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ADVISORY CIRCULAR

AIR CARRIER MAINTENANCE PROGRAMS

U.S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Flight Standards Service
Washington, D.C.

PREFACE

This advisory circular (AC) describes air carrier aircraft maintenance programs. It explains the background as well as the Federal Aviation Administration's (FAA) regulatory requirements for these programs. Also described are the nine elements of aircraft maintenance programs. As used in this AC, maintenance means "inspection, overhaul, repair, preservation, and the replacement of parts," as well as preventive maintenance. This material is not regulatory, nor does it establish minimum standards. However, where terms such as "must," "shall," and "will" are used in this AC, such use reflects actual regulatory requirements.

/s/ Louis C. Cusimano for
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CHAPTER 1. GENERAL

100. What is the purpose of this advisory circular?

This advisory circular (AC) describes air carrier aircraft maintenance programs. It explains the background as well as the Federal Aviation Administration's (FAA) regulatory requirements for these programs. Also described are the nine elements of aircraft maintenance programs. As used in this AC, maintenance means "inspection, overhaul, repair, preservation, and the replacement of parts," as well as preventive maintenance. This material is not regulatory, nor does it establish minimum standards. However, where terms such as "must," "shall," and "will" are used in this AC, such use reflects actual regulatory requirements.

101. Who does this AC apply to?

This AC applies to air carriers subject to Title 14 of the Code of Federal Regulations (14 CFR), parts 119, 121, and 135. For part 135 operations, this AC applies only to operations conducted with aircraft type-certificated for a seating capacity, excluding any pilot seat, of 10 seats or more.

102. What is the regulatory basis for air carrier maintenance programs?

Title 49 of the United States Code (49 U.S.C.) § 44701 (formerly the Federal Aviation Act of 1958, § 604) is the primary authority for all air carrier Federal Aviation Regulations. Title 49 U.S.C. § 44701 tells the FAA Administrator to promote the safe flight of civil aircraft in air commerce through regulations and standards prescribed in the interest of safety. Section 44701 further obliges the Administrator, when prescribing regulations and standards, to: (1) consider the duty of an air carrier to provide service with the highest possible degree of safety in the public interest; (2) consider differences between air transportation and other air commerce; and (3) classify a regulation or standard appropriate to the differences between air transportation and other air commerce. The term "air commerce" is defined within 49 U.S.C. § 40102 as the operation of an aircraft within the limits of a federal airway. The term "air transportation" is defined within that same section as the transportation of passengers or property by aircraft as a common carrier for compensation.

103. How does the FAA authorize your maintenance program?

FAA issues you air carrier operations specifications (OpSpecs) authorizing you to use a maintenance program and the air carrier maintenance manual required by the FAA's regulations. This method for authorizing operations and maintenance in air transportation evolved from the Civil Aeronautics Board's earlier method of issuing operating certificates and temporary permits accompanied by competency letters issued by the Secretary of Commerce. Containing information that authorized the air carrier's services, routes, aircraft, maintenance, airmen, and weather procedures, these competency letters were considered part of the air carrier operating certificate and could be amended as the circumstances dictated. However, in 1953, the Civil Air Regulations were amended to require the issuance of air carrier OpSpecs that replaced, formalized, and standardized the competency letters being used at the time. The amended regulations also stated that OpSpecs were not part of an air carrier certificate. Tailored to your

specific operating context and the requirements of your individual operations, OpSpecs convey the general terms of regulations into specific terms, conditions, and limitations. As with the predecessor competency letters, OpSpecs are amended as circumstances dictate. Approved by the FAA, OpSpecs are as legally binding as the regulations themselves.

104. What are the objectives of air carrier maintenance programs?

Your maintenance program assures that all parts of your aircraft can perform their intended function. Your maintenance program should reflect four specific program objectives to provide the highest possible level of safety in air transportation:

a. Each aircraft released to service is airworthy and has been properly maintained for operations in air transportation;

b. Maintenance and alterations you perform, or that other persons perform for you, are performed in accordance with your maintenance manual;

c. Competent personnel with adequate facilities and equipment perform your maintenance and alterations; and

d. You have a system of continuing cycles of surveillance, investigations, data collection, analysis, corrective action, and corrective action monitoring to ensure all parts of your maintenance program are effective and are being performed in accordance with your manual.

105. What are the elements of an air carrier maintenance program?

An air carrier maintenance program includes nine elements. This AC explains each of these elements individually. The nine elements are:

- Airworthiness responsibility
- Maintenance manual
- Maintenance organization
- Maintenance schedule
- Maintenance recordkeeping system
- Accomplishment and approval of maintenance and alterations
- Contract maintenance
- Continuing analysis and surveillance system
- Personnel training

CHAPTER 2. AIRWORTHINESS RESPONSIBILITY

200. Who is responsible for maintenance on your aircraft?

As an air carrier, you are responsible for the maintenance of your aircraft. Under FAA's regulations, you must perform and/or approve all maintenance and alterations on your aircraft. You may arrange for a maintenance provider, such as a repair station, to perform your maintenance for you. However, you retain responsibility for the performance and approval of that maintenance even if someone else performs the work for you.

201. What is the difference between air carrier maintenance programs and general aviation inspection programs used under part 91?

Parts 121 and 135 require an air carrier to use a maintenance program for its aircraft, while on the other hand, sections of part 91 require operators to use an inspection program. Further, parts 121 and 135 establish the air carrier as responsible for the airworthiness of its aircraft and the performance of maintenance in accordance with its air carrier maintenance program and manual while part 91 establishes the owner or operator as responsible for maintaining the aircraft in an airworthy condition. This is consistent with the "differences" requirement of 49 U.S.C. § 44701. Under FAA's regulations, every air carrier must have a maintenance program. The maintenance program and its elements must be described in detail in a program manual. An air carrier must carry out its maintenance program according to that manual.

The maintenance responsibility of an owner/operator under part 91 is limited to the selection of an existing inspection program, the scheduling of the aircraft for the inspections, and making the airplane available to authorized and certificated person(s) who accomplish the inspections and other maintenance. Under part 91, the properly authorized and certificated persons have the responsibility to perform the maintenance properly in accordance with the manufacturer's manual and approve the aircraft for return to service, not the owner/operator.

On the other hand, an air carrier has the responsibility to determine the maintenance that is required, to perform that maintenance, and to approve for return to service its own aircraft. The air carrier also has the option to authorize another person to perform the maintenance, but the maintenance must be carried out in accordance with the air carrier's maintenance program and maintenance manual. The air carrier still retains the responsibility for the proper accomplishment of the maintenance. In addition, an air carrier is responsible for the development and use of its own air carrier maintenance program along with a manual containing the program, the method of performing maintenance, a required inspection item system, a continuous analysis and surveillance system, a description of the maintenance organization, and a number of other things that, collectively and systemically, serve to ensure that each air carrier aircraft is airworthy. An air carrier is, along with FAA oversight, the ultimate authority with regard to its maintenance program and is solely responsible for the airworthiness of its aircraft.

CHAPTER 3. MAINTENANCE MANUAL

300. Is an air carrier maintenance manual required?

You are required by FAA's regulations to have a maintenance manual and to include it in your system of manuals. Your manual must be easy to revise and you must have procedures for keeping all parts of your manual up-to-date. Some air carriers call their manual "specifications." Copies of your manual or appropriate portions (and changes or additions) must be made available to those persons who are required to comply with it. You must also provide a copy to the representatives of the Administrator assigned to you. Each person who is furnished a manual must keep it up-to-date.

301. What is the role of an air carrier maintenance manual?

Your maintenance program manual is key to standardized, consistent accomplishment and administration of your maintenance program. It is a required part of your air carrier manual system. The manual identifies, describes, and defines your maintenance program. It also provides instructions and procedures to administer, use, manage, and amend your program. Your manual is a company publication and you have sole responsibility for its organization and content, including technical content. However, others may compile and publish it. The manual may be electronic.

302. What are the major sections of an air carrier maintenance manual?

Your manual should be organized in a practical arrangement. It should have at least three or more sections such as administrative policies and procedures; detailed instructions for the administration, management, and accomplishment of the maintenance program; and technical manuals that describe maintenance standards, methods, techniques, and procedures.

1. Administrative policies and procedures.

This section deals with policies and procedures for the administration and amendment of your maintenance program. It is used as a management and administrative tool for organizing, directing, and controlling the maintenance program. Organizational charts delineating the functions, interrelationships, and lines of authority between organizational elements and personnel are normally identified here. For clarity, you may choose to identify the interrelationship between production and inspection functions in a separate inspection manual.

2. Detailed instructions for the administration, management, and accomplishment of the maintenance program.

This section contains detailed instructions for the management of the various functions and interrelationships of each maintenance program element such as maintenance time limitations, recordkeeping, maintenance program management and oversight, contract maintenance management and oversight, and personnel training. A description of scheduled maintenance tasks and procedural information and detailed instructions (or specific air carrier maintenance

manual references) for accomplishing maintenance tasks is normally included in this section. Additionally, you should describe criteria for initiation of functional evaluation flights in this part of the manual, along with procedural requirements for these flights. This portion of the manual may also include criteria and procedural information for unscheduled inspections such as those associated with lightning strikes, tail strikes, engine temperature exceedances, hazardous material spills, and hard or overweight landings.

3. Technical manuals that describe maintenance standards, methods, techniques, and procedures.

The technical manual section concerns detailed procedures for the accomplishment of specific tasks. You should describe methods, techniques, technical standards, measurements, calibration standards, operational tests, structural repairs, etc. in this portion of the manual. You should also include procedures for aircraft weight and balance, jacking and shoring, storage, cold weather operations, towing, aircraft taxi, aircraft cleaning, jacking, lifting, and shoring. You can derive your technical manual contents from the manufacturer's publications; however, based on your particular service experience, organization, and operating context, the FAA expects that your manual is continuously modified and customized as necessary for the continuing success of your maintenance program. Accordingly, your air carrier technical manual will not be the same as the manufacturer's manual.

4. Work cards.

Work cards, while not a regulatory requirement, have evolved as a "best practice." Work cards are considered part of the air carrier maintenance manual and the air carrier maintenance program. They are used as an uncomplicated means of compliance with regulations for performance of maintenance as well as maintenance recordkeeping. Work cards normally serve two primary functions. The first is to provide detailed, concise procedural instructions that serve to organize and control the maintenance activity, while providing a means to ensure the maintenance activity complies with the air carrier manual. The second primary function is to document the maintenance activity, providing a means to comply with the air carrier maintenance recordkeeping requirements. A secondary function is to document the results of inspections, checks, and tests for data collection and analysis.

CHAPTER 4. MAINTENANCE ORGANIZATION

400. Is an air carrier maintenance organization required and what does it do?

You, as an air carrier, are required to have a maintenance organization that is able to perform, supervise, manage, and amend your program, manage and guide your maintenance personnel, and provide the direction necessary to achieve your maintenance program objectives. You are required to include a chart or a description of your maintenance organization in your manual. You can read about all of the maintenance organization requirements in subpart L of part 121, subpart J of part 135, and portions of subpart C of part 119. These organizational regulations apply to your organization as well as any other organization that provides maintenance services for you.

> **NOTE: For the purposes of discussion in this AC, "authority" means the power to design or change fundamental policy or procedures without having to seek a higher-level management approval. Additionally, "responsibility" means the obligation, along with the requisite accountability, to ensure that a task or function is successfully carried out.**

Together, these regulations require your maintenance organization to:

- Have an organization that can do the required maintenance;
- Have a Director of Maintenance (DOM);
- Have a Chief Inspector (part 121 only);
- Prepare and keep current a manual for the use and guidance of personnel accomplishing maintenance on your aircraft;
- Ensure your maintenance is accomplished in accordance with your manual;
- Organize the accomplishment of your required inspection function separate from the accomplishment of your other inspection, maintenance, and alteration functions;
- Ensure competent personnel and adequate facilities and equipment are provided for your maintenance;
- Ensure that each airplane released for service after maintenance is airworthy and has been properly maintained for operations in air transportation;
- Ensure that your maintenance program remains effective; and
- Ensure that persons exercising management oversight and control, particularly revision control, over the content, organization, and performance of your maintenance program are qualified and have practical experience and demonstrated technical and managerial capabilities to effectively organize, manage, and control your maintenance program. These persons should be able to carry out their duties in a way that will fulfill your responsibility to operate with the highest possible degree of safety.

401. What are the FAA-required management positions in your maintenance organization?

FAA's regulations include specific requirements for maintenance organization management positions, including a DOM and a Chief Inspector. For part 121, you must have qualified persons serving full-time in these or equivalent positions. If necessary for your operation, you can ask FAA for a deviation from the types and numbers of required management positions. In your manual, you are required to list the names and addresses, and to state the duties, responsibilities, and authority of your required management personnel. Also, you are required to notify the FAA when you make changes in your required management personnel or when you have a vacancy. For part 135 operations, the organizational requirements are the same as part 121, except that a Chief Inspector position is not required.

402. Functionally, what air carrier maintenance organizational structure is required?

The regulations for an air carrier maintenance organization are necessarily broad, given all the different types and sizes of air carriers. These organizational regulations apply to your organization and to any other organization that provides maintenance services for you. The structure of your maintenance organization should be tailored to your specific size and staffing requirements; therefore, a single means of compliance or a single organizational chart that would apply to all air carrier organizations is not possible. However, in all maintenance organizations, you should designate a single person or position to have the authority and the overall responsibility for managing and implementing your entire maintenance program. The FAA expects you to designate this person as your DOM. You do not have to use the term Director of Maintenance as the position title; however, you should identify the person in your organizational chart as the FAA DOM or use a similar term. Your DOM should incorporate three organizational functions in your air carrier maintenance organization in order to operate efficiently and effectively, and to support flight operations with the highest possible degree of safety. These three organizational functions should be present whether your maintenance organization consists of just one person or a multitude of persons and should be documented in your manual. Although maintenance organizations vary widely in size, scope, and staffing, the requirements of authority and responsibility apply equally to all organizations. The functions are as follows:

- The first level maintenance function is carried out by your mechanics/inspectors and other maintenance personnel. These people do the basic work of your maintenance organization, i.e., the inspection, overhaul, repair, replacement of parts, preventive maintenance, and alterations of your authorized aircraft.

- The second level maintenance function is carried out by your middle managers such as your maintenance foreman or supervisor, your maintenance manager or supervisor, and/or your Chief Inspector. These people directly supply the resources for the first level maintenance function, and they directly organize, control, and supervise your mechanics/inspectors in the accomplishment of the first level maintenance functions. For smaller organizations,

particularly in part 135 operations, some or all of these second level functions may be carried out by one or a few individuals on an as-needed basis.

- The third level maintenance function is carried out by your maintenance organization's accountable manager, whom the FAA expects is your DOM. This person has the authority and overall responsibility for your maintenance program; provides general leadership and financial management; provides vision of the scope, size, and structure of the organization; sets the general organizational direction and objectives; prepares the organization for the future; and provides the focus on forecasting and planning for shifting needs and new technologies. In most organizations, except for the smallest, it will be common for the person with overall responsibility for maintenance program functions to delegate some or much of this work to others within the maintenance organization. In the smallest maintenance organizations, particularly part 135 operations, your DOM may have responsibility for all three organizational functions.

This work may be accomplished directly by the person that has been delegated responsibility; however, depending on the size and staffing of the organization, this work may also be delegated. Regardless, the person with specific responsibility has the obligation to carry out the specific function(s) of the maintenance program, including overseeing and managing any personnel to whom maintenance program functions and duties are delegated. The FAA expects to see clear authority and responsibility, including delegated responsibility, for the overall maintenance program and all of its elements and functions. You should include a description of each person's duties and responsibilities in your manual so that there is not a fragmented organizational system with high risk of confusion over who is responsible for a given task.

403. Is your inspection department required to be organizationally separate from the rest of your maintenance organization?

There is no specific regulatory requirement to keep your inspection department separate from the rest of your maintenance organization. The regulations include inspection as one of the functions of maintenance. Therefore your inspection department, if you choose to have one and your organization is large enough to have one, should be an integral unit of your maintenance organization at the first and second functional levels described above. In larger part 121 maintenance organizations, responsibility for the general inspection function usually resides in an inspection unit and is delegated to your Chief Inspector. In these larger organizations, the other maintenance, preventive maintenance, and alteration functions reside in a maintenance unit or units that are a counterpart to the inspection unit. You should organize these maintenance unit(s) at the same organizational level as your inspection unit, with a supervisor/manager at the same level as your Chief Inspector. In part 135 operations, where FAA's regulations do not require you to have a Chief Inspector, the DOM may or may not delegate the inspection function to another person. It is important to note that the general inspection function described in this section and elsewhere in this AC is not the required inspection function described in paragraph 404 and Chapter 7.

404. What are the organizational requirements for your Required Inspection Items?

There is a specific regulatory organizational requirement focusing on the required inspection item (RII) function. This RII organizational requirement is the same for both part 121 and part 135 air carriers. In addition to the discussion here, you may read about RII functional requirements in Chapter 7 of this AC. FAA regulations require you to organize the accomplishment of your RII functions to separate this function from the other maintenance (inspection, overhaul, repair, preservation, and the replacement of parts), preventive maintenance, and alteration functions. This separation must be below the level of administrative control where overall responsibility for the RII function and the other maintenance, preventive maintenance, and alterations reside. In simple terms, this means that the part of your organization that accomplishes your maintenance, preventive maintenance, and alterations cannot be the same part that accomplishes your RII. In larger maintenance organizations, the RII function may be located in an organization whose sole function is RII. In others, RII may reside in an inspection unit that is responsible for the general inspection function. However, to be consistent with the regulations, you must keep the accomplishment of any RII function separate from the accomplishment of any general inspection function. In a smaller organization, particularly a part 135 organization, the RII function may be the responsibility of one or two persons. Because the need for RII may not be a daily occurrence, in most, if not all maintenance organizations, RII is a collateral duty assignment.

405. What are the requirements for your Director of Maintenance?

The DOM has the maintenance function responsibility and is the accountable manager with the authority and overall responsibility for the entire maintenance program and other maintenance, preventive maintenance, and alteration functions. You should place the DOM at the point in your organizational structure where he or she will have the overall responsibility and authority to prescribe your maintenance policy and to organize, direct, and control the overall maintenance program and maintenance organization. Inherent with this overall responsibility and authority, your DOM should be able to commit the corporate resources necessary to carry out maintenance operations with the highest possible degree of safety. Under FAA's regulations, your DOM must be a currently certificated mechanic with airframe and powerplant ratings. This standard ensures the DOM is knowledgeable about basic safety and regulatory responsibilities inherent with supervising, performing, inspecting, and returning to service air carrier aircraft and components. All other regulatory requirements for the DOM position are based on that person having a mechanic certificate.

406. What are the requirements for your part 121 Chief Inspector?

The Chief Inspector has the maintenance function responsibility for the required inspection function of the maintenance program. In most organizations, except for the smallest, the Chief Inspector will also have the delegated responsibility for the general inspection function, as well as serving as the focal point for conflict resolution regarding inspection findings. Your Chief Inspector should not be placed at a point in your organizational structure that is below the management person having operational responsibility for the production aspects of your

maintenance, preventive maintenance, and alteration functions. Under FAA's regulations, the Chief Inspector must be a currently certificated mechanic with airframe and powerplant ratings. This standard ensures the Chief Inspector is knowledgeable about the inherent responsibilities involved with supervising and inspecting air carrier aircraft and components. All other regulatory requirements for the Chief Inspector position are based on that person having a mechanic certificate.

407. What are the requirements for your part 135 Chief Inspector?

For part 135 operations, FAA's regulations do not specify a Chief Inspector organizational requirement; however, the regulatory requirements for the required inspection function and responsibility remain and must still be addressed in the air carrier organization. The part 135 DOM has overall responsibility for the entire air carrier maintenance program, including the overall responsibility for the required inspection function.

CHAPTER 5. MAINTENANCE SCHEDULE

500. What is a maintenance schedule?

FAA regulations require you to have a maintenance schedule called "maintenance time limitations." The maintenance time limitations set out the *what, how,* and *when* of your scheduled maintenance effort. Although in the past the schedule included only basic overhaul limits and other general requirements, today it includes a specific list of each individual maintenance task and its associated time limit. The tasks are usually organized into a series of integrated scheduled work packages that provide a continuous succession of necessary or desirable scheduled maintenance tasks for the entire aircraft.

501. What is the role of the FAA in your maintenance schedule?

The FAA authorizes and monitors your maintenance schedule. The FAA expects you to make changes to your maintenance schedule in the interest of safety. If you do not, the FAA is authorized to require you to change your maintenance schedule.

502. What are the elements of a maintenance schedule?

An air carrier's maintenance schedule should contain at least the following information:

1. *What* (unique identifier): The item to be maintained. The identifier should be specific enough to allow the item to be easily and accurately identified.

2. *How* (task): The scheduled maintenance task to be done. A scheduled maintenance task is a maintenance action performed at regular, scheduled intervals to ensure the item can continue to perform its intended function within its operating context, or to discover a hidden failure. Terms such as "hard time," "on-condition," or "condition monitored" should not be used in the maintenance schedule. These terms are vague, non-specific, and usually do not adequately describe the task to be performed.

3. *When* (frequency): The maintenance interval is the time-in-service when you must perform the maintenance task. In addition, for task management, inventory, and audit purposes, you should identify the task or work card associated with each scheduled maintenance task.

503. How are integrated scheduled work packages created?

You can simplify administration and control of individual scheduled maintenance tasks by grouping or packaging the tasks into integrated scheduled work packages. The checks or work packages required most frequently are generally packages of short-duration maintenance tasks that do not need specialized equipment or facilities. The more complex work packages, usually identified as letter checks such as "A," "B," "C," and so on, are generally scheduled at successively longer intervals. Some letter checks may be set up to incorporate all of the work covered by the preceding check plus the tasks assigned at that letter check interval. Thus, each successive letter check may require an increased amount of labor, technical skill, and specialized

equipment or facilities. However, it is possible that a letter check may not completely supersede a previous letter check because of the exclusion of certain maintenance tasks.

a. Air carriers have customarily expressed intervals for letter-check packages in operating hours or flight cycles. However, primarily for the convenience and ease of scheduling large fleets of aircraft, you may wish to convert these intervals to stand-alone calendar time intervals based on the average daily usage of the aircraft. You do not need to include hours or cycles in a calendar time interval or the term "whichever comes first." If you do this conversion, your letter-check packages will include tasks to be performed once a day, once a week, once a month, and so on. In order to use calendar intervals, you should monitor your aircraft utilization to ensure the calendar interval remains valid in relation to average daily usage of the aircraft. This is particularly important when including calendar, cycle, and hourly controlled tasks in a single letter check.

b. Air carrier scheduled major structural airframe inspections have, historically, been known as "D" or "E" checks. These very large, complex work packages have also been designated by other terminology such as "Heavy Maintenance Check," "Major Maintenance Check," "Heavy Level Check," "Special Structural Visit," and "Airframe Overhaul." This type of scheduled work package normally consists of a hangar visit or series of visits that are designed to accommodate the accomplishment of major scheduled maintenance tasks.

c. Originally, the "D" or "E" check was the aircraft manufacturer's recommended inspection interval for major maintenance requirements such as structural inspections, systems operational/functional checks, aircraft modifications, cabin refurbishment, painting, etc. However, studies of the content of these checks revealed that most of the inspection tasks scheduled for accomplishment during the "D" or "E" check work packages were also listed as requirements in the "C" or multiple "C" work packages. This resulted in a duplication of task requirements. Also considered was that heavy maintenance, modifications, and refurbishment are mostly operator discretionary items that are often scheduled seasonally or in other time periods independent of the scheduled structural inspection program. It was therefore deemed advisable, due to improved efficiency, to redistribute the structural task items to the appropriate interval and eliminate the "D" or E" check terminology altogether.

d. It should also be noted that although manufacturers identified the major structural inspections for older airplanes as "D" or "E" checks, the major structural inspections for newer aircraft are not so identified. In fact, the manufacturer's recommended structural inspections for one of the newest transport category aircraft are not consolidated into work packages or letter checks at all. The recommendation simply contains a listing of all of the tasks and intervals that are considered critical to airworthiness. Using the listing, you are expected to design work packages that best suit your particular maintenance organization and operating environment. Moreover, modern air carrier maintenance philosophy does not normally identify a major inspection interval other than a "C" check. In any case, you may design and identify your structural inspection program or integrated work packages as you deem appropriate, consistent with your maintenance policy and the amendments determined by your Continuing Analysis and Surveillance System (CASS).

e. You may not wish to be faced with an intermittent, heavy workload of "C" and "D" checks, each requiring a large expenditure of labor-hours and taking an airplane out of service for a month or more. Instead, you can distribute appropriate "C" and "D" check tasks among the more frequent letter checks. In this way, aircraft are not subject to lengthy out-of-service times, and the actual scheduled maintenance workload will remain relatively constant, although the actual tasks performed may vary greatly for the same letter check from one time to the next. For example, a task that has a long accomplishment interval but is not time-consuming may be assigned to one of the more frequent letter checks but scheduled only for every second or fourth such check. Conversely, a group of tasks that are especially time-consuming may be distributed among successive letter checks of the same designation, while tasks that are monitored independently may be scheduled for the time of the nearest check regardless of its letter check designation. Consequently, for the same letter check, the actual tasks performed will differ greatly from one scheduled visit of the airplane to the next. Hence, the letter check designation terms "1A," "3A," "1B," "4B," "1C," "2C," "4C," "8C," etc.

CHAPTER 6. MAINTENANCE RECORDKEEPING SYSTEM

600. Why do you have to make and keep maintenance records?

Air carrier maintenance records are made and retained to show that the U.S. Standard Airworthiness Certificate is effective and that the aircraft is airworthy. A U.S. Standard Airworthiness Certificate is effective only as long as the maintenance and alterations are performed according to the requirements of the FAA's regulations. Incomplete or inaccurate required aircraft maintenance records can have the effect of rendering a Standard Airworthiness Certificate ineffective. Maintenance actions, in almost all cases, become intangible or abstract after the fact. Therefore, in order for an aircraft operator to make a maintenance action tangible, a record of that maintenance action must be made. Additionally, making a record of certain summary information supports the current airworthiness status of an aircraft.

601. Are there penalties for improper air carrier maintenance recordkeeping?

Maintenance records are important because the FAA uses its continuing review of aircraft maintenance records as a direct means of ensuring the airworthiness and safety of air carrier aircraft. Because the review of maintenance records is the only direct means of determining the accomplishment of required maintenance, federal law treats the act of intentionally failing to make and keep, as well as the act of intentionally falsifying, mutilating, or altering air carrier aircraft records as a criminal act, subject to the imposition of substantial fines and/or imprisonment.

602. How must you make and keep required maintenance records?

The FAA's regulations require you to have and use a recordkeeping system for the preparation, storage, and retention of required aircraft maintenance records. You must document your system in your air carrier manual. The primary objective of these systems is the generation, storage, retention, and retrieval of accurate and complete air carrier aircraft maintenance records. As stated earlier, these records are primarily made to show that the U.S. Standard Airworthiness Certificate of your air carrier aircraft is effective, and therefore the aircraft is airworthy and capable of safe flight.

In addition to the summary records and airworthiness release records, your recordkeeping system should have detailed documentation and source requirements and procedures for administrative handling of aircraft components and parts. You must clearly identify these procedures in your recordkeeping system and manual. These source and documentation requirements for parts and components may include, but are not limited to, documentation of Airworthiness Directives (AD) compliance, life-limited parts current status information, description of maintenance performed, and appropriate certification of new and repaired parts.

603. What are the required air carrier maintenance records?

Over the years, FAA's air carrier aircraft maintenance record making and retention requirements have evolved from the minimal records of repairs and alterations required in the pre WW2 era, to

the current requirements for two types of records: a list of summary information, and air carrier airworthiness release records.

604. When must these required records be made available to the FAA?

Under FAA's regulations, you must make these records available to the FAA in a reasonable amount of time. The FAA can make a request to see your records at any time or place.

605. Who must make these required records available to the FAA?

You must designate those persons in your organization who are responsible for providing each required record or report to the FAA on request. You must make a list of these persons and their location. The list must include the records, documents, and/or reports that each person is responsible for. You must keep this list current, and make it available to the FAA at your principal base of operations.

1. Summary information.

Air carriers are required to make and keep a list of certain summary status records. You are required to transfer these records with the aircraft when it is sold. Summary current status recordkeeping requirements are listed and explained as follows:

a. The "total time-in-service of the airframe, each installed engine, and each installed propeller." Total time-in-service is a record that contains the time-in-service accrued since new or rebuild, expressed in hours and landings or cycles.

b. The "current status of each life-limited part" of each airframe, engine, propeller, and appliance means a record that contains, at least, the following information:

> **NOTE: For part 135 air carriers, total time-in-service and current status of life-limited parts includes rotors.**

(1) Time-in-service since new expressed in the appropriate parameter (hours, cycles, calendar time, etc.).

(2) The time-in-service remaining to the specified life limit expressed in the appropriate parameter (hours, cycles, calendar time, etc.).

(3) The specified life limit expressed in the appropriate parameter (hours, cycles, calendar time, etc.).

(4) A record of any action that alters the part's life limit or changes the parameter of the life limit.

c. The listing of the "time since last overhaul" means a record that contains, at least, the following information:

(1) A listing of the item that requires overhaul, and its associated scheduled overhaul interval.

(2) The time-in-service since the last overhaul.

(3) The time-in-service remaining to the next scheduled overhaul.

(4) The time-in-service when the next scheduled overhaul is due.

NOTE: The listing of "time since overhaul" refers to summary current status information and must not be confused with an overhaul record, which is a description of the work performed and the identification of the person who performed and/or issued the approval for return to service.

d. The "current inspection status of the aircraft" means a record that contains, at least, the following information:

(1) A listing identifying each of the scheduled inspection packages and each task and their associated intervals that are required by the maintenance program under which the aircraft is maintained.

(2) The time-in-service accrued since the last accomplishment of each of the scheduled inspection packages and tasks required by the maintenance program under which the aircraft is maintained.

(3) The time-in-service remaining to the next accomplishment of each of the scheduled inspection packages and tasks required by the maintenance program under which the aircraft is maintained.

(4) The time-in-service when the next accomplishment of each of the scheduled inspection packages and tasks required by the maintenance program under which the aircraft is maintained is due.

e. The "current status of an airworthiness directive" means a record that contains, at least, the following information:

(1) Identification of the particular airframe, engine, propeller, appliance, or component to which the AD is applicable.

(2) The AD number (and/or regulatory amendment number).

(3) The date and the time-in-service expressed in the appropriate measuring parameter (hours, cycles, calendar time, etc.) when the required action was accomplished.

(4) If the requirement is recurring, the time-in-service when the next action is due expressed in the appropriate measuring parameter (hours, cycles, calendar time, etc.).

(5) The method of compliance means: with regard to an AD, a concise description of the action taken to comply with the requirements of the AD. If the AD or its referenced manufacturer's service bulletin permits the use of more than one method of compliance, the record must include a reference to the specific method of compliance used. If the operator uses an alternate method of compliance (AMOC) to comply with an AD, the method of compliance means a description of this AMOC and a copy of the FAA approval.

> **NOTE: The listing of "current status of an airworthiness directive" or "method of compliance" refers to summary current status information and must not be confused with an AD record of accomplishment, which is a description of the work performed and the identification of the person who performed and/or issued the approval for return to service.**

f. A listing of "the current major alterations of each airframe, engine, propeller, and appliance" means a record that contains, at least, the following information:

(1) A listing identifying each major alteration as well as the associated item to which the major alteration has been installed.

(2) A description, or reference to, the FAA-approved technical data used to make the major alteration.

> **NOTE: For part 135 air carriers, this listing includes a list of all current major repairs, as well as a requirement for a listing of major repairs and alterations to each rotor.**

> **NOTE: The listing of "all of the current major alterations" refers to summary current status information and must not be confused with a major alteration report, which is a detailed description of the work performed, a description of the FAA-approved technical data used to make the alteration, and the identification of the person who performed and/or issued the approval for return to service. This listing also must not be confused with the requirement to submit a copy of each report of a major alteration to the FAA.**

g. "All the records necessary to show that all requirements for the issuance of an airworthiness release have been met." While the regulatory requirement for these records does not provide a detailed list of these records, this requirement is generally accepted to mean:

(1) Detailed records of all scheduled maintenance that has not been superseded by work of equivalent scope and detail.

(2) Detailed records of the accomplishment of the last overhaul for those items required to be overhauled.

NOTE: An overhaul record is not required to contain a record of AD accomplishment. The regulations require records of AD current status and accomplishment to be made and preserved as a separate and distinct record.

(3) Detailed records of all unscheduled maintenance that has not been superseded by work of equivalent scope and detail.

(4) Adequate copies of the airworthiness release. "Adequate copies" is generally accepted to mean copies covering the last 60 days of operation.

NOTE: All of these items (a-g) are required, by regulation, to be transferred with the aircraft when it is sold.

2. Air carrier airworthiness release records.

The FAA's regulations require that each time you perform maintenance or alterations on your aircraft, you must make, or cause to be made, an airworthiness release or log entry before you can operate the aircraft. You are also required to give a copy of the airworthiness release to the pilot-in-command, and to keep a record of the airworthiness release for at least two months. You must keep all of the records necessary to show that all of the requirements for the issuance of an airworthiness release have been met. These records must be retained for at least one year after the work is performed, or until the work is superseded by work of equivalent scope and detail. However, you must keep detailed records of the accomplishments of the last required overhaul until the work is superseded by work of equivalent scope and detail.

Generally speaking, the airworthiness release is executed each time the aircraft completes a scheduled check. A log entry is executed each time the aircraft is approved for return to service after unscheduled maintenance. You may not operate the aircraft unless you issue an airworthiness release or approve it for return to service.

606. Are there any other required records or reports that you must make and keep?

Besides the records listed above, FAA's regulations require you to make other reports and records, listed below. You can use these records and reports to review your maintenance operations to determine the adequacy of the maintenance portion of your air carrier manual and the effectiveness of your maintenance program, as well as your CASS. FAA also uses these reports in its continuous oversight of your maintenance program.

1. You must keep an aircraft maintenance log.

Whenever you take action in response to a reported or observed failure or malfunction, you must make a record of that action in the maintenance log of the aircraft. You must ensure that each pilot-in-command enters all mechanical irregularities occurring during flight time, and that these are entered in the maintenance log at the end of that particular flight time.

2. You must make mechanical reliability reports.

You should use these reports to help you identify deficiencies within your maintenance program. The FAA uses these reports as a means of gathering information for its Service Difficulty Reporting System.

3. You must make mechanical interruption reports.

Essentially, these reports document the inability of the aircraft to arrive at its scheduled destination due to mechanical difficulties. You should use these reports to help you determine the degree of effectiveness of your maintenance program.

4. If you are a part 121 air carrier, you are required to make a report of each major alteration and each major repair made on your aircraft.

You are required to make and submit a major alteration report to the FAA. You are also required to make a report of each major repair, but you are not required to submit it. You must, however, make it available for inspection by the FAA. In addition, because you are an air carrier, you do not have to use FAA Form 337 to report a major alteration or repair that you accomplished, although you can use it.

5. If you are a part 135 air carrier, you are required to make a report of each major alteration and each major repair made on your aircraft.

You are not required to submit either report, but you must make them available to the FAA when they ask.

> **NOTE: These alteration and repair reports should not be confused with the current status listing of major alterations required under part 121 as well as the current status listing of major repairs and alterations required under part 135.**

607. Are you required to keep historical or source records to support your required maintenance records?

There is no regulatory or statutory requirement for you to prepare, store, or retain historical or source records to support your required aircraft maintenance records or current status records. Indeed, if you have a good system to prepare, store, and retain your required maintenance records and you monitor that system under your CASS, you should not need historical or source records for support. Unless there is evidence to the contrary, an aircraft maintenance record produced by your maintenance recordkeeping system should be acceptable by itself, without historical or source records. The FAA will not require you to produce or maintain any records not required by statute or regulation. However, you may wish to archive certain source

documentation records that you used to introduce parts or components into your maintenance system. These records may include documents such as the manufacturer's invoice for new parts, export certificates of airworthiness, documentation of a major repair or alteration, or other similar information that may be useful in the future.

CHAPTER 7. ACCOMPLISHMENT AND APPROVAL OF MAINTENANCE AND ALTERATIONS

You must provide instructions in your manual and program for maintenance and alterations for three major areas: scheduled maintenance, unscheduled maintenance, and specific maintenance requirements for major components of the aircraft.

700. What is scheduled maintenance?

Scheduled maintenance consists of all the individual maintenance tasks performed according to the maintenance time limitations (maintenance schedule). Your scheduled maintenance activities should include procedural instructions for the maintenance tasks and requirements to record the results of the inspections, checks, tests, and other maintenance.

701. What is unscheduled maintenance?

Unscheduled maintenance includes procedures, instructions, and standards for maintenance that occurs on an unscheduled or unforeseen basis. A need for unscheduled maintenance may result from scheduled maintenance tasks, pilot reports, or unforeseen events such as hard or overweight landings, tail strikes, lightning strikes, or engine overtemperature. You should include instructions and standards for the accomplishment of unscheduled maintenance in your technical manuals. You should include detailed procedures for recording all types of unscheduled maintenance in your manual.

702. What should your engine maintenance program contain?

Your engine maintenance program should cover both installed engines and off-wing maintenance for each engine model you operate. If your aircraft has auxiliary power units (APU), you may want to include APU maintenance as part of your engine maintenance program. Normally, the installed engine or APU requirements will be contained in the maintenance time limitations. In addition to procedural information, the off-wing program described in your manual should provide shop scheduling information or intervals for cleaning, adjusting, inspecting, testing, and lubricating each part of the engine or APU requiring that maintenance. Include in your maintenance manual the degree of inspection, the applicable wear tolerances, and the work required when the engine or APU is in the shop. Your engine maintenance or APU program should contain at least the following segments:

a. Procedures for installed and off-wing scheduled and unscheduled engine or APU maintenance tasks.

b. The engine or APU overhaul standard, if applicable.

c. The engine or APU build standard.

d. Procedures for managing the maintenance of short-term and long-term leased aircraft engines or APUs.

e. Procedures for management and maintenance of engines or APUs while they are in a shop maintenance status, whether the engines are leased or not.

f. Procedures for integrating a short-term or long-term leased engine or APU into your maintenance program.

g. Procedures for engine or APU condition and trend monitoring, if used.

703. What should your propeller maintenance program contain?

Your propeller maintenance program should cover each model of both installed propellers and off-wing propellers that you operate. Normally, the installed propeller system requirements will be contained in the maintenance time limitations. In addition to procedural information, the off-wing program described in your manual should provide shop scheduling information or intervals for cleaning, inspecting, adjusting, testing, and lubricating each part of the propeller system requiring that maintenance. Include in your maintenance manual the degree of inspection, the applicable wear tolerances, and the work required at these periods. Some modern propellers are constructed of composite materials and therefore may require unique tools, repair procedures, and training for maintenance personnel. Your propeller maintenance program should contain at least the following segments:

a. Procedures for installed and off-wing scheduled and unscheduled propeller system maintenance tasks.

b. The propeller system overhaul standard, if applicable.

c. The propeller system build standard.

d. Procedures for managing the maintenance of short-term and long-term leased propellers.

e. Procedures for management and maintenance of propellers while they are in a shop maintenance status, whether they are leased or not.

f. Procedures for integrating a leased propeller into your maintenance program.

704. What should your parts and appliance maintenance program contain?

For the most part, this component of your maintenance program covers shop operations, which may include both scheduled and unscheduled tasks. You may conduct these shop operations at some location other than where you perform maintenance on your aircraft. Your parts and appliance maintenance program should cover both installed parts and appliances and off-wing maintenance for each part and appliance model you operate. Normally, the installed part and appliance requirements will be contained in the maintenance time limitations. In addition to procedural information, the off-wing program described in your manual should provide shop scheduling information or intervals for cleaning, adjusting, inspecting, testing, and lubricating each component of the part and appliance requiring that maintenance.

Include in your maintenance manual the degree of inspection, the applicable wear tolerances, and the work required when the part or appliance is in the shop. Your parts and appliance maintenance program should contain at least the following segments:

a. Procedures for installed and off-wing scheduled and unscheduled parts and appliance maintenance tasks.

b. The parts and appliance overhaul standard, if applicable.

c. The parts and appliance build standard.

d. Procedures for managing the maintenance of short-term and long-term leased parts and appliance engines.

e. Procedures for management and maintenance of parts and appliances while they are in a shop maintenance status, whether the parts or appliances are leased or not.

f. Procedures for integrating short-term or long-term leased parts and appliances into your maintenance program.

g. Procedures for parts and appliance condition and trend monitoring, if used.

705. What is the Aging Airplane Program?

The FAA developed the aging aircraft program to address the continued airworthiness of large transport, commuter, and other aircraft that have reached or exceeded their design service life objective. Your Aging Airplane Program normally should cover:

a. Structural modification and inspection;

b. Corrosion prevention and control;

c. Supplemental structural inspection program review and update; and

d. Structural repair assessment requirements.

NOTE: Many FAA ADs associated with the Aging Airplane Program require structural modification, corrosion prevention and control, and supplemental inspection programs. You may integrate these requirements into your overall maintenance program; you do not need to treat it as a separate program, unless the AD requires separation.

706. What are Required Inspection Items?

Under FAA's regulations, you must designate certain tasks as "required inspection items" (RII). These required inspections cover maintenance tasks which, if not properly performed or if done

with improper parts or materials, could result in a failure, malfunction, or defect which would endanger the continued safe flight and landing of the aircraft. In the case of maintenance tasks performed by other persons, you may delegate the RII function to the other person's inspection organization provided you document the arrangement and control it through your maintenance manual. Some examples of other terminology used to describe RII are back-check, buy-back, and duplicate inspection.

1. Your maintenance program manual must specifically identify all RII tasks and procedures.

It should also include procedures to identify and authorize RII personnel, both within your organization and in other organizations that perform maintenance for you. You must formally notify persons authorized to accomplish RII items of the authorization and its scope. You should also identify RII on work forms, job cards, engineering orders, and so on, or by any other method consistent with your maintenance program. A primary concept of the RII function is that the person performing the item of work may not perform the required inspection on that item of work. Additionally, you must design your maintenance organization to separate the accomplishment of your required inspection function from the accomplishment of your maintenance, preventive maintenance, and alteration function. You must also have procedures in your manual to ensure that only a supervisor of an inspection unit or the person that has overall responsibility for both the RII function and the other maintenance, preventive maintenance, and alteration functions may countermand the decision of any RII inspector regarding an RII. These requirements apply equally to your organization or to an organization performing your maintenance for you.

2. RIIs differ from other inspection tasks in their critical effect on flight safety.

For example, work on a landing gear position indicating system might be a normal inspection, whereas an elevator rigging check conducted to check adjustment of elevator travel would be designated RII because improper adjustment might result in reduced controllability of the aircraft. You must consider all RIIs with the same emphasis regardless of whether an individual RII is related to a scheduled or an unscheduled task. The fact that an RII requirement arises at an awkward time or inconvenient location cannot have a bearing on the requirement to accomplish these types of inspections properly.

707. What are some examples of RIIs?

In determining the tasks to designate as RIIs, you should consider the following examples. This list does not cover all RIIs.

a. Installation, rigging, and adjustments of flight controls and surfaces.

b. Installation and repair of major airframe or engine structural components.

c. Installation of an aircraft engine, propeller, propeller blade, or rotor.

d. Installation, repair, and calibration of certain avionics and navigational equipment.

CHAPTER 8. CONTRACT MAINTENANCE

800. What is the extent of your responsibility for maintenance performed by others?

When you use a maintenance provider to provide all or part of the maintenance on your airplane or its component parts, that maintenance provider's organization becomes, in effect, an extension of your maintenance organization. However, you remain responsible for all of the maintenance performed by that maintenance provider on your airplanes. You must determine the maintenance provider's capability to do the work. You must direct the work. Since all work on your aircraft must be performed in accordance with your manual and your maintenance program, you must also provide the maintenance provider with appropriate material from your maintenance manual for that work. Your manual system should accommodate work performed for you by maintenance providers. The policy and procedures segment of your manual should assign responsibilities and delineate procedures to administer, control, and direct contracted work. The technical material that you provide should be arranged for the use and guidance of the maintenance provider.

> **NOTE: When possible, you should have a written contract with anyone performing maintenance work for you on a continuing basis. This will help ensure that your responsibilities are addressed. In the case of major operations, such as engine, propeller, or airframe overhaul, the contract should include a specification for the work. You should include or reference that specification in your manual system.**

801. What are the requirements for performing unscheduled maintenance away from your regular maintenance facilities?

Sometimes, on an unanticipated basis, you will need maintenance while your aircraft is away from your regular maintenance facilities. You may also need maintenance services on short notice. Your manual should include procedures for obtaining these services under these unanticipated conditions. You should outline the steps you will take to control and direct the work that is to be done. Unscheduled, short-notice requirements for maintenance does not abrogate your responsibility to determine that your maintenance provider has the organization, adequate facilities and equipment, competent personnel, and appropriate portions of your manual for the work that is to be done. These determinations must be made before the maintenance provider starts to work on your aircraft.

802. Who has the responsibility for releasing your aircraft as airworthy?

You, as an air carrier, have the responsibility for releasing your aircraft as airworthy. Each individual, whether employed by you or by a maintenance provider doing work for you, who releases one of your aircraft for service following maintenance must be an individual, a certificated mechanic or repairman, and be specifically authorized by you to do so. An individual may not release one of your aircraft unless you authorize them to do so.

1. You must designate each individual authorized to execute the airworthiness release for you by name and occupational title. The individual signing the release acts as your authorized agent. He or she certifies the maintenance covered by the release has been accomplished according to your manual and maintenance program and that no known condition exists that would make the aircraft unairworthy. This arrangement in no way reduces the responsibility of maintenance personnel for maintenance functions or tasks they perform or supervise.

2. In your manual, you should describe the circumstances when a release is required. Normally, an airworthiness release is required following completion of maintenance prescribed by OpSpecs, or maintenance activities involving RII. You may not operate your aircraft unless you have approved it for return to service or issued an airworthiness release.

803. How are new maintenance providers evaluated?

Before you can use a maintenance provider for the first time, you must conduct an audit of that maintenance provider to confirm the provider complies with pertinent requirements of 14 CFR part 121, subpart L. In most cases, this will be an on-site audit. You must demonstrate, through this audit or by some other means, that the maintenance provider meets all of the following requirements and is capable of performing the work consistent with the requirements of your program. The maintenance provider must have:

a. The capability to do the work;

b. An organization structured to do the work;

c. Competent, trained personnel to do the work;

d. Relevant and current technical and administrative material from your manual for the work;

e. Adequate facilities and equipment to do the work;

f. The ability to transfer and receive data and information necessary to support your CASS; and

g. A current listing of individuals trained, qualified, and authorized by you to conduct required inspections. The list must identify these individuals by name, occupational title, and the inspection(s) they are authorized to perform.

804. How do you ensure your maintenance provider continues to comply with the requirements?

Ensuring the maintenance provider's continued compliance is part of your CASS. You should establish a schedule for auditing and inspecting each maintenance provider. These audits should determine the maintenance provider's continuing compliance with both 14 CFR part 121, subpart L, and your maintenance program. The audit schedule should be based on your own unique set of circumstances and needs. It should not be fixed; rather, the frequency of audits or

inspections should respond to such variables as your level of confidence in the maintenance provider, the complexity and quantity of the work, the quality of the work produced, and the quality of the records and certifications provided. Because of these variables, your audit schedules may not be the same as another air carrier's and should change in response to information from your CASS. For maintenance providers, your CASS will continuously:

a. Ensure that all maintenance on your aircraft or component parts performed by the maintenance provider is done in accordance with your manual and maintenance program.

b. Detect and identify, and provide timely corrective action for, all deficiencies or deviations in those portions of your maintenance program done by the maintenance provider, including maintenance recordkeeping.

c. Track and evaluate the standards of performance (quality) of the maintenance done by the maintenance provider. You must include provisions for timely corrective action if the quality of work becomes unsatisfactory.

CHAPTER 9. CONTINUING ANALYSIS AND SURVEILLANCE SYSTEM

900. What are the origins of the Continuing Analysis and Surveillance System?

Introduction of a Continuing Analysis and Surveillance System (CASS) resulted from a FAA/National Transportation Safety Board (NTSB) joint study of a series of maintenance-related air carrier accidents occurring during the 1950s. The joint study found that, in some cases, the primary causal factor of an accident was the effectiveness of the air carrier's maintenance program itself. The study found that some maintenance programs were incapable or ineffective in preventing the failure that led to the accident. In other cases, the maintenance program was determined to be effective, but maintenance personnel failed to accomplish required maintenance tasks or failed to accomplish the task correctly. The study found that the maintenance program was often not performed properly.

a. Responding to this discovery, FAA introduced regulatory requirements that require air carriers to establish and use a system for the continuing analysis and surveillance of the performance and effectiveness of their inspection, maintenance, preventive maintenance, and alterations programs.

b. The system must also provide a way to correct any deficiency in those programs, regardless of whether those programs are carried out by the air carrier or by another person. CASS is crucial to the effective management of your maintenance program and your realization of the highest possible degree of safety.

901. What is CASS?

CASS is an air carrier quality assurance system. In a structured, methodical manner, CASS helps you ensure that you reach your maintenance program objectives. CASS is the only management system that is mandated by regulation. Used properly, your CASS becomes an inherent way of doing business for you, and helps you promote a safety culture in your company by providing a formal process for employees to identify and correct safety discrepancies.

902. What does CASS do?

Your CASS must be designed to detect and correct air carrier maintenance program deficiencies in the areas of program effectiveness and program performance (program execution). Your CASS provides a structured process to identify factors that could lead to an accident or incident through collection and evaluation of information that can be used as indicators of the degree of maintenance program effectiveness and performance. This is accomplished through a closed-loop, continuous cycle of surveillance, investigations, data collection and analysis, corrective action, corrective action monitoring, and back to surveillance. Your CASS should ensure that all elements of your maintenance program are being accomplished in accordance with your manual (program execution), that your program is effective in achieving its goals, and that deficiencies in your maintenance program and manuals are identified and corrected. CASS collects information, analyzes the information, and looks for precursors, indicators, or symptoms of discrepancies in your maintenance program so that you can develop and implement corrective action. FAA's regulations allow the FAA to direct changes to your maintenance program to correct deficiencies if you do not make the changes by yourself.

903. What part of your air carrier maintenance program does your CASS monitor?

CASS monitors all nine elements of your maintenance program:

- Airworthiness responsibility
- Maintenance manual
- Maintenance organization
- Maintenance schedule
- Maintenance recordkeeping system
- Accomplishment and approval of maintenance and alterations
- Contract maintenance
- CASS
- Personnel training

904. How does CASS work?

a. CASS has three primary functional areas:

(1) Monitoring a maintenance program's effectiveness;

(2) Monitoring a maintenance program's performance (program execution); and

(3) Developing and implementing corrective action for a maintenance program identified during the surveillance, investigations, and analysis process.

b. Two subfunctions within the first two primary functional areas are: scheduled (proactive) surveillance, investigations, and analysis; and unscheduled (reactive) surveillance, investigations, and analysis.

c. A subfunction within the third primary functional area is monitoring/feedback to ensure the corrective action accomplished what was intended.

905. What are the principal elements of CASS?

Your CASS should have two major sections: program execution and program effectiveness. Both should include at least the following basic elements.

a. The Accountable Manager: the person in charge. This person should have the corporate duty and responsibility to commit, control, and direct the corporate resources necessary to reach the objectives of the system and to make the maintenance program and manual amendments identified as necessary by your CASS.

b. Detailed policy and procedures for determining whether you need to amend your maintenance program or manual, and for making those amendments. These policies and procedures should cover both Proactive Surveillance and Analysis and Reactive Surveillance and

Analysis. Both types of analysis are continuous processes of surveillance, data collection, and analysis; investigations; corrective action; and monitoring and feedback. Proactive analysis forecasts faults in your maintenance program or manual through the collection and analysis of a wide variety of data. It corrects those faults, including human factors issues, in advance of any specific event, accident, or incident. Reactive analysis responds to events or accidents to address the faults, including human factors issues, in your maintenance program or manual that were responsible for those events or accidents.

906. What are the general CASS objectives?

Your CASS should accommodate your objectives by helping you:

a. Realize the levels of safety and reliability that you have set;

b. Restore the levels of safety and reliability that you have set in the event deterioration occurs;

c. Collect the information necessary to identify systemic or other maintenance error contributors that degrade airworthiness and the level of safety and reliability that you have set;

d. Collect the information you need to continuously validate that all elements of your maintenance program are being executed in accordance with your manual;

e. Collect the information you need to continuously validate the effectiveness of each element of your maintenance program;

f. Collect the information you need to continuously validate the effectiveness of each scheduled maintenance task and its associated interval; and

g. Compile the information you need to improve the design of items whose level of safety and reliability proves inadequate.

907. What does the program execution part of your CASS accomplish?

The program execution part of your CASS should ensure that everyone, including all of your maintenance providers, complies with your manual and program and with all applicable regulations and statutes. Generally, the program execution part of your CASS functions through a system of scheduled audits and investigation of operational events. You should consider each negative audit and each operational event as an indicator or symptom of a program or systemic failure. Your program execution part of CASS should include a continuous cycle of both scheduled and unscheduled (proactive and reactive) surveillance and investigations, data collection and analysis, corrective action, and monitoring and feedback.

1. Proactive surveillance and analysis.

Your CASS should provide a continuous process of surveillance, collection, and analysis of items discovered during scheduled audits and other data collections. Your CASS audit schedule should include, but not be limited to, the following items:

a. All manuals, publications, and forms are useable, current, accurate, and readily available to the user.

b. All maintenance and alterations are, in fact, performed in accordance with the methods, standards, and techniques specified in your manuals.

c. Maintenance records are generated in accordance with the manual procedures, and are adequate, correct, and complete.

d. All RIIs are clearly identified and handled in accordance with your RII procedures.

e. Air carrier airworthiness releases are executed by authorized persons and accomplished in accordance with the procedures specified in your manuals.

f. Shift turnover records and deferred maintenance are handled in accordance with your manual procedures. You should consider focusing on shift turnover errors in your surveillance system. Shift turnover errors have been identified as primary causal factors in a number of fatal air carrier accidents and incidents.

g. All maintenance facilities and equipment, including contract maintenance facilities and equipment, are adequate for the maintenance required.

h. All personnel, including contract personnel, are competent to properly execute the maintenance that is to be performed.

i. Each aircraft released to service is airworthy and properly maintained for service in air transportation.

2. Reactive surveillance and analysis.

Your CASS should monitor and respond to unexpected operational events on an unscheduled surveillance item basis. This is a continuing process of real-time surveillance, investigations, and analysis of random events that reduce the availability of the aircraft. Your event investigation should follow the causal chain much further than the determination that "the pylon pin safety lock was left off," or "the check valve was installed backwards." You should determine *why* the event occurred and take appropriate corrective action. While you should correct each individual discrepancy (for example, install the backward check valve properly), your CASS should emphasize analysis and correction of that part of your maintenance program that allowed the program performance fault (backward check valve) to occur in the first place. It helps determine what changes are needed to fix the deficiencies in your maintenance program that allowed the random event to occur. Your CASS reactive surveillance and analysis should address, but should not be limited to, the following items:

a. Aborted takeoffs;

b. Unscheduled landings;

c. In-flight engine shutdowns;

d. Accidents/incidents;

e. Canceled flights due to unscheduled maintenance requirements;

f. Delays due to an unscheduled maintenance requirement; and

g. Any other maintenance or operational related event leading to an unsafe condition.

908. What does the program effectiveness part of your CASS accomplish?

The program effectiveness part of your CASS should ensure that all elements of your maintenance program are effective in what you intend them to accomplish. The essential philosophy of the program effectiveness portion of your CASS is that certain indicators, such as adverse trends, premature failures, and maintenance-related flight cancellations/delays may be indicative of an effectiveness deficiency in a portion or portions of your maintenance program. Your CASS should function by continuously surveying, collecting information, and analyzing and validating your operation, including, but not limited to, maintenance time limits, maintenance procedures, and maintenance methods, techniques, and practices. It includes a continuous cycle of surveillance, investigations, data collection and analysis, corrective action, and monitoring and feedback.

While you must dispose of each documented aircraft discrepancy (for example, "replaced the leaking hydraulic pump"), this element of your CASS focuses on analysis and correction of that portion of your maintenance program that allowed the program performance discrepancy (what caused the hydraulic pump to leak?) in the first place. This part of your CASS should include, but not be limited to, a continuous review of pilot report data, failure analyses, previous inspection findings, and component removal rates. You can use these and other indicators as tools to identify rogue parts, and to direct maintenance and repair activity. Procedures for documenting, reporting, and analyzing inspection findings, operational malfunctions, or abnormal operations, such as hard or overweight landings, are essential parts of this element.

1. Proactive surveillance and analysis.

Your CASS should provide a continuous process of surveillance, collection, and analysis of certain data that detects impending failures or adverse trends in your maintenance program. Some data you might collect, monitor, and analyze include:

a. An increased frequency of unscheduled parts replacement or increased need for unscheduled maintenance.

b. An increased degree and frequency of adjustment and/or calibration of equipment.

c. Changes in operational capability or reliability (i.e., delays).

d. Dispatch availability rates.

e. Trend analysis of individual item failure rates.

2. Reactive surveillance and analysis.

Your CASS should monitor and respond to unexpected operational events on an unscheduled surveillance item basis. This is a continuing process of real-time surveillance, investigations, and analysis of random events that reduce the availability of the aircraft. It helps determine what changes you need to make to fix the deficiencies in your maintenance program that allowed the random event to occur. Your CASS reactive surveillance and analysis should address, but not be limited to, the following items:

a. Aborted takeoffs;

b. Unscheduled landings;

c. In-flight engine shutdowns;

d. Accidents or incidents;

e. Flights canceled due to an unscheduled maintenance requirement;

f. Delays of more than 15 minutes due to an unscheduled maintenance requirement; and

g. Any other event leading to an unsafe condition or a reduction in the availability of the aircraft for service.

CHAPTER 10. PERSONNEL TRAINING

1000. What are the basic requirements for the training program?

You can find specific air carrier maintenance training requirements in certain sections of part 121, subpart L and part 135, subpart J. These regulations state, in part, that air carriers must "have a training program to ensure that each person (including inspection personnel) who determines the adequacy of work done is fully informed about procedures and techniques and new equipment in use and is competent to perform his duties." There is an additional implied training requirement in subpart L and subpart J in that the air carrier must provide competent personnel for the proper performance of the maintenance program. As a result, a training program for maintenance personnel has evolved as an uncomplicated means of ensuring that maintenance personnel are competent. FAA's regulations contain the measure of flexibility necessary to allow each air carrier to develop a training program fitting its particular needs.

1001. What are some of the types of training that can be included in a training program?

Some of the types of training that can be included in an air carrier training program are: initial training, recurrent training, specialized training, maintenance provider training, and competence-based training.

1002. What is initial training and what does it include?

Initial training is provided right after a person is hired, or when personnel begin to work on new equipment or a new assignment. Your initial training program may include subjects such as employee indoctrination or orientation, maintenance department policies and procedures, maintenance recordkeeping and documentation, aircraft systems or ground equipment, specific skills (avionics, composite repair, aircraft run-up and taxi, etc.), skills upgrade, human factors, task-specific training, hazardous materials, or Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) regulations familiarization. Your initial program may also include a competence-based assessment of employees. This evaluates an employee's previous training and experience and helps identify their specific individual training needs.

1003. What is recurrent training and what does it include?

Recurrent training is education occurring on a repetitive basis. It provides maintenance personnel with the information and skills necessary to maintain the required level of competence. This training also accommodates the introduction of new aircraft, aircraft modifications, new or different ground equipment, new procedures, techniques, and methods, or other new information. Recurrent training, although occurring on a repetitive basis, may not adhere to a defined schedule. This training should not provide repetitive information unless it is to maintain the desired degree of competence. Recurrent training may include:

a. Continuing competency training designed to maintain regulatory and certificate currency requirements;

b. Refresher training on a seldom accomplished task or seldom used skill;

c. Update training for particular tasks or skills. Update training can include training bulletins, bulletin-board items, self-study tasks, and computer-based instruction;

d. Specific training designed to correct deficiencies identified through the air carrier's CASS; and

e. Any other continuing education or training that may not be provided on a defined schedule.

1004. What is specialized training and what does it include?

Specialized training focuses on competence in specific tasks or areas of responsibility. You might provide this training with initial or recurrent training. You don't need to limit it to maintenance subjects; may include management skills training for new supervisors, computer skills, or other training necessary because of a change in an individual's duties and responsibilities.

1005. What is maintenance provider training and what does it include?

Your training program must provide appropriate information to each employee of a maintenance provider about your specific program. The training should include function-specific training appropriate to each person's job assignment or area of responsibility. You do not need to provide training to maintenance provider personnel in areas that do not concern them. For example, training on aircraft log procedures and minimum equipment list procedures would not be required for aircraft interior cleaners, but would be required for maintenance personnel assigned to on-call maintenance for you.

> **NOTE: If a maintenance provider has specific types of training for its personnel, you do not need to duplicate that training for those individuals, but you must ensure the maintenance provider has indeed provided the training and that the training meets your own needs and training standards.**

1006. What is competence-based training and what does it include?

Although air carriers have historically provided a specified number of maintenance training hours to ensure that employees have the competencies needed for their jobs, studies have shown that it may be better to train to a competence-based standard. This type of training need not be done on a defined schedule or for a specific number of hours. Rather, you should test each individual to evaluate what training he or she needs. Use these evaluations to identify personnel who retain a high level of subject competence and who may not require a particular block of instruction. Conversely, you should also identify those individuals who require more training. Training to competence permits you to tailor training programs to the specific requirements of your individual maintenance personnel and maintenance providers.

CHAPTER 11. HAZARDOUS MATERIALS AND DANGEROUS GOODS

1100. What should my manual contain about hazardous materials?

If your maintenance operations require the use of aircraft components or consumable materials that contain hazardous materials or dangerous goods as defined in 49 CFR § 173.34, your manuals should include procedures and information about these materials. Your manuals should cover:

a. Procedures and information to help maintenance, shipping, or stores personnel to identify or recognize aircraft components or consumable materials that contain hazardous materials;

b. Procedures and instructions for the safe movement, storage, or handling of those aircraft components or consumable materials within your facility or within one of your maintenance providers' facilities;

c. Procedures and information for determining the proper packaging, marking, labeling, and materials compatibility of aircraft components or consumable materials that contain hazardous materials while they are within your facility or within one of your maintenance provider's facilities;

d. Information, guidance, and precautions regarding the specific hazards associated with aircraft components or consumable materials containing hazardous materials that are to be moved, stored, or handled within your facilities; and

e. Information, instructions, and detailed procedures for the proper disposal of unserviceable aircraft components or consumable materials containing hazardous materials.

CHAPTER 12. ADMINISTRATIVE MATTERS

1200. Which advisory circular does this AC cancel?

This AC cancels AC 120-16C, Continuous Airworthiness Maintenance Programs, dated August 8, 1980.

1201. What is the regulatory basis of this AC?

You can find the regulations that underlie this AC in the following parts of Title 14 of the Code of Federal Regulations:

1. Air Carriers' Responsibility for Airworthiness, 14 CFR §§ 121.363 and 135.413;

2. Air Carrier Maintenance Programs, 14 CFR §§ 119.5, 119.49, 121.133, 121.367, or 135.21;

3. Maintenance Program Manual, 14 CFR §§ 121.133, 121.137, 121.367, 121.369, 135.21, and 135.427;

4. Maintenance Organization, 14 CFR §§ 119.65, 119.67, 119.69, 119.71, 121.365 and 135.423;

5. Maintenance Time Limits, 14 CFR §§ 119.49, 121.135, and 135.23;

6. Performance and Approval of Maintenance and Alterations, 14 CFR §§ 121.379 and 135.437;

7. Performance and Approval of Maintenance and Alterations Performed by Other Persons, 14 CFR §§ 121.379 and 135.437;

8. Continuing Analysis and Surveillance System, 14 CFR §§ 121.373 and 135.431;

9. Personnel Training, 14 CFR §§ 121.375 and 135.433;

10. Maintenance Recordkeeping and Reports, 14 CFR part 121, subpart V; 14 CFR §§ 121.369, 121.380; 135.415, 135.417, 135.427, and 135.439(b);

11. Maintenance Log, 14 CFR §§ 121.563, 121.701, 121.709, and 135.65;

12. Mechanical Reliability Reports, 14 CFR §§ 121.703 and 135.415;

13. Required Inspection Items, 14 CFR §§ 121.365, 121.369, 121.371, 135.427, and 135.429;

14. Mechanical Interruption Reports, 14 CFR §§ 121.705 and 135.417;

15. Alteration and Repair Reports, 14 CFR §§ 43.9(b), 121.707, and 135.439(a)(2)(vi); and

16. Hazardous Materials Regulations, 49 CFR parts 171, 172, 173, and 175.

1202. Where can you find regulatory and guidance material related to the information in this AC?

For more information, consult:

1. CFR parts 43, 91, 119, 121, and 135.

2. 49 U.S.C. § 46310, Reporting and Recordkeeping Violations.

3. As revised, AC 91-56, Supplemental Structural Inspection Program for Large Transport Category Airplanes.

4. Revised AC 91-60A, The Continued Airworthiness of Older Airplanes.

5. FAA Order 8300.10, Airworthiness Inspector's Handbook.

6. FAA Order 8300.12, Corrosion Prevention and Control Programs.

7. Air Transport Association MSG-3, Latest Revision.

8. Report number AD-A066-579, Reliability-Centered Maintenance.

1203. Where can you get materials related to the information in this AC?

1. You can get the CFRs and those ACs for which there is a fee from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. A listing of CFR and current prices is located in AC 00-44, Status of Federal Aviation Regulations. You can also get a copy of current regulations from the CFR on-line at http://www.access.gpo.gov/ecfr/.

2. You can be placed on FAA's mailing list for free ACs by contacting the U.S. Department of Transportation, SVC-121.21, Washington, DC 20590.

3. You can request free ACs from the U.S. Department of Transportation Subsequent Distribution Office, SVC-121.23, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785.

4. You can get Report Number AD-A066-579, Reliability-Centered Maintenance, from the U.S. Department of Commerce, National Technical Information Service, Springfield, VA, 22161. Telephone: (703) 487-4650.