Chapter 9

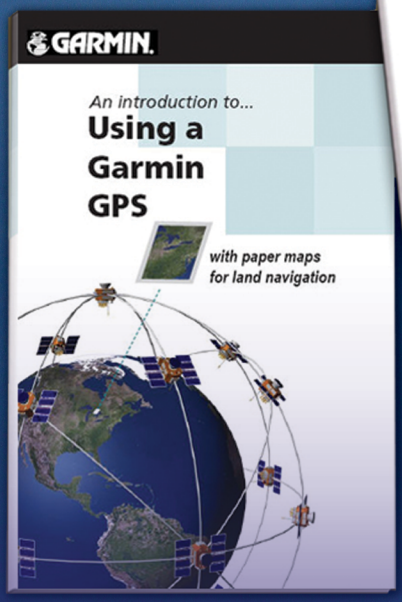
Flight Manuals and Other Documents

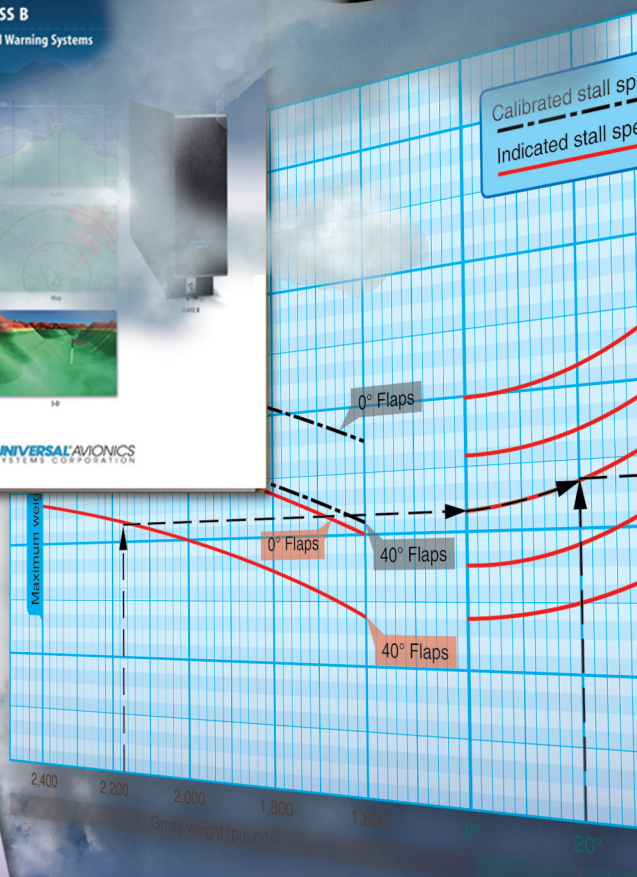
Introduction

Each aircraft comes with documentation and a set of manuals with which a pilot must be familiar in order to fly that aircraft. This chapter covers airplane flight manuals (AFM), the pilot's operating handbook (POH), and aircraft documents pertaining to ownership, airworthiness, maintenance, and operations with inoperative equipment. Knowledge of these required documents and manuals is essential for a pilot to conduct a safe flight.

Airplane Flight Manuals (AFM)

Flight manuals and operating handbooks are concise reference books that provide specific information about a particular aircraft or subject. They contain basic facts, information, and/or instructions for the pilot about the operation of an aircraft, flying techniques, etc., and are intended to be kept on hand for ready reference.





The aircraft owner/information manual is a document developed by the aircraft manufacturer and contains general information about the make and model of the aircraft. The manual is not approved by the Federal Aviation Administration (FAA) and is not specific to an individual aircraft. The manual provides general information about the operation of an aircraft, is not kept current, and cannot be substituted for the AFM/POH.

An AFM is a document developed by the aircraft manufacturer and approved by the FAA. This book contains the information and instructions required to operate an aircraft safely. A pilot must comply with this information which is specific to a particular make and model of aircraft, usually by serial number. An AFM contains the operating procedures and limitations of that aircraft. Title 14 of the Code of Federal Regulations (14 CFR) part 91 requires that pilots comply with the operating limitations specified in the approved flight manuals, markings, and placards.

Originally, flight manuals followed whatever format and content the manufacturer felt was appropriate, but this changed with the acceptance of Specification No. 1 prepared by the General Aviation Manufacturers Association (GAMA). Specification No. 1 established a standardized format for all general aviation airplane and helicopter flight manuals.

The POH is a document developed by the aircraft manufacturer and contains FAA-approved AFM information. If "POH" is used in the main title, a statement must be included on the title page indicating that sections of the document are FAA approved as the AFM.

The POH for most light aircraft built after 1975 is also designated as the FAA-approved flight manual. The typical AFM/POH contains the following nine sections: General; Limitations; Emergency Procedures; Normal Procedures; Performance; Weight and Balance/Equipment List; Systems Description; Handling, Service, and Maintenance; and Supplements. Manufacturers also have the option of including additional sections, such as one on Safety and Operational Tips or an alphabetical index at the end of the POH.

Preliminary Pages

While the AFM/POH may appear similar for the same make and model of aircraft, each manual is unique and contains specific information about a particular aircraft, such as the equipment installed and weight and balance information. Manufacturers are required to include the serial number and registration on the title page to identify the aircraft to which the manual belongs. If a manual does not indicate a specific aircraft registration and serial number, it is limited to general study purposes only.

Most manufacturers include a table of contents that identifies the order of the entire manual by section number and title. Usually, each section also contains a table of contents for that section. Page numbers reflect the section and page within that section (1-1, 1-2, 2-1, 3-1, etc.). If the manual is published in loose-leaf form, each section is usually marked with a divider tab indicating the section number, title, or both. The Emergency Procedures section may have a red tab for quick identification and reference.

General (Section 1)

The General section provides the basic descriptive information on the airframe and powerplant(s). Some manuals include a three-dimensional drawing of the aircraft that provides dimensions of various components. Included are such items as wingspan, maximum height, overall length, wheelbase length, main landing gear track width, diameter of the rotor system, maximum propeller diameter, propeller ground clearance, minimum turning radius, and wing area. This section serves as a quick reference and helps a pilot become familiar with the aircraft.

The last segment of the General section contains definitions, abbreviations, explanations of symbology, and some of the terminology used in the POH. At the discretion of the manufacturer, metric and other conversion tables may also be included.

Limitations (Section 2)

The Limitations section contains only those limitations required by regulation or that are necessary for the safe operation of the aircraft, powerplant, systems, and equipment. It includes operating limitations, instrument markings, color-coding, and basic placards. Some of the limitation areas are airspeed, powerplant, weight and loading distribution, and flight.

Airspeed

Airspeed limitations are shown on the airspeed indicator (ASI) by color coding and on placards or graphs in the aircraft. *[Figure 9-1]* A red line on the ASI shows the airspeed limit beyond which structural damage could occur. This is called the never-exceed speed (V_{NE}). A yellow arc indicates the speed range between maximum structural cruising speed (V_{N0}) and V_{NE}. Operation of an aircraft in the yellow airspeed arc is for smooth air only and then only with caution. A green arc depicts the normal operating speed range, with the upper end at V_{N0} and the lower end at stalling speed at maximum weight with the landing gear and flaps retracted (V_{S1}). For airplanes, the flap operating range is depicted by the white arc, with the upper end at the maximum flap extended speed (V_{FE}), and the lower end at the stalling speed with the landing gear and flaps in the landing configuration (V_{S0}).

Figure 9-1. *Single-engine airspeed indicator.*

In addition to the markings listed above, small multi-engine airplanes have a red radial line to indicate single-engine minimum controllable airspeed (V_{MC}). A blue radial line is used to indicate single-engine best rate of climb speed at maximum weight at sea level (V_{YSE}). *[Figure 9-2]*

Powerplant

The Powerplant Limitations portion describes operating limitations on an aircraft's reciprocating or turbine engine(s). These include limitations for takeoff power, maximum continuous power, and maximum normal operating power, which is the maximum power the engine can produce without any restrictions and is depicted by a green arc. Other items that can be included in this area are the minimum and maximum oil and fuel pressures, oil and fuel grades, and propeller operating limits. *[Figure 9-3]*

All reciprocating-engine powered aircraft must have a revolutions per minute (rpm) indicator for each engine. Aircraft equipped with a constant-speed propeller or rotor system use a manifold pressure gauge to monitor power output and a tachometer to monitor propeller or rotor speed. Both instruments depict the maximum operating limit with

Figure 9-2. *Multi-engine airspeed indicator.*

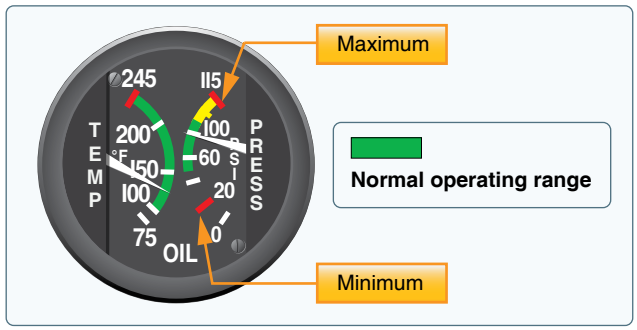


Figure 9-3. *Minimum, maximum, and normal operating range markings on oil gauge.*

a red radial line and the normal operating range with a green arc. *[Figure 9-4]* Some instruments may have a yellow arc to indicate a caution area.

Weight and Loading Distribution

Weight and Loading Distribution contains the maximum certificated weights, as well as the center of gravity (CG) range. The location of the reference datum used in balance computations is included in this section. Weight and balance computations are not provided in this area, but rather in the weight and balance section of the AFM/POH.

Figure 9-4. *Manifold pressure gauge (top) and tachometer (bottom).*

Flight Limits

Flight Limits list authorized maneuvers with appropriate entry speeds, flight load factor limits, and types of operation limits. It also indicates those maneuvers that are prohibited, such as spins or acrobatic flight, as well as operational limitations such as flight into known icing conditions.

Placards

Most aircraft display one or more placards that contain information having a direct bearing on the safe operation of the aircraft. These placards are located in conspicuous places and are reproduced in the Limitations section or as directed by an Airworthiness Directive (AD). *[Figure 9-5]* Airworthiness Directives are explained in detail later in this chapter.

Emergency Procedures (Section 3)

Checklists describing the recommended procedures and airspeeds for coping with various types of emergencies or critical situations are located in the Emergency Procedures section. Some of the emergencies covered include: engine failure, fire, and system failure. The procedures for inflight engine restarting and ditching may also be included. Manufacturers may first show an emergency checklist in an abbreviated form with the order of items reflecting the sequence of action. Amplified checklists that provide additional information on the procedures follow the abbreviated checklist. To be prepared for emergency situations, memorize the immediate action items and, after completion, refer to the appropriate checklist.

Figure 9-5. *Placards are used to depict aircraft limitations.*

Manufacturers may include an optional subsection entitled Abnormal Procedures. This subsection describes recommended procedures for handling malfunctions that are not considered emergencies.

Normal Procedures (Section 4)

This section begins with a list of the airspeeds for normal operations. The next area consists of several checklists that may include preflight inspection, before starting procedures, starting engine, before taxiing, taxiing, before takeoff, climb, cruise, descent, before landing, balked landing, after landing, and post flight procedures. An Amplified Procedures area follows the checklists to provide more detailed information about the various previously mentioned procedures.

To avoid missing important steps, always use the appropriate checklists when available. Consistent adherence to approved checklists is a sign of a disciplined and competent pilot.

Performance (Section 5)

The Performance section contains all the information required by the aircraft certification regulations and any additional performance information the manufacturer deems important to pilot ability to safely operate the aircraft. Performance charts, tables, and graphs vary in style, but all contain the same basic information. Examples of the performance information found in most flight manuals include a graph or table for converting calibrated airspeed to true airspeed; stall speeds in various configurations; and data for determining takeoff and climb performance, cruise performance, and landing performance. *Figure 9-6* is an example of a typical performance graph. For more information on use of the charts, graphs, and tables, refer to Chapter 10, Aircraft Performance.

Weight and Balance/Equipment List (Section 6)

The Weight and Balance/Equipment List section contains all the information required by the FAA to calculate the weight and balance of an aircraft. Manufacturers include sample weight and balance problems. Weight and balance is discussed in greater detail in Chapter 10, Weight and Balance.

Systems Description (Section 7)

This section describes the aircraft systems in a manner appropriate to the pilot most likely to operate the aircraft. For example, a manufacturer might assume an experienced pilot will be reading the information for an advanced aircraft. For more information on aircraft systems, refer to Chapter 7, Aircraft Systems.

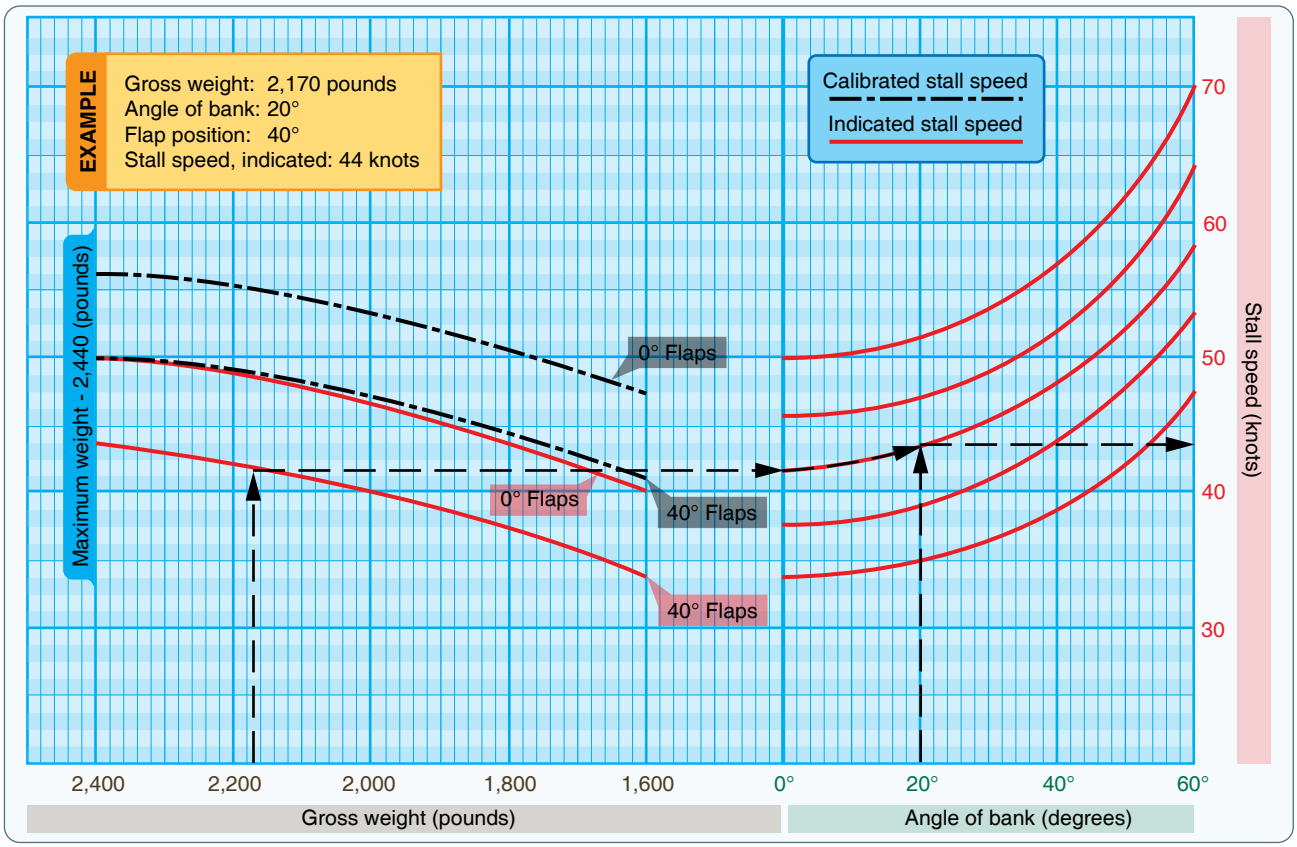


Figure 9-6. *Stall speed chart.*

Handling, Service, and Maintenance (Section 8)

The Handling, Service, and Maintenance section describes the maintenance and inspections recommended by the manufacturer (and the regulations). Additional maintenance or inspections may be required by the issuance of ADs applicable to the airframe, engine, propeller, or components. This section also describes preventive maintenance that may be accomplished by certificated pilots, as well as the manufacturer's recommended ground handling procedures. It includes considerations for hangaring, tie-down, and general storage procedures for the aircraft.

Supplements (Section 9)

The Supplements section contains information necessary to safely and efficiently operate the aircraft when equipped with optional systems and equipment (not provided with the standard aircraft). Some of this information may be supplied by the aircraft manufacturer or by the manufacturer of the optional equipment. The appropriate information is inserted into the flight manual at the time the equipment is installed. Autopilots, navigation systems, and air-conditioning systems are examples of equipment described in this section. *[Figure 9-7]*

Figure 9-7. *Supplements provide information on optional equipment.*

Safety Tips (Section 10)

The Safety Tips section is an optional section containing a review of information that enhances the safe operation of the aircraft. For example, physiological factors, general weather information, fuel conservation procedures, high altitude operations, or cold weather operations might be discussed.

Aircraft Documents

Certificate of Aircraft Registration

Before an aircraft can be flown legally, it must be registered with the FAA Aircraft Registry. The Certificate of Aircraft Registration, which is issued to the owner as evidence of the registration, must be carried in the aircraft at all times. *[Figure 9-8]*

The Certificate of Aircraft Registration cannot be used for operations when:

- The aircraft is registered under the laws of a foreign country
- The aircraft's registration is canceled upon written request of the certificate holder
- The aircraft is totally destroyed or scrapped
- The ownership of the aircraft is transferred
- The certificate holder loses United States citizenship

For additional information, see 14 CFR part 47, section 47.41. When one of the events listed in 14 CFR part 47, section 47.41 occurs, the previous owner must notify the FAA by filling in the back of the Certificate of Aircraft Registration, and mailing it to:

FAA Aircraft Registration Branch, AFS-750
P.O. Box 25504
Oklahoma City, OK 73125-0504

A dealer's aircraft registration certificate is another form of registration certificate, but is valid only for required flight tests by the manufacturer or in flights that are necessary for

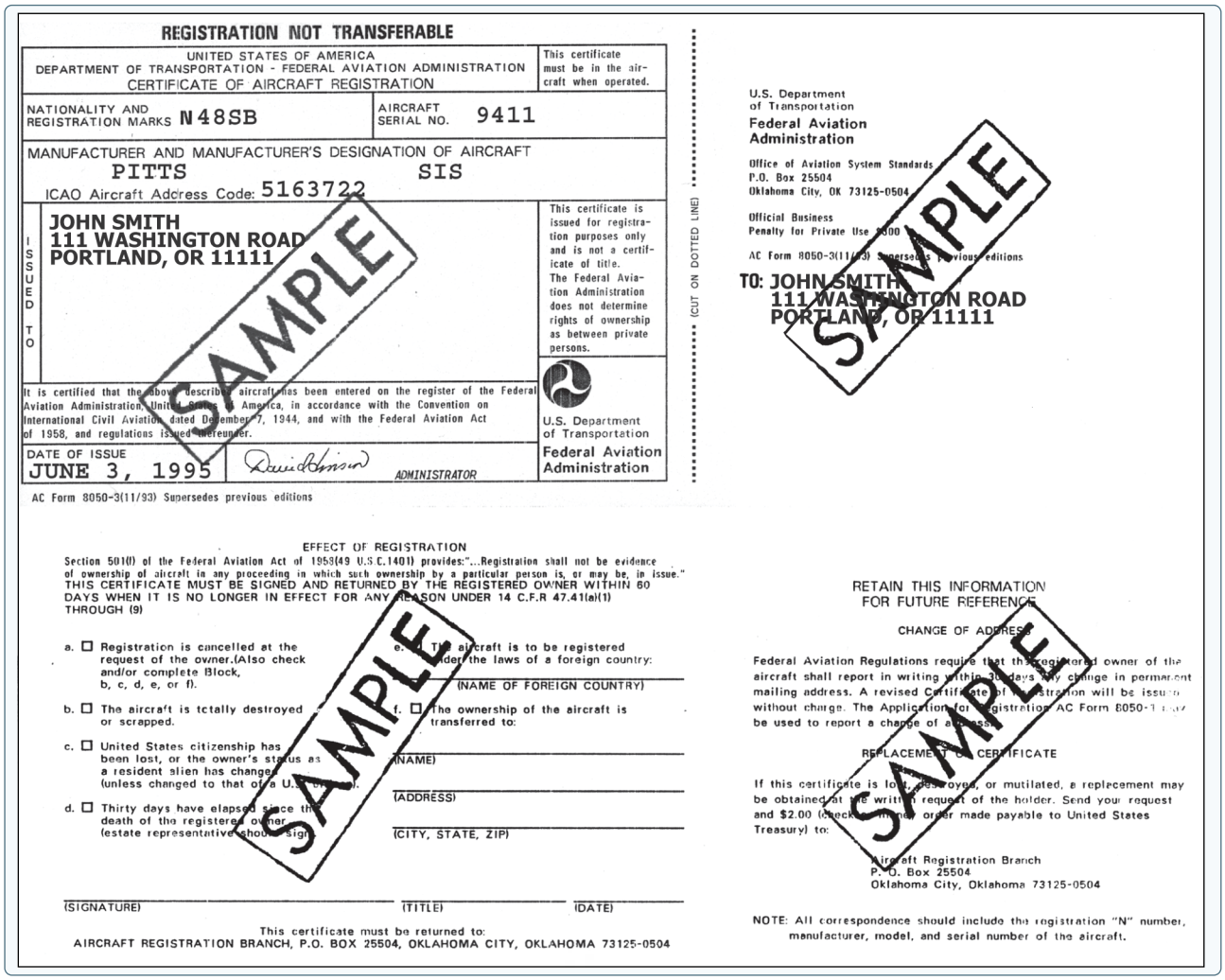

REGISTRATION NOT TRANSFERABLE
UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION
CERTIFICATE OF AIRCRAFT REGISTRATION
This certificate must be in the aircraft when operated.
NATIONALITY AND REGISTRATION MARKS N48SB
AIRCRAFT SERIAL NO. 9411
MANUFACTURER AND MANUFACTURER'S DESIGNATION OF AIRCRAFT
PITTS SIS
ICAO Aircraft Address Code: 5163722
ISSUED TO
JOHN SMITH
111 WASHINGTON ROAD
PORTLAND, OR 11111
This certificate is issued for registration purposes only and is not a certificate of title. The Federal Aviation Administration does not determine rights of ownership as between private persons.
It is certified that the above described aircraft has been entered on the register of the Federal Aviation Administration, United States of America, in accordance with the Convention on International Civil Aviation dated December 7, 1944, and with the Federal Aviation Act of 1958, and regulations issued thereunder.
U.S. Department of Transportation
Federal Aviation Administration
DATE OF ISSUE
JUNE 3, 1995
ADMINISTRATOR
AC Form 8050-3(11/93) Supersedes previous editions
SAMPLE
(CUT ON DOTTED LINE)
U.S. Department of Transportation
Federal Aviation Administration
Office of Aviation System Standards
P.O. Box 25504
Oklahoma City, OK 73125-0504
Official Business
Penalty for Private Use $300
AC Form 8050-3(11/93) Supersedes previous editions
TO: JOHN SMITH
111 WASHINGTON ROAD
PORTLAND, OR 11111
SAMPLE
EFFECT OF REGISTRATION
Section 501(f) of the Federal Aviation Act of 1958(49 U.S.C.1401) provides:"...Registration shall not be evidence of ownership of aircraft in any proceeding in which such ownership by a particular person is, or may be, in issue."
THIS CERTIFICATE MUST BE SIGNED AND RETURNED BY THE REGISTERED OWNER WITHIN 60 DAYS WHEN IT IS NO LONGER IN EFFECT FOR ANY REASON UNDER 14 C.F.R 47.41(a)(1) THROUGH (9)
a. ☐ Registration is cancelled at the request of the owner.(Also check and/or complete Block, b, c, d, e, or f).
b. ☐ The aircraft is totally destroyed or scrapped.
c. ☐ United States citizenship has been lost, or the owner's status as a resident alien has changed (unless changed to that of a U.S. citizen).
d. ☐ Thirty days have elapsed since the death of the registered owner (estate representative should sign).
e. ☐ The aircraft is to be registered under the laws of a foreign country:
(NAME OF FOREIGN COUNTRY)
f. ☐ The ownership of the aircraft is transferred to:
(NAME)
(ADDRESS)
(CITY, STATE, ZIP)
(SIGNATURE) (TITLE) (DATE)
This certificate must be returned to:
AIRCRAFT REGISTRATION BRANCH, P.O. BOX 25504, OKLAHOMA CITY, OKLAHOMA 73125-0504
SAMPLE
RETAIN THIS INFORMATION FOR FUTURE REFERENCE
CHANGE OF ADDRESS
Federal Aviation Regulations require that the registered owner of the aircraft shall report in writing within 30 days any change in permanent mailing address. A revised Certificate of Registration will be issued without charge. The Application for Registration AC Form 8050-1 may be used to report a change of address.
REPLACEMENT OF CERTIFICATE
If this certificate is lost, destroyed, or mutilated, a replacement may be obtained at the written request of the holder. Send your request and $2.00 (check or money order made payable to United States Treasury) to:
Aircraft Registration Branch
P.O. Box 25504
Oklahoma City, Oklahoma 73125-0504
NOTE: All correspondence should include the registration "N" number, manufacturer, model, and serial number of the aircraft.
SAMPLE

Figure 9-8. *AC Form 8050-3, Certificate of Aircraft Registration.*

the sale of the aircraft by the manufacturer or a dealer. The dealer must remove the certificate when the aircraft is sold.

Upon complying with 14 CFR part 47, section 47.31, the pink copy of the application for an Aircraft Registration Application, Aeronautical Center (AC) Form 8050-1, provides authorization to operate an unregistered aircraft for a period not to exceed 90 days. Since the aircraft is unregistered, it cannot be operated outside of the United States until a permanent Certificate of Aircraft Registration is received and placed in the aircraft.

The FAA does not issue any certificate of ownership or endorse any information with respect to ownership on a Certificate of Aircraft Registration.

NOTE: For additional information concerning the Aircraft Registration Application or the Aircraft Bill of Sale, contact the nearest FAA Flight Standards District Office (FSDO).

Airworthiness Certificate

An Airworthiness Certificate is issued by a representative of the FAA after the aircraft has been inspected, is found to meet the requirements of 14 CFR part 21, and is in condition for safe operation. The Airworthiness Certificate must be displayed in the aircraft so it is legible to the passengers and crew whenever it is operated. The Airworthiness Certificate must remain with the aircraft unless it is sold to a foreign purchaser.

A Standard Airworthiness Certificate is issued for aircraft type certificated in the normal, utility, acrobatic, commuter, transport categories, and manned free balloons. *Figure 9-9* illustrates a Standard Airworthiness Certificate, and an explanation of each item in the certificate follows.

1. *Nationality and Registration Marks*. The "N" indicates the aircraft is registered in the United States. Registration marks consist of a series of up to five numbers or numbers and letters. In this case, N2631A is the registration number assigned to this aircraft.
2. *Manufacturer and Model*. Indicates the manufacturer, make, and model of the aircraft.
3. *Aircraft Serial Number*. Indicates the manufacturer's serial number assigned to the aircraft, as noted on the aircraft data plate.
4. *Category*. Indicates the category in which the aircraft must be operated. In this case, it must be operated in accordance with the limitations specified for the "NORMAL" category.
5. *Authority and Basis for Issuance*. Indicates the aircraft conforms to its type certificate and is considered in condition for safe operation at the time of inspection and issuance of the certificate. Any exemptions from the applicable airworthiness standards are briefly noted here and the exemption number given. The word "NONE" is entered if no exemption exists.

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION-FEDERAL AVIATION ADMINISTRATION

STANDARD AIRWORTHINESS CERTIFICATE

1 NATIONALITY AND REGISTRATION MARKS	2 MANUFACTURER AND MODEL	3 AIRCRAFT SERIAL NUMBER	4 CATEGORY
N12345	Douglas DC-6A	43219	Transport

5 AUTHORITY AND BASIS FOR ISSUANCE

This airworthiness certificate is issued pursuant to the Federal Aviation Act of 1958 and certifies that, as of the date of issuance, the aircraft to which issued has been inspected and found to conform to the type certificate therefor, to be in condition for safe operation, and has been shown to meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation, except as noted herein.
Exceptions:

None

6 TERMS AND CONDITIONS

Unless sooner surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator, this airworthiness certificate is effective as long as the maintenance, preventative maintenance, and alterations are performed in accordance with Parts 21, 43, and 91 of the Federal Aviation Regulations, as appropriate, and the aircraft is registered in the United States.

DATE OF ISSUANCE	FAA REPRESENTATIVE	DESIGNATION NUMBER
01/20/00	E.R. White *E.R. White*	NE-XX

Any iteration, reproduction, or misuse of this certificate may be punishable by a fine not exceeding $1,000 or imprisonment not exceeding 3 years or both.
THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE FEDERAL AVIATION REGULATIONS.

FAA Form 8100-2 (04-11) Supersedes Previous Edition

Figure 9-9. *FAA Form 8100-2, Standard Airworthiness Certificate.*

6. *Terms and Conditions*. Indicates the Airworthiness Certificate is in effect indefinitely if the aircraft is maintained in accordance with 14 CFR parts 21, 43, and 91, and the aircraft is registered in the United States.

Also included are the date the certificate was issued and the signature and office identification of the FAA representative.

A Standard Airworthiness Certificate remains in effect if the aircraft receives the required maintenance and is properly registered in the United States. Flight safety relies in part on the condition of the aircraft, which is determined by inspections performed by mechanics, approved repair stations, or manufacturers that meet specific requirements of 14 CFR part 43.

A Special Airworthiness Certificate is issued for all aircraft certificated in other than the Standard classifications, such as Experimental, Restricted, Limited, Provisional, and Light-Sport Aircraft (LSA). LSA receive a pink special airworthiness certificate; however, there are exceptions. For example, the Piper Cub is in the LSA category, but it was certificated as a normal aircraft during its manufacture. When purchasing an aircraft classified as other than Standard, it is recommended that the local FSDO be contacted for an explanation of the pertinent airworthiness requirements and the limitations of such a certificate.

Aircraft Maintenance

Maintenance is defined as the preservation, inspection, overhaul, and repair of an aircraft, including the replacement of parts. Regular and proper maintenance ensures that an aircraft meets an acceptable standard of airworthiness throughout its operational life.

Although maintenance requirements vary for different types of aircraft, experience shows that aircraft need some type of preventive maintenance every 25 hours of flying time or less and minor maintenance at least every 100 hours. This is influenced by the kind of operation, climatic conditions, storage facilities, age, and construction of the aircraft. Manufacturers supply maintenance manuals, parts catalogs, and other service information that should be used in maintaining the aircraft.

Aircraft Inspections

Under 14 CFR part 91, the primary responsibility for maintaining an aircraft in an airworthy condition falls on the owner or operator of the aircraft. Certain inspections must be performed on the aircraft, and the owner must maintain the airworthiness of the aircraft during the time between required inspections by having any defects corrected.

Under 14 CFR, part 91, subpart E, all civil aircraft are required to be inspected at specific intervals to determine the overall condition. The interval depends upon the type of operations in which the aircraft is engaged. All aircraft need to be inspected at least once every 12 calendar months, while inspection is required for others after every 100 hours of operation. Some aircraft are inspected in accordance with an inspection system set up to provide for total inspection of the aircraft on the basis of calendar time, time in service, number of system operations, or any combination of these.

All inspections should follow the current manufacturer's maintenance manual, including the Instructions for Continued Airworthiness concerning inspection intervals, parts replacement, and life-limited items as applicable to the aircraft.

Annual Inspection

Any reciprocating engine or single-engine turbojet/turbopropeller-powered small aircraft (weighing 12,500 pounds or less) flown for business or pleasure and not flown for compensation or hire is required to be inspected at least annually. The inspection shall be performed by a certificated airframe and powerplant (A&P) mechanic who holds an inspection authorization (IA) by the manufacturer of the aircraft or by a certificated and appropriately rated repair station. The aircraft may not be operated unless the annual inspection has been performed within the preceding 12 calendar months. A period of 12 calendar months extends from any day of a month to the last day of the same month the following year. An aircraft overdue for an annual inspection may be operated under a Special Flight Permit issued by the FAA for the purpose of flying the aircraft to a location where the annual inspection can be performed. However, all applicable ADs that are due must be complied with before the flight.

100-Hour Inspection

All aircraft under 12,500 pounds (except turbojet/turbopropeller-powered multi-engine airplanes and turbine powered rotorcraft), used to carry passengers for hire, must receive a 100-hour inspection within the preceding 100 hours of time in service and must be approved for return to service. Additionally, an aircraft used for flight instruction for hire, when provided by the person giving the flight instruction, must also have received a 100-hour inspection. This inspection must be performed by an FAA-certificated A&P mechanic, an appropriately rated FAA-certificated repair station, or by the aircraft manufacturer. An annual inspection, or an inspection for the issuance of an Airworthiness Certificate, may be substituted for a required 100-hour inspection. The 100-hour limitation may be exceeded by no more than 10

hours for the purpose of traveling to a location at which the required inspection can be performed. Any excess time used for this purpose must be included in computing the next 100 hours of time in service.

Other Inspection Programs

The annual and 100-hour inspection requirements do not apply to large (over 12,500 pounds) airplanes, turbojets, or turbopropeller-powered multi-engine airplanes or to aircraft for which the owner complies with a progressive inspection program. Details of these requirements may be determined by referencing 14 CFR, part 43, section 43.11 and 14 CFR part 91, subpart E, or by inquiring at a local FSDO.

Altimeter System Inspection

Under 14 CFR, part 91, section 91.411, requires that the altimeter, encoding altimeter, and related system must be tested and inspected within the 24 months prior to operating in controlled airspace under instrument flight rules (IFR). This applies to all aircraft being operated in controlled airspace.

Transponder Inspection

Title 14 CFR, part 91, section 91.413, requires that before a transponder can be used under 14 CFR, part 91, section 91.215(a), it shall be tested and inspected within the 24 months prior to operation of the aircraft regardless of airspace restrictions.

Emergency Locator Transmitter

An emergency locator transmitter (ELT) is required by 14 CFR, part 91, section 91.207, and must be inspected within 12 calendar months after the last inspection for the following:

- Proper installation
- Battery corrosion
- Operation of the controls and crash sensor
- The presence of a sufficient signal radiated from its antenna

The ELT 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. Batteries used in the ELTs must be replaced (or recharged, if the batteries are rechargeable):

- When the transmitter has been in use for more than 1 cumulative hour
- When 50 percent of the battery useful life or, for rechargeable batteries, 50 percent of useful life of the charge has expired

An 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. This does not apply to batteries that are essentially unaffected during storage intervals, such as water-activated batteries.

Preflight Inspections

The preflight inspection is a thorough and systematic means by which a pilot determines if an aircraft is airworthy and in condition for safe operation. POHs and owner/information manuals contain a section devoted to a systematic method of performing a preflight inspection.

Minimum Equipment Lists (MEL) and Operations With Inoperative Equipment

Under 14 CFR, all aircraft instruments and installed equipment are required to be operative prior to each departure. When the FAA adopted the minimum equipment list (MEL) concept for 14 CFR part 91 operations, it allowed aircraft to be operated with inoperative equipment determined to be nonessential for safe flight. At the same time, it allowed part 91 operators, without an MEL, to defer repairs on nonessential equipment within the guidelines of part 91.

The FAA has two acceptable methods of deferring maintenance on small rotorcraft, non-turbine powered airplanes, gliders, or lighter-than-air aircraft operated under part 91. They are the deferral provision of 14 CFR, part 91, section 91.213(d) and an FAA-approved MEL.

The deferral provision of 14 CFR, part 91, section 91.213(d) is widely used by most pilot/operators. Its popularity is due to simplicity and minimal paperwork. When inoperative equipment is found during a preflight inspection or prior to departure, the decision should be to cancel the flight, obtain maintenance prior to flight, or to defer the item or equipment.

Maintenance deferrals are not used for inflight discrepancies. The manufacturer's AFM/POH procedures are to be used in those situations. The discussion that follows assumes that the pilot wishes to defer maintenance that would ordinarily be required prior to flight.

Using the deferral provision of 14 CFR, part 91, section 91.213(d), the pilot determines whether the inoperative equipment is required by type design, 14 CFR, or ADs. If the inoperative item is not required, and the aircraft can be safely operated without it, the deferral may be made. The inoperative item shall be deactivated or removed and an INOPERATIVE placard placed near the appropriate switch, control, or indicator. If deactivation or removal involves

maintenance (removal always will), it must be accomplished by certificated maintenance personnel and recorded in accordance with 14 CFR part 43.

For example, if the position lights (installed equipment) were discovered to be inoperative prior to a daytime flight, the pilot would follow the requirements of 14 CFR, part 91, section 91.213(d).

The deactivation may be a process as simple as the pilot positioning a circuit breaker to the OFF position or as complex as rendering instruments or equipment totally inoperable. Complex maintenance tasks require a certificated and appropriately rated maintenance person to perform the deactivation. In all cases, the item or equipment must be placarded INOPERATIVE.

All small rotorcraft, non-turbine powered airplanes, gliders, or lighter-than-air aircraft operated under 14 CFR part 91 are eligible to use the maintenance deferral provisions of 14 CFR, part 91, section 91.213(d). However, once an operator requests an MEL, and a Letter of Authorization (LOA) is issued by the FAA, then the use of the MEL becomes mandatory for that aircraft. All maintenance deferrals must be accomplished in accordance with the terms and conditions of the MEL and the operator-generated procedures document.

The use of an MEL for an aircraft operated under 14 CFR part 91 also allows for the deferral of inoperative items or equipment. The primary guidance becomes the FAA-approved MEL issued to that specific operator and N-numbered aircraft.

The FAA has developed master minimum equipment lists (MMELs) for aircraft in current use. Upon written request by an operator, the local FSDO may issue the appropriate make and model MMEL, along with an LOA, and the preamble. The operator then develops operations and maintenance (O&M) procedures from the MMEL. This MMEL with O&M procedures now becomes the operator's MEL. The MEL, LOA, preamble, and procedures document developed by the operator must be on board the aircraft during each operation. The FAA considers an approved MEL to be a supplemental type certificate (STC) issued to an aircraft by serial number and registration number. It, therefore, becomes the authority to operate that aircraft in a condition other than originally type certificated.

With an approved MEL, if the position lights were discovered inoperative prior to a daytime flight, the pilot would make an entry in the maintenance record or discrepancy record provided for that purpose. The item would then either be repaired or deferred in accordance with the MEL. Upon confirming that daytime flight with inoperative position lights is acceptable in accordance with the provisions of the MEL, the pilot would leave the position lights switch OFF, open the circuit breaker (or whatever action is called for in the procedures document), and placard the position light switch as INOPERATIVE.

There are exceptions to the use of the MEL for deferral. For example, should a component fail that is not listed in the MEL as deferrable (the tachometer, flaps, or stall warning device, for example), then repairs are required to be performed prior to departure. If maintenance or parts are not readily available at that location, a special flight permit can be obtained from the nearest FSDO. This permit allows the aircraft to be flown to another location for maintenance. This allows an aircraft that may not currently meet applicable airworthiness requirements, but is capable of safe flight, to be operated under the restrictive special terms and conditions attached to the special flight permit.

Deferral of maintenance is not to be taken lightly, and due consideration should be given to the effect an inoperative component may have on the operation of an aircraft, particularly if other items are inoperative. Further information regarding MELs and operations with inoperative equipment can be found in AC 91-67, Minimum Equipment Requirements for General Aviation Operations Under FAR Part 91.

Preventive Maintenance

Preventive maintenance is regarded as simple or minor preservation operations and the replacement of small standard parts, not involving complex assembly operations. Allowed items of preventative maintenance are listed and limited to the items of 14 CFR part 43, appendix A(c).

Maintenance Entries

All pilots who perform preventive maintenance must make an entry in the maintenance record of the aircraft. The entry must include the following information:

1. A description of the work, such as "changed oil (Shell Aero-50) at 2,345 hours"
2. The date of completion of the work performed
3. The pilot's name, signature, certificate number, and type of certificate held

Examples of Preventive Maintenance

The following examples of preventive maintenance are taken from 14 CFR, part 43, Maintenance, Preventive Maintenance, Rebuilding, and Alternation, which should be consulted for a more in-depth look at the preventive maintenance a pilot can perform on an aircraft. Remember, preventive maintenance

is limited to work that does not involve complex assembly operations including the following:

- Removal, installation, and repair of landing gear tires and shock cords; servicing landing gear shock struts by adding oil, air, or both; servicing gear wheel bearings; replacing defective safety wiring or cotter keys; lubrication not requiring disassembly other than removal of nonstructural items, such as cover plates, cowlings, and fairings; 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 manufacturer's instructions) not requiring load tape repair or replacement.
- Replenishing hydraulic fluid in the hydraulic reservoir; refinishing decorative coating of fuselage, balloon baskets, wings, tail group surfaces (excluding balanced control surfaces), fairings, cowlings, landing gear, cabin, or flight deck interior when removal or disassembly of any primary structure or operating system is not required; 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; repairing upholstery and decorative furnishings of the cabin, flight deck, or balloon basket interior when the repair 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; making small, simple repairs to fairings, nonstructural cover plates, cowlings, and small patches and reinforcements not changing the contour to interfere with proper air flow; replacing side windows where that work does not interfere with the structure or any operating system, such as controls, electrical equipment, etc.
- Replacing safety belts, seats or seat parts with replacement parts approved for the aircraft, not involving disassembly of any primary structure or operating system, bulbs, reflectors, and lenses of position and landing lights.
- Replacing wheels and skis where no weight-and-balance computation is involved; replacing any cowling not requiring removal of the propeller or disconnection of flight controls; replacing or cleaning spark plugs and setting of spark plug gap clearance; replacing any hose connection, except hydraulic connections; however, prefabricated fuel lines may be replaced.
- Cleaning or replacing fuel and oil strainers or filter elements; servicing batteries, cleaning balloon burner pilot and main nozzles in accordance with the balloon manufacturer's instructions.
- 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; adjustment of nonstructural standard fasteners incidental to operations.
- The installations of anti-misfueling devices to reduce the diameter of fuel tank filler openings only if the specific device has been made a part of the aircraft type certificate 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; troubleshooting and repairing broken circuits in landing light wiring circuits.
- Removing and replacing self-contained, front instrument panel-mounted navigation and communication devices that employ tray-mounted connectors which 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, an operational check must be performed in accordance with the applicable sections of 14 CFR part 91 on checking, removing, and replacing magnetic chip detectors.
- Inspection and maintenance tasks prescribed and specifically identified as preventive maintenance in a primary category aircraft type certificate or STC holder's approved special inspection and preventive maintenance program when accomplished on a primary category aircraft.
- Updating self-contained, front instrument panel-mounted air traffic control (ATC) navigational software databases (excluding those of automatic flight control systems, transponders, and microwave frequency DME), only if 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 14 CFR part 91.

Certificated pilots, excluding student pilots, sport pilots, and recreational pilots, may perform preventive maintenance on any aircraft that is owned or operated by them provided that the aircraft is not used in air carrier service and does not qualify under 14 CFR parts 121, 129, or 135. A pilot holding a sport pilot certificate may perform preventive maintenance on an aircraft owned or operated by that pilot if that aircraft is issued a special airworthiness certificate in the LSA category. (Sport pilots operating LSA should refer to 14 CFR part 65 for maintenance privileges.) 14 CFR part 43, appendix A, contains a list of the operations that are considered to be preventive maintenance.

Repairs and Alterations

Repairs and alterations are classified as either major or minor. 14 CFR part 43, appendix A, describes the alterations and repairs considered major. Major repairs or alterations shall be approved for return to service on FAA Form 337, Major Repair and Alteration, by an appropriately rated certificated repair station, an FAA-certificated A&P mechanic holding an IA, or a representative of the Administrator. Minor repairs and minor alterations may be approved for return to service with a proper entry in the maintenance records by an FAA-certificated A&P mechanic or an appropriately certificated repair station.

For modifications of experimental aircraft, refer to the operating limitations issued to that aircraft. Modifications in accordance with FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products, may require the notification of the issuing authority.

Special Flight Permits

A special flight permit is a Special Airworthiness Certificate authorizing operation of an aircraft that does not currently meet applicable airworthiness requirements but is safe for a specific flight. Before the permit is issued, an FAA inspector may personally inspect the aircraft or require it to be inspected by an FAA-certificated A&P mechanic or an appropriately certificated repair station to determine its safety for the intended flight. The inspection shall be recorded in the aircraft records.

The special flight permit is issued to allow the aircraft to be flown to a base where repairs, alterations, or maintenance can be performed; for delivering or exporting the aircraft; or for evacuating an aircraft from an area of impending danger. A special flight permit may be issued to allow the operation of an overweight aircraft for flight beyond its normal range over water or land areas where adequate landing facilities or fuel is not available.

If a special flight permit is needed, assistance and the necessary forms may be obtained from the local FSDO or Designated Airworthiness Representative (DAR). *[Figure 9-10]*

Airworthiness Directives (ADs)

A primary safety function of the FAA is to require correction of unsafe conditions found in an aircraft, aircraft engine, propeller, or appliance when such conditions exist and are likely to exist or develop in other products of the same design. The unsafe condition may exist because of a design defect, maintenance, or other causes. Airworthiness Directives (ADs), under 14 CFR, part 39, define the authority and responsibility of the Administrator for requiring the necessary corrective action. ADs are used to notify aircraft owners and other interested persons of unsafe conditions and to specify the conditions under which the product may continue to be operated. ADs are divided into two categories:

1. Those of an emergency nature requiring immediate compliance prior to further flight
2. Those of a less urgent nature requiring compliance within a specified period of time

ADs are regulatory and shall be complied with unless a specific exemption is granted. It is the responsibility of the aircraft owner or operator to ensure compliance with all pertinent ADs, including those ADs that require recurrent or continuing action. For example, an AD may require a repetitive inspection each 50 hours of operation, meaning the particular inspection shall be accomplished and recorded every 50 hours of time in service. Owners/operators are reminded that there is no provision to overfly the maximum hour requirement of an AD unless it is specifically written into the AD. To help determine if an AD applies to an amateur-built aircraft, contact the local FSDO.

14 CFR, part 91, section 91.417 requires a record to be maintained that shows the current status of applicable ADs, including the method of compliance; the AD number and revision date, if recurring; next due date and time; the signature; type of certificate; and certificate number of the repair station or mechanic who performed the work. For ready reference, many aircraft owners have a chronological listing of the pertinent ADs in the back of their aircraft, engine, and propeller maintenance records.

All ADs and the AD Biweekly are free on the Internet at http://rgl.faa.gov and are available through e-mail. Individuals can enroll for the e-mail service at the website above. Paper copies of the Summary of Airworthiness Directives and the AD Biweekly may be purchased from the Superintendent of Documents. The Summary contains all the valid ADs previously published and is divided into

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

SPECIAL AIRWORTHINESS CERTIFICATE

A	CATEGORY/DESIGNATION Special Flight Permit		
	PURPOSE Production Flight Testing or Customer Demonstration		
B	MANU-FACTURER	NAME The Boeing Company	
		ADDRESS P.O. Box 767, Renton WA 13567	
C	FLIGHT	FROM N/A	
		TO N/A	
D	N- N/A		SERIAL NO. N/A
	BUILDER N/A		MODEL N/A
E	DATE OF ISSUANCE 01/31/2001		EXPIRY 01/31/2001
	OPERATING LIMITATIONS DATED 01/31/2001 ARE PART OF THIS CERTIFICATE		
	SIGNATURE OF FAA REPRESENTATIVE Sam T. Smith *Sam T. Smith*		DESIGNATION OR OFFICE NO. NM-XX

Any alteration, reproduction or misuse of this certificate may be punishable by a fine not exceeding $1,000 or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE TITLE 14, CODE OF FEDERAL REGULATIONS (CFR).

FAA Form 8130-7 (07/04) *SEE REVERSE SIDE*

Figure 9-10. *FAA Form 8130-7, Special Airworthiness Certificate.*

two areas. The small aircraft and helicopter books contain all ADs applicable to small aircraft (12,500 pounds or less maximum certificated takeoff weight) and ADs applicable to all helicopters. The large aircraft books contain all ADs applicable to large aircraft.

For current information on how to order paper copies of AD books and the AD Biweekly, visit the FAA online regulatory and guidance library at: http://rgl.faa.gov.

Aircraft Owner/Operator Responsibilities

The registered owner/operator of an aircraft is responsible for:

- Having a current Airworthiness Certificate and a Certificate of Aircraft Registration in the aircraft.
- Maintaining the aircraft in an airworthy condition, including compliance with all applicable ADs and assuring that maintenance is properly recorded.
- Keeping abreast of current regulations concerning the operation and maintenance of the aircraft.
- Notifying the FAA Aircraft Registry immediately of any change of permanent mailing address, of the sale or export of the aircraft, or of the loss of the eligibility to register an aircraft. (Refer to 14 CFR, part 47, section 47.41.)
- Having a current Federal Communications Commission (FCC) radio station license if equipped with radios, including emergency locator transmitter (ELT), if operated outside of the United States.

Chapter Summary

Knowledge of an aircraft's AFM/POH and documents, such as ADs, provide pilots with ready access to pertinent information needed to safely fly a particular aircraft. By understanding the operations, limitations, and performance characteristics of the aircraft, the pilot can make educated flight decisions. By learning what preventive maintenance is allowed on the aircraft, a pilot can maintain his or her aircraft in an airworthy condition. The goal of every pilot is a safe flight. Flight manuals and aircraft documentation are essential tools used to reach that goal.