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# DESIGNEE NEWSLETTER

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**McDONNELL DOUGLAS MODEL MD-11**

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*The purpose of The Designee Newsletter is to provide designees with the latest information concerning regulations, guidance material, policy and procedures changes, and personnel activities involving the certification work accomplished within the Transport Airplane Directorate's jurisdictional area. Although the information is the latest available at press time, it should not be considered "authority approved" unless specifically stated; neither does it replace any previously approved manuals, special conditions, alternate means, or other materials/documents. If you are in doubt about the status any of the information addressed, please contact your cognizant Aircraft Certification Office (ACO), Manufacturing Inspection District Office (MIDO), or other appropriate FAA office.*

## COVER STORY: McDonnell Douglas Model MD-11 Sets Certification Records

Certification of the McDonnell Douglas Model MD-11 wide-cabin trijet on November 8, 1990, was the culmination of more than four years of concentrated design and development effort involving thousands of FAA, McDonnell Douglas, and supplier employees.

McDonnell Douglas Corporation President, **Robert H. Hood,** accepted the MD-11's type and production certificates from **FAA Administrator Admiral James B. Busey** in a planeside ceremony at Dulles International Airport. Award of the type and production certificates by the FAA will allow McDonnell Douglas to begin delivery of the MD-11 to 32 customers. The first deliveries, which were scheduled by the end of 1990, were to Finnair and Delta Air Lines.

The MD-11 is a long-range, wide-cabin, three-engine jetliner capable of carrying more than 400 passengers over intercontinental ranges nonstop. As of November 1, 1990, McDonnell Douglas had received orders and other commitments for 375 MD-11s.

The first certified MD-11s are equipped with General Electric engines; certification of airplanes with Pratt and Whitney engines will follow. Rolls-Royce engines also are offered on MD-11s, and the first of these airplanes is expected to be certified and delivered in 1993.

Engineering efforts on the MD-11 began in early 1986. McDonnell Douglas formally launched the program on December 30 of that year. Fabrication of the first part began in March 1987, with assembly of the first airplane a year later. The first flight of the MD-11 occurred on January 10, 1990.

Sophisticated instruments capable of measuring more than 4,000 parameters were installed on the flight test airplane. Of the five airplanes used in flight testing, two were dedicated to structural and performance testing, two performed avionics and systems development and testing, and the fifth was included for simulated airline operations, crew workload studies, and tests of cabin systems and equipment.

In all, nearly 2,000 hours of flight testing were conducted and 2.6 million pages of data were produced for FAA certification requirements.

A number of significant "*firsts*" took place during the flight test program. These include:

- **A rejected takeoff (RTO) at maximum speeds and weights successfully completed with worn brakes.**
- **The longest flight ever made by a commercial trijet: 9,080 miles (14,612 km).**
- **Three 7,000-mile (11,265 km) flight legs flown with significant payloads on consecutive days.**
- **Speed and distance records between Dallas, Texas, and Seoul, Korea; and between Seoul and London.**
- **FAA and European regulatory agency pilots at the control of a test airplane at the same time.**

The rejected takeoff was conducted at Edwards Air Force Base at maximum speeds and weights with brakes that had 95 percent of their usable material machined away to simulate wear. Takeoff thrust was applied and the airplane reached a speed of more than 200 mph when the brakes were applied so that brake performance, stopping times, and distances could be measured.

With the MD-11 at 615,000 pounds (278,964 kg) for the test, millions of foot/pounds of energy were transmitted to the brakes. They not only stopped the MD-11 without blown tires or fires, but when removed and examined after the test, they still had enough material left so that a second high energy RTO might have been attempted.

As part of its flight testing, the MD-11 made several passes over and near the North Pole so that navigation accuracy could be evaluated. The big trijet met design criteria and completed the record-setting 9,080 mile (14,612 km) flight in 16 hours and 35 minutes on that mission.

The maximum speed achieved in flight testing was .96 Mach, close to the speed of sound. Minimum speed was 85 knots.

Late in the flight test program, the MD-11 completed a very comprehensive series of crew workload evaluations in both long- and short-haul operations. Three 7,000-mile legs were flown to demonstrate its capability to carry large payloads long distances in simulated airline operations. Each of the three legs was flown against strong head winds that reached 110 knots at times, and each of the legs was longer than any trijet route now being flown in revenue service. Payloads were the equivalent of up to 300 passengers and bags.

## House Rule (H.R.) 3555 - Aircraft Accident Prevention Act of 1989

The following is excepted from a statement made by **Thomas McSweeny**, Deputy Director of FAA's Aircraft Certification Service (Washington, D.C.), on March 8, 1990, before the House Committee on Space, Science, and Technology, Subcommittee on Transportation, Aviation, and Materials.

. . .The purpose of H.R. 3555 is simple. It is intended to ensure that the FAA establishes and maintains a system in which safety information which could prevent the catastrophic failure of an aircraft is shared between FAA experts and other scientific and technical experts. We believe that H.R. 3555 complements and is compatible with FAA programs and philosophy and, thus, would have no objection to its enactment.

Recognizing a need to do more in this area, I would like to take a few moments to describe briefly the types of activities we undertake within the FAA to ensure that we are working closely with the scientific and technical community to develop and exchange critical safety information.

Pursuant to legislation developed by this Subcommittee, FAA has established an R, E & D advisory committee. Under this committee are several subcommittees which address specific issues such as aging aircraft and engines, airplane system vulnerability, and engine rotor containment. This is a very active organization as evidenced by the fact that, since January [1990], the subcommittees have met about 20 times. We are confident that the R, E & D committee will make a significant contribution to the data exchange that is contemplated in H.R. 3555, and will facilitate closer contacts between the FAA and the scientific/technical community.

One significant effort under the auspices of the R, E & D advisory committee involves the Transport Aircraft Safety Subcommittee. One of the more recent working groups under this Subcommittee, on which the FAA is represented, is the Improved Airworthiness Communications Steering Group. For the first time, domestic and foreign airlines, domestic and foreign airline repair stations, and aircraft engine manufacturers are working together to pool their service difficulty reports and malfunction and defect reports in a common data base, accessible to all contributors including the FAA. Problems encountered by one carrier or manufacturer will then be readily available to all others who can benefit from that information.

Several other groups have been established as well. The Data Collection Group is addressing the problem of assuring that the worldwide users of aviation products participate in the reporting system and is focusing on methods of assuring quality reports. The Data Analysis Group will define what data is useful to safety and reliability analyses. And the Safety/Reliability Action Group is defining criteria for the kind of action (whether regulatory or otherwise) that should be taken in response to information generated by the data analyses, including the specific type of action document to be issued, the timing for its release, and timing guidelines for corrective action.

We believe that this effort will be important in building a stronger framework for safety information sharing, and should go a long ways toward meeting the thrust of what is sought by H.R. 3555.

FAA also participates heavily in activities of the Radio Technical Commission for Aeronautics (RTCA) and the Society of Automotive Engineers (SAE). These organizations set standards within their particular areas of focus, and do so with full participation of those in the international aerospace community. At the technical working group meetings, state-of-the-art technical issues are discussed and consensus on standard practices within the industry is reached. Ultimately, many of the standards developed by these organizations are adopted by the FAA.

Additionally, over the past 10 years, we have worked to standardize our certification practices and policy through the Directorate system. The Directorate system, in placing sole responsibility for the initial and continued safety of similar aviation products in the control of one organization, helps ensure that, as new technology is introduced, information developed or lessons learned in conjunction with that new technology can be applied consistently to all products of the same type.

Finally, we have worked to strengthen our coordination activities within government. We and NASA meet regularly to coordinate research and development programs. This involves the exchange of in-service issues and problems and how to define the R & D necessary to investigate them. We have also strengthened our working relationships with other institutions as well. For example, in the aging aircraft area, we are taking advantage of the Navy's tremendous amount of experience and expertise in corrosion, and information generated through this effort will be fed back through our R, E & D advisory subcommittee that is involved in aging aircraft issues.

Mr. Chairman, this summarizes the considerable number of activities underway which facilitate the exchange of safety information between FAA experts and scientific and technical experts outside the agency. And we are committed to working to further develop these relationships and to strengthen the lines of communication. We need to do a better job of involving industry, academia, and other government institutions in our programs so that safety information is freely exchanged -- aviation safety can only be improved through that kind of effort. This Subcommittee recognizes that fact, and the FAA does as well. . .

## Soviet/U.S. Airworthiness Certification Agreement

Representatives of the Soviet Union's State Supervisory Commission for Flight Safety (FAA's Soviet counterpart) and the FAA met in May and June 1990, to discuss the steps necessary to establish closer operational contacts in the field of airworthiness certification, and to lay the technical foundation for a possible Bilateral Airworthiness Agreement (BAA) between the two countries.

Representatives from both countries recognized the desirability of developing common procedures and expressed their mutual intention to begin technical discussions to achieve greater understanding of and compatibility between airworthiness and noise certification standards of the U.S. and the U.S.S.R.

Such technical discussions would be based upon the following:

- **cooperation in developing an understanding on how national airworthiness and noise certification standards and regulations are applied in the U.S. and the U.S.S.R;**
- **cooperation on the harmonization of the U.S. and Soviet airworthiness and noise requirements;**
- **cooperation on the development of airworthiness requirements for supersonic transport airplanes when there is a type design presented by either government for approval;**
- **cooperation on the development of procedures to facilitate the approval process for aircraft and other aeronautical products being imported or exported between the U.S. and the U.S.S.R.;**
- **cooperation in developing an understanding of the U.S. and Soviet systems for manufacturing aeronautical products (including quality control) to facilitate the acceptance of aeronautical products produced in the U.S. and the U.S.S.R.; and**
- **cooperation in developing an understanding of the national system for maintaining aeronautical products in the U.S. and U.S.S.R. in an airworthy condition.**

The Soviets agreed to present a proposal for entering into a BAA agreement in the near future. The U.S. agreed to act promptly on such a request. The FAA is prepared and eager to begin technical discussions with the U.S.S.R. on airworthiness certification with the aim of concluding a BAA. If such an agreement can be concluded, the FAA would be in a position to certificate planned U.S./Soviet joint venture aircraft and "Westernized" Soviet-built aircraft intended for use by U.S. operators.

The planned U.S./Soviet joint venture project would be aimed at producing civil transport aircraft to compete on the international market. Soviet-built Tupolev TU-204 and Ilyushin IL-96-300 aircraft would be outfitted in Israel with U.S. Pratt & Whitney engines and Israeli and U.S. avionics. Israel and the Soviet Union have signed protocols of intent on the project.

However, the existence of a disciplined Soviet institutional system for airworthiness certification and production surveillance, including a competent, independent National Civil Airworthiness Authority with legal enforcement powers, and close industry adherence to that system, is an absolute imperative to the conclusion of a BAA. It is not clear though that such a system is now in place in the U.S.S.R., or that, institutionally, such a system can be implemented. Based on the recent meetings with top Soviet civil aviation officials, and what was learned there, the FAA estimates that it may take from five to seven years of effort to conclude a BAA.

**FAA Administrator Busey** has indicated that he would like to send his top certification executives to Moscow at an early and mutually convenient date to meet with officials of FAA's Soviet counterpart, which the FAA understands to be the State Supervisory Commission on Flight Safety and perhaps with representatives of the Soviet aviation industry and other civil aviation officials. Goals of the meeting would be to:

- **Explain the requirements for entering into a BAA;**
- **Learn of current civil aviation organizations in the U.S.S.R. and their respective roles in the overall airworthiness certification process;**
- **Discuss FAA's future working relationship with its Soviet counterpart and with the Soviet aviation industry;**
- **Discuss the process for establishing certification programs for individual aircraft programs when sponsors have decided to proceed with those programs.**

These plans are concurrent with the worldwide aviation community's major strategic plan towards the implementation of "World Standards." This is precipitated by the recent events in Europe and the strong desire for developing countries to enter the aviation manufacturing community. Hopefully, these efforts will lead to new and revised bilateral agreements and undoubtedly more involvement of FAA's Aircraft Certification personnel in working with most-favored nations to assist them in the development of the airworthiness authority capabilities.

## FAA Research Program Formed to Study Aircraft Hardening

The FAA is planning to dedicate considerable resources to research and development in the incorporation of security into aircraft design. The effort stems from the Presidential Commission's Report on Aviation Security which resulted from the Pan Am 103 accident (Lockerbie, Scotland, December 1989). The term "*aircraft hardening*" is being used by the FAA to describe the overall effort, and the program is being directed by the FAA Technical Center in Atlantic City, New Jersey.

A detailed research plan is now in preparation and will be presented to the FAA Administrator when completed. The plan will involve testing to understand the explosive event in aircraft fuselages and to validate analytical methodologies. The development of damage assessment methodologies and the evaluation of hardening techniques, including attenuating and venting designs, will also be an important part of the program.

The plan will be made public once it has been accepted by the FAA Administrator.

## Heads Up Display (HUD)

For the first time in the U.S., the FAA has granted approval for unique low-visibility operations using the Heads Up Display (HUD). Alaska Airlines and Seattle-Tacoma International Airport (SeaTac) received the go-ahead last month. But behind-the-scenes cooperation between the FAA, the Port of Seattle and the airline were necessary to establish safety for the new techniques. The FAA faced a two-pronged challenge because both Alaska Airlines' airplanes and SeaTac's facilities had to be fully prepared.

Headquartered in Seattle, Alaska Airlines is a major west coast carrier. Because it serves some of the most fog-prone U.S. cities, it has a special interest in combatting ground-hugging clouds.

Airline executives grimace at the memory of a ten-day stretch only a few years ago, when SeaTac was fog-bound for ten days in a row, stranding holiday travelers and canceling dozens of flights daily.

FAA's Northwest Mountain Region's work began when Alaska Airlines requested low-visibility takeoffs using new equipment installed on its Boeing 727-200s. The airline had conducted low-visibility landings at Seattle and other cities since late 1988, but takeoffs required separate consideration.

On a national scale, the FAA was working on low-visibility surface movement plans. Some airports in Europe already had procedures for operations in poor visibility. The FAA knew it was only a matter of time before a U.S. carrier requested the same.

To implement Alaska's request, a committee of FAA regional and Headquarters Aircraft Certification, Air Traffic, Airports, and Flight Standards personnel, along with representatives of the Port of Seattle and the airline, was formed. An advantage of this group approach was that each member was aware of the others' needs and capabilities. The committee held half a dozen meetings over the course of several months in 1990.

One major issue was how airplanes would maneuver from gate areas to runways. Radar would normally guide pilots as they taxied, but what if radar was out of operation? The solution was painting numbers on routes to and from runways. Black numbers on pink backgrounds were used to differentiate reporting points from the yellow letter on black backgrounds, which designate names for taxiways. If radar fails, pilots can tell controllers their location by using these markings.

Choosing a runway for use in low visibility operations was easier. Unlike other major airports, SeaTac has no intersecting runways. Since Runway 16R has Runway Visual Range equipment, it was quickly chosen (RVR electronically measures visibility in bad weather). In fact, because SeaTac already had most of what was needed, it was only necessary to *"fill in the gaps."*

The Heads-Up Display projects instrument readings into the pilot's line of sight in such a way that he/she can see both the environment and the readings without having to refocus or look down. Thus, information about the airspace and condition of the aircraft is received simultaneously.

The FAA's nationwide standard was not to allow takeoffs with a Runway Visual Range of less than 600 feet. Alaska Airlines requested takeoffs with an RVR of as low as 400 feet. The 600-foot minimum was in place because of the belief that any less visibility did not provide enough data to the pilot to enable him/her to steer the aircraft while on takeoff roll.

To allow takeoffs at lower visibility, the FAA would have to be convinced that HUD is reliable and precise enough to enable operations to take place with the high degree of safety needed in air carrier operations. To do this, a proof-of-concept flight test program was established. Using the FAA's 727 simulator at the Aeronautical Center in Oklahoma City, a series of simulator tests was run. Ten Alaska pilots were chosen at random to run takeoffs in the simulator -- but not just routine takeoffs. They were given various unusual conditions to cope with, such as freak crosswinds and engine failures. All simulated takeoffs were executed safely.

These tests were the turning point in proving that using the HUD in conditions as low as 300 feet RVR would be as safe as the previous 600-foot minimum.

New York's John F. Kennedy Airport and Atlanta's Hartsfield Airport are under consideration to be among the first airports to receive certification for low visibility operations. But since Alaska Airlines has the only planes equipped with the HUD and approved to fly poor-weather takeoffs and landings, it probably will be some time before SeaTac's unique situation will change.

## ELT'S

Emergency locator transmitters (ELT's) often do not do what they are designed to do -- that is, activate, following an aircraft accident, and signal for help. Indeed, they have failed to sound an alarm in two out of every three accidents, although those numbers probably are somewhat misleading, considering the broadly destructive forces of the crash that may be unleashed in many non-survivable accidents. Furthermore, the ELT was not designed to survive a hot fuel fire, or submergence in water. Radio equipment designed to withstand all possible crash consequences would be prohibitively expensive.

ELT's are simple battery-operated electronic devices, designed to transmit a distinctive warbling signal simultaneously on radio emergency frequencies 121.5 and 243.0 (military) Megahertz. ELT's are intended to activate automatically on crash impact of a given magnitude and to continue operating for at least 50 hours over a wide temperature range.

Currently, approved ELT's must be built in accordance with Technical Standard Order (TSO) C91. Most ELT's are designed to be attached to the aircraft as far aft as possible, in order to minimize damage to the transmitter in the event of a crash. (Some portable ELT's are approved for temporary location in the cockpit or cabin.)

FAA required installation of ELT's in virtually all general aviation aircraft by June 30, 1974. The exceptions were aircraft on local training flights, agricultural aircraft engaged in spraying operations, research and development aircraft, single-seat aircraft, rotorcraft, and turbojets.

The 15-year history of ELT use has been troubled by a consistently high rate of false alarms and failures to signal as expected. But despite their troubled history, there is one very important thing to bear in mind: ELT's do save lives. Statistics compiled by the Air Force Rescue Coordination Center (AFRCC) show that without a transmitting ELT to guide searchers to a remote accident site, the chances of post-crash survival in a remote area are reduced by about 43 percent.

The disturbing false alarm and failure-to-activate statistics have prompted new FAA rulemaking that would require improved ELT's for all "*future installations.*" That means a new generation of ELT's must be installed in all newly manufactured airplanes, as well as acquired to replace existing ELT's as they become unusable or unserviceable, after the effective date of the rule.

FAA issued a Notice of Proposed Rulemaking (NPRM) on new ELT installations on April 2, 1990, giving the public 120 days to comment. A final rule probably will not be published until later this year, with compliance required perhaps six months after the effective date.

The new ELT performance standards are based on work done by the Radio Technical Commission for Aeronautics (RTCA Document No. DO-183) and adopted by FAA in Technical Standard Order TSO-C91a. Like the preceding TSO-C91 ELT's, the new equipment would transmit on both the 121.5 and 243.0 MHz frequencies.

The new standard for TSO-C91a ELT activation represents a decrease in the sensititivty of the activation switch to G forces, but includes the effect of side loads.

Pending adoption of a new rule and phasing-in of the new ELT's, FAA has taken some important steps to improve the reliability and performance of existing equipment. Action Notice 8310.1, distributed to FAA field offices, as well as the general aviation community, applies both to TSO-C91 and the newly proposed TSO-C91a ELT's.

The Notice recommends that FAA Aircraft Certification Offices (ACO's) review manufacturer's instructions for ELT's currently being produced to determine adequacy for continued airworthiness, and make appropriate recommendations to the manufacturers. Inspectors are asked to monitor FAR Part 91 operators to ensure that the ELT is included in inspections for the continued airworthiness of the airplane. A supplemental ELT inspection procedure should be used when there is not adequate specific information available from the manufacturer.

*Any person may obtain a copy of the Notice of Proposed Rulemaking on ELT's by requesting it from FAA, Public Inquiry Center, AOA-430, Washington, DC 20591, or by calling (202) 267-3484. Ask for NPRM Number 90-11.*

## Alternative fuels

Fuel shortages associated with oil embargoes, the economic impact of continued reliance on imported oil, and environmental concerns such as the "*Greenhouse Effect,*" have generated a demand for alternative sources of aviation fuels. The safe use of these alternative aviation fuels has been the object of FAA Technical Center research since 1981 when the Experimental Aircraft Association applied for a Supplemental Type Certificate, allowing the use of automobile gasoline in light aircraft.

The alternative fuels programs moved from investigating fuels primarily intended for piston-powered aircraft to fuels which may be utilized in turbine-powered aircraft. In the near term, these turbine fuel alternatives will consist primarily of blends of existing turbine fuels and alcohols.

To prepare for dynamometer tests, several test flights were flown with a T34 Mentor aircraft, which allowed the FAA Technical Center to determine the effects of altitude and operational mode on the fuel system temperatures. This survey indicated that the touch-and-go mode resulted in the highest operating temperatures. The data was incorporated into the test sequence which determined that transient operations were the most sensitive to vapor formation.

The FAA evaluated the turbine fuel/alcohol blends using its dynamometer and a T-63 turboshaft engine. The tests identified the conditions most likely to result in power loss due to vapor formation. They also identified material compatibility problems associated with the use of alcohols in existing fuel systems. Additional work showed that fuel consumption increased when the engine operated on a fuel that contained alcohol. The is increase in fuel consumption reflected the reduced energy content of the alcohol used to prepare the blend.

Laboratory studies conducted at the FAA Technical Center had identified the potential for solubility problems between the alcohols and turbine fuels. These solubility problems did occur during the dynamometer testing, particularly when cold fuels were tested. A "*dual fuel system*" concept was demonstrated to solve the solubility problems and reduce the impact of vapor formation when testing hot fuels. The use of the dual fuel system appeared to reduce the severity of the material compatibility problems.

A study was conducted at the Naval Air Propulsion Center to evaluate the long-term effects of operating turbine fuel/alcohol blends in turbine engines. This study, described in T63-A-5A Engine Modified Fuel Evaluation, APC-LR-89-12, did not reveal any long term effects resulting from the use of Jet-A/ethanol blends.

The FAA was involved in several tasks related to the use of alternative fuels in piston engines. A study completed at the National Institute of Petroleum and Energy Research (NIPER) showed no significant differences in engine wear when using either 100 low lead Avgas or unleaded automobile gasoline. this work is documented in "*Comparison between Unleaded Automobile Gasoline and Aviation Gasoline on Valve Seat Recession in Light Aircraft Engines,*" DOT/FAA/CT-TN89/33.

## Digital Systems Validation

The rapid developments in computers and digital technology over the past 20 years have made digital systems increasingly useful in aircraft. As computers have become more sophisticated, they have been able to perform an increasing number of tasks which have previously been performed by the pilot or by analog systems. As a result, certification engineers are seeing increasing numbers of software-based digital systems proposed for inclusion in new generation aircraft and incorporation into existing aircraft designs.

The new systems pose a number of problems for the certification engineer. Error limits must be set for flight-critical, flight-essential, and non-essential systems. In setting error limits, safety is paramount, but other factors must also be taken into account. These factors include cost for incremental error reduction, weight penalties, and system interactions. Integrating a new digital "*black box*" into an existing design changes many of the electromagnetic characteristics of the aircraft. Care must be taken to ensure not only that the black box performs its functions within the required error limits but also to ensure that its addition does not degrade any other systems which have already been certificated.

The design of a completely new aircraft poses its own problems with digital technology. Each individual component must meet error limits, weight limits, and size limits. Systems (composed of several components more or less collocated) must meet these requirements, plus the requirements of being able to collect systemic information and pass it on to other systems while not interfering with the operation of any of the other systems.

In the summer of 1975, the FAA and the National Aeronautics and Space Administration (NASA) began to consider and plan a joint program to assess and upgrade the technologies used to evaluate the reliability of digital flight control and avionics systems. In 1976, the FAA and NASA co-sponsored a workshop on digital flight controls and avionics. A number of reports emerged from this program. These reports were collected in 1982 into the *Digital Systems Validation Handbook - Volume I* (DOT/FAA/CT-82/115) entitled "*Validation of Digital Systems in Avionics and Flight Control Applications.*"

But since the 1976 workshop and the 1982 publication of Volume I, a number of technological advances have been made and additional reports have been written. In February 1989, the FAA Technical Center published the *Digital Systems Validation Handbook - Volume II* (DOT/FAA/CT-88/10). This handbook is a compilation of tutorials based on technical results and final technical reports produced from technological investigations sponsored by the FAA and/or NASA. Some of the chapters are based on topics such as Fault Insertion, High Energy Radio Frequency Fields, Data Bases, and Software Fault Tolerance.

The handbook is a living document. Research is continuing and as the technology continues to emerge, the handbook will be updated accordingly. The FAA sponsored a corresponding Digital Systems Validation Workshop for FAA Certification Engineers at Wichita State University in 1989. The workshop was based on chapters form the *Digital Systems Validation Handbook - Volume II.*

In addition to these presentations, two panel discussions were held. The first dealt with the certification of the Airbus A320 aircraft by the FAA. This aircraft, built in France, was originally certified by the Directions Generale de l'Aviation Civile (DGAC - the French counterpart to the FAA). It employees more advanced digital technology in flight critical and flight essential systems than aircraft previously certified in the United States. The second panel discussed the level(s) of retesting required following software changes to aircraft systems.

Response to this workshop from the Certification Engineers was so favorable that a follow-up workshop is being planned for May 1991. Contact your cognizant ACO or the FAA Technical Center (in Atlantic City, NJ) for more information.

## Regulation of the Configuration Maintenance, and Procedures (CMP) Standard for Extended-Range Twin-Engine Airplane Operation (ETOPS) Suitability Approved Airplanes

This office has been asked to clarify the position of the FAA (specifically, Transport Airplane Directorate and the Engine and Propeller Directorate) with regard to controlling the CMP standards of ETOPS airplanes and the use of airworthiness directives (AD) for that purpose.

### *Background*

This issue was raised after FAA's legal office suggested that either rulemaking or AD action was more appropriate for mandating future revisions to the ETOPS CMP standards; other FAA elements maintained the position that Operations Specifications (OPS SPECS) should be used to mandate ETOPS CMP standards and subsequent revisions thereto.

A number of memorandums, briefing papers, and telecons have been generated on the issue of using an AD to mandate changes to the CMP standard versus mandating via OPS SPECS, and how to effectively correct an unsafe condition in ETOPS: If a potentially unsafe condition were to arise in ETOPS today that was not limited to one U.S. operator, where certificate action can be taken, the FAA could not respond in an appropriately expeditious manner using the OPS SPECS approach. Similarly, in a case where the threat to safety is not obvious by traditional measures, the AD process could be hampered unless there is agreement on the unique safety-related aspects of ETOPS that would justify AD action.

### *Discussion*

The original issue raised over the legality of mandating CMP standard changes via OPS SPECS is not really pertinent to our Directorates' position. The AD process is the appropriate vehicle to effect changes to the CMP standard when an unsafe condition, such as degrading reliability, exists or is likely to develop in ETOPS. In order to avoid confusion there are a number of key points that must be clarified:

### *CMP Standard*

The CMP standard is a certification requirement which establishes the minimum type design requirements to make the airplane suitable for ETOPS. It should be noted that the term "*CMP standard*" as used here and in Advisory Circular (AC) 120-42A is not to be confused with the term "*CMP document.*" The use and abuse of the "*CMP document*" by industry and FAA has led to much of the confusion over this issue. The "*CMP standard*" may or may not be identified in one document.

The CMP standard is composed of service bulletins, service letters, manual references, and other pertinent documents which define the alterations, maintenance or operational requirements, and limitations determined to be mandatory in order to make the airplane type design suitable for ETOPS. The CMP standard is approved by the Transport Airplane Directorate as one part of the Airplane Assessment Report [with the concurrence of the Propulsion system Reliability Assessment Board, the Aircraft Certification Service (AIR-1), and the Flight Standards Service (AFS-1)].

The CMP standard is an amendment to the type design. It is not necessary to issue a Supplemental Type Certificate or to mandate the original CMP standard approval by AD to make it a part of the type design. The initial CMP standard and airplane suitability approval, as a change to the type design, is analogous to other type design approvals for specific operations, such as CAT III autoland approval for an autopilot system that may or may not involve later design changes to a previously certified system.

The CMP standard is controlled through the airplane type certificate data sheet (TCDS) and the airplane flight manual (AFM) by reference to one or more documents containing the CMP standard. Even though the CMP standard may contain maintenance actions, minimum equipment list restrictions, etc., that does not mean it is not type design related. Such items are no different than instructions for continued airworthiness, certification maintenance requirements (CMR), or electronics time-limited-dispatch criteria currently controlled by the type design under FAR Parts 33 and 25.

As a minimum, the CMP standard should not be changed unless the reliability of the airplane/engine is not achieving or maintaining the reliability objective of ETOPS, or some other unsafe conditions arises. As with any type design, minor changes and routine enhancements are permitted to be incorporated by manufacturers and operators through service bulletins or productions design changes. Such enhancements are not mandated as a part of the baseline CMP standard. However, a large part of today's confusion has resulted from manufacturers making changes to their document which contains the CMP standard that have not been necessary to maintain the minimum level of safety defined in AC 120-42A. It then becomes difficult for owner/operators and FAA to keep track of the true CMP standard baseline requirements. This issue has yet to be resolved between FAA and industry.

### *Continued Airworthiness Responsibility*

The FAA has a worldwide responsibility to ensure the continued airworthiness of U.S. products and of foreign products operating in the U.S. For the most part there is no equivalent of OPS SPECS which could be used to mandate CMP standard changes on overseas operators. Foreign authorities have stated on several occasions that the only FAA means they recognize of mandating a change in type design, and thus to the CMP standard also, is an AD. They also stated that an AD is the most reliable and consistent means of bringing the need for and urgency of a change to their and the operators' attention.

Advisory Circular 120-42A, Paragraph 8.g. states:

"*Type Design Change Process. The FAA Directorate responsible for the certification of the type design will include the consideration of extended range operation in its normal monitoring and design change approval functions. Any significant problems which adversely effect extended range operation will be corrected. Modification or maintenance actions to achieve or maintain the reliability object of extended range operations will be incorporated into the type design CMP standard document. The FAA will normally coordinate this action with the affected industry. The AD process will be utilized as necessary to effect a CMP standard change. The current CMP standard will be reflected in Part D of each ETOPS operator's operations specifications.*"

As indicated in the above excerpt, the Directorates are responsible for the continuing airworthiness of the type design CMP standard. The use of the AD process already includes the necessary coordination with industry and with Flight Standards through the respective Aircraft Evaluation Group (AEG).

*Safety*

Safety takes on a new additional perspective in ETOPS which must be recognized under FAR 39. Admittedly, due to the many variables, it is an issue of judgement as to what factors in the ETOPS environment can lead to an unsafe condition. However, our Directorates have the knowledge and expertise to make those determinations, and we have done so many times in the past. Also, the guidance in AC 120-42A, based on experience and detailed engineering scrutiny by industry experts, foreign authorities, and the FAA, provides an adequate basis for judging safety through considerations we apply under FAR 39.

A question has arisen whether the lack of reliability in ETOPS constitutes an unsafe condition that is likely to exist or develop in other products of the same type design. Though not explicit in the regulations, many certification requirements have evolved to their present state based on the intended operation of the product. Certification test cycles are tailored to representative, conservative, flight cycles. Life limiting of parts often assume some weighted distribution of mission profiles. When the intended operation and mission profiles of a product oversteps the bounds of our regulatory and policy experience base, as in ETOPS, changes to the certification basis are needed. The CMP standard accomplishes those changes to ensure that the reliability, durability, and operational aspects are adequate for its intended use.

The lack of acceptable reliability in ETOPS constitutes an unsafe condition. That same unsafe condition is likely to exist or develop in other products of the same type design, specifically if they were operated in ETOPS. Under ETOPS, a higher level of reliability is imperative in order to maintain a comparable level of safety to that of domestic operations with two engine airplanes.

It should be noted that reliability, particularly in-flight shutdown (IFSD) rate, is not the sole safety concern in ETOPS. There are also common failure mode, operational, environmental, and maintenance threats that can be considerations are also assessed and monitored by our Directorates.

Thus, an AD could be necessary to correct such a threat to ETOPS safety that may or may not be a threat in regular domestic operation.

Conclusion

In light of the above, the Transport Airplane and the Engine and Propeller Directorates plan to use the AD process to control the continuing airworthiness type design requirements of the ETOPS CMP standard. The use of ADs on ETOPS equipment is consistent with FAR 39 and has a precedent. Three ETOPS-related ADs have already been issued: one withdrawing approval of the B737 aircraft powered by CFM56 engines; one requiring modification of JT9D-7R4 engines with a more stringent compliance schedule for ETOPS engines; and one requiring periodic in-flight checking of the fuel system cross-feed valve on certain ETOPS aircraft.

Whenever possible, rather than mandating a revised CMP document containing a new CMP standard, an ETOPS AD will be written against a specific aircraft or engine model, requiring a single modification, maintenance, or operational action to correct one specific problem or deficiency that is clearly affecting ETOPS safety.

However, there may be cases where several problems together may degrade ETOPS fleet reliability to an unsafe level or prevent the reliability from achieving the ETOPS objective of 0.02 IFSD per 1,000 engine hours. In those cases, the AD may require several aircraft/engine modifications, inspections, or restrictions by either (1) incorporating the requirements directly into the AD, or (2) mandating a later revision of document(s) containing a revised CMP standard.

This position does not preclude the continued use of OPS SPECS to levy CMP standards on domestic operators. The AD and OPS SPECS processes would operate in parallel. In instances where the need for corrective action is more urgent, the AD would likely precede a revision to the document containing the CMP standard and its implementation via OPS SPECS. There will be always be an AD written to correct any safety-related deficiency in the CMP standard. Since the AD takes precedence, it will not always be necessary to implement a corresponding change via the OPS SPECS. However, the OPS SPECS is a valuable means to track, surveil, and enforce the CMP standard domestically and will be retained for that purpose.

The Transport Airplane and Engine and Propeller Directorates will apply the usual AD processing procedures for preparing, coordinating, and issuing ADs. The type of AD required will be consistent with prevailing policy (*i.e.*, telegraphic, immediately adopted, or Notice or Proposed Rulemaking). An AD which affects only the engine or the airframe, will be prepared and issued by the responsible Directorate. An AD which affects both the engine and airframe would be fully coordinated between both Directorates and would reflect both in the "*FOR FURTHER INFORMATION CONTACT*" section of the AD. However, since the suitability approval is against the airplane, such ADs would be prepared and issued by the Transport Airplane Directorate.

## Landing Distance Deceleration Devices

This Directorate has received a request for a statement of FAA's position and clarification on:

- **The meaning of "*safe and reliable*" used in FAR 25.109(b) and FAR 25.125(b)(3) in terms of Advisory Circular (AC) 25.1309-1A probability.**
- **What the acceptable failure probability is for deceleration devices like anti-skid and ground spoilers that have relatively large and small effects on landing distance.**

The terms "*safe and reliable*" are generally used within the Transport Airplane Directorate to mean that a failure condition is improbable. In the context of AC 25.1309-1A quantitative probability terms, improbable failure conditions are those having a probability on the order of $1 \times 10^{-5}$ or less.

Each deceleration device, such as anti-skid and ground spoilers, would be expected to have a failure condition that is *improbable*, regardless of its effect on landing/stopping distance.

## Development of the New Designee Standardization Program

This new program is in the final stages of coordination. This program honors many of the requests that designees have made in the Standardization Course critique, and from input we have obtained through close communication with the aviation community.

The new program will be separated into two phases:

The **first phase** will be similar to the program provided to designees over the past six years, and it will provide all new designees with the introduction into the material needed to accomplish the tasks they have applied for.

The **second phase**, called the Recertification Standardization Program, will be for all designees who have completed the first phase, and it will provide a more detailed description of the specific designee functions. These detailed instructions will include:

*1. A hands-on work shop for manufacturing designees who are involved in original airworthiness certification.*

*2. A hands-on work shop for maintenance designees doing recurrent airworthiness functions.*

*3. A work shop involving filling out FAA forms, and some hard part inspection techniques.*

The first phase of this program is expected to begin during FY-91. Contact your cognizant MIDO or ACO for more information.

## Automated Designee System

Development of another new "designee management information system" is about to begin the initial prototype stage at four preselected locations. This program, named the Automated Designee Subsystem, will streamline and computerize information regarding airworthiness designees. For this initial phase, we will use active FAA offices in two of the certification Directorates and two Flight Standards Regions.

These offices will enter existing designee data into a computer data base. Once the data is captured, the computer program will automatically provide a number of services that before had to be accomplished by hand. Some of the automated services being reviewed are:

- **Automatic appointment upon selection.**
- **Automatic reappointment if qualified.**
- **Automatic notification of new requirements.**
- **Automatic identification of designees.**
- **Automatic distribution of designee material.**

The FAA may be contacting a number of designees for additional input for this system as it is implemented and tested. Hopefully, this will be the information system that will assist both the FAA and the designees with the management of our designee program into the 21st century.

## Revision of Guidance Material for Desginated Airworthiness Representatives (DAR)

Notice N8130.58, dated October 22, 1990, was published to clarify the geographical restrictions imposed on a DAR. Prior to this Notice, DAR's could not perform their authorized functions outside of the FAA managing offices' geographical area more than three times per year. Notice N8130.58 changes that requirement by removing the limitation on the amount of annual travel.

Since Notice N8130.58 also imposes some other restrictions on a travel, DARs should check with their managing offices before travelling to perform work outside of their geographical area.

Notice N8130.60, "*Termination, Nonrenewal, Appeal of Aircraft Certification Service Designations and Delegations,*" was issued December 20, 1990. This Notice lists the various reasons that may cause a designee (DMIR, DAR, DER, DOA, DAS) to be terminated, as well as the procedure used by the FAA when termination is called for.

Both Notice N8130.58 and Notice N8130.60, along with other pertinent notices and changes, will be incorporated in the next revision of FAA Order 8000.62, "*Designated Airworthiness Representative Qualification Criteria, Selection and Appointment Procedure.*" Revision of this Order and of Advisory Circular 183-33A, "*Designated Airworthiness Representative,*" is scheduled to be completed in Fiscal Year 1991.

## DERs and the Approval of Structural Repairs

The identification of structural airworthiness requirements for repairs is delegated to an FAA-approved Designated Engineering Representative (DER). It is incumbent upon the individual DER or a group of DERs to ensure that complete evaluation of technical data is performed to determine that the aircraft meets the original airworthiness specifications and standards before and after the structural repair.

The identification of the technical data showing compliance with the applicable requirement is referenced on the FAA Form 8110-3, and pertinent data are provided to the FAA Certification Office for review. We realize that in some cases the only identified reference could be a drawing reference. The documents identified on the 8110-3 form are usually supplemented with stress notes, or the data are based upon similar previously approved repairs. Further, the DER is responsible for assure that he/she and the employer maintains a file of all approved data (including stress analysis, calculation, etc.) and that this file is available to the FAA Certification Office upon request.

In case of multi-disciplinary involvement (*i.e.*, static, flutter, and damage tolerance), where the expertise of more than one appointed DER is required, all designees involved will sign the Form 8110-3 in order to indicate the total extent of designee approval.

DERs meeting the requirements for appointment are authorized to represent the FAA in determining the compliance of aircraft, aircraft structure, and repair or alteration of aircraft structure, with the applicable requirement of the Federal Aviation Regulations (FAR). By virtue of his/her appointment, the DER is authorized to approve data by this/her signature and identification number on the Form 8110-3, Statement of Compliance with the FAR. The FAA routinely audits DER submittals to assure compliance with applicable regulations.

This information applies only to those structural design repair approvals, by a DER, which are not the subject of an existing Airworthiness Directive (AD). DER authority for approval of deviations to repair methods required by an AD is limited only to minor changes. Such changes would include edge distance deviations, oversized fasteners, fastener substitution, trimming or machining necessary for fit-up or alignment, lubrication or finish requirements. All approvals must be based on a finding that the change meets the certification basis of the airplane.

## DER Approval of Airplane Flight Manual (AFM) Revisions

This Directorate has been requested to consider expanding the approval authority of Designated Engineering Representatives (DER) to include specific Airplane Flight Manual (AFM) revisions, and has been working with representatives from Boeing and McDonnell Douglas to establish a set of appropriate guidelines.

The general guidelines below provide for approval of specific AFM revisions by authorized DERs. These guidelines were formulated based on transport airplane considerations only, and as such are limited at this time to transport category AFMs. We are exploring the possibility of a broader application of these guidelines within the

Aircraft Certification Service and perhaps amending FAA Orders 8110.37 and 8110.4 to address these guidelines. Until such amendments are made and unless otherwise specified in these guidelines, all other DER requirements, procedures, and limitations contained in FAA Orders 8110.37 and 8110.4 remain valid.

These guidelines are effective immediately. Interested transport airplane manufacturers should contact their appropriate Aircraft Certification Office (ACO) Flight Test Branch Manager for specific details in obtaining the necessary authorization.

*Guidelines for Designated Engineering Representative Approval of Transport Category Airplane Flight Manual Revisions*

General guidelines are established by the Transport Airplane Directorate to delegate to appointed Designated Engineering Representatives (DERs) approval authority for select transport category Airplane Flight Manual (AFM) revisions. It remains the responsibility of the appropriate regional Aircraft Certification Office (ACO) Flight Test Branch Manager to evaluate the capability, delegate the authority, and monitor the approval activities of the airplane manufacturer and appointed designees. Unless otherwise specified in these guidelines, all other DER requirements, procedures, and limitations contained in FAA Orders 8110.37 and 8110.4 remain valid.

*DER Qualifications*

The nominee must possess the following characteristics to obtain authorization to approve AFM revisions:

- **A transport airplane manufacturer employee.**
- **Sound general knowledge of the complete Type Certification process.**
- **Familiarization with the historical background of the airplane manufacturer's AFMs.**
- **Must possess administrative ability.**
- **Authority to facilitate the DER review process.**

The authorized designee will be classified as a *Flight Analyst Designee*.

*DER/Airplane Manufacturer Review Process*

The airplane manufacturer should institute a structured review process to ensure the integrity of DER-approved AFM revisions. The manufacturer's coordination records must be made available to the FAA to audit the process. The following procedures are recommended:

- **Identify eligibility of AFM revision for DER approval (see below).**
- **Research and draft material.**
- **Select appropriate engineering disciplines (aerodynamics, propulsion, etc.) for review.**
- **Integrate comments.**

- **Coordinate final engineering discipline and airworthiness approval.**
- **Authorized designee signs AFM above signature block clearly identifying the signee as a DER and not the ACO manager or branch manager. An advance copy of the approved AFM revision is sent to the FAA, along with appropriate documentation showing coordination elements.**
- **Authorized designee signs 8110-3 form and submits to FAA.**
- **Final copies of AFM sent to FAA.**

*Material Eligible for DER-Approval*

The following types of AFM revisions are *eligible* for approval by authorized Flight Analyst Designees:

- **The addition of airplane serial numbers to an existing AFM where the airplane configuration, as related to the AFM, is identical to airplanes already in that AFM.**
- **Changes to weight limitations that are within all previously FAA-approved limitations (*e.g.*, structural, noise, etc.).**
- **The addition of compatible and previously FAA-approved AFM appendices.**
- **Conversions of previously FAA-approved combinations of units of measure added to AFM in a previously FAA-approved manner.**
- **Minor editorial changes and/or corrections.**
- **The addition of previously FAA-approved optional equipment for the same airplane model with similar operability and compatibility characteristics provided that no additional compatibility flight testing is required.**

*Material Not Eligible for DER-Approval*

New information of any kind, or any information not previously approved by the FAA, including limitations, operating procedures and performance, are *not eligible* for DER approval. Other types of AFM revisions *not eligible* for DER approval include:

- **Any information that requires certification flight tests.**
- **Any revision where approval or signature authority is affected by existing bilateral agreements and procedural practices.**
- **Revisions associated with concurrent Type Certification activity.**
- **Changing units of measure incompatible with airplane configuration (*e.g.*, fuel quantity/flow gauges).**
- **Any revision not clearly identified above as eligible for DER-approval.**

*As stated above, if you have questions or request further clarification of these guidelines, please contact your cognizant ACO.*

## New Specialists at Transport Airplane Directorate MIDOs

Since September 1988, the Los Angeles and Seattle Manufacturing Inspection District Offices (MIDO) have supported their respective Aircraft Certification Offices (ACO) with the services of a MIDO Type Certification Specialist. The specialists' positions are presently held by Messrs. **Jim Connally** (Los Angeles MIDO) and **Mike del Fierro** (Seattle MIDO), and their offices are co-located with the respective ACO. The specialists provide technical expertise and act as the inter-office focal point for manufacturing inspection responsibilities concerning type certification, production certification and approval of aeronautical product manufacturing facilities, and original airworthiness certification of aircraft and related aeronautical products and parts.

Routine designee (DMIR's, DAR's) contact with these individuals is limited, as the principal point of contract for technical information and direction for designees remains their managing office and assigned FAA Inspector. However, these specialist can provide:

*(1) authoritative information on continued operational safety, certification policy, and technical concerns of the incumbent's specialty to other persons; and*

*(2) coordination between the MIDO and the ACO for planning, directing, and evaluating aircraft certification projects.*

They are involved daily in activities to ensure that malfunctions and defects encountered in aeronautical products are appropriately investigated, to determine cause, and to work closely with other Transport Airplane Directorate personnel to identify appropriate corrective actions.

During type certification projects, they participate in the process of identifying the inspections necessary to determine that test articles and prototypes conform to the appropriate type design data. In this process, they work closely with the ACO certification team to identify the necessary ground tests and inspections of prototype products, prior to official FAA flight tests. These inspections are necessary to properly administer the type design program. At the completion of the programs, the MIDO specialists review the conformity inspection records and type inspection report to determine that the applicant has met conformity and related manufacturing inspection requirements necessary for issuance of a type certificate or other FAA design approvals.

Following the issuance of an FAA type design approval, these specialists work to rapidly provide any pertinent instructions or guidance to the FAA representative involved in the airworthiness certification process.

From the implementation of this specialist concept, the accomplishment of the Transport Airplane Directorate's objectives have been aided, and inter-office communications have been improved.

## "Recommended Reading" for Designated Engineering Representatives (DER)

This Directorate recommends that, in order to have an adequate set of Federal regulations and other guidance which may be pertinent to their work, all DER's should have a copy of at least the following documents:

- **Code of Federal Regulations (CFR) 14**
- **Federal Aviation Regulations (FAR) Parts**
  - **1 - Definitions and abbreviations**
  - **21 - Certification procedures for products and parts**
  - **36 - Noise standards: aircraft type and airworthiness**
  - **39 - Airworthiness directives**
  - **43 - Maintenance, preventative maintenance, rebuilding, and alteration**
  - **183 - Representatives of the Administrator**
- **FAA Orders**
  - **0000.4J - Washington Headquarters Directives Checklist**
  - **8000.51 - Aircraft Certification Directorates**
  - **8100.5 - Aircraft Certification Directorate Procedures**
  - **8110.4 - Type Certification**
  - **8110.37 - Designated Engineering Representatives (DER) Guidance Handbook**
- **Advisory Circulars (AC)**
  - **00-2.2 - Advisory Circular Checklist**
  - **00.44Z - Status of the Federal Aviation Regulations**
  - **43.13-1A - Acceptable Methods, Techniques, and Practices -- Aircraft Inspection and Repair**
  - **43.13-2A - Acceptable Methods, Techniques, and Practices -- Aircraft Alterations**
  - **183-35A - FAA Designated Airworthiness Representatives (DAR) Designated Alteration Stations (DAS) and Delegation Option Authorization (DOA) Directory**

*For copies of any of these documents, please contact your nearest Government Printing Office or cognizant ACO.*

## New Standards for Passengers Seated Near Exits

To increase airline passenger safety, the FAA has issued a final regulation requiring air carriers to restrict seats in exit rows to only those persons able to activate emergency exits and perform other emergency functions to ensure quick aircraft evacuation.

"The issues raised by this rule are both difficult and controversial," said **FAA Administrator James Busey.** "They require, in the interest of the safety of all passengers, that some passengers be treated differently than others, depending on their physical abilities."

The FAA found that the fastest possible evacuation from an aircraft is critical to survivability in an accident.

Due to the pivotal role played by those passengers seated in closest proximity to airplane exits, it was necessary to establish passenger eligibility to sit in an exit row.

Passengers sitting near exit doors must be able to:

1. *Locate the door and quickly follow instructions for its use.* A delay in determining how to operate the door can cost precious seconds. Operating it improperly can injure passengers or result in their deaths.

2. *Physically open the door.* This involves being able to respond to shouted or hand-signalled instructions from flight attendants, as well as being able to tell when opening an exit would be too dangerous-because of fire on the adjacent wing, for example.

3. *Get around any obstacles* and proceed quickly through the open exit, so as not to cause a traffic jam at the door and perhaps to assist other passengers in getting away form the during aircraft.

4. *Devote full attention to the emergency.* A passenger having to care for small children, for example, may be unable to do so.

The regulation requires airlines to inform passengers sitting in exit rows about what may be required of them in an emergency. It applies to all U.S. carriers except unscheduled air taxis with nine or fewer passenger seats. The compliance date is October 2, 1990.

## Amendment 25-64, Seat Safety Standards; and FAR Section 25.562, Emergency Landing Dynamic Conditions

This Directorate has received several requests for more information on Amendment 25-64, the new dynamic seat rule:

*1. When will Amendment 25-64 be effective for new airplanes and for retrofit?*

Amendment 25-64 was made effective on June 16, 1988, for new type designs. Anyone applying for a type certificate after that date will be required to comply with this Amendment. There is a proposed rule change to FAR Parts 121 and 135 which will make Amendment 25-64 applicable to all transport airplanes operated under these Parts. The proposed retrofit rule would require installation of the new seats by June 16, 1997.

*2. Are any changes proposed to Amendment 25-64 or other regulations and can they be discussed now?*

We may propose to amend Section 25.562 to delete the requirement that flight crew seats be tested with 10 degrees of floor warpage. This is still under study, however.

*3. Will dynamic testing on multiple-passenger seats require different occupant combinations?*

The most critical loading conditions for the seat and for the passenger must be considered when conducting either the dynamic or static tests. The most critical loading condition for the seat may not be the most critical condition for the passenger and vice versa.

*4. What is the accepted procedure for obtaining certification?*

The accepted procedure for certification is to submit a test plan along with detail drawings to the responsible ACO, with a copy of the test plan, to the Transport Airplane Directorate. The test plan must be approved and the conformity inspection completed prior to certification testing.

*5. Is there some form that will signify FAA approval of seats which have successfully completed these tests?*

Until the new seat Technical Standard Order (TSO) is approved, the only means of approving seats to the new standards is by Type Certificate (TC) or Supplemental Type Certificate (STC). If a seat manufacturer has a contract to provide seats for a TC holder, the seats may be approved under the TC. Alternatively, the seat manufacturer could apply for an STC in its name. In either case, TC or STC, final approval would come after the compliance inspection with the seats installed in the airplane. In the absence of a full TC or STC approval, evidence of the successful completion of the dynamic tests could be in the form of an engineering letter form the FAA attesting to the successful completion of these tests.

*6. Regarding the application of the seat leg reaction loads recorded during the seat dynamic tests, and the distribution of these loads to the floor support structure, how far should these loads be carried into the floor structure?*

The local floor support structure should be capable of withstanding the vertical and horizontal leg reaction loads developed during these tests when treated as ultimate static conditions. During formulation of the new dynamic test standard, consideration was given to floor strength levels in current transport category airplanes. It was determined that an innovative seat designer could develop a seat which would not create seat leg loads higher than current floors are capable of withstanding. However, in all cases the floor structure must be evaluated for each type seat installed to determine if the leg loads are within the floor strength envelope. The floor structure must be able to react these loads.

Of special concern are: the attachment of floor panels to the tracks, attachment of the tracks to the support beams, strength of the support beam webs in the transverse grain, support beam web buckling, and attachment of the longitudinal and transverse support beams.

## Amendment 25-69, Fuel Tank Access Covers

This Directorate has received a request for information regarding a means of showing compliance with the requirements of FAR Part 25, as amended by Amendment 25-69, for fuel tank access covers on transport category airplanes.

The FAA has accepted criteria for certification under the new standards of FAR Section 25.963(e) based on data derived from service experience on similar type airplanes. Likely fragment size and strike zones for engine debris are defined in Advisory Circular (AC) 20-128, "*Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure,*" issued March 9, 1988. Until more definitive guidance is developed, the tire tread segment sizes should be based on service experience on similar airplanes, and the energy level of the tire fragment should be based on the aircraft speed at rotation ($V_R$).

The FAA is developing a new AC which will provide more definitive guidance material for showing compliance with the new standards. Our focus in this AC is on airplane designs that have fuel tank access covers in the under-wing skin where engine and landing gear positions may subject the cover to impacts from fragments. The impact zones and energy levels are currently being developed.

## Advisory Circular (AC) 25-562-1: Seat Height Used for Dynamic Testing

This Directorate has received several inquiries regarding the interpretation of AC 25-562-1 relative to the seat height used for dynamic testing. The two paragraphs most in question are 4(c)(2)(iv) and 4(c)(3)(v).

The new dynamic seat test requirements were designed to serve two purposes:

- **to ensure that the seat and its attachments are designed to withstand likely dynamic impulses developed during crash conditions, and**
- **to evaluate the occupant injury potential during the crash.**

The test impulses defined in the new FAR Section 25.562 rule (Emergency Landing Dynamic Conditions) were derived from survivable crash environments and selected to take full advantage of the strength in existing seat restraint systems and airplane floors. In order to take full advantage of the floor strength, it is important to test the seat in the most critical configuration for the seat and supporting structure. This is consistent with the static test procedures and existing policy that requires structural substantiation for the most critical conditions. Typically, for adjustable seats this is the high C.G. location and the forward loading condition.

Occupant injury assessment for the dynamic test condition, on the other hand, is a systems approach to providing a survivable envelope for the occupant during survivable crash conditions. As such, it is necessary to test adjustable seats at the position that places the 50th percentile male occupant at the design position. Two tests are normally required to demonstrate compliance with the strength of the restraint system and with occupant injury criteria. Alternatively, adjusting the seat to its highest position, with the interior components raised accordingly, is considered an acceptable test procedure for simultaneously demonstrating compliance with both the structural and occupant injury requirements.

If the range in adjustments of crew seats is not accounted for in the dynamic tests, it would be possible to certify seats as meeting the 16-g dynamic requirement with a real capability of only about 12-g's in the extended position. Since there is no placard or flight manual prohibition regarding seat position for takeoff and landing, we expect the seats to perform to the design standards in any approved position.

*If you have any questions regarding this subject, please contact your cognizant ACO.*

## Advisory Circulars (AC) 20-53A and 20-136: Lightning Strike Zone 1A Identification Criterion

The lightning protection Advisory Circulars, AC 20-53A and AC 20-136, highlight the need to consider extending Lightning Strike Zone 1A "*if the probability of a flight safety hazard due to a Zone 1A strike to an unprotected surface is high.*"

Further, the FAA considers that the lightning strike zone identification used by an applicant should specifically address direct lightning attachment to the full authority digital engine control (FADEC) or to any other control system component where direct attachment may occur through non-conductive (such as composite) cowling or other aerodynamic fairing.

During the course of recent certification efforts in this Directorate, the need for clarification of these requirements became apparent. The following is intended to provide that clarification.

For transport category aircraft, the lightning zone identification used by the applicant should be shown to comply with the intent of the expanded Zone 1A consideration by:

1. Specifically identifying <u>*any*</u> aircraft external surface which:

a. Has not been shown to provide adequate protection from the direct effects of a Zone 1A strike as defined in Section 11 of AC 20-53A, and;

b. Is located aft of a leading edge extremity (*i.e.*, is located in a traditional Zone 2A, swept stroke zone, as defined in the lightning protection AC's), and;

2. Addressing the exposure of each surface to a Zone 1A strike when demonstrating compliance with the Lightning Certification Requirements by:

a. Establishing that the surface will not be exposed to a Zone 1A strike; or

b. Demonstrating that if the surface is exposed to a Zone 1A strike, the lightning direct and indirect affects will not contribute to or cause a failure condition which would prevent continued safe flight and landing and any resultant failure condition which could significantly impact the safety of the airplane or the ability of the crew to cope with adverse operating conditions is recoverable immediately following the strike (i.e., any critical function is not affected and any essential function can be immediately recovered).

This assessment process, when applied to the powerplant installations of a transport category airplane, should recognize the following:

- Lightning models and service experience show that fan cowls on typical wing mounted engines are exposed to lightning first return strokes.

- Loss of engine structural integrity (*e.g.*, uncontrolled fire or overspeed), a multiple engine loss of thrust control, high power reverse thrust inflight, and single engine loss of thrust control during certain critical phases of flight are examples of powerplant malfunctions which could contribute to or cause a failure condition which would prevent continued safe flight and landing.

- Loss of thrust control on a single engine or any other adverse change in an engine's operating capabilities or characteristics, loss of any powerplant instrument required by FAR Section 25.1305, and loss of a fault detection, accommodation or annunciation feature are examples of powerplant failures which could significantly impact the safety of the airplane or the ability of the crew to cope with adverse operating conditions.

It should be noted that *"loss of thrust control,"* as used herein, is defined as any loss of control over the magnitude or direction of thrust to the extent that it could adversely impact aircraft safety. The principal hazardous conditions to be considered are:

- **uncommanded change in the direction of thrust,**
- **inability to attain and retain rated forward or reverse thrust, and**
- **unpredictable or unstable powerplant operation which significantly increases crew work load or otherwise adversely impacts aircraft safety.**

## TSO-C117: Airborne Windshear Warning and Escape Guidance Systems for Transport Airplanes

This new TSO defines performance, functions, and features for systems providing windshear warning and escape guidance commands based upon sensing the airplane's encounter of such phenomena. It is not applicable to systems that look ahead to sense windshear conditions before the phenomenon is encountered nor to systems that use atmospheric and/or other data to predict the likelihood of a windshear alert. Airborne windshear warning and escape guidance systems that are to be identified with TSO identification and that are manufactured on or after July 24, 1990, must meet the minimum performance standard specified in TSO-C117.

The following documents must form a part of TSO-C117 to the extent specified. Should conflicting requirements exist, the contents of the TSO shall be followed:

Radio Technical Commission for Aeronautics (RTCA) DO-160B or DO-160C, "*Environmental Conditions and Test Procedures for Airborne Equipment.*"

RTCA Document No. DO-178A, "*Software Considerations in Airborne Systems and Equipment Certification,*" March 1985.

Society of Automotive Engineers, Inc. (SAE) Aerospace Recommended Practice (ARP) 4102/11, "*Airborne Windshear Systems,*" dated July 1988.

*To obtain a copy of TSO-C117 write to:*

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

## Other Regulatory Activity

*Final rules*

Amendment 25-72. *Special Review: Transport Category Airplane Airworthiness Standards.* This amendment was issued on June 26, 1990. It updates the standards for type certification of transport category airplanes for clarity and accuracy, and ensures that the standards are appropriate and practicable for the smaller transport category airplanes common to regional air carrier operation.

*Advisory Circulars*

AC 25.807-1, *Uniform Distribution of Exits.* This AC was issued on August 13, 1990, and provides guidance material defining acceptable means of demonstrating compliance with the requirements for distributing required passenger exits uniformly. This AC addresses only those passenger-carrying airplanes, including mixed passenger/cargo ("*combi*") configurations, which are required to comply with FAR 25.807, Amendment 25-15 or later.

*Proposed Advisory Circulars*

Proposed AC 25.1529-1, *Instructions for Continued Airworthiness.* This notice announced the availability and requested comments on a proposed AC pertaining to instructions for continued airworthiness of transport category airplanes. The proposed AC addresses approval procedures to follow when making repairs on structure certified to the damage tolerance requirements of 25.571 of the FAR, Amendment 25-45, and to type designs with supplemental inspection documents (SID) which were based on this criteria. The notice was published in the Federal Register on June 29, 1990. The comment period closed October 29, 1990.

Proposed AC 25.785-1A, *Flight Attendant Seat and Torso Restraint System Installations.* This notice announced the availability of and requested comments on a proposed AC pertaining to flight attendant seat and torso installations to provide guidance relative to the close proximity of aft-facing flight attendant seats and forward-facing passenger seats. Information is given to assist in the design of airplane interiors or the placement of seats which would preclude a passenger from striking a flight attendant during any emergency landing. The proposal also included guidance relating to the width of single and double flight attendant seats and the proper installation of torso restraint systems. The notice was published in the Federal Register on July 6, 1990. The comment period closed November 5, 1990.

Proposed Advisory Circular 20-131A, *Airworthiness Approval of Traffic Alert and Collision Avoidance Systems (TCAS II) and Mode S Transponders.* This notice announced the availability and requested comments on a proposed AC which provides guidance material on the design aspects, characteristics, mechanization, testing and criticality of system failure cases for TCAS II and Mode S transponders. The guidance material is directed to systems which provide traffic advisories and resolution advisories in the vertical axis only (TCAS II) and where the operational performance standards are defined in technical documents that were developed by a joint air transport industry/government group. The notice was published in the Federal Register on June 29, 1990. The comment period closed October 29, 1990.

## SPECIAL TOPIC: Aging Fleet Update: Corrosion Prevention and Control Programs

On November 11, 1990, the FAA issued four airworthiness directives (AD), each applicable to a different model of Boeing series airplane, which require operators to revise their FAA-approved maintenance programs to include a corrosion prevention and control program within one year. These ADs represent the second phase of an ongoing rulemaking effort to address the continued airworthiness of aging airliners.

*Background*

Subsequent to the Aloha Airlines B-737 accident in Honolulu in April 1988, the FAA sponsored a conference on aging airplanes. It became obvious that, because of the increase in air travel, the relatively slow pace of new airplane production, and the apparent economic feasibility of operating older technology airplanes, older airplanes will continue to be operated rather than be retired. Because of the problems revealed by the Aloha accident, it was generally agreed that increased attention needed to be focused on the aging fleet and maintaining its continue operational safety.

The Air Transport Association (ATA) of America and the Aerospace Industries Association (AIA) of America are committed to identifying and implementing procedures to ensure continuing structural airworthiness of aging transport category airplanes. An "*Airworthiness Assurance Task Force,*" composed of representatives from the aircraft operators, manufacturers, regulatory authorities, and other aviation representatives, was established in August 1988. The objective of the Task Force is to sponsor "*Working Groups*" to:

(1) select service bulletins, applicable to each airplane model in the transport fleet, to be recommended for mandatory modification of aging airplanes;

(2) develop corrosion-directed inspections and prevention programs;

(3) review the adequacy of each operator's structural maintenance program;

(4) review and update the Supplemental Structural Inspection Documents (SSID); and

(5) assess repair quality.

The Working Groups assigned to review the Boeing model airplanes completed their work on Item (1), above, in March 1989, and compiled their recommendations in several service documents, entitled "*Aging Airplane Service Bulletin Structural Modification Program(s),*" each related to a different Boeing model. The FAA has previously issued ADs which mandate the structural modifications specified in these documents (reference AD 90-06-02 for Model 737's; AD 90-06-06 for Model 747's; and AD 90-06-09 for Model 727's).

*The Corrosion Control Program*

The Working Groups assigned to review the Boeing model airplanes completed their work on Item (2), above, in July 1989, and have developed baseline programs for controlling corrosion problems that may jeopardize the continued airworthiness of the Boeing Model 707/720, 727, 737, and 747 fleet. These programs are contained in four separate service documents, each entitled "*Aging Airplane Corrosion Prevention and Control Program(s),*" and each related to a different Boeing model. The most recently issued aging fleet program ADs mandate the implementation of these programs: AD 90-25-07 for Model 707/720's; AD 90-25-03 for Model 727's; AD 90-25-01 for Model 737's; and AD 90-25-05 for Model 747's.

Review of other airplane models is still in process. The FAA has already published proposed ADs applicable to McDonnell Douglas series airplanes. It is expected that other Working Groups will complete their reviews of other aiprlane models sometime in the near future; further AD rulemaking will follow.

*The "Corrosion ADs"*

The recently issued "corrosion ADs," applicable to Boeing airplanes, mandate the adoption of a corrosion prevention and control program that is equivalent to or better than the program specified in the Boeing Document applicable to each individual model. These ADs are considered precedent-setting in that they mandate a preventative program, rather that a "quick fix" for an identified unsafe condition.

The FAA considers it very important that Designated Engineering Representatives (DER) understand the intent and requirements of these ADs, since DERs will be playing a vital role in ensuring the workability of the program. The four corrosion ADs are identical in their requirements, except for the citation of the pertinent Boeing service document. The following discussion addresses the ADs item-by-item; hopefully, it will explain some of the intricacies of the ADs, and answer questions that might arise.

*General Aspects of the Corrosion ADs*

During the FAA's development of the corrosion ADs, several representatives of the aviation community had suggested that the format of those ADs should follow the example of the Supplemental Structural Inspection Document (SSID) ADs. The SSID ADs, in essence, mandated a program to continually inspect a "candidate fleet" for various fatigue-related problems. The intent of this was that, if an unsafe condition were identified during the course of the inspections of a candidate fleet and confirmed to be one that could exist or develop on all airplanes of that particular type design, the FAA would then issue an AD to correct that condition, which would be applicable to the entire fleet.

Aviation representatives stated that the program initiated by the SSID ADs is preferable since it provides operators with the flexibility to make minor adjustments without seeking FAA approval. The FAA did not agree with this suggestion. Although both the SSID ADs and the corrosion ADs are similar in that they involve complex revisions to the operators' maintenance programs, they differ in several significant ways. The SSID program is not a self-contained method for addressing aging fleet problems; it serves as a sampling and monitoring tool to provide the FAA with information needed to issue additional AD's defining corrective action when problems are discovered. On the other hand, the corrosion prevention and control programs required by the new ADs are intended to be self-contained and, in addition to information gathering, addresses the nature of corrective action necessary when problems are discovered.

The purpose of the corrosion program is to maintain corrosion levels at "*Level 1*" or better, whereas the purpose of the SSID AD was simply to detect fatigue problems so that additional corrective action could be mandated. This difference necessitates the greater complexity and detail of the corrosion AD action in defining the terms of compliance.

Further, fatigue cracking, which is addressed by the SSID program, is a problem generally experienced similarly by airplanes, regardless of operational environment and, therefore, it is appropriate to address that problem through follow-on ADs applicable to the entire fleet. Since corrosion, on the other hand, is highly dependent upon the operational environment, it is appropriate to address it through individualized adjustments to an operator's corrosion prevention and control program.

Paragraph A. of each "*corrosion AD*" reads as follows:

*"A. Within one year after December 31, 1990 [the effective date of the ADs] revise the FAA-approved maintenance program to include the corrosion control program specified in [the Boeing Document entitled "Airplane Corrosion Prevention and Control Program" -- as applicable to the specific model].*

*NOTE: All structure found corroded or cracked as a result of an inspection conducted in accordance with this paragraph must be addressed in accordance with FAR Part 43.*

*NOTE: Where non-destructive inspection (NDI) methods are employed, in accordance with Section 4.1 of the Document, the standards and procedures used must be acceptable to the Administrator in accordance with FAR 43.13.*

*NOTE: Procedures identified in the Document as "optional" are not required to be accomplished by this AD."*

One important aspect is that these ADs do not contain a requirement for specific correction of corrosion. The unsafe condition to which these ADs are addressed is the inadequacy of existing corrosion control programs to detect corrosion in a timely manner; there is no basis at this time for concluding that existing maintenance practices are inadequate to address corrosion once it is found. Therefore, with regard to corrective action for specific findings of cracks and corrosion, the FAA intends that existing sound maintenance practices, as already required under FAR Part 43, continue to be followed. Accordingly, the FAA finds that including a requirement for such repair or other corrective action in these ADs is unnecessary. The FAA's intent in these ADs was not to go beyond the requirements of existing maintenance practices (as required by FAR 43).

Questions have already arisen as to whether or not Designated Engineering Representatives (DER) would be permitted to approve corrective actions to address corrosion. When the FAA originally proposed these corrosion ADs, paragraph A. had contained a provision that would have required repairs to be performed "*in accordance with a method approved by the Manager of the Seattle ACO.*" This would have been similar to requirements in other ADs where specific data cannot be referenced on how to perform repairs, and would preclude approval by a DER. However, in considering the comments received from industry and affected operators, the FAA recognized that the unsafe condition addressed in the AD is related to systematic failure to detect corrosion, rather than a failure to properly repair it once it is found. Therefore, since existing means for repairing corrosion in accordance with FAR Part 43 are adequate -- including data approvals by DERs -- the FAA decided to continue to rely on this mechanism. Accordingly, in the case of the corrosion ADs, DERs may be involved in the approval of corrective actions.

Several aviation representatives had previously suggested that the wording of paragraph A. be such to permit adoption of a corrosion control program that is "*equivalent to that defined in*" the Boeing Document, in order to avoid the necessity for obtaining FAA approval of deviations from the specific program defined in the Document. The FAA did not concur with this suggestion. In order to ensure equivalency, the FAA has determined that it is necessary for it to review proposed deviations; allowing operator discretion in determining equivalency would essentially preclude the FAA from taking appropriate action to ensure compliance with the ADs if it subsequently determines that the operator's program is not equivalent.

It should be noted that throughout the AD, the FAA has relied upon the definitions of Level 1, 2, and 3 corrosion that are contained in the referenced Boeing Document. The FAA did not replace these terms with any other wording to describe the condition of corrosion, since the definitions contained in the pertinent Boeing Documents are required to be incorporated into the operator's maintenance program (in accordance with paragraph A. of these ADs).

Paragraph B. of the ADs reads as follows:

"*B. 1. If, as a result of any inspection conducted in accordance with the program required by paragraph A., above, Level 3 corrosion is determined to exist in any area, accomplish one of the following within 7 days after such determination:*

*a. Submit a report of any findings of Level 3 corrosion to the Manager of the Seattle Aircraft Certification Office (ACO) and inspect the affected area on all Model [i.e., 727] aircraft in the operator's fleet; or*

*b. Submit for approval to the Manager of the Seattle ACO one of the following:*

*(1) Proposed adjustments to the schedule for performing the tasks in that area on remaining airplanes in the operator's fleet, which are adequate to ensure that any other Level 3 corrosion is detected in a timely manner, along with substantiating data for those adjustments; or*

*(2) Data substantiating that the Level 3 corrosion found is an isolated occurrence and that no such adjustments are necessary.*

<u>*NOTE*</u>*: Notwithstanding the provision of Section 1.1. of the Document that would permit corrosion that otherwise meets the definition of Level 3 corrosion (i.e., which is determined to be a potentially urgent airworthiness concern requiring expeditious action) to be treated as Level 1 if the operator finds that it "can be attributed to an event not typical of the operator's usage of other airplanes in the same fleet," this paragraph requires that data substan-*

*tiating any such finding be submitted to the FAA for approval.*

*NOTE: As used throughout this AD, where documents are to be submitted to the Manager of the Seattle ACO, the document should be submitted directly to the Manager, Seattle ACO, and a copy sent to the cognizant FAA Principal Inspector (PI). The PI will then forward comments or concurrence to the Seattle ACO. The Seattle ACO will not respond to the operator without the PI's comments or concurrence.*

*2. The FAA may impose adjustments other than those proposed, upon a finding that such adjustments are necessary to ensure that any other Level 3 corrosion is detected in a timely manner.*

*3. Prior to the compliance time specified for the first task required in the adjusted schedule approved under paragraph B.1. or B.2. of this AD, revise the FAA-approved maintenance program to include those adjustments.*

*NOTE: The reporting requirements of this paragraph and of paragraph D., below, do not relieve operators from reporting corrosion as required by FAR Section 121.703."*

It should be emphasized that paragraph B.1. specifies that the 7-day compliance time for additional actions begins upon a "*determination*" that Level 3 corrosion exists, NOT merely a "*discovery*" of Level 3 corrosion. The FAA deliberately chose this wording since it is recognized that some time may pass between the discovery of corrosion and the determination that it is Level 3 corrosion; and additional time will then be needed either to inspect the remainder of the operator's fleet or to develop a plan for such inspections. Therefore, it is appropriate that the compliance time start at the time the determination is made. However, the FAA plans to monitor the time experienced by operators between the time of discovery and the time of determination of Level 3 corrosion to ensure that operators continue to respond with the necessary urgency.

The FAA considers the degree of urgency associated with findings of Level 3 corrosion to be equivalent to that associated with findings of unsafe conditions warranting the issuance of emergency ADs. Therefore, if it is found that timely determinations are not being made, the FAA may propose further AD rulemaking to address this concern.

The FAA has received some questions as to whether the reporting requirements of paragraph B. are redundant of those of FAR 121.703. The FAA does not see these reports as redundant. The purpose and content of the reports required by paragraph B. are different from the general requirement of FAR 121.703; reports under this paragraph are intended to provide the FAA with information regarding not just the specific finding of corrosion, but the status of the operator's fleet and schedule adjustments.

Some operators have expressed some concern that the requirements of paragraph B.1.a. [which requires operators to submit a report of Level 3 corrosion findings to the FAA and to inspect the affected area on all Model (*i.e.*, 727) aircraft in the operator's fleet within 7 days] might ground operators with large fleets. The FAA does not foresee a problem in this regard. The requirements of that paragraph were intended as an option for operators with small fleets. Operators with large fleets have the option of accomplishing the requirements of paragraph

B.1.b. (which involves submitting a proposal for adjustment to the schedule for performing tasks in that area on remaining aircraft in the fleet, or submitting data substantiating that the Level 3 corrosion found is an isolated case).

Questions have also arisen as to whether the Note in paragraph B.1.b.(2), which would require FAA review and approval of data submitted to substantiate that Level 3 corrosion is not typical of the operator's fleet, is contradictory to the Boeing Document. In this respect, operators have indicated concern that the process of the FAA reviewing isolated cases may take too long, while the remainder of the operator's fleet may be in jeopardy. The FAA does not agree with these observations. In order to ensure the adequacy of operators' determinations, it is necessary for the FAA to review and approve them; without such approval, an operator could not be held accountable for an improper determination that a Level 3 corrosion finding was non-representative. Further, the FAA has committed to responding to Level 3 corrosion as expeditiously as possible to avoid adversely affecting safety. Finally, assuming the adequacy of proposed adjustments and their substantiation, the FAA's role will be limited to general oversight, and the associated workload should not be excessive. Therefore, delays are not inherent in this review and approval process.

Some affected operators have asked for additional guidance as to what constitutes sufficient "*substantiating data,*" or what constitutes an acceptable "*adjustment to a maintenance program.*" Without this information, they are concerned that they would not be able make submissions that would be acceptable to the FAA. The FAA responds that the data necessary to substantiate proposed schedule adjustments is the same as that relied upon by the operator in the exercise of sound engineering judgment when developing those proposals. However, as a more general explanation, "*substantiating data*" that supports the operator's proposed schedule should include:

- **the age of equipment**
- **the number of flight hours**
- **the conditions in the operational environment, and**
- **any other pertinent data to support the operator's proposal.**

If the data substantiates that schedule adjustments are unnecessary to ensure timely detection of Level 3 corrosion on certain or all airplanes in the remainder of the operator's fleet, then the FAA would approve the operator's proposal not to make such adjustments.

The FAA has received several questions concerning how the requirements of paragraph B.2. would actually work. Some operators have requested that a provision be included whereby an operator would have the opportu1nity to negotiate with the FAA in the event the FAA rejects the operator's substantiating data. As discussed above, where an operator presents proposed adjustments and substantiating data showing that those adjustments will establish an acceptable level of safety, the FAA will approve the proposal.

However, if the FAA determines that the proposed adjustments are inadequate, it may impose different adjustments, in accordance with paragraph B.2. Prior to doing so, the FAA would necessarily discuss the practicability of any such adjustments with the operator.

Ultimately, however, the FAA must retain the authority to determine what adjustments are necessary to ensure that an acceptable level of safety is maintained.

Questions have arisen concerning the Note in paragraph B.1.b.(2) referencing the role of the Principal Maintenance Inspectors (PMI) in this program. The FAA would like to emphasize that the PMIs have NOT been removed from their primary role as the single point of FAA oversight for the operators' maintenance program. The PMIs will continue to serve as FAA's critical link with the operators. Their oversight responsibilities in these corrosion ADs, as in other ADs, will not be minimized by the requirements of these AD; however, engineering support will be provided by the Seattle ACO.

Paragraph C. reads as follows:

*"C. To accommodate unanticipated scheduling requirements, it is acceptable for a repeat inspection interval to be increased by up to 10% but not to exceed 6 months. The cognizant FAA Principal Inspector (PI) must be informed, in writing, of any extension.*

*NOTE: Except as provided in this paragraph, notwithstanding Section 3.1., paragraph 4, of the Document, all extensions to any compliance time must be approved by the Manager of the Seattle ACO."*

Paragraph D. reads as follows:

*"D. Report forms for Level 2 corrosion and a follow-up report for Level 3 corrosion must be submitted at least quarterly in accordance with Section 5.0 of the Document."*

Paragraph E. reads as follows:

*"E. If the repeat inspection or task intervals of an operator's existing corrosion inspection program are shorter than the corresponding intervals in Section 4.3 of the Document, they may not be increased without specific approval of the Manager of the Seattle ACO."*

The purpose of this paragraph is to prevent those operators that currently have rigorous corrosion control programs from downgrading them. Since those programs are presumably based on the operator's service experience, and since the Boeing Document presents a program based on average fleet-wide experience, it may be that the Boeing Document would not provide an acceptable level of safety for that operator. The alternate means of compliance provision in paragraph H. of the ADs provides the opportunity for any operator to submit an alternative procedure to the FAA that would provide an acceptable level of safety.

Paragraph F. reads as follows:

*"F. Before any airplane that is subject to this AD can be added to an air carrier's operations specifications, a program for the accomplishment of tasks required by this AD must be established in accordance with the following:*

*1. For airplanes that have previously been operated under an FAA-approved maintenance program, the initial task on each area to be accomplished by the new operator must be accomplished in accordance with the previous operator's schedule or with the new operator's schedule, whichever would result in the earlier accomplishment date for that task.*

*After each task has been performed once, each subsequent task must be performed in accordance with the new operator's schedule.*

*2. For airplanes that have not previously been operated under an FAA-approved maintenance program, each initial task required by this AD must be accomplished either prior to the airplane's being added to the air carrier's operations specifications, or in accordance with a schedule approved by the Manager, Seattle ACO."*

There have been numerous questions concerning the intent of this paragraph. The FAA considers paragraph F. to be necessary in order to ensure that newly acquired airplanes are inspected within a period of time commensurate with their likely exposure to corrosion. Since the corrosion ADs merely require the adoption of a corrosion control program and, apart from paragraph F., do not dictate the order in which individual airplanes are to be inspected, it is possible that, without this paragraph, newly acquired airplanes may simply "*go to the end of the line*" under the new owner's program even if they were likely candidates for severe corrosion. Regarding airplanes that have previously been operated under maintenance programs complying with these corrosion ADs, since each operator's program will reflect its own operating environment, the only conservative approach is to require the first inspection by the new owner to be conducted in accordance with the more restrictive of the two operators' programs.

It should be emphasized that paragraphs F.1. and F.2. are exclusive of one another. If an airplane has been operated under an FAA-approved maintenance program, then it would follow the requirements of paragraph F.1. If an airplane has never been operated under an FAA-approved maintenance program, then it would follow the requirements of paragraph F.2. Assuming it has been operated under an equivalent corrosion control program adopted in accordance with the requirements of another airworthiness authority, that fact would obviously be critical in substantiating a proposed schedule under paragraph F.2. If it has not been operating under such a program, its corrosion status must be determined before it is added to the operator's operations specifications.

Paragraph G. reads as follows:

*"G. If corrosion is found to exceed Level 1 on any inspection after the initial inspection, the corrosion control program for the affected area must be reviewed and means implemented to reduce corrosion to Level 1 or better.*

*1. Within 60 days after such a finding, if corrective action is necessary to reduce future findings of corrosion to Level 1 or better, such proposed corrective action must be submitted for approval to the Manager, Seattle ACO.*

*2. Within 30 days after the corrective action is approved, revise the FAA-approved maintenance program to include the approved corrective action."*

There have been some questions about this paragraph in regards to a finding of Level 2 corrosion; some affected operators have noted that Level 2 corrosion is "*not an airworthiness concern.*" There have also been come concerns expressed that the FAA may not have the manpower to be responsive to the workload that will be generated by the requirements of paragraphs G.1. and G.2. The FAA notes that, as defined in the Boeing

Documents, Level 2 corrosion, while not urgent, is an airworthiness concern and, to the extent that corrosion control programs must be revised to prevent its recurrence, the FAA has determined that those revisions must be subject to FAA engineering review (via the Seattle ACO) to ensure the adequacy of the corrective actions. Assuming the adequacy of proposed corrective actions, the FAA's role will be limited to general oversight, and the associated workload should not be excessive.

Paragraph H. reads as follows:

*"H. An alternate means of compliance or adjustment of the compliance time, which provides an acceptable level of safety, may be used when approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA, Transport Airplane Directorate.*

*NOTE: The request should be submitted directly to the Manager, Seattle ACO, and a copy sent to the cognizant FAA Principal Inspector (PI). The PI will then forward comments or concurrence to the Seattle ACO."*

Paragraph I. reads as follows:

*"I. Special flight permits may be issued in accordance with FAR 21.197 and 21.199 to operate airplanes to a base in order to comply with the requirements of this AD."*

To obtain a copy of any of these ADs, please submit a request to either of the following offices:

**FAA, Mike Monroney Aeronautical Center**
**Engineering & Manufacturing Branch, AVN-110**
**P.O. Box 25082**
**Oklahoma City, OK 73215**

or

**FAA, Transport Airplane Directorate**
**Attention: J. DeMarco, ANM-103**
**1601 Lind Avenue S.W.**
**Renton, WA 98055-4056**

Ask for:

- **AD 90-25-07 for Model 707/720**
- **AD 90-25-03 for Model 727**
- **AD 90-25-01 for Model 737**
- **AD 90-25-05 for Model 747**

To obtain a copy of the applicable Boeing Document, please contact:

**Boeing Commercial Airplane Group**
**P.O. Box 3707**
**Seattle, Washington 98124.**

The specific documents are identified as:

**Model 707/720: Boeing Document D6-54928, Revision A, dated July 29, 1989**

**Model 727: Boeing Document D6-54926, Revision A, dated July 28, 1989**

**Model 737: Boeing Document D6-38528, Revision A, dated July 28, 1989**

**Model 747: Boeing Document D6-36022, Revision A, dated July 28, 1989**

## FAA EMPLOYMENT OPPORTUNITIES

The Northwest Mountain Region Aircraft Certification Division currently has a number of vacancies at the GS-5 through GS-13 levels ($22,067 to $57,650 per annum) for qualified aerospace engineers in the following specialties: airframe, systems and equipment, propulsion, flight test, and modifications.

These positions are located in Long Beach, California, and Seattle, Washington. They require, as a minimum, a B.S. degree in engineering for the GS-5 entry level. Further education and/or certification experience may qualify an applicant for higher grade levels.

If you or anyone you know is interested in information about FAA employment, please contact:

**Federal Aviation Administration**
**Transport Airplane Directorate**
**Aircraft Certification Service**
**ATTN: J. R. Staab, ANM-103**
**1601 Lind Avenue S.W.**
**Renton, Washington 98055-4056**

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## NOTE 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 who would like to have your name added to our mailing list, please submit your request to:

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**Transport Airplane Directorate**
**ATTN: Editor (J. DeMarco), ANM-103**
**1601 Lind Avenue S.W.**
**Renton, Washington 98055-4056**

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