CIVIL AERONAUTICS MANUAL 42

U. S. Department of Commerce — Civil Aeronautics Administration

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Supplement No. 1 — October 15, 1954

SUBJECT: Revisions to Civil Aeronautics Manual 42 dated August 1954.

This supplement is issued to provide subscribers of CAM 42 with a change in policy with respect to the establishment and revision of maintenance time limitations and to standardize the establishment and revision of maintenance time limitations for all air carrier aircraft irrespective of the basis for certification; and to make an editorial correction to Appendix B.

Remove and destroy the following pages:	*Insert in lieu thereof the following pages (rev. 10/15/54):*
V–VI	V–VI
21 through 26	
21 through 26–1.	

Ink revision:

Page 98—Appendix B—Operation in the territory of Alaska: change "42.53–3" to read "42.52–1".

Attachments:

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pliance with Airworthiness Directives and manufacturers' service bulletins.

(g) Small aircraft must be maintained in accordance with the provisions of the applicable regulations in this subchapter (i. e. the Civil Air Regulations) and the manufacturer's recommendations. No aircraft will be dispatched on any flight during which the aircraft may exceed any prescribed maintenance time limitations.

"42.31 *Inspections and maintenance.*

"(a) Aircraft shall be given a preflight check to determine compliance with section 42.51 (e) and, in addition, shall meet the following requirements:

"(1) Large aircraft shall be maintained and inspected in accordance with a continuous maintenance and inspection system as provided for in the maintenance manual.

"(2) Small aircraft shall either be maintained and inspected in accordance with subparagraph (1) of this paragraph or be given a periodic inspection at least every 100 hours of flight time and an annual inspection at least every 12 months. The annual inspection may be accepted as a periodic inspection.

"(b) A record shall be carried in the aircraft at all times showing that the latest inspections required by paragraphs (a) (1) or (2) have been accomplished, except such record may be kept at the principal operations base when the aircraft is maintained and inspected as provided in paragraph (a) (1) of this section."

42.31–1 *Inspection and maintenance—large aircraft (CAA policies which apply to section 42.31 (a) (1)).* A continuous maintenance and inspection system is one in which a prescribed schedule of maintenance and inspection functions is set forth in the maintenance manual approved by Administrator. The schedules of maintenance functions shall include the overhaul time limitations and inspection program including time limitations which are considered adequate by the Administrator to maintain the aircraft in a continuously airworthy condition.

42.31–2 *Maintenance and inspection—small aircraft (CAA policies which apply to section 42.31 (a) (2)).* The operator may elect to establish a continuous maintenance and inspection system in his maintenance manual for the maintenance of small aircraft in the same manner as is required for the maintenance of large aircraft. Under such circumstances the maintenance manual requirements and all limitations applicable to large aircraft will also be applicable to small aircraft. Otherwise the inspections shall be conducted in accordance with the periodic and annual inspection requirements of this section and, in addition, overhauls must be conducted at or before the time limitations recommended by the manufacturers of the aircraft, aircraft engine, or other components as prescribed in part 18 of this subchapter (i. e. the Civil Air Regulations).

[42.31–3 Deleted.]

42.31–4 *Maintenance and inspection records (CAA policies which apply to section 42.31 (b)).* The record required in this paragraph may consist of the aircraft log book if it is so arranged as to provide full information on the maintenance work performed on the aircraft. In case the aircraft is maintained under a continuous maintenance and inspection system, the maintenance records which are utilized in such system may be considered as complying with this requirement; however, all such records shall be complete and shall properly identify the aircraft, aircraft time, and the extent of maintenance work or inspections performed. When maintenance or inspection functions are performed away from their principal maintenance base, a copy of the record of maintenance or inspections performed shall be retained in the aircraft and a copy promptly mailed to the principal maintenance base.

"42.32 *Additional maintenance requirements for large aircraft.* The following requirements are applicable to operations conducted in large aircraft:

"(a) *Facilities.* Facilities for the proper inspection, maintenance, overhaul, and repair of the types of aircraft used shall be maintained by the air carrier, unless arrangements acceptable to the Administrator are made with other persons possessing such facilities.

"(b) *Maintenance personnel.* A staff of qualified mechanics, inspectors, and appropriate supervisory personnel shall be em-

ployed by the air carrier and kept available for performing the functions specified in section 42.30, except where the air carrier has obtained the approval of the Administrator for the performance of such functions by some other person. The air carrier shall permit maintenance to be performed only by an individual competent therefor.

"(c) *Reporting of mechanical irregularities occurring in operation.* Each air carrier shall prescribe in its operations manual a procedure for the submission of written reports by the members of the flight crew for all mechanical irregularities occurring during the operation of the aircraft. The members of the flight crew designated by the air carrier shall submit a written report in accordance with such system to the person responsible for the maintenance of the aircraft. This report shall be submitted at the end of each through flight or sooner if the seriousness of the irregularity so warrants. Such report or copy thereof indicating the action taken shall be retained in the aircraft for the information of the next flight crew.[6]

"(d) *Maintenance manual.*

"(1) The air carrier shall prepare and maintain for the use and guidance of maintenance personnel a maintenance manual which contains full information pertaining to the maintenance, repair, and inspection of aircraft and equipment and clearly outlines the duties and the responsibilities of maintenance personnel. The form and content shall be acceptable to the Administrator. It shall contain a copy of the approved time limitations for inspection and overhauling of aircraft, aircraft engines, propellers, and appliances. Copies and revisions shall be furnished to all persons designated by the Administrator. All copies in the hands of company personnel shall be kept up to date.

"(2) A copy of those portions pertaining to the aircraft shall be carried therein.

"(3) Any changes prescribed by the Administrator in the interest of safety shall be promptly incorporated in the manual. Other changes not inconsistent with any Federal regulation, the air carrier operating certificate, or safe operating practices may be made without prior approval of the Administrator.

"(4) No maintenance, repair, or inspection of aircraft or equipment shall be made by the air carrier contrary to the provisions of the maintenance manual."

42.32–1 *Facilities for the proper inspection, maintenance, overhaul, and repair (CAA interpretations which apply to section 42.32).*

(a) The facilities required in section 42.32 (a) include housing, work space, equipment, supplies, materials, tools, parts, and aircraft components in sufficient quantity and quality to assure that the needed inspection, maintenance, overhaul, and repair of the air carrier's aircraft (including airframes, powerplants, propellers, and appliances) can be satisfactorily performed at all times by either the air carrier or persons with whom the air carrier has made arrangements for the performance of such functions. The housing, facilities, equipment, and materials specified in section 52.21–1 through section 52.21–3 and section 52.30–1 through section 52.36–1 which are appropriate to the particular air carrier's aircraft and maintenance system, are considered to be the minimum facilities required by section 42.32 (a).

42.32–2 *Arrangements acceptable to the Administrator (CAA policies which apply to section 42.32 (a)).* The Administrator will determine the acceptability of arrangements made by the air carrier with other persons for the inspection, maintenance, overhaul, and repair of the types of aircraft used by the air carrier on the basis of the following criteria:

(a) Such arrangements conform to the approved continuous airworthiness, maintenance, and inspection program which the air carrier must perform in accordance with its maintenance manual.

(b) The inspection, maintenance, overhaul, and repair of the air carrier's aircraft, including airframes, powerplants, propellers, and appliances, is performed, inspected, and/or approved, by a certificated repair station, appropriately certificated air carrier, or manufacturer, in accordance with section 18.10 (b), (d), or (e); section 18.11 (a) (2), (3), or (4); and section 18.11 (b) (2), (3), or (4); provided

[6] See section 42.56 for the requirements for reporting aircraft or component malfunctioning and defects.

that inspections and maintenance specified in subparagraphs (1) and (2) may be performed and/or approved by a certificated mechanic in accordance with section 18.10 (a) and section 18.11 (a) (1).

(1) The performance of preventative maintenance and the performance and approval of minor maintenance, minor repairs, and minor inspections at points in the air carrier's area of operation, where persons specified in section 18.10 (b), (d), or (e) do not provide the facilities required in section 42.32 (a).

(2) The performance of inspections and associated minor maintenance operations which are limited to preflight inspections, daily inspections, and the most frequent periodic inspection and/or check as listed in the air carrier's maintenance manual other than preflight or daily inspections.

(c) Such arrangements provide that all replacement parts, components, and materials furnished directly or indirectly by such persons for use on the air carrier's aircraft conform to the type, quality, strength, and standards of maintenance established in the air carrier's maintenance manual and as required by section 18.30.

(d) The air carrier's maintenance manual provides full, clear, and accurate information and instructions regarding the inspection, maintenance, overhaul, and repairs to be performed by such persons, and contains the names, location of facilities, and obligations of such persons to the carrier.

(e) The overhaul, major repair, and major inspection of aircraft and aircraft components are performed by or under the direct and immediate supervision of persons who are prime contractors and are conducted at the principal maintenance base of such persons or within the environs of such maintenance base.

(f) Such arrangements are made with qualified persons who provide competent personnel and possess adequate facilities and all other requisites appropriate to the type of aircraft or aircraft component on which any inspection, maintenance, or repair is to be performed for the air carrier.

(g) Such arrangements are reviewed by the Administrator prior to the accomplishment of any inspection, maintenance, or repairs; except that temporary arrangements may be made on an emergency basis without prior review by the Administrator provided that the air carrier gives written notice to the Administrator of each such arrangement not later than ten days after any inspection, maintenance, or repairs have been performed on such emergency basis and further provided that such temporary arrangements are limited to persons who are fully qualified and competent to perform such inspection, maintenance or repairs.

42.32–3 *Maintenance personnel (CAA policies which apply to section 42.32 (b)).*

(a) The staff of maintenance personnel employed by the air carrier must be acceptable to the Administrator.

(*b*) When the air carrier desires approval for the performance of maintenance functions by another agency, the air carrier must provide at least one competent person who will be fully responsible for all maintenance functions performed by the other agency. All contracts between the Administrator and the air carrier pertaining to maintenance of aircraft will be conducted through such designated employee. This employee will be responsible for determining that maintenance or inspection functions are performed only by individuals or agencies competent therefor.

42.32–4 *Reporting of mechanical irregularities in operation (CAA policies which apply to section 42.32 (c)).* All irregularities which are experienced and reported by the flight crews must be recorded under the established procedure including the aircraft identification, irregularity experienced, the corrective action taken as a result, and identification of the person making such corrections. This record may be included as a part of the aircraft log book if the log book provides for an extra copy of such data to be retained in the aircraft.

42.32–5 *Maintenance manual (CAA policies which apply to section 42.32 (d) (1)).*

(a) *General.*

(1) The section of the maintenance manual which pertains to maintenance, repair, and inspection of aircraft shall include a detailed breakdown of the aircraft's component parts and emergency equipment (in accordance with

the requirements of section 42.24–1) which are subjected to maintenance functions; such as, overhaul, repair, inspection, or testing. This listing of components shall indicate the time limitations at which such functions are conducted. This section of the manual shall also include an outline or description of the maintenance functions conducted at each of the scheduled maintenance operations. In many cases the inspection work sheets and work assignment forms may be used to accomplish this requirement if such forms contain sufficient information to fully describe the work done.

(2) The outline of duties and responsibilities of maintenance personnel is to be in such form that the line of authority can be clearly traced from the top management to the maintenance crews. An organization chart showing levels of responsibility and areas of authority will accomplish this purpose.

(3) The maintenance manual shall be loose leaf in form with letter-size pages, and shall be numbered and indexed in a manner to facilitate its use as reference material by the personnel concerned. Each page shall include space in which the date of last revision will be indicated. Existing manuals may be utilized if they are found to fulfill the requirements of this section and are considered acceptable by the local aviation safety agent—aircraft maintenance.

(4) At any time when approval is granted for the amendment of time limitations, the pertinent pages for the manual must be promptly revised to indicate the new time limitations.

[(b) *Maintenance—time limitations.* The approved time limitations for inspection and overhauling of aircraft, aircraft engines, propellers, and appliances must be those time limitations substantiated by, and approved for, the air carrier operator by the Administrator. Initial approval of the time limitations or approval of amendments to the time limitations will be accomplished by the regional office of the region in which the principal maintenance base is located. This approval will be based, to a large extent, on the recommendation of the Aviation Safety Agent—Aircraft Maintenance assigned to the operation. The inspection and overhaul time limitations applicable to airframes, powerplants, propellers, and appliances will be revised on the basis of service experience. When the service records indicate that any component or subcomponent consistently requires repair, adjustment, or other maintenance because of damage, wear, or deterioration, within the current time limitations, the air carrier will be responsible for initiating corrective action. The procedures for amendment of such time limitations are as follows:

[(1) *Notification of intent to amend time limitations.* An operator desiring to amend the currently approved time limitations should advise the Aviation Safety Agent—Aircraft Maintenance assigned to his operation at least 15 days prior to the submission of his intention to amend the time limitations indicating the components involved and the desired change.

[(2) *Application for amendment.* The operator shall submit a written application in the form of a letter outlining the desired changes and attaching complete substantiating data. The letter shall include a statement to the effect that the operating, service, and overhaul records of the involved components for the past 90 days indicate that the changes requested will not adversely affect the continuous condition of airworthiness and safety of operation of the involved component. The substantiating data to be submitted with this letter will include a record of all mechanical irregularities, and malfunctions, and flight interruptions experienced during the preceding 90 days of operation. It will also include overhaul and inspection records pertaining to the most recent overhauls and inspections conducted on the involved components, under the currently approved time limitations.

[(3) *Procedure for establishing initial or revised time limitations.* Time limitations may be established in terms of hours of operation, multiples of engine overhaul periods, or multiples of inspection periods. Time limitations for components on which deterioration is not necessarily a function of operating hours, such as electronic units, pitot tubes, and emergency flotation equipment, may be established in terms of calendar months. Certain items may be maintained on an on-condition overhaul basis.

[On-condition overhaul is applicable to components on which a determination of airworthiness may be made by visual inspection, meas-

urements, tests, or other means without a teardown inspection or overhaul.

[(i) *Airframe—initial time limitations.* The initial time limitations for overhauls, inspections, or checks of airframes may be established on a recurrent fixed time basis or by adoption of a structural inspection specification covering procedures, such as pattern inspections, block overhauls, or progressive inspections. Regardless of the basis upon which the time limitations are established, the same basic standards will be applicable. The maintenance program must specify checks, inspections, and overhauls to be performed and times at which they will be performed.

[(ii) *Appliances—initial time limitations.* Initial time limitations for inspections, bench checks, major inspections, or overhaul, as applicable, to the appliance involved, should not be greater than those limitations applicable to the same or similar appliances used in existing aircraft operated by the air carrier. When the usage or installation of such appliances differs to a substantial extent from the previous usage or installation, the time limitations shall be adjusted to reflect the extent of such difference. When new usage or installation is involved, conservative time limitations should be established until service experience shows that more liberal time limits can be used. In those cases where an appliance has a subcomponent which is subject to wear with time in service, the air carrier will establish maintenance procedures for periodic inspection of such subcomponent to insure its continued airworthiness.

[(iii) *Powerplants—initial time limitations.* The initial overhaul time limitations for any engine used on multi-engine aircraft which has never been used in air carrier service will tentatively be established at 1,000 hours. However, a sample overhaul of a representative number of engines, but not less than three, will be accomplished at each increment of 100 hours, beginning at 800 hours, unless such new model engine incorporates certain unconventional features not previously employed in air carrier operations, in which case, the initial overhaul period will be established by the Administrator. Satisfactory teardown inspection will be necessary before increasing the fleet overhaul period to the next higher increment. This sample overhaul procedure and evaluation of service experience will provide the operator with necessary information to substantiate the basic 1,000-hour overhaul.

[The initial time limitations for overhaul of an engine model which has received substantial air carrier service experience, but not by the applicant, will tentatively be established at 1,000 hours. An engine model will not be considered as having substantial air carrier service experience unless it has been satisfactorily operated by another carrier on an approved 1,000-hour or higher overhaul period. However, it will be required that the basic 1,000-hour overhaul period be substantiated on the same basis as outlined for a new engine except that sample overhauls of a representative number of engines will be accomplished in increments of 100-hour periods beginning at 900-hours. The initial time limitations for overhaul of accessories which are a part of the power package, including propellers, will be established at the overhaul period fixed for the engine itself, unless service experience permits or requires higher or lower overhaul periods.

[The following procedures will be applicable in establishing initial overhaul time limitations for engines used in single-engine air carrier aircraft:

[(*a*) Initial overhaul time limitations for single-engine aircraft powerplants will be established in accordance with the manufacturer's recommended periods for new air carrier operators using such equipment. Where the manufacturer does not recommend specific periods for overhaul of the engine, one of the two following conditions will be applicable.

[(*1*) Operators who have previously operated and satisfactorily maintained the engine in question (as revealed by service and overhaul records) may have the initial overhaul time limitation for that engine established at a figure not to exceed 600 hours.

[(*2*) Operators who have not had the experience necessary to demonstrate the ability to operate and maintain the pertinent engine in accordance with subparagraph (*1*) of this paragraph, may have initial overhaul time limitations established at a figure not to exceed 500 hours for the engine concerned.

[(iv) *Airframe—revision of time limitations.* The increases of time limitations for overhaul (or major inspection in case of pattern system, etc.) of airframes will be based on evaluation of all pertinent service records and examination of at least one aircraft, of the model involved, that has been overhauled at the currently approved time limitations. When a pattern or block overhaul type of maintenance system is used, it will be permissible to reschedule individual items in another block or pattern, if performance and condition of the specific item warrants such an increase.

[(v) *Powerplants and associated mechanical appliances—revision of time limitations.* Increases in engine overhaul periods will not be approved in increments greater than 100 hours. Increases in time limitations above the 1000-hour basic engine overhaul period will be considered on the basis of satisfactory service experience at the currently approved time limitations. The operator may make application to amend the currently approved time limitations by submitting a letter to the assigned CAA agent, indicating the desired time limitations on the particular engines involved and designating three to five engines for disassembly inspection by the CAA agent. The engines chosen for exhibit must have operated in a satisfactory manner for the maximum time permissible, under currently approved time limitations, in relation to the established operation schedules. If, after disassembly and inspection of the exhibit engines and related components, it is found that the new time limitations are justified, the air carrier may then submit a formal application requesting the extension of the overhaul period on the entire fleet of engines and related components of the same type and model. Engine accessories may be operated to double or triple the approved engine overhaul time limitations if it is found that previous satisfactory service and overhaul experience, including the service to be performed at each engine change period, would justify the increase as not adversely affecting the continuous condition of airworthiness of the component involved. The procedure for requesting, and granting, increases in overhaul time limitations, for such components, will be the same as used for the basic engine.

[(vi) Appliances, general—revision of time limitations. Increases in established times for inspections, bench tests, or overhaul periods will be based on consideration of the following factors: (*a*) geographical area or areas of operation; (*b*) number of landings, long haul versus short haul; (*c*) maintenane organization and inspection procedures; (*d*) manufacturers' recommendations; (*e*) service history, particularly of known or evident trends toward malfunctioning. When electrical/electronic appliances are overhauled on an on-condition basis, special consideration will be given to the continued airworthiness of mechanical components of such equipment.

[(vii) *Emergency equipment.* The inspection periods for first aid kits, flotation equipment, and other emergency equipment will assure the continued serviceability and immediate readiness of such equipment for its intended emergency purposes. Major inspection periods will be established for the purpose of determining that all components of the emergency equipment are complete and airworthy and may be expected to remain in this condition until the next major inspection or actual use under emergency conditions. Routine inspection periods will be established to assure that such equipment (or any component thereof) is installed or stored properly, has not been tampered with, damaged, or had articles removed since the last inspection. All inspection periods will be adjusted in accordance with service experience and pertinent operating conditions.]

(c) *Weight control.* The maintenance manual must include complete information covering the methods and procedures for maintaining the aircraft weights and c. g. within the approved limits. The operator may elect to establish or use any system which fulfills the safety requirements of the applicable regulations of this subchapter (i. e. the Civil Air Regulations) and which is in accordance with the following provisions:

(1) Definitions of terms as specifically related to weight and balance control.

(i) *Approved weight control system.* A system of continuous recordation of weight changes on individual aircraft or fleet which will provide an accurate weight and c. g. loca-

tion value for all aircraft at all times. Under an approved system the responsibility is delegated to the operator.

(ii) *Operating or basic weight.* The operating or basic weight is the takeoff gross weight excluding the following:

Drainable fuel.
Drainable oil (when the oil load is variable).
Crew and their baggage (when variable).
Payload (including nonrevenue load).
Food.
Other items of load or equipment that are variable from trip to trip.

Due to variations in drainable oil, crew and their baggage required for specific operations, the operating or basic weight may not be directly comparable for different air carriers.

(iii) *Operators' empty weight.* The operators' empty weight is the operating or basic weight excluding the following items:

Passenger service.
Emergency equipment (including portable fire extinguishers and emergency radio).
Navigation equipment.
Flight spares.
Washing and drinking water.
Crew.
Crew baggage.
Drainable oil.

This empty weight is corrected so that it will be comparable among the air carriers.

(iv) *Drainable fuel or oil.* That fuel or oil which, in normal ground attitude, drains with all drain cocks opened.

(2) *Operators' responsibility.*

(i) Not under an approved system.

(*a*) Each aircraft shall be weighed annually in the presence of a CAA representative [6] to determine the operators' empty weight and corresponding c. g. position.

(*b*) All weight and balance data (including loading schedules, overlays, equipment lists, etc.) shall be submitted for CAA approval and file.

(ii) *Under an approved system.*

(*a*) It is not necessary for the operator to submit weight and balance data for individual aircraft for CAA approval and file. He will be expected, however, to be prepared at any time to show that he is complying with the procedures for which he has obtained CAA approval, as well as with current regulations of this subchapter (i. e. with Civil Air Regulations). Weight manifests shall be retained in the operator's files for a period of at least 30 days.

(*b*) A continuous record should be kept for each aircraft, listing all changes affecting the weight, c. g. location, and equipment included in order that a computed weight and c. g. location may be established at any time.

(*c*) Each aircraft shall be weighed every 2 years, or at shorter intervals if the operator prefers, to determine the empty weight and the corresponding c. g. (if a fleet weight system is used, aircraft may be weighed on a fleet weight basis, established in accordance with the procedure outlined in this section).

(*d*) It is necessary to show the actual c. g. location on the weight manifest, except when a schedule has been prepared which insures that the c. g. will remain within approved limits under operating conditions, in which case it should be shown that the airplane is loaded in accordance with the proper schedule.

(*e*) The presence of a CAA representative will not be necessary during the routine weighing of aircraft.

(3) *Application for approval of weight control systems.*

(i) *General.* The air carrier should submit the application to the regional office of the region in which his principal maintenance base is located, through the assigned maintenance agent. The application should be submitted in letter form. A report (in quadruplicate) should be attached, outlining in detail the system employed to control the weight and balance of the aircraft. For the purpose of approving the system, actual operating data for specific aircraft need not be included. This report should include the following information where such information is necessary to properly substantiate the proposed system.

(*a*) Description of procedures established for reporting and recording changes affecting weight and balance, with copies of all printed forms and instructions to personnel.

[6] CAA representative may be defined as a CAA employee, air carrier employee, or designee, who is authorized by the Administrator to approve weight and balance of aircraft.