

SECTION 9. DIFFERENCES TRAINING - ALL TRAINING CATEGORIES

579. GENERAL. This section contains information, direction, and guidance to be used by inspectors when evaluating an operator's differences training program in all categories of training.

A. *Background.* Due to differences in instrumentation and installed equipment, the skills and knowledge required to operate two aircraft of the same make and model can differ. The range of differences between variations of a basic aircraft model has become extremely wide in recent years with the introduction of computerized guidance systems, electronic instrument displays, and two-crewmember flightcrews. Crewmembers trained on one variant of an aircraft may require additional training to safely and efficiently operate other variants of that aircraft. Both Parts 121 and 135 require that operators conduct "differences" training in all categories of training when the crewmember is authorized to serve on more than one variant of an aircraft.

B. *Terminology.* The following terminology is defined as it applies to differences training and as it is used throughout this handbook:

- *Base Aircraft:* The aircraft or group of aircraft designated by the operator for use as a reference to compare differences with other aircraft within the operator's fleet. This comparison of differences between aircraft is for items that affect, or could affect, flightcrew knowledge, skills, or abilities pertinent to flight safety. Operators designate base aircraft by the "N" number (such as "N 611DL"), the airline tail number (such as "aircraft 801-820"), the make/model/series (such as "DC9-31"), and/or other classifications which can uniquely distinguish between the operator's different aircraft pertaining to the different configurations, handling characteristics, performance procedures, limitations, controls, instruments, indicators, systems, equipment, options or modifications. A base aircraft may either be a single aircraft or a group of aircraft with the same features and may be redesignated at the discretion of the operator. Base aircraft are typically those aircraft within a fleet which the flightcrews are first trained in, which the airline has the most number of, or which represent a target configuration for the

operator to eventually use as a standard.

- *Variant Aircraft:* An aircraft or a group of aircraft with the same features, that have pertinent differences from a base aircraft. Pertinent differences are those which could affect flight safety. Typical pertinent differences are those relating to configuration, handling qualities, performance, procedures, limitations, controls, instruments, indicators, systems, equipment, options, or modifications. Variants exist within a model or series, due to differences in installed equipment. For example, a B737-200 ADV with a performance data computer system, Omega, SP-177 autopilot, dual cue flight director, and autoland is a different variant than another B737-200 ADV with a single cue flight director, SP-77 autopilot, and basic VOR/DME navigation equipment. An operator may have a number of variants, in addition to a base aircraft within a fleet.

581. METHODS FOR ACCOUNTING FOR DIFFERENCES. There are several acceptable methods operators may use to account for differences. Inspectors should be knowledgeable of the following acceptable methods.

A. *Standardized Configurations.* The simplest and most traditional method for operators to use when dealing with differences is to avoid them by installing common instruments and equipment in each aircraft in the fleet.

B. *Separate Fleets.* Some operators treat variants of an aircraft as if they were different aircraft by developing separate curriculums for each variant and by scheduling crewmembers to operate only that variant of aircraft on which they have been trained.

C. *Integrated Training.* An operator can conduct differences training as an integral part of each of the six defined categories of training. When the operator chooses to use this method, POI's must ensure that an analysis of the differences between the variants of aircraft in the operator's fleet has been made and that instructional elements have been provided in each curriculum segment to account for the identified differences. POI's may approve this method when systems differences between the

aircraft are minor, procedural differences are minor, and flight training is not required. Approval of integrated differences training is accomplished in conjunction with the approval of the curriculum of which it is a part. When the operator chooses this method, a differences evaluation should be submitted as supporting documentation for the initial curriculum outline.

D. *Separate Differences Curriculum Segments.* The operator may choose to limit instruction throughout a curriculum to one specific "base" aircraft and then conduct training as to the differences present in variations of the aircraft as a separate and distinct curriculum segment. For example, an operator might designate the 100-series aircraft as the base aircraft in a B-737 transition course. Ground, integration, flight, and qualification curriculum segments would be based on this aircraft. At an appropriate point in the instruction, a distinct segment of training would be presented to cover differences in the 200-, 300-, or 400-series aircraft. This method is advantageous when the operator operates numerous variants of an aircraft.

583. SPECIFIC SITUATIONS REQUIRING DIFFERENCES TRAINING. Inspectors should be knowledgeable in the several situations in which differences training may be required, as follows:

- When an operator contracts for training from another party or conducts training in a leased simulator or aircraft having instrumentation or equipment different from the aircraft operated by the operator

- When an operator generates a need for differences training by introducing a variation of an aircraft into an existing fleet or by creating a variant aircraft by modifying one or more aircraft in the fleet
- When airline mergers and acquisitions generate the need for fleets to be merged in operations

585. DIFFERENCES EVALUATION. Differences training must be based on an accurate analysis of the differences in systems, equipment, and operating procedures of the aircraft involved. In 1989, the flight standardization boards (FSB's) began analyzing differences in variants of existing aircraft during certification. This analysis is published in a Master Differences Program Requirements (MDPR) document. The MDPR document contains a listing of differences and differences training requirements. When an MDPR has been published which covers all variants involved, the operator's proposed differences training program must comply with the requirements in the document. An operator preparing a training program for which an MDPR has not been published, must submit a difference analysis conducted by the operator or other qualified party (such as a manufacturer or another operator). The analysis may take any form as long as it accurately identifies all differences which are significant to the operator's crewmembers. One acceptable way of constructing a differences analysis, but not the only means, is to construct a curriculum outline for the base aircraft and to identify each curriculum item in which there is a difference.

**FIGURE 3.2.9.1
EXAMPLE OF DIFFERENCES WORKSHEET**

DIFFERENCES EVALUATION WORKSHEET	
BASE AIRCRAFT	VARIANT AIRCRAFT
Aircraft Systems Subject Areas	
Hydraulic Systems <input type="checkbox"/> Pumps <input type="checkbox"/> Supply <input type="checkbox"/> System A components <input type="checkbox"/> System B components <input type="checkbox"/> RAT <input type="checkbox"/> Limitations	Pnumatic pump deleted Electric pump added Same Same Yaw damper added Deleted Electrical pump time Yaw damper off below 100'
Electrical System Module Air Conditioning Module Etc.	Same Same
Systems Integration Subject Areas	
Normal Procedures Module <input type="checkbox"/> Loran Reciever <input type="checkbox"/> INS Operation	Deleted New procedures
Nonnormal Procedures Module Hydraulic Systems <input type="checkbox"/> Fluid Loss Procedure <input type="checkbox"/> Pump Failure <input type="checkbox"/> Fluid Overheat <input type="checkbox"/> Electrical System Etc.	Contains differences Same Different Same Same
Flight Training Subject Areas	
Normal Procedures Preflight No-Flap Approach Emergency Procedures Pressurization Loss Engine-Out Approach Etc.	Contain Differences Contains Differences Contains Differences Contain Differences Same Contains Differences

587. DEGREES OF DIFFERENCES. POI's must ensure that the methods and devices used to conduct differences training are appropriate to the degree of difference between the base aircraft and the variant aircraft. For purposes of describing degrees of difference and for defining acceptable training methods, five levels of differences have been defined (Levels A - E). These levels are compatible with those described in MDPR's but are discussed here primarily for guiding POI's in approving differences training programs that are not based on MDPR's.

A. *Level A Differences.* Level A differences are those differences which the crewmember needs to be aware of, but which have little effect on systems operations. For example, an engine starter on one variant aircraft has different time limits but does not have differences in controls, indicators, function, or procedures. Self-instruction methods such as highlighted pages of operating manuals or training bulletins are acceptable for these differences. At the Level A of differences, testing may not be required or may be delayed until the next period of recurrent training. Among the several appropriate means of conducting such testing are open book tests, verbal quizzes, and computer-based instruction (CBI). Once such differences are incorporated into the operator's aircraft operating manual, there is usually not a requirement for currency events.

B. *Level B Differences.* Level B differences are those differences in systems, controls, and indicators that have only minor procedural differences. Level B differences are of great enough degree to require formal training in either general operating subjects, aircraft systems, or both, but are not of great enough degree to require systems integration training. An example of a Level B difference might be a fuel system with additional fuel tanks, pumps, and gages. Procedural differences are limited to the operation of transfer valves and pumps while an aircraft is in cruise flight. Appropriate instructional methods for Level B differences include, but are not limited to, tape slide/presentations, lectures, and CBI. The testing that is appropriate to Level A differences is also appropriate to Level B differences, however, testing must be conducted immediately after training.

C. *Level C Differences.* Level C differences are those differences of great enough degree to require a systems integration training module but that are not of great enough degree to require actual flight training (see paragraph 443 of this volume for a definition and description of integration training). An example of a

Level C difference is the installation of a flight management system (FMS) computer. Appropriate training and testing methods in the general operating and systems training modules are the same as those used for Level B differences. Appropriate training devices in the integration module are dedicated systems trainers or training devices of level 4 or greater. Testing methods appropriate to Level C differences are demonstrations of skill in the procedures affected by the difference. In the case of the installation of an FMS computer, testing might consist of preflight programming of the computer and a demonstration of its use in navigation, climbs, and descents. In this case, the qualification curriculum segment should also contain supervised operating experience.

D. *Level D Differences.* Level D differences are those differences for which there is a requirement for flight training modules but not for high fidelity simulation for landings. When Level D differences exist between two aircraft, general operating training modules, systems training modules, and integration training modules may be required. An example of a Level D difference might be the installation of an electronically-integrated flight instrumentation display. Aircraft operations using such a display are required to contain flight training in most phases of flight, except landings. Level 6 or greater flight training devices are appropriate for conducting Level D differences training and qualification modules. The testing required consists of applicable events of a Part 121 proficiency check or a Part 135 competency check.

E. *Level E Differences.* Level E differences are those differences for which there is a requirement for flight training, including landing events. An example of a Level E difference is the installation of a STOL (short takeoff and landing) kit on an aircraft resulting in a very different flare and landing attitude. A Level C or higher (Phase II) simulator, or an airplane is required for flight training in Level E differences. The testing required in Level E differences consists of the applicable events of a Part 121 proficiency check or a Part 135 competency check.

589. RECURRENT DIFFERENCES TRAINING AND CURRENCY EVENTS.

When operators schedule crewmembers on multiple variants of an aircraft, some form of differences training must be included in the recurrent training curriculum. The amount and type of required training depends on the degree of difference involved and the operator's circumstances. Levels A and B differences should be reviewed within recurrent ground training curriculum segments. Levels C, D, and E differences require some degree of proficiency testing in a flight

training device, simulator, or aircraft. Recurrent differences training and testing can be reduced when the operator adopts a system to ensure that crewmembers remain current in all variations of the aircraft operated. For example, when a crewmember is operating aircraft equipped with servo-mechanical and CRT cockpit displays, currency could be expressed by the operator in terms of the number of flightlegs in each variant of the aircraft each quarter.

591. APPROVAL PROCESS. The approval process for differences training follows the five-step process described in section 2 of this chapter. The operator must submit an outline of the differences training program. This outline should contain appropriate modules and elements. Before the POI may grant initial approval of the training program, the operator must also submit documentation supporting the differences analysis. The documentation may consist of a reference to other documents available to the POI, such as the M DPR. The documentation may also be a differences analysis prepared by the operator or other qualified party. When the operator chooses to use the integrated method of training, differences training appears in the outline as differences modules in the appropriate curriculum segment. When the operator conducts differences training as a separate and distinct curriculum segment, all

differences modules are grouped in that segment. In either case, the POI's approval should be predicated on the operator meeting the following required criteria:

- Differences analysis is complete and accurate (but not necessarily in great detail)
- Outline contains the appropriate instructional elements to account for the differences identified in the analysis
- The appropriate modes of instruction and devices to conduct the training are used

593. SEAT DEPENDENT TRAINING. Pilots operating aircraft from the left and right pilot seats are frequently confronted with special skill and training requirements. The differences in crew duties and skill requirements vary from insignificant to highly significant in various makes and models of aircraft. For this reason, POI's must evaluate an operator's seat dependent training requirements on a case-by-case basis. POI's may require that operators use a differences evaluation (as described in this section) for making this determination.

594. - 598. RESERVED.

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