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Civil Aeronautics Manual 42

Irregular Air Carrier And Off-Route Rules

Revised August 1956

U. S. DEPARTMENT OF COMMERCE

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CIVIL AERONAUTICS ADMINISTRATION

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Introductory Note

Civil Aeronautics Manual 42 contains the rules, policies, and interpretations issued by the Administrator in application to the various sections of Part 42, Irregular Air Carrier and Off-Route Rules, adopted by the Civil Aeronautics Board.

CAA *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.

CAA *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.

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

Rules, policies, or interpretations are identified by consecutive dash numbers appended to the regulation section number.

[This manual supersedes Civil Aeronautics Manual 42 dated August 1954 and all supplements issued thereto. Moreover, the contents of this manual supersede any contradictory material which may be found in any Aviation Safety Release or like publication outstanding on the issuance date of this manual.

[This edition extends and brings up to date the text in the edition dated August 1954 by including all material which has been published in the Federal Register and is effective on July 31, 1956. New or revised material in this edition is indicated by black brackets.]

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Irregular Air Carrier and Off-Route Rules

Applicability

42.0–1 *Charter flights or other special services (CAA policies which apply to sec. 42.0 (b)).*

(a) *General.* The policies provided in this section will be applied by the Civil Aeronautics Administration 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 aviation safety district office. 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 aviation safety agent.

(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 CAA 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 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 agent 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.

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(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 Civil Aeronautics Administration 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, March 27, 1953, effective April 15, 1953; further amended in 21 F. R. 1697, March 17, 1956, effective upon publication in the Federal Register.)

42.0–2 *Provisions of Part 42 which are applicable to air taxi operators (CAA interpretations which apply to sec. 42.0 and SR–378).* See appendix B.

(Published in 19 F. R. 1601, March 25, 1954, effective April 1, 1954.)

42.0–3 *Operations for which an Air Taxi Operator Certificate is not required (CAA interpretations which apply to sec. 42.0 and SR–378).* See appendix B.

(Published in 19 F. R. 1601, March 25, 1954, effective April 1, 1954.)

Definitions

42.1–1 *Flight time (CAA interpretations which apply to section 42.1 (a) (14)).* This is construed to mean from "block to block."

(Published in 14 F. R. 7032, Nov. 22, 1949, effective upon publication.)

42.1–2 *Twilight. (CAA interpretations which apply to section 42.1 (a) (20)).* 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." [1]

(Published in 14 F. R. 7032, Nov. 22, 1949, effective upon publication.)

Certificate Rules

42.5–1 *Appropriate economic authority (CAA interpretations which apply to section 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 (CAA rules which apply to section 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 aviation safety agent. When the requirements, as prescribed in this part, have been met, the applicant should present his application to the

[1] Supplement to the American Ephemeris, 1946—Tables of Sunrise, Sunset, and Twilight, 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.

local aviation safety agent 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 upon publication.)

42.5–3 *Application for amendment (CAA rules which apply to section 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 aviation safety 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 aviation safety agent.

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

42.5–4 *Application for overseas and international authorization (CAA rules which apply to sec. 42.5).* Application for overseas and international authorization shall be made to the local aviation safety agent 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 headquarters 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 aviation safety agent, 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 be visited, navigational facilities available, air laws, public health, customs, and any other requirements established by the country or countries into which operations are to be conducted.[2]

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

42.5–5 *Application for an Air Taxi Operator Certificate (CAA rules which apply to sec. 42.5 and SR-378).* See appendix B.

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

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

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

[2] This information is normally contained in the International Flight Information Manual obtainable from the Office of Aviation Information CAA, Washington 25, D. C.

42.5–7. *Application for worldwide operation (CAA policies which apply to sec. 42.5).* If the air carrier is able to show to the satisfaction of the assigned agent 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 agent 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 on April 20, 1956, effective May 15, 1956.)

42.9–1 *Notice (CAA rules which apply to section 42.9).* Three copies of each notice, in letter form, shall be delivered by the air carrier to the district office of the Civil Aeronautics Administration 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

42.11–1 *Listing of aircraft (CAA rules which apply to section 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 (CAA interpretations which apply to section 42.11).* See appendix B.

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

42.14–1 *Takeoff performance limitations for large aircraft (CAA rules which apply to section 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.)

42.16–1 *En route performance limitations (CAA 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.)

Aircraft Equipment

42.21–1 *Seats and safety belts (CAA rules which apply to section 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 (CAA rules which apply to section 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 (CAA policies which apply to section 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 (CAA 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.)

[42.22a–1 *Airspeed limitations and related information contained in the Airplane Flight Manual (CAA policies which apply to sec. 42.22a (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.)

42.23–1 *Approved types of radio equipment (CAA 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 CAA 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 (CAA 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 (CAA 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.)

42.24–1 *First-aid and emergency equipment (CAA policies which apply to sec. 42.24).* First-aid kits, flotation equipment, and other emergency gear shall regularly be inspected to determine their condition and shall be provided with a means for readily determining that such equipment has not been tampered with or articles removed since last inspection. This will normally be accomplished by means of seals showing date or time of last inspection on each kit or item of emergency equipment.

The adequacy of all emergency equipment will be determined by the Administrator.

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

42.24–2 *First-aid kits (CAA policies which apply to sec. 42.24).* 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:

(a) *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

(b) *No. 2 kit for aircraft of 6 to 25 persons capacity.*[3]

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

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

Eye dressing packet (3 each per unit) (ophthalmic ointment, one-eighth-ounce; eye pads; eye strips) ---------- 1

(c) *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

(Published in 17 F. R. 2748, March 29, 1952, effective upon publication; amended in 18 F. R. 1719, March 7, 1953, effective April 15, 1953.)

42.24–3 *Emergency evacuation equipment (CAA policies which apply to sec. 42.24 (a)).* This requirement includes under emergency evacuation equipment such items as: ropes, ladders, chutes, etc., when such equipment is necessary for safe, rapid evacuation of passengers and crew in event of emergency or crash landings; e. g., a DC–4 would require such equipment, while a DC–3 normally would not, due to differences in height from fuselage exits to ground. This equipment shall be approved by the CAA after demonstration of the adequacy of the equipment. Instructions shall be included on placards within the aircraft as to the location and operation of such evacuation equipment or procedures for briefing occupants of the aircraft shall be included as a part of the Operations Manual, if required by section 42.60.

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

42.24-4 *Emergency equipment (CAA rules which apply to section 42.24 (b)).*

(a) *General.* The aircraft shall be equipped with the appropriate emergency equipment specified in this section. 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.

(b) *Tropical land areas:*
1 first-aid kit (from aircraft).
1 machete.
1 axe.
1 mosquito headnet for each person.
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.

(c) *Frigid land areas:*
1 first-aid kit (from aircraft).
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.
5-day supply emergency food ration for each person.
1 pint drinking water for each person.

(d) *Tropical water areas:*
1 Gibson-girl radio and accessories.
1 first-aid kit (from aircraft).
1 life vest for each person.
Sufficient number of liferafts to accommodate all persons. Each liferaft shall contain the following:
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.
5-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.

(e) *Frigid water areas:*

1 Gibson-girl radio and accessories.
1 first-aid kit (from aircraft).
1 life vest for each person.
Sufficient number of liferafts to accommodate all persons. Each liferaft shall contain the following:
1 canopy (for sail, sunshade, rain catcher or protection from elements).
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.
5-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.

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42.25–1 *Cockpit checklist (CAA policies which apply to section 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 multiengine 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.

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42.25–2 *Mimimum standard cockpit checklist (CAA policies which apply to section 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:[4]

Brakes—set.

Electrical system:

Battery switch—proper position.

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

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:[4]
Hydraulic pressures and quantity—checked.
Brakes—checked.
Hydraulic selector valves—checked.

Anti-icing and de-icing equipment:[4]
Checked and set.

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

Powerplants and propellers:[4]
Propellers—checked and set in take-off position.
All engines—checked for proper functioning and required power.
Superchargers—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.

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

Pressurization:[4]
Checked.

Flaps:[4]
Wing flaps—takeoff position.
Cowl flaps—takeoff position.

Controls:[4]
Auto pilot—off.
Trim tabs—set for takeoff.
Gust locks—off.
Free and tested through full limit of travel.

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

PRIOR TO LANDING

Fuel system:[5]
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:[5]
Hydraulic pressure—checked.
Brakes—checked and off.
Hydraulic selector valves—checked.

Anti-icing and de-icing equipment:[5]
Checked.

Powerplants and propellers:[5]
Propellers—as required.
Superchargers—as required.
Manual reverse pitch actuator or indicator [5]—checked.

Heaters:[5]
Checked.

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

Pressurization:[5]
Checked.

Controls:
Autopilot—off.
Trim tabs—as desired.

Landing gear:[4]
Down and locked—checked.

Flaps:[5]
Wing flaps—as desired.
Cowl flaps—as desired.

[5] 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.

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.
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.

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42.26–1 *Supplemental oxygen for crew members (CAA interpretations which apply to section 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, February 2, 1954, effective February 15, 1954; amended 21 F. R. 5437, July 20, 1956, effective July 31, 1956.)

42.26–2 *Oxygen requirements for standby crew members (CAA interpretations which apply to 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 (CAA policies which apply to section 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 (CAA policies which apply to section 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 (CAA policies which apply to section 42.26 (b)).* Provisions should be made for adminis-

tering 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 the bottom through which an oxygen tube or a Y-connector can be inserted. Any other acceptable method may also be used.

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

42.26–6 *Oxygen requirements for clinical purposes (CAA policies which apply to section 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.)

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

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

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

(b) *Cabin altitudes greater than 10,000 feet.* When operating a pressurized cabin aircraft which is certificated to fly with a cabin pressure altitude greater than 10,000 feet, a supply of oxygen for crew members computed on the basis of the requirements of section 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 cabin pressure altitudes between 10,000 and 12,000 feet and for the duration of the flight at cabin pressure altitudes in excess of 12,000 feet. In the event of the loss of cabin pressurization, oxygen should continue to be used by the flight crew members on flight-deck duty for the duration of the flight at cabin pressure altitudes greater than 10,000 feet. All other crew members may use oxygen according to their individual needs.

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

42.27–2 *Computation of supply for passengers in pressurized cabin aircraft (CAA policies which apply to section 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 than 10,000 feet.* When a pressurized cabin aircraft is certificated to fly with a cabin pressure altitude greater than 10,000 feet, the following policies should be considered: When the cabin pressure altitude is above 10,000 feet to and including 14,000 feet, sufficient oxygen shall be provided for 10 percent of the number of passengers for the duration of flight between such cabin pressure altitudes. When the cabin pressure altitude is above 14,000 feet to and including 15,000 feet, sufficient oxygen shall be provided for 30 percent of the number of passengers for the duration of flight between such cabin pressure altitudes. When the cabin pressure altitude is above 15,000 feet, sufficient oxygen shall be provided for each passenger for the duration of flight above such a cabin pressure altitude. In addition to the above supply of oxygen, in order to provide for loss of cabin pressure, the supplementary oxygen required by whatever portions of section 42.27 (b) are applicable, shall be provided except that in no case will it be necessary to furnish a supply of oxygen in excess of that necessary to supply oxygen to 100 percent of the passengers for the maximum possible duration of flight at the maximum cabin altitude which could be attained under either of the normal operating or emergency conditions whichever is greater.

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

42.27–3 *Oxygen requirements for clinical purposes (CAA policies which apply to section 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 (CAA policies which apply to section 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 be used.

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

42.29–1 *Protective breathing equipment and installation (CAA policies which apply to section 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 (CAA rules which apply to section 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

42.30–1 *General (CAA policies which apply to section 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) CAA 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, November 22, 1949, effective upon publication,)

42.31–1 *Inspection and maintenance—large aircraft (CAA 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 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, November 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, October 23, 1954, effective upon publication.)

42.31–4 *Maintenance and inspection records (CAA 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, November 22, 1949, effective upon publication; amended in 15 F. R. 3151, May 25, 1950, effective upon publication.)

42.32–1 *Facilities for the proper inspection, maintenance, overhaul, and repair (CAA 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 (CAA 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 (CAA 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 (CAA 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 (CAA 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 maintenance program must specify checks, inspections, and overhauls to be performed and times at which they will be performed.

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

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

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

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

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

(i) *Approved weight control system.* A system of continuous recordation of weight changes on individual aircraft or fleet which will provide an accurate weight and c. g. 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 a CAA representative [6] to determine the operators' empty weight and corresponding c. g. position.

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

(ii) *Under an approved system.*

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

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

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

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

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

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

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

(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.

(*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 CAA.

(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 the 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 CAA 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 CAA[7] 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.

(Published in 14 F. R. 7036, Nov. 22, 1949, effective upon publication; amended in 16 F. R. 11415, Nov. 9, 1951, effective Dec. 9, 1951; amended in 18 F. R. 7527, Nov. 27, 1953; amended in 19 F. R. 6829, Oct. 23, 1954, effective upon publication.)

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

42.32–6 *Copy of maintenance manual in aircraft (CAA policies which apply to section 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.

(Published in 14 F. R. 7039, Nov. 22, 1949, effective upon publication; amended in 18 F. R. 7537, Nov. 26, 1953; amended in 19 F. R. 6829, Oct. 23, 1954, effective upon publication.)

42.32–7 *Mandatory revisions (CAA rules which apply to section 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 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

42.44–1 *Equipment check (CAA policies which apply to section 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 (CAA policies which apply to section 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 between 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 per-

formance. 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.*[8]

(m) *Orientation.*[8]

(n) *Beam bracketing.*[8]

(o) *Cone identification.*[8]

(p) *Loop orientation.*[8]

(q) *Approach procedures.* An approach procedure should be made in the aircraft on the

[8] 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.

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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 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 (CAA 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 (CAA policies which apply to sec. 42.44 (a) (8)).* 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 (CAA interpretations which apply to sec. 42.44).* (a) "An authorized representative of the Administrator" as used in this section means a CAA Aviation Safety Agent.

(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, January 21, 1956, effective upon publication in the Federal Register.)

42.44–6 *Flight engineer qualifications for duty (CAA 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.)

42.45–1 *Training program (CAA 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 crew members;

(4) Through familiarization with the aircraft to be flown including the engines and all major components, operation of cabin pressur-

ization (if installed), oxygen system, standard operating procedures, a study of the CAA 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.)

42.48–1 *"Scheduled to fly," "scheduled to be aloft," and "scheduled for duty on the flight deck" (CAA interpretations which apply to section 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 (CAA 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.)

Flight Operation Rules

42.51–1 *Preflight responsibilities (CAA interpretations which apply to section 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 enroute 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 (CAA policies which apply to section 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) Conducting 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 cargo, 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 (CAA policies which apply to section 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 (CAA policies which apply to section 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 (CAA policies which apply to section 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 been 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.)

42.52–1 *Operations in the Territory of Alaska (CAA policies which apply to section 42.52 (a)).* For operations in the Territory 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 Territory of Alaska (CAA policies which apply to section 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 Territory 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.)

42.54–1 *Other parts of the aircraft (CAA interpretations which apply to section, 42.50).* 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, November 22, 1949, effective upon publication.)

42.55–1 Deleted.

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

42.55–2 *Air traffic clearance (CAA 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, November 22, 1949, effective upon publication.)

42.55–3 *IFR takeoff and landing minimums (CAA 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 CAA Aviation Safety Agent 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 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.)

42.56–1 *Standard instrument approach procedures (CAA 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 (CAA 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.[9]

(Published in 20 F. R. 9039, Dec. 9, 1955, effective Dec. 15, 1955.)

42.57–1 *Minimum facilities (CAA 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 Aviation Information Office, Civil Aeronautics Administration, 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, March 27, 1943, effective April 15, 1953.)

42.58–1 *Off-airway instrument operation (CAA 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, November 22, 1949, effective upon publication.)

42.59–1 *Placement of established procedures (CAA 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, November 22, 1949, effective upon publication.)

42.60–1 *Form of operations manual (CAA 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 Aviation Safety Agent (Operations).

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

42.60–2 *Content of operations manual (CAA rules which apply to section 42.60 (a)).*

(a) Table of contents. In preparing the manual the arrangement outlined below shall be followed.

[9] Information respecting the official runway visibility observations reported by the control tower operator may be obtained from the Office of the U. S. Weather Bureau for the airport concerned. Such office maintains a continuous graph recording of the runway visibility shown on the visibility meter in the control tower.

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(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.60–3 *Copies of operations manual (CAA rules which apply to section 42.60 (a)).*

(a) A current copy of the operations manual shall be furnished by the air carrier to the pilot.

(b) Two copies of the operations manual and all revisions thereto shall be delivered by the air carrier to the district office of the Civil Aeronautics Administration serving the principal operations base of the air carrier.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.60–4 *Copy of operations manual in aircraft (CAA policies which apply to section 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 (CAA rules which apply to section 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.)

42.61–1 *IFR operation in control zone or control area (CAA policies which apply to section 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.)

42.62–1 *Content of flight manifest (CAA policies which apply to section 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 (CAA interpretations which apply to section 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.)

Operating Limitations for Large Passenger-Carrying Airplanes

42.70–1 *Deviations (CAA rules which apply to section 42.70 (a)).* An application for any deviation shall include all supporting data and shall be forwarded to the CAA Aviation Safety District Office charged with the over-all inspection of the air carrier's operations.

(Published in 19 F. R. 2168, Apr. 15, 1954, effective Apr. 25, 1954.)

42.70–2 *Accuracy of data (CAA policies which apply to section 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 (CAA policies which apply to section 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.)

42.71–1 *Weight limitations (CAA policies which apply to section 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.)

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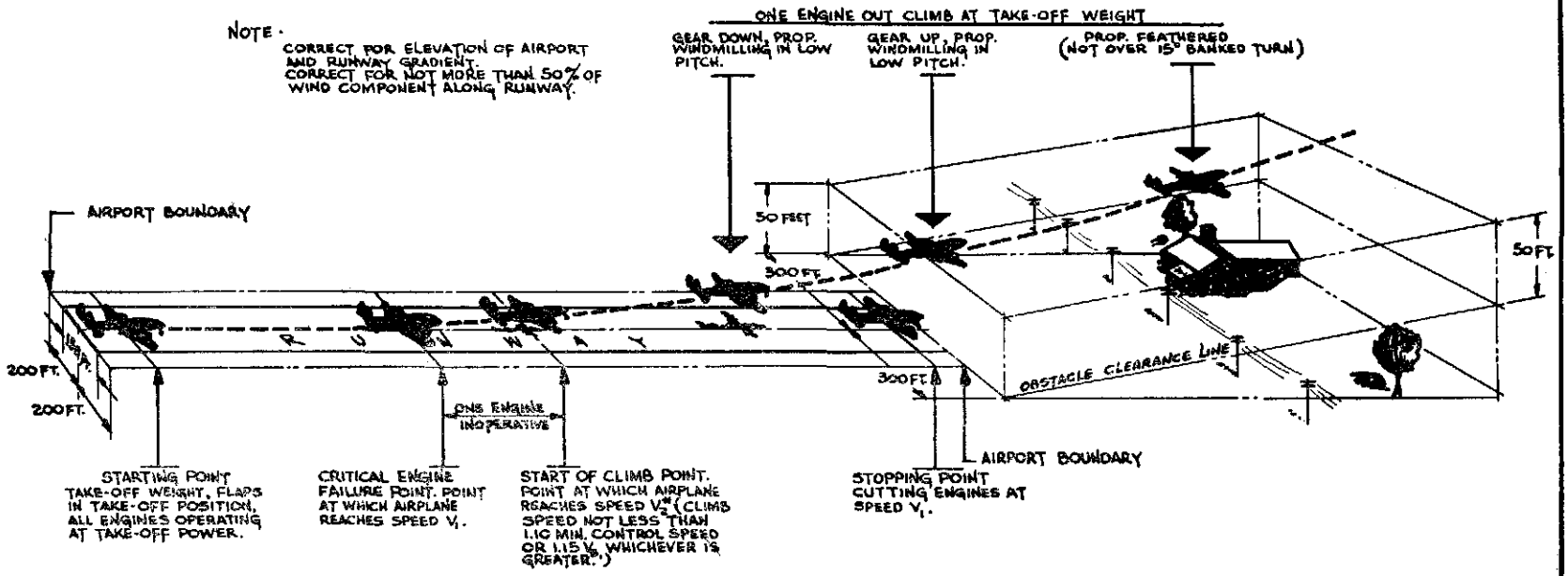
TAKE-OFF · AIRPORT LIMITATIONS



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

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

* $1.2V_{S_1}$ FOR AIRPLANES WITH TWO ENGINES
$1.15V_{S_1}$ FOR AIRPLANES WITH MORE THAN TWO ENGINES.
} V_{S_1} = STALL SPEED WITH TAKE-OFF CONFIGURATION.

Diagram 1

42.72–1 *Takeoff limitations to provide for engine failure (CAA policies which apply to section 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. Therefore, it may be necessary, for the air carrier operator, to supplement its data with information obtained from other sources. However, gross weight data calculated on the basis of such data should be rechecked or recalculated as soon as appropriate data from the Coast and Geodetic Survey becomes available.

(c) *Runways.*

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

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

(d) *Turns to avoid obstructions.*

(1) Section 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.)

42.76–1 *En route limitations; where special air navigational facilities exist (CAA policies which apply to section 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.)

42.77–1 *Landing distance limitations; airport of destination (CAA policies which apply to section 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 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 effective Apr. 25, 1954.)

42.80–1 *Performance data on Curtiss model C46 aircraft certificated for maximum weights of 45,000 pounds to 48,000 pounds (CAA rules which apply to section 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 40)

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]

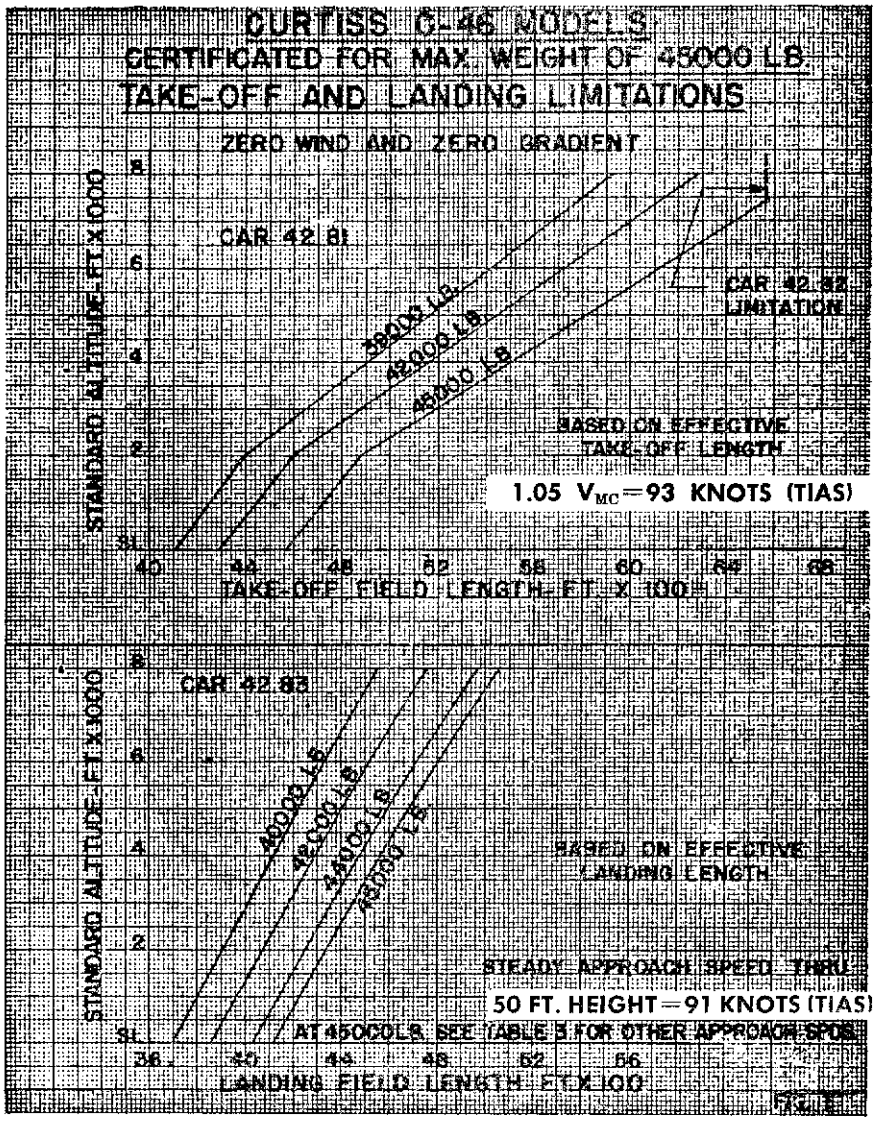
Standard altitude in feet	Airplane weight in pounds and approach speeds[2] in knots							
	40,000	V_{50}	42,000	V_{50}	44,000	V_{50}	45,000	V_{50}
	Distance in feet							
S. L.	4,710	86.0	4,910	88.0	5,130	90.5	5,230	91.0
1,000	4,835	86.0	5,050	88.0	5,270	90.5	5,370	91.0
2,000	4,965	86.0	5,180	88.0	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

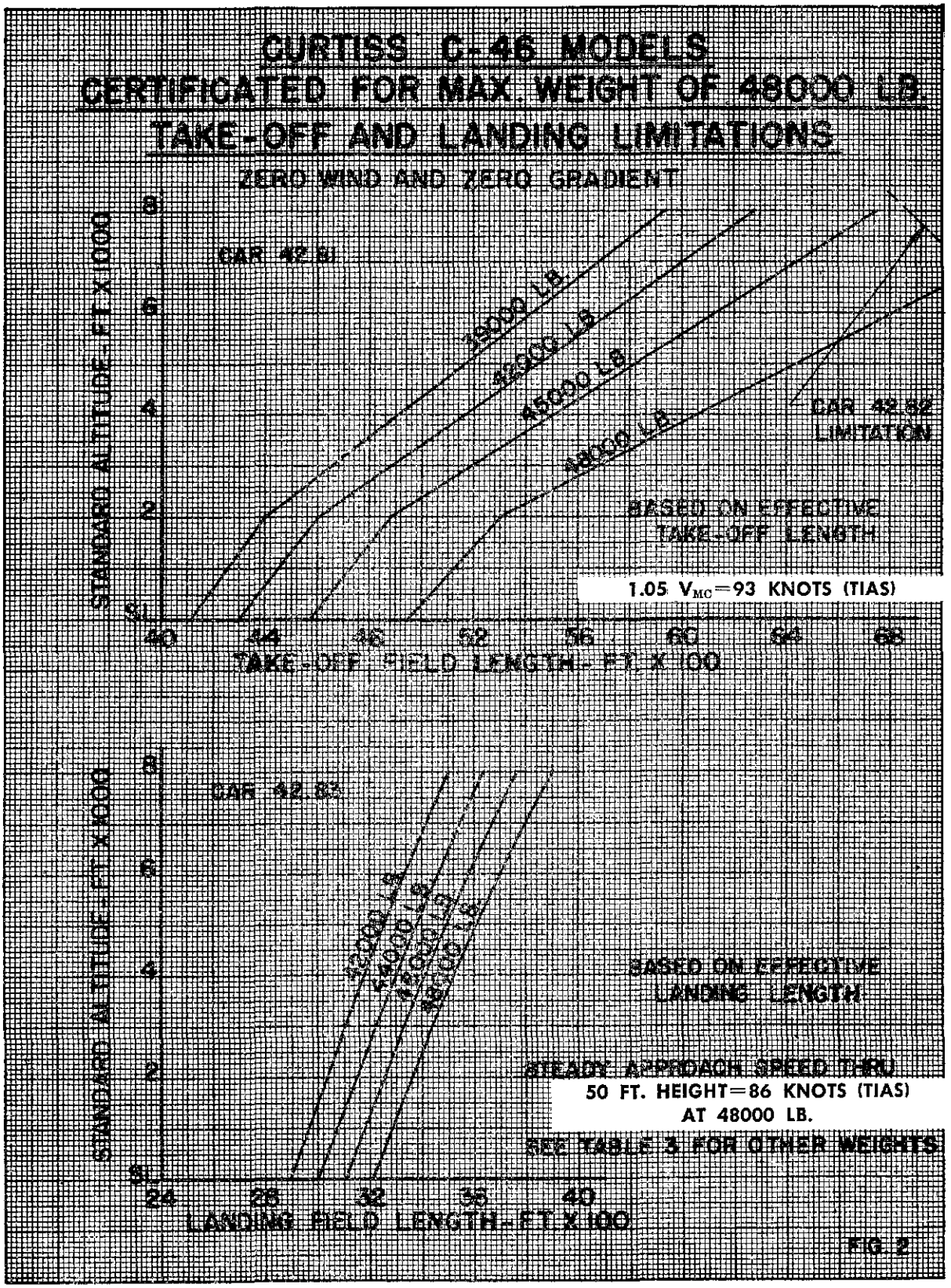
[1] Steady approach speed through 50 foot-height-knots TIAS denoted by symbol V_{50}.
[2] For use with Curtiss model C–46 aircraft when approved for this weight.

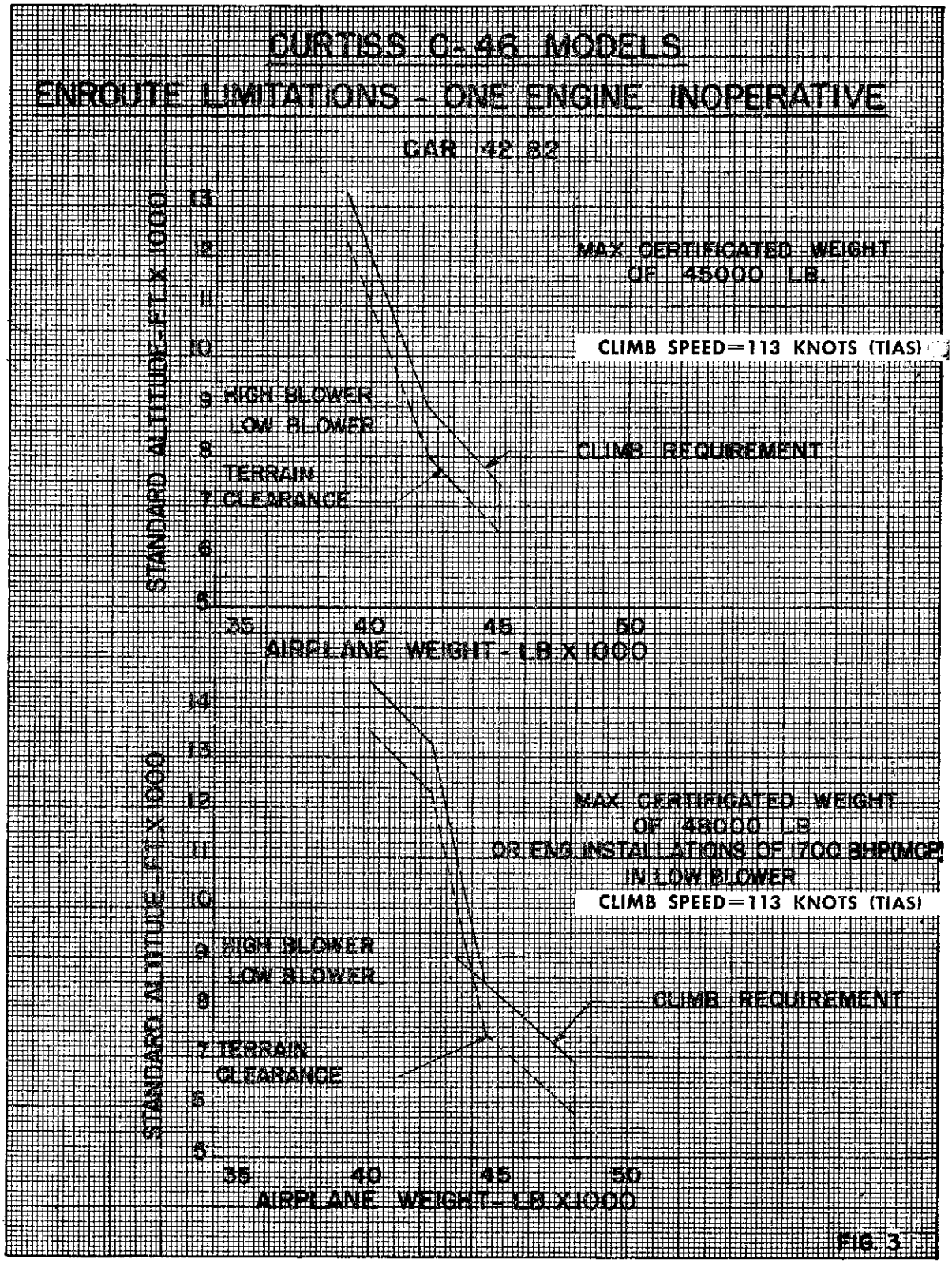
(2) Curtiss C–46 certificated for maximum weight of 48,000 pounds.[1]

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 42.81
CAR 42.82
LIMITATION
38000 LB.
42000 LB.
45000 LB.
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{MC}=93 KNOTS (TIAS)
STANDARD ALTITUDE-FT. X 1000
TAKE-OFF FIELD LENGTH-FT. X 100
CAR 42.83
38000 LB.
42000 LB.
45000 LB.
BASED ON EFFECTIVE LANDING LENGTH
STEADY APPROACH SPEED THRU 50 FT. HEIGHT=91 KNOTS (TIAS)
AT 45000 LB. SEE TABLE 3 FOR OTHER APPROACH SPDS.
LANDING FIELD LENGTH-FT. X 100
FIG. 5


CURTISS C-46 MODELS
CERTIFICATED FOR MAX. WEIGHT OF 48000 LB.
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.81
CAR 42.82 LIMITATION
48000 LB.
45000 LB.
42000 LB.
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{MC}=93 KNOTS (TIAS)
STANDARD ALTITUDE-FT. X 1000
TAKE-OFF FIELD LENGTH-FT. X 100
CAR 42.82
BASED ON EFFECTIVE LANDING LENGTH
STEADY APPROACH SPEED THRU 50 FT. HEIGHT=86 KNOTS (TIAS) AT 48000 LB.
SEE TABLE 3 FOR OTHER WEIGHTS
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 (CAA 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. 42.82.

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.

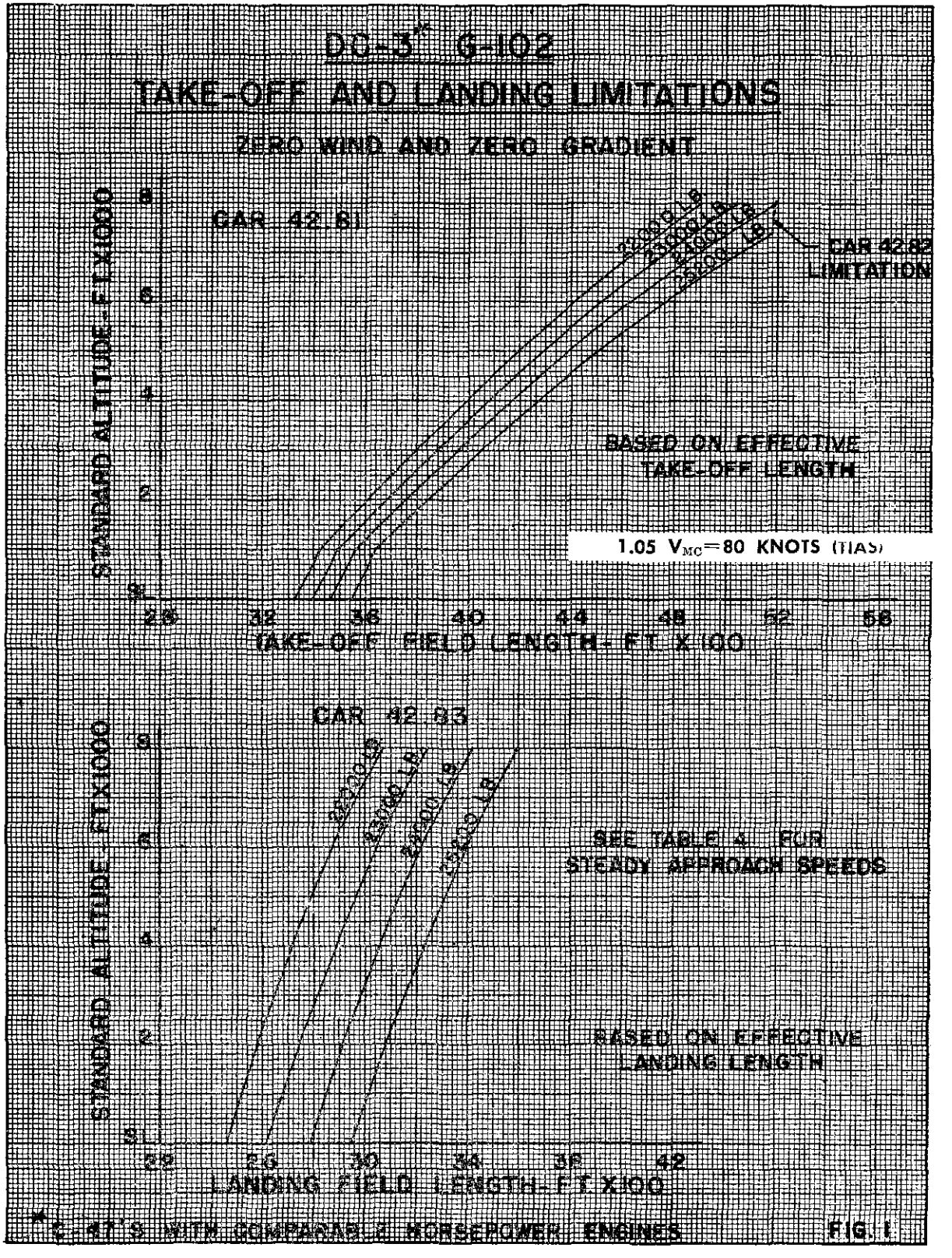
Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	22,000	V_{50}	23,000	V_{50}	24,000	V_{50}	25,200	V_{50}
	Distance in feet							
S. L	2, 460	74. 5	2, 620	76. 5	2, 790	78. 0	2, 950	80. 0
1,000	2, 520	74. 5	2, 680	76. 5	2, 850	78. 0	3, 015	80. 0
2,000	2, 580	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
CAR 42.81
CAR 42.82 LIMITATION
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{MC}=80 KNOTS (TIAS)
STANDARD ALTITUDE-FT X100
SL 2 4 6 8
28 32 36 40 44 48 52 56
TAKE-OFF FIELD LENGTH-FT X 100
CAR 42.83
SEE TABLE 4 FOR STEADY APPROACH SPEEDS
BASED ON EFFECTIVE LANDING LENGTH
SL 2 4 6 8
22 26 30 34 38 42
LANDING FIELD LENGTH-FT X100
*C-47'S WITH COMPARABLE HORSEPOWER ENGINES
FIG. 1

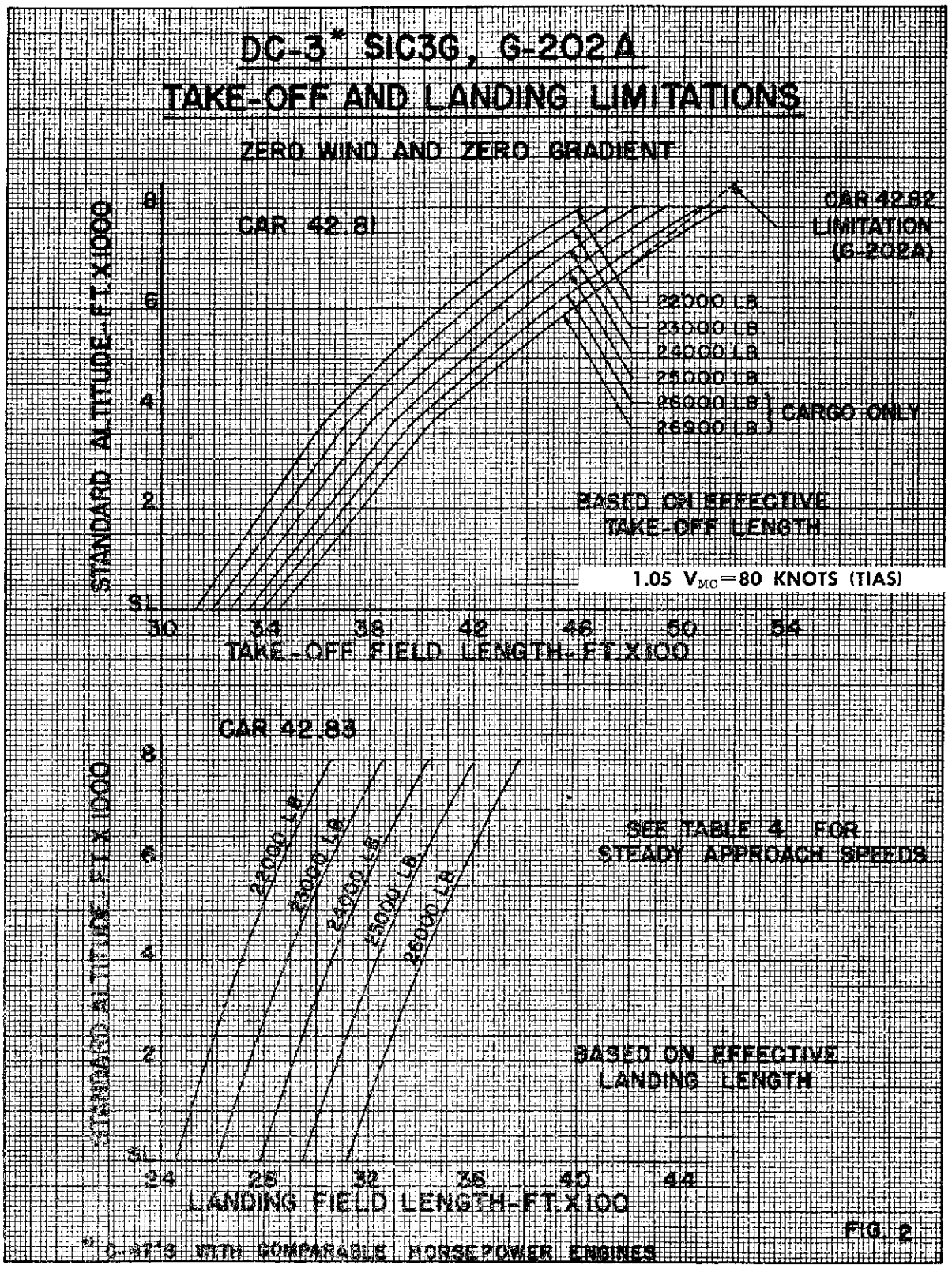

DC-3* SIC3G, G-202A
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.81
CAR 4262 LIMITATION (G-202A)
22000 LB.
23000 LB.
24000 LB.
25000 LB.
26000 LB.
26900 LB.
CARGO ONLY
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{MC} = 80 KNOTS (TIAS)
STANDARD ALTITUDE-FT.X1000
SL
2
4
6
8
30
34
38
42
46
50
54
TAKE-OFF FIELD LENGTH-FT.X100
CAR 42.83
22000 LB.
23000 LB.
24000 LB.
25000 LB.
26900 LB.
SEE TABLE 4 FOR STEADY APPROACH SPEEDS
BASED ON EFFECTIVE LANDING LENGTH
24
28
32
36
40
44
LANDING FIELD LENGTH-FT.X100
* C-47'S WITH COMPARABLE HORSEPOWER ENGINES

FIG. 2

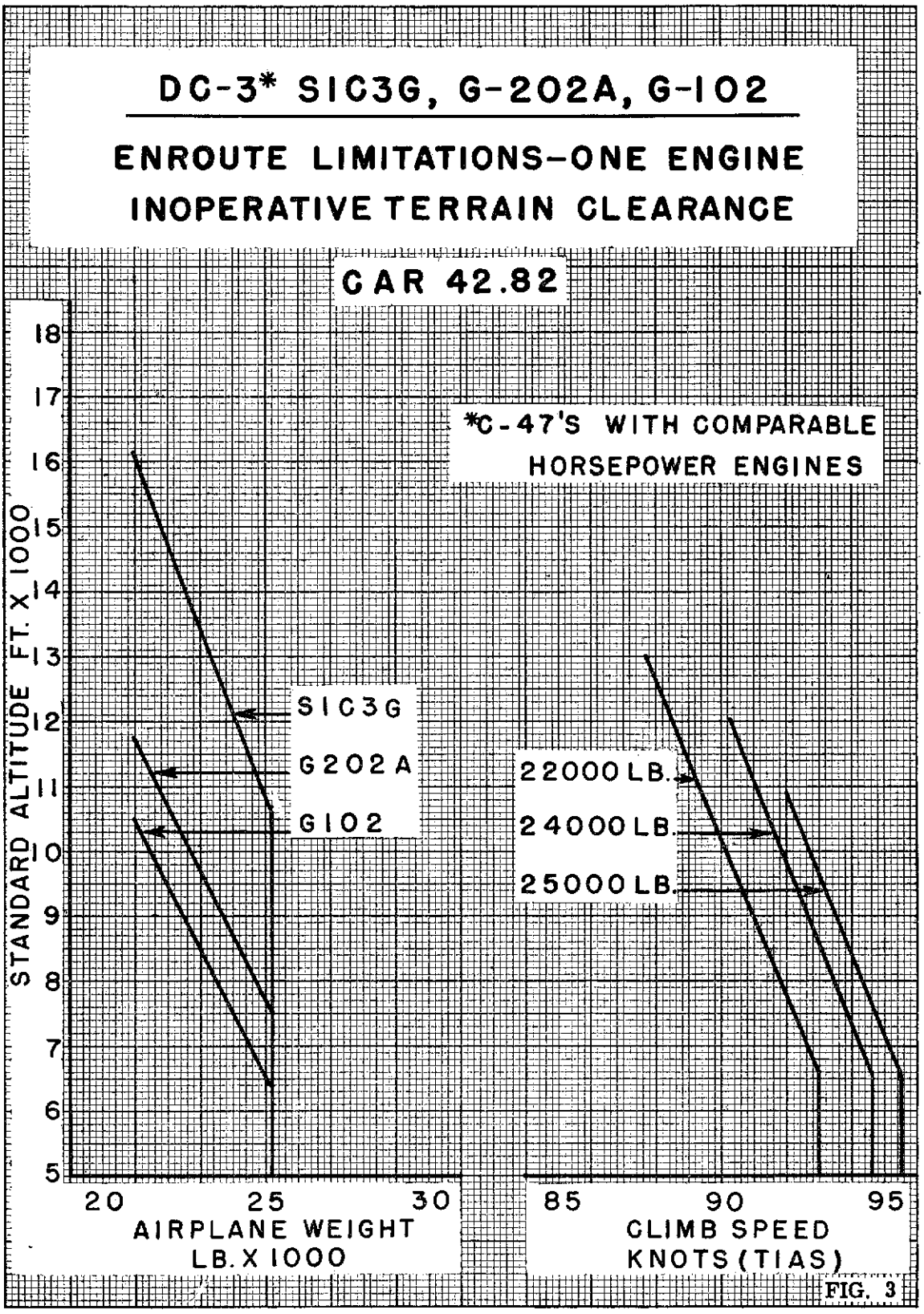


FIG. 3

(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.)

42.80–3 *Performance data on Lockheed 18 G202A aircraft (CAA 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}.

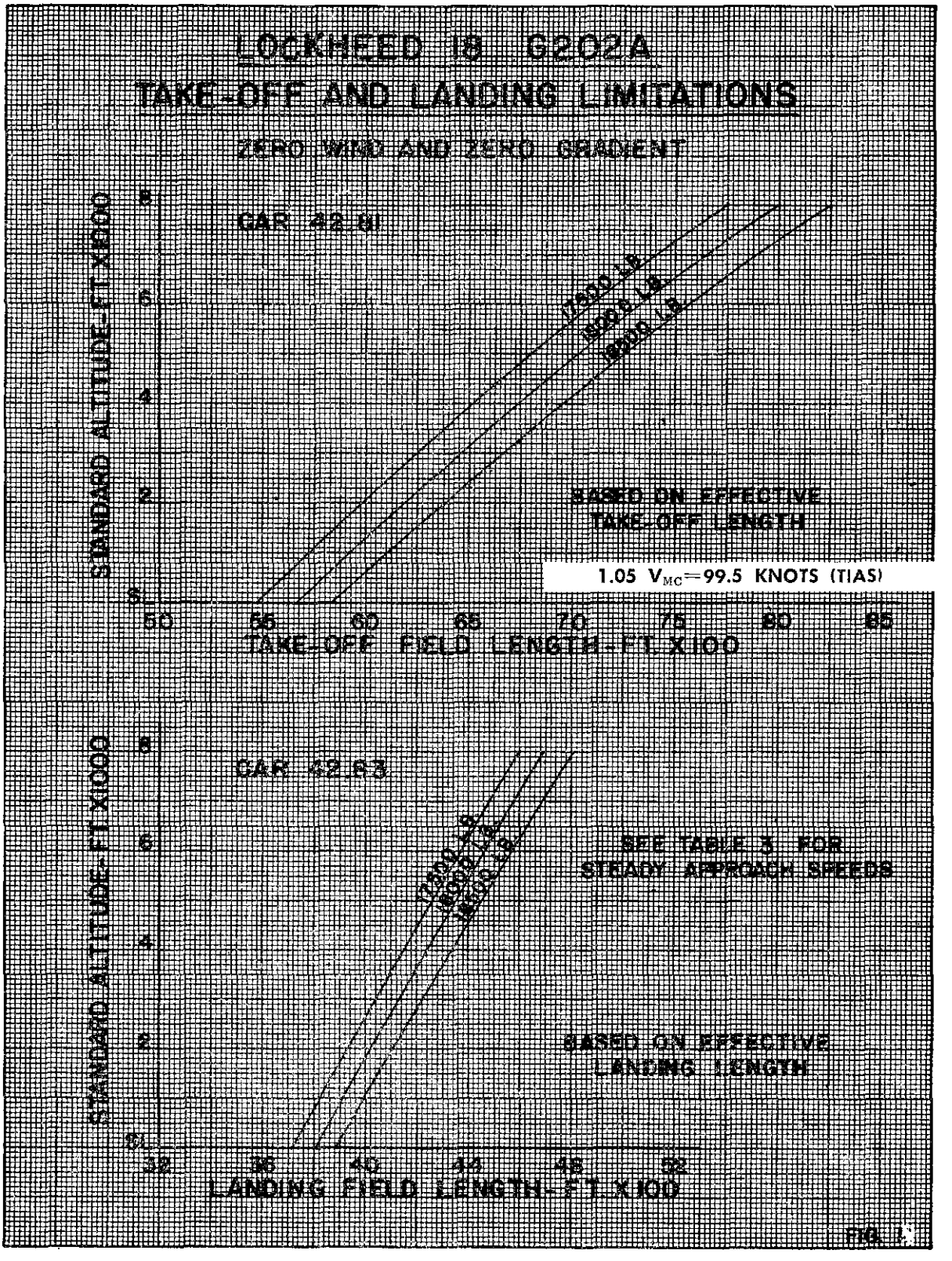
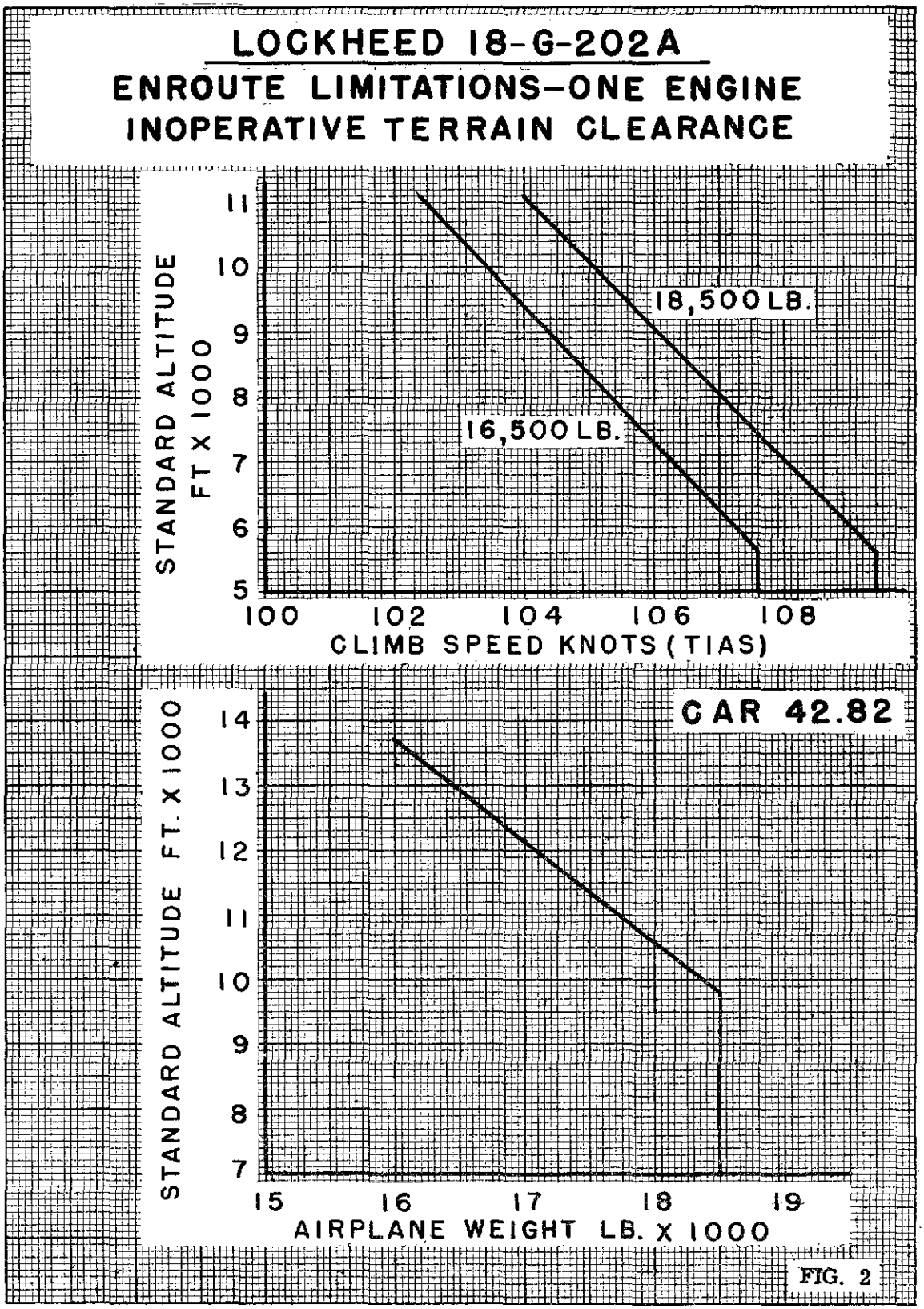

LOCKHEED 18 G202A
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.81
STANDARD ALTITUDE-FT X1000
8
6
4
2
S
17500 LB
18000 LB
18500 LB
BASED ON EFFECTIVE TAKE-OFF LENGTH
1.05 V_{MC}=99.5 KNOTS (TIAS)
50
55
60
65
70
75
80
85
TAKE-OFF FIELD LENGTH-FT X100
CAR 42.83
STANDARD ALTITUDE-FT X1000
8
6
4
2
S
17500 LB
18000 LB
18500 LB
SEE TABLE 3 FOR STEADY APPROACH SPEEDS
BASED ON EFFECTIVE LANDING LENGTH
32
36
40
44
48
52
LANDING FIELD LENGTH-FT X100

FIG. 1



(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 (CAA 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	24.5	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

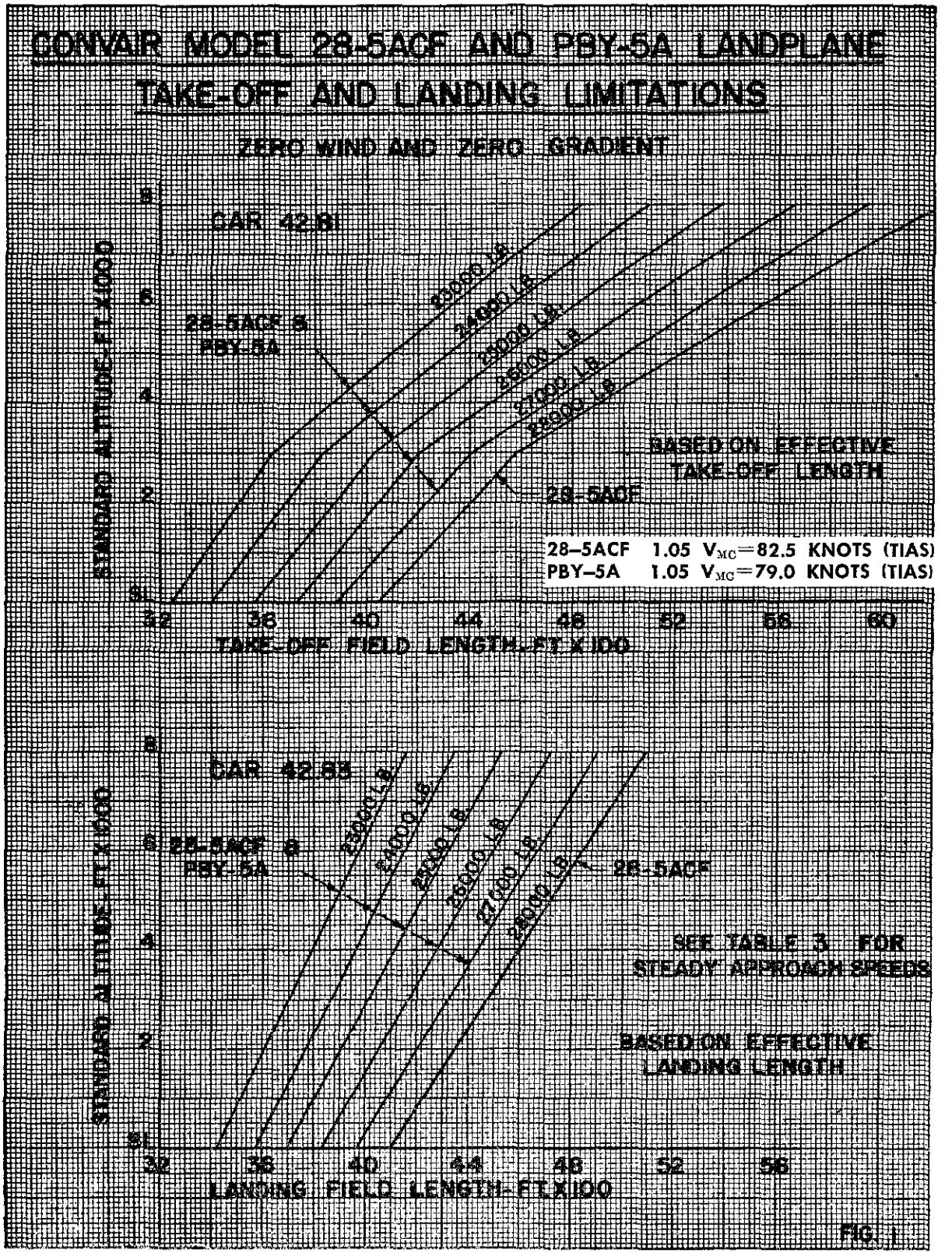
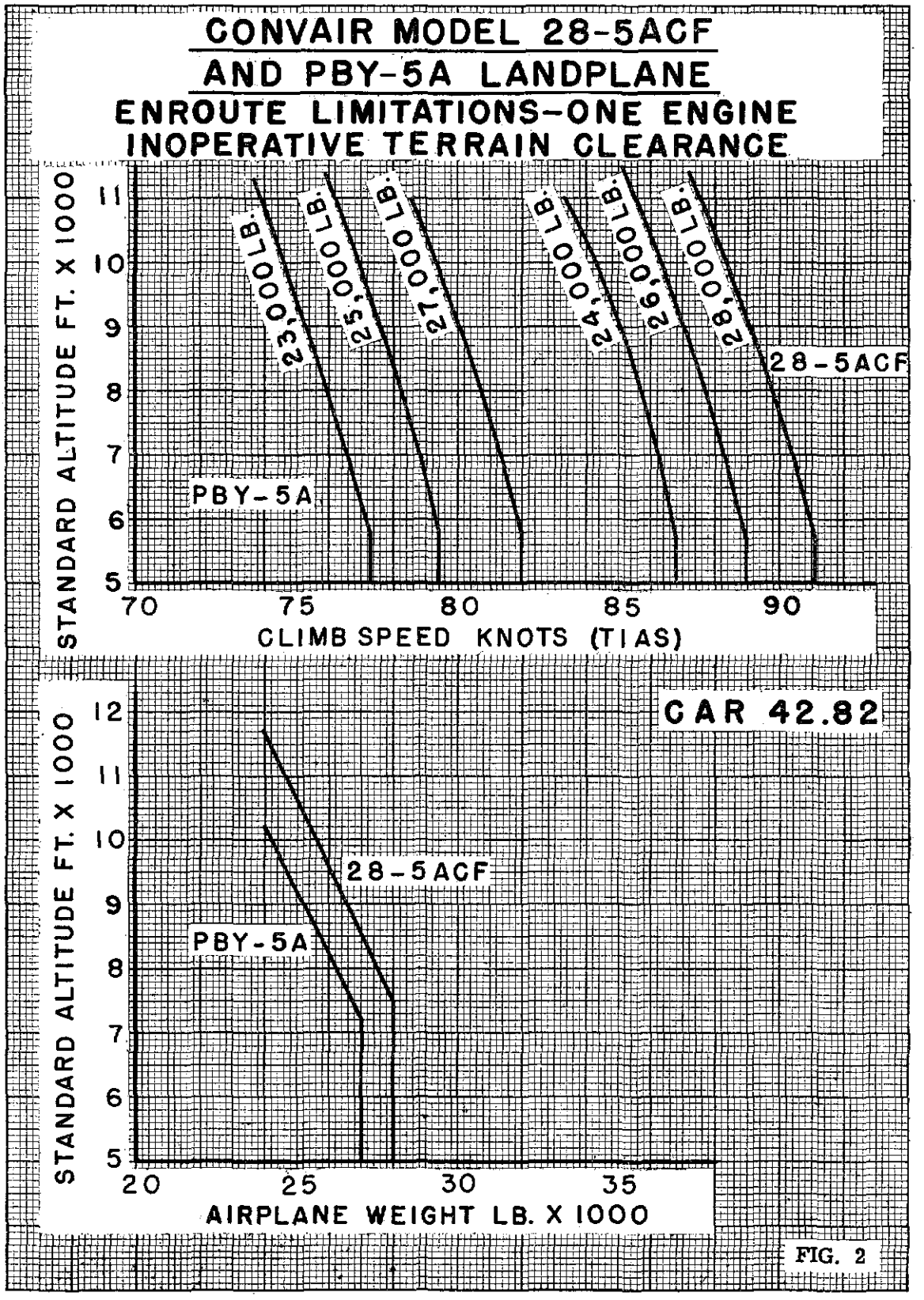

CONVAIR MODEL 28-5ACF AND PBY-5A LANDPLANE
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.61
28-5ACF & PBY-5A
28-5ACF
BASED ON EFFECTIVE TAKE-OFF LENGTH
28-5ACF 1.05 V_{MC}=82.5 KNOTS (TIAS)
PBY-5A 1.05 V_{MC}=79.0 KNOTS (TIAS)
STANDARD ATMOSPHERE-FT X 1000
TAKE-OFF FIELD LENGTH-FT X 100
CAR 42.65
28-5ACF & PBY-5A
28-5ACF
SEE TABLE 3 FOR STEADY APPROACH SPEEDS
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 (CAA 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.

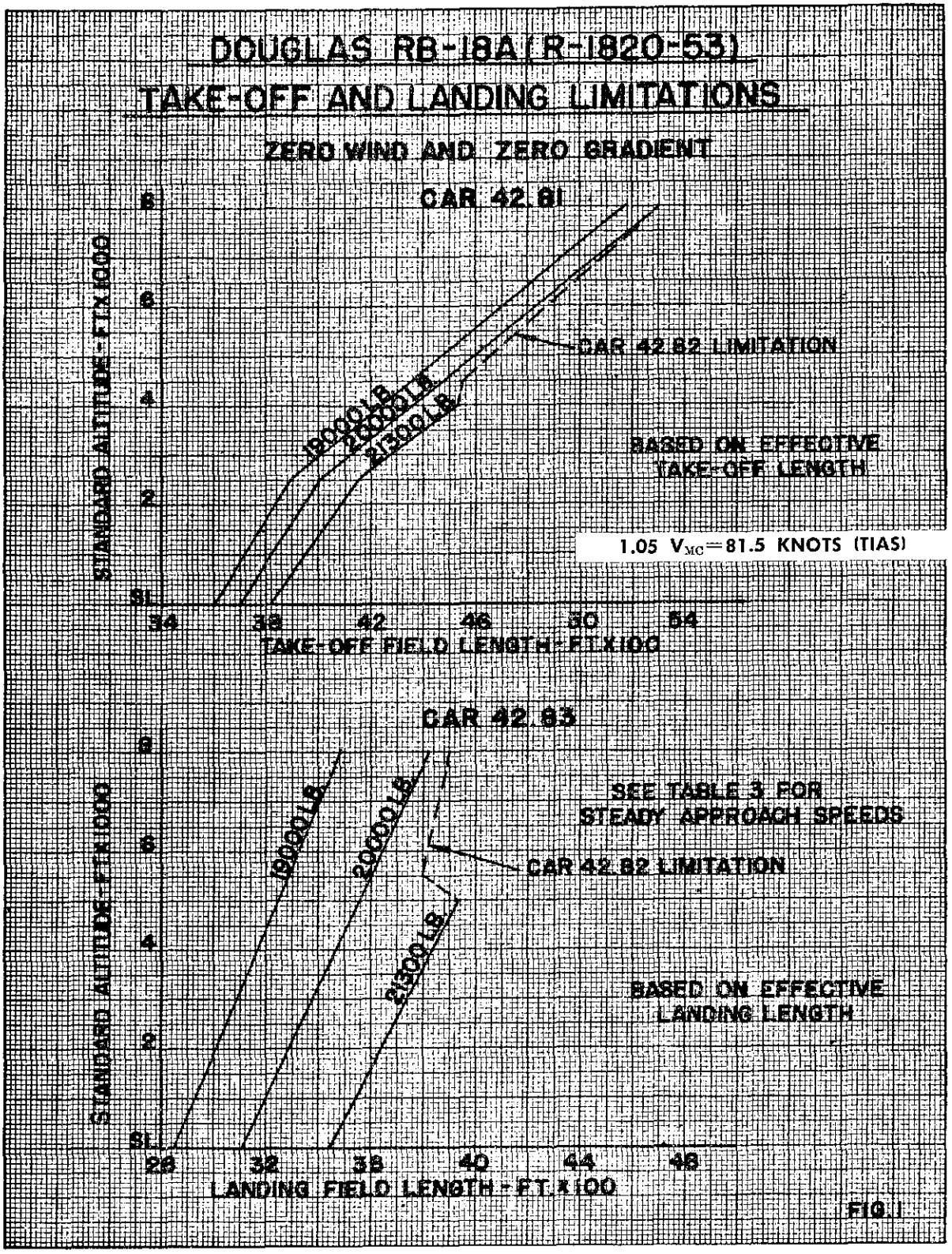
Standard altitude in feet	Airplane weight in pounds and approach speeds [1] in knots							
	19,000	V_{50}	20,000	V_{50}	21,000	V_{50}	21,300	V_{50}
	Distance in feet							
S. L.	2,850	74.5	3,110	77.0	3,370	78.5	3,445	79.0
1,000	2,930	74.5	3,200	77.0	3,470	78.5	3,545	79.0
2,000	3,010	74.5	3,290	77.0	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				

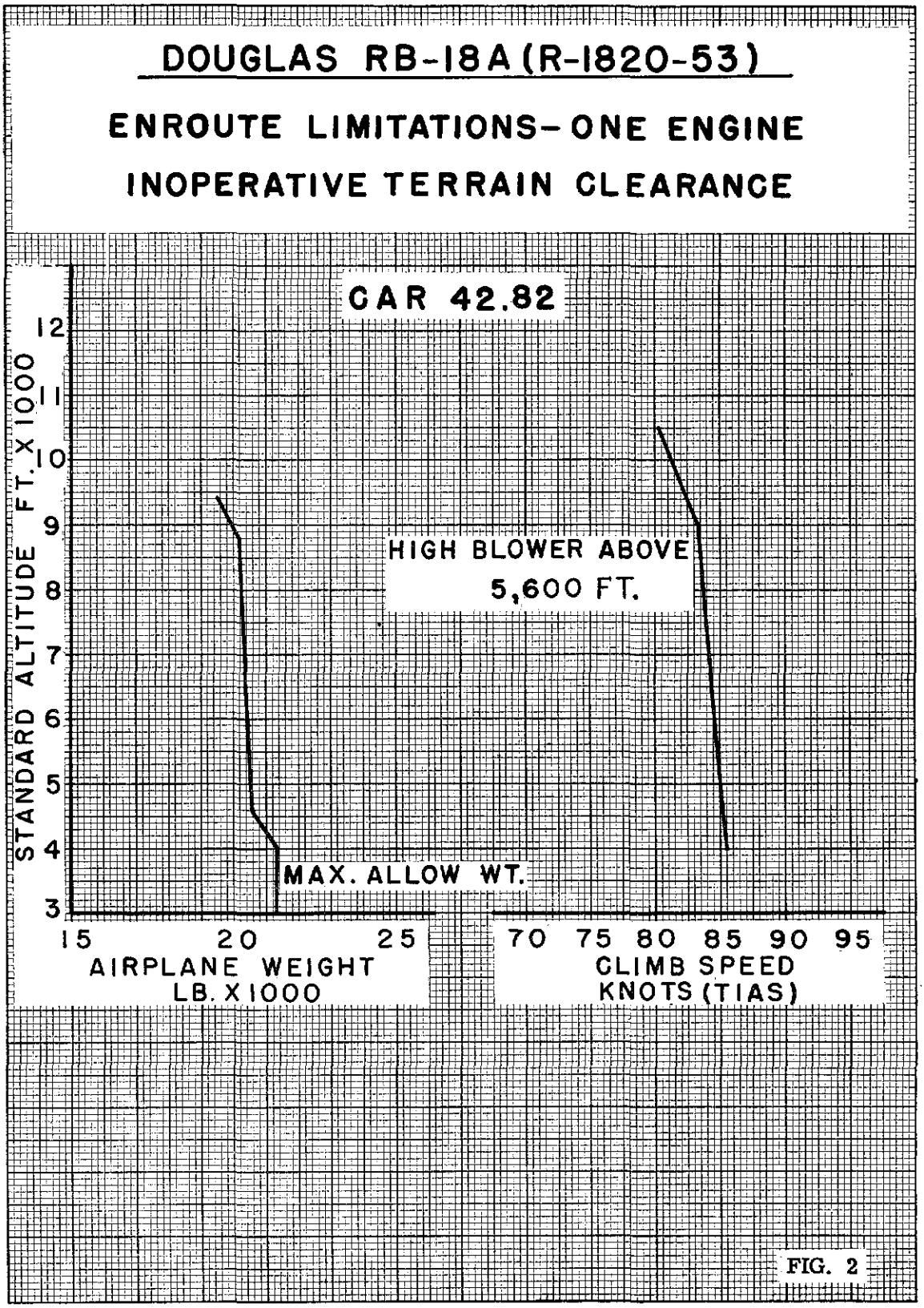
[1] Steady approach speed through 50 feet height knots TIAS denoted by symbol V_{50}.
[2] Limited by sec. 42.82.

(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
1900 LB
2000 LB
2130 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
1900 LB
2000 LB
2130 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 weights below 12,500 pounds (CAA rules which apply to sec. 42.80).* The following en route limitations data, applicable to Aero Commander 520, Beech 18A, Beech AT–11, Beech C18S, Beech D18C, Beech D18S, Beech 50, Cessna T–50, Grumman G–21, Lockheed 10A, Lockheed 10E, and Lockheed 12A aircraft, shall be used in determining compliance with section 42.80. These data are presented in Table 1 and Figures 1 through 9. 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, September 8, 1954, effective October 1, 1954.)

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, 990	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. Airplaine 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 sec. 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

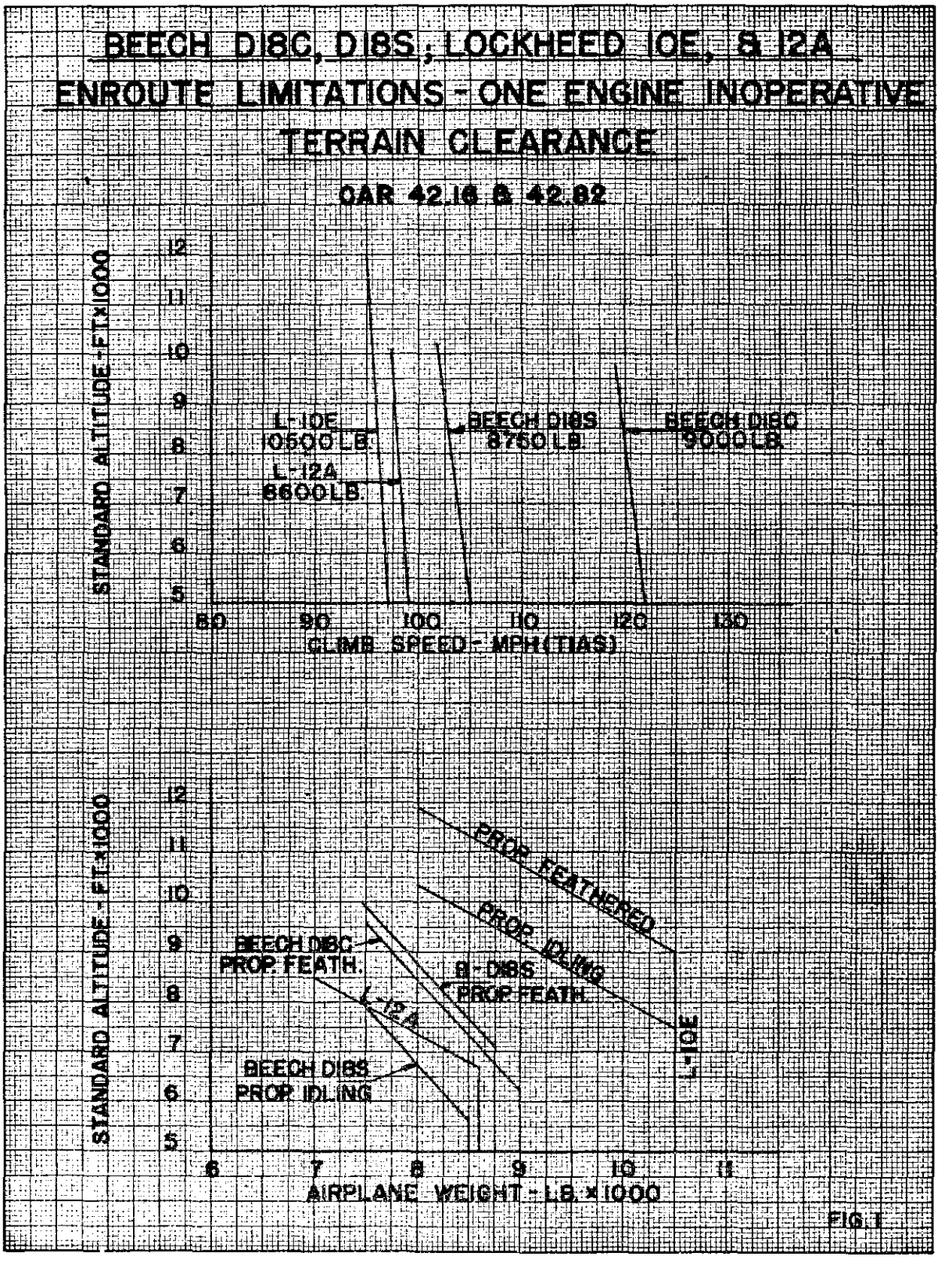
Weight in pounds	Terrain clearance [1] in feet and climb speed in miles per hour (TIAS)			
	Propeller feathered		Propeller idling	
	Feet	Miles per hour	Feet	Miles per hour
10,500	9,000	96	7,500	96.5
10,000	9,600	96	8,100	96.5
9,500	10,200	96	8,600	96.5
9,000	10,700	96	9,200	96.5
8,500	11,300	96	9,750	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.

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.


BEECH D18C, D18S; LOCKHEED 10E, & 12A
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
STANDARD ALTITUDE - FT.×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
BEECH D18S PROP. IDLING
B-D18S PROP. FEATH.
L-10E
AIRPLANE WEIGHT - LB. × 1000
FIG. 1

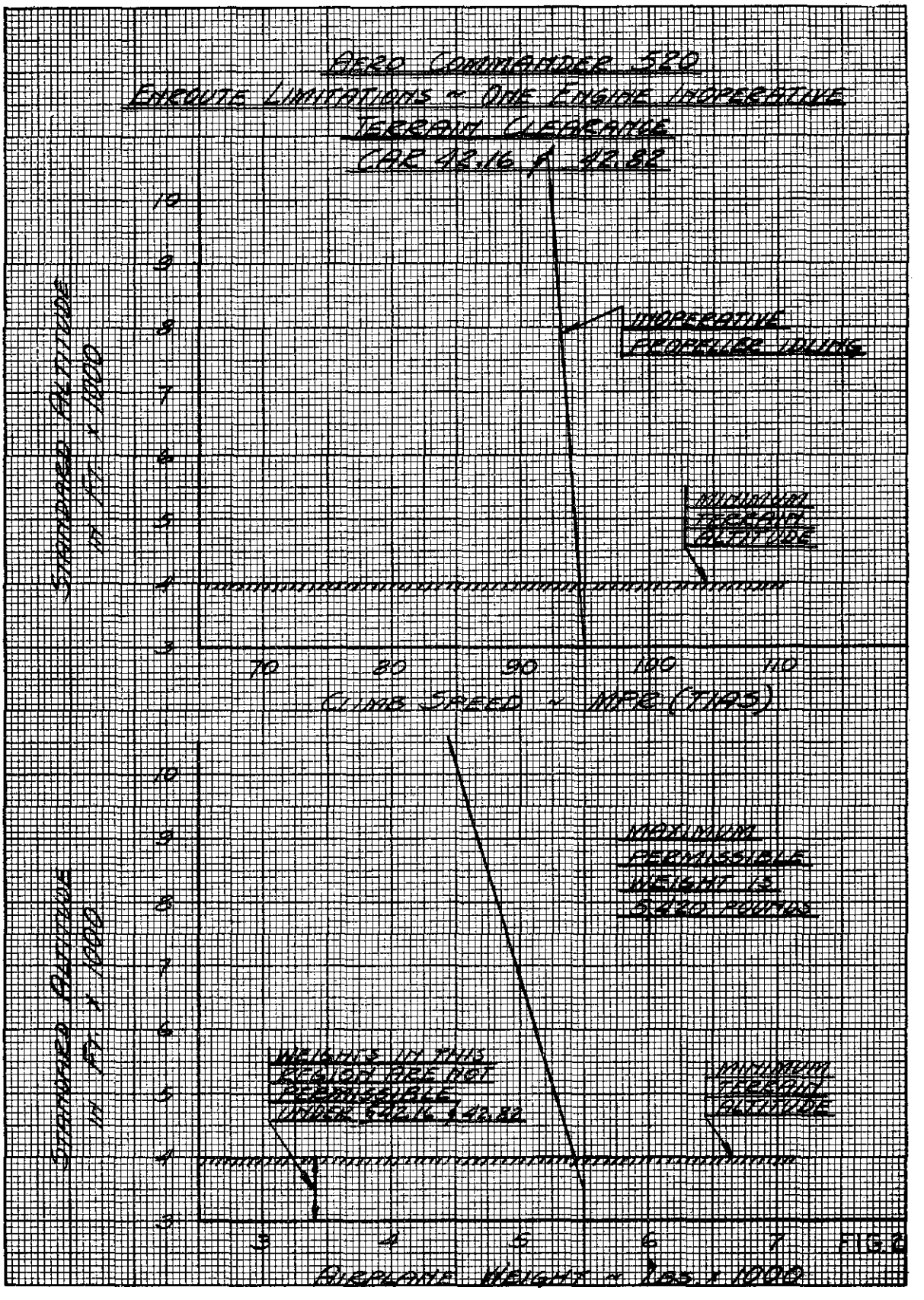

AERO COMMANDER 520
ENROUTE LIMITATIONS ~ ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
STANDARD ALTITUDE IN FT. x 1000
10
9
8
7
6
5
4
3
INOPERATIVE PROPELLER IDLING
MINIMUM TERRAIN ALTITUDE
70
80
90
100
110
CLIMB SPEED ~ MPR (TIAS)
STANDARD ALTITUDE IN FT. x 1000
MAXIMUM PERMISSIBLE WEIGHT IS 5,420 POUNDS
WEIGHTS IN THIS REGION ARE NOT PERMISSIBLE UNDER §42.16 & 42.82
MINIMUM TERRAIN ALTITUDE
3
4
5
6
7
AIRPLANE WEIGHT ~ LBS. x 1000

FIG. 2

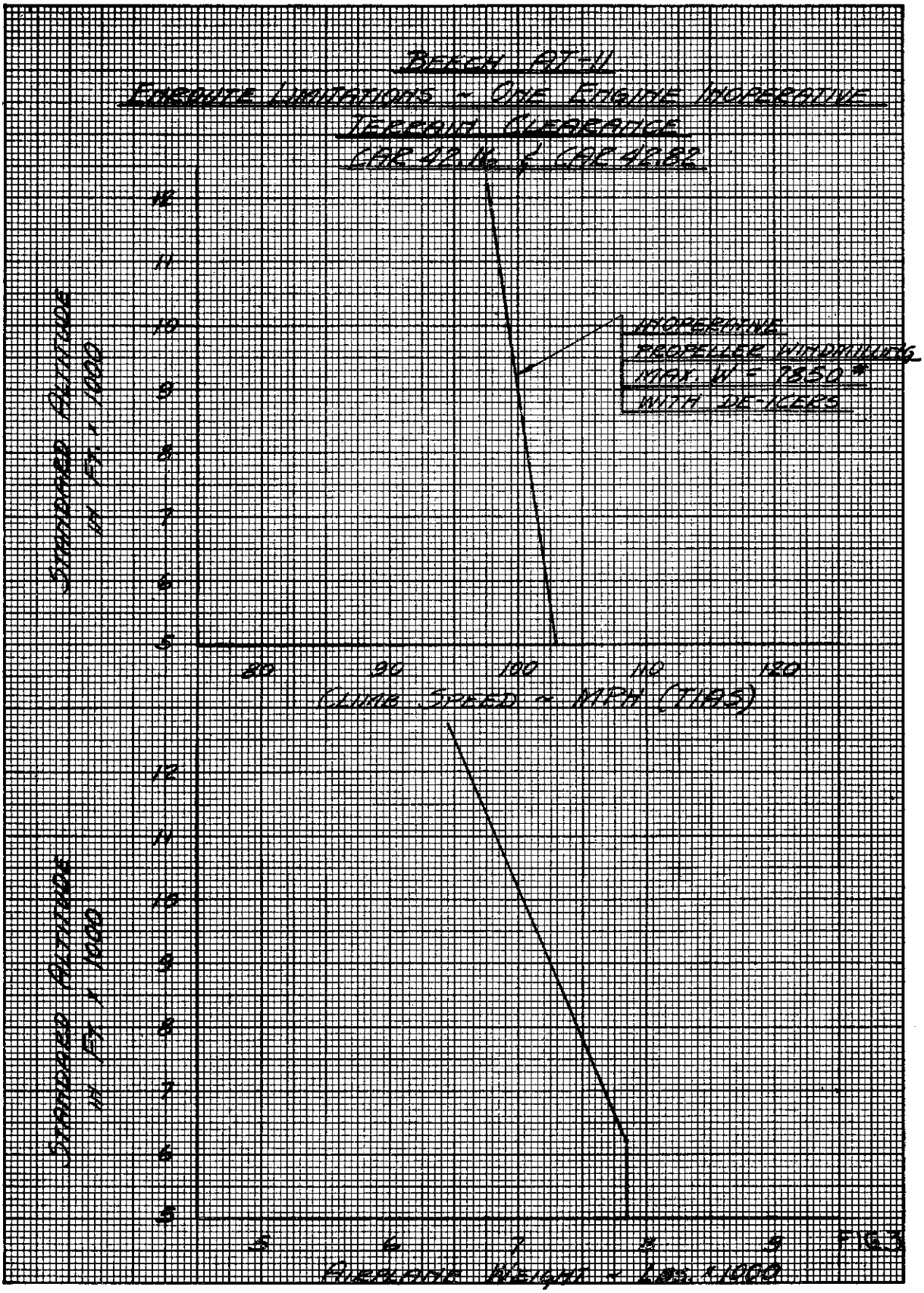

BEECH AT-11
ENROUTE LIMITATIONS ~ ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & CAR 42.82
INOPERATIVE
PROPELLER WINDMILLING
MAX. W = 7850#
WITH DE-ICERS
STANDARD ALTITUDE IN FT. x 1000
12
11
10
9
8
7
6
5
80
90
100
110
120
CLIMB SPEED ~ MPH (TIAS)
STANDARD ALTITUDE IN FT. x 1000
12
11
10
9
8
7
6
5
5
6
7
8
9
AIRPLANE WEIGHT ~ LBS. x 1000

FIG. 3

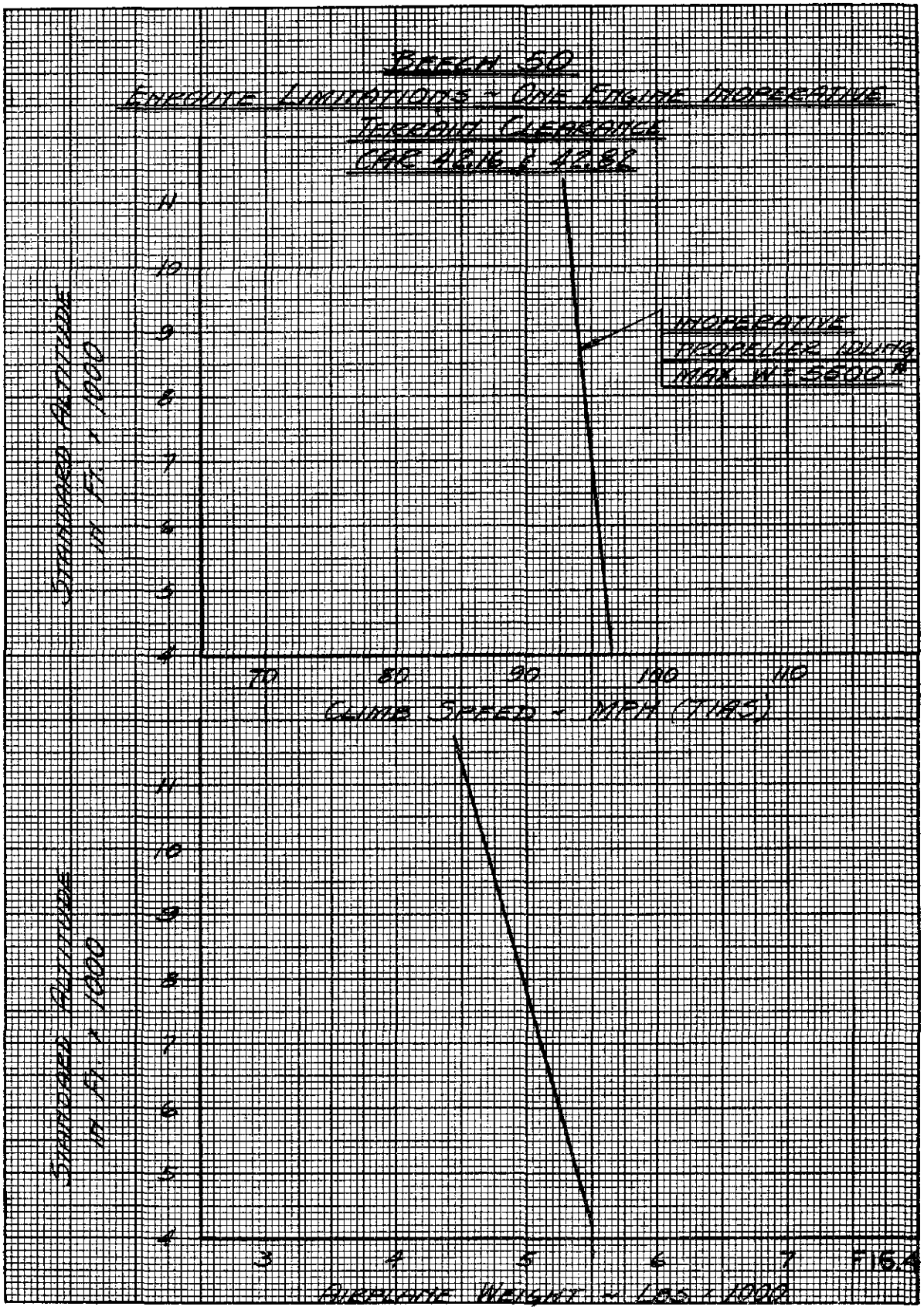

BEECH 50
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
INOPERATIVE PROPELLER IDLING
MAX. W = 5500#
STANDARD ALTITUDE IN FT. x 1000
11
10
9
8
7
6
5
4
70
80
90
100
110
CLIMB SPEED - MPH (TIAS)
STANDARD ALTITUDE IN FT. x 1000
11
10
9
8
7
6
5
4
3
4
5
6
7
AIRPLANE WEIGHT - LBS. x 1000

FIG. 4

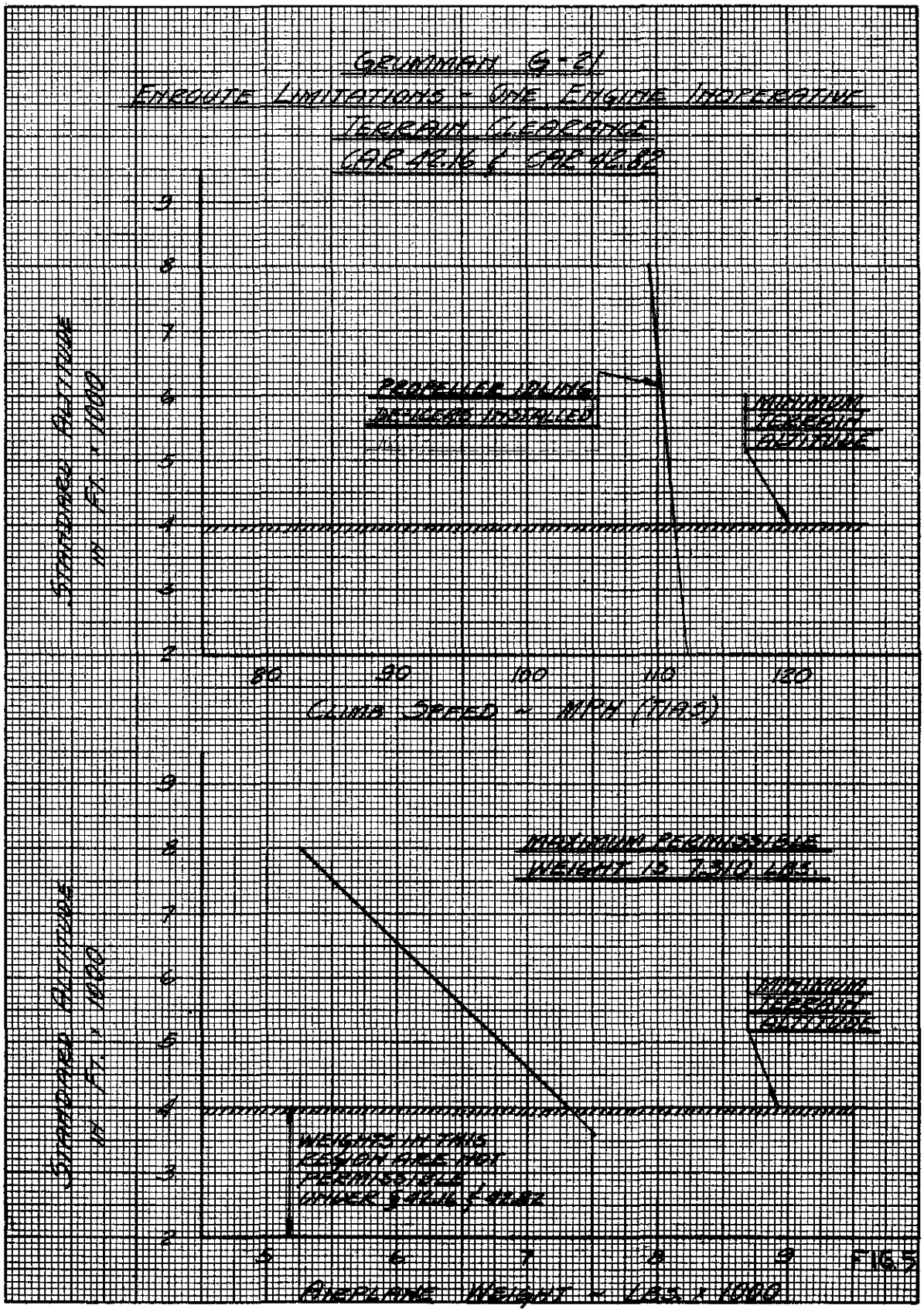

GRUMMAN G-21
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & CAR 42.82
STANDARD ALTITUDE IN FT. x 1000
PROPELLER IDLING DE-ICERS INSTALLED
MINIMUM TERRAIN ALTITUDE
CLIMB SPEED ~ MPH (TIAS)
MAXIMUM PERMISSIBLE WEIGHT IS 7,310 LBS.
WEIGHTS IN THIS REGION ARE NOT PERMISSIBLE UNDER § 42.16 & 42.82
AIRPLANE WEIGHT ~ LBS. x 1000

FIG. 5

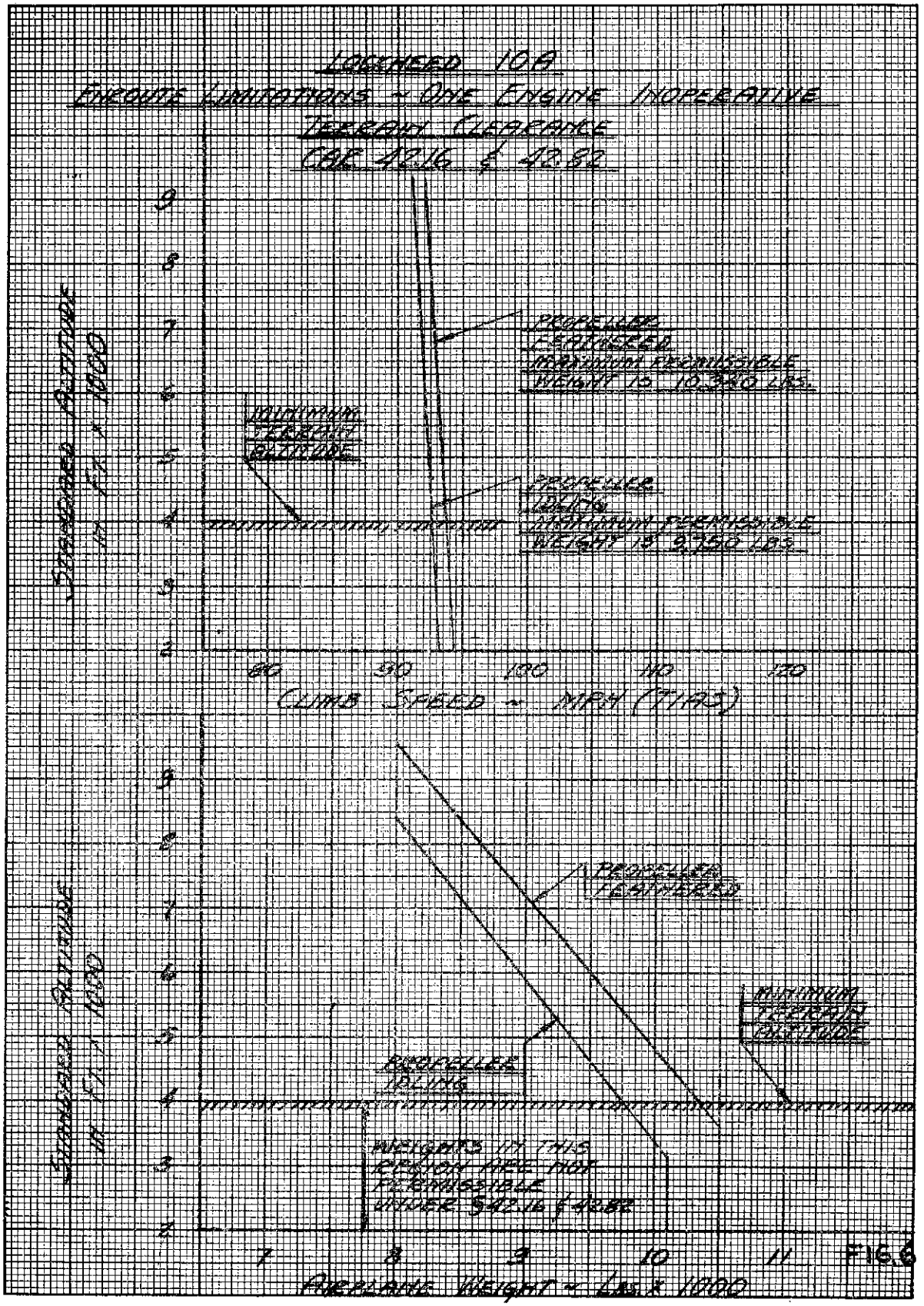

LOCKHEED 10A
ENROUTE LIMITATIONS ~ ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
STANDARD ALTITUDE IN FT. x 1000
PROPELLER FEATHERED MAXIMUM PERMISSIBLE WEIGHT IS 10,340 LBS.
MINIMUM TERRAIN ALTITUDE
PROPELLER IDLING MAXIMUM PERMISSIBLE WEIGHT IS 9,750 LBS.
CLIMB SPEED ~ MPH (TIAS)
PROPELLER 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

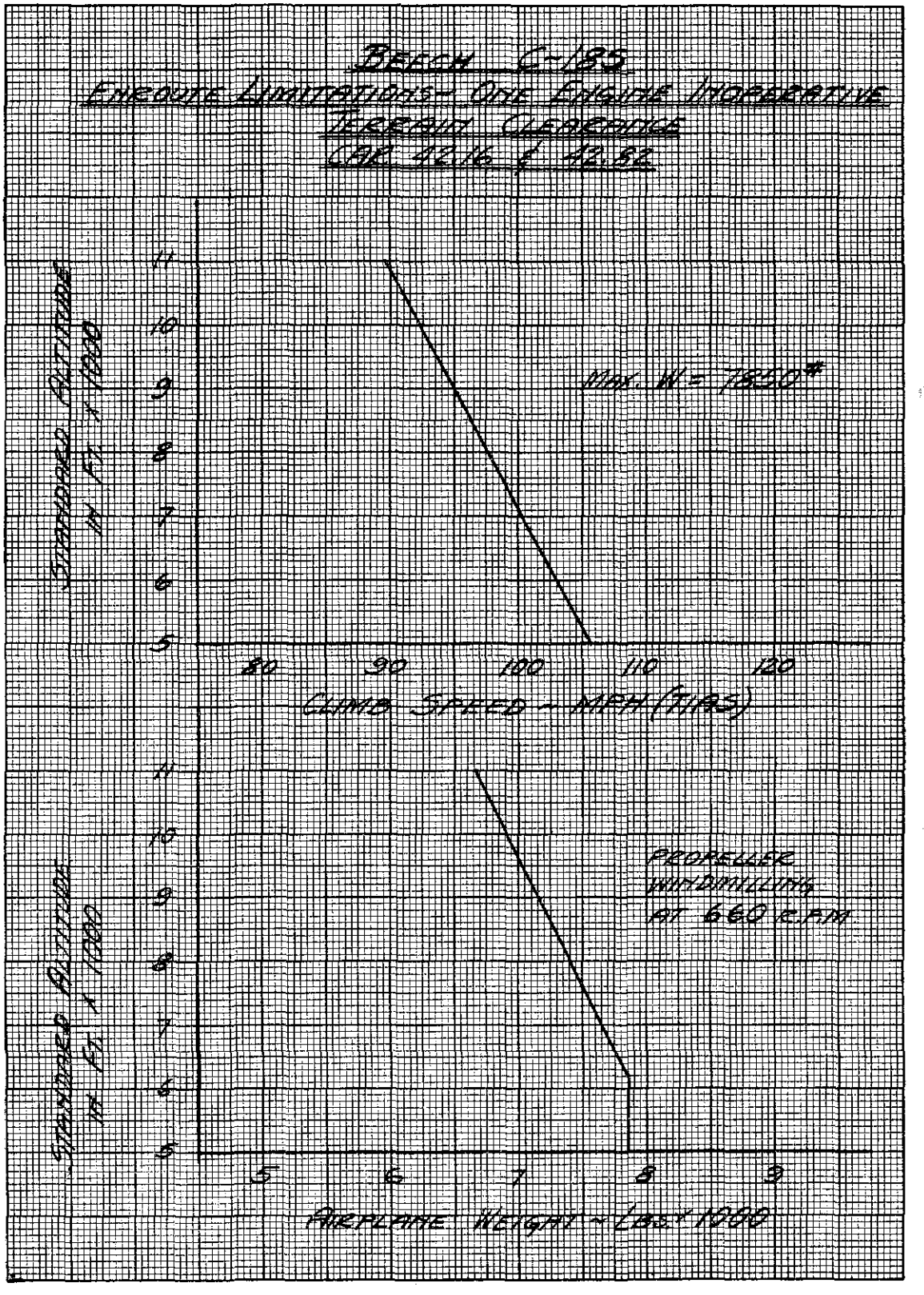

BEECH C-185
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
STANDARD ALTITUDE IN FT. X 1000
11
10
9
8
7
6
5
MAX. W = 7850#
80
90
100
110
120
CLIMB SPEED ~ MPH (TIAS)
STANDARD ALTITUDE IN FT. X 1000
11
10
9
8
7
6
5
PROPELLER WINDMILLING AT 660 R.P.M.
5
6
7
8
9
AIRPLANE WEIGHT ~ LBS. X 1000

Figure 7

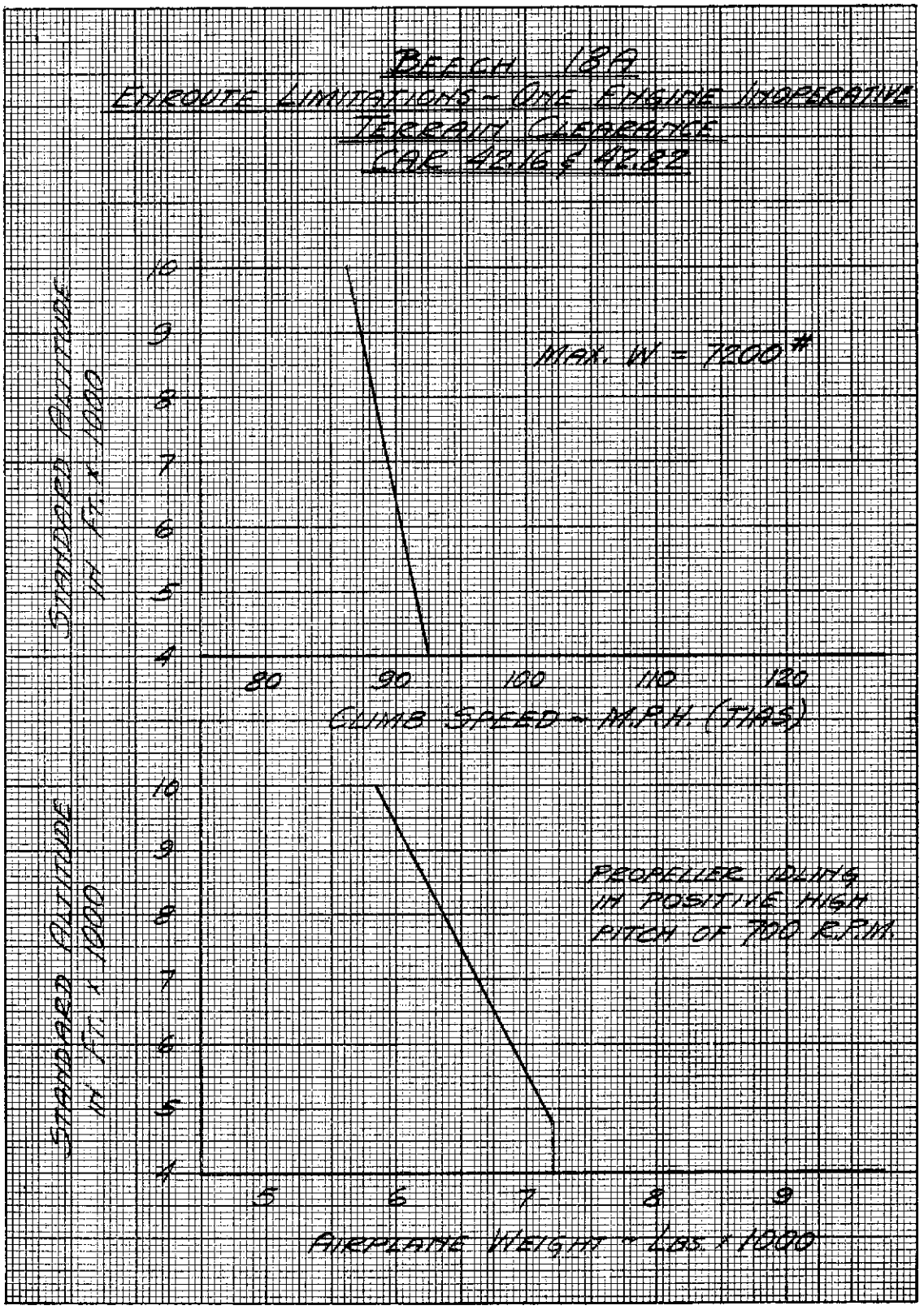

BEECH 18A
ENROUTE LIMITATIONS - ONE ENGINE INOPERATIVE
TERRAIN CLEARANCE
CAR 42.16 & 42.82
MAX. W = 7200#
STANDARD ALTITUDE IN FT. x 1000
CLIMB SPEED - M.P.H. (TIAS)
PROPELLER PLANTS IN POSITIVE HIGH PITCH OF 700 R.P.M.
AIRPLANE WEIGHT - LBS. x 1000

Figure 8

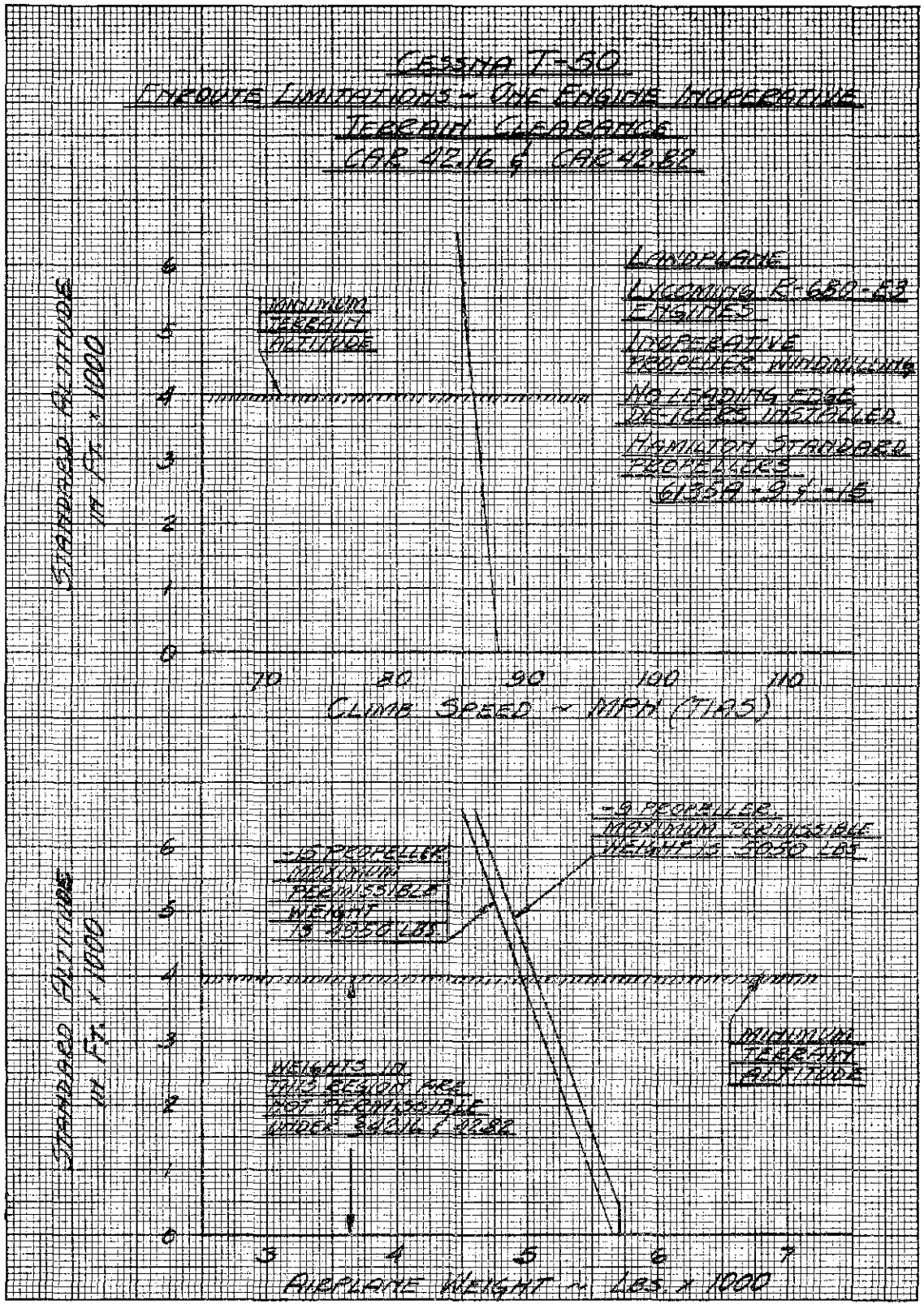


Figure 9

(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.)

42.80–7 *Performance data on Boeing S–307 aircraft (CAA 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}.

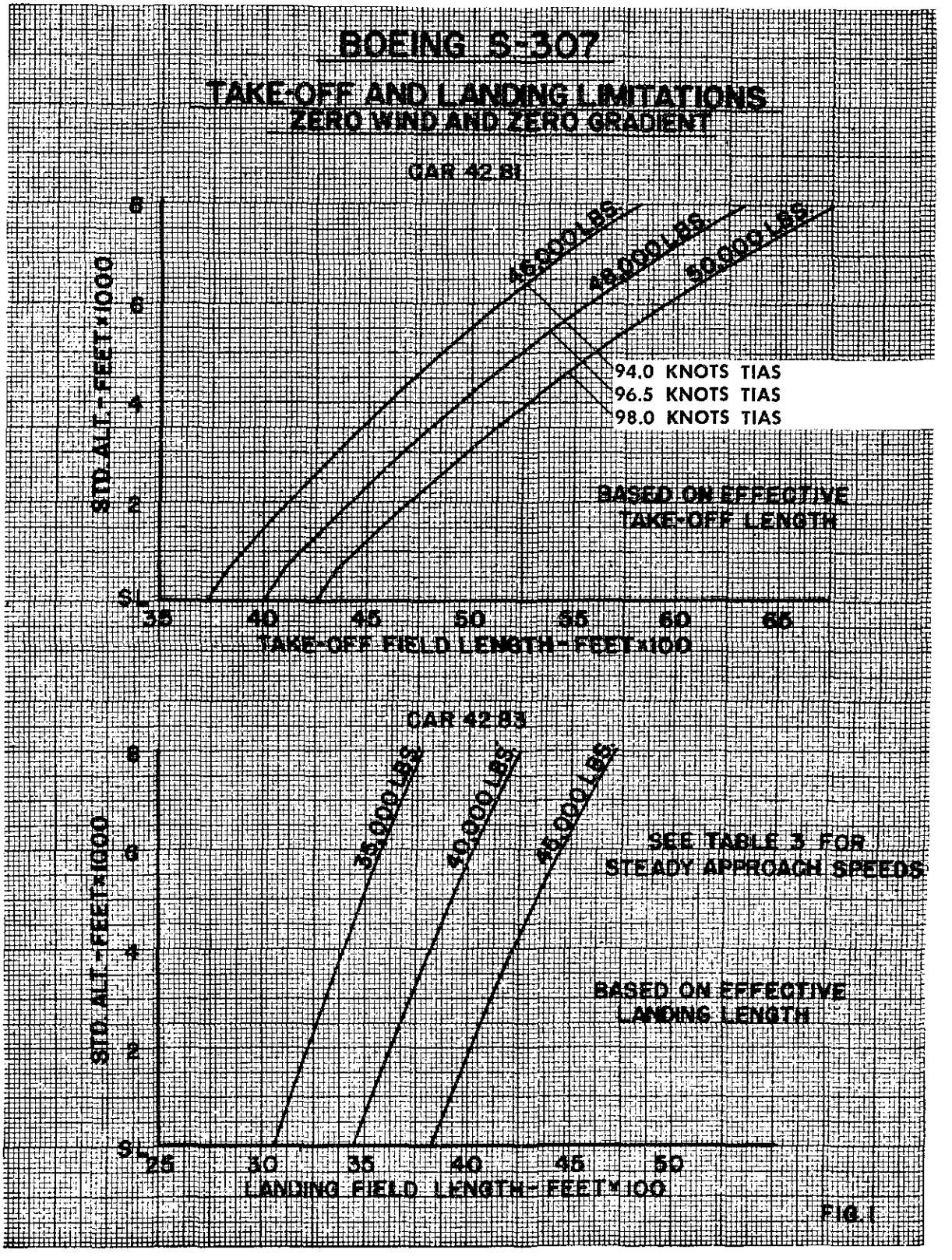
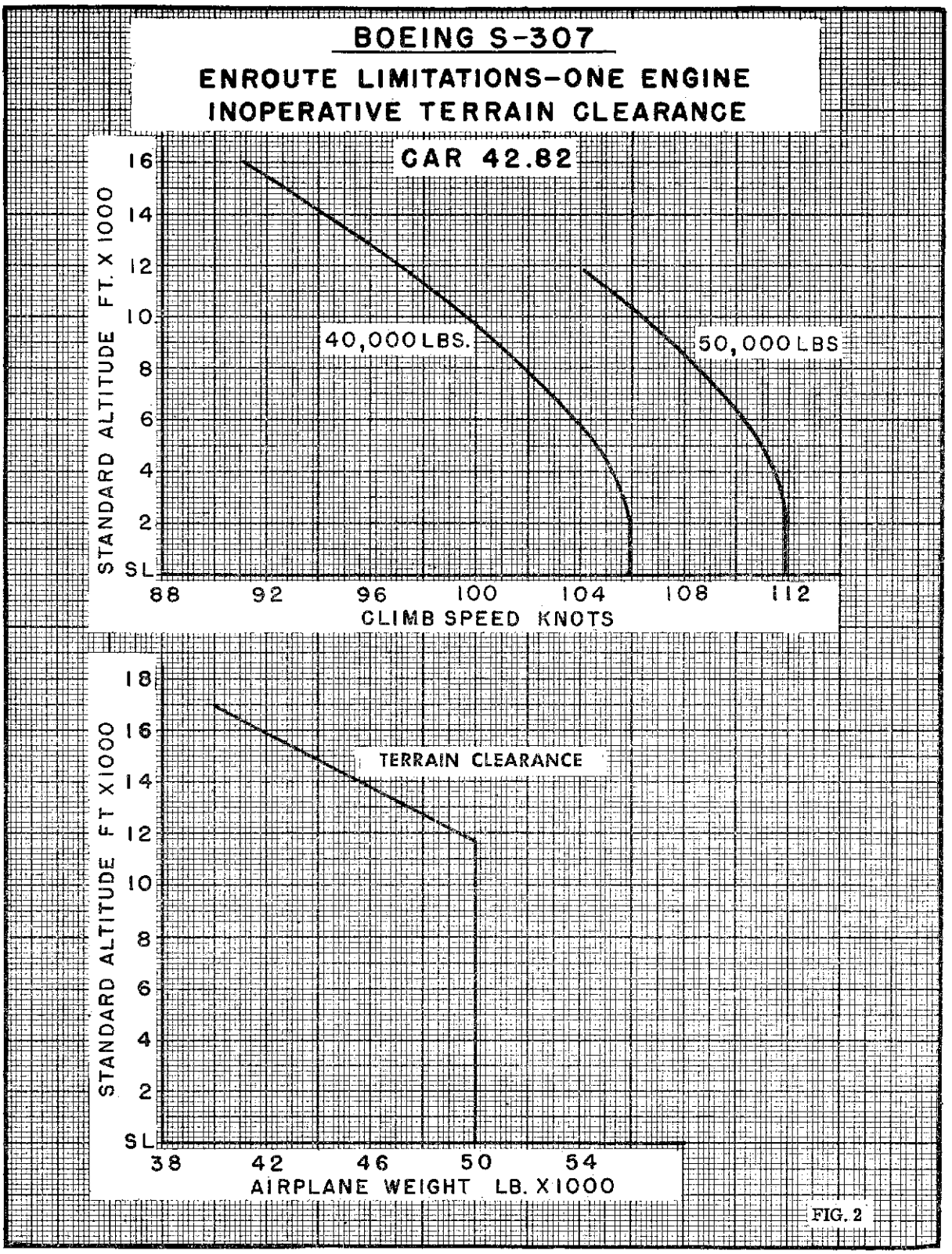

BOEING S-307
TAKE-OFF AND LANDING LIMITATIONS
ZERO WIND AND ZERO GRADIENT
CAR 42.81
46,000 LBS.
48,000 LBS.
50,000 LBS.
94.0 KNOTS TIAS
96.5 KNOTS TIAS
98.0 KNOTS TIAS
BASED ON EFFECTIVE TAKE-OFF LENGTH
STD. ALT. - FEET x 1000
SL
2
4
6
8
35
40
45
50
55
60
65
TAKE-OFF FIELD LENGTH - FEET x 100
CAR 42.83
35,000 LBS.
40,000 LBS.
45,000 LBS.
SEE TABLE 3 FOR STEADY APPROACH SPEEDS
BASED ON EFFECTIVE LANDING LENGTH
STD. ALT. - FEET x 1000
SL
2
4
6
8
25
30
35
40
45
50
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 (CAA 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 78)

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] 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 eet 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 80)

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.)

Required Records and Reports

42.91–1 *Content of maintenance records (CAA policies which apply to section 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 (CAA policies which apply to section 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 (CAA policies which apply to section 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.)

42.92–1 *Content of airman records (CAA policies which apply to section 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.

(Published in 14 F. R. 7041, Nov. 22, 1949, effective upon publication.)

42.92–2 *Availability of records (CAA policies which apply to section 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 (CAA policies which apply to section 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.)

42.93–1 *Submission of emergency flight reports (CAA policies which apply to section 42.93).* The report referred to in this section shall be submitted in duplicate to the local aviation safety agent, 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 upon publication.)

42.94–1 *Submission of pilot's emergency deviation report (CAA policies which apply to section 42.94).* The report referred to in this section shall be submitted in duplicate to the local aviation safety agent, 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 upon publication.)

42.96–1 *Mechanical hazard and difficulty reports (CAA rules which apply to section 42.96).*

(a) *General.* The following reporting pro-

cedure will apply to all certificated irregular air carriers which operate large aircraft and eliminates the necessity for submission of form ACA–1226 by these operators.

(b) *Daily mechanical reports.*

(1) *Submission of reports.* Whenever a failure, malfunction, or other defect[10] is detected in flight or on the ground in an aircraft or aircraft component, which may reasonably be expected by the air carrier to cause a serious hazard in the operation of any aircraft, notice thereof is to be transmitted to the nearest CAA aviation safety district or regional office in the area in which the aircraft is being operated.

(2) *Times of submission.* Such daily reports should be submitted only where mechanical hazards have been detected; should be submitted within the 24-hour period from midnight to midnight of the day of occurrence; and should be transmitted to the nearest aviation safety office before noon of the following working day when possible, except that reports for Fridays, Saturdays, and Sundays should be submitted not later than noon of the following Monday. When it is impossible to furnish the report before noon due to scheduling, it should be reported as early as possible, but in no case later than 24 hours after the period for which the report is submitted. It is not necessary that the operator's personnel personally appear at the CAA office since such reports may be transmitted by telephone, wire, or other rapid means of communication.

(3) *Method of transmission.* Such reports may be transmitted in a manner or on a form convenient to the air carrier's system of communications and procedures.

(i) *Suggested form for transmission.* Whenever practicable, the following guide for each aircraft type should be used by the air carrier in submission of the daily reports:

(*a*) Type, CAA identification number of aircraft, air carrier, and date;

(*b*) Emergency procedure effected (unscheduled landing, dumping fuel, etc.);

(*c*) Nature of condition (fire, structural failure, etc.);

(*d*) Identification of part and system involved, including the model designation of the major component (e. g., P & WR–2800–34);

(*e*) Apparent cause of trouble (wear, cracks, design, personnel error, etc.);

(*f*) Disposition (repaired, replaced, aircraft grounded, etc.);

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

(4) *Supplementary information.* The daily reports should not be withheld pending presentation of all specific details pertaining to such items of information. As soon as the additional information is obtained, it is to be submitted in an expedited supplement to the original report, making reference to the date and place of submission of the first report.

(c) *Monthly report of chronic mechanical difficulties.* As soon as practicable after the end of each calendar month, each certificated irregular air carrier operating large aircraft shall submit three copies of a report covering the mechanical difficulties experienced during the preceding month which they consider chronic or otherwise particularly significant from a safety standpoint. The report is to fully identify all components (manufacturer, model, type, etc.) and contain sufficient information so as to enable a determination of the trend of failures and defects and to provide information on which to base corrective action. The detailed information from which such reports are prepared shall be kept current and available for examination at the air carrrier's main headquarters by any authorized representative of the Administrator or Board.

The reports shall be submitted to the office of the assigned aviation safety agent—aircraft maintenance.

(Published in 14 F. R. 7042, Nov. 22, 1949, effective upon publication; amended in 18 F. R. 1719, Mar. 27, 1953, effective Apr. 15, 1953.)

[10] Failures, malfunctions, or other defects not covered by Part 62 of this subchapter (i. e. the Civil Air Regulations), which are to be reported under these rules, comprise generally the following basic items: Fire hazards, structural hazards, serious system or component malfunctions or failures, unsafe procedures or conditions, and defects in design or quality of parts and materials found installed on aircraft or intended for such installation.

Appendix A

Special Civil Air Regulations

Appendix A is reserved for inclusion of those Special Civil Air Regulations issued by the Civil Aeronautics Board in application to this part. The special regulations listed below, as well as copies of subsequent issues of such regulations, may be obtained from the Publications Section, Civil Aeronautics Board, Washington 25, D. C. It is suggested that this listing of special regulations be maintained current by recording all changes and new issues.

Number	Supersedes	Effective date	Termination date
SR–368A	SR–368	Aug. 1, 1954	July 31, 1957
SR–389		Oct. 27, 1952	
SR–392A	SR–392	July 1, 1955	June 30, 1960
SR–395A	SR–395	Feb. 20, 1955	
SR–399A	SR–399	Oct. 26, 1955	Oct. 25, 1960
SR–401A	SR–401	Aug. 25, 1955	Apr. 1, 1959
SR–406B	SR–406A	Apr. 1, 1956	
SR–410		Apr. 18, 1955	
SR–411		July 1, 1955	June 30, 1957
SR–415		Jan. 1, 1956	
SR–416		Feb. 23, 1956	

Appendix B

Air Taxi Operators

42.0–2 *Provisions of part 42 which are applicable to air taxi operators (CAA interpretations which apply to section 42.0 and SR–378).*

(a) Under SR–378, the following sections of the certification and operation rules of Part 42 apply to air taxi operators:

42.0 Applicability of part 42 (a).
42.1 Definitions. (a) (2), (4), (5), (6), (7), (12a), (13), (14), (15), (20), (21), (22), (23), (24), (27), (28), (29), (30), (32), (33).
42.5 Certificate issuance.
42.7 Display.
42.8 Inspection.
42.11 Aircraft required.
42.14 Minimum performance requirements for all aircraft.
42.16 Aircraft limitations for IFR and land aircraft over water operations.
42.21 Basic required instruments and equipment for aircraft.
42.24 First aid and emergency equipment.
42.25 Cockpit checklist.
42.26 Supplemental oxygen.
42.28 Equipment standards.
42.29 Protective breathing equipment for the flight crew.
42.30 General. (Maintenance requirements.)
42.31 Inspections and maintenance. (a) (2), (b).
42.40 Airman requirements.
42.41 Composition of flight crew. (a), (b), (c).
42.42 Pilot qualification for small aircraft.
42.44 Recent flight experience requirements for flight crew members.
42.46 Logging flight time.
42.47 Grace period for airman periodic checks.
42.51 Pilot responsibilities.
42.52 Fuel supply. (a) (1), (3), (b).
42.53 Minimum flight altitude rules.
42.54 Flight into known icing conditions.
42.55 Weather minimums.
42.56 Instrument approach.
42.57 Airport lighting for night operations.
42.58 Navigational aids for IFR flight.
42.59 Passenger use of emergency equipment.
42.62 Flight manifest for large aircraft and passenger-carrying aircraft operating under IFR conditions.
42.91 Maintenance records.
42.92 Airman records.
42.93 Emergency flight reports.
42.94 Pilot's emergency deviation report.
42.95 Flight manifest record.
42.96 Reporting of malfunctioning and defects.

(b) The following sections of CAM 42 are applicable to the provisions of part 42 listed in paragraph (a):

42.1–1 Flight time *(CAA interpretations which apply to 42.1 (a) (14)).*
42.1–2 Twilight *(CAA interpretations which apply to 42.1 (a) (20)).*
42.11–1 Listing of aircraft. *(CAA rules which apply to 42.11 (a).*
42.21–1 Seats and safety belts *(CAA rules which apply to 42.21 (a) (11)).*
42.21–2 Fire extinguishers *(CAA rules which apply to 42.21 (a) (12)).*
42.21–3 Altimeter *(CAA policies which apply to 42.21 (b) (1)).*

42.24–1 First-aid and emergency equipment (*CAA policies which apply to 42.24*).
42.24–2 First-aid kit (*CAA rules which apply to 42.24* (*a*)).
42.24–4 Emergency equipment (*CAA rules which apply to 42.24* (*b*)).
42.25–1 Cockpit check list (*CAA policies which apply to 42.25*).
42.25–2 Minimum standard cockpit check list (*CAA policies which apply to 42.25*).
42.30–1 General (Maintenance) (*CAA policies which apply to 42.30*).
42.31–2 Maintenance and inspection—small aircraft (*CAA policies which apply to 42.31* (*a*) (*2*)).
42.31–3 Maintenance and inspection; all aircraft (*CAA policies which apply to 42.31* (*a*) (*1*) and (*2*)). (e) (1), (2).
42.31–4 Maintenance and inspection records (*CAA policies which apply to 42.31* (*b*)).
42.51–1 Responsibilities of the pilot in command (*CAA policies which apply to 42.51*).
42.51–2 Time of reporting for duty (*CAA policies which apply to 42.51* (*b*)).
42.51–3 Flight equipment (*CAA policies which apply to 42.51* (*c*)).
42.51–4 Serviceability of equipment (*CAA policies which apply to 42.51* (*e*)).
42.52–1 Operation in the Territory of Alaska (*CAA policies which apply to 42.52* (*b*)).
42.54–1 Other parts of the aircraft (*CAA interpretations which apply to 42.54*).
42.55–1 En route weather minimums (*CAA interpretations which apply to 42.55* (*a*)).
42.55–2 Air traffic clearance (*CAA interpretations which apply to 42.55* (*a*)).
42.56–1 Standard instrument approach procedures (*CAA rules which apply to 42.56*).
42.57–1 Minimum facilities (*CAA policies which apply to 42.57*).
42.58–1 Off-airway instrument operation (*CAA rules which apply to 42.58*).
42.62–1 Content of flight manifest (*CAA policies which apply to 42.62*).
42.91–1 Content of maintenance records (*CAA policies which apply to 42.91*).
42.91–3 Retention of records (*CAA policies which apply to 42.91*).
42.92–1 Content of airman records (*CAA policies which apply to 42.92*).
42.92–2 Availability of records (*CAA policies which apply to 42.92*).
42.92–3 Retention of records (*CAA policies which apply to 42.92*).
42.93–1 Submission of emergency flight reports (*CAA policies which apply to 42.93*).
42.94–1 Submission of pilot's emergency deviation report (*CAA policies which apply to 42.94*).

(c) In addition to the items listed in (a) and (b), air taxi operators are governed by the following regulations:

(1) Economic Regulations Part 298.

(2) Economic Regulations Part 242, if aircraft having more than five passenger seats are used.

42.0–3 *Operations for which an Air Taxi Operator Certificate is not required* (*CAA interpretations which apply to section 42.0 and SR–378*). The following operations which may involve remuneration are not considered as coming within the meaning of carriage by aircraft of persons or property as an air taxi operator:

(a) Student instruction.

(b) Local sightseeing flights which return to the point of departure without landing at other points.

(c) Any crop dusting, spraying, seeding, pest control, or other agricultural operations.

(d) Any industrial aviation operations such as patrol, photography, banner towing, etc.

(e) Any other aviation operation when the carriage of persons or materials is incidential to the main purpose of the flight.

42.5–5 *Application for an Air Taxi Operator Certificate* (*CAA rules which apply to section 42.5 and SR–378*). Application for an Air Taxi Operator Certificate shall 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 aviation safety agent or district office. When the requirements, as prescribed in this part, have been met (see sec. 42.0–2), the applicant shall present his application to the local aviation safety agent and arrange for an inspection of his flight equipment and all ground facilities.

Where inspection indicates that the applicant is capable of conducting the proposed operation in accordance with the provisions of 42.0–2, an Air Taxi Operator Certificate, form ACA–1603, will be issued, together with operations specifications. The operations specifications which have been approved on the application form become a part of the certificate, and specify the carriage of passengers, cargo, or both; the category and class of aircraft (e. g., aircraft single-engine land); and the flight conditions under which operations are authorized (e. g., VFR (day), VFR (night), IFR (day), IFR (night).

42.5–6 *Amendment and reissuance of Air Taxi Operator Certificates (CAA rules which apply to section 42.5).* Application for amendment and reissuance of an Air Taxi Operator Certificate shall be made, in accordance with procedure for original issuance, when the operator desires a change in:

(a) Name of address of operator.
(b) Ownership.
(c) Area of operations.
(d) Base of operations.
(e) Type of operations.

In cases of (a), (b), and (c) the agent may elect to inspect the aircraft as for original issuance.

In cases of (d) the agent may elect to inpect the aircraft if the base of operations is not moved out of the region of previous certification. Inspection will be made and a new certificate and number will be issued when the base is moved to another region.

In cases of (e) inspection as for original issuance will be made.

42.11–2 *Listing of small aircraft (CAA interpretations which apply to section 42.11).* An air taxi operator is required to have the exclusive use of at least one aircraft. However, such aircraft are not required to be listed on the operations specifications of air carrier operating certificates issued to air taxi operators. Therefore, no amendment of the certificate is required when an air taxi operator changes aircraft.

AVIATION INFORMATION