U. S. Department of Transportation

Federal Aviation Administration

DESIGNEE NEWSLETTER

Transport Airplane Directorate

Aircraft Certification Service; Northwest Mountain Region

Edition 8; April 1, 1989

BOEING MODEL 747-400

TRANSPORT AIRPLANE DIRECTORATE
DESIGNEE NEWSLETTER

(Published semiannually; 8th edition)

Federal Aviation Administration
Northwest Mountain Region
17900 Pacific Highway So., C-68966
Seattle, WA 98198

LEROY A. KEITH
Manager
Transport Airplane Directorate
Aircraft Certification Service

R. JILL DeMARCO
Technical Programs Specialist
Transport Airplane Directorate
Aircraft Certification Service
Newsletter Editor

TAMRA J. ELKINS
Typist, Layout Assistant

FAA REORGANIZED

On July 1, 1988, a reorganization of FAA Headquarters organizations and field reporting responsibilities became effective. This reorganization was prompted by recommendations to the Secretary of Transportation by the Secretary's Task Force on Internal Reforms of the Federal Aviation Administration. A report released by that task force in April 1988 recommended, among other things, that Regional program division managers report directly to an Associate Administrator in FAA Headquarters rather than to a Regional Director. The intent of this arrangement was to create a strategically focused management structure, reduce the number of key officials reporting directly to the Administrator, delegate more authority to top managers, and pinpoint managerial accountability and responsibility for major programs.

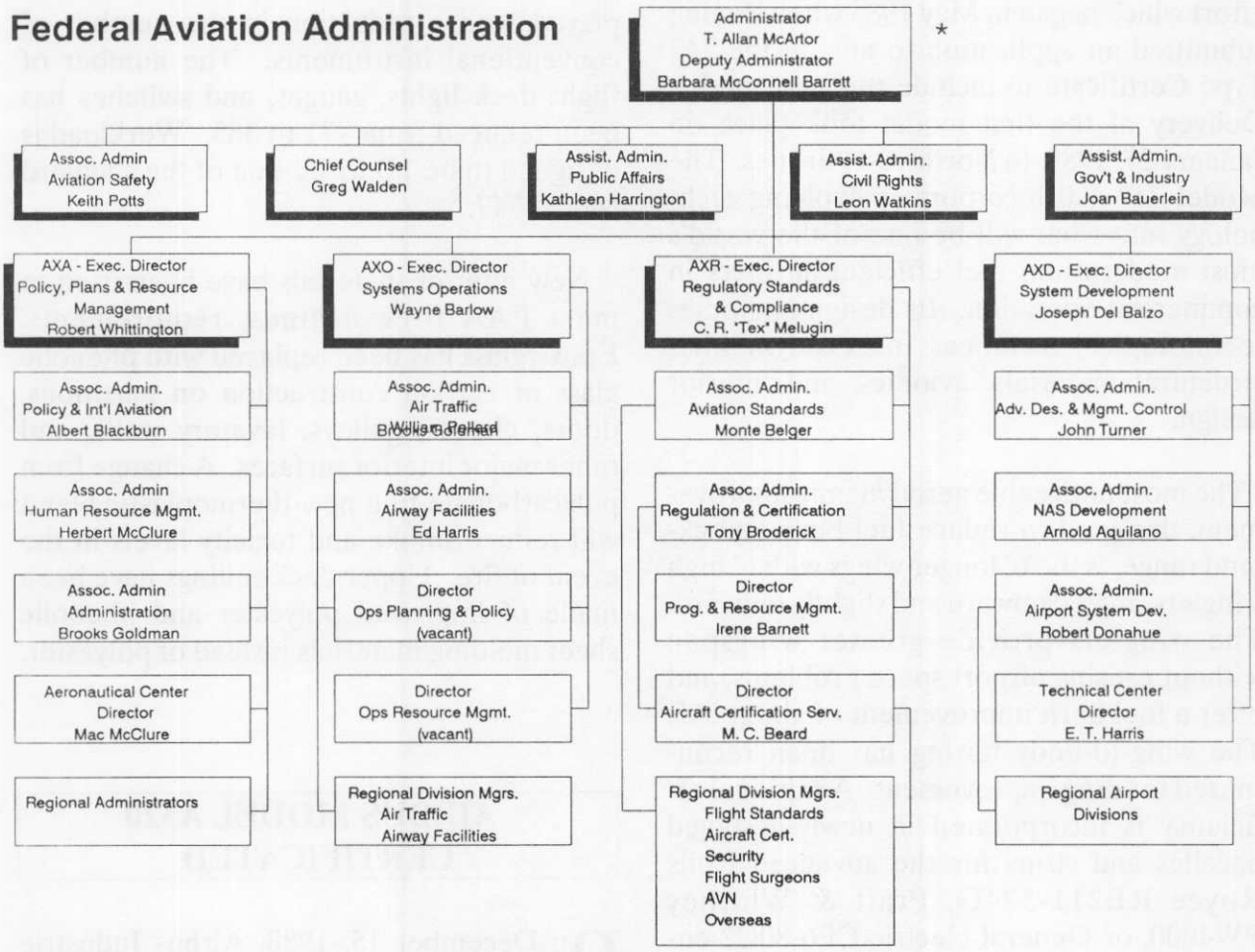
This reorganization process (nicknamed "*straightlining*") has done just that by creating four new "Executive Director" positions in FAA Headquarters, each aligned with a Regional program division that now reports directly to it. ("Regional program divisions" include Aircraft Certification Divisions, Flight Standards Divisions, Air Traffic Divisions, and Airway Facilities Divisions.)

To preclude any confusion as to who now reports to whom, we've included a two diagrams for your convenience. (See next page.)

Needless to say, these changes were made to FAA's organization such that the impact on the functioning of work programs in the field is minimal. The reorganization should not affect the existing working relationship of the aviation community with the Regional divisions, field offices, or staffs in the broad area of aircraft certification.

Moreover, implementation of this arrangement is expected to:

- **emphasize standardization and consistency**
- **streamline the regulatory process**
- **enhance technical/management training and career planning**
- **enhance automation.**



** As of press date, the acting FAA Administrator is Robert E. Whittington.*

ABOUT THE COVER

BOEING 747-400 CERTIFICATION

On January 10, 1989, FAA presented Boeing Commercial Airplanes with the Type Certificate for the Model 747-400, an effort which began in May 1985 when Boeing submitted an application to amend the 747 Type Certificate to include this new model. Delivery of the first model took place on Janaury 27, 1989, to Northwest Airlines. The Model 747-400 incorporates evolving technology into what will be one of the world's most modern and fuel efficient airliners in commercial operation. Its design embodies technological advances in aerodynamics, structural materials, avionics, and interior design.

The most noticeable aerodynamic improvement, designed to reduce fuel burn and extend range, is the 6' longer wings with 6' high winglets, angled upward and slightly outward. The winglets provide greater wingspan without causing airport space problems, and offer a fuel burn improvement of about 3%. The wing-to-body fairing has been recontoured for drag improvement. Additional efficiency is incorporated in newly-designed nacelles and struts for the advanced Rolls Royce RB211-524G, Pratt & Whitney PW4000, or General electric CF6-80C2 engines, which provide a minimum 56,000 pounds of thrust.

Use of advanced materials has allowed considerable structural weight reductions throughout the airplane. Passenger cabin flooring incorporating light, tough, graphite composite floor panels; higher strength aluminum alloys are incorporated in the skins, stringers, and lower spar chords; and graphite-epoxy materials used in the composition of the winglets; all contribute to achieving a significant weight savings.

The flight deck design includes a fully digital, two-crew flight deck with cathode ray tube displays, and a sleeping compartment for reserve crew members. These larger CRT's allow more information to be displayed with a reduction in the number of conventional instruments. The number of flight deck lights, gauges, and switches has been reduced from 971 to 365. Workload is designed to be 1/3 to 1/2 that of the standard Model 747.

New interior materials have been used to meet FAA fireworthiness requirements. Epoxy/glass has been replaced with phenolic glass or carbon construction on partitions, doors, closets, galleys, lavatory walls, and other major interior surfaces. A change from polycarbonate to a new thermoplastic blend will reduce smoke and toxicity levels in the event of fire. Upper deck ceilings have been made of improved polyester and phenolic sheet molding materials instead of polyester.

AIRBUS MODEL A320 CERTIFICATED

On December 15, 1988, Airbus Industrie received the U.S. Type Certificate for its Airbus Model A320. This event marked the culmination of an effort which began in February 1984, with Airbus's initial certificate application.

The A320 is the first commercial airliner to use "fly-by-wire" primary controls. The cockpit is connected to flaps and rudders strictly by computer instead of hydraulic or mechanical means. The system of electrical

signaling prevents the airplane from flying outside its approved flight envelope limitations. Fly-by-wire controls are also used for the plane's elevators, ailerons, spoilers, tailplane trim, slats, and speedbrakes.

The A320 is a short to medium range, twin turbo fan, transport category airplane. It has a seating capacity of 120 to 179 passengers, a maximum takeoff weight of 158,730 lbs., and a maximum altitude of 39,000 feet.

The European certification of the A320 was issued in February 1988, and it has operated in Europe since then. Airbus, a consortium of aerospace companies in Britain, France, Spain, and West Germany, currently has orders for over 400 Model A320's. The first U.S. customer for the A320, Northwest Airlines, is scheduled to take delivery of the first plane in May 1989.

ADVISORY CIRCULARS (AC)

AC 20-131: *Airworthiness and Operational Approval of Traffic Alert and Collision Avoidance Systems (TCAS II) and Mode S Transponders,* issued October 3, 1988, provides guidance material for airworthiness and operational approval of TCAS II systems.

AC 25.1357-1: *Circuit Protective Device Accessibility,* issued September 20, 1988, describes acceptable means of compliance with the requirements of Part 25.1357(d) and (f) of the FAR with respect to the accessibility of circuit protective devices, such as circuit breakers or fuses.

AC 25.1309-1A: *System Design and Analysis,* issued June 21, 1988, describes various acceptable means of showing compliance with the requirements of Part 25.1309(b), (c), and (d) of the FAR. These means are intended to provide guidance for the experienced engineering and operational judgement that must form the basis for compliance findings.

Section 25.1309(b) provides general requirements for a logical and acceptable inverse relationship between the probability and the severity of each failure condition, and 25.1309(d) requires that compliance be shown primarily by analysis. Section 25.1209(c) provides general requirements for system monitoring, failure warning, and capability for appropriate corrective crew action. Because 25.1309(b) and (c) are regulations of general applicability, they may not be used to replace or alter any allowed design practices or specific requirements of Part 25, and each requirement of 25.1309(b) and (c) applies only if other applicable sections of Part 25 do not provide a specific system requirement that has a similar purpose. While 25.1309(b) and (c) do not apply to the performance, flight characteristics, and structural loads and strength requirements of Subparts B and C, they do apply to any system on which compliance with any of those requirements is based.

AC 25-11: *Transport Category Airplane Electronic Display Systems,* issued July 16, 1987, provides guidance for certification of cathode ray tube (CRT) based electronic display systems used for guidance, control, or decision-making by the pilots of transport category airplanes. The material consists of guidance related to pilot displays and specifications for CRT's in the cockpit of commercial transport airplanes. It is limited to statements of general certification considerations; color, symbology, coding, clutter, dimensionality, and attention-getting requirements; display visual characteristics;

failure modes; information display and formatting; specific integrated display and mode considerations, including maps, propulsion parameters, warning, advisory, checklist, procedures and status displays.

AC 43.13-1A: *Acceptable Methods, Techniques, and Practices -- Aircraft Inspection and Repair,* dated 1988, contains methods, techniques, and practices acceptable for inspection and repair to civil aircraft, only when there is no manufacturer's repair or maintenance instructions. This data generally pertains to minor repairs; however, it may be used as a basis for FAA data approval for major repairs. This data may be used as approved data when (1) the user has determined that it is appropriate to the product being repaired; (2) it is directly applicable to the repair being made; and (3) it is not contrary to manufacturer's data.

FAR Part 43 requires that methods, techniques, and practices acceptable to the FAA must be used for inspection and repair to civil aircraft. Techniques, practices, and methods other than those prescribed in the AC may be used, provided that they are acceptable, and FAA inspectors are prepared to answer questions that may arise in this regard. Persons engaged in inspection and repair of civil aircraft should be familiar with FAR Part 43, Maintenance, Preventive Maintenance, Rebuilding, and Alteration; and Subparts A, D, and E of FAR Part 65 ("*Certification: Airmen Other Than Flight Crewmembers*"), and the applicable airworthiness requirements under which the aircraft was type certificated.

This AC has become an important industry standard--it serves as the primary repair and inspection manual for older aircraft when manufacturers' manuals are not available. But because of the development of new aviation technology, the advisory circular requires major changes to bring it up to date.

The revision of the AC will occur in two phases: Phase I, begun in November 1986, and completed in February 1988, corrected errors in the original advisory circular. The 168-page revision is now available to the public from the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 30402, for $9.00 per copy (NSN-050-007-00795-7).

In Phase II, the advisory circular will be completely overhauled to produce an up-to-date document. This revision will incorporate comments from other Federal Aviation Administration offices and from the aviation community.

PROPOSED ADVISORY CIRCULARS

AC 20-xx: *Protection of Aircraft Electrical/Electronic Systems Against the Indirect Effects of Lightning.* On August 11, 1988, a Notice was published in the Federal Register inviting public comment on this proposed AC that provides information and guidance concerning an acceptable means of compliance with Parts 23.25, 27, and 29 of the FAR as applicable for preventing hazardous effects, due to lightning, from occurring to electrical/electronic systems performing critical/essential functions. The public comment period closed December 9, 1988.

AMENDMENTS

Amendment Nos. 25-66 and 121-198: *Improved Flammability Standards for Materials Used in the Interiors of Transport Category Airplanes,* issued August 19, 1988, by the FAA Administrator. These amendments upgrade the fire safety standards for cabin interior materials in transport category airplanes by establishing refined fire test procedures and apparatus and a new requirement for smoke emission testing. The refined test procedures and apparatus are the result of additional research and fire testing, and are intended to improve the reproducibility of test results. The refinement for smoke emission testing is intended to minimize the possibility that emergency egress will be hampered by smoke obscuration. In addition, the operating rules for the original final rule are amended to enable additional compliance time to be granted for the few interior components for which timely compliance cannot be achieved. The FAA findings concerning the requested additional comments on final flammability criteria are also presented. The amendments appeared in Part VI of the Federal Register on August 25, 1988 (53 FR 32564), and became effective on September 26, 1988.

Amendment 25-64: *Improved Seat Safety Standards,* issued May 12, 1988, by the FAA Administrator. This amendment was published in the Federal Register on May 17, 1988 (53 FR 17640), and became effective on June 16, 1988. It upgrades the standards for occupant protection during emergency landing conditions in transport category airplanes by revising the seat restraint requirements and by defining impact injury criteria. In addition, the airframe, items of mass, supporting structures, and the seating systems must be able to bear increased static loads from all directions. These changes are based on research testing and service experience, and are intended to increase airplane occupant protection during emergency landing conditions.

All aircraft designs that are submitted for type certification after June 16, 1988 (the effective date of Amendment 25-64), must meet the requirements of this amendment. Specifically, each passenger seat model must meet specified minimum dynamic test criteria with a simulated passenger restrained only by a safety belt. Each crewmember seat model must meet the same standards with a simulated crewmember restrained by a safety belt and shoulder harness. The application and supporting tests must demonstrate that an occupant using an improved seat will survive a minor crash landing because the head, chest (crewmember only), spine, and legs are protected. In addition, the application must show that seats and attachments, safety belts, and shoulder harnesses will not give way in a manner that would impede an evacuation after a minor crash.

It should be noted that the new seating standards are applicable only to airplanes for which application for a new type certificate is made on or after the effective date of Amendment 25-64. Existing airplanes and airplanes yet to be manufactured under existing type certificates are not affected by Amendment 25-64.

On December 30, 1987, the President signed the Airport and Airway Safety and Capacity Expansion Act of 1987, which, in part, directs the Secretary of Transportation to "initiate rulemaking to consider requiring all seats on board all air carrier aircraft to meet improved crashworthiness standards based upon the best available testing stand-

ards for crashworthiness." Toward that end, the FAA published Notice 88-8 (53 FR 17650; May 17, 1988) to propose a requirement that all seats of transport category airplanes used in air carrier operations and transport category airplanes used in scheduled intrastate service comply with the standards defined in Amendment 25-64. This includes scheduled commuter air carriers, but does not include those air carriers conducting on-demand air taxi operations. The public comment period on Notice 88-8 closed October 14, 1988.

TECHNICAL STANDARD ORDERS (TSO)

The Aircraft Certification Service in FAA Headquarters recently issued the following TSO's to reflect technological advances in aeronautics:

TSO-C60b: *Airborne Area Navigation Equipment Using Loran C Inputs, Revision b,* dated May 11, 1988, prescribes the minimum performance standards identified in RTCA DO-194, "Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Loran C Inputs," dated November 17, 1986, as amended and supplemented by this TSO. RTCA DO-194 incorporates as a reference RTCA DO-160B. RTCA DO-178A has been defined for the use of software verification.

TSO-C69b: *Emergency Evacuation Slides, Ramps, and Slide/Raft Combinations, Revision b,* dated August 17, 1988, prescribes the minimum performance standards identified in Appendix 1, "Federal Aviation Administration Standards for Emergency Evacuation Slides, Ramps, and Slide/Raft Combinations," and Appendix 2, "Radiant Heat Testing of Material in Inflatable Emergency Evacuation Slides, Ramps, and Slide/Raft Combinations."

TSO-C118: *TSO-C118, Traffic Alert and collision Avoidance System (TCAS) Airborne Equipment, TCAS I,* dated August 5, 1988, prescribes the minimum performance standard that active traffic alert and collision avoidance system airborne equipment must meet in order to be identified with the applicable marking.

Equipment that is to be so identified and that is manufactured on or after the date of the TSO must meet the standards set forth in the Radio Technical Commission for Aeronautics (RTCA) Document No. RTCA/DO-197, "Minimum Operational Performance Standards for an Active Traffic Alert and Collision Avoidance System I," Section 2, March 20, 1987. This document incorporates, as a reference, RTCA document No. DC-160B, "Environmental Conditions and Test Procedures for Airborne Equipment," dated July 1984.

Copies of both of these RTCA documents may be purchased from the Radio Technical Commission for Aeronautics Secretariat, One McPherson Square, Suite 500, 1425 K Street, Washington, D.C. 20005.

To obtain a copy of any of the TSO's listed above, write to:

Federal Aviation Administration
Aircraft Certification Service
Aircraft Engineering Division (AIR-100)
800 Independence Avenue, S.W.
Washington, D.C. 20591.

Indicate in your request whether you desire to have your name placed on the mailing list to receive future issuances of the TSO's, notices for public comment on proposed TSO's, or copies of proposed TSO's.

TECHNICAL STANDARD ORDERS (TSO) PROCEDURES

On June 2, 1980, the FAA adopted a new procedure on expedite the issuance of Technical Standard Orders (TSO's). FAR Part 37 was revoked and the administration procedures for TSO's transferred to FAR Part 21, Subpart O.

Order 8150.1A, Technical Standard Order Procedures, dated September 21, 1987, contains instructions for use by the field offices in administering the TSO compliance program.

Administration of the TSO compliance program is the responsibility of the FAA Regional Offices. They control and monitor all manufacturers producing articles in conformity with the provisions of FAR Part 21.601(a), including the assumption of responsibility for all holders of TSO approvals previously issued by the FAA under FAR Part 37. Subpart O of the Part 21 sets forth the general TSO rules. The individual standards prescribed for specific types of articles are available from all ACO's.

TECHNICAL STANDARD ORDER (TSO) REVISIONS

Based on some recent questions concerning the applicability of revisions to a TSO, the FAA offers the following information:

- **When a TSO is revised, what is the status of an appliance produced under that TSO prior to the revision?**

Normally, appliances currently being produced under a TSO approval may continue to be manufactured after the TSO is revised. Terminating the approval of a previously TSO'd appliance is done on a selective basis, usually for safety or adverse performance reasons. If the change is required because an unsafe condition exists, an airworthiness directive (AD) would be issued. When the intent is to raise the level of safety of a particular appliance, it must be accomplished as part of a rulemaking package.

- **Do new models of an appliance for which a manufacturer wants TSO approval, and plans to produce on or after the date of a revision to the TSO, need to meet the current requirements?**

Revisions to TSO's carry a statement under the applicability heading, requiring new applications to meet the current TSO. FAR Part 21.611(b) requires that all major changes to a TSO'd appliance have a new application. An application for TSO approval of an appliance which is pending on the effective date of the revised TSO may continue to demonstrate compliance to the TSO standards in existence at the time of the application. This relief should be granted for a

reasonable time period providing no adverse performance or safety concerns develop during the approval process. A reasonable period of time is considered not to exceed 3 years from the date of application to the approval date.

EXPORT AIRWORTHINESS APPROVAL PROCEDURES

Advisory Circular 21-2F, "Export Airworthiness Approval Procedures," issued August 7, 1987, provides general information and guidance concerning issuance of export approvals under FAR Part 21, Subpart L. Persons in the United States desiring additional information or advice on how to get an export airworthiness approval may contact the nearest FAA Manufacturing Inspection District Office (MIDO). Foreign importers of U.S. aeronautical products and U.S. citizens located in foreign countries may contact the appropriate ACO listed in Appendix 3 of the AC.

A number of foreign countries have identified certain special requirements/conditions with which the FAA must certify compliance by the exporter before the importing country will validate an FAA export approval:

- Special requirements are those administrative requirements which must be satisfied as a condition of shipment at the time of export. They involve, for example, the requirement for a U.S. Export Certificate of Airworthiness copies of logbooks, flight manuals, etc. When a product does not meet the special requirements of an importing country, a written statement must be obtained by the exporter, from the civil air authorities of the importing country, indicating that they will accept the deviation This statement must accompany each application for an Export Certificate of Airworthiness.

- Additional requirements are those found necessary by the importing country, in addition to the exporting country's certification or approval basis, to provide a level of safety, and a level of environmental quality (including noise) equivalent to those provided for by the importing country's certification basis. When these requirements cannot or will not be satisfied, the exporter must obtain a written statement from the Exporting Civil Airworthiness Authorities (ECAA) of the importing country indicating they will accept the deviation. An exporter may obtain information on additional requirements from the ECAA of the importing country.

- Special conditions are airworthiness standards issued to cover novel and unusual design features which are not adequately covered by a country's applicable laws, regulations, and requirements. These special conditions should be included in type certificate data sheets. Special conditions for U.S. type certification are issued in accordance with FAR Section 21.16. An exporter may obtain information on special conditions from the ECAA of the importing country.

FAA HOSTS INTERNATIONAL CONFERENCE ON AGING AIRCRAFT

The Federal Aviation Administration hosted an international conference in Washington, D.C., on June 1-3, 1988, on the potential problems of using older airplanes in air carrier and commuter operations. The recent near-tragedy where an early Boeing Model B-737 series airplane lost an 18-foot section of its fuselage has focused industry and FAA concern on the safety of the aging fleet. Some 400 representatives of airlines, manufacturers, and a dozen foreign airworthiness authorities participated in the conference.

The conference addressed research and development needs, and issues related to design, maintenance, and inspection. Specific topics considered inlcuded airframe integrity, nondestructive inspection of aircraft, engine integrity, and human factors.

One important outcome of the conference was the formation of a joint industry/government a steering committee, headed by the Air Transport Association (ATA) of America, to review maintenance practices as they apply to aging aircraft. This review of maintenance practices currently addresses the following models: Boeing 727, 737, and 747; McDonnell Douglas DC-8, DC-9, and DC-10; Lockheed L-1011; Airbus A300; Fokker F-28; Convair 580; and British Aerospace BAC 1-11. (See accompanying diagram.)

A review of each model will be conducted by task groups composed of the manufacturer, an airline, and the FAA. Task group meetings have already been held on a regular basis since June to review:

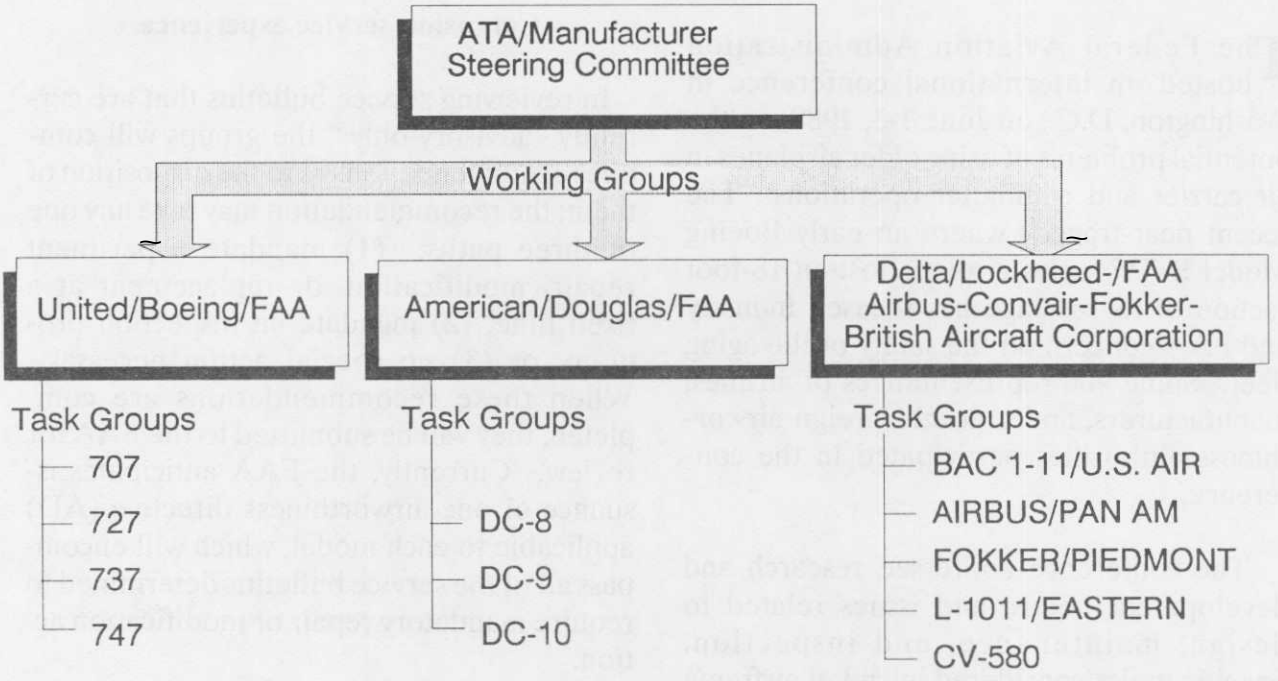
- **Service bulletins;**
- **Supplemental Structural Inspection Documents (SSID); and**
- **Corrosion service experience.**

In reviewing service bulletins that are currently "advisory-only," the groups will compile recommendations as to the disposition of them; the recommendation may take any one of three paths: (1) mandate a pertinent repair, modification, or replacement at a fixed time; (2) mandate an inspection program; or (3) no special action necessary. When these recommendations are completed, they will be submitted to the FAA for review. Currently, the FAA anticipates issuance of one airworthiness directive (AD) applicable to each model, which will encompass all of the service bulletins determined to require mandatory repair or modification action.

The initial recommendations from the Boeing Model Task Group's review of Boeing service bulletins were formulated at the end of February 1989 and are currently under review. The recommendations from the McDonnell Douglas model task group will follow by approximately two months. Completion of all recommendations for the other models indicated above is anticipated by the end of 1989.

Recommendations developed by the task groups subsequent to their review of the corrosion experience of each model, and their review of the SSID's are also in progress. Based on these recommendations, the FAA will consider any necessary follow-on rulemaking.

ATA/FAA/MANUFACTURER AGING FLEET PROGRAM



We will keep Designees abreast of new developments on this subject in future issues of the Designee Newsletter.

REVIEW OF TRANSPORT AIRPLANE MAIN DECK CARGO COMPARTMENT FIRE PROTECTION CERTIFICATION PROCEDURES

In January 1988, a special review team was formed to investigate the existing regulations, policies, and procedures used for the testing, certification, operation, and maintenance of main deck Class B compartments for Part 25 airplanes. This review was prompted by the loss of a South African Airways Boeing Model 747-244B over the Indian Ocean in November 1987. This airplane was configured as a "Combi" airplane, with a Class B cargo compartment on the main deck, separated from the occupied cabin by a partition. While the official cause of the accident has not been determined, there is evidence that there was a major fire on board the airplane, which developed from an undetermined origin and progressed within the cargo compartment. Smoke and soot apparently penetrated past the cargo compartment/passenger barrier and filled the main deck of the airplane. Subsequent to the initiation of this FAA investigation, the NTSB published Safety Recommendations A-8-61 through -63 on May 16, 1988, which recommend that the FAA mandate changes relative to Class B

cargo compartment certification and utilization.

The review team was comprised of members from the Seattle and Los Angeles Aircraft Certification Offices (ACO), and the Flight Standards Aircraft Evaluation Group. They met with various operators, manufacturers, and other technical specialists to discuss the manufacture, testing, approval, maintenance, and training involved with the operation of airplanes in the "combi" configuration.

Class B cargo compartments have been in use for approximately 40 years. The review team determined that the original intent of the Class B compartment was for use as a relatively small storage area for suitcases, bags, and other loose articles. In the event of a fire, it was envisioned that a crewmember could move articles out of the way to uncover any article that may be smoldering or burning. With the adoption of Amendment 4b-10 of 2CAR 4b in 1959, the requirement for a crewmember to be able to move each piece of cargo was deleted, and the size of Class B compartments has grown over the years to include wide-body aircraft and full-size cabin areas much larger than could reasonably be protected by a crewmember with a hand-held extinguisher. Some pallets and containers now in use are up to 10 feet wide, 10 feet high, and 20 feet long.

The accident involving the Model 747-224B has called for a re-examination of the actual environment that exists for the "Combi" airplane, and what action may be necessary for updating the smoke/fire protection criteria. The review team determined that, although a fire in a Class B compartment is rare, the existing rules, policies, and procedures applied to the certification of Class B cargo compartments in terms of smoke and fire protection are inadequate.

Based on their review of available data, and their meetings with various technical experts in the field of aircraft cargo compartment fire/smoke procedures, the review team concluded the following:

a. While entry into the cargo compartment is available, not all cargo is accessible.

b. It is unlikely that personnel have the training or experience necessary to extinguish a fire, particularly a deep-seated fire, and should not be depended upon to extinguish a fire during flight.

c. The quantity of fire extinguishing agent and the number of portable extinguishers are inadequate.

d. The level of visibility available in a smoke-filled cargo compartment is not adequate for locating and fighting a fire with a portable fire extinguisher.

e. The capability of most existing transport airplane smoke/fire detection systems to give timely warning is inadequate (they were certified prior to Amendment 25-54).

f. There were differences in the smoke testing procedures and criteria used from manufacturer to manufacturer, prior to issuance of Advisory Circular (AC) 25-9.

The FAA issued a Notice of Proposed Rulemaking (NPRM), Airworthiness Directive (AD), on July 8, 1988, applicable to airplanes certificated for operation with a main deck Class B cargo compartment, which

proposes to require design changes either to modify the cargo compartment to the Class C configuration or to require the use of flame penetration-resistant cargo containers. The period for public comment closed on November 7, 1988, and the comments received in response to the NPRM are currently under review. A final rule AD is expected to be published in the near future.

Interim procedures for new designs and new designs with filed applications for Type Design Approval were discussed in a policy memo issued by the Manager of the Transport Airplane Directorate on August 8, 1988. Consult your cognizant ACO for details.

ELECTROMAGNETIC INTERFERENCE

The FAA is investigating a possible rule(s) change to address the issue of aircraft susceptibility to high energy radio frequency (RF) environment. In the interim, aircraft certification will be accomplished on a case-by-case application, and special conditions may be defined as necessary for critical systems.

Based on reported military aircraft accidents due to interference from high power ground transmitters which upset fly-by-wire flight control systems, the FAA is concerned with the possible effect on advanced technology aircraft. Also, with changes in aircraft construction from aluminum to composites, increased authority levels of digital controls and avionics systems, and increased level of RF energy over a wide range of frequencies, present regulations may have to be amended to address the issue. Thus, the FAA has undertaken research into civil and military ground, airborne, and shipborne emitter radiation which may be a threat to safety. Concurrently, civil aviation authorities of the United Kingdom and France are performing parallel research, and data is being sought from other Western and Eastern Block countries. The goal is to define an international composite envelope, validated by measurements, and establish protection criteria.

In conjunction with the FAA, the Society of Automotive Engineers (SAE) and the Radio Technical Commission for Aeronautics (RTCA) have undertaken projects to provide the environmental envelope, identify design methods, and prescribe test and analysis requirements.

Contact your cognizant ACO for approval of electronic systems in critical applications.

PAINT REMOVAL PROCESS

In several parts of the country, engineering assistance is being requested for approval under FAR 145.33(c) of a paint removal process specification. The processes currently being proposed use the impact of plastic particles under pressure to remove paint.

To provide an adequate design material physical property data base for acceptance of the procedure, the effects of the blast process parameters on fatigue life, crack propagation rate, and tensile strength should be established. In order to approve a process specification that is concerned with instructions for paint removal, it would be necessary to establish that the method itself is not damaging to the aircraft. In this regard,

statistically valid data would have to be developed which would show that the fatigue life and the crack propagation rate for the material being tested had not deteriorated as a result of plastic bead blasting.

This type of testing is presently being accomplished by several companies in the United States. If these companies obtain positive results, and if the parameters for testing are made available, an acceptable process specification could be developed based on this data.

As a minimum, the following parameters should be considered:

- **material variations (e.g.; 7075-T6 alclad, 7075-T6 bare, 2024-T3 alclad, 2024-T3 bare, etc.);**
- **material thickness;**
- **paint, primer, and number of coatings to be removed;**
- **plastic bead characteristics: hardness, specific gravity (gms/cc), bulk density (#/ft^3), operational temperature, chemical nature;**
- **nozzle pressure;**
- **nozzle diameter;**
- **distance of nozzle to structure;**
- **angular nozzle flow impingement;**
- **plastic bead flow level (constant flow and/or pulsating flow);**
- **dwell time and number of passes over the metallic surfaces;**
- **cleanliness of the beads;**

If the process has not been previously approved, data submitted by the applicant, and generic data available in the technical literature, should be considered.

COMPOSITE MATERIALS STUDY

A recent study was conducted by the FAA regarding processing of advanced composite materials. The objective was to verify how production certificate holders were controlling incoming raw composite materials. In some instances, suppliers have changed, improved, or modified the chemical properties of raw materials without notification to the end user. This resulted in wide variations in final product material properties without an apparent cause. However, chemical characterization (fingerprinting) uses sophisticated equipment and procedures to eliminate the suppliers' material variability. The current production certificate (end users) holders have, or will have relatively shortly, the necessary equipment to fingerprint and control the incoming raw composite material to insure high quality composite parts.

Some of the recommendations reached for the production certificate (PC) holders are as follows:

- Review advanced composite raw material procurement specifications to include the material characterization requirements.

- Provide notification requirements in their procurement document for the raw material supplier to identify changes that involve resin system(s), fiber(s), modifier(s), curing agent(s), filler(s), or other agent(s).

- Review referenced ASTM specifications on current procurement documents for these may have been updated and/or deleted from ASTM listings.

- Review specifications for handling "fiber" qualifications in pre-preg systems.

- Raw material characterization equipment specifications should be developed for periodic calibration.

- Provide a periodic update of all advanced composite materials procurement and process specifications per FAR 21.

PRODUCTION CERTIFICATE (PC) EXTENSION

In the past several years, a number of PC holders have entered into co-production agreements with partners located in foreign countries. These agreements include contractual commitments that are in essence partnership arrangements involving the production of entire products (i.e., aircraft engines, propellers), or major modifications to aircraft, in countries other than the United States.

These products must be produced (or aircraft modified) pursuant to FAR Part 21, Subpart G, as an extension to the U.S. manufacturer's PC and are considered to be U.S. manufactured/modified products.

The FAA may permit a PC holder to extend its PC to include a facility located in a foreign country when:

- The proposal involves the manufacture or final assembly of an entire aircraft, engine, or propeller, or the incorporation of a major modification (STC) of an aircraft.

- The production/modification takes place in a country which has a competent Civil Airworthiness Authority (CAA) that is willing to conduct surveillance on behalf of the FAA; on a no-fee basis to the FAA; and with which the FAA has a bilateral airworthiness agreement covering such assistance.

- The FAA finds no undue burden in fulfilling its statutory responsibility *(reference FAR 21.137)*. This determination shall be based on the FAA's detailed analysis of each individual program which shall be documented on a decision paper. This burden may be mitigated by using the CAA of the country in which the production/modification will take place.

- The cognizant directorate will provide the necessary resources to support the co-production program, including the necessary on-location monitoring to permit the principal inspector (PI) to fulfill his/her responsibility; e.g., conducting initial audits and subsequent surveillance, and as necessary, investigating service difficulty, providing guidance/direction to the foreign CAA, etc.

- The FAA retains jurisdiction over the production/modification program; including enforcement capability against the PC holder in the United States.

- The FAA has assurance that it will be granted access to foreign facilities, data,

and equipment, as necessary at the foreign location.

- A determination has been made by the FAA that the PC holder has an adequate quality control (QC) system which positively ensures control of the design and quality of the product that will be manufactured/modified at the foreign facility.

- The QC system data explicitly states the manner in which the manufacturer will control its foreign facility in compliance with the FAR. This is deemed necessary since such agreements would constitute a major change to the PC holder's QC system. *(Reference FAR section 21.147.)*

- The QC procedures and design data to be used at the foreign facility must be in the English language and in sufficient detail to be auditable.

- The PC holder remains fully accountable for control of the design and quality of all products manufactured or modifications accomplished at the foreign facility under its PC.

(Reference: Action Notice A8120.2, dated September 24, 1987.)

FAR 21.29 TYPE CERTIFICATE (TC) PRODUCTION

A production certificate (PC) may be issued to an applicant based on type design data approved under the provision of FAR 21.29.

Section 21.133(a)(1) of the FAR states, in pertinent part, that any person may apply for a PC if he/she holds a current type certificate for the product concerned. Since a FAR 21.29 type certificate (TC) has the same technical and legal significance, meaning, and value as if it were issued under procedures typically applied to a domestic applicant, a FAR 21.29 TC holder (or a person who holds the rights to that TC) may apply for a PC.

In order for an applicant to be granted a PC, all requirements of FAR 21, Subpart G, must be met. However, the applicant may have difficulty in meeting the FAR requirements because the original design data is approved under bilateral procedures, whereby the FAA relies to a great extent on the cognizant foreign civil airworthiness authority (FCAA) in making compliance determinations. Further, the FAA does not maintain a complete type design data file for such design approvals.

In order for the FAA to make the necessary findings, the design data must be certified by the cognizant FCAA as being identical to that data which formed the basis for the issuance of the FAR 21.29 type certificate. This can best be accomplished by having the applicant forward the data to the cognizant FCAA through the FAA Region which has geographical responsibility for the particular foreign country.

The PC applicant must have all of the design data (including special processes, procedures, etc.) necessary to produce duplicates of the product and, further, such data must be in the English language. In addition to certification from the FCAA, the FAA may request any test or inspection deemed necessary to be accomplished prior to issuance of the PC.

GUIDANCE FOR STRUCTURAL CERTIFICATION OF COCKPIT WINDSHIELDS ON TRANSPORT CATEGORY AIRPLANES

The approval of a new cockpit windshield design normally requires bird impact tests with the windshield installed in a representative windshield support frame. Analyses alone have been accepted as proof of compliance where the changes in design from a previously approved windshield design were minor and did not affect the structural performance of the windshield. A change in the nonstructural outer spalling shield, for instance, should not require retesting for structural strength. Retesting should be required when there are any changes to the structural plies, material specifications, or process specification which would likely affect the structural strength of the windshield. These tests should be performed for the most critical loading conditions and at the most critical operating temperatures expected in service. The temperatures selected for testing should also consider the effects of failures in the windshield heaters.

The bird strike tests should be conducted using domestic poultry packaged in a frangible container with a total weight of four pounds. It may be necessary to inject a few grams of water into the bird after packaging in order to achieve the required total weight. The bird should be aimed along the airplane flight path and directed at all critical locations on the windshield and supporting structure. The design structural cruise speed (V_c) at sea level must be achieved and recorded for each test.

An evaluation must be made of likely injuries to the pilot from debris after impact. Only superficial injuries are considered acceptable for showing compliance with this requirement. Clay models are often used to record the path and energy of debris if the inner shield ply should fail. Solid matter from the bird should not penetrate the cockpit.

A PMA should not be granted to manufacture a windshield until an engineering evaluation, including any required testing, is complete and the design is approved under the applicable airworthiness regulations.

DOUGLAS AIRCRAFT COMPANY STANDARDIZATION COURSE FOR DESIGNATED ENGINEERING REPRESENTATIVES

Douglas Aircraft Company (DAC) has announced that its Airworthiness Office has completed development of a 3-day standardization course for DAC Designated Engineering Representatives (DER), Course 84232. The course consists of general classroom instruction for two days, and one day of "breakout" sessions for individual DER specialties, giving the opportunity for discussion of matters unique to the specific DER function.

The course objective is to familiarize DERs with the organization and procedures of the FAA, and the interface between the DERs and the FAA Aircraft Certification Offices (ACO), so as to give DERs a better sense of their responsibilities while wearing "two hats." DAC initiated the course because of their belief that the training will provide all DERs appointed at DAC (currently varying around 170) with a common base of information that should generate a sense of teamwork

among the DERs, the FAA, and DAC engineering, leading to more efficient functioning of certification programs.

Typical course topics include:

- **FAA organization**
- **personnel (FAA employees, designees, designee organizations)**
- **governing publications (FA Act of 1958, the FAR, Advisory Circulars)**
- **certification of aircraft and aircraft products (design approvals, application and issuance of type certificates, Technical Standard Orders, Parts Manufacture Approval, components and appliances),**
- **foreign design standards**
- **production approvals**
- **approvals for individual products**
- **special airworthiness certificates**
- **DER authority**
- **DER responsibilities**
- **DER liability**
- **Appointment of DERs**
- **DER functions and procedures**

Courses have been held at least once per month since October 1988. The schedule for 1989 has yet to be announced.

To obtain more information, contact the Airworthiness Office, Douglas Aircraft Company, McDonnell Douglas Corporation, 3855 Lakewood Boulevard, Long Beach, California 90846-0001.

DESIGNEE REMINDER

A reminder to all DER's that Order 8110.37, paragraph 11.a., specifically prohibits DER's from using the designee number on reports, drawings, or service documents. The only appropriate place for the designee number is on the 8110.3 Form. Adhering to this policy will help in avoiding any confusion in determining what is and is not FAA approved.

A REMINDER FOR FLIGHT TEST PILOT DESIGNEES

All Flight Test Pilot DER's are requested to review FAA Orders 8110.4 (Type Certification Handbook) and 8110.37 (DER Handbook). Specifically, paragraph 194.h. of Order 8110.4, and paragraphs 12.c. and 12.e. of Order 8110.37 should be noted.

In general, the above references require Flight Test Pilot DER's to:

- Coordinate with the cognizant FAA office and obtain FAA authorization prior to conducting official tests and approving test data.

- Personally perform all tests on which he/she intends to approve or recommend approval of the test data.

- Conduct tests in accordance with an FAA approved test plan, normally TIA.

This means that a Flight Test Pilot DER should not generally be submitting unsolicited 8110.3 Forms to FAA offices recommending or approving data. Exception to this

policy does allow Flight Test Pilot DER's to submit 8110.3 Forms recommending approval for the following:

- **Flight manuals, flight manual revisions, and flight manual supplements.**
- **Proposed flight test plans.**

This information is intended only as a reminder to Flight Test Pilot DER's, and does not represent any new policy interpretation.

CORRECTION:

TURBOJET THRUST REVERSER POLICY, FAR PART 25.933(a)

In the last issue of the Northwest Mountain Region Designee Newsletter *(Edition 7; June 1, 1988)* a portion of the article appearing on page 13 (titled as above) was inadvertently deleted. The second paragraph under the caption "DESIGN REQUIREMENTS" should have read as follows:

"The thrust reverser control system must be designed such that, with any single failure, unintentional deployment is not possible. The design should permit preflight failure detection and in-flight failure annunciation, such that no undetected failure or pilot action will result in unintended thrust reverser deployment. It is considered that movement by the pilot of the reverse levers to the reverse position through a control barrier is an intentional act and, thus, is not subject to the above requirement."

NOTES FROM THE EDITOR

If you would like a copy of any of the previous editions of the Transport Airplane Directorate (Northwest Mountain Region) Designee Newsletter, or if you are a Designee and would like your name added to our mailing list, please submit your request to:

Federal Aviation Administration
Northwest Mountain Region
Transport Airplane Directorate
Attention: Editor (DeMarco), ANM-103
17900 Pacific Highway South, C-68966
Seattle, Washington 98168

We actively solicit input from our readers. Any articles you wish to submit for publication in future editions of this newsletter, or any comments, questions, or suggestions you might have concerning this edition, may also be directed to the address indicated above.

Transport Airplane Directorate

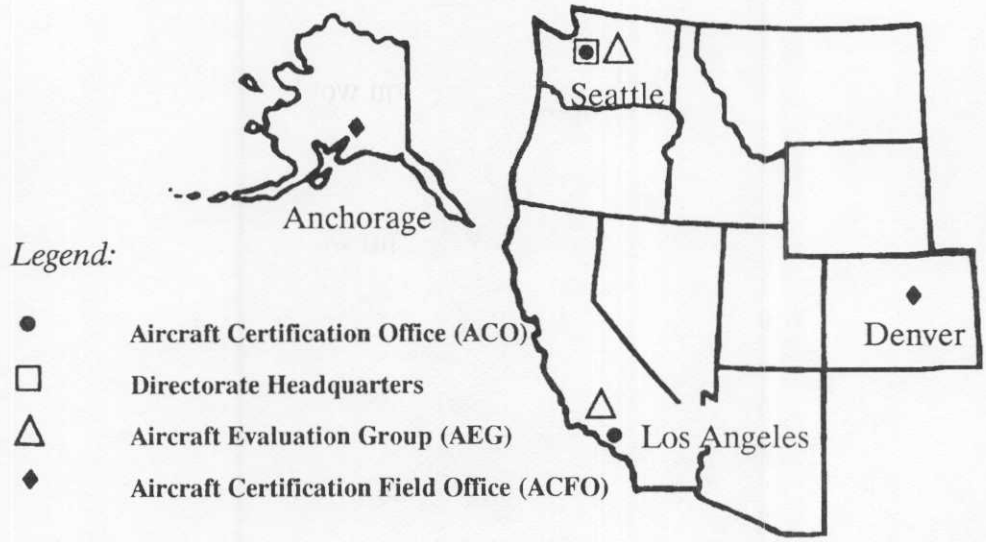


Table of Contents

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Northwest Mountain Region
17900 Pacific Highway South
C-68966
Seattle, Washington 98168

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
FAA FORM 1360-12 (12-71)

POSTAGE AND FEES PAID
FEDERAL AVIATION
ADMINISTRATION
DOT-515