VOLUME 2 AIR OPERATOR AND AIR AGENCY CERTIFICATION AND APPLICATION PROCESS

CHAPTER 11 CERTIFICATION OF A PART 145 REPAIR STATION

Section 5 Safety Assurance System: Phase 5—Administrative Functions

2-1244 GENERAL. Issue the certificate and the approved operations specifications (OpSpecs) to the applicant after correcting all unsatisfactory items. This action completes the certification process. The Federal Aviation Administration (FAA) will not, under any circumstances, certificate an applicant until the certification project manager (CPM) determines that the applicant is fully capable of fulfilling his/her responsibilities as charged by Title 49 of the United States Code (49 U.S.C.) (formerly the Federal Aviation Act of 1958 (FA Act)) and that the applicant will comply with Title 14 of the Code of Federal Regulations (14 CFR) in an appropriate manner.

2-1245 COMPLETE FAA FORM 8310-3, APPLICATION FOR REPAIR STATION CERTIFICATE AND/OR RATING. When the applicant has met all regulatory requirements, the principal inspector (PI) will complete blocks 6 through 10 of FAA Form 8310-3 to show:

- Remarks or discrepancies noted during inspection;
- Findings and recommendations;
- Date of inspection; and
- Office and signature of the PI.

2-1246 PREPARE AIR AGENCY CERTIFICATE. The certificate will include the following information (also see Volume 2, Chapter 1, Section 4).

A. Certification Number. After “Number,” insert the certificate number assigned to the facility. This will be in accordance with the current air agency numbering system. For a satellite repair station, ensure that the certificate number listed is appropriate for the satellite. For additional information on certificate number construction, see Volume 2, Chapter 1, Section 3.

B. Applicant’s Name. Under “This certificate is issued to,” insert the official name of the applicant’s business. This must be the same as shown on the application form. The acronym doing business as (DBA) will precede any additional business names listed.

C. Applicant’s Address. Under “whose business address is,” insert the address/location of the applicant’s business. This must be the same as shown on the application form.

D. Approved Repair Station. After “to operate an approved,” insert the words “repair station” or “satellite repair station,” as appropriate.

E. Ratings. Under “with the following ratings,” insert the ratings issued. List the ratings by the general category, such as airframe, powerplant, or radio.
1) Limited ratings are issued to a certificated repair station (CRS) that maintains only a particular type of airframe, engine, propeller, radio, instrument, accessory, or part thereof; or provides specialized maintenance requiring equipment and skills not ordinarily performed under other repair station ratings. Such a rating may be limited to a specific model aircraft, engine, constituent part, or to any number of parts made by a particular manufacturer.

NOTE: Under the rating “Any other purpose for which the FAA finds the applicant's request is appropriate,” the purpose will be identified and listed on the Air Agency Certificate (e.g., Limited-Unit Loading Device). Clearly identify the actual article.

2) When ratings are added or amended, show the date of each issuance in parentheses following the added or amended rating.

F. United States Repair Station. After “must continue in effect,” for repair stations located in the United States, insert the word “indefinitely.”

G. Issuance Date. Under “Date issued,” insert the issuance date of the certificate. This will be the date of original certification. Future changes or amendments to the certificate will not affect this date unless a new certificate number is issued.

H. Signatures. Under “By direction of the Administrator,” insert the signature of the Office Manager (OM) and office identifier.

2-1247 Issuance of OPSpecs and a Certificate.

A. Regulatory Requirements Met. After determining that the applicant has met all regulatory requirements, the applicant receives the appropriate certificate and OpSpecs. Prepare the OpSpecs in accordance with the procedures described in Volume 3, Chapter 18, Section 10.

B. Signatures. Before issuing the OpSpecs, the applicant and the appropriate PIs will sign it. Please see Volume 3, Chapter 18, Section 2, for more information on digital signatures and delegation procedures. The new certificate holder will then receive the original certificate and OpSpecs.

2-1248 Certification Report. When the new operator receives certification, the CPM is responsible for assembling a certification report. The CPM must sign the report, which includes the name and title of each team member who assisted in the certification project. During the business life of the air agency, maintain the report in the permanent file relating to the new operator. The report will consist of the following seven documents:

- Preapplication Statement of Intent (PASI);
- Certification Job Aid and Schedule of Events (SOE);
- FAA Form 8310-3, completed;
- The compliance statement;
- A copy of the OpSpecs issued;
- A copy of the issued Air Agency Certificate;
• A copy of any Temporary Airman Certificate issued; and
• A summary of major difficulties experienced during the certification process and/or any recommendations noted by phase and specialty that may enhance the process.

2-1249 CERTIFICATION REPORT RETENTION. The district office will retain the original of the certification report in the agent’s file as long as the certificate holder remains active.

2-1250 TASK OUTCOMES.

A. Follow Safety Assurance System (SAS) Guidance. Follow SAS guidance for the completion of the certification project in the automation. It is imperative that the PI is assigned to the certificate prior to the CPM being removed.

B. Document the Task. File all supporting paperwork in the certificate-holding district office’s (CHDO) file.


NOTE: The applicant must maintain an active project. The CHDO must evaluate an inactive period that exceeds 90 business days. Inactivity of greater than 90 business days may be cause to terminate the certification process, or you may terminate the process when it is clear that continuing the process will not result in approval or acceptance (i.e., multiple failures of the applicant’s submissions).

RESERVED. Paragraphs 2-1252 through 2-1256.
VOLUME 3 GENERAL TECHNICAL ADMINISTRATION

CHAPTER 15 RESERVED

Section 1 Reserved

RESERVED. Paragraphs 3-591 through 3-615.
3-1095 REPORTING SYSTEM(S).

A. **Program Tracking and Reporting Subsystem (PTRS) Activity Codes.** Initial Approval: 1306; Final Approval: 1307.

B. **Safety Assurance System (SAS).** This section is related to SAS Elements 2.1.1 (OP) Training of Flight Crew Members, 2.1.2 (OP) Training of Check Airmen and Instructors, and 2.1.5 (OP) Appropriate Airmen/Crewmember Checks & Qualifications.

3-1096 GENERAL.

A. **Overview.** Training curriculum approvals follow the five-phase general process for approval or acceptance described in Volume 3, Chapter 1, Section 1. The basic steps of this process must be followed. Each phase, however, may be adjusted to accommodate existing circumstances. Depending on the complexity of the operator’s request and the availability of Federal Aviation Administration (FAA) resources, the approval process may be accomplished in just a few days, or may last many months. The approval process applies to each operator requesting approval of a new curriculum or a revision to a currently approved curriculum. Inherent in the approval process is the FAA’s responsibility to deny approval of any training which does not meet regulatory requirements or which has been found deficient. Training curriculum approvals follow the five-phase general process for approval or acceptance described in Volume 3, Chapter 1, Section 1. The basic steps of this process must be followed. Each phase, however, may be adjusted to accommodate existing circumstances. Depending on the complexity of the operator’s request and the availability of Federal Aviation Administration (FAA) resources, the approval process may be accomplished in just a few days, or may last many months. The approval process applies to each operator requesting approval of a new curriculum or a revision to a currently approved curriculum. Inherent in the approval process is the FAA’s responsibility to deny approval of any training which does not meet regulatory requirements or which has been found deficient. Training curriculum approvals follow the five-phase general process for approval or acceptance described in Volume 3, Chapter 1, Section 1. The basic steps of this process must be followed. Each phase, however, may be adjusted to accommodate existing circumstances. 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curricula which have been granted approval and later found either to be in conflict with regulatory requirements or to be ineffective must be appropriately modified by the operator, or FAA approval must be withdrawn. This section establishes procedures for granting or withdrawing approval of all or part of a training curriculum. When appropriate, job aids have been developed to assist inspectors in the approval process of curriculum segments. These job aids are discussed in subsequent sections of this chapter.

**B. Applicability.** The training approval process discussed in this section applies only to Title 14 of the Code of Federal Regulations (14 CFR) part 121 operators and part 135 operators. Part 121 subparts N and O training, checking, and qualification can be approved for part 121 operators and part 135 operators. Part 135 subparts E, G, and H training, checking, and qualification can be approved for only part 135 operators (refer to part 135, § 135.3).

**3-1097 OPERATIONS CONDUCTED UNDER BOTH PARTS 121 AND 135.**

**A. Differences Between Parts 121 and 135.** There are only a few differences in the training required by parts 121 and 135. Part 121, however, generally contains more stringent requirements. To maintain the requisite level of safety without unnecessary restrictions and redundant training, certain considerations may be given to operators using flightcrew members in operations conducted under both parts 121 and 135. All regulatory requirements applicable to the operation in which the flightcrew member is engaged must be met. Training which meets the same requirements of both parts 121 and 135, however, does not have to be repeated. Training curricula may be combined if the training given clearly meets all applicable regulatory requirements. For most aircraft, however, a combined curriculum may not be possible due to differences in the training requirements between parts 121 and 135.

**B. Part 121 Subparts N and O.** The FAA recognizes that the flightcrew member training, checking, and qualification requirements of part 121 will always meet or exceed the requirements of part 135. This is consistent with the recognition that part 121 affords the highest standards of safety in civil flight operations. Therefore, as a matter of safety policy, the FAA will both permit and encourage compliance with part 121 subparts N and O by operators who conduct part 135 operations. It is FAA policy that a training, checking, and qualification program submitted by a part 135 operator, which is found by the FAA to be in compliance with part 121 subparts N and O by operators who conduct part 135 operations. It is FAA policy that a training, checking, and qualification program submitted by a part 135 operator, which is found by the FAA to be in compliance with part 121 subparts N and O, will be considered as a program that exceeds the requirements of part 135 and will be approved by the FAA for use by that operator. Principal operations inspectors (POI) are authorized to approve curriculum segments (including qualification curriculum segments which permit training to be substituted for checking), provided the operator adopts all the training, checking, and qualification requirements of part 121 subparts N and O, except as follows:

1) In accordance with § 135.3(b), a pilot serving in part 135 operations as a second in command (SIC) in a commuter operation with airplanes in which two pilots are required by the type certification rules may meet the requirements of § 135.245 instead of the requirements of part 121, § 121.436. The minimum crew requirement is typically found in the Airplane Flight Manual (AFM) or type certificate (TC).
In accordance with § 135.3(c), certificate holders conducting part 135 operations (except commuter operations with airplanes in which two pilots are required by the type certification rules) may choose to comply with the operating experience requirements of § 135.244, instead of the requirements of § 121.434.

3-1098 INITIATING THE APPROVAL PROCESS—PHASE ONE.

A. Approval Process Initiation. The training approval process can be initiated by either the operator or the FAA as follows:

1) Operator Initiated. The operator informs the FAA that it is planning to establish a new training curriculum or to change an existing curriculum.

2) FAA Initiated. The FAA informs an operator that revisions to its training program are required based on recently acquired information relative to training techniques, aviation technology, aircraft operational history, operator performance, or regulatory changes.

B. Needed Information. When a proposal is initiated by the operator, one of the first steps the POI or certification project manager (CPM) should take is to obtain the following basic information:

- Type of operation;
- Type of equipment to be operated;
- Geographic areas of operation;
- Proposed training schedules;
- Proposed date of revenue operations;
- Proposed contract training, if any;
- Type of flight simulation training device (FSTD) to be used, if any; and
- Facilities to be used.

3-1099 FAA INVOLVEMENT IN PHASE ONE.

A. POI Responsibilities. Early in the process, the FAA and the operator should establish, through discussion, a common understanding of both the regulatory training requirements and the direction and guidance provided in this order. The POI or CPM and the operator must examine the entire operation to ensure that any training necessitated by operational requirements, authorizations, or limitations (such as those in the operations specifications (OpSpecs), minimum equipment lists (MEL), deviations, and exemptions) is included in the operator’s training curricula. The training program is the area most affected by operational changes. The POI should review all general requirements in the regulations and in this order that apply to the proposed operation. The POI should be aware of changes to the information initially provided by the operator. The POI should discuss with the operator the sequence and timing of events which occur in the development and granting of initial and final approval of a training curriculum. If the operator’s proposal involves complex operations (such as long-range navigation or polar navigation operations), the POI must consult appropriate sections of this order and other relevant documents and be prepared to advise the operator during this phase. In such a case, the POI should also determine whether assistance from an FAA specialist is
necessary. If an operator’s proposal includes related aircraft differences training, the operator must first receive approval of the related aircraft designation from the Air Transportation Division (AFS-200) prior to initial approval of the curriculum. (See Volume 3, Chapter 19, Section 12, for additional information regarding related aircraft designation and related aircraft differences training.)

B. Advice and Guidance Given to the Operator. An FAA inspector should be prepared to provide advice to an operator during training curriculum development. During phase one, the operator must be informed of the procedure for requesting initial approval and the types of additional supporting information which the POI will require the operator to submit. An inspector should be prepared to provide advice and guidance to the operator on the following:

- The general format and content of curricula, curriculum segments, training modules, and flight maneuvers and procedures documents;
- Courseware;
- Facilities;
- Qualifications of instructor personnel; and
- Other areas of the operator’s proposed training program.

C. Importance of Early Involvement. Early FAA involvement is also important for the following reasons:

1) FAA advice and guidance during development of training may provide a useful service to the operator. This advice may save the operator and the FAA from unnecessary use of resources. It may also prevent the operator from submitting a training curriculum proposal which would not be approved by the FAA.

2) The POI can become familiar with the material the operator intends to submit. This facilitates review of the proposal before the granting of initial approval.

3) The POI can begin planning long-range needs, such as qualification of inspectors on the operator’s aircraft, and evaluation of the program’s overall effectiveness.

4) Early FAA inspector involvement in the development of training programs is appropriate. An FAA inspector, however, must act in an advisory capacity only. The inspector must avoid active participation in the actual training program development. The operator is responsible for the development of its own training program. The FAA inspector must not assume that responsibility.

D. Additional Help. As the operator’s proposals solidify, any significant requirements which may affect office or regional inspector resources should be discussed with the district office manager (OM). An FAA inspector may need training on an operator’s aircraft type. Requests for inspectors from outside the office or region to assist in the training approval process may be necessary.
E. Potential Causes of Approval Delays. The operator should be aware of the potential for delays in approval. Such delays may be caused by any of the following reasons:

- The applicant for a certificate not meeting the schedule of events;
- The operator failing to expeditiously transmit information to the FAA;
- A change in plans (e.g., changing either the training locations or the type of aircraft);
- Inadequate, insufficient, or unclear material submitted in phase two;
- Deficiencies in the training discovered during phases two, three, or four;
- Delays in obtaining FSTDs and training equipment or FSTD approval; and
- Higher priority work (such as accidents) assigned to the POI or other inspectors associated with the training approval process.

3-1100 REQUESTS FOR INITIAL APPROVAL—PHASE TWO.

A. Overview. Phase two begins when the operator submits its training proposal for initial approval in writing to the FAA. The operator is required to submit to the FAA an outline of each curriculum or curriculum segment and any additional relevant supporting information requested by the POI. These outlines, any additional supporting information, and a letter must be submitted to the FAA. This letter should request FAA approval of the training curriculum. Two copies of each curriculum or curriculum segment outline should be forwarded along with the letter of request to the FAA.

B. Required Information in Curricula. Each operator must submit its own specific curriculum segment outlines appropriate for its type of aircraft and kinds of operations. These outlines may differ from one operator to another and from one category of training to another in terms of format, detail, and presentation. Each curriculum should be easy to revise and should contain a method for controlling revisions, such as a revision numbering system. Curricula for different duty positions may be combined in one document, provided the positions are specifically identified and any differences in instruction are specified for each duty position. Each curriculum and curriculum segment outline must include the following information:

- Operator’s name;
- Type of aircraft;
- Duty position;
- Title of curriculum and/or curriculum segment, including the category of training;
- Consecutive page numbers; and
- Page revision control dates and revision numbers.

C. Required Curriculum Segment Items. Each curriculum and curriculum segment must also include the following items, as appropriate:

1) Prerequisites prescribed by 14 CFR or required by the operator for enrollment in the curriculum.

2) Statements of objectives of the entire curriculum and a statement of the objective of each curriculum segment.
3) A list of each training device, mockup, system trainer, procedures trainer, and other training aid which will be used in the curriculum. (The curriculum may contain references to other documents in which the approved devices and aids are listed.)

4) A list of FSTDs approved under § 121.407 or § 135.335, as applicable, including approvals for particular maneuvers, procedures, or functions.

5) Descriptions or pictorial displays of normal, abnormal, and emergency maneuvers and procedures which are intended for use in the curriculum, when appropriate. These descriptions or pictorial displays, when grouped together, are commonly referred to as the flight maneuvers and procedures document. The operator may choose to present detailed descriptions and pictorial displays of flight maneuvers and procedures in other manuals. For example, the flight maneuvers and procedures document may be described in an aircraft operating manual. However, as a required part of the training curriculum, it must either be submitted as part of the curriculum or be appropriately referenced in the curriculum.

6) An outline of each training module within each curriculum segment. Each module should contain sufficient detail to ensure that the main features of the principal elements or events will be addressed during instruction.

7) Training hours which will be applied to each curriculum segment and the total curriculum.

8) The checking and qualification modules of the qualification curriculum segment used to determine successful course completion, including any 14 CFR qualification requirements for flightcrew members to serve in part 121 or part 135 operations (e.g., Operating Experience (OE), consolidation of knowledge and skills, and line checks).

3-1101 ADDITIONAL RELEVANT SUPPORTING INFORMATION—PHASE TWO.
As specified in §§ 121.405(a)(2) and 135.325(a)(2), an operator must submit any additional relevant supporting information requested by the POI. This information is that additional information the POI finds necessary for determining whether the proposed training program is feasible and adequately supported. It is information which would be difficult to include in a curriculum outline format. The type and amount of supporting information needed will vary depending on the type of training, aircraft types to be operated, and kinds of operations. The POI must determine the appropriate types of supporting information to be required. This should be limited to only that information critical to the determination of the proposed training program’s acceptability. The following list of types of relevant supporting information is not all-inclusive, but includes information that is typical.

A. Description of Facilities. A description of facilities is appropriate if the POI is unfamiliar with the facilities, or if the facilities are not readily available for examination.

B. List of Ground and Flight Instructors and Qualifications. A list of ground and flight instructors and their qualifications may be requested. This information is particularly important if the operator intends to use contract instructors. The POI should determine whether the proposed instructors meet regulatory requirements and if they are qualified to conduct training.
C. **Description of an FSTD.** A detailed description of each FSTD is appropriate when the FSTD is not readily available for the POI’s examination. This detailed description is particularly important when the operator intends to contract for a specific FSTD. This description should provide sufficiently detailed information to enable the POI to determine whether the training and checking to be conducted is appropriate for the level of the FSTD to be used.

D. **Description of Qualification and Enrollment Prerequisites.** A detailed description of minimum student qualifications and enrollment prerequisites is appropriate when such prerequisites are not described in detail in the curriculum. Examples of these prerequisites which may need to be detailed as supporting information include: type of Airman Certificate, aircraft type qualifications, previous training programs, minimum flight hours, experience with other part 121 or 135 operators, and recency of experience. This description may be useful to the POI when determining whether the proposed amount of detail outlined in training modules and the proposed training hours are adequate.

E. **Recordkeeping Requirements.** Copies of training forms and records to be used for recording student progress and the completion of training may be required. This ensures the operator has planned for the 14 CFR recordkeeping requirements. This type of supporting information shall be required of applicants for an air operator certificate. It may also be required of operators with any significant revision to existing training programs. These forms, records, or computer transmittal worksheets must be designed so that attendance and course completion information is recorded and retrievable for verifying regulatory compliance.

F. **Supporting Information.** Supporting information may include samples of courseware, such as lesson plans and instructor guides. Descriptions of other types of courseware, such as home study, computer-based instruction (CBI), and Line-Oriented Flight Training (LOFT) scenarios, should be in enough detail to provide an understanding of how the training will be administered and of the proposed instructional delivery method. This information should describe the instructor–student interaction and indicate methods for measuring student learning.

3-1102 **INITIAL REVIEW OF REQUESTS FOR APPROVAL—PHASE TWO.** In phase two, the POI must review the submitted training curriculum and supporting information for completeness, general content, and overall quality. A detailed examination of the documents is not required during phase two. If after initial review, the submission appears to be complete and of acceptable quality, or if the deficiencies are immediately brought to the operator’s attention and can be quickly resolved, the POI may begin the phase three indepth review. If the submission is determined to be incomplete or obviously unacceptable, the approval process is terminated and the POI must immediately return the documents (preferably within 5 business days) with an explanation of the deficiencies. The documents must be immediately returned, so the operator will not erroneously assume the POI is continuing the process to the next phase. The approval process can be resumed when the revised training curriculum or curriculum segment is resubmitted.
3-1103 TRAINING CURRICULA SUBMITTED WITH AIR CARRIER OR OPERATING CERTIFICATE APPLICATIONS. An applicant for a certificate in the early stages of certification may be unable to provide all information required for its training program. For example, the applicant may not yet know what training facilities or FSTDs it intends to use. The lack of such information in the formal application does not necessarily indicate that the training curriculum attachment be returned. There should be an understanding between the applicant and the CPM that such portions are missing. The CPM may initiate the phase three indepth review without this type of information. Initial approval, however, of a curriculum segment must be withheld until all portions pertinent to the curriculum segment have been examined. For example, it may be appropriate to initially approve a ground training curriculum segment even though the FSTD has not yet been evaluated and approved for flight training. However, effective evaluation of training curricula can be hampered when an excessive number of incomplete curriculum segments are permitted. The CPM shall either delay initial approval of training curricula or return them to the applicant when an excessive number of incomplete curriculum segments have been submitted with the formal application.

3-1104 INDEPTH REVIEW OF SUBMITTED CURRICULA—PHASE THREE.

A. Specialists and/or FAA Offices. Phase three is initiated when the FAA begins a detailed analysis and evaluation of a training curriculum or curriculum segment. The purpose of this phase is to determine the acceptability of training curricula for initial approval. This phase ends either with the initial approval or the rejection of all or part of the training curriculum. To complete an evaluation in a timely manner, the POI may need to involve other FAA personnel early in this phase. Certain specialists or offices may be required to participate in the approval process as follows:

1) The principal security inspector (PSI) should be involved in security and hazardous materials (hazmat) training issues.

2) Various aviation safety inspector (ASI) specialists should be involved when appropriate. For example, navigation specialists should be involved with evaluating special navigation operations.

3) The POI may need to contact the Flight Standardization Board (FSB) and the Flight Operations Evaluation Board (FOEB) for information on training recommendations and MEL procedures. See Volume 8 for more information about FSBs and FOEBs.

4) The POI’s district OM and certain regional headquarters (HQ) personnel may need to be involved with locating and directing additional FAA resources to accomplish the approval process.

5) AFS-200 may need to be involved with deviation and exemption requests.

B. Required Evaluations. Before granting initial approval for a specific curriculum or curriculum segment, the POI must ensure that the following evaluations are accomplished:

1) A side-by-side examination of the curriculum outline with the appropriate regulations and with the direction provided in this order must be performed. This examination is
to ensure that training will be given in at least the required subjects and in-flight training maneuvers. It should also ensure that appropriate training will be given on safe operating practices.

2) An examination of the courseware developed or being developed by the operator must be performed. This review should include a sampling of available courseware such as lesson plans, audiovisual programs, flight maneuvers and procedures documents, and student handouts. The courseware must be consistent with each curriculum and curriculum segment outline. From this review, the POI should be able to determine whether the operator is capable of developing and producing effective training courseware.

3) An inspection of training facilities, FSTDs, training equipment, and instructional aids (which will be used to support the training) must be performed if the POI is not familiar with the operator’s training program capabilities.

4) The training hours specified in each curriculum segment outline must be evaluated. An inspector should not attempt to measure the quality or sufficiency of training by the number of training hours alone. This can only be determined by direct observation of training and testing (or checking) in progress, or by examination of surveillance and investigation reports. The specified training hours must be realistic, however, in terms of the amount of time it will take to accomplish the training outlined in the curriculum segment so as to achieve the stated training objectives. During the examination of courseware, an inspector should note the times allotted by the operator for each training module. These times should be realistic in terms of the complexity of the individual training modules. The number of training hours for any particular curriculum segment depends upon many factors. Some of the primary factors are as follows:

- The aircraft family in which the specific aircraft belongs;
- Complexity of the specific aircraft;
- Complexity of the type of operation;
- Amount of detail that needs to be covered;
- The experience and knowledge level of the students; and
- Efficiency and sophistication of the operator’s entire training program (including items such as instructor proficiency, training aids, facilities, courseware, and the operator’s experience with the aircraft).

C. Criteria for Approval. If, after completing these evaluations, the POI determines that the curriculum or curriculum segment is satisfactory and adequately supported and that the training hours are realistic, initial approval should be granted. Sometimes a portion of the submittal may appear to be satisfactory. However, if that portion is dependent upon another undeveloped portion or another unsatisfactory portion, initial approval must be withheld. For example: a pilot-in-command (PIC) BE-100 initial equipment, flight training curriculum segment is satisfactory but related training modules within the initial equipment ground training curriculum segment are unsatisfactory. In such a case, it may be inappropriate to grant initial approval to the initial equipment flight training curriculum segment until the ground training curriculum segment is determined to be satisfactory.
D. Establishment of Priorities. During phase three of the approval process, the POI must establish priorities to ensure that, if appropriate, the granting of initial approval is not unnecessarily delayed. These priorities should assure that deficiencies are resolved so that initial approval can be granted before the operator’s planned starting date for training.

3-1105 EXPIRATION DATES FOR INITIAL APPROVALS. When the POI determines that a training curriculum or curriculum segment should be initially approved, the POI must also determine an appropriate expiration date for the initial approval. The expiration date is important throughout phase four of the approval process. Sections 121.401(a)(1) and 135.323(a)(1) require the operator to obtain final approval of training curricula. The expiration date provides an incentive to the operator for refining all aspects of the program to assure that this regulatory requirement is met. The expiration date also provides the POI with a timeframe with which to plan evaluation activities for determining the effectiveness of the training. The expiration date assigned to an initially approved training curriculum must not exceed 24 months from the date of initial approval. The expiration date of initial approval may be reduced by the POI if it is apparent that a 24-month time frame will unnecessarily delay final approval. The POI should be aware that shortening the initial approval expiration date will commit him or her to completing the final approval phase within the shorter time period. The POI may grant final approval any time before the expiration date. Except when unforeseen circumstances preclude an adequate evaluation of training effectiveness, an extension to the initial approval expiration date should not be permitted. A new expiration date, however, may be established for a curriculum segment when there are significant revisions to an initially approved curriculum segment.

3-1106 METHOD OF GRANTING INITIAL APPROVAL.

A. Initial Approval Is Granted by Letter. Sample letters granting initial approval are included at the end of this paragraph (Figure 3-71, Letter of Initial Approval (Part 135) and Figure 3-72, Letter of Initial Approval (Part 121)). The initial approval letter must include at least the following information:

- Specific identification of the curricula and/or curriculum segments initially approved, including page numbers and revision control dates;
- A statement that initial approval is granted, including the effective and expiration dates;
- Any specific conditions affecting the initial approval, if applicable;
- A request for advance notice of training schedules so that training may be evaluated in accordance with § 121.405 or § 135.325, as appropriate; and
- If the POI is authorizing a reduction in the programmed hours specified by part 121, a statement concerning the basis for reduction.

B. Other Acceptable Methods. An initial approval letter serves as the primary record of curriculum or curriculum segment pages that are currently effective. In the past, initial approval was stamped on each page of a curriculum. Although this method is no longer necessary, the POI and each operator may agree to use the method to account for revisions to training documents. If this method is used, the stamp must clearly indicate initial approval and the expiration date. Other acceptable methods include a list of effective curriculum or curriculum segment pages, or pages with preprinted signature and date blocks.
C. Return of Originals. The original pages of the curriculum or curriculum segment shall be returned to the operator with the transmittal letter. These documents should be retained by the operator as an official record. A copy of the training curriculum or curriculum segment, with a copy of the transmittal letter granting initial approval attached, and all additional relevant supporting information, shall be maintained on file in the certificate-holding district office (CHDO) by the POI during the period that the initial approval is valid.

Figure 3-71. Letter of Initial Approval (Part 135)

ABC Airlines
Director of Operations
1 Park Avenue
New York, NY 11001

Dear Mr. Smith:

Initial approval is granted to ABC Airlines SD-330 Pilot in Command and Second in Command Initial Equipment Flight Training, pages 1 through 10, dated March 11, 1988. This training curriculum is initially approved in accordance with the provisions of Title 14 of the Code of Federal Regulations (14 CFR) part 135, § 135.325(a), effective March 30, 1988.

Initial approval of this training curriculum shall remain in effect until March 31, 1990, or upon the granting of final approval, whichever occurs first. ABC Airlines is requested to notify this office at least 10 days in advance of any training to be conducted under this program so that the Federal Aviation Administration (FAA) may evaluate the effectiveness of the program, in accordance with § 135.325(b).

Principal Operations Inspector
Figure 3-72. Letter of Initial Approval (Part 121)

ABC Airlines
Director of Training
1 Park Avenue
New York, NY 11001

Dear Mr. Townsend:

This letter is in reference to ABC Airline’s B737 Pilot in Command and Second in Command Initial Equipment Ground Training curriculum, pages 100/1 through 100/15, dated April 14, 1988. This curriculum is granted initial approval, effective April 30, 1988. The approval is contingent upon a satisfactory evaluation of your advanced systems ground trainer scheduled for April 28 and 29, 1988.

The expiration date of this initial approval is April 30, 1990. This office requests ABC Airlines to provide at least 7 days advance notice of any training to be conducted under this curriculum to allow for evaluation of the training in accordance with Title 14 of the Code of Federal Regulations (14 CFR) part 121, § 121.405(b) and (c). Approval of the reduced training hours from the programmed hours required by § 121.419(b)(2) to 75 hours is based on the improved training techniques available from your advanced systems ground trainer.

Principal Operations Inspector

3-1107 METHOD OF DENYING INITIAL APPROVAL. If the POI determines that initial approval of a proposed training curriculum or curriculum segment must be denied, the operator shall be notified in writing of the reasons for denial. This letter must contain an identification of the deficient areas of the training curriculum and a statement that initial approval is denied. It is not necessary that each minor deficiency which resulted in the denial be identified; however, the major deficiencies should be outlined in the letter. It is the operator’s responsibility to redevelop or correct the deficient area before resubmission to the FAA. A copy of the denial letter and a copy of the proposed training curriculum or curriculum segment shall be kept on file in the CHDO. Figure 3-73 is a sample letter of a denial of initial approval.
Figure 3-73. Letter of Denial of Initial Approval

ARK Airlines
Director of Operations
48 Turnover Place
Landover, MD 20765

Dear Mr. Townsend:

This letter is in response to your request for initial approval of Revision 2 to ARK Airline’s DC-9 Pilot in Command and Second in Command Recurrent Ground Training curriculum, dated August 2, 1988. Your request for initial approval for revision 2 is denied for the following reason.

More than 70 percent of your scheduled operations occur in areas which during the winter months are subject to cold weather, snow, ice, and sleet. Your pilot workforce must have adequate training in the safe operating practices associated with a cold weather environment to enable them to cope effectively with such hazards. Revision 2 deletes training previously given on major aspects of cold weather operations and does not provide any identifiable instruction to your crews for operating flights in such conditions. Presently there is not another course of training for ARK Airline’s pilots containing adequate information on cold weather procedures.

Principal Operations Inspector

3-1108  EVALUATING INITIALLY APPROVED TRAINING CURRICULA—PHASE FOUR.

A. Overview. Phase four begins when the operator starts training under the initially approved curriculum. This phase should provide the operator with adequate time to test the program and the flexibility to adjust the program during FAA evaluation. The POI must require an operator to provide ongoing schedules of all training and checking to be accomplished under an initially approved training curriculum. The POI must closely monitor training conducted under initial approval. Whenever possible, the first session of training conducted under initial approval should be monitored by the POI or a qualified Operations inspector. An FAA inspector does not need to observe every training session. A sufficient sampling of the training sessions, however, should be observed as a basis for a realistic evaluation. Inspectors qualified in the type aircraft, and other individuals knowledgeable of the curriculum subject matter, should assist in evaluating the training. During training under initial approval, the operator is expected to evaluate and appropriately adjust training methods as needed. Often, adjustments can be made by changing courseware and instructional delivery without (or with only minor) revisions to the initially approved curriculum. Conversely, it may be necessary for the operator to substantially change the curriculum which may require another initial approval action by the POI before the changes can be put into effect. Sometimes proposed revisions may be transmitted to the POI just before the initial approval expiration date. If the change is significant, the POI may need to establish a different expiration date for the curriculum segment, or for the revised portions, to allow adequate time for a proper evaluation.
B. Identification and Correction of Curriculum Deficiencies. During phase four, the operator must demonstrate the ability to effectively train flightcrew members. Each deficiency identified during the evaluation of training conducted under an initially approved curriculum must be discussed with the operator. If the deficiencies are significant, they must be documented and kept on file. In most cases, when the cause of a deficiency has been accurately identified, the operator will make the necessary changes to correct the deficiency to obtain final approval. Each significant deficiency which has been accurately identified must be immediately corrected. If an operator does not take appropriate corrective action, the POI shall advise the operator in writing that initial approval is withdrawn. See paragraph 3-1114.

3-1109 ELEMENTS AVAILABLE FOR EVALUATING TRAINING—PHASE FOUR. The POI must develop a plan for systematically evaluating training given under the initially approved training curriculum. This plan should remain in effect throughout the initial approval period. There are five elements which can be evaluated when assessing the overall effectiveness of training programs. These five elements are: curriculum segment outlines, courseware, instructional delivery methods and training environment, testing and checking, and surveillance and investigation of operator activities. These elements are interrelated; however, each can be evaluated separately. See Table 3-38, Elements for Training Evaluation, for a summary of the five elements.

A. Curriculum Segment Outlines. Before evaluating a training program, an inspector must become familiar with the contents of the curricula or curriculum segments to be evaluated. This preparation is essential if an inspector is to determine whether an operator has developed an effective course of instruction from its initially approved training curriculum.

B. Examination of Courseware. Direct examination of courseware includes reviewing materials such as lesson plans, workbooks, or flight instructor guides. The inspector must determine whether the courseware is consistent with the curriculum or curriculum segment and that it has been organized to facilitate effective instructional delivery. Courseware is usually the training program element which is most adaptable to revision or refinement. Inspectors must review at least a sampling of the courseware.

C. Observation of Instructional Delivery Methods and Training Environments. Direct observation of instructional delivery includes surveillance of training methods, such as instructor lectures, CBI presentations, and in-flight instruction. Effective learning can only occur when an instructor is organized and prepared and properly uses the courseware and various training aids. The inspector must determine that the instructional delivery is consistent with the courseware. For example, the inspector should note whether the instructor teaches the topics specified in the lesson plan. Training aids and FSTDs should function as intended during the instructional delivery. In addition, during training, the inspector should be sensitive to the type of questions being asked by students and should identify the reasons for any excessive repetition. These conditions may indicate ineffective instructional delivery or courseware. The inspector must also determine if the instructional environment is conducive to learning. Distractions which adversely affect instructional delivery, such as excessive temperatures, extraneous noises, poor lighting, and cramped classrooms or workspaces, are deficiencies because they interfere with learning.
D. **Observation of Testing and Checking.** Direct observation of testing and checking is an effective method for determining whether learning has occurred. Examining the results of tests, such as oral or written tests or checks, provides a quantifiable method for measuring training effectiveness. The POI must examine and determine the causal factors of significant failure trends.

E. **Surveillance and Investigation of Training and Checking in Progress.** Direct observation of training and checking in progress is an effective method of evaluating training. Sometimes the opportunity for direct observation, however, will be limited. In such cases, the POI will have to rely more on his evaluation of other sources of information, such as reports of surveillance and investigations. Results of inspection reports, incident or accident reports, compliance and enforcement actions, and other relevant information about the operator’s performance should be reviewed by the POI for indications of training effectiveness. The POI must establish methods to evaluate these sources of information for trends which may develop while training is being conducted under initial approval. For example, repeated reports of deficiencies, such as excessive taxi speed, navigation deviations, incomplete briefings, or incorrect use of the checklists, may be traceable to a lack of specific training or ineffective training. Such information may provide indications that revisions or refinements are needed for a curriculum segment and/or training modules. This information should be used when developing the Comprehensive Assessment Plan (CAP) in SAS Module 2, Flight Operations.

**Table 3-38. Elements for Training Evaluation**

<table>
<thead>
<tr>
<th>ELEMENTS AVAILABLE FOR EVALUATING TRAINING</th>
</tr>
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<tbody>
<tr>
<td><strong>CURRICULUM SEGMENT OUTLINES</strong></td>
</tr>
<tr>
<td>Curriculum segment outlines contain the specific training modules and the amount of time allocated for the curriculum segment. The modules must be consistent with regulatory requirements and safe operating practices. This element requires direct examination.</td>
</tr>
<tr>
<td><strong>COURSEWARE</strong></td>
</tr>
<tr>
<td>Courseware converts curriculum outline information into usable instructional material. Courseware must be consistent with the curriculum outline and be organized to permit effective instructional delivery. It is readily adaptable to adjustments and refinement by the operator. This element usually requires direct examination.</td>
</tr>
<tr>
<td><strong>INSTRUCTIONAL DELIVERY METHODS AND TRAINING ENVIRONMENT</strong></td>
</tr>
<tr>
<td>Instructional delivery methods are used to convey information to the student. Effective learning is maximized if the instructional delivery adheres to and properly uses the courseware. The training environment should be conducive to effective learning. This element requires direct observation.</td>
</tr>
<tr>
<td><strong>TESTING AND CHECKING</strong></td>
</tr>
<tr>
<td>Testing and checking is a method for determining whether learning has occurred. Testing and checking standards are used to determine that a desired level of knowledge and skill has been acquired. Testing and checking also measures the effectiveness of courseware and instructional delivery. This element requires direct observation. It can be supplemented by examining operator records of tests and checks.</td>
</tr>
<tr>
<td>ELEMENTS AVAILABLE FOR EVALUATING TRAINING</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>SURVEILLANCE AND INVESTIGATION OF OPERATOR ACTIVITIES</strong></td>
</tr>
</tbody>
</table>

**3-1110 METHOD FOR GRANTING FINAL APPROVAL—PHASE FIVE.** This phase involves the granting of final approval of an operator’s training curriculum. Based on the results of the evaluation, the POI must determine whether to grant or deny final approval of a training curriculum. This determination must be made before the expiration date of the initial approval. If the POI decides not to grant final approval, the procedures outlined in paragraph 3-1113 or paragraph 3-1114 shall be followed. If the POI decides that final approval should be granted, the following procedures apply.

**A. Programs That Contain a List of Effective Pages (LEP).** Final approval of the training curriculum is documented by the POI on the LEP. This means that the FAA has given final approval of every page of the operator’s training curriculum, as listed on the LEP, but only one FAA approval must be completed and signed.

1) The page that documents final approval of the training curriculum and/or curriculum segment must be dated and signed by the POI and include at least the information shown in Figure 3-73A, FAA Final Approval.

2) The original curriculum and/or curriculum segment must contain the one page that documents FAA approval on the LEP. The curriculum and/or curriculum segment must be transmitted to the operator with an approval letter signed by the POI in accordance with this section.

**B. Programs That Do Not Contain an LEP.** The original and a copy of each page of the training curriculum and/or curriculum segment must be dated and signed by the POI and include at least the information shown in Figure 3-73A.

**C. Original Approved Curriculum.** The original approved curriculum or curriculum segment must be transmitted to the operator with an approval letter signed by the POI. This letter must specifically identify the curriculum or curriculum segment, contain a statement that final approval is granted, and provide the effective date of approval. This letter must also state that final approval shall remain in effect until otherwise notified by the FAA that a revision is necessary in accordance with § 121.405(e) or § 135.325(d), provided the operator continues to train in accordance with the approved curriculum. If the POI is authorizing a reduction in the programmed hours specified by part 121, the letter must contain a statement concerning the basis for reduction. A copy of the approved curriculum or curriculum segment and a copy of the approval letter must be kept on file in the CHDO. Figures 3-74 and 3-75 are sample letters of final approval.
Figure 3-73A. FAA Final Approval

![FAA Final Approval]

Figure 3-74. Letter of Final Approval (Part 121)

ABC Airlines, Inc.
Director of Training
417 Oakton Boulevard
Enid, OK 78154

Dear Mr. Townsend:

Final approval is granted to ABC Airlines’ B727 Flight Engineer Recurrent Ground Training curriculum, for pages 1 through 5, dated May 21, 2007, and for pages 6 through 7, dated April 15, 2008.

The effective date of final approval is January 20, 2009. ABC Airlines may continue to train in accordance with this curriculum until a revision is required by the Federal Aviation Administration (FAA) under Title 14 of the Code of Federal Regulations (14 CFR) part 121, § 121.405(e) or until ABC Airlines revises the curriculum.

Approval of the reduced training hours from the programmed hours required by § 121.427(c)(1)(iii) to 20 hours is based on the improved training techniques available from your advanced systems ground trainer.

Principal Operations Inspector
Figure 3-75.  Letter of Final Approval (Part 135)

ABC Airlines, Inc.
Director of Operations
Hoffman Building, Suite 306
1012 Perkin Lane
Motown, LA 58642

Dear Mr. Smith:

Final approval is granted to ABC Airlines, Inc. Cessna 310 Pilot in Command Upgrade Ground Training curriculum, pages 1 through 6, dated December 10, 2008.

The effective date of this final approval is June 9, 2009. ABC Airlines may continue to train in accordance with this curriculum until a revision is required by the Federal Aviation Administration (FAA) under Title 14 of the Code of Federal Regulations (14 CFR) part 135, § 135.325(d) or until ABC Airlines revises the curriculum.

Principal Operations Inspector

3-1111 REVISIONS TO TRAINING CURRICULA.

A. Final Approval of Proposed Revisions. Revisions to initially approved training curricula shall be processed as described in paragraphs 3-1099 through 3-1109. To incorporate significant revisions into training curriculum with final approval usually requires the full training approval process. Final approval, however, may be directly granted to a proposed revision if the revision involves any of the following situations:

- Correction of administrative errors such as typographical or printing errors;
- A reorganization of training or any changes in the sequence of training that does not affect the quality or quantity of training; and
- An improvement to the quality, or an increase in the quantity, of training.

B. Probable Causes of Revisions. Other proposed revisions, including any proposal to reduce the approved number of training hours, are subject to the training program approval process. Although each step in the process must be completed, the process may be abbreviated in proportion to the complexity and extent of the proposal. There are many factors that could require revisions to training curricula. Such factors include the following:

- The effects and interrelationships of changes in the kind of operations;
- The size and complexity of an operation;
- The type of aircraft being used;
- Any special authorizations through OpSpecs;
- A revised MEL; and
- Any exemptions or deviations.
WITHDRAWING APPROVAL OF TRAINING CURRICULA. Before withdrawing approval of an operator’s training curriculum or curriculum segment, the POI shall make reasonable efforts to convince the operator to make the necessary revisions. It is important to understand that withdrawing approval could be detrimental to the operator’s business. The operator’s ability to continue to hold a certificate may be in question if a new curriculum is not submitted for initial approval within a reasonable period of time. A decision to withdraw approval must be based on sound judgment and justifiable safety reasons. When sufficient reasons are established, it is mandatory for the POI to take immediate action to remove FAA approval from an ineffective or noncompliant training curriculum. When an approval is withdrawn, the POI must ensure that the operator clearly understands that any further training conducted under an unapproved curriculum is contrary to 14 CFR requirements. Compliance or enforcement action (see Volume 14) must be taken if any company employee who received unapproved training is used in part 121 or part 135 operations. The three methods for withdrawing approval of a training curriculum are as follows:

- Allowing an initially approved training curriculum to expire without granting final approval (paragraph 3-1113);
- Withdrawing approval of an initially approved training curriculum before the expiration date (paragraph 3-1114); and
- Withdrawing approval of a training curriculum which has already received final approval in accordance with § 121.405(e) or § 135.325(d) (paragraph 3-1115).

EXPIRED TRAINING CURRICULA. A training curriculum granted initial approval has an expiration date. Usually, this date shall not be later than 24 months after the initial approval date. If the POI does not grant final approval before the expiration date, training under that curriculum must terminate as of that date. Therefore, the POI shall not allow an initially approved curriculum to expire due to the FAA’s inability to administratively grant final approval. Final approval may not be granted to an operator’s training curriculum for several reasons. One reason, for example, may be the operator’s inability to achieve an acceptable level of training effectiveness during phase four of the approval process. Another example of a reason for not granting final approval is the discontinued use of the initially approved curriculum. When the POI decides not to grant final approval before the expiration date, he must notify the operator of this decision in writing, at least 30 days before the expiration date of the initially approved curriculum. An operator not so notified may mistakenly assume that the initial approval will continue in effect until receipt of notification of either final approval or termination. The notification letter should contain the reasons for allowing the curriculum to expire and should state that any further training under the expired curriculum will not be in compliance with regulatory requirements. A POI who fails to provide this 30-day notification must establish a new expiration date so that appropriate notification can then be given to the operator.

WITHDRAWAL OF INITIAL APPROVAL OF TRAINING CURRICULA.
A POI may decide to withdraw initial approval any time during phase four of the approval process. This action may be necessary if the training is not in regulatory compliance, does not provide for safe operating practices, or is ineffective in meeting training objectives. An operator who has received a letter withdrawing approval must revise or refine the training curriculum and resubmit it for initial approval. The POI must ensure that the operator understands that it is his responsibility to correct each deficiency in the training program. The POI withdraws initial
approval of training curricula by letter. This letter must contain both a statement informing the operator that initial approval is withdrawn and the effective date of the withdrawal. This letter must include the reasons for withdrawal of approval and a precaution concerning the use of persons trained under a curriculum which is not FAA-approved. A sample letter for withdrawing initial approval is in provided Figure 3-76.

3-1115 WITHDRAWAL OF FINAL APPROVAL OF TRAINING CURRICULA. Each operator is responsible for ensuring that its training curricula, once they have been granted final approval, continue to provide training in accordance with the conditions under which final approval was granted. In accordance with §§ 121.405(e) and 135.325(d), whenever the FAA determines that revisions to a curriculum that has been granted final approval are necessary, the operator shall, after notification, make the necessary changes to ensure the effectiveness and acceptability of its training. Such notification by the FAA effectively withdraws final approval. These regulations also provide the operator with certain appeal rights. Therefore, the following procedures will be applied when a decision is made to withdraw final approval of a training curriculum.

A. Required Items of the Notification Letter. The CHDO shall inform the regional Flight Standards division (RFSD) of the impending action to withdraw final approval. The POI must notify the operator in writing that revisions are required in accordance with § 121.405(e) or § 135.325(d). See Figure 3-77 for a sample letter of a notification for withdrawing final approval. The notification letter must contain the following:

- A statement that FAA approval of the training curriculum is withdrawn;
- A list of the revisions which must be made;
- A brief description of the reasons necessitating the revisions;
- A precautionary statement concerning the use of personnel trained under a curriculum which is not FAA approved;
- A statement that the actions specified in the letter may be appealed; and
- Instructions on how to make an appeal.

B. Revisions. If the operator chooses to revise the training program in response to the notification letter, the proposed revision will be processed in the same manner as a request for initial approval. The POI must reinitiate the five-phase approval process previously described.

C. Appeal of Decision by Operator. If an operator decides to appeal the POI’s action, it must, within 30 days after receiving notification, petition the CHDO manager for reconsideration of the withdrawal of final approval. The petition must be in writing and contain a detailed explanation on why the operator believes the revisions described in the withdrawal notice are unnecessary.

1) If upon receipt of a petition, the district OM believes that an emergency exists which directly impacts aviation safety, he must immediately inform the operator in writing of his decision. The district OM’s letter must include a statement that an emergency exists, a brief description of the revisions which must be made, and the reasons the revisions are necessary. In this case, the district OM’s letter upholds the POI’s decision to withdraw final approval. The operator must revise its training program if FAA approval is to be obtained.
2) If the district OM does not believe an emergency exists, careful consideration must be given to both the operator’s petition and the POI’s reasons for withdrawal of approval. The operator’s petition stays the POI’s withdrawal of final approval and the operator may continue to train under the training curriculum, pending the district OM’s decision. The district OM may need to conduct additional evaluations of the operator’s training program. It may be appropriate for the district OM to obtain additional facts from other sources. Consultation with the RFSD and Washington HQ may be advisable.

3) The district OM must make a decision within 60 days after receipt of an operator’s petition. If the district OM accepts the operator’s explanations, he will direct the POI to rescind the letter that withdrew final approval, either partially or fully. If the decision is to uphold the POI’s action, the district OM must respond to the operator’s petition in writing.

4) The letter denying the petition should indicate that careful consideration was given to the petition. The letter must also contain the reasons for denying the petition and a statement that confirms the withdrawal of final approval. The letter must also contain a statement that any training conducted under the unapproved training curriculum is contrary to 14 CFR. 3-1116

ORGANIZATION OF DISTRICT OFFICE TRAINING PROGRAM FILES.
The POI shall maintain a separate training program file for each operator at the CHDO. Each operator’s training program file will be organized and maintained to keep each major curriculum type and any revisions together. Superseded training curriculum pages must be kept on file for 2 years. All correspondence and additional relevant supporting information associated with each training curriculum will be filed with the curriculum or curriculum segment, as appropriate.
Figure 3-76. Letter of Withdrawal of Initial Approval

ABC Airlines
Director of Training
49 Wheat Drive
Barley, Iowa 96496

Dear Mr. Roberts:

This letter notifies you that the Federal Aviation Administration (FAA) initial approvals of the following training curriculum segments are withdrawn, effective April 1, 1988:


The investigation of the in-flight incident that occurred on ABC Airline’s Flight 943 on February 10, 1988, revealed that the flightcrew did not take positive action to isolate the source of smoke caused by malfunctioning cabin light ballast. During the FAA interview, the flightcrew displayed a lack of concern about the importance of taking immediate and positive action to control in flight fire and smoke. In addition, since this incident, inspectors from this office have been emphasizing fire and smoke-combating procedures during oral testing of DC-9 pilots taking the above listed training. These inspectors have observed that many of your DC-9 pilots have a serious lack of knowledge about fire and smoke control procedures and the use of fire-fighting equipment, particularly the type of extinguishers to be used in different classes of fire. We have discussed these deficiencies with your staff and they have effectively revised the Emergency Training curriculum segment for the DC-9 PIC/SIC Recurrent Training. Your staff, however, advises that they will not revise the training curricula listed above. Therefore, FAA initial approval is withdrawn. Initial approval can be reobtained by revising the curriculum to require detailed instruction on fire and smoke control procedures and fire-fighting equipment. It is contrary to Title 14 of the Code of Federal Regulations (14 CFR) part 121 to use pilots who have not been trained in accordance with an approved training curriculum.

Principal Operations Inspector
Figure 3-77. Letter of Withdrawal of Final Approval (Part 135)

ABC Airlines, Inc.
Director of Training
49 Wheat Drive
Barley, Iowa

Dear Mr. Roberts:

This letter notifies you that, effective April 7, 1988, final approval of your Cessna 500 Pilot in Command Upgrade Training curriculum, dated March 1987, is withdrawn in accordance with Title 14 of the Code of Federal Regulations (14 CFR) part 135, § 135.325(d). This course of training must be revised as discussed below if the Federal Aviation Administration (FAA) initial approval is to be reobtained.

The revised curriculum is required to have more detailed ground and in-flight instruction on the performance, limitations, and proper operating procedures for the area navigation systems. During the past 2 months, three of your Cessna 500 flights failed to maintain the assigned route flight specified by the air traffic control (ATC) clearance. Two of the flights required ATC radar assistance for reestablishing ATC clearance. All three pilots involved in these deviations were recently upgraded to pilots in command by completing the aforementioned training curriculum. The FAA has determined, through interviews with these pilots, that the training being given does not provide sufficient knowledge for the proper operation of the area navigation systems.

You may file a petition for reconsideration of this withdrawal of final approval within 30 days after receipt of this letter by writing to Mr. Belsole, Manager, Utica Flight Standards District Office (FSDO). Your letter should contain a complete explanation of why you believe final approval of the Cessna 500 Pilot in Command Upgrade Training curriculum should not be withdrawn. It is contrary to part 135 to use pilots who have not been trained in accordance with an FAA-approved training curriculum.

Principal Operations Inspector

RESERVED. Paragraphs 3-1117 through 3-1135.
3-1196 GENERAL. This section specifies the objectives of aircraft ground training. Structure and content of flightcrew aircraft ground training curriculum segments are discussed. Also, three distinct areas of aircraft ground training are identified: general operational subjects, aircraft systems, and systems integration training. This section is related to Safety Assurance System (SAS) Element 2.1.1 (OP) Training of Flight Crew Members.

3-1197 AIRCRAFT GROUND TRAINING OBJECTIVES. The primary objective of aircraft ground training is to provide flightcrew members with the necessary knowledge for understanding the basic functions of aircraft systems, the use of the individual system components, the integration of aircraft systems, and operational procedures. An important requirement of an aircraft ground training curriculum segment is that, upon completion, a student will be sufficiently prepared to enter the flight training curriculum segment. Aircraft ground training, as used in this section, is training for a specific aircraft type. Aircraft ground training may be conducted using many methods, including classroom instruction, ground training devices.
(GTD), computer-based instruction (CBI), flight simulation training devices (FSTD), and static aircraft.

3-1198 AIRCRAFT GROUND TRAINING CURRICULUM SEGMENTS. Pilots and Flight Engineers (FE) must successfully complete an aircraft ground training curriculum segment for the appropriate category of training (initial new-hire, initial equipment, transition, upgrade, recurrent, or requalification training). Each aircraft ground training curriculum segment consists of training modules containing pertinent subject matter appropriate to the category of training. Training modules may be designed to be used interchangeably in the various categories of training. For example, a hydraulic system training module could be used in initial new-hire, initial equipment, and transition training.

3-1199 AIRCRAFT GROUND TRAINING MODULES.

A. Module Outline. An aircraft ground training curriculum segment must include as many training modules as necessary for appropriate training to occur. Each module outline must provide at least:

1) A descriptive title of the training module.

2) A list of the related elements or events that will be presented during instruction on the module.

B. Module Contents. The training module outline must contain sufficient elements or events to ensure that a student will receive training on the main features of individual systems, the operation of individual systems, and the integration of those systems with other aircraft systems. It is unnecessary to include detailed descriptions of each element within a training module outline. However, such detailed descriptions are appropriate and should be included in the operator’s courseware. During the approval process, a principal operations inspector (POI) should review courseware as necessary to ensure that the scope and depth of the training modules are adequate. The following example illustrates one of the many acceptable methods of presenting an aircraft ground training module outline:

Figure 3-176. Aircraft Ground Training Module Outline Example

<table>
<thead>
<tr>
<th>7. HYDRAULIC SYSTEM (B737-300)</th>
<th>Descriptive Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) A System</td>
<td>Elements Within a Training Module</td>
</tr>
<tr>
<td>(b) B System</td>
<td></td>
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<tr>
<td>(c) Standby System</td>
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<tr>
<td>(d) System Layout</td>
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<tr>
<td>(e) Limitations</td>
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<tr>
<td>(f) Controls and Annunciators</td>
<td></td>
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<tr>
<td>(g) Introduction to Procedures</td>
<td></td>
</tr>
</tbody>
</table>
C. **Scope and Depth of Training Modules.** The job aid at the end of this section (see Table 3-55, Aircraft Ground Training Module Job Aid) is provided to assist inspectors when determining whether the scope and depth of the aircraft ground training modules are acceptable. The following example illustrates the interrelationship of curriculum segments and training module outlines:

**Figure 3-177. Interrelationship of a Ground Curriculum Segment and Training Modules**

II. PIC BAe-146 INITIAL EQUIPMENT GROUND TRAINING

A. Objective of Training:

B. General Operational Subjects:

C. Aircraft Systems:

1. Aircraft General, Equipment and Furnishings, Emergency Equipment
2. Fire and Overheat Protection, Warning Systems, Lighting
3. Powerplants, APU
4. Electrical System
5. Pneumatic System, Air Conditioning, and Pressurization
6. Ice and Rain Protection, Oxygen System
7. Hydraulic System
8. Landing Gear and Brake System
9. Flight Controls
10. Fuel System
11. Navigation System
12. Flight Instruments, Communication Equipment
13. Review
14. Written Exam

7. HYDRAULIC SYSTEM TRAINING MODULE

(a) Yellow System
(b) Green System
(c) Standby System
(d) System Layout
(e) Limitations
(f) Controls and Annunciators
(g) Introduction to Procedures

---

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3-1200 TRAINING HOURS. The number of training hours must be specified on all aircraft ground training curriculum segment outlines. It is difficult to provide guidance on acceptable training hours for aircraft ground training curriculum segments because of the various situations that can be encountered. POIs must thoroughly study the operator’s proposals. Based on experience with the operator, past experiences with other operators, and their own training experiences, POIs must use reasonable judgment when determining whether the training can be adequately accomplished within the training hours specified in the curriculum segment. Certain training methods, such as CBI, allow students to progress through training at a rate that depends on each individual student’s ability to assimilate the required knowledge or abilities. For these kinds of training methods, the specified training hours should be indicative of the time an average student will progress through training.

A. Ground Training Hours Norms. Table 3-52, Flightcrew Aircraft Ground Training Hours National Norms (Thresholds), provides direction and guidance for determining acceptable training hours for aircraft ground training curriculum segments. Generally, training hours listed in this table approximate training days or fractions of days. Periods for reasonable breaks during instruction are included in these training hours. The table provides two sets of training hours for the various categories of training and families of aircraft.

1) The first set is considered to be the national norm and reasonable training support is presumed, such as proficient instructors, well-organized courseware, and modern training devices or aids. The national norm must not be construed as being always acceptable. When determining the adequacy of training hours, a POI should use the national norm as a point from which other factors shall be weighed. There may be many reasons why the training hours need to be greater than the national norm. The operator may need to specify more hours because of the complexity of the aircraft or types of operation. A POI may need to require more hours because of inadequate training support. Conversely, training hours less than the national norm may be fully acceptable due to the use of highly sophisticated and modern training methods, the use of less complex aircraft, or the use of a less complex type of operation.

2) The second set of training hours, in parentheses, is an established threshold for training hours. Threshold training hours are established for particular categories of training and families of aircraft. Before granting initial approval to a curriculum segment with less than the established threshold training hours, a POI must ensure that the training to be given provides sufficient training and meets the objective of the curriculum segment.

B. Upgrade Ground Training. Training hour national norms have not been established for upgrade ground training curriculum segments. Upgrade ground training requirements vary widely depending on a flightcrew member’s experience, previous duty position, and currency status in the aircraft for which training is being conducted. In cases when students have not served on the aircraft for a long time, upgrade ground training may need to be as extensive as initial equipment training. In other cases when students are currently qualified on the aircraft, either as FEs or seconds in command (SIC), the upgrade ground training may only be that training necessary to qualify them in the new duty position. In such cases, an operator may be able to expand or conduct upgrade flight training and qualify students for the new duty positions without a separate upgrade ground training curriculum segment.
1) The following illustration provides several factors to be considered when evaluating upgrade ground training curriculum segments:

Table 3-51. Factors of Upgrade Ground Training

<table>
<thead>
<tr>
<th>FLIGHTCREW MEMBER STATUS</th>
<th>GENERAL OPERATIONAL SUBJECTS</th>
<th>AIRCRAFT SYSTEMS</th>
<th>SYSTEMS INTEGRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIC (current on aircraft) upgrade to pilot in command (PIC)</td>
<td>Training modules or elements pertaining to PIC duty position</td>
<td>May not be needed</td>
<td>Training modules or elements pertaining to PIC duty position</td>
</tr>
<tr>
<td>SIC (NOT current on aircraft) upgrade to PIC</td>
<td>Training modules or elements pertaining to PIC duty position</td>
<td>Appropriate training modules depending on time NOT current</td>
<td>Appropriate training modules depending on time NOT current</td>
</tr>
<tr>
<td>FE (current on aircraft) upgrade to SIC</td>
<td>Training modules pertaining to SIC duty position</td>
<td>May not be needed</td>
<td>Training modules or elements pertaining to SIC duty position</td>
</tr>
<tr>
<td>FE (NOT current on aircraft) upgrade to SIC</td>
<td>Training modules or elements pertaining to SIC duty position</td>
<td>Appropriate training modules depending on time NOT current</td>
<td>Appropriate training modules depending on time NOT current</td>
</tr>
</tbody>
</table>

2) Training hour thresholds for upgrade ground training curriculum segments have been established. For Title 14 of the Code of Federal Regulations (14 CFR) part 121, if the approved training hours are below the threshold training hours in Table 3-52, the POI must notify the Air Transportation Division (AFS-200) by memo. The memo must describe the reasons and actions resulting in the approval and include a copy of the approved aircraft ground training curriculum segment outline and any additional supporting information submitted by the air carrier. This AFS-200 notification is necessary for tracking and standardization purposes.

C. Related Aircraft Differences Training. Training hour national norms and thresholds have not been established for related aircraft differences ground training curriculum segments. The training hours required for designated related aircraft will vary based on the training methods and level of differences specified in the Flight Standardization Board (FSB) report. (See Volume 3, Chapter 19, Section 12 for additional information regarding related aircraft designation and related aircraft differences training.)
### Table 3-52. Flightcrew Aircraft Ground Training Hours National Norms (Thresholds)

<table>
<thead>
<tr>
<th>CATEGORY OF TRAINING</th>
<th>Initial New-Hire</th>
<th>Initial Equipment</th>
<th>Transition</th>
<th>Upgrade</th>
<th>Recurrent</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMILY OF AIRCRAFT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TRANSPORT &amp; COMMUTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CATEGORY</td>
<td>Initial</td>
<td>Initial</td>
<td>Transition</td>
<td>Upgrade</td>
<td>Recurrent</td>
</tr>
<tr>
<td>Title 14 of the Code of Federal Regulations (14 CFR) Part 121 Group I (Reciprocating)</td>
<td>66(48)</td>
<td>56(40)</td>
<td>56(40)</td>
<td>(16)</td>
<td>16.5(8)</td>
</tr>
<tr>
<td>Part 121 Group I (Turboprop)</td>
<td>82(56)</td>
<td>72(48)</td>
<td>64(48)</td>
<td>(16)</td>
<td>20.5(8)</td>
</tr>
<tr>
<td>Part 121 Group II (Turbojet)</td>
<td>122(64)</td>
<td>112(64)</td>
<td>80(64)</td>
<td>(24)</td>
<td>25.5(8)</td>
</tr>
<tr>
<td>14 CFR Part 135 Transport and Commuter Category</td>
<td>72(56)</td>
<td>64(48)</td>
<td>64(48)</td>
<td>(16)</td>
<td>16(8)</td>
</tr>
<tr>
<td><strong>MULTIENGINE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 135 VFR Only</td>
<td>24(16)</td>
<td>20(8)</td>
<td>20(8)</td>
<td>(4)</td>
<td>4(4)</td>
</tr>
<tr>
<td><strong>SINGLE-ENGINE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 135 IFR/VFR</td>
<td>20(8)</td>
<td>16(8)</td>
<td>16(8)</td>
<td>(4)</td>
<td>8(4)</td>
</tr>
<tr>
<td>Part 135 VFR Only</td>
<td>12(8)</td>
<td>8(4)</td>
<td>8(4)</td>
<td>(4)</td>
<td>4(4)</td>
</tr>
<tr>
<td><strong>HELICOPTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IFR/VFR</td>
<td>32(16)</td>
<td>24(16)</td>
<td>24(16)</td>
<td>(8)</td>
<td>8(4)</td>
</tr>
<tr>
<td>VFR Only</td>
<td>24(16)</td>
<td>20(8)</td>
<td>20(8)</td>
<td>(4)</td>
<td>4(4)</td>
</tr>
</tbody>
</table>

#### D. Regulatory Programmed Hours

Part 121, §§ 121.419 and 121.427 specify 14 CFR programmed hour requirements for initial and recurrent aircraft ground training curriculum segments. The regulatory programmed hours for these categories of training are listed in Table 3-53 below.
Table 3-53. Part 121 Regulatory Programmed Hours for Ground Training Curriculum Segments

<table>
<thead>
<tr>
<th>Part 121 Airplane Groups</th>
<th>14 CFR Programmed Hours by Category of Training</th>
<th>Initial</th>
<th>Initial for Pilots Who Have Completed the ATP CTP*</th>
<th>Recurrent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before March 12, 2019</td>
<td>Beginning March 12, 2019</td>
<td>Before March 12, 2019</td>
<td>Beginning March 12, 2019</td>
</tr>
<tr>
<td>Group I (Reciprocating)</td>
<td>64</td>
<td>66</td>
<td>54</td>
<td>56</td>
</tr>
<tr>
<td>Group I (Turboprop)</td>
<td>80</td>
<td>82</td>
<td>70</td>
<td>72</td>
</tr>
<tr>
<td>Group II (Turbojet)</td>
<td>120</td>
<td>122</td>
<td>110</td>
<td>112</td>
</tr>
</tbody>
</table>

*The Airline Transport Pilot (ATP) Certification Training Program (CTP) requirements are outlined in 14 CFR part 61, § 61.156. The required initial programmed hours for pilots who have completed this course may be reduced as indicated.

1) Under § 121.405(d), a POI is authorized to approve reductions to the 14 CFR programmed hour requirements of these three categories of training. When approving reductions to the 14 CFR programmed hours, a POI must determine that the training aids, devices, and methods and procedures used by the operator will increase the quality and effectiveness of the training. The initial or final approval of these part 121 aircraft ground training curriculum segments must contain a statement giving the basis for the reduced 14 CFR programmed hours (see Volume 3, Chapter 19, Section 2, paragraphs 3-1106 and 3-1110). If the approved training hours are also below the threshold training hours in Table 3-52, the POI must notify AFS-200 by memo. The memo must describe the reasons and actions resulting in the approval and include a copy of the approved aircraft ground training curriculum segment outline and any additional supporting information submitted by the air carrier. This AFS-200 notification is necessary for tracking and standardization purposes.

2) Under § 121.418(c), a POI is authorized to approve a modification to the 14 CFR programmed hour requirements for these three categories of training for designated related aircraft. When approving a modification to the 14 CFR programmed hours, the POI must determine that the training hours for the designated related aircraft are realistic based on the training methods and level of differences specified in the FSB report. Unless reduced in accordance with § 121.405(d), the 14 CFR programmed hour requirements for these three categories of training apply to the base aircraft. (See Volume 3, Chapter 19, Section 12 for additional information regarding related aircraft designation and related aircraft differences training.)

3) There are no other categories of training in part 121 that specify 14 CFR programmed hour requirements. Part 135 does not specify any 14 CFR programmed hour requirements.
3-1201 COURSE COMPLETION REQUIREMENTS. Completion of the curriculum segment must be documented by an instructor’s or supervisor’s certification that the student has successfully completed the course. This certification is usually based on the results of a written examination given at the end of the course. With some training methods, the certification may be based on student progress checks administered during the course.

3-1202 CONTENT OF AIRCRAFT GROUND CURRICULUM SEGMENTS.

A. Training Subject Areas. An aircraft ground curriculum segment must show that training will be given in three distinct subject areas appropriate to the specific aircraft. These subject areas of training are “general operational subjects” (see paragraphs 3-1203 and 3-1204), “aircraft systems” (see paragraph 3-1205), and “systems integration” (see paragraph 3-1206). An operator should develop separate training modules for each of these distinct areas of training. Usually, training in systems integration should occur during the latter part of the course. However, other methods of training module development and sequencing of training may be fully acceptable.

B. Modification of Subject Areas for Designated Related Aircraft. Under § 121.418(c), a POI is authorized to approve a modification to the ground training subject requirements of § 121.419 for designated related aircraft based on the FSB report. (See Volume 3, Chapter 19, Section 12 for additional information regarding related aircraft designation and related aircraft differences training.)

3-1203 GENERAL OPERATIONAL SUBJECTS FOR PART 135 GROUND TRAINING. The subject area of ground training, referred to as “general subjects,” includes instruction on certain operational requirements that are specific to the operation in which the training is being conducted. The general subject area of a ground training curriculum segment may include instruction on many subjects but must include instruction in at least the following:

A. Dispatch, Flight Release, or Flight-Locating Procedures. As applicable to the specific aircraft.

B. Weight and Balance (W&B) Procedures. Specific to the aircraft, including computation of company W&B forms.

C. Adverse Weather Practices. Includes procedures specific to the aircraft that must be followed when operating in the following conditions:

- Icing,
- Turbulence,
- Heavy precipitation,
- Thunderstorms with associated wind shear and microburst phenomena,
- Low visibility, and
- Contaminated runways.
D. Communication and Navigation Procedures. Procedures for operating specific aircraft communications and navigation equipment in accordance with the following:

- Specific company communications requirements,
- Air traffic control (ATC) clearance requirements,
- Area departure and arrival requirements,
- En route requirements, and
- Approach and landing requirements.

E. Performance Characteristics. Specific performance characteristics of the aircraft during all flight regimes, including:

- The use of charts, tables, tabulated data, and other related manual information;
- Normal, abnormal, and emergency performance problems;
- Meteorological and weight-limiting performance factors (such as temperature, pressure, contaminated runways, precipitation, and climb/runway limits);
- Inoperative equipment performance limiting factors (such as minimum equipment list (MEL)/Configuration Deviation List (CDL) and inoperative antiskid); and
- Special operational conditions (such as unpaved runways, high-altitude airports, and driftdown requirements).

F. Example Outline. Figure 3-178, Aircraft Ground Training General Operational Subjects Curriculum Segment Outline Example, illustrates one of many acceptable methods in which the “general operational subjects” area of an aircraft ground training curriculum segment could be outlined (including a typical training module):
B. GENERAL OPERATIONAL SUBJECTS

1. Flight Control
2. Weight and Balance (W&B)
4. Adverse Weather
5. Flight Planning
7. Company Operations Manual (Applicable Aircraft Section)
8. Performance
4. ADVERSE WEATHER
   (a) Operations in ice, slush, and snow
   (b) Operations in turbulence
   (c) Operations in heavy precipitation
   (d) Thunderstorm, wind shear, and microburst procedures
   (e) Low visibility operations

3-1204 GENERAL OPERATIONAL SUBJECTS FOR PART 121 GROUND TRAINING (§ 121.419). Part 121 ground training for pilots and FEs must contain the subject areas as applicable to their assigned duties noted in Table 3-54, Part 121 Ground Training Subject Areas for Pilots and FEs, below. In accordance with § 121.419, the subject areas for pilot initial ground training vary depending on whether the pilot has previously completed the ATP CTP. After July 31, 2016, all applicants for an ATP Certificate with a multiengine class rating will be required to complete the ATP CTP prior to starting initial training at a part 121 air carrier. As specified in § 121.419(b), the right column in Table 3-54 applies to initial ground training for pilots who have completed the ATP CTP. As specified in § 121.419(a), the left column applies to:

- Initial ground training for pilots who have not completed the ATP CTP because they held an ATP certificate with a multiengine class rating prior to July 31, 2016;
- Transition and upgrade ground training for pilots; and
- Initial and transition ground training for FEs.
### Table 3-54. Part 121 Ground Training Subject Areas for Pilots and FEs

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Initial ground training for pilots who have not completed the ATP CTP; transition and upgrade ground training for pilots; and initial and transition ground training for FEs.</th>
<th>Initial ground training for pilots who have completed the ATP CTP in § 61.156. This ground training is specific to the certificate holder’s operation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The certificate holder’s dispatch or flight release procedures.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Principles and methods for determining W&amp;B, and runway limitations for takeoff and landing.</td>
<td>X</td>
<td>X Method only (not principles)</td>
</tr>
<tr>
<td>Enough meteorology to ensure a practical knowledge of weather phenomena, including the principles of frontal systems, icing, fog, thunderstorms, and high-altitude weather situations.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Meteorology hazards applicable to the certificate holder’s areas of operation.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Air traffic control (ATC) systems, procedures, and phraseology.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Navigation and the use of navigation aids, including instrument approach procedures (IAP).</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Approved departure, arrival, and approach procedures.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Normal and emergency communication procedures.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Visual cues prior to and during descent below decision altitude (DA)/decision height (DH) or minimum descent altitude (MDA).</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Approved Crew Resource Management (CRM) initial training.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Other instructions as necessary to ensure competence.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**3-1205 AIRCRAFT SYSTEMS.** The second subject area of an aircraft ground curriculum segment is the “aircraft systems” area. This area is particularly adaptive to the use of training modules because of the modular nature of each system and its related components. Instruction on each aircraft system must be given in sufficient detail to ensure the student clearly understands system components, limitations, relevant controls, actuators, annunciators, and procedures for
various system configurations. An example of one of the many acceptable methods in which the aircraft systems subject area of an aircraft ground curriculum segment outline could be presented is illustrated in subparagraph 3-1199C. It is not possible to list every conceivable aircraft system that should be included in the aircraft ground curriculum segment. However, the following descriptions of training modules (with typical elements) illustrate the depth and scope that should be provided for an operator’s submission to be acceptable.

A. **Aircraft General.** Typical elements include an overview of the basic aircraft, such as dimensions, turning radius, panel layouts, flight deck and cabin configurations, and other major systems and components or appliances.

B. **Powerplants.** Typical elements include a basic engine description, engine thrust ratings, and engine components such as accessory drives, ignition, oil, fuel control, hydraulic, and bleed air features.

C. **Electrical.** Typical elements should include elements identifying the sources of aircraft power including engine-driven generators, auxiliary power unit (APU) generator, and external power. Other elements include the electrical buses and related components such as circuit breakers, fuses, the aircraft battery, and other standby power systems, if applicable.

D. **Hydraulic.** Some typical elements are the hydraulic reservoirs, pumps, accumulators, and the means of routing hydraulic fluid through filters, check valves, and interconnects and to associated actuators and hydraulically operated components.

E. **Fuel.** Elements include the fuel tank system (location and quantities), engine-driven pumps, boost pumps, system valves, crossfeeds, quantity indicators, and provisions (if applicable) for fuel jettisoning.

F. **Pneumatic.** Typical elements include bleed air sources (such as engines, APU, or external ground air), and the means of routing, venting, and controlling bleed air via associated valves, ducts, chambers, and temperature- and pressure-limiting devices.

G. **Air Conditioning and Pressurization.** Typical elements include heaters, air conditioning packs, fans, and other environmental control devices. Pressurization system components include elements such as outflow and negative pressure relief valves with associated automatic, standby, and manual pressurization controls and annunciators.

H. **Flight Controls.** Elements in flight controls include primary (yaw, pitch, and roll devices) and secondary controls (leading/trailing edge devices, flaps, trim, and damping mechanisms). Elements that indicate the means of actuation (direct/indirect or fly-by-wire) should be included as well as applicable redundancy devices.

I. **Landing Gear.** Typical elements should include the landing gear extension and retraction mechanism including the operating sequence of struts, doors, and locking devices, and brake and antiskid systems, if applicable. Other elements are steering (nose or body steering gear), bogie arrangements, air/ground sensor relays, and visual downlock indicators.
J. **Ice and Rain Protection.** Elements should include rain removal systems and each anti-icing and/or deicing system that prevents or removes the formation of ice from airfoils, flight controls, engines, pitot-static probes, fluid outlets, flight deck windows, and aircraft structures. Other elements should include system components such as pneumatic/electrical valves, sensors, ducts, electrical elements, or pneumatic devices. The content regarding Ice Contaminated Tailplane Stall (ICTS) should:

1) For airplanes originally type certificated after 1994 and certain airplane models listed under “Susceptibility to Ice Contaminated Tailplane Stall (ICTS)” at http://www.faa.gov/aircraft/air_cert/design_approvals/small_airplanes/icing_protection_systems/training/:
   - Emphasize Airplane Flight Manual (AFM) limitations and procedures in icing conditions (particularly maximum allowable flap deflection);  
   - Not include a tailplane stall recovery procedure; and  
   - Not include the 1998 National Aeronautics and Space Administration (NASA)/Federal Aviation Administration (FAA) “Tailplane Icing” video.

2) For all other airplanes:
   - Include any airplane manufacturer recommendations regarding operations in icing conditions;  
   - Include NASA Video GRC-508, “Ice Contaminated Stall,” dated October 1, 2016; and  
   - Not include the 1998 NASA/FAA “Tailplane Icing” video.

K. **Equipment and Furnishings.** Typical elements are the aircraft exits, galleys, water and waste systems, lavatories, cargo areas, crewmember and passenger seats, bulkheads, seating and/or cargo configurations, and nonemergency equipment and furnishings.

L. **Navigation Equipment.** Typical elements are flight navigation system components including flight directors (FD), horizontal situation, radio magnetic indicators (RMI), and navigation receivers (automatic direction finder (ADF), very high frequency omni-directional range (VOR), Area Navigation (RNAV), marker beacon, and distance measuring equipment (DME)) used on the aircraft. Other elements include applicable inertial systems (inertial navigation system (INS) and inertial reference system (IRS)), functional displays, fault indications, and comparator systems; aircraft transponders, radio altimeters, weather radar (WX), and cathode ray tube (CRT) or computer-generated displays of aircraft position and navigation information.

M. **Autoflight System.** Typical elements include such items of equipment as the autopilot, autothrottles, and their interface with aircraft FD and navigation systems, including automatic approach tracking, autoland, and automatic fuel or performance management systems.

N. **Flight Instruments.** Typical elements should include an overview of the panel arrangement and the electrical and pitot-static sources and alternate sources for the flight instruments. Other elements include attitude, heading (directional gyro (DG) and magnetic),
airspeed, Vertical Speed (VS), altimeters, standby flight instruments, and other relevant instruments.

O. Communication Equipment. Elements include the very high frequency (VHF)/high frequency (HF) radios, audio panels, in-flight interphone and passenger address (PA) systems, the voice recorder, and air/ground passive communications systems (Aircraft Communications Addressing and Reporting System (ACARS)).

P. Warning Systems. Typical elements are aural, visual, and tactile warning systems, including the character and degree of urgency related to each signal. Other elements include warning and caution annunciator systems, including ground proximity warning (GPW) and takeoff warning systems.

Q. Fire Protection. Elements should include all fire and overheat sensors, loops, modules, or other means of providing visual and/or aural indications of fire or overheat detection. Other elements include procedures for the use of fire handles, automatic extinguishing systems, agents, and the power sources necessary to provide protection for fire and overheat conditions in the engines, APU, cargo bay/wheel well, flight deck, cabin, and lavatories.

R. Oxygen. Typical elements are the aircraft oxygen system including the installed passenger, crew, and portable systems. Other elements include sources of oxygen (gaseous or solid), flow and distribution networks, automatic deployment systems, regulators, pressure levels, gauges, and servicing requirements.

S. Lighting. Typical elements are the flight deck, cabin, and external lighting systems, including power sources, switch positions, and spare light bulb locations.

T. Emergency Equipment. Typical elements are the type, location, and purpose of each item of emergency equipment such as fire and oxygen bottles, first aid kits, liferafts, life preservers, crash axes, and emergency exits and lights. Other elements include each item of egress equipment such as slides, slide rafts, escape straps or handles, hatches, and ladders or movable stairs.

U. APU. Elements should include installation of the APU, APU capacity, and operation including its electrical and bleed air capabilities and how it interfaces with the aircraft’s electrical and pneumatic systems. Other elements include the APU components such as inlet doors, exhaust ducts, and fuel supply.

V. Stall Prevention and Recovery. Beginning March 12, 2019, part 121 pilot initial, transition, and upgrade ground training curricula must include stall prevention and recovery in the clean configuration, takeoff and maneuvering configuration, and landing configuration. Refer to the current edition of Advisory Circular (AC) 120-109, Stall Prevention and Recovery Training, for recommended elements for this topic.

W. Upset Prevention and Recovery. Beginning March 12, 2019, part 121 pilot initial, transition, and upgrade ground training curricula must include upset prevention and recovery. Refer to the current edition of AC 120-111, Upset Prevention and Recovery Training, for recommended elements for this topic.
AIRCRAFT SYSTEMS INTEGRATION TRAINING.

A. General. The third subject area of a ground training curriculum segment is referred to as “systems integration training.” This area provides the student with training on how aircraft systems interrelate with respect to normal, abnormal, and emergency procedures. This training includes procedures as basic as those for powering the aircraft electrical and pneumatic systems with the APU or as complex as those for programming computerized navigation and autoflight systems. System integration training should include flightcrew interaction in the use of checklists, CRM, and other operational procedures. It is normally conducted using GTDs portraying a specific flight deck layout, including the switch and indicator/annunciator logic. The FSTDs described in the flight training section (Volume 3, Chapter 19, Section 6) may be used for systems integration training. Additionally, CBI or other interactive systems may be used for this training. System integration training may be conducted in conjunction with aircraft systems training or as a later phase of the aircraft ground training curriculum segment.

B. Preparation for Flight Training. Effective systems integration training serves as a logical bridge between conventional ground training instructional delivery methods and flight training. This training allows students to become familiar with the flight deck layout, checklists, operator procedures, and other areas that are best learned before they conduct actual flight maneuvers and procedures. A POI should consider this type of training, and the quality and capability of the involved training devices, as factors in the decision for reducing training hours.

C. Example Modules. The following examples are of aircraft systems integration training modules with typical elements:

1) Use of Checklist. Typical elements include safety checks, flight deck preparation (switch position and checklist flows), checklist callouts and responses, and checklist sequence.

2) Flight Planning. Elements should include performance limitations (e.g., meteorological, weight, and MEL/CDL items), required fuel loads, and weather planning (e.g., lower than standard takeoff minimums or alternate requirements).

3) Display Systems. Typical elements include the use of weather radar and other CRT displays (e.g., checklist, vertical navigation (VNAV) or longitudinal navigation displays).

4) Navigation Systems. Elements include preflight and operation of applicable receivers, onboard navigation systems, and flight plan information input and retrieval.

5) Autoflight. Typical elements include the autopilot, autothrust, and FD systems, including the appropriate procedures, normal and abnormal indications, and annunciators.

6) Flight Deck Familiarization. Typical elements include activation of aircraft system controls and switches to include normal, abnormal, and emergency switches and control positions, and relevant annunciators, lights, or other caution and warning systems.

D. Variations. Aircraft systems integration training may be as simplistic as a student learning checklist procedures in a single-engine aircraft or as complex as programming aircraft computer systems for an international flight. Integration training is particularly effective when an
aircraft is equipped with relatively sophisticated computerized navigation, FD, performance, and autoflight systems. The key to effective training in this area is to use a training device that provides an accurate, real-time, and interactive medium for the students during the practice of procedures. The functional requirements of the training device do not necessarily require motion or visual systems or specific aircraft flight data characteristics. However, the training device should accurately portray relevant keyboards, switches, and CRTs and include air/ground and flightpath logic.

E. Example Outline. Figure 3-179, Aircraft Systems Integration Outline Example, illustrates one of the many acceptable methods in which the “aircraft systems integration” subject area of an aircraft ground training curriculum segment could be outlined (including a typical training module):

![Figure 3-179. Aircraft Systems Integration Outline Example](image)

F. Missed Approach/Go-Around Policy and Procedures. Training should also include the certificate holder’s policy and procedures regarding missed approach/go-around, including immediate compliance following a missed approach/go-around callout by the pilot flying (PF), pilot monitoring (PM), or the FE, as applicable.

G. APU Announcement.

1) Background.

a) A National Transportation Safety Board (NTSB) study of emergency evacuations cited an evacuation that occurred during the boarding of a Boeing 727. In preparation for flight, the flightcrew started the airplane’s APU. An orange flame appeared that extended from the APU exhaust port forward along the right side of the airplane as the APU “torched.”
b) The flame was noticeable in the cabin and several passengers screamed “fire” and began to evacuate the airplane via the left overwing exit and the jetway. The flight attendant (F/A) in the rear of the airplane tried to stop the evacuation, but as the rush of passengers approached her, she decided that opening the tailcone exit was a more prudent action. Additionally, passengers also opened the L2 door. When the flightcrew learned of the situation, they issued an announcement over the PA system to remain seated. Control was finally reestablished in the cabin, but not before several passengers received injuries. The NTSB believes that the FAA should ensure that passengers are made aware of the possibility of APU torching just prior to use of the APU to preclude an unwarranted evacuation by passengers who only see “fire” outside the aircraft.

2) Policy. The FAA agrees with the intent of this recommendation. Operators should emphasize emergency situation training modules and emergency evacuation procedures on unwarranted evacuations, including “appropriate” actions on aircraft that are equipped with an APU which have a tendency to “torch.”

a) The best way to address the issue of unwarranted evacuations is to take proactive steps to ensure that they do not occur. APU torching is a known possible outcome of starting the APU. Passenger information regarding the possibility of APU torching would eliminate the panic and confusion that results from passengers simply seeing “fire” outside the aircraft and attempting to evacuate.

b) POIs should inform their assigned certificate holders who operate Boeing 727s to include in their APU procedures instructions stating that during normal operations when passengers are on board, the flightcrew make a PA announcement about the possibility of APU torching immediately prior to starting the APU.

3-1207 GTDs. GTDs are commonly used by operators in the conduct of aircraft ground training. The level of sophistication of these devices may range from a simple paper pictorial display to a static aircraft. They may include slide/tape presentations, CBI systems, aircraft system panels, models, mockups, FSTDs, and numerous other instructional delivery methods. POIs approve or accept each GTD for use when granting initial or final approval of a ground training curriculum segment for the operator. GTDs used for systems integration training must be individually evaluated by the POI.

3-1208 EVALUATION OF GROUND TRAINING CURRICULUM SEGMENT OUTLINES FOR INITIAL APPROVAL. When evaluating an aircraft ground training curriculum segment outline, an inspector must determine whether it meets the following criteria:

A. Training Hours. The training hours specified in each curriculum segment outline must be examined. Inspectors should not attempt to measure the quality or sufficiency of training by the amount of training hours alone. Adequacy of quality and sufficiency of training can only be determined by direct observation of training and testing (or checking) in progress or by examination of surveillance and investigation reports. However, the specified training hours must be realistic in terms of the amount of time it will take to accomplish the training outlined in the curriculum segment. Any request and the appropriate justification for reductions to training hours must be submitted with the initial proposal.
B. Appropriate Modules. The curriculum segment outline contains appropriate training modules for the specific aircraft. The training modules should have sufficient elements or events to ensure that the quality and depth of training given in a particular subject area will be provided.

3-1209 CREDITING DISTANCE LEARNING AS A COMPONENT OF GROUND TRAINING FOR FLIGHTCREW—PILOTS AND FEs.

A. Background. In the so-called “information age,” many new information-sharing systems have been developed. These systems have been centered largely on digital technology involving desktop computers and the Internet. These systems include modern training products, many of which are being used effectively today in aviation courses conducted by accredited universities and in air carrier training programs approved by the FAA. Collectively, those products fall under a relatively new heading that has been called “distance learning.” As the quality of those products continues to improve, the training/learning process stands to benefit even more. Previous FAA guidance seemed to presume that traditional classroom training was inherently superior to other ground training. That presumption was reflected in this order and elsewhere. Besides the proven effectiveness of modern training products, distance learning affords a low-cost alternative to classroom ground training, an alternative that is timely and appropriate in today’s challenging economic environment. The updated guidance that follows should promote wider implementation of modern ground training methods apart from the traditional classroom.

B. Applicability. This paragraph applies to flightcrew (pilot and FE) training programs subject to FAA approval under parts 121 and 135. It may also be useful to inspectors who oversee training related to operations under 14 CFR part 91 subpart K (part 91K) (fractional ownership programs), part 125, and part 142 (training centers). Creditability of hours spent in distance learning activities applies to the programmed hours of ground training specified in part 121 regulations and to the national norms shown in this order.

C. Distance Learning Definition. Distance learning is a term currently not used in FAA regulations. It is a term used in the FAA and in the aviation industry with various meanings depending on context. For the purposes of this order, distance learning means learning that is accomplished by any training method not including an instructor and a gathering of trainees collocated in a traditional classroom. (Distance learning is known by other terms such as E-learning, home study, self-guided training, virtual classroom, distributed training, computer-based training (CBT), web-based training (WBT), and others.)

D. Interim Guidance. Experts continue to develop a systematic approach for using the many effective training methods and products now available. It is unlikely that the last word will be written in the foreseeable future, if ever, since there is apparently no end to the prospects. The guidance contained in this paragraph applies until superseded and should be used to help implement and standardize distance learning among air carriers.

E. Training Objectives and Proficiency. A training objective is a desired performance or behavior demonstrated under certain conditions with respect to specific standards. One way to identify training objectives, and to verify that they have been met (also known as validation), is by a three-tier scheme comprising knowledge, skill, and performance.
1) **Knowledge.** Specific information required to enable a student to develop the skills and attitudes to effectively recall facts, identify concepts, apply rules or principles, solve problems, and think creatively. Because knowledge is covert, students must be assigned overt activities to demonstrate their knowledge base.

   a) Knowledge may be validated through written, electronic, or oral testing.

   b) Examples include learning facts by rote, such as an operator’s history, organization, and general policies; committing AFM limitations to memory; and getting a basic understanding of an airplane’s systems.

2) **Skill.** An ability enabled by knowledge to perform an activity or action. Skills are often grouped into cognitive skill and psychomotor skill categories.

   a) Cognitive Skill. The ability to perform a task requiring the manipulation of words, numbers, and symbols. It requires the application of knowledge and usually involves classification, the application of (mental) rules, procedures or principles, the solution of problems, or the application of creative thinking.

      1. Cognitive skill may be validated through written, electronic, or oral testing, or through task performance.

      2. Examples include challenging a pilot trainee to apply knowledge of an airplane’s limitations to a W&B computation, and applying basic systems knowledge to operating aircraft systems and programming the flight management system (FMS).

   b) Psychomotor Skill. The ability to perform a task requiring dexterity, coordination, and muscular activity. It requires the application of knowledge and usually involves the manipulation of objects or materials and the use of fine and gross muscular movement in a coordinated manner.

      1. Psychomotor skill may be validated through performance of a task.

      2. An example is operation of an emergency exit by normal and alternative methods.

3) **Performance.** Ability to accomplish useful work by combining knowledge, skill, and intangibles such as inference and judgment (sometimes called “soft skills”).

   a) Performance may be validated through performance of related tasks, sometimes called “event sets.”

   b) An example is demonstrating competence as pilot in command (PIC) during an instrument landing system (ILS) approach.
F. **Scope of Creditability of Distance Learning.** Distance learning credit is appropriate for knowledge objectives and for cognitive skill objectives. Creditability of distance learning is more complicated in regard to psychomotor skills and performance and is not addressed in this paragraph.

G. **Limits on Creditability of Distance Learning.** The FAA recognizes the great training potential of distance learning that is well planned and effectively validated. That potential is already being exploited under the Advanced Qualification Program (AQP). Ground training developed in accordance with an implementation plan (described in subparagraph 3-1209I) is subject to FAA approval. Distance learning may be as much as 100-percent creditable toward the knowledge and cognitive skill training objectives in all ground training, including the following training categories:

- Basic indoctrination,
- Initial new-hire,
- Initial equipment,
- Transition,
- Upgrade,
- Recurrent, and
- Requalification.

H. **Ground Training Media.** The general nature and specific characteristics of training media used for distance learning vary widely. Examples include paper media, videotapes, CBT, CDs, WBT, and virtual classroom. The media used should meet the requirements of the respective training objective. Validation of training effectiveness is one of the most important components of the implementation plan described below.

I. **Implementation Plan.** Any proposal for ground training to be accomplished by distance learning should include a plan for startup, validation, operation, and maintenance of that training. This plan should include at least the following elements:

1) **Startup.** Identification of knowledge and cognitive training objectives.
   a) Ground training objectives can be reduced to simple terms, such as being able:
      - To recall,
      - To recognize,
      - To comprehend, and
      - To apply.
   b) Identification of the media to be used for ground training and testing.
   c) A validation strategy that addresses the effectiveness of the ground training itself, and the learning accomplished by each person trained. Key features of a validation strategy are shown below.
d) Effectiveness of the ground training being conducted.

   1. Setting a reference. One validation method is to establish a performance baseline from which to measure the effectiveness of the ground training proposed. Baselines exist in most ongoing air carrier training programs. Examples of performance baselines include average ground training hours a trainee spends in learning a certain subject, average pass–fail rates for tests of ground training content, median scores, average pass–fail rates for flight checks, and many others. A performance baseline may be set by using an existing baseline or by referring to some other existing standard.

   2. Maintaining currency. Validation depends upon maintaining the currency of the ground training to be conducted. A reliable method to do so is an essential part of a ground training proposal.


e) Learning accomplished by each person trained.

   1. A strategy for testing. Testing should be designed to determine that training objectives are being met by each trainee.

   2. Integrity of tests. A method should be developed to ensure integrity of tests, including integrity of test questions and test answers, and controlled access to tests and test results.

   3. Tracking. A method for keeping test results and tracking each individual’s performance.

2) Validation. Validation of ground training is a determination that the training proposed actually succeeds in meeting the performance objectives for that training. Two essential assessments comprise validation of ground training.

   a) Systems Knowledge Validation. Assessment of a student’s technical knowledge, accomplished by written or oral test.

   b) Cognitive Skill Validation. Assessment of an individual’s application of knowledge in respect to operation of systems, which may be accomplished by written or oral test, or by a more subjective evaluation by a subject matter expert (SME) such as an authorized ground instructor or an approved check pilot or check FE.

3) Passing Grade—80 Percent. If an electronic testing system (ETS) is used instead of an oral test or oral evaluation, the minimum passing score should be 80 percent. Any incorrect test answers should be addressed at the time of the test and should be corrected to 100 percent. A score less than 80 percent would require retraining in all substandard areas and retesting.
4) **Integrity of Test Questions.** Integrity of test questions depends on several factors:

   a) **Scope.** A test for an initial or transition trainee should include at least one question for each element contained in each training module. Ground training and testing for trainees in other curriculum segments (e.g., upgrade, recurrent, and requalification) may be less comprehensive, but should cover significant and timely subjects, particularly new material and changes since one’s previous recurrent ground training.

   NOTE: An element is a subgroup of related content within a training module. It is the fourth level of curriculum detail—curriculum, curriculum segment, training module, element. For example, Hydraulic System is one training module; the yellow system, the green system, and the standby system are elements.

   b) **Library.** A library of questions should be developed that thoroughly cover the training objectives.

   c) **Multiple Questions.** Where possible, multiple questions should be developed for each training objective.

   d) **Uniqueness.** Tests should be generated by random selection of questions from the library, so that no two tests are alike.

   e) **Currency.** Test questions should be reviewed as often as necessary to ensure their relevancy and to incorporate new or changed material.

5) **Integrity of Test Answers.** Trainers should develop measures by which the identity of a person taking the test may be confirmed, and printed or electronic test answers may not be reproduced and distributed among trainees so as to beat the test.

6) **Operations and Maintenance.** Includes quality control (QC) procedures for the collection, protection, and analysis of data for tracking ground training effectiveness; also, a strategy for equipment upgrade, program update, and program adjustments driven by data and feedback from trainers and trainees.

J. **Interactivity.** Training developers should provide for interactivity between trainees and authorized ground instructors and between the trainees themselves.

   1) **When in the Field.** In particular, a trainee should have ready access to an authorized ground instructor during normal business hours to resolve questions encountered during distance learning and pertinent testing.

   2) **When at a Centralized Training Location.** Before flight training, trainees should be convened in a proctored classroom setting with an authorized ground instructor to resolve any remaining issues arising during distance learning. This interactivity is particularly beneficial in respect to standardization of trainees in initial new-hire and initial equipment curricula.
3-1210 AIRCRAFT GROUND TRAINING CURRICULUM SEGMENT JOB AID. This job aid may be used in addition to completing appropriate Data Collection Tool (DCT) questions from SAS Element 2.1.1.

A. Job Aid Subject Areas. The aircraft ground training curriculum segment job aid (Table 3-55) is provided to assist the inspector in evaluating curriculum segments. The job aid is provided for guidance only and must not be construed as a mandatory or regulatory requirement. The job aid focuses on the three subject areas of this segment: general operational subjects, aircraft systems, and systems integration training. It serves as an aid for evaluating individual training modules.

B. Review of Operator’s Proposal. When using the job aid, an inspector should make a side-by-side comparison of the operator’s proposal to determine the following:

- Whether each subject is aircraft-specific in terms of description, company policy, and appropriate procedures; and
- Whether sufficient training module elements or events are listed to ensure the appropriate depth and scope of the material being presented.

C. Using the Job Aid. The job aid is organized with the training modules listed in the left column and evaluation criteria or remarks listed horizontally across the top. Inspectors may use the spaces within the matrix for items such as notes, comments, dates, or checkmarks. There are also blank columns and rows in the job aid in which inspectors may include additional training modules for systems unique to a particular aircraft and methods or procedures unique to a particular operation.
Table 3-55. Aircraft Ground Training Module Job Aid

**SUBJECT AREA 1: GENERAL OPERATIONAL SUBJECTS**

FOR PART 121 INITIAL FOR PILOTS WHO HAVE NOT COMPLETED THE ATP CTP REQUIRED BY 14 CFR PART 61, § 61.156; FOR PART 121 TRANSITION AND UPGRADE FOR PILOTS; FOR FE; AND FOR PART 135

<table>
<thead>
<tr>
<th>TRAINING SUBJECTS</th>
<th>Adequacy of Elements/Events</th>
<th>Adequacy of Courseware</th>
<th>Training Aids and Facilities</th>
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<tbody>
<tr>
<td>Flight Control*</td>
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<td>Weight and Balance (W&amp;B)</td>
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<td>OpSpec Authorizations/ Limitations</td>
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<td>Adverse Weather</td>
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<td>Flight Planning</td>
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<td>Aircraft Flight Manual (AFM)</td>
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<td>Company Operations Manual</td>
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<td>Performance</td>
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* Flight dispatch (part 121 domestic and flag), flight release (part 121 supplemental), or flight-locating (part 135), as applicable.
Table 3-55. Aircraft Ground Training Module Job Aid (Continued)

FOR PART 121 INITIAL FOR PILOTS WHO HAVE COMPLETED THE ATP CTP REQUIRED BY § 61.156

<table>
<thead>
<tr>
<th>TRAINING SUBJECTS</th>
<th>Adequacy of Elements/Events</th>
<th>Adequacy of Courseware</th>
<th>Training Aids and Facilities</th>
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<tbody>
<tr>
<td>The Certificate Holder’s Dispatch or Flight Release Procedures</td>
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<tr>
<td>Methods for Determining W&amp;B, and Runway Limitations for Takeoff and Landing</td>
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<tr>
<td>Meteorology Hazards Applicable to the Certificate Holder’s Areas of Operation</td>
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<tr>
<td>Approved Departure, Arrival, and Approach Procedures</td>
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<td>Normal and Emergency Communication Procedures</td>
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<td>Approved Crew Resource Management (CRM) Initial Training</td>
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Table 3-55. Aircraft Ground Training Module Job Aid (Continued)

SUBJECT AREA 2: AIRCRAFT SYSTEMS

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<th>TRAINING SUBJECTS</th>
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<th>Adequacy of Courseware</th>
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<td>Emergency Equipment</td>
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<td>Air Conditioning and Pressurization</td>
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<td>Ice and Rain Protection</td>
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<td>Auxiliary Power Unit (APU)</td>
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<td>Landing Gear and Brakes</td>
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<td>Flight Controls</td>
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<td>Fuel</td>
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<td>Communications Equipment</td>
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<td>Flight Instruments</td>
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<td>Navigation Equipment</td>
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<td>Autoflight</td>
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<td>Warning Systems</td>
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<td>Fire and Overheat Protection</td>
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<td>Oxygen</td>
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<td>Stall Prevention and Recovery (part 121)</td>
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Table 3-55. Aircraft Ground Training Module Job Aid (Continued)

SUBJECT AREA 3: AIRCRAFT SYSTEMS INTEGRATION

<table>
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<tr>
<th>TRAINING SUBJECTS</th>
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<th>Adequacy of Courseware</th>
<th>Training Aids and Facilities</th>
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<tr>
<td>Use of Checklist</td>
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<td>Flight Deck Familiarization</td>
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<td>Preflight Planning</td>
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<tr>
<td>In-Flight Planning</td>
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<tr>
<td>Use of Weather Radar (WX)/Cathode Ray Tubes (CRT)</td>
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<td>Navigation Systems</td>
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<td>Communication Systems</td>
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<tr>
<td>Autoflight/Flight Director (FD)</td>
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RESERVED. Paragraphs 3-1211 through 3-1225.
VOLUME 3 GENERAL TECHNICAL ADMINISTRATION

CHAPTER 19 TRAINING PROGRAMS AND AIRMAN QUALIFICATIONS

Section 7 Safety Assurance System: Flightcrew Qualification Curriculum Segments

3-1271 GENERAL. This section contains direction and guidance concerning qualification curriculum segments and qualification modules. A qualification curriculum segment is the final segment of each of the six categories of training defined in Volume 3, Chapter 19, Section 1. A qualification curriculum segment is composed of the testing, checking, and experience modules that a flightcrew member must successfully complete after formal training and before being qualified to serve unsupervised as a required flightcrew member in Title 14 of the Code of Federal Regulations (14 CFR) part 121 or 135 operations. This section is related to Safety Assurance System (SAS) Element 2.1.5 (OP), Appropriate Airmen/Crewmember Checks and Qualifications.

A. Primary Objectives. A qualification curriculum segment has the following primary objectives:

- To ensure that each flightcrew member has reached an acceptable level of proficiency in all assigned duties before being released from training and supervision; and
- To provide a means for measuring the effectiveness of the training program, and for identifying and correcting training deficiencies.

B. Guidance Application. The guidance in this section applies to the development and approval of qualification curriculum segments for both parts 121 and 135 training curricula. In general, equivalent qualification modules are required by both of these regulatory parts. Differences do exist, however, between parts 121 and 135 curriculum segments in both terminology and details. When the guidance in this section applies specifically to one flightcrew member duty position or regulatory part, the duty position or regulatory part will be specified.

3-1272 TYPES OF QUALIFICATION MODULES. Qualification curriculum segments are composed of qualification modules. Qualification modules are generally divided into testing, checking, and experience modules.

A. Definitions. The following definitions are used in this section:

1) Qualification Curriculum Segment. The segment of a specified curriculum that begins when formal training has been completed and ends when the flightcrew member is fully qualified to perform unsupervised and without restriction in revenue service.

2) Testing. Any form of examination of knowledge or skill, whether oral, written, or practical.

3) Checking. Specifically, a practical skills test. (For flightcrew members, a check consists of physical manipulation of aircraft controls in real time.)
4) **Basic Checking Module.** The proficiency, competency, or flight check listed in a qualification segment of a curriculum outline required for qualification in the basic duties of a flightcrew member duty position.

5) **Additional Checking Module.** A check conducted to qualify a flightcrew member for an additional level of responsibility or skill beyond that of the basic flightcrew member duty position.

6) **Experience Module.** An operation conducted in revenue service that is either under supervision or under restriction, and is measured in flight hours or in the number of repetitions of an event.

7) **Line-Oriented Flight Training (LOFT).** LOFT is a module of training conducted in a full flight simulator (FFS) after completion of a basic checking module to satisfy the requirements of part 121 appendix H.

**B. Experience Modules.** Title 14 CFR requires that experience modules be completed before a flightcrew member performs unsupervised and without restriction in revenue service. Other experience modules are required for special authorizations or to reestablish recency of experience. One or more of the following experience modules may be required in a qualification curriculum segment:

- Operating Experience (OE),
- Pilot-in-command (PIC) experience (required to use standard turbojet minimums),
- Special operations experience (such as Class II long-range navigation), and/or
- Recent experience (to reestablish recency of experience for takeoffs and landings or instrument experience).

**3-1273 FORMAT OF QUALIFICATION CURRICULUM SEGMENTS.** The content of a qualification curriculum segment for part 121 operations is almost entirely controlled by regulation. A part 121 operator may, however, use more than one means of accomplishing these requirements. For example, an operator could conduct checks for most categories of training in a level C FFS. In such a case, the operator would be required to conduct a LOFT training module after the completion of the basic checking module. An operator that uses a level A FFS would be required to conduct the basic checking module in the FFS and a second module in the airplane. The requirements of a part 135 competency check are not specified in 14 CFR, but are left to the discretion of the Administrator and the check pilot conducting the check. To ensure that a clear understanding exists between the operator and the Federal Aviation Administration (FAA), the principal operations inspector (POI) should require that the operator list each element or event in a qualification module along with the flight simulation training device (FSTD) or aircraft to be used. The operator’s format may either be a simple outline, a table such as those contained in Table 3-70, Part 135 Checking Modules—Airplanes, and Table 3-71, Part 135 Checking Modules—Helicopters, or any other format that the POI finds clearly establishes the methods to be used and elements and events to be checked.
PART 121 REQUIRED CERTIFICATES AND RATINGS (PART 121, § 121.436).
All flightcrew members must hold specific certificates and ratings before performing duties in part 121 revenue service. If a flightcrew member does not hold the required certificates and/or ratings, they must be obtained when the flightcrew member completes the qualification curriculum segment.

A. PIC. A PIC in part 121 operations must hold the following:

- Airline Transport Pilot (ATP) Certificate,
- Appropriate aircraft type rating, and
- First-class medical certificate.

B. Second in Command (SIC).

1) An SIC in part 121 domestic operations must hold the following:

- An ATP Certificate (or an ATP Certificate with restricted privileges),
- Appropriate aircraft type rating, and
- At least a second-class medical certificate.

2) An SIC in part 121 flag or supplemental operations requiring only two pilots must hold the following:

- An ATP Certificate (or an ATP Certificate with restricted privileges),
- Appropriate aircraft type rating, and
- At least a second-class medical certificate.

3) An SIC in part 121 flag or supplemental operations requiring three or more pilots must hold the following:

- An ATP Certificate (In this scenario, a pilot must hold an ATP Certificate issued per the requirements of 14 CFR part 61, § 61.159. An ATP Certificate issued per the reduced flight hours in § 61.160 is not sufficient.);
- Appropriate aircraft type rating; and
- A first-class medical certificate.

C. Flight Engineer (FE). An FE must hold the following:

- FE Certificate,
- Applicable class rating, and
- At least a second-class medical certificate.
PART 135 REQUIRED CERTIFICATES AND RATINGS (PART 135, § 135.243).
All pilots must hold specific certificates and ratings before performing duties in part 135 revenue service.

A. Pilot Certification Requirements—Airplanes. Pilot certification requirements for part 135 airplane operations depend on the kind of operation being conducted and the type of airplane used.

1) PICs conducting passenger-carrying operations in a turbojet airplane or any airplane having 10 or more passenger seats (excluding any crewmember seat), or any commuter flight in a multiengine airplane regardless of the number of passenger seats must hold the following:

a) ATP Certificate.
b) Airplane category rating.
c) Class rating (as appropriate):
   • Airplane Single-Engine Land (ASEL),
   • Airplane Multiengine Land (AMEL),
   • Airplane Single-Engine Sea (ASES), or
   • Airplane Multiengine Sea (AMES).
d) Type rating (as appropriate).
e) First-class medical certificate.

2) PICs conducting part 135 flight operations in airplanes other than those described in subparagraph 3-1275A1) must hold the following:

a) ATP Certificate or Commercial Pilot Certificate with instrument–airplane rating.
b) Airplane category rating.
c) Class rating (as appropriate):
   • ASEL,
   • AMEL,
   • ASES, or
   • AMES.
d) At least a second-class medical certificate.
3) SICs conducting any part 135 airplane operations must hold the following:
   a) ATP Certificate or Commercial Pilot Certificate with instrument–airplane rating.
   b) Airplane category rating.
   c) Class rating (as appropriate):
      • ASEL,
      • AMEL,
      • ASES, or
      • AMES.
   d) At least a second-class medical certificate.

NOTE: Certain pilots conducting part 135 visual flight rules (VFR)-only operations with single-engine reciprocating-powered airplanes in isolated areas, not a commuter operation, and not transporting contract mail, may be relieved of the requirement to hold an instrument rating in accordance with § 135.243(d) and authorized by operations specification (OpSpec) A020.

B. Pilot Certification Requirements—Helicopters. The pilot certification requirements for pilots conducting part 135 helicopter operations are as follows:

1) All PICs and SICs must hold at least the following:
   • Commercial Pilot Certificate or ATP Certificate, as appropriate;
   • Rotorcraft category rating;
   • Helicopter class rating; and
   • At least a second-class medical certificate.

2) All PICs must hold a type rating, if a type rating is required.

3) PICs conducting part 135 instrument flight rules (IFR) or VFR over-the-top operations in helicopters must hold a helicopter instrument rating or an ATP Certificate that is not limited to VFR.

3-1276 PART 121 MINIMUM PIC FLIGHT EXPERIENCE REQUIREMENTS (§ 121.436). A PIC in part 121 operations must have a minimum of 1,000 flight hours in air carrier operations as an SIC in part 121 operations, a PIC in operations under either § 135.243(a)(1) or 14 CFR part 91, § 91.1053(a)(2)(i), or any combination of these. In addition, military PIC time (up to 500 hours) in a multiengine turbine-powered, fixed-wing airplane in an operation requiring more than one pilot may also be credited towards the 1,000 hours.
3-1277  PART 135 MINIMUM PIC FLIGHT EXPERIENCE REQUIREMENTS.  
Section 135.243(b) and (c) require that a PIC who does not hold an ATP Certificate and who 
conducts operations that do not require an ATP Certificate must have acquired a minimum 
number of flight hours before serving as a PIC.  

A. VFR Requirements. Before serving as a PIC in a VFR operation, the pilot must have 
accumulated at least the following flight hour experience:
  
  • 500 total pilot flight hours,
  • 100 cross-country flight hours, and
  • 25 night, cross-country flight hours.

B. IFR Requirements. Before serving as a PIC in an IFR operation, the pilot must have 
accumulated at least the following flight hour experience:
  
  • 1,200 total pilot flight hours,
  • 500 cross-country flight hours,
  • 100 night flight hours, and
  • 75 actual or simulated instrument flight hours, 50 of which must have been in 
    actual flight.

NOTE: See Volume 5, Chapter 3 for guidance concerning the crediting of 
flight time in airplanes and helicopters to meet these requirements.

3-1278  THE BASIC CHECKING MODULE.  The basic checking modules for both parts 121 
and 135 are composed of two parts: one part consists of the written or oral test elements, and the 
other part consists of the flight check events. Although they are distinct and separate parts, when 
combined, they make up a single checking module.  

A. Basic Checking Module Content. The subject areas that must be addressed in the 
written or oral test for the part 121 basic checking module are described in part 121 appendix F. The subject areas that must be addressed in the written or oral test for the part 135 basic 
checking module are described in § 135.293(a) and, for those PICs conducting IFR operations, 
in § 135.297(c). These regulations require a written or oral test element as a distinct part of the 
basic checking module. The basic checking modules required for parts 121 and 135 are further 
discussed in paragraphs 3-1279 and 3-1280, respectively.  

B. Performance Standards. In parts 121 and 135 operations, a higher standard of 
proficiency may be required than that required for initial pilot certification. The standard 
required for basic checks is at least that required for obtaining the certificate which must be held 
to act as a PIC. For example, an SIC holding a commercial certificate with an instrument rating 
who is making an instrument landing system (ILS) approach in a G-V must perform to the same 
standard of proficiency as the PIC seated in the left seat who holds an ATP Certificate and a 
G-V type rating. POIs should bring the following guidance in Volume 5 pertaining to proficiency 
and competency checks (Table 3-69, Guidance Pertaining to Proficiency and Competency 
Checks) to the operator’s and check pilot’s attention:
Table 3-69. Guidance Pertaining to Proficiency and Competency Checks

<table>
<thead>
<tr>
<th>Section</th>
<th>Paragraph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume 5, Chapter 1, Section 1</td>
<td>Subparagraphs 5-7B–D and Paragraph 5-8</td>
</tr>
<tr>
<td>Volume 5, Chapter 1, Section 3</td>
<td>Subparagraphs 5-57A–E and Subparagraphs 5-58A–H</td>
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<tr>
<td>Volume 5, Chapter 3, Section 2</td>
<td>Subparagraphs 5-827A–D</td>
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<tr>
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<td>Subparagraphs 5-85C–H and Paragraphs 5–859 through 5-862</td>
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<td>Volume 5, Chapter 3, Section 4</td>
<td>Paragraphs 5-886 through 5-892</td>
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<td>Volume 5, Chapter 3, Section 5</td>
<td>Paragraphs 5-907 through 5-916</td>
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<td>Volume 5, Chapter 3, Section 6</td>
<td>Paragraphs 5-937 and 5-939 through 5-944</td>
</tr>
<tr>
<td>Volume 5, Chapter 4, Section 2</td>
<td>Paragraphs 5-1007 and 5-1011 through 5-1018</td>
</tr>
</tbody>
</table>

C. Use of FSTDs. An operator may take maximum advantage of FSTDs in designing qualification curriculum segments. For example, an operator may evaluate a PIC and an SIC simultaneously on many normal, non-normal, and emergency procedures when an FFS is used. POIs should encourage operators to design qualification modules accordingly.

D. LOFT Training. A LOFT training module is considered to be part of the qualification curriculum segment, but it is an experience event, not a checking event. A pilot who qualifies for a certificate or rating in a level C or D FFS is issued the certificate or rating immediately after satisfactorily completing the basic check. The pilot is not qualified to either exercise the privileges of the certificate or rating or enter revenue service until the pilot has successfully completed the LOFT training module.

3-1279 PART 121 BASIC CHECKING MODULE. The basic checking module required in part 121 is referred to as a proficiency check for pilots and a flight check for FEs. Unless the Air Transportation Division (AFS-200) has authorized a deviation in accordance with § 121.441(f), a proficiency check for pilots consists of the written or oral elements and the flight events specified in part 121 appendix F. Figure 3-80, Pilot Proficiency Check (Part 121), summarizes the elements and events that make up a proficiency check. A proficiency check qualifies pilots for both VFR and IFR Class I navigation and instrument approaches to standard minimums (Category (CAT) I Approach, if approved for the operator). Operations such as CAT II Approach or CAT III Approach require additional checking modules. For an FE, the flight check consists of the flight events summarized in Figure 3-81, Flight Engineer Flight Check (Part 121). Although part 121 does not specifically require a written or oral test element as part of the FE flight check, it is an FAA safety policy that a written or oral test be part of the FE flight check. POIs must ensure the test is included as an element of the basic checking module.
Figure 3-80. Pilot Proficiency Check (Part 121)

**ORAL OR WRITTEN EQUIPMENT EXAM** Both

**GROUND OPERATIONS**
- Preflight inspection Both
- Taxiing/runway operations Both
- Powerplant checks Both

**TAKEOFFS**
- Normal Both
- Instrument Both
- Crosswind Both
- With powerplant failure Both
- Rejected takeoff Both

**INSTRUMENT PROCEDURES**
- Area departure Both
- Area arrival Both
- Holding Both
- Normal ILS approach Both
- Engine-out ILS Both
- Coupled ILS approach Both
- Nonprecision approach Both
- Second nonprecision approach Both
- Missed approach from an ILS Both
- Second missed approach PIC
- Circling approach Both

**IN-FLIGHT MANEUVERS**
- Steep turns PIC
- Specific flight characteristics Both
- Stall prevention (approaches to stalls) Both
- Powerplant failure Both
- Two-engine inoperative approach Both (three- and four-engine aircraft)
- Normal landing Both
- Landing from an ILS Both
- Crosswind landing Both
- Landing with engine out Both
- Landing from circling approach Both

*1

*2
NORMAL AND NON-NORMAL PROCEDURES  Both

- Rejected landing ................................................. Both
- Two-engine inoperative approach ....................... PIC (three- and four-engine aircraft)

OTHER EVENTS:  At check pilot’s discretion *4

NOTES:

“Both:” The term “both” applies to pilots in command (PIC) and seconds in command (SIC).
* May be waived under certain conditions. (See Volume 5, Chapter 3, Section 2.)
1 PIC and SIC may both simultaneously take credit for this event.
2 When the operator is authorized by OpSpec C075 to conduct circling approaches. (This is not required for SICs if the operator’s manual prohibits SICs from making this approach.)
3 See guidance contained in Volume 5, Chapter 3, Section 2.
4 The check pilot is authorized to evaluate any event required for the ATP Certificate.
(See Volume 5, Chapter 1, Section 2.)

Figure 3-81.  Flight Engineer Flight Check (Part 121)

NORMAL PROCEDURES

- Oral or written examination;
- Exterior preflight;
- Interior preflight;
- Panel setup;
- Fuel load;
- Engine start procedures;
- Taxi and before-takeoff procedures;
- Takeoff and climb;
- Pressurization;
- Cruise and fuel management;
- Descent and approach;
- After landing and securing;
- Crew coordination;
- Situational awareness, traffic scan, etc.;
- Performance computations; and
- Anti-ice, deice.

NON-NORMAL AND EMERGENCY PROCEDURES

Sample as many non-normal and emergency procedures as needed to evaluate performance:
- Troubleshooting;
- Knowledge of checklist;
- Ability to perform procedures;
- Crew coordination; and
- Minimum equipment list (MEL) and Configuration Deviation List (CDL).
PART 135 BASIC CHECKING MODULE. The flight test required to qualify a pilot for revenue service is termed a basic checking module when listed in a curriculum outline. Operators must design the basic checking module of a part 135 curriculum to satisfy the requirements of § 135.293. In addition, operators must satisfy the requirements of § 135.297 for PICs conducting IFR operations. Those operators whose PICs are authorized to use an autopilot in lieu of an SIC in IFR operations must include a demonstration of these skills in the basic checking module. This paragraph contains guidance POIs will use to review and approve basic checking modules and to conduct these checks.

A. Section 135.293 Requirements. All pilots who are qualifying in an aircraft type are required by § 135.293 to complete a check in that type of aircraft before entering revenue service and annually thereafter.

1) Section 135.293(b) allows the Administrator to define airplanes with similar characteristics as a single type for purposes of this rule (see Volume 3, Chapter 19, Section 1, paragraph 3-1073, Aircraft Families, for aircraft of the equivalent series which are defined as a single type). The rule refers to this check as a competency check.

2) The requirements of § 135.293 are aircraft-specific; that is, each pilot must satisfactorily complete a competency check in each type of aircraft (as defined in Volume 3, Chapter 19, Section 1, paragraph 3-1073) prior to operating that aircraft in revenue service.

3) Section 135.293 does not specify the maneuvers (events) that must be accomplished on a competency check. The rule authorizes the Administrator or check pilot to make this determination. To ensure standardization and an adequate level of safety, the minimum acceptable content of competency checks for a part 135 curriculum is established by this paragraph and is listed in Tables 3-70 and 3-71.

4) Because operators may be authorized to conduct VFR-only operations or a combination of VFR and IFR operations, separate requirements have been established for VFR-only competency checks and for combined VFR and IFR operations competency checks. These requirements are indicated in columns marked “VFR COMP” and “IFR COMP” in each table.

a) As a matter of national safety policy, some demonstration of competency of the pilot’s ability to maneuver the aircraft solely by reference to instruments will be included on each competency check. For VFR competency checks, this demonstration will be appropriate to the aircraft’s installed equipment and the operating environment. (See note 4 to Table 3-70 and note 4 to Table 3-71.)

b) The § 135.293 requirements for a night vision enhancement device (NVED)/Night Vision Goggle (NVG) competency check are aircraft make- and model-specific for the initial competency check. Specific NVG models may only be used in accordance with aircraft Supplemental Type Certificates (STC). Competency checks are not NVG model-specific. Therefore, a satisfactory demonstration of the use of one model of NVGs is all that is required, regardless of the number of models of NVGs the operator uses; it may be used in several different types of appropriately NVG-modified aircraft. Once an initial § 135.293 and NVG
competency check has been completed in the applicable category, class, and make and model aircraft, a flightcrew member is only required to demonstrate annual NVED/NVG competency in one make and model of aircraft in each category and class. However, it is recommended that the NVED/NVG recurrent competency checks be alternated between aircraft make and models to ensure an adequate level of competency in each aircraft make and model. If the NVED/NVG competency check is used to accomplish the requirements of the “VFR COMP” § 135.293 check simultaneously, the check must be completed in the specific make and model of aircraft for which the operator seeks § 135.293 qualification and must include all maneuvers as shown in Table 3-70, not just the NVG maneuvers. (See also paragraph 3-1286, Additional Checking Modules.)

B. Section 135.297 Requirements. Section 135.297 requires that PICs complete an instrument proficiency check (IPC) prior to conducting IFR revenue operations. Thereafter, the PIC must have completed an IPC within the preceding 6 months to continue IFR revenue operations. The requirements of § 135.297 are not aircraft-specific; that is, a single check fulfilling the requirements of § 135.297 is sufficient to qualify a PIC to conduct IFR operations in all types of aircraft in which the PIC is qualified according to § 135.293. Section 135.293(c) specifies that the check conducted to satisfy § 135.297 simultaneously satisfies the requirements of § 135.293 for the type of aircraft in which the check is accomplished.

NOTE: The oral or written test requirements of § 135.293(a) must be completed.

1) Operations Requiring an ATP Certificate. Section 135.297(c)(1) requires that for operations requiring an ATP Certificate, the IPC must consist of the maneuvers required for original issuance of that certificate and any applicable type rating.

2) Operations Requiring Commercial Certificates. Section 135.297(c)(1) also requires that for operations requiring a commercial certificate and an instrument rating, the IPC must consist of the maneuvers required for the original issuance of a commercial certificate, an instrument rating, and any applicable type rating.

C. Basic Checking Modules for § 135.293 VFR Competency Check.

1) The minimum events for a § 135.293 VFR competency check are listed in the columns marked “VFR COMP” in Table 3-70 for airplanes and in Table 3-71 for helicopters. A VFR competency check is conducted without the aid of visual enhancement devices and must be conducted in visual weather conditions. NVGs are considered visual enhancement devices, and therefore cannot be used to meet initial VFR qualification requirements listed in Table 3-70 for airplanes and Table 3-71 for helicopters.

2) The minimum events for a § 135.293 VFR competency check utilizing NVG are listed in the columns marked “NVG COMP” in Table 3-70 for airplanes and in Table 3-71 for helicopters.

D. Basic Checking Modules for § 135.293 IFR Competency Check. The minimum events for a § 135.293 IFR competency check are listed in the column marked “IFR COMP” in Table 3-70 for airplanes and in Table 3-71 for helicopters.
1) **PIC Requirements.** PICs being trained in initial equipment and transition curriculum for IFR operations have normally completed the requirements of § 135.297 within the preceding 6 months. If this is the case, the qualification module for these categories of training need only satisfy the requirements of § 135.293. The columns marked “IFR COMP” in Tables 3-70 and 3-71 reflect this assumption. When this assumption is not true, the operator must ensure that PICs meet the requirements of § 135.297.

2) **Multiengine General Purpose Family.** Volume 3, Chapter 19, Section 1, subparagraph 3-1073C, Multiengine General Purpose Airplane Family, lists airplanes of the multiengine general purpose family that the Administrator has determined to be of the same type for purposes of training and checking. Table 3-70 is constructed on the assumption that pilots in the transition category are qualifying in airplanes that are not of the same series. The basic qualification module of a transition training course for airplanes of the same series of the multiengine general purpose family of airplanes consists of the oral or written test required by § 135.293(a)(2).

3) **Single-Engine General Purpose Family.** All single-engine general purpose airplanes are considered to be a single type for the purpose of training and checking. The qualification module of the transition category of training is the written or oral test required by § 135.293(a)(2).

E. **Requalification Category.** The minimum events of the requalification checking module are dependent upon whether the pilot is requalifying for VFR or IFR operations and the duty position. PICs who conduct IFR operations and have completed a § 135.297 check in the past 6 months but are overdue for a check required by § 135.293 may regain qualification by completing the items listed in the columns marked “IFR COMP” in Table 3-70 for airplanes and Table 3-71 for helicopters. PICs overdue in respect to the requirements of § 135.297 must complete the items listed in the columns marked “INST PROF” in Table 3-70 for airplanes and Table 3-71 for helicopters.

F. **Recurrent Category.** The minimum events of the “recurrent” checking module are dependent upon whether the pilot is maintaining currency for VFR or IFR operations and the duty position. PICs who conduct IFR operations and have completed a § 135.297 check in the past 6 months must complete a § 135.293 competency check to remain current. Complete those items listed in the columns marked “IFR COMP” in Table 3-70 for airplanes and Table 3-71 for helicopters. PICs due both a competency check and an IPC must complete the items listed in the columns marked “INST PROF” in Table 3-70 for airplanes and Table 3-71 for helicopters. Section 135.297 requires PICs to complete IPCs by rotating aircraft types. When one airplane is multiengine and the other a single-engine airplane, § 135.297(f) requires that this rotation begin with the multiengine airplane.

NOTE: Section 135.301 allows pilots and operators to consider a check conducted in the month before it is due or the month after it is due to have been accomplished in the month due.
G. SIC Qualification in Aircraft Not Requiring an SIC. The basic qualification module for an SIC in any operation (VFR or IFR) for which no SIC is required by regulation is either an instrument proficiency or VFR competency check in any aircraft of the same category and class and the written or oral test required by § 135.293(a)(2) for the type of aircraft involved.

H. Listing Module Events. To ensure that the content of the basic checking module is adequate and appropriate, the operator may choose (or the POI may require) that the minimum required events of each basic checking module be listed on the curriculum outline.

I. Recording Checks. Record the checks for those operators whose flightcrew members get all their checks from FAA inspectors (single pilot, single PIC, and basic operators) on FAA Form 8410-3, Airman Competency/Proficiency Check, or equivalent form. POIs should encourage all other operators to create specifically tailored forms to record these checks which reflect the requirements listed in the operator’s curriculum outline. When multiple events, such as VFR and NVG, are demonstrated during the same flight, separate indications should be annotated on the checking form for the completion of an event and the conditions under which it was completed.

Table 3-70. Part 135 Checking Modules—Airplanes

<table>
<thead>
<tr>
<th>EVENTS</th>
<th>VFR COMP.</th>
<th>IFR COMP.</th>
<th>INST. PROF.</th>
<th>NVG COMP.</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRITTEN OR ORAL TEST</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14 CFR part 135, § 135.297</td>
<td></td>
<td></td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>§ 135.293</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td></td>
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<tr>
<td>GROUND OPERATIONS</td>
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<tr>
<td>Preflight inspection</td>
<td>B⁽⁽c⁾⁾</td>
<td>B</td>
<td>P</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>Start procedures</td>
<td>B⁽⁽c⁾⁾</td>
<td>B</td>
<td>P</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>Taxiing/runway operations</td>
<td>B⁽⁽c⁾⁾</td>
<td>B</td>
<td>P</td>
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<td>Pretakeoff checks</td>
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<td>P</td>
<td>B</td>
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<td>TAKEOFF AND DEPARTURES</td>
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<td>Normal</td>
<td>B⁽⁽c⁾⁾</td>
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<td>P</td>
<td>B⁽⁽d⁾⁾</td>
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<td>Crosswind</td>
<td>B⁽⁽c⁾⁾</td>
<td>B</td>
<td>P</td>
<td>B⁽⁽d⁾⁾</td>
<td>2</td>
</tr>
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<td>Instrument</td>
<td></td>
<td>P</td>
<td>P</td>
<td></td>
<td>2</td>
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<tr>
<td>With powerplant failure</td>
<td>B</td>
<td>B</td>
<td>P</td>
<td>B⁽⁽d⁾⁾</td>
<td>ME Only</td>
</tr>
<tr>
<td>Rejected takeoff</td>
<td>P⁽⁽c⁾⁾</td>
<td>P</td>
<td>P</td>
<td>B⁽⁽d⁾⁾</td>
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<td>Short field</td>
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<td>P</td>
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</tr>
<tr>
<td>Steep turns</td>
<td>P⁽⁽b⁾⁾</td>
<td>P⁽⁽b⁾⁾</td>
<td>P⁽⁽b⁾⁾</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>EVENTS</td>
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<td>IFR COMP.</td>
<td>INST. PROF.</td>
<td>NVG COMP.</td>
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<td>---------------------</td>
</tr>
<tr>
<td>Stall prevention (approaches to stalls)</td>
<td>B&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>P</td>
<td>P</td>
<td>B</td>
<td>2</td>
</tr>
<tr>
<td>Powerplant failure</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Two-engine-inoperative approach</td>
<td>P&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>P</td>
<td>P</td>
<td></td>
<td>3 and 4 Engine Airplanes</td>
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<tr>
<td>INSTRUMENT PROCEDURES</td>
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<td>Area arrival</td>
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<tr>
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<td>Normal ILS approach</td>
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<td>Engine-out ILS</td>
<td>P</td>
<td>P</td>
<td></td>
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<td>2, ME Only</td>
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<tr>
<td>Coupled approach</td>
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<td>P</td>
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<tr>
<td>Nonprecision approach</td>
<td>B</td>
<td>P</td>
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<td>P</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Missed approach from an ILS</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second missed approach</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>LANDINGS AND APPROACHES TO LANDINGS</td>
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<tr>
<td>Normal</td>
<td>B&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>B</td>
<td>P</td>
<td>B&lt;sup&gt;(d)&lt;/sup&gt;</td>
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<td>Crosswind</td>
<td>B&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>B</td>
<td>P</td>
<td>B&lt;sup&gt;(d)&lt;/sup&gt;</td>
<td>2</td>
</tr>
<tr>
<td>Landing from an ILS</td>
<td>B</td>
<td>B</td>
<td>P</td>
<td>B&lt;sup&gt;(d)&lt;/sup&gt;</td>
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<tr>
<td>Landing with engine out</td>
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<td>Circling approach</td>
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<td>Rejected landing</td>
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<td>Two-engine-inoperative landing</td>
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<td>P</td>
<td>P</td>
<td>B&lt;sup&gt;(d)&lt;/sup&gt;</td>
<td>3 and 4 Engine Airplanes</td>
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<td>Short Field landing</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>B&lt;sup&gt;(d)&lt;/sup&gt;</td>
<td>SE Only</td>
</tr>
<tr>
<td>No Flap approach</td>
<td>P&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>P</td>
<td>P</td>
<td>B</td>
<td>2, 8</td>
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<td>Steep turns</td>
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<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
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<tr>
<td>Glassy &amp; rough water</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
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<td>Sailing</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
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<tr>
<td>Docking</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>P&lt;sup&gt;(b)&lt;/sup&gt;</td>
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### EVENTS

<table>
<thead>
<tr>
<th>NON-NORMAL AND EMERGENCY PROCEDURES</th>
<th>VFR COMP.</th>
<th>IFR COMP.</th>
<th>INST. PROF.</th>
<th>NVG COMP.</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>System malfunction</td>
<td>( B^{(c)} )</td>
<td>( B )</td>
<td>( P )</td>
<td>( B )</td>
<td>1</td>
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<tr>
<td>NVG malfunction</td>
<td></td>
<td></td>
<td></td>
<td>( B )</td>
<td></td>
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<tr>
<td>Maneuver by partial panel</td>
<td>( B )</td>
<td>( B )</td>
<td>( P )</td>
<td></td>
<td>5</td>
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<tr>
<td>Unusual attitude recovery</td>
<td>( B )</td>
<td>( B )</td>
<td>( P )</td>
<td>( B )</td>
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<tr>
<td>Emergency landing</td>
<td>( B )</td>
<td>( B )</td>
<td>( P )</td>
<td>( B )</td>
<td>SE Only</td>
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<td>Use of external lighting</td>
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<td>( B )</td>
<td></td>
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<tr>
<td>Instrument approach</td>
<td>( B )</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
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</table>

### NOTES TO TABLE 3-70, PART 135 CHECKING MODULES—AIRPLANES

- **P**  Pilot in command (PIC).
- **B**  Both the PIC and second in command (SIC).
- **ME** Multiengine
- **SE** Single-engine

(a) May be waived at the discretion of the principal operations inspector (POI) and the check pilot when the check is not simultaneously conducted for certification. (See Volume 5, Chapter 3, Section 2.)

(b) May be waived at the discretion of the POI and the check pilot when the check is not conducted in conjunction with initial new-hire or initial equipment training.

(c) Accomplishment Unaided may be combined at the discretion of the POI or the check pilot when conducting a Night Vision Goggle (NVG) proficiency check concurrent with a VFR competency check when the check is not conducted in conjunction with initial new-hire or initial equipment training.

(d) Only required if operator authorized takeoff and landing Airplane Night Vision Goggle (ANVG) operations on Operations Specification (OpSpec) A051.

1 Both PIC and SIC may be evaluated performing their assigned duties in these events simultaneously when the check pilot is not seated at the controls.

2 See Volume 5, Chapter 3, Section 2.

3 The applicant must demonstrate the ability to use all installed equipment including autopilots and flight directors (FD). In multiengine airplanes, an engine-out instrument landing system (ILS) may be substituted for the normal ILS at the option of the inspector or check pilot administering the check.

4 POIs must ensure applicants accomplish this event in an aircraft the operator uses in revenue operations (or in an appropriately equipped flight simulation training device (FSTD)). The event should reflect a realistic course of action the pilot might take to escape from an encounter with inadvertent instrument meteorological conditions (IIMC). POIs should approve methods appropriate to the aircraft, equipment, and facilities available. When the pilot is authorized to operate an appropriately equipped aircraft and the check is conducted at a location where an ILS is operational, demonstrate an ILS approach. POIs may also approve a letdown on partial panel when this would be an appropriate course of action.

5 Airplanes not having standby instrumentation.

6 See Volume 5, Chapter 3, Section 2. Any two nonprecision approaches authorized by the OpSpecs may be accomplished at the discretion of the inspector or check pilot conducting the check.
A pilot need not be evaluated in circling approaches when the operator’s procedures restrict that pilot (PIC or SIC) from conducting this event in revenue service.

Required only for transport, commuter, turboprop, and Special Federal Aviation Regulations (SFAR) aircraft families as described in Volume 3, Chapter 19, Section 1.

Table 3-71. Part 135 Checking Modules—Helicopters

<table>
<thead>
<tr>
<th>EVENTS</th>
<th>VFR COMP.</th>
<th>IFR COMP.</th>
<th>INST. PROF.</th>
<th>NVG COMP.</th>
<th>NOTES</th>
</tr>
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<tr>
<td>WRITTEN OR ORAL TEST</td>
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<td>GROUND OPERATIONS</td>
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<tr>
<td>Preflight inspection</td>
<td>B</td>
<td>B</td>
<td>P</td>
<td>B</td>
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<tr>
<td>Start procedures</td>
<td>B</td>
<td>B</td>
<td>P</td>
<td>B</td>
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<tr>
<td>Taxiing and ground hover</td>
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<td>B</td>
<td>P</td>
<td>B</td>
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<td>P</td>
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<td>TAKEOFF AND DEPARTURES</td>
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<td>Normal</td>
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<td>B</td>
<td>P</td>
<td>B</td>
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<td>Instrument</td>
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<td></td>
<td>P</td>
<td>P</td>
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<td>With powerplant failure</td>
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<td>B</td>
<td>P</td>
<td>B</td>
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<td>Rapid deceleration</td>
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<tr>
<td>Area departure</td>
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<td>P(a)</td>
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<td>IN-FLIGHT MANEUVERS</td>
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<tr>
<td>Steep turns</td>
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<td>P(a)</td>
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<tr>
<td>Settling with power</td>
<td>B</td>
<td>B</td>
<td>P</td>
<td>B(c)</td>
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<td>Unusual attitude recovery</td>
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<td>P</td>
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<td>NVG COMP.</td>
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<td>B</td>
<td>P</td>
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<td>Landing with engine out</td>
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<td>B</td>
<td>P</td>
<td>B</td>
<td>ME Only</td>
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<td>Recovery from IMC</td>
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<td>B</td>
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<td></td>
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**NOTES TO TABLE 3-71, PART 135 CHECKING MODULES—HELICOPTERS**

(a) May be waived at the discretion of the principal operations inspector (POI) and the check pilot when the check is not conducted in conjunction with initial new-hire or initial equipment training.

(b) This will include a simulated Night Vision Goggle (NVG) failure with appropriate recovery procedures.

(c) This maneuver may be waived at the discretion of the POI and check pilot when the check is not conducted in conjunction with initial new-hire or initial equipment training. Initial night vision enhancement device (NVED)/NVG training does not require this maneuver to be demonstrated or performed.
Both the pilot in command (PIC) and second in command (SIC) may be evaluated performing their assigned duties in these events simultaneously when the check pilot is not seated at the controls.

The applicant must demonstrate the ability to use all installed equipment including autopilots and flight directors (FD). In multiengine helicopters, an engine-out instrument landing system (ILS) may be substituted for the normal ILS at the option of the inspector or check pilot administering the check.

The event should reflect a realistic course of action the pilot might take to escape from an encounter with inadvertent instrument meteorological conditions (IIMC). POIs should approve methods appropriate to the aircraft, equipment installed, facilities available, operations specifications (OpSpecs) requirements, and the environment in which the operations may occur. If a part 135 helicopter operator is limited by OpSpec to day visual flight rules (VFR) only, and the operator’s helicopter(s) are not equipped with attitude reference instrumentation, this requirement may not be applicable. Training and checking must provide emphasis on avoidance of IIMC, including the discipline and decisionmaking required to divert, make a precautionary landing, or make an emergency transition to instrument flight rules (IFR), as appropriate to the circumstances. This event must include attitude instrument flying, recovery from unusual attitudes, navigation, air traffic control (ATC) communications, and, at least one instrument (if aircraft is so equipped) approach appropriate to circumstances.

A pilot need not be evaluated in circling approaches when the operator’s procedures restrict that pilot (PIC or SIC) from conducting this event in revenue service.

The accomplishment of the NVG check does not meet the requirements of a § 135.293 “A” and “B” check, unless all requirements for VFR and IFR (competency check), if required, are completed.

When the check is being conducted in a helicopter that requires the check pilot to divert his or her attention from the flight controls (such as visually confirming the location of the throttle, fuel-flow control lever, etc.) at night, this maneuver should be conducted under night-unaided conditions in lieu of being conducted under NVGs.

Helicopters not having standby instrumentation.

3-1281 CREDIT FOR CERTIFICATION FLIGHT CHECKS.

A. ATP Certificate Flight Check. When a flight check is conducted for an ATP Certificate or for an additional type rating to an ATP Certificate, the certification flight check, if conducted in accordance with the applicable air carrier’s program, may simultaneously be credited for a part 121 proficiency check, a part 135 competency check, or a part 135 IPC, as applicable.

B. FE Certificate. The certification flight test for an FE Certificate or class rating simultaneously satisfies the part 121 flight check requirement.

3-1282 CONDUCT OF PROFICIENCY, COMPETENCY, AND FLIGHT CHECKS. Specific direction and guidance for the conduct of certification flight tests is in Volume 5, Chapters 1, 3, and 4. The same standards, direction, and guidance are applicable to inspectors, check pilots, and check FEs when conducting proficiency checks, VFR competency checks, NVG checks, IFR competency checks, and FE flight checks. POIs must evaluate the operator’s check pilot and check FE program to ensure that check pilots and check FEs are applying the
same standards and are adhering to the direction and guidance for proficiency, competency, and flight checks that are applicable to certification flight checks.

A. Waiving of Events. Inspectors and check pilots may waive those events indicated by an asterisk in Figure 3-80, Table 3-70, and Table 3-71. This provision applies to all checks conducted under part 121 and those part 135 checks which do not involve certification. The waiver provisions of part 61 apply only to pilots employed by part 121 operators (refer to § 61.157(c)).

1) The use of waiver authority is not automatic. Check pilots are cautioned to exercise judgment in the use of this authority. When an applicant demonstrates a high level of performance, check pilots should make liberal use of the waiver authority. When an applicant’s performance only approaches the minimum acceptable standards, however, none of the events of the flight test should be waived.

2) Inspectors and check pilots are cautioned that some waiver provisions apply to portions of an event rather than to a whole event (e.g., the stall prevention series). Other events have specific conditions which must be fully met before waiver authority may be exercised (e.g., the second nonprecision approach). See the discussion of the conditions and limitations of waiver authority and the guidance on acceptable means and standards for conducting specific checking events in Volume 5, Chapter 3, Section 2.

3) Part 121 appendix F contains certain restrictions on waiving events. For example, when a circling approach is required but cannot be accomplished due to traffic or other reasons, it may be waived. Circling approaches, however, may not be waived for two successive checks. POIs will observe these same provisions for part 135 operators under the Administrator’s authority to determine the content of part 135 checks.

B. Training to Proficiency. When a check pilot determines that an event is unsatisfactory, the check pilot may conduct training and repeat the testing of that event. This provision is made in the interest of fairness and to avoid undue hardship and expense for pilots and operators. Training may not be conducted, however, without recording the failure of these events. The quality control (QC) of a training program is accomplished, among other means, by identifying those events on checks which flightcrew members fail. POIs must ensure the following guidance is supplied to operators and check pilots concerning the practice of training to proficiency:

1) Training and checking cannot be conducted simultaneously. When training is required, the check must be temporarily suspended, training conducted, and then the check resumed.

2) When training to proficiency is required, the check pilot must record the events which were initially failed and in which training was given.

3) When training to proficiency is conducted and the check is subsequently completed within the original session, the overall grade for the check may be recorded as satisfactory. When the training required to reach proficiency cannot be completed in the original
checking session, the check must be recorded as unsatisfactory and the pilot entered into requalification training.

4) When training to proficiency is required and it is practical to do so, the remaining events of the flight test phase should be completed before training in the failed event is conducted. If it is more practical, the failed event may be repeated at the end of a logical sequence. For example, training on stall prevention might be conducted at altitude after all other air work has been completed, but before returning to the traffic pattern.

5) If, after having received training, the pilot fails an event again, the failure must be recorded, and the pilot must be entered into requalification training.

NOTE: If for mechanical or other reasons the check cannot be completed after the failure of an event and before training and retesting can be accomplished, the check is considered terminated; however, the pilot may not serve in revenue operations until the check is successfully completed.

3-1283 USE OF FSTDs FOR PROFICIENCY, FLIGHT, AND COMPETENCY CHECKS. The guidance of this paragraph applies to the use of FSTDs in conducting either part 121 proficiency checks, part 121 flight checks, or part 135 competency checks and IPCs. The level of FSTD that can be used for any particular flight event in these checks depends on the flightcrew member’s duty position and on the category of training. The maneuvers and procedures tables along with the introductory information in Volume 3, Chapter 19, Section 6, paragraphs 3-1243 through 3-1251, specify the minimum level of FSTD that can be used for a particular training event. This minimum level is also the level that can be used to test the event during a proficiency, flight, or competency check. Before beginning a proficiency, flight, or competency check, inspectors, check pilots, and check FEs must determine which flight events can be conducted in the FSTD to be used.

3-1284 THE OE QUALIFICATION MODULE. PICs and SICs in part 121 operations completing an initial new hire, initial equipment, transition, or upgrade category of training, must satisfactorily complete OE. FEs completing an initial new hire, initial equipment, or transition category of training must acquire OE. Part 135 specifies that before a pilot may be assigned as a PIC in a commuter passenger carrying operation, that pilot must complete OE in each make and basic model of aircraft in which the pilot is to serve as a PIC. The qualification curriculum segment outline that is applicable to these flightcrew member duty positions must list the appropriate requirements for each duty position. Both parts 121 and 135 specify the minimum flight hour requirements for these duty positions. Part 121 also specifies minimum operating cycles for pilots. An operator may elect to specify a greater flight hour requirement than the regulatory minimum. Unless AFS-200 has authorized a deviation in accordance with § 121.434(a)(4), inspectors must not approve any qualification curriculum segment that lists a flight hour requirement that is less than that specified by the appropriate regulation. (See Volume 3, Chapter 19, Section 12 for additional information regarding deviations based on designation of related aircraft.)
A. Part 121 Minimum OE Flight Hours and Operating Cycles.

1) PIC or SIC Initial New-Hire, PIC or SIC Initial Equipment, or PIC Transition with FFS Training. In accordance with § 121.434(c)(3)(i), pilots who are completing an initial new-hire curriculum, initial equipment curriculum, or a PIC transition curriculum which includes training in an FFS under § 121.409 must satisfactorily complete the following minimum operating cycles and OE flight hours:

- Group I reciprocating—15 hours and 4 operating cycles with at least 2 as the Pilot Flying (PF).
- Group I turbopropeller—20 hours and 4 operating cycles with at least 2 as the PF.
- Group II turbojet—25 hours and 4 operating cycles with at least 2 as the PF.

2) SIC Transition or PIC Transition Without FFS Training. In accordance with § 121.434(c)(3)(ii), SICs who are completing a transition curriculum and PICs who are completing a transition curriculum which does not include an approved course of training in an FFS must satisfactorily complete the following minimum operating cycles and OE flight hours:

- Group I reciprocating—10 hours and 4 operating cycles with at least 2 as the PF.
- Group I turbopropeller—12 hours and 4 operating cycles with at least 2 as the PF.
- Group II turbojet PIC—25 hours and 4 operating cycles with at least 2 as the PF.
- Group II turbojet SIC—15 hours and 4 operating cycles with at least 2 as the PF.

3) SIC or PIC Upgrade. Although § 121.434 requires satisfactory completion of OE for pilots who are completing an upgrade curriculum, the minimum flight hours are not specified. The following minimum flight hours are recommended, however, for an SIC upgrading to PIC, and for an FE upgrading to SIC, regardless of whether or not the upgrade curriculum includes training in an FFS:

- Group I reciprocating—SIC to PIC, 8 hours; FE to SIC, 15 hours.
- Group I turbopropeller—SIC to PIC, 8 hours; FE to SIC, 15 hours.
- Group II turbojet—SIC to PIC, 10 hours; FE to SIC, 25 hours.

4) FE Initial New-Hire, FE Initial Equipment, or FE Transition. In accordance with § 121.434(d), FEIs who are completing initial new-hire, initial equipment, or transition curricula must satisfactorily complete the following minimum OE flight hours:

- Group I reciprocating—8 hours.
- Group I turbopropeller—10 hours.
- Group II turbojet—12 hours.
B. Reductions to Part 121 OE Flight Hours. In accordance with § 121.434(f), for flightcrew members completing the following curricula, the minimum OE flight hours may be reduced up to 50 percent by substituting one additional takeoff and landing for 1 hour of flight:

- All Group I PIC, SIC, and FE curricula.
- Group II PIC or FE transition.

NOTE: Reduction to OE flight hours is not permitted for flightcrew members who are completing: Group II PIC, SIC, or FE initial new-hire; Group II PIC, SIC, or FE initial equipment; or Group II SIC transition.

C. Part 135 Minimum Flight Hours.

1) The part 135 flight hour requirement applies only to pilots who will be assigned to serve as PIC in a commuter passenger carrying operation. In addition, the minimum OE must be acquired for each make and basic model of aircraft in which the pilot is to serve as PIC. Section 135.244 specifies that the type of engine powering the aircraft determines the minimum flight hours for commuter PICs, which are as follows:

- Single-engine airplanes and helicopters—10 hours.
- Multiengine, reciprocating-powered airplanes and helicopters—15 hours.
- Multiengine, turbine-powered airplanes and helicopters—20 hours.
- Turbojet-powered airplanes—25 hours.

2) Part 135 does not require that SICs who are to serve in commuter operations acquire OE. POIs should, however, encourage part 135 commuter operators to include an OE module in their qualification curriculum segments for SICs. For example, the SIC qualification module could require the pairing of a newly trained SIC with only a highly experienced PIC for a specified number of hours or until an experienced PIC has certified that the SIC is proficient in assigned duties.

D. Reductions to Part 135 OE Flight Hours. In accordance with § 135.244(b)(4), the minimum OE flight hours may be reduced up to 50 percent by substituting one additional takeoff and landing for 1 hour of flight.

E. Conduct of OE. All flightcrew members must have successfully completed a flight check before starting OE, and are therefore considered to be qualified to serve in revenue operations, under the appropriate supervision. Flightcrew members must acquire OE while conducting revenue operations, except when the operator has not previously used the aircraft. In this case, the flight hours acquired while conducting proving flights or ferry flights may be credited towards the OE requirement.

1) A pilot in the process of acquiring OE as a PIC under the provisions of parts 121 and 135 must occupy the appropriate pilot position and perform PIC duties under the supervision of a check pilot. The check pilot must also occupy a pilot position. In the case of a PIC trained under a part 121 transition curriculum, however, the check pilot may occupy the observer’s seat.
after the qualifying PIC has made at least two takeoffs and landings and the check pilot is satisfied that the pilot candidate is competent to perform the duties of a PIC.

a) During the time that a qualifying PIC is acquiring OE, the supervising check pilot should give instruction as needed and help to refine the pilot’s proficiency as a PIC. The check pilot must determine when the PIC is fully proficient and ready to be administered an initial line check. If the qualifying PIC is not ready for an initial line check after the minimum flight hours have been completed, the supervision must be continued until the PIC is proficient.

b) The check pilot should not recommend an initial line check until the check pilot is satisfied that the qualifying PIC is proficient. If the check pilot recommends the PIC for an initial line check before the minimum flight hours are acquired, the time spent conducting the line check may be credited toward the required flight hours. In all cases, however, the qualifying PIC must satisfactorily complete the minimum flight hours and operating cycles (part 121 only) under the supervision of a check pilot before the PIC can be released to operate unsupervised in revenue flights.

2) A pilot in the process of acquiring OE as an SIC under the provisions of part 121 must occupy the appropriate pilot position and perform the duties of an SIC under the supervision of a check pilot. The check pilot must also occupy a pilot position. The qualifying SIC must satisfactorily complete the minimum flight hours and operating cycles under the supervision of a check pilot before the SIC can be released to operate unsupervised in revenue operations.

3) An FE in the process of acquiring OE must perform the duties of an FE at the FE station under the supervision of a check pilot, check FE, or a qualified FE. In either case, the qualifying FE must satisfactorily complete the minimum flight hours before being assigned as the required FE in revenue operations. When an operator schedules FEs to complete OE under the supervision of a qualified FE who has not been trained as a check FE, the POI should consider special en route surveillance of those FEs after they are assigned as required FEs in revenue operations. The purpose of this special surveillance is to determine whether the operator’s training, flight-testing, and OE programs sufficiently prepare the FEs for line operations.

F. OE Qualification Guides. POIs should encourage operators to develop an OE qualification guide to be used by supervisors, check pilots, and check FEs. The purpose of the qualification guide is to ensure that a flightcrew member systematically gains experience in all required duties the flightcrew member will later be required to perform without supervision. Some of the typical experience events that might be incorporated in a qualification guide are as follows:

- Terminal security procedures;
- Aircraft security and anti-hijacking procedures;
- Weather forecasts and information sources;
- Flight planning;
- Dispatch procedures;
• Cockpit setup, initialization of computers, entering present position and waypoints, confirming navigation setup;
• Weight and Balance (W&B) computation (including last minute changes);
• ATC flow control procedures;
• MEL and CDL procedures;
• Pushback and powerback procedures and limitations;
• Procedures for fueling and confirming fuel loads;
• Familiarity with major terminal areas;
• Terminal and en route communications;
• Flight progress and fuel monitoring procedures;
• In-flight weather watch; and
• Diversion procedures.

3-1285 THE LINE CHECK QUALIFICATION MODULE. Both parts 121 and 135 specify that before a pilot can serve as an unsupervised PIC in revenue operations that pilot must have satisfactorily completed a line check. Except for requalification training, the qualification curriculum segment for PICs should include a line check module as a requirement for all other categories of training. Requalification training curricula that are used to requalify PICs who have been unqualified for 12 months or more should include a required PIC line check module. Both parts 121 and 135 specify that all PICs must satisfactorily complete a line check once every 12 calendar-months in at least one of the aircraft types in which the PIC is to serve. Therefore, the qualification curriculum segment for recurrent training should include a line check module for the PIC.

A. General Direction and Guidance. Part 121 specifies that the line check is to be given by a check pilot who is properly qualified in the particular airplane being used. In certain unique situations, such as when an operator is qualifying an initial cadre of check pilots, the only practical way of completing the line check requirement may be for an FAA inspector to conduct the line check and to certify the PIC’s performance. Part 135 specifies that an approved check pilot or an FAA inspector may give the line check. For both parts 121 and 135, the amount of time flown during a line check may be credited to the OE flight hour requirement. The line check, however, should not be conducted until the OE flight hour requirement has been substantially completed. When a PIC serves in both parts 121 and 135 operations, a line check conducted in a part 121 aircraft satisfies the part 135 line check requirement. POIs should encourage operators to place emphasis on their line check programs. A well-run line check program can provide detection of deficiencies and adverse trends and establish the need for a revision of old procedures or an initiation of new procedures. POIs should encourage operators to design and use line check forms to facilitate the collection of such information.

B. Part 121 Line Checks. For part 121 operations, the line check must be conducted over at least one typical route in which the PIC may be assigned. If the typical route the PIC will be flying includes Class II navigation, the line check must be conducted on a route where Class II navigation is used. The line check may be conducted during either revenue or nonrevenue operations.
C. **Part 135 Line Checks.** For part 135 operations, the line check must consist of at least one route segment over a civil airway, an approved off-airway route, or a portion of either, including takeoffs and landings at one or more airports that are representative of the operator’s type of operation. In certain part 135 operations, it may not be practical to conduct a line check during revenue operations. In these cases, the POI may authorize that the line check be conducted during the same flight period that the competency check is conducted. If the line check is conducted in this manner, the line check portion of this flight period must include the requirements previously discussed in this paragraph.

3-1286 **ADDITIONAL CHECKING MODULES.** Additional checking modules include flight test events that must be conducted to qualify flightcrew members for special operations, such as CAT II or CAT III instrument approach procedures (IAP) and NVG operations. Another example of an additional checking module is the requirement that a PIC be initially qualified over a route or area requiring a special type of navigation such as inertial navigation system (INS) or long-range navigation. (Refer to § 121.445(d)(2).)

A. **Concurrent Checks.** Additional checking modules are frequently conducted concurrently with a proficiency check, competency check, or line check.

1) The regulations and advisory circulars (AC) require additional checks, but usually do not specify the content of these checks. Since there are often several acceptable means of conducting these checks, the additional checking module outline must specify the content of these checks (see examples in paragraph 3-1272).

2) When a part 121 or part 135 operator chooses to conduct an additional checking module in conjunction with a basic checking module, the requirements of both modules must be accomplished. A single event may, however, be credited for both modules simultaneously. For example, an operator who conducts basic checking modules and CAT II additional checking modules at the same time may combine the ILS approach requirements. Similarly, NVG events can be used in some cases to satisfy corresponding VFR competency event requirements. The basic checking module requires a normal ILS; a manually flown, engine-out ILS; a coupled ILS; a landing from an ILS; and a missed approach from an ILS. The normal ILS and the coupled ILS may be combined in the basic checking module for a minimum of two ILS approaches. In this case, one approach must terminate in a landing and one in a missed approach. For an operator who conducts only coupled CAT II approaches, the CAT II additional checking module requires a minimum of two approaches to CAT II minimums; one approach must be to a landing and one to a missed approach. A POI may approve combining the compatible events of these two modules. In this case, the combined requirement is one-engine-out, manually flown ILS to CAT I minimums; one coupled, CAT II ILS to a landing, and one coupled, CAT II ILS approach to a missed approach. POIs who have concerns over what combinations are permissible should consult the regional Flight Standards division (RFSD). The RFSD should coordinate with Air Carrier Training Systems and Voluntary Safety Programs Branch (AFS-280) when necessary.
3) As an NVG competency check is an additional checking module as part of the § 135.293(b) check when requested, the VFR portion of the check must be completed prior to the NVG check to ensure VFR competency first. The NVG portion must then be accomplished to satisfy this additional qualification. Once a pilot has demonstrated VFR competency in a make and model of an airplane, the examiner may subsequently elect to allow demonstration of an event under NVG to satisfy the VFR requirement simultaneously, as indicated in Table 3-70 by note (c). Many factors will determine what events are credited, such as the experience of the pilot in that make and model airplane, the operating environment, the currency of the pilot, and the examiner’s judgment and evaluation of the pilot. The primary consideration is a complete and satisfactory demonstration of the pilot to operate safely both with and without the use of NVG. Those VFR competency events not indicated as eligible for combining must be demonstrated unaided to satisfy the VFR competency check requirements.

B. Additional Checking Modules. Operators may choose to conduct additional checking modules separately from a proficiency check, a competency check, or a line check. It may be more practical to accomplish an additional flight test separately because of high minimum PIC requirements or because of pilot bidding practices for international routes. When an operator conducts separate checking modules, the operator must limit the use of flightcrew members to those operations that do not involve the special operations until the flightcrew members have satisfactorily completed the additional testing.

RESERVED. Paragraphs 3-1287 through 3-1300.
VOLUME 4 AIRCRAFT EQUIPMENT AND OPERATIONAL AUTHORIZATIONS

CHAPTER 3 AIRPLANE PERFORMANCE AND AIRPORT DATA

Section 1 Safety Assurance System: Airplane Performance Computation Rules

4-486 GENERAL. This chapter contains direction and guidance to be used by inspectors for reviewing and approving performance data sections of Company Flight Manuals (CFM). This chapter also contains guidance for accepting or approving an operator’s system for acquiring airport data. This section is related to Safety Assurance System (SAS) Element 3.2.1 (OP) Aircraft Performance Operating Limitations.

A. Chapter Contents. Section 1 of this chapter, Safety Assurance System: Airplane Performance Computation Rules, is intended as background and reference material. It contains basic explanations of the terms and concepts used in airplane performance computations. Section 2, Safety Assurance System: Airplane Performance Rules, contains detailed information on the rules applicable to specific airplanes. Section 3, Safety Assurance System: Approval of Performance Data Sections of CFMs, contains specific direction and guidance for the review and approval of performance data sections of CFMs. Section 4, Safety Assurance System: Airport Data Acquisition Systems, contains specific direction and guidance for the review and approval of airport data acquisition systems. Section 5, Safety Assurance System: Selected Practices, contains direction and guidance concerning specific related topics.

B. How to Use This Chapter. Inspectors should first determine the specific make and model of aircraft involved. In many cases, inspectors must know which modifications have been performed by a Supplemental Type Certificate (STC). Next, inspectors must determine the specific paragraphs that apply to the airplane from Table 4-9, Airplane Categories for Performance Computation Purposes. An inspector who is generally familiar with the terms and concepts involved may then consult the specific paragraph in Volume 4, Chapter 3, Section 2. Inspectors who are not familiar with the terms and concepts involved will find it useful to review the background material contained in Volume 4, Chapter 3, Section 1 before proceeding to Volume 4, Chapter 3, Section 2.

4-487 OVERVIEW OF AIRPLANE PERFORMANCE RULES. Aircraft performance requirements are contained in Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 121, and 135, as applicable.

A. Certification Limitations. Part 91, § 91.9 requires that all flight operations (both air transportation operations and others) be conducted within the limitations approved for that aircraft. These limitations are determined by the Aircraft Certification Service (AIR). Since March 1, 1979, these limitations must be published in an approved Aircraft Flight Manual (AFM) or an approved Rotorcraft Flight Manual (RFM). Before March 1, 1979, the limits could also be presented as placards or by other means. Specific limitations are presented as maximum and minimum values, such as the maximum takeoff weight (MTOW).

B. Performance Limits. Part 121 subpart I and part 135 subpart I require operators conducting air transportation operations to conduct those operations within specified performance limits. Operators must use Federal Aviation Administration (FAA)-approved data...
to show compliance with these regulations, supplemented as necessary with manufacturers’ advisory data, for wet and contaminated operations. The aircraft certification rules require the manufacturer to determine the aircraft’s performance capabilities at each weight, altitude, and ambient temperature within the operational limits. The performance section of the AFM or RFM presents variable data in tabular or graphic format. Operators must use data extracted from the performance data section of the AFM or RFM to show compliance with the operating rules of part 121 or part 135. For those aircraft certified without an approved flight manual, the FAA-approved data may be placed on placards or placed in an approved CFM.

C. Advisory Information. Aircraft manufacturers occasionally publish advisory information in flight handbooks that is not required for certification and which, therefore, has not been placed in the limitations section of the AFM or RFM. For example, manufacturers of light multiengine aircraft certified under 14 CFR part 23 frequently publish accelerate-stop distances as advisory information. When such information is not placed in the limitations section, it is not a limitation. Inspectors are advised that operators who do not observe such advice are not exhibiting good judgment and may be in violation of § 91.9. Principal operations inspectors (POI) should ensure that operators enforce such limitations by placing appropriate policy statements in a section of the General Operations Manual (GOM).

D. Date of Aircraft Certification. As aircraft performance and complexity have increased, more stringent operating limitations have become necessary for operators to maintain an Acceptable Level of Safety (ALoS). Certification and operating rules have also become correspondingly more complex. Once an airplane is certified, however, it normally remains in production and in service under the original rules even though those rules have been superseded. Part 121 subpart I and part 135 subpart I contain a number of sets of rules to account for the progressive enhancement of safety standards. These rules frequently refer to superseded airplane certification rules and effective certification dates. When determining which performance rules apply to a specific airplane, inspectors must determine the airplane date of certification, the certification category, and the aircraft size. This information can be found on the Type Certificate Data Sheet (TCDS). Modifications by the STC document the certification basis for the change only. If the modification changes the certification category of the aircraft, a new model designation is usually assigned. Table 4-9 contains a summary of the categories into which airplanes have been divided for the purpose of performance computations under parts 121 and 135.
Table 4-9. Airplane Categories for Performance Computation Purposes

<table>
<thead>
<tr>
<th>AIRPLANE GROUPING</th>
<th>CHARACTERISTICS</th>
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<tbody>
<tr>
<td>LARGE TRANSPORT CATEGORY</td>
<td>• More than 12,500 lbs maximum takeoff weight (MTOW).</td>
</tr>
<tr>
<td></td>
<td>• Certified under Civil Aviation Regulation (CAR) 4, CAR 4a, CAR 4b, Special Civil Air Regulation (SR)-422, SR-422A, SR-422B, or 14 CFR part 25.</td>
</tr>
<tr>
<td>LARGE NONTRANSPORT CATEGORY</td>
<td>• More than 12,500 lbs MTOW.</td>
</tr>
<tr>
<td></td>
<td>• Certified prior to July 1, 1942, under Aero Bulletin 7A.</td>
</tr>
<tr>
<td>SMALL TRANSPORT CATEGORY</td>
<td>• Not more than 12,500 lbs MTOW.</td>
</tr>
<tr>
<td></td>
<td>• Certified under CAR 4, CAR 4a, CAR 4b, SR-422, SR-422A, SR-422B, or part 25.</td>
</tr>
<tr>
<td>COMMUTER CATEGORY</td>
<td>• Up to 19,000 lbs MTOW, 19 passenger seats.</td>
</tr>
<tr>
<td></td>
<td>• Reciprocating or turbopropeller.</td>
</tr>
<tr>
<td></td>
<td>• Certified under 14 CFR part 23.</td>
</tr>
<tr>
<td></td>
<td>• Defined as small for performance computation purposes and large for purposes of pilot certification.</td>
</tr>
<tr>
<td>NORMAL CATEGORY—OVER 12,500 LBS</td>
<td>• Certified under part 23 and 10 to 19 passenger Special Federal Aviation Regulation (SFAR) 41, subparagraph 1(b).</td>
</tr>
<tr>
<td></td>
<td>• 19 passenger seats and 19,000 lbs MTOW.</td>
</tr>
<tr>
<td></td>
<td>• Defined as small airplane for performance computation purposes and as a large airplane for pilot certification by SFAR 41.</td>
</tr>
<tr>
<td>NORMAL CATEGORY—12,500 LBS OR LESS</td>
<td>• 12,500 lbs or less MTOW, 10 to 19 passenger MTOW.</td>
</tr>
<tr>
<td></td>
<td>• Certified under CAR 3 or part 23 and one of the following, including:</td>
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<td></td>
<td>• Supplemental Type Certificates (STC);</td>
</tr>
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<td></td>
<td>• Special conditions (SC) of the Administrator;</td>
</tr>
<tr>
<td></td>
<td>• SFAR 23; and</td>
</tr>
<tr>
<td></td>
<td>• SFAR 41, subparagraph 1(a).</td>
</tr>
<tr>
<td>NORMAL CATEGORY—9 OR LESS PASSENGER SEATS</td>
<td>• 12,500 lbs or less MTOW.</td>
</tr>
<tr>
<td></td>
<td>• Certified CAR 3 or part 23.</td>
</tr>
</tbody>
</table>

4-488 LARGE AIRPLANE CERTIFICATION. On July 1, 1942, Civil Aviation Regulation (CAR) 4, Airplane Airworthiness, became effective, establishing the transport category for the certification of large airplanes. Large airplanes were first defined in this rule as airplanes of more than 12,500 pounds MTOW.
A. Large Nontransport Category Airplanes. Large airplanes certified under Aero Bulletin 7A, Airworthiness Requirements for Aircraft, (before the establishment of the transport category) are now referred to as large nontransport airplanes in the performance rules. Only three of these airplanes are still in active service that inspectors are likely to encounter. They are the Lockheed 18, the Curtiss-Wright C-46, and the Douglas DC-3. Many of these airplanes have been modified by STCs and been recertified in the transport category. These airplanes may only be operated in passenger-carrying service if they have been recertified in the transport category or if operated in accordance with the performance rules applicable to the transport category. In the latter case, the performance data required to comply with these rules must be approved by the POI and carried in the aircraft during passenger operations. Operators of C-46 aircraft must use part 121 appendix C to comply with the large nontransport performance requirements. This section does not apply to airplanes operating under 14 CFR part 125.

B. Reciprocating-Powered Transport Category Airplanes. By November of 1945, CAR 4 was amended by CAR 4a and CAR 4b. Most large reciprocating-powered transport category airplanes that remain in operation, such as the DC-6, were certified under these rules. While subsequent rules contain provisions for the certification of reciprocating-powered transport category airplanes, very few of these airplanes have been certified since CAR 4 has been superseded.

C. Turbine-Powered Transport Category Airplanes. Effective August 27, 1957, Special Civil Air Regulation (SR)-422 was the basis for certification of the first turbine-powered transport airplanes, such as the Boeing 707, the Lockheed Electra, and the Fairchild 27. SR-422A became effective July 2, 1958, and was superseded by SR-422B, effective August 29, 1959. Only a few airplanes were certified under SR-422A, such as the Gulfstream I and the CL-44. The majority of the turbine-powered transport category airplanes now in service, such as the DC-8, DC-9, and B-727, were originally certified under SR-422B. SR-422B was recodified with minor changes to 14 CFR part 25, which became effective February 1965.

4-489 DETERMINING APPLICABLE OPERATING RULES. Until the publication of 14 CFR part 119, Special Federal Aviation Regulations (SFAR) 38-2 governs the use of aircraft in air transport operations. Inspectors should use the guidance that follows when determining rules that apply to specific operations.

A. Part 121 Operations. SFAR 38-2 requires that airplanes of more than 7,500 pounds payload or more than 30 passenger seats be operated in air transport service under the provisions of part 121. This requirement applies to both transport and nontransport category aircraft. Transport category airplanes of less capacity may, but are not required to, be operated under part 121.

B. Part 135 Operations. Airplanes with less than 7,500 pounds payload or more than 30 passenger seating capacity (except transport category airplanes) must be operated in air transport service under the provisions of part 135. Helicopters must be operated under part 135.
C. Congruence of Parts 121 and 135. Since the adoption of SFAR 38-2, large transport and nontransport category airplanes are operated under both parts 121 and 135. Part 121 subpart I and part 135 subpart I have identical aircraft performance provisions.

4-490 SMALL AIRPLANE CERTIFICATION. Title 14 CFR part 1 defines a small airplane as one of not more than 12,500 pounds MTOW. Under CAR 3, Airplane Airworthiness—Normal, Utility, and Acrobatic Categories, and part 23, an airplane could only be certified as a small airplane in the normal category with a MTOW of not more than 12,500 pounds and nine passenger seats. The special conditions (SC) of the Administrator (14 CFR part 21, § 21.16), SFAR 23, and SFAR 41 modified this definition to the extent that airplanes were modified by STC and certified as small airplanes with up to 19 passenger seats. SFAR 41 further modified the definition to the extent that airplanes meeting the requirements of SFAR 41, subparagraph 1(b), and having up to 19,000 pounds MTOW were defined as small airplanes. Part 23, amendment 23-34, established the commuter category and defined airplanes of up to 19,000 pounds certified in that category as small airplanes.

A. Small Transport Category Airplanes. A small transport category airplane is an airplane of 12,500 pounds or less MTOW certified in the transport category. While part 25 permits certification of small airplanes in the transport category, manufacturers have rarely chosen this option. For example, the Cessna Citation 501 and the Learjet 23 are certified in the normal category under part 23. Other models of Citations and Learjets of over 12,500 pounds MTOW (large airplanes as defined in part 1) are certified in the transport category under part 25. Small turbojet airplanes certified in the normal category are operated as small turbine-powered transport category airplanes for the purposes of part 135.

B. Normal Category Airplanes with 10 or More Passenger Seats. Since deregulation, small reciprocating and turbopropeller executive transport airplanes have been stretched and passenger seats have been added. These airplanes were primarily redesigned versions of existing designs. These aircraft were originally certified under part 23 because it was considered impractical to redesign them to part 25 standards. The SCs of the Administrator, SFAR 23, SFAR 41, and part 135 appendix A were additional airworthiness standards developed to allow for the certification of a part 23 airplane with more than 9 passenger seats. All of these rules, except part 135 appendix A, have been superseded. Production of airplanes certified under these rules ended in 1991. Currently, airplanes certified under any of these provisions (except SFAR 41 subparagraph 1(b) airplanes) are limited to an MTOW of 12,500 pounds and must meet the additional performance rules of part 135 appendix A. SFAR 41 subparagraph 1(b) provided for certification of airplanes with up to 19,000 pounds MTOW and 19 passenger seats in the normal category. These airplanes must meet the provisions of part 23 and the additional airworthiness standards specified by the SFAR. They are defined as small airplanes by SFAR 41 subparagraph 1(b) for the purposes of 14 CFR parts 21, 23, 36, 121, 135, and 139. They are defined as large airplanes for the purposes of 14 CFR parts 61 and 91. These airplanes are not required to comply with the provisions of part 135 appendix A, since SFAR 41 subparagraph 1(b) provides additional standards for operations over 12,500 pounds MTOW.

C. Commuter Category. In January 1987, part 23, amendment 23-34, became effective and established the commuter category. Reciprocating and turbopropeller-powered airplanes with up to 19 passenger seats and 19,000 pounds MTOW may be certified in the commuter
category. Commuter category airplanes of over 12,500 pounds MTOW are defined as small airplanes by part 23 for the purposes of parts 21, 23, 36, 121, 135, and 139. They are defined as large airplanes for the purposes of parts 61 and 91.

D. Determining Allowable Takeoff Weight. Depending on the specific rule under which an airplane was certified, the calculations that must be performed to determine allowable takeoff weight can include any of the following:

1) AFM maximum weight limitations (structural):
   - Takeoff,
   - Zero fuel, and
   - Landing.

2) Airport elevation and temperature:
   - Departure point,
   - Destination, and
   - Alternate.

3) Runway limit weight:
   - Accelerate-stop distance,
   - Accelerate-go (one-engine-inoperative (OEI)), and
   - All-engines takeoff distance.

4) Takeoff climb limit weight:
   - First segment,
   - Second segment, and
   - Transition segment (divided into third and fourth segments under some rules).

5) Takeoff obstacle limit weight.

6) En route climb limit and terrain clearance weights:
   - All engines operative,
   - OEI, and
   - Two engines inoperative.

7) Approach climb limit weight.

8) Landing climb limit weight.

9) Destination landing distance weight.

10) Alternate landing distance weight.
E. Application of Flight Handbook Performance Limits. Many of the requirements of part 121 subpart I and part 135 subpart I apply only until the aircraft takes off from the departure point. Other requirements from these subparts apply at all times, as do the AFM limitations. For example, part 121, § 121.195 and part 135, § 135.385 prohibit a large turbine airplane from takeoff unless, allowing for en route fuel burn, the airplane will be capable of landing on 60 percent of the available runway at the planned destination. The regulations do not, however, prohibit the airplane from landing at the destination when, upon arrival, conditions have changed and more than 60 percent of the runway is required. In this case, the airplane must only be able to land on the effective runway length as shown in the flight manual performance data.

4-491 Vertical (V) SPEED DEFINITIONS. Inspectors should be knowledgeable in the terminology and definitions that apply to V speeds. The following definitions apply to speeds used in airplane performance computations.

A. $V_{MC}$. Defined in part 1 as the minimum speed at which the airplane is directionally controllable with the critical engine inoperative.

1) $V_{MCG}$ is the minimum speed at which the airplane can be demonstrated to be controlled on the ground using only the primary flight controls when the most critical engine is suddenly made inoperative. Throttling an opposite engine is not allowed in this demonstration. Forward pressure from the elevators is allowed to hold the nosewheel on the runway; however, nosewheel steering is not allowed.

2) $V_{MCA}$ is the minimum speed at which directional control can be demonstrated when airborne with the critical engine inoperative. Full opposite rudder and not more than five degrees of bank away from the inoperative engine are permitted when establishing this speed. $V_{MCA}$ may not exceed $1.2 V_S$.

B. $V_{EF}$. Defined as the airspeed at which the critical engine is assumed to fail. $V_{EF}$ is selected by the aircraft manufacturer for purposes of certification testing, primarily to establish the range of speed from which $V_1$ may be selected. $V_{EF}$ may not be less than $V_{MCG}$.

C. $V_{MU}$. Defined as minimum unstick speed. $V_{MU}$ is the minimum speed demonstrated for each combination of weight, thrust, and configuration at which a safe takeoff has been demonstrated.

D. $V_R$. Defined as rotation speed and applicable to transport category airplanes certified under SR-422A and later rules and commuter category airplanes. $V_R$ is determined so that $V_2$ is reached before the aircraft reaches 35 feet above the runway surface. $V_R$ may not be less than $V_{MU}$ or $1.05 V_{MCA}$.

E. $V_1$. Defined in part 1 as takeoff decision speed (formerly the critical engine failure speed). $V_1$ may be selected from a range of speeds. $V_1$ may be selected as low as $V_{EF}$ but cannot exceed any of the following speeds:
• \( v_r \);
• Refusal speed (the maximum speed the aircraft can be brought to a stop at the selected weight and flap setting on the remaining runway);
• \( v_{MBE} \) (brake energy limit speed); or
• Limiting tire speed (if one has been established).

**F. \( v_{LOF} \).** Defined as the speed at which the aircraft becomes airborne.

**G. \( V_S, V_{SO}, \text{ and } V_{S1} \).** \( V_s \) is power-off stalling speed or the minimum steady speed at which the aircraft is controllable. \( V_{SO} \) is stalling speed in the landing configuration. \( V_{S1} \) is the stalling speed or minimum controllable speed in a specified configuration.

**H. \( V_2 \).** Defined as takeoff safety speed. \( V_2 \) is used in multiengine transport commuter category, and large nontransport category airplanes. \( V_2 \) is the speed at which the airplane climbs through the first and second takeoff segments. \( V_2 \) must be greater than \( V_{MU} \) and 1.1 \( V_{MCA} \). \( V_2 \) must also be greater than the following:

- 1.2 \( V_{S1} \) for two-engine and three-engine reciprocating and turbopropeller-powered airplanes;
- 1.2 \( V_{S1} \) for turbojet airplanes without the capability of significantly reducing the OEI stall speed (no flaps or leading edge devices);
- 1.5 \( V_{S1} \) for turbojet airplanes with more than three engines; or
- 1.5 \( V_{S1} \) for turbojet airplanes with the capability for significantly reducing the OEI stall speed.

**I. \( V_{REF} \).** \( V_{REF} \) is 1.3 \( V_{SO} \). \( V_{REF} \) is the speed used on approach down to 50 feet above the runway when computing landing distances.

**NOTE:** All \( V \) speeds are measured and expressed as calibrated airspeeds, but may be considered as indicated airspeeds for purposes of general discussion.

**4-492 RUNWAY LENGTH.** The usable runway length may be shorter or longer than the actual runway length due to stopways, clearways, and obstacle clearance planes.

**A. Takeoff Runway Length—Nontransport Category Airplanes.** The effective takeoff runway length for nontransport category airplanes is defined by obstacle clearance planes. When a 20:1 obstacle clearance plane does not intersect the runway, the effective runway length is defined as the distance from the start of the takeoff roll to the far end of the runway. When the obstacle clearance plane does intersect the runway, the effective runway length is defined as the distance from the start of the takeoff roll to the point at which the obstacle clearance plane intersects the far end of the runway. (See Figure 4-26, Effective Runway Length.)
Figure 4-26. Effective Runway Length

B. **Transport Category Airplanes.** For transport category airplanes the usable runway is not determined by the obstacle clearance plane. An obstacle clearance analysis must be made for each runway. For transport category airplanes certified under SR-422A and subsequent rules, the actual runway length may be extended by clearways and stopways. Clearways and stopways are discussed in paragraph 4-502.

C. **Obstructions.** An obstruction is a manmade or natural object that must be cleared during takeoff and landing operations. While fixed towers and buildings can be readily identified as possible obstructions, obstruction heights over roadways, railroads, waterways, and other traverse ways are not so apparent. Unless the airport authority or the operator determines with certainty that no movable objects will project into the airspace over the following passageways when an airplane flies over, obstructions are considered to exist on them to the following heights:

- Over interstate highways: 17 feet;
- Over other roadways: 15 feet;
- Over railroads: 25 feet; and
- Over waterways and other traverse ways: the height of the tallest vehicle that is authorized to use the waterway or traverse way.

D. **Lineup Distance.** Takeoff distance is measured from the position of the main landing gear on the runway to the same point as it passes the runway crossing height (RCH). The distance required to place the airplane in position for takeoff is not available for the takeoff run. A significant error may be introduced if this distance is not subtracted from the available runway distance when takeoff performance is computed. Large airplanes can use several hundred feet of runway when turning into position on the runway. Also, rolling starts from a taxiway can reduce effective runway by an additional increment because of slow acceleration while takeoff thrust is being set. The allowance may be included in the published data or published as a correction in the AFM. POIs should ensure that operators have appropriate guidance for flightcrews.

**4-493 RUNWAY LIMIT WEIGHT—TRANSPORT AND COMMUTER CATEGORIES.** The required takeoff distance is the longest of three takeoff distances: accelerate-stop, accelerate-go, and all-engines. Since the available runway length is a fixed value, allowable takeoff weight for any given runway is determined by the most restrictive of the applicable distances.
A. **Accelerate-Stop Takeoff Distance.** The accelerate-stop distance is the total distance required to perform the following actions:

- Accelerating, with all engines operating at takeoff thrust, from a standing start to $V_{EF}$ speed, at which the critical engine is assumed to fail.
- Making a transition from takeoff thrust to idle thrust, extending the spoilers or other drag devices, and applying wheel brakes (no credit may be taken for reverse thrust).
- Decelerating, and bringing the airplane to a full stop.

B. **Accelerate-Go Takeoff Distance.** The accelerate-go (with OEI) takeoff distance is the total distance required to perform the following actions:

- Accelerating with all engines operating to $V_{EF}$ speed with recognition of the failure by the flightcrew at $V_1$.
- Continuing acceleration with OEI to $V_R$ speed, at which time the nose gear is raised off the ground ($V_R$ is $V_2$ for all airplanes certified prior to SR-422A).
- Climbing to the specified RCH and crossing the RCH at $V_2$ speed.

C. **All-Engines Takeoff Distance.** All-engines takeoff distance is the total distance required to accelerate, with all engines at takeoff thrust, to $V_R$ or $V_2$ speed (appropriate to the airplane type), and to rotate and climb to a specified RCH. For airplanes certified under SR-422A and subsequent regulations, this distance is 1.15 the measured distance.

4-494 **TAKEOFF CONDITIONS.** Takeoff performance data published in the AFM is based on takeoff results attainable on a smooth (dry or wet*), hard runway with a specified flap setting and a specific weight. The 14 CFR parts do not require that data for compensating takeoff performance for the effects of runways contaminated by frost, ice, snow, slush, or water be published in an AFM. These factors, however, must be accounted for during revenue operations (see paragraph 4-496 for more information on wet or contaminated runways).

NOTE:  *Wet runway accountability was included in part 25, amendment 25-92.

A. **Airport Elevation.** Airport elevation is accounted for in takeoff computations because the true airspeed (groundspeed in no-wind conditions) for a given takeoff increases as air density decreases. As airport elevation increases, the takeoff run required before the airplane reaches $V_1$, $V_{LOF}$, and $V_2$ speeds increases; the stopping distance from $V_1$ increases; and a greater air distance is traversed from lift-off to the specified RCH because of the increased true airspeed at the indicated $V_2$ speed.

B. **Temperature.** As air temperature increases, airplane performance is adversely affected because of a reduction in air density which causes a reduction in attainable takeoff thrust and aerodynamic performance.

C. **Density Altitude.** Takeoff performance is usually depicted in an AFM for various elevations and temperatures. The effect of variations in barometric pressure, however, is not
usually computed or required by 14 CFR. Some airplanes with specific engine installations, however, must have corrections in allowable weight for lower-than-standard barometric pressure.

D. **Weight.** Increasing takeoff weight increases the following:

- \( V_1 \) of and the ground-run distance required to reach the lift-off point;
- The air distance required to travel from the lift-off point to the specified RCH; and
- The distance required to bring the aircraft to a stop from \( V_1 \) speed and the energy absorbed by the brakes during the stop.

E. **Flap Selection.** Many airplanes have been certified for takeoff with variable flap settings. The effect of selecting more flap (within the allowable range) reduces \( V_R \), \( V_{LOF} \), and the required ground-run distance to reach lift-off. All of these increase the accelerate-stop distance limit weight, the accelerate-go distance limit weight, and the all-engines operating limit weight. The additional flap extension increases aerodynamic drag and also decreases the climb gradient the airplane can maintain past the end of the runway. In the case of a short runway, it may not be possible to take off without the flaps set at the greatest extension allowed for takeoff. In the opposite case, at a high elevation and a high ambient temperature, it may only be possible to climb at the required gradient with the minimum allowable takeoff flap extension. See Table 4-10, Example of the Effect of Flaps on Required Runway Length and Climb Gradient, for an example of the effect of flaps on required runway length and climb gradient.

### Table 4-10. Example of the Effect of Flaps on Required Runway Length and Climb Gradient

<table>
<thead>
<tr>
<th>Wing Flaps Position</th>
<th>Runway Length Required for Takeoff</th>
<th>One-Engine Inoperative Climb Gradient</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 degrees</td>
<td>6,350 feet</td>
<td>2.9 percent</td>
</tr>
<tr>
<td>15 degrees</td>
<td>7,000 feet</td>
<td>4.5 percent</td>
</tr>
<tr>
<td>5 degrees</td>
<td>7,950 feet</td>
<td>5.3 percent</td>
</tr>
</tbody>
</table>

**NOTE:** This is an example only.

F. **Accounting for Effects.** The effect of runway slope on the acceleration, stopping distance, and climbout to the end of RCH must be accounted for. Uphill grades increase the ground run required to reach the points at which \( V_1 \), \( V_R \), and \( V_{LOF} \) are attained, but they also improve stopping distance. An airplane climbing over an uphill grade runway will require more distance to reach the specified RCH. The reverse is true of downhill grades. Gradient corrections are computed for both runway length and takeoff speeds and the average runway gradient is normally used. The average gradient is determined by dividing the difference in elevation of the two ends of the runway by the runway length. For large variations in runway height (+5 feet), the retarding effect on the uphill segment is proportionally greater than the acceleration gained on the downhill portion. In such a case, the slope used for computations should be proportionately greater than the average slope.
4-495 WIND CONDITIONS DURING TAKEOFFS AND LANDINGS. Runway performance computations for both takeoffs and landings must always account for the effect of wind conditions in a conservative manner.

A. Headwinds. Although it is not required, the beneficial effect of a headwind on takeoff and climb distances may be used to compute performance. Only one half of the reported steady-state wind component (parallel to the runway) may be used.

B. Tailwinds. For a downwind takeoff or landing, at least 150 percent of the reported steady-state tailwind component must be used to compute the performance effect. While most airplanes are certified for takeoff with not more than 10 knots of tailwind component, some airplanes have been certified with higher limits. To use these higher limits, the operator must not be limited by the AFM and must be authorized by the operations specifications (OpSpecs).

C. Crosswinds. The maximum gust velocity must be used in the most unfavorable direction for computing the effective crosswind component. Inspectors should be aware of the following guidance.

1) Crosswind values in most AFMs are stated as demonstrated values rather than as limits.

2) While a crosswind may not directly limit an operation from a specific runway, crosswinds and runway conditions affect $V_{MCG}$. Under some runway conditions, an increase of 1 knot of crosswind component may raise $V_{MCG}$ by as much as 4 knots. Inspectors should be aware that the flight manual may contain different $V_{MCG}$ values for wet and dry conditions and crosswind components.

NOTE: $V_1$ may not be less than $V_{MCG}$.

4-496 TAKEOFF FROM A RUNWAY WHICH IS WET OR CONTAMINATED. AFM performance data is based on a dry or wet* runway. When a runway is contaminated by water, snow, or ice, charted AFM performance values will not be obtained. Manufacturers typically provide guidance material to operators so that appropriate corrections for these conditions may be applied to performance calculations. Inspectors should be aware of the following guidance regarding these conditions.

NOTE: *Wet runway accountability was included in part 25, amendment 25-92.

A. Definitions of Wet and Contaminated. A runway is dry when it is neither wet nor contaminated. A runway is wet when it is neither dry nor contaminated. A runway can be considered wet when more than 25 percent of the runway surface area is covered by any visible dampness or water that is ⅛ inch or less in depth. A damp runway that meets this definition is considered wet, regardless of whether or not the surface appears reflective. For the purpose of takeoff performance, a runway is considered contaminated when more than 25 percent of the runway surface area is covered by a reportable contaminant listed in Advisory Circular (AC) 91-79, Mitigating the Risks of a Runway Overrun Upon Landing, Table 1-1, Operational Runway Condition Assessment Matrix (RCAM) Braking Action Codes and Definitions, “Runway Condition Description” column. Contaminated runway data provided by the aircraft
manufacturers usually includes data for wet runway conditions (which is also appropriate for use on runways contaminated by frost and reportable contaminant depths of ¼ inch or less), as well as data for icy and contaminant depths of ⅛ inch or greater as appropriate. The manufacturer may provide additional guidance on selecting the appropriate contaminated takeoff performance data.

NOTE: Wet is a condition, not a contaminant.

B. Runway Friction. Runway braking friction can change when there is a light drizzle. In some cases, even dew or frost that changes the color of a runway will result in a significant change in runway friction. The wet-to-dry stopping distance ratio on a well-maintained, grooved, well-textured wet runway is usually around 1.15 to 1. On a runway where the grooves are not maintained and the runway has poor texture, polishing, or heavy rubber deposits, the stopping distance ratio could be as high as 1.9 to 1. On ungrooved, well-maintained, well-textured, wet runways, the stopping distance ratio is usually about 2 to 1. In the case of a runway with new pavement, poor texturing, or where rubber deposits are present, the ratio could be as high as 4 to 1. Some newly surfaced asphalt runway surfaces can be extremely slippery when only slightly wet.

C. Takeoff Data Which Accounts for Runway Contamination. Typically the manufacturer makes available takeoff data which accounts for runway contamination such as slush, snow, standing water, and ice. This data is often created using assumptions that were accepted by European certification agencies and are consistent with the recommendations in AC 25-31, Takeoff Performance Data for Operations on Contaminated Runways. Usually, this data takes into account an engine failure at the critical point and the performance effect of the contaminant on the following:

1) The first factor is the reduction of runway friction which may increase stopping distance in the case of a rejected takeoff.

2) The second factor is the impingement drag of water or slush on the landing gear or flaps which could cause a retarding force and deceleration force during takeoff.

4-497 TIRE SPEED AND BRAKE LIMITS. Inspectors should be aware that allowable takeoff weight may be limited by either tire speed limits or the ability of the brakes to absorb the heat energy generated during the stop. The energy the brakes must absorb during a stop increases by the square of the speed at which the brakes are applied. Accelerate-stop distances are determined with cold brakes. When the brakes are hot, they may not be able to absorb the energy generated, and the charted AFM stopping distances may not be achieved. The heat generated by the stop may cause the wheels or tires to fail. The peak temperature is usually not reached until 15 to 20 minutes after the stop, which can result in the wheels catching on fire. The wheels of most large airplanes are protected by frangible plugs which melt and allow air to escape from the tires before they explode. Short turnaround times and rejected takeoffs present a potential hazard in terms of heat buildup in tires and in brake assemblies. Most manufacturers publish short turnaround charts to provide a minimum cooling period for subsequent takeoffs. POIs should ensure that operators include these charts and procedures in the operator’s GOMs or Company Flight Manuals.
4-498 TAKEOFF CLIMB LIMIT WEIGHT. The climb limit is the weight at which the airplane can climb at a specified minimum climb gradient or specified minimum climb rate in still air through the segments of the takeoff flightpath.

A. Turbine-Powered Transport Category and Commuter Category Airplanes. Climb performance for airplanes in these categories is measured in terms of a gradient (height gained divided by distance traveled, expressed as a percentage) in specified climb segments. The gradients for each group of airplanes are provided in Volume 4, Chapter 3, Section 2.

B. Other Airplanes. All airplanes other than turbine-powered, transport category, and commuter category airplanes must be able to maintain a specified rate of climb throughout the takeoff climb segments. Rates of climb are expressed as multiples of $V_s$. The required rates of climb for various categories of airplanes are given in Volume 4, Chapter 3, Section 2.

4-499 TAKEOFF WEIGHTS LIMITED BY OBSTACLES. To obtain obstacle clearance throughout the takeoff flightpath, operators of transport category and commuter category airplanes must identify obstacles and limit takeoff weight. Obstacles in the takeoff path that are not cleared horizontally must be cleared vertically by at least the amount specified in the certification rule.

A. Definition of Obstacle. Any object inside the airport boundary which is within a horizontal distance of 200 feet of the flightpath or outside the airport boundary within 300 feet of the flightpath must be considered an obstacle for takeoff computations.

B. Net Flightpath. A net flightpath for takeoff is derived by subtracting a specified percentage from the actual demonstrated climb gradient. This has the effect of adding a progressively larger clearance margin as the airplane travels away from the runway. Specified percentages for airplanes certified under different rules are listed in Volume 4, Chapter 3, Section 2.

C. Conditions for Computing Net Flightpath. The takeoff weight limited by obstacle clearance is computed in a manner similar to the runway takeoff weight limit as follows:

1) One engine is assumed to fail at $V_{EF}$. The remaining engine(s) are at takeoff thrust.

2) Landing gear retraction is assumed to begin immediately after lift-off. The airplane should climb out at a speed as close as practical to, but not less than, $V_2$ speed until the selected acceleration height is reached. The acceleration height is chosen by the operator but may not be less than 400 feet.

3) After the airplane reaches the acceleration height, the final segment begins with the transition to en route climb configuration (which is to accelerate to climb speed, retract wing flaps, and reduce to maximum continuous thrust (MCT)). The operator has considerable latitude in choosing the transition method. The operator may choose the flightpath for any runway that gives the best results for the particular height and distance of the obstacles. One extreme is to climb directly over the obstacle at $V_2$, with takeoff flaps and takeoff thrust. The opposite
extreme is to level off at the selected acceleration height, accelerate in level flight (negative slope not allowed) to the “flaps up” climb speed, and then to continue climbing and reducing thrust to MCT. An infinite variety of flightpaths between these two extremes may be used. In any event, the flightpath chosen to show obstacle clearance must extend to the end of the takeoff flightpath. The takeoff flightpath ends not lower than 1,000 feet for SR-422 airplanes, and not lower than 1,500 feet for SR-422A, SR-422B, part 25, and commuter category airplanes.

D. Turns. For analysis purposes, it may be assumed that the airplane turns to avoid obstacles, but not before reaching 50 feet above the runway and by not more than a 15 degree bank. When a turn is used, the rate of climb or gradient must be reduced by the increment of climb performance lost.

E. Takeoff Minimums. Terminal Instrument Procedures (TERPS) criteria are based on the assumption that the airplane can climb at 200 feet per nautical mile (NM) (approximately 30:1) to the minimum en route altitude (MEA) through the takeoff flightpath.

1) When obstacles penetrate the obstacle clearance plane, the airplane must be able to climb at a steeper gradient or to use higher-than-standard takeoff minimums to allow the obstructions to be seen and avoided under visual conditions. Authorizations for lower-than-standard takeoff minimums are based on the operator adjusting airplane takeoff weight to avoid obstacles in the takeoff flightpath if an engine fails on takeoff. POIs shall not authorize operators who do not prepare an airport analysis and perform obstacle climb computations to use lower-than-standard takeoff minimums. POIs may approve a system in which the operator makes obstacle clearance computations and performs lower-than-standard visibility takeoffs on specified runways, as opposed to all runways.

2) The criteria for TERPS do not take into account whether or not the aircraft is operating on all engines. Operators must either show compliance with TERPS criteria with an engine out or have an alternate routing available for use in case of an engine failure. Specific guidance for approval of these procedures is in development and will be included in this order at a later date.

4-500 EN ROUTE PERFORMANCE LIMITS. There are a number of en route performance rules that may limit the weight at which an airplane can be dispatched or released.

A. Part 121 En Route Obstacle Clearance. Part 121 subpart I contains en route obstacle limitations for all airplanes operated under part 121. The details of these limitations differ for reciprocating-powered transport category airplanes; turbine-powered transport category airplanes; and large nontransport category airplanes. In general, all airplanes must be operated at a weight at which single-engine failure (two-engine airplanes) or multiple engine failures (three- and four-engine airplanes) can be experienced and the airplane can continue on to the destination or divert to an alternate airport. After the engine failure, the airplane must be capable of clearing all obstructions by a specified margin. Driftdown or fuel dumping may be used to comply with these requirements (see subparagraph 4-500E for a discussion of driftdown).

B. Part 135 En Route Obstacle Clearance. Section 135.181 places en route performance limitations on all instrument flight rules (IFR) passenger-carrying operations.
1) Section 135.181(a)(1) effectively prohibits the release of passenger-carrying flights under IFR conditions in single-engine airplanes. The rule does permit over-the-top operations under limited circumstances. The flight must be able to reach visual flight rules (VFR) conditions within 15 minutes after takeoff. At the point the airplane has flown 15 minutes, the weather below any overcast must be VFR. These conditions must exist at all points on the route, including overhead the destination.

2) Section 135.181(a)(2) prohibits the release of multiengine airplanes in passenger-carrying IFR operations or VFR over-the-top operations unless specific conditions are met. The airplane must be able to sustain a failure of the critical engine and climb at a rate of 50 feet per minute (fpm) at the MEA or 5,000 mean sea level (MSL), whichever is higher. The other circumstance in which a multiengine airplane can be released in IFR conditions or VFR over-the-top conditions is when, after an engine failure, a descent can be made to VFR conditions at or above the MEA.

NOTE: Inspectors must be aware that small airplanes of 6,000 pounds or less MTOW are not required to have the capacity to climb or maintain altitude with an engine failed at any altitude for certification.

C. Part 121 Extended Overwater Operations.

1) Section 121.161 prohibits the release of two- and three-engine airplanes (except three-engine turbojet airplanes) for operations more than 1-hour distance from an acceptable alternate airport, measured at OEI cruise speed. The only exception is that extended overwater operations of two-engine turbojet airplanes (Extended Operations (ETOPS)) may be approved by the POI with prior concurrence of the Flight Technologies and Procedures Division (AFS-400). When such approval is granted to an operator, these authorizations are contained in OpSpec B045.

2) Sections 121.183 and 121.193 limit the release of four-engine transport category airplanes. The limitations of these rules vary with the rule under which the aircraft was certified. In general, the airplanes must be dispatched at a weight that will allow the loss of two engines simultaneously at the most critical point of the flight while still allowing the airplane to maintain a specified altitude and reach an alternate airport. The two means by which operators may choose to show compliance are by limiting the takeoff weight or by fuel dumping (see subparagraph 4-500E). Two points on a route that are frequently critical are the point at which the airplane reaches the top of climb and the point at which the airplane is furthest from an alternate airport.

D. Part 135 Overwater Operations. Section 135.183 prohibits operators from operating a land airplane over water (except for takeoff and landing) at a weight at which a positive rate of climb of 50 fpm cannot be maintained at 1,000 feet above the surface. There are no provisions in part 135 for the use of fuel dumping to comply with this requirement. A number of part 135 operators have, however, obtained exemptions to allow the use of fuel dumping (see subparagraph 4-500E).
E. Fuel Dumping and Driftdown. Part 121 operators may use driftdown or fuel dumping procedures to comply with certain en route performance rules. Part 135 operators may apply for a grant of exemption to use driftdown or fuel dumping as an alternate means of complying with § 135.181 or § 135.183 in accordance with 14 CFR part 11 (see Volume 4, Chapter 3, Section 2 for information on exemptions).

1) Driftdown can be defined as a procedure by which an airplane with one or more engines inoperative, the remaining engine(s) at MCT, and while maintaining a specified speed (usually best lift over drag (L/D) X 1.01 percent), descends to the altitude at which the airplane can maintain altitude and begin to climb (this altitude is defined as driftdown height).

2) Many modern airplanes can be dispatched or released at takeoff weights that place the driftdown height below the minimum altitude that the airplane is required to maintain by part 121 or 135. In this case, the takeoff weight must be limited or fuel dumping must be used to comply with the en route limit. Compliance must be demonstrated at all points in the en route segment of the flight.

3) Before approving driftdown or fuel dumping procedures for part 121 operators (or part 135 operators who hold exemptions authorizing the use of these procedures), POIs shall carefully evaluate the operator’s proposed data, procedures, and training program. The data must either come from the AFM or from the manufacturer. Unapproved data must be reviewed by the applicable Aircraft Evaluation Group (AEG) either in the exemption process or prior to the POI’s approval. The Company Flight Manual must contain specific flightcrew procedures. The operator’s training program must provide adequate initial and recurrent training in these procedures. Operators must provide for the POI’s evaluation for each route, route segment, or area an analysis of the reliability of wind and weather forecasting, the means and accuracy of navigation, prevailing weather conditions (particularly turbulence), terrain features, air traffic control (ATC) facilities, and the availability of suitable alternate airports. The operator must provide flightcrews with adequate weather briefings.

4-501 APPROACH AND LANDING CLimb LIMITS. Approach and landing climb limit weights limit the allowable takeoff weight. To compute the maximum allowable takeoff weight, the predicted weight of the airplane after arrival at the intended destination and alternate airports must be computed by subtracting the estimated en route fuel burn. The resulting weight must allow the airplane to climb at a minimum specified gradient (rate of climb) in both the approach and landing configurations.

A. Approach Climb. This requirement is intended to guarantee adequate performance in the go-around configuration after an approach with an inoperative engine (gear up, flaps at the specified approach setting, the critical engine inoperative, and remaining engines at go-around thrust).

B. Landing Climb. This requirement is intended to guarantee adequate performance to arrest the descent and allow a go-around from the final stage of a landing (gear down, landing flaps, and go-around thrust).
4-502 LANDING DISTANCES. The landing distance may refer to either the runway length available for landing or the distance required by the aircraft landing performance calculations.

A. Effective Landing Runway Length. The regulations (§§ 121.171 and 135.361) refer to the “effective length of the runway” for landing, which is the distance from the point on the approach end of the runway where the obstruction clearance plane intersects the runway to the far end of the runway. The determination of the effective landing runway length by operators is required only where the Landing Distance Available (LDA) declared distance is not established. Stopways, clearways, and any portion of the runway declared not available and suitable for landing are not included in the effective landing runway length.

NOTE: Refer to Aeronautical Information Manual (AIM) Section 4-3-6, Use of Runways/Declared Distances, for guidance concerning runway declared distances and determination of LDA on runways with and without published declared distances.

B. LDA. The LDA declared distance, where established, is the runway length to be used for landing performance calculations.

C. Required Landing Distance. The required landing distance is established during certification and is the distance needed to completely stop from 50 feet above the runway threshold (i.e., the point at which the obstacle clearance plane intersects the runway (see Figure 4-27, Landing Distance)). In establishing landing performance data, the airplane must approach in a steady glide (or rate of descent) down to 50 feet at speed not less than \( V_{\text{REF}} \) for the chosen landing flap setting.

Figure 4-27. Landing Distance

D. Factored Landing Distance. The operating regulations (e.g., §§ 121.195, 135.385, and 91.1037) require that the takeoff weight be limited such that the aircraft can land at the intended destination, allowing for normal fuel and oil consumption in flight, within a specified percentage (60 percent for turbojet aircraft) of the effective runway landing length available at the destination airport. The inverse of this percentage \(1/.60\) is a factor \(1.67\) in this case) that can be applied to the required landing distance established at aircraft certification to produce the landing runway length required for dispatch. This is referred to as the factored landing distance. The landing distances specified in the AFM may be the required landing distance specified by the certification rules, the factored Landing Distance Required (LDR) by the operating rules, or both.
E. **Operational Landing Distance.** These distances are advisory performance data (i.e., not required by regulation) which are intended to provide a more accurate assessment of actual landing distance at time of arrival, considering factors which cannot be accurately predicted at time of dispatch, such as runway contaminants, winds, speed additives, and touchdown points. These distances may be based upon the use of reverse thrust, ground spoilers, or autobrakes, etc.

4-503 **LANDING DISTANCE ASSESSMENT AT TIME OF ARRIVAL.** There is no specific regulation requiring operators to assess landing distance requirements at time of arrival, but the FAA encourages operators to adopt such procedures to assure a safe landing can be made. Additionally, the FAA highly encourages operators to utilize their FAA-approved landing performance data and any associated manufacturer-provided supplemental/advisory data in concert with the AC 91-79-generated RCAM braking action codes to conduct an adequate landing distance assessment at the time of arrival. This is particularly important when the landing runway is contaminated or not the same runway analyzed for dispatch calculations. The following are best practices for conducting a landing distance assessment at time of arrival.

A. **Timeliness.** The assessment is initially performed when landing weather and field conditions are obtained, usually around Top of Descent (TOD). The assessment includes consideration of how much deterioration in field conditions can be tolerated so that a quick decision can be made just prior to landing if the preceding aircraft provides a Pilot Weather Report (PIREP) of worse-than-expected braking action.

B. **Source of Data.**

1) When possible, the operational landing distance data used is advisory data based on the recommendations of AC 25-32, Landing Performance Data for Time-of-Arrival Landing Performance Assessments. This data may be provided by the manufacturer or developed by a performance data provider.

2) For some older airplanes still in service, the manufacturer may not provide advisory data for a time-of-arrival assessment. This is especially true for those manufacturers no longer in business. In this case, the Landing Distance Factors (LDF) from Table 4-11, Landing Distance Factors, may be used. To find the LDR, multiply the AFM (dry, unfactored) landing distance by the applicable LDF in Table 4-11 for the runway conditions existing at the time of arrival. If the AFM landing distances are presented as factored landing distances, then those data must be adjusted to remove the applicable dispatch factors applied to that data. The LDFs given in Table 4-11 include a 15 percent safety margin, and an air distance representative of normal operational practices.
Table 4-11. Landing Distance Factors

The following factors are multipliers to the unfactored AFM demonstrated landing distances:

<table>
<thead>
<tr>
<th>Runway Condition Code</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braking Action</td>
<td>Dry</td>
<td>Good</td>
<td>Good to Medium</td>
<td>Medium</td>
<td>Medium to Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>Runway Description</td>
<td>Note 1</td>
<td>Note 1</td>
<td>Note 1</td>
<td>Note 1</td>
<td>Note 1</td>
<td>Note 1</td>
</tr>
<tr>
<td>Turbojet, No Reverse</td>
<td>1.67</td>
<td>2.6</td>
<td>2.8</td>
<td>3.2</td>
<td>4.0</td>
<td>5.1</td>
</tr>
<tr>
<td>Turbojet, With Reverse</td>
<td>1.67</td>
<td>2.2</td>
<td>2.3</td>
<td>2.5</td>
<td>2.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Turboprop, Note 2</td>
<td>1.67</td>
<td>2.0</td>
<td>2.2</td>
<td>2.4</td>
<td>2.7</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Note 1: Runway Descriptions may be found in the RCAM for each runway condition code (RwyCC) or Braking Action (refer to AC 91-79).

Note 2: These LDFs apply only to modern turboprops with efficient disking drag. For older turboprops without adequate disking drag use the Turbojet, No Reverse LDFs.

Note 3: The LDFs can apply to any type of anti-skid system (e.g., fully-modulating, quasi-modulating, or on-off system). A description of anti-skid systems can be found in AC 25-7, Flight Test Guide for Certification of Transport Category Airplanes. This note applies to the whole table.

C. Runway Condition Considerations. When available for the portion of the runway that will be used for landing, the following are considered:

1) RwyCC.

2) Expected runway conditions (contaminate type and depth).

3) Pilot braking action report.

D. Aircraft Performance Considerations. The following considerations may impact operational landing distance calculations:

1) Runway slope,

2) Airport elevation,
3) Wind,

4) Temperature,

5) Airplane weight and configuration,

6) Approach speed at threshold,

7) Adjustment to landing distance (such as autoland), and

8) Planned use of airplane ground deceleration devices.

E. Safety Margin. The operational landing distance used for a time of arrival landing assessment includes a safety margin of at least 15 percent when based on manual wheel braking.

F. Autobrake Usage. While autobrakes are a part of the aircraft’s landing configuration, this landing distance assessment procedure is not intended to force higher than reasonable autobrake selection. For operations when the runway is dry or when the runway is wet, grooved, or Porous Friction Course (PFC) (a relatively thin layer of aggregate sized porous asphalt that allows free penetration of the surface water to the underlying impervious surface course), if the manual braking distance provides a 15 percent safety margin, then the braking technique may include a combination of autobrakes and manual braking even if the selected autobrake landing data does not provide a 15 percent safety margin.

G. Touchdown Point. The touchdown point used in the assessment reflects the assumed air distance. Operational landing data usually includes an allowance for 1,500 feet or 7 seconds of air distance from the threshold to touchdown. An air distance as short as 1,000 feet may be used if an operator’s landing assessment procedures include enhancements to minimize the risk of overruns or undershoots, including:

1) Training in touchdown control and short field landing techniques.

2) Identification of required touchdown point and training to assure go-around procedures are initiated, if unable to achieve a suitable touchdown point.

3) Approach guidance and runway markings on the specific runway are consistent with a shorter air distance.

4) Operational data provided to the crew for the specific runway, conditions, and aircraft landing configuration without the need for interpolation.

5) The flight techniques assumed in the creation of the performance data used for a shorter air distance are based on flight techniques to be used in the shorter air distance operation. For example, the assumed speed bleed off used in the performance data needs to be consistent with the trained flight techniques for flaring the aircraft.
H. **Assessment Based on Dispatch Criteria.** When the runway is dry, or when the runway is wet and grooved or a PFC, the assessment may be as simple as confirming the runway meets the criteria used for dispatch.

I. **Documentation and Training.** Published material and training material include the assumptions and limitations on the use of the data provided to do a landing distance assessment at the time of arrival.

**RESERVED.** Paragraphs 4-504 through 4-520.
Section 8  Safety Assurance System: Monitor Flight Data Recorders

4-1526  REPORTING SYSTEM(S).

A.  Program Tracking and Reporting Subsystem (PTRS). For Title 14 of the Code of Federal Regulations (14 CFR) part 125, use PTRS activity codes:

- Ramp Inspection: 3627 and 5627.
- Spot Inspection: 3628 and 5628.
- Cockpit En Route Inspection: 3629 and 5629.

B.  Safety Assurance System (SAS). For 14 CFR parts 121 and 135, use SAS automation. This section is related to SAS Element 4.6.1 (AW) Avionics Special Emphasis Programs.

4-1527  OBJECTIVE. This section provides guidance for monitoring flight data recorders (FDR) to ensure that performance levels are maintained.

4-1528  GENERAL.

A.  FDR Regulatory Requirements and Guidance. This section provides aviation safety inspectors (ASI) with the applicable FDR regulatory references and guidance materials. The regulatory framework for FDRs is unique with respect to the operational requirements invoking certification requirements. The design approval holder (DAH) designs the FDR system with an intended function that is required by 14 CFR part 23, § 23.1301; part 25, § 25.1301; part 27, § 27.1301; or part 29, § 29.1301. At the time of aircraft certification, the FDR system’s intended function includes the aircraft owner or operator’s intended operational environment. Therefore, certain FDR operational requirements are met through the DAH’s certification of the FDR system.

B.  Regulatory References (14 CFR) and Guidance Materials (current editions).


2)  Part 91, § 91.1045, Additional Equipment Requirements.

3)  Part 121, § 121.344, Digital Flight Data Recorders for Transport Category Airplanes.

4)  Part 121, § 121.344(a), Digital Flight Data Recorders for 10-19 Seat Airplanes.

6) Part 125, § 125.226, Digital Flight Data Recorders.

NOTE: Section 125.226 applies to transport category airplanes. The FDR requirement is not applicable to nontransport category airplanes (e.g., airplanes certified under the Aeronautics Bulletin 7A standard category).

7) Part 125, § 125.228, Flight Data Recorders: Filtered Data.

8) Part 129, § 129.20, Digital Flight Data Recorders.

9) Part 135, § 135.152, Flight Data Recorders.

NOTE: Section 135.152(d) contains two incorrect references to the record retention requirements (one in the first sentence and one in the last sentence). In both instances, the requirements are preceded by the phrase, “except as provided in paragraph (c) of this section.” The correct reference is paragraph (e), which states additional requirements in the event the aircraft is involved in an accident or occurrence.


4-1529 PREREQUISITES AND COORDINATION REQUIREMENTS.

A. Prerequisites.

- Knowledge of the regulatory requirements of part 91, 121, 125, 129, or 135, as applicable.
- Experience with the equipment being inspected.
- Completion of the Airworthiness Aviation Safety Inspector Basic Indoctrination course, or previous equivalent.

B. Coordination Requirements. This task requires coordination with the certificate holder.

4-1530 REFERENCES, FORMS, AND JOB AIDS.


B. Forms. None.

C. Job Aids. None.

4-1531 PROCEDURES.

A. Perform the Inspection.
1) Determine the type of FDR currently in operation.

2) Evaluate the operator’s maintenance program. Accomplish the following:
   a) Ensure that the FDR system test program is accomplished in accordance with the manufacturer’s recommendations or an approved equivalent method. The program must:
      - Describe the components of the system;
      - Describe scheduled maintenance tasks with respect to the components; and
      - Describe required FDR system operational, reasonableness, and functional checks.
   b) Verify that the continuous self-monitoring and fault condition alert capabilities (e.g., built-in test equipment (BITE)) will detect the loss or deterioration of input signals before periodic readouts are allowed to be waived.
      NOTE: Periodic readouts can be waived if not required by the Maintenance Review Board (MRB).
   c) Ensure that periodic FDR bench checks and detailed analysis of the recorded data maintain the performance levels for ranges, accuracies, and recording intervals.
   d) Require operators to maintain a parameter definition and conversion algorithm document which enables accurate conversion of recorded digital values to their corresponding engineering units or discrete states. This document usually is originated by the DAH and must be kept current. This document must include the operator’s filtered flight data determination and any necessary post processing instructions. Any modifications to the FDR system must also be documented and accounted for.
   e) Review the operator’s FDR system documentation, data readouts, ramp test set readouts, and compare for the following:
      - Missing parameters,
      - Data loss, and
      - Deterioration of signals.
   f) Review the certificate holder’s maintenance procedures for underwater locating devices (ULD) attached to the FDR. The manufacturer’s recommendations must be followed, including the procedures for the battery check. A function check should be included as a task at the conclusion of the battery check.
   g) Ensure that the FDR ramp equipment, if used, can detect the loss or deterioration of input signal from sensors or transducers before periodic readouts are allowed to be waived.
h) Ensure that the manual includes procedures that prevent the operator from destroying recorded data from the removed unit until the aircraft has accumulated the appropriate amount of operating time for that type of aircraft.

3) Inspect the operator’s recordkeeping system. Accomplish the following:

   a) Ensure that the most recent instrument calibration and recorder correlation is being retained by either the air carrier or another agency keeping the records on their premises, to include the recording medium from which this calibration is derived.

   b) Review the operator’s FDR readouts and calibration records for the following:

      - Missing parameters,
      - Data loss, and
      - Deterioration of signals.

   c) Examine the operator’s process to ensure the FDR data is within the ranges, accuracies, and recording intervals as specified in the appropriate appendix (e.g., part 121 appendix M). If applicable, this examination includes how the operator shows compliance with § 121.346, § 125.228, or § 135.156.

B. Analyze Inspection Results. Review the inspection results and discuss any discrepancies with the operator.

4-1532 TASK OUTCOMES.

   A. Complete the PTRS Record. For other than parts 121 and 135 operators.

   B. Follow SAS Guidance Modules 4 and 5. For parts 121 and 135 operators.

   C. Complete the Task. Completion of this task may result in a revision to the operator’s maintenance program/manual.

   D. Document the Task. File all supporting paperwork in the operator’s office file.

4-1533 FUTURE ACTIVITIES.

   A. Follow SAS Guidance. For parts 121 and 135.

   B. Perform a Followup, As Required. For other than parts 121 and 135.

RESERVED. Paragraphs 4-1534 through 4-1550.
VOLUME 4 AIRCRAFT EQUIPMENT AND OPERATIONAL AUTHORIZATIONS

CHAPTER 16 SINGLE-ENGINE AIRCRAFT OPERATIONS


4-1666 REPORTING SYSTEM. This section is related to Safety Assurance System (SAS) Elements 4.4.4 (AW) Aircraft Acceptance Process, and 2.3.1 (OP) Appropriate Operational Equipment. Depending on the method of compliance, all three principal inspector (PI) disciplines may be involved. Since single-engine instrument flight rules (SEIFR) passenger-carrying authorizations require both operations specifications (OpSpecs) A003 and A046 and maintenance OpSpec D103 at a minimum, the principal operations inspector (POI) and principal maintenance inspector (PMI) will be involved and document the method of compliance as a configuration change request (add an aircraft) in SAS. Electrical load analysis (ELA) will involve the principal avionics inspector (PAI), who should also document results.

4-1667 GENERAL. The objective of this section is to provide direction and guidance to aviation safety inspectors (ASI) on authorizing Title 14 of the Code of Federal Regulations (14 CFR) part 135 certificate holder requests for passenger-carrying operations using single-engine aircraft operated under instrument flight rules (IFR) (i.e., SEIFR). In addition, this guidance was developed to alleviate possible confusion between the requirements of 14 CFR part 23, § 23.1353(h) and part 135, § 135.163. ASIs authorize SEIFR passenger-carrying operations by issuing the following OpSpecs:


B. OpSpec/MSpec A003, Airplane/Aircraft Authorization. Update the Web-based Operations Safety System (WebOPSS) certificate-holding district office (CHDO) Maintain Operator Data—Aircraft area to authorize SEIFR passenger-carrying operations by specific aircraft registration number and serial number by adding “SEIFR PAX” to the Authorizations for the aircraft. Also in the Aircraft details, select the appropriate En Route Type for en route operations as either “IFR/VFR” or “IFR/VFR Cargo/VFR PAX,” meaning IFR/visual flight rules (VFR) for cargo operations and VFR only for passenger-carrying operations. Issue OpSpec A003 to include the authorized En Route Type for the aircraft.

C. OpSpec D103, Additional Maintenance Requirements—Single-Engine Instrument Flight Rules (SEIFR). Issue or amend OpSpec D103 to add the registration number(s), serial number(s), and make, model, and series (M/M/S) of the aircraft used in SEIFR passenger-carrying operations in accordance with § 135.421 that correspond to the aircraft M/M/S authorized SEIFR on OpSpec A003. The aircraft must also be listed on OpSpec D085.
NOTE: PIs are also encouraged to review existing certificate holders for compliance with these standards. All noncompliant aircraft listed in OpSpec D103 are to be removed from this OpSpec per 14 CFR part 119, § 119.51, Amending Operations Specifications.

D. OpSpec/MSpec D104, Additional Maintenance Requirements—Emergency Equipment. Issue or amend OpSpec D104 if the certificate holder chooses to use § 135.163(f)(2) to comply with § 135.163. The standby battery or alternate source of electric power that is required by the regulation should be listed under Emergency Equipment Items in Table 1 of OpSpec D104. Procedures that are to be used in order to maintain continued airworthiness and ensure the battery/alternate source is capable of supplying 150 percent of the electrical loads of all required instruments and equipment necessary for safe emergency operation of the aircraft for at least 1 hour should be listed in the Maintenance Documents and Limitations and Provisions sections of Table 1.

4-1668 DISCUSSION. Aircraft certificated under part 23 do not automatically meet the requirements of part 135 for SEIFR passenger-carrying operations. The difference between these two regulations is that § 135.163(f) requires different electrical power capacity than those required by part 23. In addition to meeting all type certificate (TC) requirements, the aircraft must comply with § 135.163(f) to be authorized SEIFR passenger carrying.

A. Differences Between §§ 23.1353(h) and 135.163. The differences between the two sections are as follows:

1) Section 23.1353(h) requires that in the event of a complete loss of the primary electrical power-generating system, the battery must be capable of providing at least 30 minutes of electrical power to those loads that are essential to continued safe flight and landing. The 30-minute time period includes the time needed for the pilots to recognize the loss of generated power and take appropriate load-shedding action.

2) Section 135.163(f) specifies equipment requirements for single-engine aircraft carrying passengers under IFR. Section 135.163(f) consists of two separate methods of compliance:

   a) Section 135.163(f)(1): “Two independent electrical power generating sources each of which is able to supply all probable combinations of continuous inflight electrical loads for required instruments and equipment; or”

   b) Section 135.163(f)(2): “In addition to the primary electrical power generating source, a standby battery or an alternate source of electric power that is capable of supplying 150% of the electrical loads of all required instruments and equipment necessary for safe emergency operation of the aircraft for at least one hour.”

B. Section 135.163 Requirements. Whenever a person applies for a part 135 operating certificate to carry passengers in operations under IFR using single-engine aircraft or desires to add single-engine aircraft to an existing certificate, they must include the basis for asserting that the requested aircraft meets the requirements of § 135.163(f)(1) or (2). The PIs must determine if the aircraft complies with the requirements of § 135.163(f)(1) or (2). If electrical load-shedding...
procedures are required, the certificate holder must submit its procedures and/or checklists, including any ELA data supporting compliance to the CHDO PIs for review and acceptance.

1) **Section 135.163(f)(1) Requirements.** Section 135.163(f)(1) requires two independent electrical power-generating sources, each able to supply all normal probable combinations of continuous in-flight electrical loads for required instruments and equipment. Normal probable combinations of continuous in-flight electrical loads include, but are not limited to, equipment required by 14 CFR part 91, § 91.205; and part 135 subpart C, Aircraft and Equipment. Normal probable combinations of continuous in-flight electrical loads also include instruments and equipment required to meet operational authorizations and requirements. For example:

   a) If a certificate holder is authorized (via OpSpec A015) and uses an approved autopilot system under the § 135.105 exception to § 135.101 second-in-command (SIC) requirements, the autopilot system is required equipment and must be included in the load. However, the co-pilot’s instruments do not need to be included in this load under this scenario unless required as part of the certification basis for the aircraft.

   b) For aircraft TC’d and equipped to operate in known or forecast icing conditions (flight into known icing (FIKI) conditions), anti-ice and/or deice equipment constitute required equipment and must be included in the load, in addition to the pitot tube heat required for IFR by § 135.163(c). The maximum deicing load is included, even if portions of the system operate intermittently. Flight in icing conditions cannot be restricted by OpSpec deviations (OpSpec A005).

   c) The independent electrical power-generating sources must each be able to operate normal probable combinations of required instruments and equipment to maintain operational capability in accordance with the procedures and/or checklists, flight manual, Flight Manual Supplement (FMS), pilot’s operating handbook (POH), or owner’s manual. If one of the two electrical sources is considered a primary source and the secondary source is not capable of independently supplying power to all normal probable combinations of instruments and equipment to maintain operational capability, then procedures and/or checklists are required for load shedding of non-required equipment and must be submitted to the CHDO PI for review and acceptance.

   **NOTE:** The battery is not considered when meeting the requirements of § 135.163(f)(1). The battery is only considered in § 135.163(f)(2).

2) **Section 135.163(f)(2) Requirements.** Section 135.163(f)(2) is an alternate requirement and cannot be combined with § 135.163(f)(1). This alternative requires that aircraft must have, in addition to the primary electrical generating source, a standby battery or alternative source of electrical power capable of supplying 150 percent of the electrical loads imposed by all required instruments and equipment essential for safe emergency operations for at least 1 hour.

   a) The difference between § 135.163(f)(1) and § 135.163(f)(2) is that the equipment included in § 135.163(f)(2) is now defined as for “emergency operations,” while § 135.163(f)(1) is for normal “probable combinations of continuous in-flight electrical loads.”
b) Meeting this alternative of the regulation normally requires electrical load shedding, accomplished through procedures and/or checklists (which must be submitted to the CHDO PI for review and acceptance) or by aircraft automatic load-shedding systems. The instruments and equipment required for a safe emergency operation is based on operational authorizations and equipment required to meet operational requirements. For example, if aircraft are equipped and certified to operate in FIKI, then anti-ice and/or deice equipment are to be considered required equipment, unless the certificate holder has FAA-accepted procedures that include provisions for exiting and remaining clear of actual or forecast icing conditions and avoiding exceedance of the capacity of the electrical system during this type of emergency operation.

3) Calculating Load Requirements. The following table will be used to determine what must be included in the ELA calculations for either § 135.163(f)(1) or (2):

<table>
<thead>
<tr>
<th>§ 135.163</th>
<th>Required Equipment That Must be Included in ELA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Primary engine instruments.</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Primary flight instruments required for instrument flight rules (IFR) flight or one primary flight display (PFD) and standby flight instruments.</td>
</tr>
<tr>
<td>(f)(1)</td>
<td>Second primary flight instruments if aircraft being flown with two pilots or as required by certification.</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Sufficient permanently installed lighting to illuminate primary instruments or PFD and controls.</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>One permanently installed communication radio.</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>One permanently installed means of navigation sufficient for en route navigation and suitable instrument approaches.</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Full-authority digital engine control (FADEC) or electronic engine control (EEC) (if installed).</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Autopilot (if a single-pilot operation).</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Position lighting.</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Any required fuel pumps in accordance with aircraft procedures.</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Equipment cooling fan (if applicable and required by certification).</td>
</tr>
</tbody>
</table>
### § 135.163 Required Equipment That Must be Included in ELA

<table>
<thead>
<tr>
<th></th>
<th>Required Equipment That Must be Included in ELA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(f)(1) &amp; (2)</strong></td>
<td>Stall or angle of attack (AOA) indication systems (two, if two installed).</td>
</tr>
<tr>
<td><strong>(f)(1) &amp; (2)</strong></td>
<td>Required engine parameter monitoring systems.</td>
</tr>
<tr>
<td><strong>(f)(1)</strong></td>
<td>Deicing systems if certified FIKI (including all pitot heating elements). If heating elements operate intermittently, the maximum load when operating must be included.</td>
</tr>
<tr>
<td><strong>(f)(2)</strong></td>
<td>Deicing systems if certified FIKI (unless the certificate holder has procedures for exiting and remaining clear of forecast or actual icing conditions). Deice for primary pilot windshield (unless the certificate holder has procedures for exiting and remaining clear of forecast or actual icing conditions).</td>
</tr>
<tr>
<td><strong>(f)(1) &amp; (2)</strong></td>
<td>Any other required warning devices.</td>
</tr>
</tbody>
</table>

**NOTE:** Notice N 8900.307, Electrical Requirements for Operation of Single-Engine Passenger-Carrying Aircraft Under IFR—Title 14 CFR Part 135, § 135.163(f), required the anticollision light system be consistent with the regulations §§ 91.205(c)(3) and 91.209(b). The Air Transportation Division (AFS-200), in conjunction with the Aircraft Maintenance Division (AFS-300), has determined that the failure provisions and the operating conditions of these two regulations are consistent with allowing the anticollision light system to be turned off during this generator failure emergency and therefore not required to be included in the ELA. The emergency checklist must include this procedure if required to meet the § 135.163(f) regulation.

a) Section 135.163(i) states that for the purpose of satisfying § 135.163(f), only equipment that draws power continuously during flight needs to be considered when calculating load requirements. Equipment that imposes occasional intermittent loads does not need to be included. Therefore, a landing gear extension motor, a landing light that is turned on just prior to landing, a flap extension motor, or an electric fuel pump that is not needed continuously during flight may be omitted when calculating § 135.163(f)(1) ELA requirements.
b) Electrical load calculations are based on the calculated load of equipment and not actual load measurements obtained on the ground. Conditions vary, as do actual loads from one aircraft to another. Certificate holders are responsible for providing ELA data to the Federal Aviation Administration (FAA), and ASIs shall not be involved in actual load measurements other than as observers. Compliance with § 135.163(f) requires an ELA and is not satisfied simply by measuring electrical loads during operation or reading electrical loads on an aircraft load meter. When aircraft are modified by a Supplemental Type Certificate (STC) or field approval, the new installed equipment load is used in these calculations.

4-1669 AUTHORIZING THE USE OF SEIFR PASSENGER-CARRYING AIRCRAFT. The part 135 certificate holder’s aircraft must meet the requirements of § 135.163(f). If it is determined that a certificate holder’s aircraft electrical power sources do not meet the requirements of § 135.163(f)(1) or (2), the aircraft cannot be authorized to conduct SEIFR passenger-carrying operations. The certificate holder must bring their aircraft into compliance by modifying either their aircraft or procedures prior to SEIFR authorization. If the certificate holder makes changes to their procedures, they must incorporate these changes into an emergency or abnormal operating procedure checklist. PIs must require these procedures to be incorporated into the certificate holder’s approved training/checking program and pilots must receive this training prior to conducting SEIFR passenger-carrying operations. It is the responsibility of the certificate holder to determine the method of compliance and supply appropriate data to support their application; the FAA does not make that determination. The PIs assigned with oversight responsibilities will ensure the method chosen complies with this guidance.

A. Maintenance Procedures. ASIs must ensure that the maintenance procedures are in place to document alterations to the aircraft that change the electrical load or generating capacity that may alter the aircraft’s compliance with § 135.163(f). The General Maintenance Manual (GMM) or other appropriate manuals must contain procedures that prevent the compliance status to change without notifying the PI responsible for the certificate.

B. Compliance Through Procedures Development. If a certificate holder’s method of compliance is accomplished by developing procedures, part of the PI’s response will be based on whether the procedures are acceptable in meeting the regulations and have been incorporated into the applicable operations manual(s), training material, and checklists. PIs will review and accept these checklists and procedures in the same manner as other checklists (per Volume 3, Chapter 32, Section 12) or procedures (per Volume 3, Chapter 32, Section 5).

NOTE: Items that load shed as part of their procedures may be restored if operating conditions change and the ELA is maintained. For example, in non-icing condition, anticollision may be restored as part of procedures.

1) If any doubt remains with respect to the validity of the resulting checklists or procedures submitted, including the underlying data used to calculate total load or the identification of the equipment and systems (which are required or which must be positively deactivated), consult with the Aircraft Certification Office (ACO).
2) Once acceptable, these checklists and procedures will be accepted and incorporated as additions to the certificate holder’s cockpit checklists, Flight Operations Manual (FOM), Company Flight Manual (CFM), General Operations Manual (GOM), Standard Operating Procedures (SOP) (as appropriate), and approved training program.

3) If the submitted documents are not acceptable, the PI will notify the certificate holder in writing about the discrepancies and enter the appropriate information into SAS. Volume 10 and the SAS Resource Guide contain more information on documenting information in SAS.

C. Multiple Aircraft. It is important to note that not all certificate holders may choose to bring the noncompliant aircraft into compliance to meet the single-engine passenger-carrying IFR regulatory requirements. If this is the case, PIs must ensure the aircraft is limited to VFR operations for passenger-carrying operations only in the WebOPSS operator aircraft listing.

NOTE: These options are in the drop-down list in WebOPSS under “MAINTAIN OPERATOR DATA—AIRCRAFT—EDIT AIRCRAFT.”

1) General—Configuration:
   - All Cargo.
   - Passenger (PAX).
   - PAX and Cargo.

2) Detail—En Route Type:
   - VFR.
   - IFR.
   - IFR/VFR.
   - IFR/VFR/Cargo/VFR PAX.

3) Detail—Class of Operation (Single-Engine Land (SEL) or Single-Engine Sea (SES)):
   - SEL.
   - SEL/SES.
   - SES.

4) Authorizations: SEIFR PAX.

NOTE: Additional aircraft authorizations may apply to the aircraft, but SEIFR PAX is required to be assigned to aircraft used in SEIFR passenger-carrying operations.

RESERVED. Paragraphs 4-1670 through 4-1688.
VOLUME 6 SURVEILLANCE

CHAPTER 2  PARTS 121, 135, AND 91 SUBPART K INSPECTIONS

Section 6  Safety Assurance System: Conduct Spot Inspection of a Program Manager/Operator’s Aircraft

6-293 REPORTING SYSTEM(S).

A. Program Tracking and Reporting Subsystem (PTRS).  For Aging Aircraft Inspections for Title 14 of the Code of Federal Regulations (14 CFR) parts 91 subpart K (part 91K) and 121, use the following activity codes:

- Spot Inspection: 3628, 5628.
- Structural Spot Inspection: 3647, 5647.

B. Safety Assurance System (SAS).  For 14 CFR parts 121 (except Aging Aircraft Inspections) and 135, use SAS automation to develop a Custom Data Collection Tool (C DCT).

6-294 OBJECTIVE. This section provides guidance for observing and analyzing in-progress maintenance operations for compliance with specific methods, techniques, and practices in the program manager/operator’s inspection and maintenance programs.

6-295 GENERAL.

A. Definition. A work package is the job task control units developed by the program manager/operator for performing maintenance/inspections. A typical work package may include the following:

- Component change sheets;
- Inspection work cards;
- Nonroutine work cards;
- Appropriate sections of the maintenance procedures manual; and
- Engineering Change Orders (EO).

B. Federal Aviation Administration (FAA) Inspection Personnel. It is important that Airworthiness aviation safety inspectors (ASI) are familiar with the type of aircraft to be inspected before performing the inspection. This can be accomplished through on-the-job training (OJT).

C. Coordination Requirements.

1) For parts 121 and 135, follow SAS guidance for Modules 2 and 3 to request geographic inspector resources.

2) Airworthiness ASIs possess various degrees and types of expertise and experience. An ASI who needs additional information or guidance should coordinate with personnel experienced in that particular specialty.
6-296 INITIATION AND PLANNING.

A. Initiation. Spot inspections can be scheduled as part of the work program, but may be initiated whenever a problem is noted, including deficiencies noted during other types of inspections.

B. Planning.

1) Spot Inspections Derived from the Planned Work Program or from SAS.

a) The number of spot inspections in the work program depends on the type and number of program manager/operator aircraft. After determining the type of aircraft to be inspected, confirm the aircraft availability and scheduled maintenance functions with program manager/operator personnel.

b) If the maintenance to be observed is known, review the program manager/operator’s maintenance procedures manual to become more familiar with the maintenance task. Review the following:

- Required Inspection Items (RII), if applicable;
- Forms used to document the maintenance task;
- Latest manual revision and date;
- Special tools and equipment used to perform the maintenance task; and
- Any other manual requirements relating to the maintenance task.

c) For geographic requests, in which the maintenance procedures manuals are not in the office, review the applicable sections of the program manager/operator’s maintenance manual at the facility prior to performing this task.

d) Examining previous inspection findings provides the ASI with background information regarding problem areas found during other spot inspections. This information can give an indication of how effective past corrective actions were in resolving previously identified problem areas.

e) The FAA provides information such as Airworthiness Directives (AD), Service Difficulty Report (SDR) summaries, maintenance bulletins, surveillance data, and PTRS entries. This information should be reviewed, when available, to become familiar with current service difficulty information. While performing the spot inspection, ensure that any conditions described in this information do not exist on the aircraft.

2) Spot Inspections Not Derived From the Planned Work Program. There are many situations while performing other surveillance activities that afford the opportunity to perform spot inspections. For example, if a discrepancy is found during the inspection that requires maintenance, a spot inspection of that maintenance function could be performed.

6-297 MAINTENANCE RECORDS. During performance of the spot inspection, special attention should be paid to the following areas, as applicable:
• AD’s current status, including the method of compliance;
• Overhaul records, including documentation containing the overhaul details and replacement time;
• Major repair/alteration classifications and the use of approved data; and
• Replacement time of life-limited parts.

6-298 PERFORMING THE SPOT INSPECTION.

A. Selecting a Maintenance Task.

1) Discuss with the maintenance supervisor what maintenance is currently being performed to determine what portions of that current maintenance/inspection should be observed.

2) Special emphasis should be placed on observing maintenance tasks that involve RIIs. Problem areas to look at include the following:
   • Persons performing inspections outside of their authorizations or limitations; and
   • RIIs not being properly identified or accomplished.

B. Performance Standards.

1) Each program manager/operator has a maintenance/inspection program for their individual maintenance operations. For maintenance to be performed on the program manager/operator’s aircraft, there must be corresponding provisions and procedures in the program manager/operator’s maintenance manual.

2) Each program manager/operator should have special procedures in the manual that ensure that persons outside of the organization perform maintenance in accordance with the program manager/operator’s maintenance manual.

C. Discrepancies Noted During Surveillance. When deviations from accepted procedures are noted, it must be brought to the attention of maintenance management that corrective action must be taken immediately. Discrepancies noted during the inspection may require followup at a later time.

6-299 STRUCTURAL SPOT INSPECTIONS.

A. Increased Surveillance. The Aging Airplane Safety Rule requires the FAA to validate the effectiveness of air carrier maintenance programs with regard to structural fatigue and corrosion. In response, the FAA uses the structural spot inspection to perform surveillance of transport category aircraft undergoing “C,” “D,” or similar “heavy inspections.” Inspectors should coordinate and time their inspection activities with the certificate holder maintenance process.

B. Inspection Area. During the observance of a “heavy inspection,” ASIs must pick an inspection area where maintenance has been started and where there could be possible fatigue or
corrosion problems (especially an area that is not usually open to inspection, such as under the
galley or lavatories).

1) If inspecting an area where maintenance is in progress, the following
should be evaluated:

a) While performing their job functions, are personnel accomplishing their
job task per the work package?

b) Does the Aging Aircraft/Corrosion Control program provide the necessary
guidance to evaluate and respond in a timely manner to structural fatigue and corrosion?

2) If inspecting an area where maintenance has already been accomplished, the
following should be evaluated:

a) Are there any structural fatigue or corrosion problems evident?

b) If there are, were they identified by the person(s) responsible for that area?

c) If they were identified, was corrective action initiated and completed?

3) Is there an AD applicable to this problem? If there is an AD, what is the status
of that AD?

NOTE: While inspecting these areas that are not normally accessible, look for
evidence of structural major repairs. If a major repair was accomplished, review
the approved data for that repair.

6-300 PREREQUISITES AND COORDINATION REQUIREMENTS.

A. Prerequisites. Previous experience working with an operator/program manager with
similar types of aircraft.

B. Coordination.

1) This task may require coordination between Avionics and Maintenance ASIs.

2) Geographic inspector(s) must coordinate with the certificate-holding district
office (CHDO) to obtain knowledge of the operator’s maintenance procedures and any other
items of concern that may surface during routine inspections.
6-301 REFERENCES, FORMS, AND JOB AIDS.

A. References (current editions):

- Title 14 CFR Parts 39, 43, and 91K.
- Program Manager/Operator’s Maintenance Procedures Manual and Inspection Work Packages.

B. Forms. None.

C. Job Aids. None.

6-302 PROCEDURES.

A. Initiate Spot Inspection (as applicable).

B. Select Appropriate Aircraft for Inspection. Determine the following from the program manager/operator’s maintenance schedules:

- Aircraft availability;
- Aircraft type; and
- Type of maintenance being performed.

C. Prepare for the Inspection. Review the following:

- Maintenance manual procedures for maintenance being performed (if available);
- Operations specifications (OpSpecs)/management specifications (MSpecs) time limitations, when applicable to the maintenance task;
- Previous inspection findings;
- Applicable maintenance alert bulletins;
- SDR summary at http://av-info.faa.gov/sdrx; and
- Any new regulation and/or AD requirements affecting the aircraft to be inspected.

NOTE: If preparing for an Aging Aircraft Inspection, the ASI/Designated Airworthiness Representative (DAR)/Organization Designation Authorization (ODA) should select structural inspections, Corrosion Prevention and Control Programs (CPCP) tasks, or major repairs/modifications that are scheduled to be accomplished during this maintenance visit. If possible, supporting documentation for these tasks should be obtained before conducting the planned inspection.

D. Perform the Spot Inspection.

1) Identify the ASIs to the maintenance supervisor and discuss the nature of the inspection.

2) Discuss the status of the selected maintenance task with the maintenance supervisor/person in charge.
3) Select a particular maintenance task within the work package. If possible, include a maintenance task designated by the program manager/operator as an RII.

   a) Ensure that current maintenance procedures are available to the person(s) performing the work by accomplishing the following:

      • Asking maintenance personnel for the maintenance procedures used to accomplish the work; and
      • Recording the date of the maintenance procedures being used to perform the maintenance task for future comparison with the maintenance manual master copy.

   b) Ensure that the maintenance is performed according to established procedures by comparing actual performance to the program manager/operator’s approved maintenance/inspection manual procedures.

   c) Ensure the person performing maintenance is using the proper tools by accomplishing the following:

      • Observing that the person performing maintenance is using special tools referenced in the maintenance manual; and
      • Checking calibration due dates on precision tools, measuring devices, and testing equipment requiring calibration.

   d) Ensure that the program manager/operator has the facilities to properly perform the maintenance task.

   e) Ensure that systems being maintained are not exposed to environmental conditions that could contaminate or damage components.

   f) Ensure that the person performing maintenance accomplishes maintenance recording according to the operator’s recordkeeping system.

   g) Note any maintenance task deficiencies and include any copies of the documents that revealed the deficiencies.

   h) For those maintenance tasks involving RII functions, determine that the persons observed performing these functions are appropriately certificated, authorized, and qualified.

   NOTE: If performing an Aging Aircraft Inspection, the ASI/DAR/ODA should focus the inspection on the specific structural areas, tasks, and major repairs/modifications identified during the aircraft records review and scheduled to be accomplished during the maintenance visit.

E. Analyze the Findings. Evaluate inspection findings to determine if discrepancies exist and discuss the results with the principal inspector (PI)/program manager. For parts 121 and 135, follow SAS guidance for Module 5.
6-303 TASK OUTCOMES.

A. **Complete the PTRS Record.** When closing out a spot inspection, include the following information on FAA Form 8000-36, Program Tracking and Reporting System Data Sheet:

- The age of the aircraft (if applicable);
- If the operator’s inspection includes aging aircraft-related activities (if applicable); and
- The AD number, AD type, and inspection results, if an AD structural repair or modification was accomplished (if applicable).

**NOTE:** If performing an Aging Aircraft Inspection, enter “AGINGRIR” in the “National Use” block of Section I. Record aircraft times, cycles, inspection status, and other required data in the Comment block of Section IV.

B. **Complete the Task.** Completion of this task can result in requested manual revisions.

C. **Document the Task.** File all supporting paperwork in the program manager/operator’s office file.

D. **Follow SAS Guidance.** For parts 121 (except for Aging Aircraft Inspections) and 135.

6-304 FUTURE ACTIVITIES. Based on the analysis of inspection findings, plan increased surveillance of problem areas, as applicable. For parts 121 (except Aging Aircraft Inspections) and 135, follow Volume 10, Safety Assurance System Policy and Procedures, to plan future risk-based surveillance in SAS.

**RESERVED.** Paragraphs 6-305 through 6-319.