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TITLE 14—CIVIL AVIATION

Chapter I—Civil Aeronautics Board

Subchapter A—Civil Air Regulations

[Supplement 3]

PART 40—SCHEDULED INTERSTATE AIR CARRIER CERTIFICATION AND OPERATION RULES

MISCELLANEOUS CAA RULES

On April 13, 1953, the Civil Aeronautics Board adopted a revision of Part 40 containing major changes in the certification and operation rules applicable to domestic scheduled interstate air carriers. On October 21, 1953, the Administrator of Civil Aeronautics published in 18 F. R. 6670, rules which he proposed to adopted for the purpose of implementing the Board's revised Part 40. Interested persons were afforded an opportunity to submit written data, views, or arguments. Consideration has been given to all relevant matter presented.

This supplement sets forth the rules which the Administrator is adopting to implement revised Part 40. In the interest of safety in air commerce, the supplement is made effective on the effective date of revised Part 40. Compliance with the effective date provision of section 4 of the Administrative Procedure Act would be impracticable, and therefore is not required.

The following rules are hereby adopted:

§ 40.12–1 *Application for air carrier operating certificate (CAA rules which apply to § 40.12)*—(a) *General.* (1) The holder of a certificate of convenience and necessity shall apply to the appropriate regional administrator for an air carrier operating certificate at least 30 days prior to the date proposed for beginning scheduled interstate air transportation within the continental limits of the United States. The application shall be prepared in loose-leaf form, on white paper approximately 8'' x 10½'' in size, and using one side of the sheet only. The application shall be executed by a duly authorized officer or employee of the applicant having knowledge of the matters set forth therein, and shall have attached thereto two copies of the appropriate written authority issued to such officer or employee by the applicant.

(2) Two copies of the application, and of subsequent amendments thereto, shall be filed with the Regional Administrator having jurisdiction over the area in which the principal office of the air carrier is located. When any facility or service directly affecting the operation of the air carrier concerned is furnished by other than the applicant or the Federal Government, at least two copies of the contract or working agreement concerning such facilities or service shall be submitted with the application. In this connection, if formal contracts covering such facilities or service have not been completed, letters showing agreement between the contracting parties will be accepted until copies of the formal contract are obtainable.

(b) *Format of application.* The application shall be in the form of a letter and shall contain the information outlined below:

To: Regional Administrator, Civil Aeronautics Administration.

In accordance with section 604 of the Civil Aeronautics Act of 1938, as amended, and the Civil Air Regulations, application is hereby made for an Air Carrier Operating Certificate.

Give exact name and full post office address of applicant.

Give the name, title, and post office address of the official or employee to whom correspondence in regard to the application is to be addressed.

SECTION I. *Operations.* A. State whether the type of service proposed is for the carriage of passengers, goods, or mail, or a particular combination thereof. If the type of service is not the same for each route or portion thereof, specify the type of service for each route or portion of a route.

B. State whether the type of operation proposed is day or night, visual flight rules, instrument or over-the-top, or a particular combination thereof. If the type of operation is not the same for each route or route segment, specify the type of operation for each route or route segment.

SEC. II. *Schedule.* A. Submit a proposed schedule plan (or plans if seasonal changes or differences in equipment are involved) indicating the following:

1. Block to block time and mileage between scheduled stops.
2. Ground time at each intermediate and terminal stop.

B. Specify the basis upon which the proposed schedule has been computed, indicating the following:

1. Cruising speed and altitude.
2. Percentage of horsepower.
3. Direction and velocity of prevailing winds.

SEC. III. *Route.* A. Submit a map suitable for aerial navigation on which are shown the exact geographical track of the proposed routes, and information with respect to terminal and intermediate stops, available landing areas, and radio navigational facilities. This material will be indicated in a manner that will facilitate identification. The applicant may use any method that will clearly distinguish the information, such as different colors, different types of lines, etc. For example, if different colors are used, the identification will be accomplished as follows:

1. Airway routes: Black.
2. Direct routes: Green.
3. Terminal and regular intermediate stops: Orange circle.
4. Alternate landing fields or areas: Purple circle.
5. Other available landing fields or areas: Yellow circle.
6. Indicate the location and normal operating range of all radio navigational facilities to be used in connection with the proposed operation.

B. *Airports.* Furnish the following information with regard to each regular, alternate, refueling, and provisional airport to be used in the conduct of the proposed operation.

1. Name of airport.
2. Location (by coordinates, and by name of nearest city or town, and direction and distance thereto).
3. Class of airport or landing area (municipal, commercial, military, private or marked auxiliary).
4. Altitude above sea level.
5. Dimensions in linear feet of landing space available.
6. If hard-surfaced runways are provided, give number, direction, length and width of each and indicate type of surfacing.
7. Obstructions (list adjacent obstructions, giving height and location, or attach appropriate C. G. A. L. charts if available).
8. Airport lighting (include beacon, auxiliary beacon, boundary lights, floodlights, etc., and any emergency lighting equipment; and by whom operated).
9. List refueling facilities available.
10. Is airport control tower provided and by whom?
11. Itemize radio navigational facilities provided and indicate the operating agency.
12. Does runway gradient exceed 2 percent? If so, state gradient.
13. What provisions are made for protection of passengers during loading and unloading at scheduled stop airports?
14. Prevailing winds?
15. Where necessary, are adequate snow removal facilities available?

C. *Weather reporting.* 1. Outline the weather service proposed to be used for dispatching over each route; the source, if other than a United States Weather Bureau Station; list in detail the location and agency in control of stations furnishing reports for each service; the frequency and method of collection and dissemination of weather information. Outline available terminal and route forecasting services, the type of maps and the intervals at which they are made each day.

2. Where it has been determined that additional weather reporting services will be required of the U. S. Weather Bureau for the type of operation involved, the air carrier will apply in writing to the appropriate Weather Bureau Regional Office. The request for the weather reporting services considered essential should be made coincidental with this application to the Civil Aeronautics Administration.

3. For operations within the continental limits of the United States, if other than a U. S. Weather Bureau Station, show proof of U. S. Weather Bureau approval of the service and specify the meteorological facilities available, the number of personnel and the duties of each, such as the making of weather maps, forecasts, observations, etc.

D. *Airway lighting.* List in detail all airway lighting on the routes other than those airway lighting facilities owned and operated by the Civil Aeronautics Administration if application includes request for night VFR operation.

SEC. IV. *Radio facilities*—A. *Communications.* List company radio ground communication facilities installed, proposed to be installed, and those available to, but not owned by applicant, for each route. The expected communication coverage of all MF and HF ground facilities should be provided in map form. In the case of VHF, the expected coverage at exemplary altitudes should be outlined. Aircraft reporting and general change points, and frequencies should be specified either on the maps or as an attachment. (If owned by other than applicant, attach 2 certified copies of operating agreement.) List the following details for each station:

Transmitters. List the following information in regard to each transmitter:

1. Make and model number.
2. Remotely or locally controlled.
3. Types of emission and antenna power for each type of emission.
4. Number of frequency channels provided and actual frequencies in kilocycles proposed to be used.
5. Method of frequency change (quick shift or manual tuning).
6. Primary power source, voltage, phase, etc., and whether commercial source or locally generated.
7. Auxiliary power source.
8. Functional purpose of transmitter. If transmitter is used for more than one function, list in order of primary and secondary functions as—

a. Radiotelephone plane to ground primary purpose and radiotelephone point to point secondary purpose, or

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b. Radiotelephone point to point primary purpose and standby radiotelephone plane to ground secondary purpose, etc.

Receivers. 1. List each receiver by type of model number and state its primary function, i. e., plane-to-ground guard, point-to-point C. W. or point-to-point radiotelephony.

2. List frequency range of each receiver and state which frequencies in each receiver are crystal controlled, if any.

3. Describe receiver installation to show number of receivers locally controlled and number remotely controlled.

B. *Radio navigational facilities.* List each ground radio navigational facility, other than those operated by the United States Government, to be used in the conduct of the proposed operations (if privately owned ground radio navigational facilities are to be used and are owned by other than the applicant, attach two certified copies of the operating agreement pertaining to the use of such facilities). List the following information with respect to each facility:

1. Type of facility, i. e., ILS, GCA, Non-Directional Radio Beacon LF and VHF Radio Ranges, Loran, etc.

2. Estimated effective range (in miles).

3. Coordinates and location with respect to field or landing area.

4. Power supply, i. e., commercial or locally generated.

5. Auxiliary power supply.

6. Operating frequency or frequencies.

C. *Aircraft radio equipment.* List and describe the aircraft radio equipment installed in each aircraft by:

1. Type number.
2. Manufacturer.
3. Frequency range.
4. Operating frequencies.
5. Emergency power supply.
6. Antenna system.

SEC. V. *Weather minimums.* A. Submit in detail the proposed ceiling and visibility limitations for take-off for instrument flight and let-down-through at each regular, alternate, refueling, and provisional airport. Differentiate between daylight and darkness in the listing, and where more than one type of aircraft is to be utilized, and a differential of limitations exists, indicate proposed limitations for each type of aircraft.

B. Submit for each proposed scheduled stop and alternate airport a detailed flight procedure for instrument approach and let-down-through and where specific procedures are necessary because of terrain or traffic conditions, submit a detailed flight procedure for take-off and climb (such procedure should be set up on the basis of the ceiling and visibility minimums proposed.)

C. The above information may be submitted on Forms ACA-511 of the air carrier's proposed operations specifications.

SEC. VI. *Aircraft.* A. List the following information, as applicable, for each aircraft to be used in the proposed operations:

1. The name of the manufacturer.
2. Certification basis and category.
3. Manufacturer's model number.
4. Name of the manufacturer and type number of engines.
5. Name of manufacturer and type number of propellers.
6. N registration number and aircraft designation.
7. Type of service in which aircraft will be used (carriage of persons, property, mail, or combination thereof).
8. Will aircraft be used in regular or reserve service?
9. What type of operation (day, night, visual flight rules, instrument (over-the-top)) will be conducted with this aircraft?
10. List each route or portion thereof over which this aircraft is to be operated and the maximum gross weight proposed for each route or portion thereof.
11. What is the service ceiling of each type aircraft with one engine inoperative?
12. List and describe installation and location of all lifesaving equipment and emergency supplies carried aboard each aircraft, such as life rafts, life preservers, portable emergency transmitters, Very pistols, and emergency rations. (If the same equipment is not carried during all seasons of the year, and on all routes, list and explain the difference.)

SEC. VII. *Maintenance: Aircraft, engines, and accessories.* A. Furnish an organization chart indicating the authority and the duties of the maintenance and inspection personnel employed by the applicant and/or any other person with whom arrangements have been made for the performance of maintenance and inspection functions.

B. Furnish a schedule of overhauls, inspections and checks and the time limitations for such functions which will be performed on each type of aircraft to include the airframes, powerplants, propellers and appliances. The schedule should be sufficiently detailed to indicate all of the overhauls, inspections and checks which will be performed on all components of each type of air carrier aircraft. The schedule should be listed under the following general headings:

1. Aircraft components:
a. Wings.
b. Fuselage.
c. Empennage.
d. Landing gear.
e. Wheels and brakes.
f. Center section (when applicable).
g. Nacelles.
h. Control System.
i. Hydraulic system.
j. Accessories (aircraft).
k. Fuel and oil system (aft of firewall).
l. Fuel tanks.
m. Cabin pressurizing and heating systems
2. Engine components:
a. Engine.
b. Accessories (engine).
c. Propellers.
d. Fuel and oil system (forward of firewall).
e. Oil tanks.
3. Instruments:
a. Flight instruments.
b. Aircraft and engine instruments.

(If any of the components listed are overhauled on an "on condition" overhaul basis, describe the procedures used to control the continued airworthiness of such components.)

When maintenance functions are performed by outside agencies, copies of the maintenance agreement regarding the extent of such services to be furnished should be attached to the application, as provided for in subparagraph (a) (2) of this section. The agreement should specify that services furnished should conform to the standards approved for the operator, the air carrier operations specifications, aircraft maintenance, and complies with all requirements of the Civil Air Regulations.

C. Indicate and define the type of maintenance operations (overhauls, inspections, and checks) that will be accomplished at each terminal, intermediate and overnight stop, relative to the following:

1. Disassembly and overhaul of aircraft components, engines, propellers, instruments, and accessories (aircraft and engine).
2. Periodic inspection and check of aircraft components, engine, propellers, instruments and accessories (aircraft and engine).
3. Routine inspection of aircraft components, engines, propellers, instruments, and accessories (aircraft and engine).
4. Spare part and component replacements at intermediate and overnight stops.
5. Refueling.

D. Indicate the number of certificated, non-certificate airmen (repairmen mechanics), and helpers, etc. including their company designation (foreman, inspectors, crew chiefs, etc.), located at the main overhaul base and each terminal and intermediate stop.

E. Indicate the distribution of the following items of spare equipment:

1. Aircraft (list quantity, make, and model).
2. Engines (list quantity, make, and model).
3. Propellers (list quantity, make, and model).
4. Instruments (list quantity, make, and model).

F. For each terminal, and intermediate stop at which refueling operation will be performed, describe the following:

1. Number, type (elevated or underground), and capacity of each fuel and oil storage tank.
2. List octane ratings of fuels available.
3. List S. A. E. rating or viscosity of oil available.
4. List facilities and methods for the detection and prevention of fuel contamination.
5. Outline method and procedure with reference to recording water checks.
6. Type of covered container used to convey oil from storage tank to aircraft.
7. Outline method and procedure of grounding aircraft in protection of fire.

G. For each terminal and intermediate stop, describe the following facilities:

1. Hangars and/or work docks provided for the protection from the elements for aircraft and personnel performing maintenance operations:
a. Number, size, and type.
b. Dimensions and number of square feet available for aircraft storage.
c. Dimensions and number of square feet available for shop space.
d. Dimensions of hangar doors and/or capacity of work docks.
e. Number of largest sized aircraft of applicant which may be housed.
2. Equipment for ground handling of aircraft, as may be required for the proposed operation.
3. Tools, fixtures, test equipment, and other necessary shop apparatus necessary for the maintenance operations performed.

SEC. VIII. *Maintenance: Electrical and electronic equipment.* A. Briefly, describe the functional operation of the electrical/electronic maintenance organization, indicating the number and scope of responsibility of supervisory personnel and the number and distribution of qualified mechanics and inspectors. Indicate the number, company designation (foreman, inspectors, lead men, etc.), and location of all certificated airmen (certificated repairmen or certificated mechanics) who are directly in charge of electrical/electronic maintenance activities.

B. Indicate the following with respect to aircraft radio equipment maintenance procedures:

1. Overhaul or bench check periods of aircraft radio equipment and station at which accomplished.
2. Periodic inspection and check periods of aircraft radio equipment and stations at which accomplished.
3. Equipment replacement at intermediate and overnight stops.

C. Indicate whether overhaul, periodic inspection, and routine inspection of aircraft electrical equipment are under the jurisdiction of the radio maintenance department or other department such as aircraft, engine, or accessories maintenance department.

D. Indicate the following with respect to aircraft electrical equipment procedures:

1. Overhaul or bench check periods of aircraft electrical equipment and stations at which accomplished.
2. Periodic inspection and check periods of aircraft electrical equipment and stations at which accomplished.
3. Routine inspection periods of aircraft electrical equipment and stations at which accomplished.

E. Indicate the distribution of the following items of spare equipment:

1. Radio equipment (list quantity, make, and model).

2. Electrical equipment (list quantity, make, and model).

3. Other electronic equipment (list quantity, make, and model).

F. If "on condition" overhaul of electrical/electronic is utilized, describe the bench check or major inspection procedures used to control performance tolerances and fixed period overhaul of components subject to wear and deterioration as a function of time in service.

(c) *Operations specifications.* The operations specifications proposed by the carrier as required by § 40.18 applicable to the intended operation shall be attached to the letter of application in paragraph (b) of this section for an air carrier operating certificate. (See § 40.18–1.)

§ 40.18–1 *Original issuance and amendment of operations specifications (CAA rules which apply to § 40.18 (a)).*—(a) *Original issuance of operations specifications.* The air carrier's original application for the issuance of operations specifications shall be included with its letter of application for an air carrier operating certificate (see § 40.12–1). Details concerning appropriate forms, number of copies, etc., will be furnished either by the local CAA Air Carrier District Office or by the CAA Regional Office having jurisdiction over the area in which the air carrier will establish its principal operations base.

(b) *Amendment of operations specifications.* Applications to amend operations specifications shall be submitted by the air carrier to the appropriate local Aviation Safety Agent at least 15 days prior to the proposed effective date of such amendment, unless the Aviation Safety Agent approves a shorter filing period. The information required by § 40.12–1 in connection with the original application for an air carrier operating certificate shall, insofar as applicable, be furnished in support of an application to amend an air carrier's operations specifications.

§ 40.18–2 *Form of application for issuance of initial or revised Operations Specifications, Aircraft Maintenance (CAA rules which apply to § 40.18 (a)).* (a) Applications by the air carrier for new or amended Operations Specifications, Aircraft Maintenance, shall be made on Operations Specifications Form ACA–1014 or equivalent.

(b) Those pages of the Operations Specifications, Aircraft Maintenance, which contain the list of aircraft components, inspections, checks and overhauls, and time limitations therefor, shall be prepared by the air carrier on a Form ACA–1014 or equivalent. Such pages shall be prepared to permit insertion in a suitable loose-leaf binder. Each page shall be consecutively numbered and identified as an Operations Specification, Aircraft Maintenance.

(c) The air carrier shall list the aircraft components and the overhauls, inspections, checks, and time limitations therefor, either on separate pages in the Operations Specifications, Aircraft Maintenance, or together on the same pages. If listed separately, the overhauls, inspections, and checks shall be appropriately and thoroughly identified, by number and/or nomenclature, to include any applicable abbreviations. The list of individual aircraft components shall show proper reference to the overhauls, inspections, or checks by means of the applicable number, nomenclature, or abbreviation thereof. When so listed, it shall mean that such components are overhauled, inspected, or checked at the times identified in the Operations Specifications.

(d) Four copies of the application[1] and attachments shall be submitted to the assigned agents, the first copy of the application bearing the signature of a duly authorized representative of the air carrier. Approval or disapproval shall be indicated on the first and second copies of the application and attachments which will be returned to the air carrier. The air carrier shall, in turn, indicate receipt in the space provided on the second copy and return it to the assigned agent.

§ 40.18–3 *Form of application for issuance of initial or revised Operations Specifications, Aircraft Weight and Balance Control (CAA rules which apply to § 40.18 (a)).* (a) Applications by the air carrier for new or amended Operations Specifications, Aircraft Weight and Balance Control,[2] shall be made on Operations Specifications Form ACA–1014 or equivalent.

(b) Four copies of the application shall be submitted, the first copy of the application bearing the signature of a duly authorized representative of the air carrier. Approval or disapproval of the carrier's application shall be indicated on the first and second copies of the application which will be returned to the air carrier. The air carrier shall, in turn, indicate receipt in space provided on the second copy and return it to the assigned agent.

§ 40.18–4 *Policies, procedures and limitations governing issuance and amendment of Operations Specifications, Aircraft Maintenance (CAA policies which apply to § 40.18 (a)).*—(a) *General.* The Administrator will issue and amend Operations Specifications, Aircraft Maintenance, in accordance with the following policies, procedures, and limitations. The criteria set forth in this section will be followed by the Administrator in fixing time limitations for the performance of overhaul, inspections and checks, or in permitting or requiring revisions thereto. The basic principle followed by the Administrator will be that the inspections, checks, maintenance or overhaul be performed at times well within the expected or proven service life of each component of the aircraft. In determining what the expected or proven service life of an aircraft or any of its components might be, the Administrator will consider the following factors: (1) Geographical area or areas of operation; (2) engine operating powers, procedures, etc.; (3) number of landings, long haul versus short haul, etc.; (4) maintenance organization and inspection procedures; (5) other operators' service experience records; (6) manufacturers' recommendations; (7) service history, particularly of known or evident trends toward malfunctioning. Special reliance will be placed on service experience, including the information obtained from such tests, inspections, or measurements as have been performed in accumulating such service experience.

(b) *Procedure for establishing new or revised time limitations.* (1) 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.

(2) On condition overhaul is applicable to components on which a determination of airworthiness may be made by visual inspection, measurements, tests, or other means without a teardown inspection or overhaul.

(c) *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.

(d) *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 differ 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

[1] Application for initial time limitations applicable to new aircraft, engines, propellers or appliances, not previously used in air carrier service may require Washington concurrence prior to final issuance by the CAA regional office, and therefore should be submitted as soon as possible, but not later than 15 days prior to the date that the aircraft or component is to be placed into service.

[2] The Operations Specifications, Aircraft Weight and Balance Control may combine weight control procedures common to more than one aircraft or they may separate weight and balance procedures specifically adapted to a particular aircraft type and model.

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.

(e) *Powerplants; initial time limitations.* (1) The initial overhaul time limitations for any engine which has never been used in air carrier service will tentatively be established at 1000 hours. However, the Operations Specifications will require sample overhaul of a representative number of engines, but not less than three, to 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.

(2) 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, the Operations Specifications will require 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.

(f) *Revision of time limitations; general.* The inspection and overhaul time limitations applicable to airframes, powerplants, propellers, and appliances will be revised on the basis of service experience. Increases in such time limitations may be made when the record of service experience for the previous 90 days indicates that such increase will not adversely affect the continuous condition of airworthiness. 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 intiating corrective action.

(1) *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.

(2) *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 1,000 hour basic engine overhaul period will be considered on the basis of satisfactory operation of a specified number of engines of the same type or model. The operator may make application for a supplemental amendment to the currently approved time limitation indicating the desired time limitations and the particular engines to be operated to the new time limitations. This supplemental amendment will be applicable to 3 to 5 engines as deemed necessary by the assigned CAA agent, in order to determine the ability of the engine to operate satisfactorily at the desired new overhaul period. The engines so operated will be identified on the supplemental amendment by make, model, and serial number. Upon satisfactory completion of the 100 hours additional operation, and satisfactory disassembly and inspection of the engines and related components listed on the supplemental specification, the air carrier may then submit an application for an amendment in the routine manner, requesting a 100 hour extension of the overhaul period on the entire fleet of engines and related components of the same type and model in their operation. Experience may justify a request for the operation of some engine accessories to double or triple the approved engine overhaul limitations. Such amendments may be submitted if previous satisfactory service and overhaul experience, including the service to be performed at each engine change period, can justify the increase as not adversely affecting the continuous condition of airworthiness of the component involved. Installation of engines being operated in accordance with provisions of a supplemental specification will be limited to one per twin engine aircraft and two per four engine aircraft installed on opposite sides.

(3) *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: (1) geographical area or areas of operation; (2) number of landings, long haul versus short haul; (3) maintenance organization and inspection procedures; (4) manufacturers' recommendations; (5) 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.

(4) *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.

§ 40.19–1 *Content of Operations Specifications, Aircraft Maintenance (CAA policies which apply to § 40.19 (e)).* The Administrator will issue Operations Specifications, Aircraft Maintenance, which have the following minimum contents:

(a) (1) The Operations Specifications, Aircraft Maintenance, will contain a listing of the components of airframes, engines, propellers, and appliances, and the time limitations for checks, inspections and overhauls applicable to each listed component. The list of components will be complete and inclusive except that sub-components which are subject to check, inspection and overhaul at the same time limitations as the components to which they are related may be omitted from the listing (e. g. that form commonly called the "short form"). When this is done, the Operations Specifications will bear a statement to the effect that parts and sub-components not listed will be checked, inspected, and overhauled at the same time limitations specified for the component or assembly to which such components are related.

(2) When coded identifications or titles, such as "operation #1, #2, #3, etc." or "line check, intermediate check, base inspection, etc.," are used in connection with specified time limitations in the Operations Specifications, a brief description of such terms will be included which identifies the operation concerned.

(b) If the carrier proposes Operations Specifications, Aircraft Maintenance, which would permit for all or any part of an aircraft a block overhaul system, a sampling inspection and overhaul system, or any other maintenance system which either (1) does not prescribe a fixed period for overhaul, inspection or check of each component of an aircraft, or (2) includes alternative standards and procedures under which the air carrier may be given authority to establish and adjust such time limitations, the air carrier will fully define and describe the manner in which such a special maintenance program will be performed.

(c) Operations Specifications identified as Operations Specifications, Aircraft Maintenance—General, will contain conditions uniformly applicable to

all Operations Specifications, Aircraft Maintenance.

§ 40.19–2 *Content of Operations Specifications, Aircraft Weight and Balance Control (CAA policies which apply to § 40.19 (f)).* The Operations Specifications, Aircraft Weight and Balance Control, as submitted by an air carrier, will contain an accurate description of the procedures used to maintain control of weight and balance of all aircraft operated under the terms of the operating certificate which will insure that the aircraft, under all operating conditions, is loaded within the gross weight and center of gravity limitations. This description should include procedures used for determining weight of passengers, weight of baggage, periodic aircraft weighing, type of loading devices, and identification of aircraft concerned.

§ 40.30–1 *Route requirements; demonstration of competence (CAA policies which apply to § 40.30).* In determining the competence of an air carrier to operate over a route or route segment, the Administrator will require the carrier to show that it can conduct the proposed operation in compliance with the applicable provisions of this subchapter and the air carrier's operations specifications. The Administrator's determination may be based on a proving flight or, in a proper case, a determination may be based on written justification from the carrier as to why a proving flight is unnecessary. The Administrator's determination in any event will be predicated upon the adequacy of the facilities provided by or available to the air carrier including, but not limited to aircraft, airports, lighting facilities, maintenance facilities, communication and navigation facilities, fueling facilities, ground and aircraft radio facilities, and the competency of personnel to be used in the proposed operation.

§ 40.30–2 *Proving flight requirements (CAA policies which apply to § 40.30)*—(a) *Application.* When the Administrator has determined that a route proving flight is necessary, the carrier shall comply with the following: At least 15 days prior to the scheduling of route proving flights, officials of the air carrier shall submit to the Civil Aeronautics Administration office handling its operations specifications, a written request for the assignment of Civil Aeronautics Administration personnel to observe the flights. This request must be accompanied by an original application and copies of pertinent proposed amendments to the operations specifications, and must include sufficient data pertaining to the route to satisfy the Administrator that the air carrier is prepared for the route proving flights. This will allow sufficient time for making any necessary additions or corrections, thus preventing delays or misunderstandings.

(b) *Conduct.* After the air carrier has made all the necessary preparations to conduct the route proving flights, duly designated representatives of the Civil Aeronautics Administration will be assigned to observe them. All route proving flights shall be undertaken exactly as the operator intends to operate in scheduled air transportation when carrying passengers, property, or mail, or any combination thereof. Air carrier personnel assigned to conduct the route proving flights shall be regular crew members who, it is anticipated, will be assigned to the route.

(c) *Duration.* Route proving flights shall continue until the air carrier has demonstrated to the satisfaction of the Administrator that it is competent to conduct a safe operation over the entire route to be flown in air transportation.

§ 40.33–1 *Airports (CAA policies which apply to § 40.33).* An airport shall be deemed as properly equipped and adequate; when it meets the following minimum standards:

(a) *Size.* The landing area shall be of sufficient length to permit compliance with the airplane performance operating limitations of the transport category or non-transport category requirements of this part appropriate to the type of aircraft used.

(b) *Surface.* The landing area and taxiway areas shall be clearly defined. They may be unpaved or hard surfaced or a combination of both. These areas shall be sufficiently smooth and firm to permit an airplane of the type used to traverse them safely. Shoulders of runways and taxiways shall be graded to the extent that they will not constitute a hazard to the aircraft operating thereon.

(c) *Obstructions.* Obstructions on and in the vicinity of the airport shall be obstruction marked and lighted as applicable for day or night operations. In determining obstructions to air navigation, the criteria contained in Civil Aeronautics Administration Technical Standard Order N–18 will be used, insofar as practicable.

(d) *Facilities.* (1) At each airport utilized, weather reports prepared from observations made and released by the U. S. Weather Bureau or a source approved by it shall be available.

(2) Ramp equipment such as battery carts, fire bottles, loading stands, steps, etc., must be provided and shall be suitable to service the type aircraft being utilized.

(3) Satisfactory means of determining wind direction for day and/or night operations shall be provided, i. e., tetrahedron, wind tee, control tower, remote microphone, etc.

(e) *Public protection.* Safety measures for the protection of the public shall be provided at each airport utilized. Such measures shall be designated to restrict unauthorized personnel and vehicles from the loading ramp, runways, taxiways, etc. They may consist of fences, gates, chains, airport guards, etc., so long as they are sufficient to accomplish the intended result.

(f) *Lighting.* At airports where night operations are conducted, the minimum facilities and equipment shall be required as follows:

(1) Lights defining the boundaries of the usable area including theshhold lights and/or runway lights identifying the outer limits of the runways including threshhold lights as prescribed in Civil Aeronautics Administration Technical Standard Order N–1b. Lights of the open flame type (flare pots) are not considered satisfactory runway lights except in an emergency or when required by other extenuating circumstances.

(2) Lights either of a permanent or portable type shall be provided and operated to illuminate the ramp, apron, and passenger loading area.

(3) Obstructions on and in the vicinity of the airport shall be obstruction lighted insofar as practicable in accordance with the criteria contained in Civil Aeronautics Administration Obstruction Marking Manual.[1]

(4) An airport beacon either of a rotating or combination of rotating beacon and flashing code beacon shall be provided and operated continuously from sunset to sunrise. In this respect, the criteria contained in Civil Aeronautics Administration Technical Standard Order N–19 shall apply.

(g) *Navigation, communication aids and traffic control.* These facilities shall be suitable for the type of operations to be conducted.

§ 40.37–1 *Servicing and maintenance facilities (CAA policies which apply to § 40.37)*—(a) *General.* In demonstrating or proving to the satisfaction of the Administrator that housing, facilities, equipment and materials are adequate, the air carrier may be guided by Civil Aeronautics Manual 52, § 52.21 and §§ 52.30 through 52.36 of this chapter, insofar as applicable to his aircraft and maintenance system.

(b) *Facilities provided by other agencies.* The air carrier will show that agencies contracting to perform major overhauls, repairs, or alterations for the air carrier are those specified under § 18.10 (b), (d), or (e) of this chapter.

§ 40.51–1 *Contents of manual; methods and procedures for maintaining weight and balance control (CAA policies which apply to § 40.51 (a) (19))*—(a) *General.* (1) The air carrier may utilize any loading schedule, procedure; or means by which the air carrier can show that the aircraft is properly loaded and will not exceed authorized weight and balance limitations during operation.

(2) By whatever method used, the air carrier should account for all probable loading conditions which may be experienced in service and show that the loading schedule will provide satisfactory loading. Loading schedules may be applied to individual aircraft or to a complete fleet. Unless otherwise authorized, a copy of pertinent loading data should be carried in each aircraft. When an air carrier operates several types or models of aircraft, the loading schedule, which may be index type, tabular type or a mechanical computer, will be identified with the type or model of aircraft for which it is designed.

(b) *Loading provisions.* All seats, compartments, and other loading stations will be properly marked, and the identification used will correspond with the instructions established for computing the weight and balance of the aircraft. When the loading schedule provides blocking off of seats or compart-

[1] TSO N–2a, when published, will contain the obstruction lighting criteria.

ments in order to remain within the center of gravity limits, effective means will be provided to assure that such seats or compartments are not occupied during operations specified. Cargo compartments will be placarded showing the maximum weight of each compartment, and such placcards will be readily legible to the loading personnel. Instructions will be prepared for crew members, cargo handlers, and other personnel concerned, giving complete information necessary regarding distribution of passengers, cargo, fuel and other items. Information relative to maximum capacities and other pertinent limitations affecting the weight or balance of the aircraft will be included in these instructions. When it is possible by adverse distribution of passengers to exceed the approved CG limits of the aircraft, special instructions will be issued to the appropriate crew members so that the load distribution can be maintained within the approved limitations.

(c) *Terms, descriptions, and general standards.* For the purpose of weight and balance control, the following terms, descriptions, and general standards will apply. Deviations from these standards by the individual operator due to the nature of his operation will be acceptable.

(1) *Empty weight.* The empty weight of an aircraft is considered to be the maximum gross weight less the following:

(i) All fuel and oil, excepting system fuel and oil.[1]

(ii) Drainable anti-detonant injector and de-icing fluids.

(iii) Crew and baggage.

(iv) Passengers and cargo (revenue and non-revenue).

(v) Removable passenger service equipment, food, magazines, etc., including drainable washing and drinking water.

(vi) Emergency equipment (overwater, tropical, frigid).

(vii) Other equipment, variable for flights.

(viii) Flight spares (spark plugs, wheel, cylinder, etc.).

(2) *Operating weight.* The basic operating weight established by the air carrier for a particular model aircraft will include the following standard items of the operator in addition to the empty weight of the aircraft unless otherwise specified:

(i) Normal oil quantity.

(ii) Anti-detonant injector and de-icing (winter) fluids.

(iii) Crew and baggage.

(iv) Passenger service equipment, including washing and drinking water, magazines, etc.

(v) Emergency equipment, if required, for all flights.

(vi) All other items of equipment considered standard by the air carrier concerned.

(3) *Aircraft, zero fuel weight.* The zero fuel weight of an aircraft is the maximum weight authorized for such aircraft without fuel. The weight of fuel carried in the fuselage, or equivalent locations, will be deducted from such maximum. When zero fuel weight limitations or equivalent restrictions are specified, proper provision for loading will be made by the operator so that such structural limitations are not exceeded.

(d) *Aircraft weights.* Aircraft weight and balance control, will contain provisions for determining aircraft weights in accordance with the following procedures:

(1) *Individual aircraft weights and changes.* The loading schedule may utilize the individual weight of the aircraft in computing pertinent gross weight and balance. The individual weight and balance of each aircraft will be re-established at the specified re-weighing periods. It also will be re-established whenever the accumulated changes to the operating weight exceed plus or minus one-half of one percent of the maximum landing weight or the cumulative change in CG position exceeds one-half of one percent of the MAC.

(2) *Fleet weights, establishment and changes.* For a fleet or group of aircraft, of the same model and configuration, an average operating fleet weight may be utilized if the operating weights and CG positions are within the limits established in this paragraph. The fleet weight will be calculated on the following basis:

(i) An operator's empty fleet weight will be determined by weighing aircraft according to the following table:

For fleet of 1 to 3, weigh all aircraft.
For fleet of 4 to 9, weigh 3 aircraft plus at least 50 percent of the number over 3.
For fleet of over 9, weigh 6 aircraft plus at least 10 percent of the number over 9.

(ii) In choosing the aircraft to be weighed, the aircraft in the fleet having the highest time since last weighing should be selected. When the average empty weight and CG position has been determined for aircraft weighed and the basic operating fleet weight (winter and summer, if applicable) established, necessary data should be computed for aircraft not weighed but which are considered eligible under such fleet weight. If the basic operating weight of any aircraft weighed or the calculated basic operating weight of any of the remaining aircraft in the fleet varies by an amount more than plus or minus one-half of one percent of the maximum landing weight from the established basic operating fleet weight or the CG position varies more than plus or minus one-half of one percent of the MAC from the fleet weight CG, that airplane will be omitted from that group and operated on its actual or calculated operating weight and CG position. If it falls within the limits of another fleet or group, it may then become part of that operating fleet weight. In cases where the aircraft is within the operating fleet weight tolerance but the CG position varies in excess of the tolerance allowed, the aircraft may still be utilized under the applicable operating fleet weight but with an individual CG position.

(iii) Re-establishment of the operator's empty fleet weight or the operating fleet weight and corresponding CG positions may be accomplished between weighing periods by calculation based on the current empty weight of the aircraft previously weighed for fleet weight purposes. Weighing for re-establishment of all fleet weights will be conducted on a two-year basis unless shorter periods are desired by the air carrier.

(3) *Establishing initial weight before use in air carrier service.* Prior to being used in air carrier service, each aircraft will be weighed and the empty weight and center of gravity location established. New production transport category aircraft delivered to air carriers normally are weighed at the factory and are eligible for air carrier operations without reweighing if the weight and balance records have been adjusted for alterations or modifications to the aircraft. Aircraft transferred from one air carrier to another need not be weighed prior to utilization by the latter unless more than twenty-four calendar months have elapsed since last weighing.

(4) *Periodic weighing; aircraft using individual weights.* Aircraft operated under a loading schedule utilizing individual aircraft weights in computing the gross weight will be weighed at intervals of twenty-four calendar months. An air carrier may, however, apply for extension of this weighing period for a particular model aircraft, when pertinent records and actual routine weighing during the preceding twenty-four months of air carrier operation show that weight and balance records maintained are sufficiently accurate to indicate aircraft weights within the established limitations. Such application should be limited to increases in increments of twelve months and must be substantiated in each instance with at least two aircraft weighings. Increases may not be granted which exceed a time which is equivalent to the aircraft overhaul period.

(5) *Periodic weighing, aircraft using "fleet weights."* Aircraft operating under fleet weights should be weighed in accordance with procedures outlined for the establishment of fleet weights. Since each fleet weight will be re-established every two years and a specified number of aircraft weighed at such periods, no additional weighing is considered necessary. A rotation program should, however, be incorporated so all aircraft in the fleet will be reweighed periodically.

(6) *Weighing procedure.* Normal precautions, consistent with good practices in the weighing procedure, such as checking for completeness of the aircraft and equipment, determining that fluids are properly accounted for, and that weighing is accomplished in an enclosed building preventing the effect of the wind, will prevail. Any acceptable scales may be used for weighings provided the are properly calibrated, zeroed and used in accordance with the manufacturer's instructions. Each scale

[1] System fuel and oil is that amount required to fill both systems and the tanks, where applicable, up to the tank outlets to the engines. When oil is used for propeller feathering, such oil is included as system oil.

should have been calibrated, either by the manufacturer or by a civil Department of Weights and Measures, within one year prior to weighing any aircraft for this purpose unless the air carrier can show evidence which warrants a longer period between calibrations.

(e) *Passenger weights.* The air carrier may elect to use either the actual passenger weight or the average passenger weight to comput passenger loads over any route, except in those cases where non-standard weight passenger groups are carried. Both methods may be used interchangeably provided only one method is used for any flight from originating to terminating point of the particular trip or flight involved, except as indicated in subparagraph (3) of this paragraph. Provisions will be incorporated in the load manifest to clearly indicate to personnel concerned whether actual or average passenger weights are to be used in computing the passenger load.

(1) *Actual passenger weight.* Actual passenger weight may be determined by scale weighing of each passenger prior to boarding the aircraft, and such weight is to include minor articles carried on board by the passenger. If such articles are not weighed, the estimated weight is to be accounted for. The actual passenger weight may also be determined by asking each passenger his weight and adding thereto a pre-determined constant to provide for hand-carried articles and also to cover possible seasonal affect upon passenger weight due to variance in clothing weight. This constant may be approved for an air carrier on the basis of a detailed study conducted by the operator over the particular routes involved and during the extreme seasons when applicable.

(2) *Average passenger weight.* (i) An average weight of 160 pounds (summer) may be used for each adult passenger during the calendar period of May 1 through October 31.

(ii) An average weight of 165 pounds (winter) may be used for each adult passenger during the calendar period through April 30.

(iii) An average weight of 80 pounds may be used for children between the ages of 3 and 12. Children above 12 years of age are classified as adults for the purpose of weight and balance computations. Children less than 3 years old are considered "babes in arms."

(iv) The average passenger weight includes minor items normally carried by a passenger.

(3) *Non-standard weight groups of passengers.* The average passenger weight method will not be used in the case of flights carrying large groups of passengers whose average weight obviously does not conform with the normal standard weight. Actual weights will be used when a passenger load consists to a large extent of athletic squads or other special group which is smaller or larger than the U. S. average. Where such a group forms only a part of the total passenger load, the actual weights may be used for such group and average weights used for the balance of the passenger load. In such instances, a notation will be made on the load manifest, indicating number of persons in the special group and identifying the group (i. e., football squad, Blank Nationals, etc.).

(f) *Crew weight.* The actual weight of crew members may be used or the following approved average weights may be utilized:

(1) Male cabin attendants 150 pounds; female cabin attendants 130 pounds.

(2) All other crew members 170 pounds.

(g) *Passenger and crew baggage.* Procedures should be provided so that all baggage, including that carried on board by the passengers, is properly accounted for. If desired by the air carrier, a standard crew baggage weight may be used.

(h) *Center of gravity travel during flight.* The air carrier will show that the procedures fully account for the extreme variations in center of gravity travel during flight caused by all or any combination of the following variables:

(1) The movement of a number of passengers and cabin attendants equal to the placarded capacity of the lounges or lavatories from their normal position in the aircraft cabin to such lounge or lavatory. If the capacity of such compartment is one, the movement of either one passenger or one cabin attendant, whichever most adversely affects the CG condition will be considered. When the capacity of the lavatory or lounge is two or more, the movement of that number of passengers or cabin attendants from positions evenly distributed throughout the aircraft may be used. Where seats are blocked off, the movement of passengers and/or cabin attendants evenly distributed throughout only the actual loaded section of the aircraft will be used. The extreme movements of the cabin attendants carrying out their assigned duties within the cabin will be considered. The various conditions will be combined in such a manner that the most adverse effect on the CG will be obtained and so accounted for in the development of the loading schedule to assure the aircraft being loaded within the approved limits at all times during flight.

(2) *Landing gear retraction.* Possible change in CG position due to landing gear retraction will be investigated and results accounted for.

(3) *Fuel.* The effect on the CG travel of the aircraft during flight due to fuel used down to the required reserve fuel or to an acceptable minimum reserve fuel established by the air carrier will be accounted for.

(i) *Fuel allowance for taxiing and run-up.* The weight and balance system may provide for a weight allowance of 3 pounds of fuel for each 100 horsepower (maximum continuous) available to the aircraft from all of its engines to be added to the maximum gross weight of the aircraft to compensate for fuel used during run-up and taxiing.

(j) *Records.* The weight and balance system will include methods by which the air carrier will maintain a complete, current and continuous record of the weight and center of gravity of each aircraft. Such records should reflect all alterations and changes affecting either the weight or balance of the aircraft, and will include a complete and current equipment list. When fleet weights are used, pertinent computations should also be available in individual aircraft files.

(k) *Weight of fluids.* The weight of all fluids used in aircraft may be established on the basis of actual weight, a standard volume conversion or a volume conversion utilizing appropriate temperature correction factors to accurately determine the weight by computation of the quantity of fluid on board.

§ 40.52–1 *Copies of the entire manual, or appropriate portions thereof, to be furnished to assigned aviation safety agents (CAA policies which apply to § 40.52 (a) (3)).* The number of entire manuals and/or number of appropriate portions thereof to be furnished will be designated by the aviation safety agents assigned to each air carrier. The quantity of manuals and the designation of appropriate portions thereof to be furnished to such agents will necessarily vary according to the particular characteristics of each air carrier, such as size, distribution of operations and maintenance facilities, composition of manual, etc. However, the number of manuals or portions thereof will be held to the minimum amount necessary for such agents to accomplish their official functions. Primary distribution of such manuals or portions thereof will normally be made to the aviation safety agents assigned to duty at the air carrier's principal operations and maintenance base.

§ 40.63–1 *Materially altered in design (CAA interpretations which apply to § 40.63 (b) (1)).* A type of airplane will be considered to be materially altered in design when the alterations include, but are not necessarily limited to:

(a) Installation of powerplants other than the powerplants of a type similar to those with which the aircraft is certificated.

(b) Major alteration to the aircraft or its components which materially affects the flight characteristics.

§ 40.70–1 *Deviations (CAA rules which apply to § 40.70 (a)).* An application for any deviation shall include all supporting data and shall be forwarded to the CAA Aviation Safety District Office charged with the over-all inspection of the air carrier's operations.

§ 40.70–2 *Accuracy of data (CAA policies which apply to § 40.70 (b)).* The charts and data prepared by the air carrier for use of flight and operations personnel should be prepared with sufficient accuracy and clarity that the gross weight and runway length values for specific operating conditions can be reproduced within a tolerance of one-half of one percent by an independent recheck.

§ 40.70–3 *Temperature accountability (CAA policies which apply to § 40.70 (c)).* The maximum permissible weight for a given take-off should be equal to the lowest of three values determined separately by consideration of (a) accelerate-stop, (b) take-off and climb out to a 50-foot height and (c) the obstacle clearance condition. The established temperature accountability correction factors appearing in the Airplane Flight Manuals are applied to the take-off weights determined by the accelerate-stop and climb out to a 50-foot height. These values may be used individually or in combination, i. e., if a runway is considerably longer than is required to meet the accelerate-stop and climb out to 50 foot requirements at standard temperature, then at temperatures higher than standard, take-off weight need not be reduced as long as additional runway length is available. When the temperature reaches a value at which no additional runway length remains, then a reduction in weight would be necessary. These factors do not apply to weights determined by obstacle clearance considerations. If the take-off weight at standard temperature is limited by obstruction clearance rather than by the climb out to 50 feet or by the accelerate-stop distance, a weight reduction need not be made for temperatures higher than standard until the temperatures reach a high enough value to use up the existing runway between that used for standard temperature (limited to less than the full runway because of obstacles) and the actual length.

§ 40.71–1 *Weight limitations (CAA policies which apply to § 40.71).* The limitations imposed by § 40.71 take into account only one operating variable, i. e., the elevation of the airport to be used as it affects the weight of the aircraft during take-off or landing. Other operating variables, such as runway length, gradient, wind and temperature, are considered in other sections of this part. Compliance with this section does not present a particular problem since the Airplane Flight Manual provides performance data for airports over a wide range of elevations. However, most manuals do not provide data for operations at airports below sea level. Section 40.71 should not be construed as prohibiting operations from airports below sea level, since sea level data in the Airplane Flight Manual, being conservative, may be applied to such airports.

§ 40.72–1 *Take-off limitations to provide for engine failure (CAA policies which apply to § 40.72)*—(a) *Take-off flight path.* Figure 1 is a pictorial representation of the relationship required between the dimensions of an airport and its surroundings, and the performance of the airplane. It illustrates the take-off flight path defined by the airworthiness requirements.

(b) *Airport data.* Complete data concerning the airport dimensions and characteristics, such as runway lengths, runway gradients, obstruction heights and location, airport elevation, and the nature and condition of airport areas other than paved runways from which take-offs might be made, are necessary for the determination of permissible take-off weights. The most nearly complete and satisfactory source of such data is the series of Airport Obstruction Plans prepared by the U. S. Department of Commerce Coast and Geodetic Survey. However, their Airport Obstruction Plan series does not yet completely cover the airports used by air carrier operators of Transport Category airplanes, and in addition, the Obstruction Plans do not present any data showing the nature or condition of runway surfaces or other airport areas suitable for use in take-off and landing. Furthermore, the Obstruction Plans necessarily contain data which may be several months old and which may not completely conform to the existing obstructions. Therefore, it may be necessary, for the air carrier operator, to supplement its data with information obtained from other sources. However, gross weight data calculated on the basis of such data should be rechecked or recalculated as soon as appropriate data from the Coast and Geodetic Survey becomes available.

(c) *Runways.* (1) Normally, only paved runways will be approved for use in take-off. However, in some cases there may be a defined rectangular area hereinafter designated as a stopway at the end of a runway in the direction of take-off, selected and approved as a suitable area, in which the aircraft can be stopped after an interrupted take-off. The stopway should have the same width as the runway it augments. The stopway should be so prepared or constructed as to enable the aircraft to come to a stop on it without hazard at the operating speeds that might be expected in this area after an interrupted take-off. If it is desired to use a stopway to meet the "climb to a 50-foot height" requirement, the stopway should be suitable for the aircraft to traverse it at take-off speeds without hazard.

(2) In all cases the take-off should be assumed to begin on the paved runway and not on an unpaved area. No allowance need be made for the length of the airplane in determining what should be considered to be the proper point for beginning the take-off. Limitations established by the airport operator may make it necessary to stipulate that the beginning of the take-off area be at some point down the runway from the actual end of the paving.

(d) *Turns to avoid obstructions.* (1) Section 40.72 provides that after reaching a height of 50 feet, the aircraft may be turned with a bank not exceeding 15° to comply with the obstruction clearance criteria. Only one turn to a definite heading should be considered in detailing the take-off path.

(2) The radius of turn resulting from a banked turn of 15° may be determined from the following formula:

Radius of turn $= V^2 \times 0.25$ feet

where V = climb speed in m. p. h., TAS

For example: At a climb speed of 120 m. p. h., the radius of turn for a 15° banked turn would be,

$$120 \times 120 \times 0.25 = 3600 \text{ feet}$$

The effects of wind in altering a flight path need not be considered unless they are large (¼ climb speed) and the angle of turn is more than 45° from the runway heading.

(e) *Effects of runway gradient.* (1) The gradient effect on the ground run may be calculated from the following formula:

$$S_G = S\left[\frac{1}{1-\left(\frac{2\,S\,g\,\sin\alpha}{V_2^2}\right)}\right]$$

where

S_G = length of ground run with gradient.
S = length of ground run without gradient.
g = acceleration of gravity = 32.2 (ft./sec.²).
V_2 = climb out speed, feet per second, True Air Speed.
α = angle of grade with horizontal, uphill +, downhill −.

(2) The above formula is based on several simplifying assumptions, i. e., that a uniform grade exists, that the airplane is accelerated uniformly throughout the ground run, and that the speed V_2 may be used where the difference between V_1 and V_2 is not large. None of these assumptions may be exactly correct, but the errors introduced by making such assumptions are small provided the airplane acceleration and the actual point-to-point grade do not depart from the average values of those quantities by any great amount.

(3) The effect of gradient during the climb-out should be determined by comparing the airplane rate of climb with the change in runway elevation, to determine first the weight or wind condition at which the airplane clears the end of the runway and all obstacles by an actual 50 feet and second, that the airplane clears all points on the runway after take-off.

(4) For purposes of simplification in calculating the effect of runway gradient on the take-off flight path, an average gradient consisting of the difference in elevation of the two ends of the runway divided by the runway length may be used, provided that no intervening point on the runway lies more than 5 feet above or below a straight line joining the two ends of the runway. In this case, the gradient effects on the acceleration portion of the take-off flight path and for the accelerate-stop portion may be presented together in simple chart form without introducing excessive errors. However, the actual gradient should be used for the climb-out segments of the flight path and in no case should the gradient be greater than the first segment climb.

(5) In those cases in which intermediate points on the runway depart more than five feet from the mean line, the gradient effects on the acceleration portions, the deceleration portion, and the climb portion of the flight path should be computed separately. An average gradient may be assumed for the ground run portion of the problem because the error resulting therefrom is so small that a more rigorous treatment is not justified, provided a truly representative gradient is chosen. Where there are nc reversals or significant changes in the runway slope during the ground run, the average may be taken to be the difference in elevation between the starting point and the point of attaining take-off climb speed, V_2, divided by the distance between the two points. However, if the gradient is not essentially constant, an average gradient should be assumed that more nearly parallels the high-speed portion of the acceleration run, since the gradient has a greater effect on the distance traversed at high speed. The average gradient selected in this way will usually serve for determining gradient effects on the acceleration distance in either the take-off flight path or the accelerate-stop distance. An average gradient should be determined in the same way in determining the gradient effects on the stopping distance, while the actual gradient should be determined in checking the climb segment to the 50-foot point.

(6) The operator may take advantage of the favorable effect of a downhill gradient on the take-off flight path, if he wishes, but the unfavorable effect of such a gradient on the stopping distance should be accounted for in all cases.

(f) *Effects of wind.* (1) Section 40.72 permits the use of 50 percent of the headwind component and requires consideration of 150 percent of any tailwind component. The effect of wind on runway requirements can be determined by use of the following equation:

(i) For all headwind components, and tailwind components of 10 m. p. h. or less.

$$S_w = S\left(\frac{V_2 - V_w}{V_2}\right)^{1.85}$$

where

S_w = runway required with wind
S = runway required, zero wind
V_2 = take-off safety speed (m. p. h.)
V_w = + (0.5 × headwind component) or, − (1.5 × tailwind component)

(ii) If tailwind components in excess of 10 m. p. h. are approved, the equation will be:

$$S_w = S\left(\frac{V_2 - V_w}{V_2}\right)^3$$

Alternately, the exponent can be that which is determined to be appropriate to the separation of deceleration characteristics of the airplane type, as applicable.

(2) For steady wind conditions, the wind velocity and direction will be used in computing the effective headwind and tailwind components, and the maximum gust velocity and most unfavorable direction will be used in computing the crosswind component.

§ 40.76–1 *Special en route limitations (CAA policies which apply to § 40.76).* No attempt is made to classify specific types of navigational facilities as acceptable or unacceptable for the purposes of § 40.76, but each case will be examined on its own merits. In general, however, the facility should be of a type that gives the pilot a continuous fix of his position with an error of not more than two miles, or a continuous on-course indication with an error of not more than two miles, or a continuous indication of the bearing and distance of the obstacle from the airplane, with an accuracy adequate to allow the pilot to turn away from the obstacle with ample clearance. Any mechanical or electrical facilities that are to be acceptable should be thoroughly reliable regardless of weather or other operating conditions. Such considerations apply only for IFR operations.

§ 40.77–1 *Landing distance limitations; airport of destination (CAA policies which apply to § 40.77).* (a) Section 40.77 establishes two major considerations in determining the permissible landing weight at the airport of destination. The first is that the aircraft weight will be such on arrival that it can be landed within 60 percent of the effective landing length of the most favorable (normally the longest) runway in still air. This maximum weight for an airport/aircraft configuration, once established, remains constant and cannot be exceeded, regardless of wind conditions.

(b) The second is that consideration be given to the maximum weight that will be permitted due to the necessity of using another runway because of the probable wind condition, ground handling characteristics of the aircraft, landing aids, etc. This consideration may result in a lower gross weight than permitted in paragraph (a) of this section, in which case, dispatch must be based on this lesser weight.

(c) The probable wind referred to in paragraph (b) of this section, is the wind forecasted to exist at the time of arrival.

(d) If the forecast conditions are such that consideration of the requirements in § 40.77 (b) would preclude a landing at the intended destination, the aircraft may be dispatched if an alternate airport is designated which permits compliance with § 40.78.

(e) (1) If a flight has been properly dispatched, but arrives at the destination with a weight higher than anticipated due to unexpected wind conditions or fuel consumption, § 40.77 (b) should not be construed as prohibiting a landing at the overweight condition, provided the crosswind and/or tailwind operating limitations are not exceeded.

(2) If conditions are such that the crosswind and/or tailwind limitations will be exceeded, the flight must proceed to its alternate, if one has been named to meet the requirements of § 40.77 (b). However, if an alternate was not provided, and upon arrival the wind conditions were such that the crosswind and/or tailwind limitations would be exceeded, the pilot should exercise the authority granted him in § 40.360 (a).

(f) For application of the wind components as allowed in § 40.77 (b), refer to § 40.72–1 (g).

§ 40.90–1 *Performance data (CAA rules which apply to § 40.90).* Performance data published by the Administrator to determine performance requirements in relation to the airports to be used and the areas to be traversed are set forth in figures 1 through 10* and paragraph (b) of this section. For the purpose of determining performance data, figures 1, 3, and 6, "paved runway" shall mean paved with asphalt or concrete. Figures 2, 4, and 7 shall be used for all other runway surfaces, except in individual cases where the Administrator finds that a particular runway surface justifies the use of the paved runway data or a specific correction factor. Data based on flight tests conducted under the supervision of CAA Aircraft Engineering Division and approved by the Administrator may be used in lieu of the published data. An application for any deviation shall include all supporting data and shall be forwarded to the CAA Aviation Safety District Office charged with the over-all inspection of the air carriers' operations.

§ 40.91–1 *Take-off limitations (CAA rules which apply to § 40.91).* (a) Figures 1, 2, 3, 4, 8, 9, and 10 shall be used in determining take-off limitations.

(b) If the gradient of the runway exceeds ½ percent, the effect of the total gradient shall be accounted for. The effect of gradient may be calculated from the following formula, or other methods by which the effects of gradient can be accurately computed:

$$S_G = S\left[\frac{1}{1-\left(\frac{2Sg\sin\alpha}{V_2^2}\right)}\right]$$

Where:

S_G = length of ground run with gradient (required or available).
S = length of ground run without gradient (required or available).
g = acceleration of gravity = 32.2 (ft sec²).
V_2 = climb out speed, feet per second, true air speed.
α = angle of grade with horizontal, uphill +, downhill −.

Where runways with gradient are of such length that the gross weight would be reduced, the following equation will be more useful in determining the zero gradient runway length to be used in determining the permissible gross weight from figures 1, 2, 3, and 4:

$$S = \frac{S_G}{1+\left(\frac{S_G g 2\sin\alpha}{V_2^2}\right)}$$

Where:

S_G = effective runway length available.
S = equivalent runway length due to gradient.
g = acceleration of gravity = 32.2 (ft/sec²).
V_2 = climb out speed, feet per second, true air speed.
α = angle of grade with horizontal, uphill +, downhill −.

(c) The maximum allowable take-off weight from sod runways shall be the lesser gross weight as determined by application of the effective length to the appropriate take-off table (fig. 1 or 3) and by application of the actual runway length to the corresponding take-off table (fig. 2 or 4). Figures 1 and 3 are used to determine the maximum allowable gross weight which will permit the aircraft to take off within the effective runway length, while figures 2 and 4 are used to determine the maximum allowable gross weight which will permit the particular aircraft to be accelerated and brought to a full stop within the actual length of available runway.

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*The charts are presented in graph form for selected values. Other values may be determined by interpolation or extrapolation, provided the operating and structural limitations are not exceeded. The following examples are given to explain the use of figures 1 through 10:

Example 1. Figure 8 is used in the following manner: (a) Determine the wind velocity and wind angle relative to the runway. (In the example illustrated in figure 8, for Runway 27, and a wind from WNW at 25 m. p. h., the relative wind angle is 22°.)

(b) Enter the chart with the above information at point A.

(c) Enter chart at point B using the existing effective runway length and project a line horizontally.

(d) Project a vertical line from point A to intersect line from point B.

(e) At point C, the intersection of these two lines, read the effective runway length available for zero wind. This figure, after being corrected for runway gradient, is used with the appropriate take-off or landing chart to determine the maximum permissible gross weight. It should be noted that a reverse of this procedure will furnish information on the actual runway required if the zero wind runway required is known for a given gross weight.

(f) By projecting a line horizontally from point A to point D, the crosswind component can be determined.

Example 2. Operating conditions for take-off:

Aircraft = DC-3 S1C3G.
Airport = Elevation = 4,000'.
Effective runway length = 3,300 feet (paved).
Runway gradient = +1.2 percent.

The equivalent runway length due to gradient =

$$S = \frac{SG}{\left[1+\left(\frac{S_G g 2\sin\alpha}{V_2^2}\right)\right]}$$

$$= 1+\frac{3{,}300}{\frac{(3{,}300\times 32.2\times 2\times .012)}{(98\times 1.467)^2}}$$

$$= 2{,}938 \text{ feet.}$$

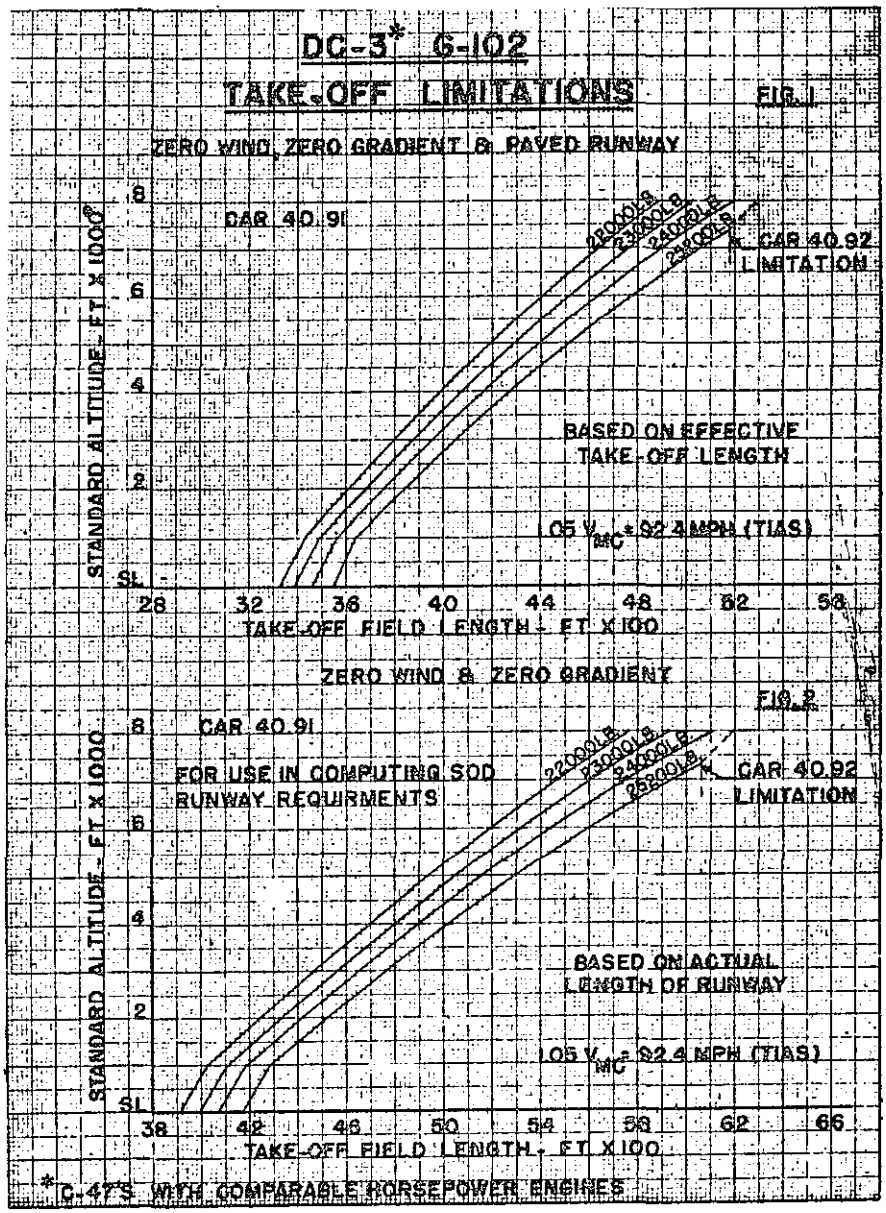
Due to the positive, or uphill, gradient effect, the zero gradient runway length is 2,938 feet. This figure, versus the airport elevation is used with figure 3 to determine the allowable gross weight for take-off. It will be noted that this runway length/airport elevation combination is outside the range of values plotted on the chart. Therefore, under a zero wind condition, operations from the runway in question would be impracticable due to the weight restriction.

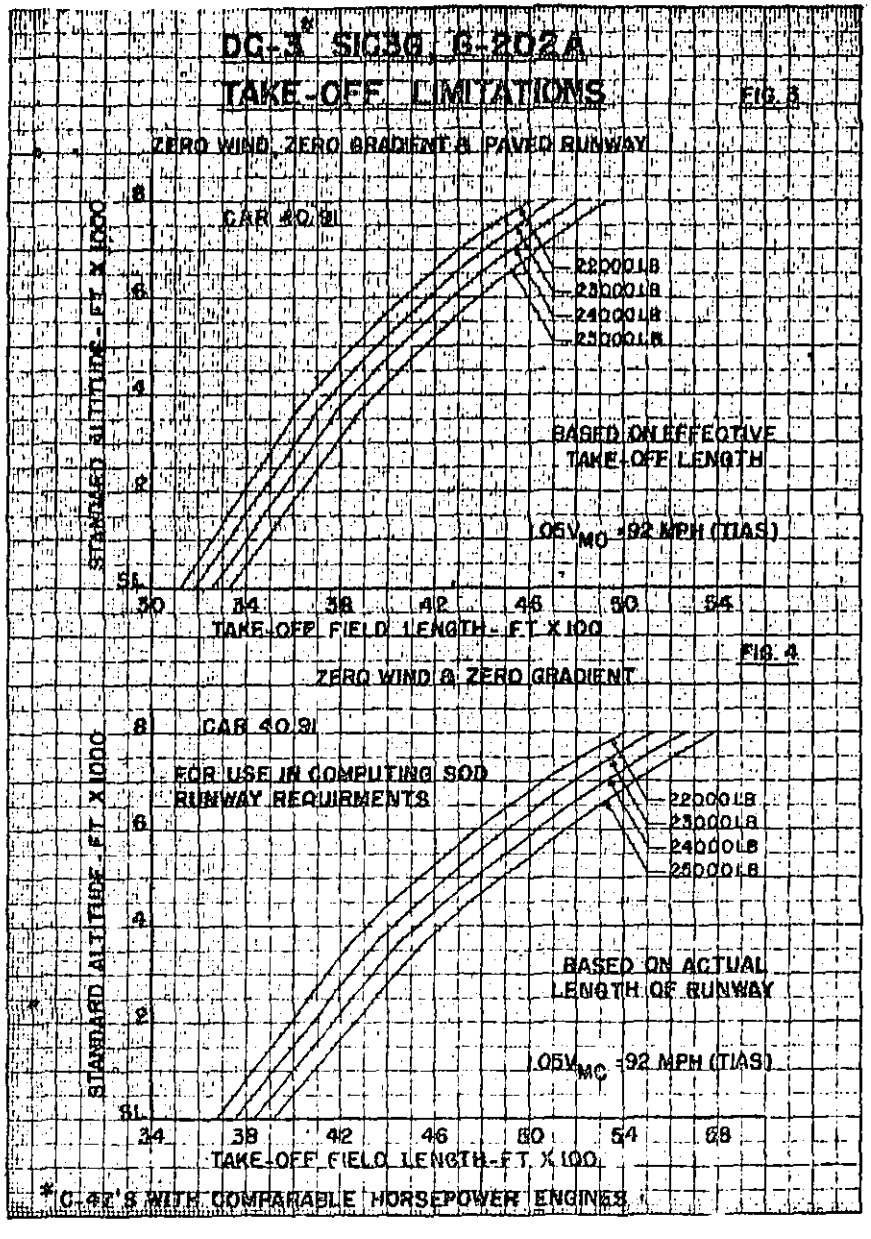
If a 25 m. p. h. headwind component exists, the use of figure 8 indicates a zero wind runway length of 3,800 feet. This figure is predicated on $1.05V_{mc}$ = 92 m. p. h. Since figure 10 indicates $1.05V_{mc}$ (92 m. p. h. TIAS) = 97.6 m. p. h. TAS (use 98) at an elevation of 4,000 feet, the distance of 3,800 feet must be multiplied by a correction factor from figure 9. The factor in this example, (25 m. p. h. headwind component and $1.05V_{mc}$ = 98 m. p. h. TAS), is 1.018 giving a corrected zero wind runway distance of 3,800 feet × 1.018 = 3,868 feet. By referring to figure 3, it is found that this zero wind runway length will permit a take-off at a weight of 24,200 pounds.

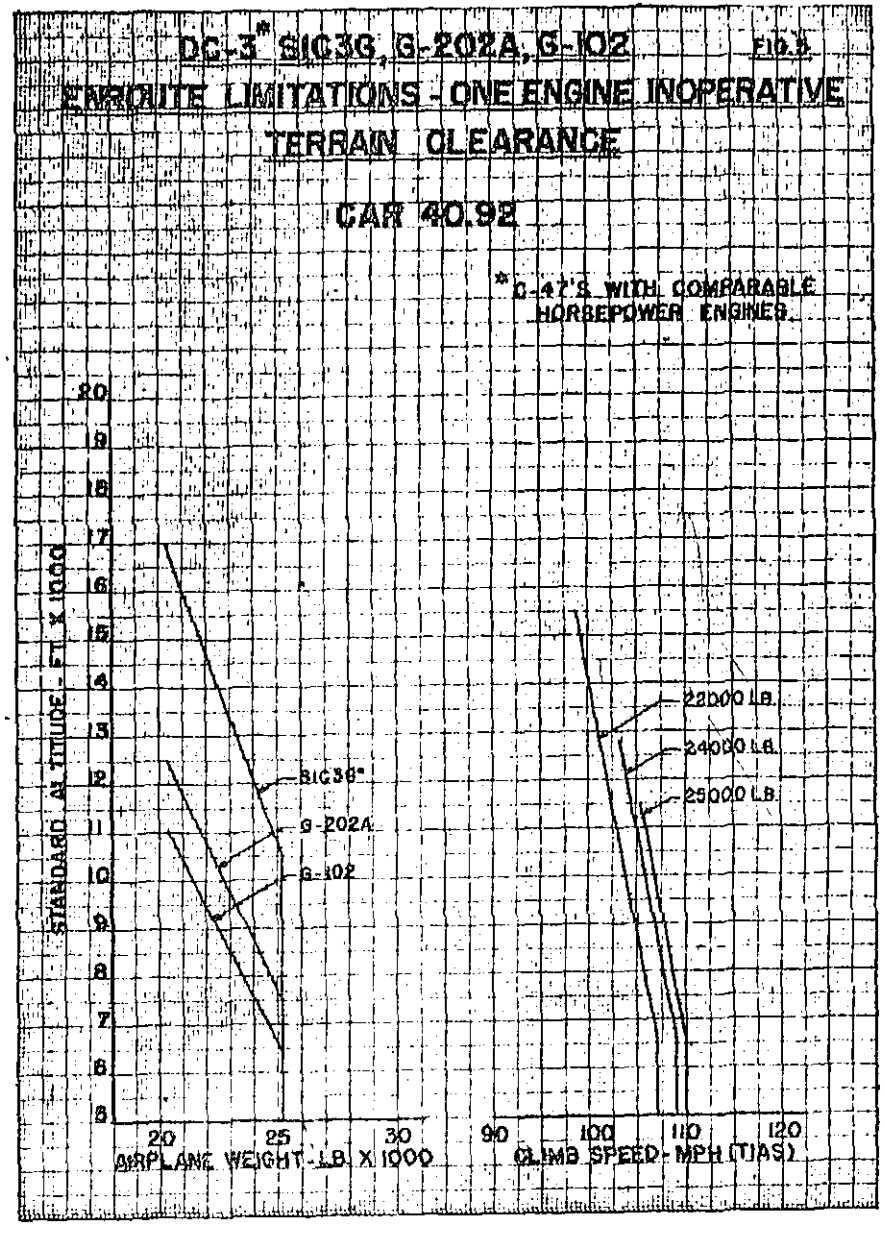
If the take-off was to be made in the opposite direction, the benefit of the downhill gradient on the accelerate distance would result in a zero gradient runway length of 3,770 feet. This would permit a take-off at a weight of 24,200 pounds, with zero wind. Figure 3 indicates that 3,970 feet of runway is required to permit take-off at a maximum gross weight of 25,200 pounds. Figure 8 indicates that a headwind component of 3 m. p. h. will give the desired zero wind runway length of 3,970 feet to permit take-off at the maximum gross weight.

Example 3. Operating conditions for landing: Same as in example 2, except that § 40.93 does not require consideration of gradient in detailing the landing limitations.

Referring to figure 6, we find that a 3,300-foot paved runway at an elevation of 4,000 feet, permits a landing gross weight of 22,600 pounds, in a zero wind condition. If a 25 m. p. h. headwind component is forecast, we find by reference to figure 8 that the zero wind runway length becomes 4,300 feet. In this example, the distance of 4,300 feet is predicated on $1.3V_{s_0}$ = 92 m. p. h. Therefore, by reference, figure 10, $1.3V_{s_0}$ is found to be 98 m. p. h. at 4,000 feet and by reference to figure 9, it is found that the correction factor is 1.018, resulting in a zero wind runway length of 4,300 × 1.018 = 4,377 feet. Figure 6 indicates that this zero wind runway length will permit landing at the maximum gross weight.


DC-3* G-102
TAKE-OFF LIMITATIONS
FIG. 1
ZERO WIND, ZERO GRADIENT & PAVED RUNWAY
CAR 40.91
26000 LB
25000 LB
24000 LB
23000 LB
CAR 40.92 LIMITATION
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V MC = 92.4 MPH (TIAS)
STANDARD ALTITUDE - FT X 1000
SL
2
4
6
8
28
32
36
40
44
48
52
56
TAKE-OFF FIELD LENGTH - FT X 100
ZERO WIND & ZERO GRADIENT
FIG. 2
CAR 40.91
FOR USE IN COMPUTING SOD RUNWAY REQUIRMENTS
23000 LB
24000 LB
25000 LB
26000 LB
CAR 40.92 LIMITATION
BASED ON ACTUAL LENGTH OF RUNWAY
1.05 V MC = 92.4 MPH (TIAS)
STANDARD ALTITUDE - FT X 1000
SL
2
4
6
8
38
42
46
50
54
58
62
66
TAKE-OFF FIELD LENGTH - FT X 100
* C-47'S WITH COMPARABLE HORSEPOWER ENGINES


DC-3* SIC3G, G-202A
TAKE-OFF LIMITATIONS
FIG. 3
ZERO WIND, ZERO GRADIENT & PAVED RUNWAY
CAR 40.91
22000 LB
23000 LB
24000 LB
25000 LB
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05V MC = 92 MPH (TIAS)
STANDARD ALTITUDE - FT X 1000
TAKE-OFF FIELD LENGTH - FT X 100
FIG. 4
ZERO WIND & ZERO GRADIENT
CAR 40.91
FOR USE IN COMPUTING SOD RUNWAY REQUIRMENTS
22000 LB
23000 LB
24000 LB
25000 LB
BASED ON ACTUAL LENGTH OF RUNWAY
1.05V MC = 92 MPH (TIAS)
STANDARD ALTITUDE - FT X 1000
TAKE-OFF FIELD LENGTH - FT X 100
*C-47'S WITH COMPARABLE HORSEPOWER ENGINES


DC-3* SIC3G, G-202A, G-102
FIG. 5
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 40.92
*C-47'S WITH COMPARABLE HORSEPOWER ENGINES.
SIC3G*
G-202A
G-102
22000 LB
24000 LB
25000 LB
STANDARD ALTITUDE - FT X 1000
AIRPLANE WEIGHT - LB X 1000
CLIMB SPEED - MPH (TIAS)

46.36

DC-3*SIC3G, G-202A, G-102
LANDING LIMITATIONS

FIG. 6

ZERO WIND, ZERO GRADIENT & PAVED RUNWAY

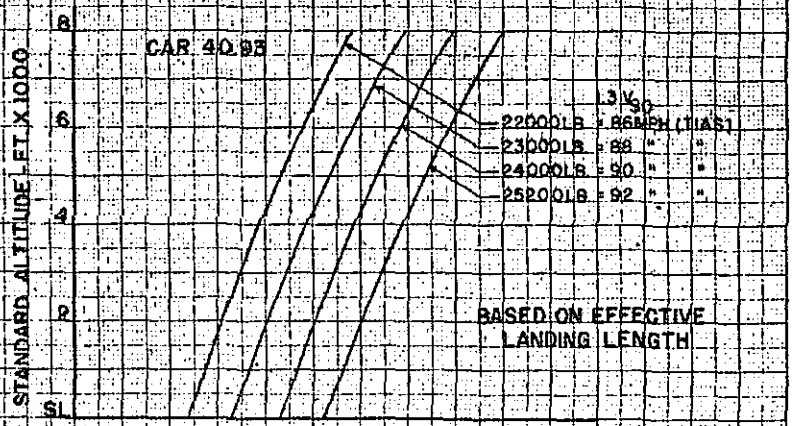
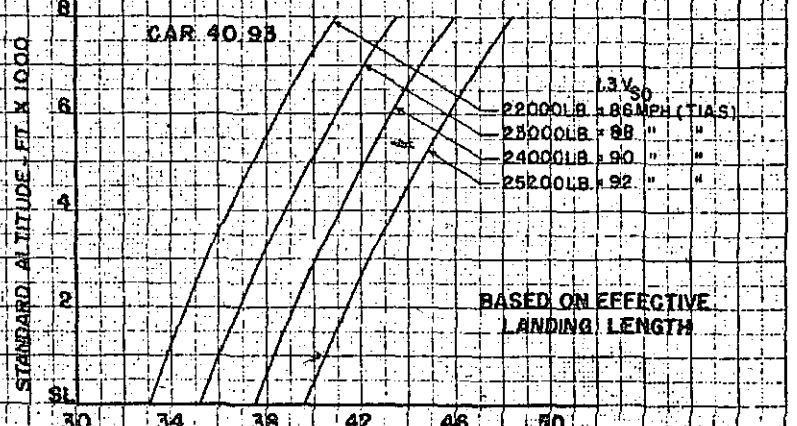


FIG. 7

ZERO WIND, ZERO GRADIENT & SOD RUNWAY

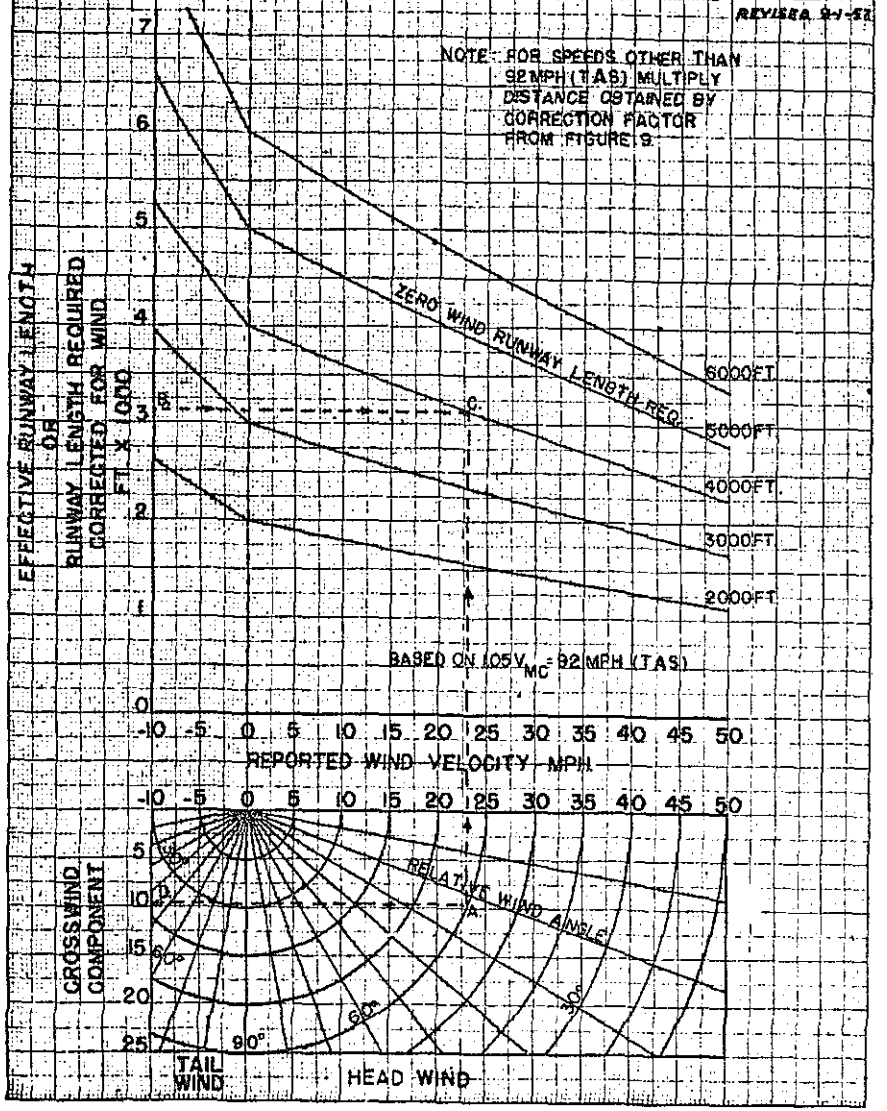


*C-47'S WITH COMPARABLE HORSEPOWER ENGINES

WIND ACCOUNTABILITY CHART FOR
TAKE-OFF & LANDING RUNWAY LENGTHS

FIG. 8

REVISED 9-1-42



TAKE-OFF & LANDING RUNWAY LENGTH CORRECTION FACTORS FOR VARIATIONS IN AIRSPEED.

FIG. 9

REVISED 9-1-48

NOTE: TO BE USED ONLY IN CONJUCTION WITH VALUES OBTAINED FROM FIG. 8

EXAMPLE:

1.3V_{SO} = 100 MPH (T.A.S.) OBTAIN (TAS) FROM FIG. 10

EFFECTIVE WIND FROM FIG. 8 = 2.3 MPH

ZERO WIND RUNWAY LENGTH REQ. FROM FIG. 8 = 4000 FT.

CORRECTION FACTOR = 1.022

CORRECTED ZERO WIND RUNWAY LENGTH REQ.

4000 X 1.022 = 4088 FT.

RUNWAY LENGTH CORRECTION FACTOR FOR SPEED VARIATION

1.09 1.08 1.07 1.06 1.05 1.04 1.03 1.02 1.01 1.00 .99 .98 .97 .96 .95 .94

EFFECTIVE WIND VELOCITY FROM FIG. 8

50 40 30 20 10 5 10

86 88 90 92 94 96 98 100 102 104 106

1.05V_{MC} OR 1.3V_{SO} IN MPH (TAS)

FIG. 10

TAS. CONVERSION TO TAS.

EXAMPLE:

TIAS = 87 MPH.

ALTITUDE = 4000 FT.

TAS. = 92.3 (USE 92 MPH.)

TIAS = 100 MPH

TIAS = 98 MPH

TIAS = 96 MPH

TIAS = 94 MPH

TIAS = 92 MPH

TIAS = 90 MPH

TIAS = 88 MPH

TIAS = 86 MPH

STANDARD ALTITUDE - FT. X 1000

1 2 3 4 5 6 7

86 88 90 92 94 96 98 100 102 104 106 108

TAS. IN MPH

§ 40.91–2 *Take-off limitations (CAA policies which apply to § 40.91).* The maximum tailwind component should be 5 mph unless another value has been approved by the Administrator.

§ 40.92–1 *En route limitations (CAA rules which apply to § 40.94).* Figure 5 shall be used in determining the en route limitations. An application for approval of "drift-down" procedures shall include all supporting data. The application will be forwarded to the CAA Aviation Safety District Office charged with the over-all inspection of the air carrier's operations.

§ 40.93–1 *Landing distance limitations (CAA rules which apply to § 40.93).* (a) Figures 6, 8, 9, and 10 shall be used in determining landing distance limitations on paved runways.

(b) Figures 7, 8, 9, and 10 shall be used in determining landing distance limitations on sod runways.

§ 40.93–2 *Landing distance limitations (CAA policies which apply to § 40.93(a)).* The determination of the adequacy of the airport of intended destination, when complying with § 40.93, is a function of proper dispatch. If the dispatch is based on the best information available, but upon arrival, the criteria in § 40.93 cannot be met, a landing may be made provided the tailwind operating limitation for the airplane is not exceeded.

(a) The maximum tailwind component should be 5 mph, unless another value has been approved by the Administrator.

(b) If this condition cannot be met at the time of dispatch, an alternate airport which fully complies with § 40.93 should be named in the clearance.

§ 40.153–1 *Carriage of cargo in passenger compartments (CAA policies which apply to § 40.153).* Normally the stowage of cargo in passenger compartments should be accomplished by utilizing the forward rows of seats in the passenger cabin. Such a practice is permissible by § 40.153: *Provided,* That the requirements specified in paragraphs (a) through (e) of § 40.153 are complied with. However, there may be instances where it might be desirable to carry cargo in the form of an unusually shaped object which would not lend itself to normal stowage practice. If safety is not adversely affected and the carriage of such cargo is in the public interest, the Administrator will authorize deviations from the CAR requirement. The authorization of such deviation will be based solely on the merits of each individual case and no blanket authorization will be granted. In the event that cargo stowed in the forward end of the passenger cabin is of sufficient size or volume so as to obscure the passengers' view of the "seat belt" and "no smoking" sign, an auxiliary sign or some other means of the proper notification of passengers must be provided.

§ 40.170–1 *Approval of aircraft instruments and equipment for all operations (CAA interpretations which apply to § 40.170 (a)).* Instruments and equipment specified in §§ 40.171, 40.172, and §§ 40.230 through 40.232 must be approved in accordance with one or more of the following methods:

(a) Instruments and equipment which are accepted as part of the aircraft on original certification.

(b) Instruments and equipment manufactured in accordance with (TSO) Technical Standard Orders and installed in accordance with approved repair and alteration procedures or on original aircraft certification.

(c) Instruments and equipment manufactured in accordance with a (CAATC) Type Certificate and installed on original aircraft certification or subsequent repair and alteration approval.

(d) Instruments and equipment approved by the Administrator in accordance with standard repair and alteration procedure.

§ 40.170–2 *Determination of operable condition of radio equipment (CAA interpretations which apply to § 40.170 (b)).* Radio equipment specified in §§ 40.230 through 40.232 which is of such complex nature that it cannot be accurately checked for operable condition prior to take-off, except by special ramp or shop performance check procedures, may be deemed to have been determined operable if equipment in this category is comprehensively checked for satisfactory operational performance during the last comprehensive performance check specified in the Operations Specifications, Aircraft Maintenance (other than preflight or daily), of the air carrier using such equipment coupled with frequent in-flight checks by pilots during regular operations.

§ 40.173–1 *Hand fire extinguishers for crew, passenger, and cargo compartments (CAA interpretations which apply to § 40.173 (d)).* Approved extinguishers are extinguishers which have been approved by the Administrator or by the Underwriters Laboratories (UL), the Factory Mutual Laboratories (FML), or any other agency which may be deemed qualified by the Administrator in accordance with § 4b.18 of this chapter.

§ 40.175–1 *Power supply requirements for operation of instruments (CAA interpretations which apply to § 40.175 (c)).* (a) Instruments and equipment using an external power source are interpreted to mean all instruments and equipment which derive their operative or motive power from an external source such as radios, air driven instruments, electric gyro instruments, etc., as contrasted with spring driven clocks or magnetic compasses which have a self-contained power source.

(b) The requirement that all airplanes have installed "a power supply and distribution system capable of producing and distributing the load for all required instruments and equipment using and external power source in the event of failure of any one power source or component of the power distribution system" is interpreted to mean that an alternate power source or sources and power distribution system or systems will be necessary to assure that all required instruments and equipment, using an external power source, receive their essential operative or motive power regardless of failure of any one power source or component of a power distribution system.

§ 40.205–1 *Requirement of protective breathing equipment in nonpressurized cabin airplanes (CAA rules which apply to § 40.205 (b)).* Protective breathing equipment for the flight crew shall be required in nonpressurized cabin airplanes having built-in carbon dioxide fire extinguisher systems in fuselage compartments (for example, cargo or combustion heater compartments); except that protective breathing equipment will not be required where:

(a) Not more than five pounds of carbon dioxide will be discharged into any one such compartment in accordance with established fire control procedures, or

(b) The carbon dioxide concentration at the flight crew stations has been determined in accordance with CAM 4b.484–1 and found to be less than 3 percent by volume (corrected to standard *sea-level conditions).*

§ 40.205–2 *Protective breathing equipment and installation (CAA policies which apply to § 40.205)*—(a) *Oxygen systems.* The 300-liter oxygen supply per flight crew member required by this requirement is intended to be used with a demand type oxygen system or a diluter-demand type oxygen system with the lever of the diluter-demand regulator set at "100 percent Oxygen" (Automix "Off"). A continuous flow protective breathing system with a suitable mask may also be used for protective breathing purposes providing an oxygen flow rate of 60 liters per minute at 8,000 feet (45 liters per minute at sea level) is supplied to the mask and providing a supply of 600 liters of free oxygen at 70° F and 760 mm Hg pressure is provided to each required flight crew member. See § 4b.651 (h) of this subchapter and associated manual material.

(b) *Portable equipment.* Portable protective breathing units of one of the types mentioned in paragraph (a) of this section may be used to meet this requirement. Portable units which are also intended to be used to meet the fire protection requirements of § 4b.330 (c) of this subchapter should be of one of the demand types; continuous flow types are not suitable for fighting fires in Class A or B cargo compartments since any unused oxygen escaping from around the face mask might aggravate the existing fire.

§ 40.230–1 *Independent radio systems (CAA interpretations which apply to § 40.230).* Radio systems are independent where each such system is separate and complete, and the function of any part of the whole of one system is not dependent on the continued functioning of any component of the other, and in event of failure in one system, the other system is capable of continued independent operation.

§ 40.241–1 *Persons directly in charge of inspection, maintenance, overhaul, or repair of airframes, engines, propellers, or appliances (CAA interpretations which apply to § 40.241 (b)).* The individual "directly in charge" is interpreted to mean each individual assigned by the carrier or other person performing maintenance, to a position in which he is responsible for the work of a shop or station which performs inspections, maintenance, repairs, alterations, or other functions affecting aircraft airworthiness. Such individuals need not necessarily physically observe and direct each worker constantly, but must be available for consultation and decision on matters requiring instruction or decision from higher authority than that of the individuals performing the work.

§ 40.286–1 *Initial crew member emergency training—synthetic trainers (CAA interpretations which apply to § 40.286 (b)).* Synthetic trainers will be deemed to sufficiently simulate flight operating emergency conditions if the trainer is so designed as to accurately reproduce the placement of flight station instruments and controls of the particular type and model of aircraft for which the training is given, and the operation of such trainer permits accurate reproduction of the instrument and control characteristics found in the emergency conditions simulated.

§ 40.302–1 *Pilot check—proficiency requirements (CAA rules which apply to § 40.302 (b)).* The following items are required by the Administrator to determine the proficiency of the pilot-in-command:

(a) *Equipment examination (oral or written).* (1) The equipment examination shall be pertinent to the type of aircraft to be flown by the pilot-in-command and may be given (i) in the air carrier's ground school, (ii) during a routine line check under the supervision of an authorized company check pilot, or (iii) during the proficiency check.

(2) The examination shall at least contain questions relative to engine power settings, airplane placard speeds, critical engine failure speeds, control systems, fuel and lubrication systems, propeller and supercharger operations, hydraulic systems, electric systems, anticing, heating and ventilating, and pressurization system (if pressurized). A record should be maintained in the pilot's file which will indicate the date, condition under which equipment examination was given, and grade received.

(b) *Taxiing, sailing, or docking.* Attention shall be directed to the manner in which the pilot-in-command conducts taxiing, sailing, or docking with reference to the taxi instruction as issued by airport traffic control or other traffic control agency, and taxi instruction which may be published in the air carrier's operations manual, and general regard for the safety of the air carrier's and other equipment which may be affected by taxiing, sailing, or docking operation.

(c) *Run-up.* Attention to detail in the use of cockpit check list and cockpit procedure shall be observed on all proficiency flights.

(d) *Take-off.* For those air carriers authorized take-off minimums of less than 300–1, the pilot being examined shall whenever practicable execute a take-off solely by reference to instruments, or at the option of the check pilot, a contact take-off may be made following which instrument conditions shall be simulated at or before reaching 100 feet with the subsequent climb conducted solely by reference to instruments. The check pilot shall observe the pilot's ability to maintain a constant heading during the take-off run, his proficiency in handling power, flap and gear operation during the critical period between take-off (off ground) and reaching five hundred feet. Should it become necessary for the check pilot to give assistance after becoming airborne, the maneuver shall be considered as unsatisfactory.

(e) *Climbs and climbing turns.* Climbs and climbing turns shall be performed in accordance with the airspeeds and power settings as prescribed by the air carrier or those set forth in the "Airplane Flight Manual." The use of proper climb speeds and designated rates of climb shall be considered in determining the satisfactory performance of this phase of the proficiency flight.

(f) *Steep turns.* Except as provided hereinafter, steep turns shall consist of at least forty-five degrees of bank. The turns shall be at least 180° of duration, (but need not be more than 360°). Smooth control application, and ability to maneuver aircraft within prescribed limits, shall be the primary basis for judging performance. When information is available on the relation of increase of stall speeds vs. increase in angle of bank, such information shall be reviewed and discussed. As a guide, the tolerance of 100 feet plus or minus a given altitude shall be considered as acceptable deviation in the performance of steep turns. Consideration may be given to factors other than pilot proficiency which might make compliance with the above tolerances impractical. For example, where the range of vision from the safety observer's position is obstructed in certain types of aircraft while in a steep left turn, the degree of left bank in such instances may be reduced to not less than thirty degrees.

(g) *Maneuvers (minimum speeds).* Maneuvers at minimum speeds shall be accomplished while using the prescribed flap settings as set forth in the Airplane Flight Manual. In addition, attention shall be directed to airplane performance as related to use of flaps vs. clean configuration while operating at minimum speeds. Attention shall be directed toward the pilot's ability to recognize and hold minimum controllable airspeed to maintain altitude and heading, and to avoid unintentional approaches to stalls.

(h) *Approach to stalls.* Approach to stalls shall be demonstrated from straight flight and turns, with and without power. An approach to stall shall be executed in landing or approach configuration. The extent to which the approach to stall will be carried and the method of recovery utilized shall be dictated by (1) the type of aircraft being flown, (2) its reaction to stall conditions, and (3) the limitation established by the air carrier. Performance shall be judged on ability to recognize the approaching stall, prompt action in initiating recovery, and prompt execution of proper recovery procedure for the particular make and model of aircraft involved.

(i) *Propeller feathering.* Propeller feathering or the assimilation thereof shall be accomplished in accordance with instructions set forth by the air carrier and be exercised at sufficient altitude to insure adequate safety for the performance of the operation. The pilot's ability to maintain altitude, directional control, and satisfactory airspeed shall be the desired prerequisites in accomplishing this maneuver. The manner in which the pilot manages his cockpit during propeller feathering shall also be noted.

(j) *Maneuvers (one or more engines out).* When performing maneuvers (one or more engines out) the aircraft shall be maneuvered with a loss of fifty percent of its power units, such loss to be concentrated on one side of the aircraft. The loss of these power units may be simulated either by retarding throttles or by following approved feathering procedures. The pilot-in-command shall be required to maintain headings and altitude and to make moderate turns both toward and away from the dead engine or engines. Proficiency shall be judged on the basis of the pilot's ability to maintain engine-out airspeed, heading and altitude; to trim the airplane; and to adjust necessary power settings.

(k) *Rapid descent and pull-out.* This maneuver shall consist of the following steps: While the aircraft is in the appropriate holding configuration and being flown at a predetermined altitude, it will be assumed that the aircraft has arrived at a navigational fix and is cleared to descend immediately to a lower altitude. (The lower altitude shall be one which permits a descent of at least 1,000 feet.) Upon reaching the lower altitude, the aircraft shall be recovered from the rapid descent and flown on a predetermined heading and altitude for a predetermined period of time. At the end of the time interval, an emergency pull-out shall be executed which will involve a change of direction of at least 180°. Performance shall be judged on the basis of ability to establish a rapid descent at constant airspeed, stopping the descent at the minimum altitude specified without going below it,

holding heading and altitude, and smooth pull-up and climb.

(l) *Ability to tune radio.*[1]

(m) *Orientation.*[1]

(n) *Beam bracketing.*[1]

(o) *Cone identification.*[1]

(p) *Loop orientation.*[1]

(q) *Approach procedures.* An approach procedure shall be made in the aircraft on the let-down aid for which the lowest minimums on a system-wide basis are authorized and include, where possible, holding patterns and air traffic control instructions which might be used by the pilot in day-to-day operations. If at the time of the proficiency flight the let-down aid affording the lowest minimums is not in operation at the point the check is given, the landing aid which affords the next lowest minimums on a system-wide basis shall be used. Where a particular air carrier is authorized landing minimums based on instrument landing systems and ground control approach, the predominant landing aid on a system-wide basis shall be utilized. In some cases a particular air carrier may be authorized its lowest landing minimums on a let-down aid which is not installed and operating at locations where the air carrier's pilots are based. It shall be the responsibility of the air carrier in this case to conduct proficiency flights at locations where such an aid is installed and operating. All other approaches which a particular operator may be authorized to use, such as ADF, LF/MR range, VOR, and VAR shall be made and may be conducted in a simulator or other approved type trainer. A record shall be maintained in the pilot's file which will indicate the date that these approaches were performed and the grade received. If these approaches (ADF, LF/MR range, VOR, and VAR) are not performed in a simulator or other approved type trainer, they shall be accomplished on the proficiency flight.

(r) *Missed approach procedures.* (See paragraph (s) of this section.)

(s) *Traffic control procedures.* Missed approach procedures and traffic control procedures shall be accomplished in a manner satisfactory to the authorized check pilot. The degree of satisfactory or unsatisfactory performance shall be predicated on the pilot's ability to (1) maneuver the aircraft while performing these procedures, (2) follow instructions either verbal or written which may be pertinent to the accomplishment of these procedures. Paragraphs (r) and (s) of this section may be accomplished while performing paragraph (q).

[1] Paragraphs (l), (m), (n), (o), and (p) of this section shall be accomplished in a satisfactory manner either during (1) a routine line check under the supervision of an authorized company check pilot, (2) in a simulated or synthetic trainer, or (3) during the proficiency flight. A record shall be maintained in the pilot's file which shall indicate the date, method utilized, and grade received in the performance of these items.

(t) *Cross-wind landing.* A cross-wind landing shall be performed when practicable. Traffic conditions and wind velocities will dictate as to whether a cross-wind landing is practicable. Performance shall be judged on the technique used in correcting for drift on final approach, judgment in the use of flaps, and directional control during roll-out.

(u) *Landing under circling approach conditions.* Landing under circling approach conditions shall necessitate a path of flight around the landing area which will require not more than a 180° turn but not less than a 90° turn. The pilot shall be judged on the basis of altitude and airspeed control and his ability to maneuver under the minimum ceiling and visibility conditions prescribed.

(v) *Take-offs and landing (with engine(s) failures).* If it is consistent with safety, traffic patterns, local rules and laws, a simulated engine failure shall be experienced during take-off. The simulated failure shall occur at any time after the aircraft has passed the V_1 speed pertinent to the particular take-off and when practicable before reaching 300 feet. When performing the landing, the aircraft shall be maneuvered to a landing while utilizing 50 percent of the available power units. The simulated loss of power shall be concentrated on one side of the aircraft. The pilot's ability to satisfactorily perform this maneuver shall be evaluated in the manner stated under paragraph (i) of this section.

(w) *Judgment.* The pilot shall demonstrate judgment commensurate with experience required of a pilot-in-command of air carrier aircraft.

(x) *Emergency procedures.* The emergency procedures shall be applicable to the type of aircraft being flown and in accordance with the emergency procedures prescribed by the air carrier. A record shall be maintained in the pilot's file which will list the emergency procedures accomplished, date performed, and grade received.

(y) *Additional training.* If performance of any of the above items is unsatisfactory in the judgment of the check pilot he may, at his discretion, give additional training to the pilot during the course of the proficiency check. If after such training, the pilot being checked is still unable to demonstrate satisfactory performance to the check pilot, he shall not be used in scheduled operation until such time as he shall have demonstrated proficiency.

§ 40.302–2 *Frequency of pilot checks (CAA interpretations which apply to § 40.302).* (a) The carrier shall establish a base check month for each pilot used as a pilot-in-command. In the case of new pilots-in-command, this base check month will be the month in which the initial qualifying line and proficiency checks are given. In the event that the line and proficiency checks are not both given in the same calendar month, the base check month shall be the month in which the first of such initial qualifying checks was given. In the case of pilots who were currently qualified as pilots-in-command on January 1, 1954, such base check month shall be the month in which the last six month check required under § 61.112 of this subchapter was given.

(b) The subsequent line checks required by § 40.302 (a) must be given not later than the end of the same calendar month as the base month in each succeeding calendar year.

(c) The first of the two proficiency checks required by § 40.302 (b) shall be given not sooner than the first day of the fourth full month following the month in which the last proficiency check was given and shall be given not later than the end of the eighth full month following the month in which the last proficiency check was given. The second of the two proficiency checks required by § 40.302 (b) must be given not later than the end of the same calendar month as the base month each succeeding calendar year. In no event shall a pilot be eligible to serve as pilot-in-command unless he has been given such a proficiency check within the last eight months.

(d) When a pilot for any reason has not met the pilot check requirements of this section, he must be given requalifying line and proficiency checks prior to being used as pilot-in-command. In this case, the base check month shall be re-established the same as though such pilot was a new pilot-in-command.

Example 1. A pilot took a proficiency check on August 30, 1953. His base month, therefore, is August 1953. The earliest date for his next proficiency check is December 1, 1953, and the latest date for the second proficiency check in the twelve month period is August 30, 1954. However, instead of December, this pilot could have taken a proficiency check in January, February, March, or April, provided the second proficiency check is taken in August 1954.

Example 2. A pilot was *not* currently qualified with respect to proficiency checks on January 1, 1954. His initial proficiency check qualification date is January 3, 1954, and January 1954 becomes his base month. The earliest date on which he can take the first of the two required proficiency checks is May 1, 1954, but not later than September 30, 1954. If he is given a proficiency check in May 1954, the earliest possible time for his second check will be September 1954 and the latest permissible time January 1955. However, if he takes his second check in September 1954, then his next proficiency check must come within eight months of that period or not later than the end of May 1955.

§ 40.302–3 *Pilot checks use of synthetic trainer (CAA policies which apply to § 40.302 (b) (2) (ii)).* An air carrier using a flight simulator in its pilot's training program may be approved to utilize such a device for certain maneuvers in conducting proficiency checks provided that (a) the training device accurately simulates the flight characteristics and the performance of the applicable aircraft through all ranges of normal and emergency operation, (b) the maneuvers to be conducted in the simulator other than those specifically authorized in § 40.302–1, paragraphs (l), (m), (n), (o), (p) and (q), are submitted to the Washington Office for approval by the region in which the headquarters of the air carrier is located, (c) certain critical maneuvers which demonstrate the instument proficiency of a pilot are executed in an aircraft of the type flown by the pilot in air carrier service. The proficiency flight in the aircraft should include at least maneuvers (minimum speed), approach procedures, handling under circling approach conditions, and take-off and landings, with engine failures as outlined in § 40.302–1, paragraphs (g), (q), (u) and (v), respectively.

§ 40.303–1 *Pilot route and airport qualification requirements (CAA interpretations which apply to § 40.303).* In order to meet the knowledge requirements of § 40.303 (b), the pilot-in-command must demonstrate adequate knowledge of the subjects listed in § 40.303 (b) for a route on which he is to serve between the regular, refueling, or provisional airports listed in the air carrier's operations specifications and any major differences which may exist between that route and any other route over which he may serve between such airports. In such case, the pilot is considered qualified over any off-airway route listed in the Form 514–A or a civil airway, control area extension, or control zone between such airports if he has also met the provisions of § 40.303 (c) and (d) where applicable.

§ 40.355–1 *Manipulation of controls (CAA interpretations which apply to § 40.355(a) and (b).* The phrase "qualified on the airplane" means a certificated pilot holding a type rating for the aircraft utilized, or a co-pilot, not holding a type rating if he has met the qualification requirements of this subchapter: *Provided,* That a certificated pilot with at least a commercial rating may, at the discretion of the pilot in command, manipulate the controls except during take-off and landing.

§ 40.356–1 *Admission to pilot compartment (CAA interpretations which apply to § 40.356).* The term "flight deck" as used in § 40.356 shall mean all of the area forward of the door or window required by Parts 4a and 4b of this subchapter to be located between the pilot compartment and the passenger compartment.

§ 40.406–1 *Take-off and landing weather minimums (CAA rule which applies to § 40.406 (b)).* (a) Whenever the latest weather report, furnished by the U. S. Weather Bureau or a source approved by the Weather Bureau contains a visibility value specified as a runway visibility for a particular runway of an airport, such visibility shall be used for straight-in instrument approach and landing or take-off for that runway only. The terminal visibility as reported in the main body of such weather report shall be used for instrument approach and landing or take-off for all other runways.

(b) The ceiling value reported in the main body of such weather report shall constitute the ceiling for both circling and straight-in instrument approach and landing or take-off for all runways.

§ 40.406–2 *Ceiling and visibility minimums–IFR (CAA policies which apply to § 40.406)*—(a) *General.* The policies set forth in this section will be used by the Civil Aeronautics Administration in authorizing the ceiling and visibility minimums contained in the operations specifications issued to scheduled air carriers. Specific deviations from these policies may be approved in instances where CAA and industry representatives concur that the safety of the operation would not be prejudiced.

(1) *Military airports.* When an air carrier is authorized to use a military airport, the ceiling and visibility minimums approved for take-off and landing at that airport will not be less than those agreed upon by the military authorities having jurisdiction over the airport.

(b) *Take-off minimums*—(1) *Regular, refueling and provisional airports*—(i) *General; all aircraft.* In approving take-off minimums for scheduled air carriers, consideration will be given to the following factors:

(a) Obstructions and terrain in the vicinity of the airport.

(b) Effective length of each runway to be used by the air carrier.

(c) The performance characteristics of each type aircraft to be used by the air carrier at the airport.

(d) IFR departure procedures, in use at the airport.

(e) Runway lighting facilities and runway pavement marking available at the airport.

(f) Radio navigation facilities serving the airport.

(ii) *Two-engine aircraft.* The lowest take-off minimums for two-engine aircraft normally will be 300–1. However, minimums as low as 200–½ may be approved in accordance with certain specific conditions and limitation prescribed in the air carrier's operations specifications.

(iii) *Four-engine aircraft.* The lowest take-off minimums for four-engine aircraft will normally be 200–½. However, take-off minimums as low as 200–¼ may be approved in accordance with certain specific conditions and limitations prescribed in the air carrier's operations specifications.

(2) *Alternate airports.* Take-off minimums for both two- and four-engine aircraft may be approved as low as 300–1 when the air carrier is authorized to use a particular airport as an alternate airport only. When an airport is used as an alternate airport and such airport is also authorized in the air carrier's operations specifications as a regular, refueling, or provisional airport, the take-off minimums shown on the applicable Form ACA–511 may be used: *Provided,* That the pilot-in-command is currently qualified into the airport in accordance with the applicable provisions of this subchapter, otherwise, take-off minimums of 300–1 or the take-off minimums shown on the Form ACA–511, whichever are greater, will be applicable.

(c) *Landing minimums, regular, refueling, or provisional airports*—(1) *Circling approach.* When it is necessary to circle an airport to effect a landing, higher landing minimums are required for aircraft with higher maneuvering, approach, and landing speeds than are required for slower type aircraft. The stall speed at maximum certificated landing weight with full flaps, landing gear extended and power-off will be used to differentiate between the two types of aircraft. Circling approach minimums are normally the same for all instrument approach procedures without regard to the type of radio navigational facility used to conduct the instrument approach, and will be established in accordance with the following:

(i) *Aircraft with stall speed in excess of 75 m. p. h.* The minimum ceiling will be, (a) at least 500 feet above the established elevation of the airport, (b) not less than 300 feet above all obstructions within a radius of two miles from the airport boundary and (c) 300 feet above all obstructions within a distance of two miles on each side of the final approach course from the radio facility to the airport. The minimum visibility that will be authorized for such aircraft will normally be one and one-half miles. However, a minimum visibility of not less than one mile may be authorized by application of the sliding scale authorized in the air carrier's operations specifications. A minimum visibility of one mile may also be authorized for those two-engine aircraft having a stall speed in excess of 75 m. p. h., which can be safely maneuvered within a radius of not more than one-half mile.

(ii) *Aircraft with stall speed of 75 mph or less.* Such aircraft will normally be authorized to operate into airports with minimums of 100–½ lower than the minimums established for the faster type aircraft. However, the ceiling will not be less than 400 feet and the visibility not less than one mile, except that the visibility may be reduced to ½ mile by application of the sliding scale authorized in the air carrier's operations specifications. The criteria with respect to obstruction clearance will be the same as in subdivision (i) of this subparagraph; except that the minimum ceiling will be at least 300 feet above all obstructions within a radius of 1½ miles from the airport boundary.

(2) *Straight-in approaches using a radio range (L/MF or VOR) or non-directional L/MF facility.* When a radio facility is within seven miles from an airport and is so located that the magnetic bearing from the facility to the end of the runway to be used for a straight-in instrument approach procedure does not diverge more than thirty degrees from the magnetic direction of such runway, straight-in approach minimums as low as 400–1 may be authorized for all types of aircraft. By application of the sliding scale authorized in the air carrier's operations specifications, the visibility minimum may be reduced to one-half mile. The ceiling minimum will be at least 300 feet above all obstructions within a distance of two miles on each side of the final approach course from the radio facility to the airport. Consideration will also be given to the rate of descent required from the final approach altitude over the radio facility to the approach end of the runway at zero altitude. Normally, lower minimums for a straight-in approach will not be authorized when a rate of descent greater than 600 feet per minute in still air is required at the aircraft's normal approach speed in its approach configuration, unless it can be shown, in specific cases, that a slightly higher rate of descent will not adversely affect safety and is compensated for by other factors such as additional runway length, high intensity runway lights, approach lights, additional approach aids, such as radar, and an "obstruction-free" approach area.

(3) *Straight-in approaches using non-directional L/MF facility.* When a non-directional L/MF facility is located on an airport, the ceiling and visibility minimums will be not less than 500–1.

(4) *Straight-in approaches using ASR.* The minimums for straight-in ASR instrument approach procedures will be established in accordance with subparagraph (2) of this paragraph.

(5) *Straight-in approaches using TVOR.* The minimums for straight-in approaches using TVOR will be not less than 400–1.

(6) *Straight-in approaches using ILS or PAR*—(i) *Components of an ILS.* The components which make up the instrument landing systems are (*a*) localizer, (*b*) glide slope, (*c*) outer marker, (*d*) middle marker, and (*e*) approach lights.[2] Compass locator stations may be installed at the sites of the outer and middle markers of an instrument landing system, but are not considered as components of the ILS. However, when installed and in normal operation they may be used in lieu of the outer or middle marker, provided the aircraft is equipped with dual automatic direction finding receivers. If an aircraft is equipped with a single ADF receiver, only one compass locator may be used in lieu of the marker at the corresponding position.

[2] When the length of runway available, exceeds by 3,000 feet the runway length required by the applicable aircraft performance requirements of the CARs, and high intensity runway lights are installed and operative on the entire length of the runway, this extra length of runway may be substituted for the approach lights as a component of the ILS or PAR.

(ii) *Components of a PAR system.* The ground facilities used for PAR approaches include (*a*) surveillance radar (ASR), (*b*) altitude and azimuth control radar (PAR) and (*c*) approach lights.[2]

(iii) *Demonstration of ability.* Approval of minimums for utilization of ILS or PAR will be predicated on satisfactory demonstration of ability by the air carrier to use the proposed facilities. An air carrier will have demonstrated such ability when (*a*) in the case of ILS, approved airborne navigational equipment is installed in the aircraft, (*b*) the air carrier's pilot training program includes instruction in the limitations and operation of ILS or PAR and (*c*) the pilots concerned have satisfactorily demonstrated under simulated instrument flight conditions, their ability to accomplish the ILS or PAR instrument approach procedures down to the proposed minimums.

(iv) *Approval of lower minimums.* The transition from the lowest minimums authorized using a radio range or comparable facility to lower minimums based on the use of ILS or PAR will be made in increments of 100 feet ceiling and one-fourth mile visibility. Such reduction in minimums will be based on satisfactory demonstration of ability by the air carrier as outlined under subdivision (iii) of this subparagraph. Subsequent reduction in minimums will be based on satisfactory operation for a period of approximately six months, unless further demonstration in accordance with subdivision (iii) of this subparagraph or under actual instrument conditions is deemed necessary.

(v) *Lowest landing minimums.* Where no adjustment to the ceiling minimums is necessary for obstruction clearance as explained in (*a*) of this subdivision, landing minimums of 200–½ are the lowest minimums which will normally be approved at the present time with all components of the ILS or PAR in operation. However, minimums lower than 200–½ may be authorized at specific locations where the installation of improved navigational aids and procedures so warrants. See subparagraph (8) of this paragraph regarding approaches when components of the ILS are inoperative.

(*a*) *Adjustment of ceiling minimums for obstruction clearance.* When the minimum obstruction clearance as described in regulations of the Administrator § 609.10 of chapter II of this title cannot be obtained in the approach area, consideration will be given to establishing ceiling minimums which will afford comparable safety. In such cases, the ceiling minimums will be determined by application of the following formula to all obstructions projecting above the established obstruction clearance slope line and located, in the case of an ILS procedure, in the approach area between the outer marker and the end of the runway, or in the case of a PAR procedure, in the approach area within a distance of five miles, outward from the end of the runway:

(*1*) Extend a line horizontally outward from the top of each obstruction and parallel with the runway center line to a point of intersection with the established obstruction clearance slope line. From that point extend a line vertically to a point of intersection with the ILS or PAR glide slope. The minimum ceiling will be the difference between the mean sea level elevation of the glide slope at such point of intersection, and the mean sea level elevation of the airport.

(*2*) Where minimum obstruction clearances cannot be met in the transitional and horizontal surfaces immediately adjacent to the approach area and when deemed necessary, consideration will be given to an adjustment in the ceiling minimums commensurate with the degree of interference presented by the particular obstruction or obstructions.

(*3*) When application of the formula, set forth in (*1*) and (*2*) of this subdivision, to an obstruction projecting above the established obstruction clearance slope line indicates a ceiling of less than 300 feet, the ceiling will not be reduced below 300 feet until it has been determined by flight checks that such lower ceiling will provide adequate safety.

(7) *Lowest landing minimums utilizing back course of the ILS.* When the back course of an ILS is provided with all components of a complete ILS, minimums of 200–½ may be authorized in accordance with subparagraph (6) (v) of this paragraph.

(8) *Instrument approach procedures with inoperative ILS components*—(i) *Straight-in approaches-one ILS component inoperative.* The air carrier operations specifications permit straight-in ILS approaches down to minimums of 300–¾ when any single component of the ILS, except the localizer, is inoperative or cannot be received; provided all other components and related airborne equipment are in normal operation. The following factors will be considered in approving landing minimums of 300–¾ under these conditions:

(*a*) *When glide slope inoperative.* Straight-in landing minimums of 300–¾ may be approved when approaching aircraft can clear by 300 feet all obstructions from the approach end of the ILS runway to the outer marker within the approach area described in regulations of the Administrator § 609.10 (f) (1) (i) and (iii) of chapter II of this title. The ceiling minimum may be approved to the nearest 100 feet as provided by subparagraph 11 below, if a flight check has shown such ceiling minimum to be safe. The final approach altitude over the outer marker will provide at least 500 feet obstruction clearance for a distance of at least 10 miles outward from the outer marker within an area of 5 miles on each side of the center line of the localizer course.

(b) *When both outer marker and outer compass locator inoperative.* Straight-in landing minimums of 300–¾ may be approved when there is no fix, other than the middle marker or middle compass locator, available along the localizer course. When an instrument approach is conducted under these conditions aircraft must, of necessity, proceed outbound along the localizer course from the middle marker for the purpose of conducting a procedure turn. In such cases 300–¾ will be approved only when approaching aircraft can clear by 300 feet all obstructions from the approach end of the ILS runway to the point of glide slope interception within the approach area described in regulations of the Administrator § 609.10 (f) (1) (i) and (iii) of chapter II of this title. The ceiling minimum may be approved to the nearest 110 feet as provided by subparagraph (11) of this paragraph if a flight check has shown such ceiling minimum to be safe. The final approach altitude between the point the procedure turn is completed and the point of glide slope interception will be at least equal to the minimum altitude at glide slope interception inbound as specified in the applicable ILS instrument approach procedure. Straight-in landing minimums of 300–¾ may also be predicated on the glide slope obstruction clearance criteria outlined in regulations of the Administrator § 609.10 (f) of chapter II of this title: *Provided*, That in addition to the middle marker or middle compass locator, a fix can be obtained along the ILS localizer course within 7 miles from the approach end of the ILS runway by means of (*1*) surveillance radar, (2) a fan marker which provides the same degree of accuracy as an ILS outer marker installation, (3) a reliable fix as described in subparagraph (9) (i) of this paragraph, or (*4*) a radio facility which provides the same degree of accuracy as an ILS outer compass locator installation.

(c) *Use of ILS back course.* The foregoing may also be applied to the back course of an ILS which is normally provided with all components of a complete ILS.

(ii) *Straight-in approaches, more than one ILS component inoperative.* The air carrier operations specifications permit straight-in ILS Approaches down to minimums of 300–1 when the localizer and either the outer marker or outer compass locator are the only components of the ILS in normal operation, or when these are the only components that can be received by the aircraft. Minimums of 300–1 may be approved under these conditions when approaching aircraft can clear by 300 feet all obstructions from the approach end of the ILS runway to the outer marker within the approach area described in regulations of the Administrator § 609.10, (f) (1) (i) and (iii) of Chapter II of this title. The ceiling minimum may be approved to the nearest 100 feet as provided by subparagraph (11) of this paragraph, if a flight check has shown such ceiling minimum to be safe. The final approach altitude over the outer marker will provide at least 500 feet obstruction clearance for a distance of at least 10 miles outward from the outer marker within an area of 5 miles on each side of the center-line of the localizer course. The foregoing may also be applied to ILS back courses equipped with either an outer marker or outer compass locator.

(iii) *Circling ILS approaches when ILS components inoperative.* Circling ILS landing minimums will be established in accordance with subparagraph (1) of this paragraph, except that 300 feet obstruction clearance may be provided from the approach end of the ILS runway to the outer marker within the approach area described in regulations of the Administrator § 609.10 (f) (1) (i) and (iii) of chapter II of this title, in lieu of the 2 mile distance each side of the final approach course to the airport as specified in subparagraph (1) of this paragraph. The air carrier operations specifications permit circling ILS approaches to be conducted down to such minimums when the localizer and either the outer marker or outer compass locator are the only components in normal operation, or when these are the only components that can be received by the aircraft. The final approach altitude over the outer marker will provide at least 500 feet obstruction clearance for

a distance of at least 10 miles outward from the outer marker within an area of 5 miles on each side of the localizer course. The foregoing may also be applied to ILS back courses equipped with either an outer marker or outer compass locator.

(9) *Instrument approach procedures using ILS localizer*—(i) *General.* Ceiling and visibility minimums for instrument approach procedures predicated on (*a*) the use of the localizer course of an ILS (either front or back course) and (*b*) a reliable fix located on the ILS localizer course, will normally be established in accordance with subparagraph (1) of this paragraph for circling approaches, and subparagraph (2) of this paragraph for straight-in approaches. Such instrument approach procedures will normally not be established when the radio fix is located at a distance greater than seven miles from the airport. The obstruction clearance will be determined within the approach area described in regulations of the Administrator § 609.10 (f) (1) (i) and (iii) of Chapter II of this title. For the purpose of this subparagraph, a reliable fix is considered to be a fix formed by the intersection of the localizer course and a bearing from a radio facility located within twenty-five miles of the fix and such bearing intersects the localizer course at an angle of at least forty-five degrees.

(ii) *Lower minimums using additional or improved aids.* Straight-in approach minimums as low as 300–1 may be authorized on an ILS front course or back course when the fix located on the localizer course within 7 miles of the ILS runway is (*a*) a fan marker which provides the same degree of accuracy as an ILS outer marker installation, (*b*) a radio facility which provides the same degree of accuracy as an ILS outer compass locator installation, or (*c*) surveillance radar.

(10) *Effect of distance between radio facility and airport on landing minimums*—(i) *Using a radio range (L/MF or VOR) or non-directional L/MF radio facility.* (*a*) For both circling and straight-in instrument approach procedures, the following minimums may be established after consideration of the obstruction clearance requirements of Part 609 of the regulations of the Administrator, Chapter II of this title, when the radio facility is located at distances greater than seven miles from the airport:

(*1*) Over 7 to 10 miles: Straight-in, 500–1 day, 500–2 night; circling,[1] 500–1½ day, 500–2 night.

(*2*) Over 10 to 12 miles: Straight-in, 700–1 day, 700–2 night; circling,[1] 700–1½ day, 700–2 night.

(*3*) Over 12 miles: Straight-in 1000–1 day, 1000–2 night; circling,[1] 1000–1½ day, 1000–2 night.

When a radio facility is over 7 miles from an airport, straight-in landing ceiling minimums will not be lower than the circling landing ceiling minimums established at the particular airport.

(11) *Application of obstruction clearance criteria in determining landing ceiling minimums.* Unless safety requires otherwise, landing ceiling minimums for instrument approaches using a radio range or nondirectional L/MF facility will be shown on the applicable Form ACA–511 to the nearest 100 feet. For example, assuming that the controlling obstruction at an airport is 249 feet high, a ceiling minimum of 500 feet will normally be considered as meeting the obstruction clearance criteria outlined in subparagraph (1) (i) of this paragraph. If, on the other hand, such obstructions were 250 feet high, a ceiling minimum of 600 feet would normally apply. In cases where the ILS obstruction clearance criteria cannot be met, the ceiling arrived at by application of the formula contained in subparagraph (6) (v) (*a*) of this paragraph will normally be shown to the nearest 100 feet; except that a flight check is required where application of the formula indicates a ceiling of less than 300 feet.

(*d*) *Airports not served by a radio navigational facility.* Take-off and landing minimums at such airports will be approved in accordance with VFR.

[1] Visibility minimums for two-engine aircraft may be established in accordance with subparagraph (1) (i) or (ii) of this paragraph.

§ 40.501–1 *Crew member and dispatcher records.* (*CAA policies which apply to § 40.501*). (a) The following pertinent information is considered the minimum necessary in the airman records required by this section.

(1) Name (full);

(2) Current date of assignment (pilots, flight engineer, dispatchers, etc.);

(3) Airman certificates (type, number and ratings);

(4) Date, result and class of last physical examination;

(5) Date, place, aircraft type and number, duration, and result of last proficiency and/or line check for each pilot-in-command;

(6) Record of the flight time of each flight crew member including, where applicable, instrument flight time and the flight time in the make and model aircraft on which he is currently qualified.

(7) Routes over which and airports into which applicable flight crew members and dispatchers are currently qualified together with qualification records, grades and dates.

(8) Dates, results, and types of training given to all crew members, flight crew members, and dispatchers.

(9) Check pilot authorization where applicable.

(Sec. 205, 52 Stat. 984, as amended; 49 U. S. C. 425. Interpret or apply secs. 601, 604, 605, 608, 52 Stat. 1007, 1010, 1011; 49 U. S. C. 551, 554, 555, 558)

This supplement shall become effective January 1, 1954. However, under Special Regulation 393A, published on October 1, 1953, in 18 F. R. 6258, the Administrator may, upon application, amend the operations specifications of an air carrier coming under the provisions of Part 40, effective January 1, 1954, to authorize such air carrier to operate, prior to January 1, 1954, in compliance with selected provisions of Part 40, effective January 1, 1954, in lieu of the equivalent provisions of presently effective Parts 40 and 61.

F. B. Lee,
Administrator of Civil Aeronautics.

a distance of at least 10 miles outward from the outer marker within an area of 5 miles on each side of the localizer course. The foregoing may also be applied to ILS back courses equipped with either an outer marker or outer compass locator.

(9) *Instrument approach procedures using ILS localizer.*—(i) *General.* Ceiling and visibility minimums for instrument approach procedures predicated on (*a*) the use of the localizer course of an ILS (either front or back course) and (*b*) a reliable fix located on the ILS localizer course, will normally be established in accordance with subparagraph (1) of this paragraph for circling approaches, and subparagraph (2) of this paragraph for straight-in approaches. Such instrument approach procedures will normally not be established when the radio fix is located at a distance greater than seven miles from the airport. The obstruction clearance will be determined within the approach area described in regulations of the Administrator § 609.10 (f) (1) (i) and (iii) of Chapter II of this title. For the purpose of this subparagraph, a reliable fix is considered to be a fix formed by the intersection of the localizer course and a bearing from a radio facility located within twenty-five miles of the fix and such bearing intersects the localizer course at an angle of at least forty-five degrees.

(ii) *Lower minimums using additional or improved aids.* Straight-in approach minimums as low as 300–1 may be authorized on an ILS front course or back course when the fix located on the localizer course within 7 miles of the ILS runway is (*a*) a fan marker which provides the same degree of accuracy as an ILS outer marker installation, (*b*) a radio facility which provides the same degree of accuracy as an ILS outer compass locator installation, or (*c*) surveillance radar.

(10) *Effect of distance between radio facility and airport on landing minimums*—(i) *Using a radio range (L/MF or VOR) or non-directional L/MF radio facility.* (*a*) For both circling and straight-in instrument approach procedures the following minimums may be established after consideration of the obstruction clearance requirements of Part 609 of the regulations of the Administrator, Chapter II of this title, when the radio facility is located at distances greater than seven miles from the airport:

(*1*) Over 7 to 10 miles: Straight-in, 500–1 day, 500–2 night; circling,[1] 500–1½ day, 500–2 night.

(*2*) Over 10 to 12 miles: Straight-in, 700–1 day, 700–2 night; circling,[1] 700–1½ day, 700–2 night.

(*3*) Over 12 miles: Straight-in 1000–1 day, 1000–2 night; circling,[1] 1000–1½ day, 1000–2 night.

When a radio facility is over 7 miles from an airport, straight-in landing ceiling minimums will not be lower than the circling landing ceiling minimums established at the particular airport.

(11) *Application of obstruction clearance criteria in determining landing ceiling minimums.* Unless safety requires otherwise, landing ceiling minimums for instrument approaches using a radio range or nondirectional L/MF facility will be shown on the applicable Form ACA–511 to the nearest 100 feet. For example, assuming that the controlling obstruction at an airport is 249 feet high, a ceiling minimum of 500 feet will normally be considered as meeting the obstruction clearance criteria outlined in subparagraph (1) (i) of this paragraph. If, on the other hand, such obstructions were 250 feet high, a ceiling minimum of 600 feet would normally apply. In cases where the ILS obstruction clearance criteria cannot be met, the ceiling arrived at by application of the formula contained in subparagraph (6) (v) (*a*) of this paragraph will normally be shown to the nearest 100 feet; except that a flight check is required where application of the formula indicates a ceiling of less than 300 feet.

(d) *Airports not served by a radio navigational facility.* Take-off and landing minimums at such airports will be approved in accordance with VFR.

[1] Visibility minimums for two-engine aircraft may be established in accordance with subparagraph (1) (i) or (ii) of this paragraph.

§ 40.501–1 *Crew member and dispatcher records.* (*CAA policies which apply to § 40.501*). (a) The following pertinent information is considered the minimum necessary in the airman records required by this section.

(1) Name (full);

(2) Current date of assignment (pilots, flight engineer, dispatchers, etc.);

(3) Airman certificates (type, number and ratings);

(4) Date, result and class of last physical examination;

(5) Date, place, aircraft type and number, duration, and result of last proficiency and/or line check for each pilot-in-command;

(6) Record of the flight time of each flight crew member including, where applicable, instrument flight time and the flight time in the make and model aircraft on which he is currently qualified.

(7) Routes over which and airports into which applicable flight crew members and dispatchers are currently qualified together with qualification records, grades and dates.

(8) Dates, results, and types of training given to all crew members, flight crew members, and dispatchers.

(9) Check pilot authorization where applicable.

(Sec. 205, 52 Stat. 984, as amended; 49 U. S. C. 425. Interpret or apply secs. 601, 604, 605, 608, 52 Stat. 1007, 1010, 1011; 49 U. S. C. 551, 554, 555, 558)

This supplement shall become effective January 1, 1954. However, under Special Regulation 393A, published on October 1, 1953, in 18 F. R. 6258, the Administrator may, upon application, amend the operations specifications of an air carrier coming under the provisions of Part 40, effective January 1, 1954, to authorize such air carrier to operate, prior to January 1, 1954, in compliance with selected provisions of Part 40, effective January 1, 1954, in lieu of the equivalent provisions of presently effective Parts 40 and 61.

F. B. LEE,
Administrator of Civil Aeronautics.