Scheduled Interstate Air Carrier Certification and Operation Rules

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(Incorporates Supplements 1 through 8)

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N. E. Halaby, *Administrator*

Important Notice

This is a consolidated reprint of all Civil Aeronautics Manual 40 material and incorporates the pages issued by Supplements 1 through 8. It contains no new material.

Subsequent changes will be issued as Supplement No. 9 or as a complete new manual as the circumstances require.

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Introductory Note

This manual contains in consolidated form (1) Civil Air Regulations Part 40, Scheduled Interstate Air Carrier Certification and Operation Rules, dated December 31, 1955, Amendments 40–1 through 40–18, and the editorial changes required by Special Regulation SR–430, effective December 31, 1958; and (2) the rules, policies, and interpretations issued by the Administrator of the Federal Aviation Agency in application to the various sections of the regulations.

FAA *rules* are supplementary regulations issued pursuant to authority expressly conferred on the Administrator in the Civil Air Regulations. Such rules are mandatory and must be complied with.

FAA *policies* provide detailed technical information on recommended methods of complying with the Civil Air Regulations. Such policies are for the guidance of the public and are not mandatory in nature.

FAA *interpretations* define or explain words and phrases of the Civil Air Regulations. Such interpretations are for the guidance of the public and will be followed by the Agency in determining compliance with the regulations.

This manual is arranged to give the number, title, and text of each section of the regulations followed by any rules, policies, or interpretations applicable to that section. These rules, policies, or interpretations of the Administrator are identified by consecutive dash numbers appended to the regulation section number.

This manual supersedes Civil Aeronautics Manual 40 dated April 1, 1956, and all supplements thereto. As amendments and other pertinent materials pertaining to Part 40 are issued, they will be included in this manual.

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Scheduled Interstate Air Carrier Certification and Operation Rules

Applicability and Definitions

40.1 *Applicability of this part.* The provisions of this part are applicable to air carriers holding certificates of public convenience and necessity issued in accordance with Title IV of the Federal Aviation Act of 1958, as amended, when they engage in scheduled interstate air transportation within the continental limits of the United States: *Provided,* That the provisions of this part shall not apply to operations conducted pursuant to economic exemption authority issued by the Board for a period of 90 days or less: *And provided further,* That the Administrator may authorize any air carrier holding authority to engage in scheduled cargo operations pursuant to Title IV of the Federal Aviation Act of 1958, as amended, to conduct such operations in accordance with the air carrier certification and operations rules prescribed in Part 42 of this subchapter: *And provided further,* That in the case of segments of routes extending beyond the continental limits of the United States the Administrator may authorize an air carrier to conduct operations over such route segments pursuant to provisions of this part.

40.2 *Applicability of Parts 43 and 60 of this subchapter.* The provisions of Parts 43 and 60 of this subchapter shall be applicable to all air carrier operations conducted under the provisions of this part unless otherwise specified in this part.

40.5 *Definitions.* As used in this part terms shall be defined as follows:

Accelerate-stop distance. Accelerate-stop distance is the distance required to accelerate an airplane to a specified speed and, assuming failure of the critical engine at the instant that speed is attained, to bring the airplane to a stop. (See the pertinent airworthiness requirements for the manner in which such distance is determined.)

Administrator. The Administrator is the Administrator of the Federal Aviation Agency.

Air carrier. An air carrier is any citizen of the United States who undertakes directly, or by lease or by other arrangement, the carriage by airplane of persons or property as a common carrier for compensation or hire, or the carriage of mail by airplane.

Aircraft dispatcher. An aircraft dispatcher is an individual holding a valid aircraft dispatcher certificate issued by the Administrator who exercises responsibility with the pilot in command in the operational control of each flight.

Airframe. Airframe means any and all kinds of fuselages, booms, nacelles, cowlings, fairings, empennages, airfoil surfaces, and landing gear, and all parts, accessories, or controls, of whatever description, appertaining thereto, but not including engines and propellers.

Airplane. An airplane is a power-driven fixed-wing aircraft, heavier than air, which is supported by the dynamic reaction of the air against its wings.

Airport. An airport is an area of land or water which is used, or intended for use, for the landing and take-off of airplanes.

Alternate airport. An alternate airport is an approved airport to which a flight may proceed if a landing at the airport to which the flight was dispatched becomes inadvisable.

Appliances. Appliances are instruments, equipment, apparatus, parts, appurtenances, or accessories of whatever description, which are used, or are capable of being or intended

to be used, in the navigation, operation, or control of airplanes in flight (including communication equipment, electronic devices, and any other mechanism or mechanisms installed in or attached to airplanes during flight, but excluding parachutes), and which are not a part or parts of airframes, engines, or propellers.

Approved. Approved, when used alone or as modifying terms such as means, method, action, equipment, etc., means approved by the Administrator.

Authorized representative of the Administrator. An authorized representative of the Administrator is any employee of the Federal Aviation Agency or any private person, authorized by the Administrator to perform particular duties of the Administrator under the provisions of this part.

Ceiling. Ceiling is the height above the ground or water of the lowest layer of clouds or obscuring phenomena that is reported as "broken," "overcast," or "obscuration" and not classified as "thin" or "partial."

Check airman. A check airman is an airman designated by the air carrier and approved by the Administrator to examine other airmen to determine their proficiency with respect to procedures and technique and their competence to perform their respective airman duties.

Crew member. A crew member is any individual assigned by an air carrier for the performance of duty on an airplane in flight.

Critical engine. The critical engine is that engine the failure of which gives the most adverse effect on the airplane flight characteristics relative to the case under consideration.

Critical-engine-failure speed, V_1 (transport category airplanes). The critical-engine-failure speed is the airplane speed used in the determination of the take-off distance required at which the critical engine is assumed to fail. (See the pertinent airworthiness requirements for the manner in which such speed is determined.)

Dispatch release. A dispatch release is an authorization issued by an air carrier specifying the conditions for the origination or continuance of a particular flight.

Duty aloft. Dut aloft includes the entire period during which an individual is assigned as a member of an airplane crew during flight time.

Effective length of runway.

(1) *Take-off.* The effective length of runway for take-off as used in the take-off operating limitations for nontransport category airplanes is the distance from the end of the runway at which the take-off is started to the point at which the obstruction clearance plane associated with the other end of the runway intersects the center line of the runway.

(2) *Landing.* The effective length of runway for landing as used in the landing operating limitations for both transport and nontransport category airplanes is the distance from the point at which the obstruction clearance plane associated with the approach end of the runway intersects the center line of the runway to the far end thereof.

En route. En route means the entire flight from the point of origination to the point of termination, including intermediate stops.

Extended overwater operation. An extended overwater operation is an operation over water conducted at a distance in excess of 50 miles from the nearest shore line.

Fireproof. Fireproof material means a material which will withstand heat equally well or better than steel in dimensions appropriate for the purpose for which it is to be used. When applied to material and parts used to confine fires in designated fire zones, fireproof means that the material or part will perform this function under the most severe conditions of fire and duration likely to occur in such zones.

Fire-resistant. When applied to sheet or structural members, fire-resistant material means a material which will withstand heat equally well or better than aluminum alloy in dimensions appropriate for the purpose for which it is to be used. When applied to fluid-carrying lines, this term refers to a line and fitting assembly which will perform its intended protective funtions under the heat and other conditions likely to occur at the particular location.

Flame-resistant. Flame-resistant material means a material which will not support combustion to the point of propagating beyond safe limits, a flame after the removal of the ignition source.

Flammable. Flammable fluids or gases mean those which will ignite readily or explode.

Flash-resistant. Flash-resistant material means material which will not burn violently when ignited.

Flight crew member. A flight crew member is a crew member assigned to duty on an airplane as a pilot or flight engineer.

Flight engineer. A flight engineer is an individual holding a valid flight engineer certificate issued by the Administrator and whose primary assigned duty during flight is to assist the pilots in the mechanical operation of an airplane.

Flight time. Flight time is the time from the moment the airplane first moves under its own power for the purpose of flight until it comes to rest at the next point of landing (block-to-block time).

High-altitude operation. High-altitude operation is flight conducted at or above 12,500 feet above sea level east of longitude 100° W. and at or about 14,500 feet above sea level west of longitude 100° W.

IFR. IFR is the symbol used to designate instrument flight rules.

Interstate air transportation. Interstate air transportation is the carriage by airplane of persons or property as a common carrier for compensation or hire or the carriage of mail by airplane, in commerce between a place in any State of the United States, or the District of Columbia, and a place in any other State of the United States, or the District of Columbia; or between places in the same State of the United States, or the District of Columbia; whether such commerce moves wholly by airplane or partly by airplane and partly by other forms of transportation.

Maximum certificated take-off weight. Maximum certificated take-off weight is the maximum take-off weight authorized by the terms of the airplane airworthiness certificate.

NOTE: The airplane airworthiness certificate incorporates as a part thereof the airplane operating record or that portion of an Airplane Flight Manual which contains the pertinent limitation.

Minimum control speed. The minimum control speed is the minimum speed at which an airplane can be safely controlled in flight after an engine suddenly becomes inoperative. (See pertinent airworthiness requirements for the manner in which such speed is determined.)

Month. A month is that period of time extending from the first day of any month as delineated by the calendar through the last day thereof.

Night. Night is the time between the ending of evening civil twilight and the beginning of morning civil twilight as published in the American Air Almanac converted to local time for the locality concerned.

NOTE: The American Air Almanac containing the ending of evening twilight and the beginning of morning twilight tables may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. Information is also available concerning such tables in the Offices of the Civil Aeronautics Administration or the United States Weather Bureau.

Obstruction clearance area.

(1) *Take-off.* A take-off obstruction clearance area as used in the take-off operating limitations for nontransport category airplanes is an area on the earth's surface defined as follows: The center line of the obstruction clearance area in plan view shall coincide with and prolong the center line of the runway, beginning at the point where the obstruction clearance plane intersects the center line of the runway and proceeding to a point not less than 1,500 feet from the beginning point. Thereafter the center line shall proceed in a path consistent with the take-off procedure for the runway or, where such a procedure has not been established, consistent with turns of at least 4,000-foot radius until a point is reached beyond which the obstruction clearance plane clears all obstructions. The obstruction clearance area shall extend laterally for a distance of 200

feet on each side of the center line at the point where the obstruction clearance plane intersects the runway and shall continue at this width until the end of the runway; thence it shall increase uniformly to 500 feet on each side of the center line at a point 1,500 feet from the intersection of the obstruction clearance plane with the runway; thereafter it shall extend laterally for a distance of 500 feet on each side of the center line.

(2) *Landing.* A landing obstruction clearance area as used in the landing operating limitations for both transport and non-transport category airplanes is an area on the earth's surface defined as follows: The center line of the obstruction clearance area in plan view shall coincide with and prolong the center line of the runway, beginning at the point where the obstruction clearance plane intersects the center line of the runway and proceeding to a point not less than 1,500 feet from the beginning point. Thereafter the center line shall proceed in a path consistent with the instrument approach procedure for the runway or, where such a procedure has not been established, consistent with turns of at least 4,000-foot radius until a point is reached beyond which the obstruction clearance plane clears all obstructions. The obstruction clearance area shall extend laterally for a distance of 200 feet on each side of the center line at the point where the obstruction clearance plane intersects the runway and shall continue at this width until the end of the runway; thence it shall increase uniformly to 500 feet on each side of the center line at a point 1,500 feet from the intersection of the obstruction clearance plane with the runway; thereafter it shall extend laterally for a distance of 500 feet on each side of the center line.

Obstruction clearance plane. An obstruction clearance plane is a plane which is tangent to or clears all obstructions within the obstruction clearance area and which slopes upward from the runway at a slope of 1:20 to the horizontal as shown in a profile view of the obstruction clearance area.

Operational control. Operational control is the exercise of authority over initiation, continuation, diversion, or termination of a flight.

Operations Specifications. Operations specifications are rules of particular applicability issued by the Administrator and are not part of the air carrier operating certificate.

Over-the-top. Over-the-top means the operation of an airplane above a layer of clouds or obscuring phenomena that is reported as "broken," "overcast," or "obscuration" and not classified as "thin" or "partial."

Pilot in command. The pilot in command is the pilot designated by the aircarrier as the pilot responsible for the operation and safety of the airplane during the time defined as flight time.

Pilotage. Pilotage is navigation by means of visual reference to landmarks.

Propeller. A propeller is a device for propelling an airplane through the air, having blades mounted on a power-driven shaft, which when rotated produces by its action on the air a thrust approximately parallel to the longitudinal axis of the airplane.

Provisional airport. A provisional airport is an airport approved for use by an air carrier for the purpose of providing service to a community when the regular airport serving that community is not available.

Rating. A rating is an authorization issued with a certificate, and forming a part thereof, delineating special conditions, pirvileges, or limitations pertaining to such certificate.

Refueling airport. A refueling airport is an airport approved as an airport to which flights may be dispatched only for refueling.

Regular airport. A regular airport is an airport approved as a regular terminal or intermediate stop on an authorized route.

Route. A route is the airspace on either side of a course joining those points on the surface of the earth between which an air carrier provides air transportation in accordance with the terms of its certificate of public convenience and necessity issued by the Board.

Route segment. A route segment is a portion of a route each terminus of which is

identified by: (1) A continental or insular geographic location, or (2) a point at which a definite radio fix can be established.

Runway. A runway is a clearly defined area of an airport suitable for the safe landing or take-off of airplanes.

Scheduled for duty aloft. Scheduled for duty aloft means the assignment of a flight crew member on the basis of the flight time established in the operations schedules rather than the actual flight time.

[*Second in command.* Second in command means a pilot other than the pilot in command who is designated by the air carrier to act as second in command of an airplane.

[(Amendment 40–21, published in 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961.)]

Show. Show means to demonstrate or prove to the satisfaction of the Administrator prior to the issuance of the air carrier operating certificate and at any time thereafter required by the Administrator.

Synthetic trainer. A synthetic trainer is a device the use of which is approved to simulate certain operating conditions.

Take-off safety speed, V_2. The take-off safety speed is the airplane speed used in the determination of the take-off flight path at which the climb-out following take-off can be safely executed with one engine inoperative and with the airplane in the take-off configuration. (See the pertinent airworthiness requirements for the manner in which such speed is determined.)

Time in service. Time in service, as used in computing maintenance time records, is the time from the moment an airplane leaves the ground until it touches the ground at the end of a flight.

Transport category airplane. A transport category airplane is an airplane which has been type certificated in accordance with the requirements of Part 4b of this subchapter or the transport category requirements of Part 4a of this subchapter.

Type. With regard to airman qualifications, type means all airplanes of the same basic design, including all modifications thereto except those modifications which the Administrator has found result in a substantial change in characteristics pertinent to the airman concerned.

VFR. VFR is the symbol used to designate visual flight rules.

V_{s_0}. *V_{s_0}* is the symbol used to designate the true indicated stalling speed or the minimum steady flight speed in the landing configuration.

Visibility. Visibility is the greatest distance at which conspicuous objects can be seen and identified.

(1) *Flight visibility.* Flight visibility is the average range of visibility forward from the cockpit of an airplane in flight to see and identify prominent unlighted objects by day and prominent lighted objects by night.

(2) *Ground visibility.* Ground visibility is the visibility at the earth's surface as reported by the United States Weather Bureau or by a source approved by the Weather Bureau.

Week. A week is that period of time extending from the first day of any week as delineated by the calendar through the last day thereof.

Year. A year is that period of time extending from the first day of any year as delineated by the calendar through the last day thereof.

Certification Rules and Operations Specifications Requirements

40.10 *Certificate required.* No person subject to the provisions of this part shall operate an airplane in scheduled interstate air transportation without, or in violation of the terms of, an air carrier operating certificate issued by the Administrator.

40.11 *Contents of certificate.* An air carrier operating certificate shall specify the points to and from which, and the routes over which, an air carrier is authorized to operate.

40.12 *Application for certificate.* An application for an air carrier operating certificate shall be made in the form and manner and contain information prescribed by the Administrator.

40.12–1 *Application for air carrier operating certificate (FAA rules which apply to sec. 40.12.)*

(a) *General.*

(1) The holder of a certificate of convenience and necessity shall apply to the appro-

priate Regional Administrator or 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 of 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,
Federal Aviation Agency

In accordance with section 604 of the Federal Aviation Act of 1958, 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.

SECTION 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.

SECTION 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 Federal Aviation Agency.

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 Federal Aviation Agency if application includes request for night VFR operation.

SECTION 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 two 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 commerical source or locally generated.

7. Auxiliary power source.

8. Functional purpose of transmitter. If transmitter is used for more than one func-

tion, list in order of primary and secondary functions as:

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

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.

SECTION V. *Weather minimums.*

A. Submit in detail the proposed ceiling and visibility limitations for takeoff 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 aproach and let-down-through and where specific procedures are necessary because of terrain or traffic conditions, submit a detailed flight procedure for takeoff 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 aircarrier's proposed operations specifications.

SECTION 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.)

SECTION 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, noncertificated 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, described 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 SAE 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.

SECTION 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 conditions" 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 section 40.18 of this part applicable to the intended operation shall be attached to the above letter of application for an air carrier operating certificate. (See sec. 40.18–1.)

(Published in 18 F.R. 8676, December 24, 1953, effective January 1, 1954.)

40.13 *Issuance of certificate.*

(a) An air carrier operating certificate shall be issued by the Administrator to an

applicant having a certificate of public convenience and necessity issued by the Civil Aeronautics Board when the Administrator finds, after investigation, that such person is properly and adequately equipped and able to conduct a safe operation in accordance with the requirements of this part and with the operations specifications authorized in this part.

(b) Whenever, upon investigation, the Administrator finds that the general standards of safety required for air carrier operations in airplanes of 12,500 pounds or less maximum certificated take-off weight, or for air carrier operations conducted pursuant to a temporary authorization issued under Title IV of the Federal Aviation Act of 1958, as amended, require or permit a deviation from any specific requirement for a particular operation or class of operations for which an application for an air carrier operating certificate has been made, he may issue operations specifications prescribing requirements which deviate from the requirements of this part.

40.14 Amendment of certificate.

(a) The Administrator shall, after notice and opportunity for hearing to the carrier concerned, amend an air carrier operating certificate when he finds that such amendment is reasonably required in the interest of safety.

(b) Upon application by an air carrier the Administrator shall amend an air carrier operating certificate when he finds that the general standards of safety permit such an amendment.

40.15 Display of certificate. The air carrier operating certificate shall be available at the principal operations office of an air carrier for inspection by any authorized representative of the Board or the Administrator.

40.16 Duration of certificate.

(a) An air carrier operating certificate shall remain in effect until termination of the certificate of public convenience and necessity or other economic authorization issued by the Board held by the air carrier, or until surrendered, suspended, revoked, or otherwise terminated by order of the Administrator. After suspension or revocation it shall be returned to the Administrator.

(b) Nothing in this section shall be construed to deny or to defeat the jurisdiction of the Federal courts, the Administrator, or the Board to impose any authorized sanction, including revocation of the certificate, for a violation of the Federal Aviation Act of 1958, as amended, regulations in this subchapter, or the air carrier operating certificate occurring during the effective period of such certificate.

40.17 *Transferability of certificate.* An air carrier operating certificate is not transferable, except with the written consent of the Administrator.

40.18 *Operations specifications required.*

(a) No person subject to the provisions of this part shall operate as an air carrier without, or in violation of, operations specifications issued by the Administrator.

(b) New or amended specifications shall be issued by the Administrator for operations subject to this part in a form and manner prescribed by him and in accordance with the provisions of this part.

40.18–1 *Original issuance and amendment of operations specifications (FAA rules which apply to sec. 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 sec. 40.12–1 of this part). Details concerning appropriate forms, number of copies, etc., will be furnished either by the local *FAA* Air Carrier District Office or by the *FAA* 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 section 40.12–1 of this part in connection with the original applica-

tion 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.

(Published in 18 F.R. 8678, December 24, 1953, effective January 1, 1954.)

40.18–2 *Form of application for issuance of initial or revised Operations Specifications, Aircraft Maintenance (FAA rules which apply to sec. 40.18(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.

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.

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 times identified in Operations Specifications.

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.

(Published in 18 F.R. 8678, December 24, 1953, effective January 1, 1954.)

40.18–3 *Form of application for issuance of initial or revised Operations Specifications, Aircraft Weight and Balance Control (FAA rules which apply to sec. 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.

(Published in 18 F.R. 8678, December 24, 1953, effective January 1, 1954.)

40.18–4 *Policies, procedures, and limitations governing issuance and amendment of Operations Specifications, Aircraft Maintenance (FAA policies which apply to sec. 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 hereinafter set forth 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

[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 FAA 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.

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

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

(e) *Powerplants—Initial time limitations.* The initial overhaul time limitations for any engine which has never been used in air carrier service will tentatively be established at 1,000 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.

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 initiating 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 reschedul individual items in another block or pattern, if performance and condition of the specific item warrants such an increase.

(2) *Powerplant 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 service experience at the currently approved time limitations. The operator may request amendment to the currently approved time limitations by submitting a letter to the assigned FAA agent indicating the desired time limitations on the particular engines involved, and designating three to five engines for disassembly inspection by the FAA agent. The engines chosen for exhibit must have operated in a satisfactory manner for the maximum time permissible under currently approved time limitations. If, after disassembly and inspection of the exhibit engines and related components, it is found that the new time limitations are justified, the air carrier may then submit a formal application for an amendment in the routine manner requesting the extension of the overhaul period on the entire fleet of engines and related components of the same type and model. Engine accessories may be operated to double or triple the approved engine overhaul time limitations if it is found that previous satisfactory service and overhaul experience, including the service to be performed at each engine change period, would justify the increase as not adversely affecting the continuous condition of airworthiness of the component involved. The procedure for requesting and granting increases in overhaul time limitations for such components will be the same as used for the basic engine.

(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: (i) geographical area or areas of operation; (ii) number of landings, long haul versus short haul; (iii) maintenance organization and inspection procedures; (iv) manufacturers' recommendations; (v) 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.

(Published in 18 F.R. 8607, December 22, 1953, effective January 1, 1954; amended in 19 F.R. 7081, October 30, 1954, effective November 15, 1954.)

40.19 Contents of specifications. **The operations specifications shall contain the following:**

(a) Types of operations authorized;

(b) Types of airplanes authorized for use;

(c) En route authorizations and limitations;

(d) Airport authorizations and limitations;

(e) Time limitation for overhauls, inspections, and checks of airframes, engines, propellers, and appliances, or standards by which such time limitations shall be determined;

(f) Procedures used to maintain control of weight and balance of airplanes;

(g) Interline equipment interchange requirements, if pertinent; and

(h) Such additional items as the Administrator determines, under the enabling provisions of this part, are necessary to cover a particular situation.

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

(a) 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 subcomponents 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 subcomponents 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.

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.

(Published in 18 F.R. 8609, December 22, 1953, effective January 1, 1954.)

40.19–2 *Content of Operations Specifications, Aircraft Weight and Balance Control (FAA policies which apply to sec. 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 certificates 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.

(Published in 18 F.R. 8609, December 22, 1953, effective January 1, 1954.)

40.20 *Utilization of operations specifications.* The air carrier shall keep its personnel informed with respect to the contents of the operations specifications and all amendments thereto applicable to the individual's duties and responsibilities. A set of specifications shall be maintained by the air carrier as a separate and complete document. Pertinent excerpts from the specifications or references thereto shall be inserted in the manual issued by the air carrier.

40.21 *Amendment of operations specifications.* Any operations specification may be amended by the Administrator if he finds that safety in air transportation so requires or permits. Except in the case of an emergency requiring immediate action in respect to safety in air transportation or upon consent of the air carrier concerned, no amendment shall become effective prior to thirty days after the date the air carrier has been notified of such amendment.

40.22 *Inspection authority.* An authorized representative of the Administrator shall be permitted at any time and place to make inspections or examinations to determine an air carrier's compliance with the requirements of the Federal Aviation Act of 1958, as amended, the regulations in this subchapter, the provisions of the air carrier's operating certificate, and the operations specifications.

40.23 *Operations and maintenance base and office.* Each air carrier shall give written notice to the Administrator of his principal business office, his principal operations base, and his principal maintenance base. Thereafter, prior to any change in any such office or base, he shall give written notice to the Administrator.

Requirements for Services and Facilities

40.30 *Route requirements; demonstration of competence.* The air carrier shall show that it is competent to conduct scheduled operations over any route or route segment between any regular, provisional, or refueling airport and that the facilities and services available are adequate for the type of operation proposed. The Administrator shall not require actual flight over a route or route segment, if the air carrier shows that such flight is not essential to safety. The air carrier may thereafter conduct operations between regular, provisional, or refueling airports on any approved route or routes on which the operational facilities and procedures are substantially similar: *Provided,* That high-altitude VFR operations may be conducted over any route.

40.30–1 *Route requirements; demonstration of competence (FAA policies which apply to sec. 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 the Civil Air Regulations 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.

(Published in 18 F.R. 6615, October 17, 1953, effective January 1, 1954.)

40.30–2 *Proving flight requirements (FAA policies which apply to sec. 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 Federal Aviation Agency office handling its operations specifications, a written request for the assigment of Federal Aviation Agency 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 Adminis-

trator 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 Federal Aviation Agency 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.

(Published in 18 F.R. 6615, October 17, 1953, effective January 1, 1954.)

40.31 *Width of routes.* A route or route segment shall include the navigable airspace on each side of an approved course or courses, and it shall have a width designated by the Administrator consistent with terrain, available navigational aids, traffic density, and air traffic control procedures: *Provided,* That for high-altitude VFR operations courses need not be approved and the width of navigable airspace on each side thereof need not be designated by the Administrator.

40.32 *IFR routes outside of control areas.* IFR routes outside of control areas shall be approved if the air carrier shows that the navigational and communications facilities are adequate for the operations proposed, unless the Administrator finds that because of traffic density an adequate level of safety cannot be insured in a particular area: *Provided,* That IFR routes outside of control areas shall not be approved for high-altitude operations.

40.33 *Airports.* The air carrier shall show that each route has sufficient airports found by the Administrator to be properly equipped and adequate for the type of operations to be conducted. Consideration shall be given to items such as size, surface, obstructions, facilities, public protection, lighting, navigational and communications aids, and traffic control.

40.33–1 *Airports (FAA policies which apply to sec. 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 nontransport 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 Federal Aviation Agency Technical Standard Order N–18 will be used, insofar as practicable.

(d) *Facilities.*

(1) At each airport utilized, whether 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 threshhold lights and/or runway lights identifying the outer limits of the runways including threshhold lights as prescribed in Federal Aviation Agency 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 Federal Aviation Agency Obstruction Marking Manual.[3]

(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 Federal Aviation Agency Technical Standard Order N–1g shall apply.

(g) *Navigation, Communication Aids and Traffic Control.* These facilities shall be suitable for the type of operations to be conducted.

(Published in 18 F.R. 6615, October 17, 1953; amended 18 F.R. 6732, October 23, 1953, effective January 1, 1954.)

40.34 *Communications facilities.* The air carrier shall show that a two-way airground radio communication system is available at such points as will insure reliable and rapid communications under normal operating conditions over the entire route, either direct or via approved point-to-point circuits for the following purposes:

(a) Communications between airplanes and the appropriate dispatch office, in which case such systems shall be independent of systems operated by the Federal Government, and

(b) Communications between airplanes and the appropriate air traffic control unit, in which case the Administrator may permit the use of communications systems operated by the Federal Government.

40.34–1 *Communications facilities required for air route traffic control (FAA policies which apply to sec. 40.34(b)).* The communications system used by the air carriers should consist of air-ground radiotelephone facilities and point-to-point radio or landline facilities. Point-to-point communication facilities used between a ground office or communication station of an air carrier and air route traffic control should be a direct interphone or a telephone or other facility approved by the Administrator.

Upon prior notification of an air carrier, the Administrator may permit the use of FAA communications facilities on a regular basis for the handling of air route traffic control messages. Direct pilot-to-controller radio communications may be used on a regular basis by an air carrier without notification to the Administrator for such use.

When an air carrier conducts operations through an air route traffic control center area in which a landing is not made, and in which there is no FAA or non-goverment air-ground radio communication system used on a regular basis, the air carrier should provide adequate direct interphone service, with priority given to the handling of air route traffic control messages, between the appropriate non-government air-ground radio station and the appropriate air route traffic control units.

(Published in 19 F.R. 2801, May 15, 1954.)

40.35 *Weather reporting facilities.* The air carrier shall show that sufficient weather reporting services are available along the route to insure weather reports and forecasts necessary for the operation. Forecasts used to control flight movements shall be prepared from weather reports furnished in accordance with paragraphs (a) and (b) of this section as appropriate.

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

(a) For operations within the continental limits of the United States, weather reports used to control flight movements shall be those prepared by the U.S. Weather Bureau, or by a source approved by the Weather Bureau.

(b) For operations authorized in accordance with section 40.1 to be conducted outside the continental limits of the United States, weather reports used to control flight movements may be those prepared by any source approved by the Administrator.

40.36 ***En route navigational facilities.*** **The air carrier shall show that nonvisual ground aids to air navigation are available along each route, that they are so located as to permit navigation to any regular, provisional, refueling, or alternate airport within the degree of accuracy necessary for the operation involved, and that they are available for the navigation of airplanes within the degree of accuracy required for air traffic control: *Provided,* That no nonvisual ground aids to navigation are required for day VFR operations where the characteristics of the terrain are such that navigation can be conducted by pilotage, or for night VFR operations along lighted airways or on routes where the Administrator has determined that reliably lighted landmarks are adequate for safe operations.**

40.37 ***Servicing and maintenance facilities.*** **The air carrier shall show that competent personnel and adequate facilities and equipment, including spare parts, supplies, and materials, are available at such points along the air carrier's routes as are necessary for the proper servicing, maintenance, repair, and inspection of airplanes and auxiliary equipment.**

40.37-1 *Servicing and maintenance facilities (FAA policies which apply to sec. 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, section 52.21 and sections 52.30 through 52.36, insofar as applicable to his aircraft and maintenance system.

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

(Published in 18 F.R. 8609, December 22, 1953, effective January 1, 1954.)

40.38 ***Location of dispatch centers.*** **The air carrier shall show that it has a sufficient number of dispatch centers adequate for the operations to be conducted and located at such points as are necessary to insure the proper operational control of each flight.**

Manual Requirements

40.50 ***Preparation of manual.*** **The air carrier shall prepare and keep current a manual for the use and guidance of flight and ground operations personnel in the conduct of its operations.**

40.51 ***Contents of manual.***

(a) The manual shall contain instructions, information, and data necessary for the personnel concerned to carry out their duties and responsibilities with a high degree of safety. It shall be in a form to facilitate easy revision, and each page shall bear the date of the last revision thereof. The contents of such manual shall not be contrary to the provisions of any Federal regulations, operations specifications, or the operating certificate. The manual may be in two or more separate parts (e.g., flight operations, ground operations, maintenance, communications, etc.) to facilitate use by the personnel concerned, but each part shall contain so much of the information listed below as is appropriate for each group of personnel:

(1) General policies;

(2) Duties and responsibilities of each crew member and appropriate members of the ground organization;

(3) Reference to appropriate regulations in this subchapter and Civil Aeronautics Manuals;

(4) Flight dispatching and control;

(5) En route flight, navigation, and communication procedures, including pro-

cedures for the dispatch or continuance of flight, if any item of equipment required for the particular type of operation becomes inoperative or unserviceable en route;

(6) Appropriate information from the en route operations specifications, including for each approved route the types of airplanes authorized, their crew complement, the type of operation (i. e., VFR, IFR, day, night) and other pertinent information;

(7) Appropriate information from the airport operations specifications, including for each airport its location, its designation (i.e., regular, alternate, provisional, etc.), types of airplanes authorized, instrument approach procedures, landing and take-off minimums, and other pertinent information;

(8) Take-off, en route, and landing weight limitations;

(9) Procedures for familiarizing passengers with the use of emergency equipment during flight;

(10) Emergency procedures and equipment;

(11) The method of designating succession of command of flight crew members;

(12) Procedures for determining the usability of landing and take-off areas and for dissemination of pertinent information to operations personnel;

(13) Procedures for operation during periods of icing, hail, thunderstorms, turbulence, or any potentially hazardous meteorological conditions;

(14) Airman training programs, including appropriate ground, flight, and emergency phases;

(15) Instructions and procedures for maintenance, repair, overhaul, and servicing;

(16) Time limitations for overhaul, inspection, and checks, of airframes, engines, propellers, and appliances, or standards by which such time limitations shall be determined;

(17) Procedures for refueling airplanes, elimination of fuel contamination, protection from fire including electrostatic protection, and the supervision and protection of passengers during refueling;

(18) Inspections for airworthiness, including instructions covering procedures, standards, responsibilities, and authority of the inspection personnel;

(19) Methods and procedures for maintaining the airplane weight and center of gravity within approved limits;

(20) Pilot and dispatcher route and airport qualification procedures;

(21) Accident notification procedures; and

(22) Other data or instructions related to safety.

(b) At least one complete master copy of the manual containing all parts thereof shall be retained at the appropriate operations base of the air carrier.

40.51-1 *Contents of manual—Methods and procedures for maintaining weight and balance control (FAA policies which apply to sec. 40.51 (a) (19)).*

(a) *General.* 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.

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 compartments in order to remain within the center of gravity limits, effective means will be provided to as-

sure 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 placards 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.[4]

(ii) Drainable antidetonant injector and de-icing fluids.

(iii) Crew and baggage.

(iv) Passengers and cargo (revenue and nonrevenue).

(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) Antidetonant 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 reestablished at the specified reweighing periods. It also will be reestablished whenever the accumulated changes to the operating weight exceeds plus or minus one-half of 1 percent of the maximum landing weight or the cumulative change in CG position exceeds one-half of 1 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 herein. The fleet weight will be calculated on the following basis:

(i) An operator's empty fleet weight will be determined by weighing aircraft according

[4] 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.

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 1 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 1 percent of the MAC from the fleet weight CG, that airplane will be omitted from that group and operated on its actual or calculatd 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) Reestablishment 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 reestablishment of all fleet weights will be conducted on a 2-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 24 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 24 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 24 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 12 months and will 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 reestablished every 2 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 they are properly calibrated, zeroed and used in accordance with the manufacturer's instructions. Each scale should have been calibrated, either by the manufacturer or by a civil Department of

Weights and Measures, within 1 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 compute passenger loads over any route, except in those cases where nonstandard 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). 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 predetermined constant to provide for handcarried articles and also to cover possible seasonal effect 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.* An average weight of 160 pounds (summer) may be used for each adult passenger during the calendar period of May 1 through October 31.

An average weight of 165 pounds (winter) may be used for each adult passenger during the calendar period from November 1 through April 30.

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."

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

(3) *Nonstandard 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 runup.* 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 its engines to be added to the maximum gross weight of the aircraft to compensate for fuel used during runup 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.

(Published in 18 F.R. 8609, December 22, 1953, effective January 1, 1954; amended in 20 F.R. 3559, May 21, 1955, effective June 15, 1955.)

40.51–2 *Contents of manual (FAA interpretations which apply to sec. 40.51(a)(8)).* Information respecting takeoff, en route, and landing weight limitations appropriate for the use of flight operations personnel may be placed in a separate handbook or manual which is carried in the aircraft to which the data applies in lieu of placing such material in the operations manual. In such case, the operations manual must contain all necessary instructions as to the handbook's or manual's location and use by the flight operations personnel.

(Published in 22 F.R. 3435, May 16, 1957, effective June 1, 1957.)

40.52 *Distribution of manual.*

(a) Copies of the entire manual, or appropriate portions thereof, together with revisions thereto shall be furnished to the following:

(1) Appropriate ground operations and maintenance personnel of the air carrier;

(2) Flight crew member; and

(3) Authorized representatives of the Administrator assigned to the air carrier to act as aviation safety agents.

(b) All copies of the manual shall be kept up to date.

40.53 *Airplane Flight Manual.*

(a) The air carrier shall keep current an approved Airplane Flight Manual for each type of transport category airplane which it operates.

(b) An approved Airplane Flight Manual or a manual complying with section 40.50 and containing information required for the Airplane Flight Manual shall be carried in each transport category airplane.

Airplane Requirements

40.60. *General.* Airplanes shall be identified, certificated, and equipped in accordance with the applicable air worthiness requirements of the regulations in this subchapter. No air carrier shall operate any airplane in scheduled operation unless such airplane meets the requirements of this part and is in an airworthy condition. In determining compliance with the applicable airworthi-

ness requirements and operating limitations, an approved weight and balance control system based upon average, assumed, or estimated weights may be utilized.

40.61 *Airplane certification requirements.*

(a) *Airplanes certificated on or before June 30, 1942.* Airplanes certificated as a basic type on or before June 30, 1942, shall either:

(1) Retain their present airworthiness certification status and meet the requirements of section 40.90, or

(2) Comply with either the performance requirements of sections 4a.737–T through 4a.750–T of this subchapter or the performance requirements of section 4b.110 through 4b.125 of this subchapter and in addition shall meet the requirements of section 40.70: *Provided,* That should any type be so qualified, all airplanes of any one operator of the same or related types shall be similarly qualified and operated.

(b) *Airplanes certificated after June 30, 1942.* Airplanes certificated as a basic type after June 30, 1942, and used in passenger operation shall be certificated as transport category airplanes and shall meet the requirements of section 40.70.

40.62 *Airplane limitation for type of route.* All airplanes used in passenger air transportation shall be multi-engine airplanes and shall comply with the following requirements:

(a) *Two- or three-engine airplanes.* Two- or three-engine airplanes shall not be used in passenger-carrying operations unless adequate airports are so located along the route that the airplanes will at no time be at a greater distance therefrom than one hour of flying time in still air at normal cruising speed with one engine inoperative: *Provided,* That the Administrator may specify distances greater or less than those set forth herein when he determines that the character of the terrain, the type of operation, or the performance of the airplanes to be used so permit or require.

(b) *Land airplanes on extended overwater routes.* Land airplanes operated on flights involving extended overwater operations shall be certificated as adequate for ditching in accordance with the ditching provisions of Part 4b of this subchapter.

40.63 *Proving tests.*

(a) A type of airplane not previously proved for use in scheduled operation shall have at least 100 hours of proving tests, in addition to the airplane certification tests, accomplished under the supervision of an authorized representative of the Administrator. As part of the 100-hour total at least 50 hours shall be flown over authorized routes and at least 10 hours shall be flown at night.

(b) A type of airplane which has been previously proved shall be tested for at least 50 hours, of which at least 25 hours shall be flown over authorized routes, unless deviations are specifically authorized by the Administrator on the ground that the special circumstances of a particular case make a literal observance of the requirements of this paragraph unnecessary for safety, when the airplane:

(1) Is materially altered in design, or

(2) Is to be used by an air carrier who has not previously proved such a type.

(c) During proving tests only those persons required to make the tests and those designated by the Board or the Administrator shall be carried. Mail, express, and other cargo may be carried when approved by the Administrator.

40.63–1 *Materially altered in design (FAA interpretations which apply to sec. 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.

(Published in 18 F.R. 8611, December 22, 1953, effective January 1, 1954.)

Airplane Performance Operating Limitations; Transport Category

40.70 *Transport category airplane operating limitations.*

(a) In operating any passenger-carrying transport category airplane the provisions of sections 40.71 through 40.78 shall be complied with, unless deviations therefrom are specifically authorized by the Administrator on the ground that the special circumstances of a particular case make a literal observance of the requirements unnecessary for safety.

(b) For transport category airplanes the performance data contained in the Airplane Flight Manual shall be applied in determining compliance with these provisions. Where conditions differ from those for which specific tests were made, compliance shall be determined by interpolation or by computation of the effects of changes in the specific variables where such interpolations or computations will give results substantially equaling in accuracy the results of a direct test.

(c) No airplane shall be taken off at a weight which exceeds the allowable weight for the runway being used as determined in accordance with the take off runway limitations of the transport category operating rules of this part, after taking into account the temperature operating correction factors required by sections 4a.749a–T or 4b.117 of this subchapter, and set forth in the Airplane Flight Manual for the airplane.

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

(Published in 18 F.R. 8678, December 24, 1953, effective January 1, 1954.)

40.70–2 *Accuracy of data (FAA policies which apply to sec. 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 1 percent by an independent recheck.

(Published in 18 F.R. 7162, November 11, 1953, effective January 1, 1954.)

40.70–3 *Temperature accountability (FAA policies which apply to sec. 40.70(c)).* The maximum permissible weight for a given takeoff should be equal to the lowest of three values determined separately by consideration of (a) accelerate-stop, (b) takeoff 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 takeoff 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 standard temperature, then at temperatures higher than standard, takeoff 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 takeoff 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 temperature reaches 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.

(Published in 18 F.R. 7162, November 11, 1953, effective January 1, 1954.)

40.71 *Weight limitations.*

(a) No airplane shall be taken off from any airport located at an elevation outside of the altitude range for which maximum take-off weights have been determined, and no airplane shall depart for an airport of intended destination or have any airport specified as an alternate which is located at an elevation outside of the altitude range

for which maximum landing weights have been determined.

(b) The weight of the airplane at take-off shall not exceed the authorized maximum take-off weight for the elevation of the airport from which the take-off is to be made.

(c) The weight at take-off shall be such that, allowing for normal consumption of fuel and oil in flight to the airport of intended destination, the weight on arrival will not exceed the authorized maximum landing weight for the elevation of such airport.

40.71–1 *Weight limitations (FAA policies which apply to sec. 40.71).* The limitations imposed by section 40.71 of this part 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 Part 40. 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.

(Published in 18 F.R. 7163, November 11, 1953, effective January 1, 1954.)

40.72 *Take-off limitations to provide for engine failure.* No take-off shall be made except under conditions which will permit compliance with the following requirements:

(a) It shall be possible, from any point in the take-off up to the time of attaining the critical-engine-failure speed, to bring the airplane to a safe stop on the runway as shown by the accelerate-stop distance data.

(b) It shall be possible, if the critical engine should fail at any instant after the airplane attains the critical-engine-failure speed, to proceed with the take-off and attain a height of 50 feet, as indicated by the take-off path data, before passing over the end of the runway. Thereafter it shall be possible to clear all obstacles, either by at least 50 feet vertically, as shown by the take-off path data, or by at least 200 feet horizontally within the airport boundaries and by at least 300 feet horizontally after passing beyond such boundaries. In determining the allowable deviation of the flight path in order to avoid obstacles by at least the distances above set forth, it shall be assumed that the airplane is not banked before reaching a height of 50 feet, as shown by the take-off path data, and that a maximum bank thereafter does not exceed 15°.

(c) In applying the requirements of paragraphs (a) and (b) of this section, corrections shall be made for any gradient of the take-off surface. To allow for wind effect, take-off data based on still air may be corrected by not more than 50 percent of the reported wind component along the take-off path if opposite to the direction of take-off, and shall be corrected by not less than 150 percent of the reported wind component if in the direction of take-off.

40.72–1 *Takeoff limitations to provide for engine failure (FAA policies which apply to sec. 40.72).*

(a) *Takeoff flight path.* Diagram 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 takeoff 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 takeoffs might be made, are necessary for the determination of permissible takeoff 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 sur-

faces or other airport areas suitable for use in takeoff 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 takeoff. 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 takeoff, selected and approved as a suitable area, in which the aircraft can be stopped after an interrupted takeoff. 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 takeoff. 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 takeoff speeds without hazard.

(2) In all cases the takeoff 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 takeoff. Limitations established by the airport operator may make it necessary to stipulate that the beginning of the takeoff 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 takeoff 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,

$$120 \times 120 \times 0.25 = 3{,}600 \text{ feet}$$

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) *Effect of runway gradient.*

(1) The effect of runway gradient on the accelerate distance, decelerate (stopping) distance, and ground run portion of the takeoff path may be calculated from the following equation or by other means by which the effects of gradient may be accurately or conservatively computed.

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

where S_G = acceleration or deceleration distance with gradient.

S = acceleration or deceleration distance without gradient.

g = acceleration of gravity = 32.2 ft/sec^2).

V = appropriate speed, feet per second, True Air Speed (For accelerate and decelerate distances, use V_1; for the takeoff path, use V_2).

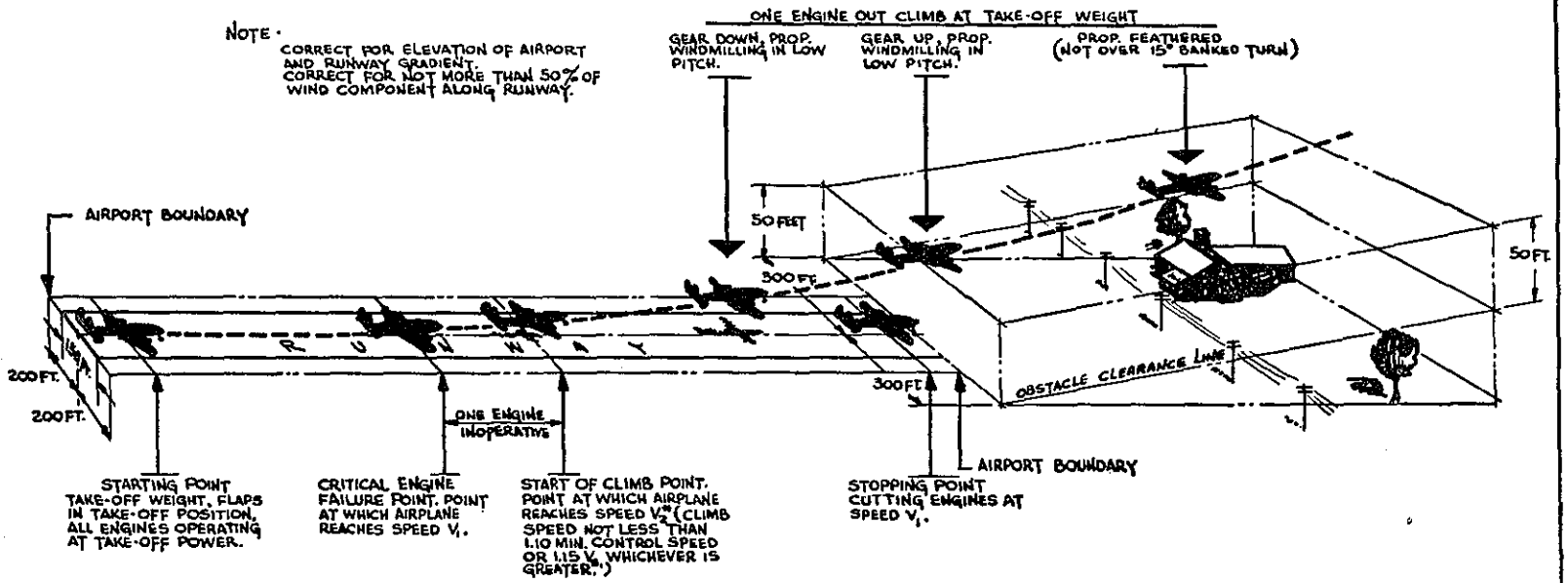
α = angle of grade with horizontal.

The following sign conventions (±) must be used in the above equation:

Uphill gradient	*Downhill gradient*
accelerate (−)	accelerate (+)
decelerate (+)	decelerate (−)

(2) The above formula is based on certain simplifying assumptions, i.e., that a uniform grade exists and that the airplane is accelerated uniformly throughout the ground run. Neither 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.

TAKE-OFF · AIRPORT LIMITATIONS



THE AIRPLANE SHALL RUN UP TO A SPECIFIED SPEED AND FROM THERE BE ABLE TO:

1. STOP WITHIN THE AIRPORT BOUNDARIES.
2. CONTINUE WITH ONE ENGINE INOPERATIVE AND CLEAR OBSTACLES AS SHOWN.

* $1.2V_s$ FOR AIRPLANES WITH TWO ENGINES
$1.15V_s$ FOR AIRPLANES WITH MORE THAN TWO ENGINES.
} V_s = STALL SPEED WITH TAKE-OFF CONFIGURATION.

Diagram 1

(3) The effect of gradient during the climbout 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 takeoff.

(4) For purposes of simplification in calculating the effect of runway gradient on the takeoff 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 takeoff 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 no 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 takeoff 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 takeoff 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 takeoff 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 = − (1.5 × tailwind component)
+ (.5 × headwind component) or,

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

$$S_w = S\left(\frac{V_2 - V_w}{V_2}\right)^2$$

Alternately, the exponent can be that which is determined to be appropriate to the separation or 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.

(Published in 18 F.R. 7163, November 11, 1953, effective January 1, 1954; amended in 19 F.R. 3327, June 5, 1954, effective June 20, 1954; amended in 19 F.R. 7451, November 19, 1954, effective November 30, 1954; amended 20 F.R. 3559, May 21, 1955, effective June 15, 1955.)

40.73 *En route limitations; all engines operating.* No airplane shall be taken off at a weight in excess of that which would permit a rate of climb (expressed in feet per minute), with all engines operating, of at least 6 V_{s_0} (when V_{s_0} is expressed in miles per hour) at an altitude of at least 1,000 feet above the elevation of the highest ground or obstruction within 10 miles on either side of the intended track. Transport category airplanes certificated under Part 4a of this subchapter are not required to comply with this section. For the purpose of this section it shall be assumed that the weight of the airplane as it proceeds along its intended track is progressively reduced by normal consumption of fuel and oil.

40.74 *En route limitations; one engine inoperative.*

(a) No airplane shall be taken off at a weight in excess of that which would permit a rate of climb (expressed in feet per minute), with one engine inoperative, of at least

$$\left(0.06-\frac{0.08}{N}\right)V_{s_0}^2$$

(when N is the number of engines installed and V_{s_0} is expressed in miles per hour) at an altitude of at least 1,000 feet above the elevation of the highest ground or obstruction within 10 miles on either side of the intended track, except that for transport category airplanes certificated under Part 4a of this subchapter, the rate of climb shall be $0.02\ V_{s_0}^2$.

(b) As an alternative to the provisions of paragraph (a) of this section, an air carrier may utilize an approved procedure whereby its airplanes are operated at an all-engine-operating altitude such that in the event of an engine failure the airplane can continue flight to an alternate airport where a landing can be made in accordance with the provisions of section 40.78, the flight path clearing all terrain and obstructions along the route within 5 miles on either side of the intended track by at least 2,000 feet. In addition, if such a procedure is utilized, subparagraphs (1) through (6) of this paragraph shall be complied with:

(1) The rate of climb (as presented in the Airplane Flight Manual for the appropriate weight and altitude) used in calculating the airplane's flight path shall be diminished by an amount, in feet per minute, equal to

$$\left(0.06-\frac{0.08}{N}\right)V_{s_0}^2$$

(when N is the number of engines installed and V_{s_0} is expressed in miles per hour) for airplanes certificated under Part 4b of this subchapter and by $0.02\ V_{s_0}^2$ for airplanes certificated under Part 4a of this subchapter.

(2) The all-engine-operating altitude shall be such that, in the event the critical engine becomes inoperative at any point along the route, the flight will be capable of proceeding to a predetermined alternate airport by use of this procedure. For the purpose of determining the take-off weight, the airplane shall be assumed to pass over the critical obstruction following engine failure at a point no closer to the critical obstruction than the nearest approved radio navigational fix: *Provided,* That the Administrator may authorize a procedure established on a different basis where adequate operational safeguards are found to exist.

(3) The airplane shall meet the provisions of paragraph (a) of this section at 1,000 feet above the airport used as an alternate in this procedure.

(4) The procedure shall include an approved method of accounting for winds and temperatures which would otherwise adversely affect the flight path.

(5) In complying with this procedure fuel jettisoning shall be permitted if the Administrator finds that the air carrier has an adequate training program, proper instructions are given to the flight crew, and all other precautions are taken to insure a safe procedure.

(6) The alternate airport shall be specified in the dispatch release and shall meet the provisions of section 40.390.

(c) For the purposes of this section it shall be assumed that the weight of the airplane as it proceeds along its intended track is

progressively reduced by normal consumption of fuel and oil.

40.75 *En route limitations; two engines inoperative.* The provisions of this section shall apply only to airplanes certificated in accordance with the performance requirements of Part 4b of this subchapter. No airplane having four or more engines shall be flown along an intended track except under the conditions of either paragraph (a) or paragraph (b) of this section.

(a) No place along the intended track shall be more than 90 minutes away from an available landing area at which a landing can be made in accordance with the requirements of section 40.78, assuming all engines to be operating at cruising power.

(b) The take-off weight shall not be greater than that which would permit the airplane, with the two critical engines inoperative, to have a rate of climb in feet per minute equal to 0.01 $V_{s_0}^2$ (V_{s_0} being expressed in miles per hour) along all points of the route, from the point where the two engines are assumed to fail simultaneously to the landing area, either at an altitude of 1,000 feet above the elevation of the highest ground or obstruction within 10 miles on either side of the intended track or at an altitude of 5,000 feet, whichever is higher. The point where the two engines are assumed to fail shall be that point along the route which is most critical with respect to the take-off weight. In showing compliance with this prescribed rate of climb, the following shall apply:

(1) It shall be permissible to consider that the weight of the airplane as it proceeds along its intended track is progressively reduced by normal consumption of fuel and oil with all engines operating up to the point where the two engines are assumed to fail and with two engines operating beyond that point.

(2) Where the engines are assumed to fail at an altitude above the prescribed minimum altitude, compliance with the prescribed rate of climb at the prescribed minimum altitude need not be shown during the descent from the cruising altitude to the prescribed minimum altitude if, at the end of the descent and during the subsequent portion of the flight, the prescribed rate of climb is met at the prescribed minimum altitudes. The descent shall be assumed to be along a net flight path and the rate of descent for the appropriate weight and altitude shall be assumed to be 0.01 $V_{s_0}^2$ greater than indicated by the performance information approved by the Administrator.

(3) If fuel jettisoning is provided, the airplane's weight at the point where the two engines are assumed to fail shall be considered to be not less than that which would include sufficient fuel to proceed to an available landing area at which a landing can be made in accordance with the requirements of section 40.78 and to arrive there at an altitude of at least 1,000 feet directly over the landing area.

40.76 *Special en route limitations.* The 10-mile lateral distance specified in sections 40.73 through 40.75 may, for a distance of no more than 20 miles, be reduced to 5 miles, if operating VFR, or if air navigational facilities are so located as to provide a reliable and accurate identification of any high ground or obstruction located outside of such 5-mile lateral distance but within the 10-mile distance.

40.76–1 *Special en route limitations (FAA policies which apply to sec. 40.76).* No attempt is made to classify specific types of navigational facilities as acceptable or unacceptable for the purposes of section 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 2 miles, or a continuous on-course indication with an error of not more than 2 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 only apply for IFR operations.

(Published in 18 F.R. 7164, November 11, 1953, effective January 1, 1954.)

40.77 *Landing distance limitations; airport of destination.* No airplane shall be taken off at a weight in excess of that which under the conditions stated in this part would permit the airplane to be brought to rest at the field of intended destination within 60 percent of the effective length of the runway from a point 50 feet directly above the intersection of the obstruction clearance plane and the runway. For the purpose of this section it shall be assumed that the takeoff weight of the airplane is reduced by the weight of the fuel and oil expected to be consumed in flight to the field of intended destination.

(a) It shall be assumed that the airplane is landed on the most favorable runway and direction in still air.

(b) It shall be assumed, considering the probable wind velocity and direction, that the airplane is landed on the most suitable runway, taking due account of the ground handling characteristics of the airplane type involved and other conditions (e.g., landing aids, terrain, etc.) and allowing for the effect on the landing path and roll of not more than 50 percent of the wind component along the landing path if opposite to the direction of landing, or not less than 150 percent of the wind component if in the direction of landing.

(c) If the airport of intended destination will not permit full compliance with paragraph (b) of this section, the airplane may be taken off if an alternate airport is designated which permits compliance with section 40.78.

40.77–1 *Landing distance limitations; airport of destination (FAA policies which apply to sec. 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 favorably (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 (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 section 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 section 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, section 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 section 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 section 40.360(a).

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

(Published in 18 F.R. 7164, November 11, 1953, effective January 1, 1954.)

40.78 *Landing distance limitations; alternate airports.* No airport shall be designated as an alternate airport in a dispatch release unless the airplane at the weight anticipated at the time of arrival at such airport can comply with the requirements of section 40.77: *Provided,* That the airplane can be brought to rest within 70 percent of the effective length of the runway.

Airplane Performance Operating Limitations; Nontransport Category

40.90 *Nontransport category airplane operating limitations.* In operating any large, nontransport category airplane in passenger service, the provisions of sections 40.91 through 40.94 shall be complied with, unless deviations therefrom are specifically authorized by the Administrator on the ground that the special circumstances of a particular case make a literal observance of the requirements unnecessary for safety. Performance data published or approved by the Administrator for each such nontransport category airplane shall be used in determining compliance with the provisions of sections 40.91 through 40.94.

40.90–1 *Performance data (FAA rules which apply to sec. 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[5] and section 40.91–1(b). For the purpose of determining performance data, figures 1, 3, 6 and 6A, "paved runway" shall mean paved with asphalt or concrete. Figures 2, 4, 7 and 7A 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 FAA 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 FAA Aviation Safety District Office charged with the overall inspection of the air carriers' operations.

(Published in 18 F.R. 8678, December 24, 1953; amended 19 F.R. 747, February 9, 1954.)

40.91. *Takeoff limitations.* No takeoff shall be made at a weight in excess of that which will permit the airplane to be brought to a safe stop within the effective length of the runway from any point during the takeoff up to the time of attaining 105 percent of minimum control speed or 115 percent of the power-off stalling speed in the takeoff configuration, whichever is the greater. In applying the requirements of this section:

(a) It may be assumed that takeoff power is used on all engines during the acceleration;

(b) Account may be taken of not more than 50 percent of the reported wind component along the takeoff path if opposite to the direction of takeoff, and account shall be taken of not less than 150 percent of the reported wind component if in the direction of the takeoff;

(c) Account shall be taken of the average runway gradient when the average gradient is greater than ½ percent. The average runway gradient is the difference between the elevations of the end points of the runway divided by the total length;

(d) It shall be assumed that the airplane is operating in the standard atmosphere.

40.91–1 *Takeoff limitations (FAA rules which apply to sec. 40.91).*

(a) Figures 1, 2, 3, 4, 8, 9, and 10 shall be used in determining takeoff limitations. The weight of de-icing equipment, when installed, must be included in the computations of allowable takeoff weights.

(b) If the gradient of the runway exceeds ½ percent, the effect of the total average gradient shall be accounted for. The effect of gradient shall be calculated as shown in figure 11 or by any other method by which the effect of gradient may be accurately or conservatively computed.

(c) The maximum allowable takeoff weight from sod runways shall be the lesser gross weight as determined by application of the effective length to the appropriate takeoff table (figure 1 or 3) and by application of the actual runway length to the corresponding takeoff table (figure 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 maxi-

[5] 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. Examples which explain the use of figures 1 to 10, inclusive, will be found in the Appendix.

mum 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.

(Published in 18 F.R. 8679, December 24, 1953, effective January 1, 1954; amended in 19 F.R. 5658, September 8, 1954, effective October 1, 1954.)

40.91–2 *Takeoff limitations (FAA policies which apply to sec. 40.91).*

(a) The maximum tailwind component should be 10 m.p.h. unless another value has been approved by the Administrator.

(Published in 18 F.R. 6617, October 17, 1953, effective January 1, 1954; amended in 19 F.R. 3328, June 5, 1954, effective June 20, 1954.)

40.92 *En route limitations; one engine inoperative.*

(a) No take-off shall be made at a weight in excess of that which will permit the airplane to climb at a rate of at least 50 feet per minute with the critical engine inoperative at an altitude of at least 1,000 feet above the elevation of the highest obstacle within 5 miles on either side of the intended track or at an altitude of 5,000 feet, whichever is the higher: *Provided,* That in the alternative an air carrier may utilize a procedure whereby the airplane is operated at an altitude such that, in event of an engine failure, the airplane can clear the obstacles within 5 miles on either side of the intended track by 1,000 feet, if the air carrier can demonstrate to the satisfaction of the Administrator that such a procedure can be used without impairing the safety of operation. If such a procedure is utilized, the rate of descent for the appropriate weight and altitude shall be assumed to be 50 feet per minute greater than indicated by the performance information published or approved by the Administrator. Before approving such a procedure, the Administrator shall take into account, for the particular route, route segment, or areas concerned, the reliability of wind and weather forecasting, the location and types of aids to navigation, the prevailing weather conditions, particularly the frequency and amount of turbulence normally encountered, terrain features, air traffic control problems, and all other operational factors which affect the safety of an operation utilizing such a procedure.

(b) In applying the requirements of paragraph (a) of this section, it shall be assumed that:

(1) The critical engine is inoperative;

(2) The propeller of the inoperative engine is in the minimum drag position;

(3) The wing flaps and landing gear are in the most favorable positions;

(4) The operative engine or engines are operating at the maximum continuous power available;

(5) The airplane is operating in the standard atmosphere; and

(6) The weight of the airplane is progressively reduced by the weight of the anticipated consumption of fuel and oil.

40.92–1 *En route limitations (FAA rules which apply to sec. 40.92).*

(a) 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 FAA Aviation Safety District Office charged with the overall inspection of the air carriers operations.

(Published in 18 F.R. 8679, December 24, 1953, effective January 1, 1954.)

40.93 *Landing distance limitations; airport of intended destination.* No take-off shall be made at a weight in excess of that which, allowing for the anticipated weight reduction due to consumption of fuel and oil, will permit the airplane to be brought to a stop within 60 percent of the effective length of the most suitable runway at the airport of intended destination.

(a) This weight shall in no instance be greater than that permissible if the landing were to be made:

(1) On the runway with the greatest effective length in still air, and

(2) On the runway required by the probable wind, taking into account not more than 50 percent of the probable headwind component and not less than 150 percent of the probable tail-wind component.

(b) In applying the requirements of this section it shall be assumed that:

(1) The airplane passes directly over the intersection of the obstruction clearance plane and the runway at a height of 50 feet in a steady gliding approach at a true indicated air speed of at least 1.3 V_{s_0};

(2) The landing is made in such a manner that it does not require any exceptional degree of skill on the part of the pilot; and

(3) The airplane is operating in the standard atmosphere.

40.93–1 *Landing distance limitations (FAA rules which apply to sec. 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.

(Published in 18 F.R. 8679, December 24, 1953, effective January 1, 1954.)

40.93–2 *Landing distance limitations; airport of destination (FAA policies which apply to sec. 40.93).*

(a) Section 40.93 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. The 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 section 40.93(a)(2) would preclude a landing at the intended destination, the aircraft may be dispatched if an alternate airport is designated which permits compliance with section 40.94.

(e) 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, section 40.93(a)(2) should not be construed as prohibiting a landing at the overweight condition, provided the crosswind and/or tailwind operating limitations are not exceeded.

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 section 40.93(a)(2). 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 section 40.360(a).

(f) For application of the wind components as allowed in section 40.93(a)(2), refer to section 40.72–1(f).

(g) The maximum tailwind component should be 10 m.p.h., unless another value has been approved by the Administrator.

(Published in 18 F.R. 6617, October 17, 1953, effective January 1, 1954; amended in 19 F.R. 3328, June 5, 1954, effective June 20, 1954.)

40.94 *Landing distance limitations; alternate airports.* No airport shall be designated as an alternate airport in a dispatch release unless the airplane at the weight anticipated at the time of arrival at such airport can comply with the requirements of section 40.93: *Provided,* That the airplane can be brought to rest within 70 percent of the effective length of the runway.

40.94–1 *Landing distance limitations; alternate airports (FAA rules which apply to sec. 40.94).*

(a) Figures 6A, 8, 9, and 10 shall be used in determining landing distance limitations on paved runways.

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

(Published in 19 F.R. 5659, September 8, 1954, effective October 1, 1954.)

Special Airworthiness Requirements

40.110 *Fire prevention.* All airplanes used in passenger service, powered by engines rated at more than 600 horsepower each for maximum continuous operation and which have not been certificated in accordance with the provisions of Part 4b of this subchapter in effect on or after November 1, 1946, shall comply with the requirements contained in sections 40.111 through 40.143: *Provided,* That if the Administrator finds that in particular models of existing airplanes literal compliance with specific items of these requirements might be extremely difficult of accomplishment and that such compliance would not contribute materially to the objective sought, he may accept such measures of compliance as he finds will effectively accomplish the basic objectives of these regulations.

40.111 *Susceptibility of materials to fire.* The Administrator shall prescribe the heat conditions and testing procedures which any specific material or individual part must meet where necessary for the purpose of applying the following defined terms: fireproof, fire-resistant, flame-resistant, flash-resistant, and flammable.

40.112 *Cabin interiors.* All compartments occupied or used by the crew or passengers shall comply with the following provisions:

(a) Materials shall in no case be less than flash-resistant.

(b) The wall and ceiling linings, the covering of all upholstering, floors, and furnishings shall be flame-resistant.

(c) Compartments where smoking is to be permitted shall be equipped with ash trays of the self-contained type which are completely removable. All other compartments shall be placarded against smoking.

(d) All receptacles for used towels, papers, and wastes shall be of fire-resistant material and shall incorporate covers or other provisions for containing possible fires started in the receptacles.

40.113 *Internal doors.* Where internal doors are equipped with louvres or other ventilating means, provision convenient to the crew shall be made for closing the flow of air through the door when such action is found necessary.

40.114 *Ventilation.* All passenger and crew compartments shall be suitably ventilated. Carbon monoxide concentration shall not exceed one part in 20,000 parts of air, and fuel fumes shall not be present. Where partitions between compartments are equipped with louvres or other means allowing air to flow between such compartments, provision convenient to the crew shall be made for closing the flow of air through the louvres or other means when such action is found necessary.

40.115 *Fire precautions.* Each compartment shall be designed so that, when used for the purpose of storing cargo or baggage, it shall comply with all of the requirements prescribed for cargo or baggage compartments. It shall include no controls, wiring, lines, equipment, or accessories the damage or failure of which would affect the safe operation of the airplane, unless such item is adequately shielded, isolated, or otherwise protected so that it cannot be damaged by movement of cargo in the compartment, and so that any breakage or failure of such item would not create a fire hazard in the compartment. Provision shall be made to prevent cargo or baggage from interfering with the functioning of the fire-protective features of the compartment. All materials used in the construction of cargo or baggage compartments, including tie-down equipment, shall be flame-resistant or better. In addition, all cargo and baggage compartments shall include provisions for safeguarding against fires according to the following classifications:

(a) Cargo and baggage compartments shall be classified in the "A" category, if pres-

ence of a possible fire therein can be readily discernible to a member of the crew while at his station, and if all parts of the compartment are easily accessible in flight. A hand fire extinguisher shall be available for such compartment.

(b) Cargo and baggage compartments shall be classified in the "B" category, if sufficient access is provided while in flight to enable a member of the crew to move by hand all contents and to reach effectively all parts of the compartment with a hand fire extinguisher. Furthermore, the design of the compartment shall be such that, when the access provisions are being used, no hazardous quantity of smoke, flames, or extinguishing agent will enter any compartment occupied by the crew or passengers. Each compartment in this category shall be equipped with a separate system of an approved type smoke detector or fire detector to give warning at the pilot or flight engineer station. Hand fire extinguishers shall be readily available for use in all compartments of this category. Compartments in this category shall be completely lined with fire-resistant material, except that additional service lining of flame-resistant material may be employed.

(c) Cargo and baggage compartments shall be classified in the "C" category, if they do not conform with the requirements for the "A" or "B" categories. Each compartment of the "C" category shall be equipped with: (1) A separate system of an approved type smoke detector or fire detector to give warning at the pilot or flight engineer station, and (2) an approved built-in-fire-extinguishing system controlled from the pilot or flight engineer station. Means shall be provided to exclude hazardous quantities of smoke, flames, or extinguishing agent from entering into any compartment occupied by the crew or passengers. Ventilation and drafts shall be further controlled within each such cargo or baggage compartment to the extent that the extinguishing agent provided can control any fire which may start within the compartment. All cargo and baggage compartments of this category shall be completely lined with fire-resistant material, except that additional service lining of flame-resistant material may be employed.

40.116 *Proof of compliance.* Compliance with those provisions of section 40.115 which refer to compartment accessibility, the entry of hazardous quantities of smoke or extinguishing agent into compartments occupied by the crew or passengers, and the dissipation of the extinguishing agent in category "C" compartments shall be demonstrated by tests in flight. It shall also be demonstrated during these tests that no inadvertent operation of smoke or fire detectors in adjacent or other compartments within the airplane would occur as a result of fire contained in any one compartment, either during or after extinguishment, unless the extinguishing system floods such compartments simultaneously.

40.117 *Propeller de-icing fluid.* If combustible fluid is used for propeller de-icing, the provisions of section 40.131 shall be complied with.

40.118 *Pressure cross-feed arrangements.* Pressure cross-feed lines shall not pass through portions of the airplane devoted to carrying personnel or cargo unless means are provided to permit the flight personnel to shut off the supply of fuel to these lines, or unless the lines are enclosed in a fuel and fumeproof enclosure that is ventilated and drained to the exterior of the airplane. Such enclosures need not be used if these lines incorporate no fittings on or within the personnel or cargo areas and are suitably routed or protected to safeguard against accidental damage. Lines which can be isolated from the remainder of the fuel system by means of valves at each end shall incorporate provisions for the relief of excessive pressures that may result from exposure of the isolated line to high ambient temperatures.

40.119 *Location of fuel tanks.* Location of fuel tanks shall comply with the provisions of section 40.132. In addition, no portion of engine nacelle skin which lies immediately behind a major air egress opening from the engine compartment shall act as

the wall of an integral tank. Fuel tanks shall be isolated from personnel compartments by means of fume- and fuel-proof enclosures.

40.120 *Fuel system lines and fittings.* Fuel lines shall be installed and supported in a manner that will prevent excessive vibration and will be adequate to withstand loads due to fuel pressure and accelerated flight conditions. Lines which are connected to components of the airplane between which relative motion may exist shall incorporate provisions for flexibility. Flexible connections in lines which may be under pressure and subjected to axial loading shall employ flexible hose assemblies rather than hose clamp connections. Flexible hose shall be of an acceptable type or proven suitable for the particular application.

40.121 *Fuel lines and fittings in designated fire zones.* Fuel lines and fittings in all designated fire zones (see sec. 40.131) shall comply with the provisions of section 40.134.

40.122 *Fuel valves.* In addition to the requirements contained in section 40.133 for shutoff means, all fuel valves shall be provided with positive stops or suitable index provisions in the "on" and "off" positions and shall be supported in such a manner that loads resulting from their operation or from accelerated flight conditions are not transmitted to the lines connected to the valve.

40.123 *Oil lines and fittings in designated fire zones.* Oil lines and fittings in all designated fire zones (see sec. 40.131) shall comply with the provisions of section 40.134.

40.124. *Oil valves.* Requirements of section 40.133 for shutoff means shall be complied with. Closing of oil shutoff means shall not prevent feathering the propeller, unless equivalent safety provisions are incorporated. All oil valves shall be provided with positive stops or suitable index provisions in the "on" and "off" positions, and shall be supported in such a manner that loads resulting from their operation or from accelerated flight conditions are not transmitted to the lines attached to the valve.

40.125 *Oil system drains.* Accessible drains shall be provided to permit safe drainage of the entire oil system and shall incorporate means for positive or automatic locking in the closed position. (See also sec. 40.135.)

40.126 *Engine breather line.* Engine breather lines shall be so arranged that condensed water vapor which may freeze and obstruct the line cannot accumulate at any point. Breathers shall discharge in a location which will not constitute a fire hazard in case foaming occurs and so that oil emitted from the line will not impinge upon the pilots' windshield. The breather shall not discharge into the engine air induction system. (See also sec. 40.135.)

40.127 *Fire walls* All engines, auxiliary power units fuel-burning heaters, and other combustion equipment which are intended for operation in flight shall be isolated from the remainder of the airplane by means of fire walls or shrouds, or other equivalent means.

40.128 *Fire-wall construction.* Fire walls and shrouds shall be constructed in such a manner that no hazardous quantity of air, fluids, or flame can pass from the engine compartment to other portions of the airplane. All openings in the fire wall or shroud shall be sealed with close-fitting fireproof grommets, bushings, or fire-wall fittings. Fire walls and shrouds shall be constructed of fireproof material and shall be protected against corrosion. The following materials have been found to comply with this requirement:

(a) Heat and corrosion resistant steel 0.015 inch thick;

(b) Low carbon steel, suitably protected against corrosion, 0.018 inch thick.

40.129 *Cowling.* Cowling shall be constructed and supported in such a manner as to be capable of resisting all vibration, inertia, and air loads to which it may normally be subjected. Provision shall be made to permit rapid and complete drainage of all portions of the cowling in all normal ground and flight attitudes. Drains shall not discharge in locations constituting a fire haz-

ard. Cowling, unless otherwise specified by these regulations, shall be constructed of fire-resistant material. Those portions of the cowling which are subjected to high temperatures due to their proximity to exhaust system parts or exhaust gas impingement shall be constructed of fireproof material.

40.130 *Engine accessory section diaphragm.* Unless equivalent protection can be demonstrated by other means, a diaphragm shall be provided on air-cooled engines to isolate the engine power section and all portions of the exhaust system from the engine accessory compartment. This diaphragm shall comply with the provisions of section 40.128.

40.131 *Powerplant fire protection.* Engine accessory sections, installations where no isolation is provided between the engine and accessory compartment, also regions wherein lie auxiliary power units, fuel-burning heaters, and other combustion equipment shall be referred to as designated fire zones. Such zones shall be protected from fire by compliance with sections 40.132 through 40.135.

40.132 *Flammable fluids.* No tanks or reservoirs which are a part of a system containing flammable fluids or gases shall be located in designated fire zones, except where the fluid contained, the design of the system, the materials used in the tank, the shutoff means, and all conections, lines, and controls are such as to provide equivalent safety. Not less than ½ inch of clear air space shall be provided between any tank or reservoir and a fire wall or shroud isolating a designated fire zone.

40.133 *Shutoff means.* Means for each individual engine shall be provided for shutting off or otherwise preventing hazardous quantities of fuel, oil, de-icer, and other flammable fluids from flowing into, within, or through any designated fire zone, except that means need not be provided to shut off flow in lines forming an integral part of an engine. In order to facilitate rapid and effective control of fires, such shutoff means shall permit an emergency operating sequence which is compatible with the emergency operation of other equipment, such as feathering the propeller. Shutoff means shall be located outside of designated fire zones, unless equivalent safety is provided (see sec. 40.132), and it shall be shown that no hazardous quantity of such flammable fluid will drain into any designated fire zone after shutting off has been accomplished. Adequate provisions shall be made to guard against inadvertent operation of the shutoff means and to make it possible for the crew to reopen the shutoff means after it has once been closed.

40.134 *Lines and fittings.* All lines and fittings for same located in designated fire zones which carry flammable fluids or gases and which are under pressure, or which attach directly to the engine, or are subject to relative motion between components, exclusive of those lines and fittings forming an integral part of the engine, shall be flexible, fire-resistant lines with fire-resistant, factory-fixed, detachable, or other approved fire-resistant ends. Lines and fittings which are not subject to pressure or to relative motion between components shall be of fire-resistant materials.

40.135 *Vent and drain lines.* All vent and drain lines and fittings for same located in designated fire zones and which carry flammable fluids or gases shall comply with the provisions of section 40.134, if the Administrator finds that rupture or breakage of a particular drain or vent line may result in a fire hazard.

40.136 *Fire-extinguishing systems.*

(a) Unless it can be demonstrated that equivalent protection against destruction of the airplane in case of fire is provided by the use of fireproof materials in the nacelle and other components which would be subjected to flame, fire-extinguishing systems shall be provided to serve all designated fire zones.

(b) Materials in the fire-extinguishing system shall not react chemically with the extinguishing agent so as to constitute a hazard.

40.137 *Fire-extinguishing agents.* Extinguishing agents employed shall be methyl bromide, carbon dioxide, or any other agent which has been demonstrated to provide equivalent extinguishing action. If methyl

bromide or any other toxic extinguishing agent is employed, provisions shall be made to prevent the entrance of harmful concentrations of fluid or fluid vapors into any personnel compartment either due to leakage during normal operation of the airplane or as a result of discharging the fire extinguisher on the ground or in flight when a defect exists in the extinguishing system. If a methyl bromide system is provided, the containers shall be charged with dry agent and shall be sealed by the fire-extinguisher manufacturer or any other party employing satisfactory recharging equipment. If carbon dioxide is used, it shall not be possible to discharge sufficient gas into personnel compartments to constitute a hazard from the standpoint of suffocation of the occupants.

40.138 *Extinguishing agent container pressure relief.* Extinguishing agent containers shall be provided with a pressure relief to prevent bursting of the container due to excessive internal pressures. The discharge line from the relief connection shall terminate outside the airplane in a location convenient for inspection on the ground. An indicator shall be provided at the discharge end of the line to provide a visual indication when the container has discharged.

40.139 *Extinguishing agent container compartment temperature.* Precautions shall be taken to assure that the extinguishing agent containers are installed in locations where reasonable temperatures can be maintained for effective use of the extinguishing system.

40.140 *Fire-extinguishing system materials.* All components of fire-extinguishing systems located in designated fire zones shall be constructed of fireproof materials, except for connections which are subject to relative motion between components of the airplane, in which case they shall be of flexible fire-resistant construction so located as to minimize the possibility of failure.

40.141 *Fire-detector systems.* Quick-acting fire detectors shall be provided in all designated fire zones and shall be sufficient in number and location to assure the detection of fire which may occur in such zones.

40.142. *Fire detectors.* Fire detectors shall be constructed and installed in such a manner as to assure their ability to resist without failure, all vibration, inertia, and other loads to which they may normally be subjected. Detectors shall be unaffected by exposure to oil, water, or other fluids or fumes which may be present.

40.143 *Protection of other airplane components against fire.* All airplane surfaces aft of the nacelles in the region of one nacelle diameter on both sides of the nacelle center line shall be constructed of fire-resistant material. This provision need not be applied to tail surfaces lying behind nacelles unless the dimensional configuration of the airplane is such that the tail surfaces could be affected readily by heat, flames, or sparks emanating from a designated fire zone or engine compartment of any nacelle.

40.150 *Control of engine rotation.* All airplanes shall be provided with means for individually stopping and restarting the rotation of any engine in flight, except that for turbine engine installations means for completely stopping the rotation need be provided only if the Administrator finds that rotation could jeopardize the safety of the airplane.

40.151 *Fuel system independence.* Airplane fuel systems shall be arranged in such manner that the failure of any one component will not result in the irrecoverable loss of power of more than one engine. A separate fuel tank need not be provided for each engine if the Administrator finds that the fuel system incorporates features which provide equivalent safety.

40.152 *Induction system ice prevention.* Means for preventing the malfunctioning of each engine due to ice accumulation in the engine air induction system shall be provided for all airplanes.

[40.153 *Carriage of cargo in passenger compartments.* Cargo shall not be carried in the passenger compartment of an airplane except as provided in either paragraph (a) or (b) of this section.

[(a) Cargo carried aft of the foremost seated passengers shall be carried in an approved cargo bin. Approved cargo bins shall meet the requirements of subparagraphs (1) through (8) of this paragraph.

[(1) The bin shall be capable of withstanding the load factors and emergency landing conditions applicable to the passenger seats of the airplane in which the bin is installed multiplied by a factor of 1.15. The combined weight of the bin and the maximum weight of cargo which may be carried in the bin shall be used to determine this strength.

[(2) The maximum weight of cargo which the bin is approved to carry and any instructions necessary to insure proper weight distribution within the bin shall be conspicuously marked on the bin.

[(3) The bin shall not impose any load on the floor or other structure of the airplane which exceeds the structural load limitations of such components.

[(4) The bin shall be attached to the seat tracks or to the floor structure of the airplane, and its attachments shall withstand the load factors and emergency landing conditions applicable to the passenger seats of the airplane in which the bin is installed multiplied by either the factor 1.15 or the seat attachment factor specified for the airplane, whichever is greater. The combined weight of the bin and the maximum weight of cargo which may be carried in the bin shall be used to determine this strength.

[(5) The bin shall not be installed in a position which restricts access to or use of any required emergency exit, or the use of the aisle in the passenger compartment.

[(6) The bin shall be fully enclosed and constructed of material which is at least flame resistant.

[(7) Suitable safeguards shall be provided within the bin to prevent the cargo from shifting under emergency landing conditions.

[(8) The bin shall not be installed in a position which obscures any passenger's view of the "seat belt" or "no smoking" sign, nor shall any required exit sign be blocked from view, unless an auxiliary sign or other approved means for proper notification of such passenger is provided.

[(b) Cargo carried forward of the foremost seated passengers shall be carried either in approved cargo bins as specified in paragraph (a) of this section, or in accordance with the following requirements:

[(1) It shall be properly secured by means of safety belts or other tiedowns having sufficient strength to eliminate the possibility of shifting under all normally anticipated flight and ground conditions;

[(2) It shall be packaged or covered in a manner to avoid possible injury to passengers;

[(3) It shall not impose any load on seats or the floor structure which exceeds the structural load limitation for those components;

[(4) It shall not be located in a position which restricts the access to or use of any required emergency or regular exit, or the use of the aisle in the passenger compartment; and

[(5) It shall not be located in a position which obscures any passenger's view of the "seat belt" or "no smoking" sign, nor shall any required exit sign be blocked from view, unless an auxiliary sign or other approved means for proper notification of such passenger is provided.]

(Amendment 40–32, published in 26 F.R. 11354, Dec. 1, 1961, effective Jan. 2, 1962; [Amendment 40–33, published in 26 F.R. 12762, Dec. 30, 1961, effective Jan. 2, 1962; Amendment 40–34, published in 27 F.R. 649, Jan. 23, 1962, effective Jan. 20, 1962.])

Instruments and Equipment for all Operations

40.170 *Aircraft instruments and equipment for all operations.*

(a) Instruments and equipment required by sections 40.171 through 40.232 shall be approved and shall be installed in accordance with the provisions of the airworthiness requirements applicable to the instruments or equipment concerned.

(b) The following provisions apply to air-speed limitations, air-speed indicators, and related information:

(1) Air-speed limitations and related information contained in the Airplane Flight Manual and pertinent placards shall be expressed in the same units as used on the air-speed indicator.

(2) When more than one air-speed indicator is required, all such indicators shall be calibrated to read in the same units.

(3) When an air-speed indicator is calibrated in statute miles per hour, a readily usable means shall be provided for the flight crew to convert statute miles per hour to knots.

(4) On and after April 1, 1956, all air-speed indicators shall be calibrated in knots, and all air-speed limitations and related information contained in the Airplane Flight Manual and pertinent placards shall be expressed in knots.

(c) The following instruments and equipment shall be in operable condition prior to take-off, except as provided in section 40.391(b) for continuance of flight with equipment inoperative:

(1) Instruments and equipment required to comply with airworthiness requirements under which the airplane is type certificated and as required by the provisions of section 40.110 and sections 40.150 through 40.153.

(2) Instruments and equipment specified in sections 40.171 through 40.178 for all operations, and the instruments and equipment specified in sections 40.200 through 40.232 for the type of operation indicated, wherever these items are not already provided in accordance with subparagraph (1) of this paragraph.

40.170–1 *Approval of aircraft instruments and equipment for all operations (FAA interpretations which apply to sec. 40.170(a)).* Instruments and equipment specified in sections 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.

(Published in 18 F.R. 8611, December 22, 1953, effective January 1, 1954.)

40.170–2 *Determination of operable condition of radio equipment (FAA interpretations which apply to sec. 40.170(c)).* Radio equipment specified in sections 40.230 through 40.232 which is of such complex nature that it cannot be accurately checked for operable condition prior to takeoff, 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.

(Published in 18 F.R. 8611, December 22, 1953, effective January 1, 1954.)

40.170–3 *Airspeed limitations and related information contained in the Airplane Flight Manual (FAA policies which apply to sec. 40.170(b)).* The airspeeds shown in the Performance Information Section only, of an Airplane Flight Manual approved prior to April 1, 1956, may continue to be expressed in statute miles per hour, provided that a table converting statute miles to knots is incorporated therein, and a cautionary note is placed on each page and chart where airspeeds are denoted indicating that the statute miles shown must be converted to knots when determining performance information. A similar note should be placed in the Operations Limitations Section, indicating that airspeeds shown in the

Performance Information Section are in statute miles and must be converted to knots when determining performance information.

(Published in 21 F.R. 4311, June 20, 1956, effective July 1, 1956.)

40.171 *Flight and navigational equipment for all operations.* The following flight and navigational instruments and equipment are required for all operations:

(a) An air-speed indicating system with heated pitot tube or equivalent means for preventing malfunctioning due to icing;

(b) Sensitive altimeter;

(c) Clock (sweep-second);

(d) Free-air temperature indicator;

(e) Gyroscopic bank and pitch indicator (artificial horizon);

(f) Gyroscopic rate-of-turn indicator combined with a slip-skid indicator (turn and bank indicator);

(g) Gyroscopic direction indicator (directional gyro or equivalent);

(h) Magnetic compass; and

(i) Vertical speed indicator (rate-of-climb indicator).

40.172 *Engine instruments for all operations.* The following engine instruments are required for all operations, except that the Administrator may permit or require different instrumentation for turbine-powered airplanes to provide equivalent safety:

(a) Carburetor air temperature indicator for each engine;

(b) Cylinder head temperature indicator for each air-cooled engine;

(c) Fuel pressure indicator for each engine;

(d) Fuel flowmeter or fuel mixture indicator for each engine not equipped with automatic altitude mixture control;

(e) Means for indicating fuel quantity in each fuel tank;

(f) Manifold pressure indicator for each engine;

(g) Oil pressure indicator for each engine;

(h) Oil quantity indicator for each oil tank when a transfer or separate oil reserve supply is used;

(i) Oil-in temperature indicator for each engine;

(j) Tachometer for each engine;

(k) An independent fuel pressure warning device for each engine or a master warning device for all engines with means for isolating the individual warning circuits from the master warning device; and

(l) Effective July 1, 1956, a means shall be provided for each reversible propeller on airplanes equipped with reversible propellers, which will indicate to the pilots when the propeller is in reverse pitch. Such means may be actuated at any point in the reversing cycle between the normal low pitch stop position and full reverse pitch. No indication shall be given at or above the normal low pitch stop position. The source of indication shall be actuated by the propeller blade angle or be directly responsive to the propeller blade angle.

40.172–1 *Warning lights for reversible propellers (FAA policies which apply to sec. 40.172(l).* In the interest of cockpit uniformity, when warning lights are used to indicate to the pilot that a reversible propeller is in reverse pitch, such warning lights should be amber in color.

(Published in 21 F.R. 4311, June 20, 1956, effective July 1, 1956.)

40.173. *Emergency equipment for all operations.*

(a) *General.* The emergency equipment specified in paragraphs (b), (c), and (d) of this section is required for all operations. Such equipment shall be readily accessible to the crew, and the method of operation shall be plainly indicated. When such equipment is carried in compartments or containers, the compartments or containers shall be so marked as to be readily identifiable.

(b) *Hand fire extinguishers for crew, passenger, and cargo compartments.* Hand, fire extinguishers of an approved type shall be provided for use in crew, passenger, and cargo compartments in accordance with the following requirements:

(1) The type and quantity of extinguishing agent shall be suitable for the type of fires likely to occur in the compartment where the extinguisher is intended to be used.

(2) At least one hand fire extinguisher shall be provided and conveniently located on the flight deck for use by the flight crew.

(3) At least one hand fire extinguisher shall be conveniently located in the passenger compartment of airplanes accommodating more than six but less than 31 passengers. On airplanes accommodating more than 30 passengers, at least two fire extinguishers shall be provided. None need be provided in passenger compartments of airplanes accommodating six or less persons.

(c) *First-aid equipment.* First-aid equipment suitable for treatment of injuries likely to occur in flight or in minor accidents shall be provided in a quantity appropriate to the number of passengers and crew accommodated in the airplane.

(d) *Crash ax.* All airplanes shall be equipped with at least one crash ax.

(e) *Means for emergency evacuation.* After August 31, 1957, on all passenger-carrying airplanes, at all emergency exits which are more than 6 feet from the ground with the airplane on the ground and with the landing gear extended, means shall be provided to assist the occupants in descending from the airplane. At floor level exits approved as emergency exits, such means shall be a chute or equivalent device suitable for the rapid evacuation of passengers. During flight time this means shall be in a position for ready use: *Provided,* That the requirements of this paragraph do not apply to emergency exits over the wing where the greatest distance from the lower sill of the exit to the wing surface does not exceed 36 inches.

(f) *Interior emergency exit marking.*

(1) After May 31, 1957, all passenger emergency exits, their means of access, and their means of opening shall be marked conspicuously. The identity and location of emergency exits shall be recognizable from a distance equal to the width of the cabin. The location of the emergency exit operating handle and the instructions for opening shall be marked on or adjacent to the emergency exit and shall be readable from a distance of 30 inches by a person with normal eyesight.

[(2) In all passenger-carrying airplanes, a source or sources of light with an energy supply independent of the main lighting system shall be installed to illuminate all passenger emergency exit markings. Such lights shall be designed to function automatically in a crash landing and to continue to function thereafter, and shall also be operable manually, or shall be designed only for manual operation and also to continue to function following a crash landing. When such lights require arming of the system to function automatically, the system shall be armed prior to each takeoff and landing. When such lights require manual operation to function, they shall be turned on prior to each takeoff and landing.

[(Amendment 40-36, published in 27 F.R. 1452, Feb. 16, 1962, effective Mar. 20, 1962.)]

40.173-1 *Hand fire extinguishers for crew, passenger, and cargo compartments (FAA interpretations which apply to sec. 40.173(b)).* 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 section 4b.18.

(Published in 18 F.R. 8612, December 22, 1953, effective January 1, 1954.)

40.174 *Seats and safety belts for all occupants.* A seat and an individual safety belt are required for each passenger and crew member, excluding infants, who are in other than a recumbent position during take-off and landing. One safety belt only is required in a berth for one or two persons in a recumbent position during take-off and landing. During flight between take-off and landing, one safety belt is sufficient for two persons occupying a multiple lounge or divan seat.

40.175 *Miscellaneous equipment for all operations.* All airplanes shall have installed the following equipment:

(a) If protective fuses are used, spare fuses of a number approved for the particular airplane and appropriately described in the air carrier manual.

(b) Windshield wiper or equivalent for each pilot station.

(c) A power supply and distribution system capable of producing and distributing the load for all required instruments and equipment using an external power supply in the event of failure of any one power source or component of the power distribution system: *Provided*, That the Administrator may authorize the use of common elements in the power distribution system when he finds that such elements are so designed as to be reasonably protected against malfunction. Engine-driven sources of energy when used, shall be on separate engines.

(d) Means for indicating the adequacy of the power being supplied to required flight instruments.

(e) Two independent static pressure systems, so vented to the outside atmospheric pressure that they will be least affected by air flow variation, moisture, or other foreign matter, and so installed as to be airtight except for the vent. When a means is provided for transferring an instrument from its primary operating system to an alternate system, such means shall include a positive positioning control and shall be marked to indicate clearly which system is being used.

(f) Means for locking all companionway doors which separate passenger compartments from flight crew compartments. Keys for all doors which separate passenger compartments from other compartments having emergency exit provisions shall be readily available to all crew members. Any door which is the means of access to a required passenger emergency exit shall be placarded to indicate that it must be open during takeoff and landing. All doors which lead to compartments normally accessible to passengers and which are capable of being locked by passengers shall be provided with means for unlocking by the crew in the event of an emergency.

(g) For seaplanes only, anchor light or lights, a warning bell for signaling when not under way during fog conditions, and an anchor adequate for the size of the seaplane.

40.175–1 *Power supply and distribution systems (FAA interpretations which apply to sec. 40.175(c)).*

(a) Aircraft having a power supply and distribution system which meets the requirements of sections 4b.606 (a), (b), and (c); 4b.612(e); 4b.622 (a) and (b); 4b.623; 4b.625; 4b.650(b) of this subchapter are deemed to have met the requirements of section 40.175(c).

(b) The use of common elements in the electrical power distribution system which do not meet the requirements of paragraph (a) of this section will be approved under the provisions of section 40.175(c) if their record of reliability is such that failure is improbable.[6]

(Published in 20 F.R. 4291, June 18, 1955, effective July 1, 1955.)

40.176 *Cockpit check procedure.* The air carrier shall provide for each type of airplane a cockpit check procedure. This procedure shall include all items necessary for flight crew members to check for safety prior to starting engines, prior to taking off, prior to landing, and in engine emergencies. It shall be so designated as to obviate the necessity for a flight crew member to rely upon his memory for items to be checked and shall be readily usable in the cockpit of each airplane.

40.177. *Passenger information for all operations.* All airplanes shall be equipped with signs visible to passengers and cabin attendants to notify such persons when smoking is prohibited and when safety belts should be fastened. These signs shall be capable of on-off operation by the crew.

40.178 *Exterior exit and evacuation markings for all operations.* Effective January 1, 1956, exterior surfaces of the airplane shall be marked to identify clearly all required emergency exits. When such exits are operable from the outside, markings shall consist

[6] As a result of surveys conducted by the CAA during March and July of 1954, it was found that by employing the standards in section 40.175–1, all aircraft in service which were subject to the provisions of this part, with the exception of a limited number of DC–3 aircraft, were acceptable from a compliance viewpoint. The DC–3 aircraft mentioned were not considered to meet the provisions of this section because a common circuit breaker is incorporated in the electric power distribution system to both ADF inverters and did not provide a means, such as individual fuses or circuit breakers, to assure continued operation in the event the common circuit breaker opened as a result of fault in either inverter or ADF system.

of or include information indicating the method of opening.

Instruments and Equipment for Special Operations

40.200 *Instruments and equipment for operations at night.* Each airplane operated at night shall be equipped with the following instruments and equipment in addition to those required by sections 40.171 through 40.178:

(a) Position lights;

(b) An anti-collision light for airplanes having a maximum certificated weight of more than 12,500 pounds;

(c) Two landing lights;

(d) Deleted.

(Paragraph (d) deleted by Amendment 40-30, published in 26 F.R. 8881, Sept. 21, 1961, effective Sept. 21, 1961.)

(e) Instrument lights providing sufficient illumination to make all instruments, switches, etc., easily readable, so installed that their direct rays are shielded from the flight crew members' eyes and that no objectionable reflections are visible to them. A means of controlling the intensity of illumination shall be provided unless it is shown that nondimming instrument lights are satisfactory;

(f) An air-speed indicating system with heated pitot tube or equivalent means for preventing malfunctioning due to icing; and

(g) A sensitive altimeter.

40.201 *Instruments and equipment for operations under IFR or over-the-top.* Each airplane operated under IFR or over-the-top shall be equipped with the following instruments and equipment in addition to those required by sections 40.171 through 40.178:

(a) An air-speed indicating system with heated pitot tube or equivalent means for preventing malfunctioning due to icing;

(b) A sensitive altimeter; and

(c) Instrument lights providing sufficient illumination to make all instruments, switches, etc., easily readable, so installed that their direct rays are shielded from the flight crew members' eyes and that no objectionable reflections are visible to them. A means of controlling the intensity of illumination shall be provided unless it is shown that nondimming instrument lights are satisfactory.

40.202 *Supplemental oxygen; reciprocating-engine-powered airplanes.*

(a) *General.* Except where supplemental oxygen is provided in accordance with the requirements of section 40.203, supplemental oxygen shall be furnished and used as set forth in paragraphs (b) and (c) of this section. The amount of supplemental oxygen required for a particular operation to comply with the rules in this part shall be determined on the basis of flight altitudes and flight duration consistent with the operating procedures established for each such operation and route. As used in the oxygen requirements hereinafter set forth, "altitude" shall mean the pressure altitude corresponding with the pressure in the cabin of the airplane, and "flight altitude" shall mean the altitude above sea level at which the airplane is operated.

(b) *Crew members.*

(1) At altitudes above 10,000 feet to and including 12,000 feet, oxygen shall be provided for, and used by, each member of the flight crew on flight deck duty, and provided for all other crew members during the portion of the flight in excess of 30 minutes within this range of altitudes.

(2) At altitudes above 12,000 feet, oxygen shall be provided for, and used by each member of the flight crew on flight deck duty, and provided for all other crew members during the entire flight time at such altitudes.

(c) *Passengers.* Each air carrier shall provide a supply of oxygen for passenger safety as approved by the Administrator in accordance with the following standards:

(1) For flights of over 30-minute duration at altitudes above 8,000 feet to and including 14,000 feet, a supply of oxygen sufficient to furnish oxygen for 30 minutes to 10 percent of the number of passengers carried shall be required.

(2) For flights at altitudes above 14,000 feet to and including 15,000 feet, a supply of oxygen sufficient to provide oxygen for the duration of the flight at such altitudes for 30 percent of the number of passengers carried shall generally be considered adequate.

(3) For flights at altitudes above 15,000 feet, a supply of oxygen sufficient to provide oxygen for each passenger carried during the entire flight at such altitudes shall be required.

40.202–1 *Supplemental oxygen for crew members (FAA interpretations which apply to sec. 40.202(b)(1)).*

(a) The phrase, "during the portion of flight in excess of 30 minutes within this range of altitudes" applies to all crew members including the flight crew members on flight deck duty. Thus, oxygen is required to be provided for, and used by, each member of the flight crew on flight deck duty only during the portion of the flight in excess of 30 minutes within this range of altitudes.

(b) The words "and used by" mean continuous use of the oxygen by a crew member during the required periods, except when it is necessary for the crew member to remove the oxygen mask in connection with his regular duties.

(Published in 19 F.R. 1237, March 5, 1954, effective April 1, 1954; 21 F.R. July 20, 1956, effective July 31, 1956.)

40.202–2 *Oxygen requirements for standby* crew members (*FAA interpretations which ap-*

ply to sec. 40.202(b)). Standby crew members who are on call or are definitely going to have flight deck duty prior to the completion of a flight must be provided with the same amount of supplemental oxygen as that provided for crew members on duty other than on flight deck duty. However, if the standby crew members are not on call and will not be on flight deck duty during the remainder of the flight, they must be considered as passengers with regard to supplemental oxygen.

(Published in 19 F.R. 1237, March 5, 1954, effective April 1, 1954.)

40.202–3 *Operating instructions (FAA policies which apply to sec. 40.202)*. Operating instructions appropriate to the type of system and masks installed should be provided for the flight crew in the appropriate air carrier manual. These operating instructions should contain a graph or a table which will show the duration of the oxygen supply for the various bottle pressures and pressure altitudes.

(Published in 19 F.R. 1237, March 5, 1954, effective April 1, 1954.)

40.202–4 *Oxygen requirements for jump seat occupant (FAA policies which apply to sec. 40–202)*. When the jump seat is occupied by a check airman, a crew member, or a flight crew member, as defined by section 40.5 oxygen should be provided in accordance with the requirements of section 40.202. The provision of oxygen at the jump seat location may be accomplished either by a portable oxygen unit or an outlet in a fixed system.

(Published in 19 F.R. 1237, March 5, 1954, effective April 1, 1954.)

40.202–5 *Oxygen requirements for infants-in-arms (FAA policies which apply to sec. 40.202(c))*. Provisions should be made for administering oxygen to infants-in-arms and additional oxygen should be carried whenever an unusually large number of infants is carried. This additional oxygen is needed only when there is a passenger or infant for each seat position and the number of infants not provided for exceeds 50 percent of the seat positions. Acceptable methods of administering the oxygen to infants and now used by many operators are: (a) A disposable plastic mask which can be fitted to the face; (b) an infant size BLB oro-nasal mask, and (c) semirigid paper cups, specifically reserved for the purpose, which can be fitted over the infant's nose and mouth, with a hole punched through the bottom through which an oxygen tube or a Y-connector can be inserted. Any other acceptable method may also be used.

(Published in 19 F.R. 1237, March 5, 1954, effective April 1, 1954.)

40.202–6 *Oxygen requirements for clinical purposes (FAA policies which apply to sec. 40.202(c))*. The regulations do not require that oxygen be provided for clinical purposes; hence, if the air carrier believes that such oxygen is to be desired, he should provide oxygen for this purpose. It is suggested that portable units of any size the air carrier desires be used for this purpose in order that the minimum supply required for supplementary breathing purposes will be preserved. If, however, the operator wishes to use a common source of supply for the oxygen required by the regulations and for clinical purposes, he may do so if he provides an amount of oxygen sufficiently greater than that required by the regulations. A quantity of 300 liters STPD would probably be considered as satisfying reasonable needs.

(Published in 19 F.R. 1237, March 5, 1954, effective April 1, 1954.)

40.202–T *Supplemental oxygen for sustenance; turbine-powered airplanes.*

(a) *General.* Prior to November 30, 1959, turbine-powered airplanes shall comply with the provisions of section 40.202 or, alternatively, with the provisions of this section except that effective November 30, 1959, all turbine-powered airplanes shall comply with the provisions of this section. Sustaining oxygen and dispensing equipment shall be furnished by the air carrier for use as set forth in this section. The amount of oxygen provided shall be at least that quantity which will be necessary to comply with paragraphs (b) and (c) of this section. As used in the oxygen requirements hereinafter set forth, "cabin pressure altitude" shall mean the pressure altitude corresponding with the pressure in the cabin of the airplane, and "flight altitude" shall mean the altitude

above sea level at which the airplane is operated; for airplanes not equipped with pressurized cabins, "cabin pressure altitude" and "flight altitude" shall be considered identical. The amount of sustaining and first-aid oxygen required for a particular operation to comply with the rules in this part shall be determined on the basis of cabin pressure altitudes and flight duration consistent with the operating procedures established for each such operation and route. The requirements for airplanes with pressurized cabins shall be determined on the basis of cabin pressure altitude and the assumption that a cabin pressurization failure will occur at that altitude or point of flight which is most critical from the standpoint of oxygen need, and that after such failure the airplane will descend in accordance with the emergency procedures specified in the Airplane Flight Manual without exceeding its operating limitations to a flight altitude that will permit successful termination of the flight. Following such a failure the cabin pressure altitude shall be considered to be the same as the flight altitude unless it can be shown that no probable failure of the cabin or pressurization equipment will result in a cabin pressure altitude equal to the flight altitude, under which circumstances the maximum cabin pressure altitude attained may be used as a basis for certification and/or determination of oxygen supply.

(b) *Crew members.* A supply of oxygen for crew members shall be provided in accordance with the following requirements.

(1) At cabin pressure altitudes above 10,000 feet to and including 12,000 feet, oxygen shall be provided for and used by each member of the flight crew on flight deck duty and provided for all other crew members during the portion of the flight in excess of 30 minutes within this range of altitudes.

(2) At cabin pressure altitudes above 12,000 feet, oxygen shall be provided for and used by each member of the flight crew on flight deck duty and provided for all other crew members during the entire flight at such altitudes.

(c) *Passengers.* A supply of oxygen for passengers shall be provided in accordance with the following requirements:

(1) For flights at cabin pressure altitudes above 10,000 feet to and including 14,000 feet, oxygen shall be provided for the duration of flight in excess of 30 minutes for 10 percent of the number of passengers carried.

(2) For flights at cabin pressure altitudes above 14,000 feet to and including 15,000 feet, oxygen shall be provided for the duration of flight at such altitude for 30 percent of the number of passengers carried.

(3) For flights at cabin pressure altitudes above 15,000 feet, oxygen shall be provided for each occupant carried for the duration of flight at such altitude.

40.203 *Supplemental oxygen requirements for pressurized cabin airplanes; reciprocating-engine-powered airplanes.* When operating pressurized cabin airplanes, the air carrier shall so equip such airplanes as to permit compliance with the following requirements in the event of cabin pressurization failure:

(a) *For crew members.* When operating such airplanes at flight altitudes above 10,000 feet, the air carrier shall provide sufficient oxygen for all crew members for the duration of the flight at such altitudes: *Provided,* That not less than a 2-hour supply of oxygen shall be provided for the flight crew members on flight deck duty. The oxygen supply required by section 40.205 may be considered in determining the supplemental breathing supply required for flight crew members on flight deck duty in the event of cabin pressurization failure.

(b) *For passengers.* When operating such airplanes at flight altitudes above 8,000 feet, the air carrier shall provide the following amounts of oxygen:

(1) When an airplane is not flown at a flight altitude of over 25,000 feet, a supply of oxygen sufficient to furnish oxygen for 30 minutes to 10 percent of the number of passengers carried shall be considered adequate, if at any point along the route to be flown the airplane can safely descend to a flight altitude of 14,000 feet or less within 4 minutes.

(2) In the event that such airplane cannot descend to a flight altitude of 14,000 feet or less within 4 minutes, the following supply of oxygen shall be provided:

(i) For the duration of the flight in excess of 4 minutes at flight altitudes above 15,000 feet, a supply sufficient to comply with section 40.202(c)(3);

(ii) For the duration of the flight at flight altitudes above 14,000 feet to and including 15,000 feet, a supply sufficient to comply with section 40.202(c)(2); and

(iii) For flight at flight altitudes above 8,000 feet to and including 14,000 feet, a supply sufficient to furnish oxygen for 30 minutes to 10 percent of the number of passengers carried.

(3) When an airplane is flown at a flight altitude above 25,000 feet, sufficient oxygen shall be furnished in accordance with the following requirements to permit the airplane to descend to an appropriate flight altitude at which the flight can be safely conducted. Sufficient oxygen shall be furnished to provide oxygen for 30 minutes to 10 percent of the number of passengers carried for the duration of the flight above 8,000 feet to and including 14,000 feet and to permit compliance with section 40.202 (c)(2) and (c)(3) for flight above 14,000 feet.

(c) For purposes of this section it shall be assumed that the cabin pressurization failure will occur at a time during flight which is critical from the standpoint of oxygen need and that after such failure the airplane will descend, without exceeding its normal operating limitations, to flight altitudes permitting safe flight with respect to terrain clearance.

40.203–1 *Computation of supply for crew members in pressurized cabin aircraft (FAA policies which apply to sec. 40.203 (a)).*

(a) *Cabin altitudes less than 10,000 feet.* When a pressurized cabin aircraft is certificated to fly with a cabin pressure altitude no greater than 10,000 feet, only the supply of oxygen stipulated by section 40.203(a) need be provided for crew members. In determining this supply the following policies should be considered:

(1) The supply of oxygen which should be provided for all crew members for the duration of the flight should be computed on the basis of the cabin pressure altitude which would exist after cabin depressurization has occurred and the aircraft has descended to the altitude which would permit safe flight with respect to terrain clearance. (See sec. 40.203 (c).)

(2) The operator may use the supply furnished for protective breathing purposes (see section 40.205) for compliance with the 2-hour requirement for supplementary breathing oxygen. For example, the 300-liter STPD supply per flight crew member which is the protective breathing supply when demand (or diluter-demand) systems are used, will provide a 2-hour supplementary breathing supply for one flight crew member at 20,000 feet, so that both the minimum 2-hour supplementary breathing requirement and the protective breathing requirement would be fulfilled under most emergency conditions resulting from loss of cabin pressure or from contamination of cabin air with smoke or poisonous gases.

(b) *Cabin altitudes greater than 10,000 feet.* When operating a pressurized cabin aircraft which is certificated to fly with a cabin pressure altitude greater than 10,000 feet, a supply of oxygen for crew members computed on the basis of the requirements of section 40.202(b) should be provided.

(1) The oxygen supply required for protective breathing purposes, as defined in section 40.205 should be provided in addition to the above supply for the flight crew members on flight deck duty. This emergency supply may be used in the event of cabin pressurization failure. In the event that operations occur over terrain which require flights of such duration and altitude as to use up the emergency oxygen supplied either for protective breathing purposes or for the 2-hour supply following pressurization failure, the supply should be increased to provide for this difference, computing it for crew members on the basis of section 40.203(a).

(2) To provide oxygen for crew members other than the flight crew members on flight deck duty in the event of cabin pressurization failure, a supply of oxygen in addition to the

supplies mentioned above should be provided in accordance with the requirements of section 40.203(a) except that the total supply for these other crew members need not exceed that provided on the basis of section 40.202(b) for cabin pressure altitudes in excess of 10,000 feet plus an additional supply necessary to satisfy the increased oxygen flow which might be needed following a pressurization failure; this supplement to the section 40.202(b) supply should be based on the duration of flight at the altitudes which would permit safe flight with respect to terrain clearance.

(3) During normal operation at cabin pressure altitudes above 10,000 feet oxygen should be used by each member of the flight crew on flight deck duty for the duration of the flight in excess of 30 minutes at the cabin pressure altitudes between 10,000 and 12,000 feet and for the duration of the flight at cabin pressure altitudes in excess of 12,000 feet. In the event of the loss of cabin pressurization, oxygen should continue to be used by the flight crew members on flight deck duty for the duration of flight at cabin pressure altitudes greater than 10,000 feet. All other crew members may use oxygen according to their individual needs.

(Published in 19 F.R. 1237, March 5, 1954, effective April 1, 1954.)

40.203–2 *Computation of supply for passengers in pressurized cabin aircraft (FAA policies which apply to sec. 40.203(b)).*

(a) *Cabin altitudes less than 10,000 feet.* When a pressurized cabin aircraft is certificated to fly with a cabin pressure altitude no greater than 10,000 feet, only the supply of oxygen stipulated by section 40.202(c) need be provided for passengers. In determining this supply the following policies should be considered:

(1) The altitude which should be used in computing the supply of oxygen required by this section should be the altitude to which the aircraft would descend following a cabin pressurization failure, considering terrain clearance and operating limitations.

(2) Relative to sections 40.203(b) (1) and (2), no oxygen need be provided for the first 4 minutes following a cabin pressurization failure.

(b) *Cabin altitudes greater than 10,000 feet.* When a pressurized cabin aircraft is certificated to fly with a cabin pressure altitude greater than 10,000 feet, the following policies should be considered: When the cabin pressure altitude is above 10,000 feet to and including 14,000 feet, sufficient oxygen shall be provided for 10 percent of the number of passengers for the duration of flight between such cabin pressure altitudes. When the cabin pressure altitude is above 14,000 feet to and including 15,000 feet, sufficient oxygen shall be provided for 30 percent of the number of passengers for the duration of flight between such cabin pressure altitudes. When the cabin pressure altitude is above 15,000 feet, sufficient oxygen shall be provided for each passenger for the duration of flight above such a cabin pressure altitude. In addition to the above supply of oxygen, in order to provide for loss of cabin pressure, the supplementary oxygen required by whatever portions of section 40.203(b) are applicable, shall be provided except that in no case will it be necessary to furnish a supply of oxygen in excess of that necessary to supply oxygen to 100 percent of the passengers for the maximum possible duration of flight at the maximum cabin altitude which could be attained under either of the normal operating or emergency conditions whichever is greater.

(Published in 19 F.R. 1238, March 5, 1954, effective April 1, 1954.)

40.203–3 *Oxygen requirements for clinical purposes (FAA policies which apply to sec. 40.203(b)).* The regulations do not require that oxygen be provided for clinical purposes; hence, if the air carrier believes that such oxygen is to be desired, he should provide oxygen for this purpose. It is suggested that portable units of any size the air carrier desires be used for this purpose in order that the minimum supply required for supplementary breathing purposes will be preserved. If, however, the operator wishes to use a common source of supply for the oxygen required by the regulations and for clinical purposes, he may do so if he provides an amount of oxygen sufficiently greater than that required by the regulations.

It is suggested that a quantity of 300 liters may be considered as satisfying reasonable needs.

(Published in 19 F.R. 1238, March 5, 1954, effective April 1, 1954.)

40.203–4 *Oxygen requirements for infants-in-arms (FAA policies which apply to sec. 40.203(b)).* Provisions should be made for administering oxygen to infants-in-arms and additional oxygen over that required by section 40.203(b) should be carried whenever an unusually large number of infants is carried. This additional oxygen is needed only when there is a passenger or infant for each seat position and the number of infants not provided for exceeds 50 percent of the seat positions. Acceptable methods of administering the oxygen to infants and now used by many operators are: (a) A disposal plastic mask which can be fitted to the face; (b) an infant size BLB oro-nasal mask; and (c) semirigid paper cups, specifically reserved for the purpose, which can be fitted over the infant's nose and mouth, with a hole punched through the bottom through which an oxygen tube or Y-connector can be inserted. Any other acceptable method may also be used.

(Published in 19 F.R. 1238, March 5, 1954, effective April 1, 1954.)

40.203–T *Supplemental oxygen for emergency descent and for first aid; turbine-powered airplanes with pressurized cabins.*

(a) *General.* Prior to November 30, 1959, turbine-powered airplanes with pressurized cabins shall comply with the provisions of section 40.203, with the additional requirement that, when operating at flight altitudes above 25,000 feet, all flight crew members on flight deck duty shall be provided with oxygen masks, connected to appropriate supply terminals, which shall be immediately available for use; or alternatively, with the provisions of this section except that effective November 30, 1959, all such turbine powered airplanes shall comply with the provisions of this section. When operating pressurized cabin airplanes, the air carrier shall furnish oxygen and dispensing equipment necessary to permit compliance with the requirements set forth in this section in the event of cabin pressurization failure.

(b) *Crew members.* When operating at flight altitudes above 10,000 feet, oxygen shall be provided to permit compliance with section 40.202–T except that not less than a 2-hour supply shall be provided for the flight crew members on flight deck duty. The oxygen required by section 40.205 may be included in determining the supply required for flight crew members on flight deck duty in the event of cabin pressurization failure.

(c) *Use of oxygen masks by flight crew members.*

[(1) When operating above flight level 250, each flight crewmember on flight deck duty shall be provided with an oxygen mask so designed that it is capable of being rapidly placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand; and so designed that upon completion of the donning action the oxygen mask does not prevent the flight crewmember from being able immediately to communicate with other crewmembers over the airplane intercommunication system. When not being used above flight level 250, the oxygen mask shall be kept at all times in a condition for ready use and so located as to be within the immediate reach at all times of the flight crewmember while at his duty station.

[(2) When operating above flight level 250, one pilot at the controls of the airplane shall at all times wear and use an oxygen mask secured, sealed, and supplying oxygen: *Provided*, That the one pilot need not wear and use an oxygen mask while at or below flight level 350 if each flight crewmember on flight deck duty is provided with a quick-donning type of oxygen mask which the air carrier has demonstrated to the satisfaction of a representative of the Administrator is capable of being placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand, with one hand and within 5 seconds. The air carrier shall also demonstrate that the donning of the mask can be accomplished without disturbing eye glasses and without delaying the flight crewmember from proceeding with his assigned emergency duties. Upon comple-

tion of the donning action, the oxygen mask shall not prevent the flight crewmember from being able immediately to communicate with other crewmembers over the airplane intercommunication system.

[(3) Notwithstanding the provisions in subparagraph (2) of this paragraph, when operating above flight level 250, if at any time it is necessary for one pilot to leave his station at the controls of the airplane for any reason, the remaining pilot at the controls shall don and use his oxygen mask until the other pilot has returned to his duty station.

[(4) Prior to takeoff of a flight, each flight crewmember shall personally preflight his oxygen equipment to insure that the oxygen mask is functioning, fitted properly, connected to appropriate supply terminals, and that the oxygen supply and pressure is adequate for use.]

(Amendment 40–23, published in 24 F.R. 9839, Dec. 8, 1959, effective Nov. 30, 1959; Amendment 40–25, published in 25 F.R. 797, Jan. 30, 1960, effective Feb. 1, 1960; [Amendment 40–28, published in 26 F.R. 1055, Feb. 3, 1961, effective Mar. 3, 1961.)]

(d) *Use of portable oxygen equipment by cabin attendants.* Portable oxygen equipment of not less than a 15-minute oxygen supply shall be carried by each attendant during the entire time flight is conducted above 25,000 feet flight altitude, unless it is shown that sufficient portable oxygen units equipped with masks or spare outlets and masks are distributed throughout the cabin to insure immediate availability of oxygen to the cabin attendants regardless of their location at the time of cabin depressurization.

(e) *Passenger cabin occupants.* When operating at flight altitudes above 10,000 feet, the following supply of oxygen shall be provided for the use of passenger cabin occupants:

(1) When an airplane is certificated to operate at flight altitudes to and including

25,000 feet, and if at any point along the route to be flown the airplane can descend safely to a flight altitude of 14,000 feet or less within 4 minutes, oxygen shall be available at the rate prescribed by this part for a 30-minute period for not less than 10 percent of the number of passenger cabin occupants carried.

(2) When an airplane is operated at flight altitudes to and including 25,000 feet and cannot descend safely to a flight altitude of 14,000 feet within 4 minutes, or when an airplane is operated at flight altitudes above 25,000 feet, oxygen shall be available at the rate prescribed by this part for not less than 10 percent of the number of passenger cabin occupants carried for the duration of flight following cabin depressurization at cabin pressure altitudes above 10,000 feet to and including 14,000 feet and, as applicable, to permit compliance with section 40.202–T(b) (2) and (3), except that not less than a 10-minute supply for all passenger cabin occupants shall be provided.

(3) For first-aid treatment of occupants who for physiological reasons might require undiluted oxygen following descent from cabin pressure altitudes above 25,000 feet, a supply of oxygen in accordance with the requirements of section 4b.651(b)(4) (see sec. 40.204) shall be provided for 2 percent of the occupants for the duration of flight following cabin depressurization at cabin pressure altitudes above 8,000 feet, but in no case to less than one person. An appropriate number of acceptable dispensing units, but in no case less than 2, shall be provided. Means shall be provided to enable the cabin attendants to use this supply.

(f) *Passenger briefing.* Before flight is conducted above 25,000 feet, a crew member shall give instructions and demonstrations to the passengers sufficient to insure that all passengers are adequately informed regarding the location and operation of the oxygen-dispensing equipment and the necessity of using oxygen in the event of cabin depressurization.

40.204 *Equipment standards.*

(a) *Reciprocating-engine-powered airplanes.* The oxygen apparatus, the minimum rates of oxygen flow, and the supply of oxygen necessary to comply with the requirements of section 40.202 shall meet the standards established in section 4b.651 of this subchapter effective July 20, 1950: *Provided,* That where full compliance with such standards is found by the Administrator to be impracticable, he may authorize such changes in these standards as he finds will provide an equivalent level of safety.

(b) *Turbine-powered airplanes.* Prior to November 30, 1959, turbine-powered airplanes shall comply with the provisions of paragraph (a) of this section or, alternatively, with the provisions of this paragraph except that effective November 30, 1959, all turbine-powered airplanes shall comply with the provisions of this paragraph. The oxygen apparatus, the minimum rate of oxygen flow, and the supply of oxygen to comply with the requirements of sections 40.202–T and 40.203–T shall meet the standards established in section 48.651 of this subchapter effective September 1, 1958; *Provided,* That where full compliance with such standards is found by the Administrator to be impracticable, he may authorize such changes in these standards as he finds will provide an equivalent level of safety.

40.205 *Protective breathing equipment for the flight crew.*

(a) *Pressurized cabin airplanes.* Each required flight crew member on flight deck duty shall have easily available at his station protective breathing equipment covering the eyes, nose, and mouth, or the nose and mouth where accessory equipment is provided to protect the eyes, to protect him from the effects of smoke, carbon dioxide, and other harmful gases. Not less than a 300-liter STPD supply of oxygen for each required flight crew member on flight deck duty shall be provided for this purpose.

(b) *Nonpressurized cabin airplanes.* The requirement stated in paragraph (a) of this section shall apply to nonpressurized cabin airplanes, if the Administrator finds that it is possible to obtain a dangerous concentration of smoke, carbon dioxide, or other

harmful gases in the flight crew compartments in any attitude of flight which might occur when the airplane is flown in accordance with either the normal or emergency procedures approved by the Administrator.

40.205–1 *Requirement of protective breathing equipment in nonpressurized cabin airplanes (FAA rules which apply to sec. 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 5 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 section 4b.484–1 and found to be less than 3 percent by volume (corrected to standard sea level conditions).

(Published in 18 F.R. 8679, December 24, 1953, effective January 1, 1954.)

40.205–2 *Protective breathing equipment and installation (FAA policies which apply to sec. 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 section 4b.651(h) and associated manual material.

(b) *Portable equipment.* Portable protective breathing units of one of the types mentioned in paragraph (a) may be used to meet this requirement. Portable units which are also intended to be used to meet the fire protection requirements of section 4b.380(c) 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.

(Published in 18 F.R. 6618, October 17, 1953, effective January 1, 1954.)

40.206 *Equipment for overwater operations.*

(a) The following equipment shall be required for all extended overwater operations:

(1) Life vest or other adequate individual flotation device for each occupant of the airplane;

(2) Life rafts sufficient in number and of such rated capacity and buoyancy as to accommodate all occupants of the airplane;

(3) Suitable pyrotechnic signaling devices; and

(4) One portable emergency radio signaling device, capable of transmission on the appropriate emergency frequency or frequencies, which is not dependent upon the airplane power supply and which is self-buoyant and water-resistant.

(b) All required life rafts, life vests, and signaling devices shall be easily accessible in the event of a ditching without appreciable time for preparatory procedures. After May 31, 1957, this equipment shall be installed in conspicuously marked approved locations.

(c) After May 31, 1957, a survival kit, appropriately equipped for the route to be flown, shall be attached to each required life raft.

40.207 *Equipment for operations in icing conditions.*

(a) For all operations in icing conditions each airplane shall be equipped with means for the prevention or removal of ice on windshields, wings, empennage, propellers, and other parts of the airplane where ice formation will adversely affect the safety of the airplane.

(b) For operations in icing conditions at night means shall be provided for illuminating or otherwise determining the formation

of ice on the portions of the wings which are critical from the standpoint of ice accumulation. When illuminating means are used, such means shall be of a type which will not cause glare or reflection which would handicap crew members in the performance of their normal functions.

40.208 *Flight recorders.*

[(a) An approved flight recorder which records at least time, altitude, airspeed, vertical acceleration, and heading shall be installed in accordance with the following requirements:

[(1) On all airplanes of more than 12,500 pounds maximum certificated takeoff weight which are certificated for operations above 25,000 feet altitude; and

[(2) On and after November 1, 1960, on all turbine-powered airplanes of more than 12,500 pounds maximum certificated takeoff weight; *Provided*, That, the Director, Bureau of Flight Standards, or his authorized representative, may extend the November 1, 1960, compliance date for any air carrier who, prior to September 1, 1960, submits to the Federal Aviation Agency, in writing, a request for approval for such an extension, together with substantiating data, which shows to the satisfaction of the Director, or his authorized representative:

[(i) That the air carrier will be unable to comply with the November 1, 1960, date due to flight recorder procurement or installation problems, and;

[(ii) The action the air carrier has undertaken to insure that a progressive installation of the required flight recorder equipment will be completed at the earliest practicable date following November 1, 1960. In no event will the November 1, 1960, compliance date be extended beyond May 1, 1961.

[(b) When a flight recorder is installed it shall be operated continuously from the instant the airplane commences the takeoff roll until it has completed the landing roll at an airport.

[(c) Recorded information shall be retained by the air carrier for a period of at least 60 days. For a particular flight or series of flights, the information shall be retained for a longer period if requested by an authorized representative of the Administrator or the Civil Aeronautics Board.

[(Amendment 40-27, published in 25 F.R. 6826, July 19, 1960, effective Aug. 18, 1960.)]

Radio Equipment

40.230 *Radio equipment.* Each airplane used in scheduled air transportation shall be equipped with radio equipment specified for the type of operation in which it is engaged. Where two independent radio systems are required by sections 40.231 and 40.232, each system shall have an independent antenna installation: *Provided*, That where rigidly supported nonwire antennas or other antenna installations of equivalent reliability are used, only one such antenna need be provided.

40.230–1 *Independent radio systems (FAA interpretations which apply to sec. 40.230).* Radio systems are independent where each such system is separate and complete, and the function of any part or 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.

(Published in 18 F.R. 8612, December 22, 1953, effective January 1, 1954.)

40.231 *Radio equipment for operations under VFR over routes navigated by pilotage.*

(a) For operations conducted under VFR over routes on which navigation can be accomplished by pilotage, each airplane shall be equipped with such radio equipment as is necessary under normal operating conditions to fulfill the following functions:

(1) Communicate with at least one appropriate ground station (as specified in sec. 40.34) from any point on the route and other airplanes operated by the air carrier;

(2) Communicate with airport traffic control towers from any point in the control zone within which flights are intended; and

(3) Receive meteorological information from any point en route by either of two independent systems.

(b) For all operations at night conducted under VFR over routes on which navigation can be accomplished by pilotage, each airplane shall be equipped with such radio equipment as is necessary under normal operating conditions to fulfill the functions specified in paragraph (a) of this section and to receive radio navigational signals applicable to the route flown except that no marker beacon receiver or ILS receiver need be provided.

40.232 *Radio equipment for operations under VFR over routes not navigated by pilotage or for operations under IFR or over-the-top.*

(a) For operations conducted under VFR over routes on which navigation cannot be accomplished by pilotage or for operations conducted under IFR or over-the-top each airplane shall be equipped with such radio equipment as is necessary under normal operating conditions to fulfill the functions specified in section 40.231(a) and to receive satisfactorily by either of two independent systems, radio navigational signals from all primary en route and approach navigational facilities intended to be used, except that only one marker beacon receiver which provides visual and aural signals and one ILS receiver need be provided. Equipment provided to receive signals en route may be used to receive signals on approach, if it is capable of receiving both signals.

(b) In the case of operation on routes using procedures based on automatic direction finding, only one automatic direction finding system need be installed: *Provided,* That ground facilities are so located and the airplane is so fueled that, in case of failure of the automatic direction finding equipment, the flight may proceed safely to a suitable airport which has ground radio navigational facilities whose signals may be received by the use of the remaining airplane radio systems.

(c) During the period of transition from low frequency to very high frequency radio navigational systems, one means of satisfactory receiving signals over each of these systems shall be considered as complying with the requirement that two independent systems be provided to receive en route or approach navigational facility signals: *Provided,* That ground facilities are so located and the airplane is so fueled that in case of failure of either system the flight may proceed safely to a suitable airport which has ground radio navigational facilities whose signals may be received by use of the remaining airplane radio system.

40.232–1 *Dispatch of aircraft equipped with one VHF and one low frequency radio receiver (FAA interpretations which apply to sec. 40.232(c)).* When an aircraft equipped with one VHF radio navigation receiver and one low frequency radio navigation receiver is dispatched under conditions requiring an alternate airport for departure or destination, such alternate airport must be:

(a) An alternate airport served by both low frequency and VOR (or VAR) radio navigation facilities each of which has an approved instrument approach procedure established for such airport, or

(b) An alternate airport served by a VOR (or VAR) radio navigation facility, provided another alternate airport is specified which is served by a low frequency radio navigation facility and an approved instrument approach procedure is established at each such airport, or

(c) An alternate airport for which the weather reports and forecasts, or a combination thereof, indicate that the weather conditions will remain at or above the weather minimums prescribed in section 40.390(c) until such time as the flight would arrive at such alternate airport.

(Published in 19 F.R. 1410, March 13, 1954, effective April 1, 1954.)

Maintenance and Inspection Requirements

40.240 *Responsibility for maintenance.* Irrespective of whether the air carrier has made arrangements with any other person for the performance of maintenance and inspection functions, each air carrier shall have the primary responsibility for the airworthiness of its airplanes and required equipment.

40.241 *Maintenance and inspection requirements.*

(a) The air carrier, or the person with whom arrangements have been made for the performance of maintenance and inspection functions, shall establish an adequate inspection organization responsible for determining that workmanship, methods employed, and material used are in conformity with the requirements of the regulations of this subchapter, with accepted standards and good practices, and that any airframe, engine, propeller, or appliance released for flight is airworthy.

(b) Any individual who is directly in charge of inspection, maintenance, overhaul, or repair of any airframe, engine, propeller, or appliance shall hold an appropriate license or airman certificate.

40.241–1 *Persons directly in charge of inspection, maintenance, overhaul, or repair of airframes, engines, propellers, or appliances (FAA interpretations which apply to sec. 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.

(Published in 18 F.R. 8612, December 22, 1953, effective January 1, 1954.)

40.242 *Maintenance and inspection training program.* The air carrier, or the person with whom arrangements have been made for the performance of maintenance and inspection functions, shall establish and maintain a training program to insure that all maintenance and inspection personnel charged with determining the adequacy of work performed are fully informed with respect to all procedures and techniques and with new equipment introduced into service, and are competent to perform their duties.

40.243 *Maintenance and inspection personnel duty time limitations.* All maintenance and inspection personnel shall be relieved of all duty for a period of at least 24 consecutive hours during any 7 consecutive days or equivalent thereof within any one month.

Airman and Crew Member Requirements

40.260 *Utilization of airman.*

(a) No air carrier shall utilize an individual as an airman unless he holds a valid appropriate airman certificate issued by the Administrator and is otherwise qualified for the particular operation in which he is to be utilized.

(b) No individual who has reached his 60th birthday shall be utilized or serve as a pilot on any aircraft while engaged in air carrier operations.

(Amendment 40–22, published in 24 F.R. 9767, Dec. 5, 1959, effective March 15, 1960.)

40.261 *Composition of flight crew.*

(a) No air carrier shall operate an airplane with less than the minimum flight crew specified in the airworthiness certificate for the type of airplane and required in this part for the type of operation.

(b) Where the provisions of this part require the performance of two or more functions for which an airman certificate is necessary, such requirement shall not be satisfied by the performance of multiple functions at the same time by any airman.

[(c) Where the air carrier is authorized to operate under instrument conditions or operate airplanes of more than 12,500 pounds maximum certificated weight, the minimum pilot crew shall consist of two pilots, one of whom shall be designated as pilot in command and the other as second in command.

[(Amendment 40–21, published in 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961.)]

(d) On flights requiring a flight engineer, at least one other flight crew member shall be sufficiently qualified, so that in the event of illness or other incapacity, emergency cov-

erage can be provided for that function for the safe completion of the flight. A pilot need not hold a flight engineer certificate to function in the capacity of a flight engineer for such emergency coverage.

40.263 *Flight engineer.* An airman holding a valid flight engineer certificate shall be required on all airplanes certificated for more than 80,000 pounds maximum certificated take-off weight. Such airman shall also be required on all four-engine airplanes certificated for more than 30,000 pounds maximum certificated take-off weight where the Administrator finds that the design of the airplane used or the type of operation is such as to require engineer personnel for the safe operation of the airplane.

40.265 *Flight attendant.* At least one flight attendant shall be provided by the air carrier on all flights carrying passengers in airplanes of 10-passenger capacity or more.

40.266 *Aircraft dispatcher.* Each air carrier shall provide an adequate number of qualified dispatchers at each dispatch center to insure the proper operational control of each flight.

40.267 *Assignment of emergency evacuation functions for each crew member.* After May 31, 1956, each air carrier shall assign all necessary emergency functions for each crew member to perform in the event of circumstances requiring emergency evacuation. The air carrier shall show that functions so assigned are practicable of accomplishment. These functions shall be described in the air carrier manual.

Training Program

40.280 *Training requirements.*

(a) Each air carrier shall establish a training program sufficient to insure that each crew member and dispatcher used by the air carrier is adequately trained to perform the duties to which he is to be assigned. The initial training phases shall be satisfactorily completed prior to serving in scheduled operations.

(b) Each air carrier shall be responsible for providing adequate ground and flight training facilities and properly qualified instructors. There also shall be provided a sufficient number of check airmen to conduct the flight checks required by this part. Such check airmen shall hold the same airman certificates and ratings as are required for the airman being checked.

(c) The training program for each flight crew member shall consist of appropriate ground and flight training including proper flight crew coordination. Procedures for each flight crew function shall be standardized to the extent that each flight crew member will know the functions for which he is responsible and the relation of those functions to those of other flight crew members. The initial program shall include at least the appropriate requirements specified in sections 40.281 through 40.286.

(d) The crew member emergency procedures training program shall include at least the requirements specified in section 40.286.

(e) The appropriate instructor, supervisor, or check airman responsible for the particular training or flight check shall certify to the proficiency of each crew member and dispatcher upon completion of his training, and such certification shall become a part of the individual's record.

40.281 *Initial pilot ground training.* Ground training for all pilots shall include instruction in at least the following:

(a) The appropriate provisions of the air carrier operations specifications and appropriate provisions of the regulations of this subchapter with particular emphasis on the operation and dispatching rules and airplane operating limitations;

(b) Dispatch procedures and appropriate contents of the manuals;

(c) The duties and responsibilities of crew members;

(d) The type of airplane to be flown, including a study of the airplane, engines, all major components and systems, performance limitations, standard and emergency operating procedures, and appropriate contents of the approved Airplane Flight Manual;

(e) The principles and methods of determining weight and balance limitations for take-off and landing;

(f) Navigation and use of appropriate aids to navigation, including the instrument approach facilities and procedures which the air carrier is authorized to use;

(g) Airport and airways traffic control systems and procedures, and ground control letdown procedures if pertinent to the operation;

(h) Meteorology sufficient to insure a practical knowledge of the principles of icing, fog, thunderstorms, and frontal systems; and

(i) Procedures for operation in turbulent air and during periods of ice, hail, thunderstorms, and other potentially hazardous meteorological conditions.

40.282 *Initial pilot flight training.*

(a) Flight training for each pilot shall include at least take-offs and landings, during day and night, and normal and emergency flight maneuvers in each type of airplane to be flown by him in scheduled operations, and flight under simulated instrument flight conditions. [A pilot qualifying to serve as other than pilot in command or as second in command shall demonstrate to a representative of the Administrator or to a check pilot his ability to take off and land each type of airplane in which he is to serve.]

[(Amendment 40-21, published in 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961.)]

(b) Flight training for a pilot qualifying to serve as pilot in command shall include flight instruction and practice in at least the following maneuvers and procedures:

(1) In each type of airplane to be flown by him in scheduled operations:

(i) At the authorized maximum take-off weight, take-off using maximum take-off power with simulated failure of the critical engine. For transport category airplanes the simulated engine failure shall be accomplished as closely as possible to the critical engine failure speed (V_1), and climb-out shall be accomplished at a speed as close as possible to the take-off safety speed (V_2). Each pilot shall ascertain the proper values for speeds V_1 and V_2;

(ii) At the authorized maximum landing weight, flight in a four-engine airplane, where appropriate, with the most critical combinations of two engines inoperative, or operating at zero thrust, utilizing appropriate climb speeds as set forth in the Airplane Flight Manual;

(iii) At the authorized maximum landing weight, simulated pull-out from the landing and approach configurations accomplished at a safe altitude with the critical engine inoperative or operating at zero thrust;

(iv) Suitable combinations of airplane weight and power less than those specified in subdivisions (i), (ii), and (iii) of this subparagraph may be employed if the performance capabilities of the airplane under the above conditions are simulated.

(2) Conduct of flight under simulated instrument conditions, utilizing all types of navigational facilities and the letdown procedures used in normal operations. If a particular type of facility is not available in the training area, such training may be accomplished in a synthetic trainer.

[(c) Flight training for a pilot qualifying to serve as second in command shall include flight instruction and practice in at least the following maneuvers and procedures:

[(1) In each type of airplane to be flown by him in scheduled operation:

[(i) Assigned flight duties as second in command, including flight emergencies,

[(ii) Taxiing,

[(iii) Takeoffs and landings,

[(iv) Climbs and climbing turns,

[(v) Slow flight,

[(vi) Approach to stall,

[(vii) Engine shutdown and restart,

[(viii) Takeoff and landing with simulated engine failure,

[(ix) Conduct of flight under simulated instrument conditions, including instrument approach at least down to circling approach minimum and missed-approach procedures.

[(2) Conduct of flight under simulated instrument conditions, utilizing all types of navigation facilities and the letdown procedures used in normal operations. Except for those approach procedures for which the

lowest minimums are approved, all other letdown procedures may be given in a synthetic trainer which contains the radio equipment and instruments necessary to simulate other navigational and letdown procedures approved for use by the air carrier.

[(Amendment 40-21, published in 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961.)]

40.284 *Initial flight engineer training.*

(a) The training for flight engineers shall include at least the instruction specified in section 40.281 (a) through (e).

(b) Flight engineers shall be given sufficient training in flight to become proficient in those duties assigned them by the air carrier. Except for emergency procedures, this training may be accomplished during scheduled flight under the supervision of a qualified flight engineer.

40.286 *Initial crew member emergency training.*

(a) The training in emergency procedures shall be designed to give each crew member appropriate individual instruction in all emergency procedures, including assignments in the event of an emergency, and proper coordination between crew members. At least the following subjects as appropriate to the individual crew member shall be taught: The procedures to be followed in the event of the failure of an engine, or engines, or other airplane components or systems, emergency decompression, fire in the air or on the ground, ditching, evacuation, the location and operation of all emergency equipment, and power setting for maximum endurance and maximum range.

(b) Synthetic trainers may be used for training of crew members in emergency procedures where the trainers sufficiently simulate flight operating emergency conditions for the equipment to be used.

[(c) All crewmembers performing duties on pressurized airplanes operated above flight level 250, shall, as a part of their approved emergency procedure training, receive instructions by means of lectures and films covering at least: respiration, hypoxia, duration of consciousness at altitude when supplemental oxygen is not supplied, gas expansion, gas bubble formation, physical phenomena and incidents of decompression; and receive actual training and practice in the donning of the oxygen mask and operation of the oxygen equipment. In lieu of the required films, the air carrier may use any other equivalent means of visual presentation which, after demonstration, meets with the approval of a representative of the Administrator.

[(Amendment 40-28, published in 26 F.R. 1055, Feb. 3, 1961, effective March 3, 1961.)]

40.286-1 *Initial crew member emergency training—synthetic trainers* (FAA *interpretations which apply to sec. 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.

(Published in 18 F.R. 6619, October 17, 1953, effective January 1, 1954.)

40.288 *Initial aircraft dispatcher training.*

(a) The training program for aircraft dispatchers shall provide for training in their duties and responsibilities and shall include a study of the flight operation procedures, air traffic control procedures, the performance of the airplanes used by the air carrier, navigational aids and facilities, and meteorology. Particular emphasis shall be placed upon the procedures to be followed in the event of emergencies, including the alerting of proper Governmental, company, and private agencies to render maximum assistance to an airplane in distress.

(b) Each aircraft dispatcher shall, prior to initially performing the duty of an aircraft dispatcher, satisfactorily demonstrate to the supervisor or ground instructor authorized to certify to his proficiency, his knowledge of the following subjects:

(1) Contents of the air carrier operating certificate;

(2) Appropriate provisions of the air carrier operations specifications, manual, and regulations of this subchapter;

(3) Characteristics of the airplanes operated by the air carrier;

(4) Cruise control data and cruising speeds for such airplanes;

(5) Maximum authorized loads for the airplanes for the routes and airports to be used;

(6) Air carrier radio facilities;

(7) Characteristics and limitations of each type of radio and navigational facility to be used;

(8) Effect of weather conditions on airplane radio reception;

(9) Airports to be used and the general terrain over which the airplanes are to be flown;

(10) Prevailing weather phenomena;

(11) Sources of weather information available;

(12) Pertinent air traffic control procedures; and

(13) Emergency procedures.

(Part 40, 20 F.R. 10131, Dec. 31, 1955, effective Dec. 31, 1955.)

40.289 *Recurrent training.*

(a) Each air carrier shall provide such training as is necessary to insure the continued competence of each crew member and dispatcher and to insure that each possesses adequate knowledge of and familiarity with all new equipment and procedures to be used by him.

[(b) Each air carrier shall, as a part of the training program, check the competence of each crewmember and dispatcher each 12 months with respect to procedures, techniques, and information essential to the satisfactory performance of his duties. The competence check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due. Where the check of the pilot in command or second in command requires actual flight, such check shall be considered to have been met by the checks accomplished in accordance with sections 40.302 and 40.305, respectively.]

(c) The appropriate instructor, supervisor, or check airman shall certify as to the proficiency demonstrated, and such certification shall become a part of the individual's record.

(Part 40, 20 F.R. 10131, Dec. 31, 1955, effective Dec. 31, 1955; as amended by Amdt. 40-21, 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961; [Amdt. 40-37, 27 F.R. 7673, Aug. 3, 1962, effective Aug. 3, 1962].)

40.290 *Approval of training program.* The training program established under the provisions of sections 40.280 through 40.289 by the air carrier shall meet with the approval of an authorized representative of the Administrator: *Provided,* That the curriculum of such training program shall be submitted in appropriate form to an authorized representative of the Administrator not later than May 1, 1960.

(Added by Amdt. 40-21, 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961, except as noted.)

Flight Crew Member and Dispatcher Qualification

40.300 *Qualification requirements.*

(a) No air carrier shall utilize any flight crew member or dispatcher, nor shall any such airman perform the duties authorized by his airman certificate, unless he satisfactorily meets the appropriate requirements of section 40.280 or section 40.289, and sections 40.301 through 40.310. All pilots serving as pilot in command shall hold appropriate airline transport pilot certificates and ratings. All other pilots shall hold at least commercial pilot certificates and instrument ratings.

(b) Check airmen shall certify as to the proficiency of all pilots being examined, as required by sections 40.302, 40.303, and 40.305, and such certification shall become a part of the airman's record.

(Part 40, 20 F.R. 10131, Dec. 31, 1955, effective Dec. 31, 1955; as amended by Amdt. 40-21, 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961.)

40.301 *Pilot recent experience.* No air carrier shall schedule a pilot in command or second in command to serve as such in scheduled air transportation unless within the preceding 90 days he has made at least 3 takeoffs and 3 landings in the airplane of the particular type on which he is to serve.

(Part 40, 20 F.R. 10131, Dec. 31, 1955, effective Dec. 31, 1955; as amended by Amdt. 40-21, 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961.)

40.302. *Pilot checks.*

(a) *Line check.* Prior to serving as pilot in command, and at least once each 12 months thereafter, a pilot shall satisfactorily accomplish a line check in one of the types of airplanes normally to be flown by him. The line check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due. This check shall be given by a check pilot who is qualified for the route. It shall consist of at least a scheduled flight between terminals over a route to which the pilot is normally assigned during which the check pilot shall determine whether the individual being checked satisfactorily exercises the duties and responsibilities of pilot in command.

(Amendment 40-26, published 25 F.R. 3850, May 4, 1960, effective June 1, 1960.)

(b) *Proficiency check.*

(1) An air carrier shall not utilize a pilot as pilot in command until he has satisfactorily demonstrated to a check pilot or a representative of the Administrator his ability to pilot and navigate airplanes to be flown by him. Thereafter, he shall not serve as pilot in command unless each 6 months he successfully completes a similar pilot pro-

ficiency check. The proficiency check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due. Where such pilots serve in more than one airplane type, at least every other successive proficiency check shall be given in flight in the larger airplane type.

[(Amendment 40–19, published in 24 F.R. 7865, Sept. 30, 1959, effective Oct. 29, 1959.)]

(2) The pilot proficiency check shall inlude at least the following:

(i) The flight maneuvers specified in section 40.282(b)(1), except that the simulated engine failure during take-off need not be accomplished at speed V_1, nor at actual or simulated maximum authorized weight,

(ii) Flight maneuvers approved by the Administrator accomplished under simulated instrument conditions utilizing the navigational facilities and letdown procedures normally used by the pilot: *Provided,* That maneuvers other than those associated with approach procedures for which the lowest minimums are approved may be given in a synthetic trainer which contains the radio equipment and instruments necessary to simulate other navigational and letdown procedures approved for use by the air carrier.

[(3) Subsequent to the initial pilot proficiency check, an approved course of training in an aircraft simulator, if satisfactorily completed, may be substituted at alternate 6-month intervals for the proficiency check required by subparagraph (1) of this paragraph. The air carrier shall show that the flight characteristics, performance, instrument reaction, and control loadings of the applicable aircraft are accurately simulated in the aircraft simulator through all ranges of normal and emergency operations in accordance with subdivisions (i) through (vii) of this subparagraph.

[(Amendment 40–19, published in 24 F.R. 7865, Sept. 30, 1959, effective Oct. 29, 1959.)]

(i) The simulator shall represent a full-scale mock-up of the cockpit interior, including normal flight crew stations and accommodations for the instructor or check airman.

(ii) The effect of changes on the basic forces and moments shall be introduced for all combinations of drag and thrust normally encountered in flight. The effect of changes in airplane attitude, power, drag, altitude, temperature, gross weight, center of gravity location, and configuration shall be included.

(iii) In response to control movement by a flight crew member, all instrument indications involved in the simulation of the applicable airplane shall be entirely automatic in character unless otherwise specified. The rate of change of simulator instrument readings and of control forces shall correspond to the rate of change which would occur on the applicable airplane under actual flight conditions, for any given change in the applied load on the controls, in the applied power or in aircraft configuration. Control forces and degree of actuating control travel shall correspond to that which would occur in the airplane under actual flight conditions.

(iv) Through the medium of instrument indication, it shall be possible to use the simulator for the training and checking of a pilot in the operational use of controls and instruments on the applicable airplane model during the simulated execution of ground operation, take-off, landing, normal flight, unusual attitudes, navigation problems, and instrument approach procedures. In addition, the simulator shall be designed so that malfunction of aircraft engines, propellers, and primary systems may be presented and corrective action taken by the crew to cope with such emergencies.

(v) Suitable course and altitude recorders shall be included.

(vi) Communication and navigation aids of the applicable airplane shall be simulated for on-the-ground and in-flight operations.

(vii) Other aircraft systems and components shall be simulated to the extent found necessary by the Administrator.

(c) Prior to serving as pilot in command

in a particular type of airplane, a pilot shall have accomplished during the preceding 12 months either a proficiency check or a line check in that type of airplane.

40.302–1 *Pilot check—proficiency requirements (FAA rules which apply to sec. 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, anti-icing, 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) *Runup.* Attention to detail in the use of cockpit checklist and cockpit procedure shall be observed on all proficiency flights.

(d) *Takeoff.* For those air carriers authorized takeoff minimums of less than 300–1, the pilot being examined shall whenever practicable execute a takeoff solely by reference to instruments, or at the option of the check pilot, a contact takeoff 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 takeoff run, his proficiency in handling power, flap and gear operation during the critical period between takeoff (off ground) and reaching 500 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 45 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 30 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 towards the pilot's ability to recognize and hold minimum controllable airspeeds to maintain alti-

tude 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 simulation 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 50 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 pullout.* 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 pullout 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.*[7]

(m) *Orientation.*[7]

(n) *Beam bracketing.*[7]

(o) *Cone identification.*[7]

(p) *Loop orientation.*[7]

(q) *Approach procedures.* An approach procedure shall be made in the aircraft on the letdown 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 letdown 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 letdown 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/MF

[7] Paragraphs (l), (m), (n), (o), and (p) 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.

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/MF 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).

(t) *Crosswind landing.* A crosswind landing shall be performed when practicable. Traffic conditions and wind velocities will dictate as to whether a crosswind 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 rollout.

(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) *Takeoffs 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 takeoff. The simulated failure shall occur at any time after the aircraft has passed the V_1 speed pertinent to the particular takeoff 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 subdivision (i).

(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.

(Published in 18 F.R. 8682, December 24, 1953, effective January 1, 1954.)

40.302–2 [Deleted]

(Published in 18 F.R. 6619, October 17, 1953, effective January 1, 1954. Deletion published in 24 F.R. 7865, Sept. 30, 1959, effective Oct. 29, 1959.)

40.302–3 *Pilot checks use of synthetic trainer (FAA policies which apply to sec. 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 section 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 instrument 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 takeoff and landings, with engine failures as outlined in section 40.302–1, paragraphs (g), (q), (u), and (v), respectively.

(Published in 18 F.R. 6619, October 17, 1953, effective January 1, 1954.)

40.302–4 *Requirements for approved training course—aircraft simulator (FAA rules which apply to sec. 40.302(b)(3)).*

(a) *Application for approval.* An applicant desiring approval of an aircraft simulator training course shall submit his application in triplicate to the local Air Carrier Safety Inspector. The application shall contain a training course, including a description of the equipment, facilities, and material to be used, together with a letter to the Administrator of the Federal Aviation Agency requesting approval [7a] of the course. The application shall be prepared in looseleaf form, shall include a table of contents, time required for each phase of the course; and procedures for administering the following training course:

(1) *Training course.* Flight equipment used shall be identical to that used in actual flight operations and the course [7b] shall incorporate at least the following subjects:

(i) All of the required maneuvers in section 40.282(b)(1) and section 40.302–1 except the visual flight maneuvers performed around the airport.

(ii) A detailed description of the procedures to be employed in performing each of the required maneuvers applicable to the type aircraft being simulated.

(iii) Emergency procedures concerned with aircraft performance and also all emergency procedures outlined in the approved flight manual.

[7a] The Administrator will review the training course, and if it is found adequate, will return an approved copy of the application to the applicant.

[7b] Any logical arrangement of the training course material will be acceptable, if all the required maneuvers are included with appropriate description of techniques and procedures.

(b) *Revision of training course.* Requests for revisions of the approved training course, facilities, equipment, and material shall be accomplished in the manner established for securing approval of the original training course. Three copies of the revision shall be submitted in such form that entire pages of the approved course can be removed and replaced by the revision.

(c) *Satisfactory completion of course.* Determination of satisfactory completion of the approved aircraft simulator training course shall be made by an authorized representative of the Administrator or a check airman.

(d) *Cancellation of approval.* Failure to meet or maintain any of the standards established for the approval of a training course shall be considered sufficient reason for cancellation of approval.

(Published in 22 F.R. 8997, November 9, 1957, effective November 25, 1957.)

40.302–5 *Simulation requirements of aircraft simulators used in an approved training course (FAA policies which apply to sec. 40.302(b)(3)).* The aircraft simulator should fully simulate the following systems or conditions:

All normal cockpit noises (adjustable volume is permissible).
All surface controls.
Gust locks.
Trim tabs.
Landing gear operation.
Wheel brakes.
Steering mechanism used on the ground.
Wing flaps.
Powerplants.
Propellers.
Fuel and oil systems (constant rate of depletion is permissible).
Cockpit and circuit breaker station (circuit breakers relating to nonessential flight equipment need not be operable).
Hydraulic system.
Interior cockpit lights.
Fire detection and extinguishing systems.
Pressurization system for aircraft intended to operate above 25,000 feet.
De-icing and anti-icing systems.
Oxygen system for the flight crew.

(Published in 22 F.R. 8997, November 9, 1957, effective November 25, 1957.)

40.303 *Pilot route and airport qualification requirements.*

(a) An air carrier shall not utilize a pilot in command until he has been qualified for the route on which he is to serve in accordance with the provisions of this section and the appropriate instructor or check pilot has so certified.

(b) Each such pilot shall demonstrate adequate knowledge concerning the subjects listed below with respect to each route to be flown. Those portions of the demonstration pertaining to holding procedures and instrument approach procedures may be accomplished in a synthetic trainer which contains the radio equipment and instruments necessary to simulate the navigational and letdown procedures approved for use by the air carrier:

(1) Weather characteristics,

(2) Navigational facilities,

(3) Communication procedures,

(4) Type of en route terrain and obstruction hazards,

(5) Minimum safe flight levels,

(6) Position reporting points,

(7) Holding procedures,

(8) Pertinent traffic control procedures, and

(9) Congested areas, obstructions, physical layout, and all instrument approach procedures for each regular, provisional, and refueling airport approved for the route.

(c) Each such pilot shall make an entry as a member of the flight crew at each regular, provisional, and refueling airport into which he is scheduled to fly. Such entry shall include a landing and take-off. The qualifying pilot shall occupy a seat in the pilot compartment and he shall be accompanied by a pilot who is qualified at the airport.

(d) such pilot shall not be required to meet the entry requirements of paragraph (c) of this section when:

(1) The initial entry is made under VFR weather conditions at the particular airport involved; or

(2) The air carrier shows that the pilot airport qualifications can be accomplished by an approved pictorial means; or

(3) The air carrier notifies the Administrator that it intends to conduct operations at an airport in close proximity to an airport into which the pilot involved is presently qualified by entry, and the Administrator finds that such pilot is adequately qualified at the new airport. The Administrator, in making such finding, shall take into consideration at least the familiarity of the pilot with the layout, surrounding terrain, location of obstacles, and instrument approach and traffic control procedures at the new airport.

(e) On routes or route segments on which navigation must be accomplished by pilotage and on which flight is to be conducted at or below the level of the adjacent terrain which is within a horizontal distance of 25 miles on either side of the center line of the route to be flown, the pilot shall be familiarized with such route or route segments by not less than two one-way trips on the flight deck over the route or route segments under VFR weather conditions to permit the qualifying pilot to observe terrain along the route.

40.303–1 *Pilot route and airport qualification requirements (FAA interpretations which apply to sec. 40.303).* In order to meet the knowledge requirements of section 40.303(b), the pilot-in-command must demonstrate adequate knowledge of the subjects listed in section 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 514A or a Federal airway, control area extension, or control zone between such airports if he has also met the provisions of sections 40.303 (c) and (d) where applicable.

(Published in 18 F.R. 6619, October 17, 1953, effective January 1, 1954.)

40.304 *Maintenance and reestablishment of pilot route and airport qualifications for particular trips.*

(a) To maintain pilot route and airport qualifications, each pilot being utilized as

pilot in command, within the preceding 12-month period, shall have made at least one trip as pilot or other member of the flight crew between terminals into which he is scheduled to fly and shall have complied with the provisions of section 40.303(e), if applicable.

(b) In order to reestablish pilot route and airport qualifications after absence from a route for a period in excess of 12 months, a pilot shall comply with the appropriate provisions of section 40.303.

[40.305 *Proficiency check; second in command.*

[(a) An air carrier shall not utilize a pilot as second in command until he has satisfactorily demonstrated to a check pilot or a representative of the Administrator his ability to pilot and navigate airplanes to be flown by him and to perform his assigned duties. Thereafter, he shall not serve as second in command unless each 12 months he successfully completes a similar pilot proficiency check. The proficiency check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due. Where such pilots serve in more than one airplane type, at least every other successive proficiency check shall be given in flight in the larger airplane type. The pilot proficiency check shall include at least an oral or written equipment examination, and the procedures and flight maneuvers specified in section 40.282(c)(1). The pilot proficiency check may be demonstrated from either the right or left pilot seat.

[(b) Subsequent to the initial pilot proficiency check for the second in command, an approved course of training in an airplane simulator which meets the requirements of section 40.302(b)(3), if satisfactorily completed, may be substituted at alternate 12-month intervals for the proficiency check required by paragraph (a) of this section.

[(c) Satisfactory completion of the proficiency check in accordance with the requirements of section 40.302(b) will also meet the requirements of this section.

[(Amendment 40–21, published in 24 F.R. 9765, Dec. 5, 1959, effective Jan. 1, 1961.)]

40.307 *Flight engineer qualification for duty.* A flight engineer shall not be assigned to nor perform duties for which he is required to be certificated as a flight engineer unless, within the preceding 6-month period, he has had at least 50 hours of experience as a flight engineer on the type airplane on which he is to serve, or until the air carrier or an authorized representative of the Administrator has checked such flight engineer and determined that he is familiar with all essential current information and operating procedures relating to the type of airplane to which he is to be assigned and is competent with respect to such airplane. This check shall include a check in flight: *Provided,* That in the case of a flight engineer who has been previously qualified in the type airplane, the check may be accomplished in a synthetic trainer in lieu of a check in flight.

40.307–1 *Flight engineer qualifications for duty (FAA interpretations which apply to sec. 40.307).* An airman assigned to flight-check other flight engineers must meet the recent experience requirements of this part before serving as a flight engineer in air transportation. However, the time spent in giving flight engineer checks may be applied toward the 50-hour recent experience requirements on a particular type of aircraft. Unless such experience has been obtained within the preceding 6-month period, a check by the air carrier or an authorized representative of the Administrator is required.

(Published in 21 F.R. 678, January 31, 1956, effective February 15, 1956.

40.310 *Aircraft dispatcher qualification for duty.*

(a) Prior to dispatching airplanes over any route or route segment, an aircraft dispatcher shall be familiar, and the air carrier shall determine that he is familiar, with all essential operating procedures for the entire route and with the airplanes to be used: *Provided,* That where he is qualified only on

a portion of such route, he may dispatch airplanes, but only after coordinating with dispatchers who are qualified for the other portions of the route between the points to be served.

(b) An aircraft dispatcher shall not dispatch airplanes in the area over which he is authorized to exercise dispatch jurisdiction unless within the preceding 12 months he has made at least one round trip over the particular area on the flight deck of an airplane. The trip selected for qualification purposes shall be one which includes entry into as many points as practicable, but it shall not be necessary for the aircraft dispatcher to make a flight over each route in the area.

Flight Time Limitations

40.320 *Flight time limitations.*

(a) An air carrier shall not schedule any flight crew member for duty aloft in scheduled air transportation or in other commercial flying if his total flight time in all commercial flying will exceed the following flight time limitations:

(1) 1,000 hours in any year.

(2) 100 hours in any month,

(3) 30 hours in any seven consecutive days.

(b) An air carrier shall not schedule any flight crew member for duty aloft for more than 8 hours during any 24 consecutive hours, unless he is given an intervening rest period at or before the termination of 8 scheduled hours of duty aloft. Such rest period shall equal twice the number of hours of duty aloft since the last preceding rest period, and in no case shall the rest period be less than 8 hours.

(c) When a flight crew member has been on duty aloft in excess of 8 hours in any 24 consecutive hours he shall, upon completion of his assigned flight or series of flights, be given at least 16 hours for rest before being assigned any further duty with the air carrier.

(d) Time involved in transportation, not local in character, required of a flight crew member by an air carrier and provided by the air carrier for the purpose of transporting the flight crew member to an airport at which he is required to serve on a flight as a crew member, or from the airport at which he was relieved from duty as a crew member to return to his home station, shall not be considered as part of any required rest period.

(e) Each flight crew member engaged in scheduled air transportation shall be relieved from all duty with the air carrier for at least 24 consecutive hours during any seven consecutive days.

(f) No flight crew member shall be assigned any duty with an air carrier during any rest period prescribed by this part.

(g) A flight crew member shall not be considered to be scheduled for duty in excess of prescribed limitations, if the flights to which he is assigned are scheduled and normally terminate within such limitations, but due to exigencies beyond the air carrier's control, such as adverse weather conditions, are not at the time of departure expected to reach their destination within the scheduled time.

Duty Time Limitations; Aircraft Dispatcher

40.340 *Aircraft dispatcher daily duty time limitations.*

(a) The daily duty period for an aircraft dispatcher shall commence at such time as will permit him to become thoroughly familiar with existing and anticipated weather conditions along the route prior to the dispatch of any airplane. He shall remain on duty until all airplanes dispatched by him have completed their flights, or have proceeded beyond his jurisdiction, or until he is relieved by another qualified aircraft dispatcher.

(b) The following rules will govern the hours of duty for an aircraft dispatcher, except when circumstances or emergency conditions beyond the control of the air carrier require otherwise:

(1) *Maximum consecutive hours of duty.* No dispatcher shall be scheduled for duty as such for a period of more than 10 consecutive hours.

(2) *Maximum scheduled hours of duty in 24 consecutive hours.* If a dispatcher is scheduled for duty as such for more than 10 hours in a period of 24 hours, he shall be given a rest period of not less than 8 hours at or before the termination of 10 hours of dispatcher duty.

(3) *Dispatcher's time off.* Each aircraft dispatcher shall be relieved from all duty with the air carrier for a period of at least 24 consecutive hours during any 7 consecutive days or the equivalent thereof within any one month.

Flight Operations

40.351 *Operational control.* The air carrier shall be responsible for operational control.

(a) *Joint responsibility of aircraft dispatcher and pilot in command.* The aircraft dispatcher and the pilot in command shall be jointly responsible for the preflight planning, delay, and dispatch release of the flight in compliance with the applicable regulations of this subchapter and operations specifications.

(b) *Responsibility of dispatcher.* The aircraft dispatcher shall be responsible:

(1) For monitoring the progress of each flight and the issuance of instructions and information necessary for the continued safety of the flight.

(2) For the cancellation or redispatch of a flight if, in his opinion or in the opinion of the pilot in command, the flight cannot operate or continue to operate safely as planned or released.

(c) *Responsibility of pilot in command.* The pilot in command shall during flight time be in command of the airplane and crew and shall be responsible for the safety of the passengers, crew members, cargo, and airplane.

NOTE: Interpretation No. 1, 19 F.R. 1758, Mar. 31, 1954, provides as follows:

The Board interprets and construes section 40.351(c) as conferring on the pilot in command, with respect to matters concerning the operation of the airplane, full control and authority without limitation over all other crew members and their duties during flight time, whether or not he holds a valid certificate authorizing him to perform the duties and functions of such other crew member.

40.352 *Operations notices.* Each air carrier shall notify the appropriate operations personnel promptly of all changes in equipment and operating procedures, including known changes in the use of navigational aids, airports, air traffic control procedures and regulations, local airport traffic control rules, and of all known hazards to flight, including icing and other potentially hazardous meteorological conditions and irregularities of ground and navigational facilities.

40.353 *Operations schedules.* In establishing flight operations schedules, each air carrier shall allow sufficient time for the proper servicing of airplanes with fuel and oil at intermediate stops, and it shall consider the prevailing winds along the particular route and the cruising speed of the type of airplane to be flown which shall not exceed the specified cruising output of the airplane engines.

40.354 *Flight crew members at controls.* All required flight crew members when on flight deck duty shall remain at their respective stations while the airplane is taking off or landing, and while en route except when the absence of one such flight crew member is necessary for the performance of his duties in connection with the operation of the airplane. All flight crew members shall keep their seat belts fastened at their respective stations.

40.355 *Manipulation of controls.* No person other than a qualified pilot of the air carrier shall manipulate the flight controls during flight, except that any one of the following persons may, with the permission of the pilot in command, manipulate such controls:

(a) Authorized pilot safety representatives of the Administrator or the Board who are qualified on the airplane and are engaged in checking flight operations, or

(b) Pilot personnel of another air carrier properly qualified on the airplane and authorized by the operating carrier.

40.355–1 *Manipulation of controls (FAA interpretations which apply to sec. 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 copilot, not holding a type rating if he has met the qualification requirements of the Civil Air Regulations: *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 takeoff and landing.

(Published in 18 F.R. 6619, October 17, 1953, effective January 1, 1954.)

40.356 *Admission to flight deck.* No persons, other than crew members, shall be admitted to the flight deck of an airplane except those authorized in paragraphs (a) and (b) of this section. For the purposes of this section, the Administrator shall determine what constitutes the flight deck.

(a) FAA Flight Operations and Airworthiness Inspectors and authorized representatives of the Board while in the performance of official duties shall be admitted to the flight deck.

NOTE: Nothing contained in this paragraph shall be construed as limiting the emergency authority of the pilot in command to exclude any person from the flight deck in the interest of safety.

(b) The persons listed below may be admitted to the flight deck when authorized by the pilot in command:

(1) An employee of the Federal Government or of an air carrier or other aeronautical enterprise whose duties are such that his presence on the flight deck is necessary or advantageous to the conduct of safe air carrier operations, or

NOTE: Federal employees who deal responsibly with matters relating to air carrier safety and such air carrier employees as pilots, dispatchers, meteorologists, communication operators, and mechanics whose efficiency would be increased by familiarity with flight conditions may be considered eligible under this requirement. Employees of traffic, sales, and other air carrier departments not directly related to flight operations cannot be considered eligible unless authorized under subparagraph (2) of this paragraph.

(2) Any other person specifically authorized by the air carrier management and the Administrator.

(c) All persons admitted to the flight deck shall have seats available for their use in the passenger compartment except:

(1) FAA Flight Operations and Airworthiness Inspectors or other authorized representatives of the Federal Aviation Agency or the Civil Aeronautics Board engaged in checking flight operations;

(2) Air traffic controllers who have been authorized by the Administrator to observe ATC procedures;

(3) Certificated airmen of the air carrier whose duties with the carrier require an airman certificate;

(4) Certificated airmen of another air carrier whose duties with such carrier require an airman certificate and who have been authorized by the air carrier concerned to make specific trips over the route;

(5) Employees of the air carrier, whose functions are directly related to the conduct or planning of flight operations or the in-flight monitoring of aircraft equipment or operating procedures, but only when their presence in the cockpit is required in the furtherance of such functions and when specifically authorized in writing by a responsible supervisor in the operations department of the air carrier, who is listed in the Operations Manual as having such authority; and

(6) Technical representatives of the manufacturer of the airplane or its components whose functions are directly related to the in-flight monitoring of aircraft equipment or operating procedures, but only when their presence in the cockpit is required in the furtherance of such functions and only when specifically authorized in writing by the Administrator and by a responsible supervisor in the operations department of the air carrier, who is listed in the Operations Manual as having such authority.

40.356–1 *Admission to flight deck (FAA interpretations which apply to sec. 40.356).* The term "flight deck" as used in section 40.356 is interpreted to mean all of the area forward of the door or window required by Parts 4a and 4b of the Civil Air Regulations to be located between the pilot compartment and the passenger compartment.

(Published in 18 F.R. 6619, October 17, 1953, effective January 1, 1954, amended in 23 F.R. 2097, March 29, 1958, effective March 29, 1958.)

40.357 *Use of cockpit check procedure.* The cockpit check procedure shall be used by the flight crew for each procedure as set forth in section 40.176.

40.358 *Personal flying equipment.* The pilot in command shall insure that the following equipment is aboard the airplane for each flight:

(a) Appropriate aeronautical charts containing adequate information concerning navigational aids and instrument approach procedures, and

(b) A flashlight in good working order in the possession of each crew member.

40.359 *Restriction or suspension of operation.* When conditions exist which constitute a hazard to the conduct of safe air carrier operations, including airport and runway conditions, the air carrier shall restrict or suspend operations until such hazardous conditions are corrected.

40.360 *Emergency decisions; pilot in command and aircraft dispatcher.*

(a) In emergency situations which require immediate decision and action, the

pilot in command may follow any course of action which he considers necessary under the circumstances. In such instances the pilot in command, to the extent required in the interest of safety, may deviate from prescribed operations procedures and methods, weather minimums, and the regulations of this subchapter.

(b) If an emergency situation arises during the course of a flight which requires immediate decision and action on the part of the aircraft dispatcher, and which is known to him, he shall advise the pilot in command of such situation. The aircraft dispatcher shall ascertain the decision of the pilot in command and shall cause the same to be made a matter of record. If unable to communicate with the pilot, the dispatcher shall declare an emergency and follow any course of action which he considers necessary under the circumstances.

(c) When emergency authority is exercised by the pilot in command or by the dispatcher, the appropriate dispatch center shall be kept fully informed regarding the progress of the flight, and within 10 days after the completion of the particular flight a written report of any deviation shall be submitted by the individual declaring the emergency to the Administrator through the air carrier operations manager.

40.361 *Reporting potentially hazardous meteorological conditions and irregularities of ground and navigational facilities.* When any meteorological condition or irregularity of ground or navigational facilities is encountered in flight, the knowledge of which the pilot in command considers essential to the safety of other flights, he shall notify an appropriate ground radio station as soon as practicable. Such information shall thereupon be relayed by that station to the appropriate governmental agency.

40.362 *Reporting mechanical irregularities.* The pilot in command shall enter or cause to be entered in the maintenance log of the airplane all mechanical irregularities encountered during flight. He shall, prior to each flight, inspect the log to ascertain the status of any irregularities entered in the log at the end of the last preceding flight.

40.363 *Engine failure or precautionary stoppage.*

(a) Except as provided in paragraph (b) of this section, when one engine of an airplane fails or where the rotation of an engine of an airplane is stopped in flight as a precautionary measure to prevent possible damage, a landing shall be made at the nearest suitable airport in point of time where a safe landing can be effected.

(b) The pilot in command of an airplane having 4 or more engines may, if not more than one engine fails or the rotation thereof is stopped, proceed to an airport of his selection if, upon consideration of the following factors, he determines such action to be as safe a course of action as landing at the nearest suitable airport:

(1) The nature of the malfunctioning and the possible mechanical difficulties which may be encountered if flight is continued;

(2) The availability of the inoperative engine for use;

(3) The altitude, airplane weight, and usable fuel at the time of engine stoppage;

(4) The weather conditions en route and at possible landing points;

(5) The air traffic congestion;

(6) The type of terrain; and

(7) The familiarity of the pilot with the airport to be used.

(c) When engine rotation is stopped in flight, the pilot in command shall immediately notify the proper ground radio station and shall keep such station fully informed regarding the progress of the flight.

(d) In cases where the pilot in command selects an airport other than the nearest suitable airport in point of time, he shall, upon completion of the trip, submit a written report, in duplicate, to his operations manager setting forth his reasons for determining that the selection of an airport other than the nearest was as safe a course of action as landing at the nearest suitable airport. The operations manager shall, within 7 days after completion of the trip, furnish a copy of this

report with his own comments thereon to the Administrator.

40.364 *Instrument approach procedures.* When an instrument approach is necessary, the instrument approach procedures and weather minimums authorized in the operations specifications shall be adhered to.

40.365 *Requirements for air carrier equipment interchange.*

(a) Prior to conducting any operations pursuant to an interchange agreement authorized by the Civil Aeronautics Board, the air carrier shall show that:

(1) The procedures proposed for the conduct of such operations by the carriers involved conform with the provisions of this subchapter and with safe operating practices;

(2) All operations personnel involved are familiar with the airplanes and equipment of the air carrier with whom interchange is to be effected, and with the communications and dispatching procedures to be used;

(3) All maintenance personnel involved are familiar with the airplanes and equipment, and the maintenance procedures of the air carrier with whom interchange is to be effected;

(4) The flight crew and the dispatchers involved meet the appropriate route and airport qualifications; and

(5) All airplanes operated are essentially similar to those airplanes of the carrier with whom interchange is to be effected with respect to flight instruments and their arrangement and with respect to the arrangement and motion of controls critical to safety, unless the Administrator determines that adequate training programs have been established to insure that any dissimilarities which might be a potential hazard will be safely overcome by flight crew familiarization.

(b) The pertinent provisions and procedures affecting the carriers involved shall be included in their manuals.

40.370 *Briefing of passengers.* After May 31, 1956, each air carrier engaged in extended overwater operations shall assure that all passengers are briefed orally concerning the location and method of operation of life vests and emergency exits and the location of life rafts. The procedure to be followed in presenting this briefing shall be described in the air carrier manual. Such a briefing shall include a demonstration of the method of donning and inflating a life vest. Where the airplane proceeds directly over water after take-off, the briefing on location of the life vests and emergency exits shall be accomplished prior to take-off, and the remainder of the briefing shall be accomplished as soon thereafter as practicable. Where the airplane does not proceed directly over water after take-off, no part of the briefing need be accomplished prior to take-off but the entire briefing shall be accomplished prior to reaching the overwater portion of the flight.

40.371 *Drinking and serving of alcoholic beverages.*

(a) No person shall drink any alcoholic beverage aboard an air carrier aircraft unless such beverage has been served to him by the air carrier operating the aircraft.

(b) No air carrier shall serve any alcoholic beverage to any person aboard an air carrier aircraft if such person appears to be intoxicated.

[(c) No air carrier shall permit any person to board an air carrier aircraft if such person appears to be intoxicated.

[(d) An air carrier shall report to the Administrator within 5 days any incident in which a person aboard its aircraft refuses to comply with paragraph (a) of this section, or any disturbance caused by a person who appears to be intoxicated while aboard its aircraft.]

(Amendment 40-24, published in 25 F.R. 169, Jan. 9, 1960, effective March 10, 1960;

[Amendment 40-31, published in 26 F.R. 9995, Oct. 21, 1961, effective Nov. 21, 1961.)]

Dispatching Rules

40.381 *Necessity for dispatching authority.* No flight shall be started without specific authority from an aircraft dispatcher, except when an airplane has landed at an in-

termediate airport specified in the original dispatch release and has remained there for one hour or less.

40.382 *Familiarity with weather conditions.* No aircraft dispatcher shall release a flight unless he is thoroughly familiar with existing and anticipated weather conditions along the route to be flown.

40.383 *Facilities and services.* The dispatcher shall furnish to the pilot in command all available current reports or information pertaining to irregularities of navigational facilities and airport conditions which may affect the safety of the flight. He shall also furnish the pilot, while en route, any addi-

tional available information concerning meteorological conditions and irregularities of facilities and services which may affect the safety of the flight.

40.384 *Airplane equipment required for dispatch.* All airplanes dispatched shall be airworthy and shall be equipped in accordance with the provisions of section 40.170.

40.385 *Communications and navigational facilities required for dispatch.* No airplane shall be dispatched over any route or route segment unless the communications and navigational facilities required by sections 40.34 and 40.36 are in satisfactory operating condition.

40.386 *Dispatching under VFR.* Airplanes shall be dispatched for operation under VFR only if the appropriate weather reports and forecasts, or a combination thereof, indicate that the ceilings and visibilities along the route to be flown are, and will remain, at or above the minimums required for flight under VFR until the flight arrives at the airport or airports of intended landing specified in the dispatch release.

40.387 *Dispatching under IFR or over-the-top.* Airplanes shall be dispatched for operation under IFR or over-the-top only if the appropriate weather reports and forecasts, or a combination thereof, pertaining to the airport or airports to which dispatched indicate that the ceilings and visibilities will be at or above the minimums approved by the Administrator at the estimated time of arrival thereat.

40.388 *Alternate airport for departure.*

(a) If the weather conditions at the airport of take-off are below the approved landing minimums for that airport, no airplane shall be dispatched from that airport unless an alternate airport located with respect to the airport of take-off as follows is specified in the dispatch release: *Provided,* That such alternate need not be selected if the ceiling and visibility respectively at the take-off airport are at least 300 feet and one mile, 400 feet and three-quarters mile, or 500 feet and one-half mile:

(1) *Airplanes having 2 or 3 engines.* Alternate airport located at a distance no greater than one hour of flying time in still air at normal cruising speed with one engine inoperative.

(2) *Airplanes having 4 or more engines.* Alternate airport located at a distance no greater than 2 hours of flying time in still air at normal cruising speed with one engine inoperative.

(b) The alternate airport weather requirements shall be those specified in section 40.390.

(c) All required alternate airports shall be listed in the dispatch release.

40.389 *Alternate airport for destination; IFR or over-the-top.*

(a) For all IFR or over-the-top operations there shall be at least one alternate airport designated for each airport of destination and, when the weather conditions forecast for the destination and first alternate are marginal, at least one additional alternate airport: *Provided,* That no alternate need be designated when, for the period two hours before to two hours after the estimated time of arrival, the ceiling at the airport to which the flight is dispatched is forecast to be at least 1,000 feet above the minimum initial approach altitude applicable to such airport and the visibility at such airport is forecast to be at least three miles.

(b) The alternate airport weather requirements shall be those specified in section 40.390.

(c) All required alternate airports shall be listed in the dispatch release.

40.390 *Alternate airport weather minimums.* An airport shall not be specified in the dispatch release as an alternate airport unless the weather conditions existing there at the time of dispatch are equal to or above the ceiling and visibility minimums approved for such airport when using it as an alternate, and the appropriate weather reports, and forecasts, or a combination thereof, indicate that the weather conditions will be at or above such minimums until the flight shall arrive thereat. The weather minimums at such alternate airport shall not be less than one of the following and in no event less than the corresponding minimums speci-

fied for the airport when used as a regular airport: *Provided,* That the Administrator may approve higher or lower minimums at particular airports where the safe conduct of flight requires or permits, considering the character of the terrain being traversed, the meteorological service and navigational facilities available, and other conditions affecting flight.

(a) An airport served by an approved radio navigational facility and either an instrument landing system or a ground control approach system which the carrier has been authorized to use: Ceiling 800 feet and visibility of one mile; or ceiling 700 feet and visibility of 1½ miles; or ceiling 600 feet and visibility of two miles;

(b) An airport served by an approved radio navigational facility: Ceiling 1,000 feet and visibility of one mile; or ceiling 900 feet and visibility of 1½ miles; or ceiling 800 feet and visibility of two miles;

(c) An airport not served by an approved radio navigational facility: If overcast, ceiling 1,000 feet above the minimum en route instrument altitude applicable to the route to such alternate airport and visibility of two miles; if broken clouds, ceiling 1,000 feet above the elevation of the airport and visibility of two miles.

40.390–1 *Alternate airport landing minimums for airports not served by a radio navigation facility (FAA policies which apply to sec. 40.390(c)).* When there is no minimum en route instrument altitude associated with an alternate airport, the approval of alternate airport landing minimums under overcast conditions will be contingent upon (a) the incorporation of appropriate minimum en route altitudes in the air carriers operations manual in order to provide a basis for establishing weather minimums in accordance with section 40.390 (c) and (b) the availability of radio navigation facilities of sufficient adequacy to permit safe navigation over such alternate airport. The latter may be accomplished by using any of the following or a combination thereof:

(1) Radio bearings from the airport of intended destination,

(2) Radio range course from the airport of intended destination,

(3) Radio range course projected over the alternate airport on a line with the intended course to be flown,

(4) Radio bearing from a radio facility located beyond the alternate airport on a line with the intended course to be flown, or

(5) Radio bearing from a radio facility located along the intended course to be flown.

(Published in 19 F.R. 7451, November 19, 1954, effective November 30, 1954.)

40.390–2 *Establishment of alternate airport landing minimums at airports where ILS or GCA only available instrument approach aids (FAA interpretations which apply to sec. 40.390(a)).* Alternate airport landing minimums as low as 600–2, 700–1½, or 800–1 may be approved at airports where an ILS or GCA is the only instrument approach aid serving such airport: *Provided*, That adequate radio facilities are available to accomplish transition to the ILS or GCA.

(Published in 20 F.R. 3559 on May 21, 1955, effective June 15, 1955.)

40.390–3 *Establishment of alternate airport landing minimums at airports served by ILS (FAA policies which apply to sec. 40.390(a)).* The landing minimums prescribed in section 40.390(a) may be authorized at airports where the ILS is not equipped with approach lights.

(Published in 21 F.R. 4999, July 6, 1956, effective July 12, 1956.)

40.391 *Continuance of flight; flight hazards.*

(a) No airplane shall be continued in flight toward any airport to which it has been dispatched when, in the opinion of the pilot in command or the aircraft dispatcher, the flight cannot be completed with safety, unless in the opinion of the pilot in command there is no safer procedure. In the latter event, continuation shall constitute an emergency situation as set forth in section 40.360.

(b) If any item of equipment required pursuant to the regulations of this subchapter for the particular operation being conducted becomes unserviceable en route, the pilot in command shall comply with the procedures specified in the manual for such occurrence: *Provided*, That the Administrator may authorize the incorporation in the air carrier manual of procedures for the continued operation of an airplane beyond a scheduled terminal where he finds that, in the particular circumstances of the case, literal compliance with this requirement is not necesary in the interest of safety.

40.391–1 *Circumstances when incorporation of procedures may be authorized in the air carrier's manual for continued operation beyond a scheduled terminal (FAA policies which apply to sec. 40.391(b)).* Authority to incorporate procedures in the air carrier manual for the continuation of flight beyond a scheduled terminal with an airplane which has inoperative required equipment [8] will be given to an air carrier when the air carrier shows that:

(1) Such procedures specify the required equipment that may be inoperative and the particular circumstances and conditions under which the airplane may continue in air transportation beyond a scheduled terminal without adversely affecting the safety of the flight; and

(2) Such procedures specify the place to which the flight may be continued and the inoperative required equipment will be repaired or replaced in lieu of the terminal stop: *Provided*, That the airplane may not continue flight beyond a place at which it is normally scheduled for the accomplishment of the next daily service or inspection by the air carrier.

(Published in 20 F.R. 6212 on August 25, 1955, effective September 15, 1955.)

40.392 *Operation in icing conditions.*

(a) An airplane shall not be dispatched, en route operations continued, or landing made when, in the opinion of the pilot in command or aircraft dispatcher, icing conditions are expected or encountered which might adversely affect the safety of the flight.

(b) No airplane shall take off when frost, snow, or ice is adhering to the wings, control surfaces, or propellers of the airplane.

40.393 *Redispatch and continuance of flight.*

(a) Any regular, provisional, or refueling airport the use of which is authorized for the type of airplane to be operated may be speci-

[8] Required equipment is that equipment which is specified in section 40.170.

fied as a destination for the purpose of original dispatch.

(b) An airport specified as a destination or alternate for the purpose of original dispatch may be changed en route to another airport which is authorized for the type of airplane to be operated, provided that the appropriate requirements of sections 40.381 through 40.409 and section 40.70 or 40.90 are met at the time of redispatch.

(c) No flight shall be continued to any airport to which it has been dispatched unless the weather conditions at an alternate airport specified in the dispatch release remain at or above the minimums specified for such airport when used as an alternate: *Provided,* That the dispatch release may be amended en route to include any approved alternate airport lying within the fuel range of the airplane as specified in sections 40.396 and 40.397.

(d) When the dispatch release is amended while the airplane is en route, such amendments shall be made a matter of record.

40.394 *Dispatch to and from provisional airport.*

(a) No aircraft dispatcher shall dispatch an airplane to a provisional airport unless such airport complies with all of the requirements of this part pertinent to regular airports.

(b) Dispatch from a provisional airport shall be accomplished in accordance with the same regulations governing dispatch from a regular airport.

40.395 *Take-offs from alternate airports or from airports not listed in the operations specifications.* No airplane shall take off from an alternate airport or from an airport which is not listed in the air carrier operations specifications unless:

(a) Such airport and related facilities are adequate for the operation of the airplane;

(b) In taking off it is possible to comply with the applicable airplane operating limitations;

(c) The weather conditions at that airport are equal to or better than those prescribed for such airport; and

(d) The airplane is dispatched in accordance with all dispatching rules applicable to operation from an approved airport.

40.396 *Fuel supply for all operations.* No airplane shall be dispatched unless it carries sufficient fuel:

(a) To fly to the airport to which dispatched, and thereafter;

(b) To fly to and land at the most distant alternate for the airport to which dispatched where such alternate is required, and thereafter;

(c) To fly for a period of at least 45 minutes at normal cruising consumption.

40.397 *Factors involved in computing fuel required.* In computing the fuel required, consideration shall be given to the wind and other weather conditions forecast, traffic delays anticipated, and any other conditions which might delay the landing of the airplane. Required fuel shall be additional to unusable fuel.

40.405 *Take-off and landing weather minimums; VFR.* Irrespective of any clearance which may be obtained from air traffic control, no airplane shall take off or land under VFR when the reported ceiling or ground visibility is less than specified below: *Provided,* That where a local surface restriction to visibility exists, such as smoke, dust, or blowing snow or sand, the visibility for both day and night operations may be reduced to one-half mile, if all turns after take-off and prior to landing and all flight beyond a mile from the airport boundary can be accomplished above or outside, the area so restricted.

(a) For day operations: 1,000-foot ceiling and one-mile visibility;

(b) For night operations: 1,000-foot ceiling and two-mile visibility.

40.405–1 *VFR take-off and landing minimums (FAA interpretations which apply to sec. 40.405).*

(a) *General.* The ceiling and visibility contained in the main body of the latest weather report furnished by the U.S. Weather Bureau or a source approved by the Weather Bureau will control for VFR take-offs and landings on all runways of an airport, except as provided in paragraph (b) of this section.

(b) *Runway visibility.* Whenever the latest weather report furnished by the U.S. Weather Bureau or a source approved by the Weather Bureau, including an aural report from the control tower, contains a visibility value specified as runway visibility for a particular runway of an airport, such visibility will control for take-offs and landings on that runway.[9]

(Published in 23 F.R. 5235, July 10, 1958, effective Aug. 15, 1958.)

40.406 *Take-off and landing weather minimums; IFR.*

(a) Except as provided in paragraphs (c) and (d) of this section, irrespective of any clearance which may be obtained from air traffic control, no airplane shall take off or land under IFR when the ceiling or ground visibility reported by the U.S. Weather Bureau or by a source approved by the Weather Bureau is less than the minimum approved for the airport when used as a regular airport.

(b) Except as provided in paragraphs (c) and (d) of this section, no instrument approach procedure shall be executed when the latest weather report prepared by the U.S. Weather Bureau or by a source approved by the Weather Bureau indicates the ceiling or visibility is less than the landing minimum approved for the airport when used as a regular airport.

(c) An instrument approach procedure may be executed when the weather report prepared by the U.S. Weather Bureau or by a source approved by the Weather Bureau indicates that the ceiling or visibility is less than approved minimum for landing, if the airport is served by ILS and PAR in operative condition and both are used by the pilot, and thereafter a landing may be made, if weather conditions equal to or better than the prescribed minimums are found to exist by the pilot in command upon reaching the authorized landing minimum altitude.

(d) If an instrument approach procedure is initiated when the current report prepared by the U.S. Weather Bureau or by a source approved by the Weather Bureau indicates that the prescribed ceiling and visibility minimums exist and a later weather report indicating below minimum conditions is received after the airplane (1) is on an ILS final approach and has passed the outer marker, or (2) is on a final approach using a radio range station or comparable facility and has passed the appropriate facility and has reached the authorized landing minimum altitude, or (3) is on GCA final approach and has been turned over to the final approach controller, such ILS, Range, or GCA approach may be continued and a landing may be made in the event weather conditions equal to or better than the prescribed minimums for the airport are found to exist by the pilot in command of the flight upon reaching the authorized landing minimum altitude.

[(e) The ceiling and visibility landing minimums prescribed in the air carrier's operations specifications for regular, provisional, or refueling airports shall be increased by 100 feet ceiling and ½ mile visibility whenever the pilot in command has not served 100 hours as pilot in command in air carrier or commercial operations in the particular type of airplane being operated by him. The ceiling and visibility minimums need not be increased above those applicable to the airport when used as an alternate airport. The sliding scale, when authorized in the air carrier's operations specifications, shall not be applied until the pilot in command has served 100 hours as pilot in command in air carrier or commercial operations in the particular type of airplane being operated by him.

[(Amendment 40-29, published in 26 F.R. 3460, Apr. 22, 1961, effective May 23, 1961.)]

40.406-1 *IFR takeoff and landing, and instrument approach procedure, weather minimums (FAA interpretations which apply to sec. 40.406).*

[9] Information respecting the official runway visibility observations reported by the control tower operator may be obtained from the Office of the U.S. Weather Bureau for the airport concerned. Such office maintains a continuous graph recording of the runway visibility shown on the visibility meter in the control tower.

(a) *General.* The ceiling and visibility contained in the main body of the latest weather report furnished by the U.S. Weather Bureau or a source approved by the Weather Bureau will control for instrument approach procedures and landings and takeoffs for all runways of an airport, except as provided in paragraph (b) of this section.

(b) *Runway visibility.* Whenever the latest weather report furnished by the U.S. Weather Bureau or a source approved by the Weather Bureau, including an aural report from the control tower, contains a visibility value specified as runway visibility for a particular runway of an airport, such visibility will control for straight-in instrument approaches, landings, and takeoffs for that runway.[9]

(Published in 23 F.R. 5235, July 10, 1958, effective Aug. 15, 1958.)

40.406–2 *Ceiling and visibility minimums—IFR (FAA policies which apply to sec. 40.406).*

(a) *General.* The policies set forth in this section will be used by the Federal Aviation Agency 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 FAA and industry respresentatives 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 takeoff and landing at that airport will not be less than those agreed upon by the military authorities having jurisdiction over the airport.

(b) *Takeoff minimums.*

(1) *Regular, refueling, and provisional airports.*

(i) *General; all aircraft.* In approving takeoff 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 takeoff 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 limitations prescribed in the air carrier's operations specifications.

(iii) *Four-engine aircraft.* The lowest takeoff minimums for four-engine aircraft will normally be 200–½. However, takeoff 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.* Takeoff 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 takeoff minimums shown on the applicable Form FAA–511 may be used: *Provided*, That the pilot in command is currently qualified into the airport in accordance with the applicable Civil Air Regulations, otherwise, takeoff minimums of 300–1 or the takeoff minimums shown on the Form FAA–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, land-

[9] For footnote, see page 77.

ing 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 2 miles from the airport boundary and (*c*) 300 feet above all obstructions within a distance of 2 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 1½ miles. However, a minimum visibility of not less than 1 mile may be authorized by application of the sliding scale authorized in the air carrier's operations specifications. A minimum visibility of 1 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 ½ mile.

(ii) *Aircraft with stall speed of 75 m.p.h. 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 1 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 (i); 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 nondirectional L/MF facility.* When a radio facility is within 7 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 30 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 ½ mile. The ceiling minimum will be at least 300 feet above all obstructions within a distance of 2 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 nondirectional L/MF radio facility.* When a nondirectional L/MF radio facility is located on an airport the minimum ceiling will not be less than 500 feet and the visibility minimum as specified in subparagraph (1) of this paragraph for circling approaches.

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

(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. 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.

(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.

(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 ¼ mile visibility. Such reduction in minimums will be based on satisfactory demonstration of ability by the air carrier as outlined under subparagraph (iii). Subsequent reduction in minimums will be based on satisfactory operation for a period of approximately 6 months, unless further demonstration in accordance with subparagraph (iii) 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 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 5 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*), 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).

(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*, That 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). 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 centerline 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). 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 between the point of 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): *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), 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). 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 centerline 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), 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), in lieu of the 2-mile distance each side of the final approach course to the airport as specified in subparagraph (1). 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 procedure 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 7 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). 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 25 miles of the fix and such bearing intersects the localizer course at an angle of at least 45 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 nondirectional 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, when the radio facility is located at distances greater than 7 miles from the airport:

(*1*) Over 7 to 10 miles—
Straight-in, 500–1 day, 500–2 night
Circling,[10] 500–1½ day, 500–2 night

(*2*) Over 10 to 12 miles—
Straight-in, 700–1 day, 700–2 night
Circling,[10] 700–1½ day, 700–2 night

(*3*) Over 12 miles—
Straight-in, 1000–1 day, 1000–2 night
Circling,[10] 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 and ceiling minimums for instrument approaches using a radio range (L/MF or VOR) or a non-directional L/MF radio facility will be shown on the applicable instrument approach procedure form to the nearest 100 feet. For example, for an airport with an elevation of 200 feet m.s.l. and assuming a 300-foot obstruction clearance requirement with a controlling obstruction of 449 feet m.s.l., a ceiling minimum of 500 feet would normally be considered as meeting the obstruction clearance requirements outlined in subparagraphs (1) through (5) of this paragraph. On the other hand, if such obstruction were 450 feet m.s.l., 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*) 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.* Takeoff and landing minimum at such airports will be approved in accordance with VFR.

(Published in 18 F.R. 6620, October 17, 1953, effective January 1, 1954; amended in 20 F.R. 8809, December

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

1, 1955, effective December 30, 1955; amended in 23 F.R. 2097, March 29, 1958, effective March 29, 1958.)

40.406–3 *Instrument approach procedures and IFR landing weather minimums at airports served by both ILS and GCA (FAA interpretations which apply to sec. 40.406(c)).*

(a) The instrument approach must be conducted in accordance with the information provided the pilot from the primary aid. The landing minimums must be those prescribed in the operations specifications based on the operative components of the primary aid. The information provided the pilot from the secondary aid must be used for monitoring purposes. Either ILS or GCA (PAR) may be used as the primary approach aid. When GCA (PAR) is used as a secondary aid, specific authorization for use of such aid is not required, however, the procedures specified in the Radar Procedures for Air Traffic Control Towers for monitored approaches must apply.

(b) Both the elevation and azimuth (or localizer and glide slope) elements of the secondary aid must be operating.

(c) The ILS and PAR must be aligned with the same runway. Straight-in or circling approaches may be made provided that weather conditions equal to or higher than the prescribed minimums for the primary aid are found to exist by the pilot-in-command upon reaching the authorized minimum altitude associated with the type of approach (straight-in or circling) being conducted.

(d) The use of operational military radar (other than training units) as a secondary aid is permissible without individual authorizations.

(e) The phrase "ceiling or visibility" as used in section 40.406(c) means that either or both elements of the weather report may be reported below minimums.

(Published in 19 F.R. 7224, November 6, 1954, effective November 15, 1954.)

40.408 *Flight altitude rules.* Except when necessary for take-off and landing, the flight altitude rules prescribed in paragraphs (a) and (b) of this section, in addition to the applicable provisions of section 60.17 of this subchapter, shall govern air carrier operations: *Provided,* That other altitudes may be established by the Administrator for any route or portion thereof where he finds, after considering the character of the terrain being traversed, the quality and quantity of meteorological service, the navigational facilities available, and other flight conditions, that the safe conduct of flight permits or requires such other altitudes.

(a) *Day VFR passenger operations.* No airplane engaged in passenger operations shall be flown at an altitude less than 1,000 feet above the surface or less than 1,000 feet from any mountain, hill, or other obstruction to flight.

(b) *Night VFR or IFR operations including over-the-top.* No airplane shall be flown at an altitude less than 1,000 feet above the highest obstacle located within a horizontal distance of five miles from the center of the course intended to be flown or, in mountainous terrain designated by the Administrator, 2,000 feet above the highest obstacle located within a horizontal distance of five miles from the center of the course intended to be flown: *Provided,* That in VFR operations at night in such mountainous areas airplanes may be flown over a lighted civil airway at a minimum altitude of 1,000 feet above such obstacle: *And provided further,* That in the case of high-altitude operations, the minimum altitude shall be not less than 2,000 feet above the elevation of the highest ground within 25 miles of the intended track: *And provided further,* That adherence to a minimum flight altitude will not be required during the time a flight is proceeding in accordance with paragraph (c) of this section.

(c) *Daytime over-the-top operations below minimum en route altitudes.* Over-the-top operations may be conducted at flight altitudes lower than the minimum en route IFR altitudes by day only and in accordance with the following provisions:

(1) Such operations shall be conducted at least 1,000 feet above the top of lower broken or overcast cloud cover;

(2) The top of the lower cloud cover shall be generally uniform and level;

(3) Flight visibility shall be at least five miles; and

(4) The base of any higher broken or overcast cloud cover shall be generally uniform and level and shall be at least 1,000 feet above the minimum en route IFR altitude for the route segment.

40.409 *Altitude maintenance on initial approach.*

(a) When making an initial approach to a radio navigational facility under IFR (excluding over-the-top conducted in accordance with the provisions of section 40.408(c)), an airplane shall not descend below the pertinent minimum altitude for initial approach specified by the Administrator for such facility until arrival over the radio facility has been definitely established;

(b) When making an initial approach on a flight being conducted in accordance with the provisions of section 40.408(c), a pilot shall not commence an instrument approach until arrival over the radio facility has definitely been established. In executing an instrument approach procedure under such circumstances, the airplane shall not be flown at an altitude lower than 1,000 feet above the top of the lower cloud or the minimum altitude specified by the Administrator for that portion of the instrument approach procedure being flown, whichever is the lower.

40.411 *Preparation of dispatch release.* A dispatch release shall be prepared for each flight between specified points from information furnished by the authorized aircraft dispatcher. This release shall be signed by the pilot in command and by the authorized aircraft dispatcher only when both believe the flight can be made with safety. The aircraft dispatcher may delegate authority to sign such release for a particular flight, but he shall not delegate the authority to dispatch.

40.412 *Preparation of load manifest.* The air carrier shall be responsible for the preparation and accuracy of a load manifest form prior to each take-off. This form shall be prepared by personnel of the air carrier charged with the duty of supervising the loading of airplanes and the preparation of load manifest forms or by other qualified persons authorized by the air carrier.

Required Records and Reports

40.501 *Crew member and dispatcher records.* Each air carrier shall maintain current records of every crew member and aircraft dispatcher. These records shall contain such information concerning the qualifications of each such crew member and dispatcher as is necessary to show compliance with the appropriate requirements of the regulations of this subchapter, e.g., proficiency and route checks, airplane qualifications, training, physical examinations, and flight time records. The disposition of any flight crew member or aircraft dispatcher released from the employ of the air carrier, or who becomes physically or professionally disqualified, shall be indicated in these records which shall be retained by the air carrier for at least three months.

40.501–1 *Crew member and dispatcher records (FAA policies which apply to sec. 40.501).*

(a) The following pertinent information is considered the minimum necessary in the airman record 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;

(Published in 18 F.R. 6622, October 17, 1953, effective January 1, 1954.)

40.502 ***List of airplanes.*** **Each air carrier shall maintain a current list of all airplanes being operated by it in scheduled air transportation: *Provided,* That airplanes of another air carrier being operated in accordance with an interchange agreement may be incorporated by reference.**

40.503 ***Dispatch release form.***

(a) The dispatch release may be in any form but shall contain at least the following information with respect to each flight:

(1) Identification number of the airplane to be used, and the trip number;

(2) Airport of departure, intermediate stops, destination, and alternates therefor;

(3) Minimum fuel supply; and

(4) Type of operation, e.g., IFR, VFR.

(b) The dispatch release shall contain, or have attached thereto, weather reports, available weather forecasts, or a combination thereof, for the destination, intermediate stops, and alternates specified therein which shall be the latest available at the time the dispatch release is signed by the pilot in command and dispatcher. It shall include such additional weather reports and forecasts, as available, considered necessary or desirable by the pilot in command and aircraft dispatcher.

40.503-1 *Dispatch release form (FAA interpretations which apply to sec. 40.503(a)(2)).* The dispatch release form may contain a trip or code number for the clearance of the particular trip instead of specifying each terminal and intermediate airport. This number used in the dispatch release must correspond with the number listed in the air carrier's published schedule or operations manual, which will list all the regular and intermediate stops of the particular trip for which clearance was given. In the event field condition, weather, etc., are such that routine operations are not to be conducted in accordance with the number for the particular trip, the dispatch release will specify the exceptions indicating the reason for the nonroutine operation.

(Published in 19 F.R. 7081, October 30, 1954, effective November 15, 1954.)

40.504 ***Load manifest.***

(a) The load manifest shall contain at least the following information with respect to the loading of an airplane at the time of take-off:

(1) The weight of:

(i) Airplane,

(ii) Fuel and oil,

(iii) Cargo, including mail and baggage, and

(iv) Passengers;

(2) The maximum allowable weight applicable for the particular flight;

(3) The total weight computed in accordance with approved procedures; and

(4) Evidence that the airplane is loaded in accordance with an approved schedule which insures that the center of gravity is within approved limits.

(b) The load manifest shall be prepared and signed for each flight by qualified personnel of the air carrier charged with the duty of supervising the loading of the airplane and the preparation of load manifest forms, or by other qualified personnel authorized by the air carrier.

40.505 ***Disposition of load manifest, dispatch release form, and flight plans.*** **Copies of the completed load manifest, or information therefrom except with respect to cargo and passenger distribution, the dispatch release form, and the flight plan shall be in the possession of the pilot in command and shall be carried in the airplane to its destination. Copies also shall be kept for at least 3 months.**

40.506 ***Maintenance records.***

(a) Each air carrier shall keep at its principal maintenance base current records of the total time in service, the time since last overhaul, and the time since last inspection of all major components of the airframe, engines, propellers, and, where practicable, appliances.

(b) Records of total time in service may be discontinued when it has been shown that the service life of component parts is safely controlled by other means, such as inspection, overhaul, or parts retirement procedures.

The Administrator may require the keeping of total time records for specific parts when it is found that other procedures will not safely limit the service life of such parts.

(c) An airplane component, engine, propeller, or appliance for which complete records are not available may be placed in service, provided that:

(1) It is of a type for which total time-in-service records are not required under the provisions of paragraph (b) of this section,

(2) Parts which are limited by the Administrator or manufacturer to a specific service time are retired and replaced by new parts, and

(3) It has been properly overhauled or rebuilt, and a record of such overhaul or rebuilding is included in the maintenance records.

40.507 *Maintenance log.* A legible record shall be made in the airplane's maintenance log of the action taken in each case of reported or observed failures or malfunctions of airframes, engines, propellers, and appliances critical to the safety of the flight. The air carrier shall establish an approved procedure for retaining an adequate number of such records in the airplane in a place readily accessible to the flight crew and shall incorporate such procedure in the air carrier manual. The maintenance log shall contain information from which the flight crew may readily determine the time since last overhaul of the airframe and engines.

[40.508 *Mechanical reliability reports.*

[(a) Each air carrier shall report the occurrence or detection of those failures, malfunctions, or defects specified in paragraph (b) of this section. In addition, each air carrier shall report any other failure, malfunction, or defect which occurs or is detected at any time in an airplane or airplane component (including airplane systems, appliances, powerplants, and propellers) used by the air carrier, when, in the carrier's opinion, such failure, malfunction, or defect has endangered or may endanger the safe operation of an airplane used by the air carrier. The report shall be in written form covering a period of 24 hours beginning at 0900 hours local time of each day and ending at 0900 hours local time the next day, and shall be submitted to the Federal Aviation Agency maintenance inspector assigned to the air carrier by 0900 hours local time of the following day: *Provided,* That reports which are due on Saturday or Sunday may be submitted on the following Monday and in case of legal holidays on the following workday.

[NOTE: Failures, malfunctions, or defects reported in accordance with the accident reporting provisions of Part 320 of the Regulations of the Civil Aeronautics Board need not be included.

[(b) The air carrier shall report each occurrence or detection of a failure, malfunction, or defect involving:

[(1) Fires during flight and whether the related fire-warning system functioned properly;

[(2) Fires during flight and whether the related fire-warning system did not function properly;

[(3) Fires during flight not protected by a related fire-warning system;

[(4) False fire warning during flight;

[(5) Engine exhaust systems which result during flight in damage to engine, adjacent structure, equipment, or components;

[(6) An airplane component which results during flight in the accumulation or circulation of smoke, vapor, or toxic or noxious fumes in the crew compartment or cabin;

[(7) Engine shutdown during flight due to engine flameout;

[(8) Engine shutdown during flight when external damage to the engine or to the airplane structure has occurred;

[(9) Engine shutdown during flight due to foreign object ingestion or icing;

[(10) Engine shutdown during flight of more than one engine on an airplane;

[(11) Propeller feathering system or ability of the system to control overspeeding during flight;

[(12) Fuel or fuel-dumping systems affecting fuel flow or causing hazardous leakage during flight;

[(13) Landing gear extension or retraction or opening or closing of landing-gear doors during flight;

[(14) Brake system components which result in loss of brake actuating force while the airplane is in motion on the ground;

[(15) Airplane structure which requires major repair;

[(16) Cracks, permanent deformation, or corrosion of airplane structure which exceed the maximum limits acceptable to the manufacturer or the Federal Aviation Agency; and

[(17) Airplane components or systems which result during flight in the taking of emergency actions; except that action taken to shutdown an engine need not be reported as an emergency under this provision.

[Note: Under the provisions of this paragraph, an airplane is in flight from the moment it leaves the surface of the earth on takeoff until it touches down at a place of landing.

[(c) Reports required by paragraph (a) of this section shall be transmitted in a manner and on a form convenient to the air carrier's system of communication and procedure, and shall include in the first daily report as much of the following information as is available:

[(1) Type and identification number of the airplane, name of the operator, date, flight number, and stage during which the incident occurred; e.g., preflight, takeoff, climb, cruise, descent, landing, inspection;

[(2) Emergency procedure effected; e.g., unscheduled landing, emergency descent;

[(3) Nature of condition; e.g., fire, structural failure;

[(4) Identification of part and system involved, including available information pertaining to type designation of the major component and time since overhaul;

[(5) Apparent cause of trouble; e.g., wear, crack, design deficiency, personnel error;

[(6) Disposition; e.g., repaired, replaced, airplane grounded, part sent to manufacturer; and

[(7) Brief narrative summary of other pertinent information necessary for more complete identification, determination of seriousness, and corrective action.

[(d) Reports required by paragraph (a) shall not be withheld pending accumulation of all information specified in paragraphs (b) and (c) of this section. When additional information is obtained relative to the incident, including any that may be furnished by the manufacturer or other outside agency, it shall be expeditiously submitted as a supplement to the first report, referencing the date and place of submission of such report.

[(Amendment 40-35, published in 27 F.R. 1242, Feb. 10, 1962, effective Mar. 12, 1962.)]

40.509 *Mechanical interruption summary report.* Each air carrier shall submit regularly and promptly to the Administrator a summary report containing information on the following occurrences:

[(a) All interruptions to a scheduled flight, unscheduled changes of airplanes en route, and unscheduled stops and diversions from route which result from known or suspected mechanical difficulties or malfunctions that are not required to be included in mechanical reliability reports.]

(b) The number of engines removed prematurely because of mechanical trouble, listed by make and model of engine and the airplane type in which the engine was installed.

(c) The number of propeller featherings in flight, listed by type of propeller and type of engine and the airplane on which the propeller is installed. Propeller featherings accomplished for training, demonstration, or flight check purposes need not be reported.

[(Amendment 40-35, published in 27 F.R. 1242, Feb. 10, 1962, effective Mar. 12, 1962.)]

40.510 *Alteration and repair reports.* Reports of major alterations or repairs of airframes, engines, propellers, and appliances shall be made available to the Administrator promptly upon completion of such alterations or repairs.

40.511 *Maintenance release.* When an airplane is released by the maintenance organization to flight operations, a maintenance release or appropriate entry into the mainte-

nance log certifying that the airplane is in an airworthy condition shall be prepared and signed by a maintenance inspector or a person authorized by the inspection organization prior to release of such airplane. If a maintenance release form is prepared, a copy shall be given to the pilot in command. An appropriate record shall be kept for at least 2 months.

40.511-1 *Purpose and form of maintenance release (FAA interpretations which apply to sec. 40.511).*

(a) The purpose of the maintenance release is to assure that when any maintenance and/or inspection is performed or is required to be performed, such maintenance and or inspection is completed satisfactorily in accordance with the air carrier's instructions and the Civil Air Regulations; and that no known condition exists at the time the release is signed which would render the aircraft unairworthy.

(b) The form of the maintenance release is considered to be optional on the part of the air carrier provided such release fulfills the purpose of section 40.511 of this part.

(Published in 21 F.R. 1697, March 17, 1956, effective March 31, 1956.)

40.512 *Communication records.* Each air carrier shall maintain, and retain for a period of 30 days, records of radio contacts by or with pilots en route.

NOTE: The record-keeping and reporting requirements of this regulation have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

Appendix A

Examples which explain use of figures 1 to 11, inclusive, on pages 91 to 99, inclusive

Example 1

Figure 10 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 for 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 takeoff 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 takeoff:

Aircraft = DC-3 SIC3G

Airport = Elevation = 4,000 feet

Effective runway length = 3,500 feet (paved)

Runway gradient = +1.5%

The equivalent runway length due to gradient is obtained from figure 11 in the following manner:

(a) Follow 35-foot line on runway length scale to +1.5% gradient, point A.

(b) Proceed parallel to gradient guide lines to zero gradient, point B.

(c) Proceed horizontally to runway length scale, point C, and read zero gradient runway length of 3,585 feet. (Note: The reasons for the equivalent runway length with an uphill gradient being longer than the effective runway length are:

(1) Section 40.91 defines the takeoff distance as the accelerate-stop distance, and

(2) The stopping distance from 1.05 V_{mc}, for a DC-3 is greater than the distance to accelerate to 1.05 V_{mc}, except at the higher altitudes.)

It will be noted that a runway length of 3,585 feet at an elevation of 4,000 feet, is outside the guidelines plotted on figure 3. However, a value of approximately 21,000 lbs. is determined by extrapolation.

In order to permit takeoff from the runway under consideration, at the maximum allowable weight of 25,346 lbs. (with de-icer equipment), it is noted that a zero gradient runway length of 3,980 feet is required.

To determine the headwind component which will produce this equivalent runway length, refer to figure 8. Enter the chart with 3,585 feet at the effective runway length scale. Proceed horizontally to the zero wind runway length required, 3,980 feet. Then proceed vertically and read a wind value of 10 m.p.h. However, since figure 8 is based on TAS, it is necessary to correct the length of 3,980 feet by a correction factor contained from figure 9. Enter figure 9 with 98 m.p.h. TAS (obtained from figure 10 for TIAS of 92 feet at 4,000 feet), and 10 m.p.h. headwind component. The correction factor is found to be 1.006. This results in a corrected length of 4,004 feet or 4 feet more. In this case, the correction appears negligible. By observation of figure 9, it will be seen that corrections for airspeed above 92.4 TAS, with headwind components, may be disregarded since the results will be conservative, and for airspeed less than 92.4 TAS, tailwind components, will produce conservative results.

Example 3

Operations conditions for takeoff:

Aircraft = DC–3

Airport = Elevation = 4,000 feet

Effective runway length = 4,000 feet (paved)

Runway gradient = —1.0%

Proceed as in example 2 subparagraphs (a), (b) and (c) to appropriate points in (d), (e), and (f), shown in figure 11, and note that zero gradient runway length is 3,925 feet.

Figure 3 indicates this distance will permit takeoff at approximately 24,800 lbs.

Figure 8 indicates that a 1 m.p.h. headwind component will produce the equivalent runway length of 3,980 feet necessary to permit takeoff at 25,346 lbs.

The correction factor from figure 9, of 1.008 for a 1 m.p.h. headwind component and TAS of 98 m.p.h. results in a runway length correction of +3 feet. This can be disregarded since it is within the accuracy limits of the charts.

Example 4

Operating conditions for landing:

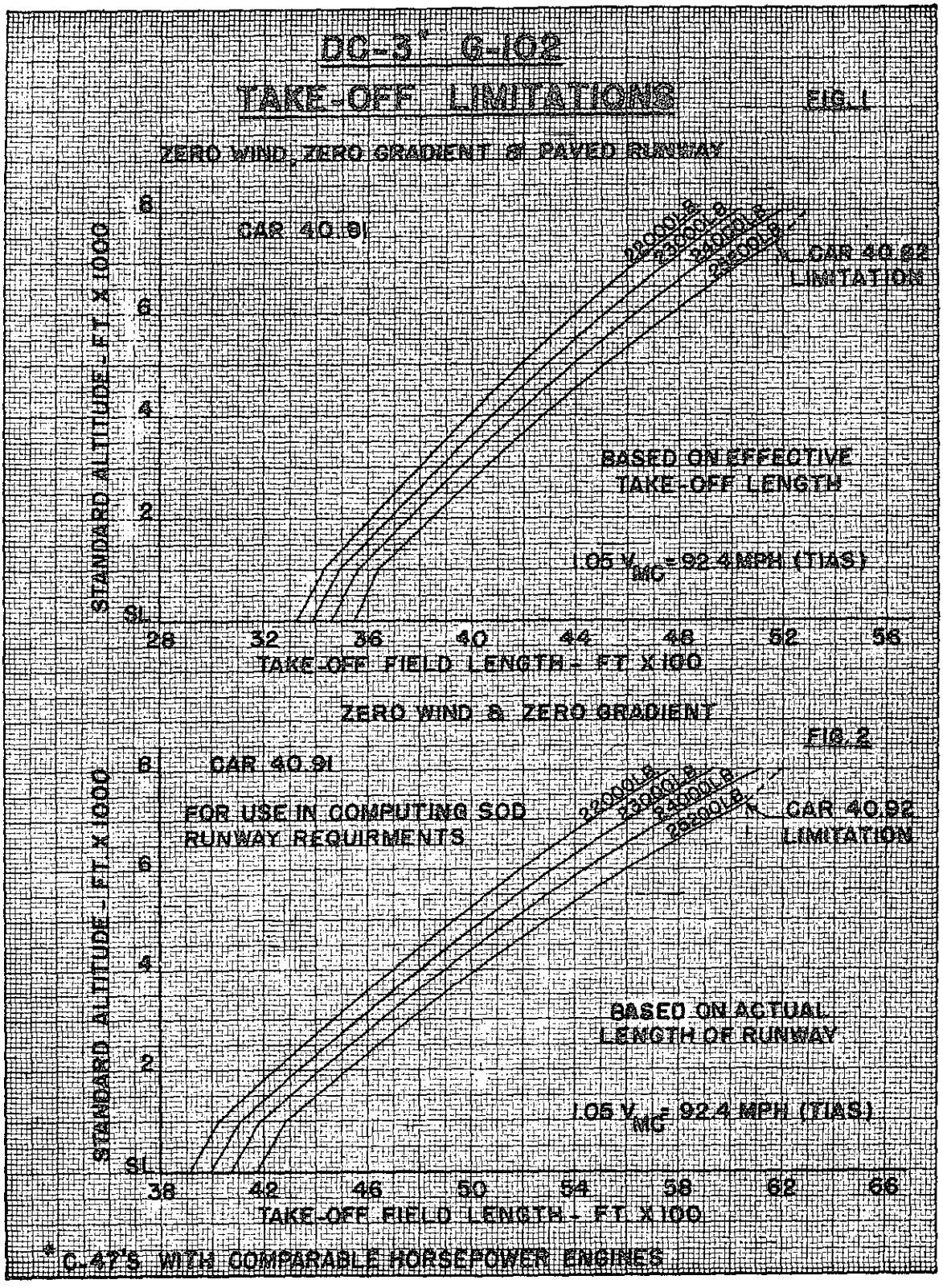
Aircraft = DC–3 S1C3G

Airport = Elevation = 4,000 feet

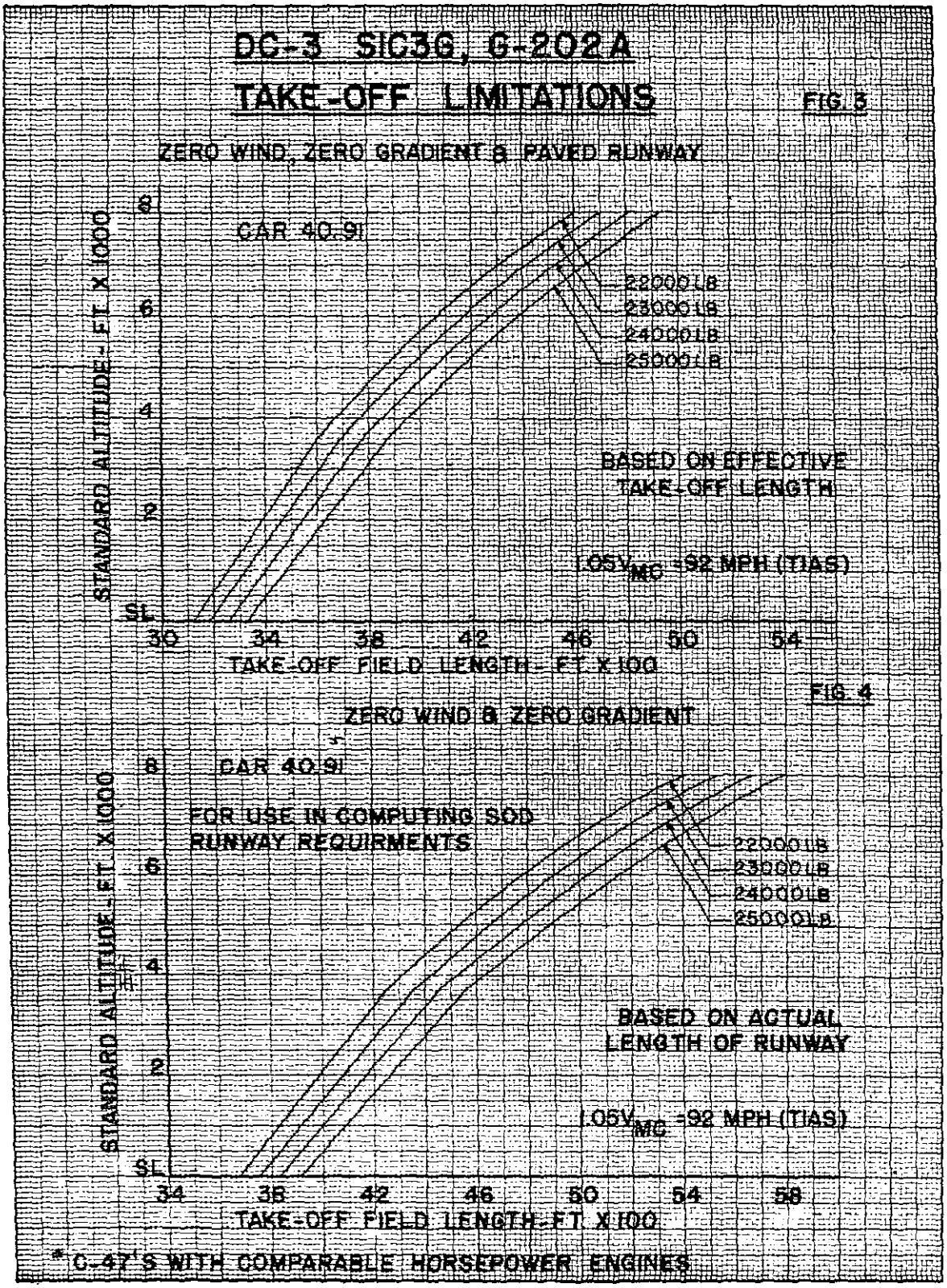
Effective runway length = 3,300 feet (paved)

(NOTE: Section 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 lbs., 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 1.3 V_{s0} = 92 m.p.h. Therefore, by reference, figure 10, 1.3 V_{s0} 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.



Figures 1 and 2.



Figures 3 and 4.

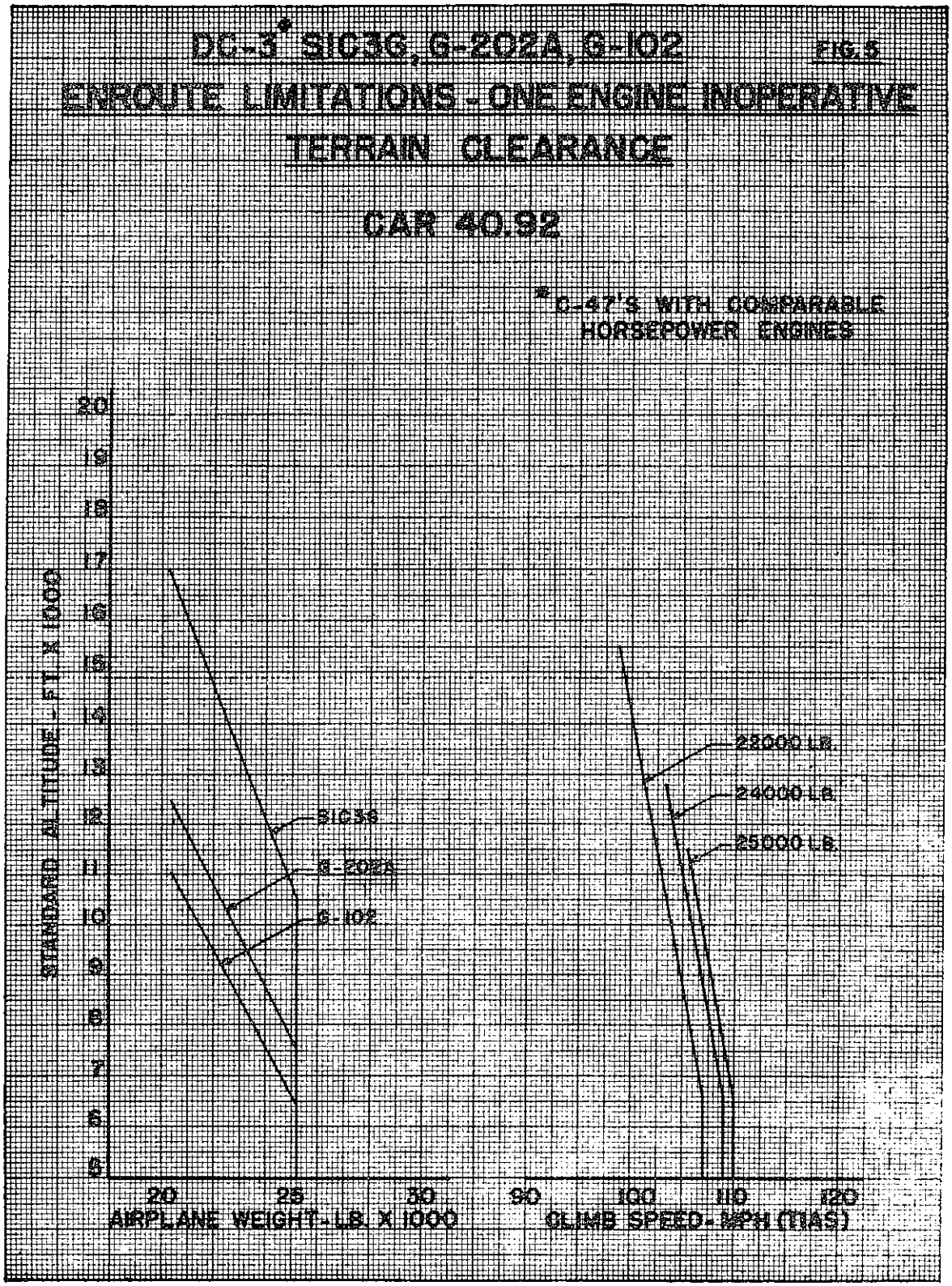
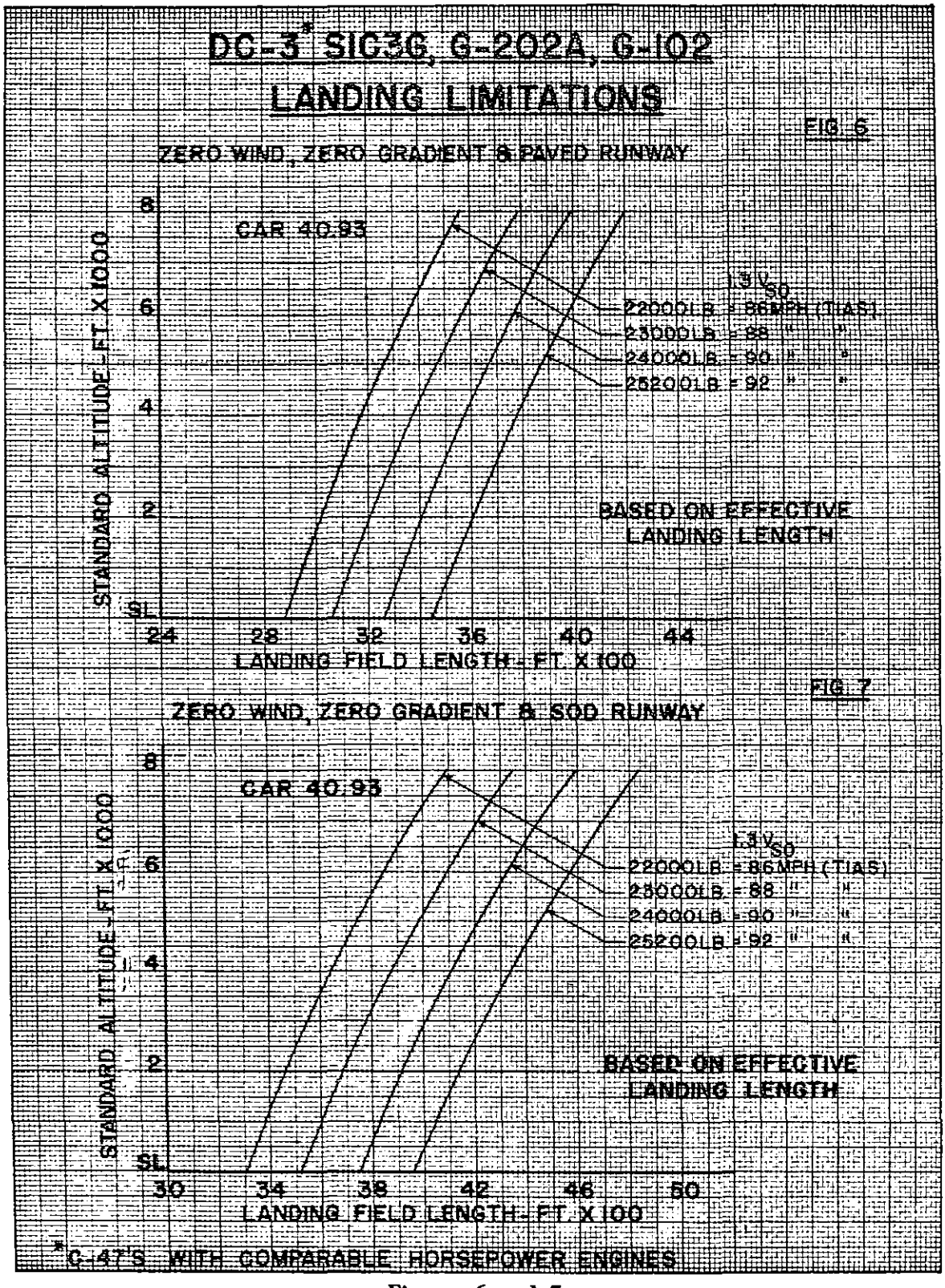
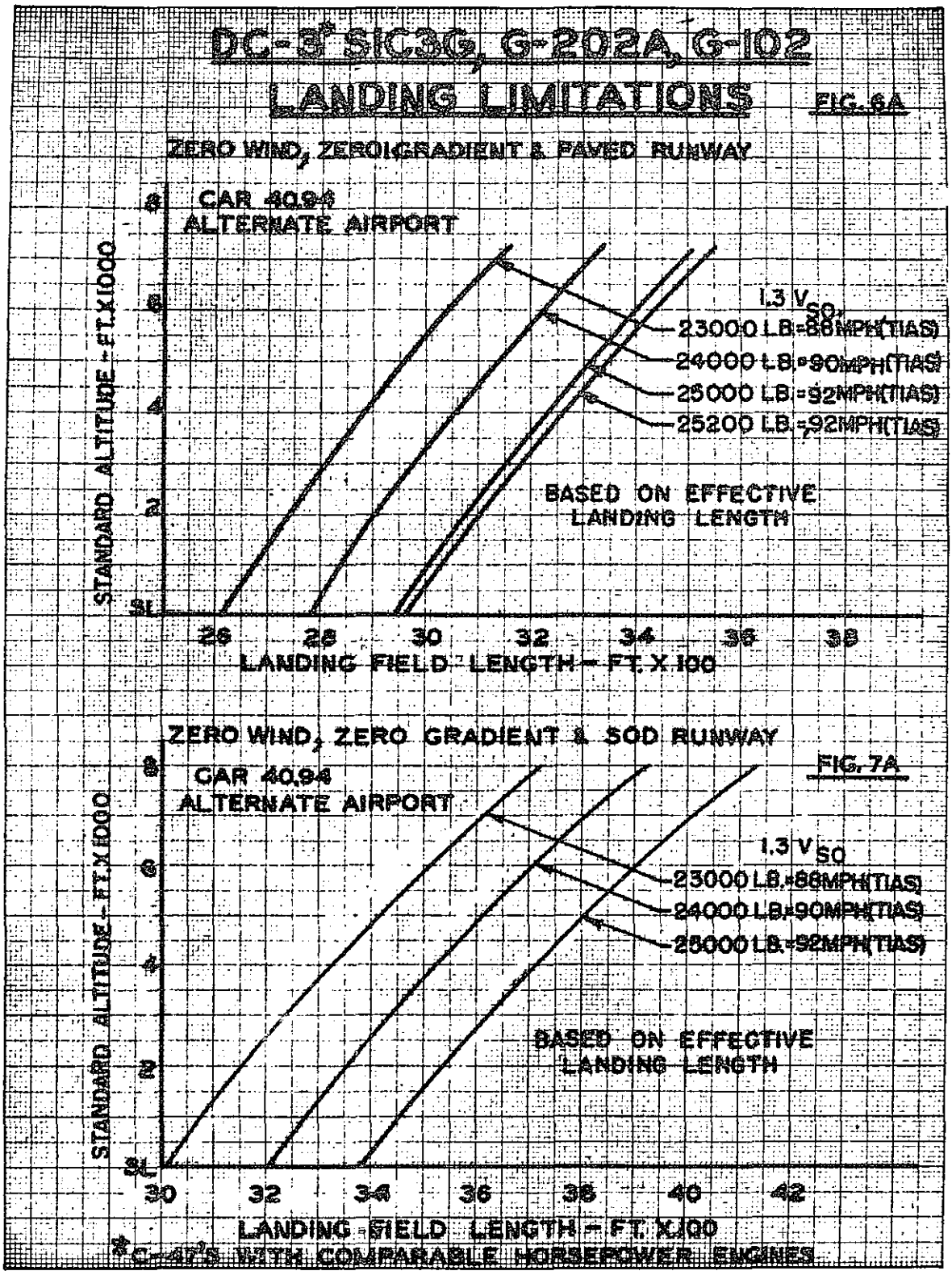

DC-3* SIC3G, G-202A, G-102 FIG. 5
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 40.92
*C-47'S WITH COMPARABLE HORSEPOWER ENGINES
STANDARD ALTITUDE - FT. X 1000
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
SIC3G
G-202A
G-102
28000 LBS.
24000 LBS.
25000 LBS.
20
25
30
90
100
110
120
AIRPLANE WEIGHT - LBS. X 1000
CLIMB SPEED - MPH (TIAS)

Figure 5.



Figures 6 and 7.



Figures 6A and 7A.

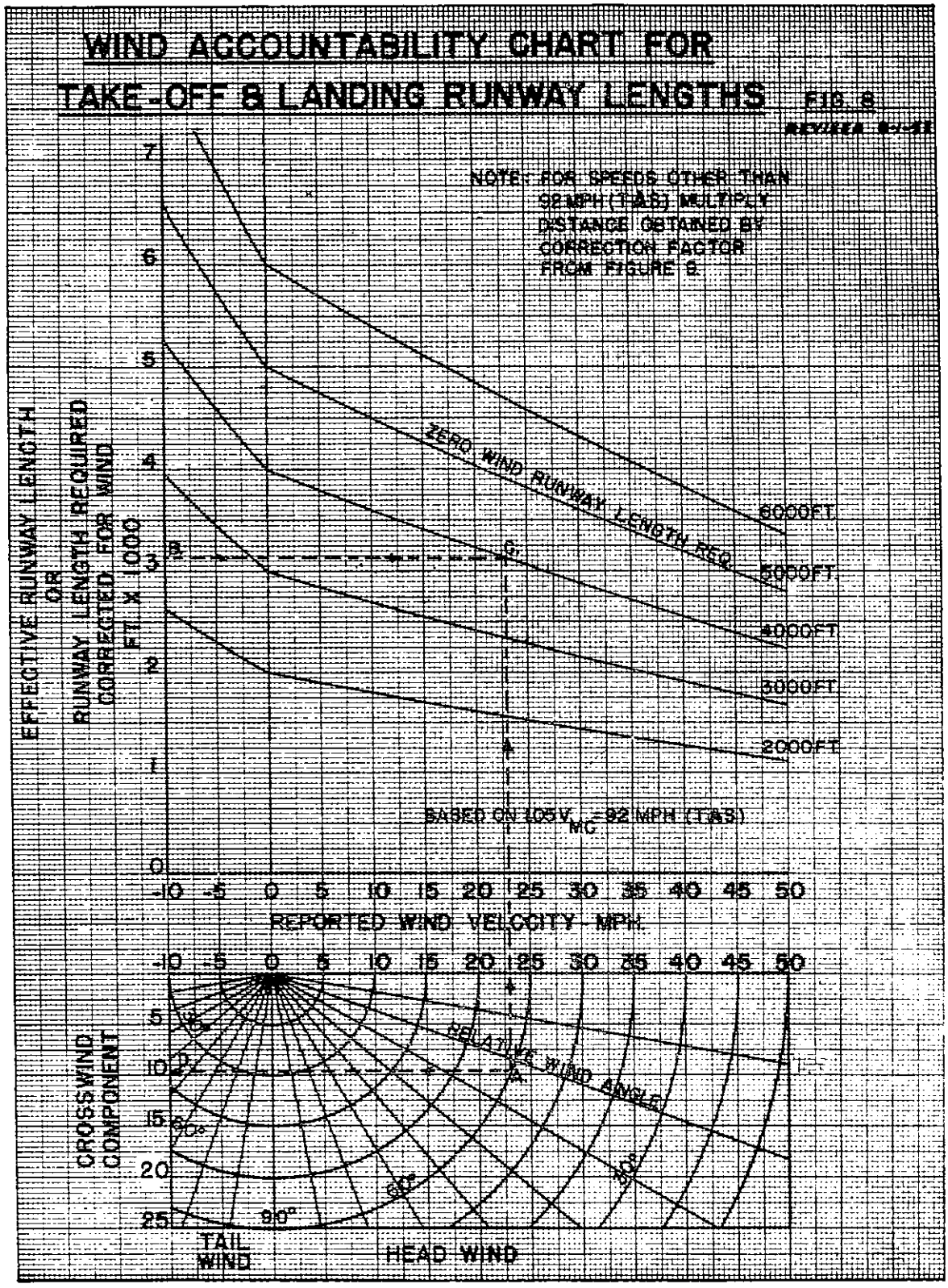

WIND ACCOUNTABILITY CHART FOR
TAKE-OFF & LANDING RUNWAY LENGTHS
FIG 8
REVISED 8-1-51
NOTE: FOR SPEEDS OTHER THAN 92 MPH (TAS) MULTIPLY DISTANCE OBTAINED BY CORRECTION FACTOR FROM FIGURE 9.
EFFECTIVE RUNWAY LENGTH OR RUNWAY LENGTH REQUIRED CORRECTED FOR WIND FT X 1000
ZERO WIND RUNWAY LENGTH REQ.
6000FT
5000FT
4000FT
3000FT
2000FT
BASED ON 105 V MG = 92 MPH (TAS)
REPORTED WIND VELOCITY - MPH.
CROSS WIND COMPONENT
RELATIVE WIND ANGLE
TAIL WIND
HEAD WIND

Figure 8.

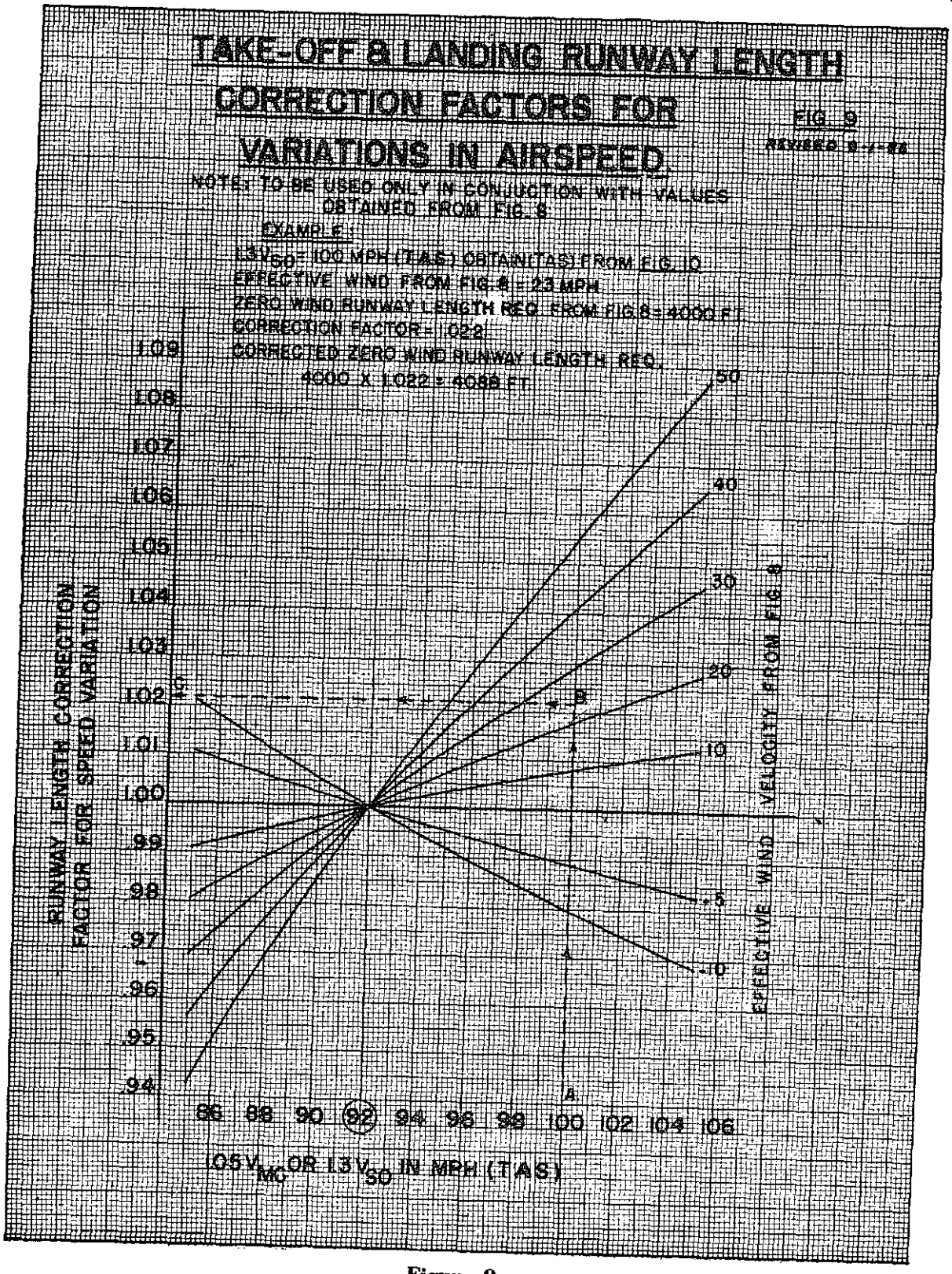

TAKE-OFF & LANDING RUNWAY LENGTH
CORRECTION FACTORS FOR
VARIATIONS IN AIRSPEED
FIG 9
REVISED 9-1-82
NOTES: TO BE USED ONLY IN CONJUCTION WITH VALUES OBTAINED FROM FIG. 8
EXAMPLE:
1.3V50 = 100 MPH (T.A.S.) OBTAIN(TAS) FROM FIG. 10
EFFECTIVE WIND FROM FIG. 8 = 23 MPH
ZERO WIND RUNWAY LENGTH REQ. FROM FIG. 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
50
40
30
20
10
5
0
EFFECTIVE WIND VELOCITY FROM FIG. 8
86 88 90 92 94 96 98 100 102 104 106
1.05VMC OR 1.3VSO IN MPH (TAS)

Figure 9.

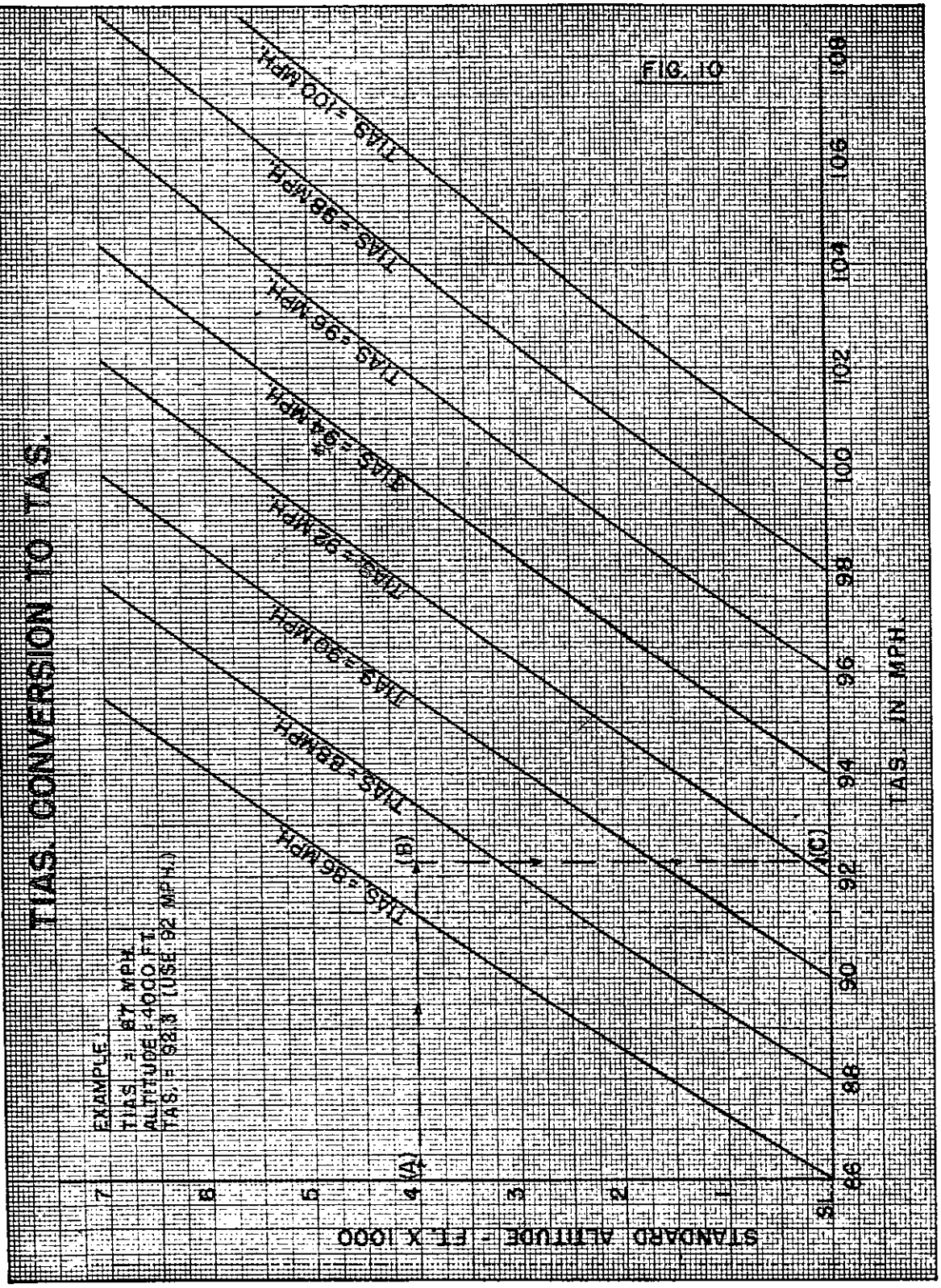

TIAS. CONVERSION TO TAS.
FIG. 10
EXAMPLE:
TIAS = 87 MPH.
ALTITUDE = 4000 FT.
TAS. = 92.3 (USE 92 MPH.)
TIAS = 100 MPH.
TIAS = 98 MPH.
TIAS = 96 MPH.
TIAS = 94 MPH.
TIAS = 92 MPH.
TIAS = 90 MPH.
TIAS = 88 MPH.
TIAS = 86 MPH.
(A)
(B)
(C)
SL
1
2
3
4
5
6
7
STANDARD ALTITUDE - FT. X 1000
86
88
90
92
94
96
98
100
102
104
106
108
TAS. IN MPH.

Figure 10.

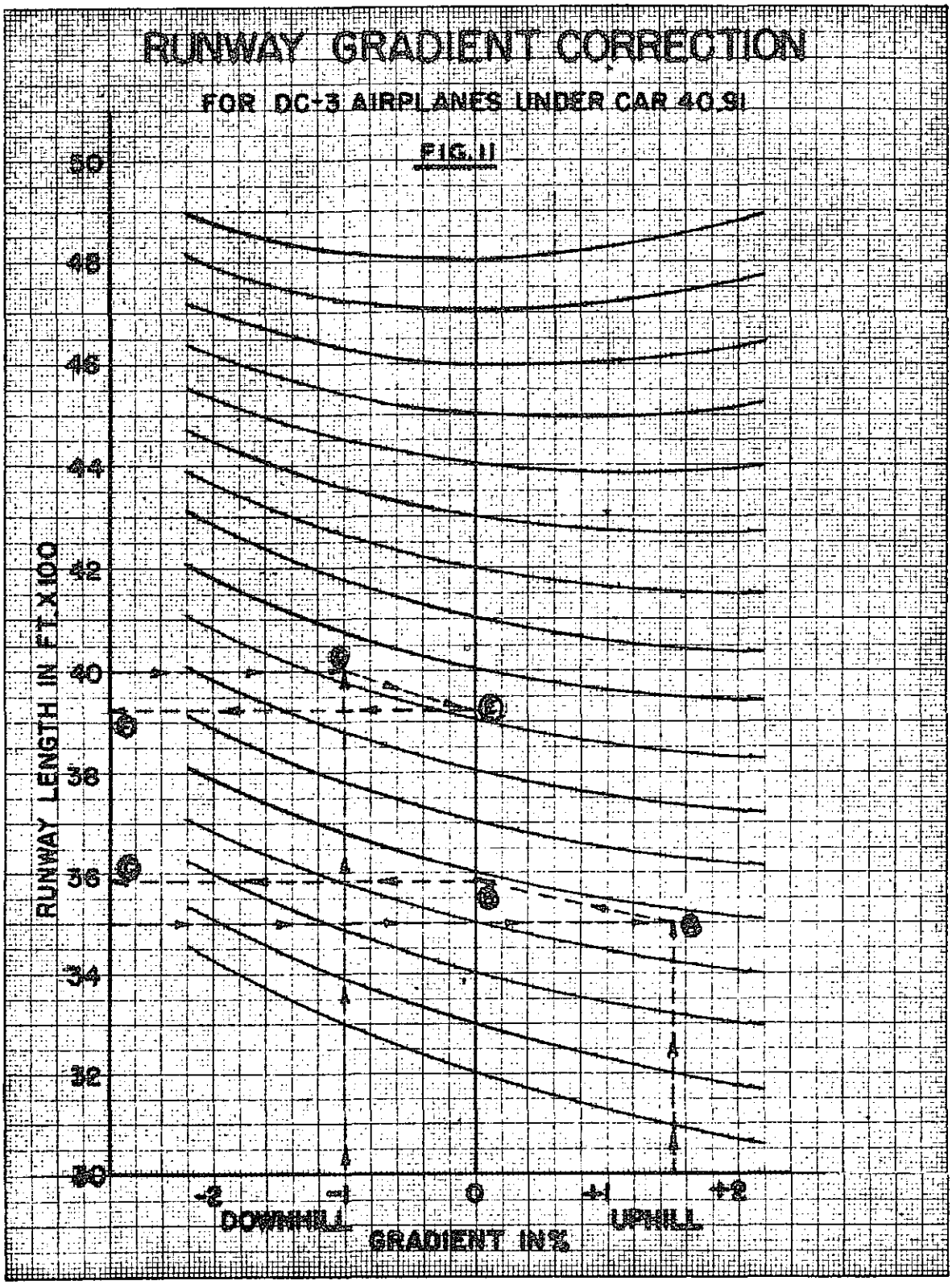

RUNWAY GRADIENT CORRECTION
FOR DC-3 AIRPLANES UNDER CAR 40.91
FIG. 11
RUNWAY LENGTH IN FT. X 100
50
48
46
44
42
40
38
36
34
32
30
-2
-1
0
+1
+2
DOWNHILL
GRADIENT IN %
UPHILL

Figure 11.

Appendix B

Special Civil Air Regulations
Which Affect Part 40

SPECIAL CIVIL AIR REGULATION NO. SR-389B

Effective: January 30, 1959
Adopted: December 24, 1958

Emergency Exits for Airplanes Carrying Passengers for Hire

Special Civil Air Regulation No. SR-389A, effective September 13, 1957, superseded Special Civil Air Regulation No. SR-389. All of the provisions of SR-389 were retained in SR-389A. However, the latter special regulation as amended on October 17, 1957, contained an addition to the occupant/exit table which permitted the Viscount 700 series airplanes to carry 53 occupants when 7 exits were provided.

Special Civil Air Regulation No. SR-389, effective October 27, 1952, superseded Special Civil Air Regulation No. SR-387. Except for correcting some minor errors with respect to the number of exits authorized by the Civil Aeronautics Administration, there was no difference between the two special regulations.

Special Civil Air Regulation No. SR-387, effective October 27, 1952, was adopted in order to make applicable to the then operating transport airplanes more stringent rules regarding the number of occupants permitted per exit. SR-387 required, among other things, that all large airplanes (more than 12,500 pounds maximum certificated takeoff weight) comply with either section 4b.362 (a), (b), and (c) of Part 4b of the Civil Air Regulations as amended by Amendment 4b-4 effective December 20, 1951, or with the specific requirements set up in SR-387. Subsequently, the provisions of section 4b.362 (a), (b), and (c) of Part 4b were revised by Amendment 4b-5, effective April 9, 1957.

Special Civil Air Regulation No. SR-389A permits the airplanes listed in the occupant/exit table to carry additional occupants if additional exits are provided, except that in no case shall more than 8 additional occupants be carried for any one additional exit. The preamble to Civil Air Regulations Draft Release No. 58-11 stated that the intent of this provision was that no more than 8 additional occupants could be authorized if the most effective exit for emergency evacuation were provided, which, by reference to the rule proposed in the draft release, is seen to be one comparable to a Type I exit as prescribed in section 4b.362. As herein set forth, it is intended that as many as 8 additional occupants may be authorized with the addition of an exit of reasonably high effectiveness and that a lesser number of occupants would be authorized with the addition of a less effective exit. For the purpose of this regulation, it has been established that the addition of an exit, approximating a Type II or IV exit as prescribed in section 4b.362, would possibly permit the addition of 8 occupants. This relaxation over the rule proposed in Draft Release 58-11 was prompted by comments received to the draft release and the fact that a number of airplanes had already received approval to carry 8 additional occupants with the addition of an exit com-

parable to a Type IV based on the Administrator's interpretation of SR–389A. Justification for the relaxation is based upon the current requirements of section 4b.362(c) wherein it may be seen that for the addition of a Type IV exit on each side, an increase of 30 passengers is permitted. While such a ratio is not advocated for airplanes covered by this special regulation because of other factors considered in establishing these values for section 4b.362, permitting 8 occupants to be added for a Type IV exit represents a more reasonable and realistic view than that proposed in Draft Release 58–11. Therefore, it is expressly provided herein that since the effectiveness of the exit varies with the type, size, and location, 8 additional occupants shall be authorized only when an exit comparable to a Type II or a Type IV exit as prescribed in section 4b.362 is provided.

Special Civil Air Regulation No. SR–389A does not contain provisions regarding the required reduction in occupancy when the number of exits is reduced. In order to cover such cases, it is provided herein that upon removal of any exit the maximum number of occupants shall be reduced by at least 8.

The occupant/exit table has been modified by listing the "L–1049 Series" in lieu of the "L–1049," and the "CV–340 and CV–440" in lieu of the "CV–340."

Interested persons have been afforded an opportunity to participate in the making of this regulation (23 F.R. 3275), and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective January 30, 1959.

1. Contrary provisions of the Civil Air Regulations notwithstanding, no large airplane (more than 12,500 pounds maximum certificated take-off weight) while carrying passengers for hire shall be operated with occupants in excess of the number permitted by applying the provisions of section 4b.362 (a), (b), and (c) of Part 4b of the Civil Air Regulations as amended by Amendment 4b–5, effective April 9, 1957, except that airplane types listed in the following table may be operated with the listed maximum number of occupants (including all crew members) and the listed corresponding number of exits (including emergency exits and doors) heretofore approved by the Administrator for emergency egress of passengers.

2. Additional occupants above the values listed in the table may be carried if additional exits are provided, except that in no case shall more than 8 additional occupants be carried for any one additional exit. For the addition of exits comparable to at least a Type II or Type IV exit as prescribed in section 4b.362, a maximum of 8 additional occupants may be authorized and for exits not comparable to at least a Type II or Type IV exit, the Administrator after consideration, among other factors, of the type, size, and location of the exit, may authorize a lesser number of additional occupants.

3. For airplanes which have a ratio (as computed from the table in this special regulation) of maximum number of occupants to number of exits greater than 14:1 and for airplanes which do not have installed at least one full-size door-type exit in the side of the fuselage in the

rearward portion of the cabin, the first additional exit approved by the Administrator for increased occupancy shall be a floor-level exit not less than 24 inches wide by 48 inches high located in the side of the fuselage in the rearward portion of the cabin. In no case shall an occupancy greater than 115 be allowed unless there is such an exit on each side of the fuselage.

4. The maximum number of occupants authorized (listed in the table) shall be reduced where the number of approved exits is less than that shown in the table. The reduction in the maximum number of occupants for each exit eliminated shall be determined by the Administrator taking due account of the effectiveness of the remaining exits for emergency evacuation, except that the maximum number of occupants shall be reduced by at least 8 for each eliminated exit. In no case, when exits are deleted, shall the resulting ratio of occupants to exits be greater than 14:1, and there shall be at least one exit on each side of the fuselage irrespective of the number of occupants.

Airplane type	Maximum number of occupants including all crew members	Corresponding number of exits authorized for passenger use
B–307	61	4
B–377	96	9
C–46	67	4
CV–240	53	6
CV–340 and CV–440	53	6
DC–3	35	4
DC–3 (Super)	39	5
DC–4	86	5
DC–6	87	7
DC–6B*	112	11
L–18	17	3
L–049, L–649, L–749	87	7
L–1049 series	96	9
M–202	53	6
M–404	53	7
Viscount 700 series	53	7

*The DC–6A, if converted to a passenger transport configuration, will be governed by the maximum number applicable to the DC–6B.

This regulation supersedes Special Civil Air Regulation No. SR–389A as amended by Amendment No. 1 and shall remain effective until superseded or rescinded by the Board or the Administrator of the Federal Aviation Agency, as appropriate.

AMENDMENT I TO SPECIAL CIVIL AIR REGULATION NO. SR–389B

Effective: September 11, 1959
Adopted: September 11, 1959

Emergency Exits for Airplanes Carrying Passengers for Hire

Special Civil Air Regulation No. SR–389B, adopted by the Civil Aeronautics Board on December 24, 1958, and effective January 30, 1959, specified in part that no large airplane while carrying passengers for hire shall be operated with occupants in excess of the number permitted by applying the provisions of section 4b.362 (a), (b), and (c) of Part 4b of the Civil Air Regulations as amended by Amendment 4b–5 effective April 9, 1957, except for those airplanes listed in the table in SR–389B. Special Civil Air Regulations SR–389A, which preceded SR–389B, contained a similar provision but referred to Amendment 4b–4 effective December 20, 1951. The effect of SR–389B was to apply the current Part 4b exit requirements referenced in SR–389A.

A review of the history of the development of SR–389B indicates that such retroactive application of current Part 4b requirements was included inadvertently and that it would impose an unnecessary burden on the operators of certain airplanes. SR–389B is therefore being amended to eliminate this retroactive provision.

Since this amendment imposes no additional burden on any person, notice and public procedure hereon are unnecessary, and the amendment is made effective immediately.

In consideration of the foregoing, Paragraph 1 of Special Civil Air Regulation No. SR–389B is hereby amended to read as follows, effective September 11, 1959.

1. Contrary provisions of the Civil Air Regulations notwithstanding, no large airplane (more than 12,500 pounds maximum certificated take-off weight) type certificated under Civil Air Regulations effective prior to April 9, 1957, while carrying passengers for hire, shall be operated with occupants in excess of the number permitted by applying the provisions of section 4b.362 (a), (b), and (c) of Part 4b of Civil Air Regulations as amended by Amendment 4b–4 effective December 20, 1951, except that airplane types listed in the following table may be operated with the listed maximum number of occupants (including all crew members) and the listed corresponding number of exits (including emergency exits and doors) heretofore approved by the Administrator for the emergency egress of passengers.

SPECIAL CIVIL AIR REGULATION NO. SR–392C

Effective: February 3, 1962
Adopted: January 30, 1962
Published: February 3, 1962
(27 F.R. 1008)

Facilitation of Experiments With Exterior Lighting Systems

Special Civil Air Regulation No. SR–392B, adopted on February 25, 1957, permits experimentation with exterior lighting systems, which do not comply with the standards prescribed in the Civil Air Regulations, on aircraft with standard airworthiness certificates. Several conditions are imposed to insure that the number of aircraft engaged in the experiments is reasonably limited; that the experimental exterior lights are in fact installed for bonafide experimentation; and that the results of such experimentation become generally available. This special regulation expires on February 25, 1962.

In a notice of proposed rule making contained in Draft Release No. 61–27 and published in the Federal Register, December 23, 1961 (26 F.R. 12294), the Agency gave notice that it has under consideration the termination of SR–392B and requested comments from interested persons concerning this matter. In response to such request, the Agency has received numerous reports, arguments and other evidence. However, the volume of the comments received is such that there is not sufficient time remaining to review and evaluate such comments prior to the termination of SR–392B. Therefore, in order to afford the Agency the opportunity to fully consider all the relevant matter presented and to take whatever additional rule making action that may be indicated, it is necessary to extend the termination date of SR–392B to June 25, 1962.

Since this regulation continues in effect the provisions of the previous regulation and imposes no additional burden upon any person, compliance with the notice and public procedure provisions of the Administrative Procedure Act is unnecessary and good cause exists for making this regulation effective on less than 30 days' notice.

In consideration of the foregoing, the following Special Civil Air Regulation is adopted to become effective on February 3, 1962:

Contrary provisions of the Civil Air Regulations notwithstanding, experimental exterior lighting equipment which does not comply with the relevant specifications contained in the Civil Air Regulations may, subject to the approval of the Administrator, be installed and used on aircraft for the purpose of experimentation intended to improve exterior lighting for a period not to exceed six months: *Provided,* That

(1) The Administrator may grant approval for additional periods if he finds that the experiments can be reasonably expected to contribute to improvements in exterior lighting;

(2) Not more than 15 aircraft possessing a U.S. certificate of airworthiness may have installed at any one time experimental exterior lighting equipment of one basic type;

(3) The Administrator shall prescribe such conditions and limitations as may be necessary to insure safety and avoid confusion in air navigation;

(4) The person engaged in the operation of the aircraft shall disclose publicly the deviations of the exterior lighting from the relevant specifications contained in the Civil Air Regulations at times and in a manner prescribed by the Administrator; and

(5) Upon application for approval to conduct experimentation with exterior lighting, the applicant shall advise the Administrator of the specific purpose of the experiments to be conducted; and, at the conclusion of the approved period of experimentation, he shall advise the Administrator of the detailed results thereof.

This regulation supersedes Special Civil Air Regulation No. SR–392B and shall terminate June 25, 1962, unless sooner superseded or rescinded.

SPECIAL CIVIL AIR REGULATION NO. SR-392D

Effective: June 25, 1962
Adopted: June 22, 1962
Published: June 26, 1962
(27 F.R. 5979)

Display of Experimental Exterior Lighting Systems Approved for Use on Aircraft

Special Civil Air Regulation No. SR-392B, adopted on February 25, 1957, and superseded by SR-392C on February 3, 1962, permitted experimentation with exterior lighting systems that did not comply with the standards prescribed in the Civil Air Regulations on aircraft with standard airworthiness certificates. Several conditions were imposed to insure that the number of aircraft engaged in the experiments was reasonably limited; that the experimental exterior lights were in fact installed for bona fide experimentation; and that the results of such experimentation became generally available.

In a notice of proposed rule making contained in Draft Release No. 61-27 and published in the Federal Register, December 23, 1961 (26 F.R. 12294), the Agency gave notice that it had under consideration the termination of SR-392B, which was then in effect, and requested comments from interested persons. However, the nature of the comments received was such that there was not sufficient time remaining, before the February 25, 1962, termination date specified in SR-392B, for their proper review and evaluation. To provide the time needed, the Agency adopted SR-392C which superseded SR-392B without revision other than extension of the termination date from February 25, 1962, to June 25, 1962.

On April 3, 1962, the Agency convened a public conference (previously announced by a notice of conference dated February 12, 1962) to give persons interested in SR-392C an opportunity to supplement their written comments with oral presentations, to make additional evidence available, and to participate in direct discussions with government-industry technical people in the aircraft lighting field.

From a study of all comments made on the issue, those who support the need for an extension of SR-392C contend essentially as follows: (1) Experimental lighting systems now operating under SR-392C are more effective than the system prescribed in the Civil Air Regulations; (2) much money and time has been invested in the experiments, which would be wasted if SR-392C were terminated; (3) extension would continue grassroots cooperation between experienced FAA inspectors and inventors, and stimulate inventive initiatives; (4) unrestrictive field testing would insure reliability of new lighting equipment by exposing it to actual service conditions; (5) a new lighting concept cannot attract financing, or interest manufacturing management, unless its sales potential is established by flight demonstrations to prospective customers; and (6) there is no satisfactory alternative to extension of SR-392C.

After more than 10 years of experimentation under the provisions of SR-392C and predecessor special regulations, the evidence supporting

the contention that various experimental lighting systems surpass the standard system now prescribed in the Civil Air Regulations remains inconclusive. For the most part, reports submitted by experimenters contain subjective evaluations of proposed systems without the use of experimental controls to insure a valid basis for comparison. Tests and studies conducted by the Navy Department and by the Agency's National Aviation Facilities Experimental Center have not corroborated the advantages claimed by private experimenters for their respective systems.

The experiments were no doubt expensive and time-consuming, but the persons who undertook them did so voluntarily and with no assurance of success. In any case, the costs incurred in such experiments do not justify the indefinitely prolonged display of experimental lighting systems, since these systems necessarily introduce some degree of ambiguity and confusion in night operations.

Termination of SR–392C would not prevent further lighting experimentation since such experiments could still be performed under the terms of an experimental airworthiness certificate. There appears to be no reason why cooperation between FAA inspectors and inventors would necessarily diminish if further lighting experiments were conducted only on that basis.

The point that unrestricted field testing insures reliability of experimental lighting equipment is largely irrelevant since the objective of SR–392C was to facilitate experiments with new lighting concepts rather than to achieve component reliability. Component technology is not in question; and, in any case, there is no evidence that unusual problems exist. Further, reliability can be attained to a large extent by laboratory tests in a simulated environment, a practice which has worked satisfactorily in the past.

It may be true that the privileges granted by SR–392C (as opposed to the generally more restrictive terms of experimental airworthiness certificates) make it easier to finance new lighting concepts, but similar privileges are not granted to those who experiment with aircraft in other ways. This preference for one class of experimenters over all other classes has not been justified in terms of safety improvements achieved to date.

Reasonable alternatives to SR–392C are, in fact, open to experimenters. Experiments may be conducted under the terms of an experimental airworthiness certificate; and the Agency's well-equipped experimental facilities, with trained personnel, are now available for cooperative evaluation of new lighting concepts developed by inventors.

For these reasons, the Agency concludes that the arguments offered in support of an extension of SR–392C are not persuasive; and SR–392C will not be continued in effect beyond June 25, 1962. However, the Agency believes that a reasonable transition period of not less than one year should be established. This would permit 6 months for completion of experiments begun before June 25, 1962, the maximum period of experimentation permitted under SR–392C without special permission, and would allow not less than an additional 6 months for airplane modifications that may be necessitated by the termination of experimentation hereunder.

The various experiments which were conducted under the provisions of SR–392C and predecessor special regulations, although inconclusive, have, nevertheless, helped to crystallize the Agency's position on the need for revisions of the currently effective exterior lighting regulations. Therefore, a proposed rule concerning these requirements is under study by the Agency. If rule making action is initiated as a result of this study, it may ultimately affect some of the details of the lighting systems now required to be installed on aircraft. Moreover, if such rule making action is initiated it may not be completed before December 25, 1962. In such case, a requirement to accomplish the necessary modifications within one year after the termination of SR–392C, i.e., by June 25, 1963, may not provide the operator with a period of 6 months in which to accomplish the modifications, if any, required by the regulation.

In order to permit an adequate transition period for the accomplishment of any necessary modifications, this regulation permits the current experimental lighting systems to be used until June 25, 1963, or 6 months after completion of the proposed rule making action in regard to exterior lighting systems, whichever date is later. If, however, the Agency finds at the conclusion of its studies that rule making action will not be adopted an appropriate notice thereof will be issued and published in the Federal Register. In such case this regulation also permits the experimental lighting systems to be used until June 25, 1963, or 6 months after such notice is published in the Federal Register, whichever date is later.

In consideration of the foregoing, the following Special Civil Air Regulation is adopted to become effective on June 25, 1962:

Contrary provisions of the Civil Air Regulations notwithstanding, experimental exterior lighting systems which do not comply with the Civil Air Regulations, and which were installed for the purposes of experimentation on aircraft with standard airworthiness certificates under the provisions of SR–392B or SR–392C, may be displayed until:

(1) 6 months after the date of publication in the Federal Register of either

(i) revised standards adopted by the Agency for exterior lighting systems, or

(ii) a notice that rule making action to revise such standards will not be adopted by the Agency; or

(2) June 25, 1963, if later than that specified in paragraph (1).

This Special Civil Air Regulation shall remain in effect until superseded or rescinded.

SPECIAL CIVIL AIR REGULATION NO. SR-395A

Effective: February 20, 1955
Adopted: February 17, 1955

Authorization for Air Taxi Operators to Conduct Operations Under the Provisions of Part 42 of the Civil Air Regulations—Extension of Expiration Date for Air Taxi Operator Certificates

On January 11, 1952, the Board adopted Special Civil Air Regulation SR-378, which provided that air taxi operators as defined in section 298.1 (a)(2) of Part 298 of the Board's Economic Regulations, shall be certificated and shall conduct operations in accordance with the applicable provisions of Part 42 of the Civil Air Regulations. Subsequently, on June 1, 1953, the Board adopted currently effective Special Civil Air Regulation SR-395, which superseded SR-378 and provided that air taxi operator certificates should continue in effect until the termination of the economic exemption authority contained in Part 298, namely, until February 20, 1955. On December 21, 1954, the Board issued a notice of proposed rule-making (Economic Regulations Draft Release No. 71), which proposed to delete the economic exemption authority termination date of February 20, 1955, which existed in Part 298. This proposal would have put the exemption authority granted to air taxi operators on a permanent basis.

The Board concurrently with the issuance of this Special Civil Air Regulation is extending the exemption authority contained in Part 298 pending a final determination as to the proper economic limitations which should be imposed on air taxi operators. It appears certain, however, that some form of economic exemption authority for air taxi operators will be continued on a permanent basis. It therefore is desirable to extend Special Civil Air Regulation SR-395 to provide for such operations.

Part 42 of the Civil Air Regulations is presently undergoing revision. This proposed revision would make Part 42 applicable solely to large aircraft; and it would be necessary to prepare a new Part for the certification and operation of small aircraft (air taxi operators). Revised Part 42 and proposed regulations to cover air taxi operations are presently being prepared in draft release form, and it is estimated that they will be adopted by the Board for circulation as a notice of proposed rule-making in the near future. For this reason, Special Civil Air Regulation SR-395 is being extended until such time as a new permanent Part, covering the certification and operation of small aircraft, becomes effective. Notice of this extension was published in the Federal Register on January 19, 1955 at 20 F.R. 422.

Interested persons have been afforded an opportunity to participate in the making of this regulation, and due consideration has been given to all relevant matter presented. Since this regulation imposes no additional burden on any person, it may be made effective without prior notice.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective February 20, 1955:

Notwithstanding the provisions of Parts 40 and 41 of the Civil Air Regulations, any air taxi operator as defined in section 298.1(a)(2) of Part 298 of the Board's Economic Regulations shall be certificated and shall conduct operations in air transportation in accordance with the provisions of Part 42 of the Civil Air Regulations: *Provided,* That any air carrier operating certificate issued for air taxi operations which is in effect on, or issued after, the effective date of this regulation shall remain in effect until the expiration of this special regulation, unless such certificate is sooner surrendered, suspended, or revoked.

This regulation supersedes Special Civil Air Regulation SR–395 and shall remain in effect until such time as new air taxi certification and operation rules become effective, unless sooner terminated or rescinded by the Board.

SPECIAL CIVIL AIR REGULATIONS NO. SR–405

Effective: June 14, 1954
Adopted: June 14, 1954

Crew Flight Time Limitations for Certain Transcontinental Nonstop Operations

By application filed on May 6, 1954, American Airlines, Inc. petitioned the Board to grant it a waiver of section 40.320(b) of the Civil Air Regulations to enable it to continue nonstop transcontinental operations. Petitions seeking substantially the same relief were subsequently filed by United Air Lines and by Trans World Airlines. Interested parties were given an opportunity to file written comments with respect to the several petitions, and oral argument was heard by the Board on May 25, 1954.

For a more complete description of the procedural steps leading to this action, of the considerations which have moved the Board in respect thereto, and of the reasons for the limitations thereon, reference is made to the opinion of the majority of the Board issued concurrently herewith, which is incorporated herein as though set forth in full.

Interested parties have been afforded an opportunity to participate in the making of this regulation, and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective June 14, 1954:

Notwithstanding the requirements of section 40.320(b) of the Civil Air Regulations, air carriers in the conduct of scheduled transcontinental nonstop flights, may schedule flight crew members for more than eight but not more than ten hours of continuous duty aloft without an intervening rest period; *Provided that,* the flight is conducted in pressurized airplanes with a flight crew of at least two pilots and a flight engineer. This regulation shall apply only to scheduled transcontinental nonstop operations, and shall terminate with the effective date of any final action taken by the Board in respect of Draft Release No. 54–16 (Flight Time Limitations for Long Distance Scheduled Interstate Operations, published in the Federal Register on June 4, 1954, p. 3307).

INTERPRETATION OF SPECIAL CIVIL AIR REGULATION SR–405

Adopted: June 23, 1954

Crew Flight Time Limitations for Certain Transcontinental Nonstop Operations

On June 14, 1954, the Board, after notice to interested persons and receipt of comment and oral argument, promulgated Special Civil Air Regulation SR–405. By this regulation air carriers were permitted, in the conduct of scheduled transcontinental nonstop flights, to schedule flight crew members for more than eight but not more than ten hours of continuous duty aloft without an intervening rest period. By petition filed June 16, 1954, the Air Line Pilots Association has requested the Board to reconsider this action.

The Board by order issued concurrently herewith has denied the petition of the Air Line Pilots Association, but because that petition raised certain questions with respect to the Board's intent in promulgating SR–405, the Board considers it desirable and in the public interest to issue this interpretation of that regulation.

The Board in issuing SR–405 did so because it was convinced that the transcontinental nonstop operation was, if anything, safer than a scheduled one or two stop flight over the same route, and that the additional flight time which the pilots might be required to put in on any given day would not so decrease their piloting effectiveness that safety would be adversely affected at any time during the flight. In arriving at its conclusion the Board had in mind the fact that a twelve-hour maximum flight time limitation has been in effect in overseas and international operations for several years, and that the Board has had no evidence that this latter rule has adversely affected the safety of the operations covered. For a more complete description of the considerations which impelled the Board to take this action, reference is made to the opinion published with the regulation.

At the same time, the Board, bearing in mind the rule-making proceeding initiated by it on May 28, 1954, to consider an increase in the flight time limitations from eight to twelve hours for certain operations within the continental United States and any related limitations, did not wish to anticipate or otherwise prejudice its action therein. Consequently in issuing the Special Civil Air Regulation, the Board circumscribed it with certain safeguards which may or may not prove to be appropriate to the final rule which may come out. These safeguards include an extension to no more than ten hours of scheduled flight time, rather than the twelve hours which are applicable in the overseas and international rules and which are contained in the notice of proposed rule-making above referred to. Moreover, the limitation was imposed that the airplanes on which crews were so scheduled must be pressurized. It was recognized that sound operational practices could not guarantee that flight crews will not be required by force of circumstances to fly occasionally more than

ten hours. However, it was the Board's intention that only circumstances beyond the carrier's power to control should bring such a situation about. Thus, the Board does not expect that carriers will make substitution in equipment, unless that equipment itself is capable under normal conditions of making the trip concerned nonstop and within the ten-hour period.

In SR–405 the Board used the words "may schedule flight crew members for more than eight but not more than ten hours of continuous duty aloft without an intervening rest period". This phraseology parallels that used in flight time limitations in the Civil Air Regulations, and consistently therewith, must be held to mean that the crew members may lawfully be assigned to a trip which is scheduled to be and on the average is completed within the prescribed maximum time. However, individual flights may exceed the limit, in which case the crew is normally expected to remain on duty. Obviously, it is possible that unexpected circumstances, such as mechanical interruptions requiring landings en route, may so delay the flight that it would be unsafe for the crew to continue on to final destination without some rest. In such circumstances, it is not only the crew's privilege to refuse to continue the flight, but its duty to do so. Section 43.42 of the Civil Air Regulations specifically prohibits a pilot from operating an aircraft during a period of known physical deficiency, and a temporary impairment produced by extreme fatigue comes within the terms of that section. Moreover, this rule is confirmed by the provisions of section 40.391(a), which provides that "No aircraft shall be continued in flight toward any airport to which it has been dispatched when, in the opinion of the pilot in command or the aircraft dispatcher, the flight cannot be completed with safety, unless in the opinion of the pilot there is no safer procedure".

The fact that landings are made in the course of a scheduled transcontinental nonstop flight will not operate to cut back the allowable scheduled flight time from ten to eight hours, provided that the landings are made for reasons of safety of the flight or of those on board. Any stop for a traffic purpose, however, would take the flight out of the class covered by the special regulation, and the general eight-hour rule would apply.

If a mechanical difficulty should arise in the course of a transcontinental nonstop flight, and the captain elects to return to the point of departure, SR–405 does not prohibit the same crew from taking the flight out again, even after a delay of several hours, just as would be possible under the regular eight-hour rule. However, as stated above, if the captain believes that the flight cannot be completed with safety because of his fatigued condition or that of other members of the crew, his obligation is not to proceed.

SR–405 contains two conditions which must be met on every flight covered by its terms. These conditions are that the particular airplane be pressurized and that it be manned by at least two pilots and a flight engineer. The Board construes the word "pressurized" as requiring that the pressurization system be operative at the time of commencement of the flight.

While theoretically any number of unscheduled landings for safety

purposes may be made, it is expected that the great majority of transcontinental flights covered by SR–405 will be made nonstop, that more than one stop will be necessary in only rare instances, and that more than two such stops on any scheduled nonstop flight would be presumptive of such operational irregularity as to require investigation by the Administrator.

Neither SR–405 nor any other provision of the Civil Air Regulations imposes an absolute limitation on the total continuous duty time, including both time in the air and on the ground, of any member of the flight crew. Because of the nonstop nature of the operation, however, the total continuous on-duty time of the crew will regularly be less than on a number of flights operated by the airlines under the eight-hour rule for years. In the rare instance where unforeseen difficulties require landings en route, with a substantial extension of on-duty time, the pilot's honest judgment of his own and his crew's physical condition will be an adequate guarantee that the flight will be conducted safely.

In considering the application of SR–405, it is to be noted that section 40.353 requires that in establishing operations schedules the air carrier take into account certain operating conditions pertinent to the determination of total time of any particular scheduled flight. It is the duty of the Administrator, on the basis of all available information, to determine whether the air carrier has in fact correctly assessed pertinent operating conditions. In the event the Administrator finds that adequate assessment of such operating conditions has not been made, it is expected that he will take appropriate action to cause revision of such operations schedules.

SPECIAL CIVIL AIR REGULATION NO. SR–406C

Effective: July 1, 1956
Adopted: June 28, 1956

Application of Transport Category Requirements to C–46-Type Airplanes

On June 30, 1954, the Civil Aeronautics Board adopted Special Civil Air Regulation No. SR–406, effective July 1, 1954, which provided for the modification and operation of C–46 type airplanes in passenger service. On June 7, 1955, the Board adopted Special Civil Air Regulation No. SR–406A, effective June 7, 1955, which added certain substantive and clarifying amendments to SR–406. On March 30, 1956, the Board adopted Special Civil Air Regulation No. SR–406B, effective April 1, 1956, which extended the date for modification of C–46 airplanes in passenger service from April 1, 1956, to July 1, 1956. The preamble material of these three Special Civil Air Regulations is incorporated herein by reference.

SR–406B provided only temporary relief from those provisions of Special Civil Air Regulation No. SR–406A which prevented the use of C–46 airplanes in passenger operations under Part 42 of the Civil Air Regulations on and after April 1, 1956, unless recertificated in accordance with the regulation. In SR–406B, the Board indicated that subject to persuasive reasons for failing, type certification had to be accomplished before July 1, 1956, and that, within the effective period of the regulation, the Board would determine a later end effective date by which recertification of these airplanes in the transport category must be completed. It was expressly stated that the later end effective date for recertification would depend on a bona fide showing of meeting the type certification requirements.

Since the adoption of Special Civil Air Regulation No. SR–406B, two type certificates have been issued under its provisions and one application for a type certificate has been received although complete data have not been submitted to the Civil Aeronautics Administration as of the date of adoption of this regulation, SR–406C.

In adopting SR–406B, the Board anticipated obtaining a schedule of modification of C–46 airplanes from the applicants for type certification. In its attempt to obtain this information, not only has the Board not received such a schedule, but has been advised that only a comparatively few operators have actual contractual agreements with holders of type certificates to accomplish the required modification.

The Board has previously stated that a final compliance date for modification would depend on a bona fide showing that the aircraft certification requirements will be met in the reasonably near future. However, in the absence of such a showing by more than a few operators, the Board must establish an end compliance date without the benefit of any complete and detailed modification schedules. In the only formal request for an extension of the effective date of these regulations which the Board has received, it is indicated that required modifications are

expected to be completed by January 1, 1957. No other information available to the Board indicates that this is not a reasonable end effective date; therefore, January 1, 1957, is hereby established as the date when recertification is required.

Since October 1, 1955, the Administrator has been authorized to permit the continued operation of C–46 aircraft in passenger service on a showing by operators that "genuine and diligent efforts" have been made to accomplish the required modifications. In the light of the fact that there now exist at least two persons possessing type certificates on the basis of which such modifications may be made, there no longer appears to be any reason for not requiring the showing of a firm contract between the operator and the holder of such a type certificate indicating that the required modifications will be completed prior to January 1, 1957, prior to such operations. Accordingly, this Special Civil Air Regulation contains a requirement that before the Administrator is authorized to continue to permit operation of C–46 airplanes in passenger service, between July 1, 1956, and January 1, 1957, there must be a showing by the operator that he has a firm contract with the holder of a type certificate to complete modifications prior to January 1, 1957, except that the Administrator may authorize during the period July 1, 1956, through July 15, 1956, such operations without a showing of such firm contract where the Administrator has previously permitted such operations based on genuine and diligent efforts to complete the required modifications. In other words, the Administrator may authorize continued operations of C–46 airplanes in passenger service from July 1, 1956, to July 16, 1956, where he has previously given such authority. However, on and after July 16, 1956, the Administrator may authorize such continued operations only upon a showing by the operator that he has a firm contract with the holder of a type certificate to complete modifications prior to January 1, 1957.

As stated hereinbefore, all the preamble material pertinent to the application of transport category requirements to C–46 type airplanes appearing in SR–406, SR–406A, and SR–406B is incorporated herein by reference. However, in order to obviate any possible confusion as to which specific regulations are presently applicable to accomplish the recertification of the C–46 in passenger service, all such regulations are included in this Special Civil Air Regulation.

Since this regulation continues in effect the same rules as are presently applicable to C–46 type airplanes, with the exception of the compliance date listed herein, without diminution in safety standards, and since it would be in the public interest to prescribe rules to become effective on July 1, 1956, to permit the continuation of operation of C–46 type airplanes in passenger service, the Board finds that omission of notice and public procedure is not contrary to public interest and that good cause exists for making this regulation effective on less than 30 days' notice.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective July 1, 1956:

1. Contrary provisions of the Civil Air Regulations notwithstanding (in particular the provisions of section 42.15(b) of Part 42), C–46 airplanes may be used in passenger operations conducted under Part 42 of the Civil Air Regulations. Such airplanes shall be operated in accord-

ance with section 42.15(a) of Part 42 and the provisions of this special regulation.

2. C–46 type airplanes, when used in passenger operations in accordance with paragraph 4 of this regulation, shall not be operated at weights exceeding those which are demonstrated to the Administrator will allow compliance with the performance requirements of Part 4b, except that in determining the maximum take-off weight, such weight shall be limited only to a value at which the airplane has a rate of climb equal to 0.035 V_{s1}^2 in the take-off configuration at sea level with the landing gear retracted but with the propeller of the inoperative engine feathered rather than windmilling.

3. Provisionally, pending a determination by the Administrator of the weights at which C–46 airplanes will meet the standards prescribed by paragraph 2 of this regulation, the maximum take-off weight of such airplanes, when used in the manner herein referred to, shall not exceed 44,300 pounds: *Provided,* That in the case of C–46 airplanes equipped with Hamilton Standard propellers with blades Model Number 6419A–9 or approved equivalent which have been clipped in accordance with specifications approved by the Administrator, such provisional maximum weight shall be increased by 1,000 pounds until such time as the Administrator shall have determined by suitable tests another value to correspond to the additional efficiency obtainable by the use of such propellers, and thereafter by such other value.

4. The Administrator of Civil Aeronautics may authorize continued operation of C–46 airplanes in passenger service in accordance with paragraphs 2 and 3 of this regulation until January 1, 1957, if he finds that the applicant for such authorization has a bona fide, firm contract with the holder of a type certificate indicating that the required modifications will be completed prior to January 1, 1957, except that the Administrator may authorize during the period July 1, 1956, through July 15, 1956, such continued operation without a showing of such firm contract where the Administrator has previously permitted such operations based on genuine and diligent efforts to complete the required modifications. Such type certificate shall indicate that it meets the transport category requirements of Part 4b of the Civil Air Regulations in effect on July 20, 1950, with the exceptions authorized in SR–406A.

5. On and after July 1, 1956, (except as provided in paragraph 4) C–46 airplanes in passenger service shall comply with the provisions of Part 4b as in effect on July 20, 1950, except as otherwise provided hereinafter:

a. The provisions of sections 4b.0 through 4b.19 of Part 4b, effective May 18, 1954, shall be complied with.

b. The provisions of sections 4b.100 through 4b.190 need not be complied with.

c. The birdproof windshield requirements of section 4b.352 need not be complied with.

d. The provision of sections 4b.480 through 4b.490 effective May 16, 1953, shall be complied with in lieu of sections 4b.480 through 4b.489 effective July 20, 1950, with the exception of subparagraph 4b.484(a)(1) which shall be applicable as effective July 20, 1950, and paragraph 4b.487(e) which has no counterpart in the 1950 regulations.

6. On and after January 1, 1957, C–46 airplanes in passenger service shall be recertificated in the transport category in accordance with paragraph 5 of this regulation, and shall comply with the provisions of sections 4b.100 through 4b.190 with the following exception: In determining the take-off path in accordance with section 4b.116 and the one-engine-inoperative climb in accordance with section 4b.120 (a) and (b), the propeller of the inoperative engine may be assumed to be feathered if there is installed either an approved means for automatically indicating when the particular engine has failed or an approved means for automatically feathering the propeller of the inoperative engine.

7. In applying the provisions of paragraphs 5 and 6 of this regulation, where literal compliance with the requirements of sections 4b.130 through 4b.190 of Subpart B and Subparts C, D, E, and F of Part 4b is extremely difficult to accomplish, and where the Administrator finds that service experience with the C–46 type airplane so justifies, the Administrator may authorize deviations from specific details of these requirements, taking into account the effect of design changes.

8. On or after January 1, 1957, C–46 airplanes in passenger service shall be operated in accordance with the performance operating limitations applicable to transport category airplanes.

9. C–46 airplanes which comply with the provisions of paragraphs 5 and 6 of this regulation may be used in passenger operations conducted under the provisions of Parts 40 and 41 provided they are operated in accordance with paragraph 8.

10. This Special Civil Air Regulation supersedes Special Civil Air Regulation SR–406B.

SPECIAL CIVIL AIR REGULATION NO. SR-411B

Effective: June 30, 1962
Adopted: June 29, 1962
Published: July 4, 1962
(27 F.R. 6321)

Operation of Certain Transport Category Airplanes in Cargo Service at Increased Zero Fuel and Landing Weights

The Federal Aviation Agency published as a notice of proposed rule making (27 F.R. 3890) and circulated as Civil Air Regulations Draft Release No. 62-18 dated April 19, 1962, a proposed Special Civil Air Regulation to permit certain transport category airplanes to be operated in cargo service at increased zero fuel and landing weights. The proposed regulation was intended to supersede Special Civil Air Regulation No. SR-411A, which contains a termination date of June 30, 1962.

Trial operations of cargo airplanes (Douglas DC-6A) at increased weights were first authorized in waivers issued by the Civil Aeronautics Board to individual air carriers. The first such waiver was issued on July 21, 1954. The weights involved were the zero fuel weight (i.e., the maximum weight of the airplane with no disposable fuel and oil, which has the effect of limiting the weight of the fuselage contents) and the structural landing weight. The weight increases were limited to not more than 5 percent of the zero fuel weight approved for passenger operations, and their use was made contingent upon certain findings by the Administrator of Civil Aeronautics and upon certain conditions of operation, inspections, and reporting. Authorization of the trial operations was predicated on the premise that such operations could eventually lead to the establishment of a sound basis for differentiating between standards for passenger and cargo air carrier operations. Based upon the trial operations under the waivers, the Board determined that a more extensive background of operating experience was necessary. This led to the promulgation of Special Civil Air Regulation No. SR-411 (20 F.R. 4765) which permitted any number of any type of transport category airplane to be operated by any air carrier at increased weights in cargo service.

From the data submitted by the operators in accordance with SR-411, the Board concluded that the scope of operations under SR-411 had been such that substantiation of the conditions for these operations for inclusion in the regulations on a permanent basis would entail a long-range program. The Board, therefore, extended the trial operations by adopting SR-411A on June 28, 1957 (22 F.R. 4684), with a termination date of June 30, 1962.

SR-411A is applicable to airplanes certificated under the transport category airworthiness requirements effective before March 13, 1956. The applicability was so limited because the Board believed it advisable to gain some experience with the airplanes certificated under the provisions of Part 4b effective on and after March 13, 1956, at the normal transport category weights before permitting such airplanes to operate at increased

weights. In arriving at this conclusion, the Board took into consideration the new concept of structural design requirements as well as other related changes in these requirements which were introduced in Part 4b on March 13, 1956.

As the preambles to both SR–411 and SR–411A indicated, the purpose in permitting the trial operation of transport category airplanes in cargo service at the arbitrary increased zero fuel and landing weights was to determine through operating experience whether the conditions governing the trial operations would provide a sound basis for establishing future standards for airplanes in cargo operations at increased weights. During the approximately seven years that these trial operations have been conducted, a substantial amount of data has been amassed concerning the airplanes approved for operation under these Special Civil Air Regulations.

The data submitted and the operating experience gained under SR–411 and SR–411A indicate that the airplanes approved for and operated at the increased weights can continue to be operated at such increased weights under certain conditions without adverse effect upon the safety of such airplanes. The inspection reports submitted by the operators under SR–411 and SR–411A have not indicated any serious structural difficulties resulting from operation at the increased weights. The service history of these airplanes with respect to fatigue cracks and other damage is similar to that for airplanes of the same type operated in passenger service. Furthermore, cargo operators have expressed a need to continue operation of these airplanes at the increased weights in their cargo operations. Therefore, Draft Release 62–18 proposed to extend the provisions of SR–411A indefinitely to the types of airplanes that have been qualified and operated at such weights. However, the proposal did not specify the particular models of the various types approved for increased weights under SR–411 and SR–411A. Furthermore, it has subsequently been determined that the L–1649A airplane as modified under supplemental type certificate SA 4–1402 has been approved for operation and has been operated under the provisions of SR–411A. While the application for the type certificate for this airplane was filed in 1955, the manufacturer elected to comply with the later requirements of Part 4b rather than those in effect at the time of his application for type certificate. Subsequently, a supplemental type certificate was issued covering a modification to this airplane based on a demonstration of compliance with the requirements in effect on the date of the application for the type certificate for the airplane. Since this modified airplane was certificated in accordance with the provisions of Part 4b, effective prior to March 13, 1956, it is included in the airplanes permitted to be operated under the terms of this special regulation.

One of the comments received in response to Draft Release 62–18 expressed opposition to the proposed indefinite extension of SR–411A on the grounds that there should be one set of safety standards for the design and operation of all transport category airplanes without regard as to whether the airplane is used for the carriage of cargo or passengers. In this respect, it should be noted that the airplanes covered under this regulation are the airplanes which have been operated for the carriage

of cargo at the increased weights without any adverse effect on safety, and that the special inspections conducted by the operators have not indicated any serious structural problems with respect to these airplanes operated at the increased weights as compared with airplanes operated in passenger operations. Furthermore, this regulation requires operators to continue these special inspections. Consequently, the Agency does not believe that it would be justified in arbitrarily terminating the authorization to operate such airplanes at the increased weights.

On the other hand, the majority of the comments received in response to Draft Release 62–18 concurred in the proposed regulation and at the same time recommended that various airplanes other than those covered in the proposal be permitted to operate in cargo service at the arbitrary increased weights. Numerous and detailed arguments have been presented in support of these recommendations for broadening the scope of the proposal. However, these recommendations require consideration of matters which go beyond the scope of the proposed regulation, and there is not sufficient time remaining prior to the expiration of SR–411A for the necessary evaluation of such matters. Therefore, the regulation is being adopted substantially as proposed and further study will be given to such recommendations insofar as they might indicate a need for additional rule making action on this matter.

In view of the foregoing, the special regulation set forth hereinafter permits only those airplane types and models which were approved for trial operations under SR–411 and SR–411A to be used in the carriage of cargo with the arbitrary increased weights.

This regulation relaxes the provisions of SR–411A to the extent that it also applies to foreign air carriers operating the specified airplanes. The provisions of SR–411A were made applicable only to United States air carriers because the conditions for the trial operations required close cooperation between the manufacturer, operator, and the Civil Aeronautics Administration during the initial technical evaluation and in the inspection and reporting procedures. However, since this regulation permits the continued use of increased weights only for those type airplanes previously approved for operation under SR–411A, for which the necessary data and procedures are already available, the incresed weights can now be made applicable to any foreign air carrier using airplanes of the specified types in the carriage of cargo only.

This regulation continues the requirement contained in SR–411A that airplanes used by air carriers at the increased weights be operated in accordance with the passenger-carrying transport category operating limitations of Part 40, 41, or 42, as the case may be. In addition, foreign air carriers are permitted to operate airplanes under the authority of this regulation if the country of registry of the airplanes requires such airplanes to be operated in accordance with the performance operating limitations applicable to United States air carriers or the equivalent thereof. The requirement that air carriers must operate their airplanes under the provisions of the regulation in accordance with the passenger-carrying performance operating limitations prescribed in Part 40, 41, or 42 is considered necessary in the interest of safety. Therefore, in order to insure an equivalent level of safety for operations by foreign air carriers, it is

considered appropriate to permit such carriers to operate airplanes under the authority of this regulation only on the condition that the country of registry of the airplanes requires that such airplanes be operated in accordance with the same or equivalent performance operating limitations.

This regulation also continues the requirement for special inspections, including the special inspections required prior to returning an airplane from cargo to passenger service. However, in view of the volume of data now available for the eligible airplane types, it no longer requires special reports and records be kept with respect to operations at increased weights. Based on experience gained under SR–411 and SR–411A, it is believed that intermittent cargo-passenger operations can now be permitted provided the special inspection is made each time the airplane is returned to passenger service.

This regulation contains a proviso, similar to that which appears in SR–411A, requiring a determination that any increase in the zero fuel and landing weights for the specified airplanes does not seriously affect the strength, fatigue, flutter, deformation, or vibration characteristics of such airplanes. While not proposed in Draft Release 62–18, the Agency is now of the opinion that even though such a determination has already been made for the increased weights presently authorized for the specified airplanes, such a requirement should be continued in effect to cover possible modifications to these airplanes as well as further increases in the approved weights. Since this provision merely continues in effect a provision currently applicable to the specified airplanes and imposes no additional burden on any person, notice and public procedure thereon are unnecessary for its adoption as part of this regulation.

Interested persons have been afforded an opportunity to participate in the making of this regulation, and due consideration has been given to all relevant matter presented. Since this regulation extends many of the provisions of a currently effective regulation which expires on June 30, 1962, imposes no additional burden on any person, and a delay in its effectiveness would impose a hardship on the cargo operators, good cause exists for making it effective on less than 30 days' notice.

In consideration of the foregoing, the following Special Civil Air Regulation is adopted to become effective on June 30, 1962:

Notwithstanding the applicable structural provisions of the Civil Air Regulations, any air carrier or foreign air carrier may operate, for the carriage of cargo only, the transport category airplanes specified in paragraph (1) of this regulation, at increased zero fuel and landing weights, under the conditions specified in paragraphs (2) through (6) of this regulation.

(1) Transport category airplanes certificated under the provisions of Part 4b, effective prior to March 13, 1956, as follows:

(a) DC–6A, DC–6B, DC–7B, DC–7C; and

(b) L–1049B, C, D, E, F, G, H, L–1649A when modified in accordance with supplemental type certificate SA 4–1402.

(2) The zero fuel weight (maximum weight of the airplane with no disposable fuel and oil) and the structural landing weight may be increased beyond the maximum approved in full compliance with the appli-

cable Civil Air Regulations: *Provided,* That any increase in the zero fuel weight shall not exceed 5 percent and that the increase in the structural landing weight shall not exceed the amount, in pounds, of the increase in zero fuel weight: *And provided further,* That the Administrator finds that the increase in either such weight is not likely to reduce seriously the structural strength, that the probability of sudden fatigue failure is not noticeably increased, and that the flutter, deformation, and vibration characteristics do not fall below those required by the applicable Civil Air Regulations. All other weight limitations established in accordance with the Civil Air Regulations applicable to the type airplane shall apply.

(3) Each airplane shall be inspected in accordance with the special inspection procedures for operations at increased weights established and issued by the manufacturer of the particular type airplane and approved by the Administrator.

(4) Each airplane operated by an air carrier under this regulation shall be operated in accordance with the passenger-carrying transport category performance operating limitations prescribed in Part 40, 41, or 42. Operation of airplanes by a foreign air carrier is not permitted under the authority of this regulation unless the country of registry requires the airplanes to be operated in accordance with such performance operating limitations or the equivalent thereof.

(5) The Airplane Flight Manual for each airplane operated under the provisions of this regulation shall be appropriately revised to include the operating limitations and information required for operation with the increased weights.

(6) An airplane operated at increased weights under the provisions of this regulation shall be inspected in accordance with the special inspection procedures for return to passenger service established and issued by the airplane manufacturer and approved by the Administrator, before it is used in passenger service, except as provided for the carriage of persons under Special Civil Air Regulation No. SR–432A.

This regulation supersedes Special Civil Air Regulation No. SR–411A.

SPECIAL CIVIL AIR REGULATION NO. SR–420

Effective: May 21, 1957
Adopted: May 21, 1957

Emergency Evacuation Equipment for DC–3-Type Airplanes

Sections 40.173, 41.23d, and 42.24c effective November 28, 1955, require in part that after May 31, 1957, on all passenger-carrying airplanes, at all emergency exits which are more than 6 feet from the ground with the airplane on the ground and with the landing gear extended, means shall be provided to assist the occupants in descending from the airplane. This requirement was adopted on the basis of experience which had shown that in certain instances, it is essential that some means be provided to assist passengers in evacuating airplanes on the ground.

The application of this emergency evacuation requirement to the DC–3 airplane, however, would impose an economic burden on the operators of this airplane without a commensurate increase in safety. The rear window emergency exit of this airplane is just over 6 feet from the ground, with the landing gear extended, and accordingly would require the installation of a means to assist descent. However, the main passenger door and 2 window emergency exits which are located over the wings require no special means to assist descent and they afford an excellent means of emergency evacuation. Furthermore, a study of DC–3 airplane accidents from 1938 through 1955 does not disclose any incident in which the absence of a means to assist the descent of occupants from the rear window emergency exit adversely affected the emergency evacuation of passengers. This record can be attributed in great part to the fact that the DC–3 airplane does not utilize a nose-wheel type landing gear and the probability of the rear window emergency exit being raised above its normal height from the ground, such as can occur when a nose-wheel gear collapses, is extremely remote.

Accordingly, the Board is of the view that it is not necessary in the interest of safety to require that means be provided to assist occupants in descending from the rear window emergency exit of a DC–3 airplane. It should be noted, however, that a DC–3 operator would not be prevented from installing a means to assist descent should he so desire.

Interested persons have been afforded an opportunity to participate in the making of this regulation (22 F.R. 2663), and due consideration has been given to all relevant matter presented Since this regulation imposes no additional burden on any person, it may be made effective without prior notice.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective May 21, 1957.

Contrary provisions of sections 40.173(e), 41.23d(a), and 42.24c(a) of Parts 40, 41, and 42, respectively, of the Civil Air Regulations notwith-

standing, after May 31, 1957, means need not be provided to assist the occupants of a passenger-carrying DC–3 airplane in descending from the airplane by way of the rear window emergency exit: *Provided*, That the authority contained herein shall not apply to DC–3 airplanes which are operated with an occupancy greater than that specified in Special Civil Air Regulation No. SR–389 for DC–3 airplanes with 4 exits authorized for passenger use.

SPECIAL CIVIL AIR REGULATION NO. SR-422

Effective: August 27, 1957
Adopted: July 23, 1957

Turbine-Powered Transport Category Airplanes of Current Design

Part 4b of the Civil Air Regulations contains rules governing the design of transport category airplanes. For a number of years, this part has established airworthiness requirements for this category of airplanes by prescribing detailed provisions to be met for the issuance of a type certificate. However, the advent of turbine-powered airplanes (jets, turboprops, etc.) has brought about operations at considerably higher speeds and altitudes than those involving reciprocating engine airplanes. These higher speeds and altitudes as well as certain inherent characteristics of turbine engines have introduced numerous new technical and design problems and have necessitated re-evaluation and amendment of many provisions in Part 4b.

In recent years the Board has amended Part 4b by introducing numerous technical provisions more specifically applicable to turbine-powered airplanes. These were included in amendments pertaining to structural, flight characteristic, powerplant installation, and other provisions. It is believed that Part 4b as now written is applicable to turbine-powered airplanes with but one exception; namely, airplane performance. In the future, further amendments to this part, other than those relating to performance, will be comparatively minor in nature mainly reflecting the latest experience in the certification and operation of these airplanes.

The performance requirements presently in Part 4b were first promulgated almost twelve years ago. They are now considered by the Board to be in a form not suitable for direct application to turbine-powered airplanes.

The administrator of Civil Aeronautics is in receipt of a large number of applications for type certification of turbine-powered airplanes. However, the so-called "non-retroactive"clause of section 4b.11(a) of Part 4b does not make applicable to a particular airplane type any amendment which is adopted after an application is filed by the manufacturer for type certification of that airplane. Thus, most of these airplanes are not now required to meet some of the latest effective provisions of Part 4b unless the Board prescribes otherwise. With so many applications for type certificates pending, it is essential that the Board establish adequate requirements which will effectively apply to the type certification of turbine-powered transport category airplanes. This Special Civil Air Regulation is being promulgated for that purpose.

This Special Civil Air Regulation is being made effective with respect to all turbine-powered transport category airplanes not yet certificated. In essence, it prescribes a revised set of performance requirements for turbine-powered airplanes and incorporates such of the recent amend-

ments to Part 4b as the Administrator finds necessary to insure that the level of safety of turbine-powered airplanes is equivalent to that generally intended by Part 4b.

The performance requirements contained herein include not only the performance requirements necessary for the certification of an airplane, but also the complementary performance operating limitations as applicable under Parts 40, 41, and 42 of the Civil Air Regulations. In promulgating this new performance code, the Board intends that the resulting level of safety will be generally similar to the level of safety established by the performance code as expressed by the provisions now contained in Parts 4b and 40 (or 41 or 42 as appropriate) for reciprocating engine airplanes. To attain this, many of the performance provisions have been modified for better applicability to turbine-powered airplanes, some in the direction of liberalization, others in the direction of improvement in the required performance.

A significant change being made is the introduction of full temperature accountability in all stages of performance, except the landing distances required. The introduction of full temperature accountability will insure that the airplane's performance is satisfactory irrespective of the existing atmospheric temperature. The performance requirements heretofore applicable did not give sufficient assurance in this respect.

The reason for omitting the direct application of temperature accountability in the requirement for landing distances is that this stage of performance always has been treated in a highly empirical fashion whereby temperature effects are taken into account indirectly together with the effects of other operational factors. Long range studies on rationalization of airplane performance so far have not yielded a satisfactory solution to the landing stage of performance. The Board hopes, however, that continued studies will result in a solution of this problem in the near future.

The introduction of full temperature accountability has necessitated a complete re-evaluation of the minimum climb requirements. Since the prescribed climb must now be met at all temperatures rather than to be associated with standard temperature, the specific values of climb have been altered. In each instance, the change has been in the downward direction because, although the previous values were related to standard temperature, a satisfactory resultant climb performance was attained at temperatures substantially above standard. While values of minimum climb performance specified in the new code will tend to increase the maximum certificated weights of the airplane for the lower range of temperatures, they will limit these weights for the upper range of temperatures, giving adequate assurance of satisfactory climb performance at all temperatures.

In considering the various stages of flight where minimum values of climb have been heretofore established, the Board finds that in two of the stages (all-engines-operating en route and one-engine-inoperative en route) the establishment of minimum values of climb is unnecessary because, in the case of the all-engines-operating stage, it has been found not to be critical and the case of the one-engine-inoperative stage is now more effectively covered by the en route performance operating limitations.

Considering that the minimum climbs being prescribed affect mainly the maximum certificated weights of the airplane but not the maximum operating weights, the Board, in adopting the new performance code, places considerable emphasis on the ability of the airplane to clear obstacles on take-off and during flight. To this end, criteria for the take-off path, the en route flight paths, and the transition from take-off to the en route stage of flight have been prescribed to reflect realistic operating procedures. Temperature is fully accounted for in establishing all flight paths and an expanding clearance between the take-off path and the terrain or obstacles is required until the en route stage of flight is reached.

In order to insure that the objectives of the prescribed performance are in fact realized in actual operations, the manufacturer is required to establish procedures to be followed in the operation of the airplane in the various conditions specified in the regulation. These procedures, each designed for a specific airplane, will permit the operator to utilize the full performance capabilities of the airplane more readily than if the regulations prescribed all-inclusive procedures. The use of these procedures in determining compliance with the requirements governing take-off, en route, and landing stages, will also add considerable flexibility to the regulation.

The new performance requirements established more clearly than heretofore which of the performance limitations are conditions on the airworthiness certificate of the airplane. In addition to the maximum certificated take-off and landing weights, there are included limitations on the take-off distances and on the use of the airplane within the ranges of operational variables, such as altitude, temperature, and wind. Since these limitations are in the airworthiness certificate, they are applicable to all type operations conducted with the airplane.

The new performance code contains values for minimum climb expressed as gradients of climb, in percent, rather than as rates of climb, in feet per minute, as has been the case heretofore. The Board believes that the gradient of climb is more direct in expressing the performance margins of the airplane. Use of the gradient eliminates the influence of the stalling speed on the required climb. Heretofore, higher rates of climb were required for airplanes with higher stalling speeds. The only differentiation in the new code with respect to the required climb is between two and four-engine airplanes. This type of differentiation is of long standing in the regulations, being applicable to the one-engine-inoperative stage of flight. It is now being expanded to the take-off and approach stages.

The new performance requirements contained herein are based on the best information presently available to the Board. It is realized, however, that due to the present limited operating experience with turbine-powered transport airplanes, improvement in the requirements can be expected as a result of the direct application of the code to specific designs of new airplanes. There are certain areas in the new requirements where additional refinement of details might be advisable. This is so particularly in the case of the requirements pertaining to the landing stage of flight. It is anticipated that, after further study of the regulation and especially after its application in the design, certification, and operation of forthcoming turbine-powered airplanes, the desirability of changes

may become more apparent. It is the intent of the Board to consider without delay such changes as might be found necessary. Only after the provisions of this Special Civil Air Regulation are reasonably verified by practical application will the Board consider incorporating them on a more permanent basis into Parts 4b, 40, 41, and 42 of the Civil Air Regulations.

This Special Civil Air Regulation is not intended to compromise the authority of the Administrator under section 4b.10 to impose such special conditions as he finds necessary in any particular case to avoid unsafe design features and otherwise to insure equivalent safety.

Interested persons have been afforded an opportunity to participate in the making of this regulation (21 F.R. 6091), and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective August 27, 1957.

Contrary provisions of the Civil Air Regulations notwithstanding, all turbine-powered transport category airplanes for which a type certificate is issued after the effective date of this Special Civil Air Regulation shall comply with the following:

1. The provisions of Part 4b of the Civil Air Regulations, effective on the date of application for type certificate; and such of the provisions of all subsequent amendments to Part 4b, in effect prior to the effective date of this special regulation, as the Administrator finds necessary to insure that the level of safety of turbine-powered airplanes is equivalent to that generally intended by Part 4b.

2. In lieu of sections 4b.110 through 4b.125, and 4b.743 of Part 4b of the Civil Air Regulations, the following shall be applicable:

PERFORMANCE

4T.110 *General.*

(a) The performance of the airplane shall be determined and scheduled in accordance with, and shall meet the minima prescribed by, the provisions of sections 4T.110 through 4T.123. The performance limitations, information, and other data shall be given in accordance with section 4T.743.

(b) Unless otherwise specifically prescribed, the performance shall correspond with ambient atmospheric conditions and still air. Humidity shall be accounted for as specified in paragraph (c) of this section.

(c) The performance as affected by engine power and/or thrust shall be based on a relative humidity of 80 percent at and below standard temperatures and on 34 percent at and above standard temperatures plus 50° F. Between these two temperatures the relative humidity shall vary linearly.

(d) The performance shall correspond with the propulsive thrust available under the particular ambient atmospheric conditions, the particular flight conditions, and the relative humidity specified in paragraph (c) of this section. The available propulsive thrust shall correspond with engine power and/or thrust not exceeding the approved power and/or thrust less the installational losses and less the power and/or

equivalent thrust absorbed by the accessories and services appropriate to the particular ambient atmospheric conditions and the particular flight condition.

4T.111 *Airplane configuration, speed, power, and/or thrust; general.*

(a) The airplane configuration (setting of wing and cowl flaps, air brakes, landing gear, propeller, etc.), denoted respectively as the take-off, en route, approach, and landing configurations, shall be selected by the applicant except as otherwise prescribed.

(b) It shall be acceptable to make the airplane configurations variable with weight, altitude, and temperature, to an extent found by the Administrator to be compatible with operating procedures required in accordance with paragraph (c) of this section.

(c) In determining the accelerate-stop distances, take-off flight paths, take-off distances, and landing distances, changes in the airplane's configuration and speed, and in the power and/or thrust shall be in accordance with procedures established by the applicant for the operation of the airplane in service, except as otherwise prescribed. The procedures shall comply with the provisions of subparagraphs (1) through (3) of this paragraph.

(1) The Administrator shall find that the procedures can be consistently executed in service by crews of average skill.

(2) The procedures shall not involve methods or the use of devices which have not been proven to be safe and reliable.

(3) Allowance shall be made for such time delays in the execution of the procedures as may be reasonably expected to occur during service.

4T.112 *Stalling speeds.*

(a) The speed V_{s_0} shall denote the calibrated stalling speed, or the minimum steady flight speed at which the airplane is controllable, in knots, with:

(1) Zero thrust at the stalling speed, or engines idling and throttles closed if it is shown that the resultant thrust has no appreciable effect on the stalling speed;

(2) If applicable, propeller pitch controls in the position necessary for compliance with subparagraph (1) of this paragraph;

(3) The airplane in the landing configuration;

(4) The center of gravity in the most unfavorable position within the allowable landing range;

(5) The weight of the airplane equal to the weight in connection with which V_s is being used to determine compliance with a particular requirement.

(b) The speed V_{s_1} shall denote the calibrated stalling speed, or the minimum steady flight speed at which the airplane is controllable, in knots, with:

(1) Zero thrust at the stalling speed, or engines idling and throttles closed if it is shown that the resultant thrust has no appreciable effect on the stalling speed;

(2) If applicable, propeller pitch controls in the position necessary for compliance with subparagraph (1) of this paragraph; the air-

plane in all other respects (flaps, landing gear, etc.) in the particular configuration corresponding with that in connection with which V_{s_1} is being used;

(3) The weight of the airplane equal to the weight in connection with which V_{s_1} is being used to determine compliance with a particular requirement.

(c) The stall speeds defined in this section shall be the minimum speeds obtained in flight tests conducted in accordance with the procedure of subparagraphs (1) and (2) of this paragraph.

(1) With the airplane trimmed for straight flight at a speed of 1.4 V_s and from a speed sufficiently above the stalling speed to insure steady conditions, the elevator control shall be applied at a rate such that the airplane speed reduction does not exceed one knot per second.

(2) During the test prescribed in subparagraph (1) of this paragraph, the flight characteristics provisions of section 4b.160 of Part 4b of the Civil Air Regulations shall be complied with.

4T.113 *Take-off; general.*

(a) The take-off data in sections 4T.114 through 4T.117 shall be determined under the conditions of subparagraphs (1) and (2) of this paragraph.

(1) At all weights, altitudes, and ambient temperatures within the operational limits established by the applicant for the airplane.

(2) In the configuration for take-off (see sec. 4T.111).

(b) Take-off data shall be based on a smooth, dry, hard-surfaced runway, and shall be determined in such a manner that reproduction of the performance does not require exceptional skill or alertness on the part of the pilot. In the case of seaplanes or float planes, the take-off surface shall be smooth water, while for skiplanes it shall be smooth dry snow. In addition, the take-off data shall be corrected in accordance with subparagraphs (1) and (2) of this paragraph for wind and for runway gradients within the operational limits established by the applicant for the airplane.

(1) Not more than 50 percent of nominal wind components along the take-off path opposite to the direction of take-off, and not less than 150 percent of nominal wind components along the take-off path in the direction of take-off.

(2) Effective runway gradients.

4T.114 *Take-off speeds.*

(a) The critical-engine-failure speed V_1, in terms of calibrated air speed, shall be selected by the applicant, but shall not be less than the minimum speed at which controllability by primary aerodynamic controls alone is demonstrated during the take-off run to be adequate to permit proceeding safely with the take-off using average piloting skill, when the critical engine is suddenly made inoperative.

(b) The minimum take-off safety speed V_2, in terms of calibrated air speed, shall be selected by the applicant so as to permit the gradient of climb required in section 4T.120 (a) and (b), but it shall not be less than:

(1) 1.2 V_{s_1} for two-engine propeller-driven airplanes and for airplanes without propellers which have no provisions for obtaining a significant reduction in the one-engine-inoperative power-on stalling speed.

(2) 1.15 V_{s_1} for propeller-driven airplanes having more than two engines and for airplanes without propellers which have provisions for obtaining a significant reduction in the one-engine-inoperative power-on stalling speed;

(3) 1.10 times the minimum control speed V_{MC}, established in accordance with section 4b.133 of Part 4b of the Civil Air Regulations.

(c) If engine failure is assumed to occur at or after the attainment of V_2, the demonstration in which the take-off run is continued to include the take-off climb, as provided in paragraph (a) of this section, shall not be required.

4T.115 *Accelerate-stop distance.*

(a) The accelerate-stop distance shall be the sum of the following:

(1) The distance required to accelerate the airplane from a standing start to the speed V_1;

(2) Assuming the critical engine to fail at the speed V_1, the distance required to bring the airplane to a full stop from the point corresponding with the speed V_1.

(b) In addition to, or in lieu of, wheel brakes, the use of other braking means shall be acceptable in determining the accelerate-stop distance, provided that such braking means shall have been proven to be safe and reliable, that the manner of their employment is such that consistent results can be expected in service, and that exceptional skill is not required to control the airplane.

(c) The landing gear shall remain extended throughout the accelerate-stop distance.

4T.116 *Take-off path.* The take-off path shall be considered to extend from the standing start to a point in the take-off where a height of 1,000 feet above the take-off surface is reached or to a point in the take-off where the transition from the take-off to the en route configuration is completed and a speed is reached at which compliance with section 4T.120(c) is shown, whichever point is at a higher altitude. The conditions of paragraphs (a) through (i) of this section shall apply in determining the take-off path.

(a) The take-off path shall be based upon procedures prescribed in accordance with section 4T.111(c).

(b) The airplane shall be accelerated on or near the ground to the speed V_2 during which time the critical engine shall be made inoperative at speed V_1 and shall remain inoperative during the remainder of the take-off.

(c) Landing gear retraction shall not be initiated prior to reaching the speed V_2.

(d) The slope of the airborne portion of the take-off path shall be positive at all points.

(e) After the V_2 speed is reached, the speed throughout the take-off path shall not be less than V_2 and shall be constant from the point where the landing gear is completely retracted until a height of 400 feet above the take-off surface is reached.

(f) Except for gear retraction and propeller feathering, the airplane configuration shall not be changed before reaching a height of 400 feet above the take-off surface.

(g) At all points along the take-off path starting at the point where the airplane first reaches a height of 400 feet above the take-off surface, the available gradient of climb shall not be less than 1.4 percent for two-engine airplanes and 1.8 percent for four-engine airplanes.

(h) The take-off path shall be determined either by a continuous demonstration take-off, or alternatively, by synthesizing from segments the complete take-off path.

(i) If the take-off path is determined by the segmental method, the provisions of subparagraphs (1) through (4) of this paragraph shall be specifically applicable.

(1) The segments of a segmental take-off path shall be clearly defined and shall be related to the distinct changes in the configuration of the airplane, in power and/or thrust, and in speed.

(2) The weight of the airplane, the configuration, and the power and/or thrust shall be constant throughout each segment and shall correspond with the most critical condition prevailing in the particular segment.

(3) The segmental flight path shall be based on the airplane's performance without ground effect.

(4) Segmental take-off path data shall be checked by continuous demonstrated take-offs to insure that the segmental path is conservative relative to the continuous path.

4T.117 *Take-off distance.* The take-off distance shall be the horizontal distance along the take-off path from the start of the take-off to the point where the airplane attains a height of 35 feet above the take-off surface as determined in accordance with 4T.116.

4T.118 *Climb; general.* Compliance shall be shown with the climb requirements of sections 4T.119 and 4T.120 at all weights, altitudes, and ambient temperatures, within the operational limits established by the applicant for the airplane. The airplane's center of gravity shall be in the most unfavorable position corresponding with the applicable configuration.

4T.119 *All-engine-operating landing climb.* In the landing configuration, the steady gradient of climb shall not be less than 4.0 per cent, with:

(a) All engines operating at the available take-off power and/or thrust;

(b) A climb speed not in excess of 1.4 V_{S_0}.

4T.120 *One-engine-inoperative climb.*

(a) *Take-off; landing gear extended.* In the take-off configuration at the point of the flight path where the airplane's speed first reaches V_2, in accordance with section 4T.116 but without ground effect, the steady gradient of climb shall be positive with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available take-off power and/or thrust existing in accordance with section 4T.116 at the time the airplane's landing gear is fully retracted;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the time retraction of the airplane's landing gear is initiated;

(3) The speed equal to the speed V_2.

(b) *Take-off; landing gear retracted.* In the take-off configuration at the point of the flight path where the airplane's landing gear is fully retracted, in accordance with section 4T.116 but without ground effect, the steady gradient of climb shall not be less than 2.5 percent for two-engine airplanes and not less than 3.0 percent for four-engine airplanes, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the take-off power and/or thrust available at a height of 400 feet above the take-off surface and existing in accordance with section 4T.116;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the time the airplane's landing gear is fully retracted;

(3) The speed equal to the speed V_2.

(c) *Final take-off.* In the en route configuration, the steady gradient of climb shall not be less than 1.4 percent for two-engine airplanes and not less than 1.8 percent for four-engine airplanes, at the end of the take-off path as determined by section 4T.116, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available maximum continuous power and/or thrust;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the time retraction of the airplane's flaps is initiated;

(3) The speed equal to not less than 1.25 V_{s_1}.

(d) *Approach.* In the approach configuration such that V_{s_1} does not exceed 1.10 V_{s_0}, the steady gradient of climb shall not be less than 2.2 percent for two-engine airplanes and not less than 2.8 percent for four-engine airplanes, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available take-off power and/or thrust;

(2) The weight equal to the maximum landing weight;

(3) A climb speed in excess of 1.5 V_{s_1};

4T.121 *En route flight paths.* With the airplane in the en route configuration, the flight paths prescribed in paragraphs (a) and (b) of this section shall be determined at all weights, altitudes, and ambient temperatures within the limits established by the applicant for the airplane.

(a) *One engine inoperative.* The one-engine-inoperative net flight path data shall be determined in such a manner that they represent the airplane's actual climb performance diminished by a gradient of climb equal to 1.4 percent for two-engine airplanes and 1.8 percent for four-engine airplanes. It shall be acceptable to include in these data the variation of the airplane's weight along the flight path to take into account the progressive consumption of fuel and oil by the operating engine(s).

(b) *Two engines inoperative.* For airplanes with four engines, the two-engine-inoperative net flight path data shall be determined in such a manner that they represent the airplane's actual climb performance diminished by a gradient of climb equal to 0.6 percent. It shall be acceptable to include in these data the variation of the airplane's weight

along the flight path to take into account the progressive consumption of fuel and oil by the operating engines.

(c) *Conditions.* In determining the flight paths prescribed in paragraphs (a) and (b) of this section, the conditions of subparagraphs (1) through (4) of this paragraph shall apply.

(1) The airplane's center of gravity shall be in the most unfavorable position.

(2) The critical engine(s) shall be inoperative, the remaining engine(s) operating at the available maximum continuous power and/or thrust.

(3) Means for controlling the engine cooling air supply shall be in the position which provides adequate cooling in the hot-day condition.

(4) The speed shall be selected by the applicant.

4T.122 *Landing distance.* The landing distance shall be the horizontal distance required to land and to come to a complete stop (to a speed of approximately 3 knots in the case of seaplanes or float planes) from a point at a height of 50 feet above the landing surface. Landing distances shall be determined for standard temperatures at all weights, altitudes, and winds within the operational limits established by the applicant for the airplane. The conditions of paragraphs (a) through (f) of this section shall apply.

(a) The airplane shall be in the landing configuration. During the landing, changes in the airplane's configuration, in power and/or thrust, and in speed shall be in accordance with procedures established by the applicant for the operation of the airplane in service. The procedures shall comply with the provisions of section 4T.111(c).

(b) The landing shall be preceded by a steady gliding approach down to the 50-foot height with a calibrated air speed of not less than 1.3 V_{s_0}.

(c) The landing distance shall be based on a smooth, dry, hard-surfaced runway, and shall be determined in such a manner that reproduction does not require exceptional skill or alertness on the part of the pilot. In the case of seaplanes or float planes, the landing surface shall be smooth water, while for skiplanes it shall be smooth dry snow. During landing, the airplane shall not exhibit excessive vertical acceleration, a tendency to bounce, nose over, ground loop, porpoise, or water loop.

(d) The landing distance shall be corrected for not more than 50 percent of nominal wind components along the landing path opposite to the direction of landing and not less than 150 percent of nominal wind components along the landing path in the direction of landing.

(e) During landing, the operating pressures on the wheel braking system shall not be in excess of those approved by the manufacturer of the brakes, and the wheel brakes shall not be used in such a manner as to produce excessive wear of brakes and tires.

(f) If the Administrator finds that a device on the airplane other than wheel brakes has a noticeable effect on the landing distance and if the device depends upon the operation of the engine and the effect of such a device is not compensated for by other devices in the event of engine failure, the landing distance shall be determined by assuming the critical engine to be inoperative.

4T.123 *Limitations and information.*

(a) *Limitations.* The performance limitations on the operation of the airplane shall be established in accordance with subparagraphs (1) through (4) of this paragraph. (See also sec. 4T.743.)

(1) *Take-off weights.* The maximum take-off weights shall be established at which compliance is shown with the generally applicable provisions of this regulation and with section 4T.120 (a), (b), and (c) for altitudes and ambient temperatures within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(2) *Landing weights.* The maximum landing weights shall be established at which compliance is shown with the generally applicable provisions of this regulation and with sections 4T.119 and 4T.120(d) for altitudes and ambient temperatures within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(3) *Take-off and accelerate-stop distances.* The minimum distances required for takeoff shall be established at which compliance is shown with the generally applicable provisions of this regulation and with sections 4T.115 and 4T.117 for weights, altitudes, temperatures, wind components, and runway gradients, within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(4) *Operational limits.* The operational limits of the airplane shall be established by the applicant for all variable factors required in showing compliance with this regulation (weight, altitude, temperature, etc.). (See secs. 4T.113(a) (1) and (b), 4T.118, 4T.121, and 4T.122.)

(b) *Information.* The performance information on the operation of the airplane shall be scheduled in compliance with the generally applicable provisions of this regulation and with sections 4T.116, 4T.121, and 4T.122 for weights, altitudes, temperatures, wind components, and runway gradients, as these may be applicable, within the operational limits of the airplane (see subparagraph (a)(4) of this section). In addition, the performance information specified in subparagraphs (1) through (3) of this paragraph shall be determined by extrapolation and scheduled for the ranges of weights between the maximum landing and maximum take-off weights established in accordance with subparagraphs (a)(1) and (a)(2) of this section. (See also sec. 4T.743.)

(1) Climb in the landing configuration (see sec. 4T.119);

(2) Climb in the approach configuration (see sec. 4T.120(d));

(3) Landing distance (see sec. 4T.122).

AIRPLANE FLIGHT MANUAL

4T.743 *Performance limitations, information, and other data.*

(a) *Limitations.* The airplanes' performance limitations shall be given in accordance with section 4T.123(a).

(b) *Information.* The performance information prescribed in section 4T.123(b) for the application of the operating rules of this regulation shall be given together with descriptions of the conditions, air speeds, etc., under which the data were determined.

(c) *Procedures.* For all stages of flight, procedures shall be given with respect to airplane configurations, power and/or thrust settings, and indicated air speeds, to the extent such procedures are related

to the limitations and information set forth in accordance with paragraphs (a) and (b) of this section.

(d) *Miscellaneous.* An explanation shall be given of significant or unusual flight or ground handling characteristics of the airplane.

3. In lieu of sections 40.70 through 40.78, 41.27 through 41.36(d), and 42.70 through 42.83, of Parts 40, 41, and 42 of the Civil Air Regulations, respectively, the following shall be applicable:

OPERATING RULES

40T.80 *Transport category airplane operating limitations.*

(a) In operating any passenger-carrying transport category airplane certificated in accordance with the performance requirements of this regulation, the provisions of sections 40T.80 through 40T.84 shall be complied with, unless deviations therefrom are specifically authorized by the Administrator on the ground that the special circumstances of a particular case make a literal observance of the requirements unnecessary for safety.

(b) The performance data in the Airplane Flight Manual shall be applied in determining compliance with the provisions of sections 40T.81 through 40T.84. Where conditions differ from those for which specific tests were made compliance shall be determined by approved interpolation or computation of the effects of changes in the specific variables if such interpolations or computations give results substantially equalling in accuracy the results of a direct test.

40T.81 *Airplane's certificate limitations.*

(a) No airplane shall be taken off at a weight which exceeds the take-off weight specified in the Airplane Flight Manual for the elevation of the airport and for the ambient temperature existing at the time of the take-off. (See secs. 4T.123(a)(1) and 4T.743(a).)

(b) No airplane shall be taken off at a weight such that, allowing for normal consumption of fuel and oil in flight to the airport of destination, the weight on arrival will exceed the landing weight specified in the Airplane Flight Manual for the elevation of the airport of destination and for the ambient temperature anticipated there at the time of landing. (See secs. 4T.123(a)(2) and 4T.743(a).)

(c) No airplane shall be taken off at a weight which exceeds the weight shown in the Airplane Flight Manual to correspond with the minimum distance required for take-off on the runway to be used. The take-off distance shall correspond with the elevation of the airport, the effective runway gradient, and the ambient temperature and wind component existing at the time of take-off. (See secs. 4T.123(a)(3) and 4T.743 (a).)

(d) No airplane shall be operated outside the operational limits specified in the Airplane Flight Manual. (See secs. 4T.123(a)(4) and 4T.743(a).)

40T.82 *Take-off obstacle clearance limitations.* No airplane shall be taken off at a weight in excess of that shown in the Airplane Flight Manual to correspond with a take-off path which clears all obstacles either by at least a height equal to (35+0.01D) feet vertically, where D is the distance out along the intended flight path from the end of the runway in feet, or by at least 200 feet horizontally within the airport boundaries and by at

least 300 feet horizontally after passing beyond the boundaries. In determining the allowable deviation of the flight path in order to avoid obstacles by at least the distances prescribed, it shall be assumed that the airplane is not banked before reaching a height of 50 feet as shown by the take-off path data in the Airplane Flight Manual, and that a maximum bank thereafter does not exceed 15 degrees. The take-off path considered shall be for the elevation of the airport, the effective runway gradient, and for the ambient temperature and wind component existing at the time of take-off. (See secs. 4T.123(b) and 4T.743(b).)

40T. 83 *En route limitations.*

(a) *One engine inoperative.* No airplane shall be taken off at a weight in excess of that which, according to the one-engine-inoperative en route net flight path data shown in the Airplane Flight Manual, will permit compliance with either subparagraph (1) or subparagraph (2) of this paragraph at all points along the route. The net flight path used shall be for the ambient temperatures anticipated along the route. (See secs. 4T.123(b) and 4T.743(b).)

(1) The slope of the net flight path shall be positive at an altitude of at least 1,000 feet above all terrain and obstructions along the route within 5 miles on either side of the intended track.

(2) The net flight path shall be such as to permit the airplane to continue flight from the cruising altitude to an alternate airport where a landing can be made in accordance with the provisions of section 40T.84 (b), the net flight path clearing vertically by at least 2,000 feet all terrain and obstructions along the route within 5 miles on either side of the intended track. The provisions of subdivisions (i) through (vii) of this paragraph shall apply.

(i) The engine shall be assumed to fail at the most critical point along the route.

(ii) The airplanes shall be assumed to pass over the critical obstruction following engine failure at a point no closer to the critical obstruction than the nearest approved radio navigational fix, except that the Administrator may authorize a procedure established on a different basis where adequate operational safeguards are found to exist.

(iii) The net flight path shall have a positive slope at 1,000 feet above the airport used as the alternate.

(iv) An approved method shall be used to account for winds which would otherwise adversely affect the flight path.

(v) Fuel jettisoning shall be permitted if the Administrator finds that the operator has an adequate training program, proper instructions are given to the flight crew, and all other precautions are taken to insure a safe procedure.

(vi) The alternate airport shall be specified in the dispatch release and shall meet the prescribed weather minima.

(vii) The consumption of fuel and oil after the engine becomes inoperative shall be that which is accounted for in the net flight path data shown in the Airplane Flight Manual.

(b) *Two engines inoperative.* No airplane shall be flown along an intended route except in compliance with either subparagraph (1) or subparagraph (2) of this paragraph.

(1) No place along the intended track shall be more than 90

minutes away from an airport at which a landing can be made in accordance with the provisions of section 40T.84(b), assuming all engines to be operating at cruising power.

(2) No airplane shall be taken off at a weight in excess of that which, according to the two-engine-inoperative en route net flight path data shown in the Airplane Flight Manual, will permit the airplane to continue flight from the point where two engines are assumed to fail simultaneously to an airport where a landing can be made in accordance with the provisions of section 40T.84(b), the net flight path having a positive slope at an altitude of at least 1,000 feet above all terrain and obstructions along the route within 5 miles on either side of the intended track or at an altitude of 5,000 feet, whichever is higher. The net flight path considered shall be for the ambient temperatures anticipated along the route. The provisions of subdivision (i) through (iii) of this subparagraph shall apply. (See secs. 4T.123(b) and 4T.743(b).)

(i) The two engines shall be assumed to fail at the most critical point along the route.

(ii) If fuel jettisoning is provided, the airplane's weight at the point where the two engines are assumed to fail shall be considered to be not less than that which would include sufficient fuel to proceed to the airport and to arrive there at an altitude of at least 1,000 feet directly over the landing area.

(iii) The consumption of fuel and oil after the engines become inoperative shall be that which is accounted for in the net flight path data shown in the Airplane Flight Manual.

40T.84 *Landing limitations.*

(a) *Airport of destination.* No airplane shall be taken off at a weight in excess of that which, in accordance with the landing distances shown in the Airplane Flight Manual for the elevation of the airport of intended destination and for the wind conditions anticipated there at the time of landing, would permit the airplane to be brought to rest at the airport of intended destination within 60 percent of the effective length of the runway from a point 50 feet directly above the intersection of the obstruction clearance plane and the runway. The weight of the airplane shall be assumed to be reduced by the weight of the fuel and oil expected to be consumed in flight to the airport of intended destination. Compliance shall be shown with the conditions of subparagraphs (1) and (2) of this paragraph. (See secs. 4T.123(b) and 4T.743(b).)

(1) It shall be assumed that the airplane is landed on the most favorable runway and direction in still air.

(2) It shall be assumed that the airplane is landed on the most suitable runway considering the probable wind velocity and direction and taking due account of the ground handling characteristics of the airplane and of other conditions (i.e., landing aids, terrain, etc.). If full compliance with the provisions of this subparagraph is not shown, the airplane may be taken off if an alternate airport is designated which permits compliance with paragraph (b) of this section.

(b) *Alternate airport.* No airport shall be designated as an alternate airport in a dispatch release unless the airplane at the weight anticipated at the time of arrival at such airport can comply with the provisions of paragraph (a) of this section, provided that the airplane can be brought to rest within 70 percent of the effective length of the runway.

SPECIAL CIVIL AIR REGULATION NO. SR–422A

Adopted: July 2, 1958
Effective: July 2, 1958

Turbine-Powered Transport Category Airplanes of Current Design

On July 23, 1957, the Board adopted Special Civil Air Regulation No. SR–422 which sets forth airworthiness requirements applicable to the type certification and operation of turbine-powered transport category airplanes for which a type certificate is issued after August 27, 1957. Included in that regulation was a new set of performance requirements, with respect to which the Board indicated that consideration would be given to any changes found necessary as a result of further study and experience. The preamble to SR–422 contains the relevant considerations leading to its promulgation and is considered to provide the basic background for this regulation.

Since the adoption of SR–422, considerable study has been devoted to the new performance requirements by all interested parties. As a result of these studies and of further experience gained in the design, certification, and operation of turbine-powered airplanes, certain issues with respect to SR–422 require re-evaluation. This regulation reflects the resolution of most of the outstanding issues in the light of the best information presently available to the Board.

The following provisions of this regulation differ from, or are additional to, the provisions of SR–422; Introductory paragraph; item 1; sections 4T.111(c); 4T.112; 4T.114 (b), (b)(1), (b)(4), and (c); introductory paragraph of 4T.116; 4T.116 (b), (c), (e), and (g); 4T.117; 4T.117a; 4T.119; 4T.120 (a), (a)(1), (b), (b)(1), (c), (c)(2), (c)(3), (d), and (d)(3); 4T.121 (a) and (b); introductory paragraph of 4T.122; 4T.122 (b), (f), and (g); 4T.123 (a)(1), (a)(2), (a)(3), and (b); 4T.743(c); 40T.81 (b) and (c); 40T.82; 40T.83 (a)(2)(iii), (b)(2), and (b)(2)(ii); item 4; and item 5. Of these provisions, the following differ from those proposed in Civil Air Regulations Draft Release No. 58–6: sections 4T.111(c); 4T.112(a)(4); 4T.114 (b)(4), (c), (c)(2), (c)(3), and (c)(4); 4T.116 (c) and (e); 4T.117 (b)(1) and (b)(2); 4T.119(a); 4T.120(a); 40T.81(c) and 43T.11(c).

With respect to the applicability of this regulation, experience with certification under SR–422 indicates that a lead time of about two months between the date of adoption of the regulation and the date of issuance of the type certificate should provide a reasonable period of time within which to show compliance with this regulation. In view of this, and in the interest of having uniform regulations applicable to most of the turbine-powered airplanes, it is considered advisable to have this regulation apply to all such airplanes for which a type certificate is issued after September 30, 1958. Turbine-powered transport category airplanes for which a type certificate is issued on or prior to September 30, 1958, may comply with the provisions of this regulation in lieu of SR–422. If

this option is exercised, it is intended that compliance be shown with all the provisions of this regulation and it is not intended to permit a showing of compliance with portions of this regulation and portions of SR–422.

The provisions of this regulation involve the following technical issues:

A substantive change is made by introducing an all-engines-operating take-off in establishing the take-off distance. Presently, the take-off distance is based only on a one-engine-out take-off. To insure that an adequate margin of safety will exist for day-in and day-out operations, the minimum take-off distance is being related to both the one-engine-inoperative distance now prescribed and to the distance with all engines operating, with a factor of 1.15 being applied to the latter.

There are also included important changes with respect to the speeds applicable to the take-off path. The provisions of SR–422 prescribe that the airplane shall be accelerated on or near the ground to the speed V_2. This provision has been subject to varying interpretations having a marked difference in effect on the resultant level of performance. The issue in this matter is whether or not the airplane should be permitted to lift off the runway at some speed below V_2. Because of the increased acceleration of turbine-powered airplanes, the tendency to overshoot the lift-off speed will be greater than on piston-engine airplanes and this tendency increases with the reduction in weight of the airplane. To restrict lift-off to the minimum take-off safety speed V_2 would unduly extend the take-off distance in cases where such overshooting of speed occurs. Such a restriction would be unnecessarily conservative and would not reflect realistic take-off procedures. For these reasons this regulation permits the airplane to lift off the ground at a speed lower than the V_2 speed, but prescribes certain limiting conditions. The lift-off speed is related to a rotational speed V_R which must not be less than 95 percent of the minimum V_2 speed and must be 10 percent greater than a speed at which no hazardous characteristics are displayed by the airplane, such as a relatively high drag condition or a ground stall. The V_2 speed has been re-defined to take into account the increment in speed arising from overshoot tendencies. Under the new definition, the minimum V_2 speed corresponds with the minimum take-off safety speed as now defined in SR–422. With respect to the take-off path, the V_2 speed is required to be attained prior to reaching a height of 35 feet above the take-off surface and thus is related to the selection of the rotational speed. Further, there is a revision which requires V_2 to be maintained as close as practicable at a constant value from the 35-foot point to a height of 400 feet above the take-off surface. This speed is the speed at which the prescribed minimum take-off gradients must be met.

There is introduced in this regulation the concept of unbalanced take-off field lengths. SR–422 does not preclude unbalancing of field lengths, provided that the unbalancing is within the length of the runway. Other countries have employed unbalancing with respect to so-called "stopways" and "clearways." It appears that United States operators ultimately will find it advantageous to resort to the use of unbalancing, but probably not to the same extent as practiced in other countries. On the premise that only clearways will be utilized, the amendments have been formulated accordingly. Clearways, as defined herein, are areas not suitable

for stopping the airplane in the event of an aborted take-off, but adequate to provide additional take-off distance for climb-out. To safeguard operations utilizing clearways, there is introduced the concept of a take-off run which operationally relates to the determination of the minimum runway length required. The take-off run is defined as the greater of the horizontal distances along the take-off path to a given point with one engine inoperative or with all engines operating, with a margin of 15 percent being added to the latter. The take-off run is measured from the beginning of take-off to a point equidistant between the point where the airplane lifts off and the point where a height of 35 feet is reached. The required runway length must not be less than the take-off run nor less than the accelerate stop distance.

According to the definition given, a clearway is subjected to the control of the airport authorities. It is not intended, however, that there be ownership by the airport authorities of the area in which the clearway lies. The objective for requiring control by the airport authorities is to insure that no flight will be initiated using a clearway unless it is determined with certainty that no movable obstacle will exist within the clearway when the airplane flies over.

It is anticipated that the introduction of clearways will offer further possibilities of increasing the utility of existing airport facilities in this country. When such areas can be integrated into existing facilities, economical benefits will accrue to the community and the operators. In addition, since clearways are presently available at some of the airports in other countries, United States operators will have the opportunity of taking advantage of such facilities.

There are included changes with respect to the prescribed minimum altitude of 1,000 feet relative to the take-off path and to the one-engine-inoperative and two-engine-inoperative requirements applicable to the vicinity of the airport. Heretofore, the Civil Air Regulations have incorporated the reference altitude of 1,000 feet in respect of performance criteria over the airport. Obscure as is the significance of this altitude operationally, the altitude of 1,500 feet has worldwide precedent of being used as the altitude above the airport at which, generally, IFR approaches are initiated and go-around procedures executed. For this reason, the changes made extend the take-off path to a minimum altitude of 1,500 feet and make this altitude applicable to the prescribed performance criteria above the airport for the one- and two-engine-inoperative en route requirements. It is not anticipated that these changes will create any problems with respect to the en route stages of flight; however, it is realized that a further extension of the take-off path might add to the problem of obtaining accurate data on obstacles relatively distant from the airport. The Board finds that the extension of the flight path to 1,500 feet is warranted in light of the operational significance of this altitude and because the extended flight paths will provide more fully for adequate terrain clearance at the end of the take-off path.

There is included a change with respect to the take-off path whereby the take-off flight path is established as starting from a 35-foot height at the end of the take-off distance and a net take-off flight is prescribed for operational use. This latter change is for consistency with the specification of net flight paths for the en route stages of flight and to simplify

determination of obstacle clearances operationally. The net flight path is specified to be the actual flight path diminished by a gradient of 1.0 percent. It is intended that the net flight path be obtained from the gross flight path by simple geometric means.

The change in the altitude from 1,000 to 1,500 feet previously mentioned, as well as a re-evaluation in other respects of some of the climb gradients in SR-422, justify certain changes. The gradients of 1.4 and 1.8 applicable to the take-off path and the final take-off climb are being reduced to 1.2 and 1.7 for two-engine and four-engine airplanes, respectively. In addition, the gradients of 1.4 and 1.8 in the one-engine-inoperative en route case are being reduced to 1.1 and 1.6, respectively.

Changes are made with respect to the one-engine-inoperative take-off climb by interrelating more realistically the prescribed airplane configuration, weight, and power. These changes, in effect, permit meeting the prescribed gradients of climb at slightly higher airplane weights than would be possible under the presently effective provisions.

There is included a change to the provisions applicable to the one-engine-inoperative take-off climb with landing gear extended which increases the prescribed minimum gradient from substantially zero to 0.5 percent for four-engine airplanes. This change is made to attain consistency in the difference between gradients applicable to twins and fours.

Changes are incorporated in connection with the two-engine-inoperative en route requirement. Representations have been made that the gradient of 0.6 percent now prescribed is unduly conservative. On the other hand, it has been pointed out that the fuel requirements for this case are not realistically covered. Both of these contentions warrant consideration and changes are included which reduce the margin gradient from 0.6 to 0.5 percent, reduce the prescribed altitude from 5,000 to 2,000 feet, and require scheduling the flight so that there is sufficient fuel on board to reach the airport and subsequently to fly for 15 minutes at cruise power or thrust.

Changes are also made relative to the approach and landing stages of flight. There is a new provision which requires the establishment of procedures for the execution of missed approaches and balked landings. A question has been raised as to whether the speed limitation of 1.5 V_s applicable to the approach condition is realistically related to the normal day-in and day-out landing procedures. To insure that it will be so related, it is required that the speed used for demonstrating the approach climb be established consistent with the landing procedures, but that it not exceed 1.5 V_s. In addition, the approach gradient of 2.8 percent prescribed for four-engine airplanes is being reduced to 2.7 percent to obtain consistency in the differences between gradients applicable to twins and fours.

A change is made to the "all-engines-operating landing climb" provisions which now require a 4.0 percent gradient of climb in the landing configuration. On the premise that requiring the landing configuration during the climb after a balk is unduly conservative, consideration was given to a proposal to permit showing of compliance with the 4.0 percent gradient of climb in the configuration which would exist 5 seconds after the initiation of the climb. Further study of this proposal indicated that such a rule would tend to introduce complications in design and lead to

less favorable operating procedures which ultimately would not contribute to safety. One of the most important factors in connection with this configuration is the response of the engines to throttle movement. Therefore, there is a provision which requires that the power used in showing compliance with the climb gradient be that power or thrust attained 8 seconds after initiation of movement of the power controls to the take-off position from the minimum flight idle position. In addition, for consistency with the procedures used for determining the landing distance, the speed limitation of 1.4 V_s is reduced to 1.3 V_s. Concern has been indicated to the effect that any reduction in the prescribed gradient of 4.0 percent might not insure in all cases the ability of the airplane to continue a safe climb after a balk. To provide a further safeguard, the take-off weight-altitude-temperature limitations (WAT limitations stemming from the application of the one-engine-inoperative take-off climb requirements) are being made applicable to the maximum landing weight at the airport of landing. In the past, the landing weight limitations were applicable to the airport of destination but not to the weather alternates. This regulation makes both the take-off weight and landing weight limitations equally applicable to the airport of destination and the weather alternates. In view of the aforementioned changes, a reduction of the required climb gradient from 4.0 to 3.2 percent is justified and included in this regulation.

In addition to the substantive changes which have been discussed, there are three significant changes of a clarifying nature. The first deals with the determination of the landing distance as affected by devices or means other than wheel brakes. There is included a provision similar to the one applicable to the accelerate-stop distance for application to the landing distance. This provision permits the use of means other than wheel brakes in the determination of the landing distance. Additionally, there is a change to the provision which requires in some cases the determination of the landing distance with one engine inoperative. It is believed that the new requirement expresses the intent more clearly. One of the more obvious applications of this provision is in respect of turbopropeller airplanes. Such airplanes usually are landed with the propellers in a relatively high drag position. If one of the engines becomes inoperative, its propeller would be expected to be in a relativly low drag position with the consequence of a longer landing distance than with all engines operating. In such a case it is required that the landing distance be determined with one engine inoperative unless use could be made by the crew of other means (e.g., reverse thrust not otherwise considered in determining the landing distance) which would reduce the landing distance at least to that determined for all-engine operation.

The second clarification being included deals with the provision setting forth the procedures which must be included in the Airplane Flight Manual. This provision in SR–422 does not make clear what procedures are involved and whether the procedures are considered to be limitations on the operation of the airplane. The clarification in language specifies that the procedures which are included with the performance limitations shall be considered only as guidance material.

The third clarification concerns the applicability of the performance limitations prescribed in SR–422. These consist of the "certificate limita-

tions" and the "operating limitations." The former relate to maximum take-off and landing weights, minimum take-off distances, accelerate-stop distances, and the operational limits imposed upon the airplane. These limitations, being part of the conditions of the type and airworthiness certificates, must be complied with at all times irrespective of the type of operation being conducted (e.g., air carrier, private, cargo). The "operating limitations," distinct from the "certificate limitations," are only applicable when required by the operating parts of the regulations (Parts 40, 41, and 42 require compliance for passenger operations). Although it appeared that previous Board pronouncements regarding this general principle as well as the explanation contained in the preamble to SR–422 would make the issue quite clear, it has come to the Board's attention that there is still some misunderstanding of this matter. Apparently this misunderstanding stems from the fact that SR–422 prescribes operating rules for air carrier operations which contain both the "certificate limitations" and the "operating limitations" while no prescription is given to non-air-carrier operations; thus giving an impression that not even the "certificate limitations" are applicable to non-air-carriers. The inclusion of "certificate limitations" for air carrier operations with the "operating limitations" was meant only to provide the operators with the convenience of having together the complete prescription of the applicable performance limitations, notwithstanding that such an inclusion, in fact, duplicates the general requirement of compliance with the "certificate limitations" contained in the Airplane Flight Manual. In view of the possible misunderstanding which might exist from the aforementioned inclusion, there are included in this regulation the same "certificate limitations" for application to all operations under the provisions of Part 43 of the Civil Air Regulations.

In addition, other changes of a minor nature are included herein, the most significant of which is the generalization of the stall speed V_s, eliminating reference to V_{s_0} and V_{s_1}.

Of the changes to SR–422 made in this regulation, there are a number which might require further consideration as studies continue and as additional experience is gained with the application of these new rules. Several of these involve new concepts with which U.S. operators have had little or no experience. These entail the requirements relative to unbalanced field lengths with respect to clearways, to the rotational speed, and to the all-engine take-off distance. Strong representation has been made to the Board to the effect that the numerical factors applicable to the aforementioned rules are too high and should be reduced pending further experience. The Board considers that it would not be in the public interest to reduce any of these factors until such time as further experience indicates that they are in fact overly conservative. Realizing, however, that these issues are of considerable importance in prescribing a practicable level of performance, the Board stands ready to reconsider the relevant provisions of this regulation at such time as substantiating information is received.

There are areas other than those previously mentioned where additional refinement of details may be advisable. This is so particularly in the case of the requirements pertaining to the landing stage of flight, to the take-off lateral clearances, and to the two-engine-inoperative en route

gradient margin. It is anticipated that, after further study of the regulation and especially after its application in the design, certification, and operation of forthcoming turbine-powered airplanes, the desirability of changes may become more apparent. It is the intent of the Board to consider without delay such changes as might be found necessary. Only after the provisions of this Special Civil Air Regulation are reasonably verified by practical application will the Board consider incorporating them on a more permanent basis into Parts 4b, 40, 41, 42, and 43 of the Civil Air Regulations.

This Special Civil Air Regulation is not intended to compromise the authority of the Administrator under section 4b.10 to impose such special conditions as he finds necessary in any particular case to avoid unsafe design features and otherwise to insure equivalent safety.

Interested persons have been afforded an opportunity to participate in the making of this regulation (23 F.R. 2139), and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective July 2, 1958:

Contrary provisions of the Civil Air Regulations notwithstanding, all turbine-powered transport category airplanes for which a type certificate is issued after August 27, 1957, shall comply with Special Civil Air Regulation No. SR–422 or, alternatively, with the following provisions, except that those airplanes for which a type certificate is issued after September 30, 1958, shall comply with the following provisions:

1. The provisions of Part 4b of the Civil Air Regulations, effective on the date of application for type certificate; and such of the provisions of all subsequent amendments to Part 4b, in effect prior to August 27, 1957, as the Administrator finds necessary to insure that the level of safety of turbine-powered airplanes is equivalent to that generally intended by Part 4b.

2. In lieu of sections 4b.110 through 4b.125, and 4b.743 of Part 4b of the Civil Air Regulations, the following shall be applicable:

PERFORMANCE

4T.110 *General.*

(a) The performance of the airplane shall be determined and scheduled in accordance with, and shall meet the minima prescribed by, the provisions of sections 4T.110 through 4T.123. The performance limitations, information, and other data shall be given in accordance with section 4T.743.

(b) Unless otherwise specifically prescribed, the performance shall correspond with ambient atmospheric conditions and still air. Humidity shall be accounted for as specified in paragraph (c) of this section.

(c) The performance as affected by engine power and/or thrust shall be based on a relative humidity of 80 percent at and below standard temperatures and on 34 percent at and above standard temperatures plus 50° F. Between these two temperatures the relative humidity shall vary linearly.

(d) The performance shall correspond with the propulsive thrust available under the particular ambient atmospheric conditions, the particular flight condition, and the relative humidity specified in paragraph (c) of this section. The available propulsive thrust shall correspond with engine power and or thrust not exceeding the approved power and/or thrust less the installational losses and less the power and/or equivalent thrust absorbed by the accessories and services appropriate to the particular ambient atmospheric conditions and the particular flight condition.

4T.111 *Airplane configuration, speed, power, and/or thrust; general.*

(a) The airplane configuration (setting of wing and cowl flaps, air brakes, landing gear, propeller, etc.), denoted respectively as the take-off, en route, approach, and landing configurations, shall be selected by the applicant except as otherwise prescribed.

(b) It shall be acceptable to make the airplane configurations variable with weight, altitude, and temperature, to an extent found by the Administrator to be compatible with operating procedures required in accordance with paragraph (c) of this section.

(c) In determining the accelerate-stop distances, take-off flight paths, take-off distances, and landing distances, changes in the airplane's configuration and speed, and in the power and/or thrust shall be in accordance with procedures established by the applicant for the operation of the airplane in service, except as otherwise prescribed. In addition, procedures shall be established for the execution of balked landings and missed approaches associated with the conditions prescribed in sections 4T.119 and 4T.120(d), respectively. All procedures shall comply with the provisions of subparagraphs (1) through (3) of this paragraph.

(1) The Administrator shall find that the procedures can be consistently executed in service by crews of average skill.

(2) The procedures shall not involve methods or the use of devices which have not been proven to be safe and reliable.

(3) Allowance shall be made for such time delays in the execution of the procedures as may be reasonably expected to occur during service.

4T.112 *Stalling speeds.*

(a) The speed V_s shall denote the calibrated stalling speed, or the minimum steady flight speed at which the airplane is controllable, in knots, with:

(1) Zero thrust at the stalling speed, or engines idling and throttles closed if it is shown that the resultant thrust has no appreciable effect on the stalling speed;

(2) If applicable, propeller pitch controls in the position necessary for compliance with subparagraph (1) of this paragraph; the airplane in all other respects (flaps, landing gear, etc.) in the particular configuration corresponding with that in connection with which V_s is being used;

(3) The weight of the airplane equal to the weight in connection with which V_s is being used to determine compliance with a particular requirement;

(4) The center of gravity in the most unfavorable position within the allowable range.

(b) The stall speed defined in this section shall be the minimum speed obtained in flight tests conducted in accordance with the procedure of subparagraphs (1) and (2) of this paragraph.

(1) With the airplane trimmed for straight flight at a speed of 1.4 V_s and from a speed sufficiently above the stalling speed to insure steady conditions, the elevator control shall be applied at a rate such that the airplane speed reduction does not exceed one knot per second.

(2) During the test prescribed in subparagraph (1) of this paragraph, the flight characteristics provisions of section 4b.160 of Part 4b of the Civil Air Regulations shall be complied with.

4T.113 *Take-off; general.*

(a) The take-off data in sections 4T.114 through 4T.117 shall be determined under the conditions of subparagraphs (1) and (2) of this paragraph.

(1) At all weights, altitudes, and ambient temperatures within the operational limits established by the applicant for the airplane.

(2) In the configuration for take-off (see sec. 4T.111).

(b) Take-off data shall be based on a smooth, dry, hard-surfaced runway and shall be determined in such a manner that reproduction of the performance does not require exceptional skill or alertness on the part of the pilot. In the case of seaplanes or float planes, the take-off surface shall be smooth water, while for skiplane it shall be smooth dry snow. In addition, the take-off data shall be corrected in accordance with subparagraphs (1) and (2) of this paragraph for wind and for runway gradients within the operational limits established by the applicant for the airplane.

(1) Not more than 50 percent of nominal wind components along the take-off path opposite to the direction of take-off, and not less than 150 percent of nominal wind components along the take-off path in the direction of take-off.

(2) Effective runway gradients.

4T.114 *Take-off speeds.*

(a) The critical-engine-failure speed V_1, in terms of calibrated air speed, shall be selected by the applicant, but shall not be less than the minimum speed at which controllability by primary aerodynamic controls alone is demonstrated during the take-off run to be adequate to permit proceeding safely with the take-off using average piloting skill, when the critical engine is suddenly made inoperative.

(b) The take-off safety speed V_2, in terms of calibrated air speed, shall be selected by the applicant so as to permit the gradient of climb required in section 4T.120 (a) and (b), but it shall not be less than:

(1) 1.2 V_s for two-engine propeller-driven airplanes and for airplanes without propellers which have no provisions for obtaining a significant reduction in the one-engine-inoperative power-on stalling speed;

(2) 1.15 V_s for propeller-driven airplanes having more than two engines and for airplanes without propellers which have provisions for obtaining a significant reduction in the one-engine-inoperatve power-on stalling speed;

(3) 1.10 times the minimum control speed V_{MC}, established in accordance with section 4b.133 of Part 4b of the Civil Air Regulations;

(4) The rotation speed V_R plus the increment in speed attained in compliance with section 4T.116(e).

(c) The minimum rotation speed V_R, in terms of calibrated air speed, shall be selected by the applicant, except that it shall not be less than:

(1) The speed V_1;

(2) A speed equal to 95 percent of the highest speed obtained in compliance with subparagraph (1) or (2), whichever is applicable, and with subparagraph (3) of paragraph (b) of this section;

(3) A speed which permits the attainment of the Speed V_2 prior to reaching a height of 35 feet above the take-off surface as determined in accordance with section 4T.116(e);

(4) A speed equal to 110 percent of the minimum speed above which the airplane, with all engines operating, can be made to lift off the ground and to continue the take-off without displaying any hazardous characteristics.

4T.115 *Accelerate-stop distance.*

(a) The accelerate-stop distance shall be the sum of the following:

(1) The distance required to accelerate the airplane from a standing start to the speed V_1;

(2) Assuming the critical engine to fail at the speed V_1, the distance required to bring the airplane to a full stop from the point corresponding with the speed V_1.

(b) In addition to, or in lieu of, wheel brakes, the use of other braking means shall be acceptable in determining the accelerate-stop distance, provided that such braking means shall have been proven to be safe and reliable, that the manner of their employment is such that consistent results can be expected in service, and that exceptional skill is not required to control the airplane.

(c) The landing gear shall remain extended throughout the accelerate-stop distance.

4T.116 *Take-off path.* The take-off path shall be considered to extend from the standing start to a point in the take-off where a height of 1,500 feet above the take-off surface is reached or to a point in the take-off where the transition from the take-off to the en route configuration is completed and a speed is reached at which compliance with section 4T.120(c) is shown, whichever point is at a higher altitude. The conditions of paragraphs (a) through (i) of this section shall apply in determining the take-off path.

(a) The take-off path shall be based upon procedures prescribed in accordance with section 4T.111(c).

(b) The airplane shall be accelerated on the ground to the speed V_1 at which point the critical engine shall be made inoperative and shall remain inoperative during the remainder of the take-off. Subsequent to attaining speed V_1, the airplane shall be accelerated to speed V_2 during which time it shall be permissible to initiate raising the nose gear off the ground at a speed not less than the rotation speed V_R.

(c) Landing gear retraction shall not be initiated until the airplane becomes airborne.

(d) The slope of the airborne portion of the take-off path shall be positive at all points.

(e) The airplane shall attain the speed V_2 prior to reaching a height of 35 feet above the take-off surface and shall continue at a speed as close as practical to, but not less than, V_2 until a height of 400 feet above the take-off surface is reached.

(f) Except for gear retraction and propeller feathering, the airplane configuration shall not be changed before reaching a height of 400 feet above the take-off surface.

(g) At all points along the take-off path starting at the point where the airplane first reaches a height of 400 feet above the take-off surface, the available gradient of climb shall not be less than 1.2 percent for two-engine airplanes and 1.7 percent for four-engine airplanes.

(h) The take-off path shall be determined either by a continuous demonstrated take-off, or alternatively, by synthesizing from segments the complete take-off path.

(i) If the take-off path is determined by the segmental method, the provisions of subparagraphs (1) through (4) of this paragraph shall be specifically applicable.

(1) The segments of a segmental take-off path shall be clearly defined and shall be related to the distinct changes in the configuration of the airplane, in power and/or thrust, and in speed.

(2) The weight of the airplane, the configuration, and the power and/or thrust shall be constant throughout each segment and shall correspond with the most critical condition prevailing in the particular segment.

(3) The segmental flight path shall be based on the airplane's performance without ground effect.

(4) Segmental take-off path data shall be checked by continuous demonstrated take-offs to insure that the segmental path is conservative relative to the continuous path.

4T.117 *Take-off distance and take-off run.*

(a) *Take-off distance.* The take-off distance shall be the greater of the distances established in accordance with subparagraphs (1) and (2) of this paragraph.

(1) The horizontal distance along the take-off path from the start of the take-off to the point where the airplane attains a height of 35 feet above the take-off surface, as determined in accordance with section 4T.116.

(2) A distance equal to 115 percent of the horizontal distance along the take-off path, with all engines operating, from the start of the take-off to the point where the airplane attains a height of 35 feet above the take-off surface, as determined by a procedure consistent with that established in accordance with section 4T.116.

(b) *Take-off run.* If the take-off distance is intended to include a clearway (see item 5 of this regulation), the take-off run shall be determined and shall be the greater of the distances established in accordance with subparagraphs (1) and (2) of this paragraph.

(1) The horizontal distance along the take-off path from the start of the take-off to a point equidistant between the point where the airplane first becomes airborne and the point where it attains a height of 35 feet above the take-off surface, as determined in accordance with section 4T.116.

(2) A distance equal to 115 percent of the horizontal distance along the take-off path, with all engines operating, from the start of the take-off to a point equidistant between the point where the airplane first becomes airborne and the point where it attains a height of 35 feet above the take-off surface, as determined by a procedure consistent with that established in accordance with section 4T.116.

4T.117a *Take-off flight path.*

(a) The take-off flight path shall be considered to begin at a height of 35 feet above the take-off surface at the end of the take-off distance as determined in accordance with section 4T.117(a).

(b) The net take-off flight path data shall be determined in such a manner that they represent the airplane's actual take-off flight paths, determined in accordance with paragraph (a) of this section, diminished by a gradient of climb equal to 1.0 percent.

4T.118 *Climb; general.* Compliance shall be shown with the climb requirements of sections 4T.119 and 4T.120 at all weights, altitudes, and ambient temperatures, within the operational limits established by the applicant for the airplane. The airplane's center of gravity shall be in the most unfavorable position corresponding with the applicable configuration.

4T.119 *All-engine-operating landing climb.* In the landing configuration the steady gradient of climb shall not be less than 3.2 percent, with:

(a) All engines operating at the power and/or thrust which is available 8 seconds after initiation of movement of the power and/or thrust controls from the minimum flight idle to the take-off position;

(b) A climb speed not in excess of 1.3 V_s.

4T.120 *One-engine-inoperative climb.*

(a) *Take-off; landing gear extended.* In the take-off configuration existing at the point of the flight path where the airplane first becomes airborne, in accordance with section 4T.116 but without ground effect, the steady gradient of climb shall be positive for two-engine airplanes and shall not be less than 0.5 percent for four-engine airplanes, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available take-off power and/or thrust existing in accordance with section 4T.116 at the time retraction of the airplane's landing gear is initiated, unless subsequently a more critical power operating condition exists along the flight path prior to the point where the landing gear is fully retracted;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the time retraction of the airplane's landing gear is initiated;

(3) The speed equal to the speed V_2.

(b) *Take-off; landing gear retracted.* In the take-off configuration existing at the point of the flight path where the airplane's landing gear is fully retracted, in accordance with section 4T.116 but without ground effect, the steady gradient of climb shall not be less than 2.5 percent for two-engine airplanes and not less than 3.0 percent for four-engine airplanes, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available take-off power and/or thrust existing in accordance with section 4T.116 at the time the landing gear is fully retracted, unless subsequently a more critical power operating condition exists along the flight path prior to the point where a height of 400 feet above the take-off surface is reached;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the time the airplane's landing gear is fully retracted;

(3) The speed equal to the speed V_2.

(c) *Final take-off.* In the en route configuration, the steady gradient of climb shall not be less than 1.2 percent for two-engine airplanes and not less than 1.7 percent for four-engine airplanes, at the end of the take-off path as determined by section 4T.116, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available maximum continuous power and/or thrust;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the end of the take-off path;

(3) The speed equal to not less than 1.25 V_s.

(d) *Approach.* In the approach configuration such that the corresponding V_s for this configuration does not exceed 110 percent of the V_s corresponding with the related landing configuration, the steady gradient of climb shall not be less than 2.2 percent for two-engine airplanes and not less than 2.7 percent for four-engine airplanes with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available take-off power and/or thrust;

(2) The weight equal to the maximum landing weight;

(3) A climb speed established by the applicant in connection with normal landing procedures, except that it shall not exceed 1.5 V_s (see sec. 4T.111(c)).

4T.121 *En route flight paths.* With the airplane in the en route configuration, the flight paths prescribed in paragraphs (a) and (b) of this section shall be determined at all weights, altitudes, and ambient temperatures within the limits established by the applicant for the airplane.

(a) *One engine inoperative.* The one-engine-inoperative net flight path data shall be determined in such a manner that they represent the airplane's actual climb performance diminished by a gradient of climb equal to 1.1 percent for two-engine airplanes and 1.6 percent for four-engine airplanes. It shall be acceptable to include in these data the varia-

tion of the airplane's weight along the flight path to take into account the progressive consumption of fuel and oil by the operating engine(s).

(b) *Two engines inoperative.* For airplanes with four engines, the two-engine-inoperative net flight path data shall be determined in such a manner that they represent the airplane's actual climb performance diminished by a gradient of climb equal to 0.5 percent. It shall be acceptable to include in these data the variation of the airplane's weight along the flight path to take into account the progressive consumption of fuel and oil by the operating engines.

(c) *Conditions.* In determining the flight paths prescribed in paragraphs (a) and (b) of this section, the conditions of subparagraphs (1) through (4) of this paragraph shall apply.

(1) The airplane's center of gravity shall be in the most unfavorable position.

(2) The critical engine(s) shall be inoperative, the remaining engine(s) operating at the available maximum continuous power and/or thrust.

(3) Means for controlling the engine cooling air supply shall be in the position which provides adequate cooling in the hot-day condition.

(4) The speed shall be selected by the applicant.

4T.122 *Landing distance.* The landing distance shall be the horizontal distance required to land and to come to a complete stop (to a speed of approximately 3 knots in the case of seaplanes or float planes) from a point at a height of 50 feet above the landing surface. Landing distances shall be determined for standard temperatures at all weights, altitudes, and winds within the operational limits established by the applicant for the airplane. The conditions of paragraphs (a) through (g) of this section shall apply.

(a) The airplane shall be in the landing configuration. During the landing, changes in the airplane's configuration, in power and/or thrust, and in speed shall be in accordance with procedures established by the applicant for the operation of the airplane in service. The procedures shall comply with the provisions of section 4T.111(c).

(b) The landing shall be preceded by a steady gliding approach down to the 50-foot height with a calibrated air speed of not less than 1.3 V_s.

(c) The landing distance shall be based on a smooth, dry, hard-surfaced runway, and shall be determined in such a manner that reproduction does not require exceptional skill or alertness on the part of the pilot. In the case of seaplanes or float planes, the landing surface shall be smooth water, while for skiplanes it shall be smooth dry snow. During landing, the airplane shall not exhibit excessive vertical acceleration, a tendency to bounce, nose over, ground loop, porpoise, or water loop.

(d) The landing distance shall be corrected for not more than 50 percent of nominal wind components along the landing path opposite to the direction of landing and not less than 150 percent of nominal wind components along the landing path in the direction of landing.

(e) During landing, the operating pressures on the wheel brak-

ing system shall not be in excess of those approved by the manufacturer of the brakes, and the wheel brakes shall not be used in such a manner as to produce excessive wear of brakes and tires.

(f) In addition to, or in lieu of, wheel brakes, the use of other braking means shall be acceptable in determining the landing distance, provided such braking means shall have been proven to be safe and reliable, that the manner of their employment is such that consistent results can be expected in service, and that exceptional skill is not required to control the airplane.

(g) If the characteristics of a device (e.g., the propellers) dependent upon the operation of any of the engines noticeably increase the landing distance when the landing is made with the engine inoperative, the landing distance shall be determined with the critical engine inoperative unless the Administrator finds that the use of compensating means will result in a landing distance not greater than that attained with all engines operating.

4T.123 *Limitations and information.*

(a) *Limitations.* The performance limitations on the operation of the airplane shall be established in accordance with subparagraphs (1) through (4) of this paragraph. (See also sec. 4T.743.)

(1) *Take-off weights.* The maximum take-off weights shall be established at which compliance is shown with the generally applicable provisions of this regulation and with the take-off climb provisions prescribed in section 4T.120 (a), (b), and (c) for altitudes and ambient temperatures within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(2) *Landing weights.* The maximum landing weights shall be established at which compliance is shown with the generally applicable provisions of this regulation and with the landing and take-off climb provisions prescribed in sections 4T.119 and 4T.120 for altitudes and ambient temperatures within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(3) *Accelerate-stop distance, take-off distance, and take-off run.* The minimum distances required for take-off shall be established at which compliance is shown with the generally applicable provisions of this regulation and with sections 4T.115 and 4T.117(a), and with 4T.117(b) if the take-off distance is intended to include a clearway, for weights, altitudes, temperatures, wind components, and runway gradients, within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(4) *Operational limits.* The operational limits of the airplane shall be established by the applicant for all variable factors required in showing compliance with this regulation (weight, altitude, temperature, etc.). (See secs. 4T.113 (a)(1) and (b), 4T.118, 4T.121, and 4T.122.)

(b) *Information.* The performance information on the operation of the airplane shall be scheduled in compliance with the generally applicable provisions of this regulation and with sections 4T.117a(b), 4T.121, and 4T.122 for weights, altitudes, temperatures, wind components, and runway gradients, as these may be applicable, within the operational limits of the airplane (see subparagraph (a)(4) of this section). In addition, the

performance information specified in subparagraphs (1) through (3) of this paragraph shall be determined by extrapolation and scheduled for the ranges of weights between the maximum landing and maximum take-off weights established in accordance with subparagraphs (a)(1) and (a)(2) of this section. (See also sec. 4T.743.)

(1) Climb in the landing configuration (see sec. 4T.119);

(2) Climb in the approach configuration (see sec. 4T.120(d));

(3) Landing distance (see sec. 4T.122).

AIRPLANE FLIGHT MANUAL

4T.743 *Performance limitations, information, and other data.*

(a) *Limitations.* The airplane's performance limitations shall be given in accordance with section 4T.123(a).

(b) *Information.* The performance information prescribed in section 4T.123(b) for the application of the operating rules of this regulation shall be given together with descriptions of the conditions, air speeds, etc., under which the data were determined.

(c) *Procedures.* Procedures established in accordance with section 4T.111(c) shall be given to the extent such procedures are related to the limitations and information set forth in accordance with paragraphs (a) and (b) of this section. Such procedures, in the form of guidance material, shall be included with the relevant limitations or information, as applicable.

(d) *Miscellaneous.* An explanation shall be given of significant or unusual flight or ground handling characteristics of the airplane.

3. In lieu of sections 40.70 through 40.78, 41.27 through 41.36(d), and 42.70 through 42.83, of Parts 40, 41, and 42 of the Civil Air Regulations, respectively, the following shall be applicable:

OPERATING RULES

40T.80 *Transport category airplane operating limitations.*

(a) In operating any passenger-carrying transport category airplane certificated in accordance with the performance requirements of this regulation, the provisions of sections 40T.80 through 40T.84 shall be complied with, unless deviations therefrom are specifically authorized by the Administrator on the ground that the special circumstances of a particular case make a literal observance of the requirements unnecessary for safety.

(b) The performance data in the Airplane Flight Manual shall be applied in determining compliance with the provisions of sections 40T.81 through 40T.84. Where conditions differ from those for which specific tests were made, compliance shall be determined by approved interpolation or computation of the effects of changes in the specific variables if such interpolations or computations give results substantially equalling in accuracy the results of a direct test.

40T.81 *Airplane's certificate limitations.*

(a) No airplane shall be taken off at a weight which exceeds the take-off weight specified in the Airplane Flight Manual for the elevation of the airport and for the ambient temperature existing at the time of the take-off. (See secs. 4T.123(a)(1) and 4T.743(a).)

(b) No airplane shall be taken off at a weight such that, allowing for normal consumption of fuel and oil in flight to the airport of destination and to the alternate airports, the weight on arrival will exceed the landing weight specified in the Airplane Flight Manual for the elevation of each of the airports involved and for the ambient temperatures anticipated at the time of landing. (See secs. 4T.123(a)(2) and 4T.743(a).

(c) No airplane shall be taken off at a weight which exceeds the weight shown in the Airplane Flight Manual to correspond with the minimum distances required for take-off. These distances shall correspond with the elevation of the airport, the runway to be used, the effective runway gradient, and the ambient temperature and wind component existing at the time of take-off. (See secs. 4T.123(a)(3) and 4T.743(a).) If the take-off distance includes a clearway as defined in Item 5 of this regulation, the take-off distance shall not include a clearway distance greater than one-half of the take-off run.

(d) No airplane shall be operated outside the operational limits specified in the Airplane Flight Manual. (See secs. 4T.123(a)(4) and 42.743(a).)

40T.82 *Take-off obstacle clearance limitations.* No airplane shall be taken off at a weight in excess of that shown in the Airplane Flight Manual to correspond with a net take-off flight path which clears all obstacles either by at least a height of 35 feet vertically or by at least 200 feet horizontally within the airport boundaries and by at least 300 feet horizontally after passing beyond the boundaries. In determining the allowable deviation of the flight path in order to avoid obstacles by at least the distances prescribed, it shall be assumed that the airplane is not banked before reaching a height of 50 feet as shown by the take-off path data in the Airplane Flight Manual, and that a maximum bank thereafter does not exceed 15 degrees. The take-off path considered shall be for the elevation of the airport, the effective runway gradient, and for the ambient temperature and wind component existing at the time of take-off. (See secs. 4T.123(b) and 4T.743(b).)

40T.83 *En route limitations.*

(a) *One engine inoperative.* No airplane shall be taken off at a weight in excess of that which, according to the one-engine-inoperative en route net flight path data shown in the Airplane Flight Manual, will permit compliance with either subparagraph (1) or subparagraph (2) of this paragraph at all points along the route. The net flight path used shall be for the ambient temperatures anticipated along the route. (See secs. 4T.123(b) and 4T.743(b).)

(1) The slope of the net flight path shall be positive at an altitude of at least 1,000 feet above all terrain and obstructions along the route within 5 miles on either side of the intended track.

(2) The net flight path shall be such as to permit the airplane to continue flight from the cruising altitude to an alternate airport where a landing can be made in accordance with the provisions of section 40T.84(b), the net flight path clearing vertically by at least 2,000 feet all terrain and obstructions along the route within 5 miles on either side of the intended track. The provisions of subdivisions (i) through (vii) of this subparagraph shall apply.

(i) The engine shall be assumed to fail at the most critical point along the route.

(ii) The airplane shall be assumed to pass over the critical obstruction following engine failure at a point no closer to the critical obstruction than the nearest approved radio navigational fix, except that the Administrator may authorize a procedure established on a different basis where adequate operational safeguards are found to exist.

(iii) The net flight path shall have a positive slope at 1,500 feet above the airport used as the alternate.

(iv) An approved method shall be used to account for winds which would otherwise adversely affect the flight path.

(v) Fuel jettisoning shall be permitted if the Administrator finds that the operator has an adequate training program, proper instructions are given to the flight crew, and all other precautions are taken to insure a safe procedure.

(vi) The alternate airport shall be specified in the dispatch release and shall meet the prescribed weather minima.

(vii) The consumption of fuel and oil after the engine becomes inoperative shall be that which is accounted for in the net flight path data shown in the Airplane Flight Manual.

(b) *Two engines inoperative.* No airplane shall be flown along an intended route except in compliance with either subparagraph (1) or subparagraph (2) of this paragraph.

(1) No place along the intended track shall be more than 90 minutes away from an airport at which a landing can be made in accordance with the provisions of section 40T.84(b), assuming all engines to be operating at cruising power.

(2) No airplane shall be taken off at a weight in excess of that which, according to the two-engine-inoperative en route net flight path data shown in the Airplane Flight Manual, will permit the airplane to continue flight from the point where two engines are assumed to fail simultaneously to an airport where a landing can be made in accordance with the provisions of section 40T.84(b), the net flight path having a positive slope at an altitude of at least 1,000 feet above all terrain and obstructions along the route within 5 miles on either side of the intended track or at an altitude of 2,000 feet, whichever is higher. The net flight path considered shall be for the ambient temperatures anticipated along the route. The provisions of subdivisions (i) through (iii) of this subparagraph shall apply. (See secs. 4T.123(b) and 4T.743(b).)

(i) The two engines shall be assumed to fail at the most critical point along the route.

(ii) The airplane's weight at the point where the two engines are assumed to fail shall be considered to be not less than that which would include sufficient fuel to proceed to the airport and to arrive there at an altitude of at least 1,500 feet directly over the landing area and thereafter to fly for 15 minutes at cruise power and/or thrust.

(iii) The consumption of fuel and oil after the engines become inoperative shall be that which is accounted for in the net flight path data shown in the Airplane Flight Manual.

40T.84 *Landing limitations.*

(a) *Airport of destination.* No airplane shall be taken off at a weight in excess of that which, in accordance with the landing distances shown in the Airplane Flight Manual for the elevation of the airport of intended destination and for the wind conditions anticipated there at the time of landing, would permit the airplane to be brought to rest at the airport of intended destination within 60 percent of the effective length of the runway from a point 50 feet directly above the intersection of the obstruction clearance plane and the runway. The weight of the airplane shall be assumed to be reduced by the weight of the fuel and oil expected to be consumed in flight to the airport of intended destination. Compliance shall be shown with the conditions of subparagraphs (1) and (2) of this paragraph. (See secs. 4T.123(b) and 4T.743(b).)

(1) It shall be assumed that the airplane is landed on the most favorable runway and direction in still air.

(2) It shall be assumed that the airplane is landed on the most suitable runway considering the probable wind velocity and direction and taking due account of the ground handling characteristics of the airplane and of other conditions (i.e., landing aids, terrain, etc.). If full compliance with the provisions of this subparagraph is not shown, the airplane may be taken off if an alternate airport is designated which permits compliance with paragraph (b) of this section.

(b) *Alternate airport.* No airport shall be designated as an alternate airport in a dispatch release unless the airplane at the weight anticipated at the time of arrival at such airport can comply with the provisions of paragraph (a) of this section, provided that the airplane can be brought to rest within 70 percent of the effective length of the runway.

4. In lieu of section 43.11 of Part 43 of the Civil Air Regulations, the following shall be applicable:

43T.11 *Transport category airplane weight limitations.* The performance data in the Airplane Flight Manual shall be applied in determining compliance with the following provisions:

(a) No airplane shall be taken off at a weight which exceeds the take-off weight specified in the Airplane Flight Manual for the elevation of the airport and for the ambient temperature existing at the time of the take-off. (See secs. 4T.123(a)(1) and 4T.743(a).)

(b) No airplane shall be taken off at a weight such that, allowing for normal consumption of fuel and oil in flight to the airport of destination and to the alternate airports, the weight on arrival will exceed the landing weight specified in the Airplane Flight Manual for the elevation of each of the airports involved and for the ambient temperatures anticipated at the time of landing. (See secs. 4T.123(a)(2) and 4T.743(a).)

(c) No airplane shall be taken off at a weight which exceeds the weight shown in the Airplane Flight Manual to correspond with the minimum distances required for take-off. These distances shall correspond with the elevation of the airport, the runway to be used, the effective runway gradient, and the ambient temperature and wind component existing at the time of take-off. (See secs. 4T.123(a)(3) and 4T.743(a).) If the take-off distance includes a clearway as defined in Item 5 of this regulation, the take-off distance shall not include a clearway distance greater than one-half of the take-off run.

(d) No airplane shall be operated outside the operational limits specified in the Airplane Flight Manual. (See secs. 4T.123(a)(4) and 4T.743(a).)

5. The following definitions shall apply:

Clearway. A clearway is an area beyond the airport runway not less than 300 feet on either side of the extended center line of the runway, at an elevation no higher than the elevation at the end of the runway, clear of all fixed obstacles, and under the control of the airport authorities.

SPECIAL CIVIL AIR REGULATION NO. SR–422B

Effective: July 9, 1959
Issued: July 9, 1959

Turbine-Powered Transport Category Airplane of Current Design

Special Civil Air Regulation No. SR–422, effective August 27, 1957, prescribes requirements applicable to the type certification and operation of turbine-powered transport category airplanes for which a type certificate is issued after August 27, 1957. Special Civil Air Regulation No. SR–422A, effective July 2, 1958, included substantive changes to SR–422 and was made applicable to all turbine-powered transport category airplanes for which a type certificate is issued after September 30, 1958.

This Special Civil Air Regulation makes further changes to the airworthiness rules for turbine-powered transport category airplanes to be applicable to all such airplanes for which a type certificate is issued after August 29, 1959. These changes were proposed in Draft Release No. 58–1C (24 F.R. 128) by the Civil Aeronautics Board in connection with the 1958 Annual Airworthiness Review. The amendments herein have been adopted after careful consideration of all the discussion and comment received thereon.

Substantive and minor changes have been made to the provisions of SR–422A. For ease in identification they are listed as follows:

(a) Substantive changes: introductory paragraphs; 4T.114 (b), (c), (d), (e), and (f); 4T.115(d); 4T.117a(b); 4T.120 (a)(3), (b), and (d); 40T.81(c); 43T.11(c); and item 5 (a) and (b).

(b) Minor changes; item 2; 4T.112 (title), (b)(1), (c), (d), and (e); 4T.113(b); 4T.116(i)(4); 4T.117(b) (1) and (2); 4T.120(a); 4T.121; 4T.122(d); 4T.123(a); 40T.82; and 40T.83.

Pertinent background information to this regulation is contained in the preambles to SR–422 and SR–422A. Following is a discussion of important issues relevant to the changed provisions contained herein.

One of the most important changes being introduced concerns the rotation speed V_R of the airplane during takeoff (4T.114). Experience gained in the certification of airplanes under the provisions of SR–422 and SR–422A indicates that relating V_R to the stall speed is not essential and might unduly penalize airplanes with superior flying qualities. It has been found that the primary limitations on V_R should be in terms of a margin between the actual lift-off speeds V_{LOF} and the minimum unstick speed V_{MU} at which the airplane can proceed safely with the takeoff. The provisions contained herein require that V_R speeds be established to be applicable to takeoffs with one engine inoperative as well as with all engines operating. The V_{MU} speeds can be established from free air data provided that the data are verified by ground takeoff tests. Certain safeguards are included in conjunction with the establishment of V_R speeds to ensure that takeoffs in service can be made with consistent safety.

A change is being introduced to the provision in 4T.117a(b) concerning the manner in which the net takeoff flight path is obtained. In accordance with this provision as contained in SR–422A, the net takeoff flight path would have a negative slope throughout the acceleration segment. Since this segment usually represents level flight easily controlled by reference to the normal flight instruments, a significant reduction in the flight path's gradient would not be expected. For these reasons, the provision is being changed to permit an equivalent reduction in acceleration in lieu of a reduction in gradient.

Section 4T.117a(b) is being amended additionally by changing the value of gradient margin in the net flight path for two-engine airplanes from 1.0 percent to 0.8 percent. The value for four-engine airplanes remains 1.0 percent. Differentiation in gradient values in the net flight path between two and four-engine airplanes is consistent with the differentiation in the climb gradients for the takeoff, enroute, and approach stages of flight. Statistical analysis substantiates the specific reduction of the net flight path gradient to a value of 0.8 percent. Correlatively, a reevaluation of the climb gradients for twin-engine airplanes in the second segment takeoff and in the approach climb indicates that the respective values should be 2.4 percent and 2.1 percent and these changes are being made in 4T.120 (b) and (d).

A change is introduced in the conditions prescribed for meeting the climb gradient in the first segment takeoff climb (4T.120(a)), by changing the speed V_2 to the speed V_{LOF}. The intent of this requirement is to use the speed at which the airplane lifts off the ground. In SR–422 this speed was considered to be V_2; however, in SR–422A and in this regulation the speed V_2 is a higher speed which is reached at the end of the takeoff distance and no longer reflects the conditions pertinent to the first segment climb. In making this change consistent with relevant changes in SR–422A and in this regulation, no consideration has been given to the appropriateness of the minimum climb gradient values prescribed for the first segment climb. These are subject to alteration if results of further studies so indicate.

There is being introduced in this regulation the concept of "stopways," the definition of which is contained in item 5(b). Stopways have been used outside the United States in meeting the accelerate-stop distances in case of aborted takeoffs. They are considered to result in more practical operations. In order to ensure that they can be used without detrimental effects on safety, a provision is being included in 4T.115(d) requiring taking into account the surface characteristics of the stopways to be used in scheduling the accelerate-stop distances in the Airplane Flight Manual.

In conjunction with the introduction of stopways, there are changes being made in the definition of a "clearway" (item 5(a)). One of the changes is to specify that a clearway begins at the end of the runway whether or not a stopway is being used. Of the other changes, the most significant one expresses the clearway in terms of a clearway plane and permits this plane to have an upward slope of 1.25 percent. In effect, this change will allow, in some cases, use of clearways which would not be allowed under the definition in SR–422A because of relatively small obstacles or slightly sloping terrain. (See also 40T.81(c) and 43T.11(c).)

There are also included in this regulation a number of minor, editorial, or clarifying changes.

Draft Release No. 58–1C included a proposal for expanding lateral obstacle clearances in the takeoff flight path. Studies indicate that some expanding lateral clearances are necessary for safety in operations with all turbine-powered airplanes. It appears, therefore, that an appropriate rule should be made applicable not only to airplanes certificated in accordance with this regulation, but also to those certificated in accordance with SR–422 and SR–422A. Accordingly, no change is being made in this regulation to the lateral obstacle clearance provisions, instead, a Notice of Proposed Rule Making is now being prepared to amend SR–422, SR–422A, and this regulation, to require expanding lateral obstacle clearances for all airplanes certificated thereunder.

This Special Civil Air Regulation is not intended to compromise the authority of the Administrator under section 4b.10 to impose such special conditions as are found necessary in any particular case to avoid unsafe design features and otherwise to ensure equivalent safety.

Interested persons have been afforded an opportunity to participate in the making of this regulation (24 F.R. 128), and due consideration has been given to all relevant matter presented.

This regulation does not require compliance until after August 29, 1959; however, since applicants for a type certificate for turbine-powered transport category airplanes may elect to show compliance with this regulation before that date, it is being made effective immediately.

In consideration of the foregoing, the following Special Civil Air Regulation is hereby promulgated to become effective immediately:

Contrary provisions of the Civil Air Regulations notwithstanding, all turbine-powered transport category airplanes for which a type certificate is issued after August 29, 1959, shall comply with the following requirements. Applicants for a type certificate for a turbine-powered transport category airplane may elect and are authorized to meet the requirements of this Special Civil Air Regulation prior to August 29, 1959, in which case however, all of the following provisions must be complied with.

1. The provisions of Part 4b of the Civil Air Regulations, effective on the date of application for type certificate; and such of the provisions of all subsequent amendments to Part 4b, in effect prior to August 27, 1957, as the Administator finds necessary to ensure that the level of safety of turbine-powered airplanes is equivalent to that generally intended by Part 4b.

2. In lieu of sections 4b. 110 through 4b.125, 4b.183, and 4b.743 of Part 4b of the Civil Air Regulations, the following shall be applicable:

PERFORMANCE

4T.110 *General.*

(a) The performance of the airplane shall be determined and scheduled in accordance with, and shall meet the minima prescribed by, the provision of sections 4T.110 through 4T.123. The performance limitations, information, and other data shall be given in accordance with section 4T.743.

(b) Unless otherwise specifically prescribed, the performance shall correspond with ambient atmospheric conditions and still air.

Humidity shall be accounted for as specified in paragraph (c) of this section.

(c) The performance as affected by engine power and/or thrust shall be based on a relative humidity of 80 percent at and below standard temperatures and on 34 percent at and above standard temperatures plus 50° F. Between these two temperatures the relative humidity shall vary linearly.

(d) The performance shall correspond with the propulsive thrust available under the particular ambient atmospheric conditions, the particular flight condition, and the relative humidity specified in paragraph (c) of this section. The available propulsive thrust shall correspond with engine power and/or thrust not exceeding the approved power and/or thrust less the installational losses and less the power and/or equivalent thrust absorbed by the accessories and services appropriate to the particular ambient atmospheric conditions and the particular flight condition.

4T.111 *Airplane configuration, speed, power, and/or thrust; general.*

(a) The airplane configuration (setting of wing and cowl flaps, air brakes, landing gear, propeller, etc.), denoted respectively as the takeoff, en route, approach, and landing configurations, shall be selected by the applicant except as otherwise prescribed.

(b) It shall be acceptable to make the airplane configurations variable with weight, altitude, and temperature, to an extent found by the Administrator to be compatible with operating procedures required in accordance with paragraph (c) of this section.

(c) In determining the accelerate-stop distances, takeoff flight paths, takeoff distances, and landing distances, changes in the airplane's configuration and speed, and in the power and/thrust shall be in accordance with procedures established by the applicant for the operation of the airplane in service, except as otherwise prescribed. In addition, procedures shall be established for the execution of balked landings and missed approaches associated with the conditions prescribed in sections 4T.119 and 4T.120(d), respectively. All procedures shall comply with the provisions of subparagraphs (1) through (3) of this paragraph.

(1) The Administrator shall find that the procedures can be consistently executed in service by crews of average skill.

(2) The procedures shall not involve methods or the use of devices which have not been proven to be safe and reliable.

(3) Allowance shall be made for such time delays in the execution of the procedures as may be reasonably expected to occur during service.

4T.112 *Stalling and minimum control speeds.*

(a) The speed V_s shall denote the calibrated stilling speed, or the minimum steady flight speed at which the airplane is controllable, in knots, with:

(1) Zero thrust at the stalling speed, or engines idling and throttles closed if it is shown that the resultant thrust has no appreciable effect on the stalling speed;

(2) If applicable, propeller pitch controls in the position

necessary for compliance with subparagraph (1) of this paragraph; the airplane in all other respects (flaps, landing gear, etc.) in the particular configuration corresponding with that in connection with which V_s is being used;

(3) The weight of the airplane equal to the weight in connection with which V_s is being used to determine compliance with a particular requirement;

(4) The center of gravity in the most unfavorable position within the the allowable range.

(b) The stall speed defined in this section shall be the minimum speed obtained in flight tests conducted in accordance with the procedure of subparagraphs (1) and (2) of this paragraph.

(1) With the airplane trimmed for straight flight at a speed chosen by the applicant, but not less than 1.2 V_s nor greater than 1.4 V_s, and from a speed sufficiently above the stalling speed to ensure steady conditions, the elevator control shall be applied at a rate such that the airplane speed reduction does not exceed 1 knot per second.

(2) During the test prescribed in subparagraph (1) of this paragraph, the flight characteristics provisions of section 4b.160 of Part 4b of the Civil Air Regulations shall be complied with.

(c) The minimum control speed V_{MC}, in terms of calibrated air speeed, shall be determined under the conditions specified in this paragraph so that, when the critical engine is suddenly made inoperative at that speed, it is possible to recover control of the airplane with the engine still inoperative and to maintain it in straight flight at that speed, either with zero yaw or, at the option of the applicant, with an angle of bank not in excess of 5 degrees. V_{MC} shall not exceed 1.2 V_s with:

(1) Engines operating at the maximum available takeoff thrust and/or power;

(2) Maximum sea level takeoff weight or such lesser weight as might be necessary to demonstrate V_{MC}.

(3) The airplane in the most critical takeoff configuration existing along the flight path after the airplane becomes airborne, except that the landing gear is retracted;

(4) The airplane trimmed for takeoff;

(5) The airplane airborne and the ground effect negligible;

(6) The center of gravity in the most unfavorable position;

(d) In demonstrating the minimum speed specified in paragraph (c) of this section, the rudder force required to maintain control shall not exceed 180 pounds and it shall not be necessary to reduce the power and/or thrust of the operative engine(s).

(e) During recovery from the maneuver specified in paragraph (c) of this section, the airplane shall not assume any dangerous attitude, nor shall it require exceptional skill, strength, or alertness on the part of the pilot to prevent a change of heading in excess of 20 degrees before recovery is complete.

4T.113 *Takeoff; general.*

(a) The takeoff data in sections 4T.114 through 4T.117 shall be determined under the conditions of subparagraphs (1) and (2) of this paragraph.

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(1) At all weights, altitudes, and ambient temperatures, within the operational limits established by the applicant for the airplane.

(2) In the configuration for takeoff (see sec. 4T.111).

(b) Takeoff data shall be based on a smooth, dry, hard-surfaced runway and shall be determined in such a manner that reproduction of the performance does not require exceptional skill or alertness on the part of the pilot. In the case of seaplanes or float planes, the takeoff surface shall be smooth water, while for skiplane it shall be smooth, dry snow. In addition, the takeoff data shall include operational correction factors in accordance with subparagraphs (1) and (2) of this paragraph for wind and for runway gradients, within the operational limits established by the applicant for the airplane.

(1) Not more than 50 percent of nominal wind components along the takeoff path opposite to the direction of takeoff, and not less than 150 percent of nominal wind components along the takeoff path in the direction of takeoff.

(2) Effective runway gradients.

4T.114 *Takeoff speeds.*

(a) The critical-engine-failure speed V_1 in terms of calibrated air speed, shall be selected by the applicant, but shall not be less than the minimum speed at which controllability by primary aerodynamic controls alone is demonstrated during the takeoff run to be adequate to permit proceeding safely with the takeoff using average piloting skill, when the critical engine is suddenly made inoperative.

(b) The minimum takeoff safety speed $V_{2\,min}$, in terms of calibrated air speed, shall not be less than:

(1) 1.2 V_s for two-engine propeller-driven airplanes and for airplanes without propellers which have no provisions for obtaining a significant reduction in the one-engine-inoperative power-on stalling speed;

(2) 1.15 V_s for propeller-driven airplanes having more than two engines and for airplanes without propellers which have provisions for obtaining a significant reduction in the one-engine-inoperative power-on stalling speed;

(3) 1.10 times the minimum control speed V_{MC}.

(c) The takeoff safety speed V_2, in terms of calibrated air speed, shall be selected by the applicant so as to permit the gradient of climb required in section 4T.120(b), but it shall not be less than:

(1) The speed $V_{2\,min}$,

(2) The rotation speed V_R (see paragraph (e) of this section) plus the increment in speed attained prior to reaching a height of 35 feet above the takeoff surface in compliance with section 4T.116(e).

(d) The minimum unstick speed V_{MU}, in terms of calibrated air speed, shall be the speed at and above which the airplane can be made to lift off the ground and to continue the takeoff without displaying any hazardous characteristics. V_{MU} speeds shall be selected by the applicant for the all-engines-operating and the one-engine-inoperative conditions. It shall be acceptable to establish the V_{MU} speeds from free air data: *Provided*, That these data are verified by ground takeoff tests.

NOTE: In certain cases, ground takeoff tests might involve some takeoffs at the V_{MU} speeds.

(e) The rotation speed V_R, in terms of calibrated air speed, shall be selected by the applicant in compliance with the conditions of subparagraphs (1) through (4) of this paragraph.

(1) The V_R speed shall not be less than:

(i) The speed V_1;

(ii) A speed equal to 105 percent of V_{MC};

(iii) A speed which permits the attainment of the speed V_2 prior to reaching a height of 35 feet above the takeoff surface as determined in accordance with section 4T.116(e);

(iv) A speed which, if the airplane is rotated at its maximum practicable rate, will result in a lift-off speed V_{LOF} (see paragraph (f) of this section) not less than 110 percent of V_{MU} in the all-engines-operating condition nor less than 105 percent of V_{MU} in the one-engine-inoperative condition.

(2) For any given set of conditions (weight, configuration, temperature, etc.), a single value of V_R speed obtained in accordance with this paragraph shall be used in showing compliance with both the one-engine-inoperative and the all-engines-operating takeoff provisions.

(3) It shall be shown that the one-engine-inoperative takeoff distance determined with a rotation speed 5 knots less than the V_R speed established in accordance with subparagraphs (1) and (2) of this paragraph does not exceed the corresponding one-engine-inoperative takeoff distance determined with the established V_R speed. The determination of the takeoff distances shall be in accordance with section 4T.117(a)(1).

(4) It shall be demonstrated that reasonably expected variations in service from the takeoff procedures established by the applicant for the operation of the airplane (see sec. 4T.111(c)) (e.g., over-rotation of the airplane, out of trim conditions) will not result in unsafe flight characteristics nor in marked increases in the scheduled takeoff distances established in accordance with section 4T.117(a).

(f) The lift-off speed V_{LOF}, in terms of calibrated air speed, shall be the speed at which the airplane first becomes airborne.

4T.115 *Accelerate-stop distance.*

(a) The accelerate-stop distance shall be the sum of the following:

(1) The distance required to accelerate the airplane from a standing start to the speed V_1;

(2) Assuming the critical engine to fail at the speed V_1, the distance required to bring the airplane to a full stop from the point corresponding with the speed V_1.

(b) In addition to, or in lieu of, wheel brakes, the use of other braking means shall be acceptable in determining the accelerate-stop distance, provided that such braking means shall have been proven to be safe and reliable, that the manner of their employment is such that consistent results can be expected in service and that exceptional skill is not required to control the airplane.

(c) The landing gear shall remain extended throughout the accelerate-stop distance.

(d) If the accelerate-stop distance is intended to include a stopway with surface characteristics substantially different from those of a

smooth hard-surfaced runway, the takeoff data shall include operational correction factors for the accelerate-stop distance to account for the particular surface characteristics of the stopway and the variations in such characteristics with seasonal weather conditions (i.e., temperature, rain, snow, ice, etc.), within the operational limits established by the applicant.

4T.116 *Takeoff path.* The takeoff path shall be considered to extend from the standing start to a point in the takeoff where a height of 1,500 feet above the takeoff surface is reached or to a point in the takeoff where the transition from the takeoff to the en route configuration is completed and a speed is reached at which compliance with section 4T.120(c) is shown, whichever point is at a higher altitude. The conditions of paragraphs (a) through (i) of this section shall apply in determining the takeoff path.

(a) The takeoff path shall be based upon procedures prescribed in accordance with section 4T.111(c).

(b) The airplane shall be accelerated on the ground to the speed V_1 at which point the critical engine shall be made inoperative and shall remain inoperative during the remainder of the takeoff. Subsequent to attaining speed V_1, the airplane shall be accelerated to speed V_2 during which time it shall be permissible to initiate raising the nose gear off the

(c) Landing gear retraction shall not be initiated until the ground at a speed not less than the rotating speed V_R.
airplane becomes airborne.

(d) The slope of the airborne portion of the takeoff path shall be positive at all points.

(e) The airplane shall attain the speed V_2 prior to reaching a height of 35 feet above the takeoff surface and shall continue at a speed as close as practical to, but not less than, V_2 until a height of 400 feet above the takeoff surface is reached.

(f) Except for gear retraction and propeller feathering, the airplane configuration shall not be changed before reaching a height of 400 feet above the takeoff surface.

(g) At all points along the takeoff path starting at the point where the airplane first reaches a height of 400 feet above the takeoff surface, the available gradient of climb shall not be less than 1.2 percent for two-engine airplanes, and 1.7 percent for four-engine airplanes.

(h) The takeoff path shall be determined either by a continuous demonstrated takeoff, or alternatively, by synthesizing from segments the complete takeoff path.

(i) If the takeoff path is determined by the segmental method, the provisions of subparagraphs (1) through (4) of this paragraph shall be specifically applicable.

(1) The segments of a segmental takeoff path shall be clearly defined and shall be related to the distinct changes in the configuration of the airplane, in power and/or thrust, and in speed.

(2) The weight of the airplane, the configuration, and the power and/or thrust shall be constant throughout each segment and shall correspond with the most critical condition prevailing in the particular segment.

(3) The segmental flight path shall be based on the airplane's performance without ground effect.

(4) Segmental takeoff path data shall be checked by continuous demonstrated takeoffs up to the point where the airplane's performance is out of ground effect and the airplane's speed is stabilized, to ensure that the segmental path is conservative relative to the continuous path.

NOTE: The airplane usually is considered out of ground effect when it reaches a height above the ground equal to the airplane's wing span.

4T.117 *Takeoff distance and takeoff run.*

(a) *Takeoff distance.* The takeoff distance shall be the greater of the distances established in accordance with subparagraphs (1) and (2) of this paragraph.

(1) The horizontal distance along the takeoff path from the start of the takeoff to the point where the airplane attains a height of 35 feet above the takeoff surface, as determined in accordance with section 4T.116.

(2) A distance equal to 115 percent of the horizontal distance along the takeoff path, with all engines operating, from the start of the takeoff to the point where the airplane attains a height of 35 feet above the takeoff surface, as determined by a procedure consistent with that established in accordance with section 4T.116.

(b) *Takeoff run.* If the takeoff distance is intended to include a clearway (see item 5 of this regulation), the takeoff run shall be determined and shall be the greater of the distances established in accordance with subparagraphs (1) and (2) of this paragraph.

(1) The horizontal distance along the takeoff path from the start of the takeoff to a point equidistant between the point where the speed V_{LOF} is reached and the point where the airplane attains a height of 35 feet above the takeoff surface, as determined in accordance with section 4T.116.

(2) A distance equal to 115 percent of the horizontal distance along the takeoff path, with all engines operating, from the start of the takeoff to a point equidistant between the point where the speed V_{LOF} is reached and the point where the airplane attains a height of 35 feet above the takeoff surface, as determined by a procedure consistent with that established in accordance with section 4T.116.

4T.117a *Takeoff flight path.*

(a) The takeoff flight path shall be considered to begin at a height of 35 feet above the takeoff surface at the end of the takeoff distance as determined in accordance with section 4T.117(a).

(b) The net takeoff flight path data shall be determined in such a manner that they represent the airplane's actual takeoff flight paths, determined in accordance with section 4T.116 and with paragraph (a) of this section, reduced at each point by a gradient of climb equal to 0.8 percent for two-engine airplanes and equal to 1.0 percent for four-engine airplanes. It shall be acceptable to apply the prescribed reduction in climb gradient as an equivalent reduction in the airplane's acceleration along that portion of the actual takeoff flight path where the airplane is accelerated in level flight.

4T.118 *Climb; general.* Compliance shall be shown with the climb requirements of sections 4T.119 and 4T.120 at all weights, altitudes, and ambient temperatures, within the operational limits established by the applicant for the airplane. The airplane's center of gravity shall be in the most unfavorable position corresponding with the applicable configuration.

4T.119 *All-engine-operating landing climb.* In the landing configuration the steady gradient of climb shall not be less than 3.2 percent, with:

(a) All engines operating at the power and/or thrust which are available 8 seconds after initiation of movement of the power and/or thrust controls fromthe minimum flight idle to the takeoff position;

(b) A climb speed not in excess of 1.3 V_s.

4T.120 *One-engine-inoperative climb.*

(a) *Takeoff; landing gear extended.* In the critical takeoff configuration existing along the flight path between the points where the airplane reaches the speed V_{LOF} and where the landing gear is fully retracted, in accordance with section 4T.116 but without ground effect, the steady gradient of climb shall be positive for two-engine airplanes and shall not be less than 0.5 percent for four-engine airplanes, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available takeoff power and/or thrust existing in accordance with section 4T.116 at the time retraction of the airplane's landing gear is initiated, unless subsequently a more critical power operating condition exists along the flight path prior to the point where the landing gear is fully retracted;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the time retraction of the airplane's landing gear is initiated;

(3) The speed equal to the speed V_{LOF}.

(b) *Takeoff; landing gear retracted.* In the takeoff configuration existing at the point of the flight path where the airplane's landing gear is fully retracted, in accordance with section 4T.116 but without ground effect, the steady gradient of climb shall not be less than 2.4 percent for two-engine airplanes and not less than 3.0 percent for four-engine airplanes, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available takeoff power and/or thrust existing in accordance with section 4T.116 at the time the landing gear is fully retracted, unless subsequently a more critical power operating condition exists along the flight path prior to the point where a height of 400 feet above the takeoff surface is reached;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the time the airplane's landing gear is fully retracted;

(3) The speed equal to the speed V_2.

(c) *Final takeoff.* In the en route configuration, the steady gradient of climb shall not be less than 1.2 percent for two-engine airplanes and not less than 1.7 percent for four-engine airplanes, at the end of the takeoff path as determined by section 4T.116, with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available maximum continuous power and/or thrust;

(2) The weight equal to the airplane's weight existing in accordance with section 4T.116 at the end of the takeoff path.

(3) The speed equal to not less than 1.25 V_s.

(d) *Approach.* In the approach configuration corresponding with the normal all-engines-operating procedure such that V_s related to this configuration does not exceed 110 percent of the V_s corresponding with the related landing configuration, the steady gradient of climb shall not be less than 2.1 percent for two-engine airplanes and not less than 2.7 percent for four-engine airplanes with:

(1) The critical engine inoperative, the remaining engine(s) operating at the available takeoff power and/or thrust;

(2) The weight equal to the maximum landing weight;

(3) A climb speed established by the applicant in connection with normal landing procedures, except that it shall not exceed 1.5 V_s (see sec. 4T.111(c)).

4T.121 *En route flight paths.* With the airplane in the en route configuration, the flight paths prescribed in paragraphs (a) and (b) of this section shall be determined at all weights, altitudes, and ambient temperatures, within the operational limits established by the applicant for the airplane.

(a) *One engine inoperative.* The one-engine-inoperative net flight path data shall be determined in such a manner that they represent the airplane's actual climb performance diminished by a gradient of climb equal to 1.1 percent for two-engine airplanes and 1.6 percent for four-engine airplanes. It shall be acceptable to include in these data the variation of the airplane's weight along the flight path to take into account the progressive consumption of fuel and oil by the operating engine(s).

(b) *Two engines inoperative.* For airplanes with four engines, the two-engine-inoperative net flight path data shall be determined in such a manner that they represent the airplane's actual climb performance diminished by a gradient of climb equal to 0.5 percent. It shall be acceptable to include in these data the variation of the airplane's weight along the flight path to take into account the progressive consumption of fuel and oil by the operating engines.

(c) *Conditions.* In determining the flight paths prescribed in paragraphs (a) and (b) of this section, the conditions of subparagraphs (1) through (4) of this paragraph shall apply.

(1) The airplane's center of gravity shall be in the most unfavorable position.

(2) The critical engine(s) shall be inoperative, the remaining engine(s) operating at the available maximum continuous power and/or thrust.

(3) Means for controlling the engine cooling air supply shall be in the position which provides adequate cooling in the hot-day condition.

(4) The speed shall be selected by the applicant.

4T.122 *Landing distance.* The landing distance shall be the horizontal distance required to land and to come to a complete stop (to a speed

of approximately 3 knots in the case of seaplanes or float planes) from a point at a height of 50 feet above the landing surface. Landing distances shall be determined for standard temperatures at all weights, altitudes, and winds, within the operational limits established by the applicant for the airplane. The conditions of paragraphs (a) through (g) of this section shall apply.

(a) The airplane shall be in the landing configuration. During the landing, changes in the airplane's configuration, in power and/or thrust, and in speed shall be in accordance with procedures established by the applicant for the operation of the airplane in service. The procedures shall comply with the provisions of section 4T.111(c).

(b) The landing shall be preceded by a steady gliding approach down to the 50-foot height with a calibrated air speed of not less than 1.3 V_s.

(c) The landing distance shall be based on a smooth, dry, hard-surfaced runway, and shall be determined in such a manner that reproduction does not require exceptional skill or alertness on the part of the pilot. In the case of seaplanes or float planes, the landing surface shall be smooth water, while for skiplanes it shall be smooth, dry snow. During landing, the airplane shall not exhibit excessive vertical acceleration, a tendency to bounce, nose over, ground loop, porpoise, or water loop.

(d) The landing distance data shall include operational correction factors for not more than 50 percent of nominal wind components along the landing path opposite to the direction of landing and not less than 150 percent of nominal wind components along the landing path in the direction of landing.

(e) During landing, the operating pressures on the wheel braking system shall not be in excess of those approved by the manufacturer of the brakes, and the wheel brakes shall not be used in such a manner as to produce excessive wear of brakes and tires.

(f) In addition to, or in lieu, of, wheel brakes, the use of other braking means shall be acceptable in determining the landing distance, provided such braking means shall have been proven to be safe and reliable, that the manner of their employment is such that consistent results can be expected in service, and that exceptional skill is not required to control the airplane.

(g) If the characteristics of a device (e.g., the propellers) dependent upon the operation of any of the engines noticeably increase the landing distance when the landing is made with the engine inoperative, the landing distance shall be determined with the critical engine inoperative unless the Administrator finds that the use of compensating means will result in a landing distance not greater than that attained with all engines operating.

4T.123 *Limitations and information.*

(a) *Limitations.* The performance limitations on the operation of the airplane shall be established in accordance with subparagraph (1) through (4) of this paragraph. (See also sec. 4T.743.)

(1) *Takeoff weights.* The maximum takeoff weights shall be established at which compliance is shown with the generally applicable provisions of this regulation and with the takeoff climb provisions pre-

scribed in section 4T.120 (a), (b), and (c) for altitudes and ambient temperatures, within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(2) *Landing weights.* The maximum landing weights shall be established at which compliance is shown with the generally applicable provisions of this regulation and with the landing and takeoff climb provisions prescribed in sections 4T.119 and 4T.120 for altitudes and ambient temperatures, within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(3) *Accelerate-stop distance, takeoff distance, and takeoff run.* The minimum distances required for takeoff shall be established at which compliance is shown with the generally applicable provisions of this regulation and with sections 4T.115 and 4T.117(a) and with 4T.117(b) if the takeoff distance is intended to include a clearway, for weights, altitudes, temperatures, wind components, and runway gradients, within the operational limits of the airplane (see subparagraph (4) of this paragraph).

(4) *Operational limits.* The operational limits of the airplane shall be established by the applicant for all variable factors required in showing compliance with this regulation (weight, altitude, temperature, etc.). (See secs. 4T.113 (a)(1) and (b), 4T.115(d), 4T.118, 4T.121, and 4T.122.)

(b) *Information.* The performance information on the operation of the airplane shall be scheduled in compliance with the generally applicable provisions of this regulation and with sections 4T.117a(b), 4T.121, and 4T.122 for weights, altitudes, temperatures, wind components, and runway gradients, as these may be applicable, within the operational limits of the airplane (see subparagraph (a)(4) of this section). In addition, the performance information specified in subparagraphs (1) through (3) of this paragraph shall be determined by extrapolation and scheduled for the ranges of weights between the maximum landing and maximum takeoff weights established in accordance with subparagraphs (a)(1) and (a)(2) of this section. (See also sec. 4T.743.)

(1) Climb in the landing configuration (see sec. 4T.119);

(2) Climb in the approach configuration (see sec. 4T.120(d));

(3) Landing distance (see sec. 4T.122).

AIRPLANE FLIGHT MANUAL

4T.743 *Performance limitations, information, and other data.*

(a) *Limitations.* The airplane's performance limitations shall be given in accordance with section 4T.123(a).

(b) *Information.* The performance information prescribed in section 4T.123(b) for the application of the operating rules of this regulation shall be given together with descriptions of the conditions, air speeds, etc., under which the data were determined.

(c) *Procedures.* Procedures established in accordance with section 4T.111(c) shall be given to the extent such procedures are related to the limitations and information set forth in accordance with paragraphs (a) and (b) of this section. Such procedures, in the form of

guidance material, shall be included with the relevant limitations or information, as applicable.

(d) *Miscellaneous.* An explanation shall be given of significant or unusual flight or ground handling characteristics of the airplane.

3. In lieu of sections 40.70 through 40.78, 41.27 through 41.36(d), and 42.70 through 42.83, of Parts 40, 41, and 42, respectively, of the Civil Air Regulations, the following shall be applicable:

OPERATING RULES

40T.80 *Transport category airplane operating limitations.*

(a) In operating any passenger-carrying transport category airplane certificated in accordance with the performance requirements of this regulation, the provisions of sections 40T.80 through 40T.84 shall be complied with, unless deviations therefrom are specifically authorized by the Administrator on the ground that the special circumstances of a particular case make a literal observance of the requirements unnecessary for safety.

(b) The performance data in the Airplane Flight Manual shall be applied in determining compliance with the provisions of sections 40T.81 through 40T.84. Where conditions differ from those for which specific tests were made, compliance shall be determined by approved interpolation or computation of the effects of changes in the specific variables if such interpolations or computations give results substantially equalling in accuracy the results of a direct test.

40T.81 *Airplane's certificate limitations.*

(a) No airplane shall be taken off at a weight which exceeds the takeoff weight specified in the Airplane Flight Manual for the elevation of the airport and for the ambient temperature existing at the time of the takeoff. (See secs. 4T.123(a)(1) and 4T.743(a).)

(b) No airplane shall be taken off at a weight such that, allowing for normal consumption of fuel and oil in flight to the airport of destination and to the alternate airports, the weight on arrival will exceed the landing weight specified in the Airplane Flight Manual for the elevation of each of the airports involved and for the ambient temperatures anticipated at the time of landing. (See secs. 4T.123(a)(2) and 4T.743(a).)

(c) No airplane shall be taken off at a weight which exceeds the weight at which, in accordance with the minimum distances for takeoff scheduled in the Airplane Flight Manual, compliance with subparagraphs (1) through (3) of this paragraph is shown. These distances shall correspond with the elevation of the airport, the runway to be used, the effective runway gradient, and the ambient temperature and wind component existing at the time of takeoff. (See secs. 4T.123(a)(3) and 4T.743(a).)

(1) The accelerate-stop distance shall not be greater than the length of the runway plus the length of the stopway if present.

(2) The takeoff distance shall not be greater than the length of the runway plus the length of the clearway if present, except that the length of the clearway shall not be greater than one-half of the length of the runway.

(3) The takeoff run shall not be greater than the length of the runway.

(d) No airplane shall be operated outside the operational limits specified in the Airplane Flight Manual. (See secs. 4T.123(a)(4) and 4T.743(a).)

40T.82 *Takeoff obstacle clearance limitations.* No airplane shall be taken off at a weight in excess of that shown in the Airplane Flight Manual to correspond with a net takeoff flight path which clears all obstacles either by at least a height of 35 feet vertically or by at least 200 feet horizontally within the airport boundaries and by at least 300 feet horizontally after passing beyond the boundaries. In determining the allowable deviation of the net takeoff flight path in order to avoid obstacles by at least the distances prescribed, it shall be assumed that the airplane is not banked before reaching a height of 50 feet as shown by the net takeoff flight path data in the Airplane Flight Manual, and that a maximum bank thereafter does not exceed 15 degrees. The net takeoff flight path considered shall be for the elevation of the airport, the effective runway gradient, and for the ambient temperature and wind component existing at the time of takeoff. (See secs. 4T.123(b) and 4T.743(b).)

40T.83 *En route limitations.* All airplanes shall be operated in compliance with paragraph (a) of this section. In addition, no airplane shall be flown along an intended route if any place along the route is more than 90 minutes away from an airport at which a landing can be made in accordance with section 40T.84(b), assuming all engines to be operating at cruising power, unless compliance is shown with paragraph (b) of this section.

(a) *One engine inoperative.* No airplane shall be taken off at a weight in excess of that which, according to the one-engine-inoperative en route net flight path data shown in the Airplane Flight Manual, will permit compliance with either subparagraphs (1) or (2) of this paragraph at all points along the route. The net flight path shall have a positive slope at 1,500 feet above the airport where the landing is assumed to be made after the engine fails. The net flight path used shall be for the ambient temperatures anticipated along the route. (See secs. 4T.123(b) and 4T.743(b).)

(1) The slope of the net flight path shall be positive at an altitude of at least 1,000 feet above all terrain and obstructions along the route within 5 statute miles (4.34 nautical miles) on either side of the intended track.

(2) The net flight path shall be such as to permit the airplane to continue flight from the cruising altitude to an airport where a landing can be made in accordance with the provisions of section 40T.84(b), the net flight path clearing vertically by at least 2,000 feet all terrain and obstructions along the route within 5 statute miles (4.34 nautical miles) on either side of the intended track. The provisions of subdivisions (i) through (vi) of this subparagraph shall apply.

(i) The engine shall be assumed to fail at the most critical point along the route.

(ii) The airplane shall be assumed to pass over the critical obstruction following engine failure at a point no closer to the critical

obstruction than the nearest approved radio navigational fix, except that the Administrator may authorize a procedure established on a different basis where adequate operational safeguards are found to exist.

(iii) An approved method shall be used to account for winds which would otherwise adversely affect the flight path.

(iv) Fuel jettisoning shall be permitted if the Administrator finds that the operator has an adequate training program, proper instructions are given to the flight crew, and all other precautions are taken to ensure a safe procedure.

(v) The alternate airport shall be specified in the dispatch release and shall meet the prescribed weather minima.

(vi) The consumption of fuel and oil after the engine is assumed to fail shall be that which is accounted for in the net flight path data shown in the Airplane Flight Manual.

(b) *Two engines inoperative.* No airplane shall be taken off at a weight in excess of that which, according to the two-engine-inoperative en route net flight path data shown in the Airplane Flight Manual, will permit the airplane to continue flight from the point where two engines are assumed to fail simultaneously to an airport where a landing can be made in accordance with the provisions of section 40T.84(b), the net flight path clearing vertically by at least 2,000 feet all terrain and obstructions along the route within 5 statute miles (4.34 nautical miles) on either side of the intended track. The net flight path considered shall be for the ambient temperatures anticipated along the route. The provisions of subparagraphs (1) through (5) of this paragraph shall apply. (See secs. 4T.123(b) and 4T.734(b).)

(1) The two engines shall be assumed to fail at the most critical point along the route.

(2) The net flight path shall have a positive slope at 1,500 feet above the airport where the landing is assumed to be made after failure of two engines.

(3) Fuel jettisoning shall be permitted if the Administrator finds that the operator has an adequate training program, proper instructions are given to the flight crew, and all other precautions are taken to ensure a safe procedure.

(4) The airplane's weight at the point where the two engines are assumed to fail shall be considered to be not less than that which would include sufficient fuel to proceed to the airport and to arrive there at an altitude of at least 1,500 feet directly over the landing area and thereafter to fly for 15 minutes at cruise power and/or thrust.

(5) The consumption of fuel and oil after the engines are assumed to fail shall be that which is accounted for in the net flight path data shown in the Airplane Flight Manual.

40T.84 *Landing limitations.*

(a) *Airport of destination.* No airplane shall be taken off at a weight in excess of that which, in accordance with the landing distances shown in the Airplane Flight Manual for the elevation of the airport of intended destination and for the wind conditions anticipated there at the time of landing, would permit the airplane to be brought to rest at the airport of intended destination within 60 percent of the effective length of the runway from a point 50 feet directly above the intersection of the

obstruction clearance plane and the runway. The weight of the airplane shall be assumed to be reduced by the weight of the fuel and oil expected to be consumed in flight to the airport of intended destination. Compliance shall be shown with the conditions of subparagraphs (1) and (2) of this paragraph. (See secs. 4T.123(b) and 4T.743(b).)

(1) It shall be assumed that the airplane is landed on the most favorable runway and direction in still air.

(2) It shall be assumed that the airplane is landed on the most suitable runway considering the probable wind velocity and direction and taking due account of the ground handling characteristics of the airplane and of other conditions (i.e., landing aids, terrain, etc.). If full compliance with the provisions of this subparagraph is not shown, the airplane may be taken off if an alternate airport is designated which permits compliance with paragraph (b) of this section.

(b) *Alternate airport.* No airport shall be designated as an alternate airport in a dispatch release unless the airplane at the weight anticipated at the time of arrival at such airport can comply with the provisions of paragraph (a) of this section, provided that the airplane can be brought to rest within 70 percent of the effective length of the runway.

4. In lieu of section 43.11 of Part 43 of the Civil Air Regulations the following shall be applicable.

43T.11 *Transport category airplane weight limitations.* The performance data in the Airplane Flight Manual shall be applied in determining compliance with the following provisions:

(a) No airplane shall be taken off at a weight which exceeds the takeoff weight specified in the Airplane Flight Manual for the elevation of the airport and for the ambient temperature existing at the time of the takeoff. (See secs. 4T.123(a)(1) and 4T.743(a).)

(b) No airplane shall be taken off at a weight such that, allowing for normal consumption of fuel and oil in flight to the airport of destination and to the alternate airports, the weight on arrival will exceed the landing weight specified in the Airplane Flight Manual for the elevation of each of the airports involved and for the ambient temperatures anticipated at the time of landing. (See secs. 4T.123(a)(2) and 4T.743(a).)

(c) No airplane shall be taken off at a weight which exceeds the weight at which, in accordance with the minimum distances for takeoff scheduled in the Airplane Flight Manual, compliance with subparagraphs (1) through (3) of this paragraph is shown. These distances shall correspond with the elevation of the airport, the runway to be used, the effective runway gradient, and the ambient temperature and wind component existing at the time of takeoff. (See secs. 4T.123(a)(3) and 4T.734(a).)

(1) The accelerate-stop distance shall not be greater than the length of the runway plus the length of the stopway if present.

(2) The takeoff distance shall not be greater than the length of the runway plus the length of the clearway if present, except that the length of the clearway shall not be greater than one-half of the length of the runway.

(3) The takeoff run shall not be greater than the length of the runway.

(d) No airplane shall be operated outside the operational limits specified in the Airplane Flight Manual. (See secs. 4T.123(a)(4) and 4T.743(a).)

5. The following definitions shall apply:

(a) *Clearway.* A clearway is an area beyond the runway, not less than 500 feet wide, centrally located about the extended center line of the runway, and under the control of the airport authorities. The clearway is expressed in terms of a clearway plane, extending from the end of the runway with an upward slope not exceeding 1.25 percent, above which no object nor any portion of the terrain protrudes, except that threshold lights may protrude above the plane if their height above the end of the runway is not greater than 26 inches and if they are located to each side of the runway.

NOTE: For the purpose of establishing takeoff distances and takeoff runs, in accordance with section 4T.117 of this regulation, the clearway plane is considered to be the takeoff surface.

(b) *Stopway.* A stopway is an area beyond the runway, not less in width than the width of the runway, centrally located about the extended center line of the runway, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff: To be considered as such, a stopway must be capable of supporting the airplane during an aborted takeoff without inducing structural damage to the airplane. (See also sec. 4T.115(d) of this regulation.)

SPECIAL CIVIL AIR REGULATIONS NO. SR-423

Effective: December 20, 1957
Adopted: November 15, 1957

Type Certification of Transport Category Airplanes With Turbo-Prop Replacements

The airworthiness requirements with which a particular airplane is required to comply are established by the date of application for the type certificate. After the type certificate is issued, the holder of the type certificate or an applicant for a supplemental type certificate, at his option, can obtain approval of changes in the design in accordance with requirements in effect at the time of the original application for type certificate or in accordance with later requirements in effect at the time of the change.

Prior to May 18, 1954, the regulations placed no specific limit on the extent of changes to the airplane which could be approved in this manner nor did they define a new type design for which a new application for type certification would be required. Amendment 4b-1 effective on that date, among other changes in Part 4b, lists certain changes in design which if made to an airplane would require it to be considered as a new type. In such a case, a new application for type certification would be required and the regulations, together with all amendments thereto effective on the date of the new application, would have to be complied with (sec. 4b.11(a)). One such change which would require a new type certificate is a change to engines employing different priciples of operation or propulsion (sec 4b.11(e)(2)).

Interest has been shown recently within the aviation industry in the installation of turbo-propeller engines on airplanes presently equipped with reciprocating engines. In accordance with sec. 4b.11(e)(2) such a change would require a showing of compliance with the latest airworthiness requirements of Part 4b. The Board is of the opinion that showing of compliance with all of the latest requirements might be burdensome, impractical, and not essential to safety.

This Special Civil Air Regulation will permit the certification of a turbo-propeller-powered airplane, which previously was type certificated with the same number of reciprocating engines, if compliance is shown with the airworthiness provisions applicable to the airplane as type certificated with reciprocating engines, together with certain later provisions of the Civil Air Regulations in effect on the date of application for a supplemental or new type certificate which are applicable or related to the powerplant of the turbo-propeller-powered version.

In order to insure that the level of safety of the turbine-powered airplane is equivalent to that intended by Part 4b, the Board considers that compliance must be shown with the later provisions of Part 4b which apply to the powerplant installation, airplane performance, and cockpit standardization, such other requirements as the Administrator finds are otherwise related to the changes made in the engines.

Special Civil Air Regulation No. SR–422 establishes certain certification and operational requirements for all turbine-powered airplanes for which a type certificate is issued after the effective date of that regulation. Except as otherwise provided, all of the provisions of SR–422 remain applicable to airplanes certificated in accordance with the regulation prescribed herein. Therefore, to be certificated in accordance with the regulation prescribed herein compliance must be shown with the certification performance requirements prescribed in paragraph 2 of SR–422.

It must be emphasized that the certification performance limitations established by the performance requirements; i.e., the take-off weights, landing weights, take-off and accelerate-stop distances, and the operational limits, become part of the airworthiness certificate and must be complied with at all times, regardless of the type of operations conducted with the airplane. (See sec. 43.10, as amended, of Part 43 of the Civil Air Regulations.)

In addition to certification performance limitations, SR–422 prescribes performance operating limitations which are applicable to turbine-powered transport category airplanes when used in air carrier passenger operations. Since turbo-propeller-powered airplanes certificated in accordance with the regulation prescribed herein are required to comply with the certification performance requirements of SR–422, they are also subject to the performance operating limitations prescribed in paragraph 3 of SR–422 when used in air carrier passenger operations.

Since a change in engines will require a rather extensive change in the cockpit to accommodate the new instruments and controls for turbine engines, the Board considers that compliance with the latest cockpit standardization requirements can be accomplished without any undue burden and such compliance would speed up the cockpit standardization of other airplanes in an airline's fleet in accordance with the Board's objectives. Therefore, this regulation makes the latest cockpit standardization requirements applicable, with the exception of such detailed requirements as the Administrator finds are impracticable, and do not contribute materially to standardization. It should be noted that in referring to this exception in the preamble to Draft Release No. 56–29, the use of the conjunction "or" after the word "impracticable" was inadvertent. As the language of the proposed regulation clearly indicated, "and" was the proper conjunction following the word "impracticable."

The Board also considers it appropriate to call attention to the fact that if other changes to the airplane are made simultaneously with, or subsequent to, such an engine change, then compliance will also have to be shown with all requirements related to the additional changes in effect on the date of the new application for a supplemental or new type certificate. In this regard, if an airplane converted to turbo-propeller power is to be certificated for operation at altitudes, speeds, or weights higher than those which are applicable to the reciprocating-engine-powered airplane, compliance will be required with all the latest provisions of the regulations which are related to such changes.

In order to assure that all airplanes converted to turbo-propeller power meet the minimum requirements considered essential to safety, this regulation is made retroactive and requires compliance with the provisions of the Civil Air Regulations as set forth herein for all of such

airplanes for which application for a supplemental or new type certificate was made prior to the effective date of this regulation.

This Special Civil Air Regulation shall continue in effect for 5 years, at the end of which time the effectiveness of the regulation will be evaluated for the purpose of considering the incorporation of the substance of these rules in the permanent body of the Civil Air Regulations.

Interested persons have been afforded an opportunity to participate in the making of this Special Civil Air Regulation (21 F.R. 9436), and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation effective December 20, 1957.

Contrary provisions of section 4b.11(a) as it applies to section 4b.11 (e)(2) of Part 4b of the Civil Air Regulations and paragraph (1) of Special Civil Air Regulation No. SR–422 notwithstanding, the following provisions shall be applicable to the certification of a turbo-propeller-powered airplane which was previously type certificated with the same number of reciprocating engines:

(1) The airworthiness regulations applicable to the airplane as type certificated with reciprocating engines and, in addition thereto or in lieu thereof as appropriate, the following provisions of the Civil Air Regulations effective on the date of application for a supplemental or new type certificate (see paragraph (3)):

(a) The certification performance requirements prescribed in Special Civil Air Regulation No. SR–422;

(b) The powerplant installation requirements of Part 4b applicable to the turbo-propeller-powered airplane;

(c) The requirements of Part 4b for the standardization of cockpit controls and instruments, except where the Administrator finds that showing of compliance with a particular detailed requirement would be impractical and would not contribute materially to standardization; and

(d) Such other requirements of Part 4b applicable to the turbo-propeller-powered airplane as the Administrator finds are related to the changes in engines and are necessary to insure a level of safety of the turbo-propeller-powered airplane equivalent to that generally intended by Part 4b.

(2) If new limitations are established with respect to weight, speed, or altitude of operation and the Administrator finds that such limitations are significantly altered from those approved for the airplane with reciprocating engines, compliance shall be shown with all of the requirements, applicable to the specific limitations being changed, which are in effect on the date of application for the new or supplemental type certificate.

(3) Airplanes converted to turbo-propeller power, for which application for a supplemental or a new type certificate was made prior to the effective date of this Special Civil Air Regulation, shall comply with all of the provisions of the Civil Air Regulations specified in paragraphs (1) and (2) effective on the date of this special regulation, rather than those provisions effective on the date application was made for the supplemental or the new type certificate.

This Special Civil Air Regulation shall terminate December 20, 1962 unless sooner superseded or rescinded by the Board.

SPECIAL CIVIL AIR REGULATION NO. 425C

Effective: June 6, 1961
Adopted: May 31, 1961
Published: June 6, 1961
(26 F.R. 4990)

Provisional Certification and Operation of Aircraft

Special Civil Air Regulation No. SR–425A was adopted on July 22, 1958, to provide for provisional certification of turbine-powered transport category airplanes in order to permit certain air carriers and manufacturers to conduct crew training, service testing, and simulated air carrier operations prior to introduction of the airplanes into commercial service. The objective of this regulation was to provide a means whereby the air carriers and manufacturers could obtain as much experience as possible with turbine-powered airplanes which, although safe for flight, had not been approved for the issuance of a type certificate.

Special Civil Air Regulation No. SR–425B, which superseded SR–425A, was adopted on April 7, 1960, to extend the application of the regulation to: (1) piston-engine transport category aircraft, including rotorcraft; and (2) personal and executive type aircraft, including rotorcraft, irrespective of powerplant type. In addition, this regulation permitted operations such as sales demonstrations and market surveys with aircraft having a provisional type and airworthiness certificate.

To accomplish this, SR–425B provided for, among other things, the issuance of two classes of provisional type and airworthiness certificates. Class I provisional and airworthiness certificates could be issued for all types of aircraft for operation by the aircraft manufacturer. Class II provisional type and airworthiness certificates could be issued only for transport category aircraft, but these aircraft could be operated by either the aircraft manufacturer or a certificated air carrier. In general, the requirements for the issuance of Class I provisional certificates were less stringent, and the operating limitations less confining, than those for the issuance of Class II provisional certificates.

Under the provisions of SR–425B, however, eligibility to apply for Class I provisional certificates was limited to aircraft manufacturers. A recommendation that this eligibility be extended to include engine manufacturers had been evaluated by the Agency prior to the adoption of SR–425B, but rule making action on such extension was deferred until additional experience with provisional certification could be acquired.

Experience accumulated since the adoption of SR–425B has indicated that it would be practicable for engine manufacturers, who have altered a type certificated aircraft by installing type certificated engines of their own manufacture in place of the original engines, to show compliance with the currently effective requirements for issuance of Class I provisional type and provisional airworthiness certificates; and that compliance with these requirements will insure safe operation of provisionally certificated aircraft by such engine manufacturers. Further, the Agency

believes that operations conducted by engine manufacturers under the terms of Class I provisional certificates, for the purpose of sales demonstrations, market surveys, and other similar activities related to the sale of their engines, would contribute to the promotion and development of civil aeronautics in the United States.

SR–425B is therefore being superseded by SR–425C to permit certain engine manufacturers to apply for Class I provisional type and provisional airworthiness certificates if they have applied for the issuance of a supplemental type certificate.

Since this is a superseding regulation which relieves restrictions and imposes no additional burden on any person, notice and public procedures hereon are unnecessary, and this regulation may be made effective on less than 30 days' notice.

In consideration of the foregoing, the following Special Civil Air Regulation is adopted to become effective June 6, 1961:

GENERAL

1. *Applicability.* Contrary provisions of the Civil Air Regulations notwithstanding, provisional type and airworthiness certificates, amendments to provisional type certificates, and provisional amendments to type certificates, will be issued as prescribed in this regulation to a manufacturer or an air carrier. As used in this regulation, a manufacturer shall mean only a manufacturer who is a citizen of the United States; and the term air carrier shall not include an air taxi operator.

2. *Eligibility.*

(a) A manufacturer of aircraft manufactured by him within the United States may apply for Class I or Class II provisional type and provisional airworthiness certificates, for amendments to provisional type certificates held by him, and for provisional amendments to type certificates held by him.

(b) An air carrier holding an air carrier operating certificate authorizing him to conduct operations under Parts 40, 41, 42, or 46 of the Civil Air Regulations may apply for Class II provisional airworthiness certificates for transport category aircraft which meet the conditions of either subparagraphs (1) or (2) of this paragraph.

(1) The aircraft has a currently valid Class II provisional type certificate or an amendment thereto;

(2) The aircraft has a currently valid provisional amendment to a type certificate which was preceded by a corresponding Class II provisional type certificate.

(c) An engine manufacturer who has altered a type certificated aircraft by installing different type certificated engines, manufactured by him within the United States, in place of the original engines, may apply for Class I provisional type and provisional airworthiness certificates for such aircraft, and for amendments to Class I provisional type certificates held by him, if the basic aircraft, before alteration was type certificated in the normal, utility, acrobatic, or transport category.

3. *Application.*

(a) *General.* Applications for provisional type and airworthiness certificates, for amendments to provisional type certificates, and for

provisional amendments to type certificates, shall be submitted to the Chief, Flight Standards Division, FAA, of the Regional Office in which the manufacturer or air carrier is located and shall be accompanied by the pertinent information specified in this regulation.

4. *Duration.* Unless sooner surrendered, superseded, revoked, or otherwise terminated, certificates and amendments thereto, shall have periods of duration in accordance with paragraphs (a) through (f) of this section.

(a) A Class I provisional type certificate shall remain in effect for 24 months after the date of its issuance or until the date of issuance of the corresponding type or supplemental type certificate, whichever occurs first.

(b) A Class I provisional type certificate shall expire immediately upon issuance of a Class II provisional type certificate for aircraft of the same type design.

(c) A Class II provisional type certificate shall remain in effect for 6 months after the date of its issuance or 60 days after the date of issuance of the corresponding type certificate, whichever occurs first.

(d) An amendment to a Class I or a Class II provisional type certificate shall remain in effect for the duration of the corresponding provisional type certificate.

(e) A provisional amendment to a type certificate shall remain in effect for 6 months after its approval or until the amendment to the type certificate is approved, whichever occurs first.

(f) Provisional airworthiness certificates shall remain in effect for the duration of the corresponding provisional type certificate, amendment to a provisional type certificate, or a provisional amendment to the type certificate.

5. *Transferability of certificates.* Certificates issued pursuant to this regulation are not transferable except that a Class II provisional airworthiness certificate may be transferred to an air carrier eligible to apply for such certificate under section 2 of this regulation.

6. *Display of certificates and markings.* A provisional airworthiness certificate shall be prominently displayed in the aircraft for which it is issued. The words "Provisional Airworthiness" shall be painted in letters not less than 2 inches high on the exterior of such aircraft adjacent to each entrance to the cabin and cockpit of the aircraft.

REQUIREMENTS FOR ISSUANCE

7. *Class I provisional type certificates.* A Class I provisional type certificate and amendments thereto will be issued for a particular type design when the eligible aircraft or engine manufacturer shows compliance with the provisions of paragraphs (a) through (f) of this section, and an authorized representative of the Administrator finds, on the basis of information submitted to him by the manufacturer in compliance with the provisions of this section and of other relevant information, that there is no feature, characteristic, or condition which would render the aircraft unsafe when operated in accordance with the limitations established in paragraph (d) of this section and in section 13 of this regulation.

(a) The manufacturer has applied for the issuance of a type or supplemental type certificate for the aircraft.

(b) The manufacturer certifies that the aircraft has met the provisions of subparagraphs (1) through (3) of this paragraph.

(1) The aircraft has been designed and constructed in accordance with the airworthiness requirements applicable to the issuance of the type or supplemental type certificate for the aircraft;

(2) The aircraft substantially complies with the applicable flight characteristics requirements for the type or supplemental type certificate;

(3) The aircraft can be operated safely under the appropriate operating limitations specified in this regulation.

(c) The manufacturer has submitted a report showing that the aircraft had been flown in all maneuvers necessary to show compliance with the flight requirements for the issuance of the type or supplemental type certificate and to establish that the aircraft can be operated safely in accordance with the limitations specified in this regulation.

(d) The manufacturer has established limitations with respect to weights, speeds, flight maneuvers, loading, operation of controls and equipment, and all other relevant factors. The limitations shall include all the limitations required for the issuance of a type or supplemental type certificate for the aircraft: *Provided*, That, where such limitations have not been established, appropriate restrictions on the operation of the aircraft shall be established.

(e) The manufacturer has established an inspection and maintenance program for the continued airworthiness of the aircraft.

(f) A prototype aircraft has been flown by the manufacturer for at least 50 hours pursuant to the authority of an experimental certificate issued under Part 1 of the Civil Air Regulations or under the auspices of a United States military service: *Provided*, That the number of flight hours may be reduced by the authorized representative of the Administrator in the case of an amendment to a provisional type certificate.

8. *Class I provisional airworthiness certificates.* Except as provided in section 12 of this regulation, a Class I provisional airworthiness certificate will be issued for an aircraft, for which a Class I provisional type certificate is in effect, when the eligible aircraft or engine manufacturer shows compliance with the provisions of paragraphs (a) through (d) of this section, and an authorized representative of the Administrator finds that there is no feature, characteristic, or condition of the aircraft which would render the aircraft unsafe when operated in accordance with the limitations established in sections 7(d) and 13 of this regulation.

(a) The manufacturer is the holder of the provisional type certificate for the aircraft.

(b) The manufacturer submits a statement that the aircraft conforms to the type design corresponding with the provisional type certificate and has been found by him to be in safe operating condition under the applicable limitations.

(c) The aircraft has been flown at least 5 hours by the manufacturer.

(d) The aircraft has been supplied with a provisional aircraft flight manual or other document and appropriate placards containing the limitations required by sections 7(d) and 13 of this regulation.

9. *Class II provisional type certificates.* A Class II provisional type certificate and amendments thereto will be issued for a particular transport category type design when the manufacturer of the aircraft shows compliance with the provisions of paragraphs (a) through (h) of this section, and an authorized representative of the Administrator finds, on the basis of information submitted to him by the manufacturer in compliance with the provisions of this section and of other relevant information, that there is no feature, characteristic, or condition which would render the aircraft unsafe when operated in accordance with the limitations established in paragraph (f) of this section and in sections 13 and 14 of this regulation.

(a) The manufacturer has applied for the issuance of a transport category type certificate for the aircraft.

(b) The manufacturer holds a type certificate and a currently effective production certificate for at least one other aircraft in the same transport category as the subject aircraft.

(c) The Agency's official flight test program with respect to the issuance of a type certificate for the aircraft is in progress.

(d) The manufacturer certifies that the aircraft has met the provisions of subparagraphs (1) through (3) of this paragraph.

(1) The aircraft has been designed and constructed in accordance with the airworthiness requirements applicable to the issuance of the type certificate for the aircraft;

(2) The aircraft substantially complies with the applicable flight characteristics requirements for the type certificate;

(3) The aircraft can be operated safely under the appropriate operating limitations specified in this regulation.

(e) The manufacturer has submitted a report showing that the aircraft had been flown in all maneuvers necessary to show compliance with the flight requirements for the issuance of the type certificate and to establish that the aircraft can be operated safely in accordance with the limitations specified in this regulation.

(f) The manufacturer has prepared a provisional aircraft flight manual which includes limitations with respect to weights, speeds, flight maneuvers, loading, operation of controls and equipment, and all other relevant factors. The limitations shall include all the limitations required for the issuance of a type certificate for the aircraft: *Provided*, That, where such limitations have not been established, the provisional flight manual shall contain appropriate restrictions on the operation of the aircraft.

(g) The manufacturer has established an inspection and maintenance program for the continued airworthiness of the aircraft.

(h) A prototype aircraft has been flown by the manufacturer for at least 100 hours pursuant to the authority of either an experimental certificate issued under Part 1 of the Civil Air Regulations or a Class I provisional airworthiness certificate: *Provided*, That the number of flight hours may be reduced by the authorized representative of the Administrator in the case of an amendment to a provisional type certificate.

10. *Class II provisional airworthiness certificates.* Except as provided in section 12 of this regulation, a Class II provisional airworthiness certificate will be issued for an aircraft, for which a Class II provisional type certificate is in effect, when the applicant shows compliance with the provisions of paragraphs (a) through (e) of this section, and an authorized representative of the Administrator finds that there is no feature, characteristic, or condition of the aircraft which would render the aircraft unsafe when operated in accordance with the limitations established in sections 9(f), 13, and 14 of this regulation.

(a) The applicant submits evidence that a Class II provisional type certificate for the aircraft has been issued to the manufacturer.

(b) The applicant submits a statement by the manufacturer that the aircraft has been manufactured under a quality control system adequate to insure that the aircraft conforms to the type design corresponding with the provisional type certificate.

(c) The applicant submits a statement that the aircraft has been found by him to be in a safe operating condition under the applicable limitations.

(d) The applicant submits a statement that the aircraft has been flown at least 5 hours by the manufacturer.

(e) The aircraft has been supplied with a provisional aircraft flight manual containing the limitations required by sections 9(f), 13, and 14 of this regulation.

11. *Provisional amendments to type certificate.* A provisional amendment to a type certificate will be approved when the manufacturer of the type certificated aircraft shows compliance with the provisions of paragraphs (a) through (g) of this section, and an authorized representative of the Administrator finds, on the basis of information submitted to him by the manufacturer in compliance with the provisions of this section and of other relevant information, that there is no feature, characteristic, or condition which would render the aircraft unsafe when operated in accordance with the limitations established in paragraph (e) of this section, and section 13 and, if applicable, section 14 of this regulation.

(a) The manufacturer has applied for an amendment to the type certificate.

(b) The Agency's official flight test program with respect to the amendment of the type certificate is in progress.

(c) The manufacturer certifies that the aircraft has met the provisions of subparagraphs (1) through (3) of this paragraph.

(1) The modification involved in the amendment to the type certificate has been designed and constructed in accordance with the airworthiness requirements applicable to the issuance of the type certificate for the aircraft;

(2) The aircraft substantially complies with the applicable flight characteristics requirements for the type certificate;

(3) The aircraft can be operated safely under the appropriate operating limitations specified in this regulation.

(d) The manufacturer has submitted a report showing that the aircraft incorporating the modifications involved had been flown in all maneuvers necessary to show compliance with the flight require-

ments applicable to these modifications and to establish that the aircraft can be operated safely in accordance with the limitations specified in this regulation.

(e) The manufacturer has established, in a provisional aircraft flight manual or other document and appropriate placards, limitations with respect to weights, speeds, flight maneuvers, loading, operation of controls and equipment, and all other relevant factors. The limitations shall include all the limitations required for the issuance of a type certificate for the aircraft: *Provided,* That, where such limitations have not been established, appropriate restrictions on the operation of the aircraft shall be established.

(f) The manufacturer has established an inspection and maintenance program for the continued airworthiness of the aircraft.

(g) An aircraft modified in accordance with the corresponding amendment to the type certificate has been flown by the manufacturer for the number of hours found necessary by the authorized representative of the Administrator, such flights having been conducted pursuant to the authority of an experimental certificate issued under Part 1 of the Civil Air Regulations.

12. *Provisional airworthiness certificates corresponding with provisional amendment to type certificate.* A Class I or a Class II provisional airworthiness certificate, as specified in section 2 of this regulation, will be issued for an aircraft, for which a provisional amendment to the type certificate has been issued, when the applicant shows compliance with the provisions of paragraphs (a) through (e) of this section, and an authorized representative of the Administrator finds that there is no feature, characteristic, or condition of the aircraft, as modified in accordance with the provisionally amended type certificate, which would render the aircraft unsafe when operated in accordance with the limitations established in sections 11(e) and 13 and, if applicable, section 14 of this regulation.

(a) The applicant submits evidence that approval has been obtained for the relevant provisional amendment to the type certificate for the aircraft.

(b) The applicant submits evidence that the modification to the aircraft was accomplished under a quality control system adequate to insure that the modification conforms to the provisionally amended type certificate.

(c) The applicant submits a statement that the aircraft has been found by him to be in a safe operating condition under the applicable limitations.

(d) The applicant submits a statement that the aircraft has been flown at least 5 hours by the manufacturer.

(e) The aircraft has been supplied with a provisional aircraft flight manual or other document and appropriate placards containing the limitations required by sections 11(e) and 13 and, if applicable, section 14 of this regulation.

OPERATING LIMITATIONS

13. *Operation of provisionally certificated aircraft.* An aircraft for which a provisional airworthiness certificate has been issued shall

be operated only by a person eligible to apply for a provisional airworthiness certificate in accordance with section 2 of this regulation. Operations shall be in compliance with paragraphs (a) through (j) of this section.

(a) The aircraft shall not be operated in air transportation unless so authorized in a particular case by the Director, Bureau of Flight Standards.

(b) Operations shall be restricted to the United States, its Territories and possessions.

(c) The aircraft shall be limited to the types of operations listed in subparagraphs (1) through (7) of this paragraph.

(1) Flights conducted by the aircraft or engine manufacturer in direct conjunction with the type or supplemental type certification of the aircraft;

(2) Training of flight crews, including simulated air carrier operations;

(3) Demonstration flights conducted by the manufacturer for prospective purchasers;

(4) Market surveys by the manufacturer;

(5) Flight checking of instruments, accessories, and equipment, the functioning of which does not adversely affect the basic airworthiness of the aircraft;

(6) Service testing of the aircraft;

(7) Such additional operations as may be specifically authorized by the authorized representative of the Administrator.

(d) All operations shall be conducted within the prescribed limitations displayed in the aircraft or set forth in the provisional aircraft flight manual or other document containing the limitations for the safe operation of the aircraft: *Provided,* That operations conducted in direct conjunction with the type or supplemental type certification of the aircraft shall be subject to the experimental aircraft limitations of section 1.74 of Part 1 of the Civil Air Regulations, and all "flight tests" as defined in section 60.60 of the Civil Air Regulations shall be conducted in accordance with the requirements of section 60.24 of that part.

(e) The operator shall establish procedures for the use and guidance of flight and ground personnel in the conduct of operations under this section. Specific procedures shall be established for operations from and into airports where the runways require takeoffs or approaches over populated areas. All procedures shall be approved by an authorized representative of the Administrator. All operations shall be conducted in accordance with such approved procedures.

(f) The operator shall insure that each flight crewmember is properly certificated and possesses adequate knowledge of, and familiarity with, the aircraft and the procedures to be used by him.

(g) The aircraft shall be maintained in accordance with applicable Civil Air Regulations, with the inspection and maintenance program established in accordance with this regulation, and with any special inspections and maintenance conditions prescribed by an authorized representative of the Administrator.

(h) No aircraft shall be operated under authority of a provisional airworthiness certificate if the manufacturer or the authorized

representative of the Administrator determines that a change in design, construction, or operation is necessary to insure safe operation, until such change is made and approved by the authorized representative of the Administrator. Section 1.24 of Part 1 of the Civil Air Regulations shall be applicable to operations under this section.

(i) Only those persons who have a bona fide interest in the operations permitted under this section or who are specifically authorized by both the manufacturer and the authorized representative of the Administrator may be carried in provisionally certificated aircraft: *Provided,* That they have been advised by the operator of the provisional certification status of the aircraft.

(j) The authorized representative of the Administrator may prescribe such additional limitations or procedures as he finds necessary. This shall include limitations on the number of persons who may be carried aboard the aircraft.

14. *Additional limitations to operations by air carriers.* In addition to the limitations in section 13 of this regulation, operations by air carriers shall be subject to the provisions of paragraphs (a) through (d) of this section.

(a) In addition to crewmembers, the aircraft may carry only those persons who are listed in section 40.356(c) of Part 40 of the Civil Air Regulations or who are specifically authorized by both the air carrier and the authorized representative of the Administrator.

(b) The air carrier shall maintain current records for each flight crewmember. These records shall include such information as is necessary to show that each flight crewmember is properly trained and qualified to perform his assigned duties.

(c) The appropriate instructor, supervisor, or check airman shall certify to the proficiency of each flight crewmember and such certification shall become a part of the flight crewmember's record.

(d) A log of all flights conducted under this regulation, and accurate and complete records of inspections made and maintenance accomplished, shall be kept by the air carrier and made available to the manufacturer and to an authorized representative of the Administrator.

15. *Other operations.* The Director, Bureau of Flight Standards, may credit toward the aircraft proving test requirements of the applicable air carrier regulations such operations conducted pursuant to this special regulation as he finds have met the applicable aircraft proving test requirements: *Provided,* That he also finds that there is no significant difference between the provisionally certificated aircraft and the aircraft for which application is made for operation pursuant to an air carrier operating certificate.

CERTIFICATES ISSUED UNDER SR-425A AND SR-425B

16. *Duration.* Currently valid provisional type and airworthiness certificates issued in accordance with Special Civil Air Regulations Nos. SR-425A and SR-425B shall remain in effect for the durations and under the conditions prescribed in those regulations.

This special regulation supersedes Special Civil Air Regulation No. SR-425B and shall terminate on June 30, 1963, unless sooner superseded, rescinded, or otherwise terminated.

SPECIAL CIVIL AIR REGULATION NO. SR–426

Effective: October 27, 1958
Adopted: September 22, 1958

Performance Credit for Transport Category Airplanes Equipped with Standby Power

Standby power is power and/or thrust obtained from rocket engines and is separate from the power obtained from the airplane's main engines. Such power and/or thrust is available for a relatively short period for use in cases of emergency. The standby power system may be capable of producing more than a single thrust period. This special regulation authorizes the Administrator to grant performance credit to transport category airplanes when standby power is used in one or more of the following regimes of flight: Takeoff with one engine inoperative, approach climb with one engine inoperative, and the balked landing climb. By "performance credit" is meant the taking into account the increased performance of the airplane with standby power and, because thereof, the approval of higher maximum weights for the airplane than the weights approved on the basis of the airplane's performance without standby power. In granting performance credit, this regulation prescribes the applicable conditions and limitations.

Rocket assist takeoff units were developed initially for the military services to provide additional takeoff power for heavily loaded flying boats and carrier-based aircraft. The additional thrust improved the climb performance in the takeoff regime and permitted the airplane to attain a safe altitude and air speed in the event of engine failure. The reliability of such units has increased to the point where some civil operators have adopted them for use as emergency standby power in the event of engine failure. Other operators have been reluctant to adopt standby power installations and the attendant weight penalties without reasonable performance credit being given the airplane. With the performance credit granted by this regulation for the use of standby power, it is anticipated that such credit might be considered a compensating economic factor justifying the installation of standby power on such airplanes.

The currently effective regulations did not contemplate the use of standby power; however, the Administrator of Civil Aeronautics has established for an interim period a conservative policy permitting transport category airplanes equipped with standby power to operate at an increase in the normally approved weights by an amount equal to the weight of the standby power units.

In this regulation, the criteria for granting performance credit were formulated with the intent of providing an overall level of performance equivalent to that intended by the currently effective regulations. To this end, appropriate criteria are established with respect to the amount of performance credit which may be applied in determining the new takeoff paths, the extent to which the maximum certificated takeoff and landing weights may be increased, and operating procedures to be followed in service for the use of standby power and for the associated changes in the airplane's configuration and speed.

The basic element of the various criteria established in this regulation entails a comparison of flight paths. In Civil Air Regulations

Draft Release No. 57–28, all of the flight paths were based on procedures involving attainment of the en route configuration and the acceleration to a safe en route speed. Further consideration of this proposal indicates that an undue amount of flight testing and computation would be required for those flight conditions which presently do not involve the establishment of such flight paths. In addition, it appears that comparison of flight paths involving a particular procedure is not essential for the purpose of establishing an equivalent level of safety. In view of the foregoing, this regulation requires comparison of flight paths with respect to the takeoff regime consistent only with that required by the currently effective airworthiness performance requirements; i.e., Part 4b and Special Civil Air Regulations Nos. SR–422 and SR–422A. Further, the establishment of maximum landing weights is based on a comparison of flight paths obtained with a fixed airplane configuration and at the speed and power condition appropriate to the all-engines-operating landing climb or the one-engine-inoperative approach climb, as applicable.

Performance credit for standby power with respect to the takeoff path is limited by the specification that the all-engines-operating takeoff path reflect a conservatively greater margin of overall performance than the one-engine-inoperative takeoff path with standby power in use. It is intended that this margin exist throughout the takeoff path prescribed by the applicable performance requirements. This regulation provides for the establishment of the margin by the Administrator; however, in no case can this margin be less than 15 percent. In view of the many different types of airplanes to which this regulation is applicable, a higher margin might be necessary in certain cases to insure safe day-to-day operations.

For reciprocating-engine-powered airplanes, the provisions of this regulation require that the applicant establish a procedure for the use of standby power for attaining the en route configuration and a safe en route speed in the event of an engine failure during the takeoff. Provisions for such procedures are contained in the regulations for turbine-powered airplanes and will therefore be applicable to such airplanes. The establishment of the procedures made applicable to reciprocating-engine-powered airplanes is left to the discretion of the applicant to select the altitude at which the acceleration is to take place, the basic limitation being that the slope along all points of the airborne portion of the takeoff path must be positive. This will provide for the critical operation of cleanup and acceleration during the takeoff which are not covered by the performance requirements of Part 4b and which have been cited in the past in connection with several accidents. In addition, with respect to the clearing of obstacles, the takeoff path scheduled in the Airplane Flight Manual for airplanes for which the performance requirements of Part 4b are applicable must be appropriately modified to reflect the effect of the aforementioned procedure.

The criteria for the establishment of maximum certificated takeoff weights involve two separate comparisons of takeoff paths. These comparisons must be carried out to a height of 400 feet above the takeoff surface. This minimum height is intended to be associated with a procedure where standby power is actuated within the neighborhood of

the critical engine failure speed V_1. These provisions are intended to limit the increase in maximum takeoff weight consistent with the overall level of performance currently attained with respect to the one-engine-inoperative takeoff and to limit the amount of standby power for which performance credit can be granted to insure a reasonable margin of performance for the all-engine day-to-day operations.

The provisions for the establishment of maximum certificated landing weights require only a comparison between two flight paths based on a steady climb and fixed configuration. One represents a climb path at the maximum weight previously certificated without standby power and the other a climb path at the increased weight with standby power. In addition, there is a provision which requires the establishment of procedures for the execution of balked landings and missed approaches in conjunction with the use of standby power.

A question has been raised as to whether duplicate sets of standby power units are required to obtain performance credit for both the takeoff and the approach stages of flight. It is intended by this regulation to require duplicate sets of standby power for a flight for which the use of standby power is necessary to comply with both the maximum certificated takeoff and the maximum certificated approach weight limitations. Where the use of standby power is necessary for compliance with the maximum certificated weight limitations for only one regime of flight, i.e., takeoff or approach, one set of standby power units is required.

There are also included safety criteria for the installation and operation of the standby power system.

The Board presently has under consideration a special regulation which would be applicable to nontransport category airplanes equipped with standby power.

Interested persons have been afforded an opportunity to participate in the making of this regulation (22 F.R. 10464), and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation, effective October 27, 1958.

Contrary performance provisions of the Civil Air Regulations notwithstanding, the Administrator may grant performance credit for the use of standby power on transport category airplanes. Such credit shall be applicable only to the maximum certificated takeoff and landing weights, the takeoff distance, and the takeoff paths, and shall not exceed that found by the Administrator to result in an overall level of safety in the takeoff, approach, and landing regimes of flight equivalent to that prescribed in the regulations under which the airplane was originally certificated without standby power. (Note: Standby power is power and/or thrust obtained from rocket engines for a relatively short period and actuated only in cases of emergency.) The following provisions shall apply:

(1) *Takeoff; general.* The takeoff data prescribed in sections (2) and (3) shall be determined at all weights and altitudes, and at ambient temperatures if applicable, at which performance credit is to be applied.

(2) *Takeoff path.*

(a) The one-engine-inoperative takeoff path with standby power in use shall be determined in accordance with the performance requirements of the applicable airworthiness regulations.

(b) The one-engine-inoperative takeoff path (excluding that portion where the airplane is on or just above the takeoff surface) determined in accordance with paragraph (a) of this section shall lie above the one-engine-inoperative takeoff path without standby power at the maximum takeoff weight at which all of the applicable airworthiness requirements are met. For the purpose of this comparison, the flight path shall be considered to extend to at least a height of 400 feet above the takeoff surface.

(c) The takeoff path with all engines operating, but without the use of standby power, shall reflect a conservatively greater overall level of performance than the one-engine-inoperative takeoff path established in accordance with paragraph (a) of this section. The aforementioned margin shall be established by the Administrator to insure safe day-to-day operations, but in no case shall it be less than 15 percent. The all-engines-operating takeoff path shall be determined by a procedure consistent with that established in complying with paragraph (a) of this section.

(d) For reciprocating-engine-powered airplanes, the takeoff path to be scheduled in the Airplane Flight Manual shall represent the one-engine-inoperative takeoff path determined in accordance with paragraph (a) of this section and modified to reflect the procedure (see sec. (6)) established by the applicant for flap retraction and attainment of the en route speed. The scheduled takeoff path shall have a positive slope at all points of the airborne portion and at no point shall it lie above the takeoff path specified in paragraph (a) of this section.

(3) *Takeoff distance.* The takeoff distance shall be the horizontal distance along the one-engine-inoperative takeoff path determined in accordance with section (2)(a) from the start of the takeoff to the point where the airplane attains a height of 50 feet above the takeoff surface for reciprocating-engine-powered airplanes and a height of 35 feet above the takeoff surface for turbine-powered airplanes.

(4) *Maximum certificated takeoff weights.* The maximum certificated takeoff weights shall be determined at all altitudes, and at ambient temperatures if applicable, at which performance credit is to be applied and shall not exceed the weights established in compliance with paragraphs (a) and (b) of this section.

(a) The conditions of section (2) (b) through (d) shall be met at the maximum certificated takeoff weight.

(b) Without the use of standby power, the airplane shall meet all of the en route requirements of the applicable airworthiness regulations under which the airplane was originally certificated. In addition, turbine-powered airplanes without the use of standby power shall meet the final takeoff climb requirements prescribed in the applicable airworthiness regulations.

(5) *Maximum certificated landing weights.*

(a) The maximum certificated landing weights (one-engine-inoperative approach and all-engines-operating landing climb) shall be

determined at all altitudes, and at ambient temperatures if applicable, at which performance credit is to be applied and shall not exceed that established in compliance with the provisions of paragraph (b) of this section.

(b) The flight path, with the engines operating at the power and/or thrust appropriate to the airplane configuration and with standby power in use, shall lie above the flight path without standby power in use at the maximum weight at which all of the applicable airworthiness requirements are met. In addition, the flight paths shall comply with the provisions of subparagraphs (i) and (ii) of this paragraph.

(i) The flight paths shall be established without changing the appropriate airplane configuration.

(ii) The flight paths shall be carried out for a minimum height of 400 feet above the point where standby power is actuated.

(6) *Airplane configuration, speed, and power and/or thrust; general.* Any change in the airplane's configuration, speed, and power and/or thrust shall be made in accordance with the procedures established by the applicant for the operation of the airplane in service and shall comply with the provisions of paragraphs (a) through (c) of this section. In addition, procedures shall be established for the execution of balked landings and missed approaches.

(a) The Administrator shall find that the procedure can be consistently executed in service by crews of average skill.

(b) The procedure shall not involve methods or the use of devices which have not been proven to be safe and reliable.

(c) Allowances shall be made for such time delays in the execution of the procedures as may be reasonably expected to occur during service.

(7) *Installation and operation; standby power.* The standby power unit and its installation shall comply with the provisions of paragraphs (a) and (b) of this section.

(a) The standby power unit and its installation shall not adversely affect the safety of the airplane.

(b) The operation of the standby power unit and its control shall have proven to be safe and reliable.

Margin to trim

SPECIAL CIVIL AIR REGULATION NO. SR–432A

Effective: February 9, 1962
Adopted: February 5, 1962
Published: February 9, 1962
(27 F.R. 1208)

Carriage of Persons Aboard All-Cargo Aircraft

Authorization for the carriage of persons abroad all-cargo aircraft is presently contained in Special Civil Air Regulations No. SR–419, effective January 17, 1957 (22 F.R. 423), and No. SR–432, effective May 30, 1959 (24 F.R. 4366).

SR–419 authorizes three LOGAIR contractors, listed in Appendix A thereto, to carry military couriers, route supervisors, and LOGAIR flight crewmembers of other LOGAIR contractors in their cargo aircraft. These air carriers were granted relief from the maximum passenger weight requirements of Special Civil Air Regulation No. SR–406C, as applicable to C–46 aircraft, in addition to certain other passenger-carrying provisions of Part 42 of the Civil Regulations. Special Civil Air Regulation No. SR–419 also provides that other air carriers conducting LOGAIR operations may individually secure this authorization from the Administrator, and be listed accordingly in Appendix A of the regulation. Such authorization was granted in the interest of the efficiency and safety of these essential national defense operations.

SR–432 authorizes the carriage of certain persons in cargo operations when such persons perform specific duties in connection with the safety of flights, the safe carriage of animals, or the carriage of radioactive materials. It also provides for the carriage of security and honor guards in cargo aircraft when authorized by the Federal Government. These authorizations were based on the conclusion that compliance with the passenger operation rules of Parts 40, 41, and 42 by an air carrier when carrying these passengers in all-cargo airplanes placed an unreasonable burden upon the air carriers concerned, since such individuals should not, and were not intended to, fall within the normally accepted category of air carrier passengers.

This regulation incorporates the provisions of both Special Regulations in a single regulation with the following changes:

(1) Recently the Agency has received requests from other air carriers and commercial operators operating flights under LOGAIR or other types of military contracts who wish to take advantage of SR–419. However, as presently written, it would require a revision of the regulation or an exemption thereto each time an operator is given such authorization. The Administrator has determined that there are no special reasons to limit such authorization to LOGAIR operations or air carriers and that this privilege should be extended to all military contract air carriers or commercial operators.

(2) Requests have also been received from air carriers to permit carriage of company employees and their dependents on cargo flights without complying with the passenger-carrying airplane requirements when traveling on company business to and from outlying stations not served by adequate and regular passenger flights. The problem of providing these persons with transportation to and from their duty stations is particularly acute outside the United States. Carriage of these persons on cargo flights is similar to the carriage of the persons authorized by paragraphs 1 (a) and (b) of SR–432 and a provision is included authorizing their transportation on cargo flights without full compliance with the passenger-carrying or passenger-service airplane requirements of Part 40, 41, or 42.

(3) Many of the operators may also wish to conduct the cargo flights in accordance with SR–411A which authorizes airplanes certificated under the transport category requirements in effect prior to March 13, 1956, to be operated in cargo service at certain increased weights. Airplanes used in these cargo flights are subject to inspections in addition to those normally performed and have been operated incident-free for many years. Therefore, as part of this regulatory action the persons authorized herein may also be carried aboard those airplanes specified in SR–411A at the increased weights.

(4) Under SR–419, the operator is responsible for the issuance of instructions to insure that the persons carried will not interfere with the control of the aircraft. This requirement is unnecessary and is being deleted in this regulation. The pilot in command of the aircraft has the authority to approve or deny access to the flight deck of such aircraft and is better qualified to issue such instructions as are necessary under the particular circumstances of the flight to persons authorized to enter the flight deck under this regulation.

(5) SR–419 also requires that the operator furnish the Administrator, prior to the carriage of persons authorized by the regulation, with a list showing the type of aircraft, registration number, and an authorization from the Air Force for the transportation of such persons. Experience has shown that inspection of the records of the operators involved will supply the necessary information. Therefore, submission of this information in advance is no longer required under this regulation.

In view of the foregoing, this regulation combines the provisions of SR–419 and SR–432, insofar as they both relate to the carriage of passengers on cargo aircraft, and, in addition, permits the carriage of certain other persons on such cargo flights. The regulation also permits such flights to be conducted without compliance with the passenger-carrying or passenger-service airplane requirements of Part 40, 41, or 42, or, in the case of C–46 airplanes, the provisions of SR–406C. When such persons are authorized to be carried on airplanes certified under the transport category requirements in effect prior to March 13, 1956, the airplane may be operated in accordance with the increased weight requirements of SR–411A.

With regard to the carriage of company employees and their dependents it was deemed necessary to provide special requirements, since these persons may vary in age and agility, and thus their ability to cope with

unusual situations may be restricted. Therefore, it is being required that operators include in their operations manuals the procedures necessary for the safe carriage of such persons.

Since this regulatory action imposes no additional burden on any person, notice and public procedure hereon are unnecessary, and good cause exists for making it effective on less than 30 days' notice.

In consideration of the foregoing, the following Special Civil Air Regulation is hereby adopted, effective February 9, 1962:

1. The following persons, when duly authorized by the air carrier or commercial operator operating the airplane may be carried aboard an airplane engaged in the carriage of cargo only, without compliance with the passenger-carrying or passenger-service airplane requirements of Parts 40, 41, and 42, and SR–406C and SR–411A of the Civil Air Regulations:

(a) A person performing a specific duty assignment aboard an airplane in connection with the safety of the flight, or the safe carriage of animals, or radioactive materials within the meaning of and subject to the requirements of section 49.2 of the Civil Air Regulations; or while traveling to or from such duty assignments where the air carrier or commercial operator finds that other means of transportation are not practicable;

(b) A person performing duty as a security or honor guard aboard an airplane for shipments made by or under the authority of the Federal Government;

(c) Military couriers, military route supervisors, and flight crewmembers of any military cargo contract air carrier or commercial operator, when operating under a military cargo contract and specifically authorized by the appropriate military service; and

(d) Company employees of the air carrier or commercial operator and their dependents when traveling on company business to or from outlying stations not served by adequate, regular passenger flights. When such persons are carried, cargo will be loaded in such a manner as not to obstruct access to the pilot compartment, or the appropriate emergency or regular exits. In addition, for extended overwater flights, or for flights over uninhabited terrain, emergency and survival equipment adequate for the particular operation involved shall be carried. Procedures for the safe carriage of company employees and their dependents under this subparagraph shall be incorporated into the air carrier's or comercial operator's operations manual.

2. An approved seat with a safety belt shall be available for the use of each person described in paragraph 1. The location of the seat shall be such that the occupant will not be in a position to interfere with the flight crewmembers in the performance of their duties.

3. Persons described in paragraph 1 may be admitted to the flight deck of the airplane when authorized by the pilot in command.

This Special Civil Air Regulation supersedes Special Civil Air Regulation No. SR–419 and Special Civil Air Regulation No. SR–432, and shall remain in effect until superseded or rescinded.

SPECIAL CIVIL AIR REGULATION NO. SR–436B

Effective: January 5, 1962
Adopted: December 28, 1961
Published: January 5, 1962
(27 F.R. 97)

Airborne Weather Radar Equipment Requirements for Airplanes Carrying Passengers

Special Civil Air Regulation No. SR–436A (25 F.R. 6130), which superseded SR–436 (25 F.R. 167), requires the installation of approved airborne weather radar equipment in certain transport category airplanes used for the carriage of passengers under Part 40, 41, or 42 of the Civil Air Regulations. This requirement is based on the fact that airborne weather radar equipment facilitates the early detection and location by the pilot of certain areas of turbulence and enables him to avoid such areas or to take such other action as may be necessary in the interest of safety.

Section 4 of SR–436A expressly excepts from the provisions of the regulation airplanes used solely within the States of Alaska and Hawaii. These operations were excluded because thunderstorms and other potentially hazardous meterological conditions detectable by weather radar rarely occur in those areas.

Recently, the Federal Aviation Agency received a request from an air carrier operating in the State of Alaska to amend section 4 of SR–436A to expand the exceptions contained in that section to include certain areas of the Dominion of Canada. In support of its request the air carrier points out that because of the physical shape of the State of Alaska, the use of airways which overfly northwest Canada provide a more direct route between northeast Alaska and southeast Alaska. Moreover, when operating over the Canadian Airways Dawson and Whitehorse, Yukon Territory, Canada, are ideally located and suitably equipped to provide refueling service. However, when carrying passengers under the provisions of Part 41 or 42, compliance with the present provisions of SR–436A prevents the use of both the more direct airways over Canada and the Canadian refueling stops unless approved airborne weather radar is installed on the airplane being utilized.

At an industry meeting held in the State of Alaska, subsequently to this request, the feasibility of amending SR–436A was discussed. It was suggested at this meeting that if an amendment is made to section 4 of SR–436A it should include all of the Dominion of Canada west of a north-south line which would encompass the city of Edmonton, Alberta, Canada. This would include all of Canada west of longitude 110° W., between the northern coastline of Canada and the northern boundary of the continental United States. This request was based upon a contention that there is light thunderstorm activity in that part of Canada.

As a result of these requests, the Federal Aviation Agency initiated a study into the feasibility of amending section 4 of SR–436A to except

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airplanes operated in certain parts of Canada from the requirement of installing airborne weather radar. Information was received from the U.S. Weather Bureau that the area of Canada west of longitude 130° W., between latitude 70° N. and latitude 53° N., has meteorological conditions similar to the State of Alaska. This information also shows that thunderstorms and other potentially hazardous meteorological conditions rarely occur in that area. However, in the area of Canada that is east and south of that area and adjacent to the United States northern boundary and which encompasses Edmonton, Alberta, the thunderstorm activity increases considerably and is equal to or greater than that of a large portion of the United States where airborne weather radar is mandatory.

After considering the foregoing, it has been determined that the level of safety in air carrier passenger operations would not be reduced by excluding from the provisions of SR–436A airplanes used for the carriage of passengers within Alaska and that portion of Canada west of longitude 130° W., between latitude 70° N. and latitude 53° N., where thunderstorms and other potentially hazardous weather conditions rarely occur. In addition, such an exclusion would permit the use of more direct routes and refueling stops between northeast and southeast Alaska. Therefore, section 4 of SR-436A is amended to exclude airplanes used within the State of Alaska and that portion of Canada west of longitude 130° W., between latitude 70° N. and latitude 53° N., from the weather radar requirements.

This Special Civil Air Regulation incorporates into one document all of the provisions of SR–436A with amendments to exclude the foregoing portions of Canada. Since it imposes no additional burden on any person and relieves a restriction, I find that notice and public procedure hereon are unnecessary, and that good cause exists for making this regulation effective on less than 30 days' notice.

In consideration of the foregoing, the following Special Civil Air Regulation is hereby adopted:

1. *Airborne weather radar equipment requirement.* After the dates specified, the following transport category airplanes shall not be used for the carriage of passengers under the provisions of Part 40, 41, or 42 of the Civil Air Regulations, unless approved airborne weather radar equipment is installed in such airplanes:

(a) July 1, 1960, for all turbine-powered airplanes certificated under the transport category rules;

(b) January 1, 1961, for the Douglas DC–7 Series, Douglas DC–6 Series, and Lockheed 1049 and 1649 Series type airplanes; and

(c) January 1, 1962, for all airplanes certificated under the transport category rules, except C–46 type airplanes.

NOTE: Airplanes subject to the provisions of paragraph (c) of this section include, but are not limited to, the following types: Boeing 377; Convair 240, 340, and 440; Lockheed 049 and 749; Martin 202 and 404; and Douglas DC–4.

2. *Schedule for installation of equipment.*

(a) Each operator conducting passenger operations under the provisions of Part 40, 41, or 42 of the Civil Air Regulations with transport category airplanes on which airborne weather radar is not installed, shall establish a schedule for the progressive completion of such radar installations, in accordance with the provisions of section 1 of this regula-

tion. The schedule shall provide for the completion of all required radar installations on or before the dates specified in section 1 of this regulation, and the completion of at least 40 percent of the required installations on or before the following dates:

(1) August 1, 1960, for airplanes of the types specified in section 1(b), and

(2) February 1, 1961, for airplanes of the types specified in section 1(c).

(b) On or before July 1, 1960, a copy of the schedule required by paragraph (a) of this section shall be submitted to an authorized representative of the Administrator, together with a list of any airplanes the operator intends to discontinue using in the carriage of passengers prior to the date on which radar equipment must be installed.

3. *Requirement for dispatch and continuance of flight.* After the effective date specified in section 6 of this regulation, all transport category airplanes having approved airborne weather radar installed shall be operated in accordance with the following rules when used in passenger operations under Part 40, 41, or 42:

(a) *Dispatch.* No airplane shall be dispatched (or flight of an airplane started under the provisions of Part 42) under IFR or night VFR conditions when current weather reports indicate thunderstorms, or other potentially hazardous weather conditions which can be detected by airborne weather radar, may reasonably be expected to be encountered along the route to be flown, unless approved airborne weather radar equipment installed in the airplane is in a satisfactory operating condition.

(b) *En route.* In the event the airborne weather radar becomes inoperative en route, the airplane shall be operated in accordance with the instructions and procedures specified in the operations manual for such occurrence. After the date specified by section 1 of this regulation for the mandatory installation of approved airborne weather radar on the type of airplane involved, such instructions and procedures shall meet with the approval of an authorized representative of the Administrator.

4. *Exceptions.* The provisions of this regulation shall not apply to airplanes used (a) solely within the State of Hawaii or within the State of Alaska and that portion of the Dominion of Canada west of longitude 130° West, between latitude 70° North and latitude 53° North, or (b) during all-cargo, training, test, or ferry flights.

5. *Electrical power supply.* Contrary provisions of the Civil Air Regulations notwithstanding, an alternate electrical power supply need not be provided for airborne weather radar equipment.

6. *Effective date.* This Special Civil Air Regulation shall become effective on January 5, 1962, and supersedes Special Civil Air Regulation No. SR-436A.

SPECIAL CIVIL AIR REGULATION NO. SR-440

Effective: June 7, 1960
Adopted: June 7, 1960

Occupancy of Forward Observer's Seat During En Route Inspection

Sections 40.22, 41.5, and 42.8 of the Civil Air Regulations contain provisions which make it mandatory to permit an authorized representative of the Federal Aviation Agency at any time and place to make inspections or examinations to determine an air carrier's compliance with the requirements of the Federal Aviation Act of 1958, and the Civil Air Regulations. Similar inspection provisions have existed without interruption since the regulation of civil aviation by the former Aeronautics Branch, U.S. Department of Commerce, which provided in its regulations that the "owner, operating agency, or pilot" was required to give Federal inspectors "free and uninterrupted access to the aircraft" while conducting government inspections.

Historically, the required Government inspections of air carrier operations known as en route inspections have been conducted from a seat or station on the flight deck of the aircraft which permits the inspector to observe the operation of the aircraft by the flight crew members at their respective stations. This was done for the obvious reason that an inspection conducted from a location which would not permit observation of the operation would be essentially futile. As a result of this well established and accepted practice, it has been unnecessary for the Federal Aviation Agency or its predecessor agencies to further prescribe by regulatory action the authority of the inspector to occupy such seat in the conduct of his required en route inspections.

With the introduction into service of new type turbo jet airplanes two observers' seats were made available for use on the flight deck of such airplanes, in addition to those required for the minimum flight crew. In some of these airplanes one of these seats, the forward observer's seat, is located directly behind that occupied by the pilot in command and permits FAA inspectors while occupying such seat to observe the operation of the airplane by the flight crew members. The location of the second observer's seat, however, does not permit such observation.

By agreement entered into between the Air Line Pilots Association and certain air carriers, an additional pilot flight crew member has been assigned to assist the pilot in command in the operation of turbo jet airplanes. This agreement was entered into notwithstanding the fact that such airplanes were certificated for safe operation by the FAA with a minimum flight crew of two pilots and a flight engineer. Moreover, these airplanes are still being operated safely with such a flight crew complement by all of the other air carriers not parties to such an agreement. The Air Line Pilots Association has now advised the FAA that under the provisions of this agreement it has decided that the forward observer's seat must be occupied by the additional pilot flight crew member or the airplane will not be operated by its members—even during en route inspec-

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tions. In support of this decision, resolutions have been entered into by the Master Executive Council of the pilots of the air carriers which are parties to such agreements directing its members not to operate turbo jet airplanes for en route inspections, when the forward observer's seat is occupied by the FAA inspector instead of the additional third pilot.

Pursuant to such agreements and resolutions, the pilots of one of the air carriers have now refused to operate turbo jet airplanes which were scheduled for en route inspections by authorized representatives of the Administrator occupying the forward observers' seats. Such overt acts by the pilots involved have created a situation which requires immediate corrective action. The statutory safety responsibilities of the Federal Aviation Agency can not be derogated by the provisions of agreements between the pilots and the air carriers, or by unilateral resolutions of the pilots and their associations purporting to implement such agreements. In the exercise and performance of their statutory responsibilities, FAA inspectors conducting en route inspections must be provided with a seat in the cockpit from which they are able properly to discharge such responsibilities. This requirement is both obvious and fundamental for the conduct of inspections which will assure the highest degree of safety in the fast growing system of air transportation.

Because of the emergency nature of the situation, I find that compliance with the notice, procedures and effective date provisions of the Administrative Procedure Act would be impracticable and impede the due and timely execution of the functions of the Federal Aviation Agency.

In consideration of the foregoing this emergency Special Civil Air Regulation is adopted to make clear that the authorized representatives of the Administrator must be given full and uninterrupted access to the aircraft, including a suitable seat on the flight deck, as determined by the Administrator, for the proper performance and discharge of their en route inspection duties. This regulation is declaratory of a longstanding practice and makes explicit, with respect to certain aircraft, the location of such seat.

The following Special Civil Air Regulation is hereby adopted to become effective immediately.

Each air carrier shall make available a seat on the flight deck of each aircraft used by it in air transportation for occupancy by an authorized representative of the Administrator while conducting en route inspections. The location and equipment of such seat, in respect to its suitability for use in conducting en route inspections, shall be as required by the Administrator or his representative. In all Boeing 707's, Douglas DC–8's, and other types of aircraft having more than one observer's seat in excess of that required for the crew complement for which the aircraft was certificated, the forward observer's seat shall be made available to such representative.

SPECIAL CIVIL AIR REGULATION NO. SR-446A

Effective: May 25, 1962
Adopted: May 22, 1962
Published: May 25, 1962
(27 F.R. 4906)

Use of Portable Frequency Modulation (FM) Type Radio Receivers on Aircraft During Flight

In 1961, during tests conducted by the Federal Aviation Agency's Aviation Research and Development Service, it was found that radio receivers having local oscillators operating within or near the VHF omnirange (VOR) frequency band (108 to 118 Mcs.) cause interference which adversely affects the operation of an aircraft's VOR navigational system. Various types of portable radio receivers (i.e., radio receivers capable of being carried aboard an aircraft by a passenger) were used in these tests to determine which would produce interference to the VOR equipment. It was determined that the portable frequency modulation (FM) radio receiver is the only type radio receiver, which is commonly used by the general public, that would create this unwanted interference. Therefore, it was found that immediate regulatory action was necessary in order to provide adequately for safety in air commerce.

Accordingly, on May 4, 1961, the Federal Aviation Agency issued Special Civil Air Regulation No. SR-446 (26 F.R. 4011) to become effective May 25, 1961. This regulation, which will expire May 24, 1962, prohibits the operation of portable FM radio receivers during flight on all civil aircraft of the United States operated by an air carrier or a commercial operator. It also prohibits the operation of portable FM radio receivers on all other VOR-equipped civil aircraft of the United States while such VOR equipment is being used for navigational purposes. The added restriction in the case of aircraft operated by an air carrier or a commercial operator was necessary since most of these aircraft are equipped with VOR navigational equipment and it would be difficult, if not impossible, for a passenger to know when the pilot in command was depending upon this equipment for navigational purposes. In addition, although not all portable FM radio receivers utilize local oscillators which will create interference, it was necessary to make the rule applicable to all portable FM radio receivers since it would not be feasible to expect the general public, airline personnel, or air crewmembers to distinguish which will cause this interference.

The tests which disclosed the interference problems caused by FM radio receivers were not completed at the time SR-446 was issued in 1961. Therefore, to simplify revision of the rule if additional interference problems were found by the tests, SR-446 was issued as a temporary rule, effective for a one-year period. When SR-446 was issued, the Agency had intended, prior to its expiration, to incorporate the provisions of the rule into the applicable operating parts, i.e., Parts 40, 41, 42, 43, 45, and 46. However, since the final evaluation of these tests by all interested indus-

try parties has not been completed this action has not been taken. Accordingly, since the conditions under which SR–446 was issued still exist, it is necessary, in order to provide adequately for safety in air commerce, to extend the provisions of that rule for a period of one year.

Since this regulation extends the provisions of a currently effective regulation which expires on May 24, 1962, and a lapse in the effectiveness of the regulation would endanger safety in air commerce, I find that notice and public procedure hereon would be contrary to the public interest, and that good cause exists for making it effective on less than 30 days' notice.

In consideration of the foregoing, Special Civil Air Regulation No. SR–446 is superseded by the following Special Civil Air Regulation which is hereby adopted to become effective on May 25, 1962:

No person shall operate, nor shall any operator or pilot in command of an aircraft permit the operation of, a portable frequency modulation (FM) radio receiver on the following civil aircraft of the United States while such aircraft are engaged in flight in air commerce: (a) Aircraft operated by an air carrier or commercial operator; and (b) any other aircraft equipped with VHF omnirange (VOR) navigational equipment while such VOR equipment is being used for navigational purposes.

This special regulation supersedes Special Civil Air Regulation No. SR–446 and shall remain in effect for one year unless sooner superseded or rescinded by the Federal Aviation Agency.

SPECIAL CIVIL AIR REGULATION NO. SR–448A

Adopted: Oct. 9, 1961
Effective: Oct. 13, 1961
Published: Oct. 13, 1961
(26 F.R. 9669)

Precautions to Prevent Hijacking of Aircraft and Interference With Crewmembers in the Performance of Their Duties

Special Civil Air Regulation No. SR–448 was adopted and effective July 28, 1961 (26 F.R. 7009). The preamble thereto stated that:

"The recent hijackings of air carrier aircraft have highlighted a necessity to provide additional controls over the conduct of passengers in order to avoid a serious threat to the safety of flights and persons aboard them. The Federal Aviation Agency has the responsibility to see that air carriers take such steps as are possible to prevent such occurrences. We have requested the air carriers to take every practicable precaution to prevent passengers from having access to the pilot compartment. In addition, we are adopting a regulation which will prohibit any person, except one who is specifically authorized to carry arms, from carrying on or about his person while aboard an air carrier aircraft a concealed deadly or dangerous weapon. The regulation being adopted will also make it a violation of the CARs for any person to assault, threaten, intimidate, or interfere with a crewmember in the performance of his or her duties aboard an air carrier aircraft or to attempt to or cause a flight crewmember to divert the flight from its intended course or destination."

Special regulation SR–448, however, does not prohibit a person from carrying an unconcealed deadly or dangerous weapon on or about his person while aboard an aircraft. The present emergency situation requires stringent measures to preclude the carriage of any weapon which may be used to intimidate or interfere with crewmembers performing their duties on an aircraft engaged in air transportation. Therefore, paragraph 2 of SR–448 is amended by this regulation to prohibit any person, except those specified, from carrying a deadly or dangerous weapon on or about his person, either concealed or openly, while on board an air carrier aircraft engaged in air transportation.

Since the promulgation of Special Civil Air Regulation No. SR–448, Public Law 87–197 has been enacted which, among other things, makes it a criminal offense to carry a concealed deadly or dangerous weapon on or about one's person while aboard an air carrier aircraft being operated in air transportation. Excepted from this provision are certain law

enforcement officers, and "other persons as may be so authorized under regulations issued by the Administrator." To implement this statutory provision, this regulation excepts from the prohibition against carrying a concealed weapon while aboard an aircraft being operated by an air carrier in air transportation (1) employees or officials of municipal, State, or Federal Governments who are authorized or required to carry arms; (2) crewmembers authorized by the air carrier; and (3) such other persons as may be authorized by the air carrier pursuant to such precautions as may be established by the carrier.

In view of the foregoing exceptions, the prohibition of paragraph 2 of SR–448 is changed to apply to any person, rather than only to those persons who are passengers. This regulation does not in any way affect the shipment of unloaded firearms in baggage not accessible to the passenger while aboard the aircraft if these firearms are otherwise acceptable for shipment under the provisions of Part 49. In such case, the firearms will be located so as not to be accessible to the passenger during flight, and therefore, not deemed to be on or about his person within the meaning of this regulation.

The present provisions of paragraph 1 of SR–448 apply to aircraft being operated in air transportation. This paragraph is changed to apply to aircraft being operated in air commerce to broaden the scope of the provision to provide similar protection to those general aviation operations and operations conducted for compensation or hire which are not considered as air transportation under the Federal Aviation Act of 1958.

Because of the emergency nature of the situation and the present threat to safety of persons being carried in air commerce, I find that notice and public procedure hereon would be impracticable and good cause exists for making this regulation effective in less than 30 days.

In consideration of the foregoing changes, Special Civil Air Regulation SR–448 is superseded by the following Special Civil Air Regulation to become effective October 13, 1961:

1. No person shall assault, threaten, intimidate, or interfere with a crewmember in the performance of his duties aboard an aircraft being operated in air commerce; nor shall any person attempt to or cause the flight crew of such aircraft to divert its flight from its intended course or destination.

2. Except for employees or officials of municipal, State, or Federal Governments who are authorized or required to carry arms, and except for those crewmembers and such other persons as may be authorized by an air carrier, no person, while aboard an aircraft being operated by an air carrier in air transportation, shall carry on or about his person a deadly or dangerous weapon, either concealed or unconcealed.

SPECIAL CIVIL AIR REGULATION NO. SR-450A

Effective: Aug. 31, 1962
Adopted: Aug. 29, 1962
Published: Sept. 1, 1962
(27 F.R. 8760)

Airspeed Operation Limitation for Transport Category Airplanes

Special Civil Air Regulation No. SR-450, effective May 3, 1962 (27 F.R. 2995), contained a number of requirements dealing with airspeed operating limitations to airplanes certificated under the provisions of Part 4b in effect prior to May 3, 1962. A revision of the Airplane Flight Manual statement concerning airspeed operating limitations was prescribed for all such airplanes. Consistent revision of airspeed placards and instrument markings, and the installation of a speed warning device, were additionally prescribed for turbine-powered airplanes. The special regulation required compliance with the speed warning device provision on or before February 1, 1963; with all other provisions, on or before September 1, 1962.

Several operators of airplanes affected by SR-450 have requested extensions of the compliance dates specified therein, contending that compliance before these dates would be unnecessarily and excessively burdensome in relation to the attained increment of safety. With respect to the September 1, 1962, compliance date specified in section 1(a)(2), they point out that remarking airspeed instruments generally involves removal of the instrument seal. When this is done, the instrument is processed through a time-consuming overhaul schedule to make certain that its calibration has not been changed. They state, in addition, that the airplane manufacturer delayed delivery of the detailed service information required for the modification until necessary technical consultations with the instrument manufacturer, and with representatives of this Agency, could be completed. With respect to the February 1, 1963, date established for compliance with section 1(b), operators of turbine-powered airplanes not already equipped with a speed warning device report that they cannot obtain delivery of the device in less than 5 months; that installation of the device involves extensive electrical modifications, rework of the pitot-static pressure system, and other installation changes; that ground and flight tests are necessary to insure proper functioning of the modified systems; and that such modifications and tests, to be conducted in a safe manner, should be scheduled during a major airplane overhaul.

The Agency has determined that, for the reasons stated above and despite diligent efforts on their part, many persons affected by SR-450 will not be able to comply with its provisions before the specified dates and that a period of relief may be granted without adversely affecting safety. Accordingly, SR-450 has been amended by extending the September 1, 1962, compliance dates to March 1, 1963, and by extending the February 1, 1963, compliance date to February 1, 1964.

Since this regulation provides relief from the provisions of the previous regulation, and imposes no additional burden upon any persons,

compliance with the notice and public procedure provisions of the Administrative Procedure Act is unnecessary, and good cause exists for making this regulation effective on less than 30 days' notice.

In consideration of the foregoing, the following Special Civil Air Regulation is hereby adopted to become effective August 31, 1962:

Contrary provisions of the Civil Air Regulations notwithstanding, the following requirements shall be applicable to transport category airplanes certificated under the provisions of Part 4b in effect prior to May 3, 1962:

1. *Turbine-powered airplanes.*

(a) On or before March 1, 1963:

(1) The airspeed operating limitations in the Airplane Flight Manual shall be revised by deleting the term "normal operating limit speed" and the corresponding symbols "V_{NO}/M_{NO}", together with statements explaining the significance of this term, and inserting in lieu thereof the term "maximum operating limit speed", the corresponding symbols "V_{MO}/M_{MO}", and the following statement explaining the significance of the new term:

"The maximum operating limit speed shall not be deliberately exceeded in any regime of flight (climb, cruise, or descent), except where a higher speed is specifically authorized for flight test or pilot training operations, or in approved emergency procedures."

(2) Airspeed placards and instrument markings shall be consistent with subparagraph (1) of this paragraph. Where color markings are used on airspeed or Mach indicators, the red radial line shall be at V_{MO}/M_{MO}. Where a maximum allowable airspeed indicator is used, the limit hand shall indicate V_{MO}/M_{MO}.

(b) On or before February 1, 1964, each airplane shall be equipped with a speed warning device which shall provide aural warning to the pilots, which is distinctly different from aural warnings used for other purposes, whenever the speed exceeds V_{MO} plus 6 knots or $M_{MO}+0.01$. The upper limit of the production tolerances permitted for the warning device shall be at a speed not greater than the prescribed warning speed.

2. *Reciprocation engine-powered airplanes.* On or before March 1, 1963, the airspeed operating limitations in the Airplane Flight Manual shall be revised as necessary to state that the normal operating limit speed, or the maximum structural cruising speed (whichever term is used in the particular manual), shall not be deliberately exceeded in any regime of flight (climb, cruise, or descent), except where a higher speed is specifically authorized for flight test or pilot training operations, or in approved emergency procedures.

This regulation supersedes Special Civil Air Regulation No. SR-450.

Addendum

Preambles to Amendments to Civil Air Regulations Part 40

NOTE

Part 40 of the Civil Air Regulations was last revised by the Civil Aeronautics Board with an effective date of December 31, 1955. This was not a general revision of the part, but only a reprint to incorporate outstanding amendments and to make minor editorial changes. This revision was published in the Federal Register on December 31, 1955 (20 F.R. 10131).

Amendment 40–1

Weather Reporting Facilities and Requirements Covering Landing Limitations Outside Continental United States	Adopted: May 18, 1956 Effective: June 22, 1956 Published: May 23, 1956 (21 F.R. 3405)

Part 40 of the Civil Air Regulations contains the certification and operation rules for scheduled air carriers conducting interstate operations. Part 41, on the other hand, contains the regulations applicable to scheduled air carriers operating outside the continental limits of the United States. However, section 40.1 of Part 40 permits the Administrator to authorize air carriers whose operations are essentially domestic in character to operate on routes extending beyond the continental limits of the United States in accordance with the provisions of Part 40 in lieu of the provisions of Part 41 in order to permit continuity of operating procedures throughout the air carriers' systems.

Currently effective section 40.35 of Part 40 requires air carriers to show that sufficient weather reporting services are available en route to insure necessary weather reports and forecasts prepared and released by the United States Weather Bureau or by a source approved by the Weather Bureau. However, reports prepared by the United States Weather Bureau or a source approved by the Weather Bureau are not normally available for areas under the jurisdiction of other nations.

Currently effective section 40.406 of Part 40 prescribes the take-off and landing weather minimum requirements for IFR flight. These requirements include provisions allowing pilots to "take-a-look" to determine whether conditions at the airport are at or above prescribed weather minimums and, if so, to continue to approach and land. Authority to "take-a-look" is limited to airports served by ILS and GCA in operative condition or to airports at which certain instrument approach procedures are commenced when weather conditions above prescribed minimums exist but which a later report indicates are below minimum requirements. Part 41, on the other hand, prohibits air carriers from "taking-a-look" only at airports at which United States Weather Bureau reports indicate below minimum conditions exist. At airports outside the United States which do not possess a United States Weather Bureau reporting service, a pilot may in his discretion "take-a-look." If he finds that weather conditions at the airport are at or above prescribed weather minimums, he may complete the approach and land.

The inapplicability of section 40.35 to air carrier operations outside the United States and the inconsistency between Parts 40 and 41 with respect to "take-a-look" restrictions appear to have been an oversight. In order to correct this situation, section 40.35 is being amended to provide for the use of weather reports prepared by sources other than those approved by the United States Weather Bureau on routes extending beyond the continental limits of the United States on which operations are conducted pursuant to section 40.1. These "other" sources shall be approved by the Administrator. In addition, section 40.406 is being amended to prohibit pilots from "taking-a-look" only when the latest United States Weather Bureau report or a report from a source approved by the Weather Bureau indicates the ceiling or visibility to be less than the prescribed minimum. This will enable pilots flying on routes outside the continental United States pursuant to section 40.1 to exercise the same "take-a-look" privileges as are available to pilots flying in accordance with Part 41.

Interested persons have been afforded an opportunity to participate in the making of this amendment (20 F.R. 8579), and due consideration has been given to all relevant matter presented.

Amendment revised sections 40.35 and 40.206.

Amendment 40–2

Training Programs and Proficiency Checks—Use of Aircraft Simulators

Adopted: Feb. 8, 1957
Effective: March 15, 1957
Published: Feb. 13, 1957 (22 F.R. 885)

Part 40 of the Civil Air Regulations currently requires certain pilot proficiency checks to be accomplished twice a year by each pilot serving as pilot in command in air carrier service. The objective of these checks is to insure that the pilot maintains a high standard of proficiency in the piloting and navigation of the airplane types to be flown by him. The proficiency checks must be given by an authorized representative of the Administrator of Civil Aeronautics or a check pilot of the carrier concerned. In addition to the normal airplane maneuvers, these checks include certain critical maneuvers which are encountered from time to time in air carrier service such as take-offs and landings with inoperative engines, missed approaches, instrument letdowns, and various emergency procedures.

The Administrator, with the approval of the Board, has for several years approved many maneuvers required in the proficiency checks to be accomplished in synthetic trainers which accurately simulate the flight characteristics and the performance of the aircraft, to which a pilot is assigned, through all ranges of normal and emergency operations. This approval has been based in part upon an air carrier's use of the synthetic trainer in its pilot training program, and the pilot's satisfactory demonstration in actual flight of ability to perform at least 4 basic maneuvers, as follows: Flight at minimum speeds, approach to lowest approved minimums, landing under circling approach conditions, and simulated engine failure(s) during take-off.

The Board foresees, however, that the increasing complexity of aircraft, with concomitant need for devices to simulate the flight characteristics of large modern transport aircraft, will be further accentuated as turbo-prop and turbo-jet aircraft are procured. As a result, more intensive training of pilots and crews will be necessary to insure that they are proficient in the operation of these larger and faster aircraft with their corresponding new operating problems, and this training can be accomplished only at considerably increased costs. In anticipation of this problem, certain carriers are preparing to acquire simulators before the aircraft are put into service. This action is predicated on the assumption that essential training can be conducted in part in aircraft simulators more effectively, safely, and economically than in an aircraft, and with considerable saving in time.

The fundamental characteristics of the aircraft simulators in use and under consideration should be made clear in order that interested persons will clearly understand the nature of the device the Board is discussing in this amendment. The Board has in mind that the aircraft simulator shall be a full scale mock-up of the cockpit interior of a particular type aircraft with normal crew stations, plus accommodations for necessary additional persons such as check airmen, instructors, or observers. It shall also include suitable course and altitude recorders. It shall be capable of accurately reproducing the engine and flight performance, control loading, instrument indication, and control movements of the specific model aircraft during the execution of all normal and anticipated emergency maneuvers. Of great importance is the requirement that the device shall be designed to permit presentation of malfunction of aircraft, aircraft engines, propellers, appliances, systems, and other components, and appropriate procedures to cope with such emergencies. Capabilities, as outlined above, will permit intensive training and checking in normal and abnormal flight conditions, various flight procedures, navigational problems, and essential crew coordination.

Accordingly, the Board published on June 13, 1956, (21 F.R. 4294) a notice of proposed rule making as Civil Air Regulations Draft Release No. 56–16 "Training Programs and Proficiency Checks (Use of Aircraft Simulators)" in which certain proposals were made with respect to the use of aircraft simulators. The Board indicated that it was of the opinion that the advantages of the trainers were so apparent that their controlled introduction into air carrier training procedures on a wider basis was in the public interest and should be encouraged. In summary, the Board found that aircraft simulators have been proven as a valuable aid in improving the effectiveness of pilot training for instrument and equipment proficiency. The promise of further improvement in training is, in fact, so great that it appears desirable to reduce the number of in-flight proficiency checks that pilots are required to take. Simulators are particularly suited to instruction in and practice of numer-

ous emergency procedures which cannot satisfactorily be accomplished in flight, and permit special emphasis on the coordination of crew duties; they offer a laboratory for experimentation in techniques and procedures which might be time-consuming or hazardous in flight; they will permit training to be conducted with more safety as a result of the reduction of frequency of aircraft operations under simulated emergency conditions; their use will result in the reduction of traffic congestion and noise in large terminal areas; and they will reduce substantially the total cost of pilot training programs.

The Board also indicated that, in determining the most appropriate method to realize the full possibilities of aircraft simulators, it could not lose cognizance of its responsibility to assure the highest degree of safety in air transportation even while taking this opportunity to encourage sound technical and economic development of air carrier operations. It is the Board's opinion, therefore, that the broadened use of aircraft simulators in air carrier training programs should be permitted in accordance with these basic principles:

A. The use of simulators shall be permissive with the air carriers.

B. The air carrier shall be required to show that the aircraft simulator meets prescribed standards and shall establish within its training program an approved course of training in such an aircraft simulator. It is anticipated that the training shall consist of at least several hours covering all items currently contained in the flight proficiency checks.

C. When a pilot in command satisfactorily completes each 12 months an approved course of training in an aircraft simulator which the air carrier shows meets the prescribed standards, each such pilot need accomplish only one proficiency check in flight each 12 months.

D. The Board shall review the experience gained under these regulations to determine the effectiveness of the procedures permitted thereby.

In response to Draft Release No. 56-16, the Board received from interested persons comment favorable to the Board's basic objective of permitting broadened use of aircraft simulators by air carriers. There was, however, some diversity of opinion with respect to the specific proposals to amend the operating parts. In the Board's proposal the major change from current practice was to substitute an approved simulator course for one of the two proficiency checks required to be accomplished in flight annually. Certain air carrier spokesmen indicated that they considered this an improper mixing of the training and checking functions, and stated that the regulation should simply permit the accomplishment of one of the required checks in a simulator. Furthermore, these persons also considered that it was not necessary for the Administrator to approve a particular portion of an air carrier's training program (i.e., simulator curriculum). On the other hand, pilot spokesmen expressed concern that successful utilization of aircraft simulators would be realized only through very close supervision by the Administrator, with review by the pilots, of procedures and qualifications of instructors and check personnel.

In Draft Release No. 56-16, the Board also asked for separate comment with respect to the desirability of including in the Civil Air Regulations certain specific standards for aircraft simulator equipment (Draft Release No. 56-16, Appendix A) which would be used as a basis for approval by the Administrator.

The Board has carefully studied the various views presented and is of the opinion that, at least in the initial stages of expanded simulator use by air carriers, the Administrator should approve the aircraft simulator training program of each air carrier. This procedure will be consistent with the present policy whereby the Administrator makes rules, compliance with which is mandatory, for the conduct of the proficiency checks required by the Civil Air Regulations. The Board will, however, review the experience gained under this regulation and propose any changes which, in the light of such experience, may be in the public interest.

The Board is also of the opinion, in view of the comment received, and other information, that the detailed description of the systems or conditions being simulated, and the degree of simulation, should not be prescribed in the Civil Air Regulations but should be controlled by the Administrator through the medium of the appropriate Civil Aeronautics Manual. The Board considers, however, that the broad, basic standards which describe the characteristics and function of an acceptable aircraft simulator should be included in the regulations.

Interested persons have been afforded an opportunity to participate in the making of this amendment, and due consideration has been given to all relevant matter presented.

Amendment added a new subparagraph (3) to section 40.302(b).

Amendment 40–3

Position and Anti-Collision Light Requirements	Adopted: Feb. 25, 1957 Effective: April 1, 1957 Published: March 1, 1957 (22 F.R. 1276)

The continuing increase in air traffic density and the advent of aircraft capable of appreciably higher speeds than heretofore attained demand further improvement in the exterior lighting of aircraft. Recent studies with respect to exterior aircraft lighting indicate a need for the establishment of new specifications in the certification parts of the Civil Air Regulations for anti-collision lights.

Since the anti-collision light is a flashing light and in addition has the added advantage of more concentrated intensities which offer conspicuity at a greater distance, the Board believes that flashing position lights will no longer contribute noticeably to the conspicuity of aircraft. It is believed, however, that with the use of the anti-collision lights now required on all air carrier aircraft it becomes important for the position lights to retain their direction and attitude indicating features and this can best be accomplished by maintaining the position lights steady rather than flashing.

Interested persons have been afforded an opportunity to participate in the making of this amendment (21 F.R. 3388), and due consideration has been given to all relevant matter presented.

Amendment revised section 40.200(a) and deleted the words "After May 31, 1956" from section 40.200(b).

Amendment 40–4

Extension of Compliance Date for Installation of Emergency Exit Lighting and Means for Emergency Evacuation	Adopted: May 31, 1957 Effective: May 31, 1957 Published: June 5, 1957 (22 F.R. 3917)

Provisions of Part 40 of the Civil Air Regulations, adopted November 28, 1955 (20 F.R. 8848), require that after May 31, 1957, for night operations, aircraft emergency exit markings shall be illuminated by a special source of light, independent of the main aircraft lighting system. This regulation also requires that after May 31, 1957, certain means for emergency evacuation shall be installed on all passenger-carrying airplanes, as for example ropes and chutes.

By letter dated March 29, 1957, the Air Transport Association of America (ATA) requested, on behalf of certain member air carriers, an extension from May 31, 1957, to July 31, 1958, of the compliance date for installation of emergency exit lights in a large number of presently operated air carrier aircraft. In support of their request the ATA described in considerable detail the problems with which the air carriers had been confronted in the design, procurement, installation, and approval of emergency exit lighting systems appropriate for many types of aircraft. Also by letter dated May 3, 1957, ATA requested, on behalf of several air carriers, an extension of the May 31, 1957, compliance date for installation of the means for emergency evacuation in certain air carrier airplanes. Extensions were requested for various periods, the maximum of which was for a period of 14 months.

The Board is greatly disturbed that progress with the installation of this emergency equipment has not met with its expectations as expressed in the amendments to Part 40 requiring such equipment and the Board does not consider the substantiating data submitted by the ATA to be sufficient to warrant extension for the period of time requested by the carriers. The Board recognizes, however, that difficulties may have been encountered by the air carriers in accomplishing an orderly procurement and installation program without serious disruption of scheduled service and that a brief period of relief may be granted without affecting adversely safety in air carrier operations.

In view of the foregoing, the Board is extending the date for compliance with the emergency exit lighting and evacuation requirements of Part 40 for a period of 90 days. The Board hereby invites each air carrier which believes that it cannot comply with such requirements within 90 days to submit to the Bureau of Safety in writing not later than July 1, 1957, a request for further extension, together with complete substantiating data as to why it cannot comply and believes it should be granted such extension. Each such request for further relief will be evaluated and the Board, prior to August 31, 1957, will take such action as it deems justified.

Since this amendment grants relief by temporarily extending the date for compliance with a requirement of the Civil Air Regulations, and delay in extending such relief would impose an undue hardship, the Board for good cause finds that notice and public procedure hereon would be contrary to the public interest and may be omitted and that this amendment may be made effective immediately.

Amendment changed the date "May 31, 1957" to "August 31, 1957" in section 40.173(e) and (f)(2).

Amendment 40–5

Admission to Flight Deck

Adopted: July 11, 1957
Effective: Aug. 15, 1957
Published: July 16, 1957
(22 F.R. 5571)

Section 40.356 of Part 40 of the Civil Air Regulations specifies the persons who may be admitted to the flight deck of an air carrier airplane. Although it was the intention of the Board to limit admission to such flight deck to the persons specified in this section, it has come to the attention of the Board that there is ambiguity as to whether other persons not expressly authorized to be admitted to the flight deck are prohibited from admission thereto. This amendment eliminates this ambiguity.

A growing need for in-flight observation of equipment and procedures has been verified by the Board in the granting of many recent waivers, and the experience gained in operations subject to such waivers has been excellent. Accordingly, section 40.356 is being amended to include in the list of persons authorized to be admitted to the flight deck, without having a seat available in the passenger compartment, certain operations personnel of the air carrier and technical representatives of the manufacturer of the airplane or components thereof. It is contemplated that authorization for such operations personnel and technical representatives will be granted by the air carrier only when the presence of such persons in the pilot compartment is required in the furtherance of their functions of observing and monitoring the in-flight operations of the air carrier or its equipment. It should be clearly understood that it is not intended by this amendment to compromise in any way the authority of the pilot in command to refuse such persons admission to the flight deck.

This amendment was published in the Federal Register (21 F.R. 6573) as a notice of proposed rule making and circulated to the industry as Civil Air Regulations Draft Release No. 56–24, dated August 22, 1956. Certain comments received in response to Draft Release No. 56–24 recommended that the provisions governing admission to the flight deck be amended to give the pilot in command complete discretion with respect to admitting persons to the flight deck. The Board has given careful consideration to this recommendation, but it is of the opinion that it would not be in the interest of safety to grant to the pilot in command any greater discretion than that provided for in this amendment.

In order to achieve uniformity in the Civil Air Regulations, similar amendments are being made to the corresponding sections in Parts 41 and 42 of the Civil Air Regulations which pertain to admission to the flight deck.

Interested persons have been afforded an opportunity to participate in the making of this amendment and due consideration has been given to all relevant matter presented.

Amendment revised section 40.356.

Amendment 40–6

Flight Recorders

Adopted: Aug. 5, 1957
Effective: Sept. 9, 1957
Published: Aug. 9, 1957
(22 F.R. 6378)

On two occasions within the past several years, the Board has amended the Civil Air Regulations to require the use of a recording device on aircraft used in air transportation. In the first instance the Board found it necessary to rescind the rule because of the difficulty operators were having in providing proper maintenance due to procurement and transportation difficulties brought on by World War II. In the second instance the Board found that, contrary to earlier indications, there was no device readily available of proven reliability and fully adequate for the purpose intended. The Board gave notice, however, that a requirement for a recording device would be reconsidered at such time as a suitable instrument became available.

On November 10, 1955, the Board, having received information that a suitable instrument was available, circulated Civil Air Regulations Draft Release No. 55–26 which proposed in the alternative that flight recorders be required equipment on all large 4-engine and 2-engine airplanes originally type certificated under Part 4a or Part 4b of the Civil Air Regulations or that they be installed only on large transport category airplanes designed to operate above 25,000 feet altitude.

Although much comment, both written and oral, was received by the Board on this draft release, there was no significant opinion expressed by those in favor of requiring a flight recorder on the desirability of one or the other of the alternative proposals. It was clear that interested persons either favored the general use of flight recorders or they didn't favor use of them at all.

Those favoring use of the recorders were of the opinion that recorders might have been of some value in approximately 25 percent of the accidents studied by the Board's Analysis Division; that they would do much to eliminate the conjecture, supposition, and personal opinion from analysis of both accidents and daily routine operations; that there is a recorder in being which is rugged, dependable, and will operate months on end without need for calibration; that the record can be quickly removed and read at any time without processing; and that, aside from its value in accident investigation, its use may result in improved operational procedures and airworthiness standards.

On the other hand, those opposing use of flight recorders were of the opinion that the advantage to be derived from their use in accident investigation was highly exaggerated and that at best they would be of some assistance in only a very small percentage of accidents. This, they argued, was not sufficient justification to require use of these recorders on all large transport category airplanes when it is considered that, for the scheduled airlines alone, in a five-year period it is estimated that it would cost about 9 million dollars to purchase, maintain, and stock necessary spare parts for the recorder. Furthermore, it was argued that the reliability of the one recorder in being is subject to considerable question, the inference being that since there had been two previous abortive attempts to require use of these recorders because of their unreliability it would not be justified to require their use now until more positive evidence appeared as to their reliability.

The Board, having considered the comment received in response to the proposals contained in Civil Air Regulations Draft Release No. 55–26 and other information submitted during the oral argument held April 17, 1957, concludes that a flight recorder of sufficient reliability to fulfill the objectives for such a device is in being and should be used on all large airplanes certificated for use in air transportation above 25,000 feet altitude.

The Board agrees that the costs involved in comparison to the value of the recorder for the purposes intended do not justify a requirement for the installation of flight recorders on the entire transport fleet. The cost of the equipment and its installation and maintenance appears to be prohibitive when related to the total cost of some of the smaller airplanes of the current air carrier fleet. This consideration is magnified by the relatively low income generating capacity of many current airplane types. Furthermore, flight recorders in these airplane types would be furnishing information concerning design and operations for which there already exists a very substantial body of operational experience. Accordingly, no airplane certificated for flight below 25,000 feet altitude will be required to install and use flight recorders.

The Board is of the opinion, however, that in the case of large airplanes certificated for use in air transportation above 25,000 feet altitude, a flight recorder should be required for accident investigation purposes and for use in analyzing various incidents, such as extreme vertical accelerations due to turbulence, which occur from time to time in flight but which do not result in accidents, in order to take appropriate precautionary or remedial action. Such airplanes will be operating under conditions with respect to which little operational experience directly applicable to civil transportation exists and the recorded intelligence involving these higher altitudes, pressure differentials, and speeds will help materially in making a more accurate determination of the cause of accidents of such aircraft. Furthermore, in assessing the economic impact this requirement might have on the air carriers affected, it is clear that it will be substantially less than for currently operated airplanes because of the higher initial cost of the airplanes for which flight recorders will be required and their greater seating capacity.

Interested persons have been afforded an opportunity to participate in the making of this amendment (20 F.R. 8500), and due consideration has been given to all relevant matter presented.

Amendment added new section 40.208.

Amendment 40–7

Interior Emergency Exit Marking Lights

Adopted: Aug. 9, 1957
Effective: Aug. 9, 1957
Published: Aug. 15, 1957
(22 F.R. 6568)

Currently effective section 40.173(f)(2) of Part 40 of the Civil Air Regulations requires that, on all airplanes used for scheduled interstate air transportation at night, a source or sources of light with an emergency energy supply independent of the main lighting system be installed to illuminate all emergency exit markings. This particular requirement was was adopted by the Board in November of 1955 in an amendment concerning emergency and evacuation equipment and procedures. The Board adopted this rule to increase safety in the evacuation of airplanes. It was the Board's intention that through this amendment all passenger-carrying airplanes would be equipped with lights installed so as to illuminate all emergency exits in such a manner as to attract the attention of the occupants at night and thus expedite evacuation. The Board intended that this requirement should apply specifically to passenger-carrying airplanes as is borne out by the history of the amendment and the preamble thereto. However, this provision is so worded as to be applicable to all airplanes whether engaged in passenger or cargo operations under Part 40.

The Board has been requested to clarify its intent with respect to this provision insofar as its applicability to airplanes used in night cargo operations is concerned. A careful review of the development of the emergency and evacuation equipment and procedure amendment reveals very clearly that the concern of all interested parties was directed almost exclusively to passenger-carrying airplanes. This is particularly apparent with respect to the emergency exit marking lighting requirements, the object of which is to insure, in the case of a crash landing or of a ditching at night, that the passengers and crew may be able to identify and operate emergency exits thus expediting evacuation of the airplane. In airplanes used solely for the carrying of cargo, the problem of locating and operating emergency exits during a ditching or crash landing at night is not comparable to that encountered in passenger operations. Properly qualified crews are so familiar with every feature of the airplane, and the emergency exits which they would normally use are so close at hand, that special lighting for these exits is unnecessary. Furthermore, airline crews typically carry flashlights. All existing large airplane types used in this type of operation have an exit or loading door located immediately aft of the flight deck and the cockpit windows in most cases provide an additional means of crew evacuation. Furthermore, a survey of accidents involving night cargo operations indicates that there have been no difficulties in crew evacuation that would indicate a need for emergency illumination facilities for the emergency exits.

In view of the foregoing, section 40.173(f)(2) is being amended to reflect the intent of the Board that the emergency lighting requirements apply only to passenger-carrying airplanes.

Since this amendment is minor in nature and imposes no additional burden on any person, notice and public procedure hereon are unnecessary, and it may be made effective without prior notice.

Amendment added the words "in all passenger-carrying airplanes" after the words "August 31, 1957," in section 40.173(f)(2).

Amendment 40–8

Elimination of the Requirement in Recurring Proficiency Check for Actual or Simulated Maximum Certificated Weight for Take-off with One Engine Inoperative

Adopted: Oct. 17, 1957
Effective: Nov. 21, 1957
Published: Oct. 23, 1957 (22 F.R. 8304)

By virtue of presently effective Civil Air Regulations, a pilot who is to serve as a pilot in command must pass, periodically, a proficiency check in airplanes that he flies. This check flight includes a demonstration of the ability to complete a take-off at maximum take-off weight with the critical engine inoperative, a requirement which the Board has found to be no longer practical for the periodic checks.

In the large modern transport airplane a great difference exists between maximum certificated take-off weight and maximum certificated landing weight. If such an airplane is flown at maximum weight for a check flight, it must be loaded with large quantities of fuel or ballast. Then, if the flight is to be terminated within a reasonable time, fuel, ballast, or both must be dumped so as to reduce the weight to that permitted for landing.

To avoid the obvious disadvantages of the above, the Board by regulation has permitted maximum take-off weight to be simulated. This has been done by reducing take-off power, or by limiting take-off distance to the minimum required for the weight at which the airplane is being operated. Neither procedure has been fully satisfactory. Time-consuming calculations and special runway markings are required, and even with these devices the maximum take-off weight condition to be simulated cannot be fully represented. Furthermore, use of reduced power settings for take-offs has been opposed by engine manufacturers who contend that the practice is injurious to the powerplants, and by supervisory training personnel who state that the practice encourages nonstandard and improper use of the powerplant controls and induces an additional hazard to flight. It appears, therefore, that the requirement for an actual or simulated take-off at maximum certificated weight with one engine inoperative should not be continued as a regulatory requirement in the periodic proficiency check. It should be understood, however, that this amendment will not affect the present requirements in initial pilot flight training for simulation of engine failure at actual or simulated maximum weights in take-off, landing, and approach configurations.

Interested persons have been afforded an opportunity to participate in the making of this amendment (22 F.R. 522), and due consideration has been given to all relevant matter presented.

Amendment added the phrase "nor at actual or simulated maximum authorized weight" at the end of section 40.302(b)(2)(i).

Amendment 40-9

High-Altitude Operations

Adopted: Dec. 20, 1957
Effective: Jan. 25, 1958
Published: Dec. 27, 1957
(22 F.R. 10728)

Part 40 of the Civil Air Regulations presently permits scheduled air carriers to operate off-airways under both IFR and VFR within the continental limits of the United States at altitudes above 12,500 feet east of longitude 100° W. and 14,500 feet west of longitude 100° W. Approval by the Administrator of such high-altitude routes is not required.

In recent years, however, there has been a marked increase in air carrier and other flight operations conducted above 12,500 feet, and it has become apparent that positive traffic separation at these altitudes is increasingly important. Accordingly, a notice of proposed rule making was published in the Federal Register (22 F.R. 3418) and circulated to the industry as Civil Air Regulations Draft Release No. 57-8 to afford interested parties opportunity to comment on a proposed rule which would prohibit high-altitude operations by air carriers operating under Part 40 of the Civil Air Regulations in uncontrolled airspace within the continental limits of the United States in weather conditions less than those prescribed for VFR flight.

The comments received by the Board in response to the notice of proposed rule making were generally favorable. However, there was comment to the effect that the proposed rule is unnecessary inasmuch as the airlines have voluntarily imposed certain restrictions on their high-altitude operations. In view of the importance of traffic separation at these high altitudes, the Board deems it necessary in the interest of safety to provide for such separation through regulation.

This regulation is limited in its application to air carrier operations conducted under Part 40 of the Civil Air Regulations. However, this does not mean that air carriers subject to this part are necessarily to be governed by a different standard for these operations than are air carriers operating under Parts 41 and 42 of the Civil Air Regulations. Attention is directed to the fact that air carriers operating within the continental limits of the United States under Parts 41 and 42 who desire to conduct flights over off-airways routes must secure the approval of the Administrator of Civil Aeronautics for such routes. The Board has been advised by the Administrator that he intends to exercise this authority consistent with the restrictions imposed on Part 40 operators by this regulation.

Interested persons have been afforded an opportunity to participate in the making of this amendment (22 F.R. 3418), and due consideration has been given to all relevant matter presented.

Amendment revised the provisos in sections 40.30, 40.31, and 40.32.

Amendment 40-10

Landing Flare Requirements

Adopted: Jan. 9, 1958
Effective: Feb. 13, 1958
Published: Jan. 16, 1958
(23 F.R. 292)

Part 40 of the Civil Air Regulations currently requires that civil aircraft carrying passengers for hire at night shall be equipped with specified types and numbers of landing flares.

The value of landing flares as required equipment was discussed at the Board's 1955 Annual Airworthiness Review. Recommendations were made at that time to amend the regulations to require the carriage of flares only in large aircraft in extended overwater operations. As a result of this discussion and further study by the Board, Civil Air Regulations Draft Release No. 56-31, "Landing Flare Requirements of Parts 40, 41, 42, and 43 of the Civil Air Regulations," was circulated to the public (21 F.R. 10255). This notice, which proposed the deletion of the flare requirement, was issued for the purpose of obtaining the views of all interested persons to assist the Board in making a complete re-evaluation of existing flare requirements.

Comment received from interested persons concerning the proposals to delete all flare requirements (as contained in Draft Release 56–31) was varied. The consensus was that landing flare requirements for all non-commercial operations and for operations which employ small aircraft for the carriage of passengers for compensation or hire should be deleted. In this connection, it should be noted that Civil Air Regulations Draft Release No. 55–24, "Air Taxi Certification and Operation Rules" (small aircraft of 12,500 pounds or less maximum certificated take-off weight), did not propose flares as required equipment and no adverse comment was received on this proposal. With respect to air carrier operations, the Air Line Pilots Association, on behalf of the pilots, recommended the retention and improvement of flares. This position was also advanced by a manufacturer of flare equipment. The Aircraft Industries Association, on behalf of the aircraft manufacturers, and the Air Transport Association, on behalf of the scheduled air carriers, recommended deletion of the flare requirements. The Civil Aeronautics Administration did not object to the deletion of flare requirements for overland operations but did recommend their retention for overwater operations.

In support of the recommendations to retain flares, the following opinions were expressed. One was that flares insure the highest possible level of safety during emergency landings at night (including emergency landings made necessary by severe vibration or buffeting, failure of aircraft components, uncontrollable fires, or the evaluation of sea conditions preparatory to ditching). It was also the view of some persons that flares might become necessary to assist in night emergency landings resulting from possible fuel exhaustion, the cause of which could be mechanical difficulties, traffic delays, communications and navigational equipment and facilities failures, and unexpected adverse weather conditions. It was also recommended that flares should be improved to provide better ground illumination and longer burning capacity to make them more effective for use in the emergency situations described above. Other comment in support of retention of flares stressed the view that safety of air carrier operations would be jeopardized if flares are not carried in overwater operations.

The Board has carefully studied this entire matter and finds that available records concerning the use of landing flares in scheduled air carrier operations show only five instances from January 1938 to the present time in which flares have been used for emergency purposes. Four of these instances involved twin-engine aircraft and one involved a four-engine aircraft. From 1947 to the present time, no multiengine air carrier aircraft has been involved in the dropping of landing flares for emergency purposes. There is no available evidence or data showing the effective use of landing flares in the operation of small passenger-carrying airplanes. Furthermore, the records reveal that in 55 reported instances landing flares were discharged inadvertently while the airplane was on the ground or in the air with resultant damage in many cases to the aircraft, other aircraft, ramps, and hangars. There have been instances where flares contributed to the intensity of a fire following a crash. It is also significant that the military services discontinued the carriage of flares in their passenger transport operations several years ago for reasons involving cost, maintenance, the hazard of carrying flares and their questionable value under emergency conditions. Furthermore, the flare requirements, which have been in effect for many years, were promulgated at a time when most airplanes had a single engine with only a short operating range, when most airports or landing areas were unlighted, and the general reliability of aircraft was considerably less than that of aircraft which are presently utilized. In recent years, improved airplane performance, reliability, and operating range, more efficient airplane landing lights, a considerable increase in the number of lighted landing areas, and the development of more accurate and dependable communications and navigational aids have clearly minimized the need for landing flare installations in aircraft operations. The Board finds, however, that these developments which have greatly improved operations in the United States do not apply to the same degree in extended overwater operations.

The Board has carefully considered all of the comment received and other relevant information and has concluded that flares for passenger-carrying aircraft should not be required as mandatory safety equipment for operations conducted within the United States. It does find, however, that there is a continued need for their use in extended overwater operations.

Interested persons have been afforded an opportunity to participate in the making of this amendment (21 F.R. 10255), and due consideration has been given to all relevant matter presented.

Amendment added the words "for extended overwater operations" after the word "flares" in section 40.200(d).

Amendment 40–11

Amendments Resulting from the 1957 Annual Airworthiness Review.	Adopted: April 15, 1958 Effective: May 17, 1958 Published: April 19, 1958 (23 F.R. 2594)

The Board has been advised that the descent flight provision of the two-engine-inoperative en route requirement of Part 40 is in need of clarification. The language of this provision does not make clear the generally understood intent that the descent may be based on a net flight path. Section 40.75(b)(2) is therefore being amended to clarify the intent.

During this year's annual airworthiness meeting, the subjects of interior markings and emergency lighting for exits were discussed. As a result, changes are being made to the certification requirements to eliminate the need for the marking and lighting of crew compartment exits. Since it is considered that the operating parts should be consistent with the certification requirements, a similar amendment is being made to Part 40.

Interested persons have been afforded an opportunity to participate in the making of this amendment (22 F.R. 9116), and due consideration has been given to all relevant matter presented.

Amendment revised section 40.75(b)(2), and amended section 40.173(f)(1) and (2) by inserting in the first sentence of each subparagraph between the words "all" and "emergency" the word "passenger".

Amendment 40–12

Supplemental Oxygen Requirements for Sustenance and First-Aid	Adopted: Aug. 27, 1958 Effective: Sept. 1, 1958 Published: Aug. 30, 1958 (23 F.R. 6744)

Part 40 contains among other things oxygen requirements for aircraft operating under this part. Civil Air Regulations Draft Release No. 58–7, which was published on March 27, 1958, proposed changes to the requirements for supplemental oxygen and associated equipment both in the airworthiness requirements and operating rules. The changes simultaneously made in Part 4b requirements will be applicable only to applications for certification filed after their effective date, but the changes in the operating rules made herein will apply to all operations thereby governed on the effective date hereof, or as otherwise provided in the text of the regulation.

The particular characteristics of turbine-powered airplanes which dictate a need for somewhat different requirements relative to the use of supplemental oxygen than those applicable to piston-engine airplanes are the higher operating altitudes at the time of a possible decompression combined with excessive fuel consumption by these turbine-powered airplanes at low altitudes which may require continued cruise at an altitude demanding sustaining oxygen to enable the airplane to reach a suitable landing field.

The base cruising altitude at which oxygen must be provided is being raised from 8,000 to 10,000 feet. It has been generally agreed that this requirement, while reducing the quantity of oxygen required, will provide an acceptable level of safety.

A provision relating to crew oxygen masks is being added. The time required for the crew to institute the use of their oxygen masks when operating at these altitudes is so short that any location of crew masks that could involve any avoidable loss of time in donning them would not be in the interest of safety. To minimize the danger inherent in this situation, one pilot will be required to wear and to use his mask at all times when operations above 25,000 feet are conducted. The other members of the flight crew will be required to have the masks on their person at all times and in such a position as to be immediately placed on their faces for use. Since the object is to avoid any possible hazard to the passengers following decompression, it is considered necessary that the pilot wearing the mask be drawing oxygen from the system under normal conditions. Since all flight crew members would probably have specified duties following cabin depressurization, it is considered appropriate that masks should be immediately available for each flight crew member on flight deck duty.

On those flights wherein operations are conducted above 25,000 feet, the need for rapid action on the part of all occupants precludes waiting until an emergency occurs to instruct the passengers in the use of the oxygen equipment. A provision, therefore, is being included to require briefing of the passengers prior to such operations. This briefing should insure that the passengers know how to use the equipment provided. To the degree practicable, language problems should be avoided or overcome.

For all airplanes operating above 25,000 feet, oxygen and dispensing equipment must be provided for all passenger cabin occupants as well as the crew. Although a rapid descent of the airplane generally will be possible, it is felt that a 10-minute supply of oxygen would be the minimum amount that could be provided which would insure an adequate quantity for descent from higher altitudes in the event that circumstances prevent realization of the demonstrated descent rate. For purposes of computing a quantity of oxygen for descent, a uniform descent for the 10-minute period would be assumed.

For a particular operation to comply with the rules in this part the amount of sustaining and first-aid oxygen required shall be determined on the basis of cabin pressure altitudes and flight duration consistent with the operating procedures established for each such operation and route. The requirements for airplanes with pressurized cabins shall be determined on the basis of cabin pressure altitude and upon the assumption that a cabin pressurization failure will occur at that altitude or point of flight which is most critical from the standpoint of oxygen need, and that after such failure any descent to a flight altitude that will permit successful termination of the flight will not exceed the operating limitations of the airplane. Following such a failure, the cabin pressure altitude shall be considered to be the same as the flight altitude unless it can be shown that no probable failure of the cabin or pressurization equipment will result in a cabin pressure altitude equal to the flight altitude, under which circumstances the maximum cabin pressure altitude attained may be used as a basis for certification and/or determination of oxygen supply.

Interested persons have been afforded an opportunity to participate in the making of this amendment (23 F.R. 2229), and due consideration has been given to all relevant matter presented. In view of the imminence of operations to be conducted pursuant to this amendment, the Board finds that further notice and public procedure hereon would be contrary to the public interest and that this amendment may be made effective on less than 30 days' notice.

Amendment changed the titles of sections 40.202 and 40.203, added new sections 40.202–T and 40.203–T, and revised section 40.204.

Amendment 40–13

Pilot Route and Airport Qualification Requirements

Adopted: Sept. 16, 1958
Effective: Sept. 24, 1958
Published: Sept. 20, 1958
(23 F.R. 7339)

Section 40.303 of Part 40 of the Civil Air Regulations requires, in part, that each pilot in command in qualifying over a route shall make an entry into each regular, provisional, and refueling airport into which he is scheduled to fly. Section 40.304 governs the maintenance and re-establishment of route qualifications and requires compliance under certain circumstances with the provisions of section 40.303 by the pilot in command.

On January 20, 1955, the Bureau of Safety circulated Civil Air Regulations Draft Release No. 55-3 (20 F.R. 550) which dealt with the over-all problem of pilot airport and route qualification. Attention was drawn to the development of motion picture panoramic views of airports and their environs which showed excellent promise of providing an effective means for attaining pilot airport qualification in lieu of actual entry. An objective in this proposal was to amend the regulations in a manner that would encourage further research and development of the visual training aids programs by various commercial sources and at the same time provide more acceptable airport qualification rules for use in the meantime. Furthermore, it seemed appropriate to permit methods of airport qualification other than physical entry, provided that such alternative methods had the approval of the Administrator.

Following circulation of Draft Release 55-3 for comment, the Board promulgated a series of Special Civil Air Regulations (SR-413, SR-414, SR-418, and SR-418A) to permit the controlled introduction of new techniques in airport and route qualification. These techniques included the use of pictorial means within the training program which would enable pilots to qualify at specified airports by using color motion pictures or slides showing clear daylight views of the complete physical layouts of the airports, surrounding terrain, obstructions, approaches to all runways, restricted areas, and conspicuous reference points that are of value to pilots. Under these special regulations air carriers were also authorized to conduct operations at an airport in close proximity to an airport into which pilots were qualified when the Administrator found that such pilots were adequately qualified at the new airport. In making such findings, the Administrator took into consideration such things as the familiarity of the pilots with the layout, surrounding terrain, location of obstacles, and instrument approach and traffic control procedures at the new airport. In addition, under SR-418 and SR-418A, a pilot was expressly permitted to accomplish initial qualification into an airport without being accompanied by a pilot qualified at that airport if such initial entry were made under VFR weather conditions at the particular airport involved.

One of the principal purposes of these special regulations has been to provide sufficient opportunity for evaluation of pictorial means of airport and route qualification by industry and Government alike in order to guide the Board in its final action in amending the Civil Air Regulations. Experience gained under these special regulations up to the time of the adoption of SR-418A indicated that the various procedures provided therein for airport and route qualification, including pictorial means, had been successful. Therefore, the Board stated in the preamble to SR-418A that prior to the termination of that regulation, a proposal to incorporate its substance into Part 40 would be circulated for comment. Accordingly, the Board circulated Draft Release 58-13 to obtain comments as to the continued effectiveness and extent of use of the privileges of SR-418A and any other recommendations with respect to incorporation of the provisions of that regulation in Part 40 of the Civil Air Regulations.

It was proposed to incorporate the provisions of SR-418A into Part 40 with a slight revision of the requirement concerning route qualification on those routes on which navigation must be accomplished by pilotage and on which the flight is to be conducted at or below the level of adjacent terrain. These changes were made in the interest of clarity.

In view of the wide acceptance of this means of qualification and in the absence of any contrary view, the Board believes it desirable to include the substance of the special regulations in Part 40 of the Civil Air Regulations as proposed.

Interested persons have been afforded an opportunity to participate in the making of this amendment (23 F.R. 5356), and due consideration has been given to all relevant matter presented. Since this amendment imposes no additional burden on any person, it may be made effective on less than 30 days' notice.

Amendment revised section 40.303, and changed the reference "section 40.303(d)" to "section 40.303(e)" in section 40.304(a).

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Amendment 40-14

Required Records

Adopted: Oct. 1, 1958
Effective: Nov. 5, 1958
Published: Oct. 7, 1958
(23 F.R. 7722)

A notice of proposed rule making was published in the Federal Register March 13, 1958 (23 F.R. 1737), and circulated to the industry as Economic Regulations Draft Release No. 92 dated March 7, 1958, which proposed to bring up to date the record requirements of Part 40 of the Civil Air Regulations and make them consistent with corresponding record retention provisions in Part 249 of the Economic Regulations.

Accordingly, concurrently with the amendment of Part 249, the record provisions of Part 40 are being amended. Since the record retention requirements in Part 40 will be consistent with corresponding requirements in Part 249 and sections 40.501 through 40.511 each contain language requiring compliance therewith, there is no longer any necessity for section 40.500 and it is being deleted.

The retention period for manifests required by section 40.505 is being increased from "60 days" to "3 months" to accord with the retention requirement for manifests prescribed in Part 249.

Although it was proposed to change the retention period for maintenance releases required by section 40.511 from "60 days" to "3 months," it has been determined that the present period of retention will be adequate. However, the words "2 months" are being substituted for "60 days" to bring the language into accord with that used in Part 249.

Finally, a new section 40.512 is being added to require records of radio contacts by or with pilots en route to be maintained. Consistent with the retention period prescribed in Part 249 for such records, section 40.512 provides that they shall be retained for a period of 30 days.

The foregoing record requirements are considered necessary to enable the Board and the Administrator to discharge fully their respective accident investigation and safety regulatory responsibilities.

Interested persons have been afforded an opportunity to participate in the making of this regulation (23 F.R. 1737), and due consideration has been given to all relevant matter presented.

Amendment deleted section 40.500, changed "60 days" to "3 months" in section 40.505, changed "60 days" to "2 months" in section 40.511, and added a new section 40.512.

Amendment 40-15

Use of Average, Assumed, and Estimated Weights

Adopted: Dec. 30, 1958
Effective: Dec. 30, 1958
Published: Jan. 3, 1959
(24 F.R. 50)

Air carriers have for many years utilized approved weight and balance control procedures involving average, assumed, and estimated weights in determining compliance with the various weight limitations of this part. Such procedures have been formally endorsed by the Civil Aeronautics Administration and the Board since December 8, 1947, the date of issuance of Safety Regulation Release No. 270. Subsequently, these procedures and the methods by which they may be carried out have been continued in Civil Aeronautics Manual 40. These procedures and the recommended methods of implementation described in Civil Aeronautics Manual 40 are a practical approach to compliance with the regulations pertaining to operating limitations without adversely affecting the safety of air carrier operations. This approach recognizes that it is not possible to require literal compliance with the weight and balance requirements of Part 40 of the Civil Air Regulations through a determination of actual weights in every instance, considering the extent of present-day air carrier operations, without drastically curtailing such operations.

To obviate the actual weighing of the airplane and its contents prior to each flight, certain approved methods and procedures have become an essential part of day-to-day air carrier operations and insure reasonable compliance with the appropriate operating limitations. For a fleet or group of airplanes of the same model and configuration, an average operating fleet weight is utilized when the operating weights and positions of the center of gravity are within the limitations established by the Administrator in Civil Aeronautics Manual 40. For example, an operator of a fleet of more than 9 airplanes of the same model and configuration must weigh periodically at least 6 of these airplanes, plus at least 10 percent of the number over 9. Furthermore, to insure that a safe average weight will be maintained, certain safeguards are incorporated in the approved weight procedures. If the basic operating weight of any airplane weighed or the calculated basic operating weight of any one of the remaining airplanes 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, that airplane will be eliminated from the group and operated on its actual or calculated weight. Carriers also may elect to use either the actual passenger weight or the average passenger weight to compute passenger loads over any route except in unusual cases as, for example, a passenger load consisting of an athletic team. The average weights which may be used are set forth in Civil Aeronautics Manual 40. In determining compliance with certain operating limitations such as landing distance limitations, the carrier may assume that the take-off weight of the airplane is reduced by the weight of the fuel and oil expected to be consumed in flight to the field of intended destination and the weight of such fluids may be established on the basis of actual weight, a standard volume comparison, or a volume comparison utilizing appropriate temperature correction factors to actually determine the weight by computation of the quantity of fluid on board.

There are many other instances in which average, assumed, or estimated weights are used in the conduct of air carrier operations.

It has recently been brought to the Board's attention that the absence of explicit authority in Part 40 for the use of average, assumed, or estimated weights in accordance with procedures approved by the Administrator has given rise to concern that an air carrier might be considered in technical violation of the Civil Air Regulations if the weight of a particular airplane actually exceeded any of the various weight limitations of this part, even though the calculations had been made in accordance with approved procedures.

In order to remove any doubt as to the legality of using such approved procedures and to bring the regulations into accord with a well-established and safe administrative practice, Part 40 is being amended to provide specific authority for the use of an approved weight and balance control system in which average, assumed, or estimated weights may be utilized if such system gives assurance of results substantially equalling direct weighing.

Since this amendment merely confirms an established administrative practice essential to the maintenance of safe, optimum air carrier operations and imposes no additional burden on any person, the Board finds that notice and public procedure hereon are unnecessary and that good cause exists for making this amendment effective without prior notice

Amendment added a new sentence at the end of section 40.60.

Amendment 40–16

Absence of Flight Crew Members from Their Duty Stations

Adopted: April 17, 1959
Effective: April 22, 1959
Published: April 23, 1959 (24 F.R. 3153)

Section 40.354 of the Civil Air Regulations requires all flight crew members to remain at their respective stations with seat belts fastened during take-off or landing, and while en route except when the absence of one such flight crew member is necessary in connection with his "regular duties." As used in this regulation the term "regular duties" was intended to mean those duties involving the operation of the airplane. It was not intended to encompass activities related to furthering public relations or other activities not related to operational safety of the airplane. The absence of a flight crew member from his duty station for the performance of such activities reduces unnecessarily the degree of vigilance,

attention to duty, and availability for emergency action required for the operation of modern aircraft under conditions of high density traffic.

Accordingly, section 40.354 is being amended to clarify its intention and application. Similar amendments are being made simultaneously to Parts 41, 42, 46, and 60 of the Civil Air Regulations to provide identical rules for the types of operations covered by those parts.

Inasmuch as this amendment is a clarification of the present requirements and imposes no additional burden on any person, compliance with the notice, procedures and effective date provisions of section 4 of the Administrative Procedure Act is unnecessary and not required.

Amendment revised section 40.354.

Amendment 40–17

Extension of Compliance Date for Oxygen System Requirements for Turbine-Powered Airplanes	Adopted: July 29, 1959 Effective: July 29, 1959 Published: Aug. 4, 1959 (24 F.R. 6240)

Currently effective sections 40.202–T(a), 40.203–T(a), and 40.204(b) provide that on and after July 31, 1959, turbine-powered airplanes shall comply with requirements therein with respect to supplemental oxygen for sustenance, supplemental oxygen for emergency descent and first aid, and oxygen equipment standards.

These regulations, which were adopted on August 27, 1958, were not made mandatory until July 31, 1959, in recognition of the fact that currently operating turbine-powered airplanes were not type certificated in accordance with these provisions and operators would need reasonable time to arrange for appropriate design changes and procurement and installation of the required equipment.

The Administrator has been advised that, despite diligent efforts by air carrier operators and the manufacturer involved, compliance by July 31, 1959, is not possible, due primarily to the time required for system evaluation and late delivery of necessary parts. It now appears that an additional four months will be required to show full compliance with the requirements.

The selection of the July 31, 1959, date for compliance was predicated on the belief that this afforded sufficient time to make the necessary changes. It is recognized, however, that difficulties have been encountered by the air carriers in accomplishing an orderly procurement and installation program without serious disruption of scheduled service and that a period of relief may be granted without affecting safety adversely in air carrier operations by extending the compliance date to November 30, 1959. As before, the currently effective oxygen system requirements will apply, with the additional requirement that, when operating at flight altitudes above 25,000 feet, all flight crew members on flight deck duty shall be provided with oxygen masks, connected to appropriate supply terminals, which shall be immediately available for use.

Since this amendment grants relief by extending the date for compliance with a requirement of the Civil Air Regulations, and delay in extending such relief would impose an undue hardship, the Administrator for good cause finds that notice and public procedure hereon would be contrary to the public interest and may be omitted and that this amendment may be made effective immediately.

Amendment changed "July 31, 1959" to "November 30, 1959" wherever it appeared in sections 40.202–T(a) and 40.204(b), and revised section 40.203–T(a).

Amendment 40-18

Deletion of Certain Definitions

Adopted: Aug. 7, 1959
Effective: Aug. 13, 1959
Published: Aug. 13, 1959 (24 F.R. 6580)
Correction: Sept. 9, 1959 (24 F.R. 7253)

Part 40 of the Civil Air Regulations contains definitions of four terms which are also defined in Part 60, and which pertain primarily to the air traffic rules. The Part 40 definitions of these terms are written differently from those in Part 60, even though the terms are intended to have the same meaning in both parts.

Inasmuch as section 40.2 states that the provisions of Part 60 shall be applicable to all air carrier operations conducted under the provisions of Part 40, unless otherwise specified, the repetition of the definitions in Part 40 is unnecessarily duplicative. To avoid this, and the obvious disadvantage of revising Part 40 each time that the definitions in Part 60 may be modified, those terms which have the same meaning in both parts but which pertain primarily to Part 60 and are defined therein should not be defined in Part 40 also. This amendment therefore eliminates the four definitions in Part 40.

Since this amendment is technical in nature, makes no substantive change, and imposes no additional burden on any person, notice and public procedure hereon are unnecessary, and it may be made effective without prior notice.

Amendment deleted the definitions of "air traffic clearance," "air traffic control," "control area," and "control zone" from section 40.5.

Amendment 40-19

Frequency of Pilot Proficiency Checks

Adopted: Sept. 24, 1959
Effective: Oct. 29, 1959
Published: Sept. 30, 1959 (24 F.R. 7865)

Part 40 of the Civil Air Regulations presently requires each pilot in command to successfully pass pilot proficiency checks at least twice in each 12-month period. Section 40.302(b) requires such checks to be given at intervals of not less than 4 months nor more than 8 months. Section 40.305 specifies similar requirements for pilots other than pilots in command.

Parts 40, 41, 42, and 46 specify the time interval between pilot proficiency checks differently which has resulted in varying interpretations as to requirements and administrative practices. Since no difference is intended between air carrier operations in this respect, all of the air carrier parts are being amended to make the frequency requirement of pilot proficiency checks the same.

Since this regulatory action imposes no additional burden upon any person, notice and public procedure hereon are unnecessary.

Amendment revised section 40.302(b) (1) and (3) and section 40.305.

Amendment 40–20

Retention of Flight Recorder Tapes and Clarification of Period the Flight Recorder Shall Be in Operation	Adopted: Sept. 30, 1959 Effective: Nov. 6, 1959 Published: Oct. 7, 1959 (24 F.R. 8089)

Section 40.208 of the Civil Air Regulations requires the installation of flight recorders on all airplanes of more than 12,500 pounds maximum certificated takeoff weight which are certificated for operations above 25,000 feet altitude. The regulations further require that the flight recorders shall be operating continuously during flight time.

In promulgating this regulation, the period of time for retention of the recorder tapes was not included in the rule as it was assumed that air carriers would retain these records for a sufficient length of time for the investigation of accidents and incidents which may have occurred during the time of flight. The tapes also can furnish information to the operator concerning performance and operation of these airplane types for which there does not exist a substantial amount of operational experience.

In view of the importance of the information obtained from flight recorders, and since there may be some question as to the length of time that such tape recordings should be maintained by the air carriers, the Federal Aviation Agency believes that a clarification of the rule is needed.

As stated above, section 40.208 requires that the flight recorders "shall be operating continuously during flight time." It was the intent of this regulation to require the operation of the recorder only during flight and not during taxi operation to and from the runway. Therefore, in order to clarify this point, the word "time" is being deleted from this phrase since flight time has been defined as block-to-block time. In deleting the word "time," it is intended that the flight recorder must be in full operating condition at the instant the aircraft starts its takeoff roll and be in continuous operation during the flight and until the aircraft has completed its landing at an airport.

Accordingly, section 40.208 is being amended to clarify these matters. Similar amendments are being made concurrently to Parts 41 and 42 of the Civil Air Regulations to provide identical rules for the types of air carrier operations covered by those parts.

Inasmuch as this amendment is a clarification of the present requirements and imposes no, or very little additional burden on any person, compliance with the notice and public procedure provisions of section 4 of the Administrative Procedure Act is unnecessary.

Amendment revised section 40.208.

Amendment 40–21

Approval of Air Carrier Training Programs; Qualification of Pilots Other Than Pilots in Command; Proficiency Checks for Pilots Other Than Pilots in Command	Adopted: Dec. 1, 1959 Effective: Jan. 1, 1961, except as provided in section 40.290 Published: Dec. 5, 1959 (24 F.R. 9765)

The Federal Aviation Agency published as a notice of rule making (24 F.R. 5246) and circulated as Civil Air Regulations Draft Release No. 59–3, dated June 25, 1959, a proposal to amend Part 40 of the Civil Air Regulations to require: (1) FAA approval of air carrier training programs; (2) appropriate aircraft ratings for pilots serving as other than pilots in command; and (3) more specific initial training and recurrent proficiency checks for pilots serving as other than pilots in command.

Interested persons have been afforded an opportunity to participate in the making of this amendment and due consideration has been given to all relevant matter presented.

Because of the importance of this amendment, each portion thereof has been evaluated in the light of such comments.

1. *FAA approval of air carrier training programs.* The air carriers commenting on this portion of the proposal expressed strong opposition to it. Briefly, the air carriers contend that the present regulatory scheme for the establishment of methods and procedures for crew member training programs has been adequate and that no justification has been shown for requiring FAA approval of such programs. The FAA is unable to agree with these contentions.

It must be emphasized that the training program is one of the most important factors in the safety of air carrier operations. The quality and scope of such programs are the key to insuring that all crew members are competent to perform their duties with the high degree of skill expected and required in air carrier operations. Under the provisions of the present regulation, the air carriers are given discretion in establishing "adequate" or "appropriate" training, or "training as necessary." As a result some air carriers have prepared and are administering excellent training programs. However, others have not achieved the minimum safety objective sought by the training requirements of sections 40.280 through 40.289. While the methods and procedures employed by the various air carriers in their training programs may differ to fit the particular operation of each air carrier, each training program must provide a uniform and minimum standard of flight and ground training necessary for safety in air transportation. Experience in the administration of the present regulations shows that this standard can only be achieved by FAA approval of each training program.

Accordingly, because of the vital importance which the air carrier training program has to safety in air carrier operations, each air carrier subject to this part will be required to obtain approval of its training program by a representative of the Administrator.

This final regulation will not alter the responsibility which each air carrier has at present for the preparation and administration of its training program. However, each air carrier will be required to submit its training program, and subsequent changes thereto, to the FAA for prior approval.

2. *Initial training qualifications of pilots other than pilots in command.* The complexity of modern aircraft and the operational demands of today's navigation, communication, and air traffic control systems require a high level of skill and competence for air carrier copilots. Many of the functions which are required of the copilot, particularly with respect to emergency procedures, must be performed properly or the safety of the flight may be seriously affected. In addition, in the event that the pilot in command becomes incapacitated during flight, the copilot must possess adequate knowledge and skill to fly the aircraft safely to a destination.

In order to properly determine the ability of the copilot to operate a particular type of aircraft, it was proposed in Draft Release 59-3 to provide for the issuance of appropriate aircraft type ratings for all pilots serving as other than pilots in command. However, upon reevaluation of the original proposal in the light of comments received, it appears that the objective of the original proposal can be achieved without requiring pilots serving other than as pilots in command to obtain an appropriate aircraft type rating, provided adequate flight training for those pilots who serve as second in command is provided in the initial and recurrent training requirements of this part and is part of the training program approved by the Administrator.

Accordingly, the original proposal has been modified in this regulation by omitting the aircraft type rating requirement. In lieu of a type rating, this regulation prescribes in section 40.282(c) certain minimum maneuvers and procedures in which it is considered necessary that pilots serving as second in command be proficient, and requires that they receive instruction and practice in such maneuvers and procedures during initial flight training.

The term "second in command" is used in this regulation in order to identify more precisely those pilots who perform the traditional functions of a copilot, as distinguished from the pilot in command and other pilots. In this respect, this regulation amends current section 40.261(c) to make it clear that where the air carrier is authorized to operate under instrument conditions or operates aircraft of more than 12,500 pounds maximum

certificated weight, the minimum pilot crew shall consist of a pilot in command and a pilot designated as second in command. An appropriate definition of "second in command" is added by this regulation. In keeping with these changes, an appropriate amendment is also being made to section 40.301.

It is considered that pilots qualifying to serve on airplanes other than as pilot in command or as second in command should, in the interest of safety, be required to receive the flight training specified in section 40.282(a) and demonstrate their ability to take off and land each type of airplane in which they are to serve, in addition to accomplishing the other training requirements provided in sections 40.280 and 40.281. Accordingly, such a requirement is prescribed in this regulation.

3. *Proficiency checks for pilots other than pilots in command.* In order to make certain that all pilots serving as second in command are initially proficient and continue to maintain their proficiency to pilot and navigate, and to perform their duties on, aircraft to which they are assigned for duty, it was proposed in Draft Release 59–3 to require proficiency checks to be given such pilots prior to their initial assignment to duty and twice each 12 months thereafter by a check pilot or a representative of the Administrator.

As indicated in the draft release, the present method of having the second in command checked by the pilot in command during daily operations is not an adequate method by which the continued proficiency of the second in command can be determined. Although the air carriers were opposed to this requirement, the Agency remains firm in its belief that in order to make certain that all pilots serving as second in command are initially proficient and continue to maintain such proficiency, they must be give a proficiency check by a designated check pilot or a representative of the Administrator. However, upon reconsideration of the original proposal in the light of comments received, the Administrator has concluded that an adequate level of safety will be maintained if such proficiency checks are given only once each 12 months to pilots serving as second in command. Accordingly, such requirements are reflected in this amendment.

In Draft Release 59–3, it was proposed to include in the proficiency check at least the takeoffs and landings and other flight maneuvers generally covered in section 40.282(a). However, the original proposal is being modified by this amendment to provide that the proficiency check for a pilot serving as second in command shall include an oral or written equipment examination, and at least the procedures and flight maneuvers specified in the new section 40.282(c).

Comment received indicated that interested persons opposing Draft Release 59–3 believed the proposal would require copilots to acquire and demonstrate the same level of proficiency as is presently required of pilots in command. The Administrator wishes to make it clear that identical proficiency standards will not be required for such pilots. Under the provisions of Part 40, a pilot assigned to perform copilot duties as second in command is required to hold a commercial pilot certificate and instrument rating, whereas a pilot in command is required to hold the higher rating of an airline transport pilot certificate with appropriate aircraft type ratings. In view of the difference in the certification requirements pilots serving as second in command will not be held to the high degree of skill required of a pilot in command. However, they will be required to demonstrate that they possess the knowledge and skill to perform their duties as a copilot safely and efficiently, and to navigate and pilot the airplane to which they are assigned safely to a destination in the event the pilot in command becomes incapacitated during flight.

This final regulation is so drafted as to permit the air carriers to use the flight crew method of training and checking pilots. Air carriers utilizing this method have found that it has economic advantages over the method of training and checking crew members individually and is an effective method of standardizing training. Although initial flight training in some proficiency check maneuvers will make it necessary in the interest of safety for the check pilot to occupy one of the pilot positions, it appears that many maneuvers can be conducted safely using the flight crew concept of training and checking pilots.

This regulation is being made effective January 1, 1961. This effective date will allow air carriers subject to Part 40 sufficient time in which to obtain FAA approval of their training programs and to accomplish the initial demonstration check of pilots other than pilot in command required by this amendment. However, each air carrier will be required to submit its training program to the FAA for approval not later than May 1, 1960.

Although compliance with the requirements prescribed in this regulation may result in some additional costs to the air carriers, it appears that such costs are outweighed by the considerations of safety involved.

Amendment added definition "second in command" to section 40.5; revised paragraph (c) of section 40.201; added a new sentence at the end of paragraph (a) and added a new paragraph (c) to section 40.282; revised the last sentence of paragraph (b) and deleted the last sentence of paragraph (c) of section 40.289; revised paragraph (b) of section 40.300; and revised sections 40.301 and 40.305.

Amendment 40-22

Maximum Age Limitations for Pilots	Adopted: Dec. 1, 1959 Effective: March 15, 1960 Published: Dec. 5, 1959 (24 F.R. 9767)

Notice was given in Draft Releases 59-6 (24 F.R. 5247) that a proposal was under consideration to amend Parts 40, 41 and 42 of the Civil Air Regulations to provide, in part, maximum age limits for utilizations of pilots in air carrier operations by an air carrier.

It was pointed out in the draft release that the number of active air carrier pilots age 60 or over has been increasing significantly in recent years, that pilots in this age group are being employed in the carriage of a substantial number of passengers, both in piston and jet powered aircraft, and that this number will increase substantially within the next few years. Absent some limitation in the regulations, this condition could continue until a number of active pilots have, within the next 5 years, reached ages 65 to 70, and together with the then larger group over age 60 become increasingly responsible for a growing percentage of air carrier operations.

The draft release points out the reasons indicating that a hazard to safety is presented by utilization of pilots of these ages in air carrier operations. These include the fact that there is a progressive deterioration of certain important physiological and psychological functions with age, that significant medical defects attributable to this degenerative process occur at an increasing rate as age increases, and that sudden incapacity due to such medical defects becomes significantly more frequent in any group reaching age 60.

Such incapacity, due primarily to heart attacks and strokes, cannot be predicted accurately as to any specific individual on the basis of presently available scientific tests and criteria. On the contrary, the evidences of the aging process are so varied in different individuals that it is not possible to determine accurately with respect to any individual whether the presence or absence of any specific defect in itself either led to or precluded a sudden incapacitating attack. Any attempt to be selective in predicting which individuals are likely to suffer an incapacitating attack would be futile under the circumstances and would not be medically sound. Such a procedure, in light of the knowledge that a substantial percentage of any group of persons will suffer from such attacks after reaching age 60, would therefore be ineffective in eliminating the hazard to safety involved.

This conclusion is emphasized by the fact that, in the case of one large group under medical supervision over an extended period, some 85% of the persons who had a heart attack for the first time had the attack within six months to a year after a thorough medical examination had found the individual in a condition normal to his age and without any evidence to suggest the imminence of such an attack. In addition, the general good health of an individual, or the appearance of good health, are not determinative as to whether he will suffer a heart attack from the conditions that are normal as a result of age.

Other factors, even less susceptible to precise measurement as to their effect but which must be considered in connection with safety in flight, result simply from aging alone and are, with some variations, applicable to all individuals. These relate to loss of ability to perform highly skilled tasks rapidly, to resist fatigue, to maintain physical stamina, to perform effectively in a complex and stressful environment, to apply experience, judgment, and reasoning rapidly in new, changing and emergency situations, and to learn new techniques, skills and procedures. The progressive loss of these abilities generally starts well prior to age 60; and, even though they may be significant in themselves prior to age 60, they assume greater significance at the older ages when coupled with the medical defects leading to increased risk of sudden incapacitation.

The older pilots as a group fly the largest, highest-performance aircraft, carrying the greatest number of passengers over the longest non-stop distances, operating into and out of the most congested airports near the largest cities, and traveling in flight in and through traffic lanes with the highest density of air traffic. A great many of these flights involve the newest, largest, fastest and most highly powered jet aircraft. The possible hazards inherent in the older pilot's medical condition are entirely too serious to determine the question of safety by an attempt to balance the increased chances of an incapacitating attack against the possibility that the pilot might not be engaged in the carriage of a large number of passengers at the time of such an attack.

In exploring all the ramifications of the problems involved, the nature of air traffic and air carrier operations in the future has been considered. Present indications are that the very large increases that have taken place in recent years are small in relation to the increases yet to occur. Projection of the number of pilots who will be in the 60 to 70 year age group, in an era of extreme density and frequency of jet and piston air carrier operations involving many millions of passenger miles, indicates a probability of sudden incapacitation of some of these pilots in the course of flight. While medical science may at some future time develop accurate, validly selective tests which would safely allow selected pilots to fly in air carrier operations after age 60, safety cannot be compromised in the meantime for lack of such tests. This is particularly so in light of the statutory directives contained in section 601(b) of the Federal Aviation Act of 1958 that, "In prescribing standards, rules, and regulations * * * the Administrator shall give full consideration to the duty resting upon air carriers to perform their services with the highest possible degree of safety in the public interest * * *", and that, "The Administrator shall exercise and perform his powers and duties under this Act in such a manner as will best tend to reduce or eliminate the possibility of, or recurrence of, accidents in air transportation * * *."

To the extent that a progressive loss of certain abilities generally starts well prior to age 60, further consideration is required of those aspects of safety in flight concerned with factors other than incapacitation. Especially with the development and increasing use of larger and higher performance aircraft and more complicated traffic conditions, growing importance attaches to the ability of pilots to learn new techniques, skills, and procedures, and to unlearn and discard previously learned and well-established patterns of behavior.

For this reason, the draft proposal included a provision to establish age 55 as the age prior to which an individual must obtain a type-rating for turbo-jet powered aircraft in order to act as pilot-in-command for such aircraft in air carrier service. Age 55 was selected on the basis that it marks the point at which the detrimental effects of age on physiological and psychological functions have become significant.

All interested persons have been given an opportunity to comment and all comments received have been given careful consideration. Many strong arguments were made, both in favor of and against the draft proposal. Some of the comments in favor of the proposal recommended more stringent action than that now being taken in this amendment, and referred to opinions and conclusions more far-reaching than those expressed above. Some of these were received from active airline pilots, although a majority of those identifying themselves as airline pilots from whom comments were received were adverse to the proposal.

The Air Transport Association, representing the major air carriers, was in favor of the proposal as to age 60. The Air Line Pilots Association, from which most complete and voluminous comments were received, was opposed to all proposals, but offered no practicable substitute to achieve the safety aims of this amendment. The position taken was that qualification of a pilot should be determined on an individual selection basis without any limitation as to chronological age. This is rejected as an inadequate safety standard in light of the present inability of medical science to provide a reliable and valid basis for selection.

Some requests for a public hearing were received. In the rule-making process, a public hearing has basically the same purpose as written comments, namely, to inform the Agency of the facts and opinions of the public concerning the proposed rule. It serves a useful purpose, however, when it provides something more than usually is obtained from written comments. Normally, this would involve situations where facts and views cannot be expressed adequately by written comments, where written comments cannot properly be evaluated without further development in a public hearing, or where written comments which have been received raise new issues which require further public consideration and this can be accomplished most satisfactorily and expeditiously in a hearing.

Comments were received covering all the issues involved in the proposed rule. They have been most carefully evaluated with respect to their bearing on some of the requests that were received for a public hearing. In respect to the provision to establish age 55 as the age prior to which an individual must obtain a type-rating for turbojet powered aircraft, it is possible that a hearing may produce further information or data not already encompassed in the scope of the comments received. The comments and other data available appear to be sufficiently precise and determinative in connection with the provisions applicable to utilization of a pilot after attainment of age 60. In this connection, the requests for a public hearing did not indicate any area that the comments have not covered ade-

quately nor was any showing made that they could not be evaluated properly without a public hearing. They did not point out any issue that was not previously considered. On this point a public hearing is likely to repeat opinions and evidence already submitted in the form of written comments. With respect to this provision of the proposed rule, therefore, it does not appear that a public hearing would serve a useful purpose; and it is not deemed necessary in the public interest.

After considering all of the comments received, I find that a public hearing is necessary and appropriate with respect to the proposal concerning eligibility to obtain a type-rating for turbojet powered aircraft after the attainment of age 55 and a notice for such a hearing on January 7, 1960, is being issued. I find further that establishment of a maximum age of 60 for pilots utilized by air carriers in air carrier operations is necessary for safety in air commerce and is in the public interest.

Amendment designated the present text as paragraph (a) and added a new paragraph (b) to section 40.260.

Amendment 40–23

Extension of Compliance Date for Oxygen System Requirements for Turbine-Powered Airplanes	Adopted: Nov. 30, 1959 Effective: Nov. 30, 1959 Published: Dec. 8, 1959 (24 F.R. 9839)

Currently effective section 40.203–T(a) provides that on and after November 30, 1959, turbine-powered airplanes with pressurized cabins shall comply with the provisions of section 40.203–T. Section 40.203–T(c) requires that when operating at flight altitudes above 25,000 feet, one pilot at the controls of the airplane shall wear an oxygen mask at all times and all other flight crew members on flight deck duty shall be provided with oxygen masks, connected to appropriate supply terminals, which shall be worn in a manner that will permit immediate placing of the masks on their faces for use, properly secured and sealed.

The Administrator has received information to the effect that this requirement is not necessary to achieve the highest degree of safety in air transportation and it is claimed that compliance with this regulation may detract from the required crew coordination and adversely affect safety. The FAA intends to make further studies of this matter during the next 60 days. Under these circumstances, the effective date of this requirement will be delayed until February 1, 1960, to obtain additional information. If a change in this requirement is indicated, it will be accomplished prior to that date. If no change is required, the original rule will then become effective.

Since this amendment grants relief by extending the date for compliance with a requirement of the Civil Air Regulations, the Administrator finds that notice and public procedure hereon are not necessary, and that this amendment will be made effective immediately.

Amendment revised paragraph (c) of section 40.203–T.

Amendment 40–24

Drinking and Serving of Alcoholic Beverages	Adopted: Jan. 6, 1960 Effective: March 10, 1960 Published: Jan. 9, 1960 (25 F.R. 168)

A notice of proposed rule making was published in the FEDERAL REGISTER July 3, 1959 (24 F.R. 5424) and circulated to the industry as Draft Release 59–7 dated July 3, 1959, which proposed to amend Part 40 by adding a new section 40.371 to prohibit (1) the drinking of any alcoholic beverage aboard an air carrier aircraft unless the beverage has been served by the air carrier operating the aircraft, and (2) the serving by the air carrier of such beverage to any person who is or who appears to be intoxicated.

A large number of comments were received from individuals, air carriers, and other industry representatives. These comments ranged from opposition to hearty endorsement of the proposal, including suggestions that it did not go far enough and that all drinking and serving of alcoholic beverages aboard air carrier aircraft should be prohibited. Many of the comments were motivated by moral, religious, or social considerations, as well as safety.

The Federal Aviation Agency, when it proposed the rule, did so only after careful investigation and study. The Agency's responsibility is only for the air safety considerations and not for the social or moral aspects. The study and investigations which preceded the notice of proposed rule making were largely conducted by the Civil Aeronautics Administration, one of the predecessor agencies of the Federal Aviation Agency. The result indicated that there was no factual information, nor any specific occurrences sufficient to establish a safety hazard arising from the serving of alcoholic beverages by the air carrier to passengers aboard air carrier aircraft. The instances which were revealed tended to show that the occasional difficulties experienced had been caused either by passengers who had consumed a considerable quantity of alcoholic beverages prior to boarding the plane, or by those who drank from their own bottles during the course of the flight. This conclusion has been emphasized and verified by many of the comments received from the air carriers affected.

In addition to being confined to the safety aspects of this problem, the proposal was designed to regulate only so far as was necessary to meet safety requirements. It proposed to interfere as little as possible with the personal freedom of passengers and at the same time to prevent abuses that could possibly create a hazardous situation. It was for this reason that the proposed rule did not prohibit the consumption of alcoholic beverages, but sought to subject it to reasonable control. It is a generally accepted fact that flat prohibition has not proven successful in preventing consumption of alcoholic beverages. In this type of situation, it might even work adversely, since passengers who wish to drink might either do so to excess in advance of the flight, knowing that they could not obtain a drink aboard an aircraft, or would be encouraged to engage in surreptitious drinking from their own supply after boarding.

Some of the carriers and individuals who commented apparently misconstrued the intent of the proposed regulation insofar as they interpreted it as prohibiting passengers from bringing their own liquor abroad an aircraft. This was not our intention. The restriction proposed is against the consumption of alcoholic beverages unless they are served to the passengers by the air carriers. So construed, this would permit persons to bring liquor abroad and have it served to them by the air carrier, if the air carrier wishes to provide such service. Some of the comments received from individuals made the point that they were accustomed to having a drink before a meal, or that they required or desired some liquor for medicinal reasons or to contribute to their peace of mind while flying. The rule as proposed and adopted herein would permit a carrier to develop its own policies in this regard so that it might accommodate the varying needs of its passengers, and at the same time prevent any safety hazard.

There was also some misapprehension as to the extent of the carrier's and its personnel's responsibility for enforcing this regulation. Some apparently thought that the crew members would be required to restrain physically a passenger who wished to consume drinks that were not served to him by the carrier, and they foresaw difficulties with discharging such a responsibility. This regulation would impose no such responsibility on the flight crew members. This regulation, like all other regulations adopted by the Agency, would be enforced through the various enforcement processes of the Agency. It is expected of the carriers that they would advise their passengers of the restriction in such a regulation and make suitable reports to the Agency of any known violations. The only time it would be expected that a crew member would be required to take direct action would be when such action is required for the safety of the flight. This is no greater burden than that now on the crew members to do whatever is necessary for the safety of the aircraft and the persons aboard it.

Several comments were made pointing out that the proposed rule prohibited an air carrier from serving an alcoholic beverage to any person if such person "is or appears" to be intoxicated. It was pointed out that a person might not appear to be intoxicated when, in fact, he or she was, and those commenting did not feel that it was proper to impose responsibility for this type of judgment. With this the Agency agrees and the words "is or" will be stricken from the proposed regulation, so that the carrier and its personnel may rely on the appearance of the passenger in determining whether or not to serve him or her alcoholic beverages. Two of the carriers proposed that action on the proposed regulation be

delayed to permit the air carrier industry to develop a code which would control the amount and time of serving alcoholic beverages aboard aircraft. The Agency is strongly in favor of any such voluntary agreements that can be reached among the carriers. To the extent that they are in effect and complied with, they would clearly contribute to decreasing any safety hazard arising from the consumption of alcoholic beverages aboard air carrier aircraft. On the other hand, a code of this kind could not reach the principal problem involved—that of uncontrolled consumption by a passenger of his own liquor supply. Therefore, the adoption of a code, while extremely helpful, would not meet the entire problem. The adoption of this regulation will not in any way inhibit the industry from adopting their own code, and in fact such a move would be viewed with favor by this Agency.

Interested persons have been afforded an opportunity to participate in the making of this regulation and due consideration has been given to all relevant matter presented.

Amendment added new section 40.371.

Amendment 40–25

Requirements for Use of Oxygen Masks by Flight Crew Members of Turbine-Powered Airplanes

Adopted: Jan. 28, 1960
Effective: Feb. 1, 1960
Published: Jan. 30, 1960 (25 F.R. 797)

Currently effective section 40.203–T(c) provides that on and after February 1, 1960, when operating at flight altitudes above 25,000 feet, one pilot at the controls of the airplane shall wear and use an oxygen mask at all times and all other flight crew members on flight deck duty shall be provided with oxygen masks, connected to appropriate supply terminals, which shall be worn in a manner that will permit immediate placing of the masks on their faces for use, properly secured and sealed.

The date for compliance with this regulation was to have been November 30, 1959, but was deferred for 60 days in order to make further studies of this matter upon representation that this requirement is not necessary to achieve the highest degree of safety in air transportation and that compliance with this regulation may detract from the required crew coordination and adversely affect safety. These studies have been made during the intervening period.

No evidence has been presented during this time which validates the contention that the regulation is not necessary to achieve the highest practicable degree of safety; neither has the claim been substantiated that the regulation would adversely affect safety. It is concluded, therefore, that the original basis for the regulation remains valid and that it should remain in effect.

During the course of the study it was noted that the various types of masks intended to be used in compliance with this regulation differ in the facility with which they can be donned. For example, some masks can be placed on the face with one hand so that they are properly secured and sealed. This is accomplished by having retaining means already in place on the head. This feature permits the mask to be placed on the face with minimum delay and without disturbing headphones, glasses, or hats. Thus, the crew member can proceed with emergency procedures quickly and without distraction. Therefore, it is believed that if all crew members are provided with masks having these characteristics, safety would not be adversely affected by permitting the aircraft to be operated at flight altitudes up to 30,000 feet without requiring one pilot at the controls to wear and use an oxygen mask. Therefore, the regulation is being relaxed to the extent that a pilot need not wear a mask at or below 30,000 feet if all flight crew members are equipped with masks having these characteristics. In order for any air carrier to take advantage of this relaxation, it will be necessary for existing masks to be reevaluated by a satisfactory demonstration of these characteristics to a representative of the Administrator.

It should be emphasized, however, that the Federal Aviation Agency will continue to study the need for and use of oxygen masks by flight crew members. If shown necessary by service experience, additional rule making action will be undertaken.

Since this amendment grants relief by extending the altitude above which masks shall be worn in compliance with a requirement of the Civil Air Regulations, the Administrator finds that notice and public procedure hereon are not necessary, and that this amendment may be made effective immediately.

Amendment revised paragraph (c) of section 40.203–T.

Amendment 40–26

Frequency of Pilot Line Checks

Adopted: April 27, 1960
Effective: June 1, 1960
Published: June 4, 1960
(25 F.R. 3850)

Section 40.302(a) of the Civil Air Regulations presently requires in part that a pilot shall satisfactorily accomplish a line check prior to serving as pilot in command and at least once each 12 months thereafter. This has normally been termed within the industry as the annual or yearly line check for the pilot in command.

By letter dated February 9, 1960, the Air Transport Association of America, on behalf of its member air carriers, recommended that the time interval between line checks be specified in the same manner as Civil Air Regulations Amendments 40–19 and 41–26, which clarified the time intervals between proficiency checks. The ATA advises that such a clarification will simplify recordkeeping and administration of the line check in the same way that the proficiency check requirements have been simplified.

The FAA has considered the foregoing recommendation and believes that the requirements with respect to the frequency of pilot line checks should be amended to provide the clarification requested and to make such requirements consistent with the frequency requirements for pilot proficiency checks.

Since this regulatory action imposes no additional burden upon any person, notice and public procedure hereon are unnecessary, and it may be made effective on less than 30 days' notice.

Amendment revised section 40.302(a) by adding two new sentences after the first sentence.

Amendment 40–27

Installation of Flight Recorders on Turbine-Powered Airplanes

Adopted: July 12, 1960
Effective: Aug. 18, 1960
Published: July 19, 1960
(25 F.R. 6826)

The Federal Aviation Agency published a notice of proposed rule making in the Federal Register (25 F.R. 2734) stating that it had under consideration certain amendments to Parts 40, 41, and 42 of the Civil Air Regulations to require the installation and use of flight recorders on all large (more than 12,500 pounds maximum certificated takeoff weight) turbine-powered airplanes after September 1, 1960. The proposal was circulated to the aviation industry as Draft Release 60–6, dated March 28, 1960, and comments were requested on or before May 3, 1960.

The Air Transport Association, on behalf of the scheduled air carriers, raised specific objections to the proposed effective date of September 1, 1960. The airlines stated that the date prescribed could only be met by removing airplanes from service to complete the required installations. This, they affirmed, would impose unreasonable interruptions of schedules and add undue burdens of additional expense. Further, it was stated that some air carriers may desire to equip their airplanes with a more sophisticated type of recorder capable of recording additional parameters of information which would be of value to their operations and maintenance, as well as for incident and accident investigation purposes.

The currently required parameters are time, heading, airspeed, altitude and vertical acceleration.

The FAA recognizes that flight recorders capable of recording additional operations and maintenance parameters would make available information which would be most useful for incident and accident investigation and for accident prevention purposes. Furthermore, it appears that such recorded information would be used by the air carriers in developing more efficient maintenance and operations procedures and in developing new methods of establishing maintenance schedules for engine, accessory, and component overhauls.

Comments received from certain of the manufacturers of flight recorders indicated that the September 1, 1960 date would not provide them with a sufficient period of time to manufacture and deliver equipment ordered for installation on those turbine-powered airplanes now in operation which previously have not been required to be so equipped. In addition, certain manufacturers stated that more recently developed recorders capable of recording additional parameters can be supplied by late 1960, and early 1961, and confirmed that some air carriers had indicated a very definite interest in these newer types of recorders.

After consideration of all the comments received and upon further investigation thereof, the Agency has concluded that a longer period of time should be authorized for compliance with this regulation as it applies to turbine-propeller powered airplanes. Turbojet airplanes, since they are certificated for operation above 25,000 feet, are currently required to be equipped with flight recorders. The FAA recognizes that difficulties may be encountered by the air carriers in accomplishing an orderly procurement and installation program and that a brief period of relief may be granted with respect to turbine-propeller powered airplanes without adversely affecting safety in air carrier operations. Accordingly, a compliance date of November 1, 1960, has been adopted in this final rule. Also, provision has been made in the regulation for the Director, Bureau of Flight Standards, to further extend the November 1, 1960, date for any air carrier who, prior to September 1, 1960, submits to the FAA, in writing, a request for such an extension, together with substantiating data, which shows to the satisfaction of the Director:

1. That the air carrier will be unable to comply with the November 1, 1960, date due to flight recorder procurement or installation problems and;

2. The action the air carrier has undertaken to insure that a progressive installation of the required flight recorder equipment will be completed at the earliest practicable date following November 1, 1960. In no event will the November 1, 1960, date be extended beyond May 1, 1961. This relaxation of the original proposal will provide the air carriers further opportunities to investigate the various types of recorders available and to proceed with the orderly procurement and installation of the required equipment at the earliest practicable time following the effective date of this rule.

It will be noted that neither the November 1, 1960, compliance date nor the provision for extension thereof applies to the large turbojet-powered airplanes or large nonturbine-powered airplanes certificated for operations above 25,000 feet altitude, since they are required by currently effective regulations to be equipped with flight recorders.

Certain air carriers requested that the Fairchild F–27 airplanes be specifically exempted from the requirements of this rule in view of the geographic areas in which they are operated or in consideration of the varied local service or low altitude types of operations in which they are engaged. The FAA, in its notice of proposed rule making, explained that it was proposing this regulation specifically to encompass all of the newer types of high-speed turbine-powered airplanes, whether certificated to operate above or below 25,000 feet, since they are frequently subjected to similar atmospheric forces. The F–27 is a modern turbine-powered transport type airplane and is capable of operating at high speeds. For these reasons, the Agency is convinced that all large turbine-powered airplanes should be equipped with flight recorders. Accordingly, the rules adopted herein make no exception for the F–27 airplane.

This amendment also clarifies the Agency's intent to require continuous operation of the flight recorder from the instant the aircraft starts its takeoff roll until it has completed its landing roll at an airport. Operation of the recorder is not required during taxi operations to or from the runway.

Interested persons have been afforded an opportunity to participate in the making of this regulation and due consideration has been given to all relevant matter presented.

Amendment revised section 40.208.

Amendment 40-28

Oxygen Mask Requirements and Altitude Training for Flight Crewmembers Assigned to Duty on Turbine-Powered Airplanes Operated above 25,000 feet	Effective: March 3, 1961 Adopted: Jan. 19, 1961 Published: Feb. 3, 1961 (26 F.R. 1055)

The currently effective provisions of section 40.203-T(c) of Part 40 of the Civil Air Regulations require one pilot at the controls of a turbine-powered airplane to wear and use an oxygen mask when operating above 25,000 feet, and the remaining flight crewmembers to wear their masks in a position permitting immediate placing of the masks on their faces for use, properly secured and sealed. A proviso to the currently effective rule relieves the one pilot at the controls of the necessity of using a mask at or below 30,000 feet if all flight crewmembers are equipped with a "quick donning" type of oxygen mask which is demonstrated to be satisfactory to a representative of the Administrator.

Civil Air Regulations Draft Release No. 60-15, dated August 24, 1960 (25 F.R. 8381), proposed certain amendments to the requirements for the use of oxygen masks by flight crewmembers and certain altitude training requirements for flight crewmembers assigned to duty on turbine-powered airplanes operated above 25,000 feet.

In Draft Release 60-15, it was proposed to retain that part of the currently effective rule requiring one pilot to wear and use an oxygen mask when operating above 25,000 feet and all other flight crewmembers to wear their masks in a position for ready use. However, it was proposed to amend the proviso to the current rule and increase the altitude above which one pilot must wear and use an oxygen mask from 30,000 feet to 35,000 feet, provided all flight crewmembers are equipped with a quick-donning type of oxygen mask and are wearing the same in a ready position for use. It was proposed to classify an oxygen mask as a quick-donning type only if the mask is demonstrated to be one capable of being immediately placed on the face from the position being worn, and is shown to meet the following criteria: (1) that the mask can be placed on the face for use, properly secured and sealed, with either hand; (2) that the action of donning the mask can be accomplished without disturbing glasses, headphones, or other equipment worn; and (3) that the action of donning the mask can be accomplished without distracting or delaying the flight crewmember from proceeding with his assigned emergency procedures.

Industry comments unanimously supported the proposal to raise the present limitation of 30,000 feet to 35,000 feet as the altitude above which one pilot at the controls must wear and use an oxygen mask at all times. It was recommended, however, that the altitudes be specified in terms of "flight levels," to accord with the terminology used in the air traffic rules of Part 60 for high altitude flights. This recommendation has been incorporated into the final rule.

The industry groups expressed opposition to the proposal to continue the requirement that above an altitude of 25,000 feet flight crewmembers on flight deck duty must wear an oxygen mask at all times. Comment was also critical of the other criteria proposed with respect to the donning of oxygen masks, particularly that set forth in the proviso of the proposed rule for the quick-donning type of mask.

In lieu of the donning criteria proposed, certain industry comment recommended, for several reasons, that the rule require only that oxygen masks be located in a ready position for placement on the face in a fully operative condition within a specific time limit, such as 5 seconds. Such a period of time is well within the period beyond which the lack of oxygen becomes a critical safety factor.

In light of the comments received, we have reevaluated the requirement that oxygen masks must be worn, as well as the criteria proposed for classifying a mask as a quick-donning type. At the time the wearing of oxygen masks was originally prescribed, the use of turbine-powered airplanes in civil air transportation had just begun. Thus, the lack of previous operating experience with such airplanes and the type of oxygen masks then available justified a most conservative approach to the requirements for oxygen masks. Since that time we have accumulated many thousands of hours of experience in the operation of turbine-powered airplanes having pressurized cabins and the occurrence of sudden decompressions has been infrequent. Furthermore, certain oxygen masks and their harnesses have so advanced in design that they can meet the standards prescribed for the

quick-donning concept. Upon consideration of these factors, we believe it is no longer necessary to require the oxygen mask to be worn on the person of flight crewmembers. However, above flight level 250 we consider it necessary to require that the oxygen masks, when not being used, be kept at all times in a condition for ready use, and so located as to be within the immediate reach at all times of the flight crewmembers while at their duty stations.

This final rule requires that, when operating above flight level 250, each flight crewmember be provided with an oxygen mask so designed that it is capable of being rapidly placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand. The mask must also be so designed that upon completion of the donning action it does not prevent the flight crewmember from being able immediately to communicate with other crewmembers over the airplane intercommunication system. If flight crewmembers are provided with oxygen masks which meet these standards, the regulation requires one pilot at the controls of the airplane to wear and use an oxygen mask at all times while operating above flight level 250. However, as stated in the proviso to the rule, if each flight crewmember on flight deck duty is provided with a quick-donning type of oxygen mask, the one pilot at the controls of the airplane need not wear and use an oxygen mask while at or below flight level 350.

Upon consideration of comments received, the criteria proposed for the quick-donning type of oxygen mask have been changed to specify a donning time of 5 seconds. The proposal to require a demonstration that the mask is capable of being donned without disturbing headphones has been deleted. However, the Agency considers it necessary to require, as criteria for the quick-donning type of oxygen mask, a demonstration: (1) that the mask is capable of being placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand with one hand and within 5 seconds; (2) that the donning of the mask can be accomplished without disturbing eye glasses and without delaying the flight crewmember from proceeding with his assigned emergency duties; and (3) that upon completion of the donning action, the oxygen mask does not prevent the flight crewmember from being able immediately to communicate with other crewmembers over the airplane intercommunication system.

The Agency has concluded that if all flight crewmembers are provided with an oxygen mask which qualifies as a quick-donning type of mask, they will be sufficiently equipped for protection against the dangers of hypoxia to justify not requiring one pilot at the controls to wear and use an oxygen mask while operating at or below flight level 350. Above that flight level, however, the time element becomes more critical and in the interest of safety we consider it necessary to require one pilot at the controls to wear and use an oxygen mask at all times.

The Agency believes that the initial and recurrent instructional training given flight crewmembers should include actual training and practice in the donning of the oxygen mask. If masks of the quick-donning type are provided by the air carrier, it should require each flight crewmember to demonstrate his ability to properly don the mask from its ready position, with one hand and within 5 seconds, and proceed with his emergency duties without delay. Such training and practice are equally as important to personal safety as the quick-donning characteristics of the mask which have been demonstrated by the air carrier.

Presently, the maximum certificated ceiling for transport category airplanes used in air carrier operations is 42,000 feet. If higher ceilings are authorized in the future for airplanes used in air carrier operations, the Agency will undertake to evaluate the present rules in light of such operations and, if necessary, prescribe additional oxygen equipment and operational procedures to insure the protection of all occupants of the airplane.

With regard to the proposal for pressure chamber indoctrination for each flight crewmember, after fully considering all comments received and all factors involved, we have concluded that such a requirement should not be adopted. We believe that the trainee experiencing hypoxia does not benefit from the experience as much as the persons who are objectively observing the occurrence; nor is he apt to recall what took place while under the effects of hypoxia. Flight crewmembers participating in the air carriers' approved training programs, which include films, lectures, and studies of all phases of the subject of high-altitude operations, will be equally well indoctrinated with the dangers attendant upon hypoxia and the need for compliance with the techniques and emergency procedures involved in the event of a rapid decompression.

Therefore, in lieu of experiencing the actual low pressure chamber indoctrination, we are requiring all flight crewmembers, as a part of their approved emergency training, to receive initial and recurrent instruction by means of lectures and films covering at least respiration, hypoxia, duration of consciousness at altitude when supplemental oxygen is not supplied, gas expansion, gas bubble formation, physical phenomena and incidents of decompression, and actual training and practice in the donning of the oxygen mask and operation of the oxygen equipment.

In lieu of the required films, the air carrier may use any other equivalent means of visual presentation which meets with the approval of a representative of the Administrator. One such means would be participation by flight crewmembers in actually observing other people undergoing high-altitude training in a low pressure chamber.

The rule also provides that each flight crewmember, prior to each flight, shall personally preflight his oxygen equipment to insure that the oxygen mask is functioning, fitted properly, and connected to appropriate supply terminals, and that the oxygen supply and pressure is adequate for use. Additionally, the rule requires that whenever it is necessary for one pilot to leave his station at the controls when operating above flight level 250, the remaining pilot shall don and use his oxygen mask until the other pilot has returned to his duty station.

Oxygen masks classified as quick-donning masks under the regulation in force prior to the effective date of this amendment will be considered as satisfactorily meeting the requirements prescribed by this amendment for quick-donning masks without further demonstration.

Interested persons have been afforded an opportunity to participate in the making of this amendment and due consideration has been given to all relevant matter presented. The Air Line Pilots Association (ALPA) requested that an industry-wide meeting be scheduled to review the subject of oxygen masks if the amendment adopted herein substantially differs from the intent of the proposals recommended by ALPA. Prior to publication of Draft Release 60–15, a conference was held by the Agency at which the ALPA and other representatives of the industry were afforded an opportunity to express their views and recommendations for the development of rules governing oxygen masks and their use. These views and recommendations were thoroughly considered in the preparation of proposals contained in Draft Release 60–15. In addition, interested persons also have been given an opportunity to submit written comments in response to Draft Release 60–15. All of the views and recommendations submitted in the conference and in response to the draft release have been carefully considered and evaluated in the preparation of this final rule. Moreover, as a result of this evaluation, many of these recommendations have been incorporated in the final rule. Accordingly, I find that additional rule making proceedings, as requested by the ALPA, are unnecessary for informed administrative action; and that this amendment should be adopted without further delay.

Amendment revised paragraph (c) of section 40.203–T and added a new paragraph (c) to section 40.286

Amendment 40–29

IFR Landing Minimums for Pilots With Less Than 100 Hours as Pilot in Command in a Particular Type of Airplane	Adopted: Apr. 17, 1961 Effective: May 23, 1961 Published: Apr. 22, 1961 (26 F.R. 3460)

The Federal Aviation Agency published as a notice of proposed rule making (25 F.R. 3554) and circulated as Civil Air Regulations Draft Release No. 60–7 on April 18, 1960, a proposal to amend Parts 40, 41, and 42 of the Civil Air Regulations to require that higher landing minimums be made applicable to all pilots in command who have not served 100 hours as pilot in command in air carrier operations in a particular type of airplane.

Standard operating limitations, presently contained in the operations specifications of all air carriers subject to Part 40, require that ceiling and visibility minimums for IFR landings be increased by 100 feet ceiling and ½ mile visibility for those pilots who have not served 100 hours as pilot in command in air carrier operations in a particular type of

airplane. As this requirement is applicable to all scheduled interstate air carriers and commercial operators subject to Part 40 of the Civil Air Regulations, it is appropriate that it be included in the Civil Air Regulations rather than in the air carriers' operations specifications.

These limitations, which are presently contained in the operations specifications, permit a pilot in command to operate at the lower IFR landing minimums prior to obtaining the required 100 hours experience if a company check pilot certifies that he is qualified to do so. Investigation of the practice among air carriers has revealed wide variations in making the determination that a pilot is qualified for the lower landing minimums prior to his attaining 100 hours as pilot in command in a particular type of airplane. This has resulted in pilots being certified to operate at the lower landing minimums after having attained, in some instances, only a small fraction of the required 100 hours.

While the air carriers, in commenting on Draft Release 60–7, expressed their belief that the limitations presently contained in the operations specifications are basically sound, the majority of all comments received in response to the draft release indicated concurrence with adoption of a regulation requiring higher IFR landing minimums for pilots who have not acquired a specified amount of experience as pilot in command in a particular type of airplane in air carrier operations. In addition, the majority of comment suggested that in no case should this requirement be subject to reduction at the discretion of a company check pilot.

There were also suggestions made that certain other factors, such as the pilot's previous experience, his overall proficiency, his knowledge of the particular airport, and the number of approaches and landings made in the new type of airplane, should be recognized and substituted for a portion of the required 100 hours. While these suggestions have merit, it is believed that the factors to be considered could become so numerous, and difficult to assess in terms of an equivalent number of flight hours, as to diminish the effectiveness of the rule.

The safe execution of an instrument approach to the lowest minimums requires the highest degree of pilot familiarity with the airplane, its controls, instruments, and performance characteristics. One hundred hours of experience in a new type of airplane as pilot in command in air carrier or commercial operations is necessary in order to achieve this degree of familiarity so essential to safe operations at the lowest landing minimums.

The Federal Aviation Agency therefore believes that, in the interest of safety, all pilots in command should use IFR landing ceiling and visibility weather minimums 100 feet higher and ½ mile greater than regularly approved minimums, until they have obtained 100 hours of air carrier or commercial operator pilot in command experience in a particular type of airplane.

Interested persons have been afforded an opportunity to participate in the making of this regulation, and due consideration has been given to all relevant matters presented.

Amendment added new paragraph (e) to section 40.406.

Amendment 40–30

Landing Flare Requirements

Adopted: Sept. 15, 1961
Effective: Sept. 21, 1961
Published: Sept. 21, 1961
(26 F.R. 8881)

Section 40.200(d) of the Civil Air Regulations requires that each airplane used at night for extended overwater operations be equipped with landing flares.

In 1958, a requirement for the carriage of flares in night operations over land was deleted from Part 40 by Amendment 40–10 (23 F.R. 292). This requirement was deleted because there had been very little use of flares from 1947 to 1958, and the records revealed numerous instances of flares being inadvertently discharged on the ground or in the air, causing damage to the airplane, other airplanes, ramps, and hangars. Instances were also reported of flares contributing to the intensity of a fire following a crash. The Civil

Aeronautics Board, after consideration of all the facts involved, concluded that equipping an airplane with flares should not be a mandatory safety requirement for operations conducted over land at night.

The military transport services discontinued the use of flares in their passenger transport operations several years ago for reasons involving cost, maintenance, the hazard of carrying flares, and their questionable value under emergency conditions.

Recently, the Federal Aviation Agency received several requests from air carriers for relief from the flare requirement for overwater operations at night. In view of those requests, the Agency has carefully reviewed the subject of flare requirements. Consideration has been given to all of the data available to the Board in 1958 when it deleted the requirement for the carriage of flares in night operations over land. In addition, the Agency has weighed the probability of having to ditch an airplane as opposed to diverting to a land area, in view of such factors as improved airplane performance, reliability, operating range, and the development of more accurate and dependable communication aids. In this connection, we consider it significant that to our knowledge no multiengine air carrier airplane has been involved in the dropping of flares during the past 14 years. Finally, it should be pointed out that the Air Transport Association and the Air Line Pilots Association have recently advised the Agency that they favor deletion of the requirement for flares in night overwater operations.

Upon consideration of the foregoing, the Agency has concluded that flares for passenger-carrying airplanes should not be required as mandatory safety equipment for air carrier overwater operations conducted at night. Deletion of the flare requirement will not preclude the carriage of flares by an air carrier who may desire to continue carrying them as optional equipment.

Since this amendment relieves a restriction and imposes no additional burden on any person, I find that notice and public procedure hereon are unnecessary, and it may be made effective on less than 30 days' notice.

Amendment deleted paragraph (d) of section 40.200.

Amendment 40-31

Boarding of Air Carrier Aircraft by Persons Appearing Intoxicated

Adopted: Oct. 17, 1961
Effective: Nov. 21, 1961
Published: Oct. 21, 1961 (26 F.R. 9905)

A notice of proposed rule making was published in the Federal Register August 10, 1961 (26 F.R. 7223) and circulated to the industry as Draft Release 61-16 dated August 4, 1961, which proposed to amend Parts 40, 41, and 42 of the Civil Air Regulations to (1) place on the air carrier the responsibility of not permitting any person to board its aircraft if such person appears to be intoxicated, and (2) require that the air carrier notify the Administrator of incidents involving violations of this section, or any disturbance caused by intoxicated persons while boarding or aboard its aircraft.

Many comments were received from interested parties and consideration has been given to all relevant matter presented. Generally speaking, the comments were unanimously in favor of lengthening the proposed 24-hour reporting period contained in paragraph (d). Other comments favored limiting the reporting of violations of paragraph (a) to only those incidents in which the passenger refuses to comply with its provisions. A few comments suggested that the proposed amendments were altogether unnecessary.

In proposing these amendments, the Agency considered several recent incidents where intoxicated persons were permitted to board air carrier aircraft and, due to their condition, subsequently created disturbances, and even threatened to do bodily harm to crewmembers and other persons aboard the aircraft. The drinking regulations adopted in March, 1960, effectively control the consumption and serving of alcoholic beverages to persons aboard air carrier aircraft, but do not provide for situations such as are considered here.

Section 43.45 of the Civil Air Regulations currently provides that a pilot shall not permit any person to be carried in the aircraft who is obviously under the influence of intoxicating liquor. This provision has also served its purpose well. However, when applied to air carrier operations, this regulation has not been entirely effective to prevent incidents such as those which recently have taken place. Placing the responsibility on the pilot is not satisfactory in the case of air carrier operations since, under most conditions, the pilot is not present to observe the appearance and conduct of passengers as they board the aircraft, but is engaged elsewhere in essential duties regarding the flight.

The primary responsibility for preventing intoxicated persons from boarding air carrier aircraft must be placed on those who have an adequate opportunity to prevent the occurrence. The air carrier has both ground personnel and cabin attendants who are in a position to detect those persons who appear to be intoxicated and to refuse such persons permission to board the aircraft. The proposed amendments to Parts 40, 41, and 42 of the Civil Air Regulations place on the carrier the responsibility of not permitting any person to board its aircraft if such person appears to be intoxicated. Some air carriers have developed their own procedures and instructions to appropriate personnel in recognition of a responsibility in this area. This regulation underlines that responsibility and requires all carriers to take steps more appropriate to existing conditions. In particular it will prevent exclusive reliance on the pilot as the carrier's sole agent for this purpose. Section 43.45 is not being amended because it is always the responsibility of the pilot in command to refuse permission for the carriage of any person who is under the influence of intoxicating liquor regardless of the action taken by other airline employees if presence of such person is known to him.

Comments received in regard to the 24-hour reporting period point out that due to crew rotations, weekends and periods when the air carriers' general offices are closed, coupled with the minimum time required to process these reports, such a short period would place a serious burden on the carriers. After consideration of these circumstances, it has been decided to lengthen the reporting period to 5 days. It is felt that this allows sufficient period in which to gather the information and make the necessary report.

In response to comments other changes have been made in paragraph (d). One comment received from an air carrier points out that the rule as proposed requires the making of a report even where a passenger who was unaware of the restriction imposed by paragraph (a) complies with it upon request. It has been determined that whatever advantages might be derived by requiring such reports would be outweighed by the embarrassment and possible adverse publicity to the carrier and passenger concerned. Consequently, the paragraph has been revised to require that only those violations of paragraph (a) which persist after the passenger has been informed of its provision must be reported. Also, the phrase "under the influence of alcoholic beverage" has been changed to "appears to be intoxicated". The purpose of this change is to bring the language in paragraph (d) into conformity with that presently found in paragraphs (b) and (c).

In addition to the changes made in response to comments, the Agency has made another change in paragraph (d). The proposed rule required a report of disturbances while boarding an air carrier aircraft. Upon further consideration there does not appear any necessity for requiring a report under these circumstances. If the person is not permitted to board the aircraft there has been no safety threat involved and no necessity for a report of the incident to the Federal Government.

Amendment added new paragraphs (c) and (d) to section 40.371.

Amendment 40–32

Carriage of Cargo in Passenger Compartments

Adopted: November 27, 1961
Effective: January 2, 1962
Published: December 1, 1961 (26 F.R. 11354)

NOTE: The effective date of this amendment was postponed to January 20, 1962, by Amendment 40–33, adopted December 28, 1961. On January 19, 1962, Amendment 40–32 was rescinded by Amendment 40–34. The preamble of Amendment 40–32 is being retained as it contains the basic background leading to the promulgation of rules concerning the carriage of cargo in passenger compartments.

The currently effective provisions of section 40.153 of the Civil Air Regulations govern the carriage of cargo in the passenger compartment of an air carrier airplane. This section provides, in part, that cargo shall not be carried aft of seated passengers. The intent of this provision was to safeguard passengers from any possible injury which could be caused by the shifting forward of cargo in the event the airplane was involved in a survivable crash involving high deceleration forces. The present rule, however, does not recognize that this desired safeguard could be accomplished equally well by the incorporation of suitable methods of cargo stowage designed to prevent the shifting of cargo in accidents of this nature.

As a result of a request from the air carrier industry to permit the carriage of cargo in the passenger compartment in cargo bins specifically designed for this purpose, the Federal Aviation Agency issued a notice of proposed rule making which was published in the Federal Register (24 F.R. 8302) and circulated as Civil Air Regulations Draft Release No. 59–15 dated October 6, 1959, and titled "Carriage of Cargo in Passenger Compartments." This notice proposed to amend Parts 40, 41, and 42 of the Civil Air Regulations to authorize the carriage of cargo in the passenger compartment without regard to its location with respect to seated passengers, provided:

(a) The cargo is carried in approved bins which meet the strength and other safety provisions applicable to cargo and passenger compartments prescribed in Part 4b or other airworthiness part under which the airplane is type certificated, and

(b) The combined weight of the cargo and the approved bin or compartment does not exceed 85 percent of the load used in determining the design conditions for the structure (bin) involved.

It was also proposed in Draft Release 59–15 to continue the authorization to carry cargo forward of seated passengers in the passenger compartment under practically the same provisions as are presently in effect. However, one additional requirement was proposed to be incorporated into the current provision. This requirement was that cargo not carried in approved containers or compartments must be secured by tiedowns possessing sufficient strength to eliminate the possibility of shifting under emergency landing conditions.

The comments received in response to the draft release were for the most part favorable and they reflected endorsement of the principles of the proposal. However, definite opposition was expressed in the comments with regard to the requirement that tiedowns for cargo not carried in approved bins or compartments shall possess sufficient strength to withstand the inertia forces of an emergency landing condition. It was contended that to modify the existing rules by the addition of this requirement would prevent an operational practice which has been utilized for a number of years without adversely affecting safety. Therefore, in view of these comments, and since it was not the intent of the proposal to materially change the existing rule but only to provide additional means of safely carrying cargo in the passenger compartment, the final rule does not contain this requirement.

It will be noted that the final rule sets forth specific minimum requirements which a cargo bin must meet to be "approved" by a representative of the Administrator. Draft Release 59–15 contained notice of the Federal Aviation Agency's intension to require the use of "approved" cargo bins but did not specify the exact requirements for the "approval." The substance of the proposed rule on cargo bin specifications provided that

the cargo bin would be required to meet the strength and other safety provisions of Part 4b or other appropriate part under which the airplane is type certificated, and that the bin would be considered as an item of mass for inertia force computations. After further study of these provisions it has been determined that the incorporation into the rule of specific minimum requirements for cargo bins would provide guidance to the industry and eliminate the need for additional directives by the Federal Aviation Agency on this subject. Accordingly, the final rule specifies the minimum requirements which such cargo bins must meet.

It will also be noted that this amendment deletes section 40.153–1, since the material covered by that section is either incorporated in section 40.153, or is no longer applicable.

Interested persons have been afforded an opportunity to participate in the making of this regulation (24 F.R. 8302), and due consideration has been given to all relevant matter presented.

Amendment revised section 40.153 and deleted section 40.153–1.

Amendment 40–33

Carriage of Cargo in Passenger Compartments

Adopted: December 28, 1961
Effective: January 2, 1962
Published: December 30, 1961 (26 F.R. 12762)

On November 27, 1961, the Federal Aviation Agency issued Amendment 40–32 to Part 40 of the Civil Air Regulations (26 F.R. 11354), to become effective on January 2, 1962.

Subsequent to the issuance of this amendment, certain air carriers requested reconsideration of those provisions of the amendment restricting the height of the cargo bins which may be approved for the carriage of cargo in the passenger compartments. A preliminary reevaluation of this request indicates that the height restriction may be relaxed or eliminated without adversely affecting safety. Accordingly, in order to provide sufficient time for the completion of this reevaluation and to make other required clarifying changes, the effective date of Amendment 40–32 is being postponed from January 2, 1962, until January 20, 1962.

In view of the foregoing, I find that notice and public procedure hereon are impracticable, and good cause exists for making this amendment effective on less than 30 days' notice.

Amendment postponed the effective date of Amendment 40–32 from January 2, 1962, until January 20, 1962.

Amendment 40–34

Carriage of Cargo in Passenger Compartments

Adopted: January 19, 1962
Effective: January 20, 1962
Published: January 23, 1962 (27 F.R. 649)

Section 40.153 of Part 40 was revised by Civil Air Regulations Amendment 40–32 (26 F.R. 11354) issued November 27, 1961, to become effective January 2, 1962. This section provides a means by which cargo may be safely carried in the passenger compartment of an air carrier airplane.

Subsequent to the issuance of Amendment 40–32, certain air carriers requested reconsideration of section 40.153(a)(3) of that amendment which specified that approved cargo bins installed aft of passengers shall not be higher than the height of the passenger seats on the airplane. In addition, comments were received with regard to paragraphs (a)(1) and (a)(4) which indicated a need for a clarification of the strength requirements which a cargo bin and its attachments must meet for approval.

The effective date of Amendment 40–32 was postponed from January 2, 1962, to January 20, 1962, by Amendment 40–33 (26 F.R. 12762). This postponement of the effective date was necessary to provide sufficient time for a complete reevaluation of the provisions of section 40.153(a)(3) and to make other clarifying changes.

As a result of this reevaluation it has been concluded that, regardless of its height, a properly loaded cargo bin which has been constructed and installed in the airplane to meet specific strength requirements will not adversely affect safety if it does not obscure any passenger's view of the "seat belt" or "no smoking" sign. Therefore, this amendment eliminates the height restriction for cargo bins and in lieu thereof adds provisions which (1) require proper distribution of the weight of the cargo within the bin, (2) prohibit use of bins which exceed the structural load limitation on components of the airplane, and (3) prohibit installing the bin in a location which will obscure any passenger's view of the "seat belt" or "no smoking" sign, unless an auxiliary sign, or some other approved means for notification of the passenger is provided.

The provisions of paragraphs (a)(1) and (a)(4) of this amendment specify the strength which a cargo bin and its attachments must meet for approval. It was intended, in Amendment 40–32, that this strength be such that in the event the airplane was involved in a survivable crash involving high deceleration forces, the cargo bin would not shift forward or be dislodged and injure the passengers. To provide this safeguard, the strength of the bin and its attachments must be able to withstand at least the load factors and emergency landing conditions applicable to the passenger seats installed on the airplane. The combined weight of the cargo bin and its contents must be used to determine this strength. However, in view of the comments received, it appears that the wording of paragraphs (a)(1) and (a)(4) of Amendment 40–32 did not make this strength requirement completely clear. Accordingly, this amendment rewords these paragraphs to specify more clearly the strength requirements which a cargo bin and its attachments must meet for approval.

In addition to the aforementioned changes, other editorial changes were made in this amendment for the purpose of clarification.

Since this amendment relaxes the height requirement of a previous rule which becomes effective January 20, 1962, and imposes no additional burden on any person, I find that notice and public procedure hereon are impractical and unnecessary, and good cause exists for making this amendment effective on less than 30 days' notice.

Amendment rescinded Amendment 40–32, revised section 40.153, and deleted section 40.153–1.

Amendment 40–35

Mechanical Reliability Reports

Adopted: February 6, 1962
Effective: March 12, 1962
Published: February 10, 1962 (27 F.R. 1242)

The Federal Aviation Agency published as a notice of proposed rule making (26 F.R. 1410) and circulated as Civil Air Regulations Draft Release No. 61–2 dated February 8, 1961, a proposal to amend Parts 40, 41, 42, and 46 of the Civil Air Regulations to establish requirements for the reporting of specific types of malfunctions failures, and defects occurring to airplanes.

With the adoption of this amendment, it should be noted that the title, Daily Mechanical Report (DMR), is changed and will hereafter be known as the Mechanical Reliability Report (MRR). The Federal Aviation Agency believes the name to be appropriate in that it is more descriptive of the concept of the report.

The currently effective provisions of Part 40 require operators to submit daily a report known as a daily mechanical report (DMR) which contains information concerning each failure, malfunctioning, or other defect, regardless of where detected, which may

reasonably be expected by the air carrier to cause a serious hazard in the operation of an airplane.

The lack of specific reporting requirements and the fact that each air carrier reported only those items which, in the opinion of the air carrier, constitute a hazard, heretofore resulted in inadequate and nonuniform reporting. Various attempts were made to correct these inadequacies, such as joint industry-government meetings and the use of a trial reporting guide for a six-month period. Some improvement in reporting was accomplished; however, satisfactory reporting was not achieved. In accordance with the proposal contained in Draft Release 61–2, this amendment specifies certain airplane and airplane component failures, malfunctions, or defects which must be reported by air carriers in mechanical reliability reports. In addition, an air carrier is required to report other airplane and airplane component failures, malfunctions, or defects, even though they are not specified in the rule, when the air carrier is of the opinion that they may seriously endanger the safe operation of its airplanes.

In Draft Release 61–2 it was proposed to require air carriers to report engine shutdowns during flight necessitated or caused by airplane component failure, malfunction, or defect. Although the Agency evaluates the significance of every engine shutdown, regardless of cause or effect, it has been determined that it is presently not necessary to require all engine shutdowns to be included in mechanical reliability reports. Accordingly, in this amendment, the proposed rule has been changed to require mandatory reporting of engine shutdowns only when they involve engine flameout, foreign object ingestion or icing, external damage to the engine or airplane structure, or when more than one engine is shutdown during flight. Paragraph (b) (17) of section 40.508 has been worded to make it clear that action taken to shutdown an engine in flight need not be reported as an emergency action under the requirements of that provision.

Draft Release 61–2 contained a proposal to require reports of failures of the landing gear to extend or retract properly during flight. To avoid any misunderstanding of our intention that landing-gear doors be included in this reporting requirement, this final rule expressly provides for reporting the occurrence of a failure, malfunction, or defect which involves the extension or retraction of the landing gear, or the opening or closing of the landing-gear doors during flight.

Also, it will be noted that paragraph (b) (15) of section 40.508 has been changed from the original proposal so that failures, malfunctions, or defects in airplane structures are required to be reported only if a major repair is necessary.

Many failures, malfunctions, or defects are required to be included in the mechanical reliability report only if they occur during "flight." A note has been added to the rule to explain that in complying with the reporting requirements of section 40.508 an airplane is to be considered in "flight" from the moment it leaves the surface of the earth on takeoff until it touches down at a place of landing.

Attention is directed to the fact that Draft Release 61–2 proposed 13 specific reporting items while this amendment contains 17 reportable items. This increase in the number of items is the result of rewording and expanding the previous items to facilitate administrative handling of the reports within the Agency with automatic data processing equipment.

Another change has been made in this amendment which differs from the original proposal. This change provides that the report shall cover a 24-hour period beginning at 0900 hours local time each day and is to be submitted by 0900 hours of the following day rather than the midnight to midnight report period proposed. In this respect, local time is considered to be the time at each air carrier's main maintenance base. This revision does not alter the 24-hour interval made in the proposal, but is incorporated so that the reports can be handled more expeditiously by the Agency under its new automatic data processing system for evaluating individual reports and for distributing mechanical reliability report summaries.

Each air carrier is presently required by paragraph (a) of section 40.509 (Mechanical interruption summary report) to regularly file a summary report of "All interruptions to a scheduled flight, unscheduled changes of airplanes en route, and unscheduled stops and diversions from route which result from known or suspected mechanical difficulties or malfunctions." In response to comment received, paragraph (a) of section 40.509 is being amended to avoid duplicate reporting under paragraph (a) of those malfunctions or mechanical difficulties required to be reported under section 40.508.

The Federal Aviation Agency believes that reports of the failures, malfunctions, and defects required under this amendment, plus additional reports received from the air carriers regarding other occurrences of failures, malfunctions, and defects they consider hazardous, will provide complete, accurate, and uniform reporting. Safety will be served better by this amended reporting procedure as the Agency will be able to disseminate to industry improved reports of hazardous conditions pertaining to airplane systems, components, and equipment. In addition, through analysis of information developed from reports received, the Agency will be able to detect deteriorating conditions in airplane systems, components, and equipment, and issue Airworthiness Directives and Alert Notices before such conditions reach hazardous proportions.

Interested persons have been afforded an opportunity to participate in the making of this amendment and due consideration has been given to all relevant matter presented.

Amendment revised section 40.508 and paragraph (a) of section 40.509.

Amendment 40–36

Illumination of Passenger Emergency Exit Markings	Adopted: February 12, 1962 Effective: March 20, 1962 Published: February 16, 1962 (27 F.R. 1452)

The Federal Aviation Agency published as a notice of proposed rule making (26 F.R. 9241) and circulated as Civil Air Regulations Draft Release No. 61–20 dated September 21, 1961, a proposal to amend Parts 40, 41, 42, and 46 of the Civil Air Regulations to require the illumination of passenger emergency exit markings during all takeoffs and landings, day and night.

In proposing these amendments, the Agency considered several recent accidents and incidents where illumination of the emergency exits during daylight hours may have resulted in a more effective evacuation of the passengers and crew. The Civil Air Regulations as originally adopted did not require daytime use of the emergency exit lighting system. It is now considered that this additional lighting during daylight hours is necessary to provide maximum safety where the evacuation of large numbers of passengers is concerned.

Interested persons have been afforded an opportunity to participate in the making of this regulation and due consideration has been given to all relevant matter presented. In general, all comments received from interested persons as a result of the Agency's notice of proposed rule making were favorable to the proposal.

Amendment revised subparagraph (2) of section 40.173(f).

Amendment 40–37

Extension of Period Allowed for Compliance with the Recurrent Training Requirements of Air Carrier Training Programs	Adopted: July 30, 1962 Effective: Aug. 3, 1962 Published: Aug. 3, 1962 (27 F.R. 7673)

Paragraph (b) of section 40.289, Recurrent training, requires that each air carrier shall, at intervals established as part of the training program, but not to exceed 12 months, check the competence of each crewmember and dispatcher with respect to procedures, techniques, and information essential to the satisfactory performance of his duties.

The Federal Aviation Agency has received recommendations that the time interval between competence checks of crewmembers and dispatchers be specified in the same manner as in section 40.302, which permits pilot line and proficiency checks to be given in

the month before or following the month in which they are due. Such flexibility will simplify recordkeeping and administration of the crewmember and dispatcher competence check requirements of section 40.289(b) in the same way that the pilot line and proficiency check requirements have been simplified.

The FAA has considered the foregoing recommendations and believes that the requirements with respect to the frequency of crewmember and dispatcher competence checks should be amended to provide the flexibility recommended.

Civil Air Regulations Draft Release No. 61-7, dated April 14, 1961, subject "Qualification and Training Requirements for Pilots Other Than Pilots in Command," proposed, among other matters, to amend Parts 40, 41, and 42 to permit the competence checks of crewmembers and dispatchers to be given at any time during the month preceding or following the month in which they become due.

No adverse comments were received with respect to this particular portion of Draft Release 61-7. Accordingly, since it will permit more efficient administration of air carrier training programs and will not adversely affect safety of the carriers' operations, it is being adopted at this time separately from the other proposals which were included in the draft release. The phrase "not to exceed 12 months" contained in the present regulations and in Draft Release 61-7 has been changed to "each 12 months" to make the wording consistent with that of revised Part 41 (27 F.R. 1977), which was circulated as Draft Release 60-19 (26 F.R. 12299) prior to its adoption. The remaining proposals and the comments received thereon are being evaluated by the Agency in conjunction with comments received in response to Draft Release 61-17, "Use of Aircraft Simulators for Pilot Training and Proficiency Checks," and Draft Release 62-9, "Approval of Air Carrier Training Programs."

Interested persons have been afforded an opportunity to participate in the making of this regulation (26 F.R. 3438), and due consideration has been given to all relevant matter presented. Since this regulatory action imposes no additional burden on any person, it may be made effective on less than 30 days' notice.

Amendment revised paragraph (b) of section 40.289.

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