Civil Aeronautics Manual 42a[1]

Certification and Operation Rules for Commercial Operators and Air Taxi Operators; Small Aircraft[1]

FEDERAL AVIATION AGENCY

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Introductory Note

This manual contains in a consolidated form (1) Civil Air Regulations Part 42, Irregular Air Carrier and Off-Route Rules, dated December 15, 1954, and the editorial changes required by Special Regulations SR–430 and SR–431, effective December 31, 1958, and February 13, 1959, respectively; and (2) the rules, policies, and interpretations issued by the Administrator of the Federal Aviation Agency in application to the various sections of the regulations. Civil Air Regulations Amendments 42–1 through 42–22 and 42–24 through 42–27 have been incorporated in the text. Amendment 42–23 which, except as provided in section 42.45g, does not become effective until January 1, 1961, has been included in appendix C.

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

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

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

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

This manual supersedes Civil Aeronautics Manual 42 dated August 1956, which was issued by the CAA as Volume VII of the Civil Aeronautics Manuals, and supplements 1 through 10 to that Volume. As amendments and other pertinent materials pertaining to Part 42 are issued, they will be included in this manual.

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Addendum

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[Certification and Operation Rules for Commercial Operators and Air Taxi Operators; Small Aircraft]

General

[42a.0 *Applicability of this part.* The certification and operations provisions of this part apply to air taxi operations as defined in section 298.2(b) of the Board's Economic Regulations and the operations provisions apply to commercial operators, as defined in section 42.5, using small aircraft only.]

[42a.0-1] *Charter flights or other special services (FAA policies which apply to sec. [42a.0]).*

(a) *General.* The policies provided in this section will be applied by the Federal Aviation Agency in amending a scheduled air carrier operating certificate to authorize charter flights or other special services.

(b) *Authority.* Upon application, a scheduled air carrier electing under section 42.0 (b) to conduct charter trips or other special services pursuant to the provisions of its scheduled air carrier operating certificate, may have such certificate amended to authorize such operations.

(c) *Application for amendment.* Application for this amendment will consist of submission of form ACA-1014, Operations Specifications, available at the local district office.[1] On the face (blank side) of the form, the air carrier will list all the operations for which authorization is desired, as outlined in paragraph (d) of this section. The air carrier will also complete the upper half of the back of the form, and submit the signed original and four copies to the local inspector.[2]

(d) *Operations specifications.* The amended scheduled air carrier operating certificate will include form ACA-1014, Operations Specifications, and an amendment to the scheduled air carrier operating certificate. The amendment will be issued by the FAA regional office having direct inspectional responsibility for the principal operations of the air carrier. The form ACA-1014 will be prepared by the applicant; and will be prefaced by the statement: "Charter Flights or Other Special Services are authorized in the following category and class aircraft under the conditions specified and within the areas of operation listed."; and will specify the category and class of aircraft authorized to be used (e. g., Airplane Multiengine Land); the flight conditions under which operations are authorized (e. g., VFR (Day), VFR (Night), IFR (Day), IFR (Night); whether the carriage of passengers, cargo, or both is authorized; and the areas of operation (e. g., continental United States, and specific United States territories or possessions and foreign countries or possessions).

(e) *Operation outside the United States, its territories or possessions.* When applying for an amendment to a scheduled air carrier operating certificate to include charter or other special services outside the United States, its territories or possessions, the following paragraph will also be included on the form ACA-1014:

When operating aircraft pursuant to the terms of this certificate and these operations specifications over or within any foreign country, the air carrier shall comply with the provisions of the air traffic rules of such country, including any special air traffic rules applicable to air carriers, except where any rule prescribed in the Civil Air Regulations is more restrictive

[1] "District office", unless otherwise specified means "Bureau of Flight Standards District Office."

[2] "Inspector", unless otherwise specified means "Bureau of Flight Standards Inspector."

and may be followed without violating the rules of such country.

(f) *Area of operation.*

(1) The air carrier should specify in the space provided under the section of the operations specifications entitled "Area of Operation Authorized" the proposed areas of operation.

(2) If the air carrier is able to show to the satisfaction of the assigned inspector that it is able to conduct charter flights or special services on a worldwide basis, the following phraseology should be used in filling out the section of the operations specifications pertaining to area of operation:

> "The air carrier is authorized to conduct charter flights or other special services within the United States and between any point within the United States and any point outside thereof."

(3) If the air carrier does not desire to conduct charter operations to the extent indicated in subparagraph (2) of this paragraph, the specific areas to and from which charter operations are contemplated should be listed in the operations specifications. Such listing should show the particular countries or possessions of such countries instead of continental areas. Operations within the United States should be shown as "Continental United States". When a country or possession is comprised of a number of islands, the island group rather than the individual islands should be listed.

(g) *Flight operations and maintenance manuals.* Prior to the conduct of operations off route, the Flight Operations and Maintenance Manuals will be revised to incorporate additional instructions to flight and ground personnel for the operation, servicing and handling of the aircraft used in this type of service.

(h) *Scheduled air carriers holding irregular air carrier operating certificates.* A scheduled air carrier holding an irregular air carrier operating certificate may conduct charter flights or other special services both on route and off route under the provisions of such certificate and this part without amending its scheduled air carrier operating certificate in accordance with the above. However, if a scheduled air carrier, holding an irregular operating certificate elects to amend its scheduled operating certificate to include charter flights or other special services, the irregular operating certificate will be surrendered to the Federal Aviation Agency for cancellation at the time the amendment to the scheduled operating certificate becomes effective.

(Published in 15 F. R. 3150, May 24, 1950, effective upon publication in the Federal Register; amended in 18 F. R. 1719, Mar. 27, 1953, effective Apr. 15, 1953 further amended in 21 F. R. 1697, Mar. 17, 1956 effective May 17, 1956; amended effective June 15, 1957.)

[42a.0–2] *Provisions of [Part 42a] which are applicable to air taxi operators (FAA interpretations which apply to sec. [42a.0] and SR–395A).* See appendix B.

(Published in 19 F. R. 1601, Mar. 25, 1954, effective Apr. 1, 1954; amended effective June 15, 1957.)

[42a.0–3] *Operations for which an Air Taxi Operator Certificate is not required (FAA interpretations which apply to sec. [42a.0] and SR–395A).* See appendix B.

(Published in 19 F. R. 1601, Mar. 25, 1954, effective Apr. 1, 1954; amended effective June 15, 1957.)

[42a.1] ***Definitions.*** **As used in this part the words listed below shall be defined as follows:**

Accelerate-stop distance. **Accelerate-stop distance is the distance required to reach the critical point of takeoff and, assuming failure of the critical engine at that point, to bring the airplane to a stop using approved braking means. (See the airworthiness requirements under which the airplane was type certificated for the manner in which such distance is determined.)**

Air carrier. **Air carrier means any citizen of the United States who undertakes directly the carriage by aircraft of persons or property as a common carrier for compensation or hire, whether such carriage is wholly by aircraft or partly by aircraft and partly by other forms of transportation between any of the following places: A place in any State of the United States, or the District of Columbia, and a place in any other State of the United States, or the District of Columbia; places in the same State**

of the United States through the airspace over any place outside thereof; places in the same Territory or possession of the United States, or the District of Columbia; a place in any State of the United States, or the District of Columbia, and any place in a Territory or possession of the United States, and a place in any other Territory or possession of the United States; a place in the United States and any place outside thereof; or the carriage of mail by aircraft.

Alaskan air carrier. Alaskan air carrier includes any air carrier subject to the provisions of Part 292 [1] of this chapter as heretofore or hereafter amended.

[1] Part 292 currently provides that Alaskan air carriers shall include certificated and noncertificated air carriers engaging solely in air transportion within the State of Alaska.

Alternate airport. An alternate airport is one listed in the flight plan as a point to which a flight may be directed if, subsequent to departure, a landing at the point of intended destination becomes inadvisable.

Approach or takeoff area. The approach or takeoff area shall be an area symmetrical about a line coinciding with and prolonging the center line of the runway, or the most probable landing or takeoff path for instrument approaches where there is a multiplicity of parallel runways, or a large hard-surfaced area continuously available for landing or takeoff. This area shall be assumed to extend longitudinally in a straight line from the intersection of the obstruction clearance line with the runway to the most remote obstacle touched by the obstruction clearance line and in no case less than 1,500 feet. Thence, it shall be assumed to continue in a path consistent with the instrument approach or takeoff procedures for the runway in question or, where such procedures are not specified, consistent with turns of at least 4,000 feet in radius. It shall be further assumed to extend laterally at the point of intersection of the obstruction clearance line with the runway 200 feet on each side of such center line. This distance shall increase uniformly to 500 feet on each side of such center line at a longitudinal distance of 1,500 feet from such point of intersection. Thereafter, this distance shall be assumed to be 500 feet on each side of such center line.

Approved. Approved, when used either alone or as modifying other words such as "means," "method," "action," etc., shall mean approved by the Administrator.

Check pilot. Check pilot is a pilot authorized by the Administrator to check pilots of the air carrier for such items as familiarity with en route procedures and piloting technique.

Crewmember. Crewmember means any individual assigned by the air carrier for the performance of duty on the aircraft in flight.

Critical engine. The critical engine is the engine the failure of which gives the most adverse effect on the performance characteristics of the aircraft. (See the airworthiness requirements under which the airplane was type certificated for the manner in which such engine is determined.)

Critical-engine-failure speed. The critical-engine-failure speed is a true indicated air speed, selected by the aircraft manufacturer, at which the takeoff may be safely continued even though the critical engine becomes suddenly inoperative. (See the airworthiness requirements under which the airplane was type certificated for the manner in which such speed is determined.)

Critical point of takeoff. The critical point of takeoff is that point beyond which the aircraft cannot be brought to a safe stop in the event of failure of the critical engine. (See the airworthiness requirements under which the airplane was type certificated for the manner in which such point is determined.)

Effective length of runway. The effective length of runway is the distance from the point where the obstruction clearance line intersects the runway to the far end thereof.

Exclusive use of aircraft. Exclusive use of an aircraft means that an air carrier has the sole possession, control, and use of an aircraft for flight arising from either (i) a lease or other agreement or arrangement under which the air carrier is to have the right to such possession, control, and use for a period of at least six consecutive months from the date of such lease or other agreement or arrangement,[2] or (ii) ownership of the aircraft.

[2] Attention is invited to the provisions of sec. 408 of the Federal Aviation Act of 1958, as amended (72 Stat. 767, 49 U.S.C. 1378) which, in certain cases, regulates sales, leases of, or contracts for use of aircraft between air carriers, or other persons engaged in any phase of aeronautics, and

which may require that prior Civil Aeronautics Board approval of such arrangements be obtained. Attention is further invited to the fact that aircraft leased from United States Government agencies may not ordinarily be subleased without prior approval of the lessor.

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

Flight crewmember. Flight crewmember means a pilot, flight radio operator, flight engineer, or flight navigator assigned to flight duty on the aircraft.

Flight time. Flight time shall mean the total time from the moment the aircraft first moves under its own power for the purpose of flight until the moment it comes to rest at the end of the flight.

IFR. The symbol used to designate instrument flight rules.

Irregular air carrier. Irregular air carrier includes any air carrier subject to the provisions of Part 291 of this chapter as heretofore or hereafter amended.

Large aircraft. Aircraft of 12,500 pounds or more maximum certificated takeoff weight shall be considered large aircraft.

Maximum certificated takeoff weight. Maximum certificated takeoff weight shall mean the maximum takeoff weight authorized by the terms of the aircraft airworthiness certificate.[3]

[3] Note that the aircraft airworthiness certificate incorporates as a part thereof an airplane operating record or an airplane flight manual which contains the pertinent limitation.

Minimum control speed. The minimum control speed is the minimum speed at which the airplane can be maintained in straight flight after an engine suddenly becomes inoperative. (See the airworthiness requirements under which the airplane was type certificated for the manner in which such speed is determined.)

Night. Night is the time between the ending of evening twilight and the beginning of morning twilight as published in the Nautical Almanac converted to local time for the locality concerned.[4]

[4] The Nautical Almanac containing the ending of evening twilight and the beginning of morning twilight tables may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Information is also available concerning such tables in FAA Airport Traffic Control Towers and Communications Stations or the United States Weather Bureau.

Obstruction clearance line. The obstruction clearance line is a line drawn tangent to or clearing all obstructions showing in a profile of the approach or takeoff area which has a slope to the horizontal of 1/20.

Passenger-carrying aircraft. An aircraft carrying any individual other than a flight crew or crewmember, company employee, or an authorized Government representative shall be considered a passenger-carrying aircraft.

Pilot compartment. Pilot compartment means that part of the aircraft designed for the use of the flight crew.

Pilot in command. Pilot in command shall mean the pilot responsible for the operation and safety of the aircraft during the time defined as flight time.

Point-of-no-return. Point-of-no-return means the point beyond which the aircraft no longer has sufficient fuel, under existing conditions, to return to the point of departure or any alternate for that point.

Power-off stall speed. The power-off stall speed is the minimum steady flight speed at which the airplane with engines idling is controllable in the landing configuration. (See the airworthiness requirements under which the airplane was type certificated for the manner in which such speed is determined.)

Rating. Rating is an authorization issued with a certificate, and forming a part thereof, stating special conditions, privileges, or limitations pertaining to such certificate.

Runway. A runway is a hard-surfaced area normally used for the landing or takeoff of airplanes. An unpaved area at the end of a paved area may be considered as part of a runway if it is smooth and firm enough to permit an airplane to traverse it safely.

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

[(Amendment 42-23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)]

Second pilot. Second pilot shall include any pilot other than the pilot in command assigned as a member of the flight crew.

Small aircraft. Aircraft of less than 12,500 pounds maximum certificated takeoff weight shall be considered small aircraft.

Transport category aircraft. Transport category aircraft are aircraft which have been certificated in accordance with the requirements of Part 4b of this subchapter, or under the transport category performance requirements of Part 4a of this subchapter.

Type. Type shall mean all aircraft of the same basic design, including all modifications thereto except those modifications which result in a change in handling or flight characteristics.

VFR. The symbol used to designate visual flight rules.

V_{S_0}. V_{S_0} means the power-off true-indicated stalling speed of an aircraft. (See the airworthiness requirements under which the airplane was type certificated for the manner in which V_{S_0} is determined.)

42.1–1 *Flight time (FAA interpretations which apply to sec. 42.1).* This is construed to mean from "block to block."

(Published in 14 F. R. 7032, Nov. 22, 1949, effective upon publication; amended effective June 15, 1957.)

42.1–2 *Twilight (FAA interpretations which apply to sec. 42.1).* The twilight referred to in this section is deemed to mean civil twilight. "The duration of civil twilight is the interval in the evening from sunset until the time when the center of the sun is 6 degrees below the horizon; or the corresponding interval in the morning between sunrise and the time at which the sun was still 6 degrees below the horizon."[3]

(Published in 14 F. R. 7032, Nov. 22, 1949, effective upon publication; amended effective June 15, 1957.)

42.2 *Deviation authority.*

(a) Contrary provisions of this part notwithstanding,

(1) The Administrator may, upon application by an appropriately certificated air carrier conducting, or intending to conduct, operations pursuant to a contract with the military services (primary contractor), or an appropriately certificated air carrier conducting operations for the military services pursuant to a subcontract with a primary contractor, authorize such air carrier to deviate from the applicable provisions of this part, subject to any terms and conditions that the Administrator shall find are necessary in the interest of safety: *Provided,* That the Department of Defense certifies to the Administrator that the subject operation is essential to the national defense and requires the requested deviation: *And provided further,* That the granting of a deviation shall not be based upon an economic advantage or convenience to either the air carrier or the government, or both.

(2) The Administrator may, upon application by an appropriately certificated air carrier, authorize an air carrier proposing to conduct operations under conditions of an emergency necessitating the transportation of persons or supplies for the protection of life or property, to deviate from any provision of this part to the extent that the Administrator finds that a deviation from this part is necessary for the expeditious conduct of such operations.

(b) Any deviation authority granted by the Administrator pursuant to this section shall be limited to those military contract operations certified by the Department of Defense as essential to the national defense, or operations conducted under conditions of an emergency as determined by the Administrator and shall not be applicable to any other type of operation.

(c) The Administrator shall, in any authorization granted pursuant to this section, specify the terms, conditions, and limitations of the authorization for the deviation and each air carrier shall, in the conduct of these operations, comply with such terms, conditions, and limitations.

(d) Grants of deviation authority issued pursuant to this section may be terminated at any time by the Administrator.

(e) Authorized deviations now in existence shall be continued in effect in accordance with their terms and conditions until 90 days after the effective date of this amendment, or upon their stated expiration date, whichever shall first occur, unless reissued pursuant to this section.

Certificate Rules

42.5 *Certificate issuance.*

(a) *General.* An air carrier operating certificate, describing the operations authorized and prescribing such operating specifications and limitations as may be reasonably required in the interest of safety, shall be issued by the Administrator to a properly qualified citizen of the United States possessing appropriate economic authority granted by the Board pursuant to Title IV of the Federal Aviation Act of 1958, as amended, who is capable of conducting

[3] Tables of Sunrise, Sunset, and Twilight, supplement to the American Ephemeris, 1946, issued by the Nautical Almanac Office, United States Naval Observatory. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

the proposed operations in accordance with the applicable requirements hereinafter specified. Application for a certificate, or application for amendment thereof, shall be made in a manner and contain information prescribed by the Administrator. No person subject to the provisions of this part shall operate in air transportation without, or in violation of the terms of, an air carrier operating certificate.

[NOTE: The inspection and processing by the FAA of an application for an air carrier operating certificate where large aircraft are to be used may require up to 60 days from the date of filing. An applicant should consider this in planning his operations.]

[(Amendment 42-43, published in 27 F.R. 8424, Aug. 23, 1962, effective Aug. 23, 1962.)]

(b) ***Exceptions.*** **Whenever upon investigation the Administrator finds that the general standards of safety required for air carrier operations require or permit a deviation from any specific requirement of this part, he may issue an air carrier operating certificate or amendment providing for such deviation.**

42.5–1 *Appropriate economic authority (FAA interpretations which apply to sec. 42.5 (a)).* The term "appropriate economic authority" as used in section 42.5 (a) means economic authority from the Board to engage in the air carrier operations for which the air carrier operating certificate is issued.

(Published in 18 F. R. 1719, Mar. 27, 1953, effective Apr. 15, 1953.)

42.5–2 *Application for an Irregular Air Carrier Operating Certificate (FAA rules which apply to sec. 42.5).*

(a) Application for an irregular air carrier operating certificate will be made in triplicate on form ACA–1602, provided for this purpose by the Administrator. The application form may be obtained by contacting the local inspector. When the requirements, as prescribed in this part, have been met, the applicant should present his application to the local inspector and arrange for inspection of his flight equipment and all ground facilities.

(b) Where inspection of the applicant indicates that he is capable of conducting the proposed operation in accordance with applicable requirements, an irregular air carrier operating certificate will be issued, together with operations specifications, which become a part thereof, and will specify the carriage of passengers, cargo, or both; the category and class of aircraft (e. g. airplane single engine land); and the flight conditions under which operations are authorized (e. g. VFR (Day), VFR (Night), IFR (Day), IFR (Night)).

(Published in 14 F. R. 7032, Nov. 22, 1949, effective Nov. 22, 1949; amended effective June 15, 1957.)

42.5–3 *Application for amendment (FAA rules which apply to sec. 42.5).* Application for amendment of existing operations authorizations listed in the Operations Specifications shall be made on form ACA–1014, Operations Specifications, available at the local district office. On the face (blank side) of the form, the air carrier should list all the operations for which authorization is desired; i. e., show operations for which approval is requested and omit the operations no longer desired or for which he is no longer qualified. The air carrier should also complete the upper half of the back of the form and submit the signed original and four copies to the local inspector.

(Published in 14 F. R. 7033, Nov. 22, 1949, effective Nov. 22, 1949; amended effective June 15, 1957.)

42.5–4 *Application for overseas and international authorization (FAA rules which apply to sec. 42.5).* Application for overseas and international authorization shall be made to the local inspector in the following manner:

(a) An applicant desiring to engage in overseas and international air transportation shall so indicate in the space provided on form ACA–1602.

(b) The following information must be attached to the application:

(1) List of foreign areas for which operations specifications are desired.

(2) Points between which operations are contemplated.

(3) Type of activity; e. g., cargo, passengers, or a combination of both, etc.

(4) Statement to the effect that diplomatic clearances have been or will be obtained prior to departure either directly or through State Department channels for entry into, or flight over, all of the foreign countries involved. (Indicate which and duration.)

(5) Arrangements which the company has completed or contemplates for the servicing and maintenance of aircraft and equipment abroad.

(6) An outline of the method by which control will be exercised by company head-

quarters over operations outside the continental limits of the United States or its territories. (In lieu thereof, when a single aircraft and individual are involved, appropriate addresses in foreign countries through which the operator may be reached by normal communication channels.)

(c) An irregular air carrier possessing an irregular air carrier operating certificate, who desires to amend such certificate to include overseas and international operations authorization, shall make application on form ACA-1014 and submit it to the local inspector, together with the information required by paragraph (b) of this section.

(d) Any operator or pilot contemplating foreign flight should be well-acquainted with the airports of entry, fields to he visited, navigational facilities availahle, air laws, public health, customs, and any other requirements established by the country or countries into which operations are to be conducted.[4]

(Published in 14 F. R. 7033, Nov. 22, 1949, effective Nov. 22, 1949; amended effective June 15, 1957.)

42.5–5 *Application for an Air Taxi Operator Certificate (FAA rules which apply to sec. 42.5 and SR–395A).* See appendix B.

(Published in 19 F. R. 1602, Mar. 25, 1954, effective Apr. 1, 1954; amended effective June 15, 1957.

42.5–6 *Amendment and reissuance of Air Taxi Operator Certificates (FAA rules which apply to sec. 42.5).* See appendix B.

(Published in 19 F. R. 1602, Mar. 25, 1954, effective Apr. 1, 1954.)

42.5–7 *Application for worldwide operation (FAA policies which apply to sec. 42.5).* If the air carrier is able to show to the satisfaction of the assigned inspector that it is able to conduct operations on a worldwide basis, the following phraseology should be used by the air carrier in filling out the section of the operations specifications pertaining to area of operation:

> "The air carrier is authorized to conduct operations between any point within the United States and any point outside thereof."

If the air carrier does not desire to conduct operations on a worldwide basis or the assigned inspector finds that it is not able to do so, the specific areas to and from which operations are authorized should be listed in the operations specifications. Such listing should show the particular countries or possessions of such countries instead of continental areas. When a country or possession is comprised of a number of islands, the island group rather than the individual should be listed.

(Published in 21 F. R. 2586, Apr. 20, 1956, effective May 15, 1956; amended effective June 15, 1957.)

42.5–8 *International air taxi operations (FAA policies which apply to sec. 42.5 and SR–395A).* See appendix B.

(Published in 22 F. R., effective June 15, 1957.)

42.6 *Duration and renewal.*

(a) An air carrier operating certificate issued under this part, shall expire one year from date of issuance thereof, unless such certificate is renewed by the Administrator or such certificate has been sooner surrendered, suspended, or revoked.

(b) The Administrator shall renew an air carrier operating certificate if, upon inspection and examination, he finds that the air carrier meets the current requirements of the regulations in this subchapter for issuance of any such certificate. Evidence of renewal of air carrier operating certificates issued subsequent to July 1, 1950, shall be made a part of the air carrier operating certificate in such form and manner as the Administrator may prescribe.

(c) Application for renewal of an air carrier operating certificate shall be made no later than 60 days prior to the expiration thereof, and shall be made in the form and manner prescribed by the Administrator.

42.7 *Display.* The air carrier operating certificate shall be kept available at the carrier's principal operations office for inspection by any authorized representative of the Administrator or Board.

42.8 *Inspection.* Any authorized representative of the Administrator shall be permitted at any time and place to make inspections or examinations to determine the air carrier's compliance with the regulations in this subchapter.

[4] This information is normally contained in the International Flight Information Manual obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. (Price 50 cents.)

42.9 *Operations base, maintenance base, and/or office.* Each irregular air carrier shall give written notice to the Administrator of his principal business office, his principal operations base, and principal maintenance base. Thereafter the air carrier shall not change his principal operations or maintenance base without having secured prior approval of the Administrator of the new base or bases, nor shall the air carrier change his principal business office without advance notice thereof to the Administrator.

42.9–1 *Notice (FAA rules which apply to sec. 42.9).* Three copies of each notice, in letter form, shall be delivered by the air carrier to the district office of the Federal Aviation Agency serving the air carrier's principal business office, operations base, or maintenance base, whichever is appropriate, in order to give notice to the Administrator.

(Published in 14 F. R. 7033, Nov. 22, 1949, effective upon publication.)

Aircraft Requirements

42.11 *Aircraft required.* An air carrier shall have the exclusive use of at least one aircraft. All aircraft used in the carriage of persons or property for compensation or hire shall be certificated in accordance with standard airworthiness requirements. No air carrier shall operate a large aircraft for the carriage of goods or persons for compensation or hire unless (a) the air carrier has the exclusive use of such aircraft, (b) the Administrator has found such aircraft safe for the service to be offered and has listed such aircraft in the air carrier operating certificate, and (c) such aircraft is not listed in the air carrier operating certificate or commercial operator certificate of any other air carrier or commercial operator.

42.11–1 *Listing of aircraft (FAA rules which apply to sec. 42.11).* When an air carrier utilizes large aircraft, they shall be listed in the Operations Specifications—Aircraft Identification, form ACA–1014. When an aircraft is no longer regularly used in the air carrier's operation, it must be deleted from the Operations Specifications—Aircraft Identification, form ACA–1014. Prior to listing any aircraft in the operations specifications, the following standards shall be met:

(a) The aircraft must be properly registered and there shall be conspicuously displayed in the aircraft a current Airworthiness Certificate accompanied by an appropriate Operations Record or Airplane Flight Manual.

(b) The basic empty weight of the aircraft shall be provided and procedures effected to include the aircraft in the air carrier's weight control system.

(c) Proper application covering the maintenance of all the pertinent components of the aircraft in the maintenance manual must be submitted.

(d) The aircraft shall have the required equipment installed and shall show compliance with other requirements of applicable regulations in this subchapter (i. e., the Civil Air Regulations), the Air Carrier Operating Certificate, and operational or route requirements. Required equipment shall include an adequate number of emergency exits for rapid evacuation in the event of an emergency or crash landing. The installation, operation, and marking of required emergency exits must comply with the pertinent airworthiness regulations. Emergency exits of passenger-carrying aircraft shall be clearly marked with luminous paint. Such markings are 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. In those instances where aircraft are, on occasion, utilized in combination cargo/passenger operation, the aircraft shall be so loaded that emergency exits will be readily accessible in direct proportion to available passenger seats.

(e) The aircraft, its components and accessories shall be in such condition initially that application of the maintenance time limitations listed in the maintenance manual covering overhaul and inspection periods will provide a continuous state of airworthiness.

(Published in 14 F. R. 7033, Nov. 22, 1949, effective upon publication; amended in 16 F. R. 926, Feb. 1, 1951, effective upon publication; amended in 18 F. R. 1719, Mar. 27, 1953, effective Apr. 15, 1953.)

42.11–2 *Listing of small aircraft (FAA interpretations which apply to sec. 42.11).* See appendix B.

(Published in 19 F. R. 1602, Mar. 25, 1954, effective Apr. 1, 1954.)

42.12 *Fire prevention requirements.* All airplanes used in passenger service, powered by engines rated at more than 600 horsepower each for maximum continuous operation shall comply with the applicable fire prevention requirements of Part 4b of this subchapter in effect on or after November 1, 1946, except that fire detectors of the heat type shall be acceptable in lieu of smoke detectors for installation in Class "B" and "C" cargo compartments: *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.

42.13 *Engine rotation.* Multiengine aircraft having any engine rated at more than 480 h. p. for maximum continuous operation shall be so equipped that the rotation of each such engine can be stopped promptly in flight, except that for turbine engine installations means for completely stopping the rotation need be provided only if the Administrator finds that rotation could jeopardize the safety of the aircraft.

42.14 *Minimum performance requirements for all aircraft.* Except as otherwise provided in this part, no air carrier shall use any aircraft unless it meets such operating limitations as the Administrator determines will provide a safe relation between the performance of the aircraft and the airports to be used and the areas to be traversed. In determining compliance with the applicable airworthiness requirements and operating limitations, a weight and balance control system approved by the Administrator based upon average, assumed, or estimated weights may be utilized.

42.14–1 *Takeoff performance limitations for large aircraft (FAA rules which apply to sec. 42.14).* Whenever large aircraft are utilized in cargo operation, the following takeoff performance limitations shall apply:

(a) Transport category airplanes shall be operated in compliance with the provisions of sections 42.70 (b), 42.71 (b), and 42.72.

(b) Nontransport category airplanes shall be operated in compliance with the provisions of section 42.81 and shall meet the en route one-engine inoperative climb requirement of section 42.82 at an altitude of 1,000 feet above the airport from which the takeoff is being made. The pertinent performance limitations data published under sections 42.80–1, 42.80–2, 42.80–3, 42.80–4, 42.80–5, 42.80–7 and 42.80–8 shall be used in determining compliance with section 42.81.

(Published in 18 F. R. 766, Feb. 6, 1953, effective Feb. 15, 1953.)

42.15 *Airplane certification requirements for large airplanes used in passenger operations.*

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

(1) Retain their present airworthiness certification status and meet the requirements of section 42.80, or

(2) Comply with either the performance requirements of sections 4a.737–T through 4a.750–T of this subchapter or the performance requirements of sections 4b.110 through 4b.125 of this subchapter and in addition shall meet the requirements of sections 42.70 through 42.78: *Provided,* That should any type be so qualified all airplanes of any one operator of the same or related types shall be similarly qualified and operated.

(b) *Airplanes certificated after June 30, 1942.* Airplanes certificated as a basic type after June 30, 1942, shall be certificated as transport category airplanes and shall meet the requirements of section 42.70.

42.16 *Aircraft limitations for IFR and land aircraft overwater operations.* When passengers are carried, no air carrier shall use any aircraft under IFR weather conditions or

any land aircraft in overwater operations except as follows:

(a) *IFR operations.* Aircraft shall be multiengine with fully functioning dual controls and shall meet the appropriate en route operating limitations of section 42.74 or section 42.82.

(b) *Overwater operations.* Land aircraft shall be multiengine and shall meet the appropriate en route operating requirements of section 42.74 or section 42.82, unless the overwater operation consists only of takeoffs and landings or the aircraft is flown at such an altitude that it can reach land in the event of power failure.

42.16–1 *En route performance limitations (FAA policies which apply to sec. 42.16(b)).* Performance data applicable to this section are published under section 42.80.

(Published in 15 F. R. 83, Jan. 10, 1950, effective Jan. 1, 1950; amended in 18 F. R. 1719, Mar. 27, 1953, effective Apr. 15, 1953.)

[*42.17 Proving tests for large aircraft.*

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

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

[(1) Is materially altered in design, or

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

[NOTE: A type of aircraft will be considered to be materially altered in design when the alterations include, but are not necessarily limited to: (a) Installation of powerplants other than the powerplants of a type similar to those with which the aircraft is certificated; (b) major alteration to the aircraft or its components which materially affects the flight characteristics.

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

[(Added by Amendment 42–40, published in 27 F.R. 5391, June 7, 1962, effective July 9, 1962.)]

Aircraft Equipment

42.21 *Basic required instruments and equipment for aircraft.* The following instruments and equipment acceptable to the Administrator for the type of operations specified shall be installed and in serviceable condition in all aircraft, except that the Administrator may permit or require different instrumentation or equipment for turbine-powered aircraft to provide equivalent safety:

(a) *VFR (day).* For day VFR flight the following is required:

(1) Air-speed indicator,

(2) Altimeter,

(3) Magnetic direction indicator,

(4) Tachometer for each engine,

(5) Oil pressure gauge for each engine using pressure system,

(6) Coolant temperature gauge for each liquid-cooled engine,

(7) Oil temperature gauge for each air-cooled engine,

(8) Manifold pressure gauge or equivalent when required for the proper operation of the engine,

(9) Fuel gauge indicating the quantity of fuel in each tank,

(10) Position indicators for retractable landing gear and flaps: *Provided,* That the Administrator may approve operation of aircraft of less than 12,500 pounds maximum certificated takeoff weight without a position indicator for flaps in the event he finds that the position of the flaps is readily determinable either by direct visual inspection from the cockpit or by other adequate means,

(11) An approved seat and an approved safety belt for each occupant. In no case shall the rated strength of a safety belt be less than that corresponding with the ultimate load factors specified in the pertinent currently effective aircraft airworthiness parts of the

(2) Carburetor temperature gauge,

(3) Carburetor heating or de-icing equipment for each engine,

(4) Set of approved forward and rear position lights,

(5) At least one landing light,

(6) [Deleted.]

[(Amendment 42-33, published in 26 F.R. 8882, Sept. 21, 1961, effective Sept. 21, 1961.)]

(7) Two-way radio communications system and navigational equipment appropriate to the ground facilities to be used,

(8) Generator of adequate capacity,

(9) One set of instrument lights.

(c) *IFR (day).* For day IFR flight the following is required:

(1) Instruments and equipment specified in paragraph (a) of this section,

(2) Two-way radio communications system and navigational equipment appropriate to the ground facilities to be used,

(3) Gyroscopic rate-of-turn indicator,

(4) Bank indicator,

(5) Rate-of-climb indicator,

(6) Artificial horizon indicator,

(7) Sensitive altimeter adjustable for changes in barometric pressure, in lieu of paragraph (a) (2) of this section,

(8) Clock with a sweep-second hand,

(9) One gryo direction indicator,

(10) Generator of adequate capacity,

(11) One outside air temperature gauge easily readable from the pilot's position,

(12) One carburetor temperature gauge or equivalent approved device,

(13) Power failure warning means or vacuum gauge on instrument panel connecting to lines leading to gyroscopic instruments,

(14) Carburetor heating or de-icing equipment for each engine,

(15) Heated pitot tube for each airspeed indicator,

(d) *IFR (night).* For night IFR flight the following is required:

(1) Instruments and equipment specified in paragraphs (a), (b), and (c) of this section: *Provided,* That when any requirements under paragraphs (a), (b), or (c) of this section are identical, such requirements need not be duplicated.

42.21-1 *Seats and safety belts (FAA rules which apply to sec. 42.21 (a) (11)).* The installation and use of an approved seat and approved individual seat belt for each person over 2 years of age is required. When a child under 2 years of age is held by an adult person, the safety belt shall be used only for the adult. In small aircraft, it will be permissible to carry persons in excess of the number specified in the pertinent aircraft specification; *Provided,* That the seat or seats occupied by such persons are adequate for side-by-side seating; and a safety belt is provided for each seat. Such belt shall not be used for more persons than the number for which it is approved. In any case, the maximum certificated takeoff weight, and allowable c. g. limits of the aircraft shall not be exceeded.

(Published in 14 F. R. 7034, Nov. 22, 1949, effective upon publication.)

42.21-2 *Fire extinguishers (FAA rules which apply to sec. 42.21 (a) (12)).*

(a) A portable fire extinguisher, which shall be of an approved type, shall have a minimum capacity, if carbon tetrachloride, of 1 quart, or, if carbon dioxide, of 2 pounds, or, if other, of equivalent effectiveness.

(b) On transport-type aircraft, fire extinguishers shall be installed so as to be accessible to the passengers and ground personnel. This may be done by securing the extinguisher near the main external cabin door. An extinguisher shall be readily available to the pilot and copilot.

(c) An approved type fire extinguisher is one that has been approved by the Underwriters Laboratories or by the Administrator.

(Published in 14 F. R. 7034, Nov. 22, 1949, effective upon publication.)

42.21-3 *Altimeter (FAA policies which apply to sec. 42.21 (b) (1)).* For VFR flight at night, the installation and use of a sensitive altimeter adjustable for changes in barometric pressure is recommended.

(Published in 14 F. R. 7034, Nov. 22, 1949, effective upon publication.)

42.21–4 *Warning lights for reversible propellers (FAA policies which apply to sec. 42.21 (a) (15)).* In the interest of cockpit uniformity, when warning lights are used to indicate to the pilot that a reversible propeller is in reverse pitch, such warning lights should be amber in color.

(Published in 21 F. R. 4312, June, 20 1956, effective July 1, 1956.)

42.22 *Additional required instruments and equipment for large aircraft.* In addition to the basic instruments required by section 42.21, the following instruments and equipment for the type of operations specified shall be installed and in serviceable condition in large aircraft:

(a) *Day (VFR and IFR).* For flight during the day the following is required:

(1) Additional airspeed indicator,

(2) Additional sensitive altimeter,

(3) Alternate source of energy to supply gyroscopic instruments which shall be capable of carrying the required load. Engine-driven pumps, when used, shall be on separate engines and, in lieu of one such source of energy, an auxiliary power unit may be used. The installation shall be such that the failure of one source of energy will not interfere with the proper functioning of the instrument by means of the other source,

(4) In passenger service, in addition to fire-detecting and fire-extinguishing equipment necessitated as a result of compliance with section 42.12, such additional hand-type fire extinguishers as the Administrator finds necessary for compliance with section 42.21 (a) (12).

(b) *Night (VFR and IFR).* For flight during the night the following is required:

(1) Instruments and equipment specified in paragraph (a) of this section, and one additional landing light,

(2) After May 31, 1956, an approved anticollision light; except that in the event of failure of such light, the aircraft may continue flight to the next stop where repairs or replacements can be made.

42.22a *Flight recorders.*

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

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

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

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

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

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

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

(d) In the event of failures of the flight recorder, the airplane may continue flight to the next stop where repairs or replacements can be made.

(Amendment 42–29, published in 25 F.R. 6828, July 19, 1960, effective Aug. 18, 1960.)

42.22b ***Air-speed indicators, limitations, and related information for large aircraft.***

(a) 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.

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

(c) 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.

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

42.22b–1 *Airspeed limitations and related information contained in the Airplane Flight Manual (FAA policies which apply to sec. 42.22b (d)).* The airspeeds shown in the Performance Information Section only, of an Airplane Flight Manual approved prior to April 1, 1956, may continue to be expressed in statute miles per hour, provided that a table converting statute miles to knots is incorporated therein, and a cautionary note is placed on each page and chart where airspeeds are denoted indicating that the statute miles shown must be converted to knots when determining performance information. A similar note should be placed in the Operations Limitations Section, indicating that airspeeds shown in the Performance Information Section are in statute miles and must be converted to knots when determining performance information.

(Published in 21 F. R. 4312, June 20, 1956, effective July 1, 1956.)

42.23 ***Radio communications system and navigational equipment for large aircraft.*** In lieu of the radio communications system and navigational equipment specified in section 42.21 (b) (7) and (c) (2), the following shall be required in large aircraft for the type of operations specified. The radio equipment required under paragraphs (a) and (b) of this section shall be of approved types:

(a) For day VFR operations over routes on which navigation can be accomplished by visual reference to landmarks, each aircraft shall be equipped with such radio equipment as is necessary to accomplish the following:

(1) Transmit to at least one appropriate ground station from any point on the route and transmit to airport traffic control towers from a distance of not less than 25 miles.

(2) Receive communications at any point on the route.

(3) By either of two independent means, receive meteorological information at any point on the route and receive instructions from airport traffic control towers.

(b) For day VFR operations over routes on which navigation cannot be accomplished by visual reference to landmarks, for night VFR, or for IFR operations, each aircraft shall be equipped as specified in paragraph (a) of this section, and in addition shall be equipped with at least one marker beacon receiver and with such radio equipment as is necessary to receive satisfactorily, by either of two independent means, radio navigational signals from any other radio aid to navigation intended to be used. For operations outside the United States each aircraft operated for long distances over water or uninhabited terrain shall be equipped with two independent means of transmitting to at least one appropriate ground station from any point on the route.

(c) If appropriate, one of the means provided for compliance with paragraph (a) (3) of this section may be employed for compliance with paragraph (a) (2) of this section, and the means provided for compliance with the requirements of paragraph (b) of this section may be employed for compliance with paragraph (a) (1) and (3) of this section.

[(d) Whenever VOR navigational receivers are required by paragraph (b) or (f) of this section, at least one approved distance measuring equipment unit (DME), capable of receiving and indicating distance information from VORTAC facilities, shall be installed on each airplane when operated within the 48 contiguous states and the District of Columbia at and above 24,000 feet MSL after June 30, 1963, and on each of the following airplanes, irrespective of the altitude flown, when operating in the 48 con-

tiguous states and the District of Columbia after the following dates:

[(1) Turbojet airplanes—June 30, 1963;

[(2) Turboprop airplanes—December 31, 1963;

[(3) Pressurized reciprocating engine airplanes—June 30, 1964; and

[(4) Other airplanes having a maximum certificated takeoff weight of more than 12,500 pounds—June 30, 1965.

[(e) In the event that the distance measuring equipment (DME) becomes inoperative en route, the pilot shall notify Air Traffic Control of such failure as soon as it occurs.

[(f) In the case of operation over routes on which navigation is based on low frequency radio ranges or automatic direction finding, only one low frequency radio range receiver or ADF receiver need be installed: *Provided,* That the airplane is equipped with two VOR receivers, and VOR navigational aids are so located and the airplane is so fueled that, in the case of failure of the low frequency radio range or ADF receiver, the flight may proceed safely to a suitable airport by means of VOR aids and complete an instrument letdown by use of the remaining airplane radio system.

[(Amendment 42–44, published in 28 F.R. 482, Jan. 18, 1963, effective July 1, 1963.)**]**

42.23–1 *Approved types of radio equipment (FAA interpretations which apply to sec. 42.23).* Radio equipment is of an approved type when it is approved in accordance with the terms of a FAA type certificate or a technical standard order issued by the Administrator.

(Published in 20 F. R. 3067, May 6, 1955, effective May 31, 1955.)

42.23–2 *Independent means (FAA interpretations which apply to sec. 42.23).* 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: *Provided,* That where rigidly supported non-wire antenna or other antenna installations of equivalent reliability are used, only one such antenna need be provided.

(Published in 20 F. R. 3067, May 6, 1955, effective May 31, 1955.)

42.23–3 *Installation and use of non-approved radio communication equipment (FAA policies which apply to sec. 42.23).* All radio communication and navigation equipment required for compliance with section 42.23 must be of approved types. However, additional non-approved radio communication equipment may be installed in aircraft for test and evaluation purposes or for the performance of a non-operational function. The non-approved equipment must be constructed and installed so that it will not interfere with the proper functioning of any approved operational equipment or create an unsafe condition aboard the aircraft.

(Published in 20 F. R. 3067–8, May 6, 1955, effective May 31, 1955.)

42.24 *Emergency and safety equipment.* After May 31, 1957, the equipment required in sections 42.24a, 42.24b, and 42.24c shall be approved.

42.24–1 *First-aid and safety equipment (FAA policies which apply to sec. 42.24).* In order to retain FAA approval of first-aid kits, flotation equipment, and other emergency gear, after receiving initial approval by the Administrator, such equipment should be regularly inspected to insure that the condition and quantity continues to meet the standards of the original approval.

(Published in 14 F. R. 7034, Nov. 22, 1949, effective upon publication; amended effective June 15, 1957.)

42.24a *First-aid kits and emergency equipment.* Each airplane shall be equipped with a conveniently accessible first-aid kit adequate for the type of operation involved. Airplanes operated over routes requiring flights for long distances over uninhabited terrain must carry such additional emergency equipment as appropriate for the particular operation involved.

42.24a–1 *First-aid kits and emergency equipment (FAA policies which apply to sec. 42.24a).* First-aid kits and emergency equipment which contain the materials and meet the standards prescribed below will be approved by the

Administrator. To obtain approval to use first-aid kits not containing such materials or meeting such standards, application must be made through the local FAA inspector having certificate responsibility.

(a) Each first-aid kit should be dust and moisture proof, should contain only materials which meet Federal Specifications GGK 391, as revised, and should include at least the following items or their equivalent:

(1) *No. 1 kit for aircraft of 1 to 5 persons capacity.*

Adhesive bandage compress, 1 inch (16 per unit)	1
Antiseptic swabs, 10 mm. (10 per unit)	1
Ammonia inhalants, 6 mm. (10 per unit)	1
Ammonia, aromatic spirits, 2 cc. with drinking cups (4 each per unit)	1
2-inch bandage compress (4 per unit)	1
4-inch bandage compress (1 per unit)	1
Triangular bandage compressed, 40-inch (1 per unit)	1
Burn compound, one-eighth oz. (6 per unit)	1
Tourniquet, forceps, and scissors (1 each per double unit container)	1

(2) *No. 2 kit for aircraft of 6 to 25 persons capacity.*[5]

Adhesive bandage compresses, 1-inch (16 per unit)	2
Antiseptic swabs, 10 mm. (10 per unit)	2
Ammonia inhalants, 6 mm. (10 per unit)	1
Ammonia, aromatic spirits, 2 cc. with drinking cups (4 each per unit)	2
2-inch bandage compresses (4 per unit)	2
4-inch bandage compresses (1 per unit)	2
Triangular bandage compressed, 40-inches (1 per unit)	1
Burn compound, one-eighth-ounce (6 per unit)	1
Tourniquet, forceps, and scissors (1 each per double unit container)	1
Eye dressing packet (3 each per unit) (ophthalmic ointment, one-eighth-ounce; eye pads; eye strips)	1

(3) *No. 3 kit for aircraft of more than 25 persons capacity.*

Adhesive bandage compresses, 1-inch (16 per unit)	4
Antiseptic swabs, 10 mm. (10 per unit)	2
Ammonia inhalants, 6 mm. (10 per unit)	2
Ammonia, aromatic spirits, 2 cc. with drinking cups (4 each per unit)	2
2-inch bandage compresses (4 per unit)	3
4-inch bandage compresses (1 per unit)	3
Triangular bandage compressed, 40-inches (1 per unit)	3
Burn compound, one-eighth-ounce (6 per unit)	2
Tourniquet, forceps, scissors (1 each per double unit container)	1
Eye dressing packet (3 each per unit) (ophthalmic ointment, one-eighth-ounce; eye pads; eye strips)	1

(b) *Emergency equipment for long-distance flights over uninhabited terrain.* When the type of operation requires more than one class of equipment, it will not be necessary to carry more than one supply of items duplicated in another list.

(1) *Tropical land areas:*

1 machete.
1 axe.
1 mosquito headnet for each person.

[5] Kit No. 2 in canvas may also be used on life rafts.

1 bottle insect repellent for each person.
1 pint drinking water for each person.
1 bottle chlorine tablets for water purification.
1 waterproof box of matches.
1 magnetic compass.
1 bottle quinine tablets.
1 signaling mirror.
1 pyrotechnic pistol and 6 cartridges.
1 small bore rifle and cartridges.
1 hunting knife.
1 fishing kit.
1 snake-bite kit.
1 book on jungle survival.

(2) *Frigid land areas:*

1 machete.
1 axe.
1 blanket for each person.
2 pairs snowshoes.
1 pair sunglasses for each person.
1 book on Arctic survival.
1 waterproof box of matches.
1 magnetic compass.
1 bottle of chlorine tablets for water.
1 signaling mirror.
1 pyrotechnic pistol and 6 cartridges.
1 small bore rifle and cartridges.
1 hunting knife.
2-day supply emergency food ration for each person.
1 mosquito headnet for each person.
1 bottle insect repellent for each person.
1 fishing kit.

(Published in 17 F. R. 2748, Mar. 29, 1952, effective upon publication; amended in 18 F. R. 1719, Mar. 7, 1953, effective Apr. 15, 1953; amended effective June 15, 1957.)

42.24b *Equipment for overwater operations.*

(a) The following equipment shall be required for all extended overwater operations: *Provided,* That the Administrator, after appropriate investigation, may require the carriage of all of the prescribed equipment, or any item thereof, for any operation over water; or upon application of an air carrier, permit deviation from these requirements for a particular extended overwater operation:

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

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

(3) Suitable pyrotechnic signaling devices; and

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

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

(c) A survival kit, appropriately equipped for the route to be flown, shall be attached to each required life raft.

42.24b–1 *Survival kit for overwater operations (FAA policies which apply to sec. 42.24b).* Survival kits containing the materials listed below will be approved hy the Administrator. To obtain approval to use survival kits which do not contain such materials, application must be made through the local FAA inspector having certificate responsibility.

(a) *General.* When the type of operation requires more than one class of equipment, it will not be necessary to carry more than one supply of items duplicated in another list.

1 canopy (for sail, sunshade, or for rain catcher).
1 liferaft repair kit.
1 bailing bucket.
1 signaling mirror.
1 police whistle.
1 raft knife.
1 CO_2 bottle for emergency inflation.
1 inflation pump.
2 oars.
1 75-foot retaining line.
1 magnetic compass.
1 pyrotechnic pistol and 6 cartridges.
2-day supply of emergency food ration for each person.
1 sea water desalting kit for each 2 persons the raft is authorized to carry, or 2 pints of water per person.
1 fishing kit.
1 book on survival appropriate for area.

(Published in 14 F. R. 7034, Nov. 22, 1949, effective upon publication; amended effective June 15, 1957.)

42.24c *Emergency evacuation equipment.*

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

(b) *Interior emergency exit markings.*

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

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

[(Amendment 42-39, published in 27 F.R. 1453, Feb. 16, 1962, effective Mar. 20, 1962.)]

42.25 *Cockpit check list.* The air carrier shall provide for each type of aircraft a cockpit check list adapted to each operation in which the aircraft is to be utilized. The check list shall be installed in a readily accessible location in the cockpit of each aircraft and shall be used by the flight crew.

42.25-1 *Cockpit checklist (FAA policies which apply to sec. 42.25).*

(a) The cockpit checklist shall be legible during hours of daylight and darkness under the light conditions of the cockpit.

(b) Checklists developed by the manufacturer, military services, or the operator will be considered satisfactory, providing the following steps are covered:

Prior to starting engines.
Prior to takeoff.
Cruising.
Prior to landing.
Powerplant emergencies.
After landing.
Stopping engines.

(c) It is recommended that in all multi-engine equipment a one-engine inoperative checklist be available in cockpit for pilot reference after encountering difficulty which may cause one or more engines to become inoperative. It is further recommended that all aircraft having retractable gear and flaps also have checklists prepared for emergency use in event of failure.

(Published in 14 F. R. 7035, Nov. 22, 1949, effective upon publication.)

42.25-2 *Minimum standard cockpit checklist (FAA policies which apply to sec. 42.25).* The following checklist using general terms will be considered as the minimum standard check list for compliance with the foregoing requirements in irregular air carrier operations. Those items not applicable to the aircraft being operated may be deleted and the order of arrangement of the individual items is left to the air carrier. The checklist shall include all applicable items, but will not necessarily be limited thereto.

PRIOR TO STARTING ENGINE

Fuel system:

Quantity—checked.
Proper tank selection—checked.

Mixtures—as required.
Fuel booster pumps—as required.
Crossfeeds—as required.

Hydraulic system:[6]
Brakes—set.

Electrical system:
Battery switch—proper position.

PRIOR TO TAKEOFF

Weight and balance:
Pilot is aware of weight and takeoff limitations.

Fuel System:
Quantity—rechecked.
Proper tank selection—rechecked.
Mixtures—takeoff position.
Fuel booster pumps—as required.
Crossfeed—as required.

Hydraulic system:[6]
Hydraulic pressures and quantity—checked.
Brakes—checked.
Hydraulic selector valves—checked.

Anti-icing and de-icing equipment:[6]
Checked and set.

Electrical system:
Battery switch—proper position.
Invertors—as required.
Ignition—checked.
Generators—checked.
Radio—checked.

Powerplants and propellers:[6]
Propellers—checked and set in take-off position.
All engines—checked for proper functioning and required power.
Superehargers—checked and set in proper takeoff position.

Heaters:
Checked and set.

Instruments—engine:
Oil—quantity, temperature and pressure—normal for takeoff.
Fuel pressure—normal for takeoff.
Carburetor temperature—checked.
Cylinder head temperature—checked.

[6] Items thus marked will be double checked, such as by challenge and response, or positively checked, such as by a mechanical method.

Instruments—flight:
Static and vacuum selectors—checked.
Directional gyro—set.
Altimeter—set.
Horizon—uncaged.
Turn and bank—checked.
Clock—set.

Pressurization:[6]
Checked.

Flaps:[6]
Wing flaps—takeoff position.
Cowl flaps—takeoff position.

Controls:[6]
Auto pilot—off.
Trim tabs—set for takeoff.
Gust locks—off.
Free and tested through full limit of travel.

PRIOR TO LANDING

Fuel system:[7]
Proper tank selection—checked.
Mixtures—landing position.
Fuel booster pumps—as required.
Cross feeds—as required.

Weight and balance:
Maximum landing gross weight—checked

Hydraulic system:[7]
Hydraulic pressure—checked.
Brakes—checked and off.
Hydraulic selector valves—checked.

Anti-icing and de-icing equipment:[7]
Checked.

Powerplants and propellers:[7]
Propellers—as required.
Superchargers—as required.
Manual reverse pitch actuator or indicator[7]—checked.

Heaters:[7]
Checked.

Instruments:
Static and vaeuum selectors—checked.
Altimeter—set.
Directional gyro—set.

Pressurization:[7]
Checked.

[7] Items thus marked will be checked by one pilot calling out the item to be checked and then performing the operation with the other pilot observing the action or making a momentary visual check after the operation is completed.

Controls:
Autopilot—off.
Trim tabs—asdesired.
Landing gear:[8]
Down and locked—checked.
Flaps:[9]
Wing flaps—as desired.
Cowl flaps—as desired.

POWERPLANT EMERGENCIES

Fuel system:
Mixtures—idle cutoff on dead engine; required position on all others.
Fuel-selector valve: dead engine—off.
Fuel-booster pumps: dead engine—off.
Cross feeds—as required.
Throttle: dead engine—closed.
Hydraulic system:
Hydraulic selector valve—set on proper engine.
Hydraulic pressures—checked.
Electrical system:
Brakes—checked.
Ignition: off—dead engine.
Generators: off—dead engine.
Powerplants and propellers:
Propellers—Low revolutions per minute and feathered on dead engine—set as required on all live engines.
Engines—All live engines set for proper functioning and required power.
Superchargers—checked and set in proper position.
Heaters:
Checked and set in safe operation position.
Instruments:
Engine—oil temperature and pressure checked.
Engine—fuel supply and pressure checked.
Carburetor—temperature checked.
Cylinder head—temperature checked.
Flight instruments:
Checked and reset if necessary.
Pressurization:
Checked.

(Published in 14 F. R. 7035, Nov. 22, 1949, effective upon publication; amended in 17 F. R. 9132, Oct. 15, 1952, effective Oct. 31, 1952.)

[8] See footnote 6, page 17.
[9] See footnote 7, page 17.

42.26 *Supplemental oxygen; reciprocating-engine-powered airplanes.* **Except where supplemental oxygen is provided in accordance with the requirements of section 42.27, supplemental oxygen shall be furnished and used as set forth in paragraphs (a) and (b) of this section. The amount of supplemental oxygen required for a particular operation to comply with the rules in this part shall be determined on the basis of flight altitudes and flight duration consistent with the operating procedures established for each such operation and route. As used in the oxygen requirements hereinafter set forth, "altitude" shall mean the pressure altitude corresponding with the pressure in the cabin of the airplane, and "flight altitude" shall mean the altitude above sea level at which the airplane is operated.**

(a) *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.

(b) *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.

42.26–1 *Supplemental oxygen for crew members (FAA interpretations which apply to sec. 42.26 (a) (1)).*

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

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

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954; amended in 21 F. R. 5437, July 20, 1956, effective July 31, 1956.)

42.26–2 *Oxygen requirements for standby crew members (FAA interpretations which apply to sec. 42.26 (a)).* Standby crew members who are on call or are definitely going to have flight-deck duty prior to the completion of a flight must be provided with the same amount of supplemental oxygen as that provided for crew members on duty other than on flight-deck duty. However, if the standby crew members are not on call and will not be on flight-deck duty during the remainder of the flight, they must be considered as passengers with regard to supplemental oxygen.

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954.)

42.26–3 *Operating instructions (FAA policies which apply to sec. 42.26).* Operating instructions appropriate to the type of system and masks installed should be provided for the flight crew in the appropriate air carrier manual. These operating instructions should contain a graph or a table which will show the duration of the oxygen supply for the various bottle pressures and pressure altitudes.

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954.)

42.26–4 *Oxygen requirements for jump-seat occupant (FAA policies which apply to sec. 42.26).* When the jump seat is occupied by a check pilot, a crew member, or a flight crew member, as defined by section 42.1 (a) (7), (8), and (13) respectively, oxygen should be provided in accordance with the requirements of section 42.26. The provision of oxygen at the jump seat location may be accomplished either by a portable oxygen unit or an outlet in a fixed system.

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954.)

42.26–5 *Oxygen requirements for infants in arms (FAA policies which apply to sec. 42.26 (b)).* 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: (1) a disposable plastic mask which can be fitted to the face; (2) an infant size BLB oro-nasal mask and (3) semirigid paper cups, specifically reserved for the purpose, which can be fitted over the infant's nose and mouth, with a hole punched through tbe bottom through which an oxygen tube or a Y-connector can be inserted. Any other acceptable method may also be used.

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954.)

42.26–6 *Oxygen requirements for clinical purposes (FAA policies which apply to sec. 42.26 (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.

A quantity of 300 liters STPD would probably be considered as satisfying reasonable needs.

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954.)

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

(a) *General.* Prior to November 30, 1959, turbine-powered airplanes shall comply with the provisions of section 42.26 or, alternatively, with the provisions of this section except that effective November 30, 1959, all turbine-powered airplanes shall comply with the provisions of this section. Sustaining oxygen and dispensing equipment shall be furnished by the air carrier for use as set forth in this section. The amount of oxygen provided shall be at least that quantity which will be necessary to comply with paragraphs (b) and (c) of this section. As used in the oxygen requirements hereinafter set forth, "cabin pressure altitude" shall mean the pressure altitude corresponding with the pressure in the cabin of the airplane, and "flight altitude" shall mean the altitude above sea level at which the airplane is operated; for airplanes not equipped with pressurized cabins, "cabin pressure altitude" and "flight altitude" shall be considered identical. The amount of sustaining and first-aid oxygen required for a particular operation to comply with the rules in this part shall be determined on the basis of cabin pressure altitudes and flight duration consistent with the operating procedures established for each such operation and route. The requirements for airplanes with pressurized cabins shall be determined on the basis of cabin pressure altitude and the assumption that a cabin pressurization failure will occur at that altitude or point of flight which is most critical from the standpoint of oxygen need, and that after such failure the airplane will descend in accordance with the emergency procedures specified in the Airplane Flight Manual without exceeding its operating limitations to a flight altitude that will permit successful termination of the flight. Following such a failure the cabin pressure altitude shall be considered to be the same as the flight altitude unless it can be shown that no probable failure of the cabin or pressurization equipment will result in a cabin pressure altitude equal to the flight altitude, under which circumstances the maximum cabin pressure altitude attained may be used as a basis for certification and/or determination of oxygen supply.

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

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

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

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

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

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

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

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

(a) *For crew members.* When operating such airplanes at flight altitudes above 10,000 feet, the air carrier shall provide sufficient oxygen for all crew members for the duration of the flight at such altitudes: *Provided,* That not less than a two-hour supply of oxygen shall

be provided for the flight crew members on flight deck duty. The oxygen supply required by sec. 42.29 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 sec. 42.26 (b) (3);

(ii) For the duration of the flight at flight altitudes above 14,000 feet to and including 15,000 feet, a supply sufficeint to comply with sec 42.26 (b) (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 sec. 42.26 (b) (2) and (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.

42.27–1 *Computation of supply for crew members in pressurized cabin aircraft (FAA policies which apply to sec. 42.27 (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 stipnlated by section 42.27 (a) need be provided for crew members. In determining this supply the following policies should be considered:

(1) The supply of oxygen which should be provided for all crew members for the duration of the flight should be computed on the basis of the cabin pressure altitude which would exist after cabin depressurization has occurred and the aircraft has descended to the altitude which would permit safe flight with respect to terrain clearance. (See sec. 42.27 (c).)

(2) The operator may use the supply furnished for protective breathing purposes (see sec. 42.29) for compliance with the 2-hour requirement for supplementary breathing oxygen. For example, the 300-liters STPD supply per flight crew member which is the protective breathing supply when demand (or diluter-demand) systems are used, will provide a 2-hour supplementary breathing supply for one flight crew member at 20,000 feet, so that both the minimum 2-hour supplementary breathing requirement and the protective breathing requirement would be fulfilled under most emergency conditions resulting from loss of cabin pressure or from contamination of cabin air with smoke or poisonous gases.

(b) *Cabin altitudes greater than 10,000 feet.* When operating a pressurized cabin aircraft which is certificated to fly with a cabin pressure altitude greater than 10,000 feet, a supply of oxygen for crew members computed on the basis of the requirements of section 42.26 (a) should be provided.

(1) The oxygen supply required for protective breathing purposes, as defined in section 42.29, 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 two 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 42.27 (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 42.27 (a) except that the total supply for these other crew members need not exceed that provided on the basis of section 42.26 (a) 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 42.26 (a) 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 cahin 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 the flight at cabin pressure altitudes greater than 10,000 feet. All other crew members may use oxygen according to their individual needs.

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42.27–2 *Computation of supply for passengers in pressurized cabin aircraft (FAA policies which apply to sec. 42.27(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 42.26 (b) 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 operation limitations.

(2) Relative to section 42.27 (b) (1) and (2), no oxygen need be provided for the first four minutes following a cabin pressurization failure.

(b) *Cabin altitudes greater han 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 hetween 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 cahin 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 42.27 (h) 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.

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42.27–3 *Oxygen requirements for clinical purposes (FAA policies which apply to sec. 42.27 (b)).* The regulations do not require that oxygen be provided for clinical purposes; hence, if the air carrier believes that such oxygen is to

be desired, he should provide oxygen for this purpose. It is suggested that portable units of any size the air carrier desires be used for this purpose in order that the minimum supply required for supplementary breathing purposes will be preserved. If, however, the operator wishes to use a common source of supply for the oxygen required by the regulations and for clinical purposes, he may do so if he provides an amount of oxygen sufficiently greater than that required by the regulations. It is suggested that a quantity of 300 liters may be considered as satisfying reasonable needs.

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954.)

42.27–4 *Oxygen requirements for infants-in-arms (FAA policies which apply to sec. 42.26 (b)).* 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 papercups, 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 he used.

(Published in 19 F. R. 549, Feb. 2, 1954, effective Feb. 15, 1954.)

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

(a) *General.* Prior to November 30, 1959, turbine-powered airplanes with pressurized cabins shall comply with the provisions of section 42.27, with the additional requirement that, when operating at flight altitudes above 25,000 feet, all flight crewmembers on flight deck shall be provided with oxygen masks, connected to appropriate supply terminals, which shall be immediately available for use; or, alternatively, with the provisions of this section except that effective November 30, 1959, all such turbine-powered airplanes shall comply with the provisions of this section. When operating pressurized cabin airplanes, the air carrier shall furnish oxygen and dispensing equipment necessary to permit compliance with the requirements set forth in this section in the event of cabin pressurization failure.

(b) *Crewmembers.* When operating at flight altitudes above 10,000 feet, oxygen shall be provided to permit compliance with section 42.26–T except that not less than a 2-hour supply shall be provided for the flight crewmembers on flight deck duty. The oxygen required by section 42.29 may be included in determining the supply required for flight crewmembers on flight deck duty in the event of cabin pressurization failure.

(c) *Use of oxygen masks by flight crewmembers.*

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

[(2) When operating above flight level 250, one pilot at the controls of the airplane shall at all times wear and use an oxygen mask secured, sealed, and supplying oxygen: *Provided*, That the one pilot need not wear and use an oxygen mask while at or below flight level 350 if each flight crewmember on flight deck duty is provided with a quick-donning type of oxygen mask which the air carrier has demonstrated to the satisfaction of a representative of the Administrator is capable of being placed on the face from its ready posi-

tion, properly secured, sealed, and supplying oxygen upon demand, with one hand and within 5 seconds. The air carrier shall also demonstrate that the donning of the mask can be accomplished without disturbing eyeglasses and without delaying the flight crewmember from proceeding with his assigned emergency duties. Upon completion of the donning action, the oxygen mask shall not prevent the flight crewmember from being able immediately to communicate with other crewmembers over the airplane intercommunication system.

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

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

(Amendment 42–25, published in 24 F.R. 9840, Dec. 8, 1959, effective Nov. 30, 1959; Amendment 42–27, published in 25 F.R. 799, Jan. 30, 1960, effective Feb. 1, 1960; [Amendment 42–31, published in 26 F.R. 1058, Feb. 3, 1961 effective Mar. 3, 1961.)]

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

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

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

(2) When an airplane is operated at flight altitudes to and including 25,000 feet and cannot descend safely to a flight altitude of 14,000 feet within 4 minutes, or when an airplane is operated at flight altitudes above 25,000 feet, oxygen shall be available at the rate prescribed by this part for not less than 10 percent of the number of passenger cabin occupants carried for the duration of flight following cabin depressurization at cabin pressure altitudes above 10,000 feet to and including 14,000 feet and, as applicable, to permit compliance with section 42.26–T (b) (2) and (3), except that not less than a 10-minute supply for all passenger cabin occupants shall be provided.

(3) For first-aid treatment of occupants who for physiological reasons might require undiluted oxygen following descent from cabin pressure altitudes above 25,000 feet, a supply of oxygen in accordance with the requirements of section 4b.651(b)(4) (see section 42.28) shall be provided for 2 percent of the occupants for the duration of flight following cabin depressurization at cabin pressure altitudes above 8,000 feet, but in no case to less than one person. An appropriate number of acceptable dispensing units, but in no case less than 2, shall be provided. Means shall be provided to enable the cabin attendants to use this supply.

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

42.28 *Equipment standards.*

(a) *Reciprocating-engine-powered airplanes.* The oxygen apparatus, the minimum rates of oxygen flow, and the supply of oxygen necessary to comply with the requirements of section 42.26 shall meet the standards established in section 4b.651 of this subchapter effective July 20, 1950: *Provided,* That where

full compliance with such standards is found by the Administrator to be impracticable, he may authorize such changes in these standards as he finds will provide an equivalent level of safety.

(b) *Turbine-powered airplanes.* Prior to November 30, 1959, turbine-powered airplanes shall comply with the provisions of paragraph (a) of this section or, alternatively, with the provisions of this paragraph except that effective November 30, 1959, all turbine-powered airplanes shall comply with the provisions of this paragraph. The oxygen apparatus, the minimum rate of oxygen flow, and the supply of oxygen to comply with the requirements of sections 42.26–T and 42.27–T shall meet the standards established in section 4b.651 of this subchapter effective September 1, 1958: *Provided,* That where full compliance with such standards is found by the Administrator to be impracticable, he may authorize such changes in these standards as he finds will provide an equivalent level of safety.

42.29 *Protective breathing equipment for the flight crew.*

(a) *Pressurized cabin airplanes.* Each required flight crewmember 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.

(1) Not less than a 300-liter STPD supply of oxygen for each required flight crewmember on flight deck duty shall be provided for this purpose.

(b) *Nonpressurized cabin airplanes.* The requirements 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 aircraft is flown in accordance with either the normal or

emergency procedures approved by the Administrator.

42.29–1 *Protective breathing equipment and installation (FAA policies which apply to sec. 42.29).* Protective breathing equipment for the flight crew and its installation should comply with sections 4b.651–1 and 4b.651–2.

(Published in 15 F. R. 8924, Dec. 15, 1950, effective Jan. 1, 1951.)

42.29–2 *Requirement of protective breathing equipment in nonpressurized cabin airplanes (FAA rules which apply to sec. 42.29(b)).* Protective breathing equipment for the flight crew shall be required in nonpressurized cabin aircraft having built-in carbon dioxide fire-extinguisher systems in fuselage compartments (for example, cargo or combustion heater compartments); except that protective breathing equipment will not be required where:

(a) Not more than 5 pounds of carbon dioxide will be discharged into any one such compartment in accordance with established fire control procedures, or

(b) The carbon dioxide concentration at the flight crew stations has been determined in accordance with section 4b.484–1 of this subchapter (i. e. the Civil Air Regulations) and found to be less than 3 percent by volume (corrected to standard sea-level conditions).

(Published in 15 F. R. 8924, Dec. 15, 1950, effective Jan. 1, 1951.)

Maintenance Requirements

42.30 *General.* No person shall operate an aircraft which is not in an airworthy condition. All inspections, repairs, alterations, and maintenance shall be performed in accordance with Part 18 of this subchapter, and with the maintenance manual when required by sec. 42.32 (d).

42.30–1 *General (FAA policies which apply to sec. 42.30).*

(a) It is the operator's responsibility to maintain all aircraft in an airworthy condition at all times when operated in irregular air carrier operation.

(b) All maintenance, repairs, overhauls, and alterations shall be accomplished under the supervision of a certificated airman holding the appropriate mechanical rating for the work involved.

(c) All repairs, overhauls, and alterations shall be in accordance with materials, procedures, and standards set forth in Part 18 of this subchapter (i. e. the Civil Air Regulations) using proper equipment and tools for the type of work involved.

(d) FAA Airworthiness Directives and manufacturers' manuals, directives, bulletins, and notes shall be complied with as directed.

(e) Large aircraft must be maintained in accordance with the time limitations and maintenance schedules prescribed in the approved maintenance manual and the applicable regulations in this subchapter (i. e. the Civil Air Regulations).

(f) No engine or other major component which has not been maintained in accordance with the maintenance manual shall be installed in a large aircraft unless such engine or component is shown to be in an airworthy condition, and that it complies with current Airworthiness Directives. This may be accomplished by showing (1) that the engine or component is new and of current manufacture, (2) has been overhauled within the last 90 days by a certificated repair agency holding appropriate ratings, or (3) by disassembly to the extent necessary for the assigned agent to determine the airworthiness and extent of compliance with Airworthiness Directives and manufacturers' service bulletins.

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

(Published in 14 F. R. 7035, Nov. 22, 1949, effective upon publication.)

42.31 *Inspections and maintenance.*

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

(1) Large aircraft shall be maintained and inspected in accordance with a continuous

maintenance and inspection system as provided for in the maintenance manual.

(2) Small aircraft shall be inspected in accordance with the inspection provisions of Part 43 of this subchapter.

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

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

(Published in 14 F. R. 7036, Nov. 22, 1949, effective upon publication.)

42.31-2 Deleted.

(Published in 21 F. R. 3183, May 15, 1956, effective July 17, 1956.)

42.31-3 Deleted.

(Published in 19 F. R. 6829, Oct. 23, 1954, effective upon publication.)

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

(Published in 14 F. R. 7036, Nov. 22, 1949, effective upon publication; amended in 15 F. R. 3151, May 25, 1950, effective upon publication.)

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

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

(b) *Maintenance personnel.* A staff of qualified mechanics, inspectors, and appropriate supervisory personnel shall be employed by the air carrier and kept available for performing the functions specified in section 42.30, except where the air carrier has obtained the approval of the Administrator for the performance of such functions by some other person. The air carrier shall permit maintenance to be performed only by an individual competent therefor.

(c) *Reporting of mechanical irregularities occurring in operation.* Each air carrier shall prescribe in its operations manual a procedure for the submission of written reports by the members of the flight crew for all mechanical irregularities occurring during the operation of the aircraft. The members of the flight crew designated by the air carrier shall submit a written report in accordance with such system to the person responsible for the maintenance of the aircraft. This report shall be submitted at the end of each through flight or sooner if the seriousness of the irregularity so warrants. Such report or copy thereof indicating the action taken shall be retained in the aircraft for the information of the next flight crew.[5]

[5] See section 42.96 for the requirements for reporting aircraft or component malfunctioning and defects.

(d) *Maintenance manual.*

(1) The air carrier shall prepare and maintain for the use and guidance of maintenance personnel a maintenance manual which contains full information pertaining to the maintenance, repair, and inspection of aircraft and

equipment and clearly outlines the duties and the responsibilities of maintenance personnel. The form and content shall be acceptable to the Administrator. It shall contain a copy of the approved time limitations for inspection and overhauling of aircraft, aircraft engines, propellers, and appliances. Copies and revisions shall be furnished to all persons designated by the Administrator. All copies in the hands of company personnel shall be kept up to date.

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

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

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

42.32–1 *Facilities for the proper inspection, maintenance, overhaul, and repair (FAA policies which apply to sec. 42.32).*

(a) The facilities required in section 42.32 (a) of this subchapter include housing, work space, equipment, supplies, materials, tools, parts, and aircraft components in sufficient quantity and quality to assure that the needed inspection, maintenance, overhaul, and repair of the air carrier's or commercial operator's aircraft (including airframes, powerplants, propellers, and appliances) can be satisfactorily performed at all times by either the air carrier, or commercial operator, or persons with whom arrangements have been made for the performance of such functions.

(b) Sections 52.21–1 through 52.21–3 and sections 52.30–1 through 52.36–1 of this subchapter, outline housing, facilities, equipment and materials which constitute criteria that may be used to determine the minimum facilities required by section 42.32 (a) insofar as applicable and appropriate to the air carrier's aircraft and maintenance system: Provided, That a work dock is used for the performance of airframe maintenance in lieu of a permanent hangar, if such work dock is appropriate for the proper performance of such maintenance under the climatic conditions which prevail at the particular maintenance location. When necessary, the entire airframe or portion thereof on which work is being performed should be enclosed so as to exclude rain, snow, dust, and provide reasonable protection to workers from the extremes of temperature which might impair the work being performed.

(c) When an air carrier contracts to perform inspection, maintenance, overhaul and repair on aircraft of other air carriers, the minimum facilities required by section 42.32 (a) are considered to be the same as required for a certificated repair station performing identical functions.

(Published in 20 F. R. 4184 on June 15, 1955, effective June 30, 1955.)

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

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

(b) The inspection, maintenance, overhaul, and repair of the air carrier's aircraft, including airframes, powerplants, propellers, and appliances is performed, inspected, and/or approved by an appropriately rated certificated repair station, appropriately certificated air carrier, or manufacturer in accordance with section 18.10 (b), (d), or (e); section 18.11 (a) (2), (3), or (4); and section 18.11 (b) (2), (3) or (4): Provided, that maintenance, minor repairs, and minor alterations may be performed and/or approved by a certificated mechanic in accordance with section 18.10 (a) and section 18.11 (a) (1).

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

maintenance established in the air carrier's maintenance manual and as required by section 18.30.

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

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

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

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

(Published in 18 F. R. 7537, Nov. 26, 1953, effective Dec. 15, 1953; amended in 20 F. R. 7645, Oct. 13, 1955, effective Nov. 1, 1955.)

42.32–3 *Maintenance personnel (FAA policies which apply to sec. 42.32 (b)).*

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

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

(Published in 14 F. R. 7036, November 22, 1949, effective upon publication; redesignated in 18 F. R. 7537, November 26, 1953, effective December 15, 1953).

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

(Published in 14 F. R. 7036, November 22, 1949, effective upon publication redesignated in 18 F. R. 7537, November 26, 1953, effective December 15, 1953.)

42.32–5 *Maintenance manual (FAA policies which apply to sec. 42.32 (d) (1)).*

(a) *General.*

(1) The section of the maintenance manual which pertains to maintenance, repair, and inspection of aircraft shall include a detailed breakdown of the aircraft's component parts and emergency equipment (in accordance with the requirements of section 42.24–1) which are subjected to maintenance functions; such as, overhaul, repair, inspection, or testing. This listing of components shall indicate the time limitations at which such functions are conducted. This section of the manual shall also include an outline or description of the maintenance functions conducted at each of the scheduled maintenance operations. In many cases the inspection work sheets and work assignment forms may be used to accomplish this requirement if such forms contain sufficient information to fully describe the work done.

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

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

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

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

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

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

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

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

(i) *Airframe—initial time limitations.* The initial time limitations for overhauls, inspections, or checks of airframes may be established on a recurrent fixed time basis or by adoption of a structural inspection specification covering procedures, such as pattern inspections, block overhauls, or progressive inspections. Regardless of the basis upon which the time limitations are established, the same basic standards will be applicable. The mainte-

nance program must specify checks, inspections, and overhauls to be performed and times at which they will be performed.

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

(iii) *Powerplants—initial time limitations.*

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

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

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

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

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

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

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

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

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

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

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

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

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

(i) *Approved weight control system.* A system of continuous recordation of weight changes on individual aircraft or fleet which will provide an accurate weight and c. g. location value for all aircraft at all times. Under an approved system the responsibility is delegated to the operator.

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

Drainable fuel.

Drainable oil (when the oil load is variable).

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

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

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

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

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

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

(2) *Operators' responsibility.*

(i) Not under an approved system.

(*a*) Each aircraft shall be weighed annually in the presence of an FAA representative [10] to determine the operators' empty weight and corresponding c. g. position.

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

(ii) *Under an approved system.*

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

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

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

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

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

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

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

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

(*b*) Description of loading devices used and instructions for their proper use.

When a mechanical computor is used for loading, the operating instructions should be furnished. It may be necessary for the operator to submit the computor for examination, in which case the computor will be returned to the operator upon completion of the examination.

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

(*c*) Copies of all printed forms (including load manifests) and instructions to personnel with regard to the proper load distribution. This should include information pertaining to filling of fuel and oil tanks, passenger seating, restriction of passenger movement, distribution of cargo, etc.

(*d*) Description of procedures established to determine conformity with approved loading instructions to insure the operation of the aircraft within the approved c. g. range.

(*e*) Description of procedures established to inform the pilot of the loaded condition of the airplane.

(*f*) Information indicating the degree of responsibility of all ground and flight personnel (by title) and specific duties of each, relative to the various phases of the weight control system.

(ii) *Additional air carrier responsibilities.* Aircraft equipment lists must be prepared by the air carrier, but need not be submitted with the application. These are:

(*a*) List of fixed equipment standard for each model or type aircraft and included in the operating or basic weight.

(*b*) List of all removable equipment (including commissary, buffet equipment, meal services, etc.) and the weight and moment of each. It is satisfactory to establish an overall weight and c. g. location for each group or list.

Changes which alter the methods of the currently approved weight control system should be approved in the same manner as used for the original system. However, revisions which do not affect the method do not require approval.

EXAMPLE: A change from a tabular to an index type loading chart would require approval, but a revision to an index unit chart, already in use, would not require approval.

(4) *Passenger and crew weights.*

(i) *General.* These weights apply to operators with or without an approved weight control system. Consideration will be given to a different average of weights for crew and passengers, provided the operator can substantiate these weights based on an average of actual weights for each group.

(ii) *Passenger weights.* The actual passenger weights may be used in all computations and are preferable from the standpoint of accuracy. In addition, the use of average weights is approved as a means of expediting load manifest calculations. The use of average weights, however, does not relieve the operator of responsibility for compliance with the weight and c. g. location limitations as specified in the appropriate aircraft specification and the operating limitations prescribed in this part. In other words, if there is obvious evidence that the use of average weights will result in erroneous computations and possible violation of applicable regulations of this subchapter (i. e. the Civil Air Regulations), the total weight and c. g. location should be recomputed using actual weights. This condition is most likely to arise in cases where the major portion of a passenger load consists of a specialized group such as athletic teams or of a specific racial group which does not conform with the United States average. In all cases of such nonaverage groups actual weights must be used.

The approved averages are as follows:

(*a*) An average passenger weight (summer) of 160 pounds may be used during the calendar period of May 1 through October 31.

(*b*) An average passenger weight (winter) of 165 pounds may be used during the calendar period of November 1 through April 30.

(*c*) An average passenger weight of 80 pounds may be used at any time for children between the ages of 3 and 12.

In all computations, either the actual or average weights indicated above will be used; in no case will a combination of average and actual weights be used. However, the above calendar periods may be varied where climatic conditions warrant, upon specific approval of the FAA.

(iii) *Crew weights.* Actual or average weights may be used in the case of crew members under conditions as set forth for passenger weights. The approved averages are as follows:

(*a*) Male cabin attendants 150 pounds; female cabin attendants 130 pounds.

(*b*) All other crew members 170 pounds.

(5) *Passenger and cabin attendant movement.*

(i) *General.* Consideration must be given to the effect of passenger and cabin attendant movement on the balance of the aircraft. The movement of a number of passengers and cabin attendants equal to the placarded capacity of the lounges and/or lavatories must be considered. If the capacity is one, the movement of either a passenger or a cabin attendant, whichever most adversely affects the c. g. condition shall be used. When the capacity of the lavatory and/or lounge is two or more, the movement of passengers and/or cabin attendants evenly distributed throughout the aircraft, equal to the placarded capacity of the lounge and/or lavatory, shall be considered. Where seats are blocked off, the movement of passengers and/or cabin attendants evenly distributed throughout the actual loaded section of the aircraft may be used. The extreme movements of the cabin attendants carrying out their assigned duties should be considered. The various conditions shall be combined so that tbe most adverse effect on the c. g. will be obtained and so accounted for in the development of the loading device to assure the aircraft of being loaded within the approved limits at all times.

(ii) *Fuel use and landing gear retraction* Consideration must be given to the effect on the balance of the aircraft of fuel used down to the FAA minimum of one-twelfth gallon per METO (or maximum continuous) hp. in addition to the unusable fuel and landing gear retraction. No consideration need be given to oil use.

(6) *Fleet weights.* An average operating or basic fleet weight may be utilized for a fleet, or group of aircraft, of the same model. When the basic or operating weights and c. g. positions remain within the limits established in subdivision (vii) of this paragraph. Such weights will be calculated on the following basis:

(i) The operator will determine the empty fleet weight by weighing aircraft according to the following table:

The first three aircraft must be weighed.

Fifty percent of the next six aircraft must be weighed.

Ten percent of the remaining aircraft must be weighed.

In choosing the aircraft to be weighed, a representative number should be picked from each age group of the fleet (the number of the same model delivered during each calendar year). This is to insure that the aircraft weighed as representative of the fleet will reflect the accuracy of the operator's weight records and expose any "service pickup" or unaccountable weights not shown in the weight ledger.

(ii) The operator will establish the empty weight and c. g. position for each aircraft that has been weighed.

(iii) The operator will establish the empty fleet weight and c. g. position for each fleet or group of the same model aircraft by averaging the operator's empty weights of the weighed aircraft in each fleet or group.

(iv) The operator will establish the empty weight and c. g. position by calculation for each aircraft in each group not weighed.

(v) The operator will establish the basic or operating fleet weight and c. g. position for each fleet by adding the following items to the empty fleet weight for each fleet: normally removable equipment, i. e., passenger service equipment, emergency equipment (including portable fire extinguishers), navigation equipment, flight spares, washing and drinking water, crew and crew baggage (when not variable), and drainable oil (when the oil load is not variable).

(vi) The operator will establish an operating or basic weight for each aircraft in each fleet by adding items designated in subdivision (v) of this subparagraph to the operator's empty weight of each aircraft.

(vii) If the basic or operating weight of any aircraft weighed or the calculated weight of any of the remaining aircraft in the fleet varies by an amount more than plus or minus one-half of 1 percent of the maximum landing weight from the basic or operating fleet weight or the c. g. position varies more than plus or minus one-half of 1 percent of the MAC from the fleet average c. g. that airplane must be omitted from that group and operated on its actual or calculated basic or operating weight and c. g. position. If it falls within the limits of another

fleet or group, it may then become part of the basic or operating fleet weight of that fleet.

(viii) Reestablishment of the operator's empty fleet weight and the basic or operating fleet weight may be accomplished between weighing periods by calculation based on the current operator's empty weight and operating or basic weight of the aircraft previously weighed.

(ix) In cases where the basic or operating fleet weight does not vary more than the tolerance allowed, but the c. g. position varies in excess of the tolerance allowed, the aircraft may be operated utilizing a basic or operating fleet weight with individual c. g. positions.

If all aircraft are weighed, the same general procedure as outlined above shall be followed if a fleet weight is to be used.

Other methods of computing aircraft loading are permissible if it can be shown that the approved weight and c. g. limits are not exceeded.

(7) *Individual aircraft weights.*

(i) *General.* When the accumulated changes to the operating or basic weight and/or c. g. position exceed plus or minus one-half of one percent of the maximum landing weight or the MAC, respectively, the loading data must be revised accordingly.

(*a*) Fuel allowance for taxiing. A compensating weight allowance of 3 pounds of fuel for each 100 horsepower. METO (or maximum continuous), available to the aircraft from all of its engines may be added to the maximum weight of the aircraft.

(8) *Weighing procedure.* Normal precautions, consistent with good practices in the weighing procedure, such as checking for completeness of the aircraft and equipment, determining that fluids are properly accounted for, and that weighing is accomplished in an enclosed building preventing the effect of the wind, shall prevail. Any nationally recognized scales may be used for weighing provided they are properly calibrated, zeroed, and used in accordance with the manufacturer's instructions. Each scale should have a calibration chart, either furnished by the manufacturer or by a civic Department of Weights and Measures. This calibration chart should not be more than 1 year old unless the particular scales have had insufficient use and have been properly stored and cared for, thereby warranting a longer period between calibrations. In case of necessity, the scales may be calibrated on the spot. In any case, the calibration of the scales and the weight precedure must be acceptable to the FAA[11] representative.

(d) *Deletion of irrelevant information.* The portion of the Maintenance Manual which requires approval by the Administrator shall not include information which does not have a direct bearing on safety of the aircraft. Such material as organization procedures, employee conduct, rates of compensation, working hours, etc., if included in the Maintenance Manual shall be confined within a separate section.

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42.32–6 *Copy of maintenance manual in aircraft (FAA policies which apply to sec. 42.32 (d) (2)).* This manual shall contain such maintenance instructions as are necessary for the type of operations and aircraft concerned, and interpreting the air carrier's procedures to be followed in complying with the maintenance requirements of this part and the Operations Specifications. The foregoing shall not be construed as requiring an air carrier to carry in the aircraft complete maintenance and overhaul instructions for a particular type of aircraft. It is essential, however, that the manual contain such maintenance information as will provide adequate guidance for routine and emergency maintenance procedures, in addition to the air carrier's policy relative to their accomplishment.

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42.32–7 *Mandatory revisions (FAA rules which apply to sec. 42.32 (d) (3)).* When the operator is instructed to incorporate changes in the manual by the Administrator or his properly authorized representatives, such changes shall

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

be made promptly in all copies of the manual in the hands of designated personnel.

(Published in 14 F. R. 7039, Nov. 22, 1949, effective upon publication; amended in 18 F. R. 7537, Nov. 26, 1953.)

Flight Crew Requirements

42.40 *Airman requirements.*

(a) No air carrier shall utilize an individual as an airman unless he has met the appropriate requirements of the Civil Air Regulations: *Provided,* That, in the case of an air carrier holding a scheduled air carrier operating certificate and conducting operations in accordance with section 42.0 (a) and (b) of this part, the provisions of sections 42.44(a) and 42.45 shall not be applicable to pilots who for the previous six months have been continuously in the employ and participating regularly in the training program and established pilot training and check procedures of such air carrier and who are otherwise qualified in accordance with the requirements of Part 40 or Part 41 of this chapter.

(b) Each air carrier operating large aircraft shall designate a chief pilot who shall be responsible for seeing that no individual is assigned as a pilot unless he has met the appropriate requirements of the Civil Air Regulations.

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

42.41 *Composition of flight crew.*

(a) No air carrier shall operate an aircraft with less than the minimum flight crew required for the particular operation and the type of aircraft, as determined by the Administrator in accordance with the standards prescribed in this section, and specified in the air carrier operations manual for the area in which operations are authorized.

(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) *Second pilot.* A second pilot shall be required on large aircraft, or on other aircraft when passengers are carried on operations under IFR, or when the Administrator finds that a second pilot is otherwise required in the interest of safety.

(d) *Flight radio operator.* An airman holding a flight radio operator certificate shall be required for flight over any area over which the Administrator has determined that radiotelegraphy is necessary for communication with ground stations during flight.

(e) *Flight engineer.* An airman holding a flight engineer certificate shall be required on all aircraft of more than 80,000 lbs. maximum certificated takeoff weight, and on all other aircraft certificated for more than 30,000 lbs. maximum certificated takeoff weight where the Administrator finds that the design of the aircraft used or the type of operation is such as to require a flight engineer for the safe operation of the aircraft, or on other aircraft where required by the aircraft airworthiness certificate.

(f) *Flight navigator.* An airman holding a flight navigator certificate shall be required for flight over any area where the Administrator has determined that celestial navigation is necessary.

[(g) 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 such emergency coverage.

[(Amendment 42–28, published in 25 F.R. 2360, March 19, 1960, effective May 19, 1960.)]

42.42 *Pilot qualification for small aircraft.*

(a) *Pilot in command.* Any pilot serving as pilot in command on small aircraft shall hold a valid commercial pilot certificate with an appropriate rating for the aircraft on which he is to serve, and for:

(1) *Day flight VFR.* He shall have had at least 50 hours of cross-country flight time as a pilot;

(2) *Night flight VFR.* He shall have had a total of at least 500 hours of flight time as a pilot, including 100 hours of cross-country flight time of which 25 hours shall have been at night;

(3) *IFR flight.* He must possess a currently effective instrument rating and have had a total of at least 500 hours of flight time as a pilot including 100 hours of cross-country flight.

(b) *Second pilot.* Any pilot serving as second pilot on small aircraft shall hold for:

(1) *VFR flight.* A valid commercial pilot certificate with the appropriate ratings;

(2) *IFR flight.* A currently effective instrument rating.

42.43 *Pilot qualifications for large aircraft.*

(a) *Pilot in command.* Any pilot serving as pilot in command on large aircraft shall possess a valid airline transport pilot rating with an appropriate rating for the aircraft on which he is to serve.

(b) *Second in command.* Before a pilot shall serve as second in command on large aircraft, he shall:

(1) Possess a valid commercial pilot rating and instrument rating, or a valid air line transport pilot rating, and

(2) Demonstrate to an authorized representative of the Administrator, or to a check pilot designated by the Administrator, his ability to take off and land each type of aircraft on which he is to serve by making at least three satisfactory takeoffs and landings in each type.

(c) *Three-pilot crew.* In a crew of three or more pilots at least two pilots shall meet the requirements of paragraph (a) of this section. All other pilots shall meet the requirements of subparagraphs (1) and (2) of paragraph (b) of this section.

(Amendment 42–23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)

42.44 *Recent flight experience requirements for flight crewmembers.* No air carrier shall utilize an airman, nor shall any individual serve as an airman, unless he meets the appropriate experience requirements specified below:

(a) *Pilots.*

(1) Within the preceding 90 days a pilot shall have made at least 3 takeoffs and landings in an aircraft of the same type on which he is to serve. For night flight one of the takeoffs and landings required above shall have been made at night.

(2) *Proficiency check for pilot in command on large aircraft.* An air carrier shall not utilize a pilot as pilot in command until he has satisfactorily demonstrated to a check pilot or a representative of the Administrator his ability to pilot and navigate airplanes to be flown by him. Thereafter, he shall not serve as pilot in command unless each 6 months he successfully completes a similar pilot proficiency check. The proficiency check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due. Where such pilots serve in more than one airplane type, at least every other successive proficiency check shall be given in flight in the larger airplane type. The pilot proficiency check shall include at least the following:

(i) The flight maneuvers specified in section 42.45b(b)(1), except that the simulated engine failure during takeoff need not be accomplished at speed V_1, nor at actual or simulated maximum authorized weight.

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

(iii) Prior to serving as pilot in command in a particular type of airplane, a pilot

shall have accomplished during the preceding 12 months a proficiency check in that type of airplane.

(3) *Proficiency checks, second in command on large aircraft.* An air carrier shall not utilize a pilot as second in command until he has satisfactorily demonstrated to a check pilot or a representative of the Administrator his ability to pilot and navigate airplanes to be flown by him and to perform his assigned duties. Thereafter, he shall not serve as second in command unless each 12 months he successfully completes a similar pilot proficiency check. The proficiency check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due. Where such pilots serve in more than one airplane type, at least every other successive proficiency check shall be given in flight in the larger airplane type. The proficiency check shall include at least an oral or written equipment examination, and the procedures and flight maneuvers specified in section 42.45b(c)(1). The pilot proficiency check may be demonstrated from either the right or left pilot seat.

(i) The proficiency check for the second in command of a crew requiring 3 or more pilots shall be the same as required under subparagraph (2) of this paragraph.

(ii) Subsequent to the initial pilot proficiency check, an approved course of training in an aircraft simulator which meets the requirements of subparagraph (4) of this paragraph if satisfactorily completed may be substituted at alternate 12-month intervals for the proficiency check required by this subparagraph.

(iii) Satisfactory completion of the proficiency check in accordance with the requirements of subparagraph (2) of this paragraph will also meet the requirements of this subparagraph.

(Amendment 42–23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)

[(4) Subsequent to the initial pilot proficiency check, an approved course of training conducted in an approved airplane simulator, if satisfactorily completed, may be substituted at alternate 6-month intervals for the proficiency checks required by subparagraph (2) of this paragraph if the simulator meets the minimum standards set forth in Appendix C and:

[(i) The simulator is maintained at the same level as required for initial approval;

[(ii) A functional preflight check of the simulator is performed each day prior to commencing simulator flight training or proficiency checks;

[(iii) A daily discrepancy log is maintained and an entry of each discrepancy is made by the simulator instructor or check airman before termination of each training or check flight; and

[(iv) If a modification is made to the airplane, a corresponding modification is made to the simulator if necessary for flight crew training or proficiency checks.

[The simulator may be used with inoperative instruments or equipment, if they are not applicable to the particular phase of training being given.

[(Amendment 42–45, published in 28 F.R. 3479, April 10, 1963, effective June 10, 1963.)]

(5) *Proficiency check for pilot in command on small aircraft.* Within the preceding 6 months the pilot in command on any small aircraft under IFR conditions shall have successfully accomplished an instrument check demonstrating his ability to pilot and navigate by instruments, to accomplish a standard instrument approach using radio range facilities, and to accomplish an instrument approach in accordance with ILS, GCA, or D/F procedures when such facilities are to be used. This instrument check shall be given by an authorized representative of the Administrator or a check pilot of the air carrier, on an aircraft of a type on which the pilot in command is to serve.

(Amendment 42–30, published in 26 F.R. 93, Jan. 6, 1961, effective Jan. 1, 1961.)

(b) *Flight radio operator.* No individual shall perform, or be assigned to perform, the duties of a flight radio operator unless he has met the recent experience requirements specified in Part 33 of this subchapter.

(c) ***Flight engineer.*** **No individual shall be assigned to nor perform duties as a flight engineer unless within the preceding 12 months he has had at least 50 hours of experience as a flight engineer on the type of aircraft on which he is to serve, or until a person designated by the Administrator has checked the airman and determined that he is (1) familiar with all current information and operating procedures relating to the type of aircraft on which he is to serve and (2) competent with respect to the flight engineer's duties on such aircraft.**

(d) ***Flight navigator.*** **No individual shall be assigned to nor perform duties as a flight navigator unless within the preceding 12 months he has had at least 50 hours of experience as a flight navigator, or until a person designated by the Administrator has checked the airman and determined that he is (1) familiar with all current navigational information pertaining to the operations of the air carrier and (2) competent with respect to the operating procedures and navigational equipment to be used.**

42.44–1 *Equipment check (FAA policies which apply to sec. 42.44 (a) (2)).*

(a) *General.* The equipment check for pilots on large aircraft, other than pilots in command, should consist of (1) an equipment examination (oral or written) and (2) a flight check.

The equipment check for pilots in command on large aircraft need only consist of the equipment examination, since a pilot in command should successfully accomplish all of the instrument checks prescribed in section 42.44–2.

(b) *Equipment examination for all pilots.* This examination, which may be oral or written, should be pertinent to the type of aircraft to be flown by the pilot and should be given (1) in the air carrier's ground school, (2) during a routine line check, (3) during the flight phase of the equipment check, or (4) during the instrument checks prescribed in section 42.44–2. The examination should include, but need not be limited to, questions relative to engine power settings, stall speeds at various configurations and weights, airplane placard speeds, critical engine failure speeds, control systems, fuel and lubrication systems, propeller and supercharger operations, hydraulic systems, electric systems, anti-icing, heating and ventilating, and pressurization system (if pressurized).

(c) *Flight check for pilots other than pilots in command.* This check should include at least the following items, but no maneuvers need be accomplished solely by reference to instruments. It may be given during any flight which is of at least one hour duration.

(1) *Preflight planning.* The pilot should be directed to execute a flight plan for the flight involved, including the interpretation of weather maps, upper air charts, and sequence reports.

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

(3) *Runup.* Attention to detail in the use of cockpit check list and cockpit procedure should be observed on all flight checks.

(4) *Takeoff.* The check pilot should observe the pilot's ability to maintain a constant

heading during the takeoff run, his proficiency in using or directing the use of power, flaps, and gear operation, during the critical period between takeoff (off ground) and reaching 500 feet. If it becomes necessary for the pilot occupying the other control position to give other than routine assistance after becoming airborne, the maneuver should be considered as unsatisfactory.

(5) *Climbs and climbing turns.* Climbs and climbing turns should be performed in accordance with the airspeeds and power settings as prescribed by the air carrier or those set forth in the airplane flight manual. The use of proper climb speeds and designated rates of climb should be considered in determining the satisfactory performance of this phase of the equipment check flight.

(6) *Navigational facilities.* The pilot should be directed to use all en route navigational facilities in the proper sequence. Attention should be given to the pilot's ability to use all available airplane navigational equipment.

(7) *Loop orientation.* The pilot should be directed to obtain an en route position by the use of the radio compass. Attention should be given to the time involved in obtaining the fix and accuracy with which the airplane position is established on a proper chart.

(8) *Landing under regular approach conditions.* Landing under regular approach conditions should necessitate a path of flight around the landing area of not more than a 180° turn but not less than a 90° turn. The pilot should be judged on the basis of altitude and air-speed control and his ability to maneuver to a normal landing.

(9) *Judgment.* The pilot should demonstrate judgment commensurate with experience required of a co-pilot in air carrier aircraft.

(d) *Pilot records.* A record of the equipment check, including a report of any pilot deficiencies, should be maintained in the file of each pilot.

(1) The records of pilots, other than pilots in command, should include (i) the date, method used and grade received on the equipment examination set forth in paragraph (b) of this section and (ii) the date and grade received on the flight check set forth in paragraph (c) of this section.

(2) The records of pilots in command should include (i) the date, method used and grade received on the equipment examination set forth in paragraph (b) of this section and (ii) the date and grade received on the instrument checks prescribed in section 42.44–2.

(Published in 18 F. R. 1909, Apr. 7, 1953, effective Apr. 25, 1953.)

42.44–2 *Instrument checks (FAA policies which apply to sec. 42.44 (a) (3)).*

(a) *General.* A pilot in command on any large aircraft should successfully accomplish the instrument checks set forth in this section. Each pilot required under section 42.43 (c) to qualify as a pilot in command should successfully accomplish these instrument checks. The checks to be accomplished, and the observations to be made by the examining check pilot, are described as follows:

(b) *Taxiing, sailing, or docking.* Attention should be directed to (1) the manner in which the pilot in command conducts taxiing, sailing, or docking with reference to the taxi instruction as issued by airport traffic control or other traffic control agency, (2) any taxi instruction which may be published in the air carrier's operations manual, and (3) general regard for the safety of the air carrier's and other equipment which may be affected by taxiing, sailing, or docking operation.

(c) *Runup.* Attention to detail in the use of cockpit check list and cockpit procedure should be observed on all instrument check flights.

(d) *Takeoff.* Whenever practicable, the pilot being examined should execute a takeoff solely by reference to instruments, or at the option of the check pilot, a contact takeoff may be made following which instrument conditions should be simulated at or before reaching 100 feet with the subsequent climb conducted solely by reference to instruments. The check pilot should observe the pilot's ability to maintain a constant heading during the takeoff run, his proficiency in handling power, flap and gear operation during the critical period hetween takeoff (off ground) and reaching 500 feet. If it becomes necessary for the check pilot to give other than routine assistance after becoming airborne, the maneuver should be considered as unsatisfactory.

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

(f) *Steep turns.* Except as provided hereinafter, steep turns should consist of at least 45° of bank. The turns should be at least 180° of duration but need not be more than 360°. Smooth control application, and ability to maneuver aircraft within prescribed limits, should be the primary basis for judging performance. When information is available on the relation of increase of stall speeds versus increase in angle of bank, such information should be reviewed and discussed. As a guide, the tolerances of 100 feet, plus or minus, a given altitude should be considered as acceptable deviation in the performance of steep turns. Consideration may be given to factors other than pilot proficiency which might make compliance with the above tolerances impractical. For example, where the range of vision from the safety observer's position is obstructed in certain types of aircraft while in a steep left turn, the degree of left bank in such instances may be reduced to not less than 30°.

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

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

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

(j) *Maneuvers (one or more engines out).* When performing maneuvers (one or more engines out) the aircraft should be maneuvered with a loss of 50 percent of its power units, such loss to be concentrated on one side of the aircraft. The loss of these power units may be simulated either by retarding throttles or by following approved feathering procedures. The pilot in command should be required to maintain headings and altitude and to make moderate turns both toward and away from the dead engine or engines. Proficiency should be judged on the basis of the pilot's ability to maintain engine-out airspeed, heading and altitude; to trim the airplane; and to adjust necessary power settings.

(k) *Rapid descent and pull-out.* This maneuver should consist of the following steps: While the aircraft is under the normal approach configuration and being flown at a predetermined altitude, it will be assumed that the aircraft has arrived at a navigational fix and is cleared to descend immediately to a lower altitude. (The lower altitude should be one which permits a descent of at least 1,000 feet.) Upon reaching the lower altitude, the aircraft should be recovered from the rapid descent and flown on a predetermined heading and altitude for a predetermined period of time. At the end of the time interval, an emergency pullout should be executed which will involve a change in direction of at least 180°. Performance should

be judged on the basis of ability to establish a rapid descent at constant airspeed, stopping the descent at the minimum altitude specified without going below it, holding heading and altitude, and smooth pull-up and climb.

(l) *Ability to tune radio.*[12]

(m) *Orientation.*[12]

(n) *Beam bracketing.*[12]

(o) *Cone identification.*[12]

(p) *Loop orientation.*[12]

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

(r) *Missed approach procedures.* (See paragraph (s).)

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

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

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

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

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

(x) *Emergency procedures.* The emergency procedures should be applicable to the type of aircraft being flown and in accordance with the emergency procedures prescribed by the air carrier. A record should be maintained in the

[12] Paragraphs (l), (m), (n), (o), and (p) may be accomplished during a routine line check, or in a simulated or synthetic trainer, or during the instrument check flight. A record should be maintained in the pilot's file which should indicate the date, method utilized, and grade received in the performance of these items.

pilot's file which will list the emergency procedures accomplished, date performed, and grade received.

(Published in 18 F. R. 1911, Apr. 7, 1953, effective Apr. 25, 1953.)

42.44–3 *Aircraft used in instrument checks (FAA policies which apply to sec. 42.44 (a)(3)).* Where a pilot-in-command is scheduled to fly only one type of land aircraft or one type of seaplane, he should be given his instrument checks in that type of aircraft he is scheduled to fly.

Where a pilot-in-command is scheduled to fly more than one type of land aircraft and/or seaplane, his instrument competency should be checked in all types of aircraft he is scheduled to fly. However, the following exceptions should be allowed:

(a) If a pilot is scheduled to fly 2-engine, 3-engine, and 4-engine aircraft or any combination thereof, and/or more than one type of such aircraft, he should take his instrument checks in one of the larger and more complicated types of aircraft; or if only one of the smaller type aircraft is available, he should take his instrument checks immediately due in that aircraft, but his next instrument checks should be accomplished in one of the larger and more complicated type of aircraft.

(b) If a pilot is scheduled to fly both land aircraft and seaplanes, his instrument checks should include a demonstration of competency in both land aircraft and seaplane in accordance with paragraph (a).

(Published in 18 F. R. 1912, Apr. 7, 1953, effective Apr. 25, 1953.)

42.44–4 *Use of flight simulator in instrument checks (FAA policies which apply to sec. 42.44 (a) (3)).* An air carrier using a flight simulator in its pilot training program may be approved to utilize such a device for certain maneuvers in conducting instrument checks when (a) the training device accurately simulates the flight characteristics and the performance of the applicable aircraft through all ranges of normal and emergency operation, (b) a description of the maneuvers to be conducted in the simulator, other than those specifically authorized in paragraphs (1), (m), (n), (o), (p), and (q) of section 42.44–2, is submitted to the Washington office for approval by the region in which the headquarters of the air carrier is located, and (c) certain critical maneuvers which demonstrate the instrument proficiency of a pilot are executed in an aircraft of the type flown by the pilot in air carrier service. The proficiency flight in the aircraft should include at least maneuvers (minimum speed), approach procedures, handling under regular approach conditions, and takeoff and landings, with engine failures as outlined in section 42.44–2, paragraphs (g), (q), (u), and (v) respectively.

(Published in 18 F. R. 1912, Apr. 7, 1953, effective Apr. 25, 1953.)

42.44–5 *Persons from whom the equipment and instrument checks must be received (FAA interpretations which apply to sec. 42.44).*

(a) "An authorized representative of the Administrator" as used in this section means an FAA Flight Operations and Airworthiness Inspector.

(b) "A check pilot of the air carrier" as used in this section means a check pilot of the air carrier by which the pilot is presently employed. Therefore, checks given to a pilot by the check pilot of a previous employer within the preceding 6 months do not satisfy the experience requirements of subparagraphs (2) and (3) of section 42.44 (a).

(Published in 21 F. R. 450, Jan. 21, 1956, effective Jan. 21, 1956; amended effective June 15, 1957.)

42.44–6 *Flight engineer qualifications for duty (FAA interpretations which apply to sec. 42.44).* An airman assigned to flight-check other flight engineers must meet the recent experience requirements of this part before serving as a flight engineer in air transportation. However, the time spent in giving flight engineer checks may be applied toward the 50-hour recent experience requirement on a particular type of aircraft. Unless such experience has been obtained within the preceding 12-month period, a check by the air carrier or an authorized representative of the Administrator is required.

(Published in 21 F. R. 678, Jan. 31, 1956, effective Feb. 15, 1956; amended in 21 F. R. 2373, Apr. 12, 1956, effective upon publication.)

42.44–7 *Requirements for approved training course—aircraft simulator (FAA rules which apply to sec. 42.44 (a) (4)).*

(a) *Application for approval.* An applicant desiring approval of an aircraft simulator training course shall submit his application in triplicate to the local Air Carrier Safety Inspector. The application shall contain a training course, including a description of the equipment, facilities, and material to be used, together with a letter to the Administrator of the Federal Aviation Agency requesting approval [13] of the course. The application shall be prepared in looseleaf form, shall include a table of contents, time required for each phase of the course; and procedures for administering the following training course:

(1) *Training course.* Flight equipment used shall be identical to that used in actual flight operations and the course [14] shall incorporate at least the following subjects:

(i) All of the required maneuvers in section 40.282 (b) (1) of this subchapter and section 42.44–2 except the visual flight maneuvers performed around the airport.

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

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

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

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

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

(Published in 22 F. R. 8998, Nov. 9, 1957, effective Nov. 25, 1957.)

42.45 *Training requirements for crewmembers serving on large aircraft.*

(a) Each air carrier shall establish a training program sufficient to insure that each crewmember 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 passenger or cargo 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 crewmember 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 crewmember will know the function for which he is responsible and the relation

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

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

of those functions to those of other flight crewmembers. The initial program shall include at least the appropriate requirements specified in sections 42.45a through 42.45e.

(d) The crewmember emergency procedures training program shall include at least the requirements specified in section 42.45e.

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

(Amendment 42–23, published in 24 F. R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)

42.45–1 *Training program (FAA policies which apply to sec. 42.45).*

(a) *Ground phase.* The ground phase of the air carrier's pilot training and instruction program shall include:

(1) A study of the regulations in this subchapter applicable to irregular air carrier operation and of the provisions of the air carrier's operating certificate, including methods and principles of determining weight limitations for landings and takeoffs;

(2) A study of the company's operations manual and procedures;

(3) Training in the duties and responsibilities of flight crew and crewmembers;

(4) Through familiarization with the aircraft to be flown including the engines and all major components, operation of cabin pressurization (if installed), oxygen system, standard operating procedures, a study of the *FAA* approved Airplane Flight Manual;

(5) A study of navigation, use of radio aids to navigation and such refresher courses necessary to keep airmen current in the application of any new developments;

(6) A study of meteorology sufficient to maintain a practical knowledge of the principles of icing, fog, thunderstorms and frontal systems, etc., and the best method of operating under these various conditions.

Training and instruction in synthetic-type training devices may be included in the ground phase of the training program. However, such training should be so planned that it will supplement the flight training phase and afford further training in specific instrument let-down procedures to be conducted by the pilot in irregular air carrier operations.

(b) *Flight phase.* The flight phase of the training program should be so planned as to insure adequate initial qualification of the pilot on the type aircraft on which he is to serve. It shall also provide for the continued maintenance of a high standard of pilot proficiency. This training shall include, but not be limited to:

(1) Takeoffs and landings under varying conditions of load, wind, low ceiling and visibility, inoperative engine, etc.;

(2) Flight with one or more engines inoperative, including flight with any one engine fully throttled at maximum authorized load, either at one-engine-inoperative service ceiling or at an altitude equivalent to 1,000 feet above the highest part of the terrain on the route or routes to be flown;

(3) Operating under normal and maximum limits of power and speed;

(4) Conduct instrument flight including navigation by low frequency radio ranges, VHF, and ADF, letting-down-through procedures utilizing radio range, ADF, ILS, GCA, etc., whichever is used by the air carrier in its normal operations.

(c) *Emergency procedures.* The training program shall include instruction in emergency procedures particularly with respect to engine failure, fire in the air or on the ground, evacuation of passengers, location and operation of all emergency equipment, power settings for maximum endurance and maximum range, etc.

(d) *Other.* Whenever flight engineers, flight radio operators, flight navigators, or cabin

attendants are utilized, appropriate and adequate training and instruction shall be included in the air carrier's training program.

(Published in 14 F. R. 7039, Nov. 22, 1949, effective upon publication.)

[42.45a *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 rules and airplane operating limitations;

[(b) Appropriate contents of the manuals;

[(c) The duties and responsibilities of crewmembers;

[(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 takeoff and landing;

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

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

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

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

[(Amendment 42-23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)]

[42.45b *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 passenger or cargo flights, and flight under simulated instrument flight conditions.

[(b) Flight training for a pilot qualifying to serve as pilot in command or as second in command in a crew requiring three or more pilots 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:

[(i) At the authorized maximum takeoff weight, takeoff using maximum takeoff 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 climbout shall be accomplished at a speed as close as possible to the takeoff saftey speed (V_2). Each pilot shall ascertain the proper values for speeds V_1 and V_2;

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

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

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

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

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

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

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

[(ii) Taxiing,

[(iii) Takeoffs and landings,

[(iv) Climbs and climbing turns,

[(v) Slow flight,

[(vi) Approach to stall,

[(vii) Engine shutdown and restart,

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

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

[(2) Conduct of flight under simulated instrument conditions, utilizing all types of navigational facilities and the letdown procedures used in normal operations. Except for those approach procedures for which the lowest minimums are approved, all other letdown procedures may be given in a synthetic trainer which contains the radio equipment and instruments necessary to simulate other navigational and letdown procedures approved for use by the air carrier.

[(Amendment 42–23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)]

[42.45c *Initial flight navigation training.*

[(a) The training for flight navigation shall include the applicable portions of at least paragraphs (a) through (d) and (f) through (h) of section 42.45a.

[(b) Prior to serving as a required flight crewmember each flight navigator shall be given sufficient ground and flight training to become proficient in those duties assigned him by the air carrier. The flight training may be accomplished during passenger or cargo flights under the supervision of a qualified flight navigator.

[(Amendment 42–23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)]

[42.45d *Initial flight engineer training.*

[(a) The training for flight engineers shall include at least the instruction specified in section 42.45a (a) through (e).

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

[(Amendment 42–43, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)]

[42.45e *Initial crewmember emergency training.*

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

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

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

[(Amendment 42–23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961; Amendment 42–31, published in 26 F.R. 1058, Feb. 3, 1961, effective Mar. 3, 1961.)]

[42.45f *Recurrent training.*

[(a) Each air carrier shall provide such training as is necessary to insure the contin-

ued competence of each crewmember and to insure that each possesses adequate knowledge of and familiarity with all new equipment and procedures to be used by him.

[(b) Each air carrier shall, as a part of the training program, check the competence of each crewmember each 12 months with respect to procedures, techniques, and information essential to the satisfactory performance of his duties. The competence check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due. Where the check of the pilot in command or second in command requires actual flight, such check shall be considered to have been met by the checks accomplished in accordance with sections 42.44 (a) (2) and 42.44 (a) (3), respectively.]

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

(Amendment 42-23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961; [Amendment 42-41, published in 27 F.R. 7674, Aug. 3, 1962, effective Aug. 3, 1962.)]

42.45g *Approval of training programs.* The training program established by the air carrier under the provisions of sections 42.45 through 42.45f shall meet with the approval of an authorized representative of the administrator: *Provided,* That the curriculum of such training program shall be submitted in appropriate form to an authorized representative of the Administrator not later than May 1, 1960.

(Amendment 42-23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961, except as noted in proviso.)

42.45h *Flight crewmember qualification for large aircraft.*

(a) No air carrier shall utilize any flight crewmember, nor shall any such airman perform the duties authorized by his airman certificate, unless he satisfactorily meets the appropriate requirements of sections 42.40, 42.41, 42.43, 42.44; and 42.45 or 42.45f.

(b) Check airman shall certify as to the proficiency of the pilot being examined, as required by sections 42.43(b) and 42.44(a) and such certification shall become a part of the airman's record.

(Amendment 42-23, published in 24 F.R. 9773, Dec. 5, 1959, effective Jan. 1, 1961.)

42.46 *Logging flight time.*

(a) A pilot in command may log his total flight time.

(b) A second pilot holding an airline transport pilot certificate and rating for the aircraft flown may log the total time during which he is on duty on the flight deck.

(c) A second pilot not holding an airline transport pilot certificate and rating for the aircraft flown may log 50 percent of the total flight time during which he is on duty on the flight deck.

(d) A pilot may log as instrument flight time only such time as he is actually manipulating the controls when the aircraft is being flown solely by reference to instruments.

42.47 *Grace period for airman periodic checks.* Whenever this part requires an airman check at stated intervals, such check may be given at any time during the month preceding or following the month in which it becomes due. The effective date of the check, if given within the preceding or following month, shall be the same as if given within the month in which it became due.

42.48 *Flight time limitations for pilots on large aircraft.* The following limitations shall be applicable to pilots serving on large aircraft.

(a) *Individual pilot limitations.*

(1) A pilot may be scheduled to fly 8 hours or less during any 24 consecutive hours without a rest period during such 8 hours.

(2) A pilot shall receive 24 hours of rest before being assigned further duty when he has flown in excess of 8 hours during any 24 consecutive hours.

(3) A pilot shall be relieved from all duty for not less than 24 consecutive hours at least once during any 7 consecutive days.

(4) A pilot shall not fly as a crewmember in air carrier service more than 100 hours during any 30 consecutive days.

(5) A pilot shall not fly as a crewmember in air carrier service more than 1,000 hours in any one calendar year.

(6) A pilot shall not do other commercial flying if his total flying time for any specified period will exceed the limits of that period.

(7) Time spent in any deadhead transportation shall in no case be considered as part of a required rest period.

(b) *Aircraft having a crew of two pilots.*

(1) A pilot shall not be scheduled to fly in excess of 8 hours during any 24-hour period unless he is given an intervening rest period at or before the termination of 8 scheduled hours of flight duty. Such rest period shall equal at least twice the number of hours flown since the last preceding rest period, and in no case shall such rest period be less than 8 hours. During such rest period the pilot shall be relieved of all duty with the air carrier.

(2) A pilot shall not be on duty for more than 16 hours during any 24 consecutive hours.

(c) *Aircraft having a crew of three pilots.*

(1) A pilot shall not be scheduled for duty on the flight deck in excess of 8 hours in any 24-hour period.

(2) A pilot shall not be scheduled to be aloft for more than 12 hours in any 24-hour period.

(3) A pilot shall not be on duty for more than 18 hours in any 24-hour period.

(d) *Aircraft having a crew of four pilots.*

(1) A pilot shall not be scheduled for duty on the flight deck in excess of 8 hours during any 24-hour period.

(2) A pilot shall not be scheduled to be aloft for more than 16 hours in any 24-hour period.

(3) A pilot shall not be on duty for more than 20 hours during any 24-hour period.

42.48–1 *"Scheduled to fly," "scheduled to be aloft," and "scheduled for duty on the flight deck" (FAA interpretations which apply to sec. 42.48).* The phrases "scheduled to fly" and "scheduled to be aloft," as used in this section, refer to the estimated "block-to-block time" for a particular flight under normal operating conditions. The phrase "scheduled for duty on the flight deck," as used in this section, refers to that portion of such "block-to-block time" during which the airman is scheduled for flight duty on the aircraft.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication.)

42.48–2 *Scheduled type operations (FAA policies which apply to sec. 42.48).* An operator conducting a scheduled type operation (e. g., scheduled cargo-only service, regular flights between points pursuant to a military contract, etc.) may establish flight operations schedules for a particular route or route segment in order to determine compliance with the scheduling provisions of the flight time limitations.

(Published in 21 F. R. 4312, June 20, 1956, effective July 1, 1956.)

[42.49 *Flight time limitations for flight engineers on large airplanes.* The flight time limitations prescribed in section 42.48 (a) and (b) shall apply to an airman serving as a flight engineer except that when two of more airmen serve as flight engineers in a flight crew containing three or more pilots, the flight time limitations prescribed in section 42.48(d) shall apply in lieu of those in section 42.48(b).]

[(Amendment 42–42, published in 27 F.R. 8268, Aug. 18, 1962, effective Sept. 17, 1962.)]

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

[(Amendment 42–42, published in 27 F.R. 8268, Aug. 18, 1962, effective Sept. 17, 1962.)]

Flight Operation Rules

42.51 *Pilot responsibilities.*

(a) *Pilot in command.* The pilot in command of the aircraft shall be designated by the air carrier.

(b) *Preflight action.* Prior to commencing a flight the pilot in command shall familiarize himself with the latest weather reports pertinent to the flight issued by the United States Weather Bureau or if unavailable, by the most

reliable source, and with the information necessary for the safe operation of the aircraft en route, and on the airports or other landing areas to be used, and determine that the flight can be completed with safety.

(c) *Charts and flight equipment.* The pilot in command shall have in his possession in the cockpit proper flight and navigational facility charts, including instrument approach procedures when instrument flight is authorized, and such other flight equipment as may be necessary to properly conduct the particular flight proposed.

(d) *Emergency decisions.*

(1) When required in the interest of safety, a pilot may make any immediate decision and follow any course of action which in his judgment appears necessary, regardless of prescribed methods or requirements. He shall, where practicable, keep the proper control station fully informed regarding the progress of the flight.[6]

(2) In an emergency requiring either the dumping of fuel or a landing at a weight in excess of the authorized landing weight, a pilot may elect to follow whichever procedure he considers safer.

(e) *Serviceability of equipment.* Prior to starting any flight, the pilot shall determine that the aircraft, all engines and propellers, appliances and required equipment, including all instruments, are in proper operating condition. If during the flight any such engine, propeller, appliance, or equipment malfunctions or becomes inoperative, the pilot in command shall determine whether the flight can be continued with safety. Unless he believes that flight can be continued safely, he shall hold or cancel it until satisfactory repairs or replacements are made.

(f) *Admission to flight deck of aircraft having a separate pilot compartment.* No persons, other than crewmembers, shall be admitted to the flight deck of an airplane having a separate pilot compartment except those authorized in subparagraphs (1) and (2) of this paragraph. For the purposes of this section, the Administrator shall determine what constitutes the flight deck.

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

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

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

(i) 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

[6] See section 42.94 for the report to be filed by the pilot where the authority granted by this section is exercised.

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or advantageous to the conduct of safe air carrier operations, or

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

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

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

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

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

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

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

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

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

42.51–1 *Preflight responsibilities (FAA interpretations which apply to sec. 42.51 (a) and (b)).* In complying with section 42.51 (a) and (b)—particularly that portion requiring the pilot in command to familiarize himself with "the information necessary for the safe operation of the aircraft en route and on the airports or other landing areas to be used"—the pilot in command must, prior to origination of each flight review the en route procedures, radio navigational facilities, holding patterns, approach procedures, and letdown procedures for the airport of destination and the alternate airports, if any, for the proposed flight.

Under the provisions of section 42.60–5, an air carrier using a large aircraft is required to establish a procedure in its operations manual whereby the pilot in command will under certain conditions certify on an appropriate form provided by the air carrier that the specified preflight action has been taken, and whereby such certification will be maintained as a part of its flight records.

(Published in 17 F. R. 5811, June 28, 1952, effective upon publication; amended in 18 F. R. 172, Jan. 9, 1953, effective Jan. 31, 1953.)

42.51–2 *Responsibilities of the pilot-in-command (FAA policies which apply to sec. 42.51).* In addition to the responsibilities prescribed in this section, the pilot-in-command is responsible for:

(a) Safe and efficient conduct of the flight to which assigned;

(b) Proper performance of duties by other assigned members of the crew;

(c) Condueting the flight in accordance with the provisions of the air carrier's irregular air carrier operating certificate and the applicable Civil Air Regulations;

(d) The exercise of good judgment in the planning of the flight;

(e) Proper loading of the aircraft, stowage of eargo, and adequacy of tie-down facilities;

(f) Determining that there are sufficient approved seats and safety belts for the number

of persons aboard the aircraft, and that safety belts are fastened when required;

(g) Proper servicing of the aircraft, including sufficient fuel, oil, and other items, such as de-icer fluid, etc., as may be necessary for the safety of the flight.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication; amended in 17 F. R. 5810, June 28, 1952, effective upon publication.)

42.51–3 *Time of reporting for duty (FAA policies which apply to sec. 42.51 (b)).* Each pilot should report in sufficient time prior to the start of the flight to permit reading of pilot's bulletins, current NOTAMS, studying of weather forecasts and reports, and other items pertinent to the proposed flight.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication; amended in 17 F. R. 5810, June 28, 1952, effective upon publication.)

42.51–4 *Flight equipment (FAA policies which apply to sec. 42.51 (c)).* Flight equipment shall include, but not be limited to, a navigation computer or calculator; current Airman's Guide; Flight Information Manual; International Flight Information Manual, if foreign flight is contemplated; and when night flight is contemplated, two satisfactory flashlights in good working order.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication; amended in 17 F. R. 5810, June 28, 1952, effective upon publication.)

42.51–5 *Serviceability of equipment (FAA policies which apply to sec. 42.51 (e)).*

(a) The pilot, as the authorized representative of the air carrier, is held responsible for the airworthiness of the aircraft and all its component parts or assemblies during its operation. Prior to starting any flight, the airworthiness of the aircraft will normally be determined through an inspection of the log book and maintenance records to make sure that all required maintenance functions and inspections have beeu accomplished and that the previously reported mechanical difficulties have been corrected. In addition, the pilot shall test the radio equipment and such instruments as may be ground checked for satisfactory operation. The pilot's responsibility also includes that of determining that refueling procedures and equipment are safe in all respects; such as, determination that water has been eliminated from the fuel, that sumps are drained on the aircraft, etc.

(b) When a malfunction or other difficulty is experienced with any component of the aircraft during the flight, the pilot should determine that a reasonable margin of safety will exist with those components which remain in good operating condition. If the situation exists where an additional failure would cause a hazardous condition the pilot should not continue flight, but should land at the nearest available landing area where a safe landing can be made.

(c) If any required instrument having functions which are not compensated for becomes inoperative during flight, a landing shall be made at the first airport where proper facilities to permit a safe landing are available.

(d) If unable to maintain two-way radio communications, the pilot in command shall:

(1) If operating under VFR conditions, proceed under VFR and land as soon as practicable, or

(2) Proceed according to the latest air traffic clearance to the radio facility serving the airport of intended landing, maintaining the minimum safe altitude or the last acknowledged assigned altitude, whichever is higher. Descent shall start at the expected approach time last authorized or, if not received and acknowledged at the estimated time of arrival indicated by the elapsed time specified in the flight plan.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication; amended in 17 F. R. 5810, June 28, 1952, effective upon publication.)

42.52 *Fuel supply.* The following minimum fuel requirements shall be applicable as specified:

(a) *United States.* Within the continental limits of the United States the following requirements shall be met unless the Administrator finds, after considering the character of the terrain being traversed, the available airports, and the category of aircraft being operated, that the safe conduct of the flight normally requires a greater quantity of fuel.

(1) No flight in small aircraft under VFR shall be started unless the aircraft carries sufficient fuel and oil, considering the wind and other weather conditions forecast, to fly to the point of intended landing, and thereafter

for a period of at least 30 minutes at normal cruising consumption.

(2) No flight in large aircraft under VFR shall be started unless, considering the factors enumerated in subparagraph (1) of this paragraph, the aircraft carries sufficient fuel and oil to fly to the point of intended landing, and thereafter for a period of at least 45 minutes at normal cruising consumption.

(3) No flight in large or small aircraft under IFR shall be started unless, considering the factors set forth in subparagraph (1) of this paragraph, sufficient fuel and oil are carried aboard the aircraft (i) to reach the point of intended landing, (ii) thereafter to fly to the alternate airport, and (iii) thereafter to fly for a period of 45 minutes at normal cruising consumption.

(b) *Outside the United States.* Outside the continental limits of the United States, the following requirements shall be met unless the Administrator finds, after considering the character of the terrain being traversed, the available airports, and the category and type of aircraft being operated, that the flight may be safely conducted with a lesser quantity of fuel.

(1) No flight shall be started unless, considering the wind and other weather conditions expected, the aircraft carries sufficient fuel and oil (i) to fly to the next point of landing specified in the flight plan, (ii) thereafter to fly to and land at the most distant alternate airport designated in the flight plan, and (iii) thereafter to fly for a period of at least 2 hours at normal cruising consumption.

(2) No flight shall be returned to the point of departure or to an alternate airport for that point unless the aircraft has sufficient fuel to return to such point and thereafter to fly for a period of at least 2 hours at normal cruising consumption.

(3) No flight shall be started to a destination for which there is no available alternate unless the aircraft carries sufficient fuel, considering wind and other weather conditions expected, to fly to that point and thereafter to fly for at least 3 hours at normal cruising consumption.

42.52–1 *Operations in the State of Alaska (FAA policies which apply to sec. 42.52(a)).* For operations in the State of Alaska, the minimum fuel requirements specified for operations within the continental limits of the United States shall apply, except as indicated in section 42.52–2.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication.)

42.52–2 *Operations in the State of Alaska (FAA policies which apply to sec. 42.52 (b)).* The minimum fuel requirements specified for operations outside the continental limits of the United States shall apply to all off-airway overwater operation into or out of the State of Alaska, and to all instrument operation to or from points north of latitude 67° N. or to or from points in the Aleutian and Pribiloff Islands west of longitude 160° W.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication.)

42.53 *Minimum flight altitude rules.* Except during takeoff and landing, the flight altitude rules prescribed in paragraphs (a) and (b) of this section, in addition to the applicable provisions of Section 60.17 of this subchapter, shall govern air carrier operations: *Provided,* That other altitudes may be established by the Administrator for any area where he finds, after considering the character of the terrain being traversed, the quality and quantity of meteorological service, the navigational facilities available, and other flight conditions, that the safe conduct of flight permits or requires such other altitudes.

(a) *Day VFR operations.* No aircraft shall be flown at an altitude less than 500 feet above the surface or less than 1,000 feet from any mountain, hill, or other obstruction to flight.

(b) *Night VFR or IFR operations.* No aircraft shall be flown at an altitude less than 1,000 feet above the highest obstacle located within a horizontal distance of 5 miles from the center of the course intended to be flown or, in mountainous terrain designated by the Administrator, 2,000 feet above the highest obstacle located within a horizontal distance of 5 miles from the center of the course intended to be flown: *Provided,* That in VFR operations at night in such mountainous terrain aircraft may be flown over a lighted civil airway at a minimum altitude of 1,000 feet above such obstacle.

42.54 *Flight into known icing conditions.* No aircraft shall be flown into known or probable heavy icing conditions. Aircraft may be flown into light or moderate icing conditions only if the aircraft is equipped with an approved means for de-icing the wings, propellers, and such other parts of the aircraft as are essential to safety.

42.54–1 *Other parts of the aircraft (FAA interpretations which apply to sec. 42.54).* The other parts of the aircraft referred to in this section include, but are not limited to, carburetors, windshields, pitot-static tubes, and empennage surfaces.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication.)

42.55 *Weather minimums.* No flight shall be started unless the takeoff, en route operation, and landing at destination can be conducted in accordance with the weather requirements of Part 60 of this subchapter,[7] but in no case less than the minimums specified below:

(a) For VFR takeoff, en route operation, or landing, the weather minimums shall be a ceiling of 1,000 feet and visibility of 1 mile for day and 2 miles for night, unless otherwise authorized by an air traffic clearance obtained from air traffic control.

(b) For IFR operations the weather minimums, including alternate airport requirements, shall not be less than those specified in Parts 609 and 610 of the Regulations of the Administrator, or as otherwise specified or authorized by the Administrator. These weather minimums, including alternate airport requirements, also may be found in the Approach and Landing Charts and Radio Facility Charts of the Coast and Geodetic Survey and in the Airman's Guide.

[(c) The ceiling and visibility landing minimums prescribed in the air carrier's operations specifications for an airport, other than an alternate airport, shall be increased by 100 feet ceiling and ½ mile visibility whenever the pilot in command of a large airplane has not served 100 hours as pilot in command in air carrier or commercial operations in that particular type of airplane. The ceiling and visibility minimums need not be increased above those applicable to the airport when used as an alternate airport. The sliding scale, when authorized in the air carrier's operations specifications, shall not be applied until the pilot in command has served 100 hours as pilot in command in air carrier or commercial operations in the particular type of airplane being operated by him.

[(Amendment 42–32, published in 26 F.R.3461, Apr. 22, 1961, effective May 23, 1961.)]

42.55–1 Deleted.

(Published in 20 F. R. 4148, June 15, 1955, effective June 30, 1955.)

42.55–2 *Air traffic clearance (FAA interpretations which apply to sec. 42.55 (a)).* An air traffic clearance obtained from air traffic control is an approval for the flight, or portion thereof, only with regard to known traffic conditions and does not authorize a pilot to violate the Civil Air Regulations pertaining to weather minimums. Regardless of any air traffic clearance obtained from air traffic control, the minimum visibility shall be not less than 1 mile for day and 2 miles for night in control zones, and 3 miles in control areas.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication.)

42.55–3 *IFR takeoff and landing minimums (FAA policies which apply to sec. 42.55).*

(a) The basic IFR takeoff minimums and landing minimums for each type of instrument approach procedure are prescribed in the operations specifications issued to an air carrier or commercial operator under the authority of this part. Frequently, these minimums are higher than those published in Part 609 of the Regulations of the Administrator. However, by application to the local inspector having certificate responsibility, minimums down to the lowest minimums prescribed in Part 609 for a particular airport may be authorized if such airport is regularly used by an air carrier or commercial operator (e. g., main operations base). To obtain such authorization, the air carrier or commercial operator will be required to demonstrate that its pilot training program

[7] See Parts 609 and 610 of the Regulations of the Administrator, or refer to the Approach and Landing Charts and Radio Facility Charts of the Coast and Geodetic Survey, and to the Airman's Guide for specific en route, takeoff, and landing minimums for particular routes and airports.

and overall operating proficiency is adequate for the use of lower minimums. Such lower minimums, when approved, will be applicable only to those pilots in command who (1) have served as a pilot or as an observer member of the crew on the flight deck during operations conducted into the particular airport within the previous twelve months, (2) have been checked in accordance with section 42.44–2 of this subchapter on the type of facility for which the lower minimums are authorized, and (3) have been so certified by a company check pilot as being qualified to operate at the lower minimums.

(Published in 20 F. R. 4148, June 15, 1955, effective June 30, 1955; amended effective June 15, 1957.)

42.56 *Instrument approach.* No instrument approach procedure shall be executed or landing made at an airport when the latest United States Weather Bureau report for that airport indicates the ceiling or visibility to be less than that prescribed by the Administrator for landing at such airport: *Provided*, That, if

an instrument approach procedure is initiated when the current U. S. Weather Bureau report indicates that the prescribed ceiling and visibility minimums exist and a later weather report indicating below minimum conditions is received after the aircraft (a) is on an ILS final approach and has passed the outer marker, or (b) is on a final approach using a radio range station or comparable facility and has passed the appropriate facility and has reached the authorized landing minimum altitude, or (c) is on GCA final approach and has been turned over to the final approach controller, such approach may be continued and a landing may be made in the event weather conditions equal to or better than the prescribed minimums for the airport are found to exist by the pilot in command of the flight upon reaching the authorized landing minimum altitude.

42.56–1 *Standard instrument approach procedures (FAA rules which apply to sec. 42.56).* Standard instrument approach procedures prescribed by the Administrator are published in part 609 of this title (i. e. Regulations of the Administrator).

(Published in 16 F. R. 7351, July 27, 1951, effective upon publication.)

42.56–2 *Takeoff and landing weather minimums (FAA rules which apply to sec. 42.56).*

(a) *General.* The ceiling and visibility contained in the main body of the latest weather report furnished by the U. S. Weather Bureau or a source approved by the Weather Bureau shall be used for instrument approach and landing or takeoff for all runways of an airport except as provided in paragraph (b).

(b) *Runway visibility.* Whenever the latest weather report furnished by the U. S. Weather Bureau or a source approved by the Weather Bureau, including an aural report from the control tower, contains a visibility value specified as runway visibility for a particular runway of an airport, such visibility shall be used for a straight-in approach and landing or takeoff for that runway only.[15]

(Published in 20 F. R. 9039, Dec. 9, 1955, effective Dec. 15, 1955.)

[15] Information respecting the official runway visibility observations reported by the control tower operator may be obtained from the Office of the U. S. Weather Bureau for the airport concerned. Such office maintains a continuous graph recording of the runway visibility shown on the visibility meter in the control tower.

42.57 *Airport lighting for night operations.* No air carrier shall use an airport for the takeoff or landing of an aircraft at night unless such airport is adequately lighted.

42.57–1 *Minimum facilities (FAA policies which apply to sec. 42.57).* The minimum facilities and equipment for airport lighting where night operations are authorized and conducted shall include at least the following:

(a) Adequate boundary lights defining the boundaries of the usable area and/or adequate contact (runway marker) lights identifying the outer limits of the runways. Lights of the open-flame type (flare pots) are not considered adequate contact lights, except in an emergency. Range lights (aviation green) shall be installed and operating in conjunction with the boundary or contact (runway marker) lights.

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

(c) Obstructions on and in the vicinity of the landing area should be obstruction lighted. The criteria for determining obstructions to air navigation and for the lighting of obstructions to air navigation are contained in Technical Standard Orders available from the Aeronautical Reference Branch, Attn: MS–126, Federal Aviation Agency, Washington 25, D.C.

(d) An illuminated wind direction indicator shall be provided and located so as to be clearly visible from the ground and the air.

(Published in 18 F. R. 1719, Mar. 27, 1943, effective Apr. 15, 1953; amended effective June 15, 1957.)

42.58 *Navigational aids for IFR flight.* IFR operations shall be conducted only over civil airways and at airports equipped with radio ranges or equivalent facilities, unless the Administrator has found that instrument navigation can be conducted by the use of radio direction finding equipment installed in the aircraft or by other specialized means and has approved or otherwise authorized such operation in the air carrier operating certificate.

42.58–1 *Off-airway instrument operation (FAA rules which apply to sec. 42.58).*

(a) Off-airway instrument operation may be authorized provided the aircraft is properly equipped, and the flight crew demonstrates they are capable of navigating along a predetermined

flight path over a proposed route without deviating more than 5 miles or 5 degrees on either side (whichever is the lesser) from a straight line drawn between the point of departure and the next point of arrival.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication; amended in 21 F. R. 4312, June 20, 1956, effective July 1, 1956.)

42.59 *Briefing of passengers.* After May 31, 1956, each air carrier engaged in extended overwater operations shall assure that all passengers are briefed orally concerning the location and method of operation of life vests and emergency exits and the location of life rafts. The procedure to be followed in presenting this briefing shall be described in the air carrier manual. Such a briefing shall include a demonstration of the method of donning and inflating a life vest. Where the airplane proceeds directly over water after takeoff, the briefing on location of the life vests and emergency exits shall be accomplished prior to takeoff, and the remainder of the briefing shall be accomplished as soon thereafter as practicable. Where the airplane does not proceed directly over water after takeoff, no part of the briefing need be accomplished prior to takeoff but the entire briefing shall be accomplished prior to reaching the overwater portion of the flight.

42.59–1 *Placement of established procedures (FAA policies which apply to sec. 42.59).* The procedures required by this section shall be contained in the air carrier's operations manual.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective upon publication.)

42.60 *Operations manual for large aircraft.*

(a) When operations are conducted in large aircraft the air carrier shall prepare and maintain for the use and guidance of operations personnel an operations manual which contains full information necessary to guide flight and ground personnel in the conduct of safe flight operations and to inform such personnel regarding their duties and responsibilities. The manual shall also contain a copy of the air carrier operating certificate. The form and content shall be acceptable to the Administrator. Copies and revisions shall be furnished to all persons designated by the Administrator. All copies in the hands of company personnel shall be kept up to date.

(b) A copy of the operations manual shall be kept at the principal operations base. Those portions of the manual pertinent to safe operation of the aircraft, including the copy of the air carrier operating certificate, shall be carried therein.

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

(d) No operation shall be conducted by the air carrier contrary to the safety provisions of the operations manual.

42.60–1 *Form of operations manual (FAA rules which apply to sec. 42.60).* The operations manual shall be loose leaf in form with letter-size pages, and shall be numbered and indexed in a manner to facilitate its use as reference material by the personnel concerned. Each page shall include a space in which the date of last revision will be indicated. Existing manuals may be utilized if they are found to fulfill the requirements of this section and are considered acceptable by the local inspector.

(Published in 14 F. R. 7040, Nov. 22, 1949, effective Nov. 22, 1949; amended effective June 15, 1957.)

42.60–2 *Content of operations manual (FAA rules which apply to sec. 42.60 (a)).*

(a) Table of contents. In preparing the manual the arrangement outlined below shall be followed.

TABLE OF CONTENTS

Chapter I.—General.
- Section 1—A copy of the air carrier's operating certificate and operations specifications, including the operations authorizations.
- Section 2—Part 42 of the Civil Air Regulations and CAM 42.
- Section 3—Instrument Approach Procedure Charts for all airports which the air carrier intends to utilize.
- Section 4—Other publications deemed necessary or applicable.

Chapter II.—Organization and Company Personnel.

Chapter III.—Operations Instructions. General policies for the guidance of operations personnel

Chapter IV.—Operating Procedures, including loading instructions and copies of cockpit check lists.

Chapter V.—Accident and Emergency Procedures, including list of emergency equipment.

Chapter VI.—Training Program.

Chapter VII.—Foreign Operations Instructions (if foreign operations are authorized).

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.60–3 Deleted.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication, deleted effective June 15, 1957.)

42.60–4 *Copy of operations manual in aircraft (FAA policies which apply to sec. 42.60 (b)).* In order that flight personnel of the air carrier may have more effectual use of the manual required by this section, the pilot in command shall have readily available in the cockpit a current copy of the manual required by this section, including a copy of the air carrier operating certificate and operations specifications. This manual shall contain such operations instructions as are necessary for the type of operations and aircraft concerned, and interpreting the air carrier's procedures to be followed in complying with the operations requirements of this part and the operations specifications.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.60–5 *Preflight certification (FAA rules which apply to sec. 42.60 (a) and (c)).* In the interest of safety, the air carrier shall establish in all operations manuals maintained for the use and guidance of operations personnel a procedure whereby the pilot in command, who has not flown over the route and into the airport of destination within the preceding 60 days, will certify on an appropriate form provided by the air carrier that he has taken the preflight actions specified in section 42.51–1. The manual shall also contain a procedure for maintaining such certification as part of the air carrier flight records.

(Published in 18 F. R. 172, Jan. 9, 1953, effective Jan. 31, 1953.)

42.60a *Airplane flight manual.*

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

(b) An approved Airplane Flight Manual or a manual complying with section 42.60 and containing information required for the Airplane Flight Manual shall be carried in each transport category airplane.

42.61 *Flight plan for large aircraft.* No large aircraft shall be taken off unless a VFR or IFR flight plan containing the appropriate information required by Part 60 of this subchapter is filed by the air carrier with the nearest FAA communications station or, when outside the United States, with the appropriate authority. In the event communications facilities are not readily available, such flight plan shall be filed as soon as practicable after becoming air-borne. An IFR or VFR flight plan must thereafter be in effect for all portions of the flight.

42.61–1 *IFR operation in control zone or control area (FAA policies which apply to sec. 42.61).* Prior to takeoff from a point within a control zone, or prior to entering a control area or control zone when operating under IFR conditions, an IFR flight plan shall be filed and an air traffic control clearance shall be obtained from air traffic control.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.62 *Flight manifest for large aircraft and passenger-carrying aircraft operating under IFR conditions.* For all large aircraft, or any aircraft carrying passengers under IFR conditions, a flight manifest form shall be prepared and signed for each flight by qualified personnel of the air carrier charged with the duty of supervising the loading of the aircraft and the preparation of the flight manifest form. The form and contents of this manifest shall be in accordance with the instructions contained in the air carrier's operations manual and shall include the names and addresses of the passengers carried, points of departure and destination, the weight of the cargo and passengers, and the distribution of such weight in the aircraft in accordance with the weight control system prescribed in the operations manual. The weight of the passengers may be

determined in accordance with a weight control system prescribed by the Administrator. In the event passengers are picked up at points other than the principal operations base or discharged at points other than as shown on the latest manifest, the pilot shall, before starting the flight, cause a duplicate copy of the revised manifest to be mailed to such base, unless other requirements are set forth in the carrier's operations manual.[8]

[8] See section 42.95 for record-keeping requirements for the flight manifest.

42.62–1 *Content of flight manifest (FAA policies which apply to sec. 42.62).* The flight manifest required by this section shall include at least the following information:

(a) Company or organization name.
(b) Date of flight.
(c) Flight or trip number.
(d) Point of departure.
(e) Destination (via route, etc.).
(f) Make, model, and registration number of aircraft.
(g) Names and addresses of passengers.
(h) Location and weight of crew, gasoline, oil, passengers, cargo, and ballast (if any).
(i) Empty, gross, and useful aircraft weights.
(j) Aircraft c. g. limits.
(k) C. g. of aircraft as loaded.
(l) Signature of pilot or authorized loading officer.

Extra manifest forms should be carried aboard the aircraft in order to meet the requirements in regard to discharging or picking up passengers or cargo at other than the principal operations base.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.62–2 *Weight control system (FAA interpretations which apply to sec. 42.62).* The weight control system as mentioned in this section includes the loading procedures as prescribed in the Operations Manual as well as the data derived from the weighing procedures or approved weight control system set forth in the Maintenance Manual.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.63 *Night VFR operations for large passenger-carrying aircraft; special rules.*

(a) Night VFR passenger operations in large aircraft shall be conducted only over civil airways or over off-airway routes for which the Administrator has established minimum en route instrument altitudes. Night VFR operations over such off-airway routes shall be conducted at or above such established altitudes. In addition, night VFR operations may be conducted only at airports equipped with satisfactory radio navigational facilities for which the Administrator has established approach procedures: *Provided*, That the Administrator may authorize operations at other airports upon finding that safe transition between the route and the airport may be made visually under weather minimums which he may establish, but which will in no case be lower than those provided in section 42.55 (a).

NOTE: Minimum en route instrument altitudes which have been established by the Administrator are published in the Flight Information Manual.

(b) During night VFR passenger operations in large aircraft the pilot-in-command of the aircraft shall ensure that a continuous watch is maintained on the appropriate radio frequencies and shall report by radio as soon as possible the time and altitude of passing each designated reporting point together with weather conditions and any other information which the pilot considers important to the safety of flight. In addition, in operations over off-airway routes the pilot-in-command shall report as soon as possible the time and altitude of passing over each check point specified in the flight plan.

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

42.65 *Drinking and serving of alcoholic beverages.*

(a) No person shall drink any alcoholic beverage aboard an air carrier aircraft unless such beverage has been served to him by the air carrier operating the aircraft.

(b) No air carrier shall serve any alcoholic

beverage to any person aboard an air carrier aircraft if such person appears to be intoxicated.

[(c) No air carrier shall permit any person to board an air carrier aircraft if such person appears to be intoxicated.

[(d) An air carrier shall report to the Administrator within 5 days any incident in which a person aboard its aircraft refuses to comply with paragraph (a) of this section, or any disturbance caused by a person who appears to be intoxicated while aboard its aircraft.]

(Amendment 42-26, published in 25 F.R. 170, Jan. 9, 1960, effective Mar. 10, 1960; [Amendment 42-34, published in 26 F.R. 9907, Oct, 21, 1961, effective Nov. 21, 1961.])

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[(Amendment 42-35, published in 26 F.R. 11356, Dec. 1, 1961, effective Jan. 2, 1962; Amendment

42–36, published in 26 F.R. 12762, Dec. 30, 1961, effective Jan. 2, 1962; Amendment 42–37, published in 27 F.R. 651, Jan. 23, 1962, effective Jan. 20, 1962.)]

Operating Limitations for Large Passenger-Carrying Airplanes

42.70 *Operating limitations for transport category airplanes.*

(a) In operating any passenger-carrying transport category airplane the provisions of sections 42.71 through 42.78 shall be complied with unless deviations therefrom are specifically authorized by the Administrator on the ground that the special circumstances of a particular case make a literal observance of the requirements unnecessary for safety.

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

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

42.70–1 *Deviations (FAA rules which apply to sec. 42.70 (a)).* An application for any deviation shall include all supporting data and shall be forwarded to the district office charged with the over-all inspection of the air carrier's operations.

(Published in 19 F. R. 2168, Apr. 15, 1954, effective Apr. 25, 1954; amended effective June 15, 1957.)

42.70–2 *Accuracy of data (FAA policies which apply to sec. 42.70 (b)).* The charts and data prepared by the air carrier for use of flight and operations personnel should be prepared with sufficient accuracy and clarity that the gross weight and runway length values for specific operating conditions can be reproduced within a tolerance of one-half of 1 percent by an independent recheck.

(Published in 19 F. R. 2168, Apr. 15, 1954, effective Apr. 25, 1954.)

42.70–3 *Temperature accountability (FAA policies which apply to sec. 42.70 (c)).* The maximum permissible weight for a given takeoff should be equal to the lowest of three values determined separately by consideration of (a) accelerate-stop, (b) takeoff and climb out to a 50-foot height and (c) the obstacle clearance condition. The established temperature accountability correction factors appearing in the Airplane Flight Manuals are applied to the takeoff weights determined by the accelerate-stop and climb out to a 50-foot height. These values may be used individually or in combination, i. e., if a runway is considerably longer than is required to meet the accelerate-stop and climb out to 50-foot requirements at standard temperature, then at temperatures higher than standard, takeoff weight need not be reduced as long as additional runway length is available. When the temperature reaches a value at which no additional runway length remains, then a reduction in weight would be necessary. These factors do not apply to weights determined by obstacle clearance considerations. If the takeoff weight at standard temperature is limited by obstruction clearance rather than by the climb out to 50 feet or by the accelerate-stop distance, a weight reduction need not be made for temperatures higher than standard until the temperatures reach a high enough value to use up the existing runway between that used for standard temperature (limited to less than the full runway because of obstacles) and the actual length.

(Published in 19 F. R. 2168, Apr. 15, 1954, effective Apr. 25, 1954.)

42.71 *Weight limitations.*

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

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

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

42.71–1 *Weight limitations (FAA policies which apply to sec. 42.71).* The limitations imposed by section 42.71 take into account only one operating variable, i. e., the elevation of the airport to be used as it affects the weight of the aircraft during takeoff or landing. Other operating variables, such as runway length, gradient, wind and temperature, are considered in other sections of this part. Compliance with this section does not present a particular problem since the Airplane Flight Manual provides performance data for airports over a wide range of elevations. However, most manuals do not provide data for operations at airports below sea level. Section 42.71 should not be construed as prohibiting operations from airports below sea level, since sea level data in the Airplane Flight Manual, being conservative, may be applied to such airports.

(Published in 19 F. R. 2168, Apr. 15, 1954, effective Apr. 25, 1954.)

42.72 *Takeoff limitations to provide for engine failure.* No takeoff shall be made except under conditions which will permit compliance with the following requirements:

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

(b) It shall be possible, if the critical engine should fail at any instant after the airplane attains the critical-engine-failure speed, to proceed with the takeoff and attain a height of 50 feet, as indicated by the takeoff path data, before passing over the end of the takeoff area. Thereafter, it shall be possible to clear all obstacles, either by at least 50 feet vertically, as shown by the takeoff path data, or by at least 200 feet horizontally within the airport boundaries and by at least 300 feet horizontally after passing beyond such boundaries.

(1) In determining the allowable deviation of the flight path in order to avoid obstacles by at least the distances above set forth, it shall be assumed that the airplane is not banked before reaching a height of 50 feet, as shown by the takeoff path data, and that a maximum bank thereafter does not exceed 15°.

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

42.72–1 *Takeoff limitations to provide for engine failure (FAA policies which apply to sec. 42.72).*

(a) *Takeoff flight path.* Diagram 1 is a pictorial representation of the relationship required between the dimensions of an airport and its surroundings, and the performance of the airplane. It illustrates the takeoff flight path defined by the airworthiness requirements.

(b) *Airport data.* Complete data concerning the airport dimensions and characteristics, such as runway lengths, runway gradients, obstruction heights and location, airport elevation, and the nature and condition of airport areas other than paved runways from which takeoffs might be made, are necessary for the determination of permissible takeoff weights. The most nearly complete and satisfactory source of such data is the series of Airport Obstruction Plans prepared by the United States Department of Commerce Coast and Geodetic Survey. However, their Airport Obstruction Plan series does not yet completely cover the airports used by air carrier operators of Transport Category airplanes, and in addition, the Obstruction Plans do not present any data showing the nature or condition of runway surfaces or other airport areas suitable for use in takeoff and landing. Furthermore, the Obstruction Plans necessarily contain data which may be several months old and which may not completely conform to the existing obstructions. There-

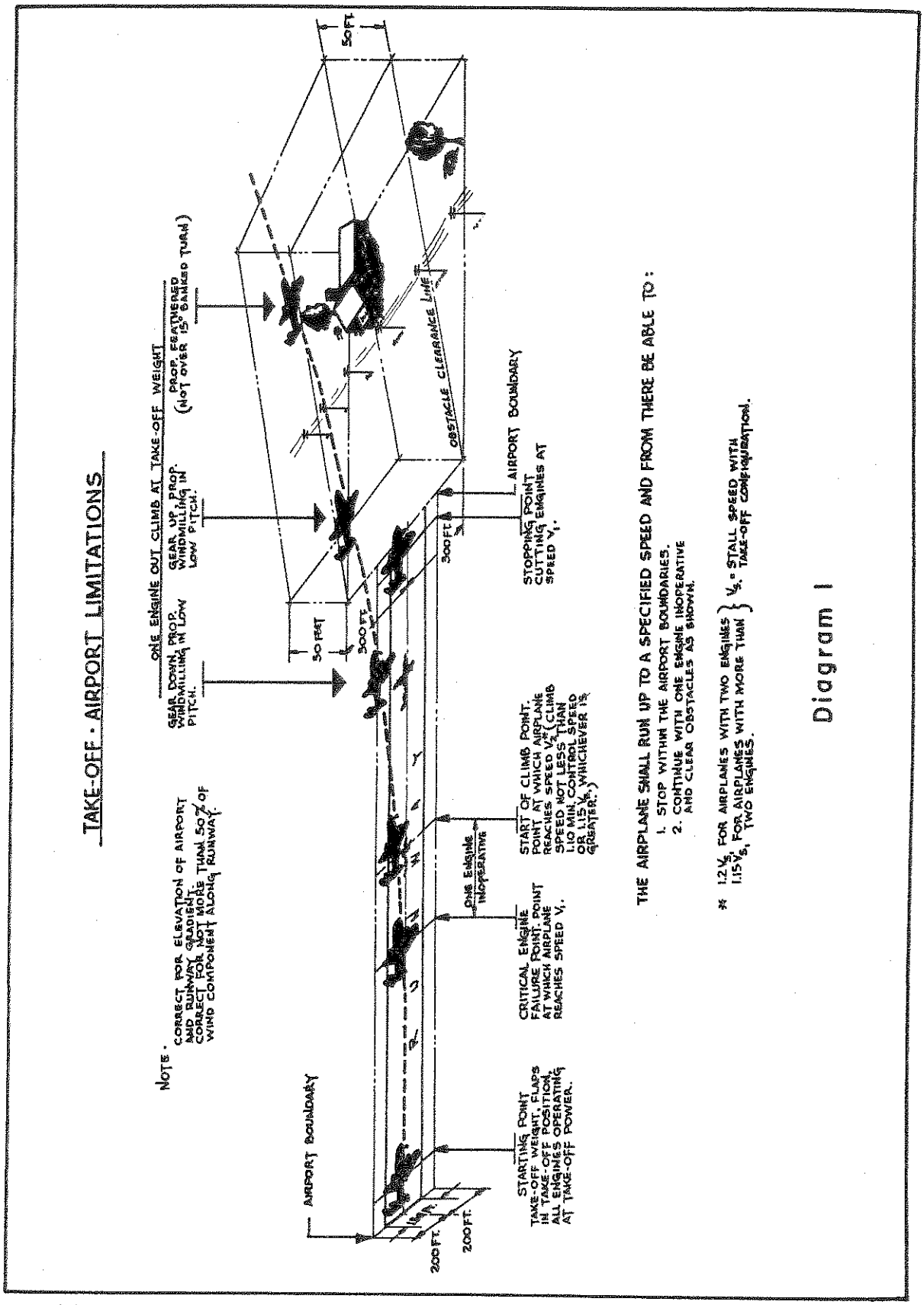

Diagram 1

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fore, it may be necessary, for the air carrier operator, to supplement its data with information obtained from other sources. However, gross weight data calculated on the basis of such data should be rechecked or recalculated as soon as appropriate data from the Coast and Geodetic Survey becomes available.

(c) *Runways.*

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

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

(d) *Turns to avoid obstructions.*

(1) Section 42.72 provides that after reaching a height of 50 feet, the aircraft may be turned with a bank not exceeding 15° to comply with the obstruction clearance criteria. Only one turn to a definite heading should be considered in detailing the takeoff path.

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

Radius of turn $=V^2, \times 0.25$ feet where V=climb speed in mph, TAS

For example: at a climb speed of 120 mph., the radius of turn for a 15° banked turn would be,

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

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

(e) *Effects of runway gradient.*

(1) The gradient effect on the ground run may be calculated from the following formula:

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

where S_G=length of ground run with gradient.

S=length of ground run without gradient.

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

V_2=climb out speed, feet per second, true air speed.

α=angle of grade with horizontal, uphill (+), downhill (−).

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

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

(4) For purposes of simplification in calculating the effect of runway gradient on the takeoff flight path, an average gradient consisting of the difference in elevation of the two ends of the runway divided by the runway length may be used, provided that no intervening point on the runway lies more than 5 feet above or below a straight line joining the two ends of the runway. In this case, the gradient effects on the acceleration portion of the takeoff flight path and for the accelerate-stop portion

may be presented together in simple chart form without introducing excessive errors. However, the actual gradient should be used for the climbout segments of the flight path and in no case should the gradient be greater than the first segment climb.

(5) In those cases in which intermediate points on the runway depart more than 5 feet from the mean line, the gradient effects on the acceleration portions, the deceleration portion, and the climb portion of the flight path should be computed separately. An average gradient may be assumed for the ground run portion of the problem because the error resulting therefrom is so small that a more rigorous treatment is not justified, provided a truly representative gradient is chosen. Where there are no reversals or significant changes in the runway slope during the ground run, the average may be taken to be the difference in elevation between the starting point and the point of attaining takeoff climb speed, V_2, divided by the distance between the two points. However, if the gradient is not essentially constant, an average gradient should be assumed that more nearly parallels the high-speed portion of the acceleration run, since the gradient has a greater effect on the distance traversed at high speed. The average gradient selected in this way will usually serve for determining gradient effects on the acceleration distance in either the takeoff flight path or the accelerate-stop distance. An average gradient should be determined in the same way in determining the gradient effects on the stopping distance, while the actual gradient should be determined in checking the climb segment to the 50-foot point.

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

(f) *Effects of wind.*

(1) Section 42.72 permits the use of 50 percent of the headwind component and requires consideration of 150 percent of any tailwind component.

The effect of wind on runway requirements can be determined by use of the following equation:

(i) For all headwind components, and tailwind components of 10 miles per hour or less.

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

where S_w = runway required with wind.
S = runway required, zero wind.
V_2 = takeoff safety speed (miles per hour).
V_w = +(.5 × headwind component) or, −(1.5 × tailwind component).

(ii) If tailwind components in excess of 10 miles per hour are approved, the equation will be:

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

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

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

(Published in 19 F. R. 2169, Apr. 15, 1954, effective Apr. 25, 1954.)

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

42.74 *En route limitations; one engine inoperative.*

(a) No airplane shall be taken off at a weight in excess of that which would permit a rate of climb (expressed in feet per minute), with one engine inoperative, of at least $\left(0.06 - \frac{0.08}{N}\right)V_{s_0}^2$

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

(b) As an alternative to the provisions of paragraph (a) of this section, an aircarrier may utilize an approved procedure whereby its airplanes are operated at an all-engine-operating altitude such that in the event of an engine failure the airplane can continue flight to an alternate airport where a landing can be made in accordance with the provisions of section 42.78, the flight path clearing all terrain and obstructions along the route within 5 miles on either side of the intended track by at least 2,000 feet. In addition, if such a procedure is utilized, subparagraphs (1) through (6) shall be complied with:

(1) The rate of climb (as presented in the Airplane Flight Manual for the appropriate weight and altitude) used in calculating the airplane's flight path shall be diminished by an amount, in feet per minute, equal to $\left(0.06-\frac{0.08}{N}\right)V_{s_0}^2$ (when N is the number of engines installed and V_{s_0} is expressed in miles per hour) for airplanes certificated under Part 4b of this subchapter, and by $0.02\ V_{s_0}^2$ for airplanes certificated under Part 4a of this subchapter.

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

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

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

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

(6) The alternate airport shall be specified in the dispatch release and shall meet the provisions of section 42.55.

(c) For the purposes of this section it shall be assumed that the weight of the airplane as it proceeds along its intended track is progressively reduced by normal consumption of fuel and oil.

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

(a) No place along the intended track shall be more than 90 minutes away from an available landing area at which a landing can be made in accordance with the requirements of section 42.78, assuming all engines to be operating at cruising power.

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

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

(2) Where the engines are assumed to fail at an altitude above the prescribed minimum altitude, compliance with the prescribed rate of climb at the prescribed minimum altitude need not be shown during the descent from the cruising altitude to the prescribed minimum altitude if, at the end of the descent and during the subsequent portion of the flight, the prescribed rate of climb is met at the prescribed minimum altitudes. The descent shall be assumed to be along a net flight path and the rate of descent for the appropriate weight and altitude shall be assumed to be 0.01 $V_{S_0}^2$ greater than indicated by the performance information approved by the Administrator.

(3) If fuel jettisoning is provided, the airplane's weight at the point where the two engines are assumed to fail shall be considered to be not less than that which would include sufficient fuel to proceed to an available landing area at which a landing can be made in accordance with the requirements of section 42.78 and to arrive there at an altitude of at least 1,000 feet directly over the landing area.

42.76 *En route limitations; where special air navigational facilities exist.* The 10-mile lateral distance specified in sections 42.73 through 42.76 may, for a distance of no more than 20 miles, be reduced to 5 miles: *Provided,* That special air navigational facilities provide a reliable and accurate identification of any high ground or obstruction located outside of such 5-mile lateral distance but within the 10-mile distance.

42.76–1 *En route limitations; where special air navigational facilities exist (FAA policies which apply to sec. 42.76).* No attempt is made to classify specific types of navigational facilities as acceptable or unacceptable for the purposes of section 42.76, but each case will be examined on its own merits. In general, however, the facility should be of a type that gives the pilot a continuous fix of his position with an error of not more than 2 miles, or a continuous on course indication with an error of not more than 2 miles, or a continuous indication of the bearing and distance of the obstacle from the airplane, with an accuracy adequate to allow the pilot to turn away from the obstacle with ample clearance. Any mechanical or electrical facilities that are to be acceptable should be thoroughly reliable regardless of weather or other operating conditions. Such considerations apply only for IFR operations.

(Published in 19 F. R. 2170, Apr. 15, 1954, effective Apr. 25, 1954.)

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

(a) It shall be assumed that the aircraft is landed on the most favorable runway and direction without regard to wind.

(b) It shall be assumed, considering every probable wind velocity and direction, that the aircraft is landed on the most suitable runway, taking due account of the ground handling characteristics of the airplane and allowing for the effect on the landing path and roll of not more than 50 percent of the favorable wind component.

(c) If the airport of intended destination will not permit full compliance with paragraph (b) of this section, the aircraft may be taken off if an alternate airport is designated which permits compliance with section 42.78.

42.77–1 *Landing distance limitations; airport of destination (FAA policies which apply to sec. 42.77).*

(a) Section 42.77 establishes two major considerations in determining the permissible landing weight at the airport of destination. The first is that the aircraft weight will be

such on arrival that it can be landed within 60 percent of the effective landing length of the most favorable (normally the longest) runway in still air. This maximum weight for an airport/aircraft configuration, once established, remains constant and cannot be exceeded, regardless of wind conditions.

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

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

(d) If the forecast conditions are such that consideration of the requirements in section 42.77 (b) would preclude a landing at the intended destination, the aircraft may be dispatched if an alternate airport is designated which permits compliance with section 42.78.

(e) (1) If a flight has been properly dispatched, but arrives at the destination with a weight higher than anticipated due to unexpected wind conditions or fuel consumption, section 42.77 (b) should not be construed as prohibiting a landing at the overweight condition, provided the crosswind and/or tailwind operating limitations are not exceeded. (2) If conditions are such that the crosswind and/or tailwind limitations will be exceeded, the flight must proceed to its alternate, if one has been named to meet the requirements of section 42.77 (b). However, if an alternate was not provided, and upon arrival the wind conditions were such that the crosswind and/or tailwind limitations would be exceeded, the pilot should exercise the authority granted him in section 42.51 (d).

(f) For application of the wind components as allowed in section 42.77 (b), refer to section 42.72–1 (f).

(Published in 19 F. R. 2170, Apr. 15, 1954, effective Apr. 25, 1954.)

42.78 *Landing distance limitations; alternate airports.* No airport shall be designated as an alternate airport in a flight plan unless the aircraft at the weight at takeoff can comply with the requirements of section 42.77 (a) and (b) at such airport: *Provided,* That the aircraft can be brought to rest within 70 percent of the effective length of the runway.

42.80 *Operating limitations for aircraft not certificated in the transport category.* In operating any passenger-carrying, large, nontransport category airplanes after January 1, 1950, the provisions of sections 42.81 through 42.83 shall be complied with. Prior to that date, such aircraft shall be operated in accordance with such operating limitations as the Administrator determines will provide a safe relation between the performance of the aircraft and the airports to be used and the areas to be traversed. Performance data published by the Administrator for each such nontransport category type aircraft shall be used in determining compliance with such provisions.

42.80–1 *Performance data on Curtiss model C46 aircraft certificated for maximum weights of 45,000 pounds to 48,000 pounds (FAA rules which apply to sec. 42.80).* The following performance limitations data, applicable to the Curtiss model C46 aircraft shall be used in determining compliance with section 42.80. These data are presented in the tables and figures of this section.

TABLE 1.—*Takeoff limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1. (Distance to accelerate to 93 knots TIAS, and stop, with zero wind and zero gradient.)

Standard altitude in feet	Airplane weight in pounds			
	39,000	42,000	45,000	[1] 48,000
	Distance in feet			
S. L.	4,110	4,295	4,570	4,950
1,000	4,250	4,450	4,725	5,130
2,000	4,400	4,600	4,880	5,300
3,000	4,650	4,890	5,190	5,680
4,000	4,910	5,170	5,500	6,050
5,000	5,165	5,450	5,810	6,430
6,000	5,420	5,730	6,120	6,805
7,000	5,685	6,000	6,440	[2]
8,000	5,940	6,280	6,750	[2]

[1] For use with Curtiss model C46 airplanes when approved for this weight.
[2] Limited by sec. 42.82.

(b) Actual length of runway required when "effective length", considering obstacles, is not determined (distance to accelerate to 93 knots TIAS, and stop divided by the factor 0.85.)

Standard altitude in feet	Airplane weight in pounds			
	39,000	42,000	45,000	[1] 48,000
	Distance in feet			
S. L.	4,835	5,050	5,375	5,825
1,000	5,000	5,235	5,555	6,035
2,000	5,175	5,410	5,740	6,235
3,000	5,470	5,750	6,105	6,680
4,000	5,775	6,080	6,470	7,120
5,000	6,075	6,410	6,830	7,565
6,000	6,375	6,740	7,200	8,005
7,000	6,690	7,060	7,575	[2]
8,000	6,990	7,390	7,940	[2]

[1] For use with Curtiss model C46 airplanes when approved for this weight.
[2] Limited by sec. 42.82.

TABLE 2.—*En route limitations*

(a) Curtiss model C–46 certificated for maximum weight of 45,000 pounds (based on a climb speed of 113 knots (TIAS)).

Weight (pounds)	Terrain clearance [1] (feet)	Blower setting
45,000	6,450	Low.
44,000	7,000	Do.
43,000	7,550	Do.
42,200	8,000	High.
41,000	9,600	Do.
40,000	11,000	Do.
39,000	12,300	Do.

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82

(b) Curtiss model C–46 certificated for maximum weight of 48,000 pounds or with engine installation approved for 2,550 revolutions per minute (1,700 brake horsepower). Maximum continuous power in low blower [1] (based on a climb speed of 113 knots (TIAS)).

Weight (pounds)	Terrain clearance [2] (feet)	Blower setting
48,000	5,850	Low.
47,000	6,300	Do.
46,000	6,700	Do.
45,000	7,200	Do.
44,500	7,450	Do.
44,250	8,000	High.
44,000	8,550	Do.
43,000	10,800	Do.
42,000	12,500	Do.
41,000	13,000	Do.

[1] Engine installations having P & W. R-2800-27, -43, -51, -71, -75, -79 engines can be approved for 1,700 brake horsepower in low blower. See engine specification chap. 19. p. 30.02 revised Oct. 10, 1949
[2] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42 82

TABLE 3.—*Landing limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient. (1) Curtiss model C–46 certificated for maximum weight of 45,000 pounds.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	40,000	V_{50}	42,000	V_{50}	44,000	V_{50}	45,000	V_{50}
	Distance in feet							
S. L.	3,700	86.0	3,855	88.0	4,030	90.5	4,110	91.0
1,000	3,800	86.0	3,960	88.0	4,140	90.5	4,220	91.0
2,000	3,900	86.0	4,070	88.0	4,250	90.5	4,335	91.0
3,000	4,050	86.0	4,180	88.0	4,360	90.5	4,450	91.0
4,000	4,110	86.0	4,290	88.0	4,475	90.5	4,565	91.0
5,000	4,215	86.0	4,400	88.0	4,595	90.5	4,680	91.0
6,000	4,330	86.0	4,515	88.0	4,710	90.5	4,800	91.0
7,000	4,430	86.0	4,635	88.0	4,845	90.5	4,930	91.0
8,000	4,550	86.0	4,755	88.0	4,970	90.5	5,060	91.0

[1] Steady approach speed through 50 foot-height-knots TIAS denoted by symbol V_{50}.

(2) Curtiss model C–46 certificated for maximum weight of 48,000 pounds.[1]

Standard altitude in feet	Airplane weight in pounds and approach speeds [2] in knots							
	42,000	V_{50}	44,000	V_{50}	46,000	V_{50}	48,000	V_{50}
	Distance in feet							
S. L.	2,890	80.5	3,000	82.0	3,110	84.5	3,215	86.0
1,000	2,960	80.5	3,070	82.0	3,180	84.5	3,285	86.0
2,000	3,035	80.5	3,145	82.0	3,250	84.5	3,360	86.0
3,000	3,110	80.5	3,215	82.0	3,330	84.5	3,430	86.0
4,000	3,185	80.5	3,300	82.0	3,410	84.5	3,520	86.0
5,000	3,260	80.5	3,370	82.0	3,495	84.5	3,615	86.0
6,000	3,330	80.5	3,460	82.0	3,580	84.5	3,700	86.0
7,000	3,415	80.5	3,545	82.0	3,670	84.5	3,800	86.0
8,000	3,500	80.5	3,635	82.0	3,765	84.5	3,900	86.0

[1] For use with Curtiss model C–46 aircraft when approved for this weight.
[2] Steady approach speed through 50 foot-height-knots TIAS denoted by symbol V_{50}.

(Continued on page 65)

TABLE 3.—*Landing limitations*—Continued

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

(1) Curtiss model C–46 certificated for maximum weight of 45,000 pounds.[1]

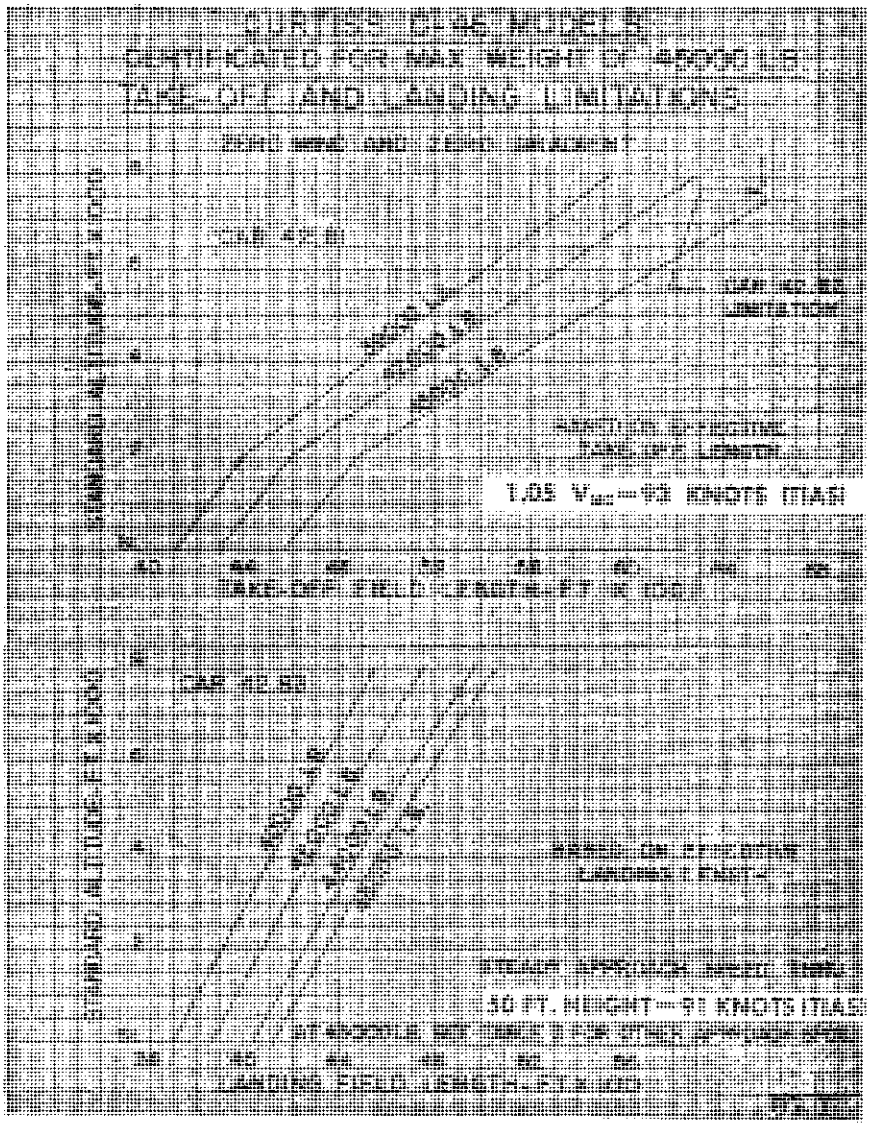
Standard altitude in feet	Airplane weight in pounds and approach speeds[2] in knots							
	40,000	V_{50}	42,000	V_{50}	44,000	V_{50}	45,000	V_{50}
	Distance in feet							
S. L.	4,710	86.0	4,910	88.0	5,130	90.5	5,230	91.0
1,000	4,835	86.0	5,050	88.0	5,270	90.5	5,370	91.0
2,000	4,965	86.0	5,180	88.0	5,410	90.5	5,520	91.0
3,000	5,155	86.0	5,320	88.0	5,550	90.5	5,665	91.0
4,000	5,230	86.0	5,560	88.0	5,695	90.5	5,810	91.0
5,000	5,365	86.0	5,600	88.0	5,850	90.5	5,955	91.0
6,000	5,510	86.0	5,745	88.0	5,995	90.5	6,110	91.0
7,000	5,640	86.0	5,900	88.0	6,165	90.5	6,275	91.0
8,000	5,790	86.0	6,050	88.0	6,325	90.5	6,550	91.0

[1] Steady approach speed through 50 foot-height-knots TIAS denoted by symbol V_{50}.
[2] For use with Curtiss model C–46 aircraft when approved for this weight.

(2) Curtiss C–46 certificated for maximum weight of 48,000 pounds.[1]

Standard altitude in feet	Airplane weight in pounds and approach speeds[2] in knots							
	42,000	V_{50}	44,000	V_{50}	46,000	V_{50}	48,000	V_{50}
	Distance in feet							
S. L.	3,680	80.5	3,820	82.0	3,960	84.5	4,090	86.0
1,000	3,765	80.5	3,905	82.0	4,045	84.5	4,180	86.0
2,000	3,860	80.5	4,000	82.0	4,135	84.5	4,275	86.0
3,000	3,960	80.5	4,090	82.0	4,240	84.5	4,365	86.0
4,000	4,055	80.5	4,200	82.0	4,340	84.5	4,480	86.0
5,000	4,150	80.5	4,290	82.0	4,450	84.5	4,600	86.0
6,000	4,240	80.5	4,405	82.0	4,555	84.5	4,710	86.0
7,000	4,345	80.5	4,510	82.0	4,670	84.5	4,835	86.0
8,000	4,455	80.5	4,625	82.0	4,790	84.5	4,965	86.0

[1] For use with Curtiss model C–46 aircraft when approved for this weight.
[2] Steady approach speed through 50 foot-height-knots TIAS denoted by symbol V_{50}.


CURTISS C-46 MODELS
CERTIFICATED FOR MAX WEIGHT OF 45000 LB
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.82
LIMITATION
1.05 V_{MC} = 93 KNOTS (TIAS)
TAKE-OFF FIELD LENGTH-FT X 1000
CAR 42.83
50 FT. HEIGHT = 91 KNOTS (TIAS)
LANDING FIELD LENGTH-FT X 1000

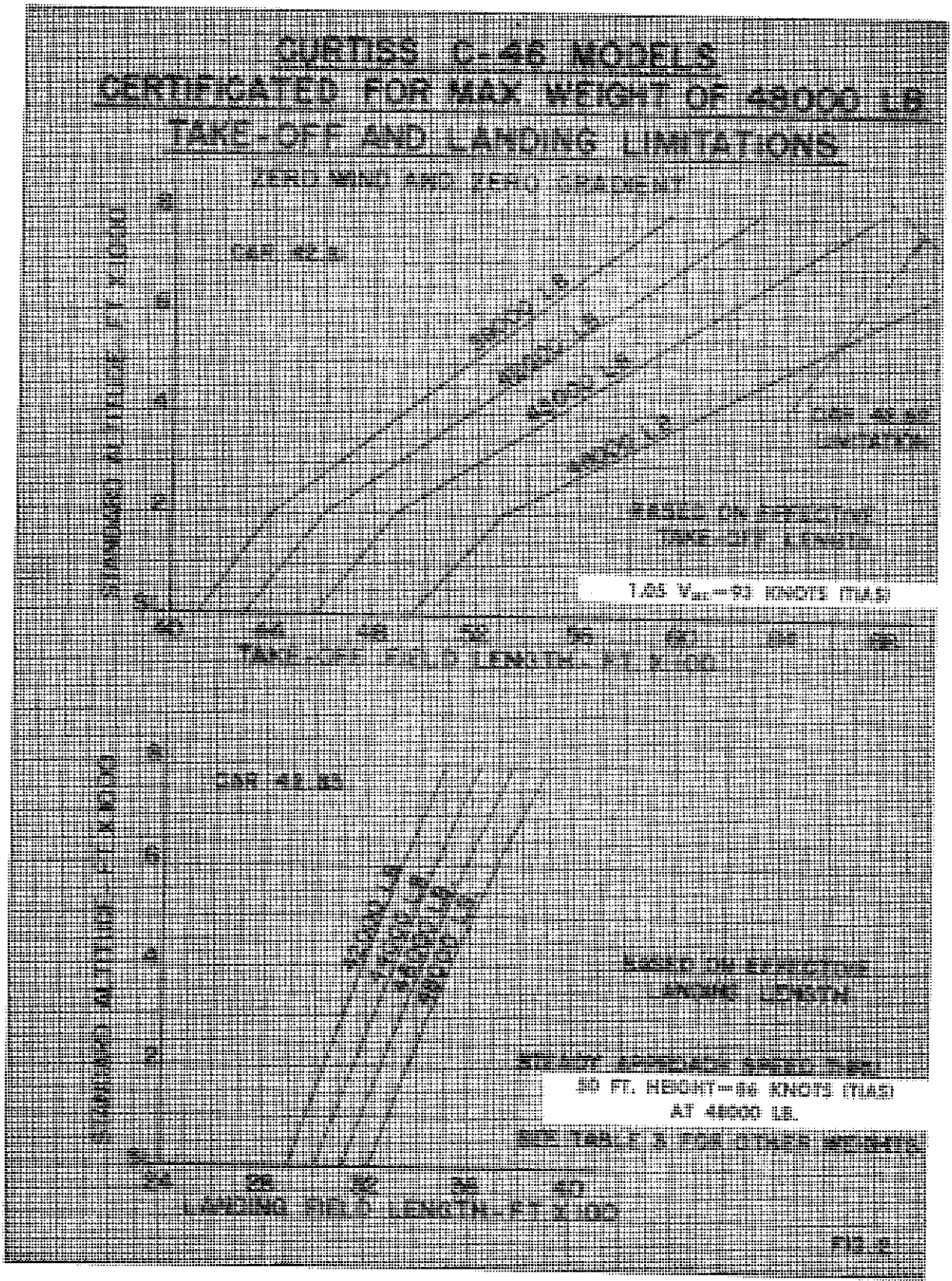
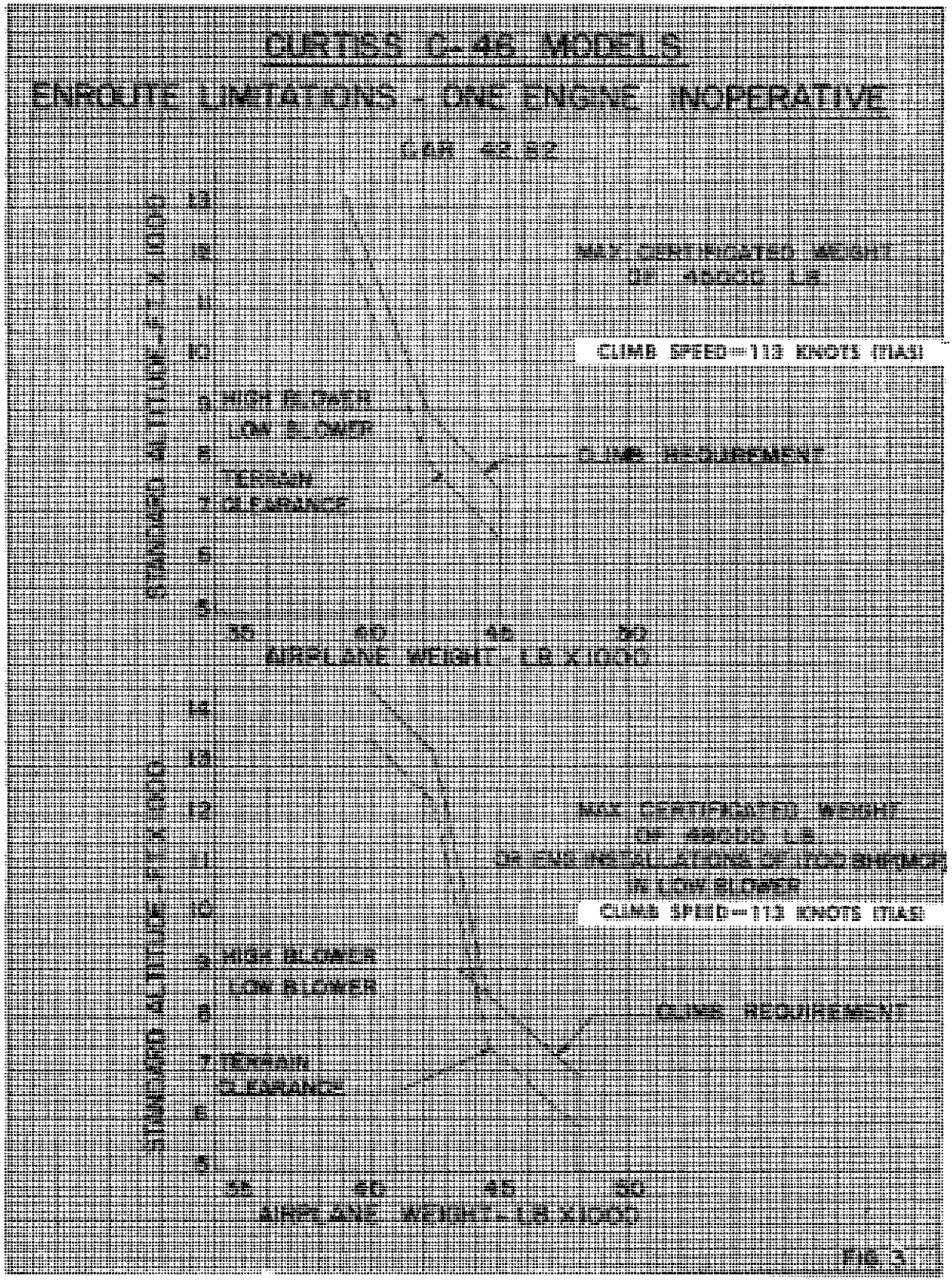

CURTISS C-46 MODELS
CERTIFICATED FOR MAX WEIGHT OF 48000 LB
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
BASED ON EFFECTIVE TAKE-OFF LENGTH
TAKE-OFF FIELD LENGTH - FT. X 100
BASED ON EFFECTIVE LANDING LENGTH
50 FT. HEIGHT—66 KNOTS (TIAS) AT 48000 LB.
LANDING FIELD LENGTH - FT. X 100

FIG. 2



(42.80–1. Published in 15 F. R. 83, Jan. 10, 1950, effective Jan. 1, 1950; amended in 15 F. R. 6852, Oct. 12, 1950, effective upon publication; amended in 21 F. R. 2232, Apr. 16, 1956, effective Apr. 1, 1956.)

42.80–2 *Performance data on Douglas DC–3 aircraft (FAA rules which apply to section 42.80).* The following performance limitations data, applicable to all Douglas DC–3 aircraft with various engine models, shall be used in determining compliance with section 42.80. These data are presented in the tables and figures of this section.

DOUGLAS DC–3 G102, AND C–47's, R4D's WITH COMPARABLE HORSEPOWER ENGINES

TABLE 1.—*Takeoff limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with sec. 42.1. (Distance to accelerate to 80 knots TIAS, and stop with zero wind and zero gradient.)

Standard altitude in feet	Airplane weight in pounds			
	22,000	23,000	24,000	25,200
	Distance in feet			
S. L	3,325	3,395	3,460	3,545
1,000	3,425	3,495	3,560	3,645
2,000	3,610	3,685	3,760	3,840
3,000	3,800	3,880	3,960	4,050
4,000	3,990	4,080	4,170	4,270
5,000	4,200	4,290	4,390	4,500
6,000	4,415	4,520	4,630	4,760
7,000	4,650	4,770	4,895	5,050
8,000	4,900	5,040	5,190	(1)

[1] Limited by sec. 42.82.

(b) Actual length of runway required when "effective length," considering obstacles, is not determined. (Distance to accelerate to 80 knots TIAS, and stop, divided by factor 0.85.)

Standard altitude in feet	Airplane weight in pounds			
	22,000	23,000	24,000	25,200
	Distance in feet			
S. L	3,910	3,990	4,070	4,170
1,000	4,030	4,110	4,185	4,285
2,000	4,245	4,335	4,420	4,515
3,000	4,470	4,565	4,655	4,765
4,000	4,690	4,800	4,905	5,020
5,000	4,940	5,045	5,160	5,290
6,000	5,190	5,315	5,445	5,600
7,000	5,470	5,610	5,755	5,940
8,000	5,760	5,925	6,105	(1)

[1] Limited by sec. 42.82.

DOUGLAS DC–3 G202A, S1C3G AND C47's, R4D's WITH COMPARABLE HORSEPOWER ENGINES

TABLE 2.—*Takeoff limitations*

(a) "Effective length" of runway required where effective length is determined in accordance with section 42.1. (Distance to accelerate to 80 knots TIAS, and stop, with zero wind and zero gradient.)

Standard altitude in feet	Airplane weight in pounds					
	22,000	23,000	24,000	25,000	[1]26,000	[1]26,900
	Distance in feet					
S. L	3,125	3,195	3,260	3,330	3,385	3,450
1,000	3,255	3,320	3,395	3,470	3,525	3,595
2,000	3,390	3,460	3,540	3,610	3,685	3,750
3,000	3,525	3,610	3,690	3,775	3,850	3,920
4,000	3,680	3,775	3,860	3,950	4,035	4,110
5,000	3,855	3,960	4,060	4,150	4,255	4,315
6,000	4,060	4,170	4,280	4,385	4,490	4,575
7,000	4,300	4,415	4,530	4,640	4,750	4,845
8,000	4,600	4,700	4,810	4,925	5,055	5,150

[1] Cargo operation only but not required under sec. 42.80.

(b) Actual length of runway required where "effective length," considering obstacles, is not determined. (Distance to accelerate to 80 knots TIAS, and stop, divided by factor 0.85.)

Standard altitude in feet	Airplane weight in pounds					
	22,000	23,000	24,000	25,000	[1]26,000	[1]26,900
	Distance in feet					
S. L	3,675	3,755	3,835	3,915	3,980	4,055
1,000	3,830	3,905	3,990	4,080	4,145	4,230
2,000	3,985	4,070	4,165	4,245	4,335	4,410
3,000	4,145	4,245	4,340	4,440	4,530	4,610
4,000	4,330	4,440	4,540	4,645	4,745	4,835
5,000	4,535	4,655	4,775	4,880	5,005	5,075
6,000	4,775	4,905	5,035	5,155	5,280	5,380
7,000	5,055	5,190	5,325	5,455	5,585	5,700
8,000	5,410	5,525	5,655	5,790	5,945	6,055

[1] Cargo operation only but not required under sec. 42.80.

DOUGLAS DC–3 G102, G202A, S1C3G, C–47's, R4D's WITH COMPARABLE HORSEPOWER ENGINES

TABLE 3.—*En route limitations*

Weight in pounds	Terrain clearance [1] in feet and climb speed in knots TIAS					
	G102	V_c	G202A	V_c	S1C3G	V_c
25,200	6, 400	95. 5	7, 500	95. 0	10, 600	92. 5
24,000	7, 550	94. 0	8, 700	93. 5	12, 100	90. 0
23,000	8, 500	92. 0	9, 750	91. 0	13, 450	88. 0
22,000	9, 500	90. 5	10, 750	89. 5	14, 750	86. 5
21,000	10, 500	89. 0	11, 750	87. 5	16, 100	85. 5

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.22.

DOUGLAS DC–3 G102, G202A S1C3G, AND C47's, R4D's WITH COMPARABLE HORSEPOWER ENGINES

TABLE 4—*Landing limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

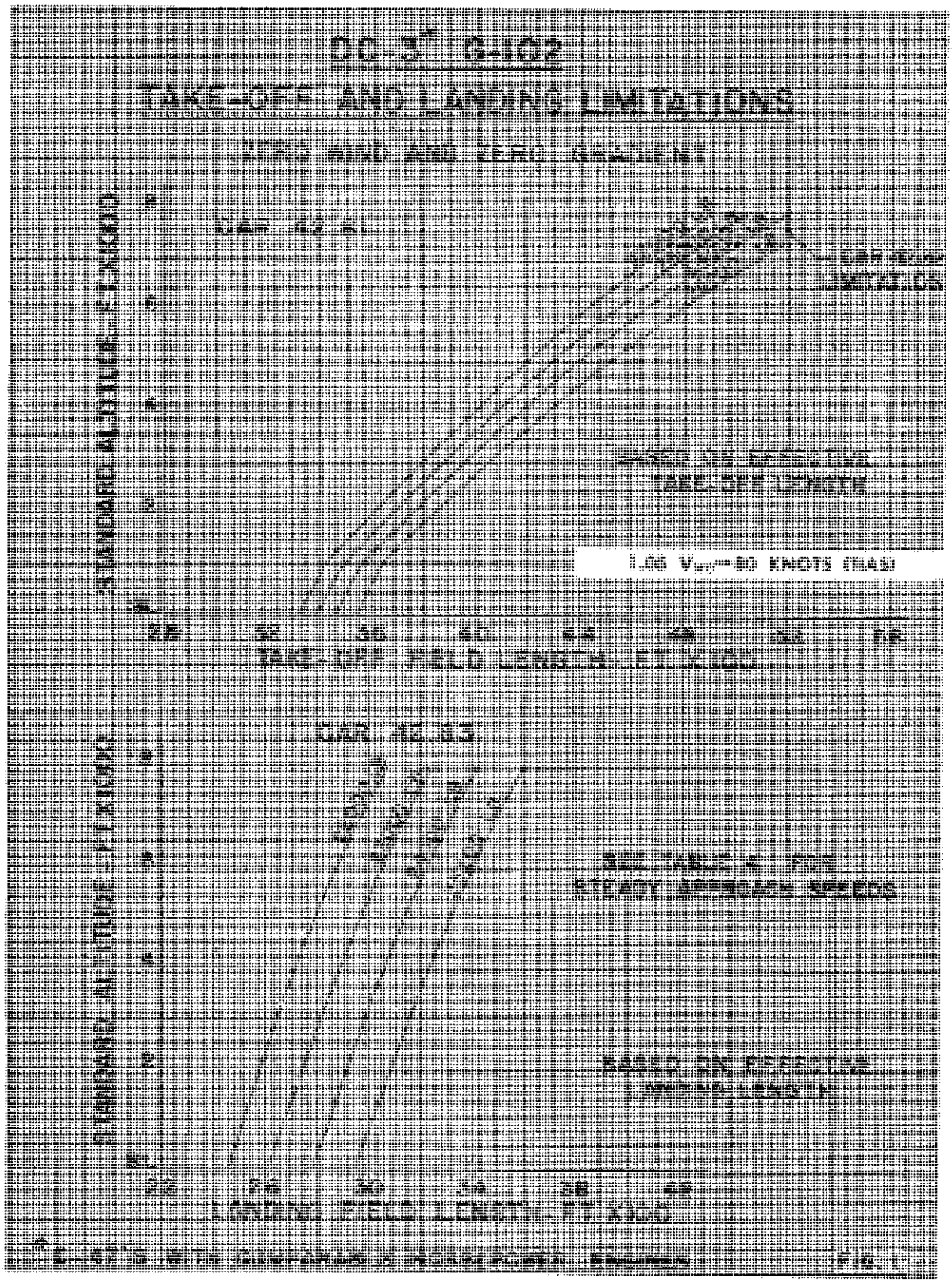
Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	22,000	V_{50}	23,000	V_{50}	24,000	V_{50}	25,200	V_{50}
	Distance in feet							
S. L.	2, 460	74. 5	2, 620	76. 5	2, 790	78. 0	2, 950	80. 0
1,000	2, 520	74. 5	2, 680	76. 5	2, 850	78. 0	3, 015	80. 0
2,000	2, 580	74. 5	2, 745	76. 5	2, 915	78. 0	3, 080	80. 0
3,000	2, 645	74. 5	2, 815	76. 5	2, 980	78. 0	3, 155	80. 0
4,000	2, 710	74. 5	2, 885	76. 5	3, 060	78. 0	3, 230	80. 0
5,000	2, 790	74. 5	2, 965	76. 5	3, 135	78. 0	3, 310	80. 0
6,000	2, 870	74. 5	3, 050	76. 5	3, 220	78. 0	3, 400	80. 0
7,000	2, 965	74. 5	3, 140	76. 5	3, 315	78. 0	3, 490	80. 0
8,000	3, 045	74. 5	3, 240	76. 5	3, 420	78. 0	3, 595	80. 0

[1] Steady approach speed through 50 feet height-knots TIAS denoted by symbol V_{50}.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	22,000	V_{50}	23,000	V_{50}	24,000	V_{50}	25,200	V_{50}
	Distance in feet							
S. L.	3, 125	74. 5	3, 325	76. 5	3, 545	78. 0	3, 745	80. 0
1,000	3, 200	74. 5	3, 390	76. 5	3, 620	78. 0	3, 830	80. 0
2,000	3, 275	74. 5	3, 485	76. 5	3, 700	78. 0	3, 910	80. 0
3,000	3, 360	74. 5	3, 575	76. 5	3, 785	78. 0	4, 005	80. 0
4,000	3, 440	74. 5	3, 665	76. 5	3, 885	78. 0	4, 100	80. 0
5,000	3, 545	74. 5	3, 765	76. 5	3, 980	78. 0	4, 205	80. 0
6,000	3, 645	74. 5	3, 875	76. 5	4, 090	78. 0	4, 320	80. 0
7,000	3, 765	74. 5	3, 990	76. 5	4, 210	78. 0	4, 430	80. 0
8,000	3, 865	74. 5	4, 115	76. 5	4, 345	78. 0	4, 565	80. 0

[1] Steady approach speed through 50 feet height-knots TIAS denoted by symbol V_{50}.


DC-3* G-102
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
STANDARD ALTITUDE - FT X1000
TAKE-OFF FIELD LENGTH - FT X100
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{MD} = 80 KNOTS (TIAS)
STANDARD ALTITUDE - FT X1000
LANDING FIELD LENGTH - FT X100
BASED ON EFFECTIVE LANDING LENGTH
FIG. 1

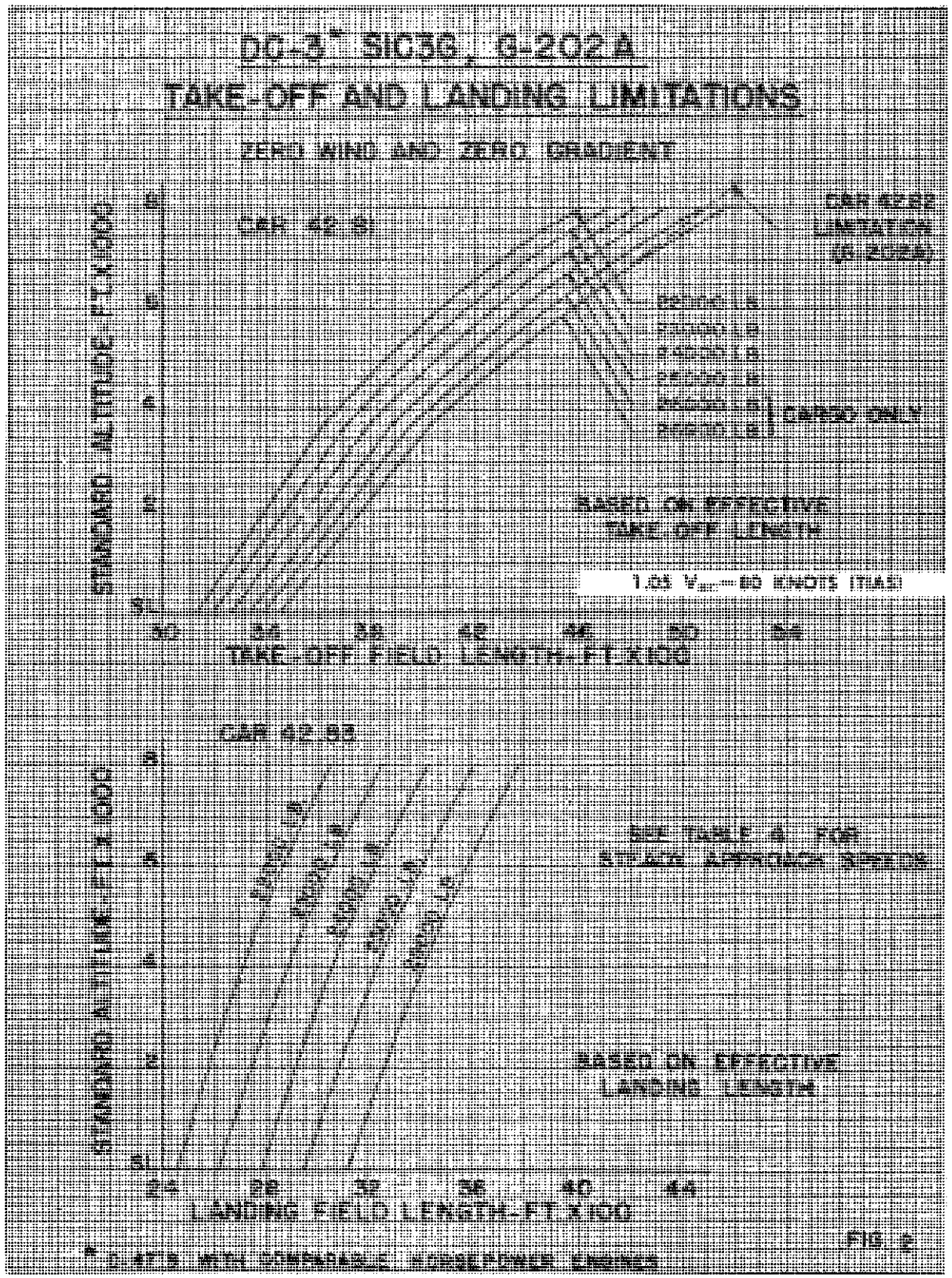
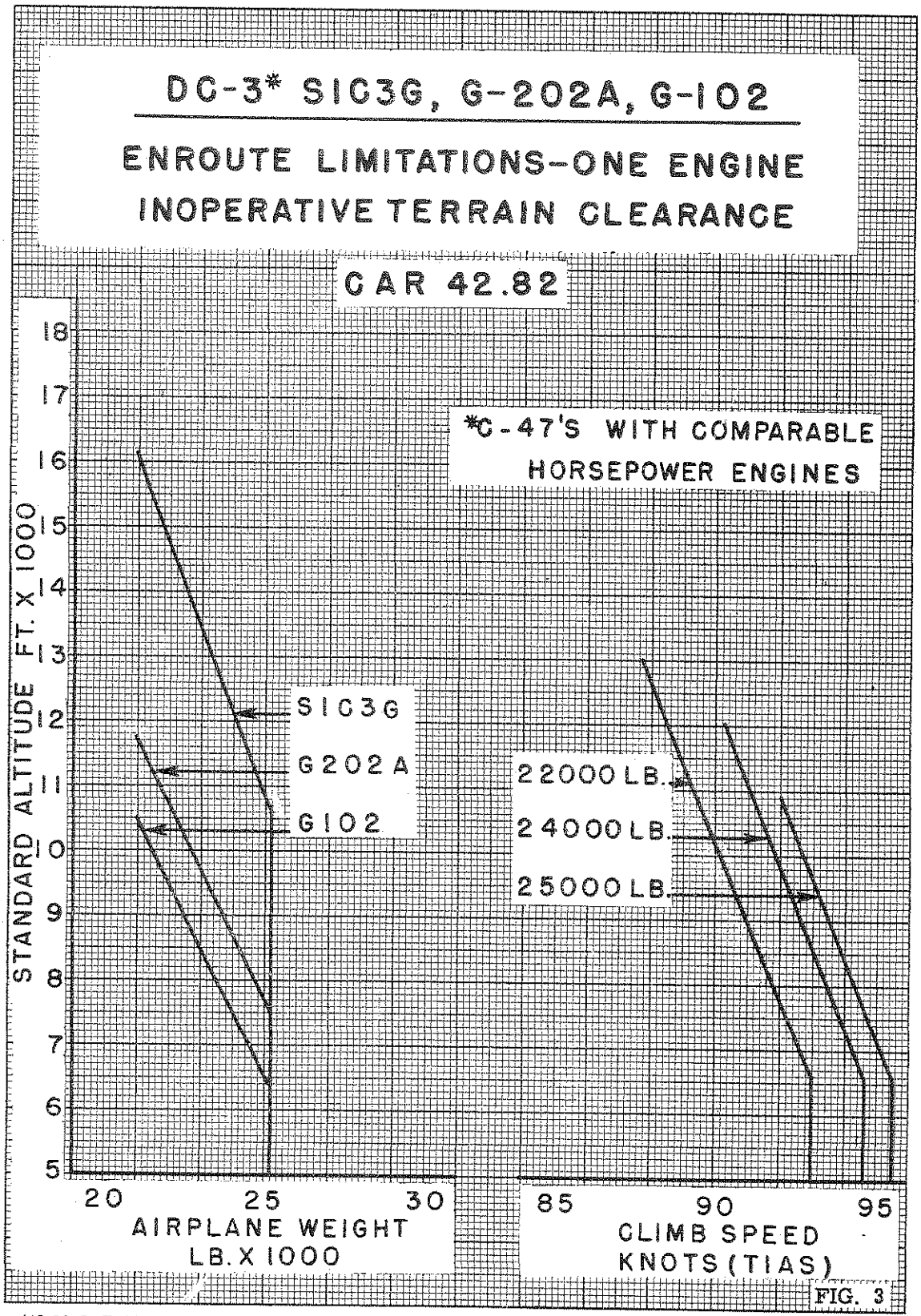

DC-3* SIC3G, G-202A
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.81
CAR 42.82 LIMITATION (G-202A)
CARGO ONLY
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{SC} — 80 KNOTS (TIAS)
STANDARD ALTITUDE-FT X 1000
TAKE-OFF FIELD LENGTH-FT X 100
CAR 42.83
SEE TABLE 4 FOR STEADY APPROACH SPEEDS
BASED ON EFFECTIVE LANDING LENGTH
LANDING FIELD LENGTH-FT X 100
* C-47'S WITH COMPARABLE HORSEPOWER ENGINES

FIG. 2



(42.80–2. Published in 15 F. R. 86, Jan. 10, 1950, effective Jan. 1, 1950; amended in 21 F. R. 2232, Apr. 6, 1956, effective Apr. 1, 1956.)

535996 O—60——6

42.80–3 *Performance data on Lockheed 18 G202A aircraft (FAA rules which apply to section 42.80).* The following performance limitations data, applicable to Lockheed 18 G202A aircraft shall be used in determining compliance with section 42.80. These data are presented in the tables and figures of this section.

TABLE 1.—*Takeoff limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1. (Distance to accelerate to 99.5 knots TIAS, and stop, with zero wind and zero gradient.)

Standard altitude in feet	Airplane weight in pounds		
	17,500	18,000	18,500
	Distance in feet		
S. L.	5,470	5,670	5,830
1,000	5,725	5,925	6,100
2,000	5,980	6,185	6,380
3,000	6,250	6,460	6,670
4,000	6,520	6,740	6,950
5,000	6,800	7,030	7,250
6,000	7,100	7,330	7,570
7,000	7,405	7,650	7,890
8,000	7,750	8,000	8,240

(b) Actual length of runway required when "effective length," considering obstacles, is not determined. (Distance to accelerate to 99.5 knots TIAS, and stop, divided by the factor 0.85.)

Standard altitude in feet	Airplane weight in pounds		
	17,500	18,000	18,500
	Distance in feet		
S. L.	6,430	6,665	6,855
1,000	6,730	6,965	7,175
2,000	7,030	7,275	7,500
3,000	7,350	7,595	7,845
4,000	7,665	7,925	8,175
5,000	7,995	8,265	8,525
6,000	8,350	8,620	8,900
7,000	8,760	8,995	9,280
8,000	9,115	9,410	9,690

TABLE 2.—*En route limitations*

Weight in pounds	Terrain clearance [1] in feet and climb speed in knots TIAS	
	Feet	Knots
18,500	9,800	104.5
18,000	10,600	103.0
17,500	11,350	102.0
17,000	12,150	101.0
16,500	12,900	100.0
16,000	13,700	99.0

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

TABLE 3.—*Landing limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

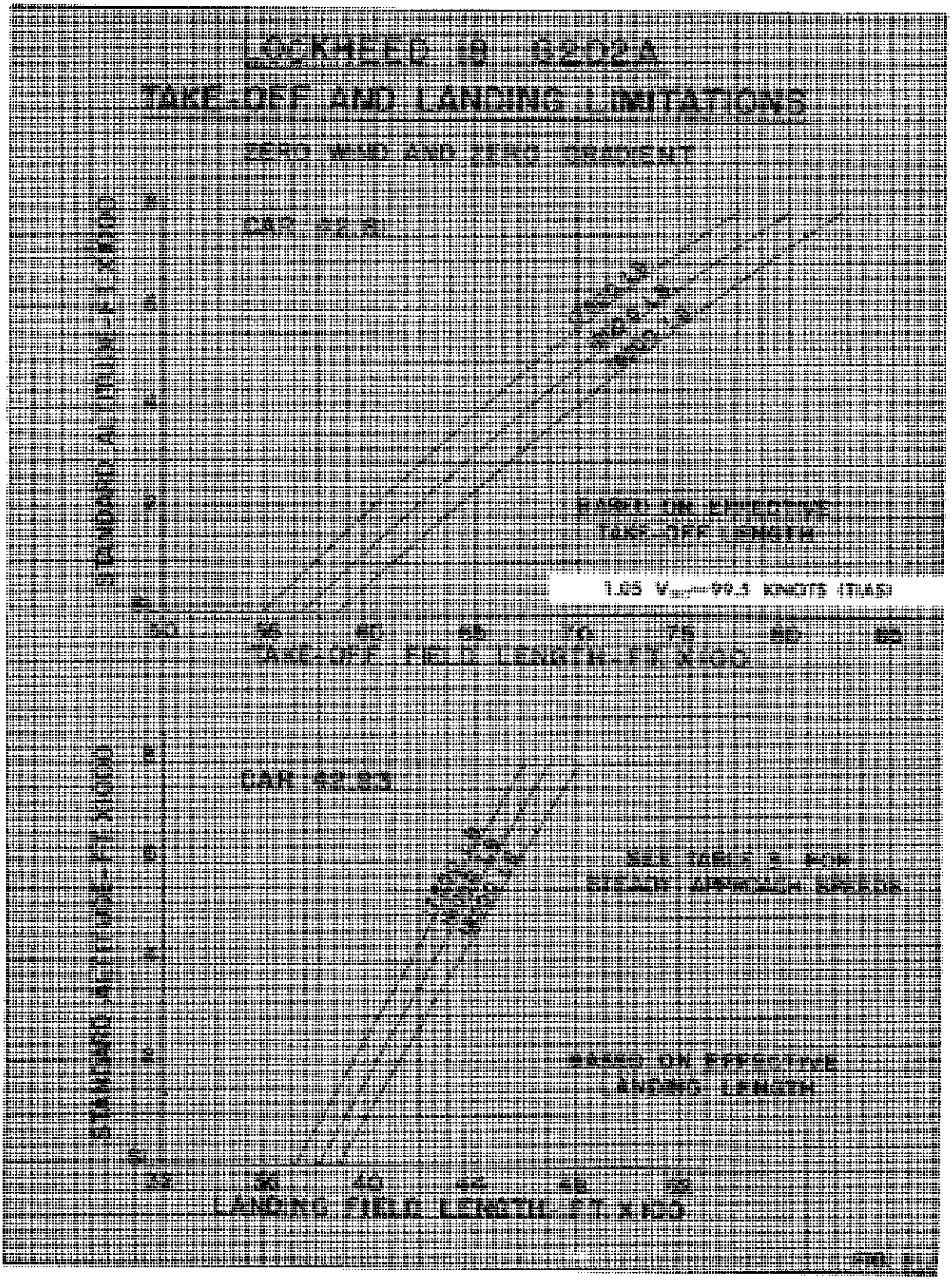
Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	17,500	V_{50}	18,000	V_{50}	18,500	V_{50}
	Distance in feet					
S. L.	3,715	83.0	3,810	84.0	3,885	86.0
1,000	3,825	83.0	3,910	84.0	3,995	86.0
2,000	3,930	83.0	4,020	84.0	4,105	86.0
3,000	4,040	83.0	4,130	84.0	4,220	86.0
4,000	4,150	83.0	4,240	84.0	4,335	86.0
5,000	4,240	83.0	4,350	84.0	4,450	86.0
6,000	4,370	83.0	4,460	84.0	4,570	86.0
7,000	4,480	83.0	4,575	84.0	4,690	86.0
8,000	4,595	83.0	4,690	84.0	4,810	86.0

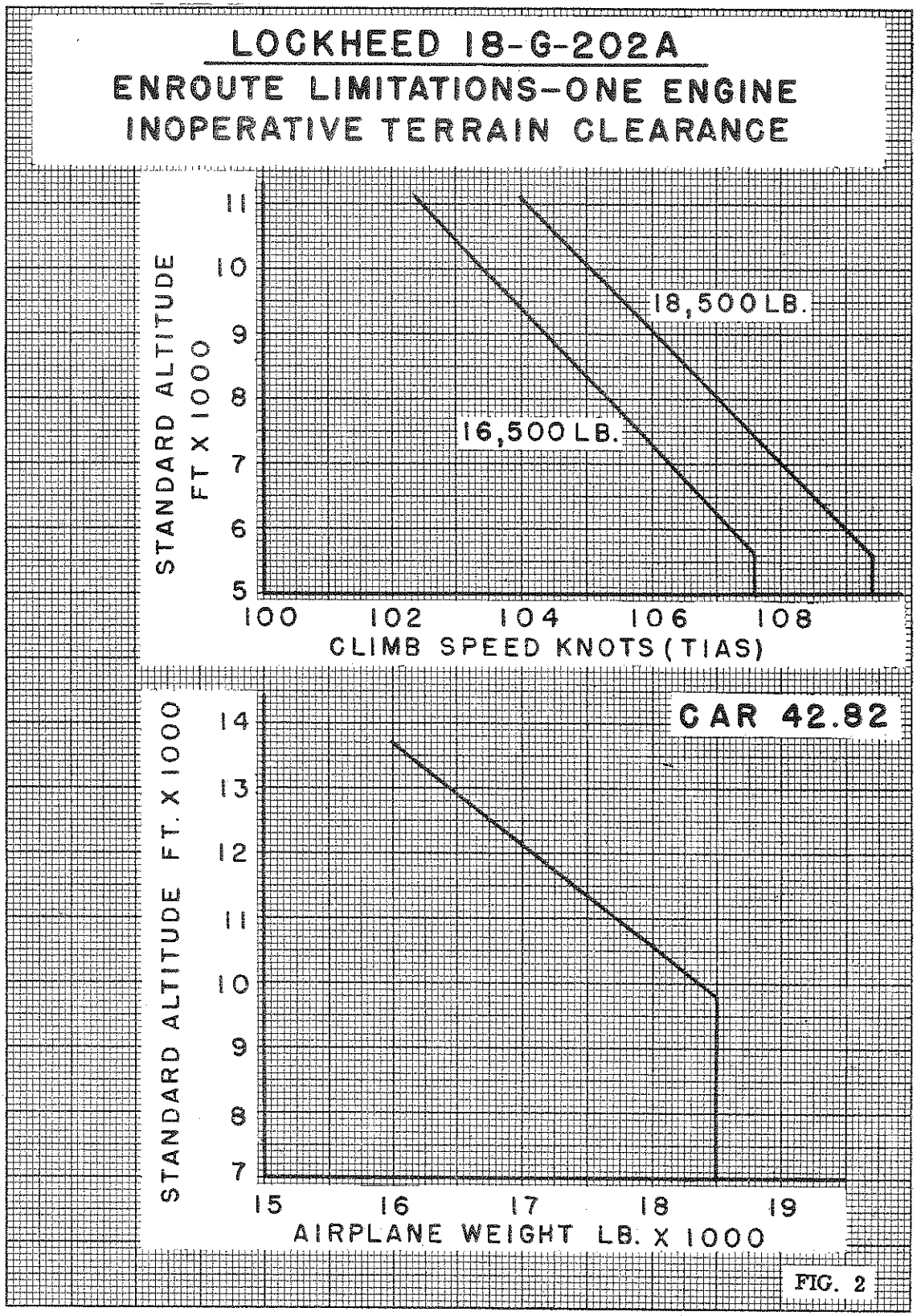
[1] Steady approach speed through 50-foot height knots TIAS denoted by symbol V_{50}.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	17,500	V_{50}	18,000	V_{50}	18,500	V_{50}
	Distance in feet					
S. L.	4,720	83.0	4,840	84.0	4,935	86.0
1,000	4,860	83.0	4,965	84.0	5,075	86.0
2,000	4,990	83.0	5,105	84.0	5,215	86.0
3,000	5,130	83.0	5,245	84.0	5,360	86.0
4,000	5,270	83.0	5,385	84.0	5,505	86.0
5,000	5,385	83.0	5,525	84.0	5,650	86.0
6,000	5,550	83.0	5,665	84.0	5,805	86.0
7,000	5,690	83.0	5,810	84.0	5,955	86.0
8,000	5,835	83.0	5,955	84.0	6,110	86.0

[1] Steady approach speed through 50-foot height knots TIAS denoted by symbol V_{50}.


LOCKHEED 18 G202A
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.81
STANDARD ALTITUDE-FT X1000
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V = 99.5 KNOTS (TIAS)
50 55 60 65 70 75 80 85
TAKE-OFF FIELD LENGTH-FT X100
CAR 42.83
STANDARD ALTITUDE-FT X1000
BASED ON EFFECTIVE LANDING LENGTH
32 36 40 44 48 52
LANDING FIELD LENGTH-FT X100



(42.80–3. Published in 15 F. R. 88 Jan. 10, 1950, effective Jan. 1, 1950; amended in 21 F. R. 2232, Apr. 6, 1956, effective Apr. 1, 1956.)

42.80–4 *Convair Model 28–5ACF and PBY–5A landplane aircraft (FAA rules which apply to sec. 42.80).* The following performance limitations data, applicable to Convair Model 28–5ACF and PBY–5A landplane aircraft shall be used in determining compliance with section 42.80. These data are presented in the tables and figures of this section.

TABLE 1.—*Takeoff limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1. (Distance to accelerate to 82.5 knots TIAS (28–5ACF), 79 knots TIAS (PBY–5A), and stop, with zero wind and zero gradient.)

Standard altitude in feet	Airplane weight in pounds					
	23,000	24,000	25,000	26,000	[1]27,000	[2]28,000
	Distance in feet					
S. L.	3,240	3,400	3,565	3,725	3,880	4,050
1,000	3,370	3,540	3,720	3,885	4,055	4,225
2,000	3,500	3,680	3,875	4,045	4,230	4,400
3,000	3,635	3,830	4,025	4,200	4,400	4,580
4,000	3,860	4,070	4,280	4,485	4,700	4,900
5,000	4,095	4,315	4,540	4,770	5,000	5,215
6,000	4,330	4,565	4,810	5,060	5,305	5,545
7,000	4,580	4,830	5,090	5,360	5,610	5,880
8,000	4,830	5,095	5,380	5,660	5,940	6,240

[1] Maximum weight for PBY–5A landplane.
[2] Maximum weight for 28–5ACF.

(b) Actual length of runway required when "effective length," considering obstacles, is not determined. (Distance to accelerate to 82.5 knots TIAS (28–5ACF), 79 knots TIAS (PBY–5A), and stop, divided by the factor 0.85.)

Standard altitude in feet	Airplane weight in pounds					
	23,000	24,000	25,000	26,000	[1]27,000	[2]28,000
	Distance in feet					
S. L.	3,810	4,000	4,190	4,380	4,560	4,760
1,000	3,965	4,165	4,375	4,570	4,770	4,970
2,000	4,115	4,330	4,555	4,755	4,975	5,175
3,000	4,275	4,505	4,735	4,940	5,175	5,385
4,000	4,540	4,785	5,035	5,275	5,525	5,760
5,000	4,815	5,075	5,340	5,610	5,880	6,130
6,000	5,090	5,370	5,655	5,950	6,240	6,520
7,000	5,385	5,680	5,985	6,305	6,600	6,915
8,000	5,680	5,990	6,325	6,655	6,985	7,340

[1] Maximum weight for PBY–5A landplane.
[2] Maximum weight for 28–5ACF.

TABLE 2.—*En route limitations*

Weight in pounds	Terrain clearance [1] in feet and climb speed in knots TIAS			
	Model PBY–5A		Model 28–5ACF	
	Feet	Knots	Feet	Knots
28,000	--------	--------	7,500	90.5
27,500	--------	--------	8,000	89.5
27,000	7,200	81.0	8,500	88.5
26,500	7,700	80.5	9,050	87.5
26,000	8,200	79.5	9,600	87.0
25,500	8,700	78.5	10,100	86.0
25,000	9,200	77.5	10,650	84.5
24,500	9,700	76.5	11,150	84.0
24,000	10,200	75.5	11,700	82.5

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

TABLE 3.—*Landing limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots TIAS					
	23,000	V_{50}	24,000	V_{50}	25,000	V_{50}
	Distance in feet					
S. L	3,420	74.5	3,570	76.5	3,690	78.0
1,000	3,515	74.5	3,665	76.5	3,800	78.0
2,000	3,605	74.5	3,765	76.5	3,900	78.0
3,000	3,700	74.5	3,860	76.5	4,010	78.0
4,000	3,790	74.5	3,955	76.5	4,110	78.0
5,000	3,885	74.5	4,055	76.5	4,215	78.0
6,000	3,975	74.5	4,150	76.5	4,320	78.0
7,000	4,070	74.5	4,245	76.5	4,425	78.0
8,000	4,160	74.5	4,340	76.5	4,525	78.0

[1] Steady approach speed through 50 feet height in knots. TIAS denoted by symbol V_{50}.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots TIAS					
	23,000	V_{50}	24,000	V_{50}	25,000	V_{50}
	Distance in feet					
S. L	4,350	74.5	4,544	76.5	4,696	78.0
1,000	4,475	74.5	4,664	76.5	4,836	78.0
2,000	4,588	74.5	4,792	76.5	4,964	78.0
3,000	4,709	74.5	4,913	76.5	5,104	78.0
4,000	4,824	74.5	5,034	76.5	5,231	78.0
5,000	4,944	74.5	5,161	76.5	5,364	78.0
6,000	5,059	74.5	5,282	76.5	5,498	78.0
7,000	5,180	74.5	5,403	76.5	5,632	78.0
8,000	5,294	74.5	5,524	76.5	5,759	78.0

[1] Steady approach speed through 50 feet height in knots. TIAS denoted by symbol V_{50}.

TABLE 4.—*Landing limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots TIAS					
	26,000	V_{50}	[2]27,000	V_{50}	[3]28,000	V_{50}
	Distance in feet					
S. L	3,830	80.0	3,965	81.0	4,100	82.5
1,000	3,940	80.0	4,080	81.0	4,220	82.5
2,000	4,050	80.0	4,200	81.0	4,345	82.5
3,000	4,160	80.0	4,315	81.0	4,470	82.5
4,000	4,275	80.0	4,430	81.0	4,595	82.5
5,000	4,385	80.5	4,550	81.0	4,720	82.5
6,000	4,495	80.0	4,665	81.0	4,840	82.5
7,000	4,610	80.0	4,785	81.0	4,970	82.5
8,000	4,720	80.0	4,900	81.0	5,090	82.5

[1] Steady approach speed through 50 feet height in knots. TIAS denoted by symbol V_{50}.
[2] Maximum weight for PBY-5A landplane.
[3] Maximum weight for 28-5ACF.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots TIAS					
	26,000	V_{50}	[2]27,000	V_{50}	[3]28,000	V_{50}
	Distance in feet					
S. L	4,874	80.0	5,046	81.0	5,218	82.5
1,000	5,014	80.0	5,193	81.0	5,371	82.5
2,000	5,154	80.0	5,345	81.0	5,530	82.5
3,000	5,294	80.0	5,492	81.0	5,689	82.5
4,000	5,441	80.0	5,638	81.0	5,848	82.5
5,000	5,581	80.0	5,791	81.0	6,007	82.5
6,000	5,721	80.0	5,937	81.0	6,160	82.5
7,000	5,867	80.0	6,090	81.0	6,325	82.5
8,000	6,007	80.0	6,236	81.0	6,478	82.5

[1] Steady approach speed through 50 feet height in knots. TIAS denoted by symbol V_{50}.
[2] Maximum weight for PBY-5A landplane.
[3] Maximum weight for 28-5ACF

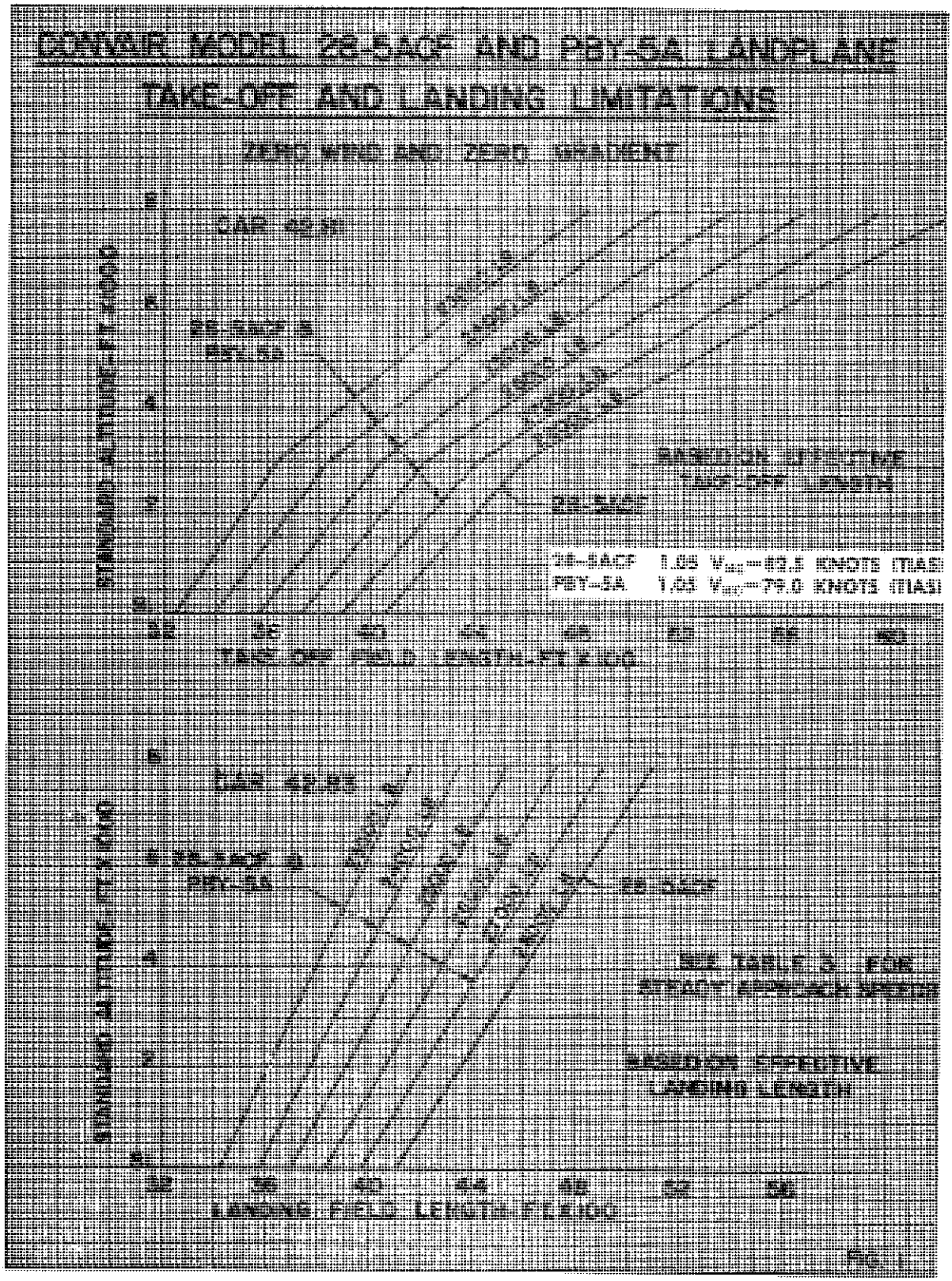
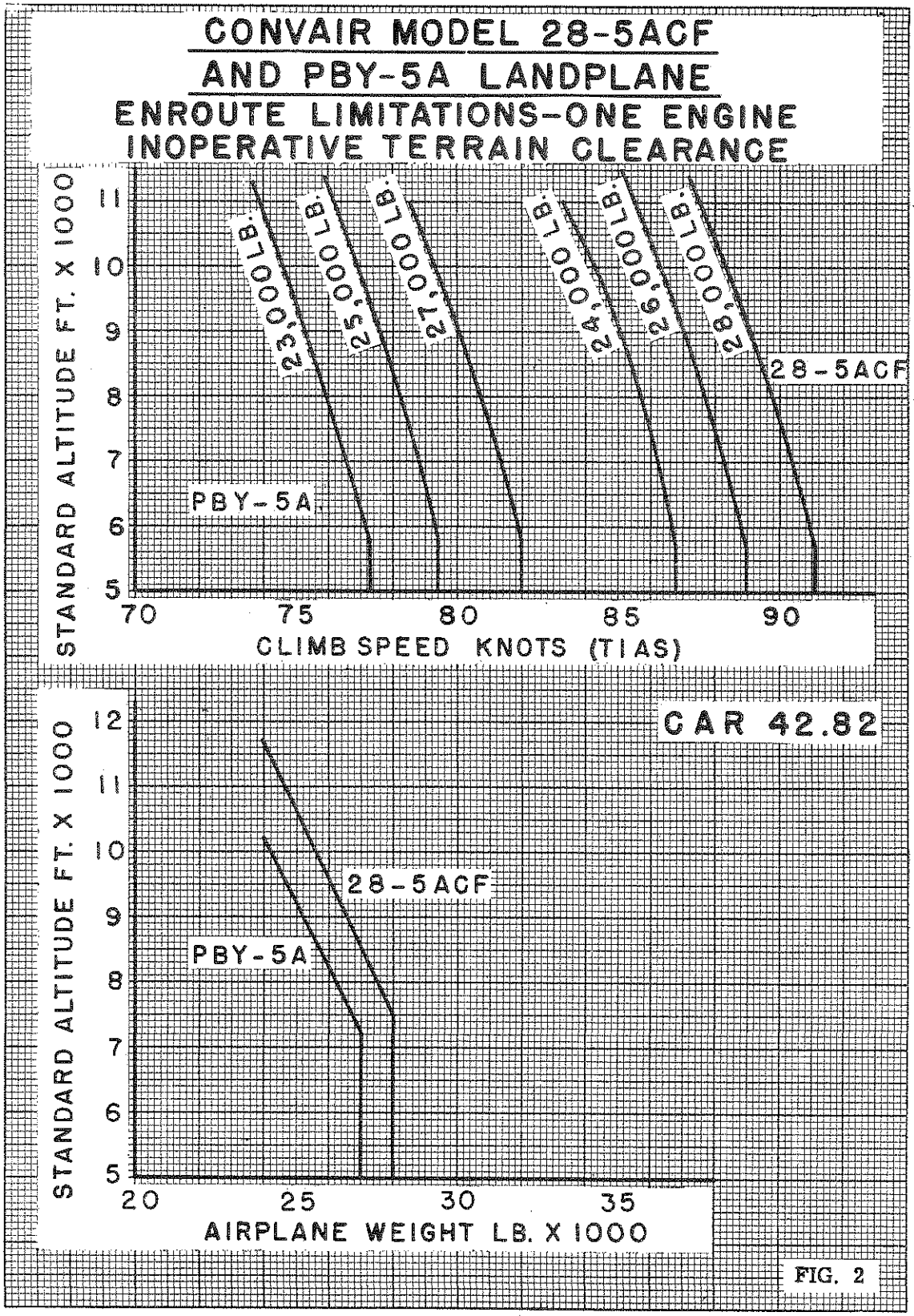

DONVAIR MODEL 28-5ACF AND PBY-5A LANDPLANE
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
STANDARD ALTITUDE-FT X 1000
28-5ACF
PBY-5A
BASED ON EFFECTIVE TAKE-OFF LENGTH
28-5ACF 1.05 V_{MC}=83.5 KNOTS (TIAS)
PBY-5A 1.05 V_{MC}=79.0 KNOTS (TIAS)
TAKE-OFF FIELD LENGTH-FT X 100
BASED ON EFFECTIVE LANDING LENGTH
LANDING FIELD LENGTH-FT X 100

FIG. 1



(42.80–4. Published in 15 F. R. 90, Jan. 10, 1950, effective Jan. 1, 1950; amended in 20 F. R. 4184, June 15, 1955, effective June 30, 1955; amended in 21 F. R. Apr. 6, 1956, effective Apr. 1, 1956.)

42.80–5 *Performance data on Douglas B–18, RB–18A (R1820–53) aircraft (FAA rules which apply to section 42.80).* The following performance limitations data, applicable to the Douglas B–18, RB–18A aircraft shall be used in determining compliance with section 42.80. These data are presented in the tables and figures of this section. As indicated by the en route limitation data for the Douglas model B–18 (table 2), operation is restricted to impractical operating weights. Therefore takeoff and landing limitations are not presented for this model.

TABLE 1.—*Takeoff limitations*

MODEL RB–18A

(a) "Effective length" of runway required when effective length is determined in accordance with 42.1. (Distance to accelerate to 81.5 knots TIAS, and stop, with zero wind and zero gradient.)

Standard altitude in feet	Airplane weight in pounds			
	19,000	20,000	21,000	21,300
	Distance in feet			
S. L.	3,605	3,695	3,790	3,820
1,000	3,710	3,815	3,920	3,950
2,000	3,835	3,945	4,045	4,085
2,500	3,890	4,000	4,110	4,150
3,000	4,015	4,130	4,230	4,275
4,000	4,240	4,355	4,475	4,525
5,000	4,475	4,595	4,720	----
6,000	4,710	4,835	----	----
7,000	4,935	5,065	(1)	(1)
8,000	5,170	5,300	----	----

[1] Limited by sec. 42.82.

(b) Actual length of runway required when "effective length", considering obstacles, is not determined. (Distance to accelerate to 81.5 knots TIAS, and stop, divided by the factor 0.85.)

Standard altitude in feet	Airplane weight in pounds			
	19,000	20,000	21,000	21,300
	Distance in feet			
S. L.	4,250	4,350	4,460	4,495
1,000	4,360	4,490	4,610	4,650
2,000	4,510	4,645	4,755	4,800
2,500	4,575	4,705	4,840	4,880
3,000	4,730	4,855	4,980	5,025
4,000	4,990	5,125	5,260	5,325
5,000	5,260	5,400	5,550	----
6,000	5,550	5,680	----	----
7,000	5,800	5,960	(1)	(1)
8,000	6,080	6,240	----	----

[1] Limited by sec. 42.82.

DOUGLAS B–18, RB18A (R–1820–53)

TABLE 2.—*En route limitations*

MODEL B–18

Weight in pounds:	*Terrain clearance[1] in feet*
13,500	4,100
13,000	4,600

Section 42.82 limitation critical for all practical operating weights.

MODEL RB–18A

Weight in pounds	Terrain clearance [1] in feet and climb speed in knots TIAS			
	Low blower		High blower	
	Feet	Knots	Feet	Knots
21,000	4,270	86.0	----	----
20,600	----	----	4,600	85.0
20,500	----	----	5,900	84.5
20,200	----	----	8,800	83.5
20,000	----	----	8,950	83.5
19,500	----	----	9,400	82.5

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

TABLE 3.—*Landing limitations*

MODEL RB–18A

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	19,000	V_{50}	20,000	V_{50}	21,000	V_{50}	21,300	V_{50}
	Distance in feet							
S. L.	2,850	74.5	3,110	77.0	3,370	78.5	3,445	79.0
1,000	2,930	74.5	3,200	77.0	3,470	78.5	3,545	79.0
2,000	3,010	74.5	3,290	77.0	3,565	78.5	3,640	79.0
3,000	3,085	74.5	3,380	77.0	3,660	78.5	3,740	79.0
4,000	3,165	74.5	3,470	77.0	3,755	78.5	3,835	79.0
5,000	3,245	74.5	3,560	77.0	3,850	78.5	3,935	79.0
6,000	3,325	74.5	3,650	77.0	----	----	----	----
7,000	3,405	74.5	3,735	77.0	[2]	[2]	[2]	[2]
8,000	3,485	74.5	3,825	77.0	----	----	----	----

[1] Steady approach speed through 50 feet height knots TIAS denoted by symbol V_{50}.
[2] Limited by sec. 42.82.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	19,000	V_{50}	20,000	V_{50}	21,000	V_{50}	21,300	V_{50}
	Distance in feet							
S. L.	3,630	74.5	3,960	77.0	4,290	78.5	4,390	79.0
1,000	3,730	74.5	4,070	77.0	4,410	78.5	4,510	79.0
2,000	3,835	74.5	4,190	77.0	4,540	78.5	4,630	79.0
3,000	3,925	74.5	4,300	77.0	4,655	78.5	4,760	79.0
4,000	4,025	74.5	4,415	77.0	4,775	78.5	4,880	79.0
5,000	4,130	74.5	4,535	77.0	4,900	78.5	5,005	79.0
6,000	4,230	74.5	4,645	77.0	----	----	----	----
7,000	4,340	74.5	4,750	77.0	----	[2]	[2]	----
8,000	4,440	74.5	4,865	77.0	----	----	----	----

[1] Steady approach speed through 50 feet height knots TIAS denoted by symbol V_{50}.
[2] Limited by sec. 42.82.

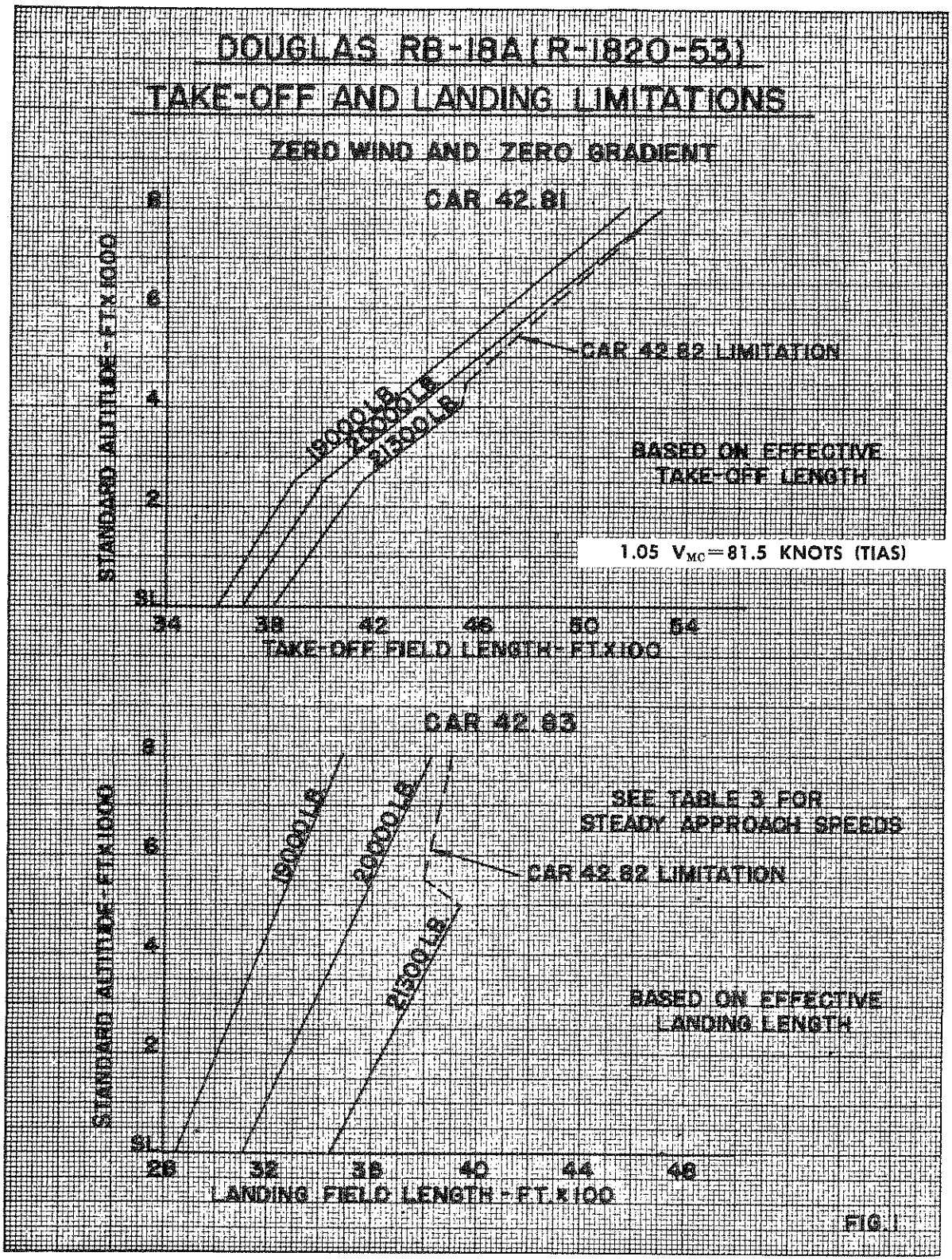
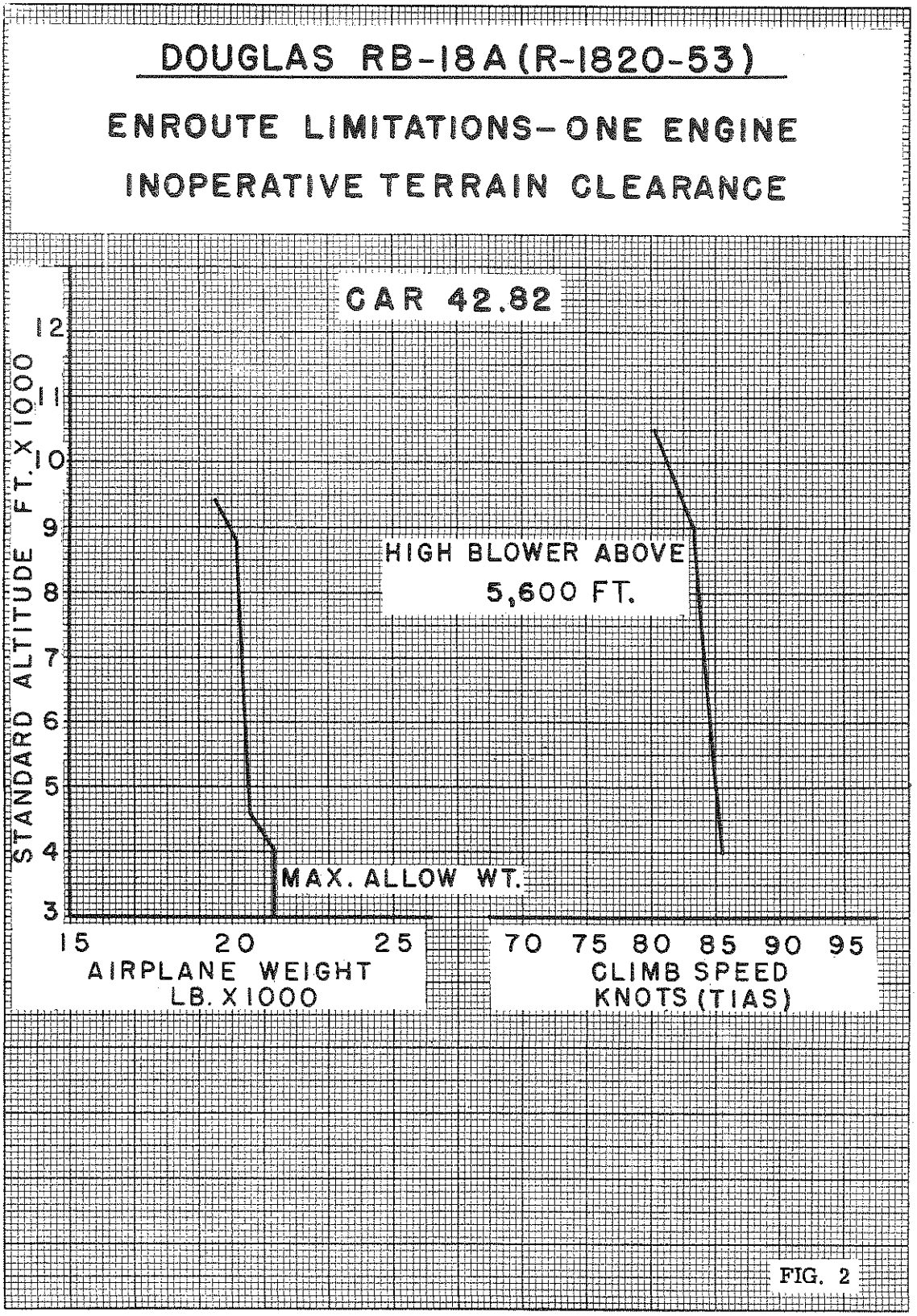

DOUGLAS RB-18A (R-1820-53)
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.81
STANDARD ALTITUDE - FT. X 1000
8
6
4
2
SL
CAR 42.82 LIMITATION
190000 LB
200000 LB
213000 LB
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{MC} = 81.5 KNOTS (TIAS)
34
38
42
46
50
54
TAKE-OFF FIELD LENGTH - FT. X 100
CAR 42.83
SEE TABLE 3 FOR STEADY APPROACH SPEEDS
CAR 42.82 LIMITATION
190000 LB
200000 LB
213000 LB
BASED ON EFFECTIVE LANDING LENGTH
28
32
36
40
44
48
LANDING FIELD LENGTH - FT. x 100

FIG. 1



(42.80–5. Published in 15 F. R. 91, Jan. 10, 1950, effective Jan. 1, 1950; amended in 17 F. R. 2887, Apr. 3, 1952, effective upon publication; amended in 21 F. R. 2232, Apr. 6, 1956, effective Apr. 1, 1956.)

42.80–6 *En route limitations on multiengine aircraft with maximum allowable takeoff weight below 12,500 pounds (FAA rules which apply to sec. 42.80).* The following en route limitations data shall be used in determining compliance with section 42.80. These data are presented in tabular and graphic form by aircraft make and model. En route performance data on other aircraft weighing less than 12,500 pounds and operated under section 42.16 will be made available upon application to the Administrator.

(Published in 19 F. R. 5660, Sept. 8, 1954, effective Oct. 1, 1954; amended in 21 F. R. 8420, Nov. 3, 1956, effective Dec. 1, 1956.)

TABLE 1.—*En route limitations*

AERO COMMANDER 520

Weight in pounds [1]	Terrain clearance [2] in feet and climb speed in miles per hour (TIAS)	
	Feet [3]	Miles per hour
5,500	(3, 480)	94. 8
5,000	6, 820	93. 5
4,500	10, 130	92. 4

[1] The maximum permissible weight under secs. 42.16 and 42.82 is 5,420 pounds.
[2] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.
[3] The "terrain clearance" in parenthesis is not usable under secs. 42.16 and 42.82 because the minimum terrain altitude is 4,000 feet under sec. 42.82.

NOTE.—Inoperative propeller windmilling.

BEECH C–18S AND BEECH 18A

Airplane	Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)	
		Feet	Miles per hour
Beech C–18S	7, 850	6, 200	102. 5
	7, 500	7, 620	98. 7
	7, 000	9, 630	93. 3
Beech 18A	7, 200	4, 760	91. 7
	7, 000	5, 540	90. 8
	6, 500	7, 460	88. 9
	6, 000	9, 400	86. 9

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

BEECH AT–11

Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)	
	Feet	Miles per hour
7,850	6, 200	102. 1
7,500	7, 800	100. 9
7,000	10, 170	99. 2
6,500	12, 500	97. 5

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

NOTE.—Inoperative propeller idling in high pitch. Cowl flaps are closed on inoperative engine. De-icers are not operating.

BEECH D–18C

Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)	
	Feet	Miles per hour
9,000	6, 200	121. 0
8,500	7, 300	120. 0
8,000	8, 450	119. 5
7,500	9, 600	119. 0

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

NOTE.—Inoperative propeller feathered.

TABLE 1.—*En route limitations*—Continued

BEECH D–18S

Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)			
	Propeller feathered		Propeller idling	
	Feet	Miles per hour	Feet	Miles per hour
8,750	7,100	103.5		
8,500	7,600	103.5	5,600	104.5
8,000	8,800	102.5	6,700	104.0
7,500	9,900	102.0	7,900	103.0

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

BEECH 50

Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)	
	Feet	Miles per hour
5,500	4,140	96.4
5,000	7,710	94.6
4,500	11,340	92.7

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

NOTE.—Inoperative propeller windmilling.

CESSNA T–50

(WITH LYCOMING R–680–E3 ENGINES AND MAXIMUM GROSS WEIGHT OF 5,700 POUNDS)

Weight [3] in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)			
	6135A–15 propeller		6135A–9 propeller	
	Feet [2]	Miles per hour	Feet [2]	Miles per hour
5,700			(450)	87.4
5,500	(920)	87.2	(1,540)	87.0
5,250	(2,280)	86.6	(2,890)	86.4
5,000	(3,740)	86.0	4,320	85.7
4,750	5,120	85.3	5,730	85.2

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.
[2] The "terrain clearances" in parentheses are not usable under sec. 42.16 and sec. 42.82 because minimum terrain altitude is 4,000 feet under sec. 42.82.
[3] Maximum permissible weights under sec. 42.16 and sec. 42.82 are 4,950 pounds with 6135A–15 propeller; 5,050 pounds with 6135A–9 propeller.

NOTE.—Inoperative propeller windmilling. No leading edge de-icers installed.

GRUMMAN G–21

Weight in pounds [1]	Terrain clearance [2] in feet and climb speed in miles per hour (TIAS)	
	Feet [3]	Miles per hour
7,500	[3] (3,620)	111.5
7,000	4,610	111.1
6,500	5,590	110.6
6,000	6,550	110.1
5,500	7,530	109.6

[1] The maximum permissible weight under secs. 42.16 and 42.82 is 7,310 pounds.
[2] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.
[3] The "terrain clearance" in parenthesis is not usable under secs. 42.16 and 42.82 because the minimum terrain altitude is 4,000 feet under sec. 42.82.

NOTE.—Propeller idling in high pitch. Airplane is equipped with de-icers.

LOCKHEED 10A

Weight in pounds [1]	Terrain clearance [2] in feet and climb speed in miles per hour (TIAS)			
	Propeller feathered		Propeller idling	
	Feet [3]	Miles per hour	Feet [3]	Miles per hour
10,500	(3,600)	93.8		
10,100	4,580	93.6	(3,120)	92.9
10,000	4,820	93.5	(3,350)	92.8
9,500	6,020	93.1	4,660	92.5
9,000	7,200	92.8	5,900	92.1
8,500	8,350	92.4	7,180	91.7
8,000	9,550	92.0	8,420	91.4

[1] The maximum permissible weights under secs. 42.16 and 42.82 are 9,750 pounds with propeller idling, 10,340 pounds with propeller feathered.
[2] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.
[3] The "terrain clearances" in parenthesis are not usable under secs. 42.16 and 42.82 because the minimum terrain altitude is 4,000 feet under sec. 42.82.

TABLE 1.—*En route limitations*—Continued

LOCKHEED 10E

Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)			
	Propeller feathered		Propeller idling	
	Feet	Miles per hour	Feet	Miles per hour
10,500	9, 000	96	7, 500	96. 5
10,000	9, 600	96	8, 100	96. 5
9,500	10, 200	96	8, 600	96. 5
9,000	10, 700	96	9, 200	96. 5
8,500	11, 300	96	9, 750	96. 5
8,000	11, 900	96	10, 350	96. 5

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

CESSNA MODEL 310

(WITH ORIGINAL PROPELLER DIAMETER LIMITS OF 82 INCHES TO 84 INCHES)

Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)	
	Feet	Miles per hour
4,600	6, 300	102. 0
4,500	6, 900	101. 8
4,250	8, 250	101. 4
4,000	9, 600	101. 0
3,750	10, 950	100. 6

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

NOTE: Inoperative propeller feathered.

LOCKHEED 12A

Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)	
	Feet	Miles per hour
8,600	6, 700	98. 5
8,000	7, 400	98. 5
7,500	7, 950	98. 5
7,000	8, 500	98. 5
6,500	9, 000	98. 5

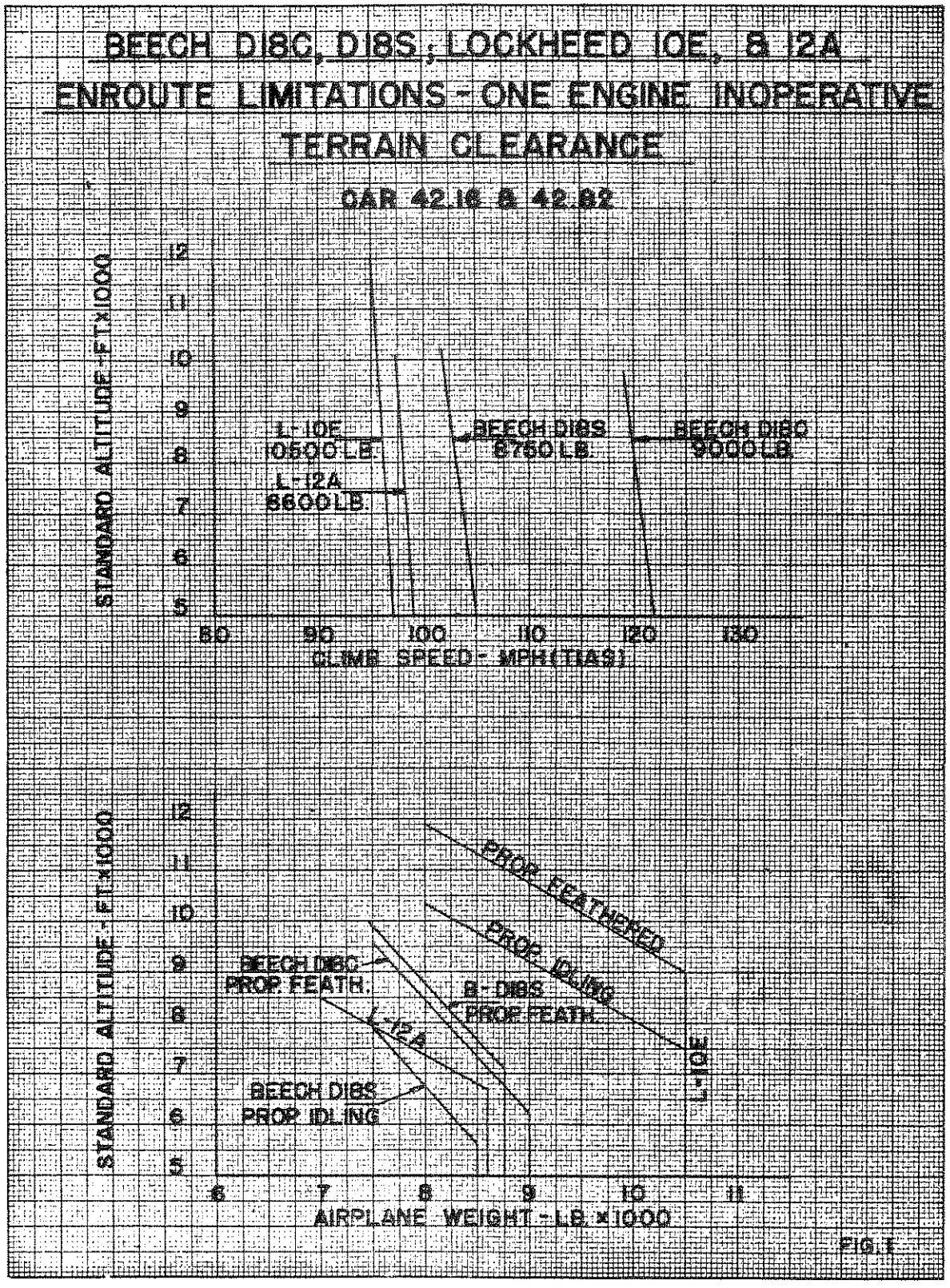
[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

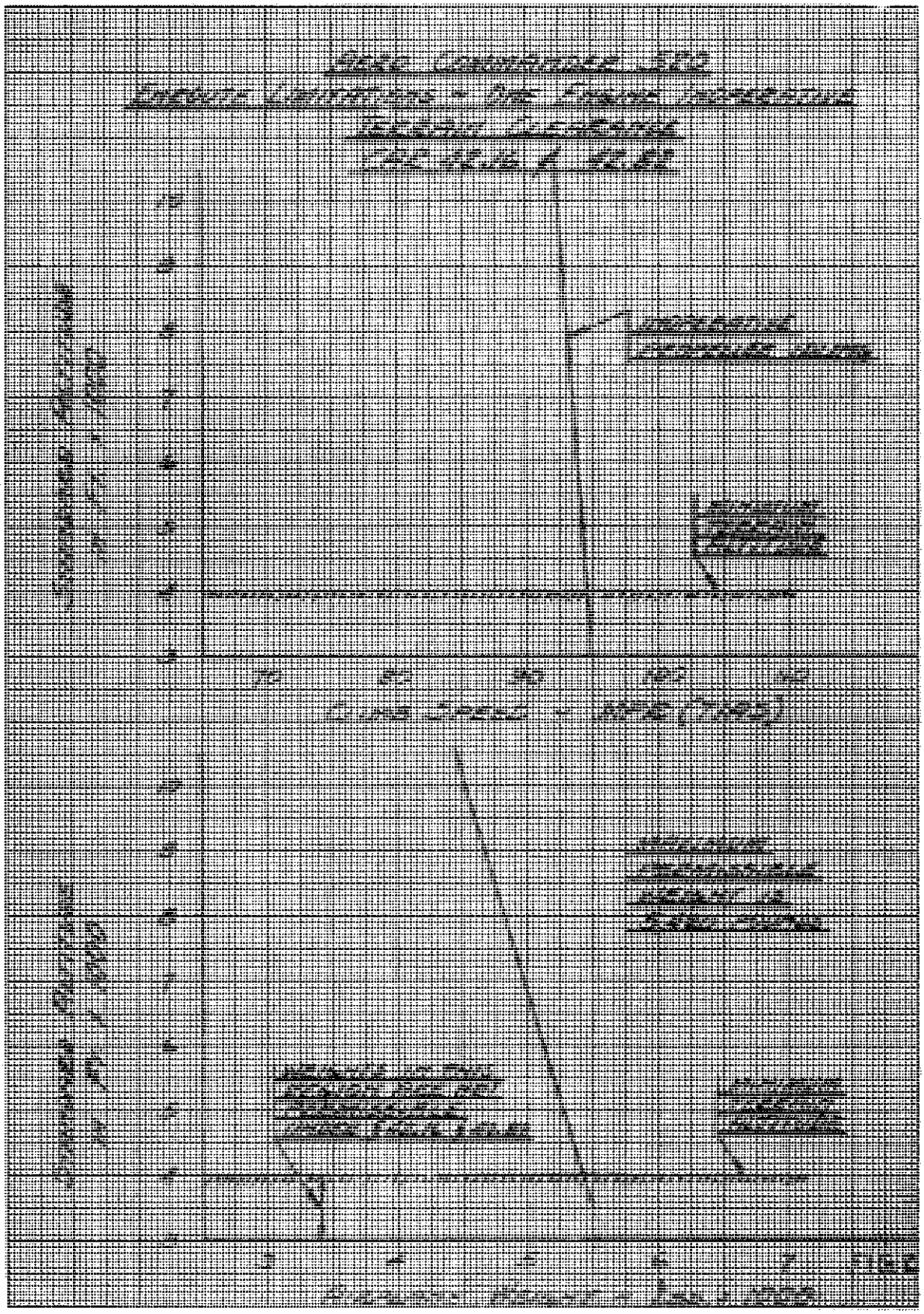
DE HAVILLAND DOVE SERIES

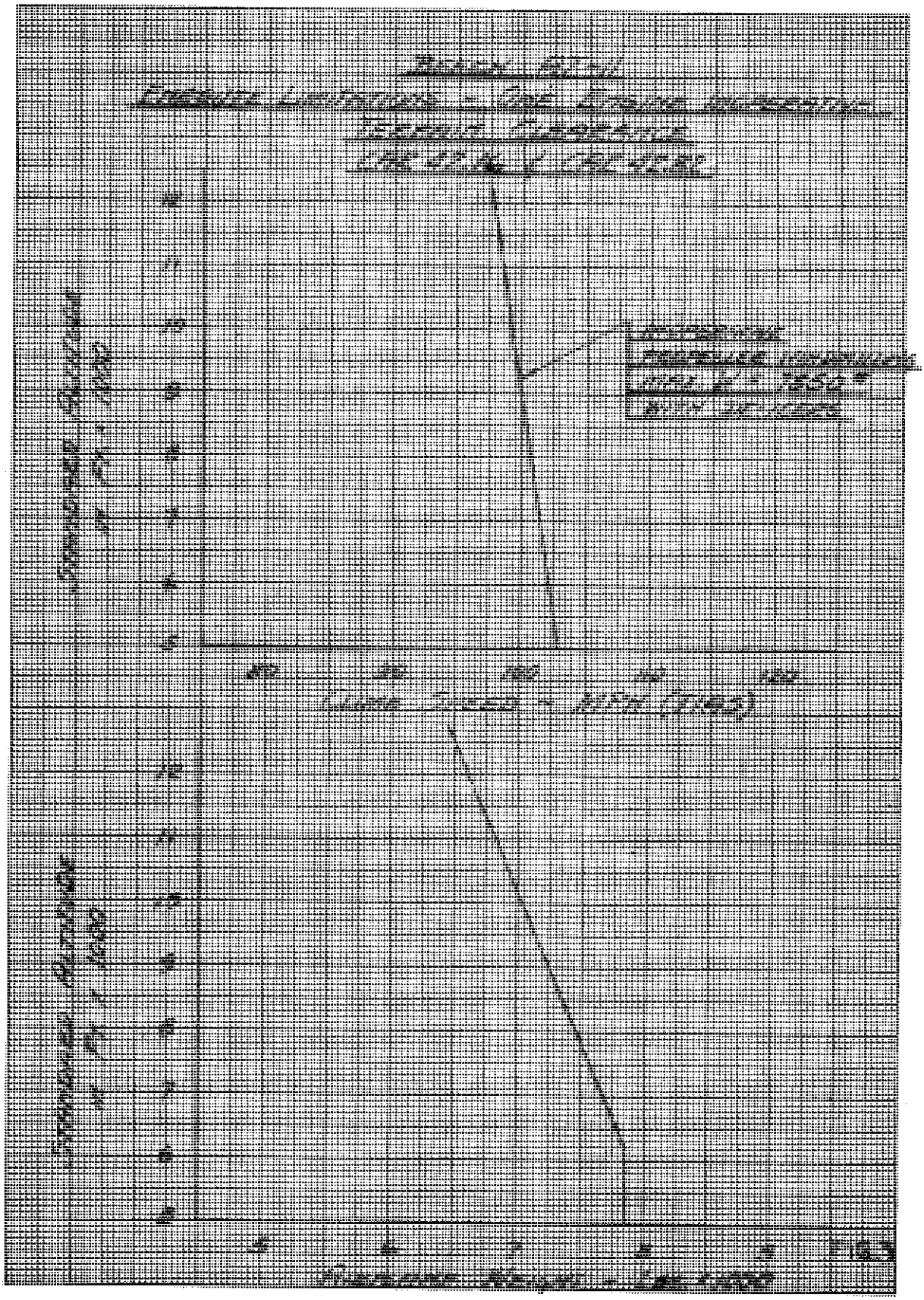
Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)		
	m. p. h.	Feet	
		1A and 2A Series	5A and 6A Series
8,800	110	----------	5, 600
8,500	108	6, 600	6, 600
8,000	105	8, 300	8, 300
7,500	102	9, 900	9, 900

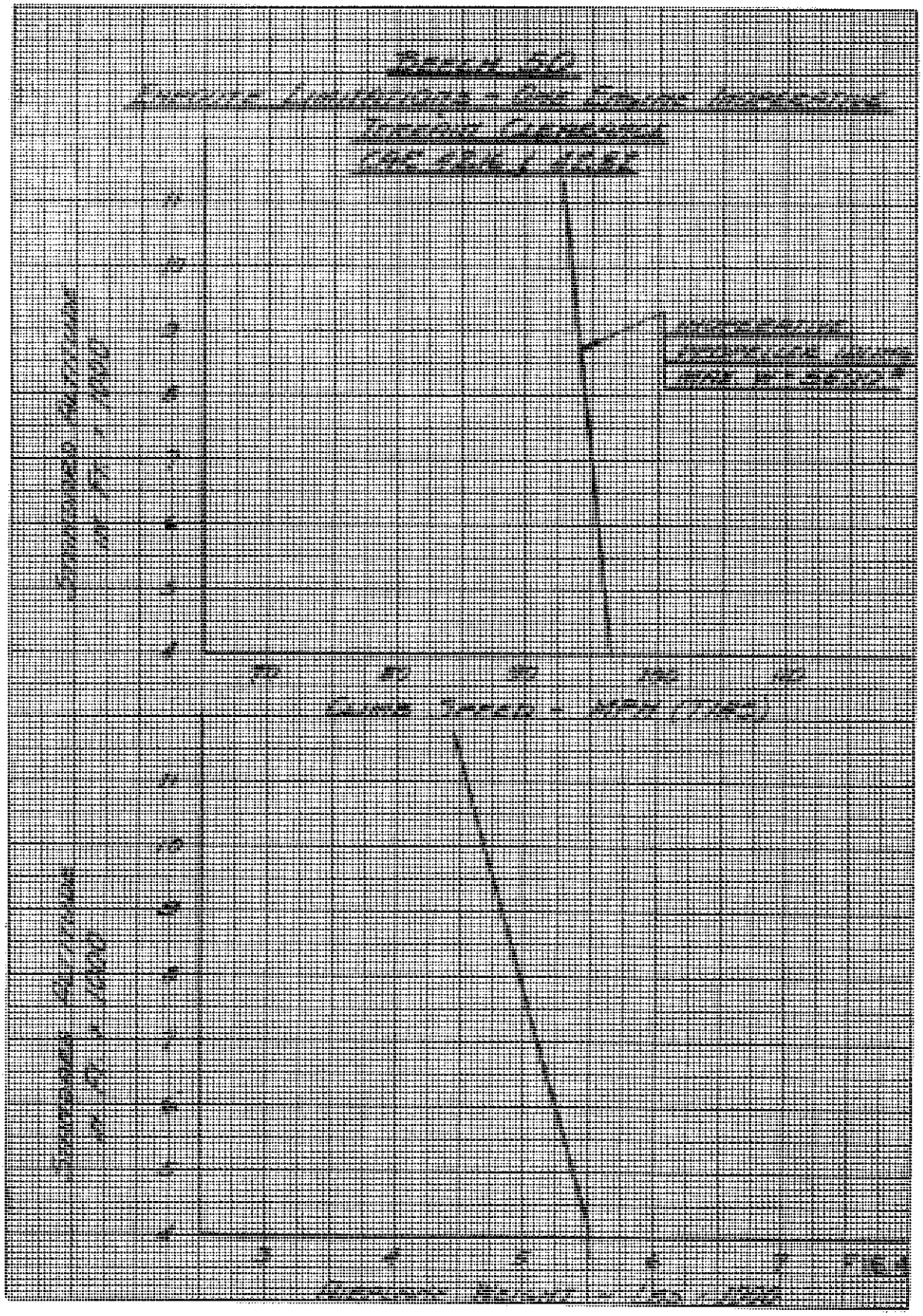
[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

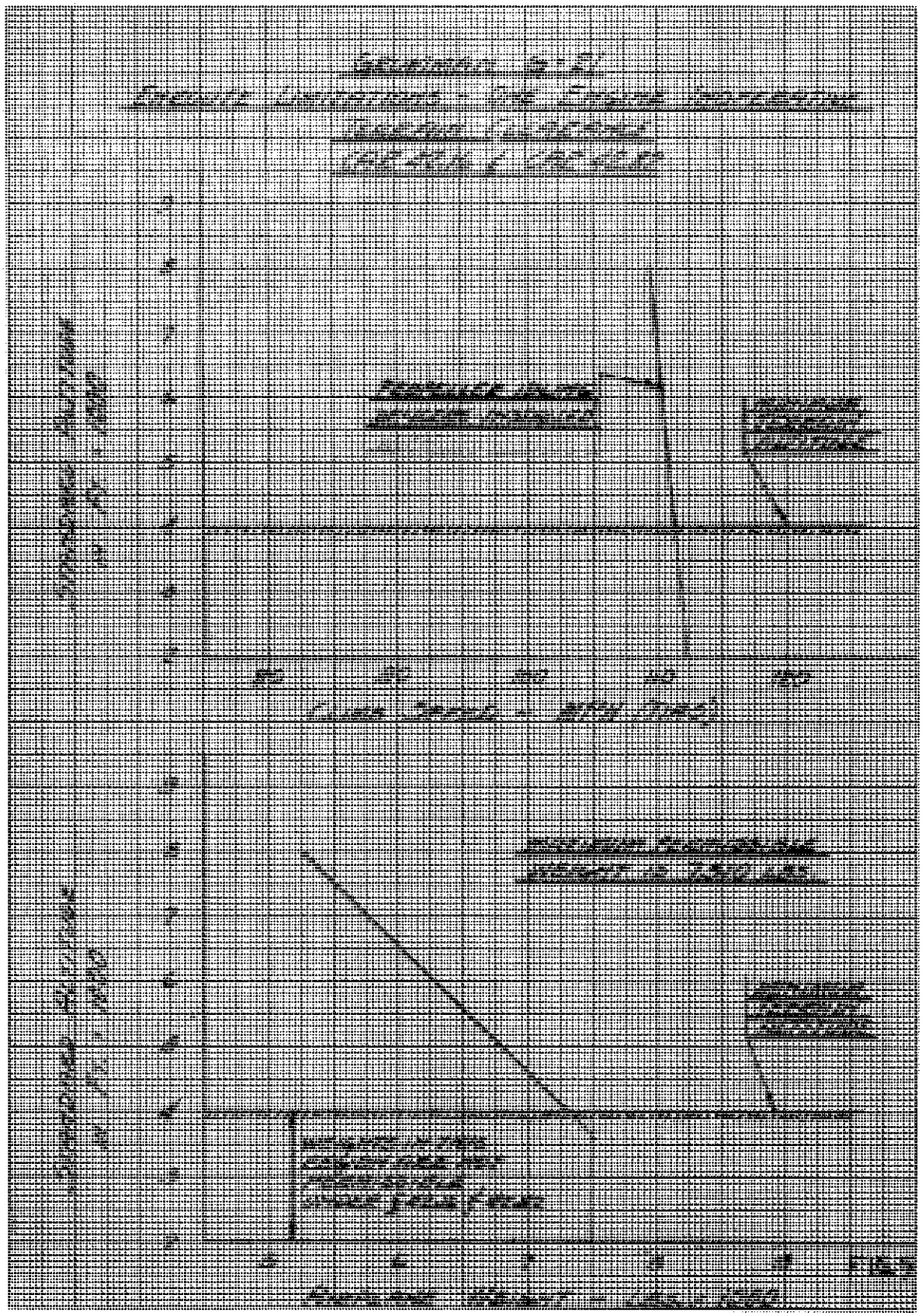
NOTE: Inoperative propeller feathered.


BEECH D18C, D18S; LOCKHEED 10E, & 12A
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
STANDARD ALTITUDE - FT. x 1000
L-10E 10500 LB.
L-12A 8600 LB.
BEECH D18S 8750 LB.
BEECH D18C 9000 LB.
CLIMB SPEED - MPH (TIAS)
PROP FEATHERED
PROP IDLING
BEECH D18C PROP FEATH.
L-12A
8-D18S PROP FEATH.
L-10E
BEECH D18S PROP IDLING
AIRPLANE WEIGHT - LB. x 1000
FIG. E









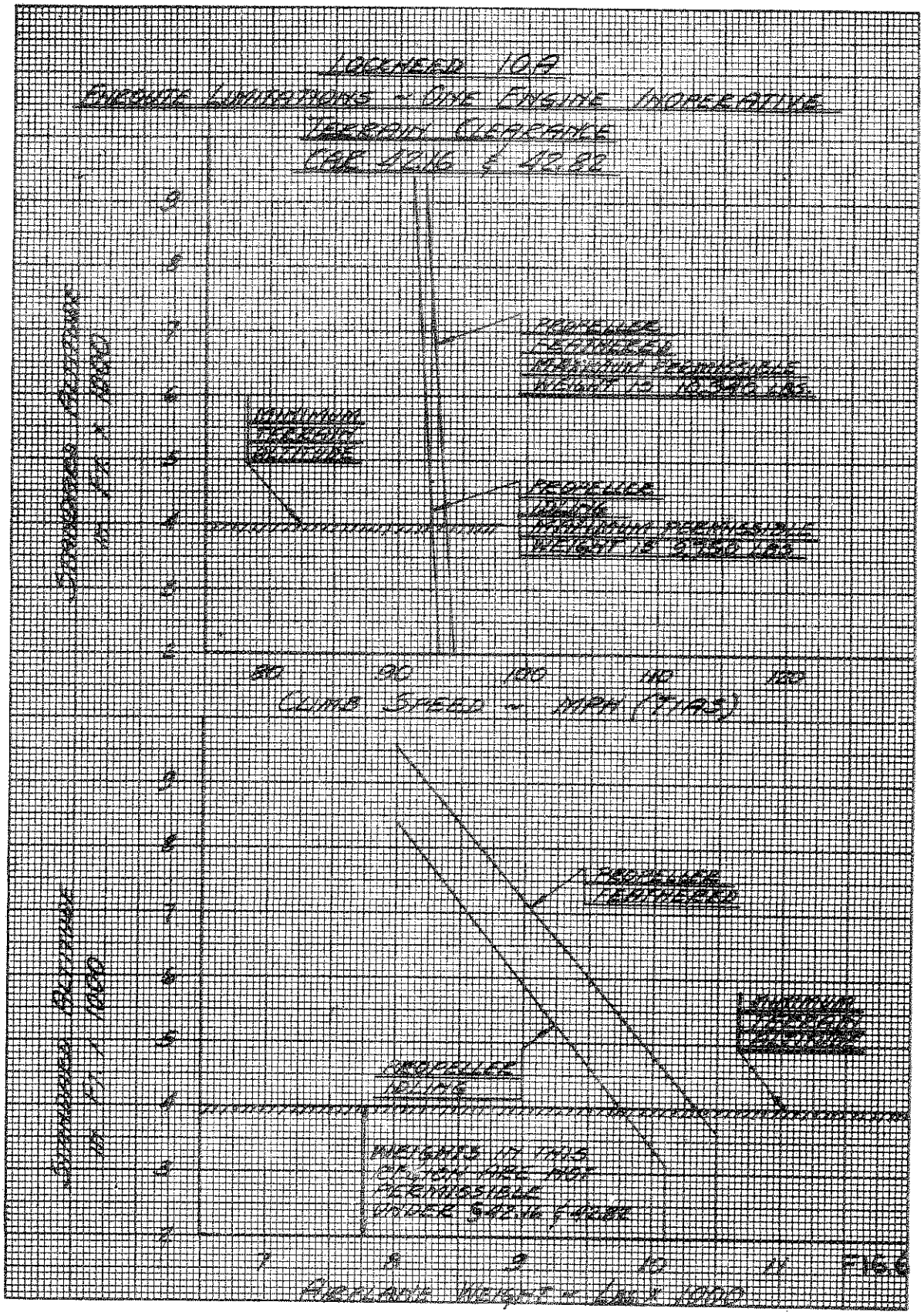

LOCKHEED 10A
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
PROPELLER FEATHERED
MAXIMUM PERMISSIBLE WEIGHT IS 10,340 LBS.
MINIMUM TERRAIN ALTITUDE
PROPELLER IDLING
MAXIMUM PERMISSIBLE WEIGHT IS 9,750 LBS.
STANDARD ALTITUDE IN FT. x 1000
CLIMB SPEED - MPH (TIAS)
PROPELLER FEATHERED
MINIMUM TERRAIN ALTITUDE
PROPELLER IDLING
WEIGHTS IN THIS REGION ARE NOT PERMISSIBLE UNDER §42.16 & 42.82
AIRPLANE WEIGHT - LBS x 1000

FIG. 6

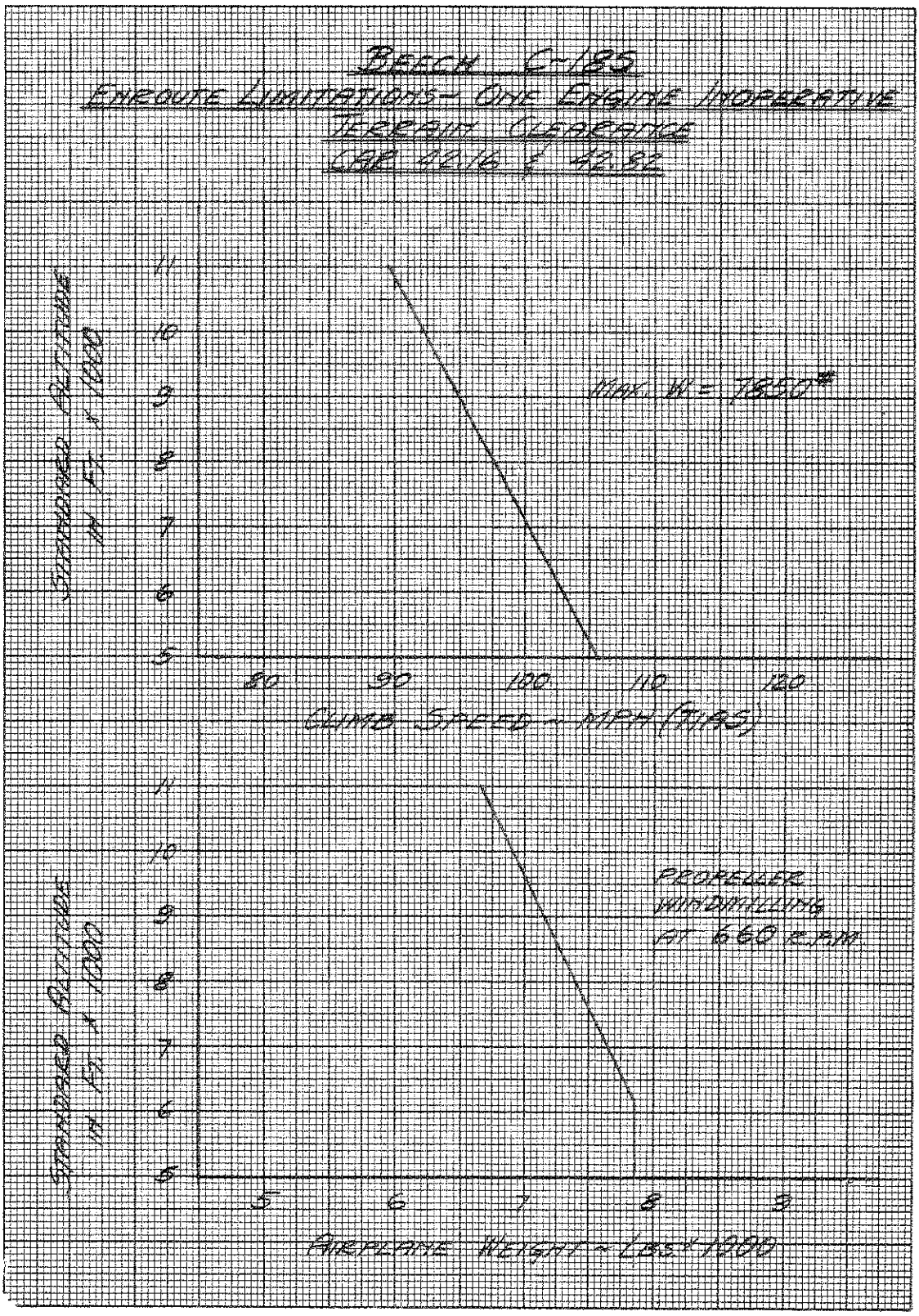

BEECH C-185
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
STANDARD ALTITUDE IN FT. X 1000
MAX. W = 7850#
CLIMB SPEED ~ MPH (TIAS)
PROPELLER WINDMILLING AT 660 R.P.M.
AIRPLANE WEIGHT ~ LBS X 1000

Figure 7.

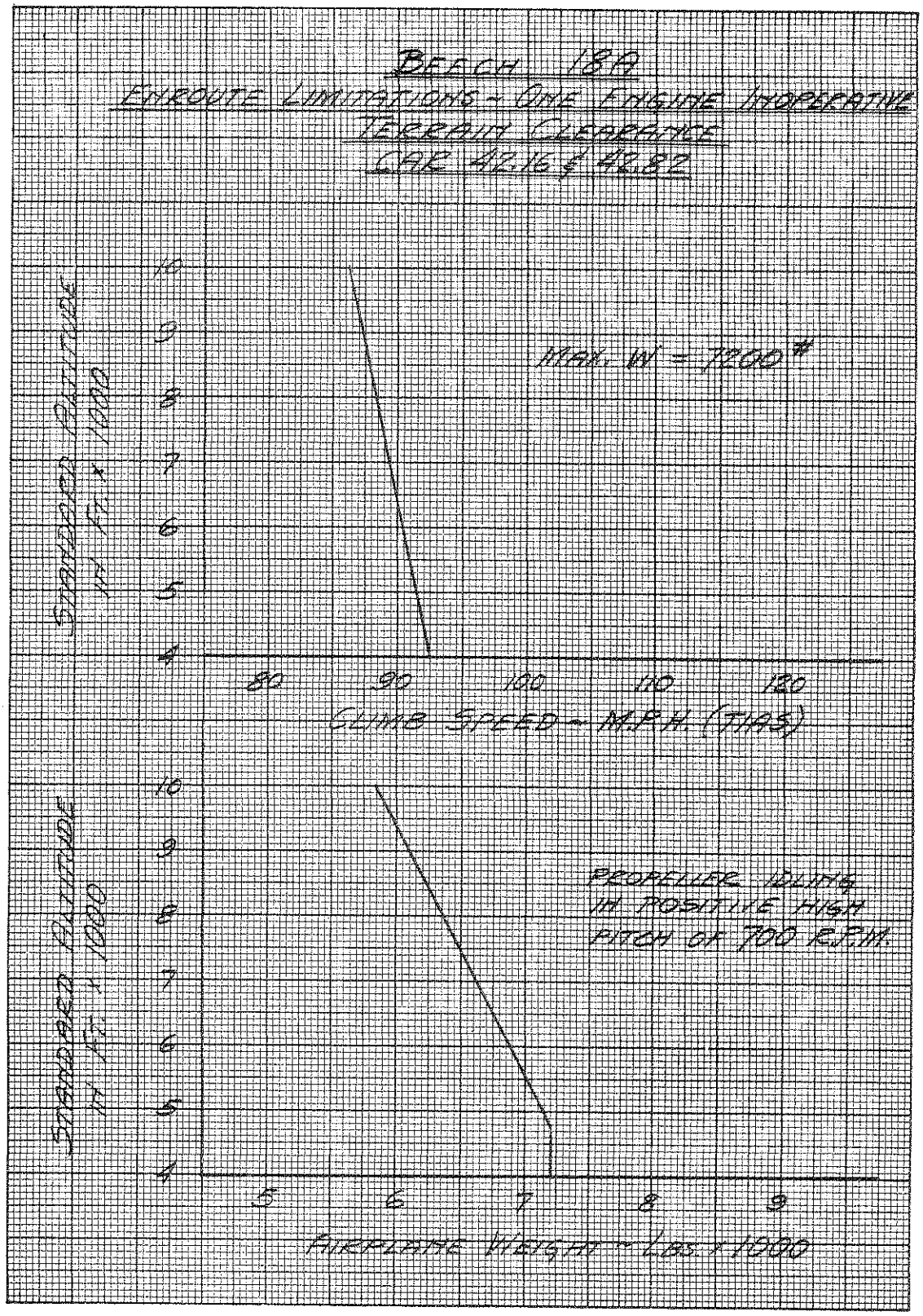

BEECH 18A
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
STANDARD ALTITUDE IN FT. x 1000
MAX. W = 7200#
CLIMB SPEED - M.P.H. (TIAS)
PROPELLER IDLING IN POSITIVE HIGH PITCH OF 700 R.P.M.
AIRPLANE WEIGHT - LBS. x 1000

Figure 8.

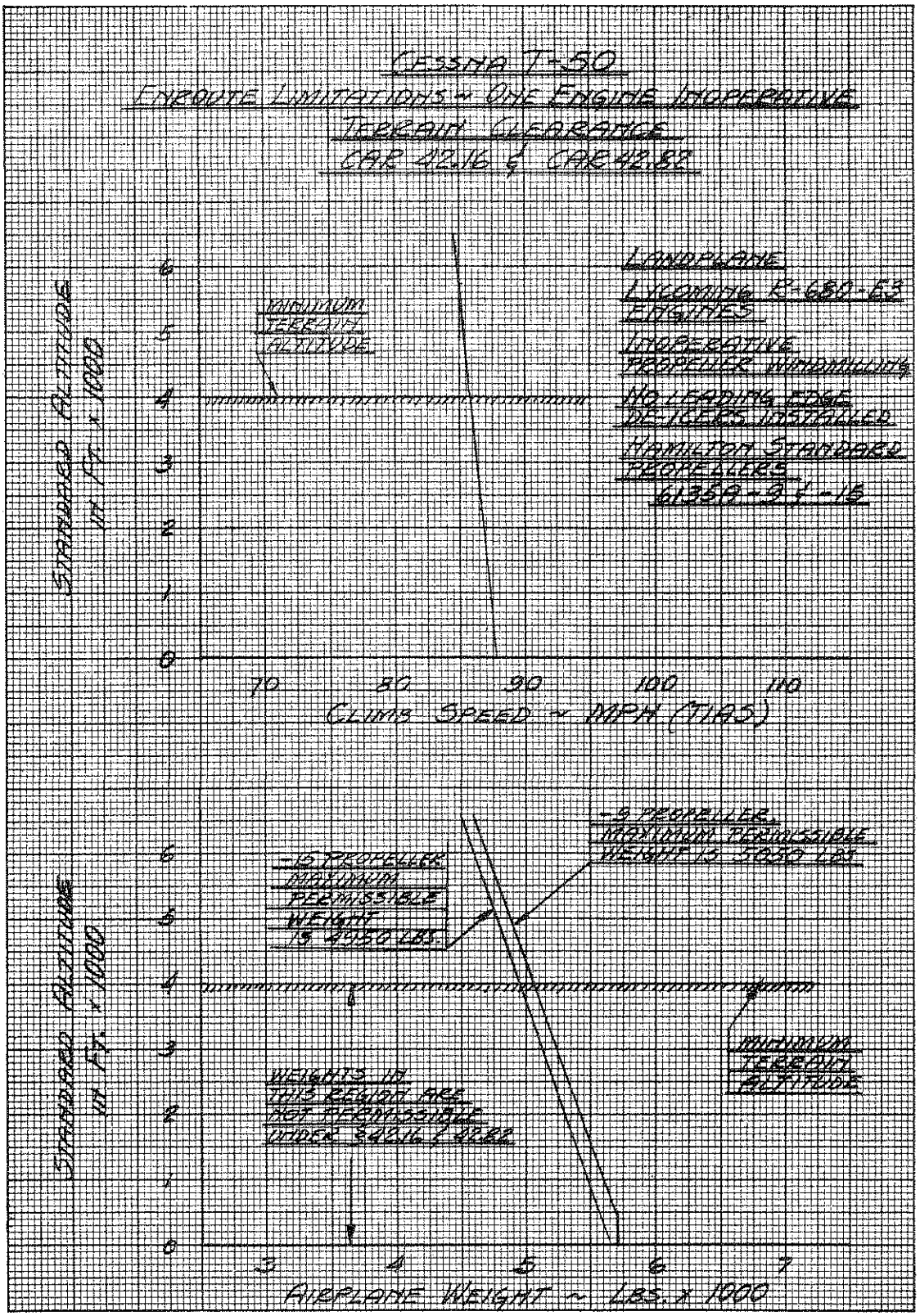


Figure 9.

(42.80–6. Published in 15 F. R. 93, Jan. 10, 1950, effective Jan. 1, 1950; amended in 19 F. R. 2054, Apr. 9, 1954, effective Apr. 24, 1954; amended in 19 F. R. 3564, June 17, 1954, effective July 15, 1954; amended in 19 F. R. 5660, Sept. 8, 1954, effective Oct. 1, 1954.)

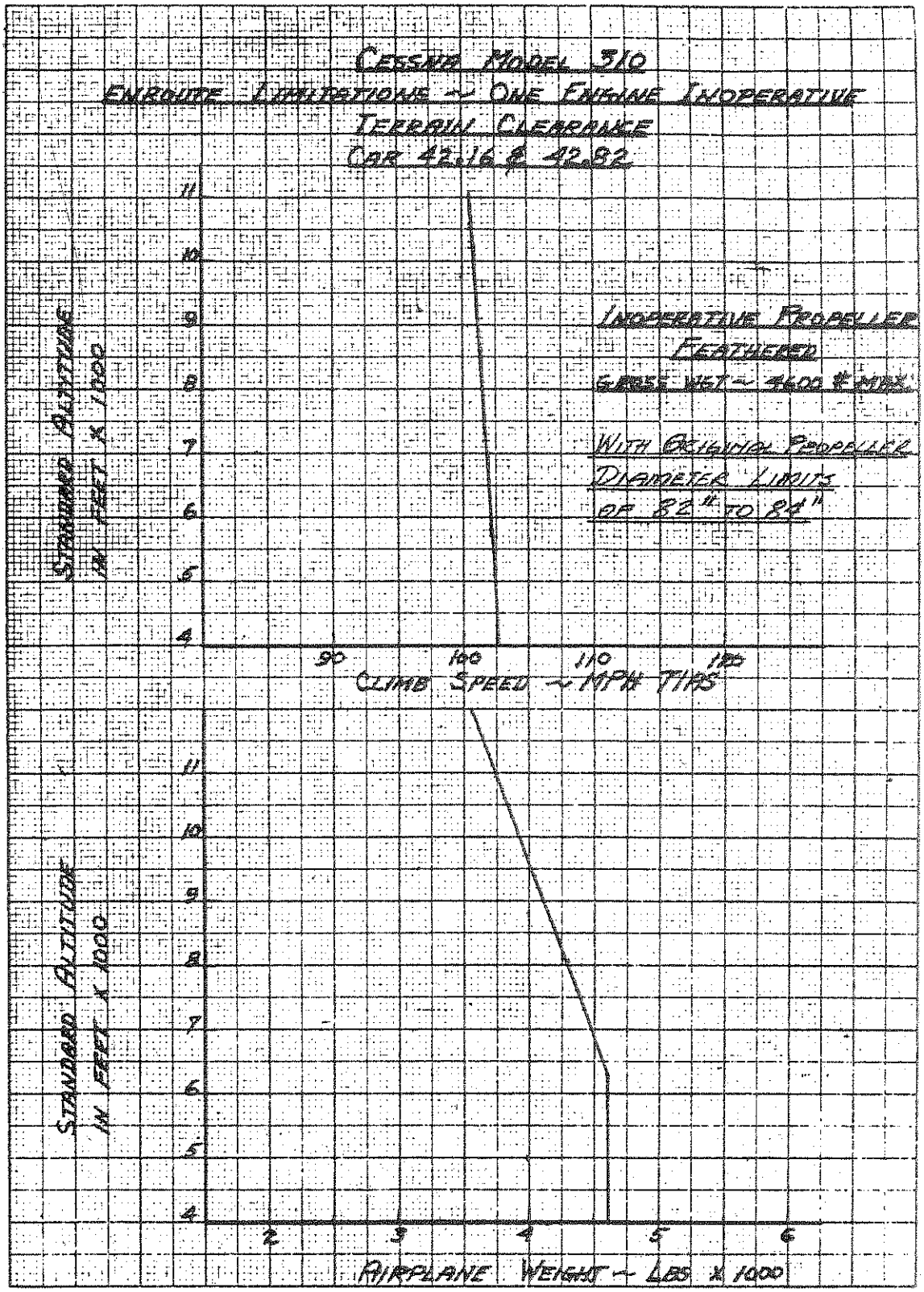


Figure 10.

(Published in 21 F. R. 8420, Nov. 3, 1956, effective Dec. 1, 1956.)

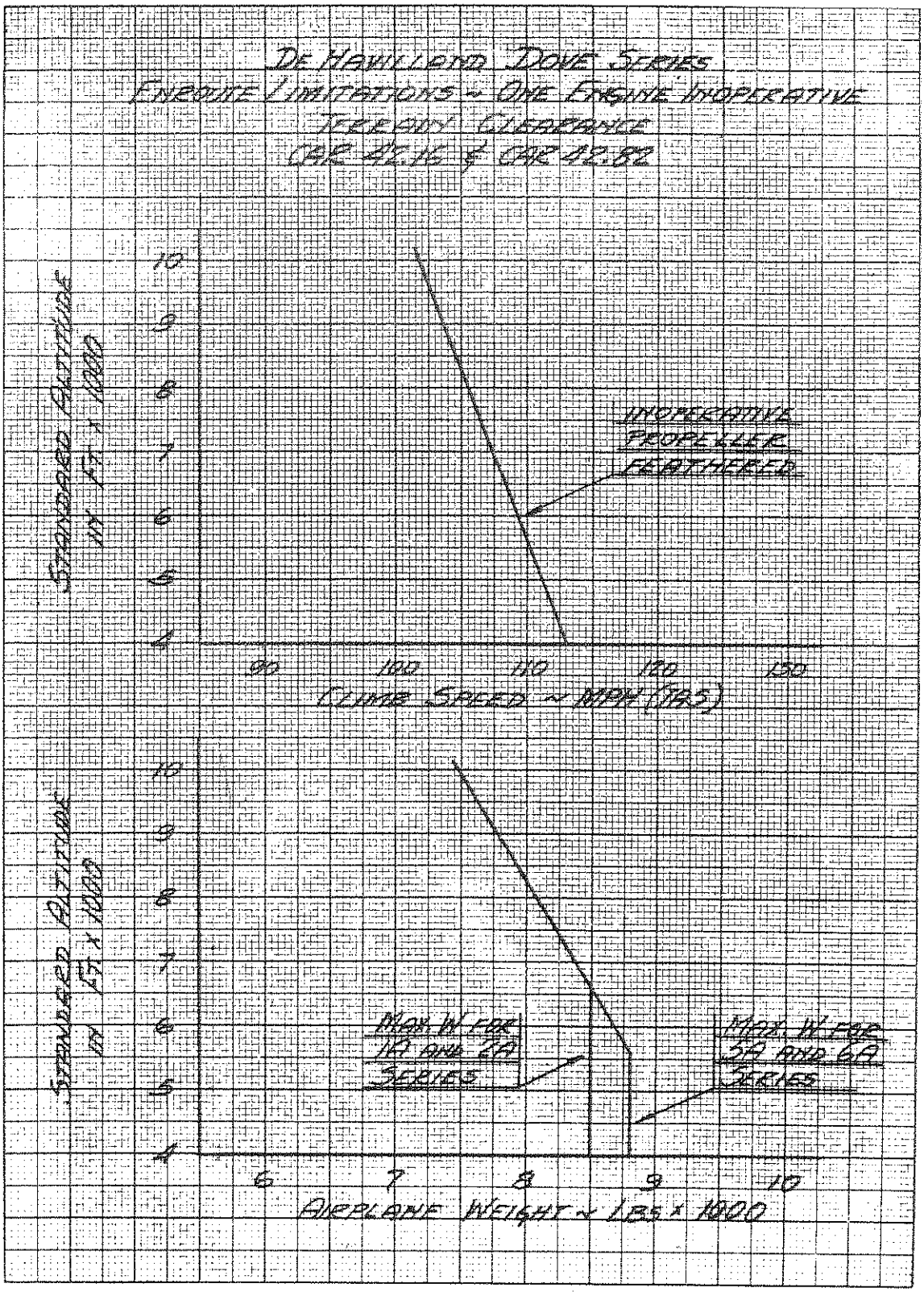


Figure 11.

(Published in 21 F. R. 8421, Nov. 3, 1956, effective Dec. 1, 1956.)

42.80–7 *Performance data on Boeing S–307 aircraft (FAA rules which apply to section 42.80).* The following performance limitations data, applicable to Boeing S–307 aircraft, shall be used in determining compliance with section 42.80. These data are presented in the tables and figures of this section.

TABLE 1.—*Takeoff limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 (distance to accelerate to 1.15 V_{s_1}=1.15 (85.4) $\sqrt{\text{Wgt.}/50{,}000}$ knots TIAS and stop, with zero wind and zero gradient).

Standard altitude in feet	Airplane weight in pounds and critical engine failure speeds in knots TIAS		
	46,000 V_1=94.0	48,000 V_1=96.5	50,000 V_1=98.0
	Distance in feet		
S. L.	3,730	4,010	4,260
1,000	3,900	4,190	4,460
2,000	4,120	4,430	4,720
3,000	4,350	4,680	4,990
4,000	4,600	4,950	5,280
5,000	4,860	5,250	5,600
6,000	5,140	5,550	5,940
7,000	5,460	5,910	6,320
8,000	5,820	6,330	6,770

(b) Actual length of runway required when "effective length," considering obstacles, is not determined (distance to accelerate to 1.15 (85.4) $\sqrt{\text{Wgt.}/50{,}000}$ knots TIAS, and stop, divided by the factor 0.85).

Standard altitude in feet	Airplane weight in pounds and critical engine failure speed (V_1) in knots TIAS		
	46,000 V_1=94.0	48,000 V_1=96.5	50,000 V_1=98.0
	Distance in feet		
S. L.	4,390	4,720	5,010
1,000	4,590	4,930	5,245
2,000	4,845	5,210	5,555
3,000	5,120	5,505	5,870
4,000	5,410	5,825	6,210
5,000	5,720	6,175	6,590
6,000	6,045	6,530	6,990
7,000	6,425	6,955	7,435
8,000	6,845	7,445	7,965

TABLE 2.—*En route limitations*

Weight in pounds	Terrain clearance [1] in feet and climb speed in knots TIAS		Weight in pounds	Terrain clearance [1] in feet and climb speed in knots TIAS	
	Feet	knots		Feet	knots
40,000	17,000	89.5	46,000	13,750	99.0
41,000	16,400	91.0	47,000	13,200	100.5
42,000	15,900	93.0	48,000	12,700	101.5
43,000	15,350	94.0	49,000	12,150	103.0
44,000	14,800	96.0	50,000	11,650	104.0
45,000	14,300	97.5			

[1] Highest altitude of terrain over which airplane may be operated in compliance with sec. 42.82.

TABLE 3.—*Landing limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots TIAS					
	35,000	V_{50}	40,000	V_{50}	45,000	V_{50}
	Distance in feet					
S. L.	3,065	81.0	3,445	86.5	3,815	91.0
1,000	3,145	81.0	3,540	86.5	3,915	91.0
2,000	3,225	81.0	3,630	86.5	4,015	91.0
3,000	3,310	81.0	3,725	86.5	4,120	91.0
4,000	3,390	81.0	3,820	86.5	4,225	91.0
5,000	3,480	81.0	3,925	86.5	4,340	91.0
6,000	3,575	81.0	4,035	86.5	4,460	91.0
7,000	3,670	81.0	4,140	86.5	4,580	91.0
8,000	3,770	81.0	4,260	86.5	4,715	91.0

[1] Steady approach speed through 50-foot height knots TIAS denoted by symbol V_{50}.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots TIAS					
	35,000	V_{50}	40,000	V_{50}	45,000	V_{50}
	Distance in feet					
S. L.	3,890	81.0	4,375	86.5	4,845	91.0
1,000	3,995	81.0	4,495	86.5	4,970	91.0
2,000	4,095	81.0	4,610	86.5	5,100	91.0
3,000	4,205	81.0	4,730	86.5	5,230	91.0
4,000	4,305	81.0	4,850	86.5	5,365	91.0
5,000	4,420	81.0	4,985	86.5	5,510	91.0
6,000	4,540	81.0	5,125	86.5	5,665	91.0
7,000	4,660	81.0	5,260	86.5	5,815	91.0
8,000	4,790	81.0	5,410	86.5	5,990	91.0

[1] Steady approach speed through 50-foot height knots TIAS denoted by symbol V_{50}.

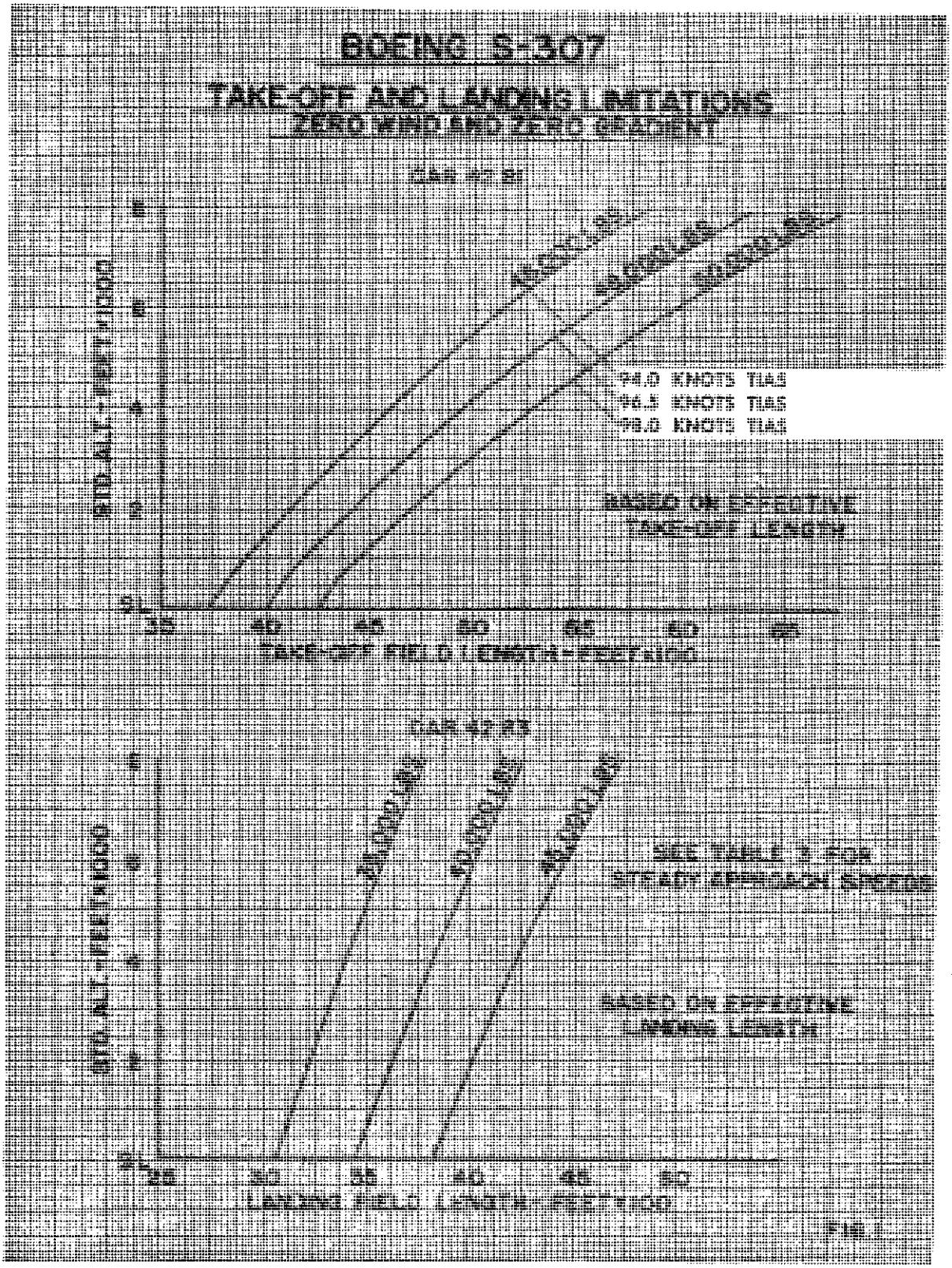
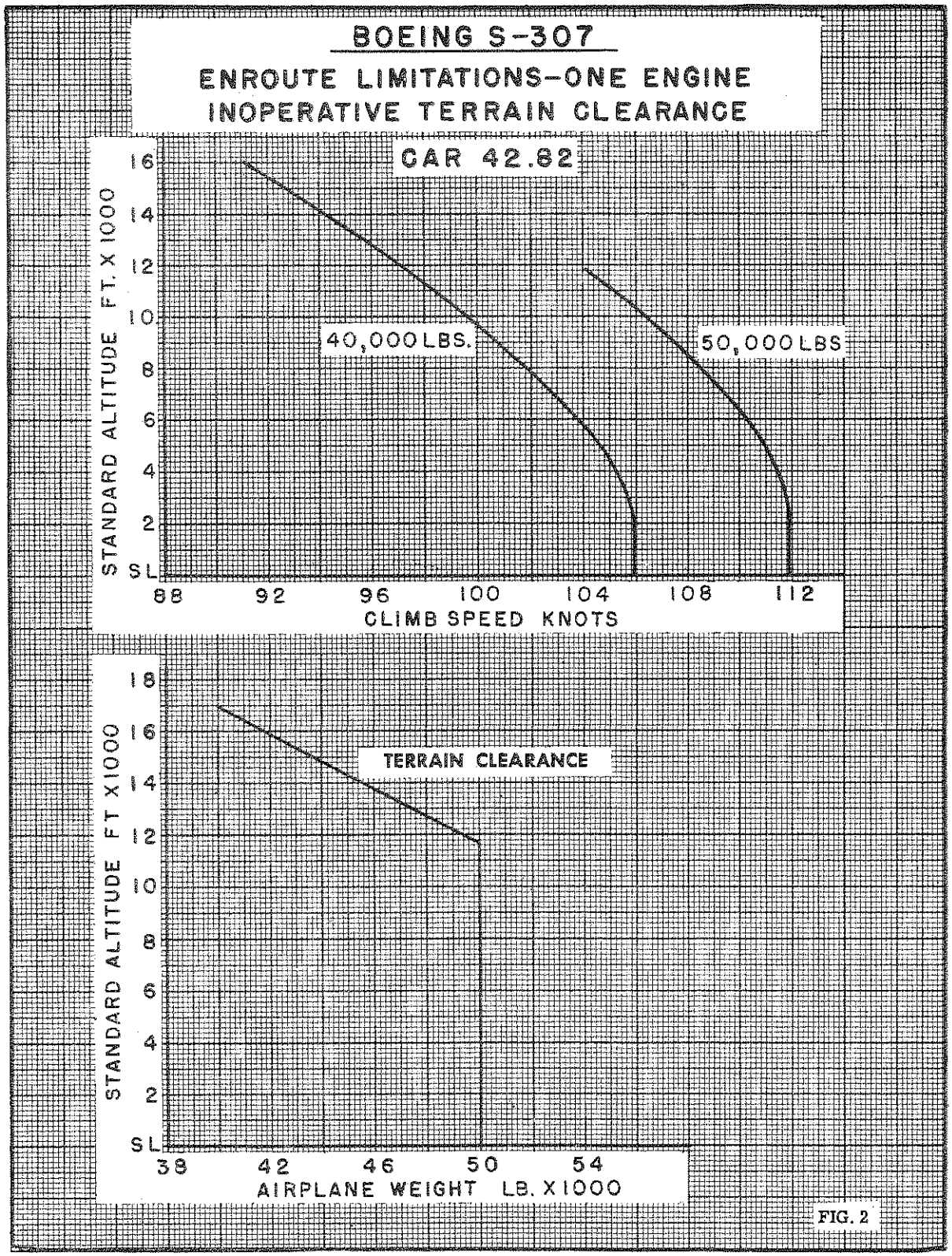

BOEING S-307
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
94.0 KNOTS TIAS
96.5 KNOTS TIAS
98.0 KNOTS TIAS
BASED ON EFFECTIVE TAKE-OFF LENGTH
TAKE-OFF FIELD LENGTH - FEET x 100
SEE TABLE 3 FOR STEADY APPROACH SPEEDS
BASED ON EFFECTIVE LANDING LENGTH
LANDING FIELD LENGTH - FEET x 100

FIG. 1



(42.80–7. Published in 16 F. R. 4486, May 15, 1951, effective May 15, 1951; amended in 21 F. R. 2232, Apr. 6, 1956, effective Apr. 1, 1956.)

42.80–8 *Performance data—operations from sod runway surfaces (FAA rules which apply to section 42.80.)*

(a) *General.* The performance limitation data and information contained herein, are adopted to provide a comparable level of safety between operations utilizing sod surfaced runways and those utilizing paved surfaced runways. There are, of course, numerous types of runway surfaces which are neither paved nor sod. Obviously, it is not feasible at this time to categorize all of the runway surfaces and to establish specific correction factors for operations from them. Therefore, all runways which are not paved shall be regarded as sod runways, and the limitations data herein shall be applied to such runways, except in those individual cases where the Administrator finds that a particular runway surface is such as to justify the use of a specific correction factor.

(b) *Takeoff limitation data.* In computing the maximum allowable takeoff weights for operations from sod runways, the takeoff weight tables contained in sections 42.80–1, 42.80–2, 42.80–3, 42.80–4, 42.80–5 or 42.80–7 shall be used in the following manner:

(1) Where the effective length of a sod runway has been established, the maximum allowable takeoff weight shall be the *lesser* gross weight as determined by application of the effective length to the appropriate takeoff table (a) and by application of the actual runway length to the corresponding takeoff table (b). Takeoff table (a) is used to determine the maximum allowable gross weight which will permit the aircraft to take off within the effective runway length, while table (b) is 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.

(2) Where the effective length of a sod runway has not been established, the maximum allowable takeoff weight shall be determined by application of the actual runway length to the appropriate takeoff table (b). Tables (b) incorporate a correction factor (approximately 17.6 percent for an assumed obstruction height and/or a reduced coefficient of friction).

(c) *Landing limitations data.* In computing the maximum allowable landing weights for operations from sod runways, the landing weight tables contained in this section shall be used in the following manner:

(1) Where the effective length of a sod runway has been established, the maximum allowable landing weight shall be determined by application of the effective length to the appropriate landing weight table (a).

(2) Where the effective length of a sod runway has not been established, the maximum allowable landing weight shall be determined by application of the actual runway length to the appropriate landing weight table (b).

DOUGLAS DC–3 G102, C202A, S1C3G, AND C47's, R4D's WITH COMPARABLE HORSEPOWER ENGINES

TABLE 4.—*Landing limitations (sod runway surfaces)*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	22,000	V_{50}	23,000	V_{50}	24,000	V_{50}	25,200	V_{50}
	Distance in feet							
S. L.	2, 830	74. 5	3, 015	76. 5	3, 210	78. 0	3, 390	80. 0
1,000	2, 900	74. 5	3, 080	76. 5	3, 275	78. 0	3, 465	80. 0
2,000	2, 965	74. 5	3, 155	76. 5	3, 350	78. 0	3, 540	80. 0
3,000	3, 040	74. 5	3, 235	76. 5	3, 425	78. 0	3, 630	80. 0
4,000	3, 115	74. 5	3, 320	76. 5	3, 520	78. 0	3, 715	80. 0
5,000	3, 210	74. 5	3, 410	76. 5	3, 605	78. 0	3, 805	80. 0
6,000	3, 300	74. 5	3, 505	76. 5	3, 705	78. 0	3, 910	80. 0
7,000	3, 410	74. 5	3, 610	76. 5	3, 810	78. 0	4, 015	80. 0
8,000	3, 500	74. 5	3, 725	76. 5	3, 935	78. 0	4, 135	80. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

(Continued on page 105)

TABLE 4.—*Landing limitations (sod runway surfaces)*—Continued

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	22,000	V_{50}	23,000	V_{50}	24,000	V_{50}	25,200	V_{50}
	Distance in feet							
S. L.	3, 595	74. 5	3, 825	76. 5	4, 075	78. 0	4, 305	80. 0
1,000	3, 680	74. 5	3, 900	76. 5	4, 165	78. 0	4, 405	80. 0
2,000	3, 765	74. 5	4, 010	76. 5	4, 255	78. 0	4, 495	80. 0
3,000	3, 865	74. 5	4, 110	76. 5	4, 355	78. 0	4, 605	80. 0
4,000	3, 955	74. 5	4, 215	76. 5	4, 470	78. 0	4, 715	80. 0
5,000	4, 075	74. 5	4, 330	76. 5	4, 575	78. 0	4, 835	80. 0
6,000	4, 190	74. 5	4, 455	76. 5	4, 705	78. 0	4, 970	80. 0
7,000	4, 330	74. 5	4, 590	76. 5	4, 840	78. 0	5, 095	80. 0
8,000	4, 445	74. 5	4, 730	76. 5	4, 995	78. 0	5, 250	80. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

LOCKHEED 18 G202A AIRCRAFT

TABLE 3.—*Landing limitations (sod runway surfaces)*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	17, 500	V_{50}	18, 000	V_{50}	18, 500	V_{50}
	Distance in feet					
S. L.	4, 270	83. 5	4, 380	84. 0	4, 470	86. 0
1,000	4, 400	83. 5	4, 495	84. 0	4, 595	86. 0
2,000	4, 520	83. 5	4, 625	84. 0	4, 720	86. 0
3,000	4, 645	83. 5	4, 750	84. 0	4, 855	86. 0
4,000	4, 770	83. 5	4, 875	84. 0	4, 985	86. 0
5,000	4, 875	83. 5	5, 000	84. 0	5, 115	86. 0
6,000	5, 025	83. 5	5, 130	84. 0	5, 255	86. 0
7,000	5, 150	83. 5	5, 260	84. 0	5, 395	86. 0
8,000	5, 285	83. 5	5, 395	84. 0	5, 530	86. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	17, 500	V_{50}	18, 000	V_{50}	18, 500	V_{50}
	Distance in feet					
S. L.	5, 430	83. 5	5, 565	84. 0	5, 675	86. 0
1,000	5, 590	83. 5	5, 710	84. 0	5, 835	86. 0
2,000	5, 740	83. 5	5, 870	84. 0	5, 995	86. 0
3,000	5, 900	83. 5	6, 030	84. 0	6, 165	86. 0
4,000	6, 060	83. 5	6, 195	84. 0	6, 330	86. 0
5,000	6, 195	83. 5	6, 355	84. 0	6, 495	86. 0
6,000	6, 380	83. 5	6, 515	84. 0	6, 675	86. 0
7,000	6, 545	83. 5	6, 680	84. 0	6, 850	86. 0
8,000	6, 710	83. 5	6, 850	84. 0	7, 025	86. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

CURTIS MODEL C–46 AIRCRAFT

TABLE 3.—*Landing limitations (sod runway surfaces)*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

(1) Curtiss model C–46 certificated for maximum weight of 45,000 pounds.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	40,000	V_{50}	42,000	V_{50}	44,000	V_{50}	45,000	V_{50}
	Distance in feet							
S. L.	4, 255	86. 0	4, 435	88. 0	4, 635	90. 5	4, 725	91. 0
1,000	4, 370	86. 0	4, 555	88. 0	4, 760	90. 5	4, 855	91. 0
2,000	4, 485	86. 0	4, 680	88. 0	4, 890	90. 5	4, 985	91. 0
3,000	4, 660	86. 0	4, 805	88. 0	5, 015	90. 5	5, 120	91. 0
4,000	4, 730	86. 0	4, 935	88. 0	5, 145	90. 5	5, 250	91. 0
5,000	4, 845	86. 0	5, 060	88. 0	5, 285	90. 5	5, 380	91. 0
6,000	4, 980	86. 0	5, 190	88. 0	5, 415	90. 5	5, 520	91. 0
7,000	5, 095	86. 0	5, 330	88. 0	5, 570	90. 5	5, 670	91. 0
8,000	5, 235	86. 0	5, 470	88. 0	5, 715	90. 5	5, 820	91. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

(2) Curtiss model C–46 certificated for maximum weight of 48,000 pounds.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	42,000	V_{50}	44,000	V_{50}	46,000	V_{50}	48,000	V_{50}
	Distance in feet							
S. L.	3, 325	80. 5	3, 450	82. 0	3, 575	84. 5	3, 695	86. 0
1,000	3, 405	80. 5	3, 530	82. 0	3, 655	84. 5	3, 780	86. 0
2,000	3, 490	80. 5	3, 615	82. 0	3, 740	84. 5	3, 865	86. 0
3,000	3, 575	80. 5	3, 695	82. 0	3, 830	84. 5	3, 945	86. 0
4,000	3, 675	80. 5	3, 795	82. 0	3, 920	84. 5	4, 050	86. 0
5,000	3, 750	80. 5	3, 875	82. 0	4, 020	84. 5	4, 155	86. 0
6,000	3, 830	80. 5	3, 980	82. 0	4, 115	84. 5	4, 255	86. 0
7,000	3, 925	80. 5	4, 075	82. 0	4, 220	84. 5	4, 370	86. 0
8,000	4, 025	80. 5	4, 180	82. 0	4, 330	84. 5	4, 485	86. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 41.1.

(1) Curtiss model C–46 certificated for maximum weight of 45,000 pounds.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	40,000	V_{50}	42,000	V_{50}	44,000	V_{50}	45,000	V_{50}
	Distance in feet							
S. L.	5, 415	86. 0	5, 645	88. 0	5, 900	90. 5	6, 015	91. 0
1,000	5, 560	86. 0	5, 795	88. 0	6, 060	90. 5	6, 175	91. 0
2,000	5, 710	86. 0	5, 955	88. 0	6, 220	90. 5	6, 350	91. 0
3,000	5, 930	86. 0	6, 120	88. 0	6, 385	90. 5	6, 515	91. 0
4,000	6, 015	86. 0	6, 280	88. 0	6, 550	90. 5	6, 680	91. 0
5,000	6, 170	86. 0	6, 440	88. 0	6, 730	90. 5	6, 850	91. 0
6,000	6, 335	86. 0	6, 605	88. 0	6, 895	90. 5	7, 025	91. 0
7,000	6, 485	86. 0	6, 785	88. 0	7, 090	90. 5	7, 215	91. 0
8,000	6, 650	86. 0	6, 960	88. 0	7, 275	90. 5	7, 405	91. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

(Continued on page 107)

TABLE 3.—*Landing limitations (sod runway surfaces)*—Continued

(2) Curtiss C–46 certificated maximum weight of 48,000 pounds.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	42,000	V_{50}	44,000	V_{50}	46,000	V_{50}	48,000	V_{50}
	Distance in feet							
S. L.	4, 230	80. 5	4, 395	82. 0	4, 555	84. 5	4, 705	86. 0
1,000	4, 330	80. 5	4, 490	82. 0	4, 650	84. 5	4, 805	86. 0
2,000	4, 440	80. 5	4, 600	82. 0	4, 755	84. 5	4, 915	86. 0
3,000	4, 555	80. 5	4, 705	82. 0	4, 875	84. 5	5, 020	86. 0
4,000	4, 665	80. 5	4, 830	82. 0	4, 990	84. 5	5, 150	86. 0
5,000	4, 775	80. 5	4, 935	82. 0	5, 120	84. 5	5, 290	86. 0
6,000	4, 875	80. 5	5, 065	82. 0	5, 240	84. 5	5, 415	86. 0
7,000	4, 995	80. 5	5, 185	82. 0	5, 370	84. 5	5, 560	86. 0
8,000	5, 125	80. 5	5, 320	82. 0	5, 510	84. 5	5, 710	86. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

CONVAIR MODEL 28–5ACF AND PBY–5A

TABLE 3.—*Landing limitations (sod runway surfaces)*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	23,000	V_{50}	24,000	V_{50}	25,000	V_{50}
	Distance in feet					
S. L.	3, 935	74. 5	4, 105	76. 5	4, 245	78. 0
1,000	4, 040	74. 5	4, 215	76. 5	4, 370	78. 0
2,000	4, 145	74. 5	4, 330	76. 5	4, 485	78. 0
3,000	4, 255	74. 5	4, 370	76. 5	4, 610	78. 0
4,000	4, 360	74. 5	4, 585	76. 5	4, 725	78. 0
5,000	4, 470	74. 5	4, 665	76. 5	4, 845	78. 0
6,000	4, 570	74. 5	4, 775	76. 5	4, 970	78. 0
7,000	4, 680	74. 5	4, 880	76. 5	5, 090	78. 0
8,000	4, 785	74. 5	4, 990	76. 5	5, 205	78. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	23,000	V_{50}	24,000	V_{50}	25,000	V_{50}
	Distance in feet					
S. L.	5, 005	74. 5	5, 225	76. 5	5, 400	78. 0
1,000	5, 145	74. 5	5, 365	76. 5	5, 560	78. 0
2,000	5, 275	74. 5	5, 510	76. 5	5, 710	78. 0
3,000	5, 415	74. 5	5, 650	76. 5	5, 870	78. 0
4,000	5, 550	74. 5	5, 790	76. 5	6, 015	78. 0
5,000	5, 685	74. 5	5, 935	76. 5	6, 170	78. 0
6,000	5, 820	74. 5	6, 075	76. 5	6, 325	78. 0
7,000	5, 955	74. 5	6, 215	76. 5	6, 475	78. 0
8,000	6, 090	74. 5	6, 355	76. 5	6, 625	78. 0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

CONVAIR MODEL 28-5ACF AND PBY-5A

TABLE 4.—*Landing limitations*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	26,000	V_{50}	[2] 27,000	V_{50}	[3] 28,000	V_{50}
	Distance in feet					
S. L.	4,405	80.0	4,560	81.0	4,715	82.5
1,000	4,530	80.0	4,690	81.0	4,855	82.5
2,000	4,660	80.0	4,830	81.0	4,995	82.5
3,000	4,785	80.0	4,960	81.0	5,140	82.5
4,000	4,915	80.0	5,095	81.0	5,285	82.5
5,000	5,045	80.0	5,235	81.0	5,430	82.5
6,000	5,170	80.0	5,365	81.0	5,565	82.5
7,000	5,300	80.0	5,505	81.0	5,715	82.5
8,000	5,430	80.0	5,635	81.0	5,855	82.5

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.
[2] Maximum weight for PBY-5A landplane.
[3] Maximum weight for 28-5ACF.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	26,000	V_{50}	[2] 27,000	V_{50}	[3] 28,000	V_{50}
	Distance in feet					
S. L.	5,605	80.0	5,805	81.0	6,000	82.5
1,000	5,765	80.0	5,970	81.0	6,175	82.5
2,000	5,925	80.0	6,145	81.0	6,360	82.5
3,000	6,090	80.0	6,315	81.0	6,540	82.5
4,000	6,255	80.0	6,485	81.0	6,725	82.5
5,000	6,420	80.0	6,660	81.0	6,910	82.5
6,000	6,580	80.0	6,830	81.0	7,085	82.5
7,000	6,745	80.0	7,005	81.0	7,275	82.5
8,000	6,910	80.0	7,170	81.0	7,450	82.5

[1] Steady approach speed through 50 feet height— knots TIAS denoted by symbol V_{50}.
[2] Maximum weight for PBY-5A landplane.
[3] Maximum weight for 28-5ACF

DOUGLAS, RB-18A AIRCRAFT

TABLE 3.—*Landing limitations (sod runway surfaces)*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	19,000	V_{50}	20,000	V_{50}	21,000	V_{50}	21,300	V_{50}
	Distance in feet							
S. L.	3,280	74.5	3,575	77.0	3,875	78.5	3,960	79.0
1,000	3,370	74.5	3,680	77.0	3,990	78.5	4,075	79.0
2,000	3,460	74.5	3,785	77.0	4,100	78.5	4,185	79.0
3,000	3,550	74.5	3,885	77.0	4,210	78.5	4,300	79.0
4,000	3,640	74.5	3,990	77.0	4,320	78.5	4,410	79.0
5,000	3,730	74.5	4,095	77.0	4,430	78.5	4,525	79.0
6,000	3,825	74.5	4,200	77.0				
7,000	3,915	74.5	4,295	77.0	(2)	(2)	(2)	(2)
8,000	4,010	74.5	4,400	77.0				

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.
[2] Limited by CAR 42.82.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	19,000	V_{50}	20,000	V_{50}	21,000	V_{50}	21,300	V_{50}
	Distance in feet							
S. L.	4,175	74.5	4,555	77.0	4,935	78.5	5,050	79.0
1,000	4,290	74.5	4,680	77.0	5,070	78.5	5,185	79.0
2,000	4,410	74.5	4,820	77.0	5,220	78.5	5,325	79.0
3,000	4,515	74.5	4,945	77.0	5,355	78.5	5,475	79.0
4,000	4,630	74.5	5,075	77.0	5,490	78.5	5,610	79.0
5,000	4,750	74.5	5,215	77.0	5,635	78.5	5,755	79.0
6,000	4,865	74.5	5,340	77.0				
7,000	4,990	74.5	5,465	77.0	[2]	[2]	[2]	[2]
8,000	5,105	74.5	5,590	77.0				

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.
[2] Limited by CAR 42.82.

BOEING MODEL S–307 AIRCRAFT

TABLE 3.—*Landing limitations (sod runway surfaces)*

(a) "Effective length" of runway required when effective length is determined in accordance with section 42.1 with zero wind and zero gradient.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	35,000	V_{50}	40,000	V_{50}	45,000	V_{50}
	Distance in feet					
S. L.	3,525	81.0	3,960	86.5	4,385	91.0
1,000	3,615	81.0	4,070	86.5	4,500	91.0
2,000	3,710	81.0	4,175	86.5	4,615	91.0
3,000	3,805	81.0	4,285	86.5	4,740	91.0
4,000	3,900	81.0	4,395	86.5	4,860	91.0
5,000	4,000	81.0	4,515	86.5	4,990	91.0
6,000	4,110	81.0	4,640	86.5	5,130	91.0
7,000	4,220	81.0	4,760	86.5	5,265	91.0
8,000	4,335	81.0	4,900	86.5	5,420	91.0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

(b) Actual length of runway required when effective length, considering obstacles, is not determined in accordance with section 42.1.

Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots					
	35,000	V_{50}	40,000	V_{50}	45,000	V_{50}
	Distance in feet					
S. L.	4,475	81.0	5,040	86.5	5,570	91.0
1,000	4,595	81.0	5,170	86.5	5,715	91.0
2,000	4,710	81.0	5,300	86.5	5,865	91.0
3,000	4,835	81.0	5,440	86.5	6,015	91.0
4,000	4,950	81.0	5,580	86.5	6,170	91.0
5,000	5,085	81.0	5,735	86.5	6,335	91.0
6,000	5,220	81.0	5,895	86.5	6,515	91.0
7,000	5,360	81.0	6,050	86.5	6,685	91.0
8,000	5,510	81.0	6,220	86.5	6,890	91.0

[1] Steady approach speed through 50 feet height—knots TIAS denoted by symbol V_{50}.

(42.80–8. Published in 18 F. R. 173, Jan. 9, 1953, effective Jan. 31, 1953; amended in 21 F. R. 2232, Apr. 6, 1956, effective Apr. 1, 1956.)

42.81 *Takeoff limitations.* No takeoff shall be made except under conditions which will permit the airplane to be brought to a safe stop within the effective length of the runway from any point on takeoff up to the time of attaining, with all engines operating at normal takeoff power, 105 percent of the minimum control speed or 115 percent of the power-off stall speed in the takeoff configuration, whichever is greater, as shown by the accelerate-stop distance data.

(a) In applying this requirement, takeoff data shall be based upon still-air conditions, and no correction shall be made for any uphill gradient of 1 percent or less when such percentage is measured as the difference between elevation at the end points of the runway divided by the total length. For all uphill gradients greater than 1 percent, the effective takeoff length of the runway shall be reduced 20 percent for each 1 percent grade.

42.82 *En route limitations; one engine inoperative.* No airplane shall be taken off at a weight in excess of that which, with the critical engine inoperative, would permit a rate of climb of at least 50 feet per minute at an altitude of at least 1,000 feet above the elevation of the highest ground or obstruction within 10 miles of either side of the intended track or at an altitude of 5,000 feet, whichever is higher. For the purpose of this section it shall be assumed that the weight of the airplane as it proceeds along its intended track is progressively reduced by the anticipated consumption of fuel and oil; that the propeller of the inoperative engine is in the minimum drag position; that the wing flaps and landing gear are in the most favorable positions; and that the remaining engine or engines are operating at the maximum continuous power available. The 10-mile lateral distance specified herein may, for a distance of no more than 20 miles, be reduced to 5 miles, provided that special air navigational facilities provide a reliable and accurate identification of any high ground or obstruction located outside of such 5-mile lateral distance but within the 10-mile distance.

42.83 *Landing distance limitations; airport of destination.* No airplane shall be taken off at a weight in excess of that which, under the conditions stated in paragraphs (a) and (b) of this section, would permit the airplane to be brought to rest at the field of intended destination within 70 percent of the effective length of the runway from a point 50 feet directly above the intersection of the obstruction clearance line and the runway. For the purpose of this section it shall be assumed that the takeoff weight of the airplane is reduced by the weight of the fuel and oil expected to be consumed in flight to the field of intended destination.

(a) It shall be assumed that the aircraft is landed on the most favorable runway and direction without regard to wind.

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

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

Required Records and Reports

42.91 *Maintenance records.*

(a) Each air carrier shall, except as provided in paragraph (b) of this section, keep at its principal operations base the following current records with respect to all aircraft, aircraft engines, propellers, and, where practicable, appliances used in air transportation: (1) Total time and service, (2) time since last overhaul, (3) time since last inspection, and (4) mechanical failures.

(b) In the case of a propeller for which there is no previous operating history, the Administrator may authorize the use of a new record if the hub is rebuilt and is fitted with blades which are free from defects and within the manufac-

turer's production tolerances. Such rebuilding of the propeller shall be accomplished by the manufacturer or by a certificated repair station having the proper rating. The new record shall be signed by the manufacturer or by the repair agency, giving the date the propeller hub or blade was rebuilt and such other information as the Administrator may require.

42.91–1 *Content of maintenance records (FAA policies which apply to sec. 42.91).* The basic requirement of the above records is to provide a means for determining that overhaul, inspection, and check of the various units or components is performed within the prescribed time limitations. In the case of appliances, any method which will accomplish this result, other than keeping of individual time records on the units themselves, will be satisfactory.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.91–2 *Principal maintenance base (FAA policies which apply to sec. 42.91).* When the principal maintenance base is at a location other than the principal operations base, the term "Principal operations base," when applied to maintenance matters, shall be considered to mean the principal maintenance base. Copies of the necessary records shall also be maintained at the principal operations base if it is in a region other than the one in which the principal maintenance base is located.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.91–3 *Retention of records (FAA policies which apply to sec. 42.91).* The records required by this section shall be preserved and retained by the air carrier for a period of 2 years. For additional requirements pertaining to preservation of records, see Part 249 of this chapter (i. e. the Economic Regulations).

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.92 *Airman records.* An air carrier shall maintain at its principal operations base, or at such other location used by the air carrier as the Administrator may designate, current records of every airman utilized as a member of a flight crew. These records shall contain such information concerning the qualifications of each airman as is necessary to show compliance with the appropriate requirements prescribed by the regulations in this subchapter. No air carrier shall utilize any airman as a flight crew member unless records are maintained for such airman as required in this section.

42.92–1 *Content of airman records (FAA policies which apply to sec. 42.92).*

(a) *General.* The following pertinent information is considered the minimum necessary in the airman records required by this section:

(1) Name (in full);

(2) Current duties and date of assignment (pilot, engineer, navigator, etc.);

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

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

(5) Date and result of last 6-month instrument competency flight check for each pilot in command;

(6) Record of each pilot's flight time including trip time, instrument, night flight time, and flight time in the make and model of aircraft on which he is currently qualified;

(7) Records of company training for all crewmen, including actual flight, synthetic flight, and maintenance of proficiency training;

(8) Any check pilot authorization.

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42.92–2 *Availability of records (FAA policies which apply to sec. 42.92).* The above information shall be made available at any time for inspection by an authorized representative of the Administrator or Board.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.92–3 *Retention of records (FAA policies which apply to sec. 42.92).* The disposition of any flight crew member released from the employ of the air carrier, or who becomes physically or professionally disqualified must be so indicated in these records and such records shall be retained by the company for at least 1 year. For additional requirements pertaining to preservation of records see Part 249 of this chapter (i. e. the Economic Regulations).

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.93 *Emergency flight reports.* In the case of emergencies necessitating the transportation of persons or medical supplies for the protection of life or property, the rules contained herein regarding type of aircraft, equipment, and weather minimums to be observed will not be applicable: *Provided,* That within 48 hours after any such flight returns to its base the air carrier shall file a report with the Administrator setting forth the conditions under which the flight was made, the necessity therefor, and the names and addresses of the crew and passengers.

42.93–1 *Submission of emergency flight reports (FAA policies which apply to sec. 42.93).* The report referred to in this section shall be submitted in duplicate to the local inspector, and a copy shall be retained by the air carrier for at least 1 year.

(Published in 14 F. R. 7042, Nov. 22, 1949, effective Nov. 22, 1949; amended effective June 15, 1957.)

42.94 *Pilot's emergency deviation report.* Where pursuant to authority granted in section 42.51 (d) a pilot has deviated from established methods or requirements, he shall, within 7 days after completion of the trip, file with the Administrator a report thereof giving a brief statement concerning the circumstances of the emergency and the nature of the deviation.

42.94–1 *Submission of pilot's emergency deviation report (FAA policies which apply to sec. 42.94).* The report referred to in this section shall be submitted in duplicate to the local inspector, and a copy shall be retained by the air carrier for at least 1 year.

(Published in 14 F. R. 7042, Nov. 22, 1949, effective Nov. 22, 1949; amended effective June 15, 1957.)

42.95 *Flight manifest record.* A signed copy and any revision of the flight manifest required by section 42.62 shall be retained in the personal possession of the pilot for the duration of the flight, and a duplicate copy thereof shall be retained by the air carrier at its principal operations base, or at such other location used by the air carrier as the Administrator may designate, for at least 1 year after completion of the flight.

[*42.96 Mechanical reliability reports.*

[(a) Each air carrier operating large aircraft shall report the occurrence or detection of those failures, malfunctions, or defects specified in paragraph (b) of this section. In addition, each air carrier shall report any other failure, malfunction, or defect which occurs or is detected at any time in an aircraft or aircraft component (including aircraft systems, appliances, powerplants, and propellers) used by the air carrier, when, in the carrier's opinion, such failure, malfunction, or defect has endangered or may endanger the safe operation of an aircraft used by the air carrier. The report shall be in written form covering a period of 24 hours beginning at 0900 hours local time of each day and ending at 0900 hours local time the next day, and shall be submitted to the Federal Aviation Agency maintenance inspector assigned to the air carrier by 0900 hours local time of the following day: *Provided,* That reports which are due on Saturday or Sunday may be submitted on the following Monday and in case of legal holidays on the following workday.

[NOTE: Failures, malfunctions, or defects reported in accordance with the accident reporting provisions of Part 320 of the Regulations of the Civil Aeronautics Board need not be included.

[(b) The air carrier shall report each occurrence or detection of a failure, malfunction, or defect involving:

[(1) Fires during flight and whether the related fire-warning system functioned properly;

[(2) Fires during flight and whether the related fire-warning system did not function properly;

[(3) Fires during flight not protected by a related fire-warning system;

[(4) False fire warning during flight;

[(5) Engine exhaust systems which result during flight in damage to engine, adjacent structure, equipment, or components;

[(6) An aircraft component which results during flight in the accumulation or circulation of smoke, vapor, or taxic or noxious fumes in the crew compartment or cabin;

[(7) Engine shutdown during flight due to engine flameout;

[(8) Engine shutdown during flight when external damage to the engine or to the aircraft structure has occurred;

[(9) Engine shutdown during flight due to foreign object ingestion or icing;

[(10) Engine shutdown during flight of more than one engine on an aircraft;

[(11) Propeller feathering system or ability of the system to control overspeeding dnring flight;

[(12) Fuel or fuel-dumping systems affecting fuel flow or causing hazardous leakage during flight;

[(13) Landing gear extension or retraction or opening or closing of landing-gear doors during flight;

[(14) Brake system components which result in loss of brake actuating force while the aircraft is in motion on the ground;

[(15) Aircraft structure which requires major repair;

[(16) Cracks, permament deformation, or corrosion of aircraft structure which exceed the maximum limits acceptable to the manufacturer or the Federal Aviation Agency; and

[(17) Aircraft components or systems which result during flight in the taking of emergency actions; except that action taken to shutdown an engine need not be reported as an emergency under this provision.

[NOTE: Under the provisions of this paragraph, an aircraft is in flight from the moment it leaves the surface of the earth on takeoff until it touches down at a place of landing.

[(c) Reports required by paragraph (a) of this section shall be transmitted in a manner and on a form convenient to the air carrier's system of communication and procedure, and shall include on the first daily report as much of the following information as is available:

[(1) Type and identification number of the aircraft, name of the operator, date, flight number, and stage during which the incident occurred; e.g., preflight, takeoff, climb, cruise, descent, landing, inspection;

[(2) Emergency procedure effected; e.g., unscheduled landing, emergency descent;

[(3) Nature of condition; e.g., fire, structural failure;

[(4) Identification of part and system involved, including available information pertaining to type designation of the major component and time since overhaul;

[(5) Apparent cause of trouble; e.g., wear, crack, design deficiency, personnel error;

[(6) Disposition; e.g., repaired, replaced, aircraft grounded, part sent to manufacturer; and

[(7) Brief narrative summary of other pertinent information necessary for more complete identification, determination of seriousness, and corrective action.

[(d) Reports required by paragraph (a) shall not be withheld pending accumulation of all information specified in paragraphs (b) and (c) of this section. When additional information is obtained relative to the incident, including any that may be furnished by the manufacturer or other outside agency, it shall be expeditiously submitted as a supplement to the first report, referencing the date and place of submission of such report.

[NOTE: The reporting requirements contained herein have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

[(Amendment 42–38, published in 27 F.R. 1245, Feb. 10, 1962, effective Mar. 12, 1962.)]

[*42.96a Monthly report of chronic mechanical difficulties.* As soon as practicable after the end of each calendar month, each irregular air carrier operating large aircraft shall submit to the assigned maintenance inspector three copies of a report covering the mechanical difficulties experienced during the preceding month which the air carrier considers chronic or otherwise particularly significant from a safety standpoint. The report shall fully identify all aircraft and aircraft components involved (i.e., manufacturer, model and type), and shall contain enough information to serve as a basis for corrective action and to enable a determination to be made of the trend of aircraft and aircraft component failures, malfunctions, or defects. The detailed information from which such reports are prepared shall be kept current and available at the air

carrier's main headquarters for examination by any authorized representative of the Administrator or Board.

[NOTE: The reporting requirements contained herein have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

[(Amendment 42-38, published in 27 F.R. 1245, Feb. 10, 1962, effective Mar. 12, 1962.)]

42.97 *Change in exclusive use of large aircraft.* When, for any reason whatsoever, an air carrier shall cease to have the exclusive use of any large aircraft, an immediate report of such fact shall be filed with the Administrator in such form and manner and containing such information as the Administrator may prescribe.