CIVIL AERONAUTICS MANUAL 40

U. S. Department of Commerce — Civil Aeronautics Administration

Civil Aeronautics Manuals and supplements thereto are issued by the Office of Aviation Safety, Civil Aeronautics Administration, for the guidance of the public and are published in the Federal Register and the Code of Federal Regulations.

Supplement No. 1 — May 1, 1954

SUBJECT: Revisions to Civil Aeronautics Manual 40 dated April 1954.

This supplement is issued to provide subscribers of CAM 40 with changes made necessary by recent CAR amendments and the following new material:

CAA policies which apply to 40.34 relative to two-way air-ground radio communication systems considered permissible by the Administrator.

CAA policies and interpretations which apply to 40.202 and 40.203 on providing oxygen for, and administering oxygen to, crew members and passengers in pressurized and non-pressurized cabin aircraft at various altitudes.

CAA interpretations which apply to 40.232 outlining the alternate airport requirements which apply when aircraft equipped with one VHF and one low frequency radio receiver are dispatched under IFR or over-the-top during weather conditions requiring an alternate airport.

Ink revisions:

1. Amend the definition "Dispatch release" in 40.5 by adding the word "release" after the word "dispatch".

2. Amend 40.51 (a) (16) by deleting the word "and" before the word "standards" and substituting in lieu thereof the word "or".

3. Amend 40.90 by deleting the reference "40.93" and substituting "40.94" in lieu thereof in each place where it appears.

4. Amend 40.302–2 (d) *Example 2* to read as follows:

Example 2.—A pilot was not currently qualified with respect to proficiency checks on April 1, 1954. His initial proficiency check qualification date is April 3, 1954, and April 1954 becomes his base month. The earliest date on which he can take the first of the two required proficiency checks is August 1, 1954, but not later than December 31, 1954. If he is given a proficiency check in August 1954, the earliest possible time for his second check will be December 1954 and the latest permissible time, April 1955. However, if he takes his second check in December 1954, then his next proficiency check must come within 8 months of that period or not later than the end of August 1955.

5. Amend 40.363 (b) (2) by deleting the word "feathered" and inserting in lieu thereof the word "inoperative".

6. Amend 40.385 by deleting the word "aircraft" and inserting in lieu thereof the word "airplane".

7. Amend 40.387 by deleting the word "aircraft" and inserting in lieu thereof the word "airplanes".

8. Amend 40.406 (a) by deleting the word "aircraft" and inserting in lieu thereof the word "airplane".

Remove and destroy the following pages:	Insert in lieu thereof the following pages (REV. 5/1/54):
iii–viii	III THRU VIII–1
17–18	17 THRU 18–1
33–34	33 THRU 34–1
39–48	39 THRU 48–4
55–58	55 THRU 58–1
61–62	61 THRU 62
71–72	71 THRU 72

Attachments:
Aviation Safety

A. S. KOCH, DIRECTOR.

Introductory Note

Civil Aeronautics manuals are publications issued by the Civil Aeronautics Administration to implement and explain the Civil Air Regulations. They include the Civil Air Regulations and are a convenient medium through which the public is appraised of CAA rules, interpretations, and policies.

CAA rules are issued pursuant to authority conferred upon the Administrator in the Civil Air Regulations. Such rules are mandatory and must be *complied with.*

CAA 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 administration in determining compliance with the regulations.

CAA policies provide recommended methods of complying with the Civil Air Regulations and are issued for the guidance of the public.

For convenience the Civil Air Regulations are quoted in bold face type ahead of the manual material. Both the regulation and the manual material are numbered in accordance with Federal Register regulations to facilitate the publication of the contents of the manual in the Code of Federal Regulations as required by the Administrative Procedure Act. For example, the CAR section identified as 40.18 is followed by related CAM sections designated as 40.18–1 and 40.18–2. The numbering system is applied to paragraphs and subdivision of paragraphs as follows:

40.18–1
(a), (b), (c), etc.
(1), (2), (3), etc.
(i), (ii), (iii), (iv), etc.
(*a*), (*b*), (*c*), etc.
(*1*), (*2*), (*3*), etc.
(*i*), (*ii*), (*iii*), (*iv*), etc.

This particular manual contains material interpreting and explaining the certification and operation rules for domestic scheduled interstate air carriers specified in Civil Air Regulations, Part 40, adopted by the Civil Aeronautics Board on April 13, 1953, and made effective April 1954. It supersedes all CAM supplements to Part 40 issued prior to April 1954, all CAM supplements to Part 61, and Aviation Releases 209, 250, 270, 278 and 320, as well as any contradictory material which may be found in any other Aviation Safety Release or like publication outstanding on the issuance date of this manual.

Table of Contents

Applicability and Definitions

Certification Rules and Operations Specifications Requirements

Requirements for Services and Facilities

Manual Requirements

Airplane Requirements

Airplane Performance Operating Limitations; Transport Category

Airplane Performance Operating Limitations; Nontransport Category

Special Airworthiness Requirements

Instruments and Equipment for All Operations

Instruments and Equipment for Special Operations

Radio Equipment

Maintenance and Inspection Requirements

Airman and Crew Member Requirements

Training Program

Flight Crew Member and Dispatcher Qualification

Flight Time Limitations

Duty Time Limitations; Aircraft Dispatcher

Flight Operations

air carrier including, but not limited to aircraft, airports, lighting facilities, maintenance facilities, communication and navigation facilities, fueling facilities, ground and aircraft radio facilities, and the competency of personnel to be used in the proposed operation.

40.30–2 *Proving flight requirements.* (*CAA policies which apply to 40.30.*)

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

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

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

"40.31 *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 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 for high-altitude operations IFR routes need not be approved."

"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, navigation and communications aids, and traffic control."

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

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

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

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

(d) *Facilities.*

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

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

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

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

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

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

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

(3) Obstructions on and in the vicinity of the airport shall be obstruction lighted insofar as practicable in accordance with the criteria contained in Civil Aeronautics Administration Obstruction Marking Manual.[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 Civil Aeronautics Administration Technical Standard Order N–19 shall apply.

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

"40.34 *Communications facilities.* The air carrier shall show that a two-way air/ground 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. (CAA policies which apply to 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 CAA 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 CAA or non-Government 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-Govern-

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

ment air-ground radio station and the appropriate air route traffic control units.

"40.35 *Weather reporting facilities.* The air carrier shall show that sufficient weather reporting services are available at such points along the route as are necessary to insure such weather reports and forecasts as are necessary for the operation. Weather reports used to control flight movements shall be those prepared and released by the U. S. Weather Bureau, or by a source approved by the Weather Bureau. Forecasts used to control flight movements shall be prepared from such weather reports."

"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."

"40.37 *Servicing and maintenance facilities.* The air carrier shall show that com-

weight as determined by application of the effective length to the appropriate take-off table (Figure 1 or 3) and by application of the actual runway length to the corresponding take-off 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 maximum allowable gross weight which will permit the particular aircraft to be accelerated and brought to a full stop within the actual length of available runway.

40.91–2 *Take-off limitations.* (*CAA policies which apply to 40.91.*)

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

"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;

"(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.* (*CAA rules which apply to 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 CAA Aviation Safety District Office charged with the over-all inspection of the air carriers operations.

"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.

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

40.93–1 *Landing distance limitations. (CAA rules which apply to 40.93.)*

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

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

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

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

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

"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 40.93: *Provided*, That the airplane can be brought to rest within 70 percent of the effective length of the runway."

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." [3]

[3] The requirements of sections 40.111 through 40.143 are taken directly from Part 04, as amended by Amendment 04–4, effective November 1, 1946, and are the requirements made applicable by the Board in Amendment 61–2, effective November 1, 1946, to all airplanes powered by engines of more than 600 horsepower each for maximum continuous operation when used in passenger service. As the requirements of Part 04 pertaining to liquid-cooling systems are not applicable, they have been omitted from this part.

"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 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 passengers 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

"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.* When operating conditions require the carriage of cargo which cannot be loaded in approved cargo racks, bins, or compartments which are separate from passenger compartments, such cargo may be carried in a passenger compartment if the following requirements are complied with: *Provided,* That the Administrator, under a particular set of circumstances, may authorize deviations from these requirements when he finds that safety will not be adversely affected and that it is in the public interest to carry such cargo:

"(a) It shall be packaged or covered in a manner to avoid possible injury to passengers.

"(b) It shall be properly secured in the airplane by means of safety belts or other tie-downs possessing sufficient strength to eliminate possibility of shifting under all normally anticipated flight and ground conditions.

"(c) It shall not be carried aft of or directly above seated passengers.

"(d) It shall not impose any loads on seats or on the floor structure which exceed the designed loads for those components.

"(e) It shall not be placed in any position which restricts the access to or use of any required emergency or regular exit or the use of the aisle between the crew and the passenger compartments."

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

Instrument 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 Man-

ual 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. (CAA interpretations which apply to 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.

40.170–2 *Determination of operable condition of radio equipment. (CAA interpretations which apply to 40.170 (b)).* 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 take-off, except by special ramp or shop performance check procedures, may be deemed to have been determined operable if equipment in this category is comprehensively checked for satisfactory operational performance during the last comprehensive performance check specified in the Operations Specifications, Aircraft Maintenance (other than pre-flight or daily), of the air carrier using such equipment coupled with frequent in-flight checks by pilots during regular operations.

"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 malfunction 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.

"(h) Magnetic compass.

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

"40.172 *Engine instruments for all operations.* The following engine instruments are required for all operations:

"(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 an automatic 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) On and after January 1, 1955, 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."

"40.173 *Emergency equipment for all operations.*

"(a) 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) On and after November 1, 1954, 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.* On and after January 1, 1955, all airplanes shall be equipped with at least one crash ax, and if accommodations are provided for more than 30 persons including the crew, airplanes shall be equipped with at least two crash axes. This equipment shall be stowed in readily accessible locations."

40.173–1 *Hand fire extinguishers for crew, passenger, and cargo compartments. (CAA interpretations which apply to 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.

"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,

"(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. *And provided further,* That the provisions of this paragraph with respect to required instruments and equipment other than flight instruments shall not be mandatory prior to July 1, 1955.

"(d) On and after December 1, 1954, 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 take-off 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 any emergency.

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

40.175–1 *Power supply requirements for operation of instruments.* (*CAA interpretations which apply to 40.175 (c).*)

(a) Instruments and equipment using an external power source are interpreted to mean all instruments and equipment which derive their operative or motive power from an external source such as radios, air driven instruments, electric gyro instruments, etc., as contrasted with spring driven clocks or magnetic compasses which have a self-contained power source.

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

"40.176 *Cockpit check procedure for all operations.* 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 designed 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 *Exit and evacuation marking for all operations.* After December 31, 1953, all airplanes shall comply with the provisions of this section.

"(a) Emergency exits of airplanes carrying passengers shall be clearly marked as such in letters not less than three-fourths of an inch high with luminous paint, such markings to be located either on or immediately adjacent to the pertinent exit and readily visible to passengers. Location and method of operation of the handles shall be marked with luminous paint.

"(b) The exterior areas of the fuselage of an airplane shall be marked to indicate the

location of mechanisms of access and those areas suitable for cutting to facilitate the escape and rescue of occupants in the event of an accident. *Provided,* That marking of areas suitable for cutting need not be applied prior to October 1, 1954."

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) Flashing position lights,

"(b) Two landing lights,

"(c) Two class 1 or class 1A landing flares,

"(d) 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,

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

"(f) 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.*

(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 on 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.* (*CAA interpretations which apply to 40.202 (b) (1).* 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.

40.202–2 *Oxygen requirements for standby crew members.* (*CAA interpretations which apply to 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.

40.202–3 *Operating instructions.* (*CAA policies which apply to 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.

40.202–4 *Oxygen requirements for jump seat occupant.* (*CAA policies which apply to 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.

40.202–5 *Oxygen requirements for infants-in-arms.* (*CAA policies which apply to 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.

40.202–6 *Oxygen requirements for clinical purposes.* (*CAA policies which apply to 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.

"40.203 *Supplemental oxygen requirements for pressurized cabin 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 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. (CAA policies which apply to 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 section 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 1 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.

40.203-2 *Computation of supply for passengers in pressurized cabin aircraft.* (*CAA policies which apply to 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.

40.203-3 *Oxygen requirements for clinical purposes.* (*CAA policies which apply to 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.

40.203–4 *Oxygen requirements for infants-in-arms (CAA policies which apply to 4b.203 (b)).* Provisions should be made for administering oxygen to infants-in-arms and additional oxygen over that required by 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: (1) A disposal plastic mask which can be fitted to the face; (2) an infant size BLB oro-nasal mask; and (3) semi-rigid 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.

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

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

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

40.205–2 *Protective breathing equipment and installation. (CAA policies which apply to 40.205.)*

(a) *Oxygen systems.* The 300-liter oxygen supply per flight crew member required by this requirement is intended to be used with a demand type oxygen system or a diluter-demand

type oxygen system with the lever of the diluter-demand regulator set at "100% 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 suplied 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.

"40.206 *Equipment for overwater operations.* (a) The following equipment shall be required for all extended overwater operations:

"(1) Life preserver or other adequate individual flotation device for each occupant of the airplane,

"(2) Lifesaving rafts sufficient in number to adequately carry all occupants of the airplane,

"(3) Suitable pyrotechnic signalling devices,

"(4) One portable emergency radio signalling 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, and

"(b) Rafts and life preservers referred to in paragraph (a) (1) and (2) of this section shall be installed so as to be available to the crew and passengers."

"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."

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 section 40.231 and section 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.* (*CAA interpretations which apply to 40.230.*) Radio systems are independent where each such system is separate and complete, and the function of any part 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.

"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 section

40.34) from any point on the route and with 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 navigation 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 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 by 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 satisfactorily 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. (CAA interpretations which apply to 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.

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

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

"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 operates airplanes of more than 12,500 pounds maximum certificated weight, the minimum pilot crew shall be 2 pilots.

"(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 coverage 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 emergency conditions only."

"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."

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;

"(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 takeoffs 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.

"(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 air-

plished in a synthetic trainer which contains the radio equipment and instruments necessary to simulate the navigational and let-down 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 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. Unless impracticable, such entry shall include a landing and takeoff under day VFR to permit the qualifying pilot to observe the airport and surrounding terrain, including any obstructions to landing and takeoff. The qualifying pilot shall occupy a seat in the pilot compartment and shall be accompanied by a pilot who is qualified at the airport.

"(d) On routes 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 by not less than two one-way trips as pilot or additional member of the crew over the route under VFR to permit the qualifying pilot to observe terrain along the route."

40.303–1 *Pilot route and airport qualification requirements. (CAA interpretations which apply to 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 514–A or a civil 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.

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 (d), if applicable.

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

"40.305 *Competence check; other pilots.* Prior to serving as pilot, and at least twice each 12 months thereafter at intervals of not less than 4 months nor more than 8 months, each pilot not being utilized as pilot in command shall demonstrate that he is capable of flying by instruments. This demonstration may be made to a pilot serving as pilot in command or a check pilot of the air carrier during scheduled flight."

"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. *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."

"40.310 *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 7 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 0–8 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 aircraft dispatchers 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 aircraft dispatchers, 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 1 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.

"(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 shall remain at their respective stations when the airplane is taking 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. All flight crew members shall keep their seat belts fastened when 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, excepting 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.* (*CAA interpretations which apply to 40.355 (a) and (b).*) The phrase "qualified on the airplane" means a certificated pilot holding a type rating for the aircraft utilized, or a co-pilot, not holding a type rating if he has met the qualification requirements of 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 take-off and landing.

"40.356 ***Admission to flight deck.*** For purposes of this section the Administrator shall determine what constitutes the flight deck of an airplane.

"(a) In addition to the crew members assigned to a particular airplane, CAA aviation safety agents and authorized representatives of the Board while in the performance of official duties shall be admitted to the flight deck of an airplane.

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,[4] or

"[4] 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 sub-paragraph (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) CAA Aviation Safety agents or other authorized representatives of the Civil Aeronautics Administration 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,

"(4) Certificated airmen of another air carrier who have been authorized by the air carrier concerned to make specific trips over the route."

40.356–1 *Admission to pilot compartment.* (*CAA interpretations which apply to 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.

"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.

"(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

the airport of takeoff as follows is specified in the dispatch release: *Provided,* That such alternate need not be selected if the ceiling and visibility respectively at the takeoff airport are at least 300 feet and 1 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 1 hour of flying time in still air at normal cruising speed with 1 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 1 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 2 hours before to 2 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 3 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 specified 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 1 mile; or ceiling 700 feet and visibility of 1½ miles; or ceiling 600 feet and visibility of 2 miles;

"(b) An airport served by an approved radio-navigational facility: Ceiling 1,000 feet and visibility of 1 mile; or ceiling 900 feet and visibility of 1½ miles; or ceiling 800 feet and visibility of 2 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 2 miles; if broken clouds, ceiling 1,000 feet above the elevation of the airport and visibility of 2 miles."

"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 necessary in the interest of safety."

"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 specified 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 section 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

tion 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 60 days."

"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 *Daily mechanical reports.*

"(a) Whenever a failure, malfunctioning, or other defect is detected in flight or on the ground in an airplane or airplane component which may reasonably be expected by the air carrier to cause a serious hazard in the operation of any airplane, a report shall be made of such failure, malfunctioning, or other defect to the Administrator. This report shall cover a 24-hour period beginning and ending at midnight, shall be submitted by 12 o'clock midnight of the following working day, or sooner if the seriousness of the malfunction or difficulty so warrants, and shall include as much of the following information as is available on the first daily report following such incidents.

"(1) Type and CAA identification number of the airplane, name of air carrier, and date;

"(2) Emergency procedure effected: unscheduled landing, dumping fuel, etc.;

"(3) Nature of condition fire, structural failure, etc.;

"(4) Identification of part and system involved, including the type designation of the major component;

"(5) Apparent cause of trouble: wear, cracks, design deficiency, personnel error, etc.;

"(6) Disposition: repaired, replaced, airplane grounded, etc.;

"(7) Brief narrative summary to supply any other pertinent data required for more complete identification, determination of seriousness, corrective action, etc.

"(b) These reports shall not be withheld pending accumulation of all of the information specified in paragraph (a) (1) through (7) of this section. When additional information is obtained relative to the incident, it shall be expeditiously submitted as a supplement to the original report, reference being made to the date and place of submission of the first report."

"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.

"(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."

"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 maintenance 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 60 days."

U. S. GOVERNMENT PRINTING OFFICE: 1954 O— 302349