THE NATIONAL ARCHIVES OF THE UNITED STATES
LITTERA SCRIPTA MANET
1934

FEDERAL REGISTER

VOLUME 15 NUMBER 16

Washington, Wednesday, January 25, 1950

TITLE 3—THE PRESIDENT

EXECUTIVE ORDER 10096

PROVIDING FOR A UNIFORM PATENT POLICY FOR THE GOVERNMENT WITH RESPECT TO INVENTIONS MADE BY GOVERNMENT EMPLOYEES AND FOR THE ADMINISTRATION OF SUCH POLICY

WHEREAS inventive advances in scientific and technological fields frequently result from governmental activities carried on by Government employees; and

WHEREAS the Government of the United States is expending large sums of money annually for the conduct of these activities; and

WHEREAS these advances constitute a vast national resource; and

WHEREAS it is fitting and proper that the inventive product of functions of the Government, carried out by Government employees, should be available to the Government; and

WHEREAS the rights of Government employees in their inventions should be recognized in appropriate instances; and

WHEREAS the carrying out of the policy of this order requires appropriate administrative arrangements:

NOW, THEREFORE, by virtue of the authority vested in me by the Constitution and statutes, and as President of the United States and Commander in Chief of the armed forces of the United States, in the interest of the establishment and operation of a uniform patent policy for the Government with respect to inventions made by Government employees, it is hereby ordered as follows:

1. The following basic policy is established for all Government agencies with respect to inventions hereafter made by any Government employee:

(a) The Government shall obtain the entire right, title and interest in and to all inventions made by any Government employee (1) during working hours, or (2) with a contribution by the Government of facilities, equipment, materials, funds, or information, or of time or services of other Government employees on official duty, or (3) which bear a direct relation to or are made in consequence of the official duties of the inventor.

(b) In any case where the contribution of the Government, as measured by any one or more of the criteria set forth in paragraph (a) last above, to the invention is insufficient equitably to justify a requirement of assignment to the Government of the entire right, title and interest to such invention, or in any case where the Government has insufficient interest in an invention to obtain entire right, title and interest therein (although the Government could obtain some under paragraph (a), above), the Government agency concerned, subject to the approval of the Chairman of the Government Patents Board (provided for in paragraph 3 of this order and hereinafter referred to as the Chairman), shall leave title to such invention in the employee, subject, however, to the reservation to the Government of a non-exclusive, irrevocable, royalty-free license in the invention with power to grant licenses for all governmental purposes, such reservation, in the terms thereof, to appear, where practicable, in any patent, domestic or foreign, which may issue on such invention.

(c) In applying the provisions of paragraphs (a) and (b), above, to the facts and circumstances relating to the making of any particular invention, it shall be presumed that an invention made by an employee who is employed or assigned (i) to invent or improve or perfect any art, machine, manufacture, or composition of matter, (ii) to conduct or perform research, development work, or both, (iii) to supervise, direct, coordinate, or review Government financed or conducted research, development work, or both, or (iv) to act in a liaison capacity among governmental or nongovernmental agencies or individuals engaged in such work, or made by an employee included within any other category of employees specified by regulations issued pursuant to section 4 (b) hereof, falls within the provisions of paragraph (a), above, and it shall be presumed that any invention made by any other employee falls within the provisions of paragraph (b), above. Either presumption may be rebutted by the facts or circumstances attendant upon the conditions under which any particular invention is made and, notwithstanding the foregoing, shall not preclude a determination that the invention falls within the provisions of paragraph (d) next below.

(d) In any case wherein the Government neither (1) pursuant to the pro-

(Continued on next page)

CONTENTS

THE PRESIDENT

EXECUTIVE AGENCIES

FEDERAL REGISTER

Published daily, except Sundays, Mondays, and days following official Federal holidays, by the Division of the Federal Register, the National Archives, pursuant to the authority contained in the Federal Register Act, approved July 26, 1935 (49 Stat. 500, as amended; 44 U. S. C., ch. 8B), under regulations prescribed by the Administrative Committee, approved by the President. Distribution is made only by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The regulatory material appearing herein is keyed to the Code of Federal Regulations, which is published, under 50 titles, pursuant to section 11 of the Federal Register Act, as amended June 19, 1937.

The FEDERAL REGISTER will be furnished by mail to subscribers, free of postage, for $1.50 per month or $15.00 per year, payable in advance. The charge for individual copies (minimum 15¢) varies in proportion to the size of the issue. Remit check or money order, made payable to the Superintendent of Documents, directly to the Government Printing Office, Washington 25, D. C.

There are no restrictions on the republication of material appearing in the FEDERAL REGISTER.

CONTENTS—Continued

CONTENTS—Continued

CONTENTS—Continued

CODIFICATION GUIDE

A numerical list of the parts of the Code of Federal Regulations affected by documents published in this issue. Proposed rules, as opposed to final actions, are identified as such.

visions of paragraph (a) above, obtains entire right, title and interest in and to an invention nor (2) pursuant to the provisions of paragraph (b) above, reserves a non-exclusive, irrevocable, royalty-free license in the invention with power to grant licenses for all governmental purposes, the Government shall leave the entire right, title and interest in and to the invention in the Government employee, subject to law.

(e) Actions taken, and rights acquired, under the foregoing provisions of this section, shall be reported to the Chairman in accordance with procedures established by him.

2. Subject to considerations of national security, or public health, safety, or welfare, the following basic policy is established for the collection, and dissemination to the public, of information concerning inventions resulting from Government research and development activities:

(a) When an invention is made under circumstances defined in paragraph 1 (a) of this order giving the United States the right to title thereto, the Government agency concerned shall either prepare and file an application for patent therefor in the United States Patent Office or make a full disclosure of the invention promptly to the Chairman, who may, if he determines the Government interest so requires, cause application for patent to be filed or cause the invention to be fully disclosed by publication thereof: *Provided, however*, That, consistent with present practice of the Department of Agriculture, no application for patent shall, without the approval of the Secretary of Agriculture, be filed in respect of any variety of plant invented by any employee of that Department.

330

(b) Under arrangements made and policies adopted by the Chairman, all inventions or rights therein, including licenses, owned or controlled by the United States or any Government agency shall be indexed, and copies, summaries, analyses and abstracts thereof shall be maintained and made available to all Government agencies and to public libraries, universities, trade associations, scientitsts and scientific groups, industrial and commercial organizations, and all other interested groups of persons.

3. (a) A Government Patents Board is established consisting of a Chairman of the Government Patents Board, who shall be appointed by the President, and of one representative from each of the following:

Department of Agriculture
Department of Commerce
Department of the Interior
Department of Justice
Department of State
Department of Defense
Civil Service Commission
Federal Security Agency
National Advisory Committee for Aeronautics
General Services Administration

Each such representative, together with an alternate, shall be designated by the head of the agency concerned.

(b) The Government Patents Board shall advise and confer with the Chairman concerning the operation of those aspects of the Government's patent policy which are affected by the provisions of this order or of Executive Order No. 9865, and suggest modifications or improvements where necessary.

(c) Consonant with law, the agencies referred to in paragraph 3 (a) hereof shall as may be necessary for the purpose of effectuating this order furnish assistance to the Board in accordance with section 214 of the Independent Offices Appropriation Act, 1946, 59 Stat. 134, 31 U. S. C. 691. The Department of Commerce shall provide necessary office accommodations and facilities for the use of the Board and the Chairman.

(d) The Chairman shall establish such committees and other working groups as may be required to advise or assist him in the performance of any of his functions.

(e) The Chairman of the Government Patents Board and the Chairman of the Interdepartmental Committee on Scientific Research and Development (provided for by Executive Order No. 9912 of December 24, 1947) shall establish and maintain such mutual consultation as will effect the proper coordination of affairs of common concern.

4. With a view to obtaining uniform application of the policies set out in this order and uniform operations thereunder, the Chairman is authorized and directed:

(a) To consult and advise with Government agencies concerning the application and operation of the policies outlined herein;

(b) After consultation with the Government Patents Board, to formulate and submit to the President for approval such proposed rules and regulations as may be necessary or desirable to implement and effectuate the aforesaid policies, together with the recommendations of the Government Patents Board thereon;

(c) To submit annually a report to the President concerning the operation of such policies, and from time to time such recommendations for modification thereof as may be deemed desirable;

(d) To determine with finality any controversies or disputes between any Government agency and its employees, to the extent submitted by any party to the dispute, concerning the ownership of inventions made by such employees or rights therein; and

(e) To perform such other or further functions or duties as may from time to time be prescribed by the President or by statute.

5. The functions and duties of the Secretary of Commerce and the Department of Commerce under the provisions of Executive Order No. 9865 of June 14, 1947 are hereby transferred to the Chairman and the whole or any part of such functions and duties may be delegated by him to any Government agency or officer: *Provided*, That said Executive Order No. 9865 shall not be deemed to be amended or affected by any provision of this Executive order other than this paragraph 5.

6. Each Government agency shall take all steps appropriate to effectuate this order, including the promulgation of necessary regulations which shall not be inconsistent with this order or with regulations issued pursuant to paragraph 4 (b) hereof.

7. As used in this Executive order, the next stated terms, in singular and plural, are defined as follows for the purposes hereof:

(a) "Government agency" includes any executive department and any independent commission, board, office, agency, authority, or other establishment of the Executive Branch of the Government of the United States (including any such independent regulatory commission or board, any such wholly-owned corporation, and the Smithsonian Institution), but excludes the Atomic Energy Commission.

(b) "Government employee" includes any officer or employee, civilian or military, of any Government agency, except such part-time consultants or employees as may be excluded by regulations promulgated pursuant to paragraph 4 (b) hereof.

(c) "Invention" includes any art, machine, manufacture, design, or composition of matter, or any new and useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States.

HARRY S. TRUMAN

THE WHITE HOUSE,
January 23, 1950.

[F. R. Doc. 50-722; Filed, Jan. 23, 1950; 1:16 p. m.]

331

RULES AND REGULATIONS

TITLE 6—AGRICULTURAL CREDIT

Chapter IV—Production and Marketing Administration and Commodity Credit Corporation, Department of Agriculture

Subchapter C—Loans, Purchases, and Other Operations

PART 610—DAIRY PRODUCTS

SUBPART—MILK AND BUTTERFAT PRICE SUPPORT PROGRAM

The U. S. Department of Agriculture will support the general levels of prices to producers for manufacturing milk and butterfat, from January 1, 1950, through March 31, 1951, at a national average of approximately $3.07 per hundredweight for manufacturing milk of 3.95 percent butterfat (yearly average test) and approximately 60 cents per pound of butterfat. The program will support the price of all milk. As a means of carrying out this program, Commodity Credit Corporation (hereinafter called CCC) will purchase manufactured dairy products as provided herein.

§ 610.125 *Price support program for milk and butterfat.* (a) CCC will purchase, during the period January 1, 1950, through March 31, 1951, butter, nonfat dry milk solids, Cheddar cheese, and evaporated milk, f. o. b. offered delivery points at any location in the continental United States, at the following prices:

Commodity	Description	Unit	Price (dollars)
Butter	U. S. Grade A or higher	Pound	$0.60
Do	U. S. Grade B	do	.58
Nonfat dry milk solids	Spray process, U. S. Extra Grade	do	.125
Do	Roller process, U. S. Extra Grade	do	.105
Cheddar cheese	U. S. Grade A or higher, Standard moisture basis	do	.31
Evaporated milk	U. S. D. A. Specifications	Case	3.95

(b) The butter shall be salted creamery butter of U. S. Grade B or higher, solid-packed in commercial containers. The nonfat dry milk solids shall be U. S. Extra Grade, packed in export containers. The Cheddar cheese shall be U. S. Grade A or higher, packed in commercial domestic containers. The evaporated milk shall meet U. S. Department of Agriculture specifications, and shall be packed in commercial domestic cases.

(c) The products purchased shall be produced and located in the continental United States. Purchases will be made in units of not less than tariff minimum carlots for the area where the product is located. Grades and weights shall be evidenced by inspection certificates issued by the U. S. Department of Agriculture.

(d) Purchases will be made by CCC subject to the terms and conditions of purchase announcements issued by the Dairy Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

(Sec. 4, 62 Stat. 1070, as amended; 15 U. S. C. Sup., 714b. Interpret or apply secs. 4, 5, 62 Stat. 1070, 1072, sec. 1, Pub. Law 897, 80th Cong., 15 U. S. C. Sup., 714b, 714c)

Issued this 20th day of January 1950.

[SEAL] ELMER F. KRUSE,
Vice President,
Commodity Credit Corporation.

Approved:

RALPH S. TRIGG,
President,
Commodity Credit Corporation.

[F. R. Doc. 50-698; Filed, Jan. 24, 1950; 8:59 a. m.]

TITLE 7—AGRICULTURE

Chapter IX—Production and Marketing Administration (Marketing Agreements and Orders), Department of Agriculture

[Grapefruit Reg. 68]

PART 955—GRAPEFRUIT GROWN IN ARIZONA; IN IMPERIAL COUNTY, CALIFORNIA; AND IN THAT PART OF RIVERSIDE COUNTY, CALIFORNIA, SITUATED SOUTH AND EAST OF THE SAN GORGONIO PASS

LIMITATION OF SHIPMENTS

§ 955.329 *Grapefruit Regulation 68*—(a) *Findings.* (1) Pursuant to the marketing agreement, as amended, and Order No. 55, as amended (7 CFR Part 955; 14 F. R. 6803), regulating the handling of grapefruit grown in the State of Arizona; in Imperial County, California; and in that part of Riverside County, California, situated south and east of the San Gorgonio Pass, effective under the applicable provisions of the Agricultural Marketing Agreement Act of 1937, as amended, and upon the basis of the recommendations of the Administrative Committee (established under the aforesaid amended marketing agreement and order), and upon other available information, it is hereby found that the limitation of shipments of grapefruit, as hereinafter provided, will tend to effectuate the declared policy of the act.

(2) It is hereby further found that it is impracticable and contrary to the public interest to give preliminary notice, engage in public rule making procedure, and postpone the effective date of this section until 30 days after publication thereof in the FEDERAL REGISTER (60 Stat. 237; 5 U. S. C. 1001 et seq.) because the time intervening between the date when information upon which this section is based became available and the time when this section must become effective in order to effectuate the declared policy of the act is insufficient; a reasonable time is permitted, under the circumstances, for preparation for such effective time; and good cause exists for making the provisions hereof effective not later than January 25, 1950. Shipments of grapefruit, grown as aforesaid, have been subject to regulation by grades and sizes, pursuant to the amended marketing agreement and order, since October 23, 1949, and will so continue until January 25, 1950; the recommendation and supporting information for continued regulation subsequent to January 24, 1950, was promptly submitted to the Department after an open meeting of the Administrative Committee on January 18; such meeting was held to consider recommendations for regulation, after giving due notice of such meeting, and interested persons were afforded an opportunity to submit their views at this meeting; the provisions of this section, including the effective time thereof, are identical with the aforesaid recommendation of the committee, and information concerning such provisions and effective time has been disseminated among handlers of such grapefruit; it is necessary, in order to effectuate the declared policy of the act, to make this section effective during the period hereinafter set forth so as to provide for the continued regulation of the handling of grapefruit; and compliance with this section will not require any special preparation on the part of persons subject thereto which cannot be completed by the effective time hereof.

(b) *Order.* (1) Grapefruit Regulation 67 (7 CFR 955.328; 14 F. R. 7876) is hereby terminated as of the effective time of this section.

(2) During the period beginning at 12:01 a. m., P. s. t., January 25, 1950, and ending at 12:01 a. m., P. s. t., February 19, 1950, no handler shall ship:

(i) Any grapefruit of any variety grown in the State of Arizona; in Imperial County, California; or in that part of Riverside County, California, situated south and east of the San Gorgonio Pass which grade lower than U. S. No. 2 grade: *Provided,* That the tolerance for grade defects permitted for such U. S. No. 2 grade shall not include serious damage due to dryness or mushy condition; however, with respect to each lot of such grapefruit 10 percent, by count, of the grapefruit in such lot may fail to meet the requirements, of such U. S. No. 2 grade, relating to freedom from serious damage caused by dryness or mushy condition: *Provided further,* That included in such 10 percent there may be not more than 5 percent, by count, of the grapefruit in such lot which show dryness or mushy condition to the extent that more than 40 percent of the pulp is affected; or

(ii) From the State of California or the State of Arizona to any point outside thereof in the United States or Canada, any grapefruit, grown as aforesaid, which are of a size smaller than $3^{9}/_{16}$ inches in diameter ("diameter" to be measured midway at a right angle to a straight line running from the stem to the blossom end of the fruit), except that a tolerance of 5 percent, by count, of grapefruit smaller than such minimum size shall be permitted which tolerance shall be applied in accordance with the provisions for the application of tolerances, specified in the revised United States Standards for Grapefruit (California and Arizona), 7 CFR 51.241; 14 F. R. 7369: *Provided,* That, in determining the percentage of grapefruit in any lot which are smaller than $3^{9}/_{16}$ inches in diameter, such percentage shall be based only on the grapefruit in such lot which are of a size $3^{13}/_{16}$ inches in diameter and smaller.

(3) As used in this section, "handler," "variety," "grapefruit," and "ship" shall have the same meaning as when used in said amended marketing agreement and order; and the term "U. S. No. 2" shall have the same meaning as when used in the revised United States Standards for Grapefruit (California and Arizona), 7 CFR 51.241; 14 F. R. 7369.

(Sec. 5, 49 Stat. 753, as amended; 7 U. S. C. and Sup., 608c)

Done at Washington, D. C., this 23d day of January 1950.

[SEAL] S. R. SMITH,
Director, Fruit and Vegetable Branch, Production and Marketing Administration.

[F. R. Doc. 50-729; Filed, Jan. 24, 1950; 8:59 a. m.]

TITLE 16—COMMERCIAL PRACTICES

Chapter I—Federal Trade Commission

[Docket No. 5638]

PART 3—DIGEST OF CEASE AND DESIST ORDERS

AUTONATOR LABORATORIES CO. AND HARRY ABELSON

Subpart—*Advertising falsely or misleadingly:* § 3.15 *Business status, advan-*

tages, or connections—Producer status of dealer—Laboratory: § 3.170 *Qualities or properties of product or service:* § 3.195 *Safety.* Subpart — *Neglecting, unfairly or deceptively, to make material disclosure:* § 3.1890 *Safety.* Subpart—*Using misleading name—Vendor:* § 3.2445 *Producer or laboratory status of dealer or seller.* In connection with the offering for sale, sale, and distribution in commerce, of respondents' electric water heating device, "Hot Donut Water Heater", or any substantially similar device, whether sold under the same name or any other name, (1) representing that said device will produce boiling hot water or steaming hot water "in a jiffy", or afford hot water in any other period of time less than is actually required; (2) using the word "Laboratories", or any other word of similar import or meaning, to designate, describe, or refer to respondents' business, or representing through any other means that either of said respondents owns, operates, or controls a laboratory or establishment containing substantial equipment and apparatus for use in study and experimentation by scientists or technicians employed for such purposes or for the conduct of research in connection with the application of electricity to water heating facilities; or, (3) distributing or selling said device unless the word "caution" or "warning", together with adequate directions for safe use of the device, is indelibly impressed, imprinted, or affixed thereon, informing the user that unless the directions for use are strictly followed dangerous electric shock may result; prohibited, subject to the provision, however, as respects said first prohibition, that nothing therein shall prohibit use of the word "jiffy" to designate the period required to heat water if in immediate and conspicuous conjunction therewith respondents truthfully state the time required to raise one or more designated volumes of water of stated temperature to a specified temperature level; and to the further provision, as respects said third prohibition, that the word "caution" or "warning", whichever is used, may be accompanied by reference to adequate directions for safe use separately but securely attached to the device and which inform the user that unless such directions are strictly followed dangerous electric shock may result.

(Sec. 6, 38 Stat. 722; 15 U. S. C. 46. Interpret or apply sec. 5, 38 Stat. 719, as amended; 15 U. S. C. 45) [Cease and desist order, Autonator Laboratories Co. et al., Docket 5638, Dec. 6, 1949]

This proceeding having been heard by the Federal Trade Commission upon the complaint of the Commission, the answer of respondents, certain stipulations of fact submitted for the record in lieu of other evidence by counsel for the respondents and counsel supporting the complaint together with a form of order to cease and desist which counsel jointly recommended to the Commission for adoption, and the tentative order to cease and desist issued subsequently by the Commission in connection with which respondents were afforded opportunity to show cause why such order should not be entered as the order to cease and desist in this proceeding; and respondents having not appeared in response to such leave to show cause and the Commission having thereafter made its findings as to the facts and its conclusion that respondents have violated the Federal Trade Commission Act:

It is ordered, That respondents, Autonator Laboratories Co., a corporation, its officers, representatives, agents, and employees, and Harry Abelson, his agents, and employees, directly or through any corporate or other device, in connection with the offering for sale, sale, and distribution in commerce, as "commerce" is defined in the Federal Trade Commission Act, of respondents' electric water heating device, "Hot Donut Water Heater", or any substantially similar device, whether sold under the same name or any other name, do forthwith cease and desist from:

(1) Representing that said device will produce boiling hot water or steaming hot water "in a jiffy", or afford hot water in any other period of time less than is actually required; provided, however, that nothing herein shall prohibit use of the word "jiffy" to designate the period required to heat water if in immediate and conspicuous conjunction therewith respondents truthfully state the time required to raise one or more designated volumes of water of stated temperature to a specified temperature level.

(2) Using the word "Laboratories", or any other word of similar import or meaning, to designate, describe, or refer to respondents' business, or representing through any other means that either of said respondents owns, operates, or controls a laboratory or establishment containing substantial equipment and apparatus for use in study and experimentation by scientists or technicians employed for such purposes or for the conduct of research in connection with the application of electricity to water heating facilities.

(3) Distributing or selling said device unless the word "caution" or "warning", together with adequate directions for safe use of the device, is indelibly impressed, imprinted, or affixed thereon, informing the user that unless the directions for use are strictly followed dangerous electric shock may result: *Provided, however*, That the word "caution" or "warning", whichever is used, may be accompanied by reference to adequate directions for safe use separately but securely attached to the device and which inform the user that unless such directions are strictly followed dangerous electric shock may result.

It is further ordered, That the respondents shall, within sixty (60) days after service upon them of this order, file with the Commission a report in writing setting forth in detail the manner and form in which they have complied with this order.

Issued: December 6, 1949.

By the Commission.

[SEAL] D. C. DANIEL, *Secretary.*

[F. R. Doc. 50-680; Filed, Jan. 24, 1950; 8:49 a. m.]

TITLE 24—HOUSING AND HOUSING CREDIT

Chapter III — Public Housing Administration, Housing and Home Finance Agency

PART 340—WAR HOUSING PROGRAM; POLICY

DISPOSITION OF FEDERALLY OWNED WAR HOUSING PROJECTS

Effective November 4, 1949, paragraphs (a), (b), and (c) of § 340.5 *Disposition of federally owned war housing projects*, are amended as follows:

§ 340.5 *Disposition of federally owned war housing projects.* The Public Housing Administration is responsible for the disposition of war housing projects, or parts thereof, upon their termination by the Administrator of the Housing and Home Finance Agency.

(a) *Definitions.* (1) "Government agency" and "Federal agency" mean any executive department, board, bureau, commission, or other agency in the executive branch of the Federal Government, or any corporation wholly owned (directly or through one or more corporations) by the United States. (The priorities of Government agencies include the priority awarded to RFC to aid sales to veterans and owner-operators of small businesses.)

(2) "State and local governments" means any state, territory, or possession of the United States, the District of Columbia, and any political subdivision or instrumentality of any of them.

(3) "Non-profit institution" means any scientific, literary, educational, public health, public welfare, charitable, or eleemosynary institution, or hospital or similar institution, or any volunteer fire company (i) which is supported in whole or in part through the use of funds derived from taxation by the United States, its territories or possessions, or by any State or political subdivision thereof, or (ii) which is exempt from taxation under section 101 (6) of the Internal Revenue Code.

(4) "Public bodies" means educational institutions and local public bodies. "Educational Institutions" means (i) any public educational institution, or (ii) any private educational institution, no part of the net earnings of which shall inure to the benefit of any private shareholder or individual. "Local public bodies" includes state and local governments and non-profit corporations which officially represent a local governing body and which will comply with the same terms and conditions in resale or rental as would a local public body.

(5) "Veteran" shall include (i) a person (or his family) who has served in the military or naval forces of the United States for any period of time on or after September 16, 1940, and prior to July 26, 1947, and who has been discharged or released therefrom under conditions other than dishonorable, (ii) a person (or his family) serving in the active military or naval forces of the United States who has served therein on or after September 16, 1940, and prior to July 26, 1947, and (iii) the family of a person who served in the military or naval forces of the United

States on or after September 16, 1940, and prior to July 26, 1947, and who died in service. (No right which was vested under this section prior to December 23, 1948, shall be affected by reason of the change in the definition of the term "veteran" effective on that date, and applications made prior to December 23, 1948, for any right or privilege under this section may be processed without regard to such change.)

"Military or naval forces of the U. S." means the Army, Navy, Air Force, Marine Corps, Coast Guard and, since July 29, 1945, the commissioned corps of the U. S. Public Health Service. The term military or naval forces does not include the Merchant Marine, Red Cross, and UNRRA. For purposes of Veterans' Administration loan guaranties, "veteran" is of course defined by the Veterans' Administration.

For the determination of priority eligibility the word "family", as used herein, shall be limited to the following relatives of the veteran: Father, mother, spouse, children, step-children, widow (widower), or child of deceased veteran.

A veteran's preference can be exercised successfully only once, and shall be exercised by the person who served in the military or naval forces of the United States, as described above, or by one member of his family as defined above whom he has designated in writing.

(6) "Demolition" means reduction of structures to component parts no greater than flat panels.

(7) "Temporary dwelling structure" means any dwelling structure determined to be of temporary character pursuant to section 313 of the Lanham Act, exclusive of trailers, mobile houses, and portable shelter structures.

(8) "Permanent dwelling structure" means any dwelling structure not determined to be of a temporary character pursuant to section 313 of the Lanham Act.

(9) "Demountable dwelling structure" means any dwelling structure not determined to be of a temporary character pursuant to section 313 of the Lanham Act which can be demounted and re-erected elsewhere.

(b) *Consultation with local governments.* Local governments shall, as provided in Public Regulation No. 1 (24 CFR 1.1–1.16), be notified of disposition plans regarding projects in their locality sufficiently in advance to give them an adequate opportunity to study the problem and make recommendations. The notice shall state the time within which such recommendations shall be made, the PHA representative who may be consulted, and to whom such recommendations shall be addressed. With respect to temporary projects, local governments shall be similarly notified of disposition plans. However, the only question to be discussed with the local community is termination, as the Lanham Act (54 Stat. 1125; 42 U. S. C. 1521), as amended, is explicit about methods of disposing of temporary dwelling units.

Where there are no dwelling units on the site of any war housing project, community consultations are not required.

(c) *Disposition of temporary projects*—(1) *Temporary dwelling buildings.* Section 313 of the Lanham Act (54 Stat. 1125; 42 U. S. C. 1521) as amended, states: "The Administrator shall, as promptly as may be practicable and in the public interest, remove all housing under his jurisdiction which is of a temporary character, as determined by him, and constructed under the provisions of this act (Pub. Law 849, Seventy-Sixth Cong.), Public Law 781, Seventy-Sixth Congress, and Public Laws 9, 73, and 353, Seventy-Seventh Congress. Such removal shall, in any event, be accomplished not later than January 1, 1951, with the exception only of such housing as the Administrator, after consultation with local communities, finds is still needed in the interest of the orderly demobilization of the war effort: *Provided*, That all such exceptions shall be reexamined annually by the Administrator and that all such exceptions and reexaminations shall be reported to the Congress." The removal provisions of the act are applicable only to the dwelling buildings.

(i) *Priorities.* The following order of preference shall govern the disposition of temporary dwelling buildings:

(*a*) Government agencies;

(*b*) State and local governments;

(*c*) Non-profit institutions.

(ii) *Conditions of sale or transfer*—(*a*) *Government agencies.* Dwelling structures may be sold or transferred to a Government agency for its use on or off the present project site: *Provided*, That when the use is to be on-site the transferee Government agency will agree to carry out the provisions of the Lanham Act concerning the removal of temporary housing. Any sale to the Reconstruction Finance Corporation for sale to veterans for owner-operated small business shall require removal by demolition. Provisions of this subparagraph apply to projects on owned, leased, or temporary use sites. If the structures are on other than owned sites and are to remain temporarily on such sites, any sale or transfer shall be subject to any conditions underlying the lease or use of the site.

(*b*) *State and local governments and non-profit institutions.* Temporary dwelling structures may be sold to state or local governments or non-profit institutions for use off the present site. If sold to a state or local government they may be removed without demolition being required, regardless of their intended use. If sold to a non-profit institution they shall be sold for removal by demolition unless they are to be removed for non-residential or institutional use.

(*c*) *Non-priority holders.* Temporary dwelling structures sold to anyone other than a Government agency, a State or local government, or a non-profit institution, must be removed from the site by demolition within the period specified in the contract of sale.

(iii) *Method of offering.* Temporary dwelling structures shall be offered for sale by a combined advertisement to priority and non-priority holders for a 15-day period. Before advertising, a price shall be established for priority holders, which shall be made available upon request. Priority holders who do not wish to offer the established price shall be asked to state a price, which will be considered competitively. In case of tie bids, priority holders shall have preference in the order of their priority. If PHA determines that the structures have no commercial value, the offering to priority holders at no cost shall precede the offering to non-priority holders, and each offering shall be for a 15-day period. Competitive bid forms should make it clear that such bids may involve either a payment by the successful bidder to the Government, or a payment by the Government to the successful bidder. When acceptable offers are not received as a result of the advertising, sales shall be made by negotiation or other means.

(2) *Non-dwelling buildings.* If non-dwelling buildings, including community, administration, commercial, and utility buildings are on leased land or land held under temporary use, they may be sold to the landowner in connection with lease or use settlements. If not sold to the land owner or if on PHA-owned land, they shall be offered for sale or removal by competitive bids. An exception to the above policy may be recommended by the PHA Field Office Director to the PHA Central Office where an offer has been received from a Federal, State, or local governmental body for the purchase of non-dwelling buildings other than commercial buildings having value as such: *Provided* (i) Such offer has been received prior to the public competitive bid offering and (ii) the property is required for a public purpose. In such case the property may be offered at a fixed price based on value. Under no circumstances may there be an exception to the competitive bid policy in the case of a commercial building, unless the commercial building has no value as such.

Non-dwelling buildings may be sold or transferred for use on or off the present site. When sold for use off-site, they may be removed without being demolished.

If non-dwelling structures were financed through the Federal Works Agency and are now under the jurisdiction of the General Services Administration, consultation shall be held by the Field Office Director with that agency to determine what disposition shall be made of such facilities.

If not transferred to a landowner of leased land, or to a governmental body, non-dwelling structures shall be offered for sale by advertisement for a 15-day period. Where desirable, advertising of non-dwelling structures may be combined with advertising of dwellings but no priorities apply to the non-dwelling buildings. If no acceptable offer is received from advertising, sales through readvertisement, negotiation, or other means shall be made.

(3) *Site improvements sold separately.* Site improvements may be sold separately from structures, in which case there shall be no priorities.

Site improvements may be (i) sold to the landowner in connection with the lease or use settlement (ii) sold for off-site removal or salvage or (iii) left on the site either by abandonment to the

337

owner of land taken under lease or temporary use where the improvements have no value, or for sale with owned land.

If sold for off-site removal or salvage, they may be offered either by advertisement for a 15-day period, or, where there are only one or two possible purchasers, by negotiation with a specific purchaser as in the case of utilities.

(4) *Sale prices.* All sales or transfers other than those on a competitive bid basis shall be made at a fixed price which shall represent the PHA's estimate of the highest amount obtainable for the property in the current market: *Provided*, That transfers to other Government agencies without reimbursement may be made when authorized by law and: *Provided*, That sales of non-dwelling buildings to governmental bodies shall be made at prices based on long-term value or use of the property as determined by the PHA after competent appraisal. In sales by competitive bidding the highest eligible bid shall be accepted unless it is determined to be in the best interest of the Government to reject all bids. Sales shall be for cash, except that transfers may be made to landowners in effecting settlements. When the PHA finds that the cost of the care, handling, and demolition of dwelling structures would equal or exceed the estimated proceeds, or otherwise determines that structures have no commercial value, the PHA may then, without receiving monetary payment, make a transfer to Government agencies, state and local governments, or non-profit institutions, but only under the removal conditions set forth above.

(5) *Disposition of trailers, mobile houses, portable shelter units.* Upon approval of termination of a project, or part thereof, further intake of tenants shall be stopped and prompt action taken to dispose of the units involved. The following order of preference shall govern the sale or transfer of projects, or parts thereof, which are terminated.

(i) *Projects operated by the PHA or a Local Authority—(a) Dwelling units.* (*1*) Veterans shall be given preference to purchase all vacant dwelling units. Such sales shall be at fixed prices. The priority of any one veteran may be exercised in connection with the sale of only one unit at any one sale.

(*2*) Occupants may be given preference to purchase dwelling units that remain occupied after termination if it is determined that this method of sale is necessary to expeditiously close down the entire project. Such sales shall be at fixed prices. Each occupant shall have preference to purchase only the unit he occupies.

(*3*) The general public shall be offered vacant dwelling units which are not sold in accordance with (*1*) or (*2*) of this subdivision. Such sales shall be at the same fixed prices as in the sales to veterans, or on a competitive bid basis.

(*b*) *Non-dwelling units.* The general public shall be offered non-dwelling units on a competitive basis.

(ii) *Projects operated by commercial bailees or other Federal Government agencies.* (*a*) The bailee or Federal Government agency which operates the project shall be given preference to purchase dwelling and non-dwelling units. Such sales shall be at fixed prices.

(*b*) Veterans shall be given preference to purchase vacant dwelling units not sold in accordance with (*a*) of this subdivision. Such sales shall be at the same fixed prices as in the offer to the bailee or Government agency.

(*c*) Occupants shall be given preference to purchase dwelling units that remain occupied after termination if it is determined that this method of sale is necessary to expeditiously close down the entire project. Such sales shall be at fixed prices.

(*d*) The general public shall be offered vacant dwelling units not sold in accordance with (*a*), (*b*), or (*c*) of this subdivision. Such sales shall be at the same fixed prices as in the sale to veterans, or on a competitive bid basis. Non-dwelling units shall be offered to the general public on a competitive bid basis.

(iii) *Title V trailer projects.* The following methods will be used in the disposition of Title V trailer projects where the responsibility for disposition rests with the PHA:

(*a*) The local body or the educational institution which operates the Title V project shall be given the opportunity to acquire title to the dwelling and non-dwelling trailers by transfer, without reimbursement, by negotiation of a contract PHA–SP–1481–L.

(*b*) Where title is not to be transferred to the local body or to the educational institutions under (*a*), of this subdivision the dwelling and non-dwelling trailers will be disposed of by the PHA in accordance with subdivision (i) of this subparagraph.

(iv) *Units in salvage or scrap condition.* Units classified as salvage or scrap may be sold without regard to the preferences stated herein.

(Sec. 8, 50 Stat. 891; 42 U. S. C. and Sup., 1408. Interpret or apply secs. 201–205, 54 Stat. 681, as amended; 42 U. S. C. and Sup., 1501–1505)

Approved: January 13, 1950.

[SEAL] JOHN TAYLOR EGAN, *Commissioner.*

[F. R. Doc. 50–671; Filed, Jan. 24, 1950; 8:46 a. m.]

338

TITLE 29—LABOR

Chapter IV—Child Labor Branch, Department of Labor

PART 441—EMPLOYMENT OF MINORS BETWEEN 14 AND 16 YEARS OF AGE

OCCUPATIONS AND PERIODS AND CONDITIONS OF EMPLOYMENT

Child Labor Regulation No. 3, effective May 24, 1939, (4 F. R. 1983) delineates the occupations in which the employment (including suffering or permitting to work) by an employer of minor employees between 14 and 16 years of age for the periods and under the conditions therein specified shall not be deemed to be oppressive child labor within the meaning of the Fair Labor Standards Act of 1938.

The Fair Labor Standards Amendments of 1949 (63 Stat. 910) effective January 25, 1950, substantially modify and expand the child labor provisions of the Fair Labor Standards Act by directly prohibiting employment of oppressive child labor in commerce or in the production of goods for commerce. Before these amendments were enacted, the language of the act merely prohibited shipment or delivery for shipment in commerce of goods produced in establishments in or about which oppressive child labor was employed. The broadened coverage of the child labor provisions of the act necessitates amendment of Child Labor Regulation No. 3 for the purpose of delineating the occupations which, within the meaning of the act as amended, do not constitute oppressive child labor for minors 14 and 15 years of age.

In addition, the Fair Labor Standards Amendments of 1949 provide an exemption from the minimum wage, overtime and child labor provisions of the act for employees engaged in the delivery of newspapers to the consumer (section 13 (d) of the act, as amended). Since those employees engaged in the distribution of newspapers who deliver to the consumer are exempt from the coverage of the amended act, and since the special hours provisions contained in paragraph (g) of § 441.3 of Child Labor Regulation No. 3 are not believed needed for other minors engaged in newspaper distribution, a further amendment to the regulation is necessary for the purpose of deleting paragraph (g).

On December 28, 1949, a notice was published in the FEDERAL REGISTER (14 F. R. 7745) that the Secretary of Labor proposed to amend Child Labor Regulation No. 3 to accomplish the desired changes. Interested persons were given until January 10, 1950, to submit data, views or arguments pertaining to the changes proposed. Pursuant to this notice, many favorable comments have been received and no substantial objections have been filed.

Accordingly, by virtue of and pursuant to authority conferred on me by section 3 (l) of the Fair Labor Standards Act, as amended, and Reorganization Plan No. 2 effective July 16, 1946, pursuant to the Reorganization Act of 1945 (59 Stat. 613), this part is amended in the following manner:

1. Add a new paragraph to § 441.2 designated as paragraph (f) to read as follows:

§ 441.2 *Occupations.* This part shall apply to all occupations other than the following:

* * * * *

(f) Occupations in connection with—

(1) Transportation of persons or property by rail, highway, air, water, pipeline, or other means;

(2) Warehousing and storage;

(3) Communications and public utilities;

(4) Construction (including demolition and repair);

except such office (including ticket office) work, or sales work, in connection with subparagraphs (1), (2), (3), and (4) of this paragraph, as does not involve the performance of any duties on trains,

motor vehicles, aircraft, vessels, or other media of transportation or at the actual site of construction operations.

2. Delete paragraphs (g) and (h) of § 441.3 and amend paragraph (f) of § 441.3 to read as follows:

§ 441.3 *Periods and conditions of employment.* Employment in any of the occupations to which this part is applicable shall be confined to the following periods:

* * * * *

(f) Between 7 a. m. and 7 p. m. in any one day. This period shall be measured by applicable standard time, except that it shall be measured by applicable daylight saving time whenever such time is adopted as the official time of the community.

3. Renumber § 441.7 as § 441.6.

The above amendments shall become effective on publication in the FEDERAL REGISTER.

(Sec. 3 (*l*), 52 Stat. 1060, 1061, 29 U. S. C. 203 (*l*))

Signed at Washington, D. C., this 19th day of January 1950.

MAURICE J. TOBIN,
Secretary of Labor.

[F. R. Doc. 50-681; Filed, Jan. 24, 1950; 8:48 a. m.]

Chapter V—Wage and Hour Division, Department of Labor

PART 520—STUDENT LEARNERS

Pursuant to section 14 of the Fair Labor Standards Act, the Administrator has heretofore promulgated regulations (29 CFR, Part 520) providing terms and conditions under which certificates may be issued authorizing the employment of student learners at wages below the minimum wage established in section 6 of the act.

On January 17, 1950, a notice was published in the FEDERAL REGISTER (15 F. R. 285) that the Administrator proposed to revise these regulations. Interested parties were given 5 days in which to submit data, views or arguments pertaining to the proposed revision of the regulations. This period has now expired, and careful consideration has been given to all material submitted.

The revised regulations, as amended herein, are made necessary by the Fair Labor Standards Amendments of 1949 raising the minimum wage from 40 cents to 75 cents an hour, and provide, among other things, the procedure to be followed in obtaining student learner certificates, the subminimum wage rates to be paid, hours of employment-training, and temporary authorization for continuation of certain state and local programs in order to prevent curtailment of opportunities of employment.

Now, therefore, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act, as amended (Section 14, 52 Stat. 1068, 29 U. S. C. 214; as amended 63 Stat. 910), I find that it is necessary, in order to prevent curtailment of opportunities for employment, that the regulations contained in this part, revised as published in the FEDERAL REGISTER on January 17, 1950, be, and such regulations hereby are, adopted as follows with the following amendments:

In § 520.3 the first paragraph is designated paragraph "(a)"; the second paragraph is designated paragraph "(b)"; and a new paragraph designated as paragraph "(c)" is added.

As revised, Part 520 reads as follows:

Sec.
520.1 Definitions.
520.2 Applications.
520.3 Conditions under which certificates will be issued.
520.4 Conditions barring issuance of certificates.
520.5 Duration of certificates.
520.6 Terms of certificate.
520.7 Proceedings on applications.
520.8 Revocation and cancellation.
520.9 Review.
520.10 Petition for amendment of the regulations in this part.

AUTHORITY: §§ 520.1 to 520.10 issued under sec. 14, 52 Stat. 1068, 29 U. S. C. 214; as amended, 63 Stat. 910.

§ 520.1 *Definitions.* As used in the regulations in this part:

(a) "Student-learner" means a student who is receiving instruction in an accredited school, college or university and who is employed on a part-time basis pursuant to a bona fide training program which is under the supervision of a State board of vocational education or other recognized educational body.

(b) A "bona fide vocational training program" means a program providing for part-time employment of student-learners for a part of the working day, or for alternating weeks, or for limited periods during the year, such employment providing training which is supplemented by related instruction given the student-learner as a regular part of his school course by the school, college or university.

§ 520.2 *Applications.* (a) Applications may be filed with the Administrator of the Wage and Hour Division, United States Department of Labor, Washington, D. C., by any officer of a school, college or university, for a special certificate authorizing the employment at wages below the minimum established in section 6 of the Fair Labor Standards Act, as amended, of a student learner engaged in a bona fide vocational training program where such action is necessary to prevent curtailment of opportunities for employment.

(b) All applications must be on official forms furnished on request by the Wage and Hour Division and must be signed by the employer, the school official, and the student learner. Applications must contain all information required by such forms, including among other things, a brief statement clearly outlining the vocational training program and showing, particularly, the nature of the processes in which the student-learner will be engaged when in training on the job; a brief statement clearly outlining the related school instruction; information showing the total number of persons employed in the establishment; data regarding the age of the employee, the proposed hourly wage rate, the length of the period for and the total weekly hours devoted to employment training and school instruction.

§ 520.3 *Conditions under which certificates will be issued.* (a) The Administrator of the Wage and Hour Division or his authorized representative may issue a certificate permitting employment of a named student-learner by a named employer where it is found that such employment provides training in an occupation which requires a substantial amount of skill and a significant learning period, which employment-training is supplemented by and integrated with a definitely organized plan of instruction designed to teach technical knowledge and related industrial information given as a part of the student learner's course by an accredited school, college, or university.

(b) Where the vocational training program is operated under the Smith-Hughes and George-Barden Acts, the Administrator or his authorized representative may consult with and require approval of any application by the State board of vocational education or the State or local representative advisory committee (consisting of an equal number of employers and employees) which has been established pursuant to official policies for the administration of vocational education. In any case, evidence may be required that the occupations selected for employment training, as well as the training plans for every student, have been approved by a State or local representative advisory committee if one exists.

(c) Written approval of the employment of a student-learner under a cooperative work-study program, trade school, or other type of cooperative vocational training program, by a State Commissioner of Education or a local Board of Education shall constitute a temporary certificate authorizing the employment of the student-learner under such program at wage rates less than 75 cents an hour during the period beginning January 25, 1950, and ending May 25, 1950: *Provided*, That—

(1) Such program conforms with the provisions of §§ 520.1, 520.4, 520.6 (a) (2), and 520.6 (b);

(2) The wage rate or rates paid the student-learner pursuant to such program is not less than 75 percent of the minimum wage established in section 6 of the act; and

(3) Applications for special certificates shall be filed at the earliest practicable date with the Administrator of the Wage and Hour Division by the school officials in accordance with the provisions of § 520.2.

§ 520.4 *Conditions barring issuance of certificates.* No certificates will be issued authorizing the employment training of student learners under any of the following conditions:

(a) When the issuance of a certificate would authorize the employment of minors contrary to the child labor provisions of the Fair Labor Standards Act [1]

[1] In general, the act establishes a 16-year minimum age for all manufacturing, mining, or processing occupations and an 18-year minimum for occupations which are found and declared by the Secretary of Labor to be particularly hazardous.

or the orders and regulations issued by the Secretary of Labor pursuant thereto (Parts 400 to 481 of Chapter IV of this title).

(b) When the issuance of such a certificate would tend to prevent the development of apprenticeships in accordance with the regulations applicable thereto (Part 521 of this chapter), or when the issuance of such certificate would impair established apprenticeship standards in the occupation involved.

(c) When it is found that employment of student-learners at subminimum wage rates would tend to depress the wage rates or working standards of experienced workers in the same occupations.

(d) When the employment of a student-learner would displace a regular worker or when such employment would fill a job or position which would otherwise be filled by a regular worker.

(e) When the number of student-learners to be employed in one establishment is more than a small proportion of its working force.

(f) When the occupational needs of the community or the industry do not warrant the training of new workers.

(g) When training is confined to a single operation for the purpose of developing high production speed.

§ 520.5 *Duration of certificates.* (a) Where employment starts at the beginning of the regular school year, the certificate will be issued for a period not to exceed one school year unless a longer period is found to be justified by reason of exceptional circumstances. If coordinated training continues throughout the summer vacation, the effective period of the certificate may be extended to cover the summer work, provided authorization is obtained from the Division in advance.

(b) Where it is desired to start employment during the summer vacation immediately prior to the commencement of the school year, the application must include, in addition to the information required in § 520.2 (b) all employment experience of the student learner with the employer. The certificate may be issued for a period not to exceed 12 months, and employment shall not begin prior to approval by the Administrator or his authorized representative.

§ 520.6 *Terms of certificate.* (a) Each certificate issued shall specify the maximum number of hours of employment and of instruction, and the minimum wage rate or rates authorized therein.

(1) The wage rate or rates established shall average over the period covered by the certificate not less than 75 percent of the statutory minimum, except that for the period between January 25, 1950, and June 30, 1950, a lower rate may be authorized.

(2) The number of hours worked each week added to the number of hours of school instruction shall not exceed 40 hours a week, except in extraordinary circumstances. The certificate may provide for the employment of student learners for 40 hours in any week when school is not in session.

(b) No provision of the regulations in this part shall excuse noncompliance with any other Federal law, or State law or municipal ordinance, concerning child labor or establishing a minimum wage higher, or a maximum work week shorter, than that authorized by any certificate issued pursuant to the regulations contained in this part.

§ 520.7 *Proceedings on applications.* (a) In considering one or more applications filed under these regulations in this part the Administrator or his authorized representative may call a hearing upon due notice to all interested parties, or may provide other opportunity for interested parties to present their views on the issues raised by such application or applications.

(b) Upon the submission of additional material facts, an authorized representative may reconsider an application and may affirm, reverse or amend his former action in granting or denying such application.

§ 520.8 *Revocation and cancellation.* (a) The Administrator or his authorized representative may cancel any certificate for cause. Cancellation may be effected (1) as of the date of issuance if it is found that the applicant set forth any fact or facts in the application which he knew or had reasonable cause to believe to be false; (2) as of the date of violation if it is found that any of its terms have been violated; and (3) prospectively if it is found that the conditions of employment of the student-learner have changed or that the purposes for which the certificate was originally issued no longer obtain.

(b) Except in cases of willfulness or those in which the public interest requires otherwise, before any contemplated action for the cancellation or revocation of any special certificate for the employment of a student learner will be considered, facts or conduct which may warrant such action will be called to the attention of the employer and he shall be afforded an opportunity to achieve or demonstrate compliance, or to show that the conditions of employment of the student-learner have not changed or that the purpose for which the certificate was originally issued still exist.

(c) No order canceling any special certificate shall take effect until the expiration of the time allowed for the filing of a petition for review under § 520.9, and if a petition for review is filed thereunder, the effective date of the cancellation shall be postponed until final action is taken on such a petition.

§ 520.9 *Review.* Any person aggrieved by the action of an authorized representative of the Administrator may within 15 days thereafter, or within such further time as the Administrator, for cause shown, may allow, file a petition for review by the Administrator of the action of the authorized representative and pray for such relief as is desired. If such petition for review is granted, all interested parties shall be afforded an opportunity to present oral or written argument before the Administrator or an authorized representative who took no part in the action under review.

§ 520.10 *Petition for amendment of the regulations in this part.* Any person wishing a revision of any of the terms of the foregoing regulations may submit in writing to the Administrator a petition setting forth the changes desired and the reasons for proposing them. If reasonable cause for amendment of the regulations is set forth, a hearing will be granted before the Administrator or his authorized representative with due notice to interested parties, or other provision will be made for affording interested parties an opportunity to present their views with respect to the proposed changes.

It is the judgment of the Administrator that the proper administration of the Fair Labor Standards Act requires that these regulations become effective simultaneously with the effective date of the Fair Labor Standards Amendments of 1949. Therefore, compliance with the requirement of the Administrative Procedure Act that publication of rules be made not less than 30 days prior to the effective date thereof is not feasible. Accordingly, the regulations contained in this part, as revised herein, shall become effective on January 25, 1950.

Signed at Washington, D. C., this 23d day of January 1950.

WM. R. MCCOMB,
Administrator,
Wage and Hour Division.

[F. R. Doc. 50-743; Filed, Jan. 24, 1950; 9:21 a. m.]

342

PART 521—EMPLOYMENT OF APPRENTICES

TRAINING OF VETERANS

In order to prevent the curtailment of opportunities for employment of veterans engaged in apprentice training programs under the supervision of the Veterans' Administration in accordance with the provisions of the Servicemen's Readjustment Act of 1944 (58 Stat. 284, 38 U. S. C. 693) as amended, it is necessary to provide for the temporary continuation of such apprentice-training of veterans, at wages below the minimum provided in section 6 of the Fair Labor Standards Amendments of 1949, under apprenticeship agreements approved by certain state agencies designated in the Servicemen's Readjustment Act of 1944 as amended.

Accordingly, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act, as amended (Sec. 14, 52 Stat. 1068, as amended; 29 U. S. C. and Sup., 214), the regulations contained in this part are hereby amended by adding a new section, to be numbered § 521.10, to read as follows:

§ 521.10 *Apprentice training of veterans.* In the case of a veteran employed in an apprentice-training course which requires more than two years of training, pursuant to the Servicemen's Readjustment Act of 1944 (58 Stat. 284; 38 U. S. C. 693) as amended, the written approval by a State agency authorized under such act, of the training program and of the apprentice-training agreement on the basis of which the veteran is eligible for receipt of a subsistence allowance under such act, shall consti-

tute a temporary certificate authorizing the employment of the veteran in such training course, at a wage rate of more than 40 cents but less than 75 cents an hour, for the period beginning January 25, 1950, and ending May 25, 1950: *Provided*, That at the earliest possible date within such period the employer of such veteran shall file with the Wage and Hour Division, United States Department of Labor, Washington 25, D. C., a true copy of the approved training program and agreement.

It is the judgment of the Administrator that the proper administration of the Fair Labor Standards Act requires that these regulations become effective simultaneously with the effective date of the Fair Labor Standards Amendments of 1949. Therefore, compliance with the requirements of paragraphs (a), (b) and (c) of section 4 of the Administrative Procedure Act is impracticable. Accordingly, the regulations contained in this part, as amended herein, shall become effective on January 25, 1950.

(Sec. 14, 52 Stat. 1068, as amended; 29 U. S. C. and Sup., 214)

Signed at Washington, D. C., this 23d day of January 1950.

WM. R. MCCOMB,
Administrator,
Wage and Hour Division.

[F. R. Doc. 50-742; Filed, Jan. 24, 1950; 9:20 a. m.]

343

PART 522—EMPLOYMENT OF LEARNERS

MILLINERY INDUSTRY, APPAREL INDUSTRY, ARTIFICIAL FLOWER AND FEATHER INDUSTRY, AND WOOLEN INDUSTRY

Pursuant to section 14 of the Fair Labor Standards Act, as amended, the Administrator has heretofore promulgated regulations setting forth terms and conditions under which special certificates may be issued to plants in the custom made and popular priced branches of the millinery industry, the apparel (other than gloves, women's apparel, single pants, shirts and allied garments, sportwear and other odd outerwear, rainwear, robes, leather and sheeplined clothing) industry, the artificial flower and feather industry, and the woolen industry authorizing employment of learners at wages below the minimum wage established in section 6 of the act.

On January 12, 1950, a notice was published in the FEDERAL REGISTER (15 F. R. 176) that the Administrator proposed to revoke the special regulations providing for the employment of learners in these industries. Interested persons were given seven days in which to submit data, views or arguments pertaining to the proposed revocation. This period has now expired, and careful consideration has been given to all material submitted.

Now, therefore, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act (Sec. 14, 52 Stat. 1068, 29 U. S. C. 214; as amended 63 Stat. 910), I find that the following special industry regulations are no longer necessary in order to prevent curtailment of opportunities for employment, and such regulations are hereby revoked, effective January 25, 1950:

Sections 522.21 through 522.27 (Custom-made Branch of the Millinery Industry);

Sections 522.31 through 522.37 (Popular Priced Branch of the Millinery Industry);

Sections 522.55 through 522.67 (Apparel Industry);

Sections 522.100 through 522.114 (Artificial Flowers and Feather Industry);

Sections 522.120 through 522.138 (Woolen Industry).

When necessary to prevent curtailment of opportunities for employment, employers in the above industries may make application under the general learner regulations (§§ 522.1 to 522.14) for permission to employ learners at subminimum wage rates.

(Sec. 14, 52 Stat. 1068; 29 U. S. C. 214)

Signed at Washington, D. C., this 20th day of January 1950.

WM. R. MCCOMB,
Administrator, Wage and Hour Division, United States Department of Labor.

[F. R. Doc. 50-686; Filed, Jan. 24, 1950; 8:48 a. m.]

344

PART 522—EMPLOYMENT OF LEARNERS

KNITTED WEAR INDUSTRY

Pursuant to section 14 of the Fair Labor Standards Act the Administrator has heretofore promulgated regulations §§ 522.68 to 522.79) setting forth terms and conditions under which special certificates may be issued in the Knitted Wear Industry authorizing employment of learners at wages below the minimum wage established in section 6 of the act.

On January 12, 1950, a notice was published in the FEDERAL REGISTER (15 F. R. 177) that the Administrator proposed to revise the regulations so as to provide, among other things, higher subminimum learner rates in the industry. Interested persons were given seven days in which to submit data, views or arguments pertaining to the proposed amendments. This period has now expired, and careful consideration has been given to all material submitted.

Now, therefore, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act, as amended, (52 Stat. 1068, 29 U. S. C. 214; as amended 63 Stat. 910) and in accordance with §522.12, I find that it is necessary, in order to prevent the curtailment of opportunities for employment, that the amendments to §§ 522.68 to 522.79, as published in the FEDERAL REGISTER on January 12, 1950, be, and such amendments to the regulations hereby are, adopted as follows:

1. Amend § 522.72 to read as follows:

§ 522.72 *Learner wage rate.* Learners employed under the certificate shall be paid not less than 60 cents per hour. Where experienced operators are paid piece work rates, learners shall be paid the same piece work rate and shall receive piece rate earnings if in excess of the subminimum rate.

2. Omit paragraph (b) of § 522.74.

3. Amend § 522.75 (b) to read as follows:

§ 522.75 *Revocation of special learner certificates.* * * *

(b) Any special certificate shall be cancelled as of the date of issue if it is found that the certificate has been obtained by fraud or misrepresentation, and the employer shall be liable to the employee for wages established by section 6 of the act as if no certificate had been issued.

4. Amend § 522.75 (c) to read as follows:

§ 522.75 *Revocation of special learner certificates.* * * *

(c) Any special certificate may be cancelled as of first date of violation if it is found that any of its terms have been violated and the employer shall be liable to those employed under such certificate from the date of violation for wages established by section 6 of the act.

5. Add to § 522.75 a new paragraph to be numbered (d) and to read as follows:

§ 522.75 *Revocation of special learner certificates.* * * *

(d) Except in cases of willfulness or those in which the public interest requires otherwise, before any contemplated action for cancellation or revocation of any special certificate for the employment of a learner will be considered, facts or conduct which may warrant such action will be called to the attention of the employer and he shall be afforded an opportunity to achieve or demonstrate compliance or to show that the conditions of employment of the learner have not changed or that the purpose for which the certificate was originally issued still exists.

It is the judgment of the Administrator that the effective administration of the Fair Labor Standards Act requires that these amendments become effective simultaneously with the effective date of the Fair Labor Standards Amendments of 1949. Therefore, compliance with the requirements of the Administrative Procedure Act that publication of rules be made not less than 30 days prior to the effective date thereof is not feasible. These amendments accordingly shall become effective on January 25, 1950, and shall continue in force and effect until modified, superseded or rescinded.

(Sec. 14, 52 Stat. 1068; 29 U. S. C. 214)

Signed at Washington, D. C., this 20th day of January 1950.

WM. R. MCCOMB,
Administrator, Wage and Hour Division, United States Department of Labor.

[F. R. Doc. 50-684; Filed, Jan. 24, 1950; 8:48 a. m.]

345

PART 522—EMPLOYMENT OF LEARNERS

INDEPENDENT TELEPHONE INDUSTRY

Pursuant to section 14 of the Fair Labor Standards Act the Administrator

has heretofore promulgated regulations (§§ 522.82 to 522.94) setting forth terms and conditions under which special certificates may be issued in the independent telephone industry authorizing employment of learners at wages below the minimum wage established in section 6 of the act.

On January 12, 1950, a notice was published in the FEDERAL REGISTER (15 F. R. 177) that the Administrator proposed to revise the regulations so as to provide, among other things, higher subminimum learner rates in the industry. Interested persons were given seven days in which to submit data, views or arguments pertaining to the proposed amendments. This period has now expired, and careful consideration has been given to all material submitted.

Now, therefore, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act, as amended (52 Stat. 1068, 29 U. S. C. 214; as amended 63 Stat. 910), and in accordance with § 522.12, I find that it is necessary, in order to prevent the curtailment of opportunities for employment, that the amendments to §§ 522.82 to 522.94, as published in the FEDERAL REGISTER on January 12, 1950, be, and such amendments to the regulations hereby are, adopted as follows with the following additional amendment: In § 522.86, change "(c)" to "(b)", and change "(b)" to "(c)".

1. In § 522.83, revoke paragraph (c), redesignate paragraph (b) as (c), and substitute new paragraph (b) to read as follows:

§ 522.83 *Number of learners.* * * *

(b) Special certificates issued to meet abnormal labor turn-over may provide:

(1) In the case of exchanges employing up to 8 operators, two learners may be employed at any one time within any 6-month period: *Provided*, That a total of no more than two learners are employed within any such period and that each learner is employed for not more than 480 hours.

(2) In the case of exchanges employing 9 to 18 operators, four learners may be employed at any one time within any 6-month period: *Provided*, That a total of no more than four learners are employed within any such period, and that each learner is employed for not more than 480 hours.

2. Amend § 522.84 to read as follows:

§ 522.84 *Learning period.* The maximum learning period which may be provided for any learner under a special certificate issued in this industry shall not extend beyond the first 480 hours of employment in training for and in switchboard operating.

3. Amend § 522.85 to read as follows:

§ 522.85 *Learner hourly rates.* The minimum hourly rates to be provided in a special certificate for learners shall be not less than 60 cents per hour for the first 320 hours, and 65 cents for the second 160 hours of the learning period.

4. In § 522.88, delete the words, "as if no certificate had been issued," at the end of paragraph (c), and add new paragraph (d) to read as follows:

§ 522.88 *Revocation of special certificates.* * * *

(d) Except in cases of willfulness or those in which the public interest requires otherwise, before any contemplated action for the cancellation or revocation of any special certificate for the employment of learners in the independent telephone industry will be considered, facts or conduct which may warrant such action shall be called to the attention of the employer in writing and he shall be accorded an opportunity to demonstrate or achieve compliance, or to show that the conditions of employment of the learner have not changed or that the purpose for which the certificate was originally issued still exists.

5. Amend § 522.91 to read as follows:

§ 522.91 *Record to be kept.* The name of each learner and occupation in which each is employed shall be entered on the payroll record of the exchange to which the special certificate is issued and he shall be designated on the payroll as a learner.

6. Omit § 522.94.

It is the judgment of the Administrator that the effective administration of the Fair Labor Standards Act requires that these amendments become effective simultaneously with the effective date of the Fair Labor Standards Amendments of 1949. Therefore, compliance with the requirement of the Administrative Procedure Act that publication of rules be made not less than 30 days prior to the effective date thereof is not feasible. These amendments accordingly shall become effective on January 25, 1950, and shall continue in force and effect until July 25, 1950, unless modified, superseded or rescinded prior to said date of termination.

(Sec. 14, 52 Stat. 1068; 29 U. S. C. 214)

Signed at Washington, D. C., this 20th day of January 1950.

WM. R. MCCOMB,
Administrator, Wage and Hour Division, United States Department of Labor.

[F. R. Doc. 50-682; Filed, Jan. 24, 1950; 8:49 a. m.]

PART 522—EMPLOYMENT OF LEARNERS

SINGLE PANTS, SHIRTS AND ALLIED GARMENTS, WOMEN'S APPAREL, SPORTSWEAR AND OTHER ODD OUTERWEAR, RAINWEAR, ROBES AND LEATHER AND SHEEP-LINED GARMENTS, DIVISONS OF THE APPAREL INDUSTRY

Pursuant to section 14 of the Fair Labor Standards Act the Administrator has heretofore promulgated regulations (§§ 522.160 to 522.165) setting forth terms and conditions under which special certificates may be issued in the single pants, shirts and allied garments, women's apparel, sportswear and other odd outerwear, rainwear, robes and leather and sheep-lined garments divisions of the apparel industry authorizing employment of learners at wages below the minimum wage established in section 6 of the act.

On January 14, 1950, a notice was published in the FEDERAL REGISTER (15 F. R. 264) that the Administrator proposed to revise the regulations so as to provide, among other things, higher subminimum learner rates in the industry. Interested persons were given five days in which to submit data, views or arguments pertaining to the proposed amendments. This period has now expired, and careful consideration has been given to all material submitted.

Now, therefore, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act, as amended (52 Stat. 1068, 29 U. S. C. 214; as amended 63 Stat. 910) and in accordance with § 522.12, I find that it is necessary, in order to prevent the curtailment of opportunities for employment, that the amendments to §§ 522.160 to 522.165, as published in the FEDERAL REGISTER on January 14, 1950, be, and such amendments to the regulations hereby are, adopted with the following correction: In § 522.162 (a), Column D, insert the words "many as", between the words, "as", and "10 learners".

§ 522.162 *Terms of special certificates.* (a) Special learner certificates may be issued authorizing the employment of learners in the branches of the apparel industry specified in § 522.161, subject to the following limitations as to occupation, duration of learning period, minimum rates of pay, and number or proportion:

A. Occupations for which certificates may be issued	B. Duration of learning period	C. Minimum rates of pay for learners	D. Number or proportion of learners
Machine operating (except cutting). Pressing. Handsewing. Finishing operations involving handsewing.	Maximum learning period of 480 hours for any occupation listed in column A, but not more than a 320-hour learning period in such occupation if, within the previous 2 years, the worker had 160 hours or more of experience in another occupation listed.[1]	A learner employed under the 480-hour authorized learning period, shall be paid not less than 55 cent per hour for the first 320 hours, and not less than 65 cents per hour for the next 160 hours.[2] An experienced worker in one of the occupations shown in column A who is being retrained in any one of the other occupations listed, shall be paid during such retraining not less than 55 cents per hour for the first 160 hours and not less than 65 cents per hour for the next 160 hours.[2] In the corsets and allied garments branch, learners shall be paid not less than 60 cents per hour for the first 480 hours.[2]	For normal labor turnover: not more than 10 percent of the productive factory workers. If total factory employment is less than 100 the certificate may authorize as many as 10 learners. For new and expanding plant: to the extent of the needs of the plant.

[1] If, within the previous 2 years, the worker has been employed for less than 480 hours, in the same occupation for which he is being trained as a learner, the number of hours of previous employment should be deducted from the maximum learning period.

[2] In establishments where experienced workers are paid on a piece rate basis learners shall be paid the same piece rates that experienced workers engaged in the same occupations are paid and earnings shall be based on those piece rates if in excess of the subminimum rates established.

(b) With respect to learners hired prior to and on the payroll of an employer on January 15, 1950, the learning period authorized in Column B of paragraph (a) of this section may be extended by 160 hours, provided such learners are paid at a rate of not less than 70 cents per hour for the additional 160 hours of the learning period, and provided further that the number of such learners shall not be counted in determining the number or proportion of learners provided in Column D of paragraph (a) of this section.

(c) No experienced worker shall be employed under the terms of a special learner certificate, except as provided in Column C of paragraph (a) of this section.

(d) No learner shall be hired under a special learner certificate if an experienced worker who is capable of equaling the performance of a worker of ordinary or minimum skill is available for employment.

(e) A special learner certificate authorizing the employment of learners for normal labor turnover may be issued for a period of one year. A special learner certificate authorizing the employment of learners by new or expanding plants shall be issued for a period not longer than necessary to complete the training of the total number of additional learners.

It is the judgment of the Administrator that the effective administration of the Fair Labor Standards Act requires that these amendments become effective simultaneously with the effective date of the Fair Labor Standards Amendments of 1949. Therefore, compliance with the requirement of the Administrative Procedure Act that publication of rules be made not less than 30 days prior to the effective date thereof is not feasible. These amendments accordingly shall become effective on January 25, 1950, and the regulations as amended and any certificates which might be issued thereunder shall continue in force and effect until modified, superseded or rescinded.

(Sec. 14, 52 Stat. 1068; 29 U. S. C. 214)

Signed at Washington, D. C., this 20th day of January 1950.

WM. R. MCCOMB,
Administrator, Wage and Hour Division, United States Department of Labor.

[F. R. Doc. 50-683; Filed, Jan. 24, 1950; 8:49 a. m.]

347

PART 522—EMPLOYMENT OF LEARNERS

CIGAR INDUSTRY

Pursuant to section 14 of the Fair Labor Standards Act the Administrator has heretofore promulgated regulations (§§ 522.201 to 522.211) setting forth terms and conditions under which special certificates may be issued to plants in the Cigar Industry in the continental United States authorizing employment of learners at wages below the minimum wage established in section 6 of the act.

On December 31, 1949, a notice was published in the FEDERAL REGISTER (14 F. R. 7941) that the Administrator proposed to amend §§ 522.201 to 522.211 so as to provide, among other things, higher subminimum learner rates in the industry. Interested persons were given ten days in which to submit data, views, or arguments pertaining to the proposed amendments. This period has now expired. No data, views, or arguments have been received.

I find that it is necessary, in order to prevent the curtailment of opportunities for employment, that such proposed amendments be adopted.

Now, therefore, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act, as amended (Sec. 14, 52 Stat. 1068, 29 U. S. C. 214; as amended 63 Stat. 910), and in accordance with § 522.12 of this part, §§ 522.201 to 522.211, are hereby amended as set forth in the FEDERAL REGISTER of December 31, 1949 (14 F. R. 7941).

1. Revoke last sentence of § 522.201.

2. Amend § 522.204 (a) to read as follows:

§ 522.204 *Subminimum rates.* (a) The subminimum rates which may be authorized in special certificates issued in the Cigar Industry shall be not less than 60 cents per hour in the occupations of cigar machine operating and cigar packing; not less than 60 cents per hour for the first 480 hours and 65 cents per hour for the second 480 hours in the occupations of hand rolling and hand bunch making; not less than 60 cents per hour for the first 320 hours and 65 cents per hour for the second 320 hours in the occupation of making Italian stogies; and not less than 60 cents per hour in the occupations of hand stripping and machine stripping.

3. Revoke § 522.205 (c).

4. Revoke § 522.211.

5. Add new § 522.211 to read as follows:

§ 522.211 *Revocation and cancellation.* (a) The Administrator or his authorized representative may cancel any certificate for cause. Cancellation may be affected (1) as of the date of issuance if it is found that the applicant set forth any fact or facts in the application which he knew or had reasonable cause to believe to be false; (2) as of the date of violation if it is found that any of its terms have been violated; and (3) prospectively if it is found that the conditions of employment of the learner have changed or that the purposes for which the certificate was originally issued no longer obtain.

(b) Except in cases of willfulness or those in which the public interest requires otherwise, before any contemplated action for cancellation or revocation of any special certificate for the employment of a learner will be considered, facts or conduct which may warrant such action will be called to the attention of the employer and he shall be afforded an opportunity to achieve or demonstrate compliance, or to show that the conditions of employment of the learner have not changed or that the purpose for which the certificate was originally issued still exist.

It is the judgment of the Administrator that the effective administration of the Fair Labor Standards Act requires that these amendments become effective simultaneously with the effective date of the Fair Labor Standards Amendments of 1949. Therefore, compliance with the requirement of the Administrative Procedure Act that publication of rules be made not less than 30 days prior to the effective date thereof is not feasible. These amendments accordingly shall become effective on January 25, 1950, and shall continue in full force and effect until July 25, 1950, unless modified, superseded or rescinded prior to such date.

(Sec. 14, 52 Stat. 1068; 29 U. S. C. 214)

Signed at Washington, D. C., this 20th day of January 1950.

WM. R. MCCOMB,
Administrator, Wage and Hour Division, United States Department of Labor.

[F. R. Doc. 50-685; Filed, Jan. 24, 1950; 8:48 a. m.]

348

PART 522—EMPLOYMENT OF LEARNERS

GLOVE INDUSTRY

On January 18, 1950, a notice was published in the FEDERAL REGISTER (15 F. R. 297) that the Administrator proposed to revise the determination and order of February 8, 1940, prescribing terms and conditions under which certificates may be issued authorizing employment of learners in the Glove Branch of the Apparel Industry at wages below the minimum wage established by section 6 of the Act. Interested parties were given 5 days in which to file data, views or arguments pertaining thereto. This period has now expired, and all material received has been given careful consideration.

The revision of the provisions of the determination and order was made necessary by the Fair Labor Standards Amendments of 1949 raising the minimum wage from 40 cents to 75 cents an hour and constitutes an interim measure to prevent curtailment of opportunities for employment. It provides terms and conditions under which learners may be employed in the glove industry for a period of 6 months following January 25, 1950, during which period the Administrator will hold a public hearing to determine the necessity for special learner regulations for the glove industry after that time.

Accordingly, pursuant to the authority vested in me by section 14 of the Fair Labor Standards Act, as amended (Sec. 14, 52 Stat. 1068, as amended; 29 U. S. C. and Sup., 214), I find that it is necessary, in order to prevent curtailment of opportunities for employment, that the revision of the determination and order governing employment of learners in the Glove Branch of the Apparel Industry, as published in the FEDERAL REGISTER on January 18, 1950 (15 F. R. 297), be, and such revision hereby is, adopted, as follows:

Sec.
522.220 Terms of special certificates.
522.221 Cancellation of certificates.
522.222 Definitions.

AUTHORITY: §§ 522.220 to 522.221 issued under sec. 14, 52 Stat. 1068, as amended; 29 U. S. C. and Sup. 214.

§ 522.220 *Terms of special certificates.* When necessary in order to prevent the curtailment of opportunities for employment, special certificates permitting the employment of learners, at subminimum rates may be issued under the conditions set forth below to all plants in the Glove Branch of the Apparel Industry making application therefor representing that experienced workers are not available to the plant, unless experienced workers are found to be available.

(a) Learners employed under the certificates shall not exceed 10 percent of the total number of workers in the plant engaged in hand and machine stitching operations on leather dress gloves; and in machine stitching operations on knit fabric and work gloves; and in finger knitting and finger closing operations on knit wool gloves, provided that as many as 10 learners may be authorized in any certificate.

(b) No person shall be employed as a learner under the certificate, longer than 480 hours.

(c) Learners employed under the certificate shall be paid not less than 55 cents for the first 320 hours and 65 cents for the last 160 hours of the learning period. In plants where experienced operators are paid on a piece-work rate, learners shall be paid at least the same piece-work rate and shall receive earnings paid on this rate if they earn in excess of the subminimum wage rates provided herein.

(d) Only learners shall be employed at a subminimum wage under the certificate and no learner shall be employed under the certificate unless hired when an experienced worker was not available.

(e) No learners shall be employed at a subminimum wage under the certificate until and unless the certificate is posted and kept posted in a conspicuous place in the plant in which learners are employed.

§ 522.221 *Cancellation of certificates.* (a) The Administrator or his authorized representative may cancel any certificate for cause. Cancellation may be effected (1) as of the date of issuance if it is found that the applicant set forth any fact or facts in the application which he knew or had reasonable cause to believe to be false; (2) as of the date of violation if it is found that any of its terms have been violated; and (3) prospectively if it is found that the conditions of employment of the learner have changed or that the purposes for which the certificate was originally issued no longer obtain.

(b) Except in cases of willfulness or those in which the public interest requires otherwise, before any contemplated action for cancellation or revocation of any special certificate for the employment of a learner will be considered, facts or conduct which may warrant such action will be called to the attention of the employer and he shall be afforded an opportunity to achieve or demonstrate compliance.

§ 522.222 *Definitions.* In §§ 522.220 to 522.222, the term "learner" means:

(a) In the leather dress branch, a person who has not been employed during the preceding three years for more than 480 hours in the aggregate in hand or machine stitching operations on leather dress gloves.

(b) In the knit fabric branch, a person who has not been employed during the preceding three years for more than 480 hours in the aggregate in machine stitching operations on leather dress or knit fabric gloves.

(c) In the work glove branch, a person who has not been employed during the preceding three years for more than 480 hours in the aggregate in machine stitching operations in any type of glove manufacture.

(d) In the knit wool branch, a person who has not been employed during the preceding three years for more than 480 hours in the aggregate on finger knitting and finger closing operations;

and, the term "Glove Branch of the Apparel Industry" includes leather dress gloves, knit fabric gloves, work gloves, and knit wool gloves.

It is the judgment of the Administrator that the proper administration of the Fair Labor Standards Act requires that the determination and order, as revised, become effective simultaneously with the effective date of the Fair Labor Standards Amendments of 1949. Therefore, compliance with the requirement of the Administrative Procedure Act that publication of rules be made not less than 30 days prior to the effective date thereof is not feasible. Accordingly, the determination and order, as revised herein, shall become effective on January 25, 1950.

Signed at Washington, D. C., this 23d day of January, 1950.

WM. R. MCCOMB,
Administrator,
Wage and Hour Division.

[F. R. Doc. 50-741; Filed, Jan. 24, 1950; 9:20 a. m.]

350

PART 549—DEFINING AND DELIMITING THE TERM "BONA FIDE PROFIT-SHARING PLAN OR TRUST"[1]

Section 7 (d) (3) (b) of the Fair Labor Standards Act, as amended, effective January 25, 1950, provides that payments made pursuant to a bona fide profit-sharing plan or trust shall be excluded from an employee's regular rate of pay, and further provides that the Administrator of the Wage and Hour Division shall issue regulations defining and delimiting the term "bona fide profit-sharing plan or trust" for purposes of this section.

In connection with the formulation of said regulations the Administrator appointed an Advisory Committee composed of representatives of the Council of Profit Sharing Industries, the Congress of Industrial Organizations and the American Federation of Labor. The Advisory Committee met in Washington, D. C., on December 6, 1949 and January 18, 1950, with the Administrator and members of his staff and advised and assisted in the preparation of the regulations hereinafter set forth.

In view of the fact that section 7 (d) (3) (b) of the Fair Labor Standards Act, as amended, becomes effective on January 25, 1950, the Administrator deems it to be in the public interest that the appropriate regulations thereunder should become effective simultaneously on said date. Consequently, notice and public procedure pursuant to section 4 (a) of the Administrative Procedure Act, is found by the Administrator to be impracticable.

Now, therefore, pursuant to the authority vested in the Administrator by section 7 (d) (3) (b) of the Fair Labor Standards Act, as amended, the regulations set forth below are hereby adopted, effective January 25, 1950.

Interested persons are invited to submit data, views or comments pertaining to these regulations to the Administrator, Wage and Hour Division, United States Department of Labor, Washington 25, D. C., within 15 days from the date of publication hereof in the FEDERAL REGISTER. If, upon the basis of any such data, views or comments submitted, the Administrator finds it necessary or desirable to revise the regulations, appropriate notice thereof will be published in the FEDERAL REGISTER.

Sec.
549.1 Essential requirements for qualification.
549.2 Disqualifying provisions.
549.3 Distinction between plan and trust.
549.4 Petition for amendment of regulations.

AUTHORITY: §§ 549.1 to 549.4 issued under 52 Stat. 1060, as amended; 29 U. S. C. and Sup., 201 et seq.

§ 549.1 *Essential requirements for qualification.* The term "bona fide profit-sharing plan or trust" as used in section 7 (d) (3) (b) of the Fair Labor Standards Act, as amended, means a definite program or arrangement in writing, communicated and made available to the employees, which meets the following standards:

(a) It is established and maintained in good faith for the purpose of distributing to the employees a share of profits as additional remuneration over and above the wages or salaries paid to employees, which wages or salaries are not dependent upon or influenced by the existence of such profit-sharing plan or trust or the amount of the payments made pursuant thereto; and

(b) All contributions or allocations by the employer to the fund or trust to be distributed to the employees are (1) derived solely from profits of the employer's business, enterprise, establish-

[1] The regulations in this part do not relate to or affect contributions irrevocably made by an employer to a trustee or third person pursuant to a bona fide plan for providing old-age, retirement, life, accident, or health insurance or similar benefits for employees as provided in section 7 (d) (4) of the Fair Labor Standards Act, as amended.

ment or plant as a whole, or an established branch or division of the business or enterprise which is recognized as such for general business purposes and for which profits are separately and regularly calculated in accordance with accepted accounting practice and (2) made periodically, but not more frequently than is customary or consonant with accepted accounting practice to make periodic determinations of profits; and

(c) Eligibility to share in profits extends at least to all employees who are subject to the minimum wage and overtime provisions of the act, or to all such employees in an established part of the employer's business as described in paragraph (b) of this section: *Provided, however,* That such eligibility may be determined by factors such as length of service or minimum schedule of hours of work which are specified in the plan or trust, or such classification of employees as the employer may designate with the approval of the Administrator upon a finding, after notice to interested persons and an opportunity to present their views either orally or in writing, that it is in accord with the meaning and intent of the provisions of this section of the act and the regulations in this part; and

(d) The shares of profits to be distributed to individual employees are determined in accordance with a formula or method of calculation specified in the plan or trust, which formula or method of calculation may be based, among other factors, on the straight-time hours or total hours or straight-time earnings or total earnings or base rate of pay of the employee, but the employee's share so determined, may not be diminished because of any other remuneration received by him; and

(e) Provision is made for payment to the individual employees of their respective shares or profits either within a reasonable period after the determination of the amount of profits to be distributed or upon the occurrence of appropriate contingencies specified in the plan or trust: *Provided, however,* That the right of an employee to receive his share is not made dependent upon his continuing in the employ of the employer after the period for which the determination of profits has been made.

§ 549.2 *Disqualifying provisions.* No plan or trust which contains any one of the following provisions shall be deemed to be a bona-fide profit-sharing plan or trust within the meaning of section 7 (d) (3) (b) of the Fair Labor Standards Act, as amended:

(a) If an individual employee's share of profits is determined by any formula or method of calculation which is based to a substantial extent on the quality or quantity of work performed by any individual employee or group or class of employees; or

(b) If the amount to be paid periodically by the employer into the fund to be distributed to his employees is a fixed sum; or

(c) If periodic payments of minimum amounts to the employees are guaranteed by the employer.

§ 549.3 *Distinction between plan and trust.* As used in the regulations in this part:

(a) "Profit-sharing plan" means any such program or arrangement as qualifies hereunder which provides for the distribution by the employer to his employees of their respective shares of profits;

(b) "Profit-sharing trust" means any such program or arrangement as qualifies hereunder which provides for the irrevocable deposit by the employer of his employees' distributive shares of profits with a trustee for deferred distribution to such employees of their respective shares.

§ 549.4 *Petition for amendment of regulations.* Any person wishing a revision of any of the terms of the foregoing regulations may submit in writing to the Administrator a petition setting forth the changes desired and the reasons for proposing them. If, upon inspection of the petition, the Administrator believes that reasonable cause for amendment of the regulations is set forth, the Administrator will either schedule a hearing with due notice to interested parties, or will make other provision for affording interested parties an opportunity to present their views, either in support of or in opposition to the proposed changes.

Signed at Washington, D. C., this 23d day of January 1950.

WM. R. MCCOMB,
Administrator,
Wage and Hour Division.

[F. R. Doc. 50-740; Filed, Jan. 24, 1950; 9:28 a. m.]

PART 550—DEFINING AND DELIMITING THE TERM "TALENT FEES"

Section 7 (d) (3) (c) of the Fair Labor Standards Act, as amended, effective January 25, 1950, provides that talent fees paid to performers, including announcers, on radio and television programs shall be excluded from computation of the performer's regular rate of pay, and further provides that the Administrator of the Wage and Hour Division shall issue regulations defining and delimiting the term "talent fees" for purposes of this section.

In connection with the formulation of said regulations, the Administrator appointed an Advisory Committee composed of representatives of the American Federation of Radio Artists and the National Association of Broadcasters. The Advisory Committee met in Washington, D. C., on November 22, 1949 and December 21, 1949 with members of the Administrator's staff and advised and assisted in the preparation of the regulations hereinafter set forth.

In view of the fact that section 7 (d) (3) (c) of the Fair Labor Standards Act, as amended, becomes effective on January 25, 1950, the Administrator deems it to be in the public interest that the appropriate regulations thereunder should become effective simultaneously on said date. Consequently, notice and public procedure pursuant to section 4 (a) of the Administrative Procedure Act is found by the Administrator to be impracticable.

Now, therefore, pursuant to the authority vested in the Administrator by section 7 (d) (3) (c) of the Fair Labor Standards Act, as amended, the regulations set forth below are hereby adopted, effective January 25, 1950.

Interested persons are invited to submit data, views or comments pertaining to these regulations to the Administrator, Wage and Hour Division, United States Department of Labor, Washington 25, D. C., within 15 days from the date of publication hereof in the FEDERAL REGISTER. If, upon the basis of any such data, views or comments submitted, the Administrator finds it necessary or desirable to revise the regulations, appropriate notice thereof will be published in the FEDERAL REGISTER.

Sec.
550.1 "Talent fees" as used in section 7 (d) (3) (c) of the Fair Labor Standards Act, as amended.
550.2 Definitions.
550.3 Petition for amendment of regulations.

AUTHORITY: §§ 550.1 to 550.3 issued under 52 Stat. 1060, as amended; 29 U. S. C. and Sup., 201 et seq.

§ 550.1 *"Talent fees" as used in section 7 (d) (3) (c) of the Fair Labor Standards Act, as amended.* The term "talent fees" in section 7 (d) (3) (c) of the act shall mean extra payments made to performers, including announcers on radio and television programs, where the payment is made:

(a) To an employee having regular duties as a staff performer (including announcers), as an extra payment for services as a performer on a particular commercial program or a particular series of commercial programs (including commercial spot announcements) or for special services as a performer on a particular sustaining program or a particular series of sustaining programs;

(b) In pursuance of an applicable employment agreement or understanding or an applicable collective bargaining agreement, in a specific amount agreed upon in advance of the performance of the services or special services for which the extra payment is made.

§ 550.2 *Definitions.* As used in the regulations in this part:

(a) The term "extra payment" shall mean a payment, in a specific amount, made in addition to the straight-time and overtime compensation which would be due the performer under the agreement applicable to his employment and under the act if the time spent in performing the services or special services referred to in paragraph (a) of § 550.1 had been devoted exclusively to duties as a staff performer; but shall not include any payment any part of which is credited or offset against any remuneration otherwise payable to the performer under any contract or statutory provision;

(b) The term "performer" shall mean a person who performs a distinctive, personalized service as a part of an actual broadcast or telecast including an actor, singer, dancer, musician, comedian, or

any person who entertains, affords amusement to, or occupies the interest of a radio or television audience by acting, singing, dancing, reading, narrating, performing feats of skill, or announcing, or describing or relating facts, events and other matters of interest, and who actively participates in such capacity in the actual presentation of a radio or television program. It shall not include such persons as script writers, stand-ins, or directors who are neither seen nor heard by the radio or television audience; nor shall it include persons who participate in the broadcast or telecast purely as technicians such as engineers, electricians and stage hands;

(c) The term "special services" shall mean services beyond the scope of a performer's regular or ordinary duties as a staff performer under the agreement applicable to the employment.

§ 550.3 *Petition for amendment of regulations.* Any person wishing a revision of any of the terms of the foregoing regulations may submit in writing to the Administrator a petition setting forth the changes desired and the reasons for proposing them. If, upon inspection of the petition, the Administrator believes that reasonable cause for amendment of the regulations is set forth, the Administrator will either schedule a hearing with due notice to interested parties, or will make other provisions for affording interested parties an opportunity to present their views, either in support of or in opposition to the proposed change.

Signed at Washington, D. C., this 23d day of January 1950.

WM. R. MCCOMB,
Administrator,
Wage and Hour Division.

[F. R. Doc. 50-739; Filed, Jan. 24, 1950; 9:28 a. m.]

353

TITLE 36—PARKS, FORESTS, AND MEMORIALS

Chapter II—Forest Service, Department of Agriculture

PART 211—ADMINISTRATION

APPEALS FROM ADMINISTRATIVE ACTION [1]

By virtue of the authority vested in the Secretary of Agriculture under the provisions of the act of March 3, 1891, as amended (16 U. S. C. 471), and the act of June 4, 1897, as amended (16 U. S. C. 551), I, Charles F. Brannan, Secretary of Agriculture, do hereby amend the first paragraph of § 211.2, Part 211, Chapter II, Title 36, Code of Federal Regulations as follows:

The first paragraph of § 211.2 is amended to read as follows:

§ 211.2 *Appeals from administrative action.* An appeal may be taken from any administrative action or decision by filing with the officer who rendered the decision a written request for reconsideration thereof or notice of appeal. Decisions of forest officers shall be final unless appeal is taken therefrom within a reasonable time. The decision appealed from shall be reviewed by the immediate superior of the officer by whom the decision was rendered; that is, in the following order: Supervisor, Regional forester, Chief of the Forest Service, Secretary of Agriculture. Appeals from the Chief of the Forest Service to the Secretary of Agriculture shall, upon the written request of the appellant, be referred to the National Forest Advisory Board of Appeals. The Board shall consider appeals referred to it on the merits and furnish the Secretary of Agriculture with its advice and recommendations.

(30 Stat. 35, as amended, sec. 1, 33 Stat. 628; 16 U. S. C. 551, 472)

Done at Washington, D. C., this 17th day of January 1950. Witness my hand and the seal of the Department of Agriculture.

[SEAL] CHARLES F. BRANNAN,
Secretary of Agriculture.

[F. R. Doc. 50-700; Filed, Jan. 24, 1950; 8:49 a. m.]

[1] See F. R. Doc. 50-699 under Department of Agriculture, Forest Service in Notices section.

354

TITLE 46—SHIPPING

Chapter II—United States Maritime Commission

Subchapter F—Merchant Ship Sales Act of 1946

[General Order 60, Amdt. 3 to Supp. 5]

PART 299—RULES AND REGULATIONS, FORMS AND CITIZENSHIP REQUIREMENTS

FORMS; DOMESTIC TRADE ADDENDUM

Section 299.82 *Uniform bareboat charter of a war-built dry-cargo vessel under the Merchant Ship Sales Act of 1946, "SHIPSALESDEMISE 303",* is amended as follows:

The form of Domestic Trade Addendum, as authorized by the Commission on July 29, 1948, and published in the FEDERAL REGISTER issue of August 14, 1948 (13 F. R. 4710) is hereby superseded and revised to read as follows:

SHIPSALESDEMISE 303
(Domestic Trade Addendum)
(Revised)

Contract No. MCc.....
Addendum No. .....

Addendum to Bareboat Charter Agreement (herein called the "Agreement") dated as of ....., between the United States of America, acting by and through the United States Maritime Commission (hereinafter called the "Owner") and ..... (hereinafter called the "Charterer").

Witnesseth

Whereas, separate accountings for foreign trade and domestic trade (coastwise or intercoastal) have been prescribed by legislation (Public Law 127, 80th Congress) with respect to all voyages commencing subsequent to June 30, 1947, and

Whereas, the parties have agreed upon new terms and conditions applicable to vessels chartered hereunder for operation on Charterer's certificated coastwise and intercoastal routes, effective as of July 1, 1947, and

Whereas, the parties desire to amend this Agreement accordingly,

Now, therefore, effective as of July 1, 1947, this Agreement is hereby amended as follows:

I. *Separate accountings.* Where the Charterer is engaged both in the foreign trade and the domestic trade (coastwise or intercoastal) additional charter hire pursuant to Clause 13, Part II, for all voyages commencing subsequent to June 30, 1947, shall be computed, accounted for, and paid separately on such domestic trade, and shall be computed, accounted for and paid separately on such foreign trade. All voyages which are subject to the provisions of this Addendum shall be treated for accounting purposes only as if this Addendum constituted a separate charter between the parties. It is specifically understood and agreed that the provisions of this clause do not require the separation of accountings for foreign trade voyages subsequent to June 30, 1947, from accountings due for such voyages prior to that date.

II. *Basic charter hire.* The following provisions shall be applicable to the vessels listed on the attached schedule marked Exhibit B, which is made a part hereof by reference, and supplements and amendments thereto:

(a) The basic charter rate stipulated in Clause C (1), Part I, shall be computed on the basis of 8½% per annum of either the unadjusted statutory sales price or the floor price of each of the vessels, whichever is higher; and the footnote pertaining to the charter rate shall be amended to read as follows:

[1] 8½% per annum of either the unadjusted statutory sales price or the floor price of the vessel, whichever is higher, which is the minimum basic monthly charter hire, subject to upward adjustment to a maximum basic monthly charter hire of 15% per annum of either the unadjusted statutory sales price or the floor price of the vessel, whichever is higher, as provided in Clause 12 (b), Part II.

(b) Clause 12, Part II, shall be deleted and the following paragraphs substituted in lieu thereof for the purpose of determining basic charter hire:

CLAUSE 12. *Basic charter hire.* (a) The Charterer shall pay to the Owner basic charter hire at the monthly rate provided for in Part I hereof, (hereinafter referred to as the ("minimum basic charter rate") from the day and hour of delivery of the Vessels until and including the day and hour of redelivery to the Owner pursuant to the terms of this Agreement; or if any Vessel shall be lost, hire shall continue until the time of her loss, if known, or if the time of loss be uncertain, then up to and including the time last heard from. Payment of such minimum basic charter hire shall be made to the Owner at Washington, D. C., on delivery of the Vessel for the remainder of the calendar month in which delivery is made, and thereafter monthly in advance on the first day of each month.

(b) It is specifically agreed that the minimum basic monthly charter hire prescribed in Part I of this Agreement (8½% per annum of either the unadjusted statutory sales price or the floor price of the Vessels covered by this Agreement, whichever is higher) shall be deemed to be an unconditional payment to the Owner, and that the balance of 6½% shall be payable from earnings before any participation in such earnings by the Charterer. If, therefore, at the end of any calendar year, or other accounting period, the total cumulative net voyage profits of all of such vessels before basic hire are in excess of such minimum basic hire, the basic hire shall be increased by the amount by which such net voyage profits before basic hire exceed the minimum basic hire, provided that such increase shall not operate to increase the basic hire to in excess of 15% per annum of either the unadjusted statutory sales price, or the floor price of the vessels, whichever, is higher.

III. *Additional charter hire.* For the purpose of determining additional charter hire on the vessels listed on the attached schedule marked Exhibit B, which is made a part hereof by reference, and supplements and amendments thereto, Clause 13, Part II, shall

be deleted and the following paragraphs substituted in lieu thereof:

CLAUSE 13. *Additional charter hire.* If at the end of the calendar year 1947, or any subsequent calendar year or at the termination of this Agreement, as amended, the cumulative net voyage profit (after the payment of the maximum basic charter hire provided herein and payment of the charterer's fair and reasonable overhead expenses applicable to operation of the Vessels) shall exceed 10 per centum per annum on the Charterer's capital necessarily employed in the business of the Vessels (all as hereinafter defined) the Charterer shall pay over to the Owner at Washington, D. C., within 30 days after the end of such year or other period, as additional charter hire for such year or other period, an amount equal to one-half of such cumulative net voyage profit in excess of 10 per centum per annum on such capital (but such cumulative net profit so accounted for shall not be included in any calculation of cumulative net profit in any subsequent year or period).

The Charterer agrees to make preliminary payments to the Owner on account of such additional charter hire at such times and in such manner and amounts as may be required by the Owner: *Provided, however,* That such payment of additional charter hire shall be deemed to be preliminary and subject to adjustment either at the time of the rendition of preliminary statements or upon the completion of each final audit by the Owner, at which times such payments shall be made to the Owner as such preliminary statements or final audit may show to be due, or such overpayments refunded to the Charterer as may be required.

IV. *Mixed voyages*—(a) *Accounting.* In instances where single voyages encompass both foreign trade and domestic trade, as hereinafter defined, it is agreed that, for the purposes of this Addendum, the capital necessarily employed and net voyage profit applicable to each such trade shall be allocated separately on such basis as the Owner may determine to be fair and reasonable, provided that, for the purposes of this allocation, (1) vessel operating revenue shall be allocated to the respective trades in which earned on an actual basis, (2) port expense, cargo expense, brokerage expense, and other voyage expense shall be allocated to the respective trades in which incurred on an actual basis wherever practicable, and (3) vessel expense and such voyage expense as is not susceptible to direct allocation shall be allocated on the basis of the relation that the revenue earned in each trade, separately, bears to the total revenue earned in both trades. For the purposes of this paragraph, the references to revenues and expenses shall be deemed to be as described in the instructions embodied in the form of "General Financial Statement" prescribed by the Commission (Budget Bureau approval Number 62–R–10–42).

(b) *Hire.* In instances where single voyages encompass both foreign trade and domestic trade, as hereinafter defined, it is agreed that, for the purposes of this Addendum, the provisions of Clause 12 (Basic Hire) and Clause 13 (Additional Hire), as amended by this Addendum, shall be applicable only to the coastwise and intercoastal portions of such voyages as hereinafter defined which portions shall be determined on the basis of the ratio of the total revenues earned from the coastwise and intercoastal passengers and cargo to the total revenue of the voyage, and the original provisions of Clauses 12 and 13, as contained in the basic charter agreement, shall be applicable to the remaining portions of such voyages.

V. *Net voyage profit.* With respect to the vessels listed on Schedule B, as supplemented and modified, an additional paragraph shall be inserted following the first paragraph of sub-paragrah (a), Clause 23, Part II, entitled: "Net Voyage Profit," reading as follows:

Upon application of the Charterer supported by adequate data based on past experience, the Owner will permit the inclusion in vessel operating expenses of such charges as the Owner determines to be fair and reasonable to provide reserves for vessel repair expenses and/or P. and I. insurance deductible average losses on all voyages terminating after December 31, 1946, provided that at the time of final accounting hereunder each of such reserves shall be adjusted to actual by distributing the balances therein to net voyage profit for the accounting periods involved in the same ratio as the reserve charges to vessel operating expenses in each such period bears to the total thereof for the entire period.

VI. *Bills of lading or voyage charters.* Notwithstanding the provisions of Clause 17, Part II, of the Agreement, Charterers engaged in coastwise or intercoastal trades will be permitted to use the standard form of bill of lading set forth in the tariffs published by the Charterer and filed with the Interstate Commerce Commission.

VII. *Period of vessel's use.* As to each vessel listed on the attached schedule marked Exhibit B, as supplemented and modified, a maximum period of about twenty-four months, it being expressly agreed that no voyage shall be commenced after June 30, 1949.

VIII. *Definition.* For the purposes of this Addendum, the term "domestic trade (coastwise and intercoastal)" as used in Public Law 127, 80th Congress, is deemed to include only trade between Continental United States ports and to exclude domestic offshore trades.

IX. That, except as herein specifically modified, all the terms and conditions of the Agreement, as heretofore amended, shall remain in full force and effect.

X. *Special provisions.*

In witness whereof, the Owner has executed this Addendum in quadruplicate the ------ day of ----------, 194--, and the Charterer has executed this Addendum the ------ day of ----------, 194--.

By: ----------

Execution for Charterer:

Attest:

----

or if not incorporated

In the presence of:

Witness

UNITED STATES OF AMERICA,
By: UNITED STATES MARITIME COMMISSION,
By: ----------,
For the Commission

Execution for Owner:

Approved as to form:
By: ----------
Assistant General Counsel

I, ----------, certify that I am the duly chosen, qualified, and acting Secretary of ----------, a party to this Agreement, and, as such, I am the custodian of its official records and the minute books of its governing body; that ----------, who signed this Agreement on behalf of said corporation, was then the duly qualified ---------- of said corporation; that said officer affixed his manual signature to said Agreement in his official capacity as said officer for and on behalf of said corporation by authority and direction of its governing body duly made and taken; that said Agreement is within the scope of the corporate and lawful powers of this corporation.

[CORPORATE SEAL] ----------
Secretary

(Sec. 12, 60 Stat. 50, sec. 2, 61 Stat. 191, Pub. Law 147, 81st Cong.; 50 U. S. C. App. and Sup. 1745, 1738)

By order of the United States Maritime Commission.

[SEAL] A. J. WILLIAMS,
Secretary.

JANUARY 12, 1950.

[F. R. Doc. 50–670; Filed, Jan. 24, 1950; 8:49 a. m.]

TITLE 47—TELECOMMUNICATION

Chapter I—Federal Communications Commission

PART 3—RADIO BROADCAST SERVICES

FM BROADCAST STATIONS

In the matter of amendment of Standards of Good Engineering Practice concerning FM broadcast stations to revise lists of approved equipment in sections 16, 17, and 18.

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 18th day of January 1950.

Whereas, sections 16, 17, and 18 of the Standards of Good Engineering Practice concerning FM broadcast stations provide that lists of approved equipment will be issued from time to time for incorporation in these Standards,

Whereas, the Commission has approved certain equipment in accordance with sections 13, 14, and 15 of these Standards, and

Whereas, the Commission has been advised by certain manufacturers that they do not intend to proceed with the manufacture of equipment heretofore proposed and given tentative approval, and

Whereas, the Commission has found that it will be in the public interest to amend the Standards of Good Engineering Practice concerning FM broadcast stations so as to revise these lists in accordance with changes and additions that have been made since last amended, and

Whereas, these amendments do not preclude the approval of additional equipment in accordance with these Standards, and

Whereas, the amendments are issued under the authority of sections 303 (e) and 303 (r) of the Communications Act of 1934, as amended, and

Whereas, in view of the foregoing, the Commission is of the opinion that it is unnecessary that the procedure for proposed rule making prescribed in section 4 of the Administrative Procedure Act be followed, and that for the same reasons the amendments may become effective immediately,

It is therefore ordered, That sections 16, 17, and 18 of the Standards of Good Engineering Practice concerning FM broadcast stations be and are hereby amended to read as set forth below.

(Sec. 303 (r), 50 Stat. 191; 47 U. S. C. 303 (r). Applies sec. 303 (e), 48 Stat. 1082; 47 U. S. C. 303 (e))

Released: January 18, 1950.

FEDERAL COMMUNICATIONS COMMISSION,
[SEAL] T. J. SLOWIE,
Secretary.

16. APPROVED TRANSMITTERS

Manufacturer's name	Type No.	Rated power
Collins Radio Co., Cedar Rapids, Iowa.	731A	250 watts.
Do	732A	1 kw.
Do	733A	3 kw.
Do	737A	5 kw.
Do	734A	10 kw.
Federal Telephone & Radio Corp., Newark, N. J.	191A	1 kw.
Do	192A	3 kw.
Do	192AZ	3 kw.
Do	193A	10 kw.

16. APPROVED TRANSMITTERS—Continued

Manufacturer's name	Type No.	Rated power
Gates Radio Co., Quincy, Ill.	BF-250A	250 watts.
Do	BF-1A	1 kw.
Do	BF-3A	3 kw.
Do	BF-3B	3 kw.
Do	BF-3C	3 kw.
Do	BF-10A	10 kw.
General Electric Co., Schenectady, N. Y.	BT-1-A	250 watts.
Do	BT-1-B	250 watts.
Do	BT-2-A	1 kw.
Do	BT-2-B	1 kw.
Do	BT-3-A	3 kw.
Do	BT-3-B	3 kw.
Do	BT-4-A	10 kw.
Do	BT-4-B	10 kw.
Harvey Radio Laboratories, Inc., Cambridge, Mass.	FM-500	250 watts.
Radio Corporation of America, New York, N. Y.	MI-7016	Exciter.
Do	BTF-250A	250 watts.
Do	BTF-1C	1 kw.
Do	BTF-3B	3 kw.
Do	BTF-5A	5 kw.
Do	BTF-10B	10 kw.
Do	BTF-50A	50 kw.
Radio Engineering Laboratories, Long Island City, N. Y.	549A-DL	250 watts.
Do	518B-DL	1 kw.
Do	518D-DL	1 kw.
Do	519-DL	3 kw.
Do	520-DL	10 kw.
Raytheon Manufacturing Co., Waltham, Mass.	RF-250	250 watts.
Do	RF-1000	1 kw.
Do	RF-3	3 kw.
Do	RF-10	10 kw.
Western Electric Co., Inc., New York, N. Y.	503 B-1	1 kw.
Do	503 B-2	1 kw.

16. APPROVED TRANSMITTERS—Continued

Manufacturer's name	Type No.	Rated power
Western Electric Co., Inc., New York, N. Y.	504 B-2	3 kw.
Do	506 B-2	10 kw.
Westinghouse Electric & Manufacturing Co., Baltimore, Md.	MO/MP	Exciter.
Do	FM-1	1 kw.
Do	FM-3	3 kw.
Do	FM-10	10 kw.
Do	FM-50	50 kw.

17. APPROVED FREQUENCY MONITORS

Manufacturer's name	Type No.
Doolittle Radio, Inc., Chicago, Ill.	FD-11.
General Electric Co., Schenectady, N. Y.	BM-1-A.
General Radio Co., Cambridge, Mass.	1170-A.
Hewlett-Packard Co., Palo Alto, Calif.	335B.
Radio Engineering Laboratories, Long Island City, N. Y.	600R.
Western Electric Co., Inc., New York, N. Y.	5A.

18. APPROVED MODULATION MONITORS

Doolittle Radio, Inc., Chicago, Ill.	FD-11.
General Electric Co., Schenectady, N. Y.	BM-1-A.
General Radio Co., Cambridge, Mass.	1170-A.
Hewlett-Packard Co., Palo Alto, Calif.	335B.
Radio Engineering Laboratories, Long Island City, N. Y.	600R.
Western Electric Co., Inc., New York, N. Y.	5A.

[F. R. Doc. 50-688; Filed, Jan. 24, 1950; 8:52 a. m.]

PROPOSED RULE MAKING

DEPARTMENT OF THE TREASURY

Bureau of Narcotics

[21 CFR, Ch. II]

ADDICTION-FORMING OR ADDICTION-SUSTAINING LIABILITY OF DRUG NU-2206

NOTICE OF PROPOSED RULE MAKING

Notice is hereby given, pursuant to the provisions of section 1 of the act of March 8, 1946 (60 Stat. 38; 26 U. S. C. 3228), section 4 of the Administrative Procedure Act (60 Stat. 238; 5 U. S. C. 1003), and by virtue of authority vested in me by the Secretary of the Treasury (21 CFR 205.1), that a determination is proposed to be made that the new drug Nu-2206 (3-hydroxy-N-methylmorphinan) has an addiction-forming or addiction-sustaining liability similar to morphine and is an opiate.

Consideration will be given to any written data, views, or arguments, pertaining to the addiction-forming or addiction-sustaining liability of Nu-2206, which are received by the Commissioner of Narcotics prior to February 20, 1950. Any person desiring to be heard on the addiction-forming or addiction-sustaining liability of Nu-2206 will be accorded the opportunity at a hearing in the office of the Commissioner of Narcotics, 1300 E Street NW., Washington, D. C., at 10:00 a. m., February 20, 1950: *Provided*, That such person furnish written notice of his desire to be heard, to the Commissioner of Narcotics, Washington 25, D. C., not later than 20 days from the publication of this notice in the FEDERAL REGISTER. If no written notice of desire to be heard shall be received within 20 days from the date of publication of this notice in the FEDERAL REGISTER, no hearing shall be held, but the Commissioner of Narcotics shall proceed to make a recommendation to the Secretary of the Treasury for a finding under section 1 of the act of March 8, 1946.

(60 Stat. 38; U. S. C. 3228)

[SEAL] H. J. ANSLINGER,
Commissioner of Narcotics.

[F. R. Doc. 50-689; Filed, Jan. 24, 1950; 8:50 a. m.]

CIVIL AERONAUTICS BOARD

[14 CFR, Part 4b]

AIRPLANE WORTHINESS, TRANSPORT CATEGORIES

NOTICE OF PROPOSED RULE MAKING

Pursuant to authority delegated by the Civil Aeronautics Board to the Bureau of Safety Regulation, notice is hereby given that the Bureau has under consideration a revision of Part 4b as hereinafter set forth.

Interested persons may participate in the making of the proposed rule by submitting such written data, views, or arguments as they may desire. Communitting such written data, views, or arguments as they may desire. Communications should be submitted to the Civil Aeronautics Board, attention Bureau of Safety Regulation, Washington 25, D. C. All communications received within 30 days from the date of this publication will be considered by the Board before taking further action on the proposed rule.

The proposed revision of Part 4b which is attached hereto is basically an editorial revision of the part in line with current FEDERAL REGISTER requirements and the new regulation format recently established for the Civil Air Regulations. There has been some rearrangement of material, some clarification of language, and a few substantive modifications which have been fully discussed with the industry and with which, we believe, there is no disagreement. It is believed that the revision will aid the industry in complying with current transport category requirements and will be useful in

considering any changes in airworthiness regulations to be proposed in the annual plan for reviewing this part of the regulations.

In order to permit the revision to supplant fully the current part and thus save the industry and the government from the necessity of having available two parts containing substantially identical regulations, we have changed the applicability clause of the part from that of the previous part. We do not thereby intend to depart from the industry-sponsored principle of future applicability only for airworthiness requirements. Thus, the revised part would apply to applications for new type certificates received after its effective date, which is proposed to be ninety days after the date of adoption to permit sufficient time for printing and distribution of the part, and to amendments or modifications of existing type designs in so far as such amendments or modifications are covered by the provisions of the part. It is provided that nothing in the part shall otherwise affect current type designs or certificates, and that amendments to the part shall, unless otherwise specifically provided, be applicable only to applications for type certificates received more than 60 days after the adoption of the amendment. Thus an amendment of the part would not, unless specifically so stated therein, affect the then currently valid type designs or certificates. In view of the fact that the substantive changes of this revision are few and noncontroversial in nature, the basic principle for implementation of airworthiness parts previously adhered to is, in our opinion, not departed from by the proposed revision.

It will also be noted that the procedural provisions for changes in type designs have been modified to describe current practice more adequately. Thus, specific authority is provided for mandatory changes in type design (e. g. CAA airworthiness directives) only in those instances where service experience indicates that a definite hazard exists. In other situations changes may be recommended but there is no authority given to exact compliance.

We have also tried to include in the revision any requirements which the Administrator has established as mandatory for aircraft to be certificated in the transport category. We have previously expressed our intention that the Civil Air Regulations contain all airworthiness requirements which are in the nature of standards for type certification. We wish to reaffirm our intention in this regard without in any way implying any disapproval of any past action of the Administrator which, in many instances, was effected with our concurrence to provide for items not covered in the regulations whose importance did not become apparent until after the part was adopted.

There is also attached an explanatory statement setting forth some of the details of the changes from current Part 4b in the proposed revision.

This revision is proposed under the authority of Title VI of the Civil Aeronautics Act of 1938, as amended.

(Secs. 205 (a), 601-610, 52 Stat. 984, 1007, 1012; 49 U. S. C. 425 (a), 551-560)

Dated December 20, 1949, at Washington, D. C.

By the Bureau of Safety Regulation.

[SEAL] JOHN M. CHAMBERLAIN,
Director.

Explanatory statement. This statement will explain briefly the more important changes made in the proposed revision of Part 4b. There is included a new provision (§ 4b.103) which will require a manufacturer to consider the effect of spanwise weight distribution on the controllability of the aircraft. This change is considered appropriate in view of the fact that spanwise weight distribution is more critical in the larger type of transport category airplane.

In Subpart C there has been included a provision permitting proof of strength by means of dynamic tests in addition to the currently provided static test (§ 4b.201). A new requirement designed to assure the proper mating of propeller and powerplant has been added to Subpart E (see § 4b.402) and the fuel tank strainer requirements have been revised to require a somewhat finer mesh screen in accordance with the current practice under this provision. In addition, a change has been made in the maximum altitude for which an engine-driven pump will be considered adequate; the change is from 10,000 feet to 6,000 feet (see § 4b.430 (h)). The de-icer requirement of Subpart F has been changed to require two independent sources of power and a positive means for deflation when air pneumatic boot-type de-icers are used. In Subpart G additional provisions have been inserted requiring entry in the Airplane Flight Manual of two new speed limitations, the landing gear operating speed and the landing gear extended speed.

Major editorial revisions have been made of all subparts in order to clarify current requirements. Provisions requiring compressibility to be taken into account, presently under the definition of the descent dive speed, have now been placed in § 4b.210, and the strength requirements for pressure cabin loads presently contained in Subpart D have been placed in Subpart C (see § 4b.216 (c)).

It should be noted that the provisions affecting center of gravity limitations do not vary in substance from the current Part 4b. While it has been called to our attention that varying interpretations have been made of these provisions, it appears to us that there are controversial substantive considerations involved which should be explored fully before any definite change is proposed.

SUBPART A—GENERAL

Applicability

§ 4b.0 *General.* This part establishes standards with which compliance shall be demonstrated for the issuance of a type certificate for transport category airplanes. This part, until superseded or rescinded, shall apply to all transport category airplanes for which application is made for type certification in the transport category. All applications for amendment or modification of currently valid type designs of transport category aircraft certificated in whole or in part under the provisions of Part 4b, as heretofore amended, received after the effective date of this part shall be subject to those provisions contained herein which are appropriate to such amendment or modification. No provision contained herein shall otherwise affect currently valid type designs of transport category aircraft or aircraft manufactured under the transport category unless it is specifically required by such provision.

Definitions

§ 4b.1 *Definitions.* Unless otherwise noted, terms used in this part of the Regulations are defined as follows:

(a) *Administration*—(1) *Administrator.* The Administrator is the Administrator of Civil Aeronautics.

(2) *Applicant.* An applicant is a person or persons applying for approval of an airplane or any part thereof.

(3) *Approved.* Approved, when used alone or as modifying terms such as means, devices, specifications, etc., shall mean approved by the Administrator.

(b) *General design*—(1) *Standard atmosphere.* The standard atmosphere is an atmosphere defined as follows:

(i) The air is a dry perfect gas,

(ii) The temperature at sea level is 59° F.,

(iii) The pressure at sea level is 29.92 inches Hg,

(iv) The temperature gradient from sea level to the altitude at which the temperature equals −67° F. is −0.003566° F./ft. and zero thereabove,

(v) The density ρ_0 at sea level under the above conditions is 0.002378 pounds sec.^{2}/ft.^{4}

(2) *Maximum anticipated air temperture.* The maximum anticipated air temperature is a temperature specified for the purpose of compliance with the powerplant cooling standards. (See § 4b.451 (b).)

(3) *Airplane configuration.* Airplane configuration is a term referring to the position of the various elements affecting the aerodynamic characteristics of the airplane (e. g. wing flaps, landing gear).

(4) *Aerodynamic coefficients.* The aerodynamic coefficients as used herein are nondimensional coefficients for forces

and moments. They correspond with those adopted by the U. S. National Advisory Committee for Aeronautics.

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

(6) *Critical-engine-failure speed.* The critical-engine-failure speed is the airplane speed used in the determination of the take-off at which the critical engine is assumed to fail. (See § 4b.114.)

(c) *Weights*—(1) *Maximum weight.* The maximum weight of the airplane is that maximum at which compliance with the requirements of this part of the Civil Air Regulations is demonstrated. (See § 4b.101 (a).)

(2) *Minimum weight.* The minimum weight of the airplane is that minimum at which compliance with the requirements of this part of the Civil Air Regulations is demonstrated. (See § 4b.101 (c).)

(3) *Empty weight.* The empty weight of the airplane is that weight which is used in the determination of the operating weights, being readily reproducible, and including such items as the airplane structure, powerplant installations, undrainable fuel and oil, normal operating equipment, etc. (See § 4b.104.)

(4) *Design maximum weight.* The design maximum weight is the maximum weight of the airplane used in structural design for flight load conditions. (See § 4b.210.)

(5) *Design minimum weight.* The design minimum weight is the minimum weight of the airplane at which compliance is shown with the structural loading conditions. (See § 4b.210.)

(6) *Design take-off weight.* The design take-off weight is the maximum airplane weight used in structural design for taxying conditions, and for landing conditions at a reduced velocity of descent. (See § 4b.210.)

(7) *Design landing weight.* The design landing weight is the maximum airplane weight used in structural design for landing conditions at the maximum velocity of descent. (See § 4b.230 (b).)

(8) *Design unit weight.* The design unit weight is a representative weight used to show compliance with the structural design requirements.

(i) Gasoline 6 pounds per U. S. gallon.

(ii) Lubricating oil 7.5 pounds per U. S. gallon.

(iii) Crew and passengers 170 pounds per person.

(d) *Speeds.* (1) TAS: The true air speed of the airplane relative to the undisturbed air.

(2) EAS: Equivalent air speed is equal to: TAS $(\rho/\rho_0)^{\frac{1}{2}}$.

(3) CAS: Calibrated air speed is equal to the air-speed indicator reading corrected for position and instrument errors. (CAS is equal to TAS in the standard atmosphere at sea level.)

(4) IAS: Indicated air speed is equal to the reading of the pitot static air-speed indicator as installed in the airplane, without correction for air-speed indicator system errors. (See §§ 4b.612 (a) and 4b.710.)

(5) V_A: The design maneuvering speed. (See § 4b.210 (b) (2).)

(6) V_B: The design speed for maximum gust intensity. (See § 4b.210 (b) (3).)

(7) V_C: The design cruising speed. (See § 4b.210 (b) (4).)

(8) V_D: The design diving speed. (See § 4b.210 (b) (5).)

(9) V_{DF}: The demonstrated flight diving speed. (See § 4b.190.)

(10) V_F: The design flap speed for flight loading conditions with wing flaps in the landing position. (See § 4b.210 (b) (1).)

(11) V_{FE}: The wing flap extended speed is a maximum speed with wing flaps in a prescribed extended position. (See § 4b.714.)

(12) V_{LE}: The landing gear extended speed is the maximum speed at which the airplane can be flown safely with the landing gear extended. (See § 4b.716.)

(13) V_{LO}: The landing gear operating speed is a maximum speed at which the landing gear can be raised or lowered safely. (See § 4b.715.)

(14) V_{MC}: The minimum control speed with any one engine inoperative. (See § 4b.133.)

(15) V_{NE}: The never-exceed speed. (See § 4b.711.)

(16) V_{NO}: The normal operating limit speed.

(17) V_{s_0}: The stalling speed or the minimum steady flight speed with wing flaps in the landing position. (See §§ 4b.112 (a) and 4b.160.)

(18) V_{s_1}: The stalling speed or the minimum steady flight speed obtained in a specified configuration. (See § 4b.112 (b).)

(19) V_1: The critical-engine-failure speed. (See § 4b.114.)

(20) V_2: The take-off safety speed. (See § 4b.114 (b).)

(e) *Structural*—(1) *Limit load.* A limit load is the maximum load anticipated in normal conditions of operation. (See § 4b.200.)

(2) *Ultimate load.* An ultimate load is a limit load multiplied by the appropriate factor of safety. (See § 4b.200.)

(3) *Factor of safety.* The factor of safety is a design factor used to provide for the possibility of loads greater than those anticipated in normal conditions of operation and for uncertainties in design. (See § 4b.200 (a).)

(4) *Load factor.* The load factor is the ratio of a specified load to the total weight of the airplane; the specified load may be expressed in terms of any of the following: aerodynamic forces, inertia forces, or ground or water reactions.

(5) *Limit load factor.* The limit load factor is the load factor corresponding with limit loads.

(6) *Ultimate load factor.* The ultimate load factor is the load factor corresponding with ultimate loads.

(7) *Checked pitching maneuver.* A checked pitching maneuver is one in which the pitching control is suddenly displaced in one direction and then suddenly moved in the opposite direction, the deflections and timing being such as to avoid exceeding the limit maneuvering load factor.

(8) *Design wing area.* The design wing area is the area enclosed by the wing outline (including wing flaps in the retracted position and ailerons, but excluding fillets or fairings) on a surface containing the wing chords. The outline is assumed to be extended through the nacelles and fuselage to the plane of symmetry in any reasonable manner.

(9) *Balancing tail load.* A balancing tail load is that load necessary to place the airplane in equilibrium with zero pitch acceleration.

(10) *Fitting.* A fitting is a part or terminal used to join one structure member to another. (See § 4b.307 (d).)

(f) *Power installation*[1]—(1) *Brake horsepower.* Brake horsepower is the power delivered at the propeller shaft of the engine.

(2) *Take-off power.* Take-off power is the brake horsepower developed under standard sea level conditions, under the maximum conditions of crankshaft rotational speed and engine manifold pressure approved for use in the normal take-off, and limited in use to a maximum continuous period as indicated in the approved engine specification.

(3) *Maximum continuous power.* Maximum continuous power is the brake horsepower developed in standard atmosphere at a specified altitude under the maximum conditions of crankshaft rotational speed and engine manifold pressure approved for use during periods of unrestricted duration.

(4) *Manifold pressure.* Manifold pressure is the absolute pressure measured at the appropriate point in the induction system, usually in inches of mercury.

(5) *Critical altitude.* The critical altitude is the maximum altitude at which in standard atmosphere it is possible to maintain, at a specified rotational speed without ram, a specified power or a specified manifold pressure. Unless otherwise stated, the critical altitude is the maximum altitude at which it is possible to maintain without ram, at the maximum continuous rotational speed, one of the following:

(i) The maximum continuous power, in the case of engines for which this power rating is the same at sea level or at the rated altitude,

(ii) The maximum continuous rated manifold pressure, in the case of engines the maximum continuous power of which is governed by a constant manifold pressure.

---

[1] For engine airworthiness requirements see Part 13 of this chapter, for propeller airworthiness requirements see Part 14 of this chapter.

(6) *Pitch setting.* Pitch setting is the propeller blade setting determined by the blade angle measured in a manner, and at a radius, specified in the instruction manual for the propeller.

(7) *Feathered pitch.* Feathered pitch is the pitch setting, chosen by the applicant, which in flight, with the engines stopped, gives approximately the minimum drag, and corresponds with a windmilling torque of approximately zero.

(8) *Reverse pitch.* Reverse pitch is the propeller pitch setting for any blade angle used beyond zero pitch (e. g. the negative angle used for reverse thrust).

(g) *Fire protection*—(1) *Fireproof.* Fireproof material means a material which will withstand heat at least as well as steel in dimensions appropriate for the purpose for which it is to be used. When applied to material and parts used to confine fires in designated fire zones, fireproof means that the material or part will perform this function under the most severe conditions of fire and duration likely to occur in such zones.

(2) *Fire-resistant.* When applied to sheet or structural members, fire-resistant material means a material which will withstand heat at least as well as aluminum alloy in dimensions appropriate for the purpose for which it is to be used. When applied to fluid-carrying lines, other flammable fluid system components, wiring, air ducts, fittings, and powerplant controls, this term refers to a line and fitting assembly, component, wiring or duct, or controls which will perform the intended functions under the heat and other conditions likely to occur at the particular location.

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

(4) *Flash-resistant.* Flash-resistant material means material which will not burn violently when ignited.

(5) *Flammable.* Flammable pertains to those fluids or gases which will ignite readily or explode.

(h) *Miscellaneous*—(1) *Supplemental breathing equipment.* Supplemental breathing equipment is equipment designed to supply the supplementary oxygen required to protect against anoxia at altitudes where the partial pressure of oxygen in ambient air is reduced. (See § 4b.651.)

(2) *Protective breathing equipment.* Protective breathing equipment is equipment designed to prevent the breathing of noxious gases which may be present as contaminants in the air within the airplane in emergency situations. (See § 4b.651.)

Certification

4b.10 *Eligibility for type and airworthiness certificates.* An airplane shall be eligible for type and airworthiness certification under the provisions of this part if it complies with the airworthiness provisions hereinafter established, or if the Administrator finds that the provision or provisions not complied with are compensated for by other design features which provide an equivalent level of safety: *Provided,* That the Administrator finds no feature or characteristic of the airplane which renders it unsafe for the transport category.

§ 4b.11 *Amendment.* Unless otherwise specified, an amendment of this part shall be effective with respect to airplanes for which application for type certificates are filed more than 60 days after the adoption date of the amendment.

§ 4b.12 *Type certificate.* An applicant shall be issued a type certificate when he demonstrates the eligibility of the aircraft by complying with the requirements of §§ 4b.13 through 4b.15 in addition to those contained in Part 2 of the Civil Air Regulations.

§ 4b.13 *Data required.* The applicant for a standard type certificate shall submit to the Administrator such descriptive data, test reports, and computations as are necessary to demonstrate that the airplane complies with the airworthiness requirements. The descriptive data shall be known as the type design and shall consist of drawings and specifications disclosing the configuration of the airplane and all design features covered in the airworthiness requirements as well as sufficient information on dimensions, materials, and processes to define the strength of the structure. The type design shall describe the airplane in sufficient detail to permit the airworthiness of subsequent airplanes of the same type to be determined by comparison with the type design.

§ 4b.14 *Inspection and tests.* Inspections and tests shall include all those found necessary by the Administrator to insure that the airplane complies with the applicable airworthiness requirements and conforms with the following:

(a) All materials and products are in accordance with the specifications in the type design;

(b) All parts of the airplane are constructed in accordance with the drawings in the type design;

(c) All manufacturing processes, construction, and assembly are such that the design strength and safety contemplated by the type design will be realized in service.

§ 4b.15 *Flight tests.* After proof of compliance with the structural requirements contained in this part and upon completion of all necessary inspections and testing on the ground, and proof of the conformity of the airplane with the type design, and upon receipt from the applicant of a report of flight tests performed by him, the following shall be conducted:

(a) Such official flight tests as the Administrator finds necessary to determine compliance with the requirements of this part.

(b) After the conclusion of flight tests specified in paragraph (a) of this section, such additional flight tests as the Administrator finds necessary to ascertain whether there is reasonable assurance that the airplane, its components, and equipment are reliable and function properly. The extent of such additional flight tests shall depend upon the complexity of the airplane, the number and nature of new design features, and the record of previous tests and experience for the particular airplane model, its components, and equipment. If practicable, these flight tests shall be conducted on the same airplane used in the flight tests specified in paragraph (a) of this section.

§ 4b.16 *Airworthiness certificates.* An airplane manufactured in accordance with a type certificate (see § 4b.12) and conforming to the type design shall become eligible for an airworthiness certificate under paragraphs (a) and (b) of this section when, upon inspection of the airplane, the Administrator finds that it so conforms and that it is in a condition for safe operation. For each newly manufactured airplane this finding shall include a flight check by the applicant.

(a) *Standard certificate.* To become eligible for a standard certificate an airplane shall comply with all of the requirements of this part found by the Administrator to be applicable

(b) *Restricted certificate.* An airplane intended to be operated for a restricted purpose for which full compliance with the transport category requirements would be impracticable, shall be eligible for a restricted airworthiness certificate if it complies with all the requirements of this part which are not rendered inapplicable by the nature of the special purpose involved. The Administrator shall establish such operating restrictions for the airplane as he finds will provide a level of safety equivalent to that established for the transport category.

(c) *Experimental certificate.* An airplane shall become eligible for a type and airworthiness experimental certificate when the applicant presents evidence that the airplane is intended only for experimental purposes, and the Administrator finds that with appropriate restrictions it can be so operated without endangering the general public. The applicant shall submit data to identify the airplane together with any other pertinent information found by the Administrator necessary to safeguard the general public.

§ 4b.17 *Production certificate.* (For requirements with regard to production certificates see Part 2 of this chapter.)

§ 4b.18 *Approval of materials, parts, processes, and appliances.* (a) Materials, parts, processes, and appliances shall be approved upon a basis and in a manner found necessary by the Administrator to implement the pertinent provisions of the Civil Air Regulations. The Administrator may adopt and publish such specifications as he finds necessary to administer this section, and shall incorporate therein such portions of the aviation industry, Federal, and military specifications respecting such materials, parts, processes, and appliances as he finds appropriate.

(b) Any material, part, process, or appliance shall be deemed to have met the requirements for approval when it meets the pertinent specifications adopted by the Administrator, and the manufacturer so certifies in a manner prescribed by the Administrator.

Changes

§ 4b.20 *General.* When the type design is changed, the applicant or holder of the type certificate shall demonstrate that the airplane complies with the applicable airworthiness requirements. (See § 4b.0.)

§ 4b.21 *Classification of changes.* Changes shall be classified as minor and major. A minor change shall be one which has no appreciable effect on the weight, balance, structural strength, powerplant operation, flight characteristics, or other characteristic affecting the airworthiness of the airplane. A major change shall be one not classified as a minor change.

§ 4b.22 *Approval of minor changes.* Minor changes to type designs may be approved by an authorized representative of the Administrator prior to the submittal to the Administrator of any revised drawings.

§ 4b.23 *Approval of major changes.* Major changes to type designs shall be approved only after receipt by the Administrator of substantiating data and necessary descriptive data for inclusion in the type design.

§ 4b.24 *Service experience changes.* (a) Where the Administrator finds, as a result of service experience, that an unsafe condition exists with respect to a design feature, part, or characteristic of any airplane certificated under this part, he shall furnish notice[1] thereof to all operators of airplanes of that type and the airplanes shall not thereafter be operated until the unsafe condition has been corrected, unless otherwise authorized by the Administrator under specified conditions and limitations.

(1) When the Administrator finds that design changes are necessary to correct the unsafe condition of the airplane, the holder of the type certificate, upon request of the Administrator, shall submit appropriate design modifications for the approval of the Administrator.

(2) Upon approval, such changes shall be made a part of the type design of the type certificate, and descriptive data covering the changes shall be made available by the holder of the type certificate to all operators of airplanes previously certificated under such type certificate.

(3) All airplanes of the same type shall be modified in accordance with such amended type certificate.

(b) Where no current unsafe condition exists but the Administrator or the holder of the type certificate finds through service experience that changes in type design will contribute to the safety of the airplane, the holder of the type certificate may submit appropriate design modifications for the approval of the Administrator. Upon approval of such modifications, the type design of the type certificate shall be amended accordingly, and all airplanes manufactured thereafter shall be modified in accordance with such amended type certificate. The manufacturer shall make available to all operators of the same type of airplane information on the design modifications.

[1] Operators of airplanes are notified of any unsafe condition, of the required corrective action, and of compliance dates through the medium of Airworthiness Directives issued by the Administrator.

SUBPART B—FLIGHT

General

§ 4b.100 *Proof of compliance.* (a) Compliance with the requirements prescribed in this subpart shall be established by flight or other tests conducted upon an airplane of the type for which a certificate of airworthiness is sought or by calculations based on such tests, provided that the results obtained by calculations are equivalent in accuracy to the results of direct testing.

(b) Compliance with each requirement shall be established at all appropriate combinations of airplane weight and center of gravity position within the range of loading conditions for which certification is sought by systematic investigation of all these combinations, except where compliance can be inferred reasonably from those combinations which are investigated.

(c) The controllability, stability, trim, and stalling characteristics of the airplane shall be established at all altitudes up to the maximum anticipated operating altitude.

(d) The applicant shall provide a person holding an appropriate pilot certificate to make the flight tests, but a designated representative of the Administrator shall pilot the airplane when it is found necessary for the determination of compliance with the airworthiness requirements.

(e) Official type tests shall be discontinued until corrective measures have been taken by the applicant when either:

(1) The applicant's test pilot is unable or unwilling to conduct any of the required flight tests; or,

(2) It is found that requirements which have not been met are so substantial as to render additional test data meaningless or are of such nature as to make further testing unduly hazardous.

(f) Adequate provision shall be made for emergency egress and for the use of parachutes by members of the crew during the flight tests.

(g) The applicant shall submit to the Administrator's representative a report covering all computations and tests required in connection with calibration of instruments used for test purposes and correction of test results to standard atmospheric conditions. The Administrator's representative shall conduct any flight tests which he finds necessary to check the calibration and correction report.

§ 4b.101 *Weight limitations.* The maximum and minimum weights at which the airplane will be suitable for operation shall be established as follows:

(a) Maximum weights shall not exceed any of the following:

(1) The weight selected by the applicant;

(2) The design weight for which the structure has been proven;

(3) The maximum weight at which compliance with all the applicable flight requirements has been demonstrated.

(b) It shall be acceptable to establish maximum weights for each altitude, temperature, and for each practicable separable operating condition (e. g. takeoff, en route, landing.)

(c) Minimum weights shall not be less than any of the following:

(1) The minimum weight selected by the applicant;

(2) The design minimum weight for which the structure has been proven;

(3) The minimum weight at which compliance with all the applicable flight requirements has been demonstrated.

§ 4b.102 *Center of gravity limitations.* Center of gravity limits shall be established as the most forward position permissible for each weight in accordance with § 4b.101 and the most aft position permissible for each of such weight. Limits of the center of gravity range shall not exceed any of the following:

(a) The extremes selected by the applicant;

(b) The extremes for which the structure has been proven;

(c) The extremes at which compliance with all the applicable flight requirements has been demonstrated.

§ 4b.103 *Additional limitations on weight distribution.* If a weight and center of gravity combination is permissible only within certain load distribution limits (e. g. spanwise) which could be exceeded inadvertently, such limits shall be established together with the corresponding weight and center of gravity combinations, and shall not exceed any of the following:

(a) The limits selected by the applicant;

(b) The limits for which the structure has been proven;

(c) The limits for which compliance with all the applicable flight requirements has been demonstrated.

§ 4b.104 *Empty weight.* (a) The empty weight, and the corresponding center of gravity position, shall be determined by weighing the airplane. This weight shall exclude the weight of the crew and payload, but shall include the weight of all fixed ballast, unusable fuel supply (see § 4b.416), undrainable oil, total quantity of engine coolant, and total quantity of hydraulic fluid.

(b) The condition of the airplane at the time of weighing shall be one which can be easily repeated and easily defined, particularly as regards the contents of the fuel, oil, and coolant tanks, and the items of equipment installed.

§ 4b.105 *Use of ballast.* Removable ballast may be used to enable the airplane to comply with the flight requirements. (See §§ 4b.738 and 4b.741 (c).)

Performance

§ 4b.110 *General.* The performance prescribed in this subpart shall be determined, and compliance shall be shown

for standard atmospheric conditions and still air.

§ 4b.111 *Wing flap positions.* (a) The wing flap positions denoted respectively as the take-off, en route, approach, and landing positions shall be selected by the applicant. (See also § 4b.323.)

(b) The flap positions may be made variable with weight and altitude.

§ 4b.112 *Stalling speeds.* (a) The speed, V_{s_0}, denotes the true indicated stalling speed, or the minimum steady flight speed at which the airplane is controllable, in miles per hour, with:

(1) Engines idling, throttles closed (or not more than sufficient power for zero thrust at a speed not greater than 110 percent of the stalling speed);

(2) Propeller pitch controls in the position normally used for take-off;

(3) Landing gear extended;

(4) Wing flaps in the landing position;

(5) Cowl flaps closed;

(6) Center of gravity in the most unfavorable position within the allowable landing range;

(7) The weight of the airplane equal to the weight in connection with which V_{s_0} is being used as a factor to determine a required performance.

(b) The speed, V_{s_1}, denotes the true indicated stalling speed, or the minimum steady flight speed at which the airplane is controllable, in miles per hour, with:

(1) Engines idling, throttles closed (or not more than sufficient power for zero thrust at a speed not greater than 110 percent of the stalling speed);

(2) Propeller pitch controls in the position normally used for take-off, the airplane in all other respects (flaps, landing gear, etc.) in the particular condition existing in the particular test in connection with which V_{s_1} is being used;

(3) The weight of the airplane equal to the weight in connection with which V_{s_1} is being used as a factor to determine a required performance.

(c) These speeds shall be determined by flight tests using the procedures outlined in § 4b.160 (b).

§ 4b.113 *Take-off; general.* (a) The take-off data in §§ 4b.114 to 4b.116, inclusive, shall be determined under the following conditions:

(1) At all weights and altitudes selected by the applicant;

(2) With a constant take-off flap position for the particular weight and altitude;

(3) With the operating engines not exceeding their approved limitations at the particular altitude.

(b) All take-off data, when corrected, shall assume a level take-off surface, and shall be determined on a smooth, dry, hard-surfaced runway, in such a manner that reproduction of the performance does not require exceptional skill or alertness on the part of the pilot.

(c) For temperature accountability data see § 4b.117. For wind and runway gradient corrections see appropriate operating parts of the Civil Air Regulations.

§ 4b.114 *Take-off speeds.* (a) The critical-engine-failure speed, V_1, in terms of true indicated air speed, shall be selected by the applicant, but shall not be less than the minimum speed at which the controllability is demonstrated during take-off run to be adequate to permit proceeding safely with the take-off, using normal piloting skill, when the critical engine is suddenly made inoperative.

(b) The minimum take-off safety speed, V_2, in terms of true indicated air speed shall be selected by the applicant so as to permit the rate of climb required in § 4b.120, but shall not be less than:

(1) 1.20 V_{s_1} for two-engine airplanes,

(2) 1.15 V_{s_1} for airplanes having more than two engines,

(3) 1.10 times the minimum control speed, V_{MC}, established under § 4b.133.

(c) If V_1 is equal to or greater than V_2, demonstration of controllability during take-off for V_1, as provided in paragraph (a) of this section, shall not be required.

§ 4b.115 *Accelerate-stop distance.* The accelerate-stop distance shall be the sum of the following:

(1) The distance required to accelerate the airplane from a standing start to the speed V_1.

(2) Assuming the critical engine to fail at the speed V_1, the distance required to bring the airplane to a full stop from the point corresponding with the speed V_1.

(b) In addition to, or in lieu of, wheel brakes, the use of other braking means shall be acceptable in determining the accelerate-stop distance, provided that such braking means shall have been proven to be safe and reliable, that the manner of their employment is such that consistent results can be expected under normal conditions of operation, and that exceptional skill is not required to control the airplane.

(c) The landing gear shall remain extended throughout the accelerate-stop distance.

§ 4b.116 *Take-off path.* The take-off path shall be considered to consist of the following five consecutive elements.

(a) The distance required to accelerate the airplane to the speed V_2, assuming the critical engine to fail at the speed V_1.

(b) The horizontal distance traversed and the height attained by the airplane in the time required to retract the landing gear when operating at the speed V_2, with:

(1) The critical engine inoperative, its propeller:

(i) Windmilling with the propeller control in a position normally used during take-off until (if applicable) its rotation has been stopped (see paragraph (c) (1) of this section),

(ii) If applicable, stopped for the remainder of the gear retraction time.

(2) The landing gear extended.

(c) If applicable, the horizontal distance traversed and the height attained by the airplane in the time elapsed from the end of element (b) until the rotation of the inoperative propeller has been stopped when:

(1) The operation of stopping the propeller is initiated not earlier than the instant the airplane has attained a total height of 50 feet above the take-off surface,

(2) The airplane speed is equal to V_2,

(3) The landing gear is retracted,

(4) The inoperative propeller is windmilling with the propeller control in a position normally used during take-off.

(d) The horizontal distance traversed and the height attained by the airplane in the time elapsed from the end of element (c) until the time limit on the use of take-off power is reached, while operating at the speed V_2, with:

(1) The inoperative propeller stopped.

(2) The landing gear retracted.

(e) The slope of the flight path followed by the airplane in the configuration of element (d), but drawing not more than maximum continuous power on the operating engine(s).

§ 4b.117 *Temperature accountability.* Operating correction factors for take-off weight and take-off distance shall be determined to account for temperatures above and below standard, and when approved by the Administrator shall be included in the Airplane Flight Manual. These factors shall be obtained as follows:

(a) For any specific airplane type, the average full temperature accountability shall be computed for the range of weights of the airplane, altitudes above sea level, and ambient temperatures required by the expected operating conditions. Account shall be taken of the temperature effect on both the aerodynamic characteristics of the airplane and on the engine power. The full temperature accountability shall be expressed per degree of temperature in terms of a weight correction, a take-off distance correction, and a change, if any, in the critical engine failure speed, V_1.

(b) The operating correction factors for the airplane weight and take-off distance shall be at least one-half of the full accountability values. The value of V_1 shall be further corrected by the average amount necessary to assure that the airplane can stop within the runway length at the ambient temperature, except that the corrected value of V_1 shall not be less than a minimum at which the airplane can be controlled with the critical engine inoperative.

§ 4b.118 *Climb; general.* Compliance with the climb requirements of §§ 4b.119 through 4b.121, shall be shown for standard atmospheric conditions, still air, and specified altitudes.

§ 4b.119 *All engines operating; climb*—(a) *General.* The steady rate of climb shall be determined at any altitude at which the airplane is expected to operate and at any weight within the range of weights to be specified in the airworthiness certificate.

(b) *Cruising configuration.* The steady rate of climb at 5,000 feet shall not be less in feet per minute than 8 V_{s_0} with:

(1) Landing gear fully retracted,

(2) Wing flaps in the most favorable position,

(3) Cowl flaps (or other means of controlling the engine cooling) in the position which provides adequate cooling in the hot-day condition.

(4) Center of gravity in the most unfavorable position,

(5) All engines operating within the maximum continuous power limitations,

(6) Maximum take-off weight.

(c) *Landing configuration.* The steady rate of climb in feet per minute shall not be less than 0.07 $V_{s_0}^2$ at any altitude within the range for which landing weight is to be specified in the certificate, with:

(1) Landing gear extended,

(2) Wing flaps in the landing position (see §§ 4b.111 and 4b.323),

(3) Cowl flaps in the position normally used in an approach to a landing,

(4) Center of gravity in the most unfavorable position permitted for landing,

(5) All engines operating at the take-off power available at such altitude,

(6) The weight equal to maximum landing weight for that altitude.

§ 4b.120 *One-engine-inoperative climb*—(a) *Flaps in take-off position; landing gear extended.* The steady rate of climb shall not be less than 50 ft./min. at any altitude within the range for which take-off weight is to be specified in the certificate, with:

(1) Wing flaps in the take-off position (see §§ 4b.111 and 4b.323),

(2) Cowl flaps in the position normally used during take-off,

(3) Center of gravity in the most unfavorable position permitted for take-off,

(4) The critical engine inoperative, its propeller windmilling with the propeller control in a position normally used during take-off,

(5) All other engines operating at the take-off power available at such altitude,

(6) The speed equal to the minimum take-off safety speed V_2, used in § 4b.114 (b),

(7) The weight equal to maximum take-off weight for that altitude.

(b) *Flaps in take-off position; landing gear retracted.* The steady rate of climb in feet per minute shall not be less than 0.035 $V_{s_1}^2$ with all other conditions as described in paragraph (a) of this section.

(c) *Flaps in en route position.* The steady rate of climb in feet per minute at any altitude at which the airplane is expected to operate, at any weight within the range of weights to be specified in the airworthiness certificate, shall be determined and shall, at a standard altitude of 5,000 feet and at the maximum take-off weight, be at least 0.02 $V_{s_0}^2$ for airplanes with a maximum take-off weight of 40,000 pounds, 0.04 $V_{s_0}^2$ for airplanes with a maximum take-off weight of 60,000 pounds or more, with a linear variation of the coefficient of $V_{s_0}^2$ between 40,000 pounds and 60,000 pounds, with:

(1) The landing gear retracted,

(2) Wing flaps in the most favorable position,

(3) Cowl flaps or other means of controlling the engine cooling air supply in the position which provides adequate cooling in the hot-day condition,

(4) Center of gravity in the most unfavorable position,

(5) The critical engine inoperative, its propeller stopped,

(6) All remaining engines operating at the maximum continuous power available at the altitude.

(d) *Flaps in approach position.* The steady rate of climb in feet per minute shall not be less than 0.04 $V_{s_0}^2$ at any altitude within the range for which landing weight is to be specified in the certificate, with:

(1) The landing gear retracted,

(2) Wing flaps set in position such that V_{s_1} does not exceed 1.10 V_{s_0},

(3) Cowl flaps in the position normally used during an approach to a landing,

(4) Center of gravity in the most unfavorable position permitted for landing,

(5) The critical engine inoperative, its propeller stopped,

(6) All remaining engines operating at the take-off power available at such altitude,

(7) The weight equal to the maximum landing weight for that altitude.

§ 4b.121 *Two-engine-inoperative climb.* For airplanes with four or more engines, the steady rate of climb at any altitude at which the airplane is expected to operate, and at any weight within the range of weights to be specified in the Airplane Flight Manual, shall be determined with:

(a) The landing gear retracted,

(b) Wing flaps in the most favorable position,

(c) Cowl flaps or other means of controlling the engine cooling air supply in the position which will provide adequate cooling in the hot-day condition,

(d) Center of gravity in the most unfavorable position,

(e) The two critical engines on one side of the airplane inopgrative and their propellers stopped,

(f) All remaining engines operating at the maximum continuous power available at that altitude.

§ 4b.122 *Determination of the landing distance; general.* The horizontal distance required to land and to come to a complete stop (to a speed of approximately 3 m. p. h. for seaplanes or float planes) from a point at a height of 50 feet above the landing surface shall be determined for a range of weights and altitudes selected by the applicant. In making this determination the following conditions shall apply:

(a) A steady gliding approach shall have been maintained down to the 50-foot altitude with a true indicated air speed of not less than 1.3 V_{s_0}.

(b) The nose of the airplane shall not be depressed, nor the forward thrust increased by application of power after reaching the 50-foot altitude.

(c) At all times during and immediately prior to the landing, the flaps shall be in the landing position, except that after the airplane is on the landing surface and the true indicated air speed has been reduced to not more than 0.9 V_{s_0} the flap position may be changed.

(d) The landing shall be made in such manner that there is no excessive vertical acceleration, no tendency to bounce, nose over, ground loop, porpoise, or water loop, and in such manner that its reproduction shall not require any exceptional degree of skill on the part of the pilot, or exceptionally favorable conditions.

§ 4b.123 *Landplanes.* The landing distance referred to in § 4b.122 shall be determined on a dry, hard-surfaced runway in accordance with the following:

(a) The operating pressures on the braking system shall not be in excess of those approved by the manufacturer of the brakes,

(b) The brakes shall not be used in such manner as to produce excessive wear of brakes or tires,

(c) Means other than wheel brakes may be used in determining the landing distance, providing that:

(1) Exceptional skill is not required to control the airplane,

(2) The manner of their employment is such that consistent results could be expected under normal service,

(3) They are regarded as reliable.

§ 4b.124 *Seaplanes or float planes.* The landing distance referred to in § 4b.122 shall be determined on smooth water.

§ 4b.125 *Skiplanes.* The landing distance referred to in § 4b.122 shall be determined on smooth, dry snow.

Controllability

§ 4b.130 *Controllability; general.* (a) The airplane shall be safely controllable and maneuverable during take-off, climb, level flight, descent, and landing.

(b) It shall be possible to make a smooth transition from one flight condition to another, including turns and slips, without requiring an exceptional degree of skill, alertness, or strength on the part of the pilot and without danger of exceeding the limit load factor under all conditions of operation probable for the type, including those conditions normally encountered in the event of sudden failure of any engine.

§ 4b.131 *Longitudinal control.* (a) It shall be possible at all speeds between 1.4 V_{s_1} and V_{s_1} to pitch the nose downward so that a prompt recovery to a speed equal to 1.4 V_{s_1} can be made with:

(1) The airplane trimmed at 1.4 V_{s_1} with landing gear extended,

(2) The wing flaps in a retracted and extended position,

(3) Power off and maximum continuous power on all engines.

(b) During each of the controllability demonstrations outlined in this paragraph, it shall not require a change in the trim control or the exertion of more control force than can be readily applied with one hand for a short period. Each maneuver shall be performed with the landing gear extended.

(1) With power off, flaps retracted, and the airplane trimmed at 1.4 V_{s_1}, the flaps shall be extended as rapidly as possible while maintaining the air speed approximately 40 percent above the stalling speed prevailing at any instant throughout the maneuver.

(i) The maneuver of this subparagraph shall be repeated, except that it shall be started with flaps extended and the airplane trimmed at 1.4 V_{s_1}, after which the flaps shall be retracted as rapidly as possible.

(ii) The maneuver of subdivision (i) of this subparagraph shall be repeated,

except that maximum continuous power shall be used.

(2) With power off, flaps retracted, and the airplane trimmed at 1.4 V_{s_1}, take-off power shall be applied quickly while maintaining the same air speed.

(i) The maneuver of this subparagraph shall be repeated, except that the flaps shall be extended.

(3) With power off, flaps extended, and the airplane trimmed at 1.4 V_{s_1}, air speeds within the range of 1.1 V_{s_1} to 1.7 V_{s_1} or V_{FE}, whichever is the lesser, shall be obtained and maintained.

(c) It shall be possible without the use of exceptional piloting skill to prevent loss of altitude when flap retraction from any position is initiated during steady horizontal flight at 1.1 V_{s_1} with simultaneous application of not more than maximum continuous power. (See also § 4b.323.)

§ 4b.132 *Directional and lateral control*—(a) *Directional control; general.* It shall be possible, while holding the wings approximately level, to execute reasonably sudden changes in heading in either direction without encountering dangerous characteristics. Heading changes up to 15° shall be demonstrated, except that the heading change at which the rudder pedal force is 180 pounds need not be exceeded. The control shall be demonstrated at a speed equal to 1.4 V_{s_1}, under the following conditions:

(1) The critical engine inoperative and its propeller in the minimum drag condition,

(2) Power required for level flight at 1.4 V_{s_1}, but not greater than maximum continuous power,

(3) Most unfavorable center of gravity position,

(4) Landing gear retracted,

(5) Wing flaps in the approach position,

(6) Maximum landing weight.

(b) *Directional control; four or more engines.* Airplanes with four or more engines shall comply with paragraph (a) of this section, except that:

(1) The two critical engines shall be inoperative, their propellers in the minimum drag position,

(2) The center of gravity shall be in the most forward position,

(3) The wing flaps shall be in the most favorable climb position.

(c) *Lateral control; general.* It shall be possible to execute 20° banked turns with or against the inoperative engine from steady flight at a speed equal to 1.4 V_{s_1} with:

(1) The critical engine inoperative and its propeller in the minimum drag condition,

(2) Maximum continuous power on the operating engines,

(3) Most unfavorable center of gravity position,

(4) Landing gear retracted and extended,

(5) Wing flaps in the most favorable climb position,

(6) Maximum take-off weight.

(d) *Lateral control; four or more engines.* It shall be possible to execute 20° banked turns with or against the inoperative engines from steady flight at a speed equal to 1.4 V_{s_1} with maximum continuous power and with the airplane in the configuration of paragraph (b) of this section.

§ 4b.133 *Minimum control speed, V_{MC}.* (a) A minimum speed shall be determined under the conditions specified in this paragraph, so that, when one engine is suddenly made inoperative at that speed, it shall be possible to recover control of the airplane, with one engine still inoperative, and maintain it in straight flight at that speed, either with zero yaw or, at the option of the applicant, with an angle of bank not in excess of 5°. Such speed shall not exceed 1.2 V_{s_1} with:

(1) Take-off or maximum available power on all engines,

(2) Rearmost center of gravity,

(3) Flaps in take-off position,

(4) Landing gear retracted.

(b) In demonstrating the minimum speed of paragraph (a) of this section, the rudder force required to maintain control shall not exceed 180 pounds, nor shall it be necessary to throttle the remaining engines.

(c) During recovery of the maneuver of paragraph (a) of this section, the airplane shall not assume any dangerous atitude, nor shall it require exceptional skill, strength, or alertness on the part of the pilot to prevent a change of heading in excess of 20° before recovery is complete.

Trim

§ 4b.140 *General.* The means used for trimming the airplane shall be such that after being trimmed and without further pressure upon, or movement of, either the primary control or its corresponding trim control by the pilot or the automatic pilot, the airplane shall comply with the trim requirements of §§ 4b.141 through 4b.144.

§ 4b.141 *Lateral and directional trim.* The airplane shall maintain lateral and directional trim under the most adverse lateral displacement of the center of gravity within the relevant operating limitations, under all normally expected conditions of operation, including operation at any speed from 1.4 V_{s_1} to 90 percent of the maximum speed in level flight at maximum continuous power.

§ 4b.142 *Longitudinal trim.* The airplane shall maintain longitudinal trim under the following conditions:

(a) During a climb with maximum continuous power at a speed not in excess of 1.4 V_{s_1} with the landing gear retracted and the wing flaps both retracted and in the take-off position;

(b) During a glide with power off at a speed not in excess of 1.4 V_{s_1} with the landing gear extended and the wing flaps both retracted and extended, with the forward center of gravity position approved for landing with the maximum landing weight, and with the most forward center of gravity position approved for landing regardless of weight;

(c) During level flight at any speed from 1.4 V_{s_1} to 90 percent of the maximum speed in level flight at maximum continuous power with the landing gear and wing flaps retracted, and from 1.4 V_{s_1} to V_{LE} with the landing gear extended.

§ 4b.143 *Longitudinal and directional trim.* The airplane shall maintain longitudinal and directional trim at a speed equal to 1.4 V_{s_1}, during climbing flight with the critical engine inoperative, with:

(a) The other engine(s) at maximum continuous power,

(b) The landing gear retracted,

(c) Wings flaps retracted.

§ 4b.144 *Trim for airplanes with four or more engines.* The airplane shall maintain trim in rectilinear flight at the climb speed, configuration, and power used in establishing the rates of climb in § 4b.121, with the most unfavorable center of gravity position, and at the weight at which the two-engine-inoperative climb is equal to at least 0.01 $V_{s_1}^2$ at an altitude of 5,000 feet.

Stability

§ 4b.150 *General.* The airplane shall be longitudinally, directionally, and laterally stable in accordance with §§ 4b.151 through 4b.157. Suitable stability and control "feel" (static stability) shall be required in other conditions normally encountered in service if flight tests show such stability to be necessary for safe operation.

§ 4b.151 *Static longitudinal stability.* In the configurations outlined in §§ 4b.152 through 4b.155, and with the airplane trimmed as indicated, the characteristics of the elevator control forces and friction shall comply with the following.

(a) A pull shall be required to obtain and maintain speeds below the specified trim speed, and a push shall be required to obtain and maintain speeds above the specified trim speed. This criterion shall apply at any speed which can be obtained without excessive control force, except that such speeds need not be greater than the appropriate operating limit speed or need not be less than the minimum speed in steady unstalled flight.

(b) The air speed shall return to within 10 percent of the original trim speed when the control force is slowly released from any speed within the limits defined in paragraph (a) of this section.

(c) The stable slope of stick force curve versus speed of §§ 4b.152 through 4b-155 shall be such that any substantial change in speed is clearly perceptible to the pilot through a resulting change in stick force.

§ 4b.152 *Stability during landing.* The stick force curve shall have a stable slope, and the stick force shall not exceed 80 pounds at any speed between 1.1 V_{s_1} and 1.8 V_{s_1} with:

(a) Wing flaps in the landing position,

(b) The landing gear extended,

(c) Maximum landing weight,

(d) Throttles closed on all engines,

(e) The airplane trimmed at 1.4 V_{s_1} with throttles closed.

§ 4b.153 *Stability during approach.* The stick force curve shall have a stable slope at all speeds between 1.1 V_{s_1} and 1.8 V_{s_1} with:

(a) Wing flaps in sea level approach position

(b) Landing gear retracted,
(c) Maximum landing weight,
(d) The airplane trimmed at 1.4 V_{s_1} and with power sufficient to maintain level flight at this speed.

§ 4b.154 *Stability during climb.* The stick force curve shall have a stable slope at all speeds between 85 and 115 percent of the speed at which the airplane is trimmed with:
(a) Wing flaps retracted,
(b) Landing gear retracted,
(c) Maximum take-off weight,
(d) 75 percent of maximum continuous power,
(e) The airplane trimmed at the best rate-of-climb speed, except that the speed need not be less than 1.4 V_{s_1}.

§ 4b.155 *Stability during cruising*—(a) *Landing gear retracted.* Between 1.3 V_{s_1} and V_{NE} the stick force curve shall have a stable slope at all speeds obtainable with a stick force not in excess of 50 pounds with:
(1) Wing flaps retracted,
(2) Maximum take-off weight,
(3) 75 percent of maximum continuous power,
(4) The airplane trimmed for level flight with 75 percent of the maximum continuous power.
(b) *Landing gear extended.* The stick force curve shall have a stable slope at all speeds between 1.3 V_{s_1} and the speed at which the airplane is trimmed, except that the range of speeds need not exceed that obtainable with a stick force of 50 pounds with:
(1) Wing flaps retracted,
(2) Maximum take-off weight,
(3) 75 percent maximum continuous power, or the power for level flight at the landing gear extended speed, V_{LE}, whichever is the lesser,
(4) The airplane trimmed for level flight with the power specified in subparagraph (3) of this paragraph.

§ 4b.156 *Dynamic longitudinal stability.* Any short period oscillation occurring between stalling speed and maximum permissible speed shall be heavily damped with the primary controls free and in a fixed position.

§ 4b.157 *Directional and lateral stability.* (a) The static directional stability, as shown by the tendency to recover from a skid with rudder free, shall be positive with all landing gear and flap positions and symmetrical power conditions, at all speeds from 1.2 V_{s_1} up to the appropriate operating limit speed.
(b) The static lateral stability, as shown by the tendency to raise the low wing in a sideslip with all landing gear and flap positions and symmetrical power conditions shall:
(1) Be positive at the appropriate operating limit speed,
(2) Not be negative at a speed equal to 1.2 V_{s_1}.
(c) In straight steady sideslips (unaccelerated forward slips) the aileron and rudder control movements and forces shall be substantially proportional to the angle of sideslip, and the factor of proportionality shall lie between satisfactory limits up to sideslip angles considered appropriate to the operation of the type.
(1) At greater angles up to that at which the full rudder control is employed or a rudder pedal force of 180 pounds is obtained, the rudder pedal forces shall not reverse, and increased rudder deflection shall produce increased angles of sideslip.
(2) Sufficient bank shall accompany sideslipping to indicate clearly any departure from steady unyawed flight unless a yaw indicator is provided.
(d) Any short period oscillation occurring between stalling speed and maximum permissible speed shall be heavily damped with the primary controls free and in a fixed position.

Stalling Characteristics

§ 4b.160 *Stalling; symmetrical power.* (a) Stalls shall be demonstrated with:
(1) Power off,
(2) The power necessary to maintain level flight at a speed of 1.6 V_{s_1} with flaps in the approach position, landing gear retracted, and at maximum landing weight,
(3) The wing flaps and landing gear in any likely combination of positions,
(4) All appropriate airplane weights,
(5) The center of gravity in the most adverse position for recovery,
(6) The airplane in straight flight and in turns with bank up to 30°.
(b) With trim controls adjusted for straight flight at a speed of 1.4 V_{s_1} the speed shall be reduced by means of the elevator control until it is steady at slightly above stalling speed; then the elevator control shall be pulled back at a rate such that the airplane speed reduction does not exceed one mile per hour per second until a stall is produced as evidenced by an uncontrollable downward pitching motion of the airplane, or until the control reaches the stop. Normal use of the elevator control for recovery may be made after such pitching motion is unmistakably developed.
(c) In conditions of paragraphs (a) and (b) of this section it shall be possible to produce and correct roll and yaw by unreversed use of the aileron and rudder controls up to the moment when the airplane pitches.
(d) In straight flight stalls, the average roll occurring between the initiation of the pitching motion and the completion of the recovery shall not exceed 20°.
(e) In turning flight stalls, the roll following the stall shall not be so violent or extreme as to make it difficult, with normal piloting skill, to make a prompt recovery and regain control of the airplane.

§ 4b.161 *Stalling; asymmetrical power.* (a) The airplane shall be safely recoverable without applying power to the inoperative engine when stalled with:
(1) The critical engine inoperative,
(2) Flaps and landing gear retracted,
(3) The remaining engines operating up to 75 percent of maximum continuous power, except that the power need not be greater than that at which the use of maximum control travel does not hold the wings level laterally.
(b) The operating engines may be throttled back during the recovery from the stall.

§ 4b.162 *Stall warning.* Clear and distinctive stall warning shall be apparent to the pilot at a speed at least 5 percent above the stalling speed, with flaps and landing gear in all possible positions, both in straight and turning flight. The warning may be furnished either through the inherent aerodynamic qualities of the airplane, by a suitable instrument, or by other means which will give clearly distinguishable indications under all conditions of flight which are to be expected in airline operations.

Ground Handling Characteristics

§ 4b.170 *Longitudinal stability and control.* (a) There shall be no uncontrollable tendency for landplanes to nose over in any reasonably expected operating condition, or when rebound occurs during landing or take-off.
(b) Wheel brakes shall operate smoothly and shall exhibit no undue tendency to induce nosing over.

§ 4b.171 *Directional stability and control.* (a) There shall be no uncontrollable ground-looping tendency in 90° cross winds of velocity up to 0.2 V_{s_0} at any ground speed at which the airplane is expected to operate.
(b) All landplanes shall be demonstrated to be satisfactorily controllable with no exceptional degree of skill or alertness on the part of the pilot in power-off landings, at normal landing speed, during which brakes or engine power are not used to maintain a straight path.
(c) Satisfactory means shall be provided for directional control of the airplane during taxying.

§ 4b.172 *Shock absorption.* The shock absorbing mechanism shall not produce damage to the structure when the airplane is taxied on the roughest ground which it is reasonable to expect the airplane to encounter in normal operation.

§ 4b.173 *Demonstrated cross wind.* There shall be established a cross component of wind velocity at which it has been demonstrated to be safe to take off or land.

Water Handling Characteristics

§ 4b.180 *Stability and control.* (a) Seaplanes shall exhibit no uncontrollable porpoising at any speed at which the airplane is normally operated on the water.
(b) There shall be no uncontrollable looping tendency in 90° cross winds of velocity up to 0.2 V_{s_0} at any speed at which the airplane is expected to operate on water.
(c) Satisfactory means shall be provided for directional control of the airplane during taxying on water.

§ 4b.181 *Spray characteristics.* Spray during taxying, take-off, or landing shall at no time dangerously obscure the vision of the pilots nor produce damage to the propeller or other parts of the airplane.

§ 4b.182 *Demonstrated cross winds.* There shall be established a cross compo-

nent of wind velocity at which it has been demonstrated to be safe to take off and land.

Miscellaneous Flight Requirements

§ 4b.190 *Flutter and vibration.* (a) All parts of the airplane shall be demonstrated in flight to be free from flutter and excessive vibration under all speed and power conditions appropriate to the operation of the airplane up to at least the minimum value permitted for V_D in § 4b.210 (b) (5). The maximum speeds so demonstrated will be used in establishing the operating limitations of the airplane in accordance with § 4b.711.

(b) There shall be no buffeting condition in normal flight severe enough to interfere with satisfactory control of the airplane, to cause excessive fatigue to the crew, or to cause structural damage.[4] (See also §§ 4b.308 and 4b.309.)

SUBPART C—STRUCTURE

General

§ 4b.200 *Loads.* Strength requirements of this subpart are specified in terms of limit and ultimate loads. Unless otherwise stated, the specified loads shall be considered as limit loads. In determining compliance with these requirements the following factors shall be applicable.

(a) The factor of safety shall be 1.5 unless otherwise specified.

(b) Unless otherwise provided, the specified air, ground, and water loads shall be placed in equilibrium with inertia forces, considering all items of mass in the airplane.

(c) All loads shall be distributed in a manner closely approximating or conservatively representing actual conditions.

(d) If deflections under load significantly change the distribution of external or internal loads, such redistribution shall be taken into account.

§ 4b.201 *Strength and deformation.* (a) The structure shall be capable of supporting limit loads without suffering detrimental permanent deformations.

(b) At all loads up to limit loads the deformation shall be such as not to interfere with safe operation of the airplane.

(c) The structure shall be capable of supporting ultimate loads without failure. It shall support the load for at least 3 seconds, unless proof of strength is demonstrated by dynamic tests simulating actual conditions of load application.

§ 4b.202 *Proof of structure.* (a) Proof of compliance of the structure with the strength and deformation requirements of § 4b.201 shall be made for all critical loading conditions.

(b) Proof of compliance by means of structural analysis shall be acceptable only when the structure conforms to types for which experience has shown such methods to be reliable. In all other cases substantiating tests shall be required.

[4] It is not the intent of this requirement to discourage such stall warning buffeting as does not contradict these provisions.

(c) In all cases certain portions of the structure shall be tested as specified in § 4b.300.

Flight Loads

§ 4b.210 *General.* Flight load requirements shall be complied with at critical altitudes within the range for which certification is desired, at all weights from the design minimum weight to the design maximum weight, the latter not being less than the design take-off weight, with any practicable distribution of disposable load within prescribed operating limitations stated in the Airplane Flight Manual. (See § 4b.740.) At all speeds in excess of those corresponding with a Mach number of 0.65, compressibility effects shall be taken into account.

(a) *Flight load factor.* The flight load factors specified in this subpart shall represent the component of acceleration in terms of the gravitational constant. The flight load factor shall be assumed to act normal to the longitudinal axis of the airplane, shall be equal in magnitude and shall be opposite in direction to the airplane inertia load factor at the center of gravity.

(b) *Design air speeds.* The design air speeds shall be "equivalent air speeds" and shall be chosen by the applicant, except that they shall not be less than the speeds defined in subparagraphs (1) through (5) of this paragraph. Where estimated values of the speeds V_{S_0} and V_{S_1} are used, such estimates shall be conservative.

(1) *Design flap speed, V_F.* The minimum value of the design flap speed shall be equal to 1.4 V_{S_1} or 1.8 V_{S_0} whichever is greater, where V_{S_1} is the stalling speed with flaps retracted at the design landing weight, and V_{S_0} is the stalling speed with flaps in the landing position at the design landing weight. (See § 4b.212 (d) regarding automatic flap operation.)

(2) *Design maneuvering speed, V_A.* The design maneuvering speed V_A shall be equal to $V_{S_1}\sqrt{n}$ where n is the limit maneuvering load factor used (see § 4b.211 (a), and V_{S_1} is the stalling speed with flaps retracted at the design take-off weight. (See fig. 4b–2.)

(3) *Design speed for maximum gust intensity, V_B.* V_B shall be the speed at which the 40 foot per second gust line intersects the positive $C_{N_{max}}$ curve on the gust V–n envelope (see § 4b.211 (b) and fig. 4b–3).

(4) *Design cruising speed, V_C.* The minimum design cruising speed V_C shall be sufficiently greater than V_B to provide for inadvertent speed increases likely to occur as a result of severe atmospheric turbulence. In the absence of a rational investigation substantiating the use of other values, V_C shall not be less than V_B+50 (m. p. h.), except that it need not exceed the maximum speed in level flight at maximum continuous power for the corresponding altitude. At altitudes where V_D is limited by Mach number, V_C need not exceed 0.8 V_D, as shown in figure 4b–1, except that is shall not be less than 1.3 V_{S_1} with the flaps retracted at the maximum altitude for which certification is desired.

(5) *Design dive speed, V_D.* The minimum design dive speed V_D shall be sufficiently greater than V_C to provide for

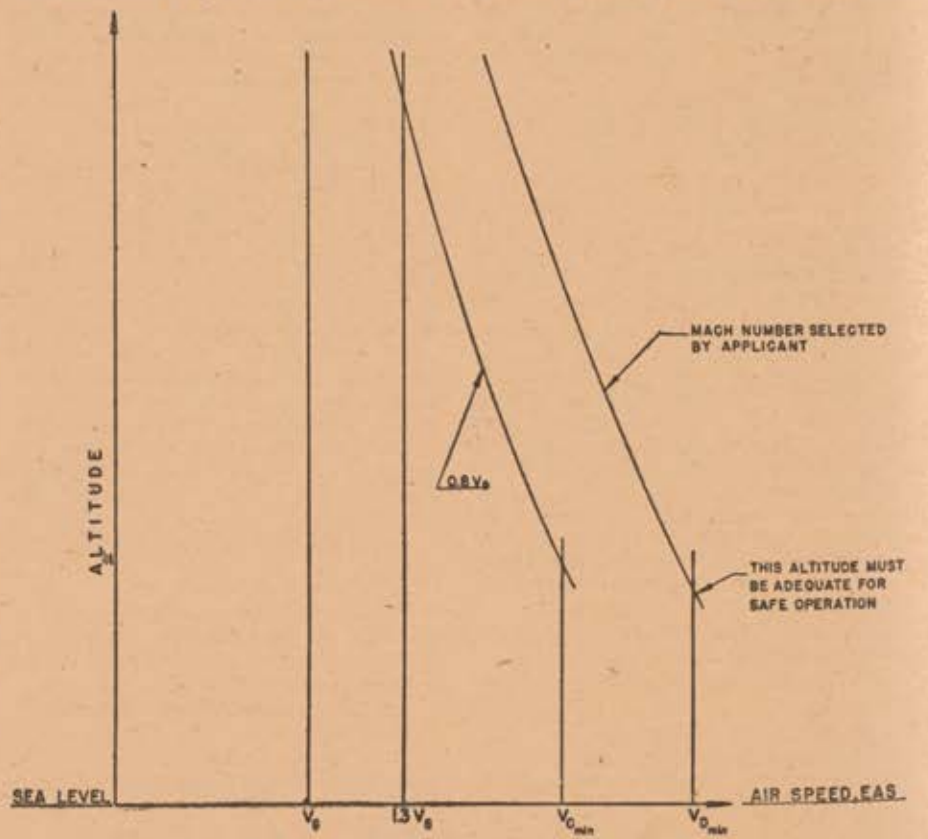


FIGURE 4b–1—Minimum design air speeds vs. altitude.

safe recovery from inadvertent upsets occurring at V_C. In the absence of a rational investigation the minimum value of V_D, in the altitude range between sea level and an altitude selected by the applicant, shall not be less than 1.25 V_C or V_C + 70 (m. p. h.), whichever is greater. The altitude range chosen shall be adequate for the safe operation of the airplane. At higher altitudes than that selected by the applicant V_D may be limited to a Mach number selected by the applicant. (See fig. 4b–1.)

§ 4b.211 *Flight envelopes.* The strength requirements shall be met at all combinations of air speed and load factor on and within the boundaries of the *V–n* diagrams of figures 4b–2 and 4b–3 which represent the maneuvering and gust envelopes. These envelopes will also be used in determining the airplane structural operating limitations as specified in § 4b.710.

(a) *Maneuvering load factors.* (See fig. 4b–2.) The airplane shall be assumed to be subjected to symmetrical maneuvers resulting in the limit load factors prescribed in subparagraphs (1) and (2) of this paragraph, except where limited by maximum (static) lift coefficients. Lower values of maneuvering load factor may be employed only if it is shown that the airplane embodies features of design which make it impossible to exceed such values in flight.

(1) The positive maneuvering load factor n for any flight speed up to V_D shall be selected by the applicant, except that it shall not be less than 2.5.

(2) The negative maneuvering load factor shall have a minimum value of −1.0 at all speeds up to V_C and shall vary linearly with speed from the value at V_C to zero at V_D.

(b) *Gust load factors.* The airplane shall be assumed to be subjected to symmetrical vertical gusts while in level flight. The resulting limit load factors shall correspond with the following conditions.

(1) Positive (up) and negative (down) gusts of 40 f. p. s. nominal intensity at a speed V_B shall be applicable where the positive 40 f. p. s. gust line intersects the positive $C_{N_{max}}$ curve. If this gust intensity produces load factors greater than those obtained in condition (2), it may be modified at altitudes above 20,000 feet in such a manner as to produce a load factor not less than that obtained in condition (2).

(2) Positive and negative gusts of 30 f. p. s. at V_C.

(3) Positive and negative gusts of 15 f. p. s. at V_D.

(4) Gust load factors shall be assumed to vary linearly between the specified conditions as shown on the gust envelope of figure 4b–3.

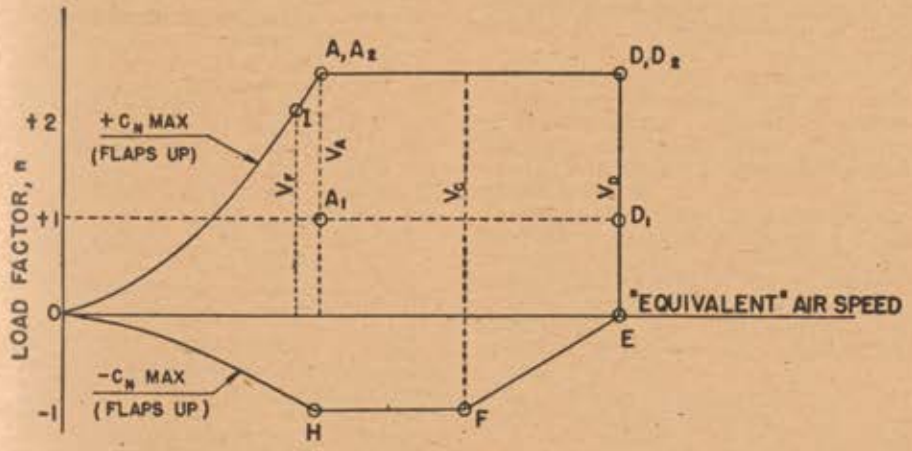


FIGURE 4b–2—Maneuvering envelope maneuvering load factor vs. speed, (*V-n*) diagram.

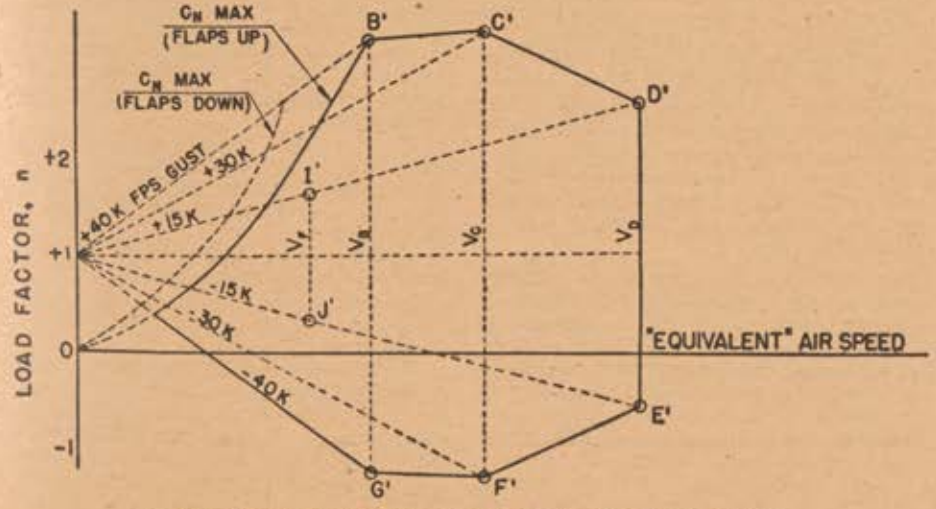


FIGURE 4b–3—Gust envelope load factor vs. velocity, (*V-n*) diagram.

(5) In the absence of a more rational analysis the gust load factors shall be computed by the following formula:

$$n = 1 + \frac{KUVa}{575(W/S)};$$

where

$$K = \tfrac{1}{2}\left(\frac{W}{S}\right)^{1/4} \text{ (for } W/S < 16 \text{ p. s. f.), or}$$

$$= 1.33 - \frac{2.67}{(W/S)^{1/4}} \text{ (for } W/S) > 16 \text{ p. s. f.),}$$

U = nominal gust velocity, ft. per second. (Note that the "effective sharp-edged" gust equals KU),

V = airplane speed (m. p. h.),

W/S = wing loading, pounds per square foot,

a = slope of the airplane normal force coefficient curve C_{N_A} per radian, if the gust loads are applied to the wings and horizontal tail surfaces simultaneously by a rational method. The wing lift curve slope C_L per radian may be used when the gust load is applied to the wings only and the horizontal tail gust loads are treated as a separate condition.

§ 4b.212 *Effect of high lift devices.* When flaps or similar high lift devices intended for use at the relatively low air speeds of approach, landing, and take-off are installed, the airplane shall be assumed to be subjected to symmetrical maneuvers and gusts with the flaps in landing position at the design flap speed V_F resulting in limit load factors within the range determined by the following conditions:

(a) Maneuvering to a positive limit load factor of 2.0.

(b) Positive and negative 15 fps nominal intensity gusts acting normal to the flight path in level flight.

(c) In designing the flaps and supporting structures, slipstream effects shall be taken into account as specified in § 4b.221.

(d) When automatic flap operation is provided, the airplane shall be designed for the speeds and the corresponding flap positions which the mechanism permits. (See § 4b.323.)

§ 4b.213 *Symmetrical flight conditions*—(a) *Procedure of analysis.* In the analysis of symmetrical flight conditions at least those specified in paragraphs (b), (c), and (d) of this section shall be considered. The following procedure of analysis shall be applicable.

(1) A sufficient number of points on the maneuvering and gust envelopes shall be investigated to insure that the maximum load for each part of the airplane structure is obtained. A conservative combined envelope may be used for this purpose.

(2) All significant forces acting on the airplane shall be placed in equilibrium in a rational or a conservative manner. The linear inertia forces shall be considered in equilibrium with wing and horizontal tail surface loads, while the angular (pitching) inertia forces shall be considered in equilibrium with wing and fuselage aerodynamic moments and horizontal tail surface loads.

(3) Where sudden displacement of a control is specified, the assumed rate of displacement need not exceed that which actually would be applied by the pilot.

(4) In determining elevator angles and chordwise load distribution in the maneuvering conditions of paragraphs (b) and (c) of this section in turns and pull-ups, account shall be taken of the effect of corresponding pitching velocities.

(b) *Maneuvering balanced conditions.* The maneuvering conditions A through I on the maneuvering envelope (fig. 4b–2) shall be investigated, assuming the airplane to be in equilibrium with zero pitching acceleration.

(c) *Maneuvering pitching conditions.* The following conditions on figure 4b–2 involving pitching acceleration shall be investigated.

(1) A_1, *Unchecked pull-up at speed* V_A. The airplane shall be assumed to be flying in steady unaccelerated flight (point A_1 on figure 4b–2) and the pitching control suddenly moved to obtain extreme positive pitching (nose up), except as limited by pilot effort, § 4b.220 (a).

(2) A_2, *Checked maneuver at speed,* V_A. (i) The airplane shall be assumed to be maneuvered to the positive maneuvering load factor by a checked maneuver from an initial condition of steady unaccelerated flight (point A_1 on fig. 4b–2). The initial positive pitching portion of this maneuver may be considered covered by subparagraph (1) of this paragraph.

(ii) A negative pitching acceleration (nose down) of at least the following value shall be assumed to be attained concurrently with the airplane maneuvering load factor (point A_2 on Fig. 4b-2), unless it is shown that a lesser value could not be exceeded:

$$-\frac{30}{V_A} n\ (n - 1.5)\ \text{(radians/sec.}^2\text{)}$$

where n is equal to the value of the positive maneuvering load factor as defined by point A_2 on figure 4b–2.

(3) D_1 *and* D_2 *checked maneuver at* V_D. The airplane shall be assumed to be subjected to a checked maneuver from steady unaccelerated flight (point D_1 on fig. 4b–2) to the positive maneuvering load factor (point D_2 on fig. 4b–2) as follows:

(i) A positive pitching acceleration (nose up), equal to at least the following value, shall be assumed to be attained concurrently with the airplane load factor of unity, unless it is shown that lesser values could not be exceeded:

$$+\frac{45}{V_D} n\ (n - 1.5)\ \text{(radians/sec.}^2\text{)}$$

where n is equal to the value of the positive maneuvering load factor as defined by point D_2 on figure 4b–2.

(ii) A negative pitching acceleration (nose down), equal to at least the following value, shall be assumed to be attained concurrently with the airplane positive maneuvering load factor (point D_2 on fig. 4b–2), unless it is shown that lesser values could not be exceeded:

$$-\frac{30}{V_D} n\ (n - 1.5)\ \text{(radians/sec.}^2\text{)}$$

where n is equal to the value of the positive maneuvering load factor as defined by point D_2 on figure 4b–2.

(d) *Gust conditions.* The gust conditions B' through J' on figure 4b–3 shall be investigated.

(1) The air load increment due to a specified gust shall be added to the initial balancing tail load corresponding with steady unaccelerated flight.

(2) The alleviating effect of wing down-wash and of the airplane's motion in response to the gust may be included in computing the tail gust load increment.

(3) The gust factor K (§ 4b.211 (b)) may be applied to the specified gust intensity for the horizontal tail, in lieu of a rational investigation of the airplane response.

§ 4b.214 *Rolling conditions.* The airplane shall be designed for rolling loads resulting from the conditions specified in paragraphs (a) and (b) of this section. Unbalanced aerodynamic moments about the center of gravity shall be reacted in a rational or a conservative manner considering the principal masses furnishing the reacting inertia forces.

(a) *Maneuvering.* The conditions, aileron deflection, and speeds, except as the deflections may be limited by pilot effort (see § 4b.220 (a)), specified as follows shall be considered in combination with an airplane load factor of at least two-thirds of the positive maneuvering factor used in the design of the airplane. In determining the required aileron deflections, torsional flexibility of the wing shall be taken into account in accordance with § 4b.200 (e).

(1) Conditions corresponding with steady rolling velocity shall be investigated. In addition, conditions corresponding with maximum angular acceleration shall be investigated for airplanes having engines or other weight concentrations outboard of the fuselage. For the angular acceleration conditions, zero rolling velocity may be assumed in the absence of a rational time history investigation of the maneuver.

(2) At speed V_A a sudden deflection of the aileron to the stop shall be assumed.

(3) At speed V_C the aileron deflection shall be that required to produce a rate of roll not less than that obtained in condition (2) of this paragraph.

(4) At speed V_D the aileron deflection shall be that required to produce a rate of roll not less than one-third of that in condition (2) of this paragraph.

(b) *Unsymmetrical gusts.* The condition of unsymmetrical gusts shall be considered by modifying the symmetrical flight conditions B' or C' of figure 4b–3, whichever produces the greater load factor. It shall be assumed that 100 percent of the wing air load acts on one side of the airplane, and 80 percent acts on the other side.

§ 4b.215 *Yawing conditions.* The airplane shall be designed for yawing loads resulting from the conditions specified in paragraphs (a) and (b) of this section. Unbalanced aerodynamic moments about the center of gravity shall be reacted in a rational or a conservative maner considering the principal masses furnishing the reacting inertia forces.

(a) *Maneuvering.* At all speeds from V_{MC} to V_A the following vertical tail loads shall be considered. In computing these loads the yawing velocity may be assumed zero.

(1) With the airplane in unaccelerated flight at zero yaw, it shall be assumed that the rudder control is suddenly displaced to the maximum deflection as limited by the control stops or by a 300-pound rudder pedal force, whichever is critical.

(2) With the rudder deflected as specified in subparagraph (1) of this paragraph it shall be assumed that the airplane yaws to the resulting sideslip angle.

(3) With the airplane yawed to the static sideslip angle corresponding with the rudder deflection specified in subparagraph (1) of this paragraph, it shall be assumed that the rudder is returned to neutral.

(b) *Lateral gusts.* The airplane shall be assumed to encounter gusts of 30 f. p. s. nominal intensity, normal to the plane of symmetry while in unaccelerated flight at speed V_C. In the absence of a rational investigation of the airplane's response to a true gust, the gust loading on the vertical tail surfaces may be computed by the following formula:

$$\overline{W} = \frac{KUV_C a}{575}$$

where

W = average limit unit pressure in pounds per square foot,

$K = 1.33 - \dfrac{4.5}{\left(\dfrac{W}{S_T}\right)^{3/4}}$; except that K shall not be less than 1.0. A value of K obtained by rational determination may be used,

U = nominal gust intensity in feet per second,

V_C = design cruising speed in miles per hour,

a = slope of lift curve of the vertical surface, C_L per radian, corrected for aspect ratio,

W = design take-off weight, pounds,

S_T = vertical surface area sq. ft.

§ 4b.216 *Supplementary flight conditions*—(a) *Engine torque effects.* Engine mounts and their supporting structures shall be designed for engine torque effects combined with basic flight conditions as described in subparagraphs (1) and (2) of this paragraph. The limit torque shall be obtained by multiplying the mean torque by a factor of 1.33 in the case of engines having 5 or more cylinders. For 4, 3, and 2-cylinder engines, the factors shall be 2, 3, and 4, respectively.

(1) The limit torque corresponding with take-off power and propeller speed acting simultaneously with 75 percent of the limit loads from flight condition A (see fig. 4b–2).

(2) The limit torque corresponding with maximum continuous power and propeller speed, acting simultaneously with the limit loads from flight condition A (see fig. 4b–2).

(b) *Side load on engine mount.* The limit load factor in a lateral direction for this condition shall be equal to the maximum obtained in the yawing conditions, but shall not be less than either 1.33 or one-third the limit load factor for flight condition A (see fig. 4b–2). Engine

mounts and their supporting structure shall be designed for this condition which may be assumed independent of other flight conditions.

(c) *Pressure cabin loads.* When pressurized compartments are provided for the occupants of the airplane, the following requirements shall be met. (See § 4b.373.)

(1) The airplane structure shall have sufficient strength to withstand the flight loads combined with pressure differential loads from zero up to the maximum relief valve setting. Account shall be taken of the external pressure distribution in flight.

(2) If landings are to be permitted with the cabin pressurized, landing loads shall be combined with pressure differential loads from zero up to the maximum to be permitted during landing.

(3) The airplane structure shall have sufficient strength to withstand the pressure differential loads corresponding with the maximum relief valve setting multiplied by a factor of 1.33 to provide for such effects as fatigue and stress concentration.

(4) Where a pressurized cabin is separated into two or more compartments by bulkheads or floor, the primary structure shall be designed for the effects of sudden release of pressure in any compartment having external doors or windows. This condition shall be investigated for the effects resulting from the failure of the largest opening in a compartment. Where intercompartment venting is provided, it shall be acceptable to take into account the effects of such venting.

Control Surface and System Loads

§ 4b.220 *Control surface loads; general.* The control surfaces shall be designed for the limit loads resulting from the flight conditions prescribed in §§ 4b.213 through 4b.215, taking into account the following provisions:

(a) *Effect of pilot effort.* (1) In the control surface flight loading conditions, the air loads on the movable surfaces and the corresponding deflections need not exceed those which could be obtained in flight by employing the maximum pilot control forces specified in figure 4b-5, except that two-thirds of the maximum values specified for the aileron and elevator shall be acceptable when control surface hinge moments are based on reliable data. In applying this criterion, proper consideration shall be given to the effects of servo mechanisms, tabs, and automatic pilot systems in assisting the pilot.

(b) *Effect of trim tab.* The effects of trim tabs on the control surface design conditions need be taken into account only in cases where the surface loads are limited on the basis of maximum pilot effort in accordance with the provision of paragraph (a) of this section. In such cases the tabs shall be considered to be deflected in the direction which would assist the pilot and the deflections shall be those specified in § 4b.222.

(c) *Unsymmetrical loads.* The maximum horizontal tail surface loading (load per unit area) as determined by the provisions of this section shall be applied to the horizontal surface on one side of the plane of symmetry, and 80 percent of that loading shall be applied to the opposite side.

(d) *Outboard fins.* (1) When outboard fins are carried on the horizontal tail surface, the tail surfaces shall be designed for the maximum horizontal surface load in combination with the corresponding loads induced on the vertical surfaces by end plate effects. Such induced effects need not be combined with other vertical surface loads.

(2) To provide for unsymmetrical loading when outboard fins extend above and below the horizontal surface, the critical vertical surface loading (load per unit area) as determined by the provisions of this section shall also be applied as follows:

(i) 100 percent to the area of the vertical surfaces above (or below) the horizontal surface, and

(ii) 80 percent to the area below (or above) the horizontal surface.

§ 4b.221 *Wing flaps.* (a) Wing flaps, their operating mechanism, and supporting structure shall be designed for critical loads prescribed by § 4b.212 with the flaps extended to any position from fully retracted to the landing position.

(b) The effects of propeller slipstream corresponding with take-off power shall be taken into account at an airplane speed of not less than 1.4 V_{s_1}, where V_{s_1} is the stalling speed with flaps as follows (for automatic flaps see § 4b.212 (d)):

(1) Landing and approach settings at the design landing weight,

(2) Take-off and en route settings at the design take-off weight.

(c) It shall be acceptable to assume the airplane load factor to be equal to 1.0 for investigating the slipstream condition.

§ 4b.222 *Tabs.* (a) At all speeds up to V_D, elevator trim tabs shall be designed for the deflections required to trim the airplane at any point within the positive portion of the maneuvering V–n diagram (fig. 4b-2), except as limited by the stops.

(b) Aileron and rudder trim tabs shall be designed for deflections required to trim airplane in appropriate unsymmetrical lateral loading and rigging, and symmetrical and unsymmetrical power conditions.

(c) Balancing and servo tabs shall be designed for deflections consistent with the primary control surface loading conditions.

§ 4b.223 *Special devices.* The loading for special devices employing aerodynamic surfaces, such as slots and spoilers, shall be based on test data.

§ 4b.224 *Primary flight control systems.* Elevator, aileron, and rudder control systems and their supporting structures shall be designed for loads corresponding with 125 percent of the computed hinge moments of the movable control surface in the conditions prescribed in § 4b.220, subject to the following provisions:

(a) The system limit loads, except the loads resulting from ground gusts, § 4b.226, need not exceed those which can be produced by the pilot or pilots and automatic devices operating the controls. Acceptable maximum and minimum pilot loads for elevator, aileron, and rudder controls are shown in figure 4b-5. These pilot loads shall be assumed to act at the appropriate control grips or pads in a manner simulating flight conditions and to be reacted at the attachment of the control system to the control surface horn.

(b) The loads shall in any case be sufficient to provide a rugged system for service use, including considerations of jamming, ground gusts, taxying tail to wind, control inertia, and friction.

§ 4b.225 *Dual primary flight control systems.* (a) When dual controls are provided, the system shall be designed for the pilots operating in opposition, using individual pilot loads equal to 75 percent of those obtained in accordance with § 4b.224, except that the individual pilot loads shall not be less than the minimum loads specified in figure 4b-5.

(b) The control system shall be designed for the pilots acting in conjunction, using individual pilot loads equal to 75 percent of those obtained in accordance with § 4b.224.

§ 4b.226 *Ground gust conditions.* The following conditions, intended to simulate the loadings on control surfaces due to ground gusts and when taxying downwind, shall be investigated.

(a) The loads in the systems between the stops nearest the surfaces and the cockpit controls need not exceed those corresponding with the maxima of figure 4b-5 for each pilot alone, or with 75 percent of these maxima for each pilot when the pilots act in conjunction.

(b) The control system stops nearest the surfaces, the control system locks, and the portions of the systems, if any, between such stops and locks and the control surface horns shall be designed for limit hinge moments H obtained from the following formula:

$$H = KcSq,$$

where:

H = limit hinge moment (ft. lb.)

c = mean chord (a. f. t.) of the control surface aft of the hinge line,

S = area of the control surface (sq. ft.) aft of the hinge line,

q = dynamic pressure (p. s. f.) based on a design speed not less than $10\sqrt{W/S}+10$ (mph), except that the designed speed need not exceed 60 mph,

K = factor as specified in figure 4b-4.

§ 4b.227 *Secondary control systems.* Secondary controls, such as wheel brake, spoiler, and tab controls shall be designed for the loads based on the maximum which a pilot is likely to apply to the control in question. The values of figure 4b-6 are considered acceptable.

Surface	K	Position of controls
(a) Aileron	[1] +0.75	Control column locked or lashed in mid-position.
(b) Aileron	[1] ±0.50	Ailerons at full throw; + moment on one aileron, − moment on the other.
(c) (d) Elevator	[1] ±0.75	Elevator (c) full up (−), and (d) full down (+).
(e) (f) Rudder	±0.75	Rudder (e) in neutral, and (f) at full throw.

[1] A positive value of K indicates a moment tending to depress the surface, while a negative value of K indicates a moment tending to raise the surface.

FIGURE 4b-4—Limit hinge moment factor.

LIMIT PILOT LOADS (ONE PILOT)

Control	Maximum load	Minimum load
Aileron:		
Stick	100 pounds	40 pounds.
Wheel [1]	80 D inch-pounds [2]	40 D inch-pounds.
Elevator:		
Stick	250 pounds	100 pounds.
Wheel	300 pounds	100 pounds.
Rudder	300 pounds	130 pounds.

[1] The critical portions of the aileron control system shall also be designed for a single tangential force having a limit value equal to 1.25 times the couple force determined from these criteria.
[2] D=wheel diameter.

FIGURE 4b-5—Pilot control force limits (Primary controls).

Control	Limit pilot loads
Miscellaneous: [1] crank wheel or lever.	$\frac{1+R}{3}\times 50$ lb., but not less than 50 lb. nor more than 150 lb. (R=radius). Applicable to any angle within 20° of plane of control.
Twist	133 inches-pounds.
Push-pull	To be chosen by applicant.

[1] Limited to flap, tab, stabilizer, spoiler, and landing gear operating controls.

FIGURE 4b-6—Pilot control force limits (secondary controls).

Ground Loads

§ 4b.230 *General.* The limit loads obtained in the conditions specified by §§ 4b.231 through 4b.236 shall be considered as external forces applied to the airplane structure and shall be placed in equilibrium by linear and angular inertia forces in a rational or conservative manner. In applying the specified conditions the provisions of paragraph (a) of this section shall be complied with. In addition, for the landing conditions of §§ 4b.231 through 4b.234 the airplane shall be assumed to be subjected to forces and descent velocities prescribed in paragraph (b) of this section. (The basic landing gear dimensional data are given in fig. 4b-7.)

(a) *Center of gravity positions.* The critical center of gravity positions within the certification limits shall be selected so that the maximum design loads in each of the landing gear elements are obtained in the landing and the ground handling conditions.

(b) *Load factor for landing conditions.* (See § 4b.332 (a) for requirements on energy absorption tests which determine the minimum limit inertia load factors corresponding with the required limit descent velocities.)

(1) In the landing conditions the limit vertical inertia load factor at the center of gravity of the airplane shall be chosen by the applicant, except that it shall not be less than the value which would be obtained when landing the airplane with a limit descent velocity of either 10 fps at the design landing weight or 6 fps at the design take-off weight.

(2) It shall be acceptable to assume a wing lift not exceeding two-thirds of the airplane weight to exist throughout the landing impact and to act through the center of gravity of the airplane.

(3) The provisions of subparagraph (1) and (2) of this paragraph shall be predicated on conventional arrangements of main and nose gears, or main and tail gears, and on normal operating techniques. It shall be acceptable to modify the prescribed descent velocities if it is shown that the airplane embodies features of design which make it impossible to develop these velocities.

§ 4b.231 *Level landing conditions.*—(a) *General.* In the level attitude, the airplane shall be assumed to contact the ground with the rates of descent specified in § 4b.230 (b) (1) at a forward velocity component parallel to the ground equal to 1.2 V_{s_0}. The following two combinations of vertical and drag components shall be considered acting at the axle center line:

(1) *Condition of maximum wheel spin-up load.* Drag components simulating the forces required to accelerate the wheel rolling assembly up to the specified ground speed shall be combined with the vertical ground reactions existing at the instant of peak drag loads. It shall be acceptable to apply this condition only to the landing gear and the directly affected attaching structure.

(2) *Condition of maximum wheel vertical load.* An aft acting drag component not less than 25 percent of the maximum vertical ground reaction shall be combined with the maximum ground reaction of § 4b.230 (b).

(b) *Level landing; tail-wheel type.* The airplane horizontal reference line shall be assumed horizontal. The conditions specified in paragraphs (a) (1) and (a) (2) of this section shall be investigated. (See fig. 4b-9.)

(c) *Level landing; nose wheel type.* The following airplane attitudes shall be considered: (See fig. 4b-9.)

(1) Main wheels contacting the ground with the nose wheel just clear of the ground. The two conditions specified in paragraphs (a) (1) and (a) (2) of this section shall be investigated.

(2) Nose and main wheels contacting the ground simultaneously. Conditions in this attitude need not be investigated if this attitude cannot reasonably be attained at the specified descent and forward velocities. The two conditions

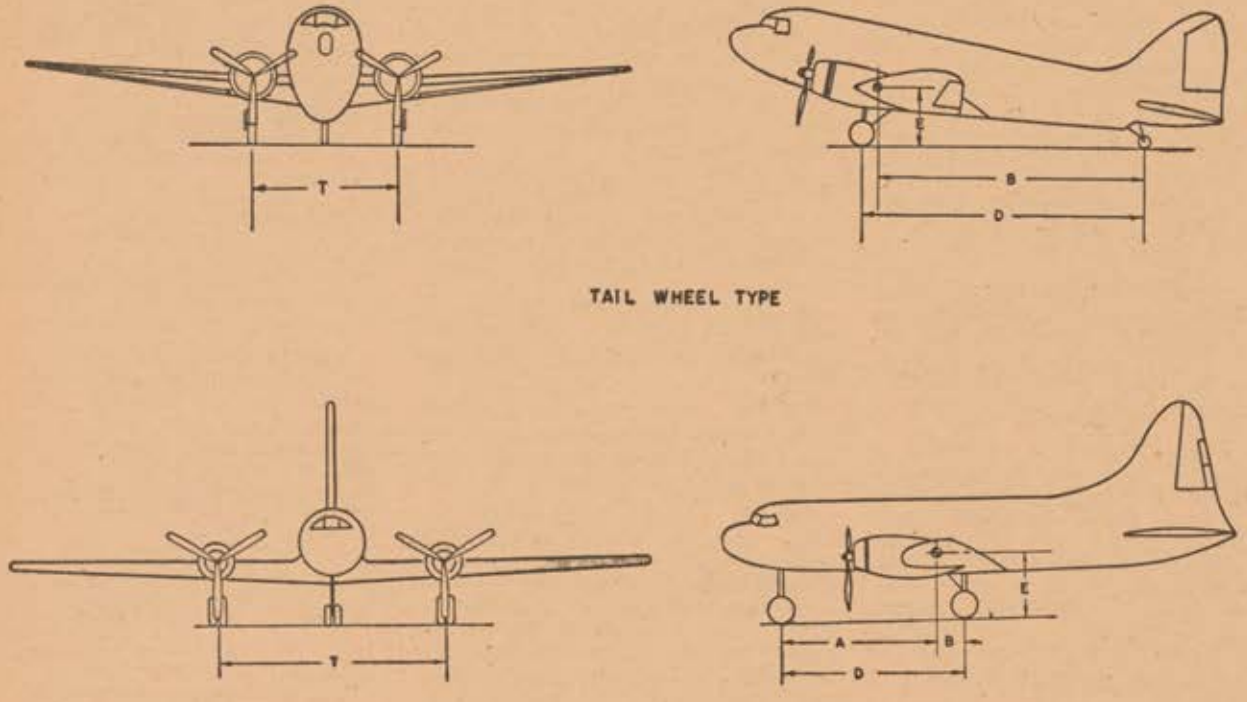


FIGURE 4b-7—Basic landing gear dimension data.

specified in paragraphs (a) (1) and (a) (2) of this section shall be investigated, except that in condition (a) (1) it shall be acceptable to investigate the nose and main gear separately neglecting the pitching moments due to wheel spin-up loads, while in condition (a) (2) the pitching moment shall be assumed to be resisted by the nose gear.

§ 4b.232 *Tail-down landing conditions.* The following conditions shall be investigated for the load factor obtained in § 4b.230 with the vertical ground reactions applied to the landing gear axles.

(a) *Tail-wheel type.* The main and tail wheels shall be assumed contacting the ground simultaneously. (See fig. 4b–8.) Two conditions of ground reaction on the tail wheel shall be assumed to act in the following directions:

(1) Vertical,

(2) Up and aft through the axle at 45° to the ground line.

(b) *Nose-wheel type.* The airplane shall be at an attitude corresponding with either the stalling angle or the maximum angle permitting clearance with the ground by all parts of the airplane other than the main wheels, whichever is the lesser. (See fig. 4b–8.)

§ 4b.233 *One-wheel landing condition.* The main landing gear on one side of the airplane center line shall contact the ground in the level attitude. (See fig. 4b–10.) The ground reactions on this side shall be the same as those obtained in § 4b.231 (a) (2). The unbalanced external loads shall be reacted by inertia of the airplane in a rational or conservative manner.

§ 4b.234 *Lateral drift landing condition.* (a) The airplane shall be in the level attitude with only the main wheels contacting the ground. (See fig. 4b–11.)

(b) Side loads of 0.8 of the vertical reaction (on one side) acting inward and 0.6 of the vertical reaction (on the other side) acting outward shall be combined with one-half of the maximum vertical ground reactions obtained in the level landing conditions. These loads shall be assumed to be applied at the ground contact point and to be resisted by the inertia of the airplane. It shall be allowed to assume the drag loads as zero.

§ 4b.235 *Ground handling conditions.* The landing gear and airplane structure shall be investigated for the conditions of this section with the airplane at the design take-off weight, unless otherwise prescribed. No wing lift shall be considered. It shall be allowed to assume the shock absorbers and tires to be deflected to their static position.

(a) *Take-off run.* The landing gear and airplane structure shall be designed for loads not less than those resulting from the condition specified in § 4b.172.

(b) *Braked roll*—(1) *Tail-wheel type.* The airplane shall be assumed in the level attitude with all load on the main wheels. The limit vertical load factor shall be 1.2 for the airplane at the design landing weight, and 1.0 for the airplane at the design take-off weight. A drag reaction equal to the vertical reaction multiplied by a coefficient of friction of 0.8 shall be combined with the vertical ground reaction and applied at the ground contact point. (See fig. 4b—12.)

(2) *Nose-wheel type.* The limit vertical load factor shall be 1.2 for the airplane at the design landing weight, and 1.0 for the airplane at the design take-off weight. A drag reaction equal to the vertical reaction multiplied by a coefficient of friction of 0.8 shall be combined with the vertical reaction and applied at the ground contact point of each wheel having brakes. The following two airplane attitudes shall be considered. (See fig. 4b–12.)

(i) The airplane in the level attitude with all wheels contacting the ground and the loads distributed between the main and nose gear. Zero pitching acceleration shall be assumed.

(ii) The airplane in the level attitude with only the main gear contacting the ground and the pitching moment resisted by angular acceleration.

(c) *Turning.* The airplane in the static position shall be assumed to execute a steady turn by nose gear steering or differential power such that the limit load factors applied at the center of gravity are 1.0 vertically and 0.5 laterally. (See fig. 4b–13.) The side ground reaction of each wheel shall be 0.5 of the vertical reaction.

(d) *Pivoting.* The airplane shall be assumed to pivot about one side of the main gear, the brakes on that side being locked. The limit vertical load factor

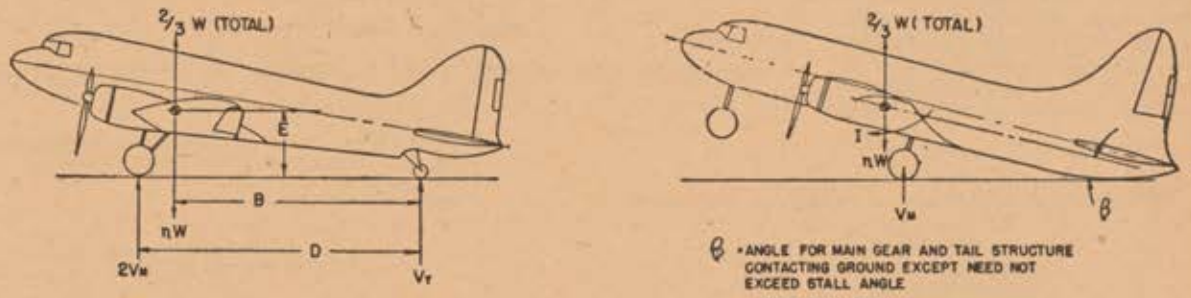


FIGURE 4b–8—Tail down landing data.

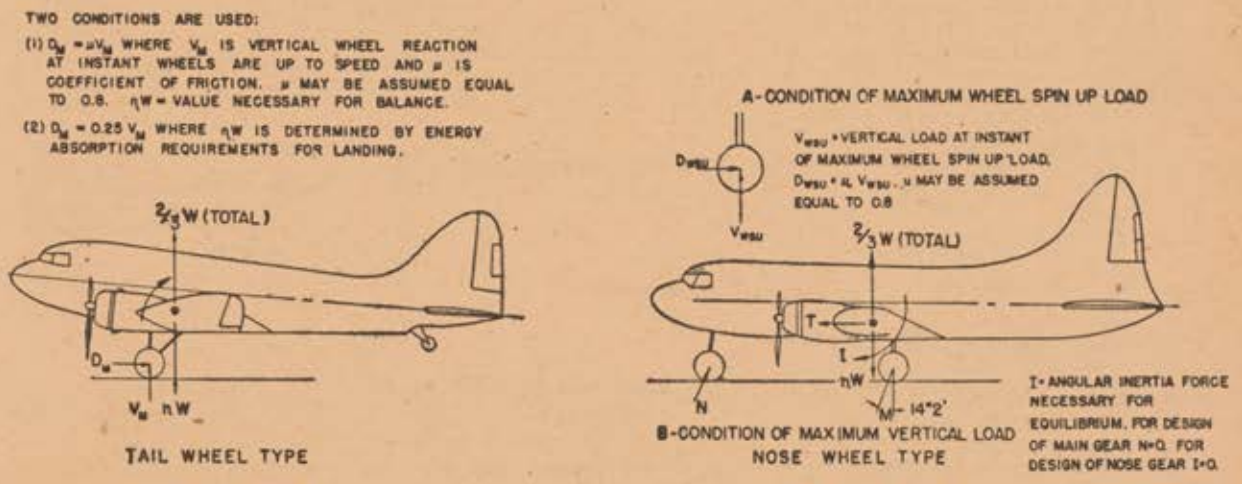


FIGURE 4b–9—Level landing data.

shall be 1.0 and the coefficient of friction 0.8. The airplane shall be assumed to be in static equilibrium, the loads being applied at the ground contact points. (See fig. 4b–14.)

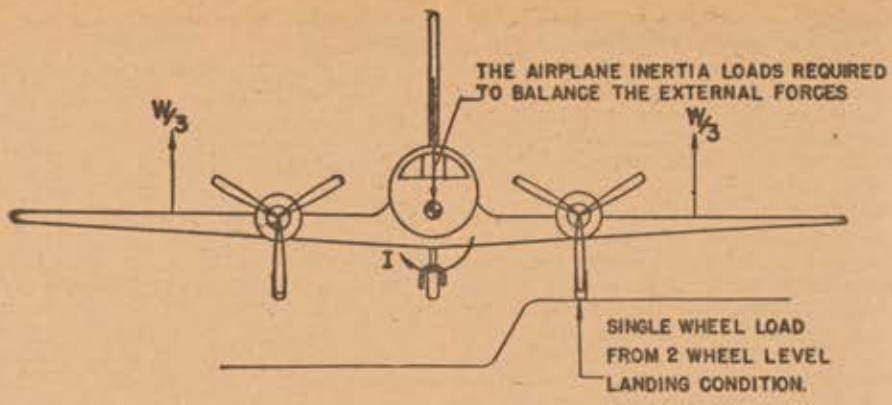
(e) *Nose-wheel yawing.* (1) A vertical load factor of 1.0 at the airplane c. g. and a side component at the nose wheel ground contact equal to 0.8 of the vertical ground reaction at that point shall be assumed.

(2) The airplane shall be placed in static equilibrium with the loads resulting from the application of the brakes on one side of the main gear. The vertical load factor at the c. g. shall be 1.0. The forward acting load at the airplane c. g. shall be 0.8 times the vertical load on one main gear. The side vertical loads at the ground contact point on the nose gear shall be those required for static equilibrium. The side load factor at the airplane c. g. shall be assumed zero.

(f) *Tail-wheel yawing.* (1) A vertical ground reaction equal to the static load on the tail wheel, in combination with a side component of equal magnitude shall be assumed.

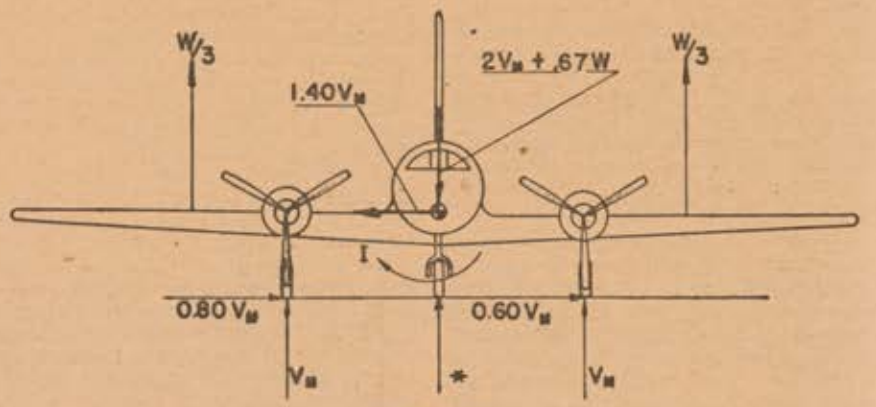
(2) When a swivel is provided, the tail wheel shall be assumed swiveled 90° to the airplane longitudinal axis with the resultant load passing through the axle. When a lock, steering device, or shimmy damper is provided, the tail wheel shall also be assumed in the trailing position with side load acting at the ground contact point.

§ 4b.236 *Unsymmetrical loads on dual-wheel units.* In dual-wheel units, 60 percent of the total ground reaction for the unit shall be applied to one wheel and 40 percent to the other. To provide for the case of one tire flat, either wheel



NOSE OR TAIL WHEEL TYPE

FIGURE 4b–10—One wheel landing.



NOSE OR TAIL WHEEL TYPE AIRPLANE IN LEVEL ALTITUDE

FIGURE 4b–11—Lateral drift landing.

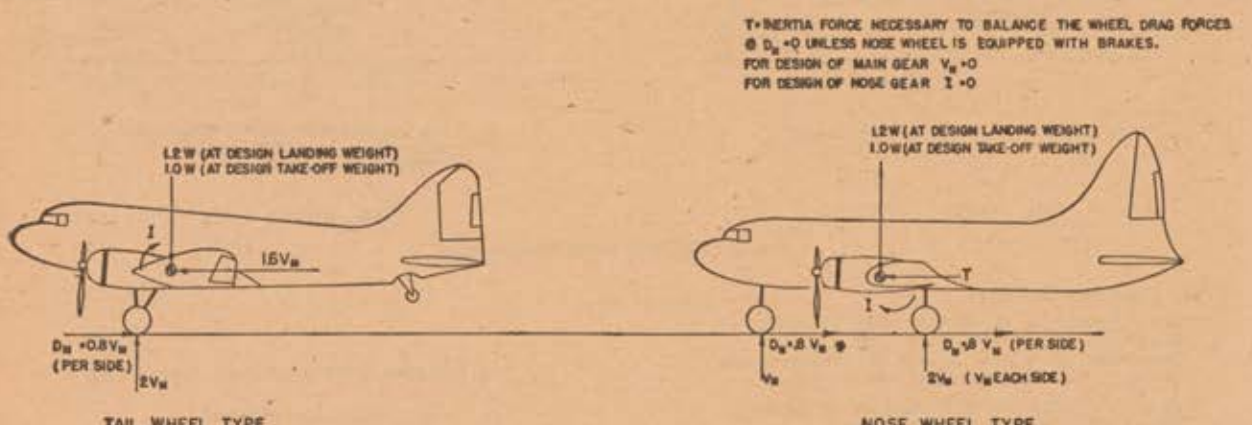


FIGURE 4b–12—Braked roll.

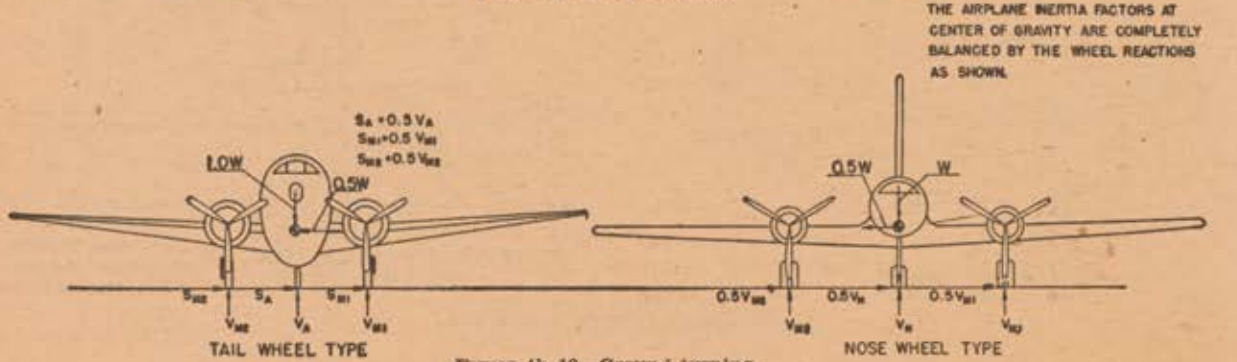


FIGURE 4b–13—Ground turning

shall be capable of withstanding 60 percent of the load which would be assigned to the unit in the specified conditions, except that the vertical ground reaction shall not be less than the full static value.

Water Loads

§ 4b.250 *General.* The water load requirements shall apply to the entire airplane. At least the hull structure, the wing, the nacelles, and any float supporting structure shall be investigated.

§ 4b.251 *Design weight.* The design weight used in the water landing conditions shall not be less than the design landing weight, except that local bottom pressure conditions shall be investigated at the design take-off weight.

§ 4b.252 *Boat seaplane bottom pressures*—(a) *Maximum local pressure.* The maximum value of the limit local pressure shall be determined from the following equation:

$$P_{max}=0.04\ V_s^{1.5};$$

where:

p=pressure, pounds per square inch,
V_s=stalling speed with flaps fully retracted at the design take-off weight.

(b) *Variation in local pressure.* The local pressures to be applied to the hull bottom shall vary in accordance with figure 4b–15. No variation from keel to chine (beamwise) shall be assumed, except when the chine flare indicates the advisability of higher pressures at the chine.

(c) *Application of local pressure.* The local pressures determined in paragraphs (a) and (b) of this section shall be applied over a local area in such a manner as to cause the maximum local loads in the hull bottom structure.

(d) *Distributed bottom symmetrical pressures.* For the purpose of designing frames, keels, and chine structure, a maximum limit pressure shall be computed according to paragraph (a) of this section, except that the stalling speed used in the computation shall be based upon the design landing weight, and the resulting pressure value shall be reduced to one-half. The pressure shall be applied simultaneously over the entire hull bottom according to the distribution of figure 4b–15. The resulting loads shall be carried into the side-wall structure of the hull proper, but need not be transmitted in a fore-and-aft direction as shear and bending.

(e) *Distributed bottom unsymmetrical pressures.* Each floor member or frame shall be designed for a load on one side of the hull center line equal to the most critical symmetrical loading as obtained in paragraph (d), combined with a load on the other side of the hull center line equal to one-half the most critical symmetrical loading.

§ 4b.253 *Boat seaplane loading conditions*—(a) *Step loading condition*—(1) *Application of load.* The resultant water load shall be applied vertically in the plane of symmetry so as to pass through the center of gravity of the airplane.

(2) *Magnitude of load.* The limit acceleration shall be 4.0, unless a lower value is shown by tests to be more applicable.

(3) *Hull shear and bending loads.* The hull shear and bending loads shall be computed from the inertia loads produced by the vertical water load. To avoid excessive local shear loads and bending moments near the point of water load application, it shall be acceptable to distribute the water load over the hull bottom using pressures not less than those specified in § 4b.252 (d).

(b) *Bow loading condition*—(1) *Application of load.* The resultant water load shall be applied in the plane of symmetry at a point one-tenth of the distance from the bow to the step and shall be directed upward and rearward at an angle of 30° from the vertical.

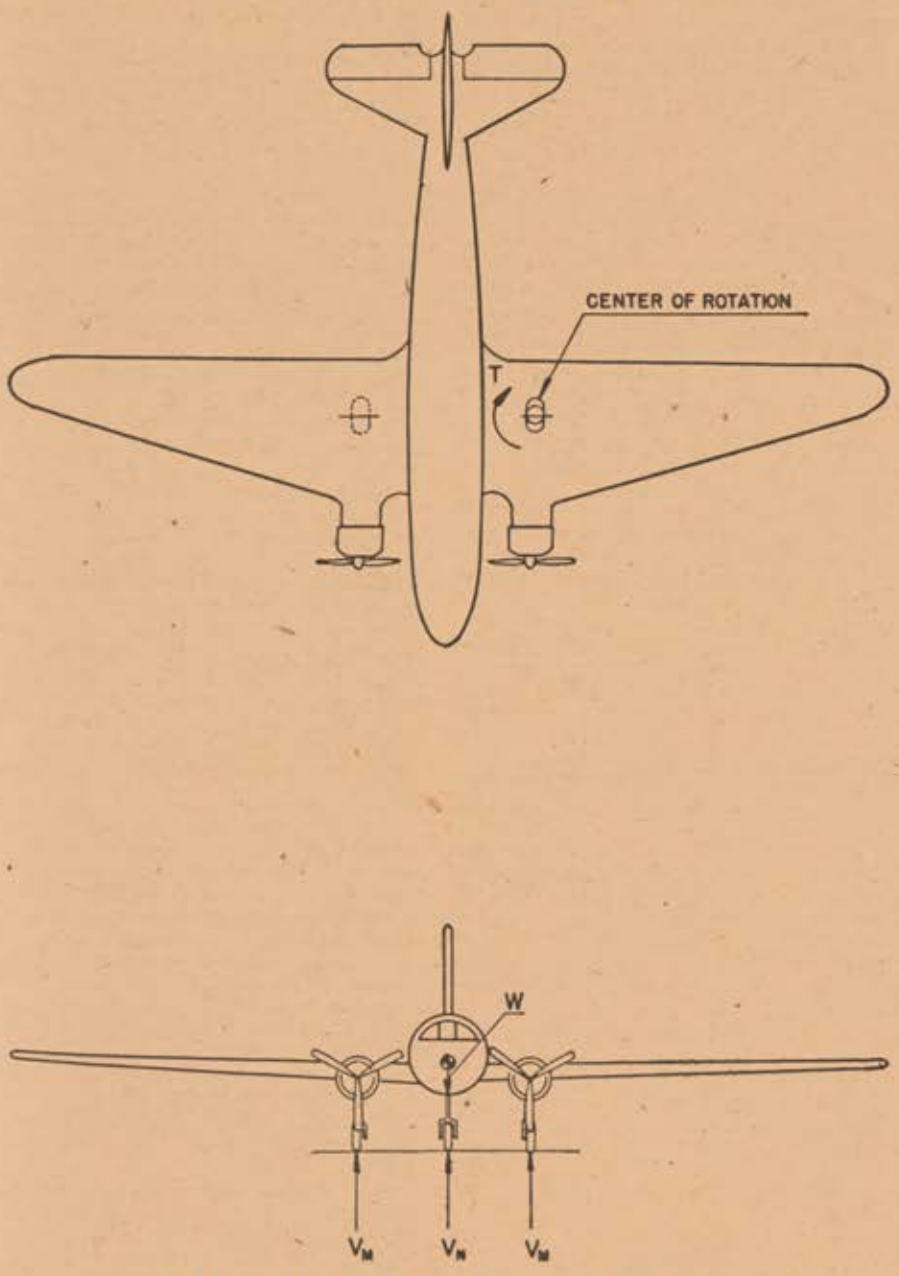
(2) *Magnitude of load.* The magnitude of the limit resultant water load shall be determined from the following equation:

$$P_b=\tfrac{1}{2}\ n_s W_e;$$

where:

P_b=the load in pounds,
n_s=the step landing load factor,
W_e=an effective weight assumed to be equal to one-half the design landing weight of the airplane.

(3) *Hull shear and bending loads.* The hull shear and bending loads shall be determined by appropriate consideration of the inertia loads which resist the linear and angular accelerations involved. To avoid excessive local shear



V_N AND V_M ARE STATIC GROUND REACTIONS. FOR TAIL WHEEL TYPE THE AIRPLANE IS IN THE THREE POINT ATTITUDE WITH STATIC LANDING GEAR REACTIONS PIVOTING ABOUT ONE MAIN LANDING GEAR UNIT.

FIGURE 4b–14—Pivoting, nose or tail wheel type.

loads, it shall be acceptable to distribute the water reaction over the hull bottom using pressures not less than those specified in § 4b.252 (d).

(c) *Stern loading condition*—(1) *Application of load.* The resultant water load shall be applied vertically in the plane of symmetry and shall be distributed over the hull bottom from the second step forward with an intensity equal to the pressures specified in § 4b.252 (d).

(2) *Magnitude of load.* The limit resultant load shall equal three-fourths of the design landing weight of the airplane.

(3) *Hull shear and bending loads.* The hull shear and bending loads shall be determined by assuming the hull structure to be supported at the wing attachment fittings and by neglecting internal inertia loads. This condition need not be applied to the fittings or to the portion of the hull ahead of the rear attachment fittings.

(d) *Side loading condition*—(1) *Application of load.* The resultant water load shall be applied in a vertical plane through the center of gravity. The vertical component shall be assumed to act in the plane of symmetry and the horizontol component at a point half-way between the bottom of the keel and the load water line at design landing weight (at rest).

(2) *Magnitude of load.* The limit vertical component of acceleration shall be 3.25, and the side component shall be equal to 15 percent of the vertical component.

(3) *Hull shear and bending loads.* The hull shear and bending loads shall be determined by appropriate consideration of the inertia loads or by introducing couples at the wing attachment points. To avoid excessive local shear loads, it shall be acceptable to distribute the water reaction over the hull bottom using pressures not less than those specifield by § 4b.252 (d).

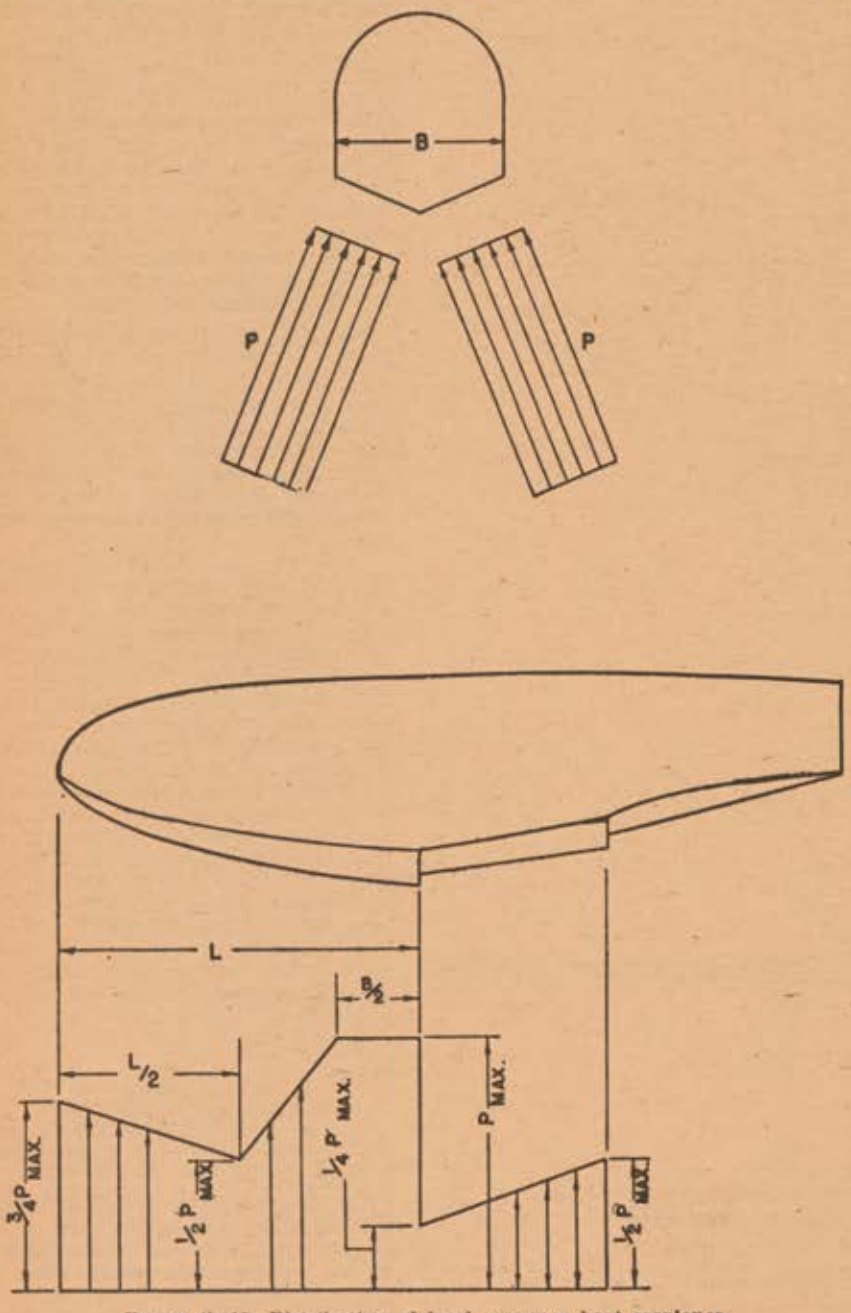


FIGURE 4b-15—Distribution of local pressures boat seaplanes.

§ 4b.254 *Float seaplane bottom pressures.* Main float seaplane bottoms shall be designed for the following:

(a) *Maximum local pressure.* The maximum value of the limit local pressure shall be as determined by the equation in § 4b.252 (a).

(b) *Variation in local pressure.* The local pressures to be applied to the float bottom shall vary in accordance with the following:

(1) A pressure of the value prescribed by paragraph (a) of this section shall be applied over the portion of the bottom lying between the main step and a section at 25 percent of the distance from the step to the bow.

(2) A pressure equal to one-half the value prescribed by paragraph (a) of this section shall be applied over the portion of the bottom lying between the section at 25 percent of the distance from the main step to the bow and a section at 75 percent of the distance from the main step to the bow.

(3) A pressure equal to 0.3 times the value prescribed by paragraph (a) of this section shall be applied over the portion of the bottom aft of the main step.

(c) *Application of local pressure.* The local pressures determined in paragraphs (a) and (b) of this section shall be applied over a local area in such a manner as to cause the maximum local loads in the float bottom structure.

(d) *Distributed bottom pressures.* For the purpose of designing frames, keels, and chine structure, distributed pressures equal to one-half of the values specified in paragraphs (a) and (b) of this section shall be applied simultaneously over the entire affected float bottom.

§ 4b.255 *Float seaplane landing conditions*—(a) *Landing with inclined reactions.* The vertical component of the limit load factor shall be 4.0, unless a lower value is shown by tests to be more applicable. The propeller axis (or equivalent reference line) shall be assumed horizontal. The resultant water reaction shall be assumed to act in the plane of symmetry and to pass through the center of gravity of the airplane inclined so that its horizontal component is equal to one-fourth of its vertical component. Inertia forces shall be assumed to act in a direction parallel to the water reaction.

(b) *Landing with vertical reactions.* The limit load factor shall be 4.0 acting vertically, unless a lower value is shown by tests to be more applicable. The propeller axis (or equivalent reference line) shall be assumed horizontal. The resultant water reaction shall be assumed to act vertically and to pass through the center of gravity of the airplane.

(c) *Landing with side load.* The vertical component of the limit load factor

shall be 4.0. The propeller axis (or equivalent reference line) shall be assumed horizontal. The resultant water reaction shall be assumed to act in a vertical plane which passes through the center of gravity of the airplane and which is perpendicular to the propeller axis. The vertical load shall be applied through the keel or keels of the float or floats and evenly divided between the floats, if twin floats are used. A side load equal to one-fourth of the vertical load shall be applied along a line approximately halfway between the bottom of the keel and the level of the water line at rest. When twin floats are used, the entire side load specified shall be applied to the float on the side from which the water reaction originates.

§ 4b.256 *Seaplane float loads.* Each float of a float seaplane shall be capable of carrying the following loads when supported at the attachment fittings as installed on the airplane.

(a) A limit load acting upward at the bow of the float equal to that portion of the airplane's weight which is normally supported by the float.

(b) A limit load acting upward at the stern of the float equal to 0.8 times that portion of the airplane's weight which is normally supported by the float.

(c) A limit load acting upward at the step of the float equal to 1.5 times that portion of the airplane's weight which is normally supported by the float.

§ 4b.257 *Wing tip float loads.* (a) Wing tip floats and their attachment, including the wing structure, shall be capable of carrying the following loads:

(1) A limit load acting upward through the completely submerged center of buoyancy of the float equal to three times the completely submerged displacement.

(2) A limit load inclined upward at 45° to the rear acting through the completely submerged center of buoyancy of the float equal to three times the completely submerged displacement.

(3) A limit load acting parallel to the water surface (laterally) applied at the center of area of the side view equal to 1.5 times the completely submerged displacement.

(b) The primary wing structure shall incorporate a sufficient strength margin to insure that failure of wing tip float attachment members occurs before the wing structure is damaged.

§ 4b.258 *Seawing loads.* Seawing design loads shall be based on appropriate test data.

Emergency Landing Conditions

§ 4b.260 *General.* The following requirements deal with emergency conditions of landing on land or water in which the safety of the occupants shall be considered, although it is accepted that parts of the airplane may be damaged.

(a) The structure shall be designed to give every reasonable probability that all of the occupants, if they make proper use of the seats, belts, and other provisions made in the design (see § 4b.358), will escape serious injury in the event of a minor crash landing (with wheels up if the airplane is equipped with retractable landing gear) in which the occupants experience the following ultimate inertia forces relative to the surrounding structure.

(1) Upward	2.0g	(Downward 4.5g)
(2) Forward	6.0g	
(3) Sideward	1.5g	

(b) The use of a lesser value of the downward inertia force specified in paragraph (a) of this section shall be allowed if it is shown that the airplane structure could absorb the landing shock corresponding with the design landing weight and an ultimate descent velocity of 5 f. p. s. without exceeding the value chosen.

(c) The specified inertia forces shall be applied to all items of mass which would be apt to injure the passengers or crew if they came adrift under such conditions, and the supporting structure shall be designed to restrain these items.

§ 4b.261 *Ditching provisions.* At the request of the applicant, the type certificate may include certifiction that adequate provision has been made for emergency landings during overwater flights.

(a) In order that landplanes may qualify for such a certification, satisfactory evidence must be submitted that all practicable measures compatible with the general characteristics of the type have been taken to minimize the change of any behavior of the airplane in an emergency landing on water which would be likely to cause immediate injury to the occupants or to make it impossible for them to escape from the airplane.

(b) In demonstrating compliance with the provisions of this section, the probable behavior of the airplane in a water landing shall be investigated by model tests or by comparison with airplanes of similar configuration for which the ditching characteristics are known.

(1) In making such tests or comparisons, proper consideration shall be given to scoops, flaps, projections, and all other factors likely to affect the hydrodynamic characteristics of the actual airplane.

(2) External doors and windows shall be designed to withstand the probable maximum local pressures, unless the effects of the collapse of such parts are taken into account in the model tests or airplane comparison.

(c) Airplanes which are to receive such certification shall also comply with provisions of § 4b.361.

(d) Where an airplane is certificated to include the ditching provisions specified in this section, the ditching procedures shall be set forth in the Airplane Flight Manual.

SUBPART D—DESIGN AND CONSTRUCTION

General

§ 4b.300 *Scope.* The airplane shall not incorporate design features or details which experience has shown to be hazardous or unreliable. The suitability of all questionable design details or parts shall be established by tests. Minimum tests required to prove the strength and proper functioning of particular parts are specified.

§ 4b.301 *Materials.* The suitability and durability of all materials used in the airplane structure shall be established on the basis of experience or tests. All materials used in the airplane structure shall conform to approved specifications which will insure their having the strength and other properties assumed in the design data.

§ 4b.302 *Fabrication methods.* The methods of fabrication employed in constructing the airplane structure shall be such as to produce a uniformly sound structure. When a fabrication process such as gluing, spot welding, or heat treating requires close control to attain this objective, the process shall be performed in accordance with an approved process specification.

§ 4b.303 *Standard fastenings.* All bolts, pins, screws, and rivets used in the structure shall be of an approved type. The use of an approved locking device or method is required for all such bolts, pins, and screws. Self-locking nuts shall not be used on bolts which are subject to rotation in operation.

§ 4b.304 *Protection.* (a) All members of the structure shall be suitably protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion, or other causes.

(b) Adequate provisions for ventilation and drainage of all parts of the structure shall be made.

(c) In seaplanes, special precautions shall be taken against corrosion from salt water, particularly where parts made from different metals are in close proximity. These precautions shall include the following:

(1) Unless otherwise protected, fittings, hinges, attachment bolts, etc., shall be covered with a corrosion-preventive material.

(2) Nonstainless cables, such as control cables, shall be covered with a corrosion-preventive material.

§ 4b.305 *Inspection provisions.* Means shall be provided to permit the close examination of such parts of the airplane as require periodic inspection, adjustments for proper alignment and functioning, and lubrication of moving parts.

§ 4b.306 *Material strength properties and design values.* (a) Material strength properties shall be based on a sufficient number of tests of material conforming to specifications to establish design values on a statistical basis.

(b) The design values shall be so chosen that the probability of any structure being understrength because of material variations is extremely remote.

(c) ANC–5a and ANC–18 values shall be used unless shown to be inapplicable in a particular case.[4]

[4] ANC–5a, "Strength of Aircraft Elements," and ANC–18, "Design of Wood Aircraft Structures," are published by the Army-Navy-Civil Committee on Aircraft Design Criteria and may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

(d) The structure shall be designed in so far as practicable, to avoid points of stress concentration where variable stresses above the fatigue limit are likely to occur in normal service.

§ 4b.307 *Design factors; general.* The following requirements shall be considered in the structural design.

(a) *Special factors.* Where there may be uncertainty concerning the actual strength of particular parts of the structure, or where the strength is likely to deteriorate in service prior to normal replacement, or where strength is subject to appreciable variability due to uncertainties in manufacturing processes and inspection methods, the factor of safety prescribed in § 4b.200 (a) shall be multiplied by a special factor to make the probability of any part being understrength from these causes extremely remote.

(b) *Casting factors.* (1) Where visual inspection only is to be employed, the casting factor shall be 2.0, except that it need not exceed 1.25 for bearing stresses.

(2) The casting factor may be reduced to 1.25 for ultimate loads and 1.15 for limit loads when at least three sample castings are tested to show compliance with these factors, and all sample and production castings are visually and radiographically inspected in accordance with an approved inspection specification.

(3) Other inspection procedures and casting factors shall be acceptable, if approved by the Administrator.

(c) *Bearing factors.* Bearing strength shall be provided for the following conditions (bearing factors need not be applied when covered by other special factors):

(1) Relative motion in operation. (Control surface and system joints are covered in §§ 4b.313, 4b.327, and 4b.329 (b).)

(2) Joints with clearance (free fit) subject to pounding or vibration.

(d) *Fitting factors.* (1) A fitting factor of at least 1.15 shall be used in the analysis of all fittings whose strength is not proven by limit and ultimate load tests in which the actual stress conditions are simulated in the fitting and the surrounding structure. This factor applies to all portions of the fittings, the means of attachment, and bearing on the members joined.

(2) In the case of integral fittings, the part shall be treated as a fitting up to the point where the section properties become typical of the member.

(3) The fitting factor need not be applied where a type of joint design based on comprehensive test data is used. The following are examples: continuous joints in metal plating, welded joints, and scarf joints in wood, all made in accordance with approved practices.

§ 4b.308 *Flutter and vibration prevention measures.* In all conditions of operation within the limit V–n envelope, the wings, tail surfaces, control surfaces, control systems, and other structural parts shall be free from flutter and dangerous vibration, including that resulting from gust impulses. In showing compliance with this requirement the following shall apply:

(a) Satisfactory analytical and/or experimental evidence shall be submitted to show that dangerous flutter conditions will not develop at any speed up to $1.2V_D$ selected in accordance with § 4b.210 (b) (5), except that the speed need not exceed the terminal velocity in a 30° dive.

(b) The airplane shall comply with the flight demonstration requirements specified in § 4b.190.

(c) The natural frequencies of all main structural components, control surfaces, and systems shall be determined by vibration tests or other reliable methods, and shall be shown to be within the range of values appropriate for the prevention of flutter.

(d) The mass balance of movable control surfaces shall be shown to preclude flutter.

(e) Control surface tabs not equipped with an irreversible actuating mechanism, as specified in § 4b.322, shall be properly mass balanced and shown by a rational flutter analysis or equivalent testing that they are free from flutter tendencies.

§ 4b.309 *Stiffness.* Wings and tail surfaces shall be shown to be free from aero-elastic divergence, and control surfaces to be free from reversal of effect, at all speeds up to 1.2 V_D selected in accordance with § 4b.210 (b) (5), except that the speed need not exceed the terminal velocity in a 30° dive. In showing compliance with this requirement, the torsional rigidity of wings and tail surfaces shall be determined by tests or other acceptable methods.

Control Surfaces

§ 4b.310 *General.* The requirements of §§ 4b.311 through 4b.313 shall apply to the design of the control surfaces.

§ 4b.311 *Proof of strength.* (a) Limit load tests shall be required to prove compliance with limit load requirements.

(b) Control surface tests shall include the horn or fitting to which the control system is attached.

(c) Analysis or individual load tests shall be conducted to demonstrate compliance with the multiplying factor requirements for control surface hinges as provided in § 4b.313 (a).

(d) Rigging loads due to wire bracing shall be taken into account in a rational or conservative manner.

(e) The end connections of brace wires shall be such as to minimize restraint against bending or vibration.

§ 4b.312 *Installation.* (a) Movable tail surfaces shall be so installed that there is no interference between the surfaces when each is held in its extreme position and all others are operated through their full angular movement.

(b) When an adjustable stabilizer is used, stops shall be provided which will limit its travel, in the event of failure of the adjusting mechanism, to a range equal to the maximum required to trim the airplane in accordance with § 4b.140.

§ 4b.313 *Hinges.* (a) Control surface hinges, excepting ball and roller bearings, shall incorporate a multiplying factor of not less than 6.67 with respect to the ultimate bearing strength of the softest material used as a bearing.

(b) For hinges incorporating ball or roller bearings, the approved rating of the bearing shall not be exceeded.

(c) Hinges shall provide sufficient strength and rigidity for loads parallel to the hinge line.

Control Systems

§ 4b.320 *General.* All controls shall operate with sufficient ease, smoothness, and positiveness to permit proper performance of their function. All controls shall be arranged and identified to provide convenience in operation and in a manner tending to prevent inadvertent operation.

§ 4b.321 *Two-control airplanes.* Two-control airplanes shall be capable of continuing safely in flight and landing in the event of failure of any one connecting element in the directional-lateral flight control system.

§ 4b.322 *Trimming controls.* (a) The trimming controls shall be conveniently located and each shall operate in the plane and with the sense of the motion of the airplane which its operation is intended to provide, as specified in § 4b.353.

(b) Proper precautions shall be taken against the possibility of inadvertent or abrupt tab operation.

(c) Means shall be provided adjacent to the control to indicate to the pilot the direction of the control movement relative to the airplane motion.

(d) Means shall be provided to indicate the position of the trim device with respect to the range of adjustment. The indicating device shall be clearly visible to the pilots and located to preclude the possibility of confusion.

(e) Trimming devices shall be capable of continued normal operation in the event of failure of any one connecting or transmitting element of the primary flight control system.

(f) Tab controls shall be irreversible, unless the tab is properly balanced and shown to be free from flutter.

(g) Irreversible tab systems shall provide rigidity and reliability in the portion of the system from the tab to the attachment of the irreversible unit to the airplane structure.

§ 4b.323 *Wing flap controls.* (a) The controls shall operate in a manner to permit the flight crew to place the flaps in any of the take-off, en route, approach, or landing positions established under § 4b.111, and to maintain these positions thereafter, without further attention on the part of the crew, except for flap movement produced by an automatic flap positioning or load limiting device.

(b) The flap control shall be located and designed to render improbable its inadvertent operation.

(c) The rate of motion of the flap in response to the operation of the pilot's control and the characteristics of the automatic flap positioning or load limiting device shall be such as to obtain satisfactory flight and performance characteristics under steady or changing con-

ditions of air speed, engine power, and airplane attitude.

(d) The flap control shall be designed to retract the flaps from the fully extended position during steady flight at maximum continuous engine power at all speeds less than V_F plus 10 m. p. h.

(e) Means shall be provided to indicate to the pilot the take-off, en route, approach, and landing flap positions.

(f) If any extension of the flaps beyond the landing position is possible, the flap control shall be clearly marked to identify such range of extension.

(g) Instructions for the proper operation of the wing flaps shall be included in the Airplane Flight Manual required by § 4b.740.

§ 4b.324 *Flap interconnection.* (a) The motion of flaps on opposite sides of the plane of symmetry shall be synchronized by a mechanical interconnection unless the airplane is demonstrated to have safe flight characteristics while the flaps are retracted on one side and extended on the other.

(b) Where an interconnection is used, it shall be designated to account for appropriate unsymmetrical loads, including those resulting from flight with the engines on one side of the plane of symmetry inoperative and the remaining engines at take-off power.

§ 4b.325 *Stops.* (a) All control systems shall be provided with stops which positively limit the range of motion of the control surfaces.

(b) Stops shall be so located in the system that wear, slackness, or take-up adjustments will not seriously affect the range of surface travel.

(c) Stops shall be capable of withstanding the loads corresponding with the design conditions for the control system.

§ 4b.326 *Control system locks.* If a device is provided for locking a control surface while the airplane is on the ground or water:

(a) The locking device shall provide unmistakable warning to the pilot when it is engaged.

(b) Means shall be provided to preclude the possibility of the lock becoming engaged during flight.

(c) Locks shall be designed for the ground gust conditions prescribed in § 4b.226.

§ 4b.327 *Static tests.* Tests shall be conducted on control systems to show compliance with limit load requirements in accordance with the following provisions:

(a) The direction of the test loads shall be such as to produce the most severe loading of the control system structure.

(b) The tests shall include all fittings, pulleys, and brackets used in attaching the control system to the main structure.

(c) Analyses or individual load tests shall be conducted to demonstrate compliance with the multiplying factor requirements specified for control system joints subjected to angular motion. (See § 4b.329 (b).)

§ 4b.328 *Operation tests.* An operation test shall be conducted for each control system by operating the controls from the pilot compartment with the entire system loaded to correspond with 80 percent of the limit load specified for the control system. In this test there shall be no jamming, excessive friction, or excessive deflection.

§ 4b.329 *Control system details; general.* All details of control systems shall be designed and installed to prevent jamming, chafing, and interference from cargo, passengers, and loose objects. Precautionary means shall be provided in the cockpit to prevent the entry of foreign objects into places where they might jam the control systems. Provisions shall be made to prevent the slapping of cables or tubes against other parts of the airplane.

(a) *Cable systems.* (1) Cables, cable fittings, turnbuckles, splices, and pulleys shall be of an approved type.

(2) Cables smaller than 1/8-inch diameter shall not be used in the aileron, elevator, or rudder systems.

(3) The design of cable systems shall be such that there will not be a hazardous change in cable tension throughout the range of travel under operating conditions and temperature variations.

(4) Pulley types and sizes shall correspond with the cables used.

(5) All pulleys shall be provided with satisfactory guards which shall be closely fitted to prevent the cables being misplaced or fouled.

(6) The pulleys shall lie in the plane passing through the cable within such limits that the cable does not rub against the pulley flange.

(7) Fairleads shall be so installed that they do not cause a change in cable direction of more than 3°.

(8) Clevis pins (excluding those not subject to load or motion) retained only by cotter pins shall not be used in the control system.

(9) Turnbuckles shall be attached to parts having angular motion in a manner to prevent positively any binding throughout the range of travel.

(10) Provision for visual inspection shall be made at all fairleads, pulleys, terminals, and turnbuckles.

(b) *Joints.* (1) Control system joints subjected to angular motion in push-pull systems, excepting ball and roller bearing systems, shall incorporate a multiplying factor of not less than 3.33 with respect to the ultimate bearing strength of the softest material used as a bearing.

(2) The factor specified in subparagraph (1) of this paragraph may be reduced to a value of 2.0 for joints in cable control systems.

(3) The approved rating of ball and roller bearings shall not be exceeded.

Landing Gear

§ 4b.330 *General.* The requirements of §§ 4b.331 through 4b.338 shall apply to the complete landing gear.

§ 4b.331 *Shock absorbers.* (a) The shock absorbing elements for the main, nose, and tail wheel units shall be substantiated by the tests specified in §§ 4b.332 and 4b.333.

(b) The shock absorbing ability of the landing gear in taxying shall be demonstrated by operational tests prescribed in § 4b.172.

§ 4b.332 *Landing gear tests.* The landing gear shall withstand the following tests.

(a) *Shock absorption tests.* (1) It shall be demonstrated by energy absorption tests that the limit load factors selected for design in accordance with § 4b.230 (b) for take-off and landing weights, respectively, will not be exceeded.

(2) In addition to the provisions of subparagraph (1) of this paragraph, a reserve of energy absorption shall be demonstrated by a test simulating an airplane descent velocity of 12 f. p. s. at design landing weight, assuming wing lift not greater than the airplane weight acting during the landing impact. In this test the landing gear shall not fail. (See paragraph (c) of this section.)

(b) *Limit drop tests.* (1) If compliance with the limit landing conditions specified in paragraph (a) (1) of this section is demonstrated by free drop tests, these shall be conducted on the complete airplane, or on units consisting of wheel, tire, and shock absorber in their proper relation. The free drop heights shall not be less than the following:

(i) 18.7 inches for the design landing weight conditions,

(ii) 6.7 inches for the design take-off weight conditions.

(2) If wing lift is simulated in free drop tests the landing gear shall be dropped with an effective mass equal to:

$$W_e = W\left(\frac{h+(1-L)\ d}{h+d}\right);$$

where:

W_e = the effective weight to be used in the drop test,

h = specified height of drop in inches,

d = deflection under impact of the tire (at the approved inflation pressure) plus the vertical component of the axle travel relative to the drop mass (the value of d used in the computation of W_e shall not exceed the value actually obtained in the drop test),

$W = W_M$ for main gear units, equal to the static weight on the particular unit with the airplane in the level attitude (with the nose wheel clear in the case of nose wheel type airplanes),

$W = W_T$ for tail gear units, equal to the static weight on the tail unit with the airplane in the tail-down attitude,

$W = W_N$ for nose wheel units, equal to the vertical component of the static reaction which would exist at the nose wheel, assuming the mass of the airplane acting at the center of gravity and exerting a force of 1.0g downward and 0.25g forward,

L = the ratio of the assumed wing lift to the airplane weight, not in excess of 0.667.

(3) The attitude in which a landing gear unit is drop tested shall simulate the airplane landing condition critical for the unit.

(c) *Reserve energy absorption drop tests.* (1) If compliance with the reserve energy absorption condition specified in § 4b.332 (a) (2) is demonstrated

by free drop tests, the landing gear units shall be dropped from a free drop height of not less than 27 inches.

(2) If wing lift equal to the airplane weight is simulated, the units shall be dropped with an effective mass equal to:

$$W_e = W\left(\frac{h}{h+d}\right);$$

where the symbols and other details are the same as in § 4b.332 (b) (2).

§ 4b.333 *Limit load factor determination.* (a) In determining the limit airplane inertia load factor n from the free drop tests specified in § 4b.332, the following formula shall be used:

$$n = n_j \frac{W_e}{W} + L;$$

where:

n_j = the load factor during impact developed on the mass used in the drop test (i. e., the acceleration dv/dt in g's recorded in the drop test plus 1.0) (see § 4b.332 (b) (2) for definition of W_e, W, and L).

(b) The value of n so determined shall not be greater than the limit load factor used in the landing conditions, § 4b.230 (b).

§ 4b.334 *Retracting mechanism*—(a) *General.* (1) The landing gear retracting mechanism and supporting structure shall be designed for the loads occurring in the flight conditions when the gear is in the retracted position, and for the combination of friction, inertia, brake torque, and air loads occurring during retraction and extension at any air speed up to 1.6 V_{s_1}, (flaps in the approach position at design landing weight) and any load factor up to those specified for the flaps extended condition, § 4b.212.

(2) The landing gear, the retracting mechanism, and the airplane structure including wheel well doors shall be designed to withstand the flight loads occurring with the landing gear in the extended position at any speed up to 0.67 V_C, unless other means are provided to decelerate the airplane in flight at this speed.

(b) *Landing gear lock.* A positive means shall be provided for the purpose of maintaining the landing gear in the extended position.

(c) *Emergency operation.* Emergency means of extending the landing gear shall be provided, so that the landing gear can be extended in the event of any reasonably probable failure in the normal retraction system. In any case the emergency system shall provide for the failure of any single source of hydraulic, electric, or equivalent energy supply.

(d) *Operation test.* Proper functioning of the landing gear retracting mechanism shall be demonstrated by operation tests.

(e) *Position indicator and warning device.* (1) When a retractable landing gear is used, means shall be provided for indicating to the pilot when the gear is secured in the extended and in the retracted position.

(2) In addition to the requirement of subparagraph (1) of this paragraph, landplanes shall be provided with an aural warning device which will function continuously when all throttles are closed if the gear is not fully extended and locked.

(3) If a manual shutoff for the warning device prescribed in subparagraph (2) of this paragraph is provided, it shall be installed so that reopening the throttles will reset the warning mechanism.

(f) *Control.* The location and operation of the landing gear retraction control shall be according to the provisions of § 4b.353.

§ 4b.335 *Wheels.* (a) Main landing gear wheels (i. e. those nearest the airplane center of gravity) shall be of a type approved in accordance with Part 15 of this chapter.

(b) The rated static load of each main wheel shall not be less than the design take-off weight of the airplane divided by the number of main wheels.

(c) Nose wheels shall be tested in accordance with Part 15 of this chapter for an ultimate radial load not less than the maximum nose wheel ultimate loads obtained in the ground loads requirements and for the corresponding side and burst loads.

§ 4b.336 *Tires.* (a) Landing gear tires shall be of a proper fit on the rim of the wheel, and their approved rating shall be such that it is not exceeded under the following conditions:

(1) Airplane weight equal to the design take-off weight.

(2) Load on main wheel tires equal to the airplane weight divided by the number of main wheels.

(3) Load on nose wheel tires (to be compared with the dynamic rating established for such tires) equal to the reaction obtained at the nose wheel, assuming the mass of the airplane concentrated at the center of gravity and exerting a force of 1.0g downward and 0.31g forward, the reactions being distributed to the nose and main wheels by the principles of statics with the drag reaction at the ground applied only at those wheels having brakes.

(b) When specially constructed tires are used, the wheels shall be plainly and conspicuously marked to that effect. Such markings shall include the make, size, number of plies, and identification marking of the proper tire.

§ 4b.337 *Brakes*—(a) *General.* (1) All airplanes shall be equipped with approved brakes.

(2) The brake system shall be so designed and constructed that in the event of a single failure in any connection or transmitting element in the brake system (excluding the operating pedal or handle) or the loss of any single source of hydraulic or other brake operating energy supply, it shall be possible to bring the airplane to rest under conditions specified in § 4b.122 with a mean deceleration during the landing roll of at least 50 percent of that obtained in determning the landing distance as prescribed in that section.

(3) In applying the requirement of subparagraph (2) of this paragraph to hydraulic brakes, the brake drum, shoes, and actuators (or their equivalents) shall be considered as connecting or transmitting elements, unless it is shown that the leakage of hydraulic fluid resulting from failure of the sealing elements in these units would not reduce the braking effectiveness below that specified in subparagraph (2) of this paragraph.

(b) *Brake controls.* Brake controls shall not require excessive control forces in their operation.

(c) *Parking brake controls.* A parking brake control shall be provided and so installed that it may be set by the pilot and, without further attention, will maintain sufficient braking to prevent the airplane from rolling on a paved, level runway while take-off power on the critical engine is being applied.

§ 4b.338 *Skis.* Skis shall be of an approved type. The approved rating of the skis shall not be less than the maximum take-off weight of the airplane.

(a) *Installation.* In addition to any shock cords installed, front and rear check cables shall be provided on skis which are not equipped with special stabilizing devices.

(b) *Tests.* It shall be demonstrated that the airplane has safe landing and taxying characteristics, and that the airplane's flight characteristics are not impaired by the installation of the skis.

Hulls and Floats

§ 4b.340 *General.* The requirements of §§ 4b.341 and 4b.342 shall apply to the design of hulls and floats.

§ 4b.341 *Buoyancy (main seaplane floats).* (a) Main seaplane floats shall have a buoyancy in excess of that required to support the maximum weight of the airplane in fresh water as follows:

(1) 80 percent in the case of single floats,

(2) 90 percent in the case of double floats.

(b) Each main seaplane float shall contain at least 5 watertight compartments of approximately equal volume.

§ 4b.342 *Buoyancy (boat seaplanes).* (a) The hulls of boat seaplanes and amphibians shall be divided into watertight compartments so that with any 2 adjacent compartments flooded the hull and auxiliary floats (and wheel tires, if used) will retain sufficient buoyancy to support the maximum weight of the aircraft in fresh water without capsizing.

(b) For the purpose of communication between compartments, bulkheads with watertight doors shall be allowed.

Personnel and Cargo Accommodations

§ 4b.350 *Pilot compartment; general.* (a) The arrangement of the pilot compartment and its appurtenances shall provide a satisfactory degree of safety and assurance that the pilot will be able to perform all his duties and operate the controls in the correct manner without unreasonable concentration and fatigue.

(b) The primary flight controls listed on figure 4b–16, excluding cables and control rods, shall be so located with respect to the propellers that no portion of the pilot or the controls lies in the region between the plane of rotation of any inboard propeller and the surface generated by a line passing through the center of the propeller hub and making

an angle of 5° forward or aft of the plane of rotation of the propeller.

Controls	Movement and actuation
Primary	
Aileron	Right (clockwise) for right wing down.
Elevator	Rearward for nose up.
Rudder	Right pedal forward for nose right.
Secondary	
Flaps (or auxiliary lift devices).	Down to extend.
Trim tabs (or equivalent).	Rotate to produce similar rotation of the airplane about an axis parallel to the axis of the control.

FIGURE 4b-16—Aerodynamic controls.

(c) When a second pilot is required for particular operations by the operating parts of the Civil Air Regulations, the airplane shall be controllable with equal safety from both seats.

(d) The pilot compartment shall be constructed to prevent leakage likely to be distracting to the crew or harmful to the structure when flying in rain or snow.

(e) A door shall be provided between the pilot compartment and the passenger compartment.

(f) The door prescribed in paragraph (e) of this section shall be equipped with a locking means to prevent passengers from opening the door without the pilot's permission.

(g) Vibration and noise characteristics of cockpit appurtenances shall not interfere with the safe operation of the airplane.

§ 4b.351 *Pilot compartment vision*—(a) *Nonprecipitation conditions.* (1) The pilot compartment shall be arranged to afford the pilots a sufficiently extensive, clear, and undistorted view to perform safely all maneuvers within the operating limitations of the airplane, including taxying, take-off, approach, and landing.

(2) It shall be demonstrated by day and night flight tests that the pilot compartment is free of glare and reflections which would tend to interfere with the pilots' vision.

(b) *Precipitation conditions.* (1) Means shall be provided for maintaining a sufficient portion of the windshield clear so that at least the first pilot is afforded a sufficiently extensive view along the flight path in all normal flight attitudes of the airplane. Such means shall be designed to function under the following conditions without continuous attention on the part of the crew:

(i) In heavy rain at speeds up to 1.6 V_{s_1}, flaps retracted,

(ii) In the most severe icing conditions for which approval of the airplane is desired.

(2) In addition to the means prescribed in subparagraph (1) of this paragraph at least the first pilot shall be provided with a window which, when the cabin is not pressurized, is openable under the conditions prescribed in subparagraph (1), and which provides the view specified in that subparagraph. The design shall be such that when the window is opened sufficient protection from the elements will be provided against the impairment of the pilot's vision.

§ 4b.352 *Pilot windshield and windows.* (a) All internal glass panes shall be of a nonsplintering safety type.

(b) The windshield, its supporting structure, and other structure in front of the pilots shall have sufficient strength to withstand without penetration the impact of a four-pound bird when the relative velocity of the bird to the airplane along the flight path of the latter is equal to the value of V_C at sea level selected in accordance with § 4b.210 (b) (4).

§ 4b.353 *Controls.* (a) All cockpit controls shall be located and identified (except those the function of which is obvious) to provide convenience in operation and in a manner tending to prevent inadvertent operation. The direction of movement of aerodynamic and certain powerplant, accessories, and auxiliary controls shall be according to figures 4b–16 and 4b–17. Wherever practicable the sense of motion involved in the operation of other controls shall correspond with the sense of the effect of the operation upon the airplane or upon the part operated.

Controls	Movement and actuation
Powerplant	
Throttles	Forward to increase power.
Propellers	Forward to increase r. p. m.
Mixture	Forward for rich.
Carburetor air heat	Forward for cold.
Auxiliary	
Landing gear	Down to extend.

FIGURE 4b-17—Powerplant and auxiliary controls.

(b) The controls shall be so located and arranged with respect to the pilots' seats that there exists full and unrestricted movement of each control without interference from either the cockpit structure or the pilots' clothing when seated. This shall be demonstrated for individuals ranging from 5'2" to 6'0" in height.

(c) Identical powerplant controls for each engine shall be located to prevent any misleading impression as to the engine to which they relate.

(d) The wing flap (or auxiliary lift device) control and the landing gear control shall be separated sufficiently to prevent inadvertent operation.

§ 4b.354 *Instrument arrangement.* (See § 4b.611.)

§ 4b.355 *Instrument marking.* (The operational markings, instructions, and placards required for the instruments, controls, etc., are specified in §§ 4b.730 through 4b.738.)

§ 4b.356 *Doors.* (a) Airplane cabins shall be provided with at least one easily accessible external main door.

(b) It shall be possible to open external doors from either inside or outside by the operation of only one handle inside or one handle outside even though persons may be crowding against the door from the inside. The means of opening shall be simple and obvious and shall be so arranged and marked that it can be readily located and operated, even in darkness.

(c) Reasonable provisions shall be made to prevent the jamming of any external door as a result of fuselage deformation in a minor crash.

(d) External doors shall be so located that persons using them will not be endangered by the propellers, when appropriate operating procedures are employed.

§ 4b.357 *Door louvres.* Where internal doors are equipped with louvres or other ventilating means, provision convenient to the crew shall be made for stopping the flow of air through the door when such action is found necessary.

§ 4b.358 *Seats, berths, and safety belts*—(a) *Arrangement.* At all stations designated as occupiable during take-off and landing, the seats, berths, belts, harnesses, and adjacent parts of the airplane shall be arranged so that a person making proper use of these facilities will not suffer serious injury in the emergency landing conditions of § 4b.260 (a).

(1) Passengers and crew shall be afforded protection from head injuries by one of the following or equivalent means:

(i) Safety belt and shoulder harness which will prevent the head from contacting any injurious object,

(ii) Safety belt and the elimination of all injurious objects within striking radius of the head in a fore and aft direction,

(iii) Safety belt and a cushioned rest which will support the arms, shoulders, head, and spine.

(2) For arrangements which do not provide a firm hand hold on seat backs, hand grips or rails shall be provided along aisles to enable passengers or crew members to steady themselves while using the aisles in moderately rough air.

(3) All projecting objects which would be apt to cause injury to persons seated or moving about the airplane in normal flight shall be padded.

(b) *Strength.* (1) All seats, berths, and supporting structure shall be designed for an occupant weighing at least 170 lbs. and for critical loads resulting from all specified flight load conditions.

(2) All seats and berths designated as occupiable during landing and take-off, and their supporting structure, shall be designed for the loads resulting from all specified ground load conditions including the emergency landing conditions of § 4b.260. Reactions from safety belts and harnesses shall be taken into account.

(3) Pilots' seats shall be designed for the reactions resulting from application of the pilot forces to the flight controls as prescribed in § 4b.224.

§ 4b.359 *Cargo and baggage compartments.* (a) Each cargo and baggage compartment shall be designed for the placarded maximum weight of contents and critical load distributions at the appropriate maximum load factors corresponding with all specified flight and ground load conditions, excluding the emergency landing conditions of § 4b.260.

(b) Provisions shall be made to prevent the contents in the compartments

from becoming a hazard by shifting under the loads specified in paragraph (a) of this section.

(c) Provisions shall be made to protect the passengers and crew from injury by the contents of any compartment when the ultimate inertia force acting forward is 6g.

Emergency Provisions

§ 4b.360 *General.* The requirements of §§ 4b.361 and 4b.362 shall apply to the emergency provisions.

§ 4b.361 *Flotation.* (a) When certification of ditching provisions is desired by the applicant under the provisions of § 4b.261, evidence shall be submitted to prove that there is every reasonable probability that the airplane, after landing in the water, will remain afloat, as follows:

(1) In the case of airplanes equipped with life rafts having capacity for all persons aboard the airplane, the floatation time and trim will permit all occupants to leave their ditching stations and occupy the rafts.

(2) In the case of airplanes not equipped with life rafts having capacity for all persons aboard the airplane, the airplane will float indefinitely with sufficient compartments above the water line to accommodate all persons aboard the airplane.

(b) Compliance with the requirements of paragraph (a) of this section may be demonstrated by buoyancy and trim computations in which suitable allowances are made for probable structural damage and leakage. For airplanes equipped with fuel dump valves, the volume of fuel which could be dumped may be considered as buoyancy volume.

§ 4b.362 *Emergency exists.* Passenger and crew compartments designated as occupiable during take-off and landing shall be provided with emergency exits as prescribed in the following paragraphs. Individual compartments shall be considered as those closed spaces to which normal access is by a door, passageway, or stair, any of which might restrict rapid evacuation of the airplane.

(a) *Evacuation.* In case of question concerning the adequacy of emergency exists, it shall be demonstrated that the airplane can be completely evacuated in 30 seconds, or in a time equal to one second per occupant, whichever is greater, under conditions simulating a forced landing. The following shall be observed during the demonstration:

(1) The maximum number of persons for whom seats are provided shall participate in the demonstration.

(2) The persons demonstrating the evacuation procedure shall not be briefed more than once prior to the official demonstration.

(b) *Number of exits.* (1) The minimum number of exists per compartment shall be as follows:

Number of persons for whom seats are provided	*Minimum number of exits required*
5 or less	1
More than 5, but not more than 15	2
More than 15, but not more than 22	3
More than 22, but not more than 29	4
More than 29, but not more than 36	5

(2) Where the number of persons for whom seats are provided exceeds 36, 1 exit per 8 persons shall be the minimum required.

(3) The external main door specified in § 4b.356 shall be considered as one emergency exit if it meets the detail requirements of paragraph (c).

(4) The number of exits in any one compartment need not exceed 4 if an adjacent compartment can be reached through a passageway without a door and if the total number of exists in the 2 compartments equals 1 exit per 8 passengers. Deviation from these numbers shall be allowed if it is demonstrated that the airplane can be evacuated within the time specified in paragraph (a) of this section.

(c) *Exit arrangement.* (1) Emergency exits shall be located to give the maximum likelihood that they will be usable in an emergency landing with wheels up.

(2) When certification of ditching provisions is desired by the applicant, it shall be shown that at least one emergency exit for every 16 passengers is located above the water line.

(3) In airplanes for which two or more emergency exits are required, the ratio of the number of exits on either side of the airplane to the total number required shall be not less than 1:3. At least one exit on the opposite side from the external main door shall be operable from the outside and shall be marked accordingly for the guidance of rescue personnel.

(4) The emergency exits shall be readily accessible, shall not require exceptional agility of a person using them, and shall be distributed so as to facilitate evacuation without crowding.

(5) Each emergency exit shall provide a clear and unobstructed opening to the outside, the minimum dimensions of which shall be such that a 19 by 26 inch ellipse can be inscribed therein.

(6) Reasonable provisions shall be made against the jamming of emergency exits as a result of fuselage deformation.

(7) The method of opening of emergency exits shall be simple and obvious. (See § 4b.738 (c).)

(8) The proper functioning of emergency exits shall be demonstrated by test.

(9) For all landplane emergency exits which are more than 10 feet from the ground with the airplane on the ground and wheels retracted, suitable means shall be provided by which the occupants can safely descend to the ground.

Ventilation, Heating, and Pressurization

§ 4b.370 *General.* The requirements of §§ 4b.371 through 4b.376 shall apply to the ventilation, heating, and pressurization of the aircraft.

§ 4b.371 *Ventilation.* (a) All passenger and crew compartments shall be suitably ventilated.

(b) Provision shall be made to prevent carbon monoxide concentration in excess of one part in 20,000 parts of air.

(c) Provision shall be made to exclude fuel fumes.

(d) Where partitions between compartments are equipped with louvres or other means allowing air to flow between such compartments, provision convenient to the crew shall be made for stopping the flow of air through the louvres or other means when such action is found necessary.

§ 4b.372 *Combustion heaters.* Gasoline combustion heater installations shall comply with applicable parts of the powerplant installation requirements pertaining to fire prevention. All pertinent requirements concerning fuel tanks, lines, and exhaust systems shall be applicable.

§ 4b.373 *Pressure cabins — general.* The design of the pressure cabins shall comply with the requirements of §§ 4b.374 through 4b.376. (See § 4b.216 (c) for strength requirements.)

§ 4b.374 *Pressure supply.* If cabin pressurization is to be used, the pressure supply shall be capable of maintaining a cabin pressure corresponding with an altitude of not more than 10,000 feet in standard atmosphere when the airplane's flight altitude is the maximum for which certification is desired.

§ 4b.375 *Pressure control.* Pressure cabins shall be provided with at least the following valves, controls, and indicators for controlling cabin pressure.

(a) At least two pressure relief valves, one or both of which may be the normal regulating valve, shall be installed to limit automatically the positive pressure differential to a predetermined value at the maximum rate of flow delivered by the pressure source. The combined capacity of the relief valves shall be such that the failure of any one valve would not cause an appreciable rise in the pressure differential. The pressure differential shall be considered positive when the internal pressure is greater than the external.

(b) At least one reverse pressure differential relief valve (or equivalent) shall be installed to prevent automatically a negative pressure differential which would damage the structure.

(c) Means shall be provided by which the pressure differential can be rapidly equalized.

(d) An automatic or manual regulator for controlling the intake and/or exhaust air flow shall be installed so that the required internal pressures and air flow rates can be maintained.

(e) Instruments shall be provided at an appropriate crew station showing the pressure differential, the absolute pressure in the cabin, and the rate of change of the absolute pressure.

(f) Warning indication shall be provided at an appropriate crew station to indicate when the safe or preset limits on pressure differential and absolute cabin pressure are exceeded.

(g) If the structure is not designed for pressure differentials up to the maximum relief valve setting in combination with landing loads (see § 4b.216 (c)), a suitable warning placard shall be placed at an appropriate crew station.

§ 4b.376 *Tests.* The complete pressurized cabin, including doors, windows, and all valves, shall be tested as a pressure vessel for the pressure differential specified in § 4b.216 (c). The following

functional tests shall be performed up to the working pressures:

(a) Functional and capacity tests of the positive and negative pressure differential relief valves and the emergency release valve, simulating the condition of regulator valves closed;

(b) Tests showing that all parts of the pressurization system will function properly under all possible conditions of pressure, temperature, and moisture up to the maximum altitude for which certification is desired;

(c) Flight tests demonstrating the performance of the pressure supply, pressure and flow regulators, indicators, and warning signals in steady and stepped climbs and descents at rates corresponding with the maximum attainable without exceeding the operating limitations of the airplane, up to the maximum altitude for which certification is desired;

(d) Tests showing that all doors and emergency exits operate properly after being subjected to the tests specified in paragraph (c) of this section.

Fire Prevention

§ 4b.380 *General.* Compliance shall be shown with the fire prevention requirements of §§ 4b.381 through 4b.384.

§ 4b.381 *Cabin interiors.* All compartments occupied or used by the crew or passengers shall comply with the following provisions.

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

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

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

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

§ 4b.382 *Cargo and baggage compartments.* (a) Cargo and baggage compartments shall include no controls, wiring, lines, equipment, or accessories the damage or failure of which would affect the safe operation of the airplane, unless such items are adequately shielded, isolated, or otherwise protected so that they cannot be damaged by movement of cargo in the compartment, and so that any breakage or failure of such item will not create a fire hazard.

(b) Provision shall be made to prevent cargo or baggage from interfering with the functioning of the fire-protective features of the compartment.

(c) All materials used in the construction of cargo or baggage compartments, including tie-down equipment, shall be flame-resistant.

§ 4b.383 *Cargo compartment classification.* All cargo and baggage compartments shall include provisions for safeguarding against fires according to the following classifications:

(a) *"A" category.* Cargo and baggage compartments shall be classified in the "A" category, if the presence of a possible fire therein would be easily discernible to a member of the crew while at his station, and if all parts of the compartment are easily accessible in flight. A hand fire extinguisher shall be available for each compartment.

(b) *"B" category.* Cargo and baggage compartments shall be classified in the "B" category, if sufficient access is provided while in flight to enable a member of the crew to move by hand all contents and to reach effectively all parts of the compartment with a hand fire extinguisher. Compliance shall be shown with the following:

(1) The design of the compartment shall be such that, when the access provisions are being used, no hazardous quantity of smoke, flames, or extinguishing agent will enter any compartment occupied by the crew or passengers.

(2) Each compartment shall be equipped with a separate system of an approved type smoke detector or fire detector other than a heat detector to give warning at the pilot or flight engineer station.

(3) Hand fire extinguishers shall be readily available for use in each compartment.

(4) The compartment shall be completely lined with fire-resistant material, except that additional service lining of flame-resistant material may be employed.

(c) *"C" category.* Cargo and baggage compartments shall be classified in the "C" category, if they do not conform to the prerequisites for the "A" or "B" categories. Compliance shall be shown with the following.

(1) Each compartment shall be equipped with:

(i) A separate system of an approved type smoke detector or fire detector other than heat detector to give warning at the pilot or flight engineer station;

(ii) An approved built-in fire-extinguishing system controlled from the pilot or flight engineer station.

(2) Means shall be provided to exclude hazardous quantities of smoke, flames, or extinguishing agent from entering into any compartment occupied by the crew or passengers.

(3) Ventilation and drafts shall be controlled within each compartment so that the extinguishing agent provided can control any fire which may start within the compartment.

(4) The compartment shall be completely lined with fire-resistant material, except that additional service lining of flame-resistant material may be employed.

§ 4b.384 *Proof of compliance.* (a) Compliance with those provisions of paragraphs (a) and (b) of § 4b.383 which refer to the compartment accessibility, the entry of hazardous quantities of smoke or extinguishing agent into compartments occupied by the crew or passengers, and the dissipation of the extinguishing agent in category "C" compartments shall be demonstrated by tests in flight.

(b) It shall also be demonstrated during the tests prescribed in paragraph (a) of this section that no inadvertent operation of smoke or fire detectors in adjacent or other compartments within the airplane would occur as a result of fire contained in any one compartment, either during or after extinguishment, unless the extinguishing system floods such compartments simultaneously.

Miscellaneous

§ 4b.390 *Reinforcement near propellers.* Surfaces near propeller tips shall have sufficient strength and stiffness to withstand the effects of the induced vibration and of ice thrown from the propeller. Windows shall not be located in this area unless shown capable of withstanding the most severe ice impact likely to occur.

§ 4b.391 *Leveling marks.* Reference marks shall be provided for use in leveling the airplane when making weight and balance determinations on the ground.

SUBPART E—POWERPLANT INSTALLATION (RECIPROCATING ENGINES)

General

§ 4b.400 *Scope.* (a) The powerplant installation shall be considered to include all components of the airplane which are necessary for its propulsion. It shall also be considered to include all components which affect the control of the major propulsive units or which affect their safety of operation between normal inspections or overhaul periods. (See §§ 4b.604 and 4b.613 for instrument installation and marking.)

(b) All components of the powerplant installation shall be constructed, arranged, and installed in such a manner as will assure their continued safe operation between normal inspections or overhaul periods.

(c) Accessibility shall be provided to permit such inspection and maintenance as is necessary to assure continued airworthiness.

(d) Electrical interconnections shall be provided to prevent the existence of differences of potential between major components of the powerplant installation and other portions of the airplane.

§ 4b.401 *Engines*—(a) *Type certification.* All engines shall be type certificated in accordance with the provisions of Part 13 of the Civil Air Regulations.

(b) *Engine isolation.* The engines shall be so isolated, each from the other, that the failure or malfunctioning of any one engine, or any part of the powerplant installation serving any one engine, will not prevent the safe operation of the remaining engine or engines.

(c) *Control of engine rotation.* Means shall be provided for stopping and restarting the rotation of any engine individually in flight. All components provided for this purpose which are located on the engine side of the fire wall and which might be exposed to fire, shall be of fire resistant construction. (See also § 4b.449.)

§ 4b.402 *Propellers.* Propellers shall be type certificated in accordance with the provisions of Part 14 of the Civil Air Regulations. The maximum propeller shaft rotational speed and the engine power permissible for use in the airplane

shall not exceed the corresponding limits for which the propeller has been certificated.

§ 4b.403 *Propeller vibration.* The magnitude of the propeller blade vibration stresses under all normal conditions of operation shall be determined by actual measurement or by comparison with similar installations for which such measurements have been made. The vibration stresses thus determined shall not exceed values which have been demonstrated to be safe for continuous operation.

§ 4b.404 *Propeller pitch and speed limitations.* (a) The propeller pitch and speed shall be limited to values which will assure safe operation under all normal conditions and which will assure compliance with the performance requirements specified in §§ 4b.110 through 4b.125.

(b) A propeller speed limiting means shall be provided at the governor. Such means shall be set to limit the maximum possible governed engine speed to a value not exceeding the maximum permissible r. p. m.

(c) The low pitch blade stop in the propeller, or other means used to limit the low pitch position, shall be set so that the propeller speed does not exceed 103 percent of the maximum permissible engine r. p. m. under the following conditions:

(1) Propeller blades at the low pitch limit and governor inoperative;

(2) Engine operating at take-off manifold pressure with the airplane stationary under standard atmospheric conditions.

§ 4b.405 *Propeller clearance.* With the airplane loaded to the maximum weight and at the most adverse center of gravity position and the propellers in the most adverse pitch position, the propeller clearances shall not be less than the following, unless smaller clearances are substantiated for the particular design involved.

(a) *Ground.* Seven inches of clearance (for airplanes equipped with nosewheel type landing gears) or 9 inches of clearance (for airplanes equipped with tail-wheel type landing gears) shall be provided with the landing gear statically deflected and the airplane in the level, normal take-off, or taxying attitude, whichever is most critical. In addition, there shall be positive clearance between the propeller and the ground when, with the airplane in the level take-off attitude, the critical tire is completely deflated and the corresponding landing gear strut is completely bottomed.

(b) *Water.* A minimum clearance of 18 inches shall be provided unless compliance with § 4b.181 can be demonstrated with less clearance.

(c) *Structure.* (1) One inch radial clearance shall be provided between the blade tips and the airplane structure, or whatever additional radial clearance is necessary to preclude harmful vibration of the propeller or airplane.

(2) One-half inch longitudinal clearance shall be provided between the propeller blades or cuffs and stationary portions of the airplane.

(3) Positive clearance shall be provided between other rotating portions of the propeller or spinner and stationary portions of the airplane.

§ 4b.406 *Propeller de-icing provisions.* (a) Airplanes intended for operation under atmospheric conditions conducive to the formation of propeller ice shall be provided with means for the prevention and removal of such ice accumulations.

(b) If combustible fluid is used for propeller de-icing, the provisions of §§ 4b.480 through 4b.483, inclusive, shall be complied with.

Fuel System Operation and Arrangement

§ 4b.410 *General.* (a) The fuel system shall be constructed and arranged in such a manner as to assure a flow of fuel to each engine at a rate and pressure which have been established for proper engine functioning under all normal conditions, including all maneuvers for which the airplane is intended. (For fuel system instruments see § 4b.604.)

(b) The fuel system shall be so arranged that no one fuel pump can draw fuel from more than one tank at a time unless means are provided to prevent introducing air into the system.

§ 4b.411 *Fuel system independence.* The fuel system shall be arranged to permit operation in such a manner that the failure of any one component will not result in the irrecoverable loss of power of more than one engine.

§ 4b.412 *Pressure cross-feed arrangements.* (a) Pressure cross-feed lines shall not pass through portions of the airplane intended to carry personnel or cargo, unless means are provided to permit the flight personnel to shut off the supply of fuel to these lines, or unless the lines are enclosed in a fuelproof and fumeproof shroud which is ventilated and drained to the exterior of the airplane.

(b) The shrouds specified in paragraph (a) of this section need not be used if the lines incorporate no fittings within the personnel or cargo areas and if they are suitably routed or protected to safeguard against accidental damage.

(c) Lines which can be isolated from the remainder of the fuel system by means of valves at each end shall incorporate provisions for the relief of excessive pressures which may result from exposure of the isolated line to high ambient temperatures.

§ 4b.413 *Fuel flow rate.* (a) The ability of the fuel system to provide the required fuel flow rate shall be demonstrated when the airplane is in the attitude which represents the most adverse condition from the standpoint of fuel feed which the airplane is designed to attain. The following shall be considered in this respect:

(1) The normal ground attitude,

(2) Climb with take-off flaps, landing gear up, using take-off power, at speed V_2 as determined in § 4b.114 (b) at landing weight,

(3) Level flight at maximum continuous power or the power required for level flight at V_C, whichever is less,

(4) The attitude of glide at a speed of 1.3 V_{s_0}, at landing weight.

(b) During the test prescribed in paragraph (a) of this section, fuel shall be delivered to the engine at a pressure not less than the minimum established for proper engine operation. In addition the following shall be met.

(1) The quantity of fuel in the tank being tested shall not exceed the amount established as the unusable fuel supply for that tank, as determined by demonstration of compliance with the provisions of § 4b.416 (see also §§ 4b.420 and 4b.613 (c)), together with whatever minimum quantity of fuel it may be necessary to add for the purpose of conducting the flow test.

(2) If a fuel flowmeter is provided, the meter shall be blocked during the flow test and the fuel shall flow through the meter by-pass.

(c) The test prescribed in paragraph (a) of this section may be demonstrated by a ground test on the airplane or on a representative mock-up of the fuel system.

§ 4b.414 *Pump systems.* (a) The fuel flow rate for pump systems (main and reserve supply) shall be 0.9 pound per hour for each take-off horsepower or 125 percent of the actual take-off fuel consumption of the engine, whichever is greater.

(b) The fuel flow rate specified in paragraph (a) of this section shall be applicable to both the primary engine-driven pump and to emergency pumps. It shall be available when the pump is running at the speed at which it would normally be operating during take-off. In the case of hand operated pumps, the speed shall be considered to be not more than 60 complete cycles (120 single strokes) per minute.

§ 4b.415 *Transfer systems.* The provisions of § 4b.414 shall also apply to transfer systems, except that the required fuel flow rate for the engine or engines involved shall be established upon the basis of maximum continuous power and its corresponding speed instead of take-off power and its corresponding speed.

§ 4b.416 *Determination of unusable fuel supply and fuel system operation on low fuel.* (a) Upon presentation of the airplane for test, the applicant shall select the quantity of fuel with which to demonstrate compliance with this provision. He shall indicate which of the conditions specified in paragraph (b) of this section are most likely to be critical from the standpoint of establishing the unusable fuel supply and the order in which the other conditions may be critical.

(b) The ususable fuel supply for each tank used for take-off and landing shall be established as not less than the quantity at which the first evidence of malfunctioning occurs under the following conditions: (See § 4b.420.)

(1) Level flight at maximum continuous power or at the power required for level flight at V_C, whichever is less;

(2) Climb with take-off flaps and landing gear up, using take-off power, at speed V_2 as determined in § 4b.114 (b), at landing weight;

(3) Rapid application of maximum continuous power and subsequent transition to climb at speed V_2, with retraction of flaps and landing gear, from a power-off glide at 1.3 V_{s_0}, with flaps and landing gear down, at landing weight.

(c) If an engine can be supplied with fuel from more than one tank, it shall be possible to regain the full fuel pressure of that engine in not more than 20 seconds after switching to any fuel tank after engine malfunctioning becomes apparent due to the depletion of the fuel supply in any tank from which the engine can be fed. Compliance with this provision shall be demonstrated in level flight.

(d) The unusable fuel supply for all tanks other than those used for take-off and landing shall be established as not less than the quantity at which the first evidence of malfunctioning occurs under the conditions specified in paragraph (b) (1) of this section. It shall be acceptable to demonstrate compliance with this requirement by a ground test.

§ 4b.417 *Fuel system hot weather operation.* (a) To prove satisfactory hot weather operation the airplane shall be climbed from the altitude of the airport, chosen by the applicant, to the altitude corresponding with that at which the one-engine-inoperative best rate of climb is not greater than the appropriate en route climb specified in § 4b.120 (c). There shall be no evidence of vapor lock or other malfunctioning. The climb test shall be conducted under the following conditions.

(1) All engines shall operate at maximum continuous power, except that take-off power shall be used for the altitude range extending from 1,000 feet below the critical altitude through the critical altitude. The time interval during which take-off power is used shall not exceed the take-off time limitation.

(2) The weight shall be with full fuel tanks, minimum crew, and such ballast as is required to maintain the center of gravity within allowable limits.

(3) The speed of climb shall not exceed that which will permit compliance with the climb requirement specified in § 4b.119 (b).

(4) A fuel temperature not less than 110° F.

(b) The test prescribed in paragraph (a) of this section shall be conducted either in flight or on the ground closely simulating flight conditions. Where the flight test is conducted in cold weather, it may be required that fuel tank surfaces, fuel lines, and other fuel system parts subjected to cooling action from cold air be suitably insulated to simulate, in so far as practicable, flight in hot weather.

§ 4b.418 *Flow between interconnected tanks.* In fuel systems with tanks the outlets of which are interconnected, it shall not be possible for fuel to flow between tanks in quantities sufficient to cause an overflow of fuel from the tank vent when the airplane is operated as specified in § 4b.416 (b) and the tanks are full.

Fuel System Construction and Installation

§ 4b.420 *General.* (a) Fuel tanks shall be capable of withstanding without failure all vibration, inertia, fluid, and structural loads to which they may be subjected in operation.

(b) Flexible fuel tank liners shall be of an acceptable type or shall be proven suitable for the particular application.

(c) The fuel tanks, as installed, shall be designed to withstand a minimun internal pressure of 3.5 p. s. i.

(d) Integral type fuel tanks shall be provided with facilities for the inspection and repair of the tank interior.

(e) The total usable capacity of the fuel tanks shall not be less than 0.15 gallon for each maximum continuous horsepower for which the airplane is certificated.

(f) The unusable fuel capacity shall be the minimum quantity of fuel which will permit compliance with the provisions of § 4b.416.

(g) The fuel quantity gauge shall be adjusted to account for the unusable fuel supply as specified in § 4b.613 (c).

(h) The weight of the unusable fuel supply shall be included in the empty weight of the airplane.

§ 4b.421 *Fuel tank tests.* (a) Fuel tanks shall be capable of withstanding the following pressure tests without failure or leakage. The pressures may be applied in a manner simulating the actual pressure distribution in service.

(1) Conventional metal tanks and nonmetallic tanks the walls of which are not supported by the airplane structure shall be submitted to a pressure of 3.5 p. s. i., or the pressure developed during the maximum ultimate acceleration of the airplane with a full tank, whichever is greater.

(2) Integral tanks shall be submitted to a minimum pressure of 3.5 p. s. i. unless the pressure developed during the maximum limit acceleration of the airplane with a full tank exceeds this value, in which case a hydrostatic head, or equivalent test, shall be applied to duplicate the acceleration loads in so far as possible, except that the pressure need not exceed 3.5 p. s. i. on surfaces not exposed to the acceleration loading.

(3) Nonmetallic tanks the walls of which are supported by the airplane structure shall be submitted to a pressure of 3.5 p. s. i. when mounted in the airplane structure.

(b) Tanks with large unsupported or unstiffened flat areas shall be capable of withstanding the following tests, or other equivalent tests, without leakage or failure.

(1) The complete tank assembly together with its supports shall be subjected to a vibration test when mounted in a manner simulating the actual installation.

(2) The tank assembly shall be vibrated for 25 hours at an amplitude of not less than $\frac{1}{32}$ inch while filled two-thirds full of water.

(3) The frequency of vibration shall be 90 percent of the maximum continuous rated speed of the engine unless some other frequency within the normal operating range of speeds of the engine is more critical, in which case the latter speed shall be employed and the time of test shall be adjusted to accomplish the same number of vibration cycles.

(4) In conjunction with the vibration test, the tank assembly shall be rocked through an angle of 15° on either side of the horizontal (30° total) about an axis parallel to the axis of the fuselage.

(5) The assembly shall be rocked at the rate of 16 to 20 complete cycles per minute.

(c) In the case of tanks with nonmetallic liners a specimen liner of the same basic construction as that to be used in the airplane, when installed in a suitable representative test tank, shall withstand satisfactorily the slosh test as specified in paragraph (b) of this section with fuel at a temperature of 110° F.

§ 4b.422 *Fuel tank installation.* (a) The method of support for fuel tanks shall not be such as to concentrate loads, resulting from the weight of the fuel in the tank, on unsupported tank surfaces. The following shall be applicable.

(1) Pads shall be provided to prevent chafing between the tank and its supports.

(2) Materials employed for padding shall be nonabsorbent or shall be treated to prevent the absorption of fluids.

(3) If flexible tank liners are employed, they shall be so suported that the liner is not required to withstand fluid loads.

(4) Interior surfaces of compartments for such liners shall be smooth and free of projections which may cause wear of the liner, unless provisions are made for protection of the liner at such points or unless the construction of the liner itself provides such protection.

(b) Spaces adjacent to the surfaces of the tank shall be ventilated consistent with the size of the compartment to avoid fume accumulation in the case of minor leakage. If the tank is in a sealed compartment it shall be acceptable to limit the ventilation to that provided by drain holes of sufficient size to prevent excessive pressure resulting from altitude changes.

(c) Location of fuel tanks shall comply with the provisions of § 4b.481 (a).

(d) No portion of engine nacelle skin which lies immediately behind a major air egress opening from the engine compartment shall act as the wall of an integral tank.

(e) Fuel tanks shall be isolated from personnel compartments by means of fume and fuel proof enclosures.

§ 4b.423 *Fuel tank expansion space.* (a) Fuel tanks shall be provided with an expansion space of not less than 2 percent of the tank capacity.

(b) It shall not be possible to fill the fuel tank expansion space inadvertently when the airplane is in the normal ground attitude.

§ 4b.424 *Fuel tank sump.* (a) Each fuel tank shall be provided with a sump having a capacity of not less than either 0.25 percent of the tank capacity or 1.16 of a gallon, whichever is greater.

(b) The fuel tank sump capacity specified in paragraph (a) of this section

shall be effective with the airplane in the normal ground attitude. The fuel tank shall be constructed to permit drainage of any hazardous quantity of water from all portions of the tank to the sump when the airplane is in the ground attitude.

(c) Fuel tank sumps shall be provided with a drain to permit complete drainage of the sump on the ground. The drain shall discharge clear of all portions of the airplane and shall be provided with means for positively or automatically locking the drain in the closed position. The drain shall be accessible.

§ 4b.425 *Fuel tank filler connection.* (a) The fuel tank filler connections shall be marked as prescribed in § 4b.738 (b).

(b) Provision shall be made to prevent the entrance of fuel into the fuel tank compartment or any portions of the airplane other than the tank itself.

(c) Recessed fuel filler connections which retain any appreciable quantity of fuel shall incorporate a drain, and the drain shall discharge clear of all portions of the airplane.

(d) The filler cap shall provide a fuel-tight seal.

§ 4b.426 *Fuel tank vents and carburetor vapor vents.* (a) Fuel tanks shall be vented from the top portion of the expansion space in such a manner that the tank is vented under all normal flight conditions. The following shall be applicable.

(1) Vent outlets shall be so located and constructed as to prevent the possibility of being obstructed by ice or other foreign matter.

(2) The vent shall be constructed to preclude the possibility of siphoning fuel during normal operation.

(3) The vent shall be of sufficient size to permit the rapid relief of excessive differences of pressure between the interior and exterior of the tank.

(4) Air spaces of tanks the outlets of which are interconnected shall also be interconnected.

(5) There shall be no points in the vent line where moisture may accumulate with the airplane in either the ground or the level flight attitudes unless drainage is provided.

(6) Vents and drainage shall not terminate at points where the discharge of fuel from the vent outlet will constitute a fire hazard or from which fumes may enter personnel compartments.

(b) Carburetors which are provided with vapor elimination connections shall be provided with a vent line which will lead vapors back to one of the fuel tanks. The vents shall comply with the following.

(1) Satisfactory provisions shall be incorporated in the vent system to avoid stoppage by ice.

(2) If more than one fuel tank is provided and it is necessary to use the tanks in a definite sequence, the vapor vent return line shall lead back to the fuel tank used for take-off and landing.

§ 4b.427 *Fuel tank outlet.* A fuel strainer, of 8 to 16 meshes per inch, shall be provided either for the fuel tank outlet or for the booster pump. Strainers shall comply with the following.

(a) The clear area of the fuel tank outlet strainer shall not be less than 5 times the area of the fuel tank outlet line.

(b) The diameter of the strainer shall not be less than the diameter of the fuel tank outlet.

(c) Finger strainers shall be accessible for inspection and cleaning.

Fuel System Components

§ 4b.430 *Fuel pumps.* (a) If the engine fuel supply is maintained by means of pumps, one fuel pump for each engine shall be engine driven.

(b) Fuel pumps shall meet the pertinent flow requirements of § 4b.413.

(c) Unless equivalent provisions are available for the continuous supply of fuel to all engines in case of the failure of any positive displacement fuel system pump, the pump itself shall incorporate an integral bypass. Engine fuel injection pumps which are certificated as an integral part of the engine need not incorporate a bypass.

(d) Emergency fuel pumps shall be provided to permit supplying all engines with fuel in case of the failure of any one fuel system pump, unless the engine-driven pump has been approved with the engine and suitable precautions are taken to avoid vapor lock and pump cavitation. If the only pump used in the system is an engine fuel-injection pump which has been certificated as an integral part of the engine, an emergency pump need not be provided.

(e) Emergency pumps shall be capable of complying with the same flow requirements as are prescribed for the main pumps.

(f) Hand emergency pumps shall not require excessive effort for their continued operation at the rate of 60 complete cycles (120 single strokes) per minute.

(g) Emergency pumps shall be available for immediate use in case of failure of any other pump.

(h) If engine-driven pumps are capable of maintaining flight up to 6,000 feet altitude and with 110° F. fuel without the aid of auxiliary pumps, the auxiliary pump may be considered as emergency pumps.

§ 4b.431 *Fuel pump installation.* (a) Provision shall be made to maintain the fuel pressure at the inlet to the carburetor within the range of limits established for proper engine operation.

(b) When necessary for the maintenance of the proper fuel delivery pressure, a connection shall be provided to transmit the carburetor air intake static pressure to the proper fuel pump relief valve connection. In such cases, to avoid erroneous fuel pressure reading, the gauge balance lines shall be independently connected to the carburetor inlet pressure.

§ 4b.432 *Fuel system lines and fittings.* (a) Fuel lines shall be installed and supported to prevent excessive vibration and to withstand loads due to fuel pressure and accelerated flight conditions.

(b) Lines which are connected to components of the airplane between which relative motion may exist shall incorporate provisions for flexibility.

(c) Flexible connections in lines which may be under pressure and subjected to axial loading shall employ flexible hose assemblies rather than hose clamp connections.

(d) Flexible hose shall be of an acceptable type or shall be shown to be suitable for the particular application.

§ 4b.433 *Lines and fittings in designated fire zones.* Fuel lines and fittings in all designated fire zones (see § 4b.480) shall comply with the provisions of § 4b.483.

§ 4b.434 *Fuel valves.* In addition to the requirements of § 4b.482 for shut-off means, all fuel valves shall be provided with positive stops or suitable index provisions in the "on" and "off" positions and shall be supported so that loads resulting from their operation or from accelerated flight conditions are not transmitted to the lines attached to the valve.

§ 4b.435 *Fuel strainer.* A fuel strainer complying with the following paragraphs shall be provided between the fuel tank outlet and the carburetor inlet.

(a) If an engine-driven fuel pump is provided, the strainer shall be located between the tank outlet and the engine-driven pump inlet.

(b) The strainer shall be accessible for drainage and cleaning, and the strainer screen shall be easily removable.

(c) The strainer shall be mounted in a manner not to cause its weight to be supported by the connecting lines or by the inlet or outlet connections of the strainer itself.

§ 4b.436 *Fuel system drains.* Drainage of the system shall be accomplished by fuel strainer drains and other drains as provided in § 4b.424. The following shall apply.

(a) Drains shall discharge clear of all portions of the airplane and shall incorporate means for positive or automatic locking of the drain in the closed position.

(b) All fuel system drains shall be accessible.

(c) If drainage of the strainer permits compliance with paragraphs (a) and (b) of this section, no additional drains need be provided unless it is possible for a hazardous quantity of water or sediment to be trapped therein. (See also § 4b.483 (c).)

§ 4b.437 *Fuel jettisoning system.* (a) If the maximum take-off weight for which the airplane is certificated exceeds 105 percent of its maximum landing weight, provision shall be made to permit the jettisoning of fuel from the maximum take-off to the maximum landing weight at an average rate of 1 percent of the maximum take-off weight per minute, except that the time required to jettison the fuel need not in any case be less than 10 minutes when the airplane is flown in the following conditions. The fuel jettisoning system shall permit the safe discharge of fuel clear of all portions of the airplane under the following conditions at the maximum take-

off weight and with flaps and landing gear up:

(1) Power-off glide at a speed of 1.4 V_{s_1};

(2) Climb at the one-engine-inoperative speed with the critical engine inoperative, the other engines at maximum continuous power;

(3) Level flight at a speed of 1.4 V_{s_1}, if found critical as a result of tests specified in subparagraphs (1) and (2) of this paragraph.

(b) Unless it is demonstrated that the flap position does not adversely affect fuel jettisoning, a placard shall be provided adjacent to the jettisoning control to warn flight personnel against jettisoning fuel while the flaps are lowered. A notation to this effect shall also be included in the Airplane Flight Manual (§ 4b.740).

(c) The fuel jettisoning system and its operation shall be free of fire hazard.

(d) Neither fumes nor fuel shall enter any portion of the airplane.

(e) The jettisoning operation shall not adversely affect the controllability of the airplane.

(f) Compliance with the provisions of paragraphs (c), (d), and (e) of this section shall be demonstrated in flight.

(g) It shall not be possible to jettison fuel in the tanks used for take-off and landing below the level providing 45 minutes flight at 75 percent maximum continuous power, except that all fuel may be jettisoned where an auxiliary control is provided independent of the main jettisoning control.

(h) The fuel jettisoning valve shall permit the flight personnel to close the valve during any portion of the jettisoning operation. (See § 4b.475 for fuel jettisoning system controls.)

Oil System

§ 4b.440 *General.* (a) Each engine shall be provided with an independent oil system capable of supplying the engine with an appropriate quantity of oil at a temperature not exceeding the maximum which has been established as safe for continuous operation. (For oil system instruments see §§ 4b.604 and 4b.735.)

(b) The oil capacity of the system shall not be less than one gallon for every 30 gallons of fuel capacity, unless provisions are made for transferring oil between tanks in flight or unless a reserve oil supply which can be fed to any tank during flight is provided.

(c) If either a reserve oil system or an oil transfer system is provided, the total oil capacity need not exceed one gallon for each 40 gallons of fuel capacity.

(d) Oil-fuel ratios lower than those prescribed in paragraphs (b) and (c) of this section shall be acceptable if substantiated by data indicating unusually low oil consumption of the engine.

(e) The ability of the oil cooling provisions to maintain the oil inlet temperature to the engine at or below the maximum established value shall be demonstrated in accordance with pertinent provisions of §§ 4b.450 through 4b.454.

§ 4b.441 *Oil tank construction.* The following requirements shall apply to the construction of the oil tank.

(a) *Oil tank expansion space.* (1) Oil tanks shall have an expansion space of not less than either 10 percent of the tank capacity or 0.5 gallon, whichever is greater.

(2) Reserve oil tanks which have no direct connection to any engine shall have an expansion space which is not less than 2 percent of the tank capacity.

(3) It shall not be possible to fill the oil tank expansion space inadvertently when the airplane is in the normal ground attitude.

(b) *Oil tank filler connection.* (1) Oil tank filler connections shall be marked as prescribed in § 4b.738 (b).

(2) Recessed oil filler connections which retain any appreciable quantity of oil shall incorporate a drain, and the drain shall discharge clear of all portions of the airplane.

(3) The filler cap shall provide an oil-tight seal.

(c) *Oil tank vent.* (1) Oil tanks shall be vented from the top portion of the expansion space in such a manner that the tank is vented under all normal flight conditions.

(2) Oil tank vents shall be arranged so that condensation of water vapor which may freeze and obstruct the line cannot accumulate at any point. (See also § 4b.483 (c).)

(d) *Oil tank outlet.* The oil tank outlet shall not be enclosed or covered by any screen or other guard which may impede the flow of oil. (See also § 4b.449.)

(e) *Flexible oil tank liners.* Flexible oil tank liners shall be of an acceptable type or shall be shown to be suitable for the particular application.

§ 4b.442 *Oil tank tests.* (a) Oil tanks shall be capable of withstanding without failure all vibration, inertia, and fluid loads to which they may be subjected in operation.

(b) Oil tank tests shall be the same as fuel tank tests (see § 4b.421), except as follows:

(1) The test pressure specified in § 4b.421 (a) shall be 5 p. s. i.

(2) The test fluid specified in § 4b.421 (c) shall be oil at a temperature of 250° F.

§ 4b.443 *Oil tank installation.* Oil tank installation shall comply with the provisions of § 4b.422, except that oil tanks may be located on the engine side of the fire wall.

§ 4b.444 *Oil lines and fittings*—(a) *General.* Oil lines shall comply with the provisions of § 4b.432.

(b) *Lines and fittings in designated fire zones.* Oil lines and fittings in all designated fire zones (see § 4b.480) shall comply with the provisions of § 4b.483.

(c) *Engine breather lines.* (1) Engine breather lines shall be arranged so that condensation of water vapor which may freeze and obstruct the line cannot accumulate at any point.

(2) Breathers shall discharge in a location which will not constitute a fire hazard in case foaming occurs and so that the emitted oil will not impinge upon the pilot windshield.

(3) The breather shall not discharge into the engine air induction system. (See also § 4b.483 (c).)

§ 4b.445 *Oil valves.* (a) The requirements of § 4b.482 for shut-off means shall be complied with. Closing of oil shut-off means shall not prevent feathering the propeller.

(b) All oil valves shall be provided with positive stops or suitable index provisions in the "on" and "off" positions, and shall be supported so that loads resulting from their operation or from accelerated flight conditions are not transmitted to the lines attached to the valve.

§ 4b.446 *Oil radiators.* (a) Oil radiators shall be capable of withstanding without failure all vibration, inertia, and oil pressure loads to which they may be subjected in operation.

(b) Oil radiator air ducts shall be located so that flames issuing from normal openings of the engine nacelle in case of fire shall not impinge directly upon the radiator.

§ 4b.447 *Oil filters.* If the airplane is equipped with an oil filter, the filter shall be constructed or installed in such a manner that complete blocking of the flow through the filter element will not prevent the safe operation of the engine oil supply system.

§ 4b.448 *Oil system drains.* Accessible drains shall be provided to permit safe drainage of the entire oil system and shall incorporate means for positive or automatic locking of the drain in the closed position. (See also § 4b.483 (c).)

§ 4b.449 *Propeller feathering system.* (a) If the propeller feathering system is dependent upon the use of the engine oil supply, provision shall be made to trap a quantity of oil in the tank in case the supply becomes depleted due to failure of any portion of the lubricating system other than the tank itself.

(b) The quantity of trapped oil shall be sufficient to accomplish the feathering operation and shall be available only to the feathering pump.

(c) The ability of the system to accomplish feathering with the trapped supply of oil shall be demonstrated. It shall be acceptable to make this demonstration on the ground.

Cooling System

§ 4b.450 *General.* The powerplant cooling provisions shall be capable of maintaining the temperatures of major powerplant components, engine fluids, and the carburetor intake air within the established safe values under all conditions of ground and flight operation. (For cooling system instruments see §§ 4b.604 and 4b.734.)

§ 4b.451 *Cooling tests*—(a) *General.* Compliance with the provisions of § 4b.450 shall be demonstrated under critical ground, water, and flight operating conditions. If the tests are conducted under conditions which deviate from the maximum anticipated air temperature (see paragraph (b) of this section), the recorded powerplant temperatures shall be corrected in accordance with the provisions of paragraphs (b) and (c) of this section. The corrected

temperatures determined in this manner shall not exceed the maximum established safe values. The fuel used during the cooling tests shall be of the minimum octane number approved for the engines involved, and the mixture settings shall be those used in normal operation. The test procedures shall be as outlined in §§ 4b.452 through 4b.454.

(b) *Maximum anticipated air temperature.* The maximum anticipated air temperature (hot day condition) shall be 100° F. at sea level, decreasing from this value at the rate of 3.6° F. per thousand feet of altitude above sea level until a temperature of −67° F. is reached above which altitude the temperature shall be constant at −67° F.

(c) *Correction factor for cylinder head, oil inlet, carburetor air, and engine coolant outlet temperatures.* The cylinder head, oil inlet, carburetor air, and engine coolant outlet temperatures shall be corrected by adding the difference between the maximum anticipated air temperature and the temperature of the ambient air at the time of the first occurrence of maximum head, air, oil, or coolant temperature recorded during the cooling test, unless a more rational correction is shown to be applicable.

(d) *Correction factors for cylinder barrel temperatures.* Cylinder barrel temperatures shall be corrected by adding 0.7 of the difference between the maximum anticipated air temperature and the temperature of the ambient air at the time of the first occurrence of the maximum cylinder barrel temperature recorded during the cooling test, unless a more rational correction is shown to be applicable.

§ 4b.452 *Climb cooling test procedure.* (a) The climb cooling test shall be conducted with the critical engine inoperative and its propeller feathered.

(b) All remaining engines shall be operated at their maximum continuous power or at full throttle when above the critical altitude.

(c) After stabilizing temperatures in flight, the climb shall be started at or below the lower of the two following altitudes and shall be continued until at least 5 minutes after the occurrence of the highest temperature recorded, or until the maximum altitude is reached for which certification is desired:

(1) 1,000 feet below the engine critical altitude,

(2) 1,000 feet below the maximum altitude at which the rate of climb is equal to that established in accordance with § 4b.120 (c).

(d) The climb shall be conducted at an air speed which does not exceed the speed used in establishing the rate of climb required in § 4b.120 (c). It shall be acceptable to conduct the climb cooling test in conjunction with the take-off cooling test of § 4b.453.

§ 4b.453 *Take-off cooling test procedure.* If the time for which take-off power is used in establishing the take-off path of the airplane exceeds two minutes, a take-off cooling test shall be conducted to demonstrate cooling during take-off and during subsequent climb with one engine inoperative. The following procedure shall be applicable.

(a) The take-off cooling test shall be commenced by stabilizing temperatures during level flight at 75 percent of maximum continuous power (all engines operating) with the appropriate cowl flap and shutter settings.

(b) After all temperatures have stabilized, the climb shall be started at the lowest practicable altitude and shall be conducted with one engine inoperative and its propeller feathered.

(c) The remaining engines shall be operated at take-off rpm and power (or full throttle when above the take-off critical altitude) for the same time interval as take-off power is used during determination of the take-off flight path (see § 4b.116).

(d) At the end of the time interval prescribed in paragraph (c) of this section the power shall be reduced to the maximum continuous power and the climb continued until at least 5 minutes after the occurrence of the highest temperature recorded.

(e) The speed used during take-off power operation (paragraph (c) of this section) shall not exceed the speed used during determination of the take-off flight path.

§ 4b.454 *Cooling test procedure for flying boat operation.* In the case of flying boats, cooling shall be demonstrated during taxying down wind for 10 minutes at 5 m. p. h. above the step speed.

§ 4b.455 *Liquid cooling systems.* Each liquid-cooled engine shall be provided with an independent cooling system. The coolant system shall be so arranged that no air or vapor can be trapped in any portion of the system other than the expansion tank, either during filling or during operation. No flammable coolant shall be used.

§ 4b.456 *Coolant tank*—(a) *General.* The tank shall have a usable coolant capacity of not less than one gallon and shall be capable of withstanding without failure all vibration, inertia, and fluid loads to which it may be subjected in operation. Coolant tanks shall be provided with an expansion space of not less than 10 percent of the total coolant system capacity. It shall not be possible inadvertently to fill the expansion space with the airplane in the normal ground attitude.

(b) *Coolant tank tests.* Coolant tank tests shall be the same as fuel tank tests (see § 4b.421), except as follows:

(1) The 3.5 p. s. i. pressure test of § 4b.421 (a) shall be replaced by either the sum of the pressure developed during the maximum ultimate acceleration with a full tank plus the maximum working pressure of the system, or 1.25 times the maximum working pressure of the system, whichever is greater.

(2) In the case of tanks with nonmetallic liners, the test fluid shall be a coolant at operating temperature rather than fuel as specified in § 4b.421 (c).

(c) *Coolant tank installation.* (1) Coolant tanks shall be supported in such a manner that the tank loads will be distributed over a large portion of the tank surface.

(2) Pads shall be provided to prevent chafing between the tank and the support. Material used for padding shall be nonabsorbent or shall be treated to prevent the absorption of flammable fluids.

(d) *Coolant tank filler connection.* (1) Coolant tank filler connections shall be marked as specified in § 4b.738 (b).

(2) Recessed coolant filler connections which retain any appreciable quantity of coolant shall incorporate a drain, and the drain shall discharge clear of all portions of the airplane.

§ 4b.457 *Coolant system installation.* The following requirements shall apply to the installation of the coolant system components.

(a) *Fire-resistant coolant lines and fittings.* If the coolant used will ignite and burn under the conditions of powerplant fires, all lines and fittings located within designated fire zones shall comply with the provisions of § 4b.483.

(b) *Coolant radiators.* (1) Coolant radiators shall be capable of withstanding without failure all vibration, inertia, and coolant pressure loads to which they may be subjected in operation.

(2) Radiators shall be supported in a manner which will permit expansion due to operating temperatures and which will prevent the transmittal of harmful vibration to the radiator.

(3) The air intake duct to the coolant radiator shall be so located that in case of fire, flames issuing from normal openings of the engine nacelle cannot impinge directly upon the radiator.

(c) *Coolant system drains.* (1) One or more drains shall be provided to permit drainage of the coolant system, including the coolant tank, radiator, and the engine, when the airplane is in the normal ground attitude.

(2) Drains shall discharge clear of all portions of the airplane and shall incorporate means for positive locking of the drain in the closed position.

(3) Coolant system drains shall be accessible.

Induction and Exhaust Systems

§ 4b.460 *General.* (a) The engine air induction system shall permit supplying an adequate quantity of air to the engine under all conditions of operation.

(b) The induction system shall provide air to permit acceptable fuel metering and mixture distribution with the induction system valves in any position.

(c) Each engine shall be provided with an alternate air source unless equivalent safety is demonstrated by other means.

(d) Air intakes shall not open within the cowling, unless that portion of the cowling is isolated from the engine accessory section by means of a fire-resistant diaphragm, or unless provision is made to prevent the emergence of backfire flames.

(e) Alternate air intakes shall be located in a sheltered position.

§ 4b.461 *Induction system de-icing and anti-icing provisions.* The engine air induction system shall incorporate means for the prevention and elimination of ice accumulations in accordance with the following provisions, unless it is demonstrated that equivalent safety can be obtained by a lower heat rise or by other

means. It shall be demonstrated that compliance with the following provisions can be accomplished when the airplane is operating in air at a temperature of 30° F. when the air is free of visible moisture.

(a) Airplanes equipped with altitude engines employing conventional venturi carburetors shall be provided with a preheater capable of providing a heat rise of 120° F. when the engine is operating at 60 percent of its maximum continuous power.

(b) Airplanes equipped with altitude engines employing carburetors which embody features tending to reduce the possibility of ice formation shall be provided with a preheater capable of providing a heat rise of 100° F. when the engine is operating at 60 percent of its maximum continuous power.

§ 4b.462 *Carburetor air preheater design.* (a) Means shall be provided to assure ventilation of the carburetor air preheater when the engine is being operated with cold air.

(b) The preheater shall be constructed to permit inspection of exhaust manifold parts which it surrounds and also to permit inspection of critical portions of the preheater itself.

§ 4b.463 *Induction system ducts.* (a) Induction system ducts ahead of the first stage of the supercharger shall be provided with drains to prevent the hazardous accumulation of fuel and moisture in the ground attitude.

(b) Sufficient strength shall be incorporated in the ducts to prevent induction system failures resulting from normal backfire conditions.

(c) Drains shall not discharge in locations which might cause a fire hazard.

(d) Ducts which are connected to components of the airplane between which relative motion may exist shall incorporate provisions for flexibility.

§ 4b.464 *Induction system screens.* (a) If induction system screens are employed, they shall be located upstream from the carburetor.

(b) It shall not be possible for fuel to impinge upon induction system screens.

(c) Screens shall not be located in portions of the induction system which constitute the only passage through which air may reach the engine, unless the screen is so located that it can be de-iced by heated air.

(d) De-icing of induction system screens by means of alcohol alone shall not be acceptable.

§ 4b.465 *Carburetor air cooling.* (a) Installations employing two-stage superchargers shall be provided with means to maintain the air temperature at the inlet to the carburetor at or below the maximum established value.

(b) Demonstration of compliance with the provision of paragraph (a) shall be accomplished in accordance with § 4b.451.

§ 4b.466 *Inter-coolers and after-coolers.* Inter-coolers and after-coolers shall be capable of withstanding without failure all vibration, inertia, and air pressure loads to which they may be subjected in operation.

§ 4b.467 *Exhaust system and installation components*—(a) *General.* (1) The exhaust system shall be constructed and arranged to assure the safe disposal of exhaust gases without the existence of a fire hazard or carbon monoxide contamination of air in personnel compartments.

(2) Unless suitable precautions are taken, exhaust system parts shall not be located in hazardous proximity to portions of any systems carrying flammable fluids or vapors nor shall they be located under portions of such systems where the latter may be subject to leakage.

(3) All airplane components upon which hot exhaust gases may impinge, or which may be subjected to high temperatures due to proximity to exhaust system parts, shall be constructed of fireproof material. All exhaust system components shall be separated by means of fireproof shields from adjacent portions of the airplane which are outside the engine compartment.

(4) Exhaust gases shall not discharge within dangerous proximity of any fuel or oil system drains.

(5) Exhaust gases shall not discharge at a location which will cause a glare seriously affecting pilot visibility at night.

(6) All exhaust system components shall be ventilated to prevent the existence of points of excessively high temperature.

(b) *Exhaust piping.* (1) Exhaust piping shall be constructed of material suitably resistant to heat and corrosion, and shall incorporate provisions to prevent failure due to expansion when heated to operating temperatures.

(2) Exhaust pipes shall be supported to withstand all vibration and inertia loads to which they may be subjected in operation.

(3) Portions of the exhaust piping which are connected to components between which relative motion may exist shall incorporate provisions for flexibility.

(c) *Exhaust heat exchangers.* (1) Exhaust heat exchangers shall be constructed and installed to assure their ability to withstand without failure all vibration, inertia, and other loads to which they may be subjected in operation.

(2) Heat exchangers shall be constructed of materials which are suitable for continued operation at high temperatures and which are resistant to corrosion due to products contained in exhaust gases.

(3) Provision shall be made for the inspection of all critical portions of exhaust heat exchangers.

(4) Heat exchangers shall be cooled whenever they are subject to contact with exhaust gases.

(d) *Exhaust heating of ventilating air.* If an exhaust heat exhanger is used for heating ventilating air, a secondary heat exchanger shall be provided between the primary exhaust gas heat exchanger and the ventilating air system, unless it is demonstrated that sufficient safety can be obtained by other means.

(e) *Exhaust driven turbo-superchargers.* (1) Exhaust driven turbines shall be of an approved type or shall be proven suitable for the particular application. They shall be installed and supported to assure their safe operation between normal inspection and overhaul periods.

(2) Provision for expansion and flexibility shall be made between exhaust conduits and the turbine.

(3) Provision shall be made for lubrication of the turbine and for cooling of those turbine parts where the temperatures are critical.

(4) Means shall be provided for automatically limiting the turbine speed to its maximum allowable overspeed value.

Power-Plant Controls and Accessories

§ 4b.470 *Power-plant controls.* All power-plant controls shall comply with the provisions of § 4b.353 with respect to location, grouping, and direction of motion, and shall comply with the provisions of § 4b.737 with respect to marking. In addition they shall comply with the following.

(a) Controls shall be so located that they cannot be inadvertently operated by personnel entering or leaving the airplane, or while flight personnel are making normal movements in the cockpit.

(b) Controls shall maintain any set position without constant attention by flight personnel. They shall not tend to creep due to control loads or vibration.

(c) Flexible controls shall be of an approved type or shall be proven suitable for the particular application.

(d) Controls shall have strength and rigidity to withstand operating loads without failure and without excessive deflection.

§ 4b.471 *Throttle controls.* (a) A separate throttle control shall be provided for each engine.

(b) Throttle controls shall afford a positive and immediately responsive means of controlling the engines.

(c) Throttle controls shall be grouped and arranged to permit separate control of each engine and also simultaneous control of all engines.

§ 4b.472 *Ignition switches.* (a) Ignition switches shall provide control for each ignition circuit on each engine.

(b) Means shall be provided for quickly shutting off all ignition by the grouping of switches or by providing a master ignition control.

(c) If a master ignition control is provided, a guard shall be incorporated to prevent inadvertent operation of the control.

§ 4b.473 *Mixture controls.* (a) If mixture controls are provided, a separate control shall be provided for each engine.

(b) The mixture controls shall be grouped and arranged to permit separate control of each engine and also simultaneous control of all engines.

§ 4b.474 *Propeller controls*—(a) *Propeller speed and pitch controls.* (See also § 4b.404.) The propeller speed and pitch controls shall be grouped and arranged to permit control of the propellers separately and together. The controls shall provide for synchronization of all propellers.

(b) *Propeller feathering controls.* (1) A separate feathering control shall be provided for each propeller.

(2) Propeller feathering controls shall be provided with means to prevent inadvertent operation.

(3) If feathering is accomplished by movement of the propeller pitch or speed control lever, provision shall be made to prevent the movement of this control to the feathering position during normal operation.

(c) *Propeller reversing controls.* If the propeller blades can be placed in a pitch position which produces negative thrust, propeller reversing controls shall be arranged to prevent inadvertent operation.

§ 4b.475 *Fuel system control.* (See § 4b.434):

(a) Fuel jettisoning system controls shall be provided with guards to prevent their inadvertent operation.

(b) Fuel jettisoning system controls shall not be located in close proximity to fire extinguisher controls nor to any other controls intended for operation to combat fire.

§ 4b.476 *Carburetor air preheat controls.* Separate carburetor air preheat controls shall be provided to regulate the temperature of the carburetor air for each engine.

§ 4b.477 *Powerplant accessories.* (a) Engine mounted accessories shall be of a type approved for installation on the engine involved, and shall utilize the provisions made on the engine for mounting.

(b) Items of electrical equipment subject to arcing or sparking shall be installed to minimize the possibility of their contact with any flammable fluids or vapors which may be present in a free state.

§ 4b.478 *Engine ignition systems.* (a) Battery ignition systems shall be supplemented with a generator which is automatically made available as an alternate source of electrical energy to permit continued engine operation in the event of the depletion of any battery.

(b) The capacity of batteries and generators shall be sufficient to meet the simultaneous demands of the engine ignition system and the greatest demands of any airplane electrical system components which may draw electrical energy from the same source.

(1) The design of the engine ignition system shall take into consideration the condition of an inoperative generator and the condition of a completely depleted battery when the generator is running at its normal operating speed.

(2) If only one battery is provided the design of the engine ignition system shall take into consideration the condition in which the battery is completely depleted and the generator is operating at idling speed.

(c) Means shall be provided to warn flight personnel if malfunctioning of any part of the electrical system is causing the continuous discharging of a battery which is necessary for engine ignition. (See § 4b.472 for ignition switches.)

Powerplant Fire Protection

§ 4b.480 *Designated fire zones.* (a) Designated fire zones shall comprise the following regions:

(1) Engine power section;

(2) Engine accessory section;

(3) Complete powerplant compartments in which no isolation is provided between the engine power section and the engine accessory section;

(4) Auxiliary power unit compartments;

(5) Fuel-burning heaters, regions surrounding them, and other combustion equipment installations.

(b) Designated fire zones shall be protected from fire by compliance with §§ 4b.481 through 4b.489.

§ 4b.481 *Flammable fluids.* (a) No tanks or reservoirs which are a part of a system containing flammable fluids or gases shall be located in designated fire zones, except where the fluid contained, the design of the system, the materials used in the tank, the shut-off means, all connections, lines, and controls are such as to provide equivalent safety.

(b) Not less than ½ inch of clear air space shall be provided between any tank or reservoir and a fire wall or shroud isolating a designated fire zone.

§ 4b.482 *Shut-off means.* (a) Means for each individual engine and for each individual fire zone specified under subparagraphs (4) and (5) of § 4b.480 (a) shall be provided for shutting off or otherwise preventing hazardous quantities of fuel, oil, de-icer, and other flammable fluids from flowing into, within, or through any designated fire zone, except that means need not be provided to shut off flow in lines forming an integral part of an engine.

(b) In order to facilitate rapid and effective control of fires, shut-off means shall permit an emergency operating sequence which is compatible with the emergency operation of other equipment, such as feathering the propeller.

(c) Shut-off means shall be located outside of designated fire zones, unless equivalent safety is provided (see § 4b.481). It shall be shown that no hazardous quantity of flammable fluid will drain into any designated fire zone after shutting-off has been accomplished.

(d) Provisions shall be made to guard against inadvertent operation of the shut-off means and to make it possible for the crew to reopen the shut-off means after it has once been closed.

§ 4b.483 *Lines and fittings.* (a) All lines and fittings located in designated fire zones which carry flammable fluids or gases and which are under pressure, or which attach directly to the engine, or are subject to relative motion between components, exclusive of those lines and fittings forming an integral part of the engine, shall be flexible, fire-resistant lines with fire-resistant end fittings of the permanently attached, detachable, or other approved types.

(b) Lines and fittings which are not subject to pressure or to relative motion between components shall be of fire-resistant materials.

(c) Vent and drain lines and fittings located in designated fire zones and which carry flammable fluids or gases shall comply with the provisions of paragraph (a) of this section, if it is found that rupture or breakage of a particular drain or vent line may result in a fire hazard.

§ 4b.484 *Fire extinguisher systems.* (a) *General.* (1) Unless it is demonstrated that equivalent protection against destruction of the airplane in case of fire is provided by the use of fireproof materials in the nacelle and other components which would be subjected to flame, fire extinguishing systems shall be provided to serve all designated fire zones, except in the case of an engine power section which is completely isolated from the engine accessory section by a fireproof diaphragm complying with the provisions of § 4b.486.

(2) The fire extinguishing system, the quantity of extinguishing agent, and the rate of discharge shall be such as to provide two adequate discharges. It shall be possible to direct both discharges to any main engine installation. Individual "one-shot" systems shall be acceptable in the case of auxiliary power units, fuel-burning heaters, and other combustion equipment.

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

(b) *Fire extinguishing agents.* (1) Extinguishing agents employed shall be methyl bromide, carbon dioxide, or any other agent which has been shown to provide equivalent extinguishing action.

(2) If methyl bromide, carbon dioxide, or any other toxic extinguishing agent is employed, provision shall be made to prevent the entrance of harmful concentration of fluid or fluid vapors into any personnel compartments either due to leakage during normal operation of the airplane or as a result of discharging the fire extenguisher on the ground or in flight. Compliance with this requirement shall be demonstrated by appropriate tests.

(3) If a methyl bromide system is provided, the containers shall be charged with a dry agent and shall be sealed by the fire extinguisher manufacturer or by any other party employing satisfactory recharging equipment.

(4) If carbon dioxide is used, it shall not be possible to discharge sufficient gas into personnel compartments to constitute a hazard from the standpoint of suffocation of the occupants.

(c) *Extinguishing agent container pressure relief.* Extinguisher agent containers shall be provided with a pressure relief to prevent bursting of the container due to excessive internal pressures. The following shall apply:

(1) The discharge line from the relief connection shall terminate outside the airplane in a location convenient for inspection on the ground.

(2) An indicator shall be provided at the discharge end of the line to provide a visual indication when the container has discharged.

(d) *Extinguishing agent container compartment temperature.* Precautions shall be taken to assure that the extinguishing agent containers are installed in a location where reasonable temperatures can be maintained for effective use of the extinguisher system.

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

§ 4b.485 *Fire detector systems.* (a) Quick acting fire detectors shall be provided in all designated fire zones and shall be sufficient in number and location to assure the detection of fire in such zones.

(b) Fire detectors shall be constructed and installed to assure their ability to resist without failure all vibration, inertia, and other loads to which they may be subjected in operation.

(c) Detectors shall be unaffected by exposure to oil, water, or other fluids or fumes which may be present.

§ 4b.486 *Fire walls.* All engines, auxiliary power units, fuel-burning heaters, and other combustion equipment which are intended for operation in flight shall be isolated from the remainder of the airplane by means of fire walls, shrouds, or other equivalent means. The following shall apply:

(a) Fire walls and shrouds shall be constructed in such a manner that no hazardous quantity of air, fluids, or flame can pass from the engine compartment to other portions of the airplane.

(b) All openings in the fire wall or shroud shall be sealed with close-fitting fireproof grommets, bushings, or firewall fittings.

(c) Fire walls and shrouds shall be constructed of fireproof material and shall be protected against corrosion.

§ 4b.487 *Cowling.* (a) Cowling shall be constructed and supported so as to make it capable of resisting all vibration, inertia, and air loads to which it may be subjected in operation.

(b) Provision shall be made to permit rapid and complete drainage of all portions of the cowling in all normal ground and flight attitudes. Drains shall not discharge in locations which might cause a fire hazard.

(c) Cowling, unless otherwise specified by these regulations, shall be constructed of fire-resistant material.

(d) Those portions of the cowling which are subjected to high temperatures due to their proximity to exhaust system parts or exhaust gas impingement shall be constructed of fireproof material.

§ 4b.488 *Engine accessory section diaphragm.* Unless equivalent protection can be shown by other means, a diaphragm shall be provided on air-cooled engines to isolate the engine power section and all portions of the exhaust system from the engine accessory compartment. This diaphragm shall comply with the provisions of § 4b.486.

§ 4b.489 *Protection of other airplane components against fire.* All airplane surfaces aft of the nacelles, in the region of one nacelle diameter on both sides of the nacelle center line, shall be constructed of fire-resistant material. This provision need not be applied to tail surfaces lying behind nacelles, unless the dimensional configuration of the aircraft is such that the tail surfaces could be affected readily by heat, flames, or sparks emanating from a designated fire zone or engine compartment of any nacelle.

SUBPART F—EQUIPMENT

General

§ 4b.600 *Scope.* The required equipment as prescribed in this subpart is the minimum which shall be installed in the airplane for certification. Such additional equipment as is necessary for a specific type of operation is prescribed in the operating parts of the Civil Air Regulations.

§ 4b.601 *Functional and installational requirements.* Each item of equipment shall be:

(a) Of a type and design satisfactory to perform its intended function,

(b) Adequately labeled as to its identification, function, or operational limitations, or any combination of these, whichever is applicable,

(c) Properly installed in accordance with specified limitations of the equipment,

(d) Demonstrated to function satisfactorily in the airplane.

§ 4b.602 *Required basic equipment.* The basic equipment listed in §§ 4b.603 through §4b.605 shall be required for certification of the airplane.

§ 4b.603 *Flight navigation instruments.* (a) Air-speed indicating system with heated pitot tube or equivalent means of preventing malfunctioning due to icing (see paragraphs 4b.612 (a) and (b)),

(b) Altimeter (sensitive) (see §4b.612 (b)),

(c) Clock (sweep-second),

(d) Free air temperature indicator,

(e) Gyroscopic bank and pitch indicator (see § 4b.612 (e)),

(f) Gyroscopic rate-of-turn indicator (with bank indicator) (see § 4b.612 (e)),

(g) Gyroscopic direction indicator (see § 4b.612 (e)),

(h) Magnetic direction indicator (see § 4b.612 (c)),

(i) Rate-of-climb indicator (vertical speed) (see § 4b.612 (b)).

§ 4b.604 *Powerplant instruments.* (a) Carburetor air temperature indicator for each engine,

(b) Coolant indicator for each liquid-cooled engine,

(c) Cylinder head temperature indicator for each air-cooled engine (see § 4b.613 (f)),

(d) Fuel pressure indicator for each pump-fed engine,

(e) For each engine not equipped with an automatic altitude mixture control:

(1) Fuel flowmeter indicator (see § 4b.613 (d)), or

(2) Fuel mixture indicator,

(f) Fuel quantity indicator for each fuel tank (see § 4b.613 (c)),

(g) Manifold pressure indicator for each engine,

(h) Oil pressure indicator for each engine,

(i) Oil quantity indicator for each oil tank when a transfer or oil reserve supply system is used (see § 4b.613 (e)),

(j) Oil temperature indicator for each engine,

(k) Tachometer for each engine,

(l) Fire warning indicators (see § 4b.485).

§ 4b.605 *Miscellaneous equipment.* (a) Approved seats for all occupants (see § 4b.358).

(b) Approved safety belts for all occupants (see § 4b.643),

(c) A master switch arrangement for electrical circuits other than ignition,

(d) Adequate source(s) of electrical energy,

(e) Electrical protective devices,

(f) Radio communication system (two-way),

(g) Radio navigation system,

(h) Windshield wiper or equivalent for each pilot,

(i) Ignition switch for each and all engines (see § 4b.472),

(j) Approved portable fire extinguisher (see § 4b.641).

Instruments—Installation

§ 4b.610 *General.* The provisions of §§ 4b.611 through 4b.613 shall establish the installation requirements for aircraft and powerplant instruments.

§ 4b.611 *Arrangement and visability of instrument installations.* (a) Flight, navigation, and powerplant instruments for use by each pilot shall be easily visible to him from his station with the minimum practicable deviation from his normal position and line of vision when he is looking out and forward along the flight path.

(b) All of the required flight instruments shall be conveniently grouped and as nearly as practicable centered about the vertical plane of the pilot's forward vision.

(c) All the required powerplant instruments shall be closely grouped on the instrument panel.

(d) Identical powerplant instruments for the several engines shall be located to prevent any misleading impression as to the engines to which they relate.

(e) Important powerplant instruments shall be easily visible to the appropriate crew members.

(f) The vibration characteristics of the instrument panel shall be such as not to impair seriously the accuracy of the instruments or to damage them.

§ 4b.612 *Flight and navigation instruments*—(a) *Air-speed indicating systems.* (1) Air-speed indicating instruments shall be calibrated to indicate true air speed at sea level in the standard atmosphere with a minimum practicable instrument calibration error when the corresponding pitot and static pressures are applied to the instrument.

(2) The air-speed indicating system shall be calibrated in flight to determine the system error, i. e. the relation between IAS and CAS.

(3) The air-speed error of the installation, excluding the air-speed indicator instrument calibration error, shall not exceed 3 percent or 5 m. p. h., whichever is greater, throughout the speed range from V_{NO} to 1.3 V_{S_1} with flaps retracted, and at 1.3 V_{S_0} with flaps in landing position.

(4) The air-speed indicating system shall be arranged in so far as practicable to preclude malfunctioning or serious error due to the entry of moisture, dirt, or other detrimental substances.

(5) The air-speed indicating system shall be provided with a heated pitot tube or equivalent means of ice protection.

(b) *Static air vent system.* (1) All instruments provided with static air case connections shall be vented to the outside atmosphere through a suitable piping system.

(2) The vent(s) shall be so located on the airplane that its orifices will be least affected by air flow variation, moisture, or other foreign matter.

(3) The installation shall be such that the system will be air-tight, except for the vent into the atmosphere.

(c) *Magnetic direction indicator.* (1) The magnetic direction indicator shall be installed so that its accuracy will not be excessively affected by the airplane's vibration or magnetic fields of a permanent or transient nature.

(2) After the magnetic direction indicator has been compensated, the calibration shall be such that the deviation in level flight does not exceed $\pm 10^{\circ}$ on any heading.

(3) A calibration placard shall be provided as specified in § 4b.733.

(d) *Automatic pilot system.* If an automatic pilot system is installed, the following shall be applicable:

(1) The actuating (servo) devices shall be of such design that they can, when necessary, either be disengaged positively or be overpowered by the pilot to enable him to maintain satisfactory control of the airplane.

(2) A satisfactory means shall be provided to indicate readily to the pilot the alignment of the actuating device in relation to the control system which it operates, except when automatic synchronization is provided.

(3) The manually operated control(s) for the system's operation shall be readily accessible to the pilot.

(4) The automatic pilot system shall be of such design and so adjusted that, within the range of adjustment available to the human pilot, it cannot produce loads in the control system and surfaces greater than those for which the system and surfaces were designed.

(e) *Gyroscopic indicators (air-driven type).* All air-driven gyroscopic instruments shall derive their energy from a suction air pump driven either by an engine or by an auxiliary power unit. The following shall be applicable.

(1) Two suction air pumps actuated by separate power means shall be provided, either one of which shall be of sufficient capacity to operate all of the air-driven gyroscopic instruments at the service ceiling of the airplane in normal cruising condition.

(2) A suitable means shall be provided in the suction air pump installation, where the lines from the individual pumps connect into a common line, to select either pump in case of failure of one pump source.

(3) When an automatic means to permit simultaneous air flow is provided in the system, a suitable method for indicating any interrupted air flow in the suction air pump lines shall be incorporated in the system. In order to indicate which source has failed, a visual means shall be provided to indicate this condition to the flight crew.

(4) A suction gauge shall be installed to indicate readily to the flight crew while in flight the suction in inches of mercury which is being applied to the air-driven types of gyroscopic instruments.

§ 4b.613 *Power plant instruments*—(a) *Operational markings.* Instruments shall be marked as specified in §§ 4b.734 through 4b.738.

(b) *Instrument lines.* (1) Instrument lines carrying flammable fluids or gases under pressure shall be provided with restricted orifices or equivalent safety devices at the source of the pressure to prevent escape of excessive fluid or gas in case of line failure.

(2) Power plant instrument lines shall comply with the provisions of § 4b.432. (For fire-resistant power plant instrument lines see § 4b.483.)

(c) *Fuel quantity indicator.* Means shall be provided to indicate to the flight crew the quantity in gallons or equivalent units of usable fuel in each tank during flight. The following shall apply:

(1) Tanks, the outlets and air spaces of which are interconnected, shall be considered as one tank for the purpose of providing separate indicators.

(2) Exposed sight gauges shall be protected against damage.

(3) Fuel quantity indicators shall be calibrated to read zero during level flight when the quantity of fuel remaining in the tank is equal to the unusable fuel supply as defined by § 4b.416 (see § 4b.736).

(d) *Fuel flowmeter system.* When a flowmeter system is installed, the metering component shall include a suitable means for bypassing the fuel supply in the event that malfunctioning of the metering component results in a severe restriction to fuel flow.

(e) *Oil quantity indicator.* (1) A stick gauge or other equivalent means shall be provided to indicate the quantity of oil in each tank (see § 4b.735).

(2) If an oil transfer system or a reserve oil supply system is installed, means shall be provided to indicate to the crew during flight the quantity of oil in each tank.

(f) *Cylinder head temperature indicating system for air-cooled engines.* A cylinder head temperature indicator shall be provided for each air-cooled engine on airplanes equipped with cowl flaps. In the case of airplanes without cowl flaps, an indicator shall be provided if compliance with the provisions of § 4b.450 is demonstrated at a speed in excess of the speed of best rate of climb.

Electrical Systems and Equipment

§ 4b.620 *Installation.* (a) Electrical systems and equipment shall be free from hazards in themselves, in their method of operation, and in their effects on other parts of the airplane. They shall be protected from fuel, oil, water, other detrimental substances, and from mechanical damage.

(b) For substantiation of the electrical system the data required under § 4b.13 shall include:

(1) Wiring diagrams, including a schematic power supply diagram,

(2) Installation data, including the manufacturer's name, type of all electrical items, and reference to pertinent specifications.

(3) An electrical load analysis.

§ 4b.621 *Batteries.* (a) The battery capacity shall be that determined necessary from an electrical load analysis.

(b) Means shall be provided to prevent corrosive battery substance from coming in contact with other parts of the airplane during servicing or in flight.

(c) Batteries shall be completely enclosed in a container or compartment and shall be easily accessible for servicing and inspection on the ground.

(d) The battery container or compartment shall be vented so that gases released by the battery are carried outside the airplane.

(e) Battery cooling shall be provided, if found necessary to keep the battery temperature within the limits specified by the battery manufacturer.

§ 4b.622 *Generator system*—(a) *Generator.* The generator capacity necessary shall be determined initially from an electrical load analysis, and its adequacy shall be demonstrated during flight test. A switch shall be provided for each generator to permit its output to be interrupted. Individual generators shall be capable of delivering their continuous rated power.

(b) *Generator controls.* Generator voltage control equipment shall be capable of regulating the generator output within rated limits.

(c) *Reverse current cutout.* A generator reverse current cutout shall disconnect the generator from the battery and from other generators when the generator is developing a voltage of such value that current sufficient to cause malfunctioning can flow into the generator.

§ 4b.623 *Master switch.* A master switch arrangement shall be provided which will disconnect all sources of electrical power from the main distribution system at a point adjacent to the power sources.

§ 4b.624 *Master switch installation.* The master switch and its controls shall be so installed that is easily discernible and accessible to a member of the crew in flight.

§ 4b.625 *Protective devices.* Protective devices (fuses or circuit breakers) shall be installed in the circuits to all electrical equipment, except that such items need not be installed in the main circuits of starter motors or in other circuits where no hazard is presented by

their omission. If fuses are used, one spare of each rating or 50 percent spare fuses of each rating, whichever is greater, shall be provided.

§ 4b.626 *Protective devices installation.* Protective devices in circuits used in flight shall be located conveniently and properly to facilitate replacement of fuses or resetting of circuit breakers in flight.

§ 4b.627 *Electric cables.* The electric cables used shall be in accordance with approved standards for aircraft electric cable of a slow-burning type. They shall have current-carrying capacity sufficient to deliver the necessary power to the items of equipment to which they are connected.

§ 4b.628 *Switches.* Switches shall be capable of carrying their rated current. They shall be accessible to the crew and shall be labeled as to operation and the circuit controlled.

Lights

§ 4b.630 *Instrument lights*—(a) *Illumination.* Instrument lights shall provide sufficient illumination to make all instruments, switches, etc., easily readable.

(b) *Instrument light installation.* Instrument lights shall be installed in a manner so that their direct rays are shielded from the pilot's eyes and so that no objectional reflections are visible to him.

(c) *Light dimming.* A means of controlling the intensity of illumination shall be provided, unless it is shown that nondimmed instrument lights are satisfactory under all expected conditions of flight.

§ 4b.631 *Landing lights*—(a) *Type.* Landing lights shall be of an approved type.

(b) *Landing light installation.* (1) Landing lights shall be installed so that there is no objectionable glare visible to the pilot and so that the pilot is not adversely affected by halation.

(2) Landing lights shall be installed in a location where they provide the necessary illumination for night landing.

(c) *Landing light switch.* A switch for each light shall be provided, except that where multiple lights are installed at one location a single switch for the multiple lights shall be acceptable.

§ 4b.632 *Position lights*—(a) *Type.* Forward and rear position lights shall be of a type certificated in accordance with Part 15.

(b) *Forward position light installation.* (1) Forward position lights shall be installed so that, with the airplane in normal flying position, the red light is displayed on the left side and the green light on the right side, each showing unbroken light between two vertical planes the dihedral angle of which is 110° when measured to the left and to the right of the airplane from dead ahead.

(2) The lights shall be spaced laterally as far apart as practicable.

(c) *Rear position light installation.* (1) The red and white position lights shall be mounted as far aft as practicable and installed so that unbroken light is directed symmetrically aft from each light with the axis of the maximum cone of illumination parallel to the flight path.

(2) The intersection of the two planes forming the dihedral angle A prescribed in Part 15 shall be vertical.

(3) If separate red and white lights are used, they shall be located as close together as practicable.

(d) *Top and bottom fuselage lights.* (1) The top and bottom fuselage lights shall each furnish illumination of an intensity equivalent to a 32-candlepower lamp installed in a reflector of high reflective properties and shall have a clear cover glass.

(2) The top and bottom fuselage lights shall show through approximately a hemisphere.

(3) The top fuselage light shall be installed approximately in line with the forward position lights.

(4) The bottom fuselage light on landplanes shall be installed approximately in line with the forward position lights. In the case of seaplanes the location of the bottom light will be subject to specific approval on each model airplane.

(e) *Position light flasher.* (1) The position light flasher shall incorporate two flashing circuits which are energized alternately to provide a flashing of the position and fuselage lights in the manner indicated in paragraph (f).

(2) The flasher shall be of an approved type.

(f) *Flashing light sequence.* (1) The forward position lights and the rear white position light shall be on one of the flasher circuits, and the top and bottom fuselage lights and the rear red position light shall be on the other circuit.

(2) The flashing sequence shall be repeated automatically when the position light switch is in the "flash" position.

(g) *Flashing light cutout switch.* A switch shall be provided to eliminate the flasher from the position light circuit so that continuous light may be provided by the forward position lights and the rear white position light, while the top and bottom fuselage lights are not lighted.

§ 4b.633 *Riding light.* When a riding (anchor) light is required for a seaplane, flying boat, or amphibian, it shall be capable of showing a white light for at least two miles at night under clear atmospheric conditions.

§ 4b.634 *Riding light—installation.* The riding light specified in § 4b.633 shall be installed to show the maximum unbroken light practicable when the airplane is moored or drifting on the water. Externally hung lights shall be acceptable.

Safety Equipment

§ 4b.640 *De-icers.* When an ice protection system is installed, it shall be of an approved type. If pneumatic boots are used, at least two independent sources of power and a positive means for the deflation of the boots shall be provided.

§ 4b.641 *Fire extinguishers; number and installation.* (a) The approved portable fire extinguisher required in § 4b.605 (j) shall be installed primarily for the use of the pilot and copilot.

(b) When the operating rules require additional fire-extinguishing equipment, the installation of such equipment shall depend upon the size and compartmentation of the aircraft and on the number and distribution of the crew and passengers. Such fire extinguishers shall be placed in approved locations.

§ 4b.642 *Flare installation.* (a) Parachute flares shall be releasable from the pilot compartment and installed to minimize the danger of accidental discharge.

(b) It shall be demonstrated in flight that the flare installation is such that ejection can be accomplished without hazard to the airplane and its occupants.

(c) If the flares are ejected so that recoil loads are involved, the structure of the airplane shall withstand such loads.

§ 4b.643 *Safety belts.* Airplanes manufactured on or after January 1, 1951, shall be equipped with safety belts approved in accordance with § 4b.18. In no case shall the rated strength of the safety belt be less than that corresponding with the ultimate load factors specified in § 4b.260 (a), taking due account of the dimensional characteristics of the safety belt installation for the specific seat or berth arrangement. Safety belts shall be attached so that no part of the anchorage will fail at a load lower than that corresponding with the ultimate load factors specified in § 4b.260 (a).

§ 4b.644 *Safety belt signal.* When a means is provided to indicate to the passengers when seat belts should be fastened, the device shall be so installed that it can be operated from the seat of either pilot or copilot.

§ 4b.645 *Emergency flotation and signaling equipment.* (a) Rafts and life preservers shall be installed so as to be readily available to the crew and passengers.

(b) Rafts released automatically or released by the pilot shall be attached to the airplane by means of a line to keep them adjacent to the airplane.

(c) Signaling devices shall be accessible, shall function satisfactorily, and shall be free from any hazard in their operation.

Miscellaneous Equipment

§ 4b.650 *Radio installation.* Radio equipment installations in the airplane shall be free from hazards in themselves, in their method of operation, and in their effects on other components of the airplane.

§ 4b.651 *Oxygen equipment and supply.* When required by the operating parts of the Civil Air Regulations, the supplemental and protective breathing equipment and its installation shall meet the following requirements.

(a) *General.* The oxygen system installed shall be free from hazards in itself, in its method of operation, and in its effect on other components of the airplane. A means shall be provided to enable the crew to determine the quantity of oxygen available in each source of supply.

(b) *Required minimum mass flow supplemental oxygen.* The minimum mass flow of supplemental oxygen required per person at various cabin pressure altitudes shall be at least that indicated by figure 4b–18.

(c) *Equipment standards for distribution system.* Where oxygen is to be supplied to both crew and passengers, the distribution system shall be designed to provide either:

(1) A source of supply for the flight crew on duty and a separate source for the passengers and other crew members, or

(2) A common source of supply with means provided so that the minimum supply required by the flight crew on duty can be separately reserved.

(d) *Equipment standards for dispensing units.* An individual dispensing unit shall be provided for each crew member and passenger for whom supplemental oxygen is required to be furnished. All units shall be designed to cover the nose, and at least 25 percent of the units required to be furnished shall, in addition, cover the mouth. (For crew masks to be used for protective breathing purposes see the pertinent air carrier operating rules.)

(e) *Means for determining use of oxygen.* A means shall be provided to enable the crew to determine whether oxygen is being delivered to each user.

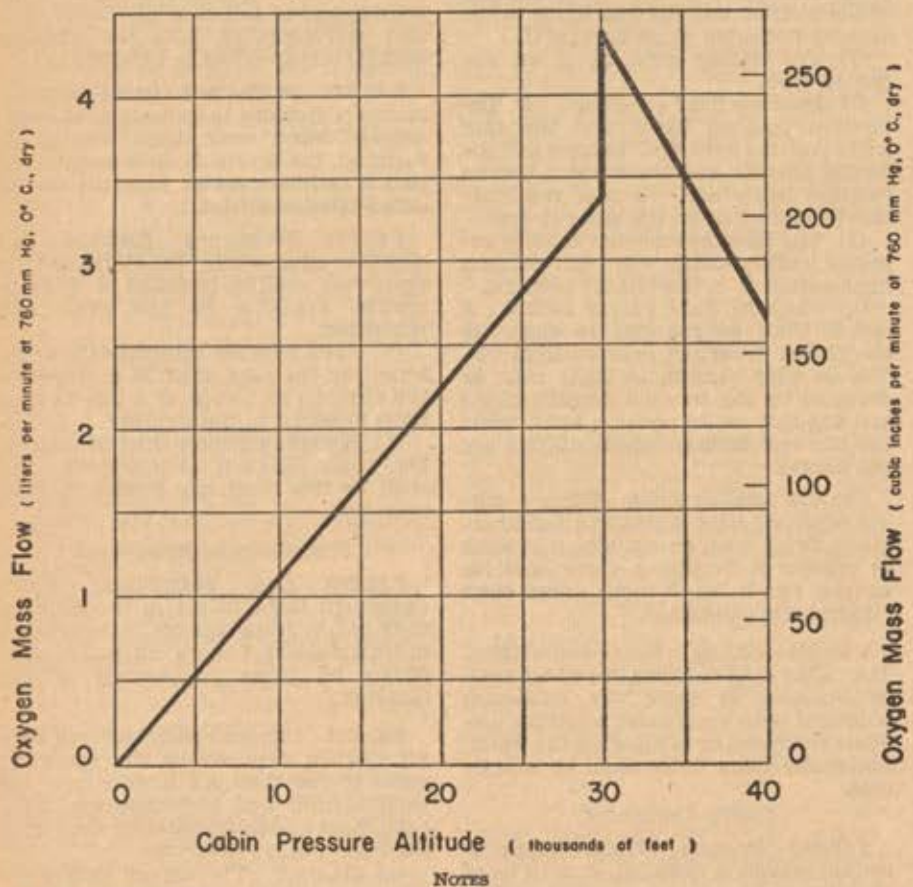
§ 4b.652 *Engine-driven accessories.* Engine-driven accessories essential to safe operation of the airplane shall be so distributed among two or more engines that the failure of any one engine will not impair the safe operation of the airplane.

§ 4b.653 *Hydraulic systems*—(a) *Design.* Hydraulic systems and elements shall withstand, without exceeding the yield point, all structural loads wich may be imposed in addition to the hydraulic loads.

(b) *Tests.* Hydraulic systems shall be substantiated by proof pressure tests. When proof tested, no part of the hydraulic systems shall fail, malfunction, or experience a permanent set. The proof load of any system shall be 1.5 times the maximum operating pressure of that system.

(c) *Lines and fittings.* Hydraulic lines and fittings in all designated fire zones (see § 4b.480) shall comply with the provisions of § 4b.483.

(d) *Reservoirs and accumulators.* Location of hydraulic reservoirs and accumulators shall comply with the provisions of § 4b.481, except when they are an integral part of the engine or propeller.



NOTES

1. Data based on:
   a. System 100 percent efficient.
   b. Respiratory minute volume equals 15 liters (915 cubic inches) per minute.
   c. 100 percent oxygen above 30,000 feet.
2. For dilutor-demand regulators use flow characteristics supplied by manufacturer to calculate required supply. Such flows must not be less than those indicated on this graph of delivery rate of 15 liters per minute.

FIGURE 4b–18—Minimum flow of oxygen for operation at various altitudes.

SUBPART G—OPERATING LIMITATIONS AND INFORMATION

General

§ 4b.700 *Scope.* (a) The operating limitations listed in §§ 4b.710 through 4b.723 shall be established as prescribed in this part.

(b) The operating limitations, together with any other information concerning the airplane found necessary for safety during operation, shall be made available to appropriate members of the flight crew by means of the Airplane Flight Manual, as prescribed in § 4b.740, by means of the markings and placards as prescribed in § 4b.730, and by such additional means as may be found necessary to accomplish this purpose.

Operating Limitations

§ 4b.710 *Air-speed limitations; general.* When air-speed limitations are a function of weight, weight distribution, altitude, or Mach number, the values corresponding with all critical combinations of these values shall be established. These air speeds shall be expressed in IAS.

§ 4b.711 *Never-exceed speed, V_{NE}.* (a) To allow for possible variations in the airplane characteristics and to minimize the possibility of inadvertently exceeding safe speeds, the never-exceed speed V_{NE} shall be a speed established sufficiently below the lesser of:

(1) The design dive speed V_D chosen in accordance with § 4b.210 (b) (5), or

(2) The maximum speed demonstrated in flight in accordance with § 4b.190.

(b) In the absence of a rational investigation, the value of V_{NE} shall not exceed 0.9 times the lesser of the two speeds referred to in paragraph (a).

§ 4b.712 *Normal operating limit speed, V_{NO}.* (a) The normal operating limit speed V_{NO} shall be established not to exceed the design cruising speed V_C chosen in accordance with § 4b.210 (b) (4) and sufficiently below the never-exceed speed V_{NE} to make it unlikely that V_{NE} would be exceeded in a moderate upset occurring at V_{NO}.

(b) In the absence of a rational investigation, the value of V_{NO} shall not exceed 0.9 times V_{NE}.

§ 4b.713 *Maneuvering speed.* The maneuvering speed shall not exceed the design maneuvering speed V_A determined in accordance with § 4b.210 (b) (2).

§ 4b.714 *Flaps extended speed, V_{FE}.* (a) The flaps extended speed V_{FE} shall be established not to exceed the lesser of:

(1) The design flap speed V_F chosen in accordance with § 4b.210 (b) (1), or

(2) The design speed for slipstream effects with flaps in the landing position, chosen in accordance with § 4b.221.

(b) The value of V_{FE} established in accordance with paragraph (a) shall not be less than a value which provides a safe speed margin above the stall during approach and landing.

(c) It shall be acceptable to establish supplementary values of V_{FE} for other

combinations of flap setting, air speed, and engine power, if the structure and the flight characteristics of the airplane have been shown to be satisfactory for such combinations.

§ 4b.715 *Landing gear operating speed, V_{LO}.* The landing gear operating speed V_{LO} shall be established not to exceed a speed at which it is safe to extend or retract the landing gear as limited by design in accordance with § 4b.334 or by flight characteristics.

§ 4b.716 *Landing gear extended speed, V_{LE}.* The landing gear extended speed V_{LE} shall be established not to exceed a speed at which it has been shown that the airplane can be safely flown with the landing gear secured in the fully extended position, and for which the structure has been proven in accordance with § 4b.334.

§ 4b.717 *Minimum control speed, V_{MC}.* (See § 4b.133.)

§ 4b.718 *Powerplant limitations.* The following powerplant limitations shall be established for the airplane. They shall not exceed the corresponding limits established as a part of the type certification of the engine and propeller installed in the airplane.

(a) *Take-off operation.* (1) Maximum rotational speed (rpm),

(2) Maximum permissible manifold pressure,

(3) The time limit for use of the power which corresponds with the values established in subparagraphs (1) and (2), of this paragraph,

(4) Where the time limit established in subparagraph (3) of this paragraph exceeds two minutes, the maximum allowable cylinder head or coolant outlet, and oil temperatures.

(b) *Maximum continuous operation.* (1) Maximum rotational speed (rpm),

(2) Maximum permissible manifold pressure,

(3) Maximum allowable cylinder head or coolant outlet, and oil temperatures.

(c) *Fuel octane rating.* The minimum octane rating of fuel required for satisfactory operation of the powerplant at the limits specified in paragraphs (a) and (b) of this section.

§ 4b.719 *Airplane weight and center of gravity limitations.* The airplane weight and center of gravity limitations shall be those determined in accordance with §§ 4b.101 and 4b.102. Where the airplane is certificated for more than one center of gravity range, the appropriate limitations with regard to weight and loading procedures shall be set forth in the Airplane Flight Manual for each separate center of gravity range.

§ 4b.720 *Minimum flight crew.* The minimum flight crew shall be established by the Administrator as that number of persons which he finds necessary for safety in the operations authorized under § 4b.721. This finding shall be based upon the work load imposed upon individual crew members with due consideration given to the accessibility and the ease of operation of all necessary controls by the appropriate crew members.

§ 4b.721 *Types of operation.* The types of operation to which the airplane is limited shall be established by the category in which it has been found eligible for certification and by the equipment installed. (See the operating parts of the Civil Air Regulations.)

§ 4b.722 *Maximum operating altitude.* A maximum altitude shall be established up to which operation is permitted, as limited by flight, structural, powerplant, functional, or equipment characteristics.

§ 4b.723 *Maneuvering flight load factors.* Load factor limitations shall be established not to exceed the limit positive load factors determined from the maneuvering diagram, figure 4–2. (See § 4b.211 (a).)

Markings and Placards

§ 4b.730 *General.* (a) Markings and placards shall be displayed in a conspicuous place and shall be such that they cannot be easily erased, disfigured, or obscured.

(b) Additional information, placards, and instrument markings having a direct and important bearing on safe operation shall be required when unusual design, operating, or handling characteristics so warrant.

§ 4b.731 *Instrument markings; general.* (a) When markings are placed on the cover glass of the instrument, provision shall be made to maintain the correct alignment of the glass cover with the face of the dial.

(b) All arcs and lines shall be of sufficient width and so located that they are clearly visible to the pilot.

§ 4b.732 *Air-speed indicator.* The following markings shall be placed on the air-speed indicator. If speeds vary with altitude, means shall be provided to indicate the appropriate limitation to the pilot throughout the operating altitude range.

(a) A radial red line shall indicate the never-exceed speed V_{SE} (see § 4b.711).

(b) A yellow arc extending from the red line specified in paragraph (a) of this section to the upper limit of the green arc specified in paragraph (c) of this section shall indicate the caution range.

(c) A green arc with the lower limit at V_{s_1} as determined in § 4b.112 (b) with maximum take-off weight, landing gear and wing flaps retracted, and the upper limit at the normal operating limit speed V_{NO} established in § 4b.712 shall indicate the normal operating range.

(d) A white arc with the lower limit at V_{s_0} as determined in § 4b.112 (a) at the maximum landing weight, and the upper limit at the flaps-extended speed V_{FE} as established in § 4b.714 shall indicate the flap operating range.

§ 4b.733 *Magnetic direction indicator.* (a) A placard shall be installed on or in close proximity to the magnetic direction indicator which contains the calibration of the instrument in a level flight attitude with engine(s) operating. The placard shall state whether the calibration was made with radio receiver(s) on or off.

(b) The calibration readings shall be in terms of magnetic headings in not greater than 45° increments.

§ 4b.734 *Powerplant instruments; general.* All required powerplant instruments shall be marked as follows:

(a) The maximum and the minimum (if applicable) safe operational limits shall be marked with red radial lines.

(b) The normal operating ranges shall be marked with a green arc not extending beyond the maximum and minimum safe operational limits.

(c) The take-off and precautionary ranges shall be marked with a yellow arc.

§ 4b.735 *Oil quantity indicators.* Indicators shall be marked in sufficient increments so that they will indicate readily and accurately the quantity of oil.

§ 4b.736 *Fuel quantity indicator.* When the unusable fuel supply for any tank exceeds 1 gallon or 5 percent of the tank capacity, whichever is greater, a red arc shall be marked on the indicator extending from the calibrated zero reading to the lowest reading obtainable in the level flight attitude. A suitable notation in the Airplane Flight Manual shall be made to indicate that the fuel remaining in the tank when the quantity indicator reaches zero is not usable in flight. (See § 4b.613 (c).)

§ 4b.737 *Control markings; general.* All cockpit controls, with the exception of the primary flight controls and other controls the function of which is obvious, shall be plainly marked and/or identified as to their function and method of operation.

(a) *Aerodynamic controls.* The secondary controls shall be marked to comply with §§ 4b.322 and 4b.323.

(b) *Powerplant fuel controls.* (1) Controls for fuel tank selector valves shall be marked to indicate the position corresponding with each tank and with all possible cross-feed positions.

(2) When more than one fuel tank is provided, and if safe operation depends upon the use of tanks in a specific sequence, the fuel tank selector controls shall be marked adjacent to or on the control itself to indicate the order in which the tanks should be used.

(3) Controls for engine selector valves shall be marked to indicate the position corresponding with each engine.

(c) *Accessory and auxiliary controls.* (1) When a retractable landing gear is used, the visual indicator required in §4b.334 (e) shall be marked so that the pilot can ascertain at all times when the wheels are locked in either extreme position.

(2) Emergency controls shall be colored red and shall be marked to indicate their method of operation.

§ 4b.738 *Miscellaneous markings and placards*—(a) *Baggage compartments and ballast location.* Each baggage and cargo compartment as well as the ballast location shall bear a placard stating the maximum allowable weight of contents and, if applicable, any other limitation on contents found necessary due to loading requirements.

(b) *Fuel, oil, and coolant filler openings.* The following information shall be marked on or adjacent to the appropriate filler cover:

(1) The word "fuel", the minimum permissible fuel octane number for the engines installed, and the usable fuel tank capacity (see § 4b.416);

(2) The word "oil" and the oil tank capacity;

(3) The name of the proper coolant fluid and the capacity of the coolant system.

(c) *Emergency exit placards.* (1) Emergency exits shall be marked as such with luminous paint in letters not less than ¾ inch high. The markings shall be located either on or immediately adjacent to the exit and shall be conspicuous to the passengers.

(2) The location and method of operation of the emergency exit handles shall be marked with luminous paint. (See § 4b.362 (c).)

(d) *Operating limitation placard.* A placard shall be provided in front of and in clear view of the pilots stating: "This airplane must be operated in compliance with the operating limitations specified in CAA approved Airplane Flight Manual."

(e) *Safety equipment.* (1) Safety equipment controls which the crew is expected to operate in time of emergency such as flares, automatic life raft releases, etc., shall be easily accessible and plainly marked as to their method of operation.

(2) When fire extinguishers and signaling and other life-saving equipment are carried in lockers, compartments, etc., these locations shall be marked accordingly.

Airplane Flight Manual

§ 4b.740 *General.* (a) An Airplane Flight Manual shall be furnished with each airplane.

(b) The portions of the manual listed in §§ 4b.741 through 4b.743 as are appropriate to the airplane shall be verified and approved and shall be segregated, identified, and clearly distinguished from portions not so approved.

(c) Additional items of information having a direct and important bearing on safe operation shall be required when unusual design, operating, or handling characteristics so warrant.

§ 4b.741 *Operating limitations*—(a) *Air-speed limitations.* The following air-speed limitations shall be included together with sufficient information to permit marking the air-speed indicator in accordance with § 4b.732:

(1) The never-exceed speed (see § 4b.711);

(2) The normal operating limit speed (see § 4b.712) together with a statement to the effect that normal flight operations should be confined to speeds below this value, and a further statement to the effect that the range of speeds between the normal operating limit speed and the never-exceed speed should be entered with caution and with due regard to the prevailing flight and atmospheric conditions;

(3) When an air-speed limitation is based upon compressibility effects, a statement to this effect, together with information as to any symptoms, the probable behavior of the airplane, and recommended recovery procedures;

(4) The maneuvering speed (see § 4b.210 (b) (2)), together with a statement to the effect that full application of rudder and aileron controls as well as those maneuvers which involve angles of attack near the stall should be confined to speeds below this value;

(5) The flaps extended speed (see § 4b.714), together with a description of the pertinent flap positions and engine powers;

(6) The landing gear operating speed (see § 4b.715), together with a statement to the effect that this is the maximum speed at which it is safe to extend or retract the landing gear;

(7) The landing gear extended speed (see § 4b.716), if greater than the landing gear operating speed, together with a statement to the effect that this is the maximum speed at which the airplane can be flown safely with the landing gear in the extended position.

(b) *Powerplant limitations.* Information shall be included to outline and to explain all powerplant limitations (see § 4b.718) and to permit marking the instruments as required in §§ 4b.734 through 4b.736.

(c) *Weight and loading distribution.* The airplane weights and c. g. limits required by §§ 4b.101 and 4b.102, shall be included together with the items of equipment on which the empty weight is based. Where the variety of possible loading conditions warrants, instructions shall be included to facilitate observance of the limitations.

(d) *Flight load acceleration limits.* The positive maneuvering limit load factors for which the airplane structure has been proven shall be described in terms of accelerations, together with a statement to the effect that these accelerations limit the angle of bank in turns and limit the severity of pull-up maneuvers.

(e) *Flight crew.* The number and functions of the minimum flight crew determined in accordance with § 4b.720 shall be described.

(f) *Type of operation.* The type(s) of operation(s) shall be listed for which the airplane and its equipment installations have been approved.

(g) *Maximum operating altitude.* The altitude established under § 4b.722 shall be included, together with an explanation of the limiting factors.

§ 4b.742 *Operating procedures*—(a) *Normal.* Information and instructions shall be included regarding any peculiarities of starting and warming the engines, taxying, operation of wing flaps, landing gear, automatic pilot, etc.

(b) *One engine inoperative.* The recommended procedure shall be described to be followed in the event of engine failure, including minimum speeds, trim, operation of remaining engine(s), operation of flaps, etc.

(c) *Propeller feathering.* The recommended procedure shall be described to be followed in stopping the rotation of propellers in flight.

(d) *Other emergency procedures.* Recommended procedures shall be described to be followed in the event of fire, decompression, etc.

§ 4b.743 *Performance information*—(a) *Performance data.* A summary of all pertinent performance data shall be given, including the performance data necessary for the application of the operating rules of the Civil Air Regulations, together with descriptions of the conditions, air speeds, etc., under which these data were determined.

(b) *Flap controls.* Instructions shall be included describing the use and adjustment of the flap controls necessary to obtain the performance listed according to paragraph (a) of this section.

(c) *Air speeds.* The indicated air speeds corresponding with those determined for take-off shall be listed together with the procedures to be followed in the event the critical engine becomes inoperative during take-off (see § 4b.742 (b)).

(d) *Miscellaneous.* An explanation shall be included of any significant or unusual flight or ground handling characteristics.

Airplane Identification Data

§ 4b.750 *Identification plate.* A fireproof identification plate shall be securely attached to the structure in an accessible location where it will not likely be defaced during normal service. The identification plate shall not be placed in a location where it might be expected to be destroyed or lost in the event of an accident. The identification plate shall contain the identification data required by § 2.36 of this chapter.

[F. R. Doc. 50-723; Filed, Jan. 24, 1950; 8:59 a. m.]

NOTICES

DEPARTMENT OF THE TREASURY

Fiscal Service, Bureau of the Public Debt

[1950 Dept. Circular 856]

1¼ PERCENT TREASURY NOTES OF SERIES A–1951

OFFERING OF NOTES

JANUARY 20, 1950.

I. *Offering of notes.* 1. The Secretary of the Treasury, pursuant to the authority of the Second Liberty Bond Act, as amended, invites subscriptions, at par, from the people of the United States for notes of the United States, designated 1¼ percent Treasury Notes of Series A–1951, in exchange for Treasury Certificates of Indebtedness of Series B–1950, maturing February 1, 1950.

II. *Description of notes.* 1. The notes will be dated February 1, 1950, and will bear interest from that date at the rate of 1¼ percent per annum, payable on a semiannual basis on October 1, 1950, and April 1 and October 1, 1951. They will mature October 1, 1951, and will not be subject to call for redemption prior to maturity.

2. The income derived from the notes shall be subject to all taxes, now or hereafter imposed under the Internal Revenue Code, or laws amendatory or supplementary thereto. The notes shall be subject to estate, inheritance, gift or other excise taxes, whether Federal or State, but shall be exempt from all taxation now or hereafter imposed on the principal or interest thereof by any State, or any of the possessions of the United States, or by any local taxing authority.

3. The notes will be acceptable to secure deposits of public moneys. They will not be acceptable in payment of taxes.

4. Bearer notes will be issued in denominations of $1,000, $5,000, $10,000, $100,000 and $1,000,000. The notes will not be issued in registered form.

5. The notes will be subject to the general regulations of the Treasury Department, now or hereafter prescribed, governing United States notes.

III. *Subscription and allotment.* 1. Subscriptions will be received at the Federal Reserve Banks and Branches and at the Treasury Department, Washington. Banking institutions generally may submit subscriptions for account of customers, but only the Federal Reserve Banks and the Treasury Department are authorized to act as official agencies.

2. The Secretary of the Treasury reserves the right to reject any subscription, in whole or in part, to allot less than the amount of notes applied for, and to close the books as to any or all subscriptions at any time without notice; and any action he may take in these respects shall be final. Subject to these reservations, all subscriptions will be allotted in full. Allotment notices will be sent out promptly upon allotment.

IV. *Payment.* 1. Payment at par for notes allotted hereunder must be made on or before February 1, 1950, or on later allotment, and may be made only in Treasury Certificates of Indebtedness of Series B–1950, maturing February 1, 1950, which will be accepted at par, and should accompany the subscription.

V. *General Provisions.* 1. As fiscal agents of the United States, Federal Reserve Banks are authorized and requested to receive subscriptions, to make allotments on the basis and up to the amounts indicated by the Secretary of the Treasury to the Federal Reserve Banks of the respective Districts, to issue allotment notices, to receive payment for notes allotted, to make delivery of notes on full-paid subscriptions allotted, and they may issue interim receipts pending delivery of the definitive notes.

2. The Secretary of the Treasury may at any time, or from time to time, prescribe supplemental or amendatory rules and regulations governing the offering, which will be communicated promptly to the Federal Reserve Banks.

[SEAL] JOHN W. SNYDER,
Secretary of the Treasury.

[F. R. Doc. 50–690; Filed, Jan. 24, 1950; 8:50 a. m.]

DEPARTMENT OF AGRICULTURE

Forest Service

[Memorandum No. 1249]

NATIONAL FOREST ADVISORY BOARD OF APPEALS [1]

There is hereby established the National Forest Advisory Board of Appeals to advise the Secretary on any appeals to him from the decisions of the Chief of the Forest Service involving any public use of the national forests and other lands under the administration or control of the Forest Service. The Board shall be comprised of five employees of the Department of Agriculture, to be selected from any agencies within the Department except the Forest Service. A majority of the members of the Board shall constitute a quorum. Upon receipt of a written request to the Secretary from the appellant, the Secretary shall refer the appeal to the Board before which the appellant may appear if he so desires and the Board shall consider the appeal on its merits and furnish its advice and recommendations to the Secretary.

Done at Washington, D. C., this 17th day of January 1950. Witness my hand and the seal of the Department of Agriculture.

[SEAL] CHARLES F. BRANNAN,
Secretary of Agriculture.

[F. R. Doc. 50–699; Filed, Jan. 24, 1950; 8:49 a. m.]

[1] See Title 36, Chapter II, Part 211, *supra.*

CIVIL AERONAUTICS BOARD

[Docket No. 4150]

GOLDEN NORTH AIRWAYS, INC.

NOTICE OF HEARING

In the matter of the suspension and revocation of Letter of Registration No. 666 issued to Golden North Airways, Inc.

Notice is hereby given that hearing in the above-entitled proceeding postponed from January 19, 1950, to a time and place to be fixed, is assigned to be held on February 2, 1950, at 10:00 a. m., e. s. t., in Room 116, Wing "C", Temporary Building No. 5, Sixteenth Street and Constitution Avenue NW., Washington, D. C., before Examiner Curtis C. Henderson.

Dated at Washington, D. C., January 19, 1950.

By the Civil Aeronautics Board.

[SEAL] M. C. MULLIGAN,
Secretary.

[F. R. Doc. 50–673; Filed, Jan. 24, 1950; 8:46 a. m.]

FEDERAL COMMUNICATIONS COMMISSION

DELEGATIONS OF AUTHORITY

In the matter of amendment of section 0.145 of the Commission's statement of delegations of authority.

At a meeting of the Federal Communications Commission held at its offices in Washington, D. C. on the 18th day of January 1950;

The Commission having under consideration a delegation to the Secretary of the Commission upon securing the approval of the Bureaus of Law, Engineering and Accounting, to act on applications for construction permits for noncommercial educational FM broadcast stations; and

It appearing, that such delegation would expedite Commission action on the above authorizations and would be in the public interest; and

It further appearing, that the amendment of the Commission's rules and regulations to effectuate the above proposal is procedural in nature and that the public notice and procedure provided for in section 4 of the Administrative Procedure Act is not required herein;

It is ordered, That, effective immediately, section 0.145 of the Commission's rules and regulations is amended by the addition of new paragraph (g), reading as follows:

(g) Applications for construction permits for new noncommercial educational FM broadcast stations.

Released: January 18, 1950.

FEDERAL COMMUNICATIONS COMMISSION,

[SEAL] T. J. SLOWIE,
Secretary.

[F. R. Doc. 50–687; Filed, Jan. 24, 1950; 8:52 a. m.]

INTERSTATE COMMERCE COMMISSION

[Rev. S. O. 562, King's Rev. I. C. C. Order 9]

REROUTING OR DIVERSION OF TRAFFIC

In the opinion of Homer C. King, Agent, the railroads, because of high water of the Ohio and the Wabash rivers and their tributaries in the states of Illinois, Indiana, and Kentucky, are unable to transport traffic routed over their lines in that territory: It is ordered, that:

(a) *Rerouting traffic.* Railroads unable to transport traffic to or through points in the states of Illinois, Indiana, and Kentucky because of high waters of the Ohio and the Wabash rivers and their tributaries, are hereby authorized and directed to reroute or divert such traffic over any available route to expedite the movement; the billing covering all such cars rerouted shall carry a reference to this order as authority for the rerouting.

(b) *Concurrence of receiving roads to be obtained.* The railroad desiring to divert or reroute traffic under this order shall confer with the proper transportation officer of the railroad or railroads to which such traffic is to be diverted or rerouted, and shall receive the concurrence of such other railroads before the rerouting or diversion is ordered.

(c) *Notification to shippers.* The carrier rerouting cars in accordance with this order shall notify each shipper at the time each car is rerouted or diverted and shall furnish to such shipper the new routing provided under this order.

(d) *Effective date.* This order shall become effective 12:01 a. m., January 18, 1950.

(e) *Expiration date.* This order shall expire at 11:59 p. m., January 31, 1950, unless otherwise modified, changed, suspended or annulled.

It is further ordered, that this order shall be served upon the Association of American Railroads, Car Service Division, as agent of all railroads subscribing to the car service and per diem agreement under the terms of that agreement.

Issued at Washington, D. C., January 18, 1950.

INTERSTATE COMMERCE COMMISSION,
HOMER C. KING,
Agent.

[F. R. Doc. 50-679; Filed, Jan. 24, 1950; 8:47 a. m.]

[4th Sec. Application 24809]

VARIOUS COMMODITIES FROM, TO AND BETWEEN POINTS IN THE SOUTH

APPLICATION FOR RELIEF

JANUARY 20, 1950.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: R. E. Boyle, Jr., Agent, pursuant to fourth-section order No. 9800.

Commodities involved: Various commodities.

From: To and between points in the south.

Grounds for relief: Circuitous routes.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL,
Secretary.

[F. R. Doc. 50-675; Filed, Jan. 24, 1950; 8:46 a. m.]

[4th Sec. Application 24810]

MOTOR-RAIL RATES; NEW YORK, NEW HAVEN AND HARTFORD RAILROAD CO.

APPLICATION FOR RELIEF

JANUARY 20, 1950.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: The New York, New Haven and Hartford Railroad Company and Rand Express Freight Lines, Inc.

Commodities involved: All commodities.

Between: Harlem River, N. Y., and Providence, R. I., or Boston, Mass., or Springfield, Mass.

Grounds for relief: Competition with motor carriers.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL,
Secretary.

[F. R. Doc. 50-676; Filed, Jan. 24, 1950; 8:47 a. m.]

[4th Sec. Application 24811]

WOODPULP FROM THE SOUTH TO MENOMINEE, MICH., AND MARINETTE, WIS.

APPLICATION FOR RELIEF

JANUARY 20, 1950.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: R. E. Boyle, Jr., Agent, for and on behalf of carriers parties to Agent C. A. Spaninger's tariff I. C. C. No. 1051.

Commodities involved: Woodpulp, carloads.

From: Points in the south.

To: Menominee, Mich., and Marinette, Wis.

Grounds for relief: Circuitous routes.

Schedules filed containing proposed rates: C. A. Spaninger's tariff I. C. C. No. 1051, Supplement 79.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL,
Secretary.

[F. R. Doc. 50-677; Filed, Jan. 24, 1950; 8:47 a. m.]

[4th Sec. Application 24812]

GRAIN FROM TEXAS TO ST. LOUIS, MO., AND EAST ST. LOUIS, ILL.

APPLICATION FOR RELIEF

JANUARY 20, 1950.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section (4) (1) of the Interstate Commerce Act.

Filed by: D. Q. Marsh, Agent, for and on behalf of carriers parties to his tariff I. C. C. No. 3831.

Commodities involved: Grain, grain products and related articles, also seeds, carloads.

From: Points in Texas.

To: St. Louis, Mo., and East St. Louis, Ill.

Grounds for relief: Circuitous routes.

Schedules filed containing proposed rates: D. Q. Marsh's tariff I. C. C. No. 3831, Supplement 14.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commis-

sion in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL, *Secretary.*

[F. R. Doc. 50-678; Filed, Jan. 24, 1950; 8:47 a. m.]

SECURITIES AND EXCHANGE COMMISSION

[File Nos. 70-1178, 70-1852]

INDIANA SERVICE CORP. ET AL.

SUPPLEMENTAL ORDER APPROVING EXTENSION OF TIME

At a regular session of the Securities and Exchange Commission held at its office in the city of Washington, D. C., on the 19th day of January A. D. 1950.

In the matter of Indiana Service Corporation, Indiana & Michigan Electric Company, American Gas and Electric Company, File No. 70-1852; American Gas and Electric Company, File No. 70-1178.

American Gas and Electric Company ("American Gas") having on June 30, 1947, acquired all the common stock of Indiana Service Corporation ("Indiana Service") in accordance with the Commission's order of December 18, 1946, subject to the condition that the non-electric properties of Indiana Service be disposed of within one year from the date of acquisition, provided, however, that application might be made for an extension or extensions of such period for good cause shown; and

The Commission by order dated June 30, 1948, having (1) approved the merger of Indiana Service into Indiana & Michigan Electric Company ("Indiana & Michigan"), also a subsidiary of American Gas, and (2) extended the period for the disposition of the gas properties by the merged company; and the Commission by orders dated January 6, 1949, and July 6, 1949, having granted further extensions of time for such dispositions; and

American Gas and Indiana & Michigan having filed an application for a further extension of the period for the disposition of the gas properties to June 30, 1950, said application indicating that American Gas and Indiana & Michigan have heretofore disposed of the transportation and water properties of Indiana & Michigan, that the only remaining properties of the company to be disposed of are the gas properties, and that the companies concerned have been engaged in negotiations looking toward the sale of the gas properties; and

It appearing to the Commission that it is appropriate to grant the application in view of all the circumstances of this case:

It is ordered, That the period for American Gas and Indiana & Michigan to dispose of the gas properties of Indiana & Michigan be, and the same hereby is, extended to June 30, 1950.

By the Commission.

[SEAL] ORVAL L. DUBOIS, *Secretary.*

[F. R. Doc. 50-672; Filed, Jan. 24, 1950; 8:46 a. m.]

DEPARTMENT OF JUSTICE

Office of Alien Property

AUTHORITY: 40 Stat. 411, 55 Stat. 839, Pub. Laws 322, 671, 79th Cong., 60 Stat. 50, 925; 50 U. S. C. and Supp. App. 1, 616; E. O. 9193, July 6, 1942, 3 CFR, Cum. Supp., E. O. 9567, June 8, 1945, 3 CFR, 1945 Supp., E. O. 9788, Oct. 14, 1946, 11 F. R. 11981.

[Vesting Order 14049, Amdt.]

MARY HOPFF

In re: Debt owing to Mary Hopff, also known as Caecilie Hopff.

Vesting Order 14049, dated November 17, 1949, is hereby amended as follows and not otherwise:

By deleting from subparagraph 2 of said Vesting Order 14049 the date "December 31, 1945" and substituting therefor the date "July 18, 1948".

All other provisions of said Vesting Order 14049 and all actions taken by or on behalf of the Attorney General of the United States in reliance thereon, pursuant thereto and under the authority thereof are hereby ratified and confirmed.

Executed at Washington, D. C., on January 6, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON, *Acting Director, Office of Alien Property.*

[F. R. Doc. 50-691; Filed, Jan. 24, 1950; 8:50 a. m.]

[Return Order 529]

GISELA BOESL

Having considered the claim set forth below and having issued a determination allowing the claim, which is incorporated by reference herein and filed herewith,

It is ordered, That the claimed property, described below and in the determination, be returned, subject to any increase or decrease resulting from the administration thereof prior to return, and after adequate provision for taxes and conservatory expenses:

Claimant, Claim No., Notice of Intention To Return Published, and Property

Gisela Boesl, Vienna, Austria; Claim No. 39913; December 2, 1949 (14 F. R. 7261); $990.51 in the Treasury of the United States.

Appropriate documents and papers effectuating this order will issue.

Executed at Washington, D. C., on January 18, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON, *Acting Director, Office of Alien Property.*

[F. R. Doc. 50-692; Filed, Jan. 24, 1950; 8:51 a. m.]

[Return Order 532]

UNITA BALDUCCI

Having considered the claim set forth below and having issued a determination allowing the claim, which is incorporated by reference herein and filed herewith,

It is ordered, That the claimed property, described below and in the determination, be returned, subject to any increase or decrease resulting from the administration thereof prior to return, and after adequate provision for taxes and conservatory expenses:

Claimant, Claim No., Notice of Intention To Return Published, and Property

Unita Balducci, Vicopisano, Pisa, Italy; Claim No. 7136; December 2, 1949 (14 F. R. 7261); $4,602.07 in the Treasury of the United States and an undivided one-half interest in each of two pieces of real property, described as follows:

(1) All that certain lot, piece or parcel of land, lying and being in the City of Richmond, Virginia, at the northwest corner of Kensington and Belmont Avenues, and more fully described as follows: Beginning at the northwest intersection of Kensington and Belmont Avenues, thence running westwardly along and fronting on the north line of Kensington Avenue Fifty (50) Feet, thence back northwardly from said front and between parallel li[illegible] (the eastern line of which is the western line of Belmont Avenue) One hundred and Twenty (120) Feet to an alley in the rear Fifteen (15) feet wide, being lots 32 and 33 in Block 5 in the Plan of Lee Annex.

(2) All that certain lot, piece or parcel of land, lying and being in the City of Richmond, Virginia, and more fully described as follows, to-wit: Beginning at a point on the West Line of Belmont Avenue distant One Hundred (100) Feet North of the intersection of the Northern line of Kensington Avenue with the Western line of Belmont Avenue, thence running Northwardly along the said Western line of Belmont Avenue Twenty (20) Feet to the Southern line of a fifteen (15) Foot alley, thence back Westwardly between parallel lines Thirty (30) Feet, (the Northern line of which is the Southern line of said Fifteen (15) Foot alley.

Appropriate documents and papers effectuating this order will issue.

Executed at Washington, D. C., on January 18, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON, *Acting Director, Office of Alien Property.*

[F. R. Doc. 50-693; Filed, Jan. 24, 1950; 8:51 a. m.]

[Return Order 536]

BERTHA GRUMBACH

Having considered the claim set forth below and having issued a determination allowing the claim, which is incorporated by reference herein and filed herewith,

It is ordered, That the claimed property, described below and in the determination, be returned, subject to any increase or decrease resulting from the administration thereof prior to return, and after adequate provision for taxes and conservatory expenses:

Claimant, Claim No., Notice of Intention To Return Published, and Property

Bertha Grumbach, Freiburg, Germany; Claim No. 29438; December 14, 1949 (14 F. R. 7496); $4,192.45 in the Treasury of the United States. All right, title and interest of Bertha Grumbach in and to the Estate of Emil Weil, deceased, and in and to the trusts created under the Will of Emil Weil.

Appropriate documents and papers effectuating this order will issue.

Executed at Washington, D. C., on January 18, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON,
Acting Director,
Office of Alien Property.

[F. R. Doc. 50-694; Filed, Jan 24, 1950; 8:52 a. m.]

DUSINE MARIE FRIMER

NOTICE OF INTENTION TO RETURN VESTED PROPERTY

Pursuant to section 32 (f) of the Trading With the Enemy Act, as amended, notice is hereby given of intention to return, on or after 30 days from the date of the publication hereof, the following property, subject to any increase or decrease resulting from the administration thereof prior to return, and after adequate provision for taxes and conservatory expenses:

Claimant, Claim No., Property, and Location

Dusine Marie Frimer, Veslos, Denmark; Claim No. 4734; $1,122.63 in the Treasury of the United States.

Executed at Washington, D. C., on January 19, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON,
Acting Director,
Office of Alien Property.

[F. R. Doc. 50-695; Filed, Jan. 24, 1950; 8:52 a. m.]

[Return Order 519]

GIUSEPPINA AZZOLINI ET AL.

Having considered the claims set forth below and having issued a determination allowing the claims, which is incorporated by reference herein and filed herewith,

It is ordered, That the claimed property, consisting of shares of the common and third preferred capital stock of the De Nobili Cigar Company, Long Island City, New York, together with the cash dividends accrued thereon be returned, subject to any increase or decrease resulting from the administration thereof prior to return and after adequate provision for taxes and conservatory expenses. The claimants, the number of shares claimed, the stock certificate numbers and the amount of the dividends are identified below:

Claim No.	Claimant	Shares		Certificate numbers	Amount
		Common	Preferred		
39679	Giuseppina Azzolini, Sarzana, Italy	51		22	$218.02
			30	86	
39600	Alfonso Bruzzo, Lorenzo Bruzzo, Benedetto Bruzzo, Matteo Bruzzo, a/k/a Fratelli Bruzzo, Genoa, Italy		210	106	1,074.30
39614	Maria Barbano ved. Ceci, a/k/a Maria Ceci, Rome, Italy	25		64	236.27
			40	119	
39616	Bianca Boccardo, Paolina Boccardo ved. Cerone, Eugenia Boccardo, as heirs of Domenico Boccardo Genoa, Italy	20		66	224.83
			39	121	
39626	Ida Novaresio ved. de Ferrari, Giovanna De Ferrari, Nicoletta De Ferrari, as heirs of Angelo De Ferrari, Pavia, Italy	215		74	1,499.96
			240	131	
39643	Angelo Galletto as sole heir of G. B. Galletto, Genoa, Italy	25		92	195.35
			32	147	
39647	Giuseppe Gambaro, as sole heir of Maria Gambaro, Genoa, Italy	220		96	1,127.66
			165	151	
39673	Giuseppe Orlando, Florence, Italy	18		122	196.72
			34	175	
39677	Enrica Basevi ved. Levi, Gabriella Basevi in Zamorani, Rome, Italy	25		126	31.64
39693	Lina Poggiolini, Anna Poggiolini, Florence, Italy	36		147	45.57
39699	Enrichetta Capurro, Genoa, Italy	20		153	127.63
			20	203	
39702	Olga Queirolo, Anna Benvenuto, as heirs of Giovanni Queirolo, Genoa, Italy.	10		156	168.13
			30	206	
39709	Ing. Riccardo Salvadori, Rome, Italy		106	213	542.26
39712	Mario Scartezzini, Giorgina Scartezzini, Maria Scartezzini, as the heirs of Giovanna Bassi ved. Scartezzini, Genoa, Italy.	18		165	534.35
			100	216	
39719	Enrico Sermarini, as the sole heir of Andreina Vignolo ved. Sermarini, Genoa, Italy.	6		172	365.69
			70	222	
39732	Clemente Aldobrandini, Ferdinando Aldobrandini, as heirs of Giuseppe Aldobrandini, Rome, Italy.	25		185	133.96
			20	233	
39741	Gemma Apricale, Angelita Apricale, as heirs of Placida Erminia Apricale, Genoa, Italy.	4		190	40.88
			7	237	
39779	Adelaide Manni Reale, a/k/a Adelaide Manni di Attilio, Rome, Italy.	5		225	24.67
			2	268	
39780	Carlo Miragoli, Maria Grazia De Angelis, as heirs of Giovanni Miragoli, Rome, Italy	5		226	9.34
39786	Cesare Cavalleroni, Leopolda Pizzorno Cavalleroni, Elena Cavalleroni, Adele Bignone ved. Cavalleroni, as heirs of Riccardo Cavalleroni, Genoa, Italy	10		232	18.66
39795	Eugenia Tomati, Maria Tomati, as heirs of Mario Dazlio, Genoa, Italy.	3		240	121.46
			23	272	
39839	Angelita Apricale, Gemma Apricale, Lorenzo Rubatto, Genoa, Italy		36	312	184.17
39847	William Thomas Dowland Robson, as sole heir of Jole Robson, Apuania, Italy.		4	318	33.13
		10		282	
40644	Francesco Perotto, Giovanni Perotto, as heirs of Umberto Perotto, Spezia, Italy.	40		142	306.41
			50	194	
40645	Giovanna Saudino, Giuseppe Saudino, Pier Luigi Saudino, Giovanni Ferrarini, as heirs of Leopoldo Ferrarini, Naples, Italy.	51		143	279.41
			42	195	

Appropriate documents and papers effectuating this order will issue.

Executed at Washington, D. C., on January 17, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON,
Acting Director,
Office of Alien Property.

[F. R. Doc. 50-665; Filed, Jan. 23, 1950; 8:49 a. m.]

FELIKS GRABCZEWSKI

NOTICE OF INTENTION TO RETURN VESTED PROPERTY

Pursuant to section 32 (f) of the Trading With the Enemy Act, as amended, notice is hereby given of intention to return, on or after 30 days from the date of publication hereof, the following property located in Washington, D. C., including all royalties accrued thereunder and all damages and profits recoverable for past infringement thereof, after adequate provision for taxes and conservatory expenses:

Claimant and Property

Feliks Grabczewski; d/b/a F. Grabczewski; Lodz, Cegielniana 82/8, Warsaw, Poland; Claim No. 37365; property to the extent owned by the claimant immediately prior to the vesting thereof, described in Vesting Order No. 4033 (9 F. R. 13269, November 8, 1944) relating to certain copyrights identified by assignments in the United States Copyright Office (listed in Exhibit A of said vesting order), including royalties pertaining thereto in the amount of $1,631.65.

Executed at Washington, D. C., on January 19, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON,
Acting Director,
Office of Alien Property.

[F. R. Doc. 50-696; Filed, Jan. 24, 1950; 8:52 a. m.]

HERMAN ROTTENBERG ET AL.

NOTICE OF INTENTION TO RETURN VESTED PROPERTY

Pursuant to section 32 (f) of the Trading With the Enemy Act, as amended, notice is hereby given of intention to return, on or after 30 days from the date of the publication hereof, the following property, subject to any increase or decrease resulting from the administration thereof prior to return, and after ade-

quate provision for taxes and conservatory expenses:

Claimant, Property, and Location

Herman Rottenberg, Brooklyn, N. Y.; Emanuel David Rothenberg, Waco, Tex.; Ruth Dina Rottenberg, New York, N. Y.; Gusti Rottenberg, New York, N. Y.; Regina Rottenberg, Brooklyn, N. Y.; Claim No. 24741; All right, title, interest and claim of any kind or character of Mina Rottenberg in and to the trust created under the will of Aaron Hanauer, deceased, in equal shares to the claimants; $1,019.40 in the Treasury of the United States in equal shares to the claimants.

To each of the claimants a one-fifth (⅕) interest in and to the following securities in the custody of the Safekeeping Department of the Federal Reserve Bank of New York:

United States Savings Bond No. 565515, Series G, 2½%, in the face amount of $5,000.00, dated October 1, 1942, due October 1, 1954, registered in the name of the Alien Property Custodian, Account No. 28-12305, Washington, D. C.

United States Savings Bond No. 3667977, Series G, 2½%, in the face amount of $1,000.00, dated October 1, 1942, due October 1, 1954, registered in the name of Alien Property Custodian, Account No. 28-12305, Washington, D. C.

United States Savings Bond No. 3667947, Series G, 2½%, in the face amount of $1,000.00, dated September 1, 1943, due September 1, 1955, registered in the name of Alien Property Custodian, Account No. 28-12305, Washington, D. C.

Executed at Washington, D. C., on January 19, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON,
Acting Director,
Office of Alien Property.

[F. R. Doc. 50-697; Filed, Jan. 24, 1950; 8:52 a. m.]

[Return Order 526]

HANS STRAUSS

Having considered the claim set forth below and having issued a determination allowing the claim, which is incorporated by reference herein and filed herewith,

It is ordered, That the claimed property, described below and in the determination, be returned, subject to any increase or decrease resulting from the administration thereof prior to return, and after adequate provision for taxes and conservatory expenses:

Claimant, Claim No., Notice of Intention To Return Published, and Property

Hans Strauss, New York, N. Y.; Claim No. 7778; Dec. 2, 1949 (14 F. R. 7261); all right, title, interest and claim of any kind or character whatsoever of Bertha Lion Strauss in and to the trust estate of Meier Katten, deceased; $3,881.46 in the Treasury of the United States.

Appropriate documents and papers effectuating this order will issue.

Executed at Washington, D. C., on January 17, 1950.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON,
Acting Director,
Office of Alien Property.

[F. R. Doc. 50-666; Filed, Jan. 23, 1950; 8:50 a. m.]