at -37.4 (6 qt. usable) See NOTE 1 for data on undrainable oil

Control Surface Movements	Wing flaps				30° +1° -2°
	Ailerons	Up	21° ±2°	Down	14° 30' ±2°
	Elevator	Up	21° ±1°	Down	19° ±1°
	Elevator tab	Up	25° +1° -0°	Down	5° +1° -0°
	Rudder (measured perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°
	(measured parallel to 0.0.W.L.)	Right	24° ±1°	Left	24° ±1°

Serial Nos. Eligible	20700001 through 20700148	1969 Model
	20700149 through 20700190	1970 Model
	20700191 through 20700205	1971 Model
	20700206 through 20700215	1972 Model
	20700216 through 20700227	1973 Model
	20700228 through 20700267	1974 Model
	20700268 through 20700314	1975 Model
	20700315 through 20700362	1976 Model

II - Model 207A/T207A, Skywagon/Turbo Skywagon; Stationair/Turbo Stationair, 7 PCLM (Normal Category), Approved July 12, 1976; 8 PCLM (Normal Category), Approved September 11, 1979

Model 207A

Engine: Continental IO-520-F

*Fuel: 100/130 minimum grade aviation gasoline (S/N 20700363 through 20700414)
100LL/100 minimum aviation grade gasoline (S/N 20700415 and up)

*Engine Limits: Takeoff (5 min.) at 2850 r.p.m., 300 hp.
For all other operations, 2700 r.p.m., 285 hp.

Propeller and Propeller Limits:

1. (a) McCauley D3A32C90/82NC-2 (S/N 20700363 through 20700482)
   Diameter: not over 80 in., not under 78 in.
   Pitch settings at 30 in. sta.:
   low 11.5°, high 28.1°
   (b) Cessna spinner 1250909
   (c) Woodward hydraulic governor 210462 or McCauley hydraulic governor C290D4/T4
2. (a) McCauley D3A34C404/80VA-0 (S/N 20700483 and up)
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 11.0°, high 27.0°
   (b) Cessna spinner 1250030
   (c) McCauley hydraulic governor C290D4/T4

Model T207A

Engine: Continental TSIO-520-M

*Fuel: 100/130 minimum grade aviation gasoline (S/N 20700363 through 20700414)
100LL/100 minimum aviation grade gasoline (S/N 20700415 and up)

*Engine Limits: Takeoff (5 min.) at 2700 r.p.m., 36.5 in. Hg. mp., 310 hp.
For all other operations, 2600 r.p.m., 35 in. Hg. mp., 285 hp.

Propeller and Propeller Limits:

1. (a) McCauley D3A34C401/90DFA-10
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 12.4°, high 28.5°
   Avoid continuous operation between 1850 and 2150 r.p.m. above 24 in. mp.
   (b) Cessna spinner 1250909
   (c) McCauley hydraulic governor C290D4/T2

Models 207A & T207A

*Airspeed Limits (IAS) (See NOTE 5 on use of IAS)	S/N 20700363 through 20700482	
	Never exceed (207A)	186 knots
	(T207A)	182 knots
	Maximum structural cruising (207A)	151 knots
	(T207A)	148 knots
	Maneuvering	130 knots
	Flaps extended 0° - 10°	140 knots
	10° - 30°	100 knots
	S/N 20700483 and up	
	Never exceed	182 knots
	Maximum structural cruising	148 knots
	Maneuvering	130 knots
	Flaps extended 0° - 10°	140 knots
	10° - 30°	105 knots

*C.G. Range

(+43.0) to (+50.5) at 3800 lb.
(+31.0) to (+50.5) at 2600 lb. or less
Straight line variation between points given

Empty Wt. C.G. Range

None

*Maximum Weight

3800 lb.

No. of Seats

7 (2 at +34 to +48, 2 at +69 to +79, 2 at +100 to +110, 1 at +124 to +130)
S/N 20700363 through 20700562
8 (2 at +34 to +48, 2 at +69 to +79, 2 at +100 to +110, 2 at +124 to +130)
S/N 20700563 and up

Maximum Baggage

Reference weight and balance data

Fuel Capacity

Std.: 61 gal. (54 gal. usable), two 30.5 gal. tanks in wings at +48
Opt.: 80 gal. (73 gal. usable), two 40 gal. tanks in wings at +48
See NOTE 1 for data on unusable fuel

Oil Capacity

12 qt. at -37.4 (6 qt. usable)
See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps				30° +1° -2°
Ailerons	Up	21° ±2°	Down	14° 30' ±2°
Elevator	Up	21° ±1°	Down	19° ±1°
Elevator tab	Up	25° +1° -0°	Down	5° +1° -0°
Rudder (measured perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°
(measured parallel to 0.0.W.L.)	Right	24° ±1°	Left	24° ±1°

Serial Nos. Eligible

20700363 through 20700414	1977 Model
20700415 through 20700482	1978 Model
20700483 through 20700562	1979 Model
20700563 through 20700654	1980 Model
20700655 through 20700729	1981 Model
20700730 through 20700762	1982 Model
20700763 through 20700767	1983 Model
20700768 through 20700788	1984 Model

Data Pertinent to All Models

Datum	Fuselage sta. 0.0 (front face of lower baggage bulkhead)
Leveling Means	Screws and nutplates located on the left hand side of the fuselage at 0.0.W.L. and sta. +25.57 and -1.00
Certification Basis	Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by 23-1 through 23-6. In addition, effective S/N 20700483 and up, FAR 23.1559 effective March 1, 1978. FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-6 for S/N 20700363 and up. Application for Type Certificate dated May 15, 1968. Type Certificate No. A16CE issued December 31, 1968, obtained by the manufacturer under delegation option procedures. Equivalent Safety Items S/N 20700315 and on Airspeed Indicator FAR 23.1545 (See NOTE 5 on use of IAS) Airspeed Limitations FAR 23.1583(a)(1)
Production Basis	Production Certificate No. 4. Delegation Option Manufacturer No. CE-1 authorized to issue airworthiness certificates under delegation option provisions of Part 21 of the Federal Aviation Regulations.

Equipment: The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Airplane Flight Manual effective S/N 20700480 and on. In addition, the following item of equipment is required:

1. Stall Warning Indicator, Cessna Dwg. S1672-5

NOTE 1. Current weight and balance report including list of equipment included in the certificated empty weight and loading instructions when necessary, must be provided for each aircraft at the time of original certification. The certificated empty weight and corresponding center of gravity location must include unusable fuel of 42 lb. at +48 on the 207 and T207 Series, and undrainable oil of 0.0 at (-37.4) through S/N 20700314 and full oil of 22.5 lb. at (-37.4) for S/N 20700315 and on.

NOTE 2. The following placards must be displayed as indicated:

A. Applicable to Models 207 and T207 Landplane

(1) In full view of the pilot:

(a) S/N 20700001 through 20700314

"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved.

Maximums

Maneuvering speed 148 m.p.h. (CAS)
Gross weight 3800 lb.
Flight maneuvering load factors:
Flaps up +3.8; -1.52 Flaps down +2.40
Altitude loss in stall recovery 350 ft.
Flap extension speed 110 m.p.h. (CAS) 0° - 30°
160 m.p.h. (CAS) 0° - 10°
Airplane is controllable in 20 knot cross-winds.
Known icing conditions to be avoided.
This airplane is certified for the following flight operations as of date of original airworthiness certification:

VFR - IFR - DAY - NIGHT" (as applicable)

(b) S/N 20700315 and up
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

Maximums		
Maneuvering speed (IAS)		132 knots
Gross weight		3800 lb.
Flight load factor	Flaps Up	+3.8 -1.52
	Flaps Down	+2.4

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery -350 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
DAY - NIGHT - VFR - IFR" (As applicable)

(2) On control lock:
"Control lock - remove before starting engine."

(3) On fuel selector plate: (S/N 20700001 through 20700221)
(Standard range tanks) "Off - Left tank 29.0 gal. Right tank 29.0 gal.
Use full rich mixture to switch tanks. Take off and land on fuller tank."
(Optional long range tanks)
"Off - Left tank 38.5 gal. Right tank 38.5 gal.
Use full rich mixture to switch tanks. Take off and land on fuller tank."

(S/N 20700222 through 20700225)
(Standard range tanks) "Off - Left tank 29.0 gal. Right tank 29.0 gal.
Take off and land on fuller tank."
(Optional long range tanks)
"Off - Left tank 38.5 gal. Right tank 38.5 gal.
Take off and land on fuller tank."

(S/N 20700226 and up)
(Standard range tanks) "Off - Left tank 27.0 gal. Right tank 27.0 gal.
Take off and land on fuller tank."
(Optional long range tanks)
"Off - Left tank 36.5 gal. Right tank 36.5 gal.
Take off and land on fuller tank."

(4) On fuel tank filler cap: (S/N 20700001 through 20700203)
(Standard range tanks) "Tank capacity 32.5 U.S. Gal., 100/130."
(Optional long range tanks)
"Tank capacity 42 U.S. Gal., 100/130."
Forward of fuel tank filler cap: (S/N 20700204 through 20700225)
(Standard range tanks) "Service this airplane with 100/130 min. aviation grade gasoline - capacity 32.5 gal."
(Optional long range tanks)
"Service this airplane with 100/130 min. aviation grade gasoline - capacity 42.0 gal."

Forward of fuel tank filler cap: (S/N 20700226 and on)
(Standard range tanks) "Service this airplane with 100/130 min. aviation grade gasoline - capacity 30.5 gal."
(Optional long range tanks)
"Service this airplane with 100/130 min. aviation grade gasoline - capacity 40.0 gal."

(5) Above selector valve: (S/N 20700001 through 20700227)
"When switching from dry tank turn pump on 'HI' momentarily."
(S/N 20700228 and up)
"When switching from dry tank turn auxiliary fuel pump 'on' momentarily."

(6) On cargo door: "Baggage net 180 lb. max. capacity. Refer to weight and balance data for baggage/cargo loading."

(7) On the following model(s) near manifold pressure gauge:

207

"Fuel flow at full throttle

	2850 rpm	2700 rpm
Sea level	24 gph	23 gph
4,000 ft.	22 gph	21 gph
8,000 ft.	20 gph	19 gph

T207

Maximum Power Settings and Fuel Flow

Takeoff (5 min. only	2700 rpm
35 In. Mp.	30 gph
Max. continuous power	2600 rpm

Alt. Ft.	Man. Press In. Hg.	Fuel Flow G.P.H.
S.L. to 17,000	35	28
18,000	34	27
20,000	32	25
22,000	30	23
24,000	28	21
26,000	26	19
28,000	24	18
30,000	22	17

75% Power Climb: 2500 rpm
28 In. MP., 20 GPH."

(8) On instrument panel above fuel pump switch (S/N 20700001 through 20700148)
"Use 'HI' for emergency only."

(9) On the baggage door:
"Max. baggage 120 lb. Refer to weight and balance data for baggage/cargo loading."

(10) Below oil temperature gauge: (S/N 20700216 and up)
"High voltage."

(11) On the flap control indicator for the following models:
(a) S/N 20700001 through 20700314
"(i) Up to 10° (Partial flap range with blue color code and 160 m.p.h. callout; also mechanical detent at 10°).
(ii) 10° to Full (Indices at these positions with white color code and 110 m.p.h. callout; also mechanical detent at 20°)."
(b) S/N 20700315 through 20700362
"(i) Up to 10° (Partial flap range with blue color code and 140 knot callout; also mechanical detent at 10°).
(ii) 10° to Full (Indices at these positions with white color code and 100 knot callout; also mechanical detent at 20°)."

(12) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD DL189-13 FOR EXPANDED INSTRUCTIONS."

B. Applicable to Models 207A and T207A

(1) In full view of the pilot:

(a) S/N 20700363 through 20700482

"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

Maximums		
Maneuvering speed (IAS)		130 knots
Gross weight		3800 lb.
Flight load factor	Flaps Up	+3.8 -1.52
	Flaps Down	+2.4

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery -350 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR" (As applicable)

(b) S/N 20700483 through 20700729

"The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, approved. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR" (As applicable)

(2) On control lock through 20700729:
"Control lock - remove before starting engine."

(3) On fuel selector plate through 20700729:

(Standard range tanks)	"Off - Left on 27.0 gal. Right on 27.0 gal. Take off and land on fuller tank."
(Optional long range tanks)	"Off - Left on 36.5 gal. Right on 36.5 gal. Take off and land on fuller tank."

(4) (a) Forward of fuel tank filler cap: (S/N 20700363 through 20700414)
(Standard range tanks) "Service this airplane with 100/130 min. aviation grade gasoline - capacity 30.5 gal."
(Optional long range tanks)
"Service this airplane with 100/130 min. aviation grade gasoline - capacity 40.0 gal."

(b) Forward of fuel tank filler cap: (S/N 20700415 through 20700729)
(Standard range tanks) "Service this airplane with 100LL/100 min. aviation grade gasoline - capacity 30.5 gal."
(Optional long range tanks)
“Service this airplane with 100LL/100 min. aviation grade gasoline - capacity 40.0 gal."

(5) Above selector valve through 20700729:
"When switching from dry tank turn auxiliary fuel pump 'on' momentarily."

(6) On cargo door through 20700729: "Baggage net 180 lb. max. capacity. Refer to weight and balance data for baggage/cargo loading."

(7) Near the manifold pressure gauge:

(a) Model 207A:

S/N 20700363 through 20700482

"Maximum power setting and fuel flow

Takeoff (5 min. only): 2850 r.p.m., maximum continuous pwr.: 2700 r.p.m.,

Fuel flow at full throttle

	2700 r.p.m.	2850 r.p.m.
S.L.	23 g.p.h.	24 g.p.h.
4000 ft.	21 g.p.h.	22 g.p.h.
8000 ft.	19 g.p.h.	20 g.p.h.
12000 ft.	17 g.p.h.	18 g.p.h."

S/N 20700483 through 20700729

"Min. fuel flows at full throttle

R.P.M.	S.L.	4000	8000	12000
2700	23 g.p.h.	21 g.p.h.	19 g.p.h.	17 g.p.h.
2850	24 g.p.h.	22 g.p.h.	20 g.p.h.	18 g.p.h."

(b) Model T207A

(1) S/N 20700363 through 20700482

"Maximum power setting and fuel flow

Takeoff (5 min. only): 2700 r.p.m., 36.5 in. mp., 31 g.p.h.

Maximum continuous power: 2600 r.p.m., 35.0 in. mp., 27 g.p.h.

Alt. Ft.	Man. Press In. Hg.	Fuel Flow G.P.H.
S.L. to 17,000	35	27
18,000	34	26
20,000	32	24
22,000	30	22
24,000	28	20
26,000	26	18
28,000	24	17
30,000	22	16

normal climb 2500 r.p.m. 30.0 in. mp., 22 g.p.h."

S/N 20700483 through 20700729

"MINIMUM FUEL FLOWS

TAKEOFF	Maximum Continuous Power: 2600 RPM								
2700 RPM	ALT - FT/1000	SL	1-7	18	20	22	24	26	28	30
36.5 In. Hp.	MP. In. Hg.	35	34	32	30	28	26	24	22
31 GPH	Fuel flow - GPH	27	26	24	22	20	18	17	16"

(2) S/N 20700363 through 20700729

"Avoid continuous operation between 1850 and 2150 r.p.m. above 24 in. mp."

(8) On the baggage door through 20700729:

"Max. baggage 120 lb. Refer to weight and balance data for baggage/cargo loading."

(9) Adjacent to the voltage light:

S/N 20700363 through 20700482

"High Voltage"

S/N 20700483 through 20700729

"Low Voltage"

(10) (a) S/N 20700363 through 20700482
On the flap control indicator
"Up to 10° (Partial flap range with blue color code and 140 knot callout; also mechanical detent at 10°).
10° to Full (Indices at these positions with white color code and 100 knot callout; also mechanical detent at 20°)."

(b) S/N 20700483 through 20700729
On the flap control indicator
"Up to 10° (Partial flap range with blue color code and 140 knot callout; also mechanical detent at 10°).
10° to Full (Indices at these positions with white color code and 105 knot callout; also mechanical detent at 20°)."

(11) Near airspeed indicator:
S/N 20700483 through 20700729
"Maneuver Speed
130 KIAS"

(12) In full view of the pilot:
(a) Model 207A and T207A, S/N 20700363 through 20700482
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

(b) Model 207A, S/N 20700483 through 20700562
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE P.O.H. FOR EXPANDED INSTRUCTIONS."

(c) Model T207A, S/N 20700483 through 20700729
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE P.O.H. FOR EXPANDED INSTRUCTIONS."

(13) Effective 20700730 and up:
All placards required in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be installed in the appropriate locations."

In addition to the above placards, the prescribed operating limitations indicated by an asterisk (*) under Sections I and II of this data sheet must also be displayed by permanent markings.

NOTE 3. Reserved.

NOTE 4. The cylinder head thermistors must be installed as follows:

MODEL	CYLINDER HEAD NUMBER
207	3
T207	1
207A (1977 & 1978 Models)	3
207A (1979 Model and on)	6
T207A	6

NOTE 5. The marking of the airspeed indicator with IAS provides an equivalent level of safety to FAR 23.1545 when the approved airspeed calibration data presented in Section V of the Pilot's Operating Handbooks listed below is available to the pilot:

207	Cessna P/N D1068-13
T207	Cessna P/N D1067-13
207A (1977	Cessna P/N D1092-13
T207A (1977)	Cessna P/N D1093-13
207A (1978)	Cessna P/N D1120-13
T207A (1978)	Cessna P/N D1121-13
207A (1979)	Cessna P/N D1149-13PH
T207A (1979)	Cessna P/N D1150-13PH
207A (1980)	Cessna P/N D1184-13PH
T207A (1980)	Cessna P/N D1185-13PH
207A (1981)	Cessna P/N D1205-13PH
T207A (1981)	Cessna P/N D1206-13PH
207A (1982)	Cessna P/N D1224-13PH
T207A (1982)	Cessna P/N D1225-13PH
207A (1983)	Cessna P/N D1242-13PH
T207A (1983)	Cessna P/N D1243-13PH
207A (1984)	Cessna P/N D1263-13PH
T207A (1984)	Cessna P/N D1264-13PH

NOTE 6. 14-volt electrical system
(207 series through S/N 20700414)

28-volt electrical system
(207 series S/N 20700415 and up)

"WARNING: Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage, and is therefore prohibited on Cessna airplanes."

.....END.....

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

3A21
Revision 46
CESSNA

210	210K
210A	T210K
210B	210L
210C	T210L
210D	210M
210E	T210M
210F	210N
T210F	P210N
210G	T210N
T210G	210R
210H	P210R
T210H	T210R
210J	210-5 (205)
T210J	210-5A (205A)

March 31, 2003|

TYPE CERTIFICATE DATA SHEET NO. 3A21

This data sheet which is part of Type Certificate No.3A21 prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder — Cessna Aircraft Company
P. O. Box 7704
Wichita, Kansas 67277

I - Model 210, 4 PCLM (Normal Category), Approved April 20, 1959

Engine — Continental IO-470-E

*Fuel — 100/130 minimum grade aviation gasoline

*Engine Limits — For all operations, 2625 r.p.m. (260 b.hp.)

Propeller and Propeller Limits

1. (a) Hartzell HC-A2XF-1/8433-2
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 13.5°, high 28.0°
   (b) Cessna spinner 0752006

or 2. (a) McCauley D2A36C33/90M-8 or D2A34C49/90A-8 or D2A34C58/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.8°, high 25.8°
   (b) Cessna spinner 0752004

3. Woodward hydraulic governor 210270, 210280, 210340 or 210345

Page No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
Rev.No.	46	30	30	27	27	29	27	29	27	27	27	27	31	31	34	36	40	40	44	44
Page No.	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*
Rev.No.	44	30	30	27	27	45	27	29	27	27	27	27	31	31	34	36	40	40	44	44
Page No.	*41*	*42*	*43*																	
Rev.No.	44	44	46																	

I - Model 210 (cont'd)

*Airspeed Limits (CAS)	Never exceed	200 m.p.h. (174 knots)
	Maximum structural cruising	175 m.p.h. (152 knots)
	Maneuvering	130 m.p.h. (113 knots)
	Flaps extended	110 m.p.h. (96 knots)
	Landing gear operating speed	160 m.p.h. (139 knots)
	Landing gear extension speed	160 m.p.h. (139 knots)

C.G. Range (Landing Gear Extended)
(+38.4) to (+46.5) at 2900 lb.
(+34.5) to (+46.5) at 2550 lb. or less
Straight line variation between points given.
Moment change due to retracting landing gear (+2456 in.-lb.)

Empty Wt. C.G. Range
None

*Maximum Weight
2900 lb.

No. of Seats
2 (2 at +36, 2 at +70)

Maximum Baggage
120 lb. (+95)

Fuel Capacity
65 gal. (55 gal. usable); two 32.5 gal. tanks in wings at +48.
See NOTE 1 for data on unusable fuel

Oil Capacity
12 qt. (-19.4), 6 qt. usable
See NOTE 1 for data on undrainable oil

Control Surface Movements

Wing flaps	Up	0°	Down	38° +2°, -1°
Ailerons	Up	20° ±2°	Down	14° ±2°
Elevator	Up	26°30' ±1°	Down	22° ±1°
Elevator tab	Up	25° +1°, -0°	Down	15° +1°, -0°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0 W.L.)

Serial Nos. Eligible
Model 210: 618, 57001 through 57575 (1960 Model)

II - Model 210A, 4 PCLM (Normal Category), Approved June 14, 1960

Engine
Continental IO-470-E

*Fuel
100/130 minimum grade aviation gasoline

*Engine Limits
For all operations, 2625 r.p.m. (260 b.hp.)

Propeller and Propeller Limits

1. (a) Hartzell HC-A2XF-1/8433-2
   Diameter: not over 82 in., not under 80
   Pitch settings at 30 in. sta.:
   low 13.5°, high 28.0°
   (b) Cessna spinner 0752006

or

2. (a) McCauley D2A36C33/90M-8 or D2A34C49/90A-8 or D2A34C58/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.8°, high 25.8°
   (b) Cessna spinner 0752004
3. Woodward hydraulic governor 210270, 210280, 210340, 210345

II - Model 210A (cont'd)

*Airspeed Limits (CAS)	Never exceed	200 m.p.h. (174 knots)
	Maximum structural cruising	175 m.p.h. (152 knots)
	Maneuvering	130 m.p.h. (113 knots)
	Flaps extended	110 m.p.h. (96 knots)
	Landing gear operating speed	160 m.p.h. (139 knots)
	Landing gear extended speed	160 m.p.h. (139 knots)
C.G. Range (Landing Gear Extended)	(+38.4) to (+44.4) at 2900 lb. (+33.7) to (+44.4) at 2250 lb. or less Straight line variation between points given. Moment change due to retracting landing gear (+2456 in.-lb.)	
Empty Wt. C.G. Range	None	
*Maximum Weight	2900 lb.	
No. of Seats	4 (2 at +36, 2 at +70)	
Maximum Baggage	120 lb. (+103)	
Fuel Capacity	65 gal. (55 gal. usable); two 32.5 gal. tanks in wings at +48. See NOTE 1 for data on unusable fuel	
Oil Capacity	12 qt. (-19.4), 6 qt. usable See NOTE 1 for data on undrainable oil	

Control surface movements

Wing flaps	Up	0°	Down	38° +2°, -1°
Ailerons	Up	20° ±2°	Down	14° ±2°
Elevator	Up	26°30' ±1°	Down	22° ±1°
Elevator tab	Up	10° +2°, -0°	Down	25° +2°, -0°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0. W.L.)

Serial Nos. Eligible — Model 210A: 616, 21057576 through 21057840 (1961 Model)

III - Model 210B, 4 PCLM (Normal Category), Approved June 27, 1961
Model 210C, 4 PCLM (Normal Category), Approved June 14, 1962

Engine — Continental IO-470-S

*Fuel — 100/130 minimum grade aviation gasoline

*Engine Limits — For all operations, 2625 r.p.m. (260 b.hp.)

Propeller and Propeller Limits

1. (a) Hartzell HC-A2XF-1/8433-2
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 30 in. sta.:
   low 13.5°, high 28.0°
   (b) Cessna spinner 0752006

or

2. (a) McCauley D2A36C33/90M-8 or D2A34C49/90A-8 or D2A34C58/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.8°, high 25.8°
   (b) Cessna spinner 0752004
3. Woodward hydraulic governor 210270, 210280, 210340, 210345, 210451, 210452

III - Model 210B, Model 210C (cont'd)

*Airspeed Limits (CAS)	Never exceed	225 m.p.h. (196 knots)
	Maximum structural cruising	190 m.p.h. (165 knots)
	Maneuvering	132 m.p.h. (115 knots)
	Flaps extended	110 m.p.h. (96 knots)
	Landing gear operating speed	160 m.p.h. (139 knots)
	Landing gear extended speed	160 m.p.h. (139 knots)
C.G. Range (Landing Gear Extended)	(+39.2) to (+45.0) at 3000 lb. (+33.0) to (+45.0) at 2250 lb. or less Straight line variation between points given. Moment change due to retracting landing gear (+2456 in.-lb.)	
Empty Wt. C.G. Range	None	
*Maximum Weight	3000 lb.	
No. of Seats	4 (2 at +36, 2 at +70)	
Maximum Baggage	120 lb. (+103)	
Fuel Capacity	65 gal. (63.4 gal. usable); two 32.5 gal. tanks in wings at +48. See NOTE 1 for data on unusable fuel	
Oil Capacity	12 qt. (-19.4), 6 qt. usable. See NOTE 1 for data on undrainable oil	

Control Surface Movements					
	Wing flaps	Up	0°	Down	40° +1°, -2°
	Ailerons	Up	20° ±2°	Down	14° ±2°
	Elevator	Up	26°30' ±1°	Down	18° ±1°
	Elevator tab	Up	20° +1°, -0°	Down	20° +1°, -0°
	Rudder	Right	24° ±1°	Left	24° ±1°
	(measured parallel to 0.0 W.L.)				

Serial Nos. Eligible	Model 210B: 21057841 through 21058085 (1962 Model) Model 210C: 21058086 through 21058139 and 21058141 through 21058220 (1963 Model)

IV - Model 210-5 (205), 6 PCLM (Normal Category), Approved June 14, 1962
Model 210-5A (205A), 6 PCLM (Normal Category), Approved July 19, 1963

Engine	Continental IO-470-S
*Fuel	100/130 minimum grade aviation gasoline
*Engine Limits	For all operations, 2625 r.p.m. (260 b.hp.)
Propeller and Propeller Limits	1. (a) Hartzell HC-A2XF-1A13.5/8433-2 Diameter: not over 82 in., not under 80 in. Pitch settings at 30 in. sta.: low 13.5°, high 28.0° (b) Cessna spinner 0752614 or 2. (a) McCauley D2A36C33/90M-8 or D2A34C49/90A-8 or D2A34C58/90AT-8 Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.8°, high 25.8° (b) Cessna spinner 0752614 3. Woodward hydraulic governor 210270, 210280, 210340, 210345, 210451, 210452

IV - Model 210-5 (205), Model 210-5A (205A) (cont'd)

*Airspeed Limits (CAS)	Never exceed	210 m.p.h	(182 knots)
	Maximum structural cruising	170 m.p.h.	(148 knots)
	Maneuvering	138 m.p.h.	(120 knots)
	Flaps extended	110 m.p.h.	(96 knots)

C.G. Range (Landing Gear Extended)
(+40.5) to (+47.4) at 3300 lb.
(+33.0) to (+47.4) at 2250 lb. or less
Straight line variation between points given.

Empty Wt. C.G. Range
None

*Maximum Weight
3300 lb.

No. of Seats
6 (2 at +36, 2 at +69, 2 at +100)

Maximum Baggage
Reference weight and balance data

Fuel Capacity
65 gal. (63.4 gal. usable); two 32.5 gal. tanks in wings at +48.
See NOTE 1 for data on unusable fuel.

Oil Capacity
12 qt. (-19.4), 6 qt. usable.
See NOTE 1 for data on undrainable oil.

Control Surface Movements

Wing flaps	Up	0°	Down	40° +1°, -2°
Ailerons	Up	20° ±2°	Down	14° ±2°
Elevator	Up	26°30' ±1°	Down	18° ±1°
Elevator tab	Up	20° +1°, -0°	Down	20° +1°, -0°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0. W.L.)

Serial Nos. Eligible
Model 210-5 (205) : 641, 205-0001 through 205-0480 (1963 Model)
Model 210-5A (205A) : 205-0481 through 205-0577 (1964 Model)

V - Model 210D, 4 PCLM (Normal Category), Approved July 19, 1963

Engine
Continental IO-520-A

*Fuel
100/130 minimum grade aviation gasoline

*Engine Limits
For all operations, 2700 r.p.m. (285 b.hp.)

Propeller and propeller limits
1. (a) McCauley D2A34C58/90AT-8
Diameter: not over 82 in., not under 80 in.
Pitch settings at 36 in. sta.:
low 10.3°, high 25.8°
(b) Cessna spinner 0752004
(c) Woodward hydraulic governor D210452

*Airspeed limits (CAS)	Never exceed	225 mph.	(196 knots)
	Maximum structural cruising	190 mph.	(165 knots)
	Maneuvering	134 mph.	(116 knots)
	Flaps extended	110 mph.	(96 knots)
	Landing gear operating speed	160 mph.	(139 knots)
	Landing gear extended speed	160 mph.	(139 knots)

C.G. range (landing gear extended)
(+39.2) to (+46.6) at 3100 lb.
(+33.0) to (+46.6) at 2250 lb. or less
Straight line variation between points given.
Moment change due to retracting landing gear (+2456 in.-lb.)

V - Model 210D (cont'd)

Empty wt. C.G. range	None
*Maximum weight	3100 lb.
No. of seats	4 (2 at +36, 2 at +70)
Maximum baggage	Reference weight and balance data
Fuel capacity	65 gal. (63.4 gal. usable); two 32.5 gal. tanks in wings at +48. See Note 1 for data on unusable fuel.
Oil capacity	12 qt. (-19.4), 6 qt. usable. See Note 1 for data on undrainable oil.

Control surface movements

Wing flaps	Up	0°	Down	40° +1°, -2°
Ailerons	Up	21° ±2°	Down	14°30' ±2°
Elevator	Up	26°30' ±1°	Down	18° ±1°
Elevator tab	Up	20° +1°, -0°	Down	10° +1°, -0°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0. W.L.)

Serial Nos. eligible: Model 210D: 21058221 through 21058510 (1964 Model)

VI - Model 210E, 4 PCLM (Normal Category), Approved September 17, 1964

Engine	Continental IO-520-A
*Fuel	100/130 minimum grade aviation gasoline
*Engine limits	For all operations, 2700 rpm. (285 b.hp.)

Propeller and propeller limits

1. (a) McCauley E2A34C64/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.3°, high 25.8°
   (b) Cessna spinner 1250411
   (c) Woodward hydraulic governor D210452
2. (a) McCauley E2A34C73/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.3°, high 25.8°
   (b) Cessna spinner 1250415
   (c) Woodward hydraulic governor D210452

*Airspeed limits (CAS)

Never exceed	225 mph.	(196 knots)
Maximum structural cruising	190 mph.	(165 knots)
Maneuvering	134 mph.	(116 knots)
Flaps extended	110 mph.	(96 knots)
Landing gear operating speed	160 mph.	(139 knots)
Landing gear extended speed	160 mph.	(139 knots)

C.G. range (landing gear extended): (+39.2) to (+46.6) at 3100 lb.
(+33.0) to (+46.6) at 2250 lb. or less
Straight line variation between points given.
Moment change due to retracting landing gear (+2456 in.-lb.)

Empty wt. C.G. range: None

VI - Model 210E (cont'd)

*Maximum weight	3100 lb.				
No. of seats	4 (2 at +36, 2 at +70)				
Maximum baggage	Reference weight and balance data				
Fuel capacity	65 gal. (63.4 gal. usable); two 32.5 gal. tanks in wings at +48. See Note 1 for data on unusable fuel.				
Oil capacity	12 qt. (-19.5), 6 qt. usable See Note 1 for data on undrainable oil.				
Control surface movements	Wing flaps	Up	0°	Down	40° +1°, -2°
	Ailerons	Up	21° ±2°	Down	14°30' ±2°
	Elevator	Up	26°30' ±1°	Down	18° ±1°
	Elevator tab	Up	20° +1°, -0°	Down	10° +1°, -0°
	Rudder	Right	24° ±1°	Left	24° ±1°
	(measured parallel to 0.0. W.L.)				
Serial Nos. eligible	Model 210E: 21058511 through 21058715 (1965 Model)				

VII - Model T210F, 4 PCLM (Normal Category), Approved August 3, 1965

Engine	Continental TSIO-520-C
*Fuel	100/130 minimum grade aviation gasoline
*Engine limits	For all operations, 2700 r.p.m., 32.5 in. Hg. mp. (285 b.hp.)
Propeller and propeller limits	1. (a) McCauley E2A34C70/90AT-8 Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 11.8°, high 32.0° (b) Cessna spinner 1250415 (c) Woodward hydraulic governor G210452 2. (a) McCauley D3A32C77/82NK-2 Diameter: not over 80 in., not under 78 in. Pitch settings at 30 in. sta.: low 13.2°, high 32.5° (b) Cessna spinner 1250419-2 (c) Woodward hydraulic governor G210452 3. (a) McCauley D3A32C88/82NC-2 Diameter: not over 80 in., not under 78 in. Pitch settings at 30 in. sta.: low 14.0°, high 33.0° (b) Cessna spinner 1250419-2 (c) Woodward hydraulic governor G210452

*Airspeed limits (CAS)			
	Never exceed	225 mph.	(196 knots)
	Maximum structural cruising	190 mph.	(165 knots)
	Maneuvering	131 mph.	(114 knots)
	Flaps extended	110 mph	(96 knots)
	Landing gear operating speed	160 mph.	139 knots)
	Landing gear extended speed	160 mph.	(139 knots)

VII - Model T210F (cont'd)

C.G. range (landing gear extended)	(+39.0) to (+46.6) at 3300 lb. (+33.0) to (+46.6) at 2480 lb. or less Straight line variation between points given. Moment change due to retracting landing gear (+2456 in.-lb.)				
Empty wt. C.G. range	None				
*Maximum weight	3300 lb.				
No. of seats	4 (2 at +36, 2 at +70)				
Maximum baggage	Reference weight and balance data				
Fuel capacity	65 gal. (63 gal. usable); two 32.5 gal. tanks in wings at +48. See Note 1 for data on unusable fuel.				
Oil capacity	12 qt. (-19.4), 6 qt. usable. See Note 1 for data on undrainable oil.				
Control surface movements	Wing flaps	Up	0°	Down	40° +1°, -2°
	Ailerons	Up	21° ±2°	Down	14°30' ±2°
	Elevator	Up	26°30' ±1°	Down	18° ±1°
	Elevator tab	Up	20° ±1°	Down	20° ±1°
	Rudder	Right	24° ±1°	Left	24° ±1°
	(measured parallel to 0.0. W.L.)				
Serial Nos. eligible	Model T210F: T210-0001 through T210-0197 (1966 Model)				

VIII - Model 210F, 4 PCLM (Normal Category), Approved August 3, 1965

Engine	Continental IO-520-A
*Fuel	100/130 minimum grade aviation gasoline
*Engine limits	For all operations, 2700 rpm. (285 b.hp.)
Propeller and propeller limits	1. (a) McCauley E2A34C73/90AT-8 Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.3°, high 25.8° (b) Cessna spinner 1250415 (c) Woodward hydraulic governor D210452 2. (a) McCauley D3A32C77/82NK-2 Diameter: not over 80 in., not under 78 in. Pitch settings at 30 in. sta.: low 11.3°, high 27.6° (b) Cessna spinner 1250419-2 (c) Woodward hydraulic governor D210452 3. (a) McCauley D3A32C88/82NC-2 Diameter: not over 80 in., not under 78 in. Pitch settings at 30 in. sta.: low 13.8°, high 28.1° (b) Cessna spinner 1250419-2 (c) Woodward hydraulic governor D210452

VIII - Model 210F (cont'd)

*Airspeed limits (CAS)	Never exceed	225 mph.	(196 knots)
	Maximum structural cruising	190 mph.	(165 knots)
	Maneuvering	131 mph	(114 knots)
	Flaps extended	110 mph	(96 knots)
	Landing gear operating speed	160 mph	(139 knots)
	Landing gear extended speed	160 mph.	(139 knots)

C.G. range (landing gear extended)
(+39.0) to (+46.6) at 3300 lb.
(+33.0) to (+46.6) at 2400 lb. or less
Straight line variation between points given.
Moment change due to retracting landing gear (+2456 in.-lb.)

Empty wt. C.G. range
None

*Maximum weight
3300 lb.

No. of seats
4 (2 at +36, 2 at +70)

Maximum baggage
Reference weight and balance data

Fuel capacity
65 gal. (63 gal. usable), two 32.5 gal. tanks in wings at +48.
See Note 1 for data on unusable fuel.

Oil capacity
12 qt. (-19.4), 6 qt. usable
See Note 1 for data on undrainable oil.

Control surface movements

Wing flaps	Up	0°	Down	40° +1°, -2°
Ailerons	Up	21° ±2	Down	14°30' ±2°
Elevator	Up	26°30' ±1°	Down	18° ±1°
Elevator tab	Up	20° ±1°	Down	20° ±1°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0. W.L.)

Serial Nos. eligible
Model 210F: 21058716 through 21058818 (1966 Model)

IX - Model T210G, 4 PCLM (Normal Category), Approved August 23, 1966
Model T210H, 4 PCLM (Normal Category), Approved August 16, 1967

Engine
Continental TSIO-520-C

*Fuel
100/130 minimum grade aviation gasoline

*Engine limits
For all operations, 2700 rpm., 32.5 in. Hg. mp. (285 b.hp.)

Propeller and propeller limits

1. (a) McCauley E2A34C70/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 11.8°, high 32.0°
   (b) Cessna spinner 1250415
   (c) Woodward hydraulic governor G210452
   (d) McCauley hydraulic governor C290D2/T2 or C290D4/T2
2. (a) McCauley D3A32C88/82NC-2
   Diameter: not over 80 in., not under 78 in.
   Pitch settings at 30 in. sta.:
   low 14.0°, high 33.0°
   (b) Cessna spinner 1250419-2
   (c) Woodward hydraulic governor G210452
   (d) McCauley hydraulic governor C219D2/T2 or C290D4/T2

IX - Model T210G, Model T210H (cont'd)

Propeller and propeller limits	3. (a) McCauley D3A32C77/82NK-2 (T-210G Only) Diameter: not over 80 in., not under 78 in. Pitch settings at 30 in. sta.: low 13.2°, high 32.5° (b) Cessna spinner 1250419-2 (c) Woodward hydraulic governor G210452
*Airspeed limits (CAS)	Never exceed 225 mph. (196 knots) Maximum structural cruising 190 mph (165 knots) Maneuvering 135 mph. (117 knots) Flaps extended 110 mph. (96 knots) Landing gear operating speed 160 mph. (139 knots) Landing gear extended speed 160 mph. (139 knots)
C.G. range (landing gear extended)	(+39.7) to (+47.8) at 3400 lb. (+35.5) to (+47.8) at 2800 lb. or less Straight line variation between points given. Moment change due to retracting landing gear (+2456 in.-lb.)
Empty wt. C.G. range	None
*Maximum weight	3400 lbs.
No. of seats	4 (2 at +36, 2 at +70)
Maximum baggage	Reference weight and balance data.
Fuel capacity	90 gal. (89 gal. usable), two 45.0 gal. tanks in wings at +43. See Note 1 for data on unusable fuel
Oil capacity	12 qt. (-19.4), 6 qt. usable. See Note 1 for data on undrainable oil
Control surface movements	Wing flaps Up 0° Down 30° Ailerons Up 20° ±2° Down 15° ±2° Elevator Up 23° ±1° Down 15° ±1° Elevator tab Up 20° ±1° Down 5° ±1° Rudder Right 24° ±1° Left 24° ±1° (measured parallel to 0.0. W.L.)
Serial Nos. eligible	Model T210G: T210-0198 through T210-0307 (1967 Model) Model T210H: T210-0308 through T210-0392 (1968 Model)

X - Model 210G, 4 PCLM (Normal Category), Approved August 23, 1966
Model 210H, 4 PCLM (Normal Category), Approved August 16, 1967

Engine	Continental IO-520-A
*Fuel	100/130 minimum grade aviation gasoline
*Engine limits	For all operations, 2700 rpm. (285 b.hp.)
Propeller and propeller limits	1. (a) McCauley E2A34C73/90AT-8 Diameter: not over 82 in., not under 80 in. Pitch settings at 36 in. sta.: low 10.3°, high 25.8° (b) Cessna spinner 1250415 (c) Woodward hydraulic governor D210452 (d) McCauley hydraulic governor C290D2/T5 or C290D3/T5

X - Model 210G, Model 210H

(cont'd)

2. (a) McCauley D3A32C88/82NC-2
Diameter: not over 80 in., not under 78 in.
Pitch settings at 30 in. sta.:
low 13.8°, high 28.1°
(b) Cessna spinner 1250419-2
(c) Woodward hydraulic governor D210452
(d) McCauley hydraulic governor C290D2/T5 or C290D3/T5

*Airspeed limits (CAS)

Never exceed	225 mph	(196 knots)
Maximum structural cruising	190 mph	(165 knots)
Maneuvering	135 mph.	(117 knots)
Flaps extended	110 mph.	(96 knots)
Landing gear operating speed	160 mph.	(139 knots)
Landing gear extended speed	160 mph.	(139 knots)

C.G. range (landing gear extended)

(+39.7) to (+47.8) at 3400 lb.
(+35.5) to (+47.8) at 2800 lb. or less
Straight line variation between points given.
Moment change due to retracting landing gear (+2456 in.-lb.)

Empty wt. C.G. range

None

*Maximum weight

3400 lb.

No. of seats

4 (2 at +36, 2 at +70)

Maximum baggage

Reference weight and balance data

Fuel capacity

90 gal. (89 gal. usable); two 45.0 gal. tanks in wings at +43.
See Note 1 for data on unusable fuel.

Oil capacity

12 qt. (-19.4); 6 qt. usable
See Note 1 for data on undrainable oil.

Control surface movements

Wing flaps	Up	0°	Down	30°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator	Up	23° ±1°	Down	15° ±1°
Elevator tab	Up	20° ±1°	Down	5° ±1°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0. W.L.)

Serial Nos. eligible

Model 210G: 21058819 through 21058936 (1967 Model)
Model 210H: 21058937 through 21059061 (1968 Model)

XI - Model T210J, 4 PCLM (Normal Category), Approved July 17, 1968

Engine

Continental TSIO-520-H

*Fuel

100/130 minimum grade aviation gasoline

*Engine limits

For all operations, 2700 rpm., 32.5 in. Hg. mp. (285 b.hp.)

Propeller and propeller limits

1. (a) McCauley E2A34C70/90AT-8
Diameter: not over 82 in., not under 80 in.
Pitch settings at 36 in. sta.:
low 11.8°, high 32.0°
(b) Cessna spinner 1250415
(c) Woodward hydraulic governor G210452
(d) McCauley hydraulic governor C290D2/T2 or C290D4/T2

XI - Model T210J (cont'd)

2. (a) McCauley D3A32C88/82NC-2
Diameter: not over 80 in., not under 78 in.
Pitch settings at 30 in. sta.:
low 14.0°, high 33.0°
(b) Cessna spinner 1250419-2
(c) Woodward hydraulic governor G210452
(d) MCauley hydraulic governor C219D2/T2 or C290D4/T2

Airspeed limits (CAS)

Never exceed	225 mph.	(196 knots)
Maximum structural cruising	90 mph.	(165 knots)
Maneuvering	135 mph	(117 knots)
Flaps extended	110 mph.	(96 knots)
Landing gear operating speed	160 mph	(139 knots)
Landing gear extended speed	160 mph	(139 knots)

C.G. range (landing gear extended)
(+39.7) to (+47.8) at 3400 lb.
(+35.5) to (+47.8) at 2800 lb. or less
Straight line variation between points given.
Moment change due to retracting landing gear (+2456 in.-lb.)

Empty wt. C.G. range
None

*Maximum weight
3400 lb.

No. of seats
4 (2 at +36, 2 at +70)

Maximum baggage
Reference weight and balance data.

Fuel capacity
90 gal. (89 gal. usable), two 45.0 gal. tanks in wings at +43.
See Note 1 for data on unusable fuel.

Oil capacity
10 qt. (-12.5), 8 qt. usable
See Note 1 for data on undrainable oil.

Control surface movements

Wing flaps	Up	0°	Down	30°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator	Up	23° ±1°	Down	15° ±1°
Elevator tab	Up	20° ±1°	Down	5° ±1°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0. W.L.)

Serial Nos. eligible
Model T210J: 21058140, T210-0393 through T210-0454 (1969 Model)

XII - Model 210J, 4 PCLM (Normal Category), Approved July 17, 1968

Engine
Continental IO-520-J

*Fuel
100/130 minimum grade aviation gasoline

*Engine limits
For all operations, 2700 rpm. (285 b.hp.)

Propeller and propeller limits
1. (a) McCauley E2A34C73/90AT-8
Diameter: not over 82 in., not under 80 in.
Pitch settings at 36 in. sta.:
low 10.3°, high 25.8°
(b) Cessna spinner 1250415
(c) Woodward hydraulic governor D210452
(d) McCauley hydraulic governor C290D2/T5 or C290D3/T5

XII - Model 210J (cont'd)

2. (a) McCauley D3A32C88/82NC-2
Diameter: not over 80 in., not under 78 in.
Pitch settings at 30 in. sta.:
low 13.8°, high 28.1°
(b) Cessna spinner 1250419-2
(c) Woodward hydraulic governor D210452
(d) McCauley hydraulic governor C290D2/T5 or C290D3/T5

*Airspeed limits (CAS)

Never exceed	225 mph.	(196 knots)
Maximum structural cruising	190 mph	(165 knots)
Maneuvering	135 mph.	(117 knots)
Flaps extended	110 mph.	(96 knots)
Landing gear operating speed	160 mph.	(139 knots)
Landing gear extended speed	160 mph.	(139 knots)

C.G. range (landing gear extended)
(+39.7) to (+47.8) at 3400 lb.
(+35.5) to (+47.8) at 2800 lb. or less
Straight line variation between points given.
Moment change due to retracting landing gear (+2456 in.-lb.)

Empty wt. C.G. range
None

*Maximum weight
3400 lb.

No. of seats
4 (2 at +36, 2 at +70)

Maximum baggage
Reference weight and balance data

Fuel capacity
90 gal. (89 gal. usable); two 45.0 gal. tanks in wings at +43.
See Note 1 for data on unusable fuel.

Oil capacity
10 qt. (-12.5); 8 qt. usable
See Note 1 for data on undrainable oil.

Control surface movements

Wing flaps	Up	0°	Down	30°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator	Up	23° ±1°	Down	15° ±1°
Elevator tab	Up	20° ±1°	Down	5° ±1°
Rudder	Right	24° ±1°	Left	24° ±1°

(measured parallel to 0.0. W.L.)

Serial Nos. eligible
Model 210J: 21059062 through 21059199 (1969 Model)

XIII - Model 210K/T210K, 6 PCLM (Normal Category), Approved September 26, 1969
Model 210L/T210L, 6 PCLM (Normal Category), Approved October 7, 1971

Model 210K/210L

Engine
Continental IO-520-L

*Fuel
100/130 minimum grade aviation gasoline

*Engine limits
Takeoff (5 min.) at 2850 rpm. (300 hp.)
For all other operations, 2700 r.p.m. (285 hp.)

XIII Model 210K/T210K, Model 210L/T210L (cont'd)

Propeller and propeller limits

1. Model 210K/210L (S/N 21059200 through 21060539)
   (a) McCauley E2A34C73/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 10.3°, high 25.8°
   (b) Cessna spinner 1250419
   (c) Woodward hydraulic governor 2104562
   (d) McCauley hydraulic governor C290D2/T4 or C290D4/T4
2. (a) McCauley D3A32C88/82NC-2
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 11.5°, high 28.1°
   (b) Cessna spinner 1250419-2
   (c) Woodward hydraulic governor 210462
   (d) McCauley hydraulic governor C290D2/T4 or C290D4/T4

Model T210K/T210L

Engine: Continental TSIO-520-H

*Fuel: 100/130 minimum grade aviation gasoline

*Engine limits: For all operations, 2700 rpm., 32.5 in. Hg. mp. (285 b.hp.)

Propeller and Propeller Limits

1. Model T210K/T210L (S/N 21059200 through 21060539)
   (a) McCauley E2A34C70/90AT-8
   Diameter: not over 82 in., not under 80 in.
   Pitch settings at 36 in. sta.:
   low 11.8°, high 32.0°
   (b) Cessna spinner 1250415
   (c) Woodward hydraulic governor G210452
   (d) McCauley hydraulic governor C290D2/T2 or C290D4/T4
2. (a) McCauley D3A32C88/82NC-2
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 14.0°, high 33.0°
   (b) Cessna spinner 1250419-2
   (c) Woodward hydraulic governor G210452
   (d) McCauley hydraulic governor C290D2/T2 or C290D4/T2

Models 210K/210L/T210K/T210L

*Airspeed Limits (CAS)

Model 210K/T210K, 210L/T210L (S/N 21059200 through 21061039)

Never exceed	225 m.p.h	(196 knots)
Maximum structural cruising	190 m.p.h	(165 knots)
Maneuvering	135 m.p.h	(117 knots)
Flaps extended (210K/T210K)	110 m.p.h	(96 knots)
Flaps extended (210L/T210L)	120 m.p.h	(104 knots)
Landing gear operating speed	160 m.p.h	(139 knots)
Landing gear extended speed	160 m.p.h	(139 knots)

(IAS)
(See NOTE 4 on use of IAS)

Model 210L/T210L (S/N 21061040 through 21061573)

Never exceed	199 knots
Maximum structural cruising	168 knots
Maneuvering	119 knots
Flaps extended	105 knots
Landing gear operating speed	140 knots
Landing gear extended speed	140 knots

Models 210K/210L/T210K/T210L (cont'd)

C.G. Range (Landing Gear Extended)	(+42.5) to (+53.0) at 3800 lb. (+37.0) to (+53.0) at 3000 lb. or less Straight line variation between points given. Moment change due to retracting landing gear (+3207 in.-lb.)				
Empty Wt. C.G. Range	None				
*Maximum Weight	3800 lb.				
No. of Seats	Standard 6 (2 at +34 to +46, 2 at +61 to +77, 2 at +101) Optional 4 (2 at +34 to +46, 2 at +77) (210K/T210K)				
Maximum Baggage	Reference weight and balance data				
Fuel Capacity	90 gal. (89 gal. usable); two 45.0 gal. tanks in wings at +43 See NOTE 1 for data on unusable fuel.				
Oil Capacity	10 qt. (-12.5); 8 qt. usable See NOTE 1 for data on undrainable oil.				
Control Surface Movements	Wing flaps	Up	0°	Down	30° +1°, -2°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator	Up	23° ±1°	Down	17° ±1°
	Elevator tab	Up	25° ±1°	Down	10° ±1°
	Rudder	Right	24° ±1°	Left	24° ±1°
	(measured parallel to 0.0 W.L.)				
	Rudder	Right	27°13' ±1°	Left	27°13' ±1°
	(measured perpendicular to hinge line)				
Serial Nos. Eligible	Models 210K/T210K: 21059200 through 21059351 (1970 Model) 21059352 through 21059502 (1971 Model) Models 210L/T210L: 21059503 through 21059719 (1972 Model) 21059720 through 21060089 (1973 Model) 21060090 through 21060539 1974 Model) 21060540 through 21061039 1975 Model) 21061040 through 21061041 1976 Model) 21061043 through 21061573 (1976 Model)				

XIV - Model 210M/T210M, 6 PCLM (Normal Category), October 7, 1976

Model 210M

Engine	Continental IO-520-L
*Fuel	Model 210M (S/N 21061574 through 21062273) 100/130 minimum grade aviation gasoline Model 210M (S/N 21062274 through 21062953) 100LL/100 minimum grade aviation gasoline
*Engine Limits	Takeoff (5 min.) at 2850 r.p.m. (300 hp.) For all other operations, 2700 r.p.m. (285 hp.)

XIV - Model 210M/T210M (cont'd)

Propeller and Propeller Limits

1. Model 210M (S/N 21061574 through 21062273)
   (a) McCauley D3A32C88/82NC-2
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 11.5°, high 28.1°
   (b) Cessna spinner 1250419-2
   (c) Woodward hydraulic governor 210462
   (d) McCauley hydraulic governor C290D4/T4
2. Model 210M (S/N 21062274 and up)
   (a) McCauley D3A34C404/80VA-0
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 11.0°, high 27.0°
   (b) Cessna spinner 1250419
   (c) McCauley hydraulic governor C290D4/T4

*Airspeed Limits (IAS)
(See NOTE 4 on use of IAS)

1. Model 210M (S/N 21061574 through 21062273)

Never exceed	199 knots
Maximum structural cruising	168 knots
Maneuvering	119 knots
Flaps extended	105 knots
Landing gear operating speed	140 knots
Landing gear extended speed	140 knots

2. Model 210M (S/N 21062274 through 21062953)

Never exceed	199 knots
Maximum structural cruising	168 knots
Maneuvering	119 knots
Flaps extended	115 knots
Landing gear operating speed	140 knots
Landing gear extended speed	199 knots

Model T210M

Engine: Continental TSIO-520-R

*Fuel:
Model T210M (S/N 21061574 through 21062273)
100/130 minimum grade aviation gasoline

Model T210M (S/N 21062274 through 21062953)
100LL/100 minimum grade aviation gasoline

Engine Limits: Takeoff (5 min. at 2700 r.p.m., 36.5 in. Hg. mp. (310 hp.)
For all other operations 2600 r.p.m., 35 in. Hg. mp. (285 hp.)

Propeller and Propeller Limits

1. (a) McCauley D3A34C402/90DFA-10
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 12.4°, high 28.5°
   (b) Cessna spinner 1250419-10
   (c) McCauley hydraulic governor C290D4/T2
   (d) Woodward hydraulic governor G210452

*Airspeed Limits (IAS)
(See NOTE 4 on use of IAS)

1. Model T210M (S/N 21061574 through 21062273)

Never exceed	195 knots
Maximum structural cruising	165 knots
Maneuvering	119 knots
Flaps extended	105 knots
Landing gear operating speed	140 knots
Landing gear extended speed	140 knots

2. Model T210M (S/N 21062274 through 21062953

Never exceed	195 knots
Maximum structural cruising	165 knots
Maneuvering	119 knots
Flaps extended	115 knots
Landing gear operating speed	140 knots
Landing gear extended speed	195 knots

Models 210M/T210M

C.G. Range (Landing Gear Extended)	(+42.5) to (+53.0) at 3800 lb. (+37.0) to (+53.0) at 3000 lb. or less Straight line variation between points given Moment change due to retracting landing gear (+3207 in.-lb.)
Empty Wt. C.G. Range	None
*Maximum Weight	3800 lb.
No. of Seats	6 (2 at +34 to +46, 2 at +61 to +77, 2 at +101)
Maximum Baggage	Reference weight and balance data
Fuel Capacity	90 gal. (89 gal. usable), two 45.0 gal. tanks in wings at +43. See NOTE 1 for data on unusable fuel
Oil Capacity	10 qt. (-12.5), 8 qt. usable

Control Surface Movements

Wing flaps	Up	0°	Down	30° +1°, -2°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator	Up	23° ±1°	Down	17° ±1°
Elevator tab	Up	25° ±1°	Down	10° ±1°
Rudder	Right	24° ±1°	Left	24° ±1°
(measured parallel to 0.0 W.L.)				
Rudder	Right	27° 13' ±1°	Left	27° 13' ±1°
(measured perpendicular to hinge line)				

Serial Nos. Eligible	Models 210M/T210M:	21061574 through 21062273 (1977 Model) 21061042, 21062274 through 21062954 (1978 Model)

XV - Model P210N, Pressurized Centurion, 6 PCLM (Normal Category), Approved August 10, 1977

Engine	Model P210N (S/N P21000001 through P21000760: Continental TSIO-520-P Model P210N (S/N P21000761 and up): Continental TSIO-520-AF
*Fuel	100LL/100 minimum grade aviation gasoline
*Engine Limits	Model P210N (S/N P21000001 through P21000760) Takeoff (5 min.) at 2700 r.p.m., 36.5 in. Hg. mp. (310 hp.) For all other operations 2600 r.p.m., 33.5 in. Hg. mp. (285 hp.) Model P210N (S/N P21000761 and up) Takeoff (5 min.) at 2700 r.p.m., 35.5 in. Hg. mp. (310 hp.) For all other operations, 2600 r.p.m., 34.5 in. Hg. mp. (285 hp.)

XV - Model P210N (cont'd)

Propeller and Propeller Limits

1. (a) McCauley D3A34C402/90DFA-10
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 12.4°, high 28.5°
   Model P210N (S/N P21000001 through P21000760)
   Avoid continuous operation between 1850 and 2150 r.p.m. above 24 in. mp.
   Model P210N (S/N P21000761 and up)
   Avoid continuous operation between 1850 and 2150 r.p.m. above 23 in. mp.
   (b) Cessna spinner 1250419
   (c) McCauley hydraulic governor C290D4/T2

***Airspeed Limits (IAS)** (See NOTE 4 on use of IAS)

1. Model P210N (S/N P21000001 through P21000150)

Never exceed	200 knots
Maximum structural cruising	167 knots
Maneuvering	130 knots
Flaps extended	115 knots
Landing gear operating speed	140 knots
Landing gear extended speed	200 knots

2. Model P210N (S/N P21000151 and up)

Never exceed	200 knots
Maximum structural cruising	167 knots
Maneuvering	130 knots
Flaps extended	115 knots
Landing gear operating speed	165 knots
Landing gear extended speed	200 knots

C.G. Range (Landing Gear Extended)

(+43.9) to (+52.0) at 4000 lb.
(+42.5) to (+52.0) at 3800 lb.
(+37.0) to (+52.0) at 3000 lb. or less
Straight line variation between points given
Moment change due to retracting landing gear
(+3207 in.-lb.) S/N P21000001 through P21000150
(+2907 in.-lb.) S/N P21000151 and up

Empty Wt. C.G. Range

None

***Maximum Weight**

4000 lb. takeoff and flight
3800 lb. landing
4016 lb. ramp, S/N 21000151 and up

No. of Seats

6 (2 at +34 to +46, 2 at +61 to +77, 2 at +101)

Maximum Baggage

Reference weight and balance data

Fuel Capacity

90 gal. (89 gal. usable), S/N P21000001 through P21000760
90 gal. (87 gal. usable), S/N P21000761 and up
two 45.0 gal. tanks in wings at +43
See NOTE 1 for data on unusable fuel.

Oil Capacity

10 qt. (-12.5); 8 qt. usable

Control Surface Movements

Wing flaps	Up	0°	Down	30° +1°, -2°
Ailerons	Up	20° ±2°	Down	15° ±2°
Elevator	Up	23° ±1°	Down	17° ±1°
Elevator tab	Up	25° ±1°	Down	10° ±1°
Rudder	Right	24° ±1°	Left	24° ±1°
(measured parallel to 0.0 W.L.)				
Rudder	Right	27° 13' ±1°	Left	27° 13' ±1°
(measured perpendicular to hinge line)				

XV - Model P210N (cont'd)

Serial Nos. Eligible	Model P210N:	P21000001 through P21000150 (1978 Model) P21000151 through P21000385 (1979 Model) P21000386 through P21000590 (1980 Model) P21000591 through P21000760 (1981 Model) P21000761 through P21000811 (1982 Model) P21000812 through P21000834 (1983 Model)

XVI - Model 210N/T210N, Centurion/Turbo System Centurion, 6 PCLM (Normal Category), approved October 19, 1978

Model 210N

Engine	Continental IO-520-L
*Fuel	100LL/100 minimum grade aviation gasoline
*Engine Limits	Takeoff full throttle (5 min.) at 2850 r.p.m. (300 hp. rating) For all other operations, full throttle 2700 r.p.m. (285 hp. rating)
Propeller and Propeller Limits	1. (a) McCauley D3A34C404/80VA-0 Diameter: not over 80 in., not under 78.5 in. Pitch settings at 30 in. sta.: low 11.0°, high 27.0° (b) Cessna spinner 1250419 (c) McCauley hydraulic governor C290D4/T4
*Airspeed Limits (IAS) (See NOTE 4 on Use of IAS)	1. Model 210N (S/N 21062954 and up) Never exceed 200 knots Maximum structural cruising 165 knots Maneuvering 125 knots Flaps extended 115 knots Landing gear operating speed 165 knots Landing gear extended speed 200 knots
C.G. Range (Landing Gear Extended)	(+42.5) to (+53.0) at 3800 lb. (+37.0) to (+53.0) at 3000 lb. or less Straight line variation between points given Moment change due to retracting landing gear (+2907 in.-lb.)
Empty Wt. C.G. Range	None
*Maximum Weight	3800 lb. 3812 lb. ramp
No. of Seats	6 (2 at +34 to +46, 2 at +61 to +77, 2 at +101)
Maximum Baggage	Reference weight and balance data
Fuel Capacity	90 gal. (89 gal. usable), S/N 21062955 through 21064535 90 gal. (87 gal. usable), S/N 21064536 and up two 45.0 gal. tanks in wings at +43 See NOTE 1 for data on unusable fuel.
Oil Capacity	10 qt. (-12.5), 8 qt. usable

Model 210N (cont'd)

Control Surface Movements	Wing flaps	Up	0°	Down	30° +1°, -2°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator	Up	23° ±1°	Down	17° ±1°
	Elevator tab	Up	25° ±1°	Down	10° ±1°
	Rudder (measured parallel to 0.0 W.L.)	Right	24° ±1°	Left	24° ±1°
	Rudder (measured perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°

Serial Nos. Eligible	Model 210N:	21062955 through 21063640	(1979 Model)
		21063641 through 21064135	(1980 Model)
		21064136 through 21064535	(1981 Model)
		21064536 through 21064772	(1982 Model)
		21064773 through 21064822	(1983 Model)
		21064823 through 21064897	(1984 Model)

Model T210N

Engine: Continental TSIO-520-R

Fuel: 100LL/100 minimum grade aviation gasoline

*Engine Limits: Takeoff (5 min.) at 2700 r.p.m., 36.5 in. Hg. mp. (310 hp. rating)
For all other operations 2600 r.p.m., 35 in. Hg. mp. (285 hp. rating)

Propeller and Propeller Limits:

1. (a) McCauley D3A34C402/90DFA-10
   Diameter: not over 80 in., not under 78.5 in.
   Pitch settings at 30 in. sta.:
   low 12.4°, high 28.5°
   Avoid continuous operation between 1850 and 2150 r.p.m..
   above 24 in. mp.
   (b) Cessna spinner 1250419
   (c) McCauley hydraulic governor C290D4/T2 or Woodward hydraulic governor G210452

*Airspeed Limits (IAS) (See NOTE 4 on Use of IAS)

1. Model T210N (S/N 21062954 and up)

Never exceed	203 knots
Maximum structural cruising	168 knots
Maneuvering	130 knots
Flaps extended	115 knots
Landing gear operating speed	165 knots
Landing gear extended speed	203 knots

C.G. Range (Landing Gear Extended):
(+43.9) to (+52.0) at 4000 lbs.
(+42.5) to (+53.0) at 3800 lbs.
(+37.0) to (+53.0) at 3000 lbs.
Straight line variation between points given
Moment change due to retracting landing gear (+2907 in.-lb.)

Empty Wt. C.G. Range: None

*Maximum Weight:
4000 lb. takeoff and flight
3800 lb. landing
4016 lb. ramp

No. of Seats: 6 (2 at +34 to 46, 2 at +61 to +77, 2 at +101)

Maximum Baggage: Reference weight and balance data

Model T210N (cont'd)

Fuel Capacity	90 gal. (89 gal. usable), S/N 21062955 through 21064535 90 gal. (87 gal. usable), S/N 21064536 and up two 45.0 gal. tanks in wings at +43 See NOTE 1 for data on unusable fuel.				
Oil Capacity	10 qt. (-12.5); 8 qt. usable				
Control Surface Movements	Wing flaps	Up	0°	Down	30° +1°, -2°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator	Up	23° ±1°	Down	17° ±1°
	Elevator tab	Up	25° ±1°	Down	10° ±1°
	Rudder	Right	24° ±1°	Left	24° ±1°
	(measured parallel to 0.0 W.L.)				
	Rudder	Right	27° 13' ±1	Left	17° 13' ±1°
	(measured perpendicular to hinge line)				
Serial Nos. Eligible	Model T210N:	21062955 through 21063640 (1979 Model)			
		21063641 through 21064135 (1980 Model)			
		21064136 through 21064535 (1981 Model)			
		21064536 through 21064772 (1982 Model)			
		21064773 through 21064822 (1983 Model)			
		21064823 through 21064897 (1984 Model)			

XVII - Model P210R, Pressurized Centurion, 6 PCLM (Normal Category), Approved September 24, 1984

Engine	Continental TSIO-520-CE
*Fuel	100LL/100 minimum grade aviation gasoline
*Engine Limits	For all operations 2700 r.p.m., 37 in. Hg. mp. (325 hp.)
Propeller and Propeller Limits	1. (a) McCauley D3A36C410/80VMB-0 Diameter: not over 80 in., not under 78.5 in. Pitch settings at 30 in. sta.: low 14.2°, high 36.5° (b) Cessna spinner 2150150 (c) McCauley hydraulic governor C290D4/T2
*Airspeed Limits (IAS)	Never exceed 200 knots Maximum structural cruising 167 knots Flaps extended 115 knots Maneuvering 130 knots Landing gear operating speed 165 knots Landing gear extended speed 200 knots
C.G. Range (Landing Gear Extended)	(+42.0) to (+52.0) at 4100 lb. (+37.0) to (+52.0) at 3350 lb. or less Straight line variation between points given Moment change due to retracting landing gear (+2907 in.-lb.)
Empty Wt. C.G. Range	None
*Maximum Weight	4100 lb. takeoff and flight 3900 lb. landing 4116 lb. ramp
No. of Seats	6 (2 at +34 to 46, 2 at +61 to +77, 2 at +101)
Maximum Baggage	Reference weight and balance data

XVII - Model P210R (cont'd)

Fuel Capacity	Std.: 90 gal. (87 gal. usable) Two 45.0 gal. tanks in wings at +42.5 Opt.: 120 gal. (115 gal. usable) Two 60.0 gal. tanks in wings at +42.5 See NOTE 1 for data on unusable fuel				
Oil Capacity	10 qt. (-12.5), 8 qt. usable				
Maximum Operating Altitude	25,000 ft.				
Control Surface Movements	Wing flaps	Up	0°	Down	30° +1°, -2°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator	Up	25° ±1°	Down	20° ±1°
	Elevator tab	Up	20° ±1°	Down	15° ±1°
	Rudder (measured parallel to 0.0 W.L.)	Right	24° ±1°	Left	24° ±1°
	Rudder (measured perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°
Serial Nos. Eligible	Model P210R: P21000835 through P21000866 (1985 Model) P21000867 through P21000874 (1986 Model)				

XVIII - Model T210R, Turbo System Centurion, 6 PCLM (Normal Category), Approved December 4, 1984
Model 210R, Centurion, 6 PCLM (Normal Category), Approved December 20, 1984

Model 210R

Engine	Continental IO-520-L	
*Fuel	100LL/100 minimum grade aviation gasoline	
*Engine Limits	Takeoff full throttle (5 min.) at 2850 r.p.m. (300 hp. rating) For all other operations, full throttle 2700 r.p.m. (285 hp. rating)	
Propeller and Propeller Limits	1. (a) McCauley D3A34C404/80VA-0 Diameter: not over 80 in., not under 78.5 in. Pitch settings at 30 in. sta.: low 11.0°, high 27.0° (b) Cessna spinner 1250419 (c) McCauley hydraulic governor C290D4/T4	
*Airspeed Limits (IAS) (See NOTE 4 on use of IAS)	Never exceed	200 knots
	Maximum structural cruising	167 knots
	Maneuvering	125 knots
	Flaps extended	115 knots
	Landing gear operating speed	165 knots
	Landing gear extended speed	200 knots
C.G. Range (Landing Gear Extended)	(+40.33) to (+52.0) at 3850 lb. (+37.0) to (+52.0) at 3350 lb. or less Straight line variation between points given Moment change due to retracting landing gear (+2907 in.-lb.)	
Empty Wt. C.G. Range	None	
*Maximum Weight	3850 lb. 3862 lb. ramp	
No. of Seats	6 (2 at +34 to 46, 2 at +61 to +77, 2 at +101)	

XVIII - Model T210R, 210R (cont'd)

Maximum Baggage	Reference weight and balance data				
Fuel Capacity	Std.: 90 gal. (87 gal. usable) Two 45.0 gal. tanks in wings at +42.5 Opt: 120 gal. (115 gal. usable) Two 60 gal. tanks in wings at +42.5 See NOTE 1 for data on unusable fuel.				
Oil Capacity	10 qt. (-12.5), 8 qt. usable				
Control Surface Movements	Wing flaps	Up	0°	Down	30° +1°, -2°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator	Up	25° ±1°	Down	20° ±1°
	Elevator tab	Up	20° ±1°	Down	15° ±1°
	Rudder (measured parallel to 0.0 W.L.)	Right	24° ±1°	Left	24° ±1°
	Rudder (measured perpendicular to hinge line)	Right	27° 13' ±1°	Left	27° 13' ±1°
Serial Nos. Eligible	Model 210R: 21064898 through 21064949 (1985 Model) 21064950 through 21065009 (1986 Model)				

Model T210R

Engine	Continental TSIO-520-CE
*Fuel	100LL/100 minimum grade aviation gasoline
*Engine Limits	For all operations 2700 r.p.m., 37 in. Hg. mp. (325 hp.)
Propeller and Propeller Limits	1. (a) McCauley D3A36C410/80VMB-0 Diameter: not over 80 in., not under 78.5 in. Pitch settings at 30 in. sta.: low 14.2°, high 36.5° (b) Cessna spinner 2150150 (c) McCauley hydraulic governor C290D4/T2
*Airspeed Limits (IAS)	Never exceed 203 knots Maximum structural cruising 167 knots Maneuvering 130 knots Flaps extended 115 knots Landing gear operating speed 165 knots Landing gear extended speed 200 knots
C.G. Range (Landing Gear Extended)	(+42.0) to (+52.0) at 4100 lb. (+37.0) to (+52.0) at 3350 lb. Straight line variation between points given Moment change due to retracting landing gear (+2907 in.-lb.)
Empty Wt. C.G. Range	None
*Maximum Weight	4100 lb. takeoff and flight 3900 lb. landing 4116 lb. ramp
No. of Seats	6 (2 at +34 to 46, 2 at +61 to +77, 2 at +101)
Maximum Baggage	Reference weight and balance data

Model T210R (cont'd)

Fuel Capacity	Std.: 90 gal. (87 gal. usable) Two 45.0 gal. tanks in wings at +42.5 Opt: 120 gal. (115 gal. usable) Two 60 gal. tanks in wings at +42.5 See NOTE 1 for data on unusable fuel				
Oil Capacity	10 qt. (-12.5), 8 qt. usable				
Control Surface Movements	Wing flaps	Up	0°	Down	30° +1°, -2°
	Ailerons	Up	20° ±2°	Down	15° ±2°
	Elevator	Up	25° ±1°	Down	20° ±1°
	Elevator tab	Up	20° ±1°	Down	15° ±1°
	Rudder	Right	24° ±1°	Left	24° ±1°
	(measured parallel to 0.0 W.L.)				
	Rudder	Right	27° 13' ±1°	Left	27° 13' ±1°
	(measured perpendicular to hinge line)				

Serial Nos. Eligible — Model T210R: 21064898 through 21064949 (1985 Model)
21064950 through 21065009 (1986 Model)

Data Pertinent to All Models

Datum — Fuselage station 0.0 (front face of firewall)

Leveling Means — Baggage compartment floor (except for 210-5(205) and 210-5A(205A)) -
Top of tailcone (except 210K/T210K/P210N and up, screws on left side tailcone)

Certification Basis — Models 210/210A: Part 3 of the Civil Air Regulations effective May 15, 1956, with no amendments.
Models 210B, 210C, 210D, 210E, 210F, T210F, 210G, T210G, 210H, T210H, 210J, T210J, 210K, T210K, 210L, T210L, 210M, T210M, 210N, T210N, 210R, 210-5(205), 210-5A(205A): Part 3 of the Civil Air Regulations effective May 15, 1956, and Paragraph 3.112 as amended October 1, 1959. FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-4 for Models 210M/T210M/210N/210R; Amendments 36-1 through 36-9 for the T210N. In addition, FAR 23.1559 effective March 1, 1978, for the Models 210N/T210N/210R.

Models P210N, P210R: Part 3 of the Civil Air Regulations dated May 15, 1956, Paragraph 3.112 as amended October 1, 1959, and 23.365, 23.571, 23.775, 23.841, 23.843, 23.901, 23.909, 23.1041, 23.1043, 23.1143, 23.1305, 23.1325, 23.1441 and 23.1527 of FAR 23 effective February 1, 1965, as amended to February 14, 1975. FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-6 for P210N; Amendments 36-1 through 36-12 for P210R. Also FAR 23.1559 effective March 1, 1978, for P21000151 and up. Also for P210R, FAR 23.1323 effective September 1, 1977, and FAR 23.1545 effective December 1, 1978.

Model T210R: Part 3 of the Civil Air Regulations dated May 15, 1956, Paragraph 3.112 as amended October 1, 1959, and 23.901, 23.909, 23.1041, 23.1043, 23.1143, 23.1305 of FAR 23 effective February 1, 1965, as amended to February 14, 1975; FAR 23.1323 effective September 1, 1977; FAR 23.1545 effective December 1, 1978; and FAR 23.1559 effective March 1, 1978; FAR 36 dated December 1, 1969, plus Amendments 36-1 through 36-12.

Compliance with ice protection has been demonstrated in accordance with FAR 23.1419, as amended through Amendment 23-14, when ice protection equipment is installed in accordance with the airplane equipment list (Models P210N, T210N, P210R, and T210R only).

Certification basis (cont'd) Application for type certificate dated August 13, 1956.

Type Certificate No. 3A21 issued April 20, 1959, obtained by the manufacturer under delegation option procedures.

Equivalent Safety Items (S/N 21061040 through 21064897 (T210 only), and S/N P21000001 through P21000835)

Airspeed Indicator	CAR 3.757 (See NOTE 4 for effectivity)
Operating Limitations	CAR 3.778(a) (210 S/N 21061040 through 21065009) (T210 S/N 21061040 through 21064897) (P210 S/N P21000001 through P21000834)
Airspeed Indicating System	CAR 3.663 (210N, S/N 21062955 through 21064897) (210R, S/N 21064898 through 21065009)

Production Basis Production Certificate No. 4. Delegation Option Manufacturer No. CE-1 authorized to issue airworthiness certificates under delegation option provisions of Part 21 of the Federal Aviation Regulations.

Equipment The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. This equipment must include a current Airplane Flight Manual effective S/N 21062955 and up and P21000151 and up. In addition, the following item of equipment is required:

1. Stall warning indicator, Cessna Dwg. 0511062-4: S/N 21057001 through 21058818
   S/N T210-0001 through T210-0197
   Cessna Dwg. S-1672-1: S/N 21058819 and up
   S/N T210-0198 through T210-0454
   S/N P21000001 and up

NOTE 1. Current weight and balance report including list of equipment included in certificated empty weight, and loading instructions when necessary must be provided for each aircraft at the time of original certification. The certificated empty weight and corresponding center of gravity location must include unusable fuel of 60 lb. at (+46) on Models 210 and 210A, 9 lb. at (+46) on the 210B, 210C, 210D, 210E, 210-5(205) 210-5A(205A); 12 lb. at (+46) on the 210F, T210F; and 6 lb. at (+23) on the 210G, T210G, 210H, T210H, 210J, T210J, 210K, T210K, 210L, T210L, 210M, T210M, 210N, T210N, P210N through S/N's 21064535 and P21000760; and 18 lb. at (+38) on S/N's 21064536 and up, and P21000761 and up; and undrainable oil of 0 lb. at (-19) through S/N 21061039 and full oil of 18.8 lb. at (-12.5) S/N 21061040 and up, and S/N P21000001 and up.

NOTE 2. The following placards must be displayed in locations as indicated:

A. Applicable to Models 210/210A

(1) In full view of the pilot:

(i) "This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers, including spins, approved. Maximum maneuvering speed - 130 m.p.h. - CAS. Maximum design weight 2900 lb. Maximum flight maneuvering load factors - Flaps up +3.8, -1.52; Flaps down +3.5. Maximum gear extension speed 160 m.p.h. - CAS. Maximum flap extension speeds 10° flaps - 160 m.p.h. - CAS; 10°-40° flaps - 110 m.p.h. - CAS.

Before takeoff	Before landing
1. Set tabs	1. Gear down
2. Flaps 0°-20°	2. Flaps down
3. Check induction air-cold	3. Check induction air-cold
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Check cowl flaps open	6. Check cowl flaps closed
7. Check fuel selector on fullest tank	7. Check fuel selector on fullest tank"

NOTE 2. (cont'd) or

(i) "This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers, including spins, approved. Maximum maneuvering speed - 130 mph - CAS. Maximum design weight 2900 lb. Maximum flight maneuver load factors - Flaps up +3.8, -1.52; Flaps down +3.5. Maximum gear extension speed 160 mph - CAS. Maximum flap extension speeds 10° flaps - 160mph - CAS; 10° - 40° flaps - 110 mph - CAS.

Before takeoff	Before landing
1. Set tabs	1. Gear down
2. Fuel selector full tank	2. Fuel selector full tank
3. Cowl flaps open	3. Cowl flaps closed
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Flaps 0° -20°	6. Flaps down"

(2) On the control lock: "Control lock - remove before starting engine."

(3) On the upper pack cover: "To extend gear manually, place gear handle in full down position, pull emergency handle and pump vertically."

(4) On fuel selector valve plate: "Both off. Left tank - 27.5 gal. Right tank 27.5 gal. Use full rich mixture to switch tanks. Take off and land on fullest tank."

(5) On the baggage door: "Maximum baggage 120 lb. For additional loading instructions see weight and balance data."

(6) On the fuel tank filler cap: "Tank capacity 32.5 U.S. gallons, 100/130."

(7) On the instrument panel directly below the fuel gauge indicators: "Avoid landing approaches in red arc and over 30 second slips under 1/2 tank. (Reference Owner's Manual)."

(8) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

B. Applicable to Models 210B/210C

(1) In full view of the pilot:
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved. Maximum maneuvering speed - 132 m.p.h. - CAS. Maximum design weight 3000 lb. Maximum flight maneuvering load factors - Flaps up +3.8, -1.52; Flaps down +3.5. Maximum gear extension speed 160 m.p.h. - CAS; Maximum flap extension speeds 10° flaps - 160 m.p.h. - CAS; 10°-40° flaps - 110 m.p.h. - CAS.

Before Takeoff	Before Landing
1. Set tabs	1. Gear down
2. Fuel selector	2. Fuel selector full tank
3. Cowl flaps open	3. Cowl flaps closed
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Flaps 0°-20°	6. Flaps down."

(2) On the control lock: "Control lock - remove before starting engine."

(3) On the upper pack cover: "To extend gear manually, place gear handle in full down position, pull emergency handle and pump vertically."

(4) On fuel selector valve plate: "Both off. Left tank - 31.7 gal. Right tank - 31.7 gal. Use full rich mixture to switch tanks. Take off and land on fullest tank."

(5) On the baggage door: "Maximum baggage 120 lb. For additional loading instructions see weight and balance data."

(6) On the fuel tank filler cap: "Tank capacity 32.5 U.S. gallons, 100/130."

(7) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

C. Applicable to Model 210-5(205) and 210-5A(205A)

(1) In full view of the pilot:
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved. Maximum maneuvering speed - 138 m.p.h. - CAS. Maximum design weight 3300 lb. Maximum flight maneuvering load factors - Flaps up +3.8, -1.52; Flaps down +3.0; altitude load in stall recovery 200 ft.; Flap extension speed - 110 m.p.h. - CAS."

(2) On the control lock: "Control lock - remove before starting engine."

(3) On fuel selector valve plate: "Both off. Left tank - 31.7 gal. Right tank - 31.7 gal. Use full rich mixture to switch tanks. Take off and land on fullest tank."

(4) On the fuel tank filler cap: "Tank capacity 32.5 U.S. gallons, 100/130."

(5) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189013 FOR EXPANDED INSTRUCTIONS."

D. Applicable to Models 210D/210E

(1) In full view of the pilot:
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved. Maximum maneuvering speed - 134 m.p.h. - CAS. Maximum design weight 3100 lb. Maximum flight maneuvering load factors - Flaps up +3.8, -1.52; Flaps down +3.5. Maximum gear extension speed 160 m.p.h. - CAS; Maximum flap extension speeds 10°, flaps - 160 m.p.h. - CAS; 10°-40° flaps - 110 m.p.h. - CAS; altitude loss in stall recovery 130 ft.

Before Takeoff	Before Landing
1. Set tabs	1. Gear down
2. Fuel selector full tank	2. Fuel selector full tank
3. Cowl flaps open	3. Cowl flaps closed
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Flaps 0°-20°	6. Flaps down."

(2) On the control lock: "Control lock - remove before starting engine."

(3) On the upper pack cover: "To extend gear manually, place gear handle in full down position, pull emergency handle out and pump vertically."

NOTE 2.

(4) On fuel selector valve plate: "Both off. Left tank - 31.7 gal. Right tank - 31.7 gal. Use full rich mixture to switch tanks. Take off and land on fullest tank."

(5) On baggage door: "Maximum weight each child's seat, 140 lb. Refer to weight and balance data for baggage/cargo loading."

(6) On the fuel tank filler cap: "Tank capacity 32.5 U.S. gallons, 100/130."

(7) Above selector valve: "Turn pump on 'HI' when switching from a dry tank to a tank containing fuel."

(8) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2 SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

E. Applicable to Models 210F/T210F

(1) In full view of the pilot:
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers including spins approved. Maximum maneuvering speed - 131.0 m.p.h. - CAS. Maximum design weight 3300 lb. Maximum flight maneuvering load factors - Flaps up +3.8, -1.52; Flaps down +3.0. Maximum gear extension speed 160 m.p.h. - CAS; Maximum flap extension speeds 10° flaps - 160 m.p.h. - CAS; 10°-40° flaps - 110 m.p.h. - CAS; Altitude loss in stall recovery 240 feet.

Before Takeoff	Before Landing
1. Set tabs	1. Gear down
2. Fuel selector full tank	2. Fuel selector full tank
3. Cowl flaps open	3. Cowl flaps closed
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Flaps 0°-20°	6. Flaps down."

(2) On control lock: "Control lock - remove before starting engine."

(3) On the power pack cover: "To extend gear manually, place gear handle in full down position, pull emergency handle and pump vertically."

(4) On fuel selector valve plate: "Both off. Left tank - 31.5 gal. Right tank - 31.5 gal. Use full rich mixture to switch tanks. Take off and land on fullest tank."

(5) On baggage door: "Maximum weight each child's seat, 140 lb. Refer to weight and balance data for baggage/cargo loading."

(6) On the fuel tank filler cap: "Tank capacity 32.5 U.S. gallons, 100/130."

(7) Above selector valve: "Turn pump on 'HI' when switching from a dry tank to a tank containing fuel."

NOTE 2. (cont'd) (8) Near the engine power instruments: (T210F only)

*Altitude in Feet Sea Level to:	Manifold Pressure in. Hg.	Fuel Flow Gal/Hr
19,000	32.5	28
20,000	31.5	26
22,000	29.5	24
24,000	27.5	22
26,000	25.5	20
28,000	23.5	19
30,000	21.5	18

75% power climb - 2500 r.p.m. - 27.5 manifold pressure - 20 g.p.h."

(9) On instrument panel above fuel boost pump switch:
"Use 'HI' for emergency only ↓."

(10) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

F. Applicable to Models 210G, T210G, 210H, T210H, 210J, T210J

(1) In full view of the pilot:
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers, including spins, approved. Maximum maneuvering speed - 135 m.p.h. - (CAS). Maximum design weight 3400 lb. Maximum flight maneuvering load factors - Flaps up +3.8, -1.52; Flaps down +3.0. Maximum gear extension speed - 160 m.p.h. - (CAS); Maximum flap extension speeds 10° flaps - 160 m.p.h. - (CAS); 10°-30° flaps - 110 m.p.h. - (CAS); Altitude loss in stall recovery 250 feet.

Before Takeoff	Before Landing
1. Set tabs	1. Gear down
2. Fuel selector full tank	2. Fuel selector full tank
3. Cowl flaps open	3. Cowl flaps closed
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Flaps 0°-20°	6. Flaps down."

(2) On control lock: "Control lock - remove before starting engine"

(3) On the power pack cover: "To extend gear manually, place gear handle in full down position, pull emergency handle out and pump vertically."

(4) On fuel selector valve plate: "Both off. Left-44.5 gal. Right-44.5 gal. Use full rich mixture to switch tanks. Take off and land on fullest tank."

(5) On baggage door: "Maximum weight each child's seat 140 lb. Refer to weight and balance data for baggage/cargo loading."

(6) Aft of the filler cap on the adapter plate: "Tank capacity 45.0 U.S. gallons. Service this airplane with 100/130 minimum grade aviation gasoline."

NOTE 2. (cont'd)

(7) Above selector valve: "Turn pump on 'HI' when switching from a dry tank to a tank containing fuel."

(8) Near the engine power instruments: (T210G/T210H/T210J)

*Altitude in Feet Sea Level to:	Manifold Pressure in. Hg.	Fuel Flow Gal/Hr
19,000	32.5	28
20,000	31.5	26
22,000	29.5	24
24,000	27.5	22
26,000	25.5	20
28,000	23.5	19
30,000	21.5	18

75% power climb - 2500 r.p.m. - 27.5 manifold pressure - 20 g.p.h."

(9) On instrument panel above fuel boost pump switch:
"Use 'HI' for emergency only ↓."

(10) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

G. Applicable to Model 210K/T210K (S/N 21059200 through 21059351)

(1) In full view of the pilot:
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals. No acrobatic maneuvers, including spins, approved. Maximum maneuvering speed - 135 m.p.h.(CAS). Maximum design weight 3800 lb. Maximum flight maneuvering load factors - Flaps up +3.8, -1.52; Flaps down +2.0. Maximum gear extension speed - 160 m.p.h.- (CAS); Maximum flap extension speed 10° flaps - 160 m.p.h. - (CAS); 10°-30° flaps - 110 m.p.h. - (CAS); Altitude loss in stall recovery 300 feet.

Checklist Placard

Before Takeoff	Before Landing
1. Adjust trim controls	1. Fuel selector full tank
2. Fuel selector full tank	2. Gear down
3. Cowl flaps open	3. Cowl flaps closed
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Flaps 0°-10°	6. Flaps down."

(2) On control lock: "Control lock - remove before starting engine."

(3) On the power pack cover: "To extend gear manually, place gear handle in full down position, pull emergency handle and pump vertically."

(4) On fuel selector valve plate: "Both off. Left on-44.5 gal. Right on -44.5 gal. Take off and land on fuller tank."

(5) On baggage door: "Maximum baggage 120 lb. Refer to weight and balance data for baggage/cargo loading."

(6) Aft of the filler cap on the adapter plate: "Tank capacity 45.0 U.S. gallons. Service this airplane with 100/130 minimum grade aviation gasoline."

NOTE 2. (cont'd) G. (7) Above selector valve: "When switching from a dry tank turn pump on 'HI' momentarily."

(8) Above fuel flow and manifold pressure indicator: (Model 210K)

"Fuel flow at Full Throttle

	2700 r.p.m.	2850 r.p.m.
Sea Level	23 gal/hr	24 gal/hr
4000 ft.	21 gal/hr	22 gal/hr
8000 ft.	19 gal/hr	20 gal/hr"

(9) Near the engine power instruments: (Model T210K)

*Altitude in Feet Sea Level to:	Manifold Pressure in. Hg.	Fuel Flow Gal/Hr
19,000	32.5	28
20,000	31.5	26
22,000	29.5	24
24,000	27.5	22
26,000	25.5	20
28,000	23.5	19
30,000	21.5	18

75% power climb - 2500 r.p.m. - 27.5 manifold pressure - 20 g.p.h."

(10) On flap control indicator:
"a. 0°-10° - T.O. (Takeoff range with blue color code and 160 m.p.h. callout; also mechanical detent at 10°)"
"b. 10°-20° - Full (Indices at these positions with white color code and 110 m.p.h. callout; also, mechanical detent at 20°."

(11) In plain view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

H. Applicable to Model 210K/T210K (S/N 21059352 through 21059502)
Applicable to Model 210L/T210L (S/N 21059503 through 21061039)
(1) In full view of the pilot:
(a) Applicable to Model 210K/T210K (S/N 21059352 through 21059502)
Applicable to Model 210L/T210L (S/N 21059503 through 21061039)
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

MAXIMUMS

Maneuvering speed	135 m.p.h. CAS (117 knots)
Gear extension speed	160 m.p.h. CAS (139 knots)
Gross weight	3800 lbs.
Flight load factor	Flaps up +3.8, -1.52
	Flaps down +2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery - 300 ft. Known icing conditions to be avoided. This airplane is certificated for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR" (As applicable)

NOTE 2. (cont'd) H. (1) (b) Applicable to Model 210L/T210L (S/N 21061040 and up)
"This airplane must be operated as a normal category airplane in accordance with the operating limitations as stated in the form of placards, markings, and manuals.

MAXIMUMS	
Maneuvering speed (IAS)	119 knots
Gear extension speed (IAS)	140 knots
Gross weight	3800 lbs
Flight load factor	Flaps up +3.8, -1.52 Flaps down +2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery - 300 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
DAY - NIGHT - VFR - IFR" (As applicable)

Checklist Placard (Model 210K/T210K)(S/N 21059352 through 21059502)

"Checklist Placard

Before Takeoff	Before Landing
1. Adjust trim controls	1. Fuel selector full tank
2. Fuel selector full tank	2. Gear down
3. Cowl flaps open	3. Cowl flaps closed
4. Mixture rich	4. Mixture rich
5. Propeller full in	5. Propeller full in
6. Flaps 0°-10°	6. Flaps down."

Checklist (Model 210L/T210L)(S/N 21059503 through 21060539)
(Stowed - not required for flight)

"Cessna 210L & T210L or Centurion & Centurion II (as applicable)
Checklist

Before Takeoff	Before Landing
1. Controls - free and correct	1. Fuel selector - fullest tank
2. Elevator and rudder trim - set	2. Landing gear - DN 160 m.p.h. max
3. Fuel seelctor - fullest tank	3. Mixture - rich
4. Cowl flaps - open	4. Propeller - high r.p.m.
5. Propeller - high r.p.m.	5. Airspeed - 100 m.p.h. flaps up
6. Mixture - as required	90 m.p.h. flaps down"
7. Flaps - 0° to 10°	
8. Instruments - check and set	
9. Seats and belts - secure	

(2) On control lock: "Control lock - remove before starting engine."

(3) On the power pack cover: (210K/T210K) (S/N 21059200 through 21059502)
To extend gear manually, place gear handle in full down position, pull emergency handle out and pump vertically."
On hand pump cover: (210L/T210L) (S/N 21059503 and up)
"Manual gear extension: 1. select gear down; 2. pull handle forward; 3. pump vertically."

(4) On fuel selector valve plate: "Off. Left on -44.5 gal.
Right on -44.5 gal. Takeoff and land on fuller tank."

(5) On baggage door: "Maximum baggage 120 lb. Refer to weight and balance data for baggage/cargo loading."

NOTE 2. (cont'd) H. (6) Aft of the filler cap on the adapter plate: "Service this airplane with 100/130 minimum aviation grade gasoline. Total capacity 45.0 gal."

(7) Above fuel selector valve: "When switching from dry tank, turn pump on 'HI' momentarily" (210L/T210L) (S/N 21059503 through 21060089)

Above fuel selector valve: "When switching from dry tank, turn Auxiliary fuel pump 'ON' momentarily" (210L/T210L) (S/N 21060090 and up).

(8) In front of pilot on lower instrument panel knee pad: "Alternate static air ↓ on."

(9) Above ammeter: "Do not turn off alternator in flight except in emergency." (Model 210K/T210K) (S/N 21059200 through 21059502)

(10) Adjacent to overvoltage light: "High voltage" (Models 210L/T210L) (S/N 21059503 and up)

(11) Above left fuel gauge: "Do not turn off alternator in flight except in emergency." (Models 210L/T210L) (S/N 21059503 through 21059719)

(12) Above fuel flow and manifold pressure indicator: (Model 210K/210L)

"Fuel flow at full throttle

	2700 r.p.m.	2850 r.p.m.
S.L.	138 lbs/hr	144 lbs/hr
400 ft.	126 lbs/hr	132 lbs/hr
8000 ft.	114 lbs/hr	120 lbs/hr"

(13) Near the engine power instruments (Models T210K/T210L)

"Max. allowable manifold press. & climb fuel flow

Alt.-ft/1000	SL-19	20	22	24	26	28	30
M.P.-In. Hg.	32.5	31.5	29.5	27.5	25.5	23.5	21.5
Fluel flow-lbs/hr	168	156	144	132	120	114	108

75% power climb - 2500 r.p.m., 27.5 in. M.P., 120 lbs/hr"

(14) On lower surface of right hand wing just outboard of fuselage: "Oxygen filler door." (All models with oxygen)

(15) On flap control indicator: (210K/T210K) (S/N 21059352 through 21059502)
"a. 0°-10° (Takeoff range with blue color code and 160 m.p.h. callout; also mechanical detent at 10°)"

b. 10°-20° Full (Indices at these positions with white color code and 110 m.p.h. callout; also mechanical detent at 20°)"

On flap control indicator: (210L/T210L) (S/N 21059503 through 21061039)
"a. 0°-10° (Takeoff range with blue color code and 160 m.p.h. callout; also mechanical detent at 10°)"

b. 10°-20° Full (Indices at these positions with white color code 120 m.p.h. callout; also mechanical detent at 20°)"

NOTE 2. (cont'd) H. (15) On flap control indicator: (210L/T210L) (S/N 21051040 and up)

"a. 0°-10° (Takeoff range with blue color code and 140 knots callout; also mechanical detent at 10°)"

b. 10°-20° - Full (Indices at these positions with white color code and 105 knots callout; also mechanical detent at 20°)"

(16) On inside nose wheel doors:
"WARNING - before working in wheel well area pull hydraulic pump circuit breaker off." (Model 210L/T210L) (S/N 21059503 and up)

(17) In full view of the pilot:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

J. Applicable to Model 210M/T210M, 210N/T210N, 210R/T210R

(1) In full view of the pilot:

(a) Applicable to Model 210M/T210M (S/N 21061574 through 21062273)
"This airplane must be operated as a normal category airplane in compliance with operating limitations as stated in the form of placards, markings and manuals.

MAXIMUMS	
Maneuvering speed (IAS)	119 knots
Gear extension speed (IAS)	140 knots
Gross weight	3800 lbs.
Flight load factor	Flaps up +3.8, -1.52
	Flaps down +2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery - 300 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR" (As applicable)

(b) Applicable to Model 210M/T210M (S/N 21061042, 21062274 through 21062954
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

MAXIMUMS		
Maneuvering speed (IAS)		119 knots
Gross weight		3800 lbs.
Flight load factor	Flaps up	+3.8, -1.52
	Flaps down	+2.0

No acrobatic maneuvers, including spins, approved. Altitude loss in a stall recovery 300 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
DAY - NIGHT - VFR - IFR" (As applicable)

(c) Applicable to Models 210N/T210N (S/N 21062955 through 21064535)
"The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, approved.
Flight into known icing conditions prohibited.

NOTE 2. (cont'd) J. (1) (c) This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR" (As applicable)

(2) On control lock through 21064535: "Control Lock - Remove Before Starting Engine."

(3) On the hand pump cover:
(S/N 21061574 through 21062273)
"Manual gear extension: 1. Select gear down; 2. pull handle forward; 3. pump vertically."

(S/N 21061042, 21062274 through 21064535)
"Manual gear extension: 1. Select gear down; 2. pull handle forward; 3. pump vertically.

CAUTION: Do not pump with gear up selected"

(4) On fuel selector valve plate through 21064535:
"Off. Left on - 44.5 gal. Right on - 44.5 gal.
Takeoff and land on fuller tank."

(5) 210M/T210M (S/N 21061042, 21061574 through 21062954)
On baggage door: "Maximum baggage 120 lb. Refer to weight and balance data for baggage/cargo loading."

210N/T210N (S/N 21062955 through 21064535)
On baggage door: "Maximum baggage 200 lbs. total. Refer to weight and balance data for baggage/cargo loading."

(6) Near the wing filler caps:
(S/N 21061574 through 21062273)
"Service this airplane with 100/130 minimum aviation grade gasoline. Total capacity 45.0 gal."

(S/N 21061042, 21062274 through 21064535)
"Service this airplane with 100LL/100 minimum aviation grade gasoline. Total capacity 45.0 gal."

(7) Near fuel selector valve through 21064535:
"When switching from dry tank, turn auxiliary fuel pump on momentarily."

(8) In front of pilot on lower instrument panel:
(S/N 21061574 through 21062273)
"Alternate static air ↓ pull on."

(S/N 21061042, 21062274 through 21064535)
"Alternate static air pull on."

(9) 210M/T210M (S/N 21061042 through 21062954)
Adjacent to overvoltage light: "High Voltage."

210N/T210N (S/N 21062955 through 21064535)
Adjacent to low voltage light: "Low Voltage"

(10) Near the engine power instruments (Model 210M, S/N 21061574 through 21062954):
"Fuel Flow at Full Throttle

	2700 r.p.m.	2850 r.p.m.
S.L.	138 lbs/hr	144 lbs/hr
400 ft.	126 lbs/hr	132 lbs/hr
8000 ft.	114 lbs/hr	120 lbs/hr"

"Max. power setting
Takeoff (5 min. only) 2850 r.p.m.
Max. continuous power 2700 r.p.m."

NOTE 2. (cont'd) J. (10)

Near the engine power instruments (Model 210N, S/N 21062955 through 21064535:
"Min. Fuel Flows at Full Throttle

	2700 r.p.m.	2850 r.p.m.
S.L.	138 lbs/hr	144 lbs/hr
4000 ft.	126 lbs/hr	132 lbs/hr
8000 ft.	114 lbs/hr	120 lbs/hr
12000 ft.	102 lbs/hr	108 lbs/hr"

(11) Near the engine power instruments (T210M):
(S/N 21061574 through 21062273)

"Maximum power setting & fuel flow
T.O. (5 min. only): 2700 r.p.m. Normal climb: 2500 r.p.m.
36.5 in. mp., 186 lbs/hr 30.0 in. mp., 126 lbs/hr

Max. continuous power: 2600 r.p.m.

Alt.-ft/1000	SL-17	18	20	22	24	26	28	30
M.P.-In. Hg.	35	34	32	30	28	26	24	22
Fluel flow-lbs/hr	162	156	144	132	120	108	102	96"

"Avoid continuous operation between 1850 and 2150 r.p.m. above 24 in. M.P."

(S/N 21061042, 21062274 through 21062953)
"Maximum power setting & fuel flow
T.O. (5 min. only): 2700 r.p.m. Normal climb: 2500 r.p.m.
36.5 in. mp., 186 lbs/hr 30.0 in. mp., 120 lbs/hr
Max. continuous power: 2600 r.p.m.

Alt.-ft/1000	SL-17	18	20	22	24	26	28	30
M.P.-In. Hg.	35	34	32	30	28	26	24	22
Fluel flow-lbs/hr	162	156	144	132	120	108	102	96"

"Avoid continuous operation between 1850 and 2150 r.p.m. above 24 in. M.P."

Near the engine power instruments (T210N, S/N 21062955 through 21064535):
"Minimum Fuel Flows
T.O.: 2700 r.p.m.
36.5 in. mp., 186 lbs/hr
Maximum continuous power: 2600 r.p.m.

Alt.-ft/1000	SL-17	18	20	22	24	26	28	30
M.P.-In. Hg.	35	34	32	30	28	26	24	22
Fluel flow-lbs/hr	162	156	144	132	129	108	102	96"

"Avoid continuous operation between 1850 and 2150 r.p.m. above 24 in. M.P."

(12) On lower surface of right hand wing just outboard of fuselage through 21064535:
"Oxygen filler door." (All models with oxygen.)

(13) On flap indicator:
(S/N 21061574 through 21062273)

a. "0° - 10° - (Partial flap range with blue color code and 140 knots callout; also, mechanical detent at 10°)"
b. "10°- 20° - Full - (Indices at these positions with white color code and 105 knots callout; also, mechanical detent at 20°)"

NOTE 2. (cont'd) J. (13) (S/N 21061042, 21062274 through 21063640)

a. "0° - 10° - (Partial flap range with blue color code and 150 knots callout; also, mechanical detent at 10°)"
b. "10°- 20° - Full - (Indices at these positions with white color code and 115 knots callout; also, mechanical detent at 20°)"

(S/N 21063641 through 21064535)

a. "0° - 10° - (Partial flap range with dark blue color code and 160 knot callout; also, mechanical detent at 10°)"
b. "10°- 20° - (Indices at these positions with light blue color code and 130 knot callout; also, mechanical detent at 10°)"
c. "20°- 30° - (Indices at these positions with white color code and 115 knot callout)"

(14) On inside nose wheel doors, strut doors and main wheel doors through 21062954 and on inside of nose wheel doors S/N 21064535: "Warning - Before working in the wheel well area pull hydraulic pump circuit breaker off."

(15) Applicable to the Model 210M: (S/N 21062274 through 21062954)
Near the gear selector handle:
"Maximum speed IAS
Gear oper. 140 knots
Gear down 199 knots"

(16) Applicable to the Model T210M: (S/N 21061042, 21062274 through 21062953)
Near the gear selector handle:
"Maximum speed IAS
Gear oper. 140 knots
Gear down 195 knots"

(17) Applicable to the Model 210N: (S/N 21062955 through 21064535)
Near the gear selector handle:
"Maximum speed IAS
Gear oper. 165 knots
Gear down 200 knots"

(18) Applicable to the Model T210N: (S/N 21062955 through 21064535)
Near the gear selector handle:
"Maximum speed IAS
Gear oper. 165 knots
Gear down 203 knots"

(19) Near the airspeed indicator

(a) Model 210N (S/N 21062955 through 21064535)
"Maneuver Speed 125 KIAS"

(b) Model T210N (S/N 21062955 through 21064535)
"Maneuver Speed 130 KIAS"

(20) Near the fuel cap
Models 210N/T210N (S/N 21062955 through 21063640)
"For 32 gal. fuel load fill to bottom of filler neck extension."

Models 210N/T210N (S/N 21063641 through 21064535)
"Capacity 33.5 gallons to bottom of filler neck extension."

NOTE 2. (cont'd) J. (21) Near the oil filler
Models 210N/T210N (S/N 21062955 through 21064135)
"Oil 10 qts."

(22) On the nose gear strut
Models 210N/T210N (S/N 21062955 through 21064135)
"WARNING
Release air and fluid pressure before removing any part of this assembly."

(23) In full view of the pilot:
(a) Models 210M/T210M (S/N 21061574 through 21062954)
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

(b) Model 210N (S/N 21062955 through 21063640)
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2 SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE P.O.H. FOR EXPANDED INSTRUCTIONS."

(c) Model T210N (S/N 21062955 through 21064535)
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON, ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE P.O.H. FOR EXPANDED INSTRUCTIONS."

(24) Effective S/N 21064536 and up:
"All placards required in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be installed in the appropriate locations."

K. Applicable to Model P210N and P210R
(1) In full view of the pilot:
Model P210N (S/N P21000001 through P21000150)
"This airplane must be operated as a normal category airplane in compliance with the operating limitations as stated in the form of placards, markings and manuals.

MAXIMUMS		
Operating altitude		23,000 ft.
Maneuvering speed (IAS)		130 knots
Gross weight	Takeoff	4000 lbs.
	Landing	3800 lbs.
Flight load factor	Flaps up	+3.8, -1.52
	Flaps down	+2.0

No acrobatic maneuvers, including spins, approved. Landing with cabin pressurized is prohibited. Altitude loss in a stall recovery - 300 ft. Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate:
DAY - NIGHT - VFR - IFR" (As applicable)

NOTE 2. (cont'd) K. (1) Model P210N (S/N P21000151 and up)
"The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, apaproved.
Landing with cabin pressurized is prohibited.
Flight into known icing conditions prohibited.

This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR" (As applicable)

(2) On control lock through P21000760: "Control Lock - Remove Before Starting Engine."

(3) On the hand pump cover through P21000760:
"Manual gear extension: 1. Select gear down; 2. pull handle forward;
3. pump vertically. CAUTION: Do Not Pump With Gear Up Selected."

(4) On fuel selector valve plate through P21000760: "Off. Left on - 44.5 gal., Right on - 44.5 gal., Takeoff and land on fuller tank"

(5) On baggage door through P21000760:
"Maximum baggage 200 lbs. total. Raised area aft of baggage door 80 lbs. maximum.
Refer to weight and balance data for baggage cargo loading."

(6) Near the wing filler caps through P21000760: "Service this airplane with 100LL/100 minimum aviation grade gasoline. Total capacity 45.0 gal."

(7) Near fuel selector valve through P21000760: "When switching from dry tank, turn auxiliary fuel pump on momentarily."

(8) P210N (S/N P21000001 through P21000150)
Adjacent to over voltage light: "HIGH VOLTAGE"

P210N (S/N P21000151 through P21000760)
Adjacent to low voltage light: "LOW VOLTAGE"

(9) Near the engine power instruments through P21000760:
"Minimum Fuel Flows

TAKEOFF		MAX. CONTINUOUS POWER: 2600 RPM						
2700 R.P.M.	ALT-FT/1000	SL-17	18	19	20	21	22	23
36.5 In.M.P	M.P. IN. HG.	35.5	34.5	33.5	32.5	31.5	30.5	29.5
180 LBS/HR	Fuel Flow - lbs/hr	162	156	150	144	138	132	126"

(10) On flap indicator:
P210N (S/N P21000001 through P21000385)
a. "0° - 10° - (Partial flap range with dark blue color code and 150 knots callout; also, mechanical detent at 10°)"
b. "10°- 20° - Full - (Indices at these positions with white color code and 115 knot callout; also, mechanical detent at 20°)"

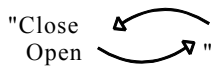
P210N (S/N P21000386 through P21000760)
a. "0° - 10° - (Partial flap range with dark blue color code and 160 knot callout; also, mechanical detent at 10°)"
b. "10°- 20° - Full - (Indices at these positions with light blue color code and 130 knot callout; also, mechanical detent at 20°)"
c. "20°- 30° - (Indices at these positions with white color code and 115 knot callout)" (Full)

NOTE 2. (cont'd) K. (11) On inside nose wheel doors, strut doors and main wheel doors:
"Warning - Before working in wheel well area pull hydraulic pump circuit breaker off."

(12) Near the gear selector handle:
P210N (S/N P21000001 through P21000150)
"Maximum speed IAS
Gear oper. 140 knots
Gear down 200 knots"

P210N (S/N P21000151 through P21000760)
"Maximum speed IAS
Gear oper. 165 knots
Gear down 200 knots"

(13) Near the pilot's outside door handle through P21000760:



(14) Near the emergency button to unlock the pilot's cabin door from the outside through P21000760:
"Emergency
Push to unlock"

(15) Near the secondary lock for the inside pilot's door handle through P21000760:
"Door Handle Safety Lock
Push Flush to Lock
Pull To Unlock"

(16) Near the pilot's inside door handle through P21000760:
"Close
Open ⟷ Lock"

(17) Near the right exit handle through P21000760:
"Open ⟷ Close ⟷ Latch
Push Flush
to Lock
Close and Lock for Flight"

(18) Near the airspeed indicator:
P210 (S/N P21000151 through P21000760)
"Maneuver Speed - 130 KIAS"

(19) Near the oil filler:
P210N (S/N P21000151 through P21000760)
"Oil 10 qts"

(20) Near the fuel cap:
P210N (S/N P21000151 through P21000760)
"For 32 gal. fuel load fill to bottom of filler neck extension."

(21) On emergency exit through P21000760:
"Emergency Exit - To Open
1. Lift handle (Do not pull inward)
2. Rotate counter clockwise to 'OPEN' position
3. Push door outward"

NOTE 2. (cont'd) K. (22) On the main cabin door through P21000760:
"Door Handle Safety Lock
Push Flush To Lock
Pull to Unlock"

And

"To Open Door
1. Unlock safety lock (pull out)
2. Rotate handle to 'OPEN' position
3. Push door outward"

(23) In full view of the pilot:
S/N P21000001 through P21000150
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE PROCEDURE CARD D1189-13 FOR EXPANDED INSTRUCTIONS."

S/N P21000151 through P21000760:
"MAJOR FUEL FLOW FLUCTUATIONS/POWER SURGES
1. AUX FUEL PUMP ON ADJUST MIXTURE
2. SELECT OPPOSITE TANK
3. WHEN FUEL FLOW STEADY, RESUME NORMAL OPERATIONS
SEE P.O.H. FOR EXPANDED INSTRUCTIONS."

(24) When equipped with optional EGT gauge: - On the left forward side panel near instrument panel (S/N P21000001 through P21000150):

"EGT LIMITATION
USE OF EGT GAUGE IS PROHIBITED
AT ALL R.P.M. SETTINGS ABOVE 2500
R.P.M. AT ALL ALTITUDES"

(25) When equipped with optional EGT gauge: - On the left side panel near instrument panel (S/N P21000001 through P21000150):

"EGT LIMITATIONS
USE OF EGT GAUGE IS PROHIBITED AT ALL POWER SETTINGS
ABOVE 80% AT ALL ALTITUDES; OR ABOVE THE FOLLOWING
POWERS AT THE LISTED ALTITUDES WHEN OAT IS ABOVE STANDARD.
75% AT 17,000 FEET OR HIGHER
70% AT 20,000 FEET OR HIGHER
65% AT 22,000 FEET OR HIGHER
CONTINUOUS OPERATION LEANER THAN SHOWN IN THE TABLE IS PROHIBITED."

EXHAUST GAS TEMPERATURE (°F RICH OF PEAK)

POWER	2500 R.P.M.	2400 R.P.M.	2300 R.P.M.	2200 R.P.M.
76 to 80%	100%	75%	75%	50%
71 to 75%	75°	75°	50°	50°
66 to 70%	75°	50°	50°	25°
61 to 65%	50°	50°	25°	25°
56 to 60%	50°	25°	25°	Peak EGT
51 to 55%	25°	25°	Peak EGT	Peak EGT
46 to 50%	25°	Peak EGT	Peak EGT	Peak EGT
45% or less	Peak EGT	Peak EGT	Peak EGT	Peak EGT

NOTE 2. K. (26) Effective P21000761 and up:
"All placards required in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be installed in the appropriate locations."

NOTE 3. The cylinder head thermistors must be installed as follows:

Model		Cylinder Head Number
210, 210A	(1960-61 Model)	3
210B, 210C, 210D	(1962-63-64 Model)	1
210E,210F,210G,210H,210J	(1965-66-67-68-69 Model)	2
210F,T210G,T210H,T210J	(1966-67-68-69 Model)	5
210K	(1970-71 Model)	3
T210K	(1970-71 Model)	5
210L	(1972-73-74-75-76 Model)	3
T210L	(1972-73 Model)	5
T210L	(1974-75-76 Model)	1
210M	(1977 Model)	3
210M	(1978 Model)	1
T210M	(1977-78 Model)	1
P210N	(1978-81 Model)	5
210N	(1979-81 Model)	1
T210N	(1979 Model)	1
T210N	(1980-81 Model)(Non-Air Cond)	5 or 1
T210N	(1980-81 Model)(With Air Cond)	1
P210N	(1982-83 Model)	4
210N, 210R	(1982 Model and up)(Non Air Cond)	4
210N, 210R	(1982 Model and up)(With AirCond)	1
T210N	(1982 Model and up)	3
P210R, T210R	(1985 Model and up)	1

NOTE 4. The marking of the airspeed indicator with I.A.S. provides an equivalent level of safety to CAR 3.757 when the approved airspeed calibration data presented in Section V of the Pilot's Operating Handbooks listed below is available to the pilot:

210L	Cessna P/N D1069-13	(S/N 21061040 through 21061573)
T210L	Cessna P/N D1070-13	(S/N 21061040 through 21061573 except 21061042)
210M	Cessna P/N D1094-13	(S/N 21061574 through 21062273)
T210M	Cessna P/N D1095-13	(S/N 21061574 through 21062273)
210M	Cessna P/N D1122-13	(S/N 21062274 through 21063954)
T210M	Cessna P/N D1123-13	(S/N 21061042, 21062274 through 21062954)
P210N	Cessna P/N D1124-13	(S/N P21000001 through P21000150)
210N	Cessna P/N D1151-13PH	(S/N 21062955 through 21063640)
T210N	Cessna P/N D1152-13PH	(S/N 21062955 through 21063640)
P210N	Cessna P/N D1153-13PH	(S/N P21000151 through P21000385)
210N	Cessna P/N D1186-13PH	(S/N 21063641 through 21064135)
T210N	Cessna P/N D1187-13PH	(S/N 21063641 through 21064135)
P210N	Cessna P/N D1188-13PH	(S/N P21000386 through P21000590)
210N	Cessna P/N D1207-13PH	(S/N 21064136 through 21064535)
T210N	Cessna P/N D1208-13PH	(S/N 21064136 through 21064535)
P210N	Cessna P/N D1209-13PH	(S/N P21000591 through P21000760)
210N	Cessna P/N D1226-13PH	(S/N 21064536 through 21064772)
T210N	Cessna P/N D1227-13PH	(S/N 21064536 through 21064772)
P210N	Cessna P/N D1228-13PH	(S/N P21000761 through P21000811)
210N	Cessna P/N D1244-13PH	(S/N 21064773 through 21064822)
T210N	Cessna P/N D1245-13PH	(S/N 21064773 through 21064822)
P210N	Cessna P/N D1246-13PH	(S/N P21000812 through P21000834)
210N	Cessna P/N D1265-13PH	(S/N 21064823 through 21064897)
T210N	Cessna P/N D1266-13PH	(S/N 21064823 through 21064897)
210R	Cessna P/N D1288-13PH	(S/N 21064898 through 21065009)

NOTE 5. Service information applicable to Models P210N and P210R:

Components subject to the establishment of a retirement life as shown below with the corresponding retirement life hours:

Component Name	Retirement Hours
Windshield, rear cabin top windows Side windows, and ice detector light lens	13,000 hours

NOTE 6. 14-volt electrical system
(210/T210 series through S/N 21059502)
(205 series through S/N 205-0577)

28-volt electrical system
(210/T210 series effective S/N 21059503 and up)
(P210 series effective S/N P21000001 and up)

In addition to the placards specified above, the prescribed operating limitations indicated by an asterisk (*) under Sections I through XVIII of this data sheet must also be displayed by permanent markings.

"WARNING: Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage, and is therefore prohibited on Cessna airplanes."

...END...

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

	A3SO
	Revision 31
	Piper Aircraft, Inc
PA-32-260	PA-32R-301 (SP)
PA-32-300	PA-32R-301 (HP)
PA-32S-300	PA-32R-301T
PA-32R-300	PA-32-301
PA-32RT-300	PA-32-301T
PA-32RT-300T	
PA-32-301FT	
PA-32-301XTC	June 7, 2007

TYPE CERTIFICATE DATA SHEET NO. A3SO

This data sheet which is a part of Type Certificate No. A3SO, prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder	Piper Aircraft, Inc. 2926 Piper Drive Vero Beach, Florida 32960
Type Certificate Holder Record	The New Piper Aircraft, Inc transferred TC A3SO to Piper Aircraft, Inc on August 7, 2006.

I. - Model PA-32-260 (Cherokee Six 260), 6 PCLM (Normal Category), Approved March 4, 1965; 7 PCLM (Normal Category), Approved November 15, 1966.

Engine	Lycoming O-540-E4B5 with carburetor setting 10-4404, 10-5042, or 10-5054 Oil cooler P/N 8529245 required with 10-5042 setting
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (260 hp)
Propeller and Propeller Limits	McCauley fixed pitch metal 1P235PFA82 (See NOTE 8) Static r.p.m. at maximum permissible throttle setting, not over 2480 r.p.m., not under 2270 r.p.m. Diameter: Not over 82 in., not under 80.5 in. Spinner: P/N 63760-00 or 63760-03 (See NOTE 6) Hartzell constant speed Model HC-C2YK-1( ) and Blade Model 8477-2, or Hartzell constant speed Model HC-C2YK-1( )F and Blade Model F8477-2 Pitch: High 32° ± 2°, Low 12.0° ± .2° at 30 in. station Diameter: Not over 82 in., not under 80.5 in. Governor Assembly: Hartzell F-4-4( ) or F-4-11( ) (See NOTE 10) Spinner: P/N 68713 or 66785 Spinner Tip and P/N 66786 Spinner Shell or P/N 67790-0 Spinner, P/N 67791-0 Bulkhead, P/N 67793-0 Bulkhead, P/N 99499-0 Plate, two each P/N 67794-0 Cuff or Kit 760-452V (See NOTE 6)

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Rev No.	31	25	27	25	27	25	27	27	24	27	27	24	29	27	25	27	27	24	27

Page No.	20	21	22	23	24	25	26	27	28	29	30	31
Rev No.	29	29	27	29	29	31	31	31	31	31	31	31

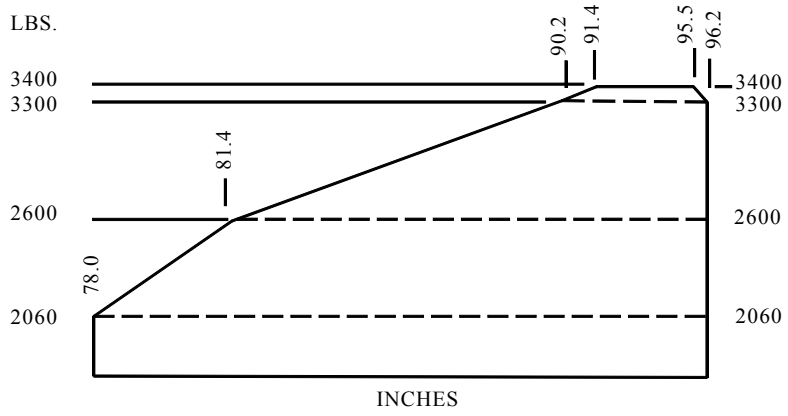
I. - Model PA-32-260 (cont'd)

Airspeed Limits

Never exceed	212 m.p.h. (184 knots)	CAS
Maximum structural cruise	168 m.p.h. (146 knots)	CAS
Maneuvering	149 m.p.h. (130 knots)	CAS
Flaps extended	125 m.p.h. (109 knots)	CAS

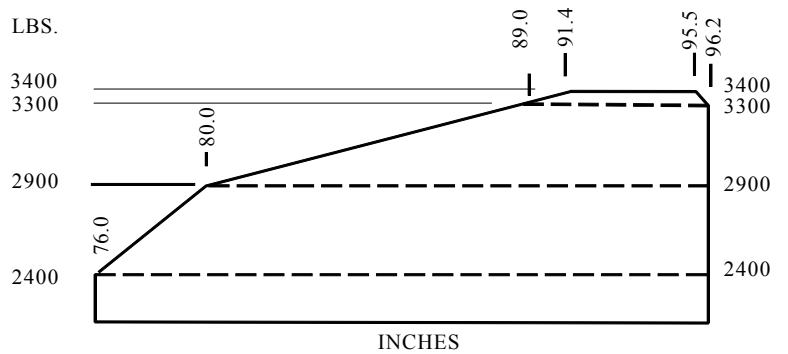
C.G. Range (gear extended)

(+91.4) to (+95.5) at 3400 lb.
(+90.2) to (+96.2) at 3300 lb.
(+81.4) to (+96.2) at 2600 lb.
(+78.0) to (+96.2) at 2060 lb. or less
Straight line variation between points given.



(S/N 32-1 through 32-1075)

(+91.4) to (+95.5) at 3400 lb.
(+89.0) to (+96.2) at 3300 lb.
(+80.0) to (+96.2) at 2900 lb.
(+76.0) to (+96.2) at 2400 lb. or less
Straight line variation between points given.



(S/N 32-1111 through 32-1297, and 32-7100001 through 32-7800008)

Empty Weight C.G. Range None

Maximum Weight 3400 lb.

I. - Model PA-32-260 (cont'd)

No. of Seats
6 (2 at +85.5, 2 at +118.1, 2 at +155.7)
7 (2 at +85.5, 3 at +118.1, 2 at +155.7) (See NOTE 3)

6 (2 at +85.5, 2 at +118.1, 2 at +157.6)
7 (2 at +85.5, 3 at +118.1, 2 at +157.6) (See NOTE 3)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11)
* - Optional Club Seats

Maximum Baggage
200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity
84 gallons at +95.0 (4 wing tanks)
See NOTE 1 for data on system fuel

Oil Capacity
12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on system oil

Control Surface Movements

Wing Flaps	Up	0° (±2°)	Down	40° (±2°)
Ailerons	Up	30° (±2°)	Down	15° (±2°)
Rudder	Left	27° (±2°)	Right	27° (±2°)
Stabilator	Up	16° (±1°)	Down	2° (±1°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)

Nose Wheel Travel

S/N 32-1 through 32-1297, and 32-7100001 through 32-7300066:
Left 30° (±2°) Right 30° (±2°)
S/N 32-7400001 through 32-7800008:
Left 24° (±2°) Right 24° (±2°)

Manufacturer's Serial Nos.
32-03, 32-04, 32-1 through 32-1297, and 32-7100001 through 32-7800008. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32-1034 through 32-1297, and 32-7100001 through 32-7800008 under the delegation option provisions of FAR 21.

II. - Model PA-32-300 (Cherokee Six 300), 6 PCLM (Normal Category), Approved May 27, 1966; 7 PCLM (Normal Category), Approved November 15, 1966.

Same as Model PA-32-260 except for engine installation and fuel system.

Engine
Lycoming IO-540-K1A5, Bendix injector type RSA-10ED1
Lycoming IO-540-K1G5 (See NOTE 12)
Flow Setting No. 2524273

Fuel
100/130 minimum grade aviation gasoline

Engine Limits
For all operations, 2700 r.p.m. (300 hp)

Propeller and Propeller Limits
Hartzell constant speed Model HC-C2YK-1( ), Blade Models 8475-4 & 8475D-4, or
Hartzell constant speed Model HC-C2YK-1( )F, Blade Models F8475D-4
Pitch: High 34° ± 1°, Low 13.5° ± .2° at 30 in. station
Diameter: Not over 80 in., not under 78.5 in.
Governor Assembly: Hartzell F-4-4( ) or F-4-11( ) (See NOTE 10)
Spinner: P/N 68713 or P/N 66785 Spinner Tip and P/N 66786 Spinner Shell, or P/N 67790-0 Spinner, P/N 67791-0 Bulkhead, P/N 67793-0 Bulkhead, P/N 99499-0 Plate, two each P/N 67794-0 Cuff or Kit 760-452V (See NOTE 6)

II. - Model PA-32-300 (cont'd)

Propeller and Propeller Limits (continued)

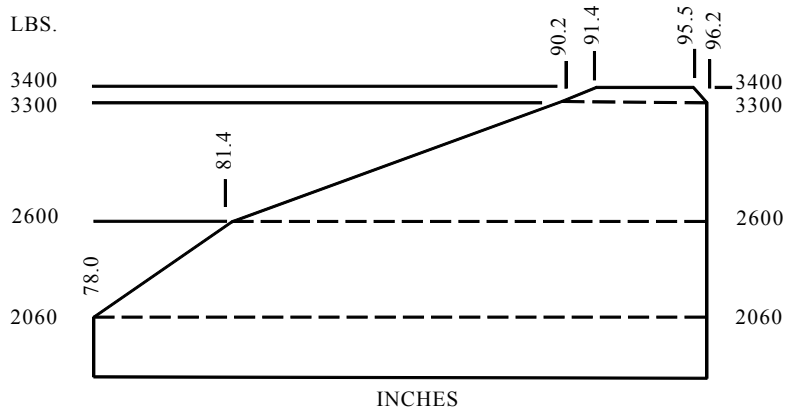
Hartzell constant speed Model HC-C2YK-1( ), Blade Model 8475R-0, or
Hartzell constant speed Model HC-C2YK-1( )F, Blade Model F8475R-0
Pitch: High 29° ± 1°, Low 12.4° ± .2° at 30 in. station
Diameter: Not over 84 in., not under 82.3 in.
Governor Assembly: Hartzell F-4-4( ) or F-4-11( ) (See NOTE 10)
Spinner: P/N 68713 or P/N 66785 Spinner Tip and P/N 66786 Spinner Shell or P/N 67790-0 Spinner, P/N 67791-0 Bulkhead, P/N 67793-0 Bulkhead, P/N 99499-0 Plate, two each P/N 67794-0 Cuff or Kit 760-452V (See NOTE 6)

Airspeed Limits

Never exceed	212 m.p.h. (184 knots)	CAS
Maximum structural cruise	168 m.p.h. (146 knots)	CAS
Maneuvering	149 m.p.h. (130 knots)	CAS
Flaps extended	125 m.p.h. (109 knots)	CAS

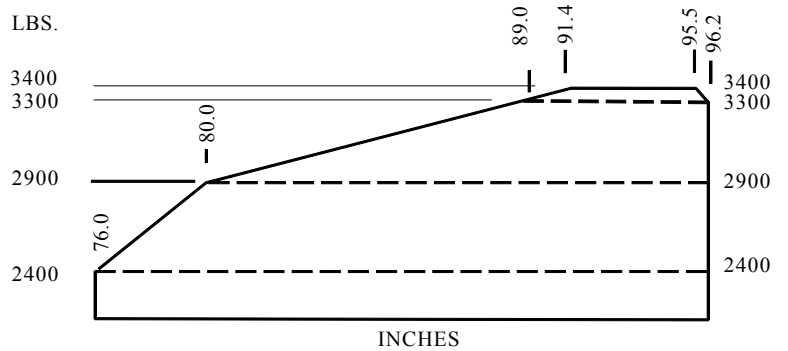
C.G. Range (gear extended)

(+91.4) to (+95.5) at 3400 lb.
(+90.2) to (+96.2) at 3300 lb.
(+81.4) to (+96.2) at 2600 lb.
(+78.0) to (+96.2) at 2060 lb. or less
Straight line variation between points given.



(S/N 32-40001 through 32-40565)

(+91.4) to (+95.5) at 3400 lb.
(+89.0) to (+96.2) at 3300 lb.
(+80.0) to (+96.2) at 2900 lb.
(+76.0) to (+96.2) at 2400 lb. or less
Straight line variation between points given.



(S/N 32-40566 through 32-40974, and 32-7140001 through 32-7940290)

II. - Model PA-32-300 (cont'd)

Empty Weight C.G. Range	None
Maximum Weight	3400 lb.
No. of Seats	6 (2 at +85.5, 2 at +118.1, 2 at +155.7) 7 (2 at +85.5, 3 at +118.1, 2 at +155.7) (See NOTE 3) 6 (2 at +85.5, 2 at +118.1, 2 at +157.6) 7 (2 at +85.5, 3 at +118.1, 2 at +157.6) (See NOTE 3) 6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11) * - Optional Club Seats
Maximum Baggage	200 lb. (100 lb. at +42.0, 100 lb. at +178.7)
Fuel Capacity	S/N 32-15, 32-21, 32-40000 through 32-40974, and 32-7140001 through 32-7840202: 84 gallons at +95.0 (4 wing tanks) S/N 32-7940001 through 32-7940290: 98 gallons at +93.6 (2 wing tanks) (94 gallons usable) See NOTE 1 for data on system fuel
Oil Capacity	12 qt. at +16.6 (9-1/4 qt. usable) See NOTE 1 for data on system oil

Control Surface Movements

Wing Flaps	Up	0° (±2°)	Down	40° (±2°)
Ailerons	Up	30° (±2°)	Down	15° (±2°)
Rudder	Left	27° (±2°)	Right	27° (±2°)
Stabilator	Up	16° (±1°)	Down	2° (±1°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)

Nose Wheel Travel

S/N 32-40001 through 32-40974, and 32-7140001 through 32-7340191:

	Left	30° (±2°)	Right	30° (±2°)

S/N 32-7400001 through 32-7940290:

	Left	24° (±2°)	Right	24° (±2°)

Manufacturer's Serial Nos. 32-15, 32-21, 32-40000 through 32-40974, and 32-7140001 through 32-7940290. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32-40382, 32-40385, 32-40403, 32-40465 through 32-40469, 32-40471 through 32-40974, and 32-7140001 through 32-7940290 under the delegation option provisions of FAR 21 (See NOTE 7 and 9).

III. - Model PA-32S-300 (Cherokee Six Seaplane), 7 PCSM (Normal Category), Approved February 14, 1967.

Same as Model PA-32-300 except for float installation.

Engine	Lycoming IO-540-K1A5 Flow Setting No. 2524273
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (300 hp)

III. - Model PA-32S-300 (cont'd)

Propeller and Propeller Limits

Hartzell constant speed Model HC-C2YK-1( ), Blade Models 8475-4 & 8475D-4, or
Hartzell constant speed Model HC-C2YK-1( )F, Blade Model F8475D-4
Pitch: High 34° ± 1°, Low 13.5° ± .2° at 30 in. station
Diameter: Not over 80 in., not under 78.5 in.
Governor Assembly: Hartzell F-4-4( ) or F-4-11( ) (See NOTE 10)
Spinner: P/N 68713 or P/N 66785 Spinner Tip and P/N 66786 Spinner Shell (See NOTE 6)

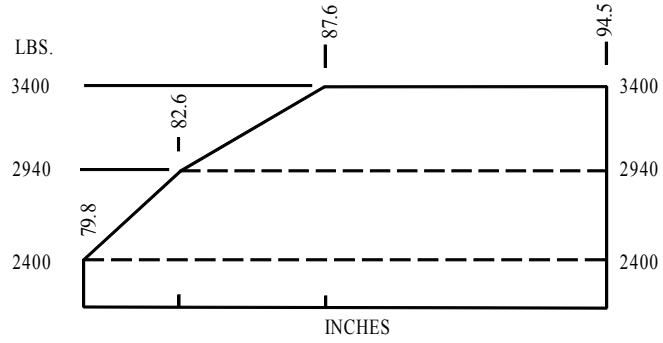
Hartzell constant speed Model HC-C2YK-1( ), Blade Model 8475R-0, or
Hartzell constant speed Model HC-C2YK-1( )F, Blade Model F8475R-0
Pitch: High 29° ± 1°, Low 12.4° ± .2° at 30 in. station
Diameter: Not over 84 in., not under 82.3 in.
Governor Assembly: Hartzell F-4-4( ) or F-4-11( ) (See NOTE 10)
Spinner: P/N 68713 or P/N 66785 Spinner Tip and P/N 66786 Spinner Shell or P/N 67790-0 Spinner, P/N 67791-0 Bulkhead, P/N 67793-0 Bulkhead, P/N 99499-0 Plate, two each P/N 67794-0 Cuff or Kit 760-452V (See NOTE 6)

Airspeed Limits

Never exceed	176 m.p.h. (153 knots) CAS
Maximum structural cruise	140 m.p.h. (122 knots) CAS
Maneuvering	140 m.p.h. (122 knots) CAS
Flaps extended	125 m.p.h. (109 knots) CAS

C.G. Range (gear extended)

(+87.6) to (+94.5) at 3400 lb.
(+82.6) to (+94.5) at 2940 lb.
(+79.8) to (+94.5) at 2400 lb.
Straight line variation between points given.
(See NOTE 4 for operation in landplane configuration)



(S/N 32S-40001 through 32S-40974, and 32S-7140001 through 32S-7240137)

Empty Weight C. G. Range: None

Maximum Weight: 3400 lb.

No. of Seats: 7 (2 at +85.5, 2 at +118.1, 2 at +155.7)

Maximum Baggage: 200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

III. - Model PA-32S-300 (cont'd)

Fuel Capacity	84 gallons at +95.0 (4 wing tanks) See NOTE 1 for data on system fuel				
Oil Capacity	12 qt. at +16.6 (9-1/4 qt. usable) See NOTE 1 for data on system oil				
Control Surface Movements	Wing Flaps	Up	0° (±2°)	Down	40° (±2°)
	Ailerons	Up	30° (±2°)	Down	15° (±2°)
	Rudder	Left	27° (±2°)	Right	27° (±2°)
	Stabilator	Up	16° (±1°)	Down	2° (±1°)
	Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)
Manufacturer's Serial Nos.	32S-15, 32S-40000 through 32S-40974, and 32S-7140001 through 32S-7240137. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32S-40382, 32S-40385, 32S-40403, 32S-40465 through 32S-40469, 32S-40471 through 32S-40974, and 32S-7140001 through 32S-7240137 under the delegation option provisions of FAR 21 (See NOTE 7 and 9).				

IV. - Model PA-32R-300 (Lance), 7 PCLM (Normal Category), Approved February 25,1975.

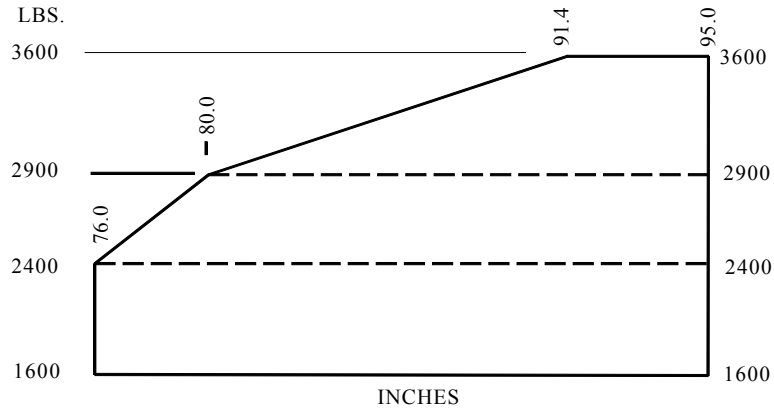
Same as Model PA-32-300 except for redesigned wing and engine mount to accommodate retractable landing gear, gross weight increase, increased capability fuel system and other minor changes.

Engine	Lycoming IO-540-K1A5D Lycoming IO-540-K1G5D for S/N 32R-7680141 through 32R-7880068 (See NOTE 13) Flow Setting No. 2524273		
Fuel	100/130 minimum grade aviation gasoline		
Engine Limits	For all operations, 2700 r.p.m. (300 hp)		
Propeller and Propeller Limits	Hartzell constant speed Model HC-C2YK-1( )F, Blade Model F8475D-4 Pitch: High 34° ± 1°, Low 13.5° ± .2° at 30 in. station Diameter: Not over 80 in., not under 78.5 in. Governor Assembly: Hartzell F-4-11B( ) Spinner: P/N 67790-0 Spinner, P/N 67791-0 Bulkhead, P/N 67793-0 Bulkhead, P/N 99499-0 Plate, and two each P/N 67794-0 Cuff (See NOTE 6)		
Airspeed Limits	Never exceed	217 m.p.h. (188 knots)	CAS
	Maximum structural cruise	172 m.p.h. (149 knots)	CAS
	Maneuvering	125 m.p.h. (109 knots)	CAS
	Maximum flaps extended	125 m.p.h. (109 knots)	CAS
	Maximum gear extension	150 m.p.h. (130 knots)	CAS
	Maximum gear retraction	125 m.p.h. (109 knots)	CAS

IV. - Model PA-32R-300 (cont'd)

C.G. Range (gear extended)

(+91.4) to (+95.0) at 3600 lb.
(+80.0) to (+95.0) at 2900 lb.
(+76.0) to (+95.0) at 2400 lb. or less
Straight line variation between points given.



Empty Weight C.G. Range: None

Maximum Weight: 3600 lb.

No. of Seats:
7 (2 at +85.5, 3 at +118.1, 2 at +155.7)
7 (2 at +85.5, 3 at +118.1, 2 at +157.6)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11)
* - Optional Club Seats

Maximum Baggage: 200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity: 98 gallons at +93.6 (2 wing tanks) (94 gallons usable)
See NOTE 1 for data on system fuel

Oil Capacity: 12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on system oil

Control Surface Movements

Wing Flaps	Up	0° (±2°)	Down	40° (±2°)
Ailerons	Up	30° (±2°)	Down	15° (±2°)
Rudder	Left	27° (±2°)	Right	27° (±2°)
Stabilator	Up	16° (±1°)	Down	2° (±1°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)

Manufacturer's Serial Nos.: 32R-7680001 through 32R-7880068. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32R-7680001 through 32R-7880068 under the delegation option provisions FAR 21 (See NOTE 7).

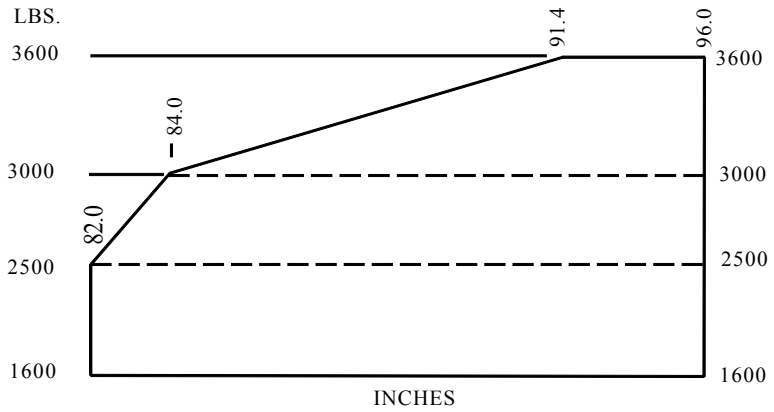
V. - Model PA-32RT-300 (Lance II), 7 PCLM (Normal Category), Approved December 13, 1977.
Same as Model PA-32R-300 except for redesigned tail surfaces in "T" configuration and other minor changes.

Engine	Lycoming IO-540-K1G5D Flow Setting No. 2524273
Fuel	100/130 minimum grade aviation gasoline
Engine Limits	For all operations, 2700 r.p.m. (300 hp)
Propeller and Propeller Limits	Hartzell constant speed Model HC-C2YK-1( )F, Blade Model F8475D-4 Pitch: High 34° ± 1°, Low 13.5° ± .2° at 30 in. station Diameter: Not over 80 in., not under 78.5 in. Governor Assembly: Hartzell F-4-11B( ) Spinner: P/N 99374 (See NOTE 6)

Airspeed Limits		
	Never exceed	217 m.p.h. (189 knots) CAS
	Maximum structural cruise	173 m.p.h. (150 knots) CAS
	Maneuvering (with 3600 lb. gross weight)	152 m.p.h. (132 knots) CAS
	Maximum flaps extended	125 m.p.h. (109 knots) CAS
	Maximum gear extension	150 m.p.h. (130 knots) CAS
	Maximum gear retraction	125 m.p.h. (109 knots) CAS

C.G. Range (gear extended)

(+91.4) to (+96.0) at 3600 lb.
(+84.0) to (+96.0) at 3000 lb.
(+82.0) to (+96.0) at 2500 lb. or less
Straight line variation between points given.



Empty Weight C.G. Range	None
Maximum Weight	3600 lb.
No. of Seats	7 (2 at +85.5, 3 at +118.1, 2 at +157.6) 6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11) * - Optional Club Seats
Maximum Baggage	200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

V. - Model PA-32RT-300 (cont'd)

Fuel Capacity	98 gallons at +93.6 (2 wing tanks) (94 gallons usable) See NOTE 1 for data on system fuel				
Oil Capacity	12 qt. at +16.6 (9-1/4 qt. usable) See NOTE 1 for data on system oil				
Control Surface Movements	Wing Flaps	Up	0° (±2°)	Down	30° (±2°)
	Ailerons	Up	30° (±2°)	Down	15° (±2°)
	Rudder	Left	36° (±2°)	Right	36° (±2°)
	Stabilator	Up	14.5° (±.5°)	Down	10° (±1°)
	Stabilator Tab	Up	2.5° (±1°)	Down	10° (±.5°)
Manufacturer's Serial Nos.	32R-7885002 through 32R-7985106. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32R-7885002 through 32R-7985106 under the delegation option provisions FAR 21 (See NOTE 7).				

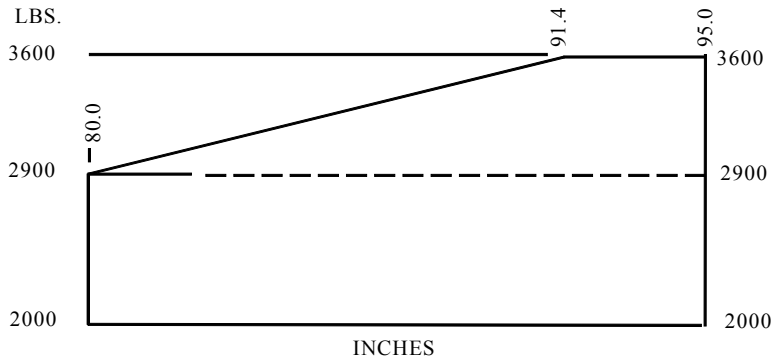
VI. - Model PA-32RT-300T (Turbo Lance II), 7 PCLM (Normal Category), Approved April 20, 1978.

Same as Model PA-32RT-300 except for turbocharged engine installation and other minor changes.

Engine	Lycoming TIO-540-S1AD Bendix Injector Type RSA-10ED1 Flow Setting No. 2524693 for S/N 32R-7787001, 32R-7887002 through 32R-7887041 Bendix Injector Type RSA-10ED2 Flow Setting No. 2524791 for S/N 32R-7787001, 32R-7887002 through 32R-7987126		
Fuel	100/130 minimum grade aviation gasoline		
Engine Limits	For 5 minute takeoff, 2700 r.p.m. and 36.0" Hg MAP (300 hp) For maximum continuous operation, 2575 r.p.m. and 33.0" Hg MAP (270 hp)		
Propeller and Propeller Limits	Hartzell constant speed Model HC-E2YR-1( )F, Blade Model F8477-4 Pitch: High 34° ± 1°, Low 15.6° ± .2° at 30 in. station Diameter: Not over 80 in., not under 78.5 in. Governor Assembly: Hartzell F-4-11B or F-4-11B( ) Spinner: Piper P/N 98708-2 or Hartzell P/N A-2298-2		
Airspeed Limits	Never exceed	217 m.p.h. (189 knots)	CAS
	Maximum structural cruise	173 m.p.h. (150 knots)	CAS
	Maneuvering (with 3600 lb. gross weight)	152 m.p.h. (132 knots)	CAS
	Maximum flaps extended	125 m.p.h. (109 knots)	CAS
	Maximum gear extension	150 m.p.h. (130 knots)	CAS
	Maximum gear retraction	125 m.p.h. (109 knots)	CAS

VI. - Model PA-32RT-300T (cont'd)

C.G. Range (gear extended) (+91.4) to (+95.0) at 3600 lb.
(+80.0) to (+95.0) at 2900 lb. or less
Straight line variation between points given.



Empty Weight C.G. Range None

Maximum Weight 3600 lb.

No. of Seats 7 (2 at +85.5, 3 at +118.1, 2 at +157.6)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11)
* - Optional Club Seats

Maximum Baggage 200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity 98 gallons at +93.6 (2 wing tanks) (94 gallons usable)
See NOTE 1 for data on system fuel

Oil Capacity 12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on system oil

Control Surface Movements

Wing Flaps	Up	0° (±2°)	Down	40° (±2°)
Ailerons	Up	30° (±2°)	Down	15° (±2°)
Rudder	Left	36° (±2°)	Right	36° (±2°)
Stabilator	Up	14.5° (±.5°)	Down	10° (±1°)
Stabilator Tab	Up	1.0° (±1°)	Down	10° (±.5°)

Manufacturer's Serial Nos. 32R-7787001, 32R-7887002 through 32R-7987126. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32R-7787001, 32R-7887002 through 32R-7987126 under the delegation option provisions of FAR 21 (See NOTE 7).

VII. - Model PA-32R-301 (Saratoga SP), 7 PCLM (Normal Category), Approved November 7, 1979.

Same as Model PA-32R-300 except for tapered wings and other minor changes.

Engine Lycoming IO-540-K1G5D
Bendix Injector Type RSA-10ED1
Flow Setting No. 2524273

Fuel 100 or 100LL aviation grade fuel

VII. - Model PA-32R-301 (cont'd)

Engine Limits

For airplanes equipped with standard Hartzell 2 blade propeller
HC-C2Y(K,R)-1( )F/F8475D-4:
For 5 minute takeoff, 2700 r.p.m. and full throttle (300 rated hp)
For maximum continuous operation, 2600 r.p.m. and full throttle (294 rated hp)

For airplanes equipped with optional Hartzell 3 blade propeller
HC-C3YR-1( )F/F7663R-0:
For all operations, 2700 r.p.m. and full throttle (300 rated hp)

Propeller and Propeller Limits

Hartzell constant speed Model HC-C2Y(K,R)-1( )F/F8475D-4 (standard 2 blade):
Pitch: High 34° ± 1°, Low 13.5° ± .2° at 30 in. station
Diameter: Not over 80 in., not under 78.5 in.
Governor Assembly: Hartzell F-4-11B or F-4-11B( )
Spinner: Piper P/N 98708-2 or Hartzell P/N A-2298-2

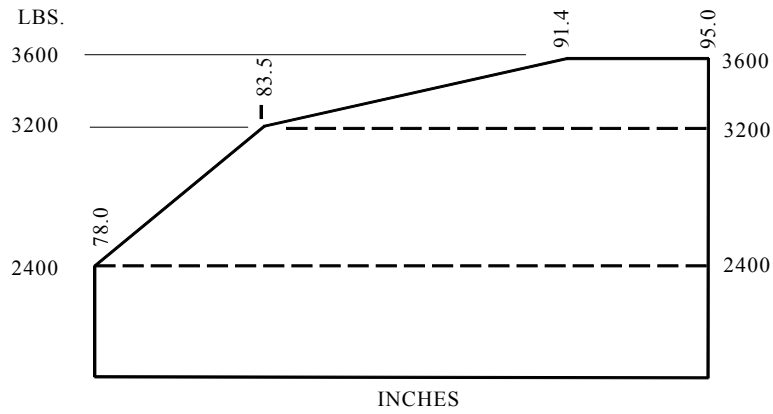
Hartzell constant speed Model HC-C3YR-1( )F/F7663R-0 (optional 3 blade):
Pitch: High 32.0° ± 1°, Low 12.4° ± .2° at 30 in. station
Diameter: Not over 78 in., not under 76 in.
Governor Assembly: Hartzell F-4-11B or F-4-11B( )
Spinner: Piper PS50077-56 or Hartzell P/N 835-47

Airspeed Limits (Indicated)

Never exceed	197 knots (226 m.p.h.)
Maximum structural cruise	154 knots (177 m.p.h.)
Maneuvering (with 3600 lb. gross weight)	134 knots (154 m.p.h.)
Maximum flaps extended	112 knots (129 m.p.h.)
Maximum gear extension	132 knots (151 m.p.h.)
Maximum gear retraction	110 knots (126 m.p.h.)
Maximum gear extended	132 knots (151 m.p.h.)

C.G. Range (gear extended)

(+91.4) to (+95.0) at 3600 lb.
(+83.5) to (+95.0) at 3200 lb.
(+78.0) to (+95.0) at 2400 lb.
Straight line variation between points given.



Empty Weight C.G. Range

None

Maximum Weight

Ramp: 3615 lb.
Takeoff: 3600 lb.
Landing: 3600 lb.

No. of Seats

7 (2 at +85.5, 3 at +118.1, 2 at +157.6)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11)
* - Optional Club Seats

VII. - Model PA-32R-301 (cont'd)

Maximum Baggage: 200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity: 107 gallons at +94.0 (2 wing tanks) (102 gallons usable)
See NOTE 1 for data on system fuel

Oil Capacity: 12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on system oil

Control Surface Movements:

Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
Ailerons	Up	28° (±1°)	Down	22° (±1°)
Rudder	Left	28° (±1°)	Right	28° (±1°)
Stabilator	Up	14.5° (±.5°)	Down	5.5° (±.5°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)

Manufacturer's Serial Nos.: 32R-8013001 through 32R-8613006, 3213001 through 3213028, and 3213030 through 3213041. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32R-8013001 through 32R-8613006, 3213001 through 3213028, and 3213030 through 3213041 under the delegation option provisions of FAR 21.

VIII. - Model PA-32R-301 (Saratoga II HP), 7 PCLM (Normal Category), Approved May 26, 1993.

Same as Model PA-32R-301, Saratoga SP, except for engine cowling, engine model designation and other minor changes.

Engine:
Lycoming IO-540-K1G5
Precision Airmotive Injector, Type RSA-10ED1
Flow Setting No. 2524273 for S/N 3213042 through 3213103, and 3246001 and up

Lycoming IO-540-K1G5D for S/N 3213029 only

Fuel: 100 or 100LL aviation grade fuel

Engine Limits: Equipped with Hartzell 3 blade propeller HC-I3YR-1RF/F7663DR:
For all operations, 2700 r.p.m. and full throttle (300 rated hp)

Propeller and Propeller Limits:
Hartzell constant speed Model HC-I3YR-1RF/F7663DR (3 blade)
Hartzell constant speed Model HC-I3YR-1RF/F7663DRB
(3 blade with TKS Ice Protection System)
Pitch: High 32.0° ± 1°, Low 12.4° ± .2° at 30 in. station
Diameter: Not over 78 in., not under 77 in.
Governor: Hartzell V-5-4
Spinner Assy: Hartzell P/N C3575-1 (P)
Dome: Hartzell P/N C-3532-16P (with TKS Ice Protection System)
Do not exceed 23" manifold pressure below 2100 r.p.m.

Airspeed Limits (Indicated):

For S/N 3213029, 3213042 through 3213103, and 3246001 through 3246017:

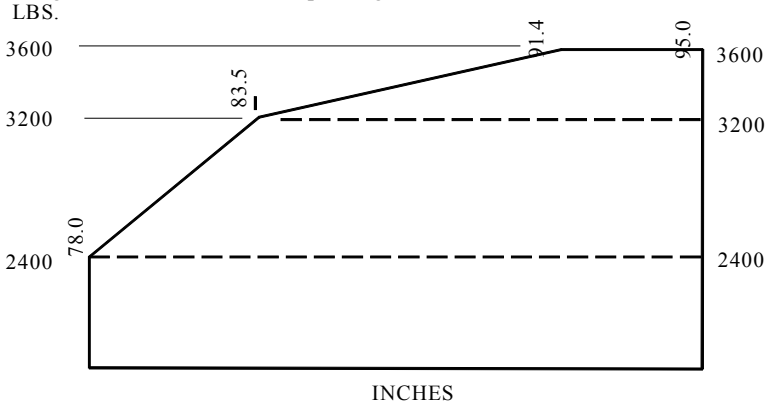
Never exceed	193 knots (222 m.p.h.)
Maximum structural cruise	160 knots (184 m.p.h.)
Maneuvering (with 3600 lb. gross weight)	132 knots (152 m.p.h.)
Flaps extended	108 knots (124 m.p.h.)
Maximum gear extension	130 knots (150 m.p.h.)
Maximum gear retraction	108 knots (124 m.p.h.)
Maximum gear extended	130 knots (150 m.p.h.)

For S/N 3246018 and up:

Never exceed	191 knots (220 m.p.h.)
Maximum structural cruise	160 knots (184 m.p.h.)
Maneuvering (with 3600 lb. gross weight)	134 knots (154 m.p.h.)
Flaps extended	110 knots (127 m.p.h.)
Maximum gear extension	132 knots (152 m.p.h.)
Maximum gear retraction	110 knots (127 m.p.h.)
Maximum gear extended	132 knots (152 m.p.h.)

VIII. - Model PA-32R-301 (cont'd)

C.G. Range (gear extended) (+91.4) to (+95.0) at 3600 lb.
(+83.5) to (+95.0) at 3200 lb.
(+78.0) to (+95.0) at 2400 lb.
Straight line variation between points given.



Empty Weight C.G. Range None

Maximum Weight Ramp: 3615 lb.
Takeoff: 3600 lb.
Landing: 3600 lb.

No. of Seats 6 (2 at +85.5, 2 at +119.1, 2 at +157.6)

Maximum Baggage 200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity 107 gallons at +94.0 (2 wing tanks) (102 gallons usable)
See NOTE 1 for data on fuel system

Oil Capacity 12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on oil system

Control Surface Movements

Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
Ailerons	Up	28° (±1°)	Down	22° (±1°)
Rudder	Left	28° (±1°)	Right	28° (±1°)
Stabilator	Up	14.5° (±.5°)	Down	5.5° (±.5°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)

Manufacturer's Serial Nos. 3213029, 3213042 through 3213103 (14v), 3246001 through 3246017 (14v), and 3246018 and up (28v). The manufacturer is authorized to issue airworthiness certificates under the delegation option provisions of FAR 21.

IX. - Model PA-32R-301T (Turbo Saratoga SP), 7 PCLM (Normal Category), Approved November 7, 1979.

Same as Model PA-32R-300 except for tapered wings, turbocharged powerplant installation and other minor changes.

Engine Lycoming TIO-540-S1AD
Bendix Injector, Type RSA-10ED2
Flow Setting No. 2524791

Fuel 100 or 100LL aviation grade fuel

IX. - Model PA-32R-301T (cont'd)

Engine Limits

For airplanes equipped with standard Hartzell 2 blade propeller HC-E2YR-1( )F/F8477-4:
For 5 minute take-off, 2700 r.p.m. and 36.0" Hg MAP (300 hp) - Sea level to 16,000 ft. altitude
For maximum continuous operation, 2575 r.p.m. and 36.0" Hg MAP (294 hp) - Sea level to 16,000 ft. altitude

For airplanes equipped with optional Hartzell 3 blade propeller HC-E3YR-1( )F/F7673DR-0:
For all operations, 2700 r.p.m. and 36.0" Hg MAP (300 rated hp) - Sea level to 16,000 ft. altitude

Propeller and Propeller Limits

Hartzell constant speed Model HC-E2YR-1( )F/F8477-4 (standard 2 blade):
Pitch: High 34.0° ± 1°, Low 15.6° ± .2° at 30 in. station
Diameter: Not over 80 in., not under 78.5 in.
Governor Assembly: Hartzell F-4-11B or F-4-11B( )
Spinner: Piper P/N 98708-2 or Hartzell P/N A-2298-2

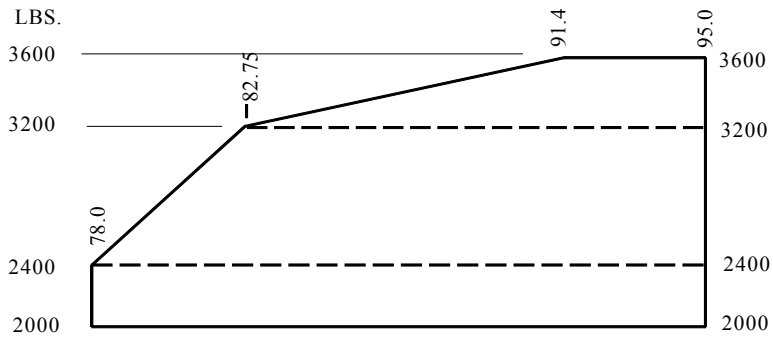
Hartzell constant speed Model HC-E3YR-1( )F/F7673DR-0 (optional 3 blade):
Pitch: High 34.5° ± 1°, Low 13.2° ± .2° at 30 in. station
Diameter: Not over 78 in., not under 76 in.
Governor Assembly: Hartzell F-4-11B or F-4-11B( )
Spinner: Piper P/N PS50077-58 or Hartzell P/N C-3575

Airspeed Limits (Indicated)

Never exceed	197 knots
Maximum structural cruise	154 knots
Maneuvering (with 3600 lb. gross weight)	134 knots
Flaps extended	112 knots
Maximum gear extension	132 knots
Maximum gear retraction	110 knots
Maximum gear extended	132 knots

C.G. Range (gear extended)

(+91.4) to (+95.0) at 3600 lb.
(+82.75) to (+95.0) at 3200 lb.
(+78.0) to (+95.0) at 2400 lb.
Straight line variation between points given.



Empty Weight C.G. Range

None

Maximum Weight

Ramp: 3615 lb.
Takeoff: 3600 lb.
Landing: 3600 lb.

IX. - Model PA-32R-301T (cont'd)

No. of Seats
7 (2 at +85.5, 3 at +118.1, 2 at +157.6)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11)
* - Optional Club Seats

Maximum Baggage
200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity
107 gallons at +94.0 (2 wing tanks) (102 gallons usable)
See NOTE 1 for data on system fuel

Oil Capacity
12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on system oil

Control Surface Movements

Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
Ailerons	Up	28° (±1°)	Down	22° (±1°)
Rudder	Left	28° (±1°)	Right	28° (±1°)
Stabilator	Up	14.5° (±.5°)	Down	5.5° (±0.5°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)

Manufacturer's Serial Nos.
32R-8029001 through 32R-8629008, and 3229001 through 3229003. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32R-8029001 through 32R-8629008, and 3229001 through 3229003 under the delegation option provisions of FAR 21 (See NOTE 7).

X. - Model PA-32-301 (Saratoga), 7 PCLM (Normal Category), Approved January 9, 1980.

Same as Model PA-32-300 except for tapered wings, increased gross weight and other minor changes.

Engine
Lycoming IO-540-K1G5
Bendix Injector Type RSA-10ED1
Flow Setting No. 2524273

Fuel
100 or 100LL aviation grade fuel

Engine Limits
For airplanes equipped with standard Hartzell 2 blade propeller HC-C2Y(K,R)-1( )F/F8475D-4:
For 5 minute takeoff, 2700 r.p.m. and full throttle (300 rated hp)
For maximum continuous operation, 2600 r.p.m. and full throttle (294 rated hp)

For airplanes equipped with optional Hartzell 3 blade propeller HC-C3YR-1( )F/F7663R-0:
For all operations, 2700 r.p.m. and full throttle (300 rated hp)

Propeller and Propeller Limits
Hartzell constant speed Model HC-C2Y(K,R)-1( )F/ F8475D-4 (standard 2 blade):
Pitch: High 34° ± 1°, Low 13.5° ± .2° at 30 in. station
Diameter: Not over 80 in., not under 78.5 in.
Governor Assembly: Hartzell F-4-11 or F-4-11( )
Spinner: P/N 67790-0 Spinner, P/N 67791-0 Bulkhead, P/N 67793-0 Bulkhead, P/N 99499-0 Plate, and two each 67794-0 Cuff (See NOTE 6)

Hartzell constant speed Model HC-C3YR-1( )F/F7663R-0 (optional 3 blade):
Pitch: High 32° ± 1°, Low 12.4° ± .2° at 30 in. station
Diameter: Not over 78 in., not under 76 in.
Governor Assembly: Hartzell F-4-11B or F-4-11B( )
Spinner: Hartzell P/N 835-47 (See NOTE 6)

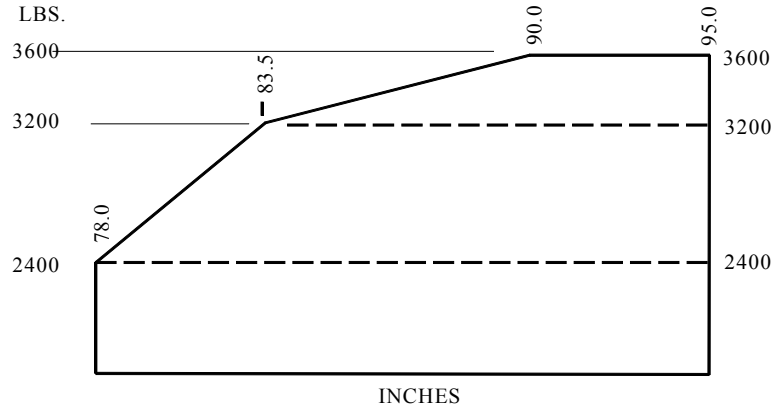
X. - Model PA-32-301 (cont'd)

Airspeed Limits (Indicated)

Never exceed	197 knots
Maximum structural cruise (with 3600 lb. gross weight)	154 knots
Maneuvering	134 knots
Flaps extended	112 knots

C.G. Range (gear extended)

(+90.0) to (+95.0) at 3600 lb.
(+83.5) to (+95.0) at 3200 lb.
(+78.0) to (+95.0) at 2400 lb.
Straight line variation between points given.



Empty Weight C.G. Range: None

Maximum Weight

Ramp: 3615 lb.
Takeoff: 3600 lb.
Landing: 3600 lb.

No. of Seats

6 (2 at +85.5, 2 at +118.1, 2 at +157.6)
7 (2 at +85.5, 3 at +118.1, 2 at +157.6)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11)
* - Optional Club Seats

Maximum Baggage: 200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity: 107 gallons at +94.0 (2 wing tanks) (102 gallons usable)
See NOTE 1 for data on system fuel

Oil Capacity: 12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on system oil

Control Surface Movements

Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
Ailerons	Up	28° (±1°)	Down	22° (±1°)
Rudder	Left	28° (±1°)	Right	28° (±1°)
Stabilator	Up	14.5° (±0.5°)	Down	5.5° (±0.5°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)
Nose Wheel Travel				
	Left	24° (±2°)	Right	24° (±2°)

Manufacturer's Serial Nos.: 32-8006002 through 32-8606023, and 3206001 through 3206019, 3206042 through 3206044, 3206047, 3206050 through 3206055, and 3206060. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32-8006002 through 32-8606023, and 3206001 through 3206019 under the delegation option provisions of FAR 21 (See NOTE 7).

XI. - Model PA-32-301T (Turbo Saratoga), 7 PCLM (Normal Category), Approved January 9, 1980.

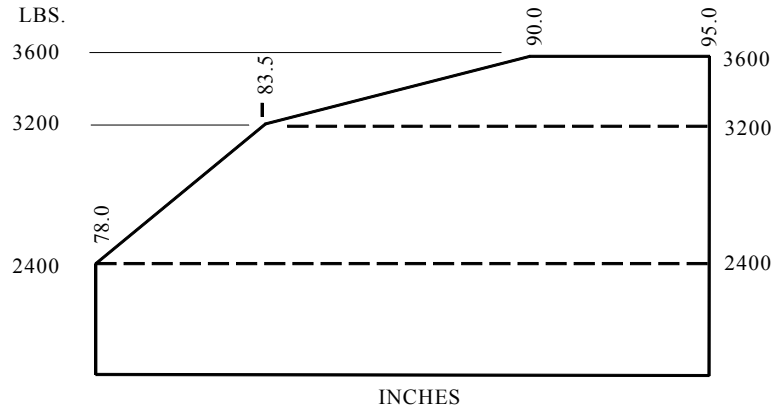
Same as Model PA-32-300 except for tapered wings, turbocharged powerplant, increased gross weight, and other minor changes.

Engine	Lycoming TIO-540-S1AD Bendix Injector Type RSA-10ED2 Flow Setting No. 2524791	
Fuel	100 or 100LL aviation grade fuel	
Engine Limits	For airplanes equipped with standard Hartzell 2 blade propeller HC-E2YR-1( )F/F8477-4: For 5 minute takeoff, 2700 r.p.m. and 36.0" Hg MAP (300 hp) - Sea level to 16,000 ft. altitude For maximum continuous operation, 2575 r.p.m. and 36.0" Hg MAP (294 rated hp) - Sea level to 16,000 ft. altitude For airplanes equipped with optional Hartzell 3 blade propeller HC-E3YR-1( )F/F7673DR-0: For all operations, 2700 r.p.m. and 36.0" Hg MAP (300 rated hp) - Sea level to 16,000 ft	
Propeller and Propeller Limits	Hartzell constant speed Model HC-E2YR-1( )F/F8477-4 (standard 2 blade): Pitch: High 34° ± 1°, Low 15.6° ± .2° at 30 in. station Diameter: Not over 80 in., not under 78.5 in. Governor Assembly: Hartzell F-4-11B or F-4-11B( ) Spinner: Piper P/N 98708-2 or Hartzell P/N A-2298-2 Hartzell constant speed Model HC-E3YR-1( )F/F7673R-0 (optional 3 blade): Pitch: High 34.5° ± 1°, Low 13.2° ± .2° at 30 in. station Diameter: Not over 78 in., not under 76 in. Governor Assembly: Hartzell F-4-11B or F-4-11B( ) Spinner: Piper P/N PS50077-58 or Hartzell P/N C-3575	
Airspeed Limits (Indicated)	Never exceed	197 knots (226 m.p.h.)
	Maximum structural cruise (with 3600 lb. gross weight)	154 knots (177 m.p.h.)
	Maneuvering	134 knots (154 m.p.h.)
	Maximum flaps extended	112 knots (129 m.p.h.)

XI. - Model PA-32-301T (cont'd)

C.G. Range (gear extended)

(+90.0) to (+95.0) at 3600 lb.
(+83.5) to (+95.0) at 3200 lb.
(+78.0) to (+95.0) at 2400 lb.
Straight line variation between points given.



Empty Weight C.G. Range

None

Maximum Weight

Ramp: 3617 lb.
Takeoff: 3600 lb.
Landing: 3600 lb.

No. of Seats

6 (2 at +85.5, 2 at +118.1, 2 at +157.6)
7 (2 at +85.5, 3 at +118.1, 2 at +157.6)
6 (2 at +85.5, *2 at +119.1, 2 at +157.6) (See NOTE 11)
* - Optional Club Seats

Maximum Baggage

200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity

107 gallons at +94.0 (2 wing tanks) (102 gallons usable)
See NOTE 1 for data on system fuel

Oil Capacity

12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on system oil

Control Surface Movements

Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
Ailerons	Up	28° (±1°)	Down	22° (±1°)
Rudder	Left	28° (±1°)	Right	28° (±1°)
Stabilator	Up	14.5° (±0.5°)	Down	5.5° (±0.5°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)

Nose Wheel Travel

Left 24° (±2°) Right 24° (±2°)

Manufacturer's Serial Nos.

32-8024001 and 32-8424002. The manufacturer is authorized to issue airworthiness certificates for airplane serial numbers 32-8024001 through 32-8424002 the delegation option provisions of FAR 21 (See NOTE 7).

XII. - Model PA-32R-301T (Saratoga II TC), 6 PCLM (Normal Category), Approved July 9, 1997.

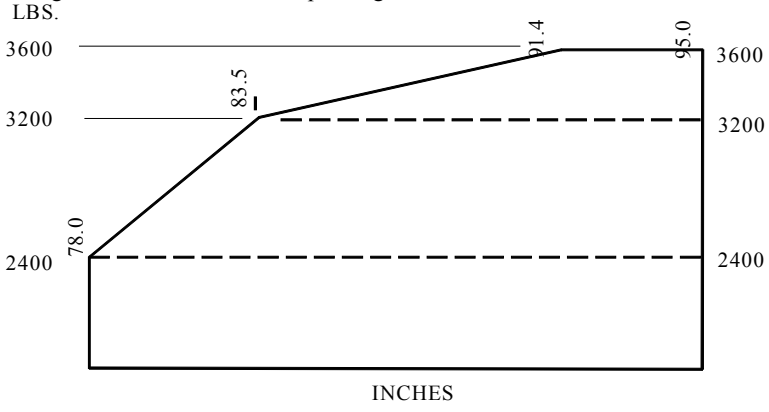
Same as Model PA-32R-301T, Turbo Saratoga SP, except for new turbocharged powerplant, 28 Volt electrical system and other minor changes.

Engine	Lycoming TIO-540-AH1A Precision Airmotive Injector, Type RSA-10ED1 Flow Setting No. 2576554-2
Fuel	100 or 100LL aviation grade fuel
Engine Limits	For all operations, 2500 r.p.m. and 38.0" Hg MAP (300 rated hp) - Sea level to 12,000 ft. altitude Do not operate above 26.0" Hg MAP below 2100 r.p.m.
Propeller and Propeller Limits	Hartzell constant speed Model HC-I3YR-1RF/F7663DR (3 blade) Hartzell constant speed Model HC-I3YR-1RF/F7663DRB (3 blade with TKS Ice Protection System) Pitch: High 34.0° ± 0.5°, Low 15.2° ± 0.2° at 30 in. station Diameter: Not over 78 in., not under 76 in. Governor: Hartzell V-5-6 Spinner Assy: Piper P/N PS50077-90 or Hartzell P/N C-3575-1 (P) Dome: Hartzell P/N 3532-16P (with TKS Ice Protection System)

Airspeed Limits (Indicated)		
	Never exceed	191 knots
	Maximum structural cruise	167 knots
	Maneuvering (with 3600 lb. gross weight)	134 knots
	Flaps extended	110 knots
	Maximum gear extension	132 knots
	Maximum gear retraction	110 knots
	Maximum gear extended	132 knots

C.G. Range (gear extended)

(+91.4) to (+95.0) at 3600 lb.
(+83.5) to (+95.0) at 3200 lb.
(+78.0) to (+95.0) at 2400 lb.
Straight line variation between points given.



Empty Weight C.G. Range	None
Maximum Weight	Ramp: 3615 lb. Takeoff: 3600 lb. Landing: 3600 lb.
No. of Seats	6 (2 at +85.5, 2 at +119.1, 2 at +157.6) 5 (2 at +85.5, 1 at +119.1, 2 at +157.6)
Maximum Baggage	200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

XII. - Model PA-32R-301T (cont'd)

Fuel Capacity	107 gallons at +94.0 (2 wing tanks) (102 gallons usable) See NOTE 1 for data on fuel system				
Oil Capacity	12 qt. at +16.6 (9-1/4 qt. usable) See NOTE 1 for data on oil system				
Control Surface Movements	Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
	Ailerons	Up	28° (±1°)	Down	22° (±1°)
	Rudder	Left	28° (±1°)	Right	28° (±1°)
	Stabilator	Up	14.5° (±.5°)	Down	5.5° (±.5°)
	Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)
Manufacturer's Serial Nos.	3257001 and up. The manufacturer is authorized to issue airworthiness certificates for serial numbers 3257001 and up under the delegation option provisions of FAR 21.				

XIII - Model PA-32-301FT (Piper 6X), 6 PCLM (Normal Category), Approved July 22, 2003.

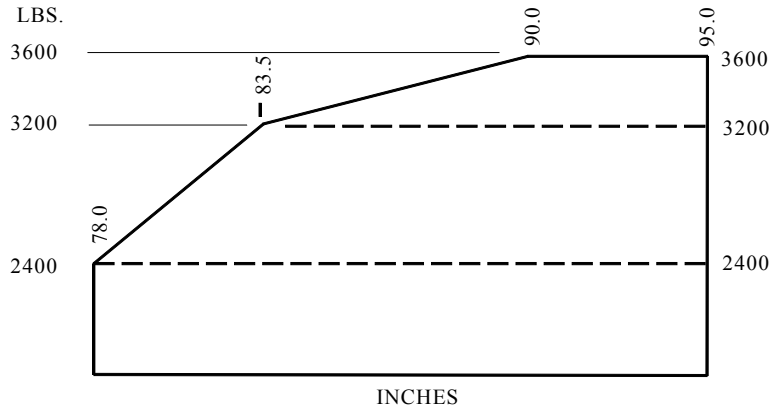
Similar to Model PA-32R-301, Saratoga IIHP, except for fixed landing gear and other minor changes.

Engine	Lycoming IO-540-K1G5 Precision Airmotive Injector, Type RSA-10ED1 Flow Setting No. 2524273	
Fuel	100 or 100LL aviation grade fuel	
Engine Limits	Equipped with Hartzell 3 blade propeller HC-I3YR-1RF/F7663DR: For all operations, 2700 r.p.m. and full throttle (300 rated hp)	
Propeller and Propeller Limits	Hartzell constant speed Model HC-I3YR-1RF/F7663DR (3 blade) Hartzell constant speed Model HC-I3YR-1RF/F7663DRB (3 blade with TKS Ice Protection System) Pitch: High 32.0° ± 1°, Low 12.4° ± .2° at 30 in. station Diameter: Not over 78 in., not under 77 in. Governor: Hartzell V-5-4 Spinner Assy: Hartzell P/N C3575-1 (P) Dome: Hartzell P/N C-3532-16P (with TKS Ice Protection System) Do not exceed 23" manifold pressure below 2100 r.p.m.	
Airspeed Limits (Indicated)	For serial number 3232001 and up:	
	Never exceed	189 knots (218 m.p.h.)
	Maximum structural cruise	150 knots (173 m.p.h.)
	Maneuvering (with 3600 lb. gross weight)	132 knots (152 m.p.h.)
	Flaps extended	113 knots (130 m.p.h.)

XIII. - Model PA-32-301FT (cont'd)

C.G. Range

(+90.0) to (+95.0) at 3600 lb.
(+83.5) to (+95.0) at 3200 lb.
(+78.0) to (+95.0) at 2400 lb.
Straight line variation between points given.



Empty Weight C.G. Range

None

Maximum Weight

Ramp: 3615 lb.
Takeoff: 3600 lb.
Landing: 3600 lb.

No. of Seats

6 (2 at +85.5, 2 at +119.1, 2 at +157.6)

Maximum Baggage

200 lb. (100 lb. at +42.0, 100 lb. at +178.7)

Fuel Capacity

107 gallons at +94.0 (2 wing tanks) (102 gallons usable)
See NOTE 1 for data on fuel system

Oil Capacity

12 qt. at +16.6 (9-1/4 qt. usable)
See NOTE 1 for data on oil system

Control Surface Movements

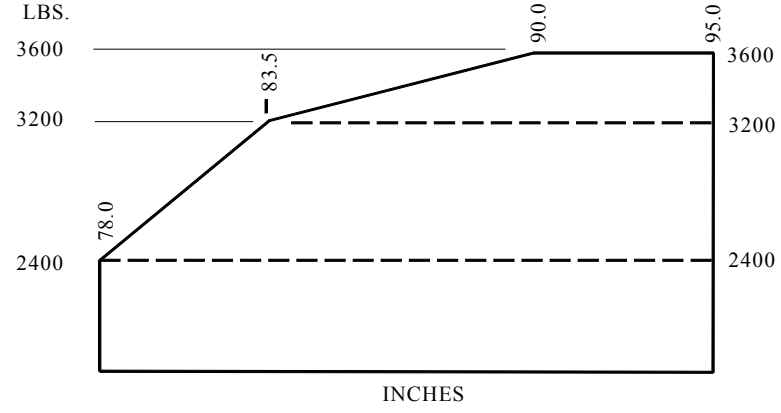
Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
Ailerons	Up	28° (±1°)	Down	22° (±1°)
Rudder	Left	28° (±1°)	Right	28° (±1°)
Stabilator	Up	14.5° (±0.5°)	Down	5.5° (±0.5°)
Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)
Nose Wheel Travel				
	Left	24° (±2°)	Right	24° (±2°)

Manufacturer's Serial Nos.

3232001 and up. The manufacturer is authorized to issue airworthiness certificates for serial numbers 3232001 and up under the delegation option provisions of FAR 21.

XIV. - Model PA-32-301XTC (Piper 6XT), 6 PCLM (Normal Category), Approved August 28, 2003.
Similar to Model PA-32R-301T, Saratoga IITC, except for fixed landing gear and other minor changes.

Engine	Lycoming TIO-540-AH1A Precision Airmotive Injector, Type RSA-10ED1 Flow Setting No. 2576554-2
Fuel	100 or 100LL aviation grade fuel
Engine Limits	For all operations, 2500 r.p.m. and 38.0" Hg MAP (300 rated hp) - Sea level to 12,000 ft. altitude Do not operate above 26.0" Hg MAP below 2100 r.p.m.
Propeller and Propeller Limits	Hartzell constant speed Model HC-I3YR-1RF/F7663DR (3 blade) Hartzell constant speed Model HC-I3YR-1RF/F7663DRB (3 blade with TKS Ice Protection System) Pitch: High 34.0° ± 0.5°, Low 15.2° ± 0.2° at 30 in. station Diameter: Not over 78 in., not under 76 in. Governor: Hartzell V-5-6 Spinner Assy: Piper P/N PS50077-90 or Hartzell P/N C-3575-1 (P) Dome: Hartzell P/N C-3532-16P (with TKS Ice Protection System)
Airspeed Limits (Indicated)	Never exceed 189 knots (218 m.p.h.) Maximum structural cruise 150 knots (173 m.p.h.) Maneuvering (with 3600 lb. gross weight) 132 knots (152 m.p.h.) Flaps extended 113 knots (130 m.p.h.)
C.G. Range	(+90.0) to (+95.0) at 3600 lb. (+83.5) to (+95.0) at 3200 lb. (+78.0) to (+95.0) at 2400 lb. Straight line variation between points given.



Empty Weight C.G. Range	None
Maximum Weight	Ramp: 3615 lb. Takeoff: 3600 lb. Landing: 3600 lb.
No. of Seats	6 (2 at +85.5, 2 at +119.1, 2 at +157.6)
Maximum Baggage	200 lb. (100 lb. at +42.0, 100 lb. at +178.7)
Fuel Capacity	107 gallons at +94.0 (2 wing tanks) (102 gallons usable) See NOTE 1 for data on fuel system

Oil Capacity	12 qt. at +16.6 (9-1/4 qt. usable) See NOTE 1 for data on oil system				
Control Surface Movements	Wing Flaps	Up	0° (±1°)	Down	40° (±2°)
	Ailerons	Up	28° (±1°)	Down	22° (±1°)
	Rudder	Left	28° (±1°)	Right	28° (±1°)
	Stabilator	Up	14.5° (±0.5°)	Down	5.5° (±0.5°)
	Stabilator Tab	Up	5° (±1°)	Down	8° (±1°)
	Nose Wheel Travel				
		Left	24° (±2°)	Right	24° (±2°)

Manufacturer's Serial Nos. 3255001 and up. The manufacturer is authorized to issue airworthiness certificates for serial numbers 3255001 and up under the delegation option provisions of FAR 21.

Data Pertinent to All Models

Datum 78.4" forward of wing leading edge

Leveling Means Two screws left side fuselage below window

Certification Basis Type Certificate No. A3SO issued March 4, 1965.
Date of application for Type Certificate, February 20, 1964.
Delegation Option Authorization per FAR 21, Subpart J, granted July 17, 1968.

PA-32-260, PA-32S-300, and PA-32-300 (S/N 32-15 through 32-7840202): CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962.

PA-32-300, S/N 32-7940001 through 32-7940290: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.221 and 23.959 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; and FAR 23.1581(b)(2) as amended by Amendment 23-21, effective March 1, 1978. Equivalent Safety Finding for CAR 3.757.

PA-32R-300: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.221 and 23.959 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; and FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977.

PA-32RT-300: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.221, 23.959, and 23.1091 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.427 and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 as amended by Amendment 23-15, effective October 31, 1974; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; and FAR Part 36, through Amendment 36-7, effective October 1, 1977. Equivalent Safety Finding for CAR 3.757.

PA-32RT-300T: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.221, 23.901, 23.909, 23.959, 23.1041, 23.1043, 23.1047, 23.1091, 23.1143, and 23.1527 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.427 and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 and 23.1305 as amended by Amendment 23-15, effective October 31, 1974; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21 effective March 1, 1978; and FAR Part 36 through Amendment 36-7, effective October 1, 1977. Equivalent Safety Finding for CAR 3.757, 3.84 and 3.86.

PA-32R-301, S/N 32R-8013001 through 32R-8613006, 3213001 through 3213028, and 3213030 through 3213041: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.207, 23.221, 23.959, and 23.1091 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201, 23.203, and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 and 23.1557(c)(1) as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21, effective March 1, 1978; and FAR 36 through Amendment 36-9, effective January 15, 1979. Equivalent Safety Finding for CAR 3.757 and 3.777.

PA-32R-301, S/N 3213029, 3213042 through 3213103, and 3246001 through 3246087: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.207, 23.221, 23.959, and 23.1091 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201, 23.203, and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 and 23.1557(c)(1) as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21, effective March 1, 1978; and FAR 36, Appendix G, through Amendment 36-16, effective December 22, 1988. Equivalent Safety Finding for CAR 3.757 and 3.777.

PA-32R-301, S/N 3246088 and up: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.207, 23.221, 23.959, and 23.1091 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201, 23.203, and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21, effective March 1, 1978; FAR 23.1545 as amended by Amendment 23-23, effective December 1, 1978; FAR 23.1529 as amended by Amendment 23-26, effective October 14, 1980; FAR 23.1557(c)(1) as amended by Amendment 23-45, effective September 7, 1993; FAR 23.561(b)(3) as amended by Amendment 23-51, effective March 11, 1996; FAR 23.1305 as amended by Amendment 23-52, effective July 25, 1996; and FAR 36 through Amendment 36-16, effective December 22, 1988.

For aircraft S/N 3246218 and up equipped with Piper factory installed optional Avidyne Entegra system and Mid-Continent Model 4300-411 Electric Attitude Indicator, the additional certification basis for installation specific items only (see Report VB-1885) is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.561, 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335 as amended by Amdt. 23-20; FAR 23.853, 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323, 23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, 23.1431 as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition 23-147-SC for HIRF (Docket No. CE207), dated July 16, 2004.

PA-32R-301T, S/N 32R-8029001 through 32R-8629008, and 3229001 through 3229003: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.965 of FAR 23 effective February 1, 1965; FAR 23.207, 23.221, 23.901, 23.909, 23.959, 23.1041, 23.1043, 23.1047, 23.1091, and 23.1527 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201, 23.203, and

23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1305 as amended by Amendment 23-15, effective October 31, 1974; FAR 23.1093 and 23.1557(c)(1) as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21, effective March 1, 1978; and FAR 36 through Amendment 36-9, effective January 15, 1979. Equivalent Safety Finding for CAR 3.757 and 3.777. Compliance with FAR 23.1441 as amended by Amendment 23-9, effective June 17, 1970, will be shown with optional supplemental oxygen.

PA-32-301: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.965 of FAR 23, effective February 1, 1965; FAR 23.207, 23.221, 23.959, and 23.1091 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201, 23.203, and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 and 23.1557(c)(1) as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21, effective March 1, 1978; FAR 23.1545 as amended by Amendment 23-23, effective December 1, 1978; and FAR 36 through Amendment 36-9, effective January 15, 1979.

PA-32-301T: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.965 of FAR 23, effective February 1, 1965; FAR 23.207, 23.221, 23.901, 23.959, 23.1041, 23.1043, 23.1047, 23.1091, 23.1143, and 23.1527 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201 and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1305 as amended by Amendment 23-15, effective October 31, 1974; FAR 23.1093 and 23.1557(c)(1) as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581(b)(2) as amended by Amendment 23-21, effective March 1, 1978; FAR 23.1545 as amended by Amendment 23-23, effective December 1, 1978; and FAR 36 through Amendment 36-9, effective January 15, 1979. Compliance with FAR 23.1441as amended by Amendment 23-9, effective June 17, 1970, will be shown with optional supplemental oxygen.

PA-32R-301T, S/N 3257001 and up: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.965 of FAR 23, effective February 1, 1965; FAR 23.207, 23.221, 23.901, 23.909, 23.959, 23.1041, 23.1043, 23.1047, 23.1091, and 23.1527 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201, 23.203, and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581 as amended by Amendment 23-21, effective March 1, 1978; FAR 23.1545 as amended by Amendment 23-23, effective December 1, 1978; FAR 23.1529 as amended by Amendment 23-26, effective October 14, 1980; FAR 23.1557(c)(1) as amended by Amendment 23-45, effective September 7, 1993; FAR 23.1305 as amended by Amendment 23-52, effective July 25, 1996; and FAR 36 through Amendment 36-16, effective December 22, 1988. Compliance with FAR 23.1441 as amended by Amendment 23-9, effective June 17, 1970, has been shown with optional supplemetnal oxygen.

For aircraft S/N 3257339 and up equipped with Piper factory installed optional Avidyne Entegra system and Mid-Continent Model 4300-411 Electric Attitude Indicator, the additional certification basis for installation specific items only (see Report VB-1885) is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.561, 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335 as amended by Amdt. 23-20; FAR 23.853, 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323,

23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, 23.1431 as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition 23-147-SC for HIRF (Docket No. CE207), dated July 16, 2004.

For aircraft S/N 3257447, 3257455 and up equipped with Piper factory installed optional Garmin G1000 system, the additional certification basis for installation specific items only (see Report VB-1965) is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.561, 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335, 23.1547 as amended by Amdt. 23-20; FAR 23.853, 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323, 23.1326, 23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, 23.1431 as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1553, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition 23-204-SC for HIRF (Docket No. CE264), dated January 24, 2007.

PA-32-301FT, S/N 3232001 and up and PA-32-301 XTC, S/N 3255001 and up: CAR 3, effective May 15, 1956, through Amendment 3-8, effective December 18, 1962. In addition, FAR 23.965 of FAR 23, effective February 1, 1965; FAR 23.207, 23.221, 23.901, 23.909, 23.959, 23.1091, and 23.1527 as amended by Amendment 23-7, effective September 14, 1969; FAR 23.201, 23.203, and 23.967(e)(2) as amended by Amendment 23-14, effective December 20, 1973; FAR 23.1093 as amended by Amendment 23-18, effective May 2, 1977; FAR 23.1327 and 23.1547 as amended by Amendment 23-20, effective September 1, 1977; FAR 23.1581 as amended by Amendment 23-21, effective March 1, 1978; FAR 23.1545 as amended by Amendment 23-23, effective December 1, 1978; FAR 23.1529 as amended by Amendment 23-26, effective October 14, 1980; FAR 23.853(a) and (c)(1) as amended by Amendment 23-34, effective January 15, 1987; FAR 23.1309 as amended by Amendment 23-41 for the communication and navigation LRUs only; FAR 23.1557(c)(1) as amended by Amendment 23-45, effective September 7, 1993; FAR 23.561(b)(3) as amended by Amendment 23-48, effective March 11, 1996; FAR 23.1041, 23.1043, and 23.1047 as amended by Amendment 23-51, effective March 11, 1996; FAR 23.1305 as amended by Amendment 23-52, effective July 25, 1996; and FAR 36 through the latest Amendment at the time of certification. Compliance with FAR 23.1441 as amended by Amendment 23-9, effective June 17, 1970, has been show with supplemental oxygen for the PA-32-301XTC only.

For aircraft equipped with Piper factory installed S-Tec system 55X autopilot installations, the additional certification basis for installation specific items only is: 14 CFR Part 23 regulations FAR 23.609, 23.627 issued on 02/01/65; FAR 23.611, 23.619, 23.625 as amended by Amdt. 23-7 Eff. 09/14/69; FAR 23.603 as amended by Amdt. 23-23, Eff. 12/01/78; FAR 23.1309 as amended by 23-41

Eff. 11/26/90; FAR 23.572(a)(1), 23.613(a)(b)(d) as amended by Amdt. 23-45, Eff. 09/07/93; FAR 23.561(b)(3)(e) as amended by Amdt. 23-48, Eff. 03/11/96; FAR 23.1329 as amended by Amdt. 23-49 Eff. 02/09/96.

For PA-32-301FT aircraft S/N 3232014 and up and PA-32-301XTC aircraft S/N 3255015 and up equipped with Piper factory installed optional Avidyne Entegra system and Mid-Continent Model 4300-411 Electric Attitude Indicator, the additional certification basis for installation specific items only (see Report VB-1885) is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.561, 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335 as amended by Amdt. 23-20; FAR 23.853, 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323, 23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, 23.1431 as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition 23-147-SC for HIRF (Docket No. CE207), dated July 16, 2004.

For PA-32-301FT aircraft S/N 3232068 and up equipped with Piper factory installed optional Garmin G1000 system, the additional certification basis for installation specific items only (see Report VB-1965) is: 14 CFR Part 23 regulations FAR 23.301, 23.337, 23.341, 23.561, 23.607, 23.611, as amended by Amdt. 23-48; FAR 23.303, 23.307, 23.601, 23.609, 23.1367, 23.1381 issued on 02/01/65; FAR 23.305, 23.613, 23.773, 23.1525, 23.1549 as amended by Amdt. 23-45; FAR 23.603, 23.605 as amended by Amdt. 23-23; FAR 23.777, 23.1191, 23.1337 as amended by Amdt. 23-51; FAR 23.1301, 23.1327, 23.1335, 23.1547 as amended by Amdt. 23-20; FAR 23.853, 23.867, 23.1303, 23.1307, 23.1309, 23.1311, 23.1321, 23.1323, 23.1326, 23.1329, 23.1351, 23.1353, 23.1359, 23.1361, 23.1365, 23.1431 as amended by Amdt. 23-49; FAR 23.1305 as amended by Amdt. 23-52; FAR 23.1322, 23.1331, 23.1357 as amended by Amdt. 23-43; FAR 23.1325, 23.1543, 23.1545, 23.1553, 23.1555, 23.1563, 23.1581, 23.1583, 23.1585 as amended by Amdt. 23-50; FAR 23. 771 as amended by Amdt. 23-14; FAR 23.1501, 23.1541 as amended by Amdt. 23-21; FAR 23.1523 as amended by Amdt. 23-34; FAR 23.1529 as amended by Amdt. 23-26; Special Condition 23-204-SC for HIRF (Docket No. CE264), dated January 24, 2007.

Production basis

Production Certificate No. 206. The manufacturer is authorized to issue airworthiness certificates under the delegation option provisions of FAR 21.

Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification.

In addition, the following documents are required:

MODEL	AFM/POH	REPORT NO.	APPROVED	S/N EFFECTIVITY
PA-32-260	AFM	VB-152	3- 4-65	32-1 through 32-1110
	AFM	VB-156	12-17-68	32-1111 through 32-1297, and 32-7100001 through 32-7200045

	AFM Supp.	VB-357	8-25-71	32-1 through 32-1297, and 32-7100001 through 32-7100027
	AFM	VB-478	9- 1-72	32-7300001 through 32-7300065
	AFM	VB-561	5-14-73	32-7400001 through 32-7600024
	POH	VB-820	8-18-76	32-7700001 through 32-7800008
PA-32-300	AFM	VB-154	5-27-66	32-40000 through 32-40565
	AFM	VB-158	12-17-68	32-40566 through 32-40974, and 32-7140001 through 32-7240055
	AFM Supp.	VB-357	8-25-71	32-40000 through 32-40974, and 32-7140001 through 32-7240001
	AFM	VB-393	1-20-72	32-7240056 through 32-7340191
	AFM	VB-562	5-14-73	32-7440001 through 32-7640130
	POH	VB-830	8-19-76	32-7740001 through 32-7840202
	POH	VB-830, Rev. 4	9-21-78	32-7940001 through 32-7940290
PA-32R-300	POH	VB-750	8- 1-75	32R-7680001 through 32R-7680525
	POH	VB-840	8-20-76	32R-7780001 through 32R-7880066
PA-32S-300	AFM	VB-184	2-14-67	32S-40001 through 32S-40565
	AFM	VB-186	12-17-68	32S-40566 through 32S-40974, and 32S-7140001 through 32S-7240137
	AFM Supp.	VB-357	8-25-71	32S-40001 through 32S-40974, and 32S-7140001 through 32S-7240137
PA-32RT-300	POH/AFM	VB-890	12-13-77	32R-7885002 through 32-7985106
PA-32RT-300T	POH/AFM	VB-900	5-1-78	32R-7787001, and 32R-7887002 through 32R-7987126
PA-32R-301	POH/AFM	VB-1080	11-8-79	32R-8013001 through 32R-8613006, 3213001 through 3213028, and 3213030 through 3213041
	POH/AFM	VB-1551	5-31-93	3213029, and 3213042 through 3213103
	POH/AFM	VB-1614	7-12-95	3246001 through 3246017
	POH/AFM	VB-1600	11-30-95	3246018 through 3246087
	POH/AFM	VB-1669	6-30-97	3246088 and up
PA-32R-301T	POH/AFM	VB-1090	11-8-79	32R-8029001 through 32R-8629008, and 3229001 through 3229003
	POH/AFM	VB-1647	6-30-97	3257001 and up
PA-32-301	POH/AFM	VB-1060	1-9-80	32-8006002 through 32-8606023, and 3206001 through 3206019
PA-32-301T	POH/AFM	VB-1070	1-9-80	32-8024001 through 32-8424002
	POH/AFM	VB-1975	4-9-2007	3257447, 3257455 and up having the Garmin G1000 system installed
PA-32-301FT	POH/AFM	VB-1850	7-22-2003	3232001 and up
	POH/AFM	VB-1976	4-9-2007	3232068 and up having the Garmin G1000 system installed
PA-32-301XTC	POH/AFM	VB-1881	8-26-2003	3255001 and up

NOTE 1 Current weight and balance report, including list of equipment included in certificated empty weight, and loading instructions when necessary, must be provided for each aircraft at the time of original certification. The certificated empty weight and corresponding center of gravity locations must include undrainable system oil (not included in oil capacity) and unusable fuel as noted below:

Models PA-32-260 and PA-32-300 (S/N 32-40000 through 32-40974, and 32-7140001 through 32-7840202):
Fuel 2.3 lb. at +103.0
Models PA-32R-300, PA-32RT-300, PA-32RT-300T and PA-32-300 (S/N 32-7940001 through 32-7940290):
Fuel 24.0 lb. at +103.0
Models PA-32R-301, PA-32R-301T, PA-32-301, and PA-32-301T:
Fuel 30.0 lb. at +95.2
Model PA-32-260:
Oil 2.4 lb. at +23.0
Models PA-32-300, PA-32R-300, PA-32RT-300T, PA-32R-301, PA-32R-301T, PA-32-301 and PA-32-301T:
Oil 3.0 lb. at +23.0

NOTE 2 All placards required in the Approved Airplane Flight Manual or "Pilot's Operating Handbook and Approved Airplane Flight Manual" and Approved A.F.M. Supplements, plus the following placards, must be displayed in full view of the pilot, in the appropriate location.

(a) "THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS. NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED."

(b) "THIS AIRCRAFT APPROVED FOR VFR, IFR, DAY AND NIGHT NON-ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135."

NOTE 3 The Models PA-32-260, PA-32-300, and PA-32S-300, 6 PCLM, may be converted to the 7 place (7 PCLM) configuration by the installation of Piper Kit No. 69072-3. All weight in excess of 3112 lb. must be fuel weight only. This restriction does not apply to PA-32-300 aircraft, S/N 32-7940001 through 32-7940290.

NOTE 4 When the Model PA-32S-300 is operated in a landplane configuration, use the PA-32-300 C.G. envelope with the corresponding airplane serial number (last five digits).

NOTE 5 The Model PA-32-260, S/N 32-1 through 32-1297, and 32-7100001 through 32-7700023, and Model PA-32-300, S/N 32-40001 through 32-40974, and 32-7140001 through 32-7740113, require two nose wheel centering springs (P/N 67168) installed, if the optional nose wheel fairing or the optional nose and main wheel fairings are removed or not installed.

The Model PA-32-260, S/N 32-7800001 through 32-7800008, and Model PA-32-300, S/N 32-7840001 through 32-7940290, require rudder centering spring (P/N 37929-2) installed, if the optional nose wheel fairing or the optional nose and main wheel fairings are removed or not installed.

The Model PA-32-260, S/N 32-7800001 through 32-7800008, requires the removal of the nose gear strut fairing (P/N 37891) when the nose gear wheel fairing is removed or not installed.

NOTE 6 Models PA-32-260, PA-32-300, PA-32S-300, and PA-32R-301 (S/N 32R-8013001 through 32R-8613006, 3213001 through 3213028, and 3213030 through 3213041) may be operated with the spinner dome removed or with the spinner dome and rear bulkhead removed. Models PA-32R-300, PA-32RT-300 and PA-32-301 may be operated with spinner dome and front bulkhead removed.

NOTE 7 The following serial numbered aircraft are not eligible for import certification to the U.S.:

PA-32-300:
32-40491, 32-40503, 32-40518, 32-40532, 32-40533, 32-40544, 32-40545, 32-40965, 32-40966, 32-40968 through 32-40974, 32-7240120, 32-7240123, 32-7240126, 32-7240129, 32-7240132, 32-7340133, 32-7340155, 32-7340159, 32-7340160, 32-7340172, 32-7440144, 32-7540114, 32-7540136, 32-7640127, 32-7740100, 32-7840028, 32-7940141, and 32-7940240.
PA-32R-300:
32R-7680409, 32R-7680410, 32R-7780520, 32R-7880057, 32R-7880058, 32R-7880067, and 32R-7880068.
PA-32RT-300:
32R-7885027, 32R-7885099, 32R-7885100, 32R-7885176, 32R-7885177, 32R-7885213 through 32R-7885215, 32R-7885234 through 32R-7885237, 32R-7885259, 32R-7885260, 32R-7885285, and 32R-7985027.
PA-32RT-300T:
32R-7887036, 32R-7887081, 32R-7887222, 32R-7987050, 32R-7987085, and 32R-7987122.
PA-32R-301T:

32R-8029121, 32R-8129041, 32R-8229065, and 32R-8329017.
PA-32-301:
32-8006090, 32-8106043, and 3206005, 3206020 through 3206041, 3206045, 3206046, 3206048, 3206049, 3206056 through 3206059, 3206061 through 3206088.
PA-32-301T:
32-8024031, 32-8024032, 32-8124011, 32-8124017, 32-8124018, 32-8124035, 32-8124036, 32-8224011, 32-8224013, 32-8224014, 32-8324006, 32-8324015, and 32-8324016.

NOTE 8 The fixed pitch propeller may be used on S/N 32-1 through 32-1297, and 32-7100001 through 32-7200045.

NOTE 9 The following serial numbered aircraft are not eligible for import certification to the U.S.:

AR32-7440144, AR32-7340133, AR32-7340155, AR32-7340159, AR32-7340160, AR32-7340172.

NOTE 10 Engines with serial numbers ending with "A" require the F-4-11( ) propeller governor assembly. Other engines require the F-4-4( ) propeller governor.

NOTE 11 In the following serial numbered aircraft the rear seat location is farther aft as shown and the center seats may be removed and replaced by CLUB SEATS INSTALLATION, which has a more aft C.G. location as shown:

PA-32-260	S/N 32-7700001 through 32-7800008
PA-32-300	S/N 32-7740001 through 32-7940290
PA-32R-300	S/N 32R-7680001 through 32R-7880068
PA-32RT-300	S/N 32R-7885002 through 32R-7985106
PA-32RT-300T	S/N 32R-7787001, 32R-7887002 through 32R-7987126
PA-32R-301	S/N 32R-8013001 through 32R-8613006, 3213001 through 3213103, and 3246001 and up
PA-32R-301T	S/N 32R-8029001 through 32R-8629008, and 3229001 through 3229003
PA-32-301	S/N 32-8006002 through 32-8606023, and 3206001 through 3206019
PA-32-301T	S/N 32-8024001 through 32-8424002

NOTE 12 Lycoming engine Model IO-540-K1G5 with Hartzell propeller HC-C2YK-1(F), Blade Model 8475D-4, S/N 32-7640066 (only) and S/N 32-7640072 through 32-7940290.

NOTE 13 Lycoming engine Model IO-540-K1G5D with Hartzell propeller HC-C2YK-1(F), Blade Model 8475D-4, S/N 32R-7680141 through 32R-7880068.

NOTE 14 On Models PA-32-301, S/N 32-8006001 through 32-8606023 and 3206001 through 3206019, and PA-32-301T, S/N 32-8024001 through 32-8424002, the wheel fairings alone or the wheel fairings and landing gear strut fairings may be removed.

NOTE 15 On models PA-32-301FT, S/N 3232001 and up, and PA-32-301XTC, S/N 3255001 and up, the nose wheel centering springs must be installed when operating the aircraft with or without wheel pants.

END OF SECTION 4

Section V FAA FORMS

- FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance)

- FAA Form 8130-3, Authorized Release Certificate

US Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved OMB No. 2120-0020 11/30/2007

Electronic Tracking Number

For FAA Use Only

INSTRUCTIONS: Print or type all entries. See Title 14 CFR §43.9, Part 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. §44701). Failure to report can result in a civil penalty for each such violation. (49 U.S.C. §46301(a))

1. Aircraft	Nationality and Registration Mark	Serial No.	
	Make	Model	Series
2. Owner	Name *(As shown on registration certificate)*	Address *(As shown on registration certificate)* Address City State Zip Country	

3. For FAA Use Only

4. Type		5. Unit Identification			
Repair	Alteration	Unit	Make	Model	Serial No.
☐	☐	AIRFRAME		*(As described in Item 1 above)*	
☐	☐	POWERPLANT			
☐	☐	PROPELLER			
☐	☐	APPLIANCE	Type Manufacturer		

6. Conformity Statement

A. Agency's Name and Address	B. Kind of Agency		
Name	☐ U. S. Certificated Mechanic	☐ Manufacturer	
Address	☐ Foreign Certificated Mechanic	C. Certificate No.	
City State	☐ Certificated Repair Station		
Zip Country	☐ Certificated Maintenance Organization		

D. I certify that the repair and/or alteration made to the unit(s) identified in item 5 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Extended range fuel per 14 CFR Part 43 App. B ☐	Signature/Date of Authorized Individual

7. Approval for Return to Service

Pursuant to the authority given persons specified below, the unit identified in item 5 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☐ Approved ☐ Rejected

BY	☐	FAA Flt. Standards Inspector	☐ Manufacturer	☐ Maintenance Organization	☐	Persons Approved by Canadian Department of Transport	
	☐	FAA Designee	☐ Repair Station	☐ Inspection Authorization		Other *(Specify)*	

Certificate or Designation No.	Signature/Date of Authorized Individual

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished
(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

Nationality and Registration Mark	Date

☐ Additional Sheets Are Attached

Paperwork Reduction Act Statement: The reason for collecting this information is to track major maintenance performed on aircraft. The collected information is used as part of the aircraft's historical file. The public reporting burden for this collection of information is estimated to average 30 minutes per response. Responses are mandated by 14 CFR Part 43. Collected information becomes part of the public record and no confidentiality is required. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection is 2120-0020. Comments concerning the accuracy of this burden and suggestions for reducing the burden should be directed to the FAA at: 800 Independence Ave. SW Washington, DC 20591, Attn: Information Collection Clearance Officer, AIO-20.

1. Approving National Aviation Authority/Country:	2.	3. Form Tracking Number:
	AUTHORIZED RELEASE CERTIFICATE **FAA Form 8130–3, AIRWORTHINESS APPROVAL TAG**	
4. Organization Name and Address:		5. Work Order/Contract/Invoice Number:

6. Item:	7. Description:	8. Part Number:	9. Eligibility: *	10. Quantity:	11. Serial/Batch Number:	12. Status/Work:

13. Remarks:

14. Certifies the items identified above were manufactured in conformity to: ☐ Approved design data and are in a condition for safe operation. ☐ Non-approved design data specified in Block 13.		19. ☐ 14 CFR 43.9 Return to Service ☐ Other regulation specified in Block 13 Certifies that unless otherwise specified in Block 13, the work identified in Block 12 and described in Block 13 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.	
15. Authorized Signature:	16. Approval/Authorization No.:	20. Authorized Signature:	21. Approval/Certificate No.:
17. Name (Typed or Printed):	18. Date (m/d/y):	22. Name (Typed or Printed):	23. Date (m/d/y):

User/Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the part/component/assembly.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts parts/components/assemblies from the airworthiness authority of the country specified in Block 1.

Statements in Blocks 14 and 19 do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

FAA Form 8130–3 (6–01) *Installer must cross-check eligibility with applicable technical data. NSN: 0052-00-012-9005

END OF SECTION 5