SPECIFICATION FOR PILOT'S OPERATING HANDBOOK

GAMA SPECIFICATION NO. 1

Issued: February 15,1975
Revised: October 18, 1996; Revision No. 2

prepared by

General Aviation
Manufacturers Association

SPECIFICATION FOR PILOT'S OPERATING HANDBOOK

LOG OF REVISIONS

Rev. Date	Page No.	Description
Rev. 1 (09/01/84)	iii	Revised preface page.
	iv	Revised preface page con't.
	v	Revised title. Rev. para. 3A, 6, 7 & 10.
	0-1	Revised para. 0.1,0.3, 0.5, 0.7.
	0-2	Revised para. 0.9, 0.11, 0.13, 0.15, 0.17.
	0-3	Revised para. 0.19, 0.21, 0.23, 0.25, 0.31.
	0-4	Revised para. 0.33, 0.35, 0.41, 0.43, 0.45, 0.51.
	0-5	Revised Figure 0-1.
	0-7	Revised Figure 0-2.
	0-8	Revised Figure 0-3.
	0-9	Revised Figure 0A.
	0-10	Revised Figure 0-5.
	0-11	Revised Figure 0-6.
	1-1	Revised para. 1.1, 1.3, 1.11, 1.13.
	1-2	Revised para. 1.21, 1.23, 1.25, 1.27, 1.29, 1.31.
	1-3	Revised para. 1.31 con't.
	1-4	Revised para. 1.31 con't.
	1-5	Revised para. 1.31 con't.
	2-1	Revised para. 2.1, 2.3.
	2-2	Revised Figure 2-1.
	2-3	Revised para. 2.5.
	2-4	Revised para. 2.7, 2.9.
	2-5	Revised para. 2.11, 2.12 and Figure 2-3.
	2-6	Revised para. 2.21. 2.23, 2.37, 2.39.
	3-1	Revised para. 3.1, 3.3, 3.5, 3.7.
	3-2	Revised para. 3.9, 3.9(a), 3.9(b), 3.9(c), 3.9(d), 3.9(e), 3.9(fl, 3.9(g), 3.9(h).
	3-3	Revised para. 3.9(i).
	3A-1	Revised para. 3A. 1, 3A.3, 3A.5.
	3A-2	Revised para. 3A.7, 3A.9.
	4-1	Revised para. 4.1 ,4.3, 4.5, 4.7.
	4-2	Revised para. 4.9, 4.13, 4.15, 4.17, 4.19.
	4-3	Revised para. 4.19 con't.
	5-1	Revised para. 5.1, 5.3, 5.7, 5.9, 5.11, 5.13, 5.15.
	5-2	Revised para. 5.35.
	5-3	Revised para. 5.37(e), 5.37(i).
	5-4	Revised para. 5.41(f).
	5-5	Revised para. 5.41(1) 5.
	5-7	Revised List of Figures.
	5-36	Revised page.
	5-37	Revised page.
	6-1	Revised title. Revised para. 6.1, 6.3, 6.5, 6.7, 6.9.
	6-2	Revised para 6.9 con't.

SPECIFICATION FOR PILOT'S OPERATING HANDBOOK

LOG OF REVISIONS

Rev. Date	Page No.	Description
Rev. 1 (09/01/84) (cont)	7-1	Revised title. Revised para. 7.1.
	7-3	Revised para. 7.33.
	7-4	Revised para. 7.51.
	8-1	Revised para. 8.1, 8.3, 8.9.
	8-2	Revised para. 8.15.
	9-1	Revised para. 9.1. 9.7, 9.9.
	10-1	Revised title.

Barry D. Clements, Manager
Aircraft Certification
Division, ACE-100
Revised: September 1, 1984

Rev. Date	Page No.	Description
Rev 2 (10/18/96)	iii	Revised log page
	iv	Revised preface page
	3-2	Revised para. 3.9(a), 3.9(g)
	4-2	Revised para. 4.9, 4.15
	5-6	Added para 5.42 Performance Presentations in Icing Conditions
	7-2	Revised para. 7.25(a), 7.25(g)
	10-1	Added safety tips (5)

JAN 17 1997

Michael Gallagher, Manager
Aircraft Certification Division
Small Airplane Directorate, ACE-100
Revised: October 18, 1996

PREFACE FOR REVISION 2

This revision of GAMA Specification No. 1 incorporates NTSB suggestions for inclusion of emergency procedures for supercharger/turbocharger failure, safety tips for operating in icing conditions and use of child restraint seats and normal operating procedures for short field and soft field landings. It also establishes, per FAA, the limitations of use of the specification for showing compliance with FAR 23.1581. The limitation applies to all editions of the specification and is as follows:

GAMA SPECIFICATION NO. 1 LIMITATION

Pilots Operating Handbooks prepared in accordance with "GAMA Specification No. 1", as revised through Revision No. 2, dated October 18, 1996, are appropriate for showing compliance with CAR 3, Paragraph 3.777, and FAR 23, Paragraph 23.1581 on airplanes having a certification basis including FAR 23 through Amendment 23-44 except Commuter Category (Ref. FAR 23 Amendment 23-34, Amendment 23-39 or both).

PREFACE

This Specification was developed by representatives of member companies of the General Aviation Manufacturers Association for use in preparing Pilot's Operating Handbooks that-

a. Are of maximum usefulness as an operating reference book for pilots;
b. Meet government regulatory requirements* where applicable; and
c. Meet industry standards for scope of material, arrangement, nomenclature and definitions.

This Specification is designed to provide guidance for the preparation of Handbooks for all types of general aviation airplanes originally certificated at maximum takeoff weights of 12,500 pounds or less (or 5,700 kg). Consequently, not all of the material in the Specification is applicable to any one model and provision is made for manufacturers to omit material inappropriate to specific aircraft types or models. Thus, the Specification provides flexibility in Handbook preparation based on the complexity of the airplane while maintaining a high degree of standardization of arrangement, definitions, and performance information.

The rules of construction followed in the preparation of this Specification are the same as generally used by the FAA in the preparation of its rules (See Federal Aviation Regulation 1.3). "Shall" is used in the imperative sense (that is, when there is an obligation to act in the manner specified). The word "shall" is also used in the imperative sense when there is a choice of more than one manner of fulfilling the obligation to act. In such cases, the right to choose between alternatives belongs to the Handbook (airplane) producer. For example, see Section 5, Performance, Paragraph 5.9 Format Options. This paragraph requires a presentation of data in one of only two formats - graphical or tabular. No other format is permissible. Which to use, graphical or tabular, is a choice completely up to the Handbook (airplane) producer.

When a right or privilege is conferred upon the producer of a Handbook, the word "may" is used. When a right or privilege is abridged, the words "may not" are used. Except when a specific layout, style, format, standard, etc., is required (or when a choice must be made from a specified list) the producer of the Handbook (airplane) may use whatever layout, style, format, standard, etc., he chooses. Except when the Handbook producer is restricted in choice or otherwise limited, the choice is his.

The sequence of topics in the Handbook is intended to increase in-flight usefulness. For example, the Sections on "Limitations" and "Emergency Procedures" are placed ahead of "Normal Procedures," "Performance," "Weight and Balance" and other Sections to provide easier access to information that may be required in flight.

The units used are those which will be of most value to pilots. Calibrated Airspeed (CAS) is to be used only as necessary to comply with any applicable requirements of the certificating authority as the pilot works exclusively with Indicated Airspeed (IAS). Also KNOTS are used throughout to avoid the confusion between knots (KTS) and miles per hour (MPH) in performance charts and tables.

Derived terms, such as "Density Altitude," are not used. Charts and tables are constructed so that they may be used with data directly available, such as pressure altitude and temperature.

The Specification contains little, if any, new material or novel approaches. Basically, it is a guide to industry standardization of proven concepts to be presented in a form most useful to pilots.

The Federal Aviation Administration has reviewed this Specification and has ". . . determined that a handbook that would meet the specification would also meet the intent of the requirements in FAR 23, which is to provide the pilot with all of the information needed to operate his aircraft in a safe manner." The Federal Aviation Administration recognized that compliance with this Specification will result in a high degree of standardization of content and format for all aircraft types and this will lead to a level of safety equal to or higher than is required under FAR 23.

*Note: This Specification refers to various FAA regulations. If the Specification is being used to prepare a Handbook for acceptance by an airworthiness authority other than FAA, the appropriate regulations of that airworthiness authority may be substituted.

CONTENTS

Section

SECTION 0

TECHNICAL PUBLICATION GUIDANCE

TABLE OF CONTENTS

INTENTIONALLY LEFT BLANK

SECTION 0
TECHNICAL PUBLICATION GUIDANCE

0.1 General

In order to achieve the objective of providing the pilot with required, useful or desirable information concerning the operation of the particular airplane, in a form reasonably uniform throughout the industry, drafters of Handbooks shall follow the Specification to the extent practical. Questions of compliance with the Specification shall be referred to the General Aviation Manufacturers Association (GAMA) and the Federal Aviation Administration (FAA) for resolution. Significant opinions concerning compliance with the Specification shall be published.

0.3 Cover Title

The cover title shall be "Pilot's Operating Handbook" or "Pilot's Operating Handbook and FAA Approved Airplane Flight Manual".

The cover title and applicable airplane designation shall be prominently displayed on the cover or spine (or both) of the Handbook. Other information may be displayed on the cover.

0.5 Binder Type and Page Size

Handbooks shall be readily revisable. They may be in loose-leaf form, with durable, multi-ring cover, or permanently bound. If in loose-leaf form "standard", or commonly used page sizes shall be used.

0.7 Title Page

The title page (See Figure 0-1) shall contain the following information:

1. The title, "Pilot's Operating Handbook and FAA Approved Airplane Flight Manual" for all airplanes except those for which the airplane manufacturer elected to provide a separate FAA Approved Airplane Flight Manual. In the latter case, the title shall be "Pilot's Operating Handbook".

Note: After the effective date of this revision, Pilot's Operating Handbooks for newly manufactured airplanes must be FAA Approved Airplane Flight Manuals.

2. The manufacturer's name.
3. The Handbook producer's (airplane manufacturer's) publication identification, if applicable.
4. The airplane serial number and registration number if appropriate (leave space for insertion of these numbers).

Note: The backside of the title page should be left blank to avoid the need for revision and potential loss of the inserted airplane serial and registration numbers.

5. The airplane model number, as shown in the FAA Type Certificate Data Sheet or Aircraft Specification and, at the Handbook producer's option, the type certification number or common airplane name, or both.
6. An applicability statement, prominently displayed, and similar to the following example (as appropriate).

"FAA approved in the normal category based on FAR 23. This document must be carried in the airplane at all times."

7. In Handbooks for airplanes required to have (or for which the airplane manufacturer has elected to Provide) FAA Approved Airplane Flight Manuals, the statement:

"THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER AND CONSTITUTES THE FAA APPROVED AIRPLANE FLIGHT MANUAL."

8. For Handbooks that are not FAA Approved Airplane Flight Manuals, the statement:

"THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER."

9. A statement that the Handbook meets GAMA Specification No. 1, SPECIFICATION FOR PILOT'S OPERATING HANDBOOK, dated (date of the Specification to which the particular Handbook conforms).
10. The date of FAA approval and signature and title of the certificating authority.

0.9 Table of Contents

The main text of each section shall be preceded by a Table of Contents, listing the paragraph heads in numerical page order. Subparagraphs and other pertinent information, such as a list of figures, may be shown in the Table of Contents of the Section.

0.11 Page Identification

The page numbers in each section will include the section number and a dash (i.e. "3-" for all pages in the "Emergency Procedures" section) followed by the serial number of the page beginning with "1" for each section, such as 3-1, 3-2, etc.

Each page shall bear a page number and date of issue or revision at the bottom. The page number shall be in the lower right corner and the date of issue in the lower left corner, for right-hand pages. (Figure 0-2) The page number shall be in the lower left corner and the date of issue in the lower right corner, for left-hand pages. (Figure 0-3) Pages of permanently bound Handbooks need not be dated. Table of Contents pages shall be dated but need not be numbered.

Each page shall bear the date of the original issue until revised and, when revised, that of the latest revision. Instead of using the actual date of issue on each page of an original issue of a Handbook, the words "original issue" may be used. In such a case, the Title Page and the Table of Contents pages preceding each section of the Handbook shall bear the actual date of issue following the words "original issue".

On pages requiring folding, the fold shall be made in a manner that permits the page number to be visible. Except as provided below, a normal blank page within a page block, other than the back of a foldout page, shall be identified, with a phrase such as "This page left blank intentionally" or "Intentionally left blank".

Instead of printing either "This page left blank intentionally" or "Intentionally left blank" on blank pages, the Handbook producer may use dual page numbering on pages preceding or following a blank page. For example: 3-9 (3-10 blank) or (3-9 blank/3-10).

In the event a page must be added subsequent to the initial printing, the page shall carry the number of the preceding page with a letter suffix added. The added page(s) shall show the following page number (e.g. Page 1-6A/1-6B).

0.13 Copy Standards

Text may be prepared in one or two columns with or without justification. Warnings, cautions and notes may be used to highlight or emphasize important points. All pages (except wiring diagrams and foldouts) shall be printed on both sides. Each section shall be started on a right-hand page. The manufacturer's masthead, publication title, airplane model, and issue or revision date shall appear on all pages (that have text, illustrations, figures or tables) of loose-leaf Handbooks.

0.15 Illustrations, Figures, and Tables

Illustrations, figures and tables may be used. They should be located as close as practical to the related portions of the text. A list of figures may precede a substantial grouping of illustrations, figures and tables in a section of the Handbook.

For ease of reading and cross reference, illustrations, figures and tables should be presented in a vertical layout, if practical. When an illustration, figure or table is reproduced horizontally on a page, the top shall be placed toward the left edge of the sheet. (See Figure 0-3)

All illustrations, figures and tables shall be referenced in the text as figures or by title (or both). Each figure shall identified by a title or a figure number. Numbering shall be in numerical progression, prefixed by the Section Number (e.g., Figure 1-1, Figure 1-2; Figure 2-1, Figure 2-2).

Though techniques such as shading, crosshatching, screening or similar means are recommended, the use of color is permissible.

Issued: February 15, 1975
Revised: October 18, 1996

0.17 Schematic Diagrams, General

Schematic diagrams may be used to indicate "flow" and to illustrate the operation of systems such as air control, electrical, fluid power, fuel and turbosystems. (See Figures 0-5 and 0-6)

The user of the schematic diagram is the pilot. The schematic diagram shall not be created for primary use by a mechanic or technician. The schematic diagram should tend to deal with an overall system rather than with subsystems, e.g., the air conditioning system rather than a compressor or blower within the air conditioning system.

The schematic diagram must be of sufficient size that legends, symbols, devices, codes, etc., are readable by persons with normal vision. Turn-page schematic diagrams shall be avoided to the extent practical.

In designing schematic diagrams, it may be necessary to compromise between detail necessary to make the diagram self-explanatory and the simplicity essential for ease of reading and understanding. Where schematic diagrams are complex by virtue of automatic features or interrelated controls in the subject system, these characteristics should be pointed out by means of explanatory text in the diagram, or in the accompanying text, or both.

On schematic diagrams with a large number of listed items, (e.g., an electrical schematic) the items shall be presented in a logical order, such as the sequence of the arrangement of the items in the airplane.

0.19 Schematic Diagrams, Details

The flow of the system shall receive primary attention. It shall be presented in patterned shading with a minimum of turns in the lines. Arrows shall be used to indicate flow direction when needed to understand the schematic diagram. The flow shall include the generator, tank, reservoir, or other appropriate starting point. The diagram shall be arranged so that the flow of the system can be traced with a minimum of effort. Crossovers should be avoided if practical. Return lines need not be shown in entirety unless needed to understand the system.

A separate shading pattern shall be used for each individual system on any one illustration, to distinguish between supply, pressure, return, etc.

Flow control devices within the system, such as check valves, fuel pumps, accumulators, and relays, should be included. Solenoid valves shall be shown with a notation indicating whether the valve is spring-loaded to the open or closed position.

0.21 Schematic Diagram, Legends

Space permitting, legends shall be spelled out within the diagram rather than abbreviated or keyed by numerals to a list of legends at the bottom or on an adjacent page. No abbreviations may be used unless they are universally meaningful. If an obscure abbreviation must be used because of space limitations, it shall be asterisked and spelled out in an unused portion of the image area. When text supports the illustration, the text shall employ the exact terms used in the illustration.

0.23 Schematic Diagram Symbols, Devices or Codes

The same symbol, device, or code shall be used throughout the Handbook to depict the same system, valve or control.

Whenever practical, each symbol should physically resemble the actual system component depicted in the schematic diagram. Abstractions should be avoided. If an abstraction must be used, it shall be selected from a recognized national standard or shall be a box with a title inside.

0.25 Tab Dividers

If the Handbook is prepared in looseleaf form, each section shall be marked with a plasticized tab divider. For ease of reference, the dividers shall be staggered. Tab dividers shall indicate section numbers or titles, or both. The section containing "Emergency Procedures" shall have a red plasticized tab divider. Separation of sections in permanently bound Handbooks is not required.

0.31 Contents

The Handbook shall contain the following sections in the order shown

Section 1	-	General
Section 2	-	Limitations
Section 3	-	Emergency Procedures
Section 3A	-	Abnormal Procedures (Optional)

Section 4 - Normal Procedures
Section 5 - Performance
Section 6 - Weight & Balance/ Equipment List
Section 7 - Airplane & Systems Descriptions
Section 8 - Airplane Handling, Service & Maintenance
Section 9 - Supplements
Section 10 - Safety and Operational Tips (Optional)
Alphabetical Index (Optional)

Each section shall be complete within itself, with respect to page and numbering. There shall be a list of sections entitled "CONTENTS", in the front of the Handbook.

0.33 Order and Numbering

The order of presentation of the subject matter of the paragraphs used in this Specification shall be followed in each Handbook except when

(a) the inclusion of material called for in a paragraph is inappropriate for the type of airplane; or

(b) the specific section indicates, under "General", that the order of presentation of the paragraphs is for guidance only and need not be followed. (See, for example, Section 7.1, General.)

If a paragraph contains subparagraphs, the order of presentation of the subparagraphs is for guidance only and need not be followed. The Handbook producer should arrange the material within paragraphs in a manner he considers to be most informative to the kind of pilot expected to use the Handbook.

The numbering of paragraphs and subparagraphs within a section is not required. If numbered, they should be numbered sequentially and need not follow the numbering in this Specification so as to avoid "gaps" resulting from Specification material not appropriate to the type of airplane.

0.35 Subject Headings

Subject headings shall be the same as, or substantively equivalent to, the examples used in this Specification except when not appropriate because of the design or operational features of the type of airplane.

0.41 Identifying Revised Material

A revision to a page is defined as any change to the printed matter that was previously printed on that page.

Revisions, additions and deletions shall be identified by a vertical black line along the outside of the page (or the gutter on two column pages) opposite only that portion of the printed matter that was changed. In the case of a revision to an illustration, a black vertical line will appear in the left margin opposite the revision. The date of the revision shall be shown on each revised page. (See Figure 0-2)

0.43 Log of Revisions

Each Handbook shall have a log of Revisions or effective pages, listing all revisions or effective pages, immediately following the Title Page. (Note: Do not print on the back of the title page.) Following the last entry, there shall be a box containing the date of the revision and the signature (over the printed name and title) of the person approving the revision. (See Figure 0-4)

0.45 Obtaining Revisions

The Handbook shall contain information concerning the procedures or actions that need to be taken by the operator of the airplane to maintain the Handbook in a current status.

An appropriate warning or note shall be contained in each Handbook to inform the operator that a current Handbook is required to be in the airplane during flight and that it is the operator's responsibility to maintain the Handbook in a current status.

0.51 Supplements

Section 9 of this Specification contains the requirements for supplements.

Issued: February 15, 1975
Revised: October 18, 1996

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

[redacted]

[redacted]

[redacted]

Serial No. _____ (if appropriate)

Registration No. _____ (if appropriate)

Type Certificate No. _____

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER, AND CONSTITUTES THE FAA APPROVED AIRPLANE FLIGHT MANUAL.

This Handbook meets GAMA Specification No. 1, *Specification for Pilot's Operating Handbook*, issued February 15, 1975 and revised September 1, 1984.

Approved by the Federal Aviation Administration

By: _____
(NAME) **(TITLE)**

Date: _____

Manufacturers Name _____

Address _____

Figure 0-1
Title Page Layout

INTENTIONALLY LEFT BLANK

Issued: February 15, 1975
Revised: October 18, 1996

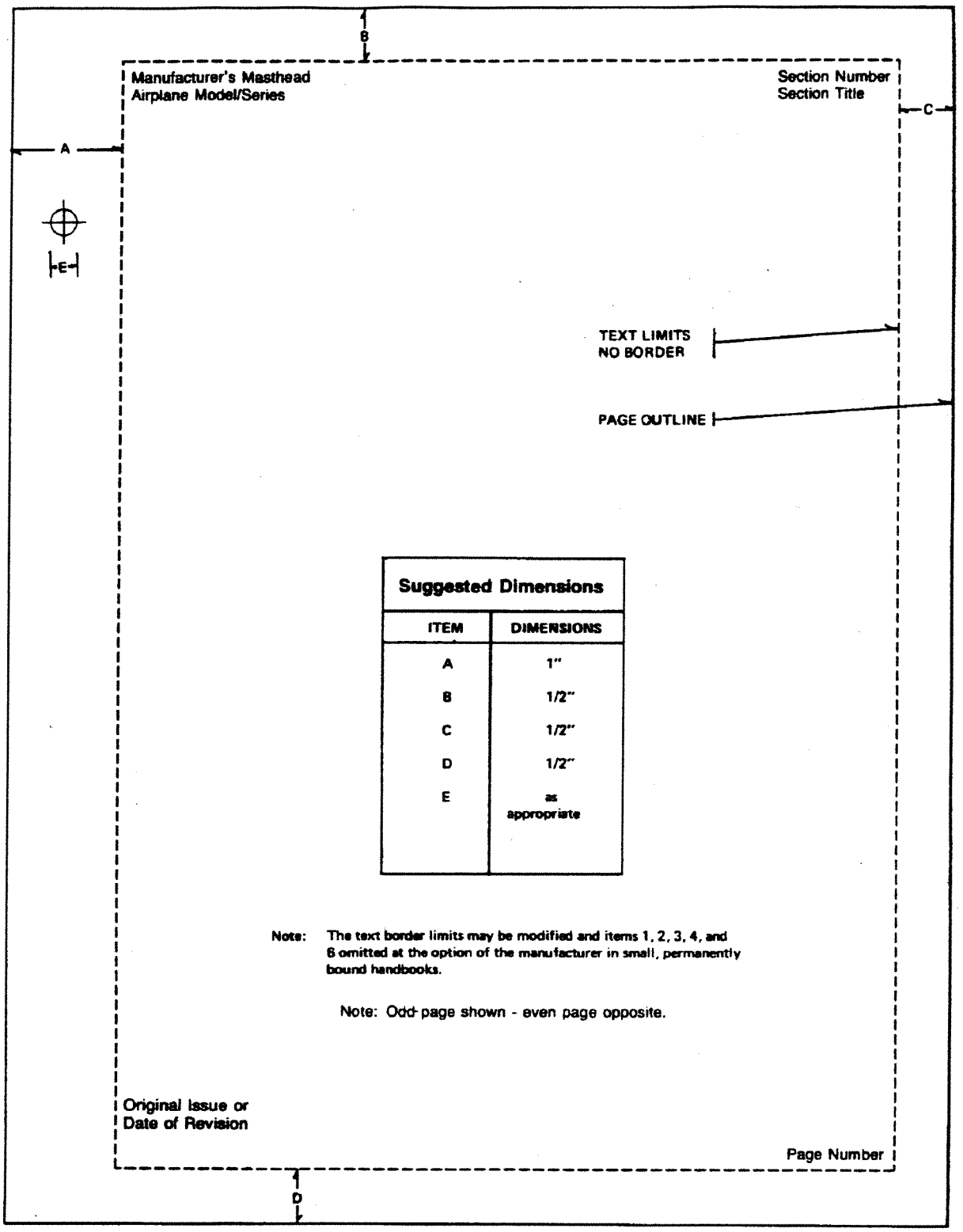


Figure 0-2
Suggested Vertical Page Layout

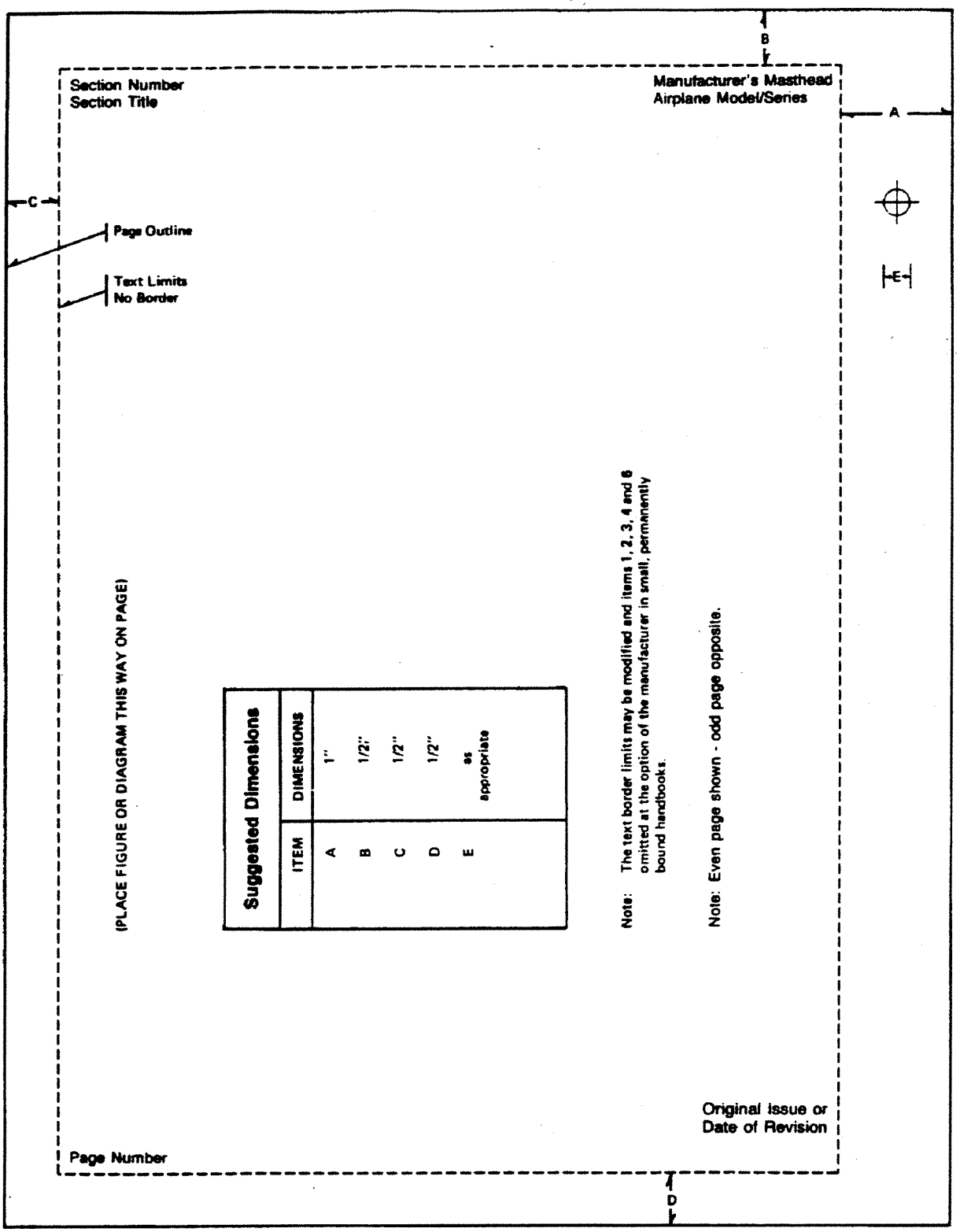


Figure 0-3
Suggested Horizontal Page Layout

Issued: February 15, 1975
Revised: October 18, 1996

Manufacturer's Masthead
Airplane Model/Series

Section Number
Section Title

PILOT'S OPERATING HANDBOOK

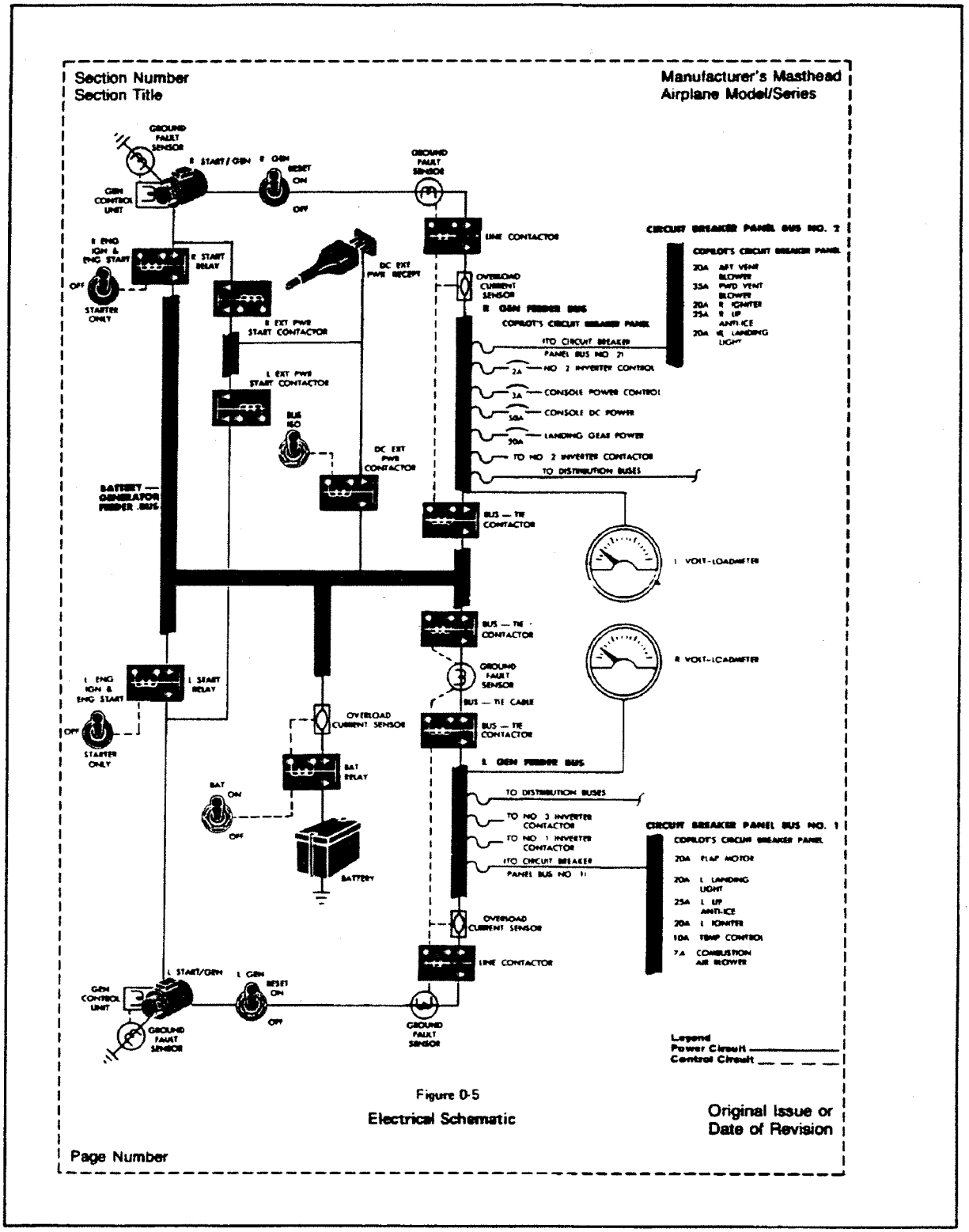
LOG OF REVISIONS

Revision Number and Date	Revised Pages	Description of Revision

Original Issue or
Date of Revision

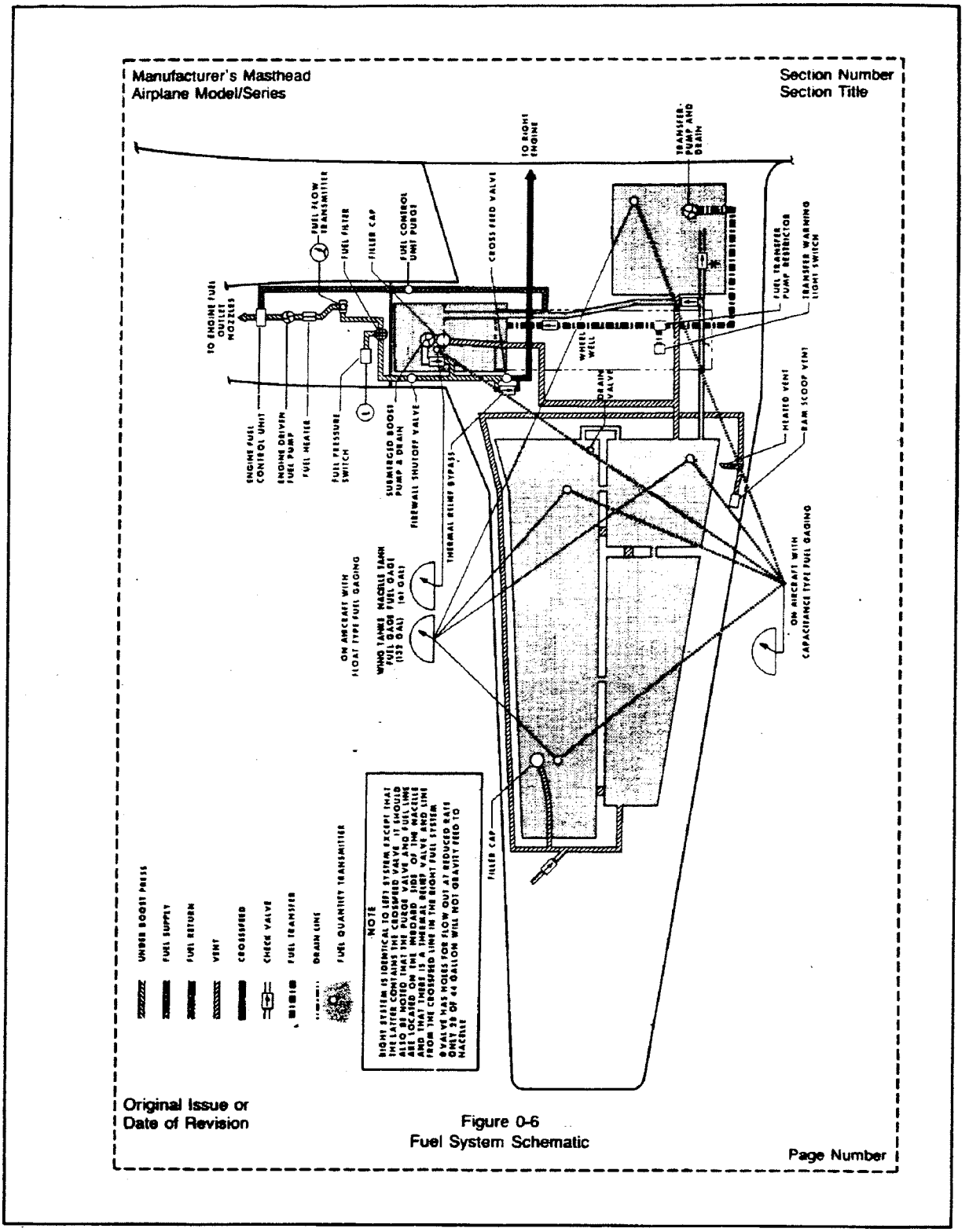
Page Number

Figure 0-4
Suggested Log of Revisions



Page

Figure 0-5
Suggested Vertical Schematic



Layout

Figure 0-6
Fuel System Schematic

SECTION 1

GENERAL

TABLE OF CONTENTS

SECTION 1

GENERAL

1.1 General

Section 1 of the Pilot's Operating Handbook shall present basic data and information of general interest to the pilot which is useful in loading, sheltering, handling, and routine preflight checking of the airplane. In addition, it shall provide definitions or explanations of symbols, abbreviations, and terminology used in the Handbook. The selection of data by the Handbook producer, to be included in this Section, shall be governed by the concepts contained in the Preface of this Specification.

1.3 Introduction

The introduction shall include a brief outline of the Handbook's content, organization, method of usage and the following statement:

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER AND CONSTITUTES THE FAA APPROVED AIRPLANE FLIGHT MANUAL.

1.5 Three View Drawing

The airplane general arrangement shall be illustrated with a scale line drawing consisting of plan, side and front views presented in a vertical sequence upon a single page. Principal dimensions, particularly those useful for handling and sheltering the airplane, shall be shown upon the drawing. These dimensions include, as applicable:

(a) Wing Span
(b) Maximum Height
(c) Overall Length
(d) Wheel Base Length
(e) Main Landing Gear Track Width
(f) Maximum Propeller Diameter
(g) Propeller Ground Clearance
(h) Minimum Turning Radius
(i) Wing Area

1.11 Required Descriptive Data

Descriptive Data shall be supplied for standard and optional engine and propeller installations and fuel and oil systems. The data may be supplemented by brief descriptions of additional characteristics or features if desired. The Handbook shall include the information outlined in paragraphs 1.13 through 1.29, as applicable to the airplane.

1.13 Engine(s)

(a) Number of Engines
(b) Engine Manufacturer
(c) Engine Model Number
(d) Engine Type, for Example:
Reciprocating Engines
Normally aspirated or Turbocharged
Direct Drive or Geared
Air or Liquid Cooled
Horizontally Opposed or Radial
Number of Cylinders
Displacement
Turbopropeller Engines
Single Shaft or Multiple Shaft
Compressor Stages and Types
Combustion Chamber Type
Turbine Stages and Type
(e) Horsepower Ratings and Engine (or Propeller) Rotational Speed
(1) Takeoff Power
(2) Maximum Continuous Power
(3) Maximum Normal Operating Power
(4) Maximum Climb Power
(5) Maximum Cruise Power

Note: Horsepower ratings shall be in terms of horsepower for static, sea level, standard day conditions.

1.15 Propeller(s)

(a) Number of Propellers
(b) Propeller Manufacturer
(c) Propeller Model Number
(d) Number of Blades
(e) Propeller Diameter
(f) Propeller Type, for Example:
Fixed Pitch or Constant Speed
Full Feathering
Reversible
Hydraulic or Electrically Actuated
Pitch Range

1.17 Fuel

(a) Fuel Grade or Specification, (including color), alternate fuels and approved additives
(b) Total Capacity
(c) Usable Fuel

1.19 Oil

(a) Oil Grade or Specification
(b) Viscosity Recommended for Various Average Air Temperature Ranges
(c) Total Oil Capacity
(d) Drain and Refill Quantity
(e) Oil Quantity Operating Range

1.21 Maximum Certificated Weights

(a) Maximum Ramp Weight (if applicable)
(b) Maximum Takeoff Weight
(c) Maximum Landing Weight
(d) Maximum Zero Fuel Weight (if applicable)
(e) Maximum Weight(s) in Baggage Compartment(s)

1.23 Typical Airplane Weights

Weights corresponding to the airplane as offered with typical seating and interior, avionics, accessories, standard equipment and fixed ballast, and the typical empty weight and maximum useful load based on this weight.

1.25 Cabin and Entry Dimensions

(a) Cabin Width (Maximum)
(b) Cabin Length (Maximum)
(c) Cabin Height (Maximum)
(d) Entry Width (Minimum)
(e) Entry Height (Minimum)
(f) Sill Height (Maximum)
(g) Other dimensions useful in determining what may be loaded.

1.27 Baggage Spaces and Entry Dimensions

Baggage Space or Compartment

(a) Compartment Width
(b) Compartment Length
(c) Compartment Height
(d) Compartment Volume
(e) Entry Width (Minimum)
(f) Entry Height (Minimum)
(g) Other dimensions useful in determining what may be loaded.

1.29 Specific Loadings

Wing and power loading, based on the Maximum Takeoff Weight of Paragraph 1.21(b) and the Takeoff Horsepower Rating of Paragraph 1. 13(e)(1) and the Wing Area of Paragraph 1.5(i).

1.31 Symbols, Abbreviations and Terminology

Define symbols, abbreviations and terminology necessary for the clear understanding and precise use of the information presented in various sections of the Handbook. Definitions should emphasize operational significance when possible.

The following guidelines shall be applied:

1. Define all abbreviations used or referred to in the Handbook.
2 Define any special terminologies used in the Handbook with emphasis on those which could be misused or misunderstood.
3. Definitions should be worded as simply as possible and must conform with the use of the defined terms in the Handbook.
4. Definitions shall be consistent with definitions contained in the Federal Aviation Regulations.

(a) *General Airspeed Terminology and Symbols*

CAS	*Calibrated Airspeed* means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in "knots".
GS	*Ground Speed* is the speed of an airplane relative to the ground.
IAS	*Indicated Airspeed* is the speed of an aircraft as shown in the airspeed indicator when corrected for instrument error. IAS values published in this Handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in "knots".
M	*Mach Number* is the ratio of true airspeed to the speed of sound.
TAS	*True Airspeed* is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility

Issued: February 15, 1975
Revised: October 18, 1996

V_A — *Maneuvering Speed* is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.

V_{FE} — *Maximum Flap Extended Speed* is the highest speed permissible with wing flaps in a prescribed extended position.

V_{LE} — *Maximum landing Gear Extended Speed* is the maximum speed at which an aircraft can be safely flown with the landing gear extended.

V_{LO} — *Maximum Landing Gear Operating Speed* is the maximum speed at which the landing gear can be safely extended or retracted.

V_{MCA} — *Air Minimum Control Speed* is the minimum flight speed at which the airplane is directionally and laterally controllable, determined in accordance with the Federal Aviation Regulations. Airplane certification conditions include one engine becoming inoperative and windmilling (or, in airplanes with autofeathering devices, feathered), not more than a 5° bank toward the operative engine, takeoff power on the operative engine, landing gear up, flaps in the takeoff position, and the most critical C.G.

V_{MO} / M_{MO} — *Maximum Operating Limit Speed* is the speed limit that may not be deliberately exceeded in normal flight operations. V is expressed in knots and M in Mach Number

V_{NE} / M_{NE} — *Never Exceed Speed* or Mach Number is the speed limit that may not be exceeded at any time.

V_{NO} — *Maximum Structural Cruising Speed* is the speed that should not be exceeded except in smooth air and then only with caution.

V_S — *Stalling Speed* or the minimum steady flight speed at which the airplane is controllable.

V_{SO} — *Stalling Speed* or the minimum steady flight speed at which the airplane is controllable in the landing configuration.

V_{SSE} — *Intentional One Engine Inoperative Speed* is the minimum speed, selected by the manufacturer, for intentionally rendering one engine inoperative, inflight, for pilot training.

Note: V_{SSE} is predicated upon the maintenance of conservative controllability margins when one engine is suddenly, intentionally rendered inoperative. Its selection shall be based upon the characteristics of the specific airplane to which it applies. However, in no case may it be lower than 1.05 V_{MCA}.

V_X — *Best Angle-of-Climb Speed* is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.

V_Y — *Best Rate-of-Climb Speed* is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

(b) Meteorological Terminology

ISA — *International Standard Atmosphere* in which

(1) The air is a dry perfect gas;
(2) The temperature at sea level is 15° Celsius (59° Fahrenheit);
(3) The pressure at sea level is 29.92 inches h g.(1013.2 mb);
(4) The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is - 0.00198°C (- 0.003564°F) per foot and zero above that altitude.

OAT — Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.

Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013.2 mb).
Pressure Altitude	Altitude measured from standard sea level pressure (29.92 in. hg.) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this Handbook, altimeter instrument errors are assumed to be zero.
Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this Handbook are to be understood as the headwind or tailwind components of the reported wind.

(c) *Power Terminology*

Include, as applicable, the following definitions or explanations of terms. The definitions provided are examples. The definitions used in a particular Handbook should be appropriate for that particular airplane or installation.

Takeoff Power	The maximum power permissible for takeoff (may be time limited).
Maximum Continuous Power (MCP)	(1) (for multi-engine aircraft) The maximum power for one engine inoperative, abnormal or emergency operations.
Maximum Continuous Power (MCP)	(2) (for single-engine aircraft) Continuous The maximum power for abnormal or emergency operations.
Maximum Normal Operating Power (MNOP)	The maximum power for all normal operations (except takeoff). This power may be the same as Maximum Continuous Power.
Cruising Climb Power	The power (not to exceed MNOP) recommended to operate the airplane in a cruise climb (a continuous, gradual climb) profile.
Maximum Cruise power	The maximum power (not to MNOP) recommended for cruise
Flight Idle Power	The power required to run an engine, in flight, at the lowest speed that will ensure satisfactory engine operation and airplane handling characteristics
Ground Idle Power	The power required to run an engine on the ground, as slowly as possible, yet sufficient to ensure satisfactory engine, engine accessory, and airplane operation with a minimum of thrust.
Reverse Thrust	The thrust of the propeller directed opposite the usual direction, thereby producing a braking action.
Zero Thrust	The absence of appreciable thrust, in either direction.

(d) *Engine Controls and Instruments*

Include, as applicable, definitions, descriptions or explanations of the following terms or components. The definitions, descriptions and explanations provided are examples. Those used in a particular Handbook should be appropriate for that particular airplane or installation.

Throttle or Power Control Lever	The lever used to control engine power, from the lowest through the highest power, by controlling propeller pitch, fuel flow, engine speed, or any combination of these
Propeller Control	The lever used to select a propeller speed. For some airplanes, in the maximum decrease rpm position, it may feather the propeller. It may also activate the fuel cut off to that engine.
Mixture Control	On reciprocating (piston) engine powered airplanes, the mixture control provides a mechanical linkage with the mixture control valve of the carburetor, or the fuel control unit of fuel injection engines, to control the size of the fuel feed aperture, and thus, the air/fuel mixture. It is also a primary means to shut down the engine

Issued: February 15, 1975
Revised: October 18, 1996

Condition Lever	On some turbopropeller powered airplanes, the condition lever is the primary control for starting and stopping the engine. On others, it is the primary control used to set engine and propeller speed. On some engines, it coordinates other power management system functions. It may also be used to feather or unfeather the propeller.
EGT Gauge	The exhaust gas temperature indicator, on piston engine powered airplanes, is the instrument used to identify the lean fuel flow mixtures for various power settings.
TIT, ITT or TTI Gauge	A temperature measuring system that senses gas temperature in the turbine section of the engine. On some engines, it indicates thrust or power.
Tachometer	An instrument that indicates rotational speed. On reciprocating engine installations, the speed is usually shown as propeller revolutions per minute (RPM). Turbine engine tachometers usually measure speed as a percentage of the nominal maximum speed of the turbine(s), unless specifically referred to the propeller
Torquemeter	An indicating system that displays the output torque available on the propeller shaft. Torque may be shown in dimensional terms, such as foot-pounds, or in reference terms, such as a percentage or a pressure.
Propeller Governor	The device that regulates the rpm of the engine/propeller by increasing or decreasing the propeller pitch, through a pitch change mechanism in the propeller hub.
Beta Range	On turbine powered aircraft using fully reversing propellers, this is the range of propeller blade angle movement not controlled by a governor and the propeller control lever. In this range, the blade pitch angle is scheduled by power lever movement and the constant propeller speed mechanism is blocked out. On some airplanes, a portion of the beta range may be used for drag control on approach, and on others, it is used only on the ground for taxi and reverse thrust control.

(e) *Airplane Performance and Flight Planning Terminology*

Include definitions necessary for the pilot to use airplane performance information effectively. The following definitions should be included as applicable.

Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval
Demonstrated Crosswind Velocity	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests. The value shown may or may not be limiting. (Whether or not the value shown is limiting should be stated.)
Accelerate-Stop Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at the instant that speed is attained, to bring the airplane to a stop
Accelerate-Go Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at the instant that speed is attained, continue take-off on the remaining engine(s) to a height of 50 feet.

MEA	Minimum enroute IFR altitude.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

(f) *Weight and Balance*

Include definitions of terms used in weight and balance descriptions and computations; such as:

Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C . G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between take off weight, or ramp weight if applicable, and basic empty weight.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel

1.4 Conversion to Metric System

At the option of the manufacturer, factors for conversion of dimensional, quantity and performance units to the metric system may be included.

Issued: February 15, 1975
Revised: October 18, 1996

SECTION 2

LIMITATIONS

TABLE OF CONTENTS

SECTION 2

LIMITATIONS

2.1 General

This Section of the Pilot's Operating Handbook shall contain only those limitations required by regulation or necessary for safe operation of the airplane and approved by the regulatory authority. It shall present the various operating limitations, instrument markings, color coding and basic placards necessary for the safe operation of the airplane, its powerplant(s), systems and equipment. The content of this Section shall be guided by the following considerations:

(a) As only approved limitations may be included in this Section, an introductory statement to this effect shall be contained in a prefatory note or the opening paragraph. For example:

"The limitations included in this Section are approved by the Federal Aviation Administration."

(b) Limitations associated with optional systems or equipment may be included in this Section or in *Section 9, Supplements.* If limitations are incorporated in Section 9, this Section shall contain a note referring the reader to that section for limitations on the optional systems or equipment.

(c) The specific content of this Section shall conform to the applicable Federal Aviation Regulations (FAR's) governing the certification and operation of the particular airplane. Though this Section of this Specification often references Part 23 of the Federal Aviation Regulations (FAR 23), the references are *for illustration purposes only.* The applicable regulations for any specific airplane, which may differ from the referenced FAR, must be followed.

2.3 Airspeed Limitations

Provide airspeed limitations and the operational significance of such limitations. The name, symbol, value in knots, CAS, and IAS (assuming zero instrument error), and the significance of each airspeed, shall also be provided. Where the airspeed values may be applicable to more than one configuration, the more conservative IAS value shall be used. (See Figure 2-1)

SPEED	CAS	IAS	REMARKS
Maneuvering Speed V_A (Knots)			(Specify weight) Do not make full or abrupt control movements above this speed.
Maximum Flap Extended Speed V_{FE} (Knots)			(Specify flap setting) Do not exceed this speed with a given flap setting.
Maximum Landing Gear Operating Speed V_{LO} (Knots)			Do not extend or retract landing gear above this speed
Maximum Landing Gear Extended Speed V_{LE} (Knots)			Do not exceed this speed with landing gear extended.
Air Minimum Control Speed V_{MCA}			This is the minimum flight speed at which the airplane is directionally and laterally controllable, determined in accordance with the Federal Aviation Regulations.
**Maximum Operating Speed Limit V_{MO} (Knots) M_{MO} (Mach #)			Do not exceed this airspeed or Mach Number in any operation.
*Never Exceed Speed V_{NE} (Knots) M_{NE} (Mach #)			Do not exceed this speed or Mach Number in any operation.
*Maximum Structural Cruising Speed V_{NO} (Knots) M_{NO} (Mach #)			Do not exceed this speed or Mach Number except in smooth air and then only with caution.

Add any other speed limitations

*reciprocating powered airplanes only

** turbine powered airplanes only

Figure 2-1
Airspeed Limitations

Issued: February 15, 1975
Revised: October 18, 1996

2.5 Airspeed Indicator Markings

An explanation of airspeed indicator markings, including the color coding, shall immediately follow the presentation on airspeed limitations. The use of line drawings or photographs to show the markings is encouraged. (See Figure 2-2)

MARKINGS	IAS VALUE OR RANGE	SIGNIFICANCE
Red Line		Airspeed Control Speed (Multi-Engine Only)
White Arc		Full Flap Operating Range. Lower limit is maximum weight stalling speed in landing configuration. Upper limit is maximum speed permissible with flaps extended
Blue Line		One Engine Inoperative Best Rate of Climb (Specify Weight and Altitude if Applicable}
Green Arc		Normal Operating Range. Lower Limit is maximum weight stalling speed with flaps and landing gear (if retractable) retracted. Upper limit is maximum structural cruising speed.
Yellow Arc		Operations must be conducted with caution and only in smooth air.
Red Line		Maximum speed for all operations

Figure 2-2
Airspeed Indicator Markings

2.7 Power Plant Limitations (Reciprocating Engines)
Provide the following powerplant limitations and data. as applicable:

(a) Number of Engines
(b) Engine Manufacturer
(c) Engine Model Number
(d) Engine Operating Limits for Takeoff Power, Maximum Continuous Power, and Maximum Normal Operating Power, as applicable.
(e) Oil Pressure (Minimum and Maximum)
(fl Fuel Pressure (Minimum and Maximum)
(g) Other (Such as Ice Protection System Time Limit)
(h) Fuel Grade or Specification. including color
(i) Oil Grade or Specification
U) Number of Propellers
(k) Propeller Manufacturer
(l) Propeller Hub and Blade Model Numbers
(m) Propeller Diameter (Minimum and Maximum)
(n) Propeller Blade Angles at Specified Radius or Station
(o) Propeller Operating Limits
  (l) Rotational Speed Restrictions

Note: The Federal Aviation Regulations require the use of 'maximum continuous power", during certification of an airframe and engine combination, to show compliance with certain standards. When the airplane manufacturer selects a "maximum continuous power less than the rated "maximum continuous power listed in the Engine Type Data Sheet. the maximum continuous power listed in the Airplane Type Data Sheet is used to show compliance with the applicable airworthiness standards and is the value shown in the Pilot's Operating Handbook.

2.9 Powerplant Limitations (Turbine Engines)
Provide the following powerplant limitations and data , as applicable:

(a) Number of Engines
(b) Engine Manufacturer
(c) Engine Model Number
(d) Engine Operating Limits shall be provided for the following applicable operations:
  (I) Takeoff
  (2) Maximum Continuous
  (3) Maximum Climb
  (4) Maximum Cruise
  (5) Normal Cruise
  (6) Idle (Flight and/or Ground)
  (7) Maximum Reverse
  (8) Acceleration
  (9) Starting
  (10) Other
(e) Operating Limits associated with the type of Operation specified by (d) above, may include:
  (l) Maximum Power Indication (Torque, Shaft Horsepower)
  (2) Maximum Shaft Rotational Speed
  (3) Maximum Gas Temperature
  (4) Maximum Time for Specified Operation
  (5) Maximum Oil Temperature
  (6) Other
(f) Oil Pressure (Minimum and Maximum)
(g) Fuel Pressure (Minimum and Maximum)
(h) Other (Such as Generator or Alternator Limits)
(i) Fuel Grade or Specification and Approved Fuel Additives (Preferred and alternate, with any Limitations on use of Aviation Gasoline)
(j) Oil Grade or Specification and Approved Oil Additives
(k) Number of Propellers
(l) Propeller Manufacturer
(m) Propeller Hub and Blade Model Numbers
(n) Propeller Diameter (Minimum and Maximum)
(o) Propeller Blade Angles and Specified Radius or Station
(p) Propeller Operating Limits
  (l) Rotational Speed Restrictions

Issued: February 15, 1975
Revised: October 18, 1996

2.11 Powerplant Instrument Markings

An explanation of powerplant instrument markings shall immediately follow the presentation on powerplant limitations. The use of line drawings or photographs to show the markings is encouraged. (See Figure 2-3.)

INSTRUMENT	Red Line	yellow Arc	Green Arc	Yellow Arc	Red Line
	MINIMUM LIMIT	CAUTION RANGE	NORMAL OPERATING	CAUTION OR TAKEOFF	MAXIMUM LIMIT
POWER INDICATOR					
TACHOMETER					
MANIFOLD PRESSURE					
GAS TEMPERATURE					
OIL TEMPERATURE					
CYLINDER HEAD TEMPERATURE					
COOLANT TEMPERATURE					
FUEL PRESSURE					
OIL PRESSURE					
OTHER (As Generator)					

Figure 2-3
Power Plant Instrument Markings

2.12 Miscellaneous Instrument Markings

Provide limitations and markings for miscellaneous instruments, such as a pneumatic pressure gauge or a vacuum/pressure instrument gauge, as appropriate.

2.13 Weight Limits

Maximum Certificated Airplane Weights shall be started as required. If appropriate, reference shall be made to data in Section 5 (Performance) of the Pilot's Operating Handbook concerning the Maximum Takeoff Weight as limited by performance. If certificated in more than one category, the weights, with any restrictions, shall be given for each category. The following weights shall be presented if applicable:

(a) *Maximum Ramp Weight*
(b) *Maximum Takeoff Weight*
(c) *Maximum Landing Weight*
(d) *Maximum Zero Weight*
(e) *Maximum Weight(s) in Baggage Compartment(s)*

2.15 Center of Gravity Limits

Allowable Forward and Aft Center of Gravity Limits shall be presented as required. These limits shall be presented for each Category for which the aircraft is certificated. These limits shall be specified over the range from Minimum to Maximum Takeoff Weight, landing gear extended, and shall include the following supporting information:

(a) Guidance as to the proper method of interpolating tabular statements of the center of gravity limits for various weights
(b) A definition of the Reference Datum relative to the airframe in terms convenient for operational use
(c) The length and location of the leading edge of the Mean Aerodynamic Cord, if used
(d) If removable ballast is used, the location and amount of the ballast weight, and any cautionary information required

2.17 Maneuver Limits

The following information on maneuvers appropriate to the Airplane Category shall be given:

(a) A Statement of Authorized Maneuvers and Appropriate Entry Speeds

(b) A Statement of Unauthorized Maneuvers

(c) A Statement that the airplane is Approved for Spins, Unapproved for Spins, or is characteristically incapable of spinning

2.19 Flight Load Factor Limits

The limit maneuvering load factors, in g units of acceleration, for clean cruise and landing configurations, shall be given. The negative g limit, flaps up, should be given for aircraft approved for spinning or aerobatics.

2.21 Flight Crew Limits

Provide a statement of the minimum crew and the function of each flight crew member, if more than one is required.

2.23 Kinds of Operations

Provide, at an appropriate place in this Section, a statement of the kinds of operations allowed when listed operable equipment is installed. If any installed equipment affects an operating limitation, the equipment shall be listed and identified as to operational function.

2.25 Fuel Limitations

Total capacity and usable fuel shall be stated and, if the unusable fuel exceeds the limits of FAR 23, information shall be given identifying the quantities unusable in flight.

2.27 Climb Condition Limits

For turbopropeller powered airplanes only, the established temperatures and corresponding altitude limits of powerplant components and engine fluids shall be stated.

2.29 Maximum Operating Altitude Limit

For pressurized airplanes and turbosupercharged or turbopropeller powered airplanes, the Maximum Altitude Limits shall be stated.

2.31 Outside Air Temperature Limits

For turbopropeller powered airplanes only, the Minimum and Maximum Outside Air Temperature Limits shall be presented as a function of pressure altitude.

2.33 Cabin Pressurization Limit

Data shall be presented stating the Normal and Maximum Cabin Operating Differential Pressure. Restrictions on use of cabin pressurization during takeoff, landing, or in flight shall be noted, if applicable.

2.35 Maximum Passenger Seating Limits

Any limits on Maximum Passenger Seating, by number of passengers or specific restrictions on seat occupancy, shall be stated.

2.37 Systems and Equipment Limits

Limits on any Airplane systems or equipment shall be provided. For example, limits may be necessary in connection with electrothermal elements used in ice protection systems, or in battery temperatures. Provide limitations necessary for the safe operation of optional systems or equipment in this Section or in Section 9, Supplements, or in both.

2.39 Other Limitations

Provide a statement of any limitation required by regulation or permitted or approved by the regulatory authority, not specifically covered in this Section.

2.41 Placards

Operating Placards shall be listed or illustrated.

Issued: February 15, 1975
Revised: October 18, 1996

SECTION 3

EMERGENCY PROCEDURES

TABLE OF CONTENTS

SECTION 3

EMERGENCY PROCEDURES

3.1 General

This Section of the Pilot's Operating Handbook shall' clearly and precisely describe the recommended procedures for coping with various types of emergencies or critical situations. Procedures for handling malfunctions or other abnormalities that are not of emergency nature, or involve a potential emergency that may be deferred, may be included in this Section or in optional Section 3A, Abnormal Procedures. The incorporation of an Abnormal Procedures Section in Handbooks is encouraged.

The subject matter and subject headings of this Section of a Handbook shall conform to the order and headings of paragraphs in this Section of the Specification.

The material within subparagraphs of a Handbook may follow the order of material within subparagraphs of this Section of the Specification or may be arranged to suit a particular type or model of airplane. In addition, Handbook writers shall consider the following objectives:

(a) Airspeeds used in the Emergency Procedures shall be specified in terms of Indicated Airspeed, assuming zero instrument error, in order to make the information as directly usable as possible.

(b) The Emergency Procedures Section shall include at the beginning a check list with regard to order of action when sequence is essential to safety.

(c) The check list may be followed by amplified procedures to provide pilots with a better understanding of the reasons for actions in the short form check list.

(d) Emergency procedures associated with optional systems or equipment may be included in this Section or in Section 9, Supplements. If emergency procedures are incorporated in Section 9, this Section shall contain a note referring the reader to that Section for emergency procedures on the optional systems or equipment.

3.3 Airspeeds for Emergency Operations

(a) Required and recommended airspeeds (and the configuration of the airplane for which the airspeeds apply) deemed likely to enhance safety of operation during an emergency shall be listed near the beginning of this Section or in the Emergency Procedures Check List, or both. For example, this list will include speeds such as the maneuvering airspeed(s) and the speed(s) for maximum gliding distance.

(b) In addition, for multi-engine airplanes, include the one engine inoperative best rate of climb speed (V_{YSE}), the one engine inoperative best angle of climb speed (V_{XSE}), and the air minimum control speed (V_{MCA}) with the critical engine inoperative. For these speeds, provide the significant conditions under which they may be obtained (aircraft weighty, atmospheric conditions, etc.).

3.5 Emergency Procedures Check List

The emergency procedures check list should be in concise, abbreviated form designed to remind pilots of items to check without providing details concerning the operation of any system.

The check list may be arranged by 'Challenge" and "Response" headings for two pilot aircraft or by "Item" and "Condition" headings for single pilot aircraft. Under either method, the item to be checked is listed with the desired condition stated. Key words or switch and lever positions are capitalized in the Condition Column.

EXAMPLE:

CHALLENGE OR ITEM	RESPONSE OR CONDITION
Battery Switch	OFF
Generator	OFF

The check list should be limited to the minimum number of items determined to be essential to aid the pilot in an emergency.

3.7 Amplified Emergency Procedures

The check list may be followed by additional information (amplified procedures) to provide pilots with a better understanding of the reasons for actions in the check list. The amplified procedures may also

include additional procedures that a pilot would not reasonably be expected to refer to in resolving a given emergency. Discussion of emergency situations, the resolution of which are not amenable to check list format, may also be included.

3.9 Emergencies

3.9(a) Engine Failure

Procedures shall be provided for all airplanes for all cases of engine failure, including partial failure (partial power), during takeoff and in flight.

3.9(b) Air Start

Procedures shall be provided for starting the engine in flight and, in the event the engine does not start, for subsequent action(s).

3.9(c) Smoke and Fire

Procedures shall be provided for coping with cases of smoke and/or fire in the cabin or from an engine in the following flight phases:

(1) On the Ground
(2) During Takeoff
(3) In-Flight

3.9(d) Emergency Descent

Procedures shall be provided for making an emergency descent.

3.9(e) Glide

Procedures and information shall be provided for a gliding descent, including:

(1) The Recommended Airspeed
(2) The Associated Configuration
(3) The distance(s) from (a) specified height(s) above ground level that an airplane will glide, or the glide ratio in nautical miles per thousand feet.

3 .9(f) Landing Emergencies

Procedures shall be provided for the various landing emergencies, including:

(1) For all airplanes, forced landings under the following conditions:
  (A) Precautionary Landings
  (B) With a Flat Tire
  (C) With a Defective Landing Gear
  (D) With Power, Landing Gear Retracted
  (E) Without Power, Landing Gear Retracted
  (F) Ditching, for aircraft with extended overwater flight capability
  (G) Approach and landings with flaps retracted, if flapless landings require any special technique or if information is required by the certificating authority.
(2) For Multi-Engine Airplanes Only:
  (A) One Engine Inoperative Landing
  (B) One Engine Inoperative Go-Around
  (If this maneuver cannot be performed safely, a warning against attempting it shall be provided.)

3.9(g) System Emergencies

Procedures shall be provided for coping with emergencies involving the following systems, as applicable:

(1) Engine
(2) Supercharger/turbocharger or other augmentation
(3) Propeller
(4) Fuel
(5) Electrical
(6) Hydraulic
(7) Pneumatic
(8) Flight Controls
(9) Landing Gear
(10) Nose Wheel Steering
(11) Environmental
(12) Oxygen
(13) Ice Protection
(14) Emergency Exits
(15) Other

3.9(h) Spins

Handbooks for all single engine airplanes, other than for those airplanes which have been shown to be "characteristically incapable of spinning" shall contain procedures for recovery from spins. These procedures shall be in the Emergency Procedures Section for all airplanes except those in the acrobatic category. Spin recovery procedures for acrobatic airplanes may be included under Normal Procedures.

If the airplane has not been tested for spin characteristics and recovery methods, a discussion of prevention of spins and probable best recovery techniques will be included with the qualification that no tests were made and the recovery techniques are based on the best judgment of the manufacturer.

Issued: February 15, 1975
Revised: October 18, 1996

Spin recovery procedures for multi-engine airplanes may be included at the option of the manufacturer. It should be noted that multi-engine airplanes have not been spun by the manufacturer, if such is the case.

3.9(i) Other

Emergency Procedures and other pertinent information necessary for safe operations shall be provided for emergencies peculiar to a particular airplane design, operating or handling characteristics

SECTION 3A

ABNORMAL PROCEDURES

TABLE OF CONTENTS

SECTION 3A

ABNORMAL PROCEDURES

3A. 1 General

This section of the Pilot's Operating Handbook shall clearly and precisely describe the recommended procedures for handling malfunctions of equipment, or other abnormalities, that are not of an emergency nature or involve a potential emergency that may be deferred. An example of a deferred emergency is a landing gear that does not respond properly to normal gear switch actions when there are no other malfunctions in the powerplant or other systems. A gear up emergency landing, if necessary can be deferred until after all other methods of lowering the gear have been unsuccessfully tried and a suitable landing area has been selected. Examples of less critical abnormal conditions include failure of some portion of the electrical system in day VFR conditions, failure of automatic pilots or wing levelers enroute, or failure of some, but not all, elements of the navigation and communication systems.

An "emergency" however, almost always involves a failure that requires immediate and rapid response, such as a total powerplant failure, fire or smoke, or rapid cabin decompression. The difference between an "emergency" and "abnormal" situation may also depend on the circumstances of flight, i.e., night or IFR versus day VFR, the presence of icing conditions, or the occurrence of multiple malfunctions.

Because differences in design and complexity of the various types and models of airplanes play a major role in deciding whether a specific malfunction is more appropriately listed under "emergency" or "abnormal" procedures, or whether an "Abnormal Procedures" section is desirable, the decision to include an "ABNORMAL PROCEDURES" Section, or provide only an "EMERGENCY PROCEDURES" Section, is left to the Handbook producer.

If an Abnormal Procedures Section is provided, the subject matter and subject headings of this Section of a Handbook shall conform to the order and headings of paragraphs in this Section of the Specification. The material within subparagraphs of a Handbook may follow the order of material within subparagraphs of this Section of the Specification or may be arranged to suit a particular type or model of airplane. In addition, Handbook writers shall consider the following objectives:

(a) Airspeeds used in this Section shall be specified in Indicated Airspeed, assuming zero instrument error, in order to make the information as directly usable as possible.

(b) The Abnormal Procedures Section shall include, at the beginning, a check list with regard to order of action when sequence is essential to safety.

(c) The Check List may be followed by amplified procedures to provide pilots with a better understanding of the reasons for actions in the check list.

(d) Abnormal procedures associated with optional systems or equipment may be included in this Section or in Section 9, Supplements. If Abnormal Procedures are incorporated in Section 9, this Section shall contain a note referring the reader to that Section for abnormal procedures on the optional systems or equipment.

(e) The exact content of the Abnormal Procedures Section shall be determined by each Handbook producer, considering the design features of each airplane.

3A. 3 Airspeeds for Abnormal Operations

Airspeeds (and the configuration of the airplane for which the airspeeds apply) deemed likely to enhance safety of operation during an abnormal situation shall be listed near the beginning of this Section or in the Abnormal Procedures Check List, or both.

3A.5 Abnormal Procedures Check List

The Abnormal Procedures Check List should be in concise, abbreviated form and designed to remind pilots of items to check without providing details concerning the operation of any system. The Check List may be arranged by "Challenge" and "Response" headings for two pilot aircraft or by "Item" and "Condition" headings for single pilot aircraft. Under either method, the item to be checked is listed with the desired condition stated. Key words or switch and

lever positions are capitalized in the Condition column.

EXAMPLE:

CHALLENGE OR ITEM	RESPONSE OR CONDITION
Gear Selector	UP
Generator Trip Switches	PUSH

3A.7 Amplified Abnormal Procedures

The Check List may be followed by additional information (amplified procedures) to provide pilots with a better understanding of the reasons for actions in the Check List. In addition, or as an alternative, there may be a reference to Section 7, Description of the airplane and Its System or Section 9, Supplements.

3A.9 Abnormalities

The abnormalities to be included in this Section shall be determined by the Handbook producer, considering the following:

(a) Engine
(b) Propeller
(c) Fuel
(d) Electrical
(e) Hydraulic
(f) Pneumatic
(g) Flight Controls
(h) Landing Gear
(I) Nose Wheel Steering
(j) Environmental
(k) Oxygen
(l) Ice Protection
(m) Emergency Exits
(n) Other

Issued: February 15, 1975
Revised: October 18, 1996

SECTION 4

NORMAL PROCEDURES

TABLE OF CONTENTS

SECTION 4

NORMAL PROCEDURES

4.1 General

This Section of the Pilot's Operating Handbook shall clearly and precisely describe the recommended procedures for the conduct of normal operations. Except as noted in paragraph 4.19, the subject matter and subject headings of this Section of the Handbook shall conform to the order and headings of paragraphs in this Section of the Specification.

The material within subparagraphs of Handbooks may follow the order of material within subparagraphs of this Section of the Specification or may be arranged to suit a particular type or model of airplane. In addition, Handbook writers shall consider the following objectives:

(a) Airspeeds used in this Section shall be specified in Indicated Airspeed, assuming zero instrument error, in order to make the information *as* directly usable as possible.

(b) The Normal Procedures Section shall include, at the beginning, a check list, with regard to order of action, when sequence is essential.

(c) The Check List may be followed by amplified procedures to provide pilots with more detail on, and better understanding of, the reasons for actions in the Check List.

(d) Normal procedures associated with optional systems or equipment may be included in this Section or in Section 9, Supplements. If normal procedures are incorporated in Section 9, this Section shall contain a note referring the reader to that Section for normal procedures on the optional systems or equipment.

(e) The exact content of the Normal Procedures Section shall be determined by the applicable regulations of the certificating authority and by the operating and design features of each particular airplane. All information required by FAR Part 23, or other applicable regulations, will be included.

4.3 Airspeeds for Normal Operations

The airspeeds which may enhance the safety of operations shall be provided as a preface to the Normal Procedures Section. The following speeds, with associated weight, atmospheric and other conditions, shall be given:

(a) The ALL Engines Recommended Climb Speed

(b) The ALL Engines Best Angle of Climb Speed

(c) ALL Engines Approach Speed

(d) Speeds for Transition to the Balked Landing Condition

(e) The Maximum Demonstrated Crosswind Velocity

(fl The Recommended Turbulent Air Penetration Speed

(g) Other airspeeds recommended by the manufacturer, such as Intentional One Engine Inoperative Speed.

4.5 Normal Procedures Check List

The normal procedures check list should be in concise, abbreviated form and designed to remind pilots of items to check without providing details concerning the operation of any system.

The Check List may be arranged by "Challenge" and "Response" headings for two pilot airplanes or by "Item" and "Condition" headings for single pilot airplanes. Under either method, the item to be checked is listed with the desired condition stated. Key words or switch and lever positions are capitalized in the Condition Column.

EXAMPLE:

CHALLENGE OR ITEM	RESPONSE OR CONDITION
Mixture	RICH
Generators	ON/CHECKED
Carburetor Heat	COLD

The Check List may also contain supplemental information pertinent to the operation of the airplane, such as performance data, optional equipment operation, etc., that the pilot might routinely use.

4.7 Amplified Normal Procedures

Additional information, to provide a more complete understanding of the items in the Normal Procedures Check List, in the order of this Check List. may be included in this Section immediately following the Check List. The Amplified Normal Procedures are not intended for routine use in flight, permitting substantial detail and explanation. For example, if the Check List lists "engine run-up", the amplified

procedures would explain how to perform the run-up. Items essential or pertinent to the operation of the airplane not included in the Check List may also be included in this Section following the information on items in the Check List.

4.9 Normal Procedures

Except when inapplicable or inappropriate to the particular airplane model, Handbooks shall contain the recommended normal procedures for the following phases of flight, in the order shown.

(a) Preflight Inspection
(b) Before Engine Starting
(c) Use of External Power
(d) Engine Starting
(e) Before Taxiing
(f) Taxiing
(g) Before Takeoff
(h) Takeoff
  - Normal
  - Short Field*
  - Soft Field*
(i) Climb
(j) Cruise
(k) Descent
(l) Before Landing
(m) Landing
  - Normal
  - Short Field*
  - Soft Field*
  - Balked
(n) After Landing
(o) Shutdown
(p) Postflight ELT

* Where such operations are approved

4.11 Environmental Systems

Include information necessary for safe operation of:

(a) Oxygen Systems (include capacity and duration)
(b) Pressurization System
(c) Heating & Ventilating Systems
(d) Air Conditioning Systems

4.13 Other Normal Procedures

Other procedures essential or pertinent to the operation of the airplane may be included in the Handbook. Generally, this will include information based on the standard or typical airplane and its systems and equipment. Information on specific optional systems or equipment may be included in this Section or in Section 9, Supplements. This Section may also include normal procedures for features peculiar to a particular airplane design or to particular handling characteristics. For example, spin recovery techniques may be included in this Section of an acrobatic category airplane Handbook.

4.15 Noise Characteristics

In addition to information required by Part 36 of the Federal Aviation Regulations, the Handbook producer shall provide strongly worded advice to be used by the operator to minimize the noise impact of the airplane during operation at, or in the vicinity of, airports.

4.17 Procedures for Practice Demonstration of V_{MCA}

For multi-engine airplanes, procedures shall be provided for practice demonstrations of V_{MCA}. The procedures shall be based on the use of V_{SSE}, *Intentional One Engine Inoperative Speed.*

The procedure shall specify that intentionally rendering one engine inoperative for the purpose of demonstrating, or training in, the recognition of V_{MCA} will be done by starting at or above V_{SSE}, then gradually reducing the speed (at approximately one knot per second) until either V_{MCA} or stall warning, whichever occurs first, is obtained.

Some types of airplanes (e. g., turbopropeller powered) may have V_{MCA} determined with automatic propeller pitch control devices that may have substantially more drag from an engine operating at reduced power, to simulate an engine failure, than with an inoperative engine. In such cases (where V_{SSE} is established at a speed to accommodate simulated engine failure by power reduction) the procedures shall include an explanation of the difference between simulated and actual power loss.

There should be a note that V_{SSE} is used only in training and is not a limiting speed.

4.19 Fuel Conservation

(a) Recommended fuel conservation procedures, appropriate to all phases of ground and flight operations, considering engine cooling, performance, and economy, shall be integrated into this Section (and, as appropriate, in Section 5, Performance). The main objective is to show how to maximize ground (nautical) miles per gallon (pound) by careful flight planning and

Issued: February 15, 1975
Revised: October 18, 1996

attention to good operating procedures. The information may be expressed in discussing examples, graphs, tables or other means, or any combination thereof. In addition, general information and tips on fuel conservation may be included in Section 10 of the Handbook (if incorporated).

(b) The information shall include a discussion of the effects of variables (such as leaning and power settings, wind components, air temperature, cruise speeds, altitudes and weight) on fuel consumption. The significant tradeoffs to be considered in order to obtain the best fuel economy must be explained.

(c) The recommended fuel conservation procedures shall contain a caution, if applicable, that the power settings recommended by the manufacturer must be used during the break-in period of new and newly overhauled engines. The use of economy power settings during this period may be detrimental to the engine life.

SECTION 5

PERFORMANCE

TABLE OF CONTENTS

SECTION 5

PERFORMANCE

5.1 General

(a) This Section of the Pilot's Operating Handbook shall contain all performance information required by the Federal Aviation Regulations (or other applicable regulations) and this Specification. Additional performance and related information may be provided to enhance the pilot's operation of the airplane. The basis for such information may be stated (e . g., calculations, tests, analysis based on similar designs, etc.)

(b) The subject matter, including optional information, of this Section of the Handbook shall conform to the following general order of presentation unless a different order is more suitable for a particular airplane:

(1) Introduction, general information, and sample flight planning calculations.
(2) Takeoff.
(3) Climb.
(4) Cruise.
(5) Descent.
(6) Landing.

(c) Paragraphs 5.37 and 5.41 set forth the detailed, minimum subject matter and typical order of presentation within each phase of operation (or subject) listed in subparagraph (b) of this paragraph. Additional information provided by the manufacturer should be appropriately integrated into the order shown in paragraphs 5.37 or 5.41. Figures 5-29 and 5-30 are examples of orders of presentation in which optional items have been incorporated.

5.3 Fuel Conservation Information

Recommended Fuel Conservation Information shall be integrated into this Section to show the pilot how to minimize fuel usage during operation of the airplane.

5.5 Identification of Graphs or Tables

For standardization and user convenience, the titles in the "LIST OF FIGURES" on page 5-7 should be used to identify the appropriate items of airplane performance. Where two or more graphs or tables, which are similar in appearance, are used to cover the variation of items, such as alternative takeoff wing flap settings, the title information should be amplified as required to insure immediate recognition of the particular case.

5.7 Limitations

Limitations contained in this Section shall be clearly noted and cross-referenced to the appropriate paragraph in Section 2 of the Handbook.

5.9 Format Options

Airplane performance data shall be presented in either graphical or tabular formats.

5.11 Readability of Graphs

For graphical data presentations, the incremental value of the smallest graduation or pair of reticle lines should be the product of 1, 2, or 5, multiplied by an integral power of 10.

5.13 Readability of Tables

For tabular data presentations, independent variables shall be chosen so that linear interpolation of the data will provide a reasonable approximation of the function value to be extracted.

When other than simple interpolations in tables are involved, such as three way interpolations, explanations and examples of interpolation shall be included or a procedure for selecting conservative approximations may be given. This may be done in the Sample Flight Planning Section or on the specific table.

5.15 Associated Conditions

Each item of Airplane Performance shall include a statement of significant conditions associated with the data. As a minimum, the following information shall be provided as applicable.

(a) Power Setting and Propeller Condition
Note: Whenever a Maximum Normal Operating Power (MNOP) is included as a limitation, it may not be shown to be exceeded on any chart except those concerning takeoff, emergency, or abnormal procedures.
(b) Wing Flaps
(c) Cowl Flap Setting
(d) Landing Gear Position

(e) Environmental System Operation
(f) Ice Protection System Operation
(g) Runway Precipitation, Slope and Surface Type
(h) Leaning Instructions

5.17 Technique

The technique or procedure necessary to duplicate the performance presented shall be included for those items of performance where the attainment of the predicted airplane performance requires a special sequence of actions.

5.19 Examples

Each graphical or tabular data presentation shall include one or more examples of the proper use of the data presentation unless its use is sufficiently simple that misuse or misunderstanding is improbable.

The examples shall:

(a) Illustrate the most general use of the presentation, avoiding special cases involving standard temperatures, reference weights, zero wind velocities, exact values of table entries or other occurrences not typical of actual situations.
(b) Present assumed example data in the order in which it must be used in the graph or table.
(c) Illustrate upon the face of the presentation graph or table, the successive entry of each assumed variable and the extraction of the end result.
(d) Demonstrate any necessary subsidiary computations which must be performed upon the result extracted from the presentation.
(e) Use assumed conditions, where applicable, the same as those used in the introduction to flight planning.

5.21 Location of Examples, Associated Conditions and Technique

Where possible, examples, associated conditions and technique should be presented on the same page as the chart. If space is not sufficient to include the necessary information, then the page facing the chart should be used.

5.23 Weight

Single engine airplanes require, as a minimum, data presented at the maximum weight. Data for multi-engine airplanes should be presented for a range of specified weights.

5.25 Airspeeds

Airspeed values shall be expressed in knots.

5.27 Distances

All range distances shall be expressed in nautical miles.

5.29 Pressure Altitude and Air Temperature

Only pressure altitude shall be used in specifying airplane performance where altitude is involved. No reference shall be made to density altitude. All airplane performance making use of air temperature shall be presented in terms of degrees Celsius only, or in terms of both Celsius and, Fahrenheit simultaneously. If Celsius only is used, a conversion chart between Celsius and Fahrenheit will be provided.

5.31 Wind Velocities

The effective wind components along the runway shall be taken as 50% of headwind components and 150% of tailwind components in all takeoff, landing, accelerate-stop, accelerate-go and other runway performance.

5.33 Fuel Density

For the purposes of range computations and related weight statements, the density of aviation gasoline shall be taken as 6.0 LB/U.S. Gal. and for aviation kerosene as 6.7 LB/U.S. Gal.

5.35 Performance Formats and Rules

The formats of performance presentations and related parameters and rules shall follow the examples in this Specification. If the format parameter or rule is inappropriate to the type of airplane, equivalents likely to achieve the same objective may be used. The notes on example graphs and tables in this Section are for guidance only.

5.37 Minimum Performance Presentations for Single Engine Airplanes

(a) *Introduction to Performance and Flight Planning*

An actual trip, employing realistic or actual conditions, shall be planned utilizing as much of the performance section as possible. Include sample calculations and any information which will facilitate the proper use and application of performance information including an introduction to tabulated performance. (Figure 5-1)

(b) *Airspeed Calibration*

Issued: February 15, 1975
Revised: October 18, 1996

Data shall be presented as Calibrated Airspeed (CAS) versus Indicated Airspeed (IAS) assuming zero instrument error. The presentation for the normal airspeed system should include data for all flap configurations for which performance is quoted. The presentation for the alternate airspeed system, if applicable, should include data for cruise and landing flap configurations. All calibration data should cover the appropriate speed operating range. (Figure 5-2 or 5-3)

(c) *Altimeter Corrections*

Data shall be presented as altimeter correction versus indicated airspeed at the option of the manufacturer. The presentation should be included for those configurations and airspeed systems for which airspeed calibration data are presented. As a minimum, data should be presented at 5000 feet. A second table should be added if tabular data are presented at more than one altitude. (Figure 5-4 or 5-5)

(d) *Stall Speeds*

Data shall be presented as indicated airspeed and calibrated airspeed versus flap configurations (any flap position for which performance has been quoted) and angle of bank at maximum weight with throttle closed. Altitude loss of more than 100 feet and pitch below the horizon of more than thirty degrees during recovery from stalls should be added if applicable. (Figure 5-6 or 5-7)

(e) *Takeoff Distance*

Data shall be presented as distance versus outside air temperature, altitude and wind. Both ground roll and total distance over a 50 foot obstacle shall be included. The speeds required to attain these distances shall be scheduled in IAS. Unless a higher margin is required by the certification basis, for airplanes certificated after January 1, 1985, regardless of certification basis, the speed(s) at the 50 foot obstacle may not be less than 20% above the power-off stall speed for the same airplane configuration. The speed(s) for which ground roll distances were determined should be higher than the power-off stall speed for the same configuration. The chart should incorporate the limits of temperature and altitude where performance in the takeoff configuration has become marginal. The limiting criteria should involve the capability to climb in the takeoff configuration, free of ground effect, at 50 fpm for retractable gear and 150 fpm for fixed gear airplanes. This limiting rate-of-climb value shall be identified clearly on the chart along with the power and configuration conditions. (Figure 5-9 or 5-10)

(f) *Rate-of-Climb*

Data shall be presented as rate-of-climb versus outside air temperature and altitude at maximum weight and maximum power approved for climb. Climb speed(s) should be either the best rate-of-climb speed or an average best rate-of climb speed and scheduled in IAS. (Figure 5-13 or 5-14)

(g) *Time, Fuel and Distance to Climb*

Data shall be presented as time, fuel and distance to climb from sea level versus altitude on a standard day (ISA). The climb speeds should be scheduled in IAS on the chart and preferably selected so that they will provide optimum range performance. The power setting(s) used shall be no more than the maximum nonemergency climb rating. The associated conditions of power and fuel flow should be specified. (Figure 5-17 or 5-18)

(h) *Cruise*

Data shall be presented as engine power settings, (manifold pressure, engine or propeller speed, fuel flow or whatever parameters are required to establish power) and true airspeed versus altitude and temperature. The format of the cruise performance presentation is at the discretion of the airplane manufacturer, but should consider the following:

1. The format should not rely on devices such as a power computer.
2. The format should be simple to use for both preflight planning and inflight establishment of power.
3. The proper use of the data should be explained.

(i) Range Profiles

Data should be presented as range of airplane versus altitude for various power settings and at least a full fuel loading. Range values should include an allowance for fuel to start, taxi, takeoff, climb and reserve. The following guidelines should be adhered to:

1. For start, taxi and takeoff, allow 5 minutes of fuel flow at takeoff power.
2. For climb, assume a sea level takeoff and use the data presented on the time, fuel and distance to climb chart.

3. For all fuel loadings, the initial airplane weight should be the maximum allowable.
4. Reserve shall be computed as 45 minutes at the cruise power to be used for the flight. The explanation information presented with the chart should explain how the reserve was computed.
5. Range should be computed at standard day (ISA) temperatures.
6. Range values should be included for at least the maximum and minimum power settings for which information has been presented in the Handbook.
7. Range value shall not include parameters or variables that have not been presented in the Handbook.

The sample graph is presented for only one fuel loading. Additional fuel loadings may be presented either as a secondary scale on the same chart or as an additional graph. (Figure 5-21)

(j) *Endurance Profile*
Data shall be presented as endurance time of airplane versus altitude for various power settings and at least a full fuel loading. Endurance should be calculated applying the same guidelines as for range profiles and for the same conditions. (Figure 5-22)

(k) *Landing Distance*
Data shall be presented as landing distance versus outside air temperature altitude and wind. Both ground roll and the total distance over a 50 foot obstacle shall be included. The speed(s) at the 50 foot height point required to obtain the total distance shall be included. (Figure 5-27 or 5-28)

5.41 Minimum Performance Presentations for Multi-Engine Airplanes

(a) *Introduction to Performance and Flight Planning*
An actual trip, employing realistic or actual conditions, shall be planned utilizing as much of the performance section as possible. Include sample calculations and any information which will facilitate the proper use and application of performance information including introduction to tabulated performance. (Figure 5-1)

(b) *Airspeed Calibration*
Data shall be presented as Calibrated Airspeed (CAS) versus Indicated Airspeed (IAS) assuming zero instrument error. The presentation for the normal airspeed system should include data for all flap configurations for which performance is quoted. The presentation for the alternate airspeed system, if applicable, should include data for cruise and landing flap configurations. All calibration data should cover the appropriate speed operating range. (Figure 5-2 and 5-3)

(c) *Altimeter Corrections*
Data shall be presented as altimeter correction versus indicated airspeed and altitude at the option of the manufacturer. The presentation should be included for those configurations and airspeed systems for which airspeed calibration data are presented. If tabular data are presented repeat the table for additional altitudes. (Figure 5-5 or 5-5)

(d) *Stall Speeds*
Data shall be presented as indicated and calibrated airspeed versus flap configurations (any flap position for which performance has been quoted), angle of bank and weight with throttles closed. If tabular presentation is used, repeat the table of additional weights. Altitude loss of more than 100 feet and pitch below the horizon of more than 30 degrees during recovery from stalls should be added if applicable. (Figure 5-6 or 5-7)

(e) *Maximum Takeoff Weight (If Applicable)*
Data shall be presented as maximum takeoff weight versus temperature and altitude. The chart shall be clearly identified as a limitation in accordance with Paragraph 5.7. (Figure 5-8)

(f) *All Engines Operating Take off Distance*
Data shall be presented as distance versus outside air temperature, altitude, weight, and wind. Both ground roll and total distance over a 50 foot obstacle shall be included. The speeds required to attain these distances shall be scheduled in IAS. The speed(s) at the 50 foot obstacle height may not be less than 20% above the power-off stall speed(s) for the same airplane configuration or 10% above V_{MCA}, whichever is higher. The speed(s) at the end of the ground roll distances(s) may not be less than 5% above the power-off stall speed(s) for the same airplane configuration or 5% above V_{MCA}, whichever is higher. The chart shall indicate the extremes of temperature and altitude where all engine performance in the takeoff configuration becomes marginal. These extremes should

Issued: February 15, 1975
Revised: October 18, 1996

involve the capability to climb in the takeoff configuration, free of ground effect, at 50 fpm for retractable gear airplanes and 150 fpm for fixed gear airplanes. This limiting rate-of-climb value shall be clearly identified on the chart, along with the power and configuration conditions. (Figure 5-9 or 5-10)

(g) *Accelerate-Stop Distance*
Data shall be presented as distance versus outside air temperature, altitude, weight and wind. Distances should include acceleration, deceleration and a time delay at engine failure speed equivalent to 3 seconds at the engine failure speed. Engine failure speed(s) shall be the same as the lift-off speed(s) assumed on the All Engines Operating Takeoff Distance chart except lower values may be used when a corresponding "accelerate-go" chart has been provided. (Figure 5-11 or 5-12)

(h) *Rate-of-Climb*
Data shall be presented as rate-of-climb versus outside air temperature, altitude and weight at the maximum power approved or as specified by the appropriate FAA requirements. Separate charts shall be included for the following:

1. Rate-of-Climb-all engines operating with flaps set to the takeoff position and landing gear retracted.
2. Rate-of-Climb-all engines operating with flaps set to the enroute position and landing gear retracted (If applicable)
3. Rate-of-Climb-one engine inoperative with flaps set to the enroute position and landing gear retracted.
4. Rate-of-Climb-Balked Landing.
   The climb speeds appropriate to each configuration shall be scheduled in IAS. (Figure 5-13 or 5-l4)

(i) *Service Ceiling-One Engine Inoperative*
Data shall be presented as service ceiling and outside air temperature versus weight. Service ceiling shall be the pressure altitude where an airplane has the capability of climbing 50 ft/min with one engine propeller feathered. (Figure 5-15 or 5-16)

(j) *Time, Fuel and Distance to Climb*
Data shall be presented as time, fuel and distance to climb from sea level versus outside air temperature, altitude and weight. The climb speed(s) should be scheduled in IAS on the chart and preferably selected so that they will provide optimum range performance. The power setting(s) should not exceed the maximum nonemergency climb power rating and all associated conditions should be specified. (Figure 5-17 or 5-18)

(k) *Cruise*
Data shall be presented as engine power setting (manifold pressure, engine or propeller speed, fuel flow or whatever parameters are required to establish power) and true airspeed versus altitude and temperature. The effect of weight should also be scheduled if it significantly affect cruise performance. The format of the cruise performance presentation is at the discretion of the airplane manufacturer, but should consider the following:

1. The format should not rely on devices such as a power computer.
2. The format should be simple to use for both preflight planning and inflight establishment of power.
3. The proper use of the data should be explained.

(l) *Range Profiles*
Data shall be presented as range of airplanes versus altitude for various power settings and at least a full fuel loading. Range values should include an allowance for fuel to start, taxi, takeoff, climb, descend and reserve. The following guidelines should be adhered to:

1. For start, taxi, and takeoff, allow 5 minutes of fuel flow at takeoff power.
2. For climb, assume a sea level takeoff and use the data presented on the time, fuel and distance to climb chart.
3. For descent, assume a descent from cruise altitude to sea level and use the data presented on the time, fuel and distance to descend chart.
4. For all fuel loadings, the initial airplane weight should be the maximum allowable.
5. Reserve shall be computed as 45 minutes at the cruise power to be used for the flight. The explanation information presented with the chart should explain how the reserve was computed.
6. Range should be computed at standard day (ISA) temperatures.
7. Range values should be included for at least the maximum and minimum power

settings for which information has been presented in the Handbook.

8. Range values shall not include parameters or variables that have not been presented in the Handbook.

   The sample graph is presented for only one fuel loading.

   Additional fuel loadings may be presented either as a secondary scale on the same chart or as an additional graph. (Figure 5-21)

(m) *Endurance Profile*

Data shall be presented as endurance time versus altitude for various power settings and at least a full fuel loading. Endurance should be calculated applying the same guidelines as for range profiles and for the same conditions. (Figure 5-22)

(n) *Holding Time*

Data shall be presented as holding time versus altitude and fuel required at a recommended power setting for holding. (Figure 5-23 or 5-24)

(o) *Time, Fuel & Distance to Descend*

Data shall be presented as time, fuel and distance to descend to sea level versus altitude. The conditions of speed and rate-of-descent should be selected by the airplane manufacturer and specified. The format is the same as the graph or table for time, fuel and distance to climb for single engine aircraft. (Figure 5-25 or 5-26)

(p) L*anding Distance*

Data shall be presented as landing distance versus outside air temperature altitude, weight and wind. Both ground roll and the total distance over a 50 foot obstacle shall be included. The speed(s) at the 50 foot height point required to obtain the total distance shall be scheduled. (Figure 5-27 or 5-28)

5.42 Performance Presentations in Icing Conditions

(a) *Introduction*

Appendix C of FAR Part 25 defines specific parameters for certification of aircraft for operations in continuous maximum and intermittent maximum icing conditions. Atmospheric conditions, including large supercooled water droplets, freezing rain or a mixture of conditions, may exceed the FAR parameters and the capabilities of the certified ice protection system. This information shall be presented along with information to aid recognition of icing conditions which may exceed the certified capabilities of the aircraft and its ice protection system.

(b) *Operations in Icing Conditions*

Data shall be presented by general statements of allowances necessary while operating in icing conditions or with residual ice on the airframe.

(1) Data providing loss in rate of climb (FPM), reduction in cruise speed (KIAS) and significant buffet and stall speed increase (KTS) for a selected ice accumulation and for residual ice remaining on the boots and unprotected areas of the airplane.

(2) Data providing airspeed recommendations for operating with selected accumulations of ice or residual ice shall be presented.

(3) Data providing airspeed recommendations and effects of boot operations prior to and during the landing approach.

(4) Recommendations for ATC holding operation in icing conditions for up to 45 minutes (or less if so demonstrated).

(5) Recommendations, if any, for engine operating parameter effects on the ice protection system or on performance of the engine in icing conditions.

(c) *Presentation Formats*

FAA Advisory Circular 23.1419-2, Certification of Part 23 Airplanes For Flight In Icing Conditions, contains recommendations for presentation of data and limitations. Reference to this Advisory Circular during preparation of the Pilot's Operating Handbook is encouraged.

Issued: February 15, 1975
Revised: October 18, 1996

LIST OF FIGURES

INTRODUCTION TO TABULATED PERFORMANCE:

Tabulations of performance are presented in increments of temperature, altitude and any other variables involved. Performance for a given set of conditions may be approximated as follows:

Takeoff, climb, and landing - Enter tables at the next higher increment of altitude, temperature, weight and at zero wind.

Cruise Enter tables at next lower increment of temperature, altitude and fuel loading; and the next higher increment of weight, if applicable.

To obtain exact performance values from tables, it is necessary to interpolate between the incremental values.

The following is an excerpt from the Table for Takeoff Distances:

WEIGHT LBS	TAKEOFF SPEED KNOTS ~ IAS		PRESS ALT FT	20°		30°	
	LIFT OFF	50 FT		GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS
11,800	101	118	2000	2410	3850	2720	4320
			4000	2840	4600	3230	5020
11,000	98	115	2000	2170	3450	2415	3800
			4000	2580	4015	2860	4450

NOTE: DECREASE DISTANCE 4% FOR EACH 5 KNOTS HEADWIND

EXAMPLE

GIVEN: WEIGHT 11,275 LBS.

OUTSIDE AIR TEMPERATURE 25°C

PRESSURE ALTITUDE 3966 FT

HEADWIND 9.5 KNOTS

FIND: TAKEOFF SPEEDS AT LIFT-OFF

50 FEET

GROUND ROLL

TOTAL DISTANCE TO CLEAR 50 FT OBSTACLE

APPROXIMATION METHOD:

Read values at 11,800 lbs., 30°6 and 4,000 feet:

Takeoff Speeds	
Lift-off	101 KIAS
50 feet	118 KIAS
Ground Roll	3230 FEET
Total to Clear 50' Obstacle	5020 FEET

INTERPOLATION METHOD:

The example weight is 34% of the difference between 11,000 and 11,800 pounds.

The example pressure altitude is 98% of the difference between 2000 and 4000 feet.

The example temperature is 50% of the difference between 20° and 30°6.

Summary of Interpolated Values:

Takeoff Speeds	
Lift-off	99 KIAS
50 feet	116 KIAS
Ground Roll	2818 FEET
Total to Clear 50' Obstacle	4416 FEET

Correction for Head Wind:

For a 9.5 Knot Headwind, decrease distances by 7.6%.

Ground Roll 2818-(7,6%) (2818) = 2604 feet

Total to Clear 441~(7.6%) (4416) = 4080 feet

Figure 5-1

Issued: February 15, 1975
Revised: October 18, 1996

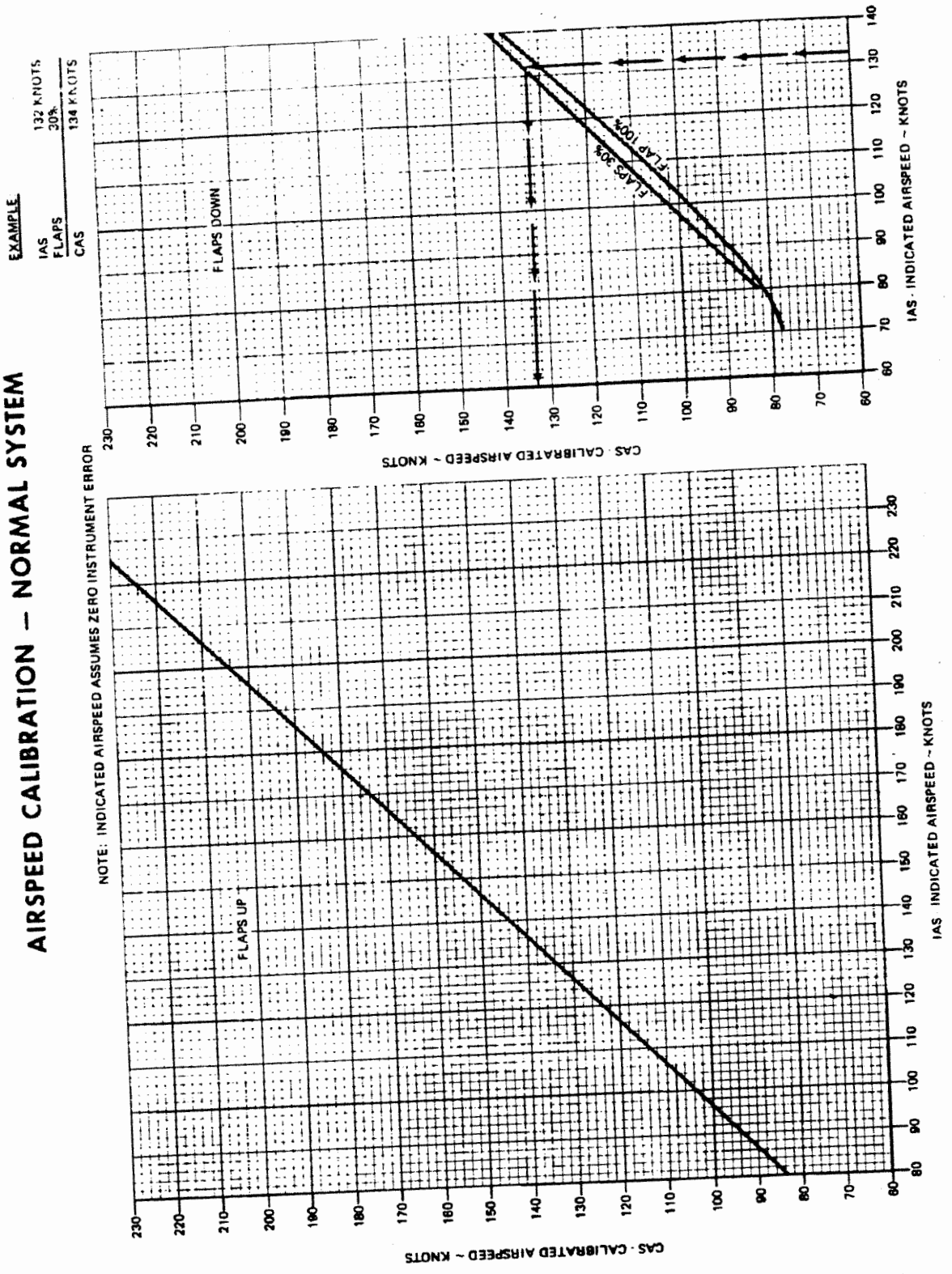


Figure 5-2

Issued: February 15, 1975
Revised: October 18, 1996

AIRSPEED CALIBRATION – NORMAL SYSTEM

EXAMPLE:

FLAPS	FULL	
INDICATED AIR SPEED	110	KIAS
CALIBRATED AIR SPEED	109	KCAS

NOTE:

INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.

FLAPS UP	KIAS	60	100	120	140	160	180	200
	KCAS	87	101	118	137	166	176	196
FLAPS 1/3	KIAS	70	80	90	100	120	140	160
	KCAS	79	85	92	100	117	135	155
FLAPS FULL	KIAS	65	75	85	95	105	115	125
	KCAS	71	79	86	95	104	113	122

KIAS = INDICATED AIRSPEED IN KNOTS
KCAS = CALIBRATED AIRSPEED IN KNOTS

Figure 5-3

Issued: February 15, 1975
Revised: October 18, 1996

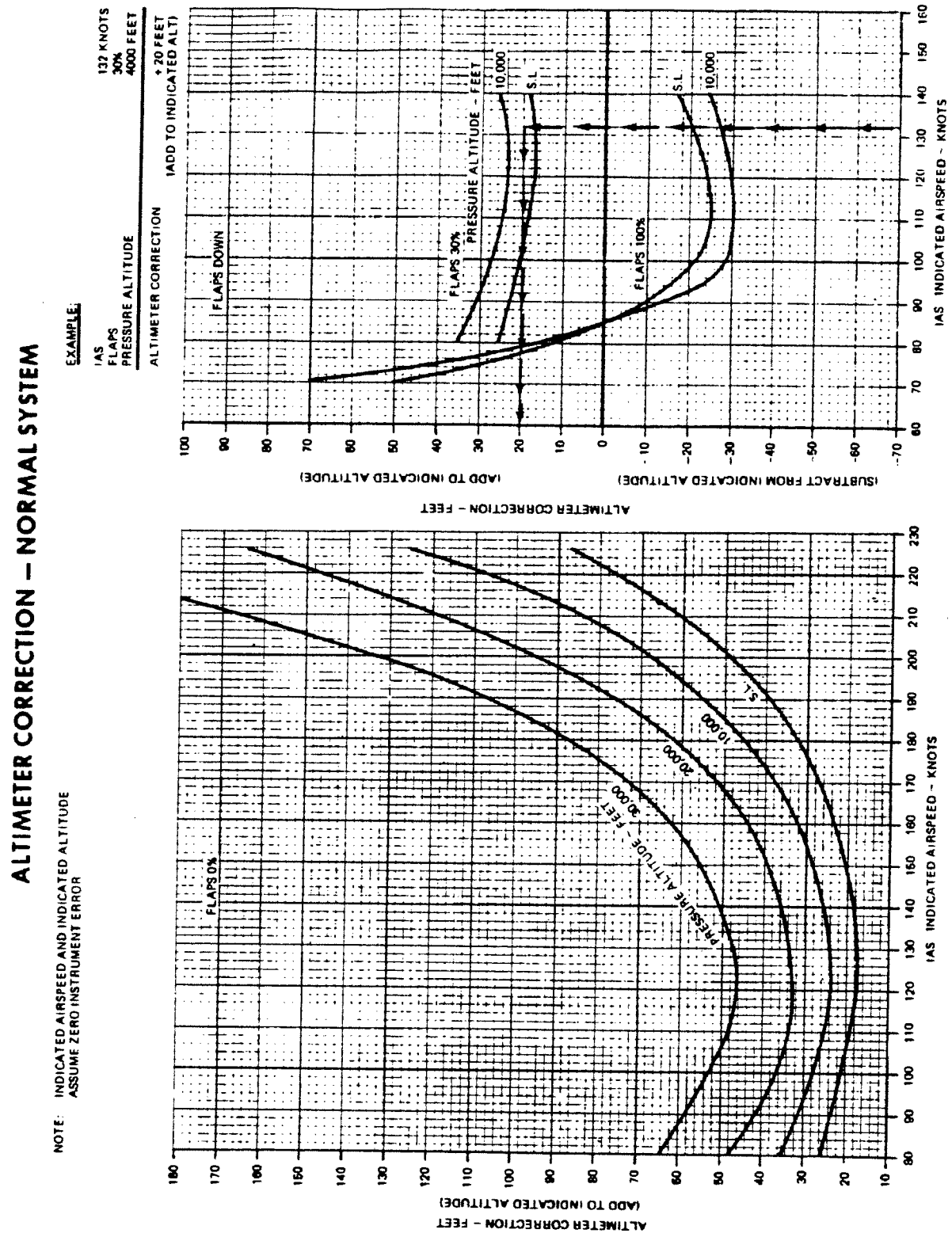


Figure 5-4

ALTIMETER CORRECTION – NORMAL SYSTEM

EXAMPLE:

FLAPS	FULL	
INDICATED AIR SPEED	95	KIAS
CORRECTION TO BE ADDED	-30	FT

NOTE:

1. ADD CORRECTION TO INDICATED ALTIMETER READING.
2. IAS AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR.

CONDITION	CORRECTION TO BE ADDED ~ FEET					
	KNOTS IAS					
	80	100	120	140	160	180
FLAPS UP	-10	-20	-40	-60	-90	-115
FLAPS 1/3	-10	-35	-60	-80	-110	---
FLAPS FULL	-16	-35	-60	—	—	---

Figure 5-5

Issued: February 15, 1975
Revised: October 18, 1996

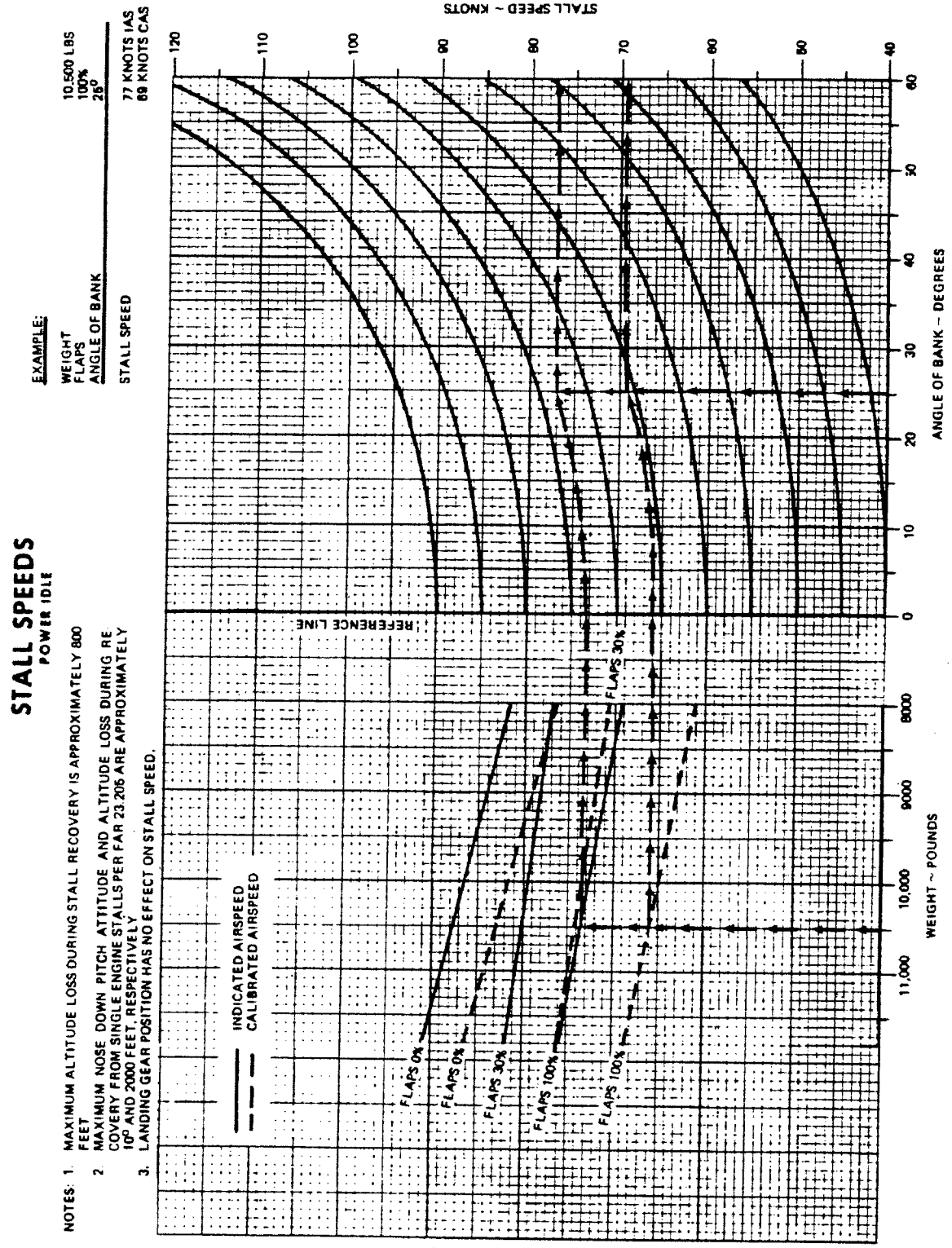


Figure 5-6

Figure 5-6

STALL SPEEDS

ASSOCIATED CONDITIONS:

POWER	IDLE
LANDING GEAR	UP OR DOWN

EXAMPLE:

WEIGHT	4600 LBS.
LANDING GEAR	DOWN
FLAPS	100%
ANGLE OF BANK	15°
STALL SPEED	58 KIAS 64 KCAS

NOTES:

1. MAXIMUM ALTITUDE LOSS DURING STALL RECOVERY IS APPROXIMATELY 800 FEET.
2. MAXIMUM NOSE DOWN PITCH ATTITUDE AND ALTITUDE LOSS DURING RECOVERY FROM SINGLE ENGINE STALLS ARE APPROXIMATELY 10° AND 2000 FEET, RESPECTIVELY
3. LANDING GEAR POSITION HAS NO EFFECT ON STALL SPEEDS.

WEIGHT LBS.	CONDITION	STALL SPEEDS ~ KNOTS							
		ANGLE OF BANK							
		0°		30°		45°		60°	
		IAS	CAS	IAS	CAS	IAS	CAS	IAS	CAS
4600	FLAPS UP	60	69	64	74	71	62	85	98
	FLAPS 1/3	57	68	61	71	68	78	81	93
	FLAPS FULL	56	62	60	66	67	74	79	88

Figure 5-7

Issued: February 15, 1975
Revised: October 18, 1996

MAXIMUM TAKEOFF WEIGHT
OPERATING LIMITATION

EXAMPLE:

PRESSURE ALTITUDE	3200 FEET
OAT	30°C
MAXIMUM TAKEOFF WEIGHT	11,000 LBS

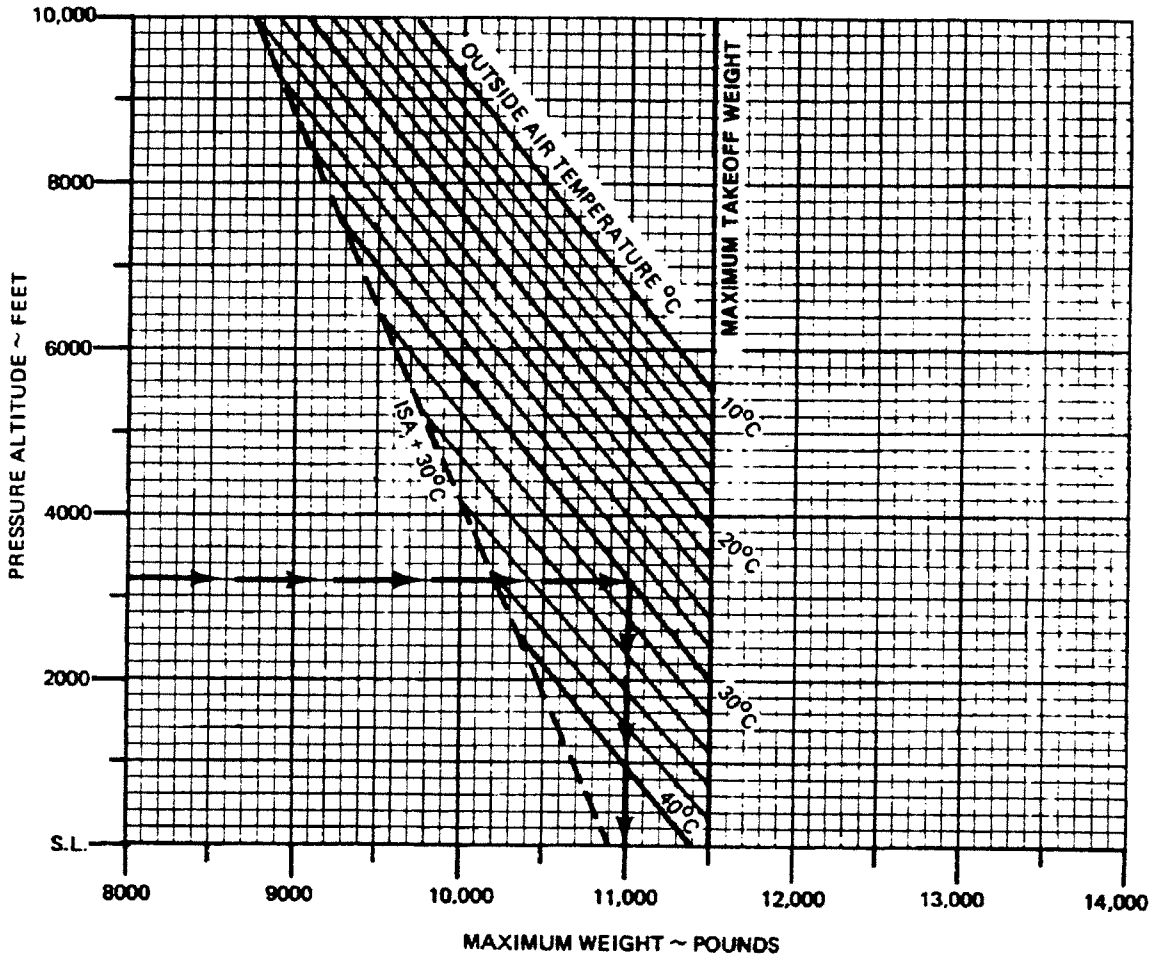


Figure 5-8

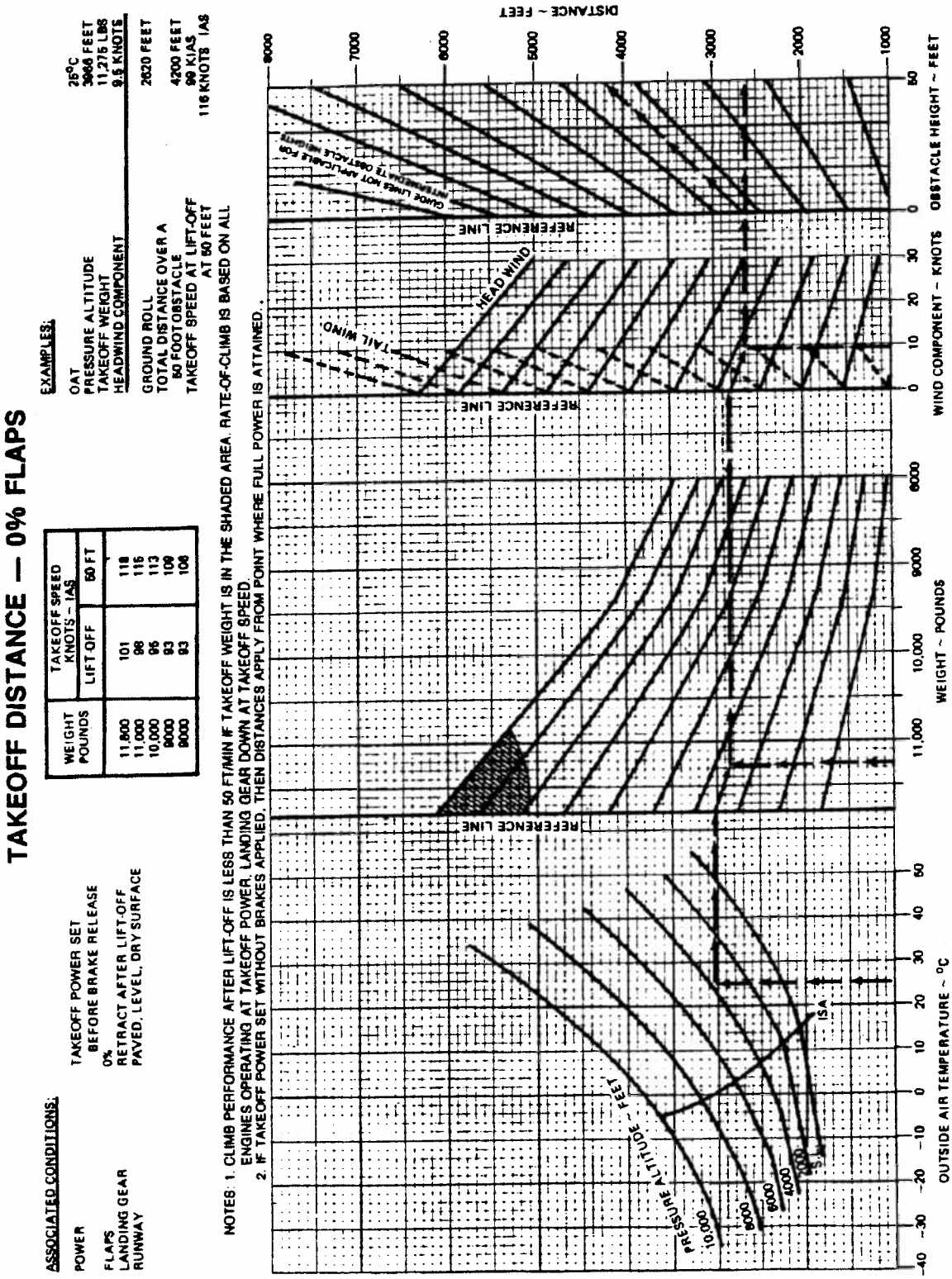


Figure 5-9

Issued: February 15, 1975
Revised: October 18, 1996

TAKEOFF DISTANCE

ASSOCIATED CONDITIONS:

POWER	TAKEOFF POWER SET BEFORE BRAKE RELEASE
FLAPS	0%
LANDING GEAR	RETRACTED AFTER LIFT-OFF
RUNWAY	PAVED, LEVEL, DRY SURFACE

EXAMPLE:

WEIGHT	11,275 LBS
OUTSIDE AIR TEMPERATURE	25°C
PRESSURE ALTITUDE	3966 FT
HEADWIND COMPONENT	9.5 KTS
GROUND ROLL	2604 FT
TOTAL TO CLEAR 50 FT. OBS.	4080 FT
TAKEOFF SPEED AT LIFT-OFF	99 KIAS
50 FEET	116 KIAS

NOTES:

1. DECREASE DISTANCES 4% FOR EACH 5 KNOTS HEADWIND. FOR OPERATION WITH TAILWINDS UP TO 10 KNOTS, INCREASE DISTANCES BY 6% FOR EACH 2.5 KNOTS.
2. WHERE DISTANCE VALUE HAS BEEN DELETED, CLIMB PERFORMANCE AFTER LIFT-OFF IS LESS THAN ___ FT/MIN.
   RATE-OF-CLIMB IS BASED ON ALL ENGINES OPERATING AT TAKEOFF POWER, GEAR DOWN AT TAKEOFF SPEED.
3. IF TAKEOFF POWER SET WITHOUT BRAKES APPLIED, THEN DISTANCE APPLY FROM POINT WHERE FULL POWER IS ATTAINED.

WEIGHT LBS	TAKEOFF SPEED KNOTS ∿ IAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	50 FT		GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS
11800	101	118	SL	1950	3075	2030	3225	2165	3420	2370	3700	2680	4215
			2000	2150	3400	2225	3550	2410	3850	2720	4320	3180	5015
			4000	2375	3700	2550	4140	2840	4600	3280	5020	3700	6000
			6000	2730	4300	3050	4875	3400	5560	3780	6200	4350	7250
			8000	3240	5125	3600	5775	4040	6100	4575	7760	----	----
			10000	3840	6200	4270	7040	4815	8000	----	----	----	----
11000	98	115	SL	1710	2725	1800	2850	1915	3030	2100	3310	2375	3700
			2000	1890	3030	2010	3210	2170	3450	2415	3800	2775	4400
			4000	2110	3315	2340	3650	2580	4015	2880	4450	3230	5250
			6000	2400	3740	2700	4260	3030	4830	3400	5470	3900	6300
			8000	2850	4500	3225	5020	3800	5670	4070	6740	----	----
			10000	3420	5540	3780	6140	4265	7150	----	----	----	----
10000	95	113	SL	1450	2440	1540	2530	1650	2660	1810	2850	2040	3165
			2000	1650	2640	1760	2785	1900	2990	2090	3300	2375	3780
			4000	1825	2880	2010	3080	2225	3370	2485	3700	2785	4400
			6000	2075	3250	2315	3520	2570	3920	2880	4400	3315	5355
			8000	2460	3875	2700	4300	2970	4790	3400	5560	----	----
			10000	2910	4650	3230	5200	3650	5850	----	----	----	----

Figure 5-10

ACCELERATE – STOP DISTANCE – 0% FLAPS

ASSOCIATED CONDITIONS:

POWER	1. TAKEOFF POWER SET BEFORE BRAKE RELEASE 2. BOTH ENGINES IDLE AT ENGINE FAILURE SPEED AND REVERSE OPERATING ENGINE
FLAPS	0%
BRAKING	MAXIMUM
RUNWAY	PAVED, LEVEL, DRY SURFACE

WEIGHT POUNDS	ENGINE FAILURE SPEED KNOTS IAS
11,500	99
11,000	96
10,000	91
9000	88
8000	86

EXAMPLE:

OAT	25°C
PRESSURE ALTITUDE	3966 FEET
WEIGHT	11,275 LBS
HEADWIND COMPONENT	9.5 KNOTS
ACCELERATE - STOP DISTANCE	6000 FEET
ENGINE FAILURE SPEED	98 KNOTS IAS

NOTE: DISTANCES INCLUDE A FAILURE RECOGNITION TIME OF 3 SECONDS.

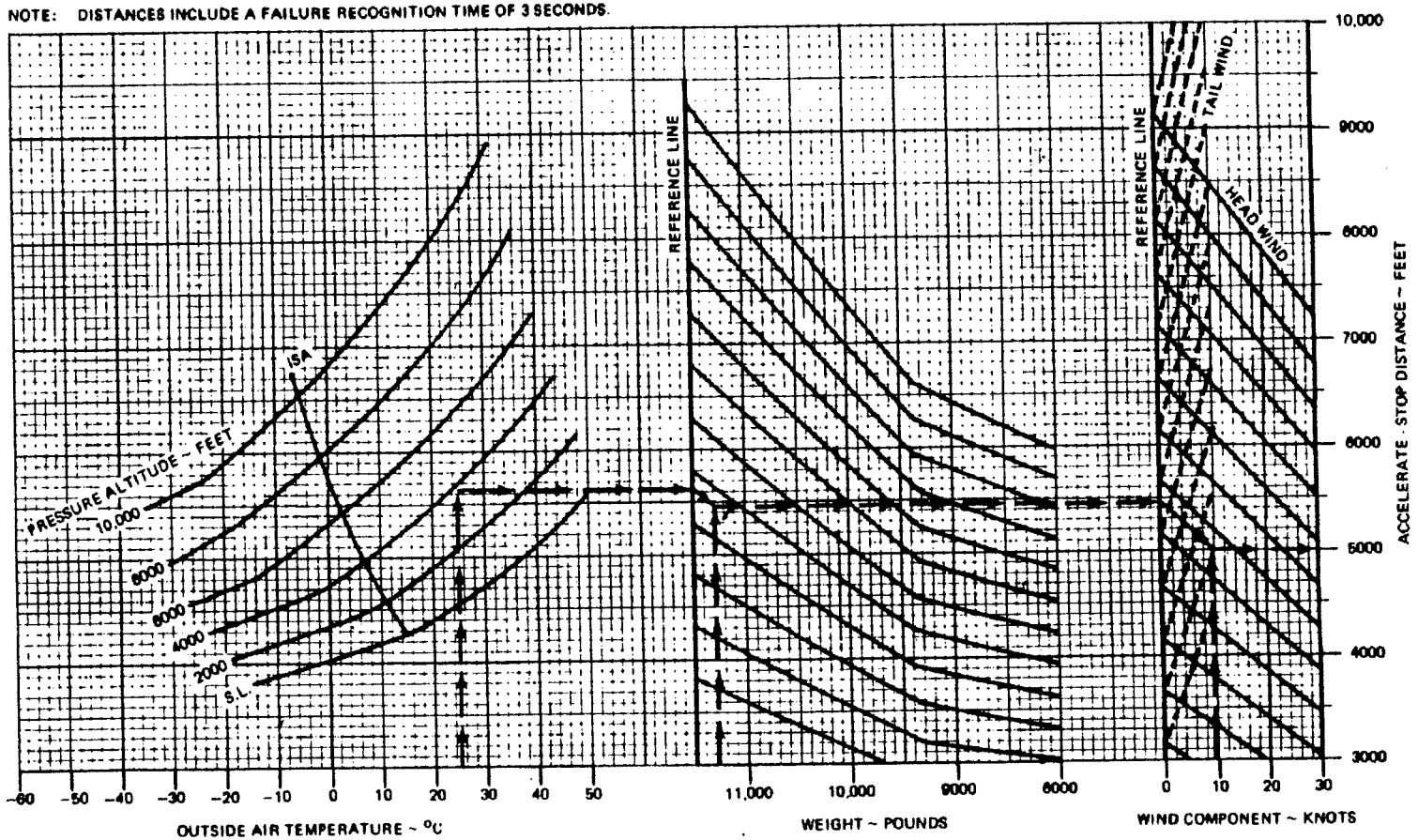


Figure 5-11

Issued: February 15, 1975
Revised: October 18, 1996

ACCELERATE - STOP ∿ 0% FLAPS

ASSOCIATED CONDITIONS:

POWER 1. TAKEOFF POWER SET BEFORE BRAKE RELEASE
2. BOTH ENGINES IDLE AT ENGINE FAILURE SPEED AND REVERSE OPERATING ENGINE.

FLAPS 0%
BRAKING MAXIMUM
RUNWAY PAVED, LEVEL, DRY SURFACE

EXAMPLE:

WEIGHT	11275 LBS
OUTSIDE AIR TEMPERATURE	25°C
PRESSURE ALTITUDE	3966 FT
HEADWIND COMPONENT	9.5 KTS

1. APPROXIMATION METHOD
   ACCELERATE-STOP DISTANCE 5870 FT
   ENGINE FAILURE SPEED 98 KIAS
2. INTERPOLATION METHOD
   ACCELERATE-STOP DISTANCE 5077 FT
   ENGINE FAILURE SPEED 98 KIAS

NOTE:

1. DECREASE DISTANCES 4% FOR EACH 5 KNOTS HEADWIND. FOR OPERATIONS WITH TAILWINDS UP TO 10 KNOTS, INCREASE DISTANCES BY 6% FOR EACH 2.5 KNOTS.
2. DISTANCES INCLUDE A FAILURE RECOGNITION TIME OF 3 SECONDS.

WEIGHT LBS.	ENGINE FAILURE SPEED	PRESSURE ALTITUDE FEET	0°C	10°C	20°C	30°C	40°C
			ACCELERATE - STOP DISTANCE ∿ FEET				
11500	99	SL	4025	4170	4370	4650	5100
		2000	4370	4570	4810	5150	5710
		4000	4725	5080	5450	5870	6500
		6000	5300	5740	6180	6670	7300
		8000	6020	6490	6975	7600	—
		10000	6800	7400	8010	8770	—
11000	96	SL	3800	3960	4160	4390	4770
		2000	4080	4310	4570	4890	5390
		4000	4400	4750	5120	5525	6060
		6000	5000	5350	5725	6150	6800
		8000	5625	6050	6520	7100	—
		10000	6375	6860	7480	—	—
10000	91	SL	3310	3460	3620	3840	4160
		2000	3560	3750	3950	4190	4660
		4000	3825	4130	4420	4750	5280
		6000	4325	4625	4950	5315	5840
		8000	4900	5235	5610	6075	—
		10000	5475	5900	6420	—	—

Figure 5-12

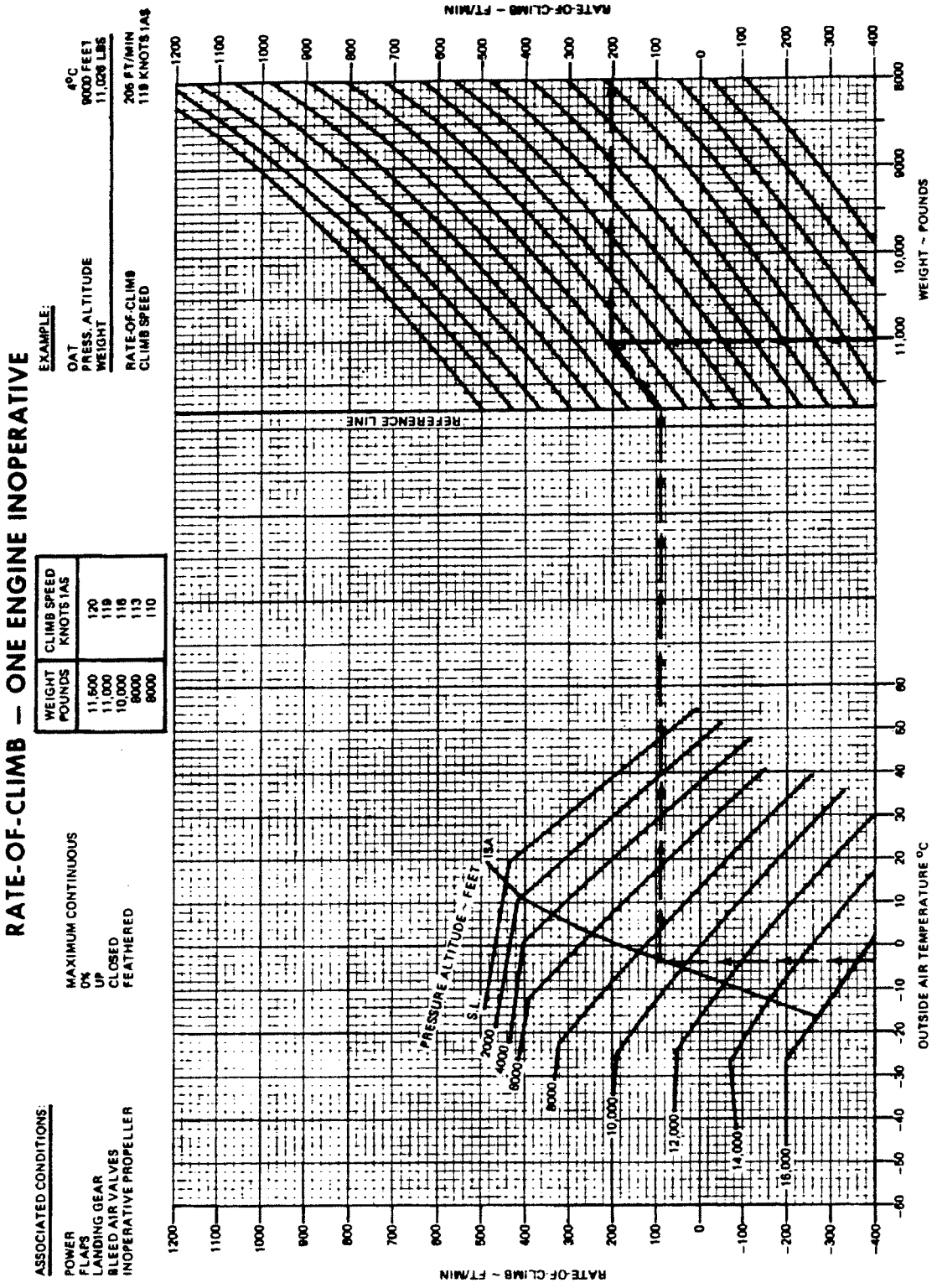


Figure 5-13

Issued: February 15, 1975
Revised: October 18, 1996

RATE-OF-CLIMB - ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:

POWER	MAX. CONT. AT 2800 RPM
LANDING GEAR	UP
FLAPS	UP
PRESSURIZATION	OFF
INOPERATIVE PROPELLER	FEATHERED
FUEL MIXTURE	AT RECOMMENDED LEANING SCHEDULE.

EXAMPLE:

WEIGHT	4400	LBS
PRESSURE ALTITUDE	3000	FT
OUTSIDE AIR TEMPERATURE	10°C	
CLIMB SPEED	89	KIAS
RATE-OF-CLIMB	273	FT/MIN

WEIGHT LBS.	PRESSURE ALTITUDE FT	CLIMB SPEED KNOTS ∿ IAS	RATE-OF-CLIMB - FT/MIN			
			-20°C	0°C	20°C	40°C
4600	SL	90	430	375	320	255
	2000	90	340	285	230	170
	4000	89	260	200	145	95
	6000	89	165	110	55	0
	8000	88	75	26	-30	-85
	10000	88	-20	-75	-130	-185
4500	SL	88	645	490	435	380
	2000	88	455	405	350	300
	4000	87	365	310	260	210
	6000	87	275	220	165	116
	8000	86	186	130	75	26
	10000	86	95	40	-15	-70
4000	SL	86	685	630	575	520
	2000	86	590	550	485	430
	4000	84	495	445	390	340
	6000	84	400	345	290	245
	8000	82	310	250	200	150
	10000	82	210	155	100	50

Figure 5-14

SERVICE CEILING — ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:

POWER	MAXIMUM CONTINUOUS
LANDING GEAR	UP
BLEED AIR VALVE	CLOSED
INOPERATIVE PROPELLER	FEATHERED
FLAPS	UP

EXAMPLE:

OAT AT MEA	10°C
ROUTE SEGMENT MEA	11,400 FEET
WEIGHT	10,200 LBS

NOTE: SERVICE CEILING IS THE PRESSURE ALTITUDE WHERE AIRPLANE HAS CAPABILITY OF CLIMBING 50 FT/MINUTE WITH ONE PROPELLER FEATHERED.

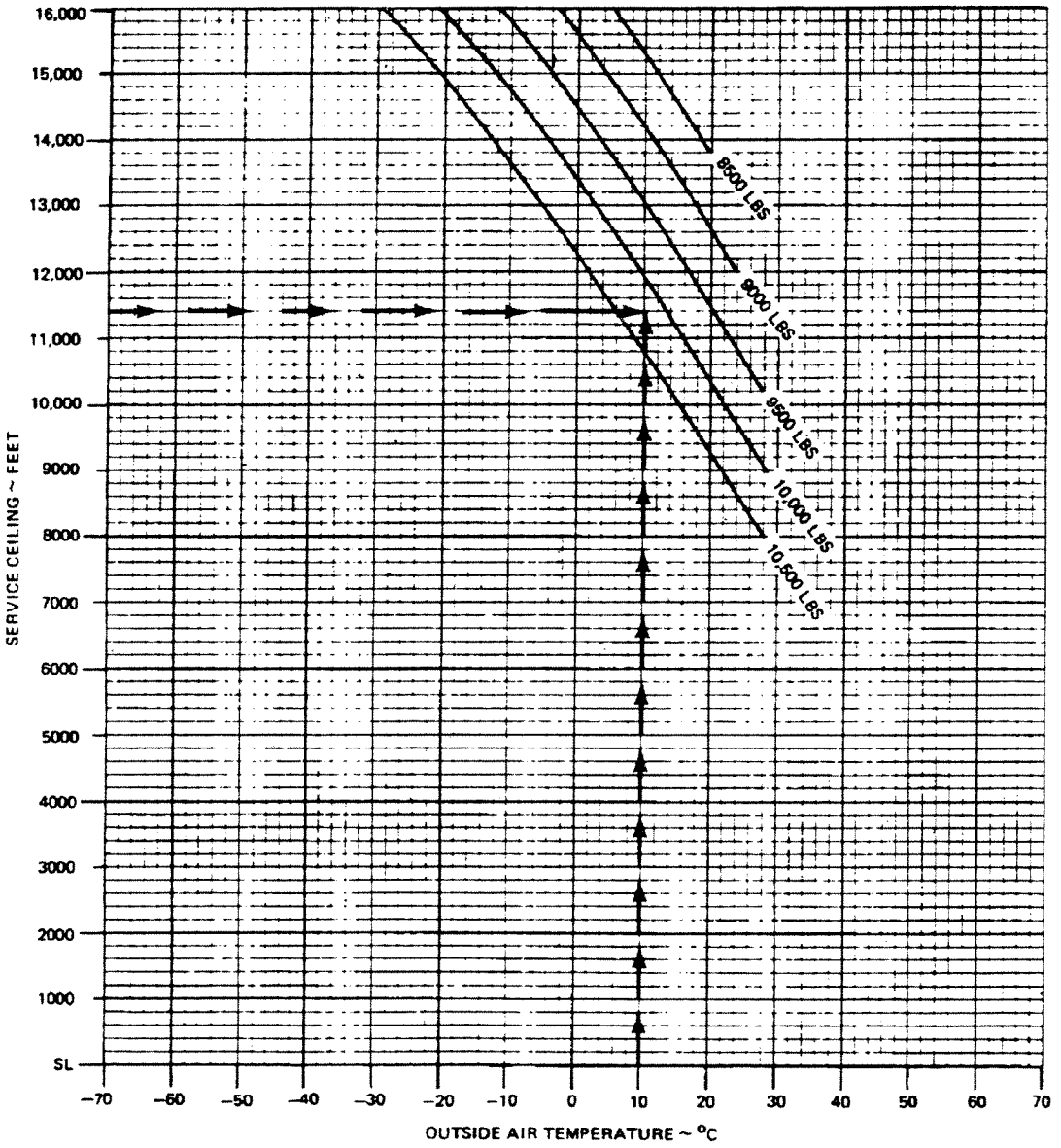


Figure 5-15

Issued: February 15, 1975
Revised: October 18, 1996

SERVICE CEILING - ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:

POWER	MAX. CONTINUOUS
FLAPS	UP
LANDING GEAR	UP
BLEED AIR VALVE	CLOSED
INOPERATIVE PROPELLER	FEATHERED

EXAMPLE:

OAT AT MEA	-5°C
ROUTE SEGMENT	
MEA	8500 FT
WEIGHT	4305 LBS

NOTE:

SERVICE CEILING IS ALTITUDE WHERE AIRCRAFT HAS CAPABILITY OF CLIMBING 50 FT/MIN WITH ONE ENGINE FEATHERED.

PRESSURE ALTITUDE FEET	OUTSIDE AIR TEMPERATURE ∿ °C					
	-20	-10	0	10	20	30
	WEIGHT ∿ POUNDS					
4000	4600	4600	4600	4600	4600	4600
5000	4600	4600	4600	4600	4600	4520
7000	4600	4600	4510	4400	4290	4190
8000	4560	4450	4340	4230	4120	4020
9000	4380	4270	4160	4060	3950	3860
10000	4200	4100	3990	3900	---	---
11000	4020	3920	3820	---	---	---
12000	3950	---	---	---	---	---
13000	---	---	---	---	---	---
14000	---	---	---	---	---	---

Figure 5-16

TIME, FUEL, AND DISTANCE TO CLIMB

WEIGHT POUNDS	CLIMB SPEED KNOTS IAS
3300	130
2800	130

ASSOCIATED CONDITIONS:

POWER	2625 RPM, FULL THROTTLE
MIXTURE	FULL RICH
TEMPERATURE	STANDARD DAY (ISA)
FUEL DENSITY	6.0 LBS/GAL

EXAMPLE:

AIRPORT ALTITUDE	2600 FEET
CRUISE ALTITUDE	8600 FEET
TIME TO CLIMB (17 - 3.5)	13.5 MINUTES
FUEL TO CLIMB (180 - 43)	137 LBS
DISTANCE TO CLIMB (46.5 - 9.5)	37.0 N M

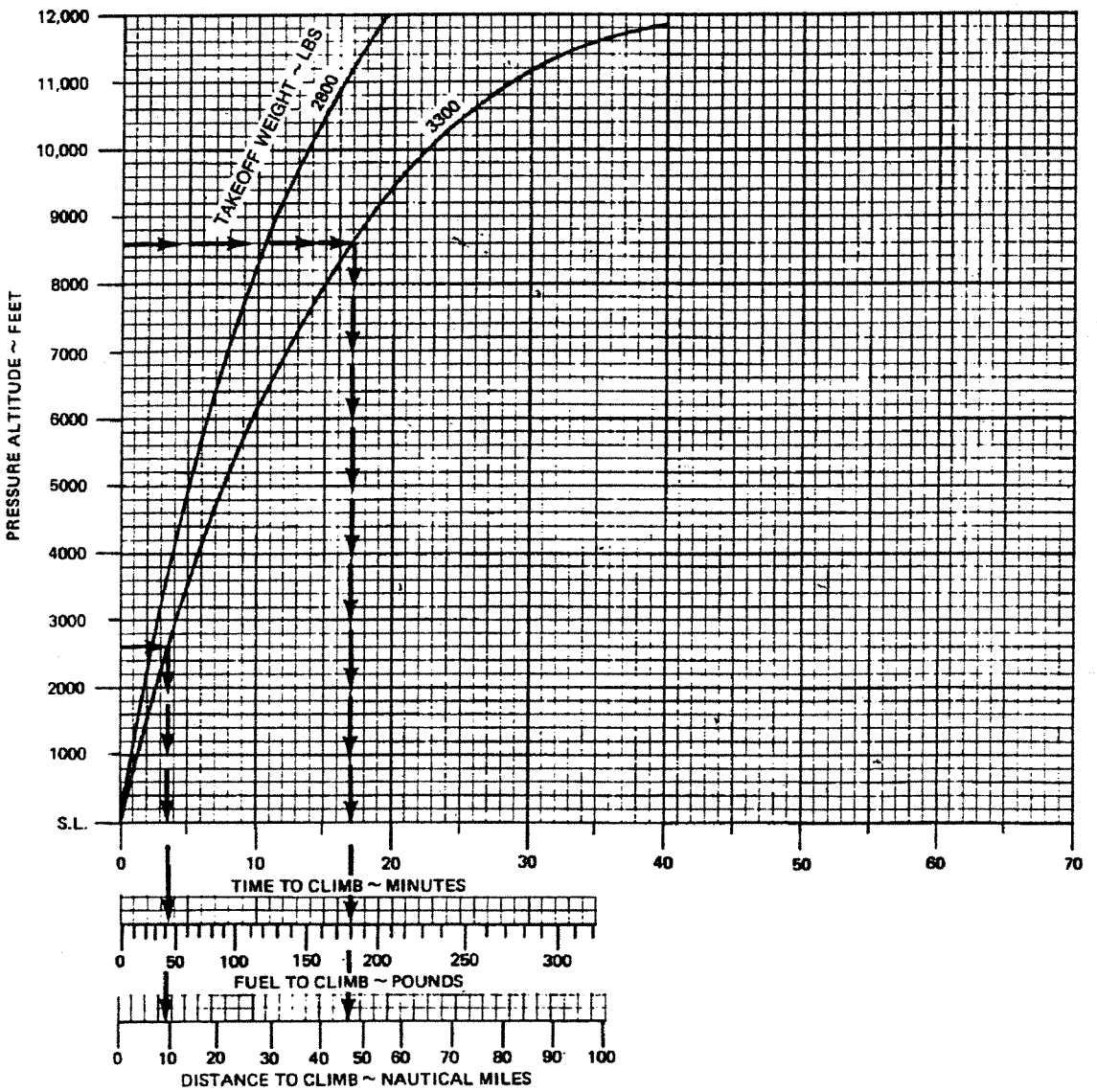


Figure 5-17

Issued: February 15, 1975
Revised: October 18, 1996

TIME, FUEL, AND DISTANCE TO CLIMB

ASSOCIATED CONDITIONS:

POWER	MAX. M.P. AT 2700 RPM
FUEL MIXTURE	RECOMMENDED LEANING SCHEDULE
FUEL DENSITY	6.0 LBS/GAL
FLAPS	0%
TEMPERATURE	STANDARD DAY (ISA) (SEE NOTE 2, FOR APPROX. PERFORMANCE ABOVE ISA)

EXAMPLE:

ALTITUDE	17,500 FT
WEIGHT	3,350 LBS
INDICATED AIR SPEED	89 KIAS
RATE-OF-CLIMB	765 FT/MIN
TIME	23 MIN
FUEL	61 LBS
DISTANCE	40 N.M.

NOTES:

1. DISTANCES SHOWN ARE BASED ON ZERO WIND.
2. FOR TEMPERATURES ABOVE STANDARD, DECREASE RATE-OF-CLIMB 40 FT/MIN FOR EACH 5°C ABOVE STANDARD DAY TEMPERATURE FOR PARTICULAR ALTITUDE.

PRESSURE ALTITUDE	CLIMB SPEED	WEIGHT	RATE OF CLIMB	FROM SEA LEVEL		
				TIME	FUEL USED	DISTANCE
FT	KIAS	LBS	FT/MIN	MIN	LBS	N.M.
SEA LEVEL	90	3600	1030	0	12	0
		3100	1300	0	12	0
		2600	1660	0	12	0
5,000	90	3600	950	5	30	9
		3100	1220	4	24	7
		2600	1570	3	18	8
10,000	90	3600	860	11	42	20
		3100	1120	8	36	16
		2600	1470	6	30	12
15,000	90	3600	740	18	60	35
		3100	1000	14	31	28
		2600	1320	10	43	20
20,000	88	3600	540	37	84	55
		3100	780	20	68	40
		2600	1080	14	46	30
25,000	84	3600	190	13	120	95
		3100	330	29	92	65
		2600	630	20	63	45

Figure 5-18

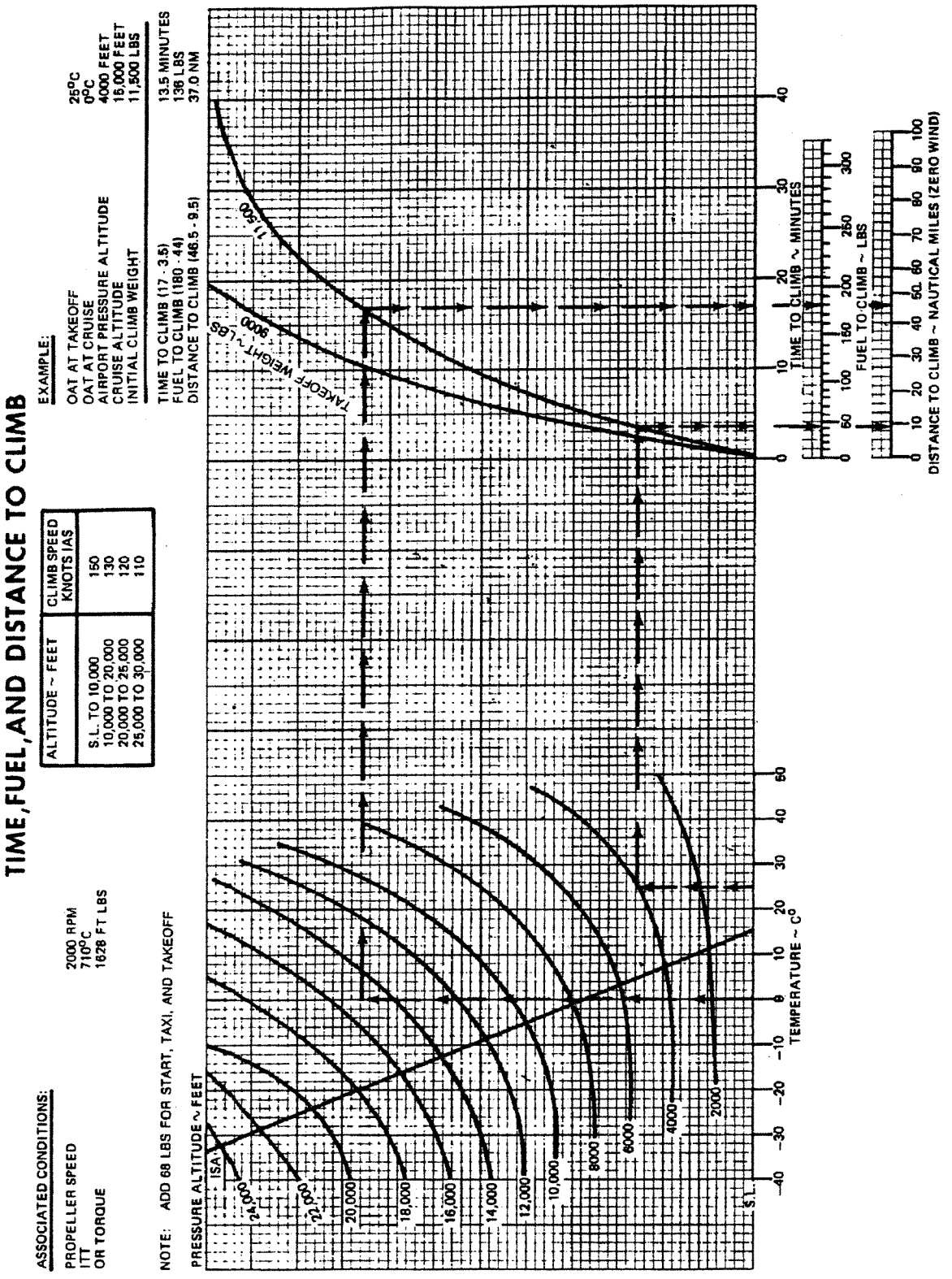


Figure 5-19

Issued: February 15, 1975
Revised: October 18, 1996

TIME, FUEL, AND DISTANCE TO CLIMB

ASSOCIATED CONDITIONS:

POWER	MAX. M.P. AT 2275 RPM
FUEL MIXTURE	RECOMMENDED LEAN
LANDING GEAR	UP
FLAPS	0%

EXAMPLE:

OAT AT TAKEOFF	ISA + 6°C
OAT AT CRUISE	ISA - 2°C
AIRPORT PRESSURE ALTITUDE	4000 FT
CRUISE ALTITUDE	15000 FT
INITIAL CLIMB WEIGHT	11500 LBS
TIME TO CLIMB (12-3)	9 MIN
FUEL TO CLIMB (141-37)	104 LBS
DISTANCE TO CLIMB (34-8)	26 N.M.

NOTE:

1. DISTANCES SHOWN ARE BASED ON ZERO WIND.
2. ADD 68 LBS. OF FUEL FOR START, TAXI AND TAKEOFF.

PRESSURE ALTITUDE FT	CLIMB SPEED KIAS	TAKEOFF WEIGHT LBS	TEMPERATURE FROM SEA LEVEL								
			ISA + 10°C			ISA			ISA - 10°C		
			TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM	TIME MIN	FUEL LBS	DIST NM
SEA LEVEL	150	11,500	0	0	0	0	0	0	0	0	0
		8,000	0	0	0	0	0	0	0	0	0
4,000	150	11,500	3	39	8	3	34	7	2	31	7
		8,000	2	26	6	2	24	5	2	23	5
8,000	150	11,500	6	76	17	5	67	15	5	62	14
		8,000	4	53	12	4	47	10	3	41	9
12,000	130	11,500	11	127	30	9	107	24	8	98	22
		8,000	7	85	20	6	73	17	5	65	15
16,000	130	11,500	17	182	47	14	156	38	12	138	33
		8,000	11	122	28	9	107	24	8	96	22
20,000	120	11,500	29	278	81	21	215	59	18	192	51
		8,000	16	105	44	13	147	35	11	129	30
24,000	120	11,500		0	0	36	320	101	30	285	84
		8,000	21	216	59	19	195	52	17	182	47

Figure 5-20

INTENTIONALLY LEFT BLANK

Issued: February 15, 1975
Revised: October 18, 1996

FUEL AND TIME REQUIRED

70% POWER

CONDITIONS:
5150 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature

NOTE:
Fuel required includes the fuel used for engine start, taxi, takeoff, normal climb, descent and 45 minutes reserve. Time required includes the time during a normal climb and descent.

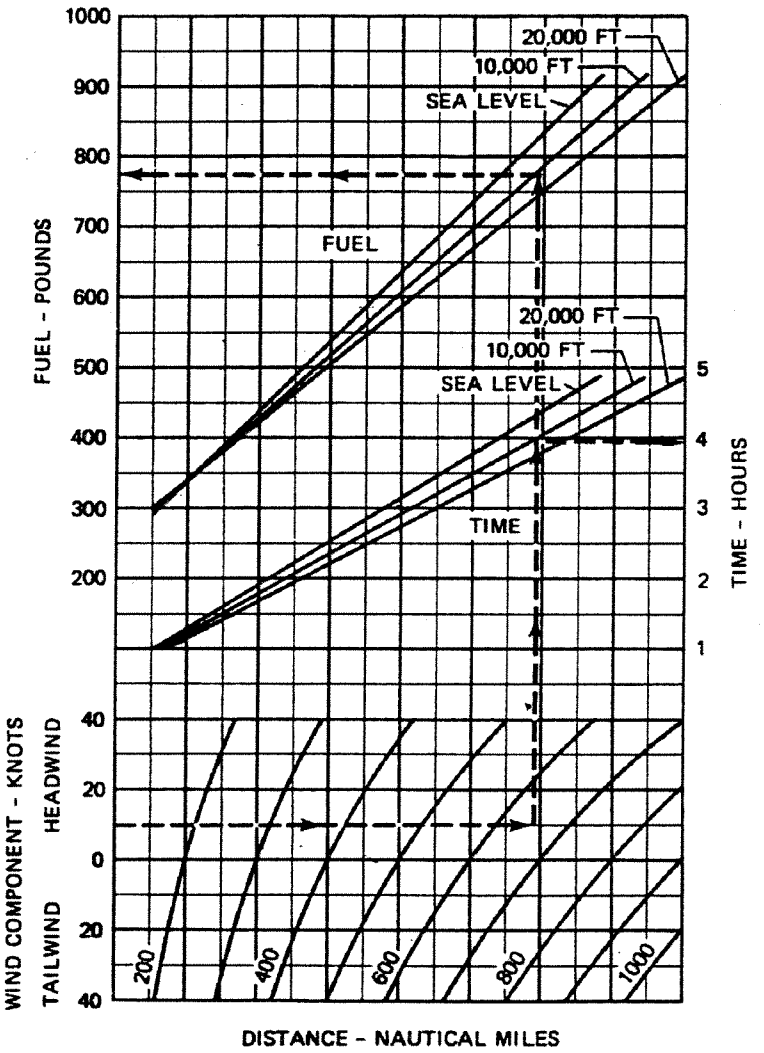


Figure 5-20A

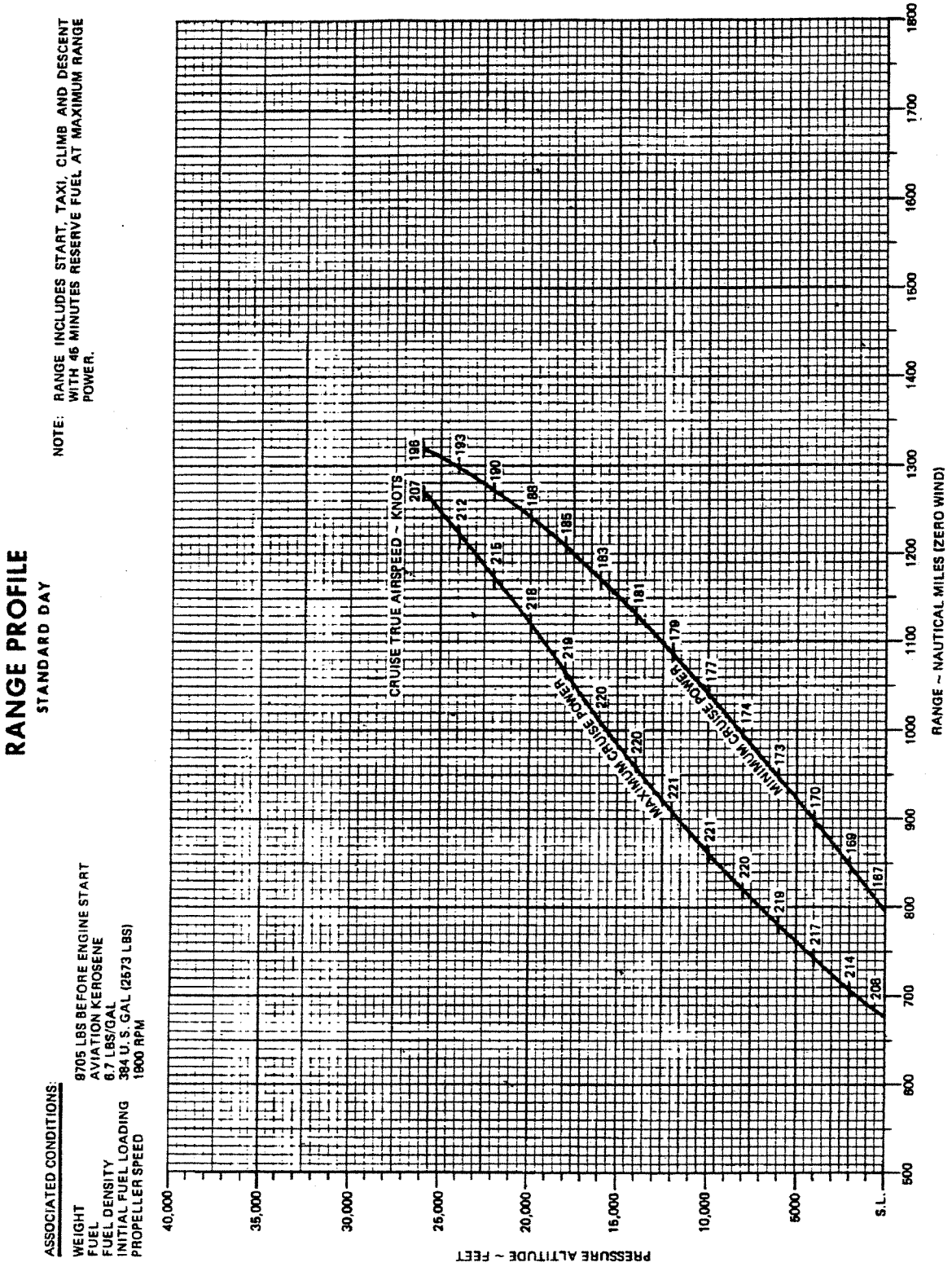


Figure 5-21

Issued: February 15, 1975
Revised: October 18, 1996

ENDURANCE PROFILE

STANDARD DAY

ASSOCIATED CONDITIONS:

WEIGHT	9706 LBS BEFORE ENGINE START
FUEL	AVIATION KEROSENE
FUEL DENSITY	6.7 LBS/GAL
INITIAL FUEL LOADING	384 U. S. GAL (2573 LBS)
PROPELLER SPEED	1900 RPM

NOTE: ENDURANCE INCLUDES START, TAXI, CLIMB AND DESCENT WITH 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.

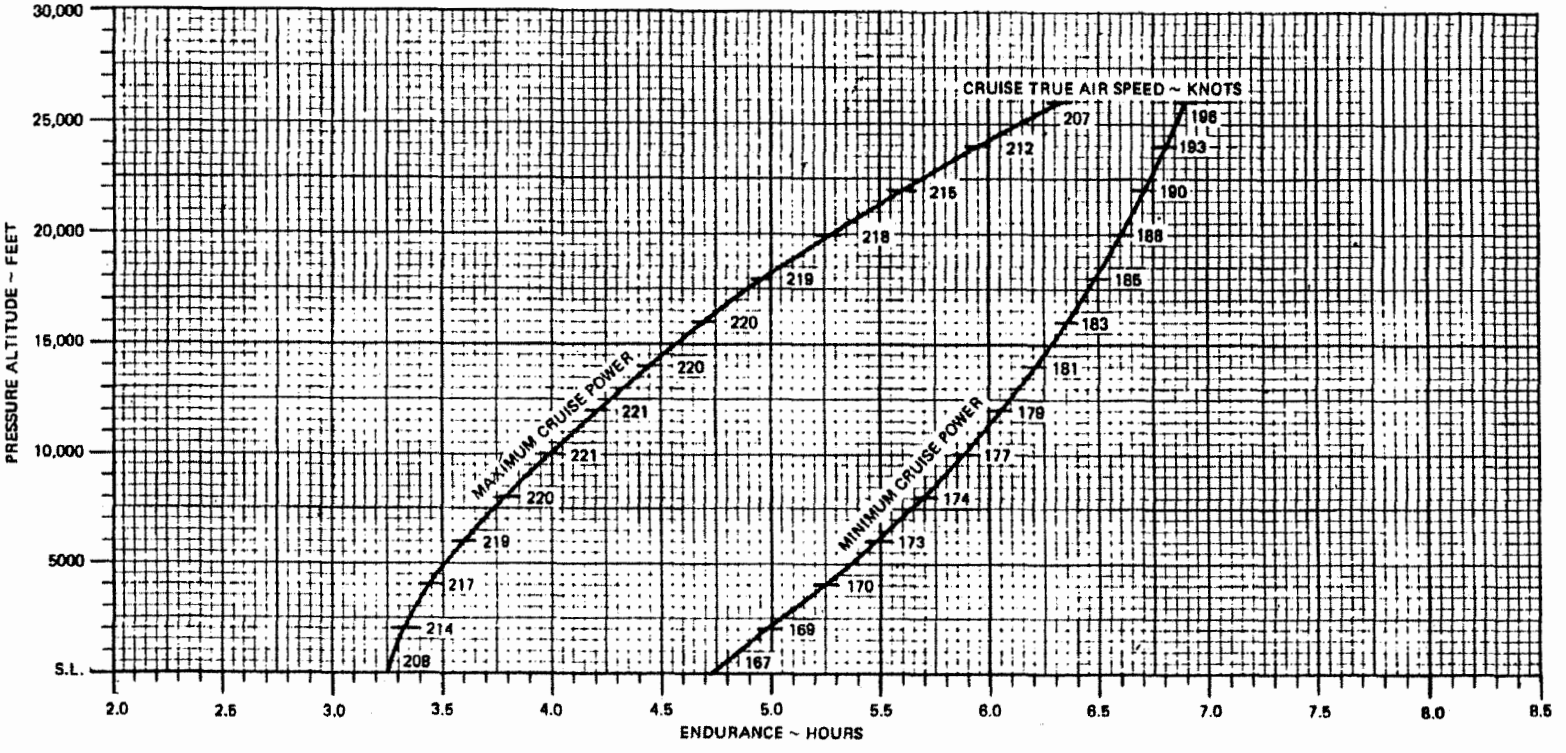


Figure 5-22

HOLDING TIME

ASSOCIATED CONDITIONS:

TORQUE SETTING	650 FT LBS
PROPELLER SPEED	1900 RPM

EXAMPLES:

❶	FUEL AVAILABLE FOR HOLDING	440 LBS
	PRESSURE ALTITUDE	6000 FEET
	HOLDING TIME	1.1 HOURS (1 HR, 6 MIN)
❷	REQUIRED HOLDING TIME	45 MINUTES (.75 HRS)
	HOLDING PRESSURE ALTITUDE	8000 FEET
	FUEL REQUIRED	295 LBS

NOTE: APPLICABLE FOR ALL TEMPERATURES

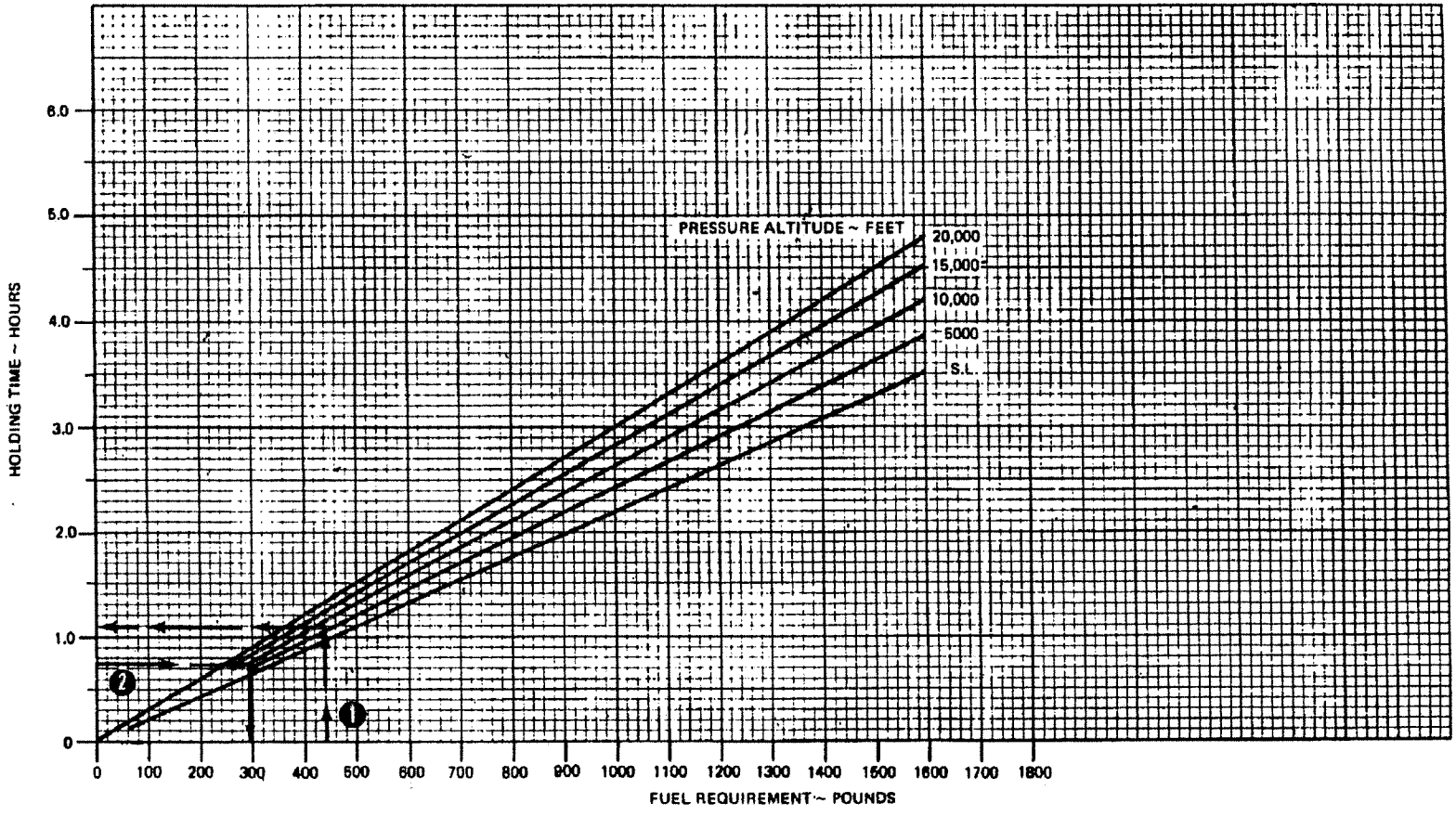


Figure 5-23

Issued: February 15, 1975
Revised: October 18, 1996

HOLDING TIME

ASSOCIATED CONDITIONS:

TORQUE SETTING	650 FT LBS
PROPELLER SPEED	1900 RPM

EXAMPLES:

1.	FUEL AVAILABLE FOR HOLDING	440 LBS
	PRESSURE ALTITUDE	6000 FT
	HOLDING TIME	1.04 HRS (1 HR, 2 MIN)
2.	REQUIRED HOLDING TIME	45 MIN (.75 HRS)
	HOLDING PRESSURE ALTITUDE	8000 FT
	FUEL REQUIRED	319 LBS

FUEL REQUIREMENT/ OR AVAILABLE ∿ POUNDS	HOLDING TIME ∿ HRS PRESSURE ALTITUDE ∿ FEET			
	S.L.	5000	10000	15000
100	.2	.2	.2	.3
200	.4	.4	.5	.6
300	.6	.7	.7	.8
400	.8	.9	1.0	1.1
500	1.1	1.2	1.3	1.4
600	1.3	1.4	1.5	1.7
700	1.5	1.7	1.8	1.9
800	1.7	1.9	2.1	2.2
900	1.9	2.1	2.3	2.5
1000	2.2	2.4	2.6	2.8
1100	2.4	2.6	2.9	3.1
1200	2.6	2.9	3.1	3.4
1300	2.8	3.1	3.4	3.6
1400	3.0	3.3	3.6	3.9
1500	3.3	3.6	3.9	4.2
1600	3.5	3.8	4.2	4.5

Figure 5-24

TIME, FUEL, AND DISTANCE TO DESCEND

ALTITUDE ~ FEET	DESCENT SPEED KNOTS IAS
31,000 TO 20,000	160
20,000 TO S.L.	200

ASSOCIATED CONDITIONS:

POWER	AS REQUIRED TO DESCEND AT 1000 FT/MIN
LANDING GEAR	UP
FLAPS	0%
PROPELLER SPEED	1900 RPM

EXAMPLE:

INITIAL ALTITUDE	17,000 FEET
FINAL ALTITUDE	5850 FEET
TIME TO DESCEND (17 - 5.8)	11 MINUTES
FUEL TO DESCEND (142 - 62)	80 LBS
DESCENT DISTANCE (65 - 20)	45 NM

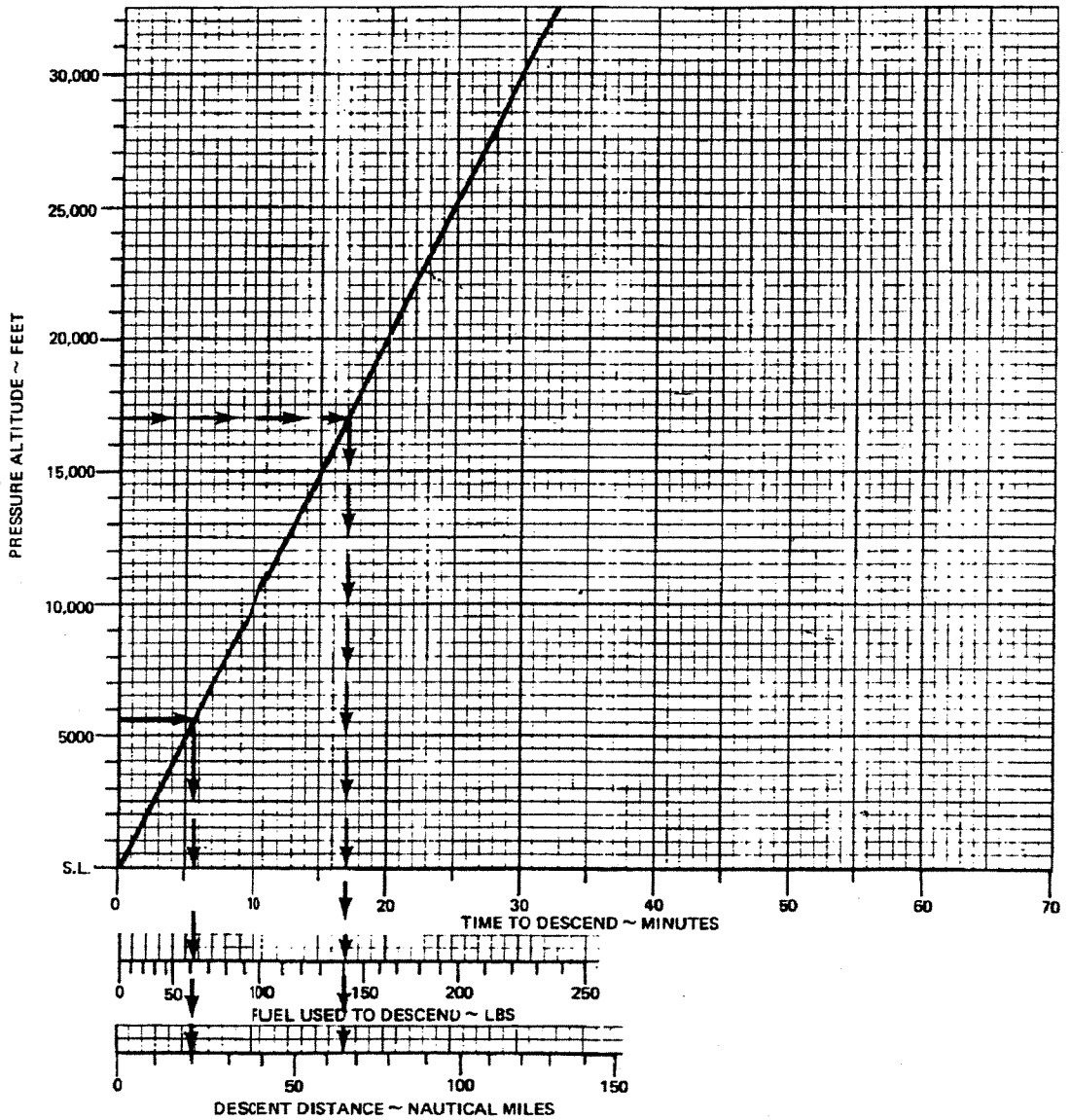


Figure 5-25

Issued: February 15, 1975
Revised: October 18, 1996

TIME, FUEL, AND DISTANCE TO DESCEND

ASSOCIATED CONDITIONS:

POWER	AS REQ'D. FOR 1000 FPM
FLAPS	UP
LANDING GEAR	UP
AIRSPEED	200 KIAS

EXAMPLE:

INITIAL ALTITUDE	17,000 FT
FINAL ALTITUDE	5650 FT
TIME TO DESCEND (17-6)	11 MIN
FUEL TO DESCEND (143-62)	81 LBS
DISTANCE TO DESCEND (69-20)	49 N.M.

PRESSURE ALTITUDE FEET	TIME MIN	FUEL LBS	DISTANCE N.M.
30,000	30	223	118
25,000	25	197	97
20,000	20	163	88
15,000	15	130	57
10,000	10	95	36
5,000	5	57	18
SEA LEVEL	0	0	0

Figure 5-26

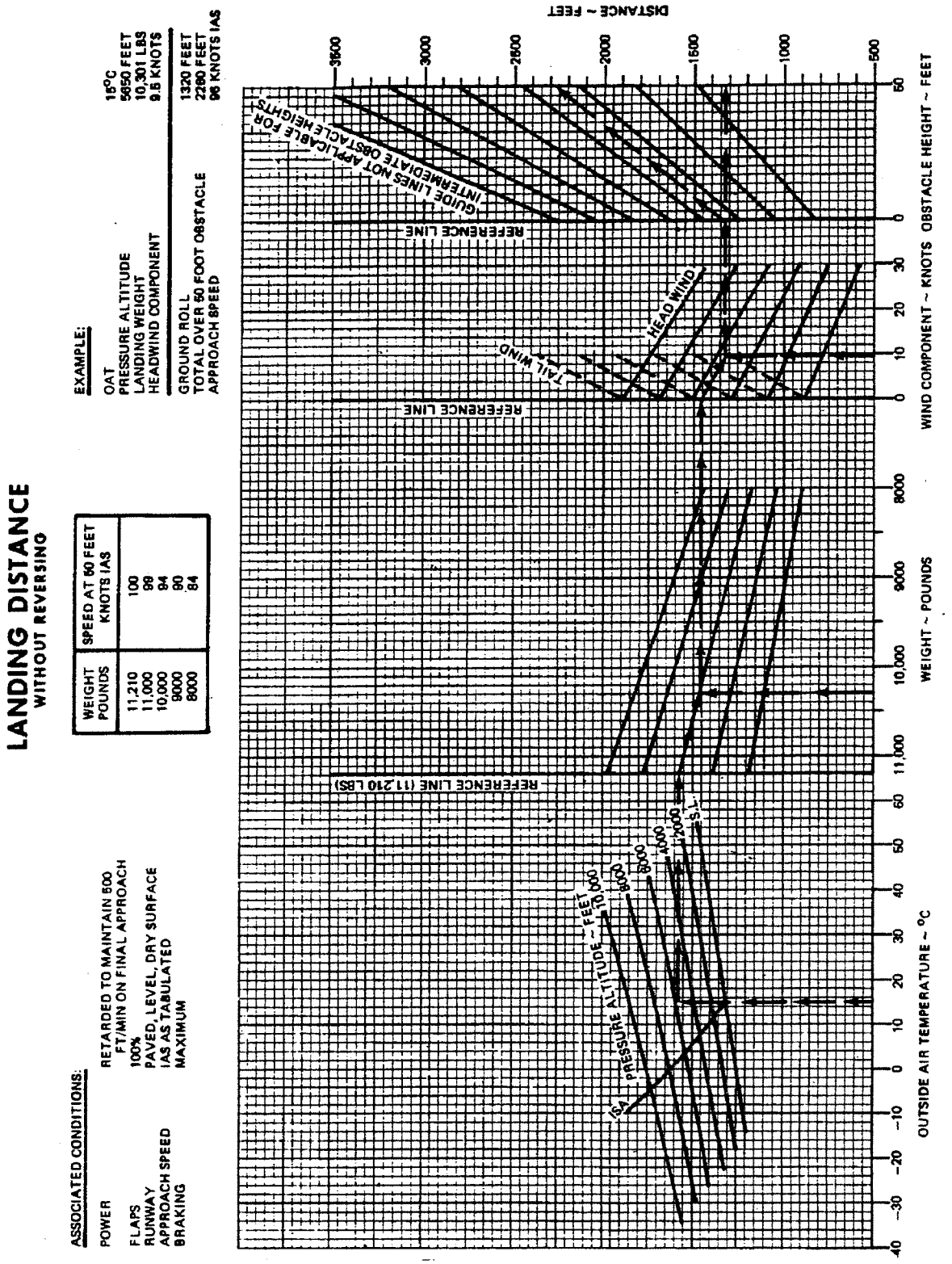


Figure 5-27

Issued: February 15, 1975
Revised: October 18, 1996

Issued: February 15, 1975
Revised: October 18, 1996

LANDING DISTANCE

ASSOCIATED CONDITIONS:

POWER	RETARDED TO MAINTAIN 500 FT/MIN ON FINAL APPROACH
FLAPS	100%
RUNWAY	PAVED, LEVEL, DRY SURFACE
BRAKING	MAXIMUM

EXAMPLE:

WEIGHT	10301 LBS
OUTSIDE AIR TEMPERATURE	15°C
PRESSURE ALTITUDE	5650 FT
HEADWIND COMPONENT	9.5 KTS
GROUND ROLL	1333 FT
TOTAL OVER 50 FT OBSTACLE	2249 FT
APPROACH SPEED	95 KIAS

NOTE:

1. DECREASE DISTANCES 4% FOR EACH 5 KNOTS HEADWIND.
   FOR OPERATIONS WITH TAILWINDS UP TO 10 KNOTS, INCREASE DISTANCES BY 6% FOR EACH 2.5 KNOTS.

WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FEET	0°C		10°C		20°C		30°C		40°C	
			GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS	GROUND ROLL	TOTAL TO CLEAR 50 FT OBS
11210	100	SL	1250	2140	1275	2160	1300	2200	1350	2260	1410	2360
		2000	1325	2270	1380	2300	1420	2340	1455	2410	1490	2320
		4000	1425	2365	1455	2420	1490	2490	1550	2570	1600	2685
		6000	1525	2575	1570	2630	1610	2705	1660	2790	1720	2900
		8000	1625	2750	1675	2825	1730	2920	1800	3065	----	---
		10000	1750	2975	1800	3140	1860	3265	1900	3370	----	---
11000	99	SL	1235	2085	1250	2140	1280	2200	1320	2275	1380	2380
		2000	1300	2200	1340	2260	1390	2320	1430	2390	1485	2485
		4000	1400	2360	1440	2420	1475	2480	1520	2500	1560	2540
		6000	1490	2550	1540	2600	1580	2695	1630	2800	1700	2900
		8000	1610	2690	1650	2800	1700	2900	1760	3030	----	----
		10000	1720	2925	1760	3060	1850	3070	1900	3290	----	----
10000	94	SL	1125	1925	1150	1980	1180	2030	1220	2085	1270	2160
		2000	1200	2050	1225	2075	1250	2120	1285	2180	1885	2250
		4000	1300	2200	1315	2250	1340	2300	1375	2350	1440	2430
		6000	1370	2300	1400	2350	1430	2400	1480	2470	2550	2520
		8000	1460	2450	1500	2490	1540	2580	1610	2730	----	---
		10000	1580	2650	1610	2800	1660	2925	1740	3025	----	---

Figure 5-28

SINGLE ENGINE AIRPLANES
IDENTIFICATION OF GRAPHS OR TABLES
IN TYPICAL ORDER OF PRESENTATION
INCLUDING OPTIONAL ITEMS

ORDER	*TITLE*
1	Introduction to Performance and Flight Planning
2	Airspeed Calibration
3	Altimeter Correction
* 4	Fahrenheit to Celsius Temperature Conversion
5	Stall Speeds
6	Takeoff Distance
* 7	Minimum Takeoff Distance
8	Rate-of-Climb
9	Time, Fuel and Distance to Climb
10	Cruise
*11	Cruise Speeds
*12	Fuel Flow vs Brake Horsepower
13	Fuel and Time Required
14	Range Profile
15	Endurance Profile
16	Landing Distance

* Optional items may be required by regulation for some airplane models.

Figure 5-29

Issued: February 15, 1975
Revised: October 18, 1996

MULTI- ENGINE AIRPLANES
IDENTIFICATION OF GRAPHS OR TABLES
IN TYPICAL ORDER OF PRESENTATION
INCLUDING OPTIONAL ITEMS

ORDER	TITLE
1	Introduction to Performance and Flight Planning
2	Airspeed Calibration-Normal System
3	Airspeed Calibration-Alternate System (If Applicable)
4	Altimeter Correction-Normal System
5	Altimeter Correction-Alternate System (If Applicable)
* 6	Indicated Outside Air Temperature Correction
* 7	Fahrenheit to Celsius Temperature Conversion
* 8	Terrain Clearance Limitations
9	Stall Speeds
15	Takeoff Distance
*16	Minimum Takeoff Distance
17	Accelerate-Stop Distance
* 18	Accelerate-Go Distance
19	Rate-of-Climb-All Engines Operating (Flaps set to take-off position)
*20	Climb Gradient-One Engine Inoperative (Flaps set to take-off position)
*21	Rate-of-Climb-All Engines Operating (Flaps set to enroute position)
22	Time, Fuel and Distance to Climb
23	Rate-of-Climb-One Engine Inoperative (Flaps set to enroute position)
24	Service Ceilings-One Engine Inoperative
25	Rate-of-Climb-Balked Landing
26	Cruise-All Engines Operating
*27	Cruise Speeds-Maximum Recommended Cruise Power-All Engines Operating
28	Fuel and Time Required
29	Range Profile
*30	Range Payload Trade-Off-All Engines Operating
31	Endurance Profile
*32	Cruise Performance-One Engine Inoperative
33	Holding Time
*34	Pressurization Controller Setting for Landing
35	Landing Distance

*Optional items may be required by regulation for some airplane models.

Figure 5-30

SECTION 6

WEIGHT AND BALANCE AND EQUIPMENT LIST (as applicable)

TABLE OF CONTENTS

SECTION 6

WEIGHT AND BALANCE AND EQUIPMENT LIST (as applicable)

6.1 General

This Section of the Pilot's Operating Handbook shall contain all weight and balance information required by the Federal Aviation Regulations and this Specification. Additional weight and balance and related information may be provided. The figures in this Section of the Specification are for illustrative purposes only. The manufacturer should use formats appropriate to the specific airplane and Handbook size.

6.3 Airplane Weighing Procedure

This paragraph describes the procedure for establishing weight and moment (relative to reference datum) of the empty airplane. Each Handbook shall have an "Airplane Weighing Form" that includes an airplane side view showing the location of weighing points (using jacking points or undercarriage) relative to the datum line. The form shall include tables for recording and correcting weighing data, and for establishing "basic empty weight" and moment. (See Figure 6-1) The calculation procedures and "basic empty weight" data used in loading calculations shall be explained.

6.5 Weight and Balance Record

Each Handbook shall contain a weight and balance record. The record shall start with the "as delivered" weight and balance data. Explain how to maintain this record when changes to the weight or moments of the airplane are made so that accurate starting data is available to calculate the weight and c. g. during normal operation of the airplane. (See Figure 6-2)

6.7 Weight and Balance Determination for Flight

This paragraph describes the procedures to calculate weight and moment for various phases of a planned flight and to ensure that the center of gravity is within approved limits.

A Weight and Moment Limit diagram shall be used to describe the c. g. limits. (See Figure 6-3)

A weight and balance loading form and an explanation of the calculation procedure shall be provided (See Figures 6-4 and 6-5 for examples). Provide weight and moment values for normal items of a load. (See Figure 6-6)

Instead of (or in addition to) the weight and balance loading form, the manufacturer may provide a device to be used to calculate weight and balance. Instructions for its use shall be provided.

6.9 Equipment List

The manufacturer shall provide an equipment list in this Section, in a separate document appended to the Handbook, or as a separate document. If the equipment list is not contained in this Section, state its location. In addition, this Section may contain a comprehensive list of equipment available for installation by the manufacturer.

The equipment list shall contain all required or optional equipment installed in the particular airplane when delivered. The list may be a suitable notation in a comprehensive list of available equipment. Equipment without significant effect on the weight or balance of the airplane need not be listed.

Describe each equipment list item and show its weight and airplane location, with respect to the datum. The weight and arm for optional equipment may be shown as the net difference between standard and optional equipment, if noted accordingly. All parts of an integral installation may be combined into a single equipment list item if variation of weight or arm is not significant. (See Figure 6-7.)

Equipment list items may be identified by an item number and may be grouped logically, using headings such as "Propeller and Propeller Accessories", "Engine and Engine Accessories", "Landing Gear", "Electrical Equipment", "Interior Equipment", "Autopilot", etc. If the equipment list is a comprehensive list of equipment available for installation by the manufacturer, a check (√) or "X" may be used to indicate the items installed when the Handbook for the specific airplane was prepared and placed in the airplane. A manufacturer may use an "X" to indicate standard or required equipment and a check (√) to indicate installed optional equipment.

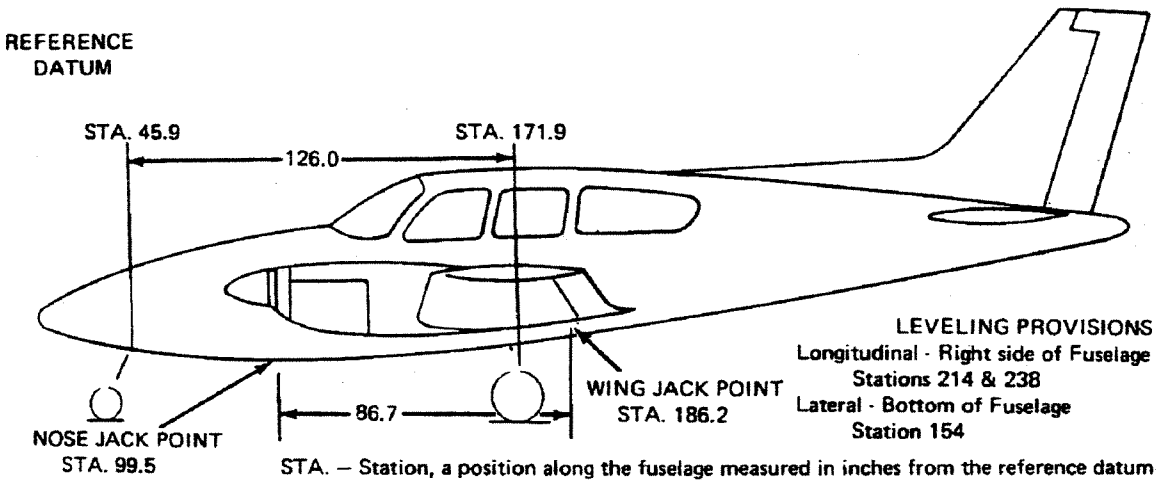
Alternates for equipment may be listed under the same item number. (See Figure 6-7, Item 62) For installations made up of a number of units which may be located at various places in the airplane, each unit should be listed separately. (See Figure 6-7, Item 402)

Issued: February 15, 1975
Revised: October 18, 1996

AIRPLANE WEIGHING FORM

MODEL XXX

SERIAL NUMBER _____ REGISTRATION NUMBER _____ DATE _____



STA. – Station, a position along the fuselage measured in inches from the reference datum

AIRPLANE AS WEIGHED
(Including full oil and operating fluids but no usable fuel*)

POSITION	SCALE READING	SCALE ERROR	NET WEIGHT
Left Wing			
Right Wing			
Nose			
AIRPLANE TOTAL AS WEIGHED (W)			

C G arm of airplane as weighed.

$171.9 \cdot \frac{(126.0)W_n}{W}$ = inches aft of reference datum

or $186.2 \cdot \frac{(86.7)W_n}{W}$ = inches aft of reference datum

BASIC EMPTY WEIGHT AND C G

ITEM		WEIGHT (LBS)	C G ARM (IN.)	MOMENT (LBS - IN.)
Subtract - Usable Fuel (if applicable)				
Add - Drainable Unusable Fuel (if weighed with fuel drained) (6 lbs per gallon)				
Optional Equipment (if applicable)				
BASIC EMPTY WEIGHT				

*Note: Normally weighed at factory without usable fuel.

Figure 6-1

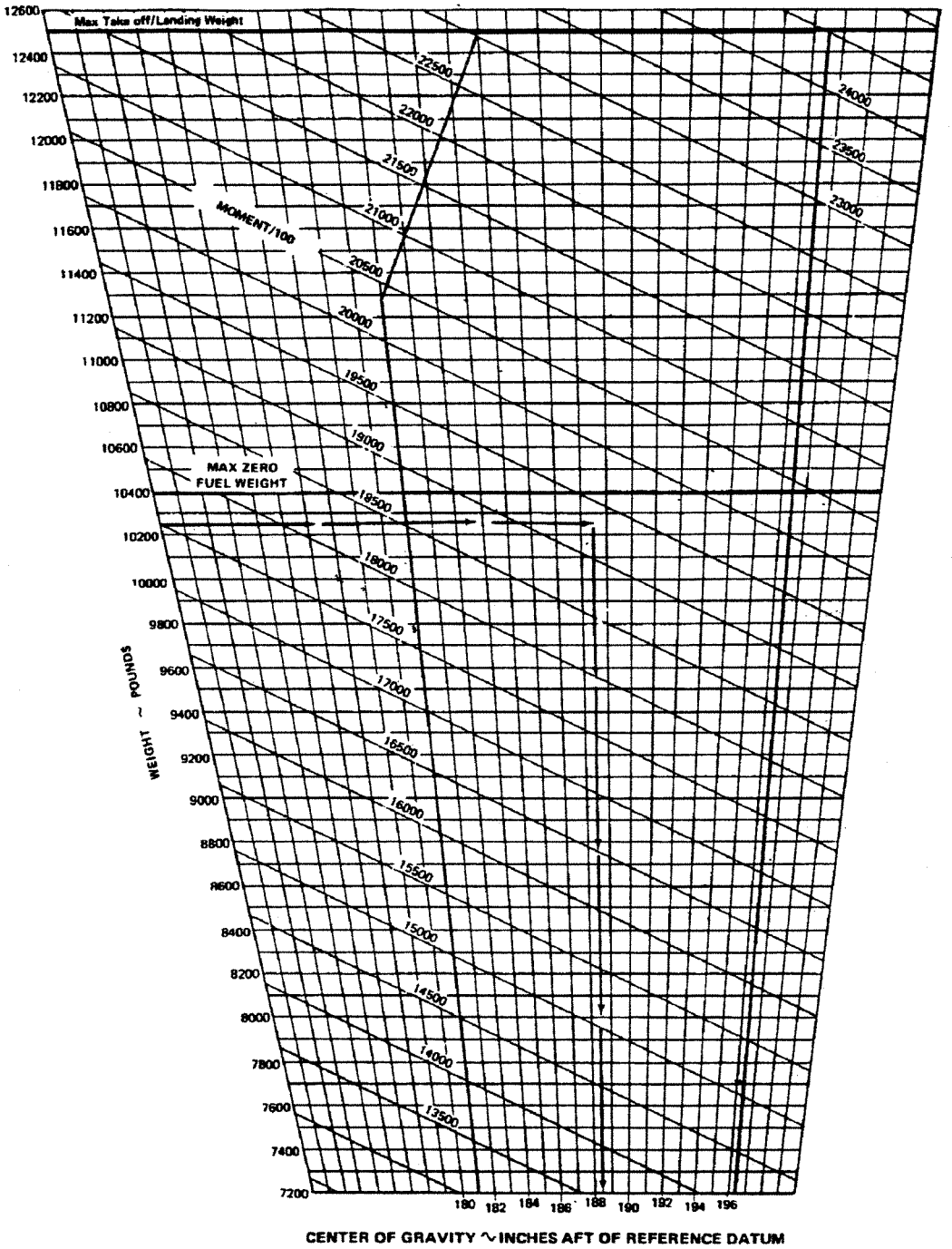
WEIGHT AND BALANCE RECORD

(Continuous History of Changes in Structure or Equipment Affecting Weight and Balance)

AIRPLANE MODEL				SERIAL NUMBER					PAGE NUMBER		
DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE						RUNNING BASIC EMPTY WEIGHT	
				ADDED (+)			REMOVED (-)				
	In	Out		Wt. (lb.)	Arm (In.)	Moment /100	Wt. (lb.)	Arm (In.)	Moment /100	Wt. (lb.)	Moment /100
			AS DELIVERED								

Figure 6-2

WEIGHT AND MOMENT LIMITS



EXAMPLE

AT 10,250 LBS AND 19,300 MOMENT/100
CG LOCATION IS 188.5 IN. AFT OF REFERENCE DATUM

Figure 6-3

WEIGHT AND BALANCE LOADING FORM

	WEIGHT	MOMENT (IN. LBS)
Basic Empty Weight		
Front Seats		
Middle Seats		
Rear Seats		
Fwd Luggage		
Rear Luggage		
Main Wing Tank Fuel (Usable)		
Aux Wing Tank Fuel (Usable)		
Other		
Totals		

Totals must be within approved weight and C G limits. It is the responsibility of the airplane owner and the pilot to insure that the airplane is loaded properly. The Basic Empty Weight C G is noted on the Airplane Weighing Form. If the airplane has been altered, refer to the Weight and Balance Record for this information.

Figure 6-4

Issued: February 15, 1975
Revised: October 18, 1996

WEIGHT AND BALANCE LOADING FORM

SERIAL NO.	REGISTRATION NO.	DATE

PAYLOAD COMPUTATIONS			
ITEM OCCUPANTS OR CARGO	ARM	WEIGHT	MOM/100
BAGGAGE			
CABINET CONTENTS			
TOTAL PAYLOAD			

*Totals must be within approved weight and C G limits. It is the responsibility of the airplane owner and the pilot to insure that the airplane is loaded properly. The Basic Empty Weight C G is noted on the Airplane Weighing Form. If the airplane has been altered, refer to the Weight and Balance Record for this information.

REF	ITEM	WEIGHT	MOM/100
1.	BASIC EMPTY WEIGHT		
2.	PAYLOAD		
3.	WEIGHT (LESS FUEL) (sub-total) (Do not exceed max. zero fuel weight)		
4.	MAIN WING TANK FUEL LOADING		
5.	AUX. WING TANK FUEL LOADING		
* 6.	RAMP CONDITION (Sub-total)		
7.	LESS FUEL FOR START & TAXI		
* 8.	TAKEOFF CONDITION		
9.	LESS FUEL TO DESTINATION		
* 10.	LANDING WEIGHT		

Figure 6-5

OCCUPANTS

WEIGHT	PILOT OR COPILOT ARM 65	CENTER SEATS FWD POSITION ARM 121	CENTER SEATS AFT POSITION ARM 136	5TH & 6TH SEATS ARM 150
	MOMENT/100			
120	102	145	163	180
130	111	157	177	195
140	118	168	190	210
150	128	182	204	225
160	135	194	218	240
170	145	206	231	255
180	153	218	245	270
190	167	230	258	285
200	170	242	272	300

FUEL

GALLONS	WEIGHT	MAIN WING TANKS ARM 75	AUX WING TANKS ARM 93
		MOMENT/100	
5	30	23	28
10	60	45	56
15	90	68	84
20	120	90	112
25	150	113	140
30	180	135	167
34	204	153	190
35	210	168	195
40	240	180	223
45	270	203	251
50	300	225	270
55	330	248	307
60	360	270	336
65	372	279	346
70	420	315	
75	450	338	
80	480	360	

BAGGAGE **CARGO**

WEIGHT	FORWARD ARM 31	REAR FS 131 TO 170 ARM 150	REAR FS 170 TO 190 ARM 180	FWD. OF SPAR (CENTER SEATS REMOVED) ARM 108	AFT OF SPAR (CENTER & AFT SEATS REMOVED) ARM 145
			MOMENT/100		
10	3	15	18	11	15
20	6	30	36	22	29
30	9	45	54	32	44
40	12	60	72	43	58
50	16	75	90	54	73
60	18	90	108	65	87
70	22	105	126	76	102
80	25	120	144	86	116
90	28	135	162	97	131
100	31	150	180	108	145
110	34	165	198	119	160
120	37	180	216	130	174
130	40	195		140	189
140	43	210		151	203
150	47	225		162	218
160	59	240		173	232
170	53	255		184	247
180	56	270		194	261
190	59	285		205	276
200	62	300		216	290
210	65	315			305
220	68	330			319
230	71	345			334
240	74	360			348
250	78	375			363
260	81	300			377
270	84	405			392
280	87	420			406
290	90	435			421
300	93	450			435
310		465			450
320		480			464
330		495			479
340		510			493
350		525			508
360		540			522
370		555			537
380		570			551
390		589			566
400		600			580

Figure 6-6

Issued: February 15, 1975
Revised: October 18, 1996

Format of Equipment List:

EQUIPMENT LIST

_____ _____

Manufacturer Model

SERIAL NO._____REGISTRATION NO._____DATE:_____

ITEM NO.	ITEM	MARK IF INSTALLED	WEIGHT (POUNDS)	ARM (INCHES)
62	a. Airspeed Indicator No. 41507-6		.7	96
	b. Airspeed Indicator No. 41507-5	√	.6	96
402	Autopilot,			
	Gyro	√	15	90
	Amplifier	√	2	90
	Servo	√	5	80

Figure 6-7

SECTION 7

DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

TABLE OF CONTENTS

SECTION 7

DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.1 General

This Section of the Pilot's Operating Handbook shall describe the airplane in a manner considered by the manufacturer to be most informative to the kind of pilot considered most likely to operate the airplane. The paragraph order and detail in this Section need not be followed in a Handbook. The purpose of this Section is to provide a comprehensive guide and check list of items to be considered in the Handbook prepared by the manufacturer. This format may, of course, be used in its entirety or in part.

Generally, in describing the airplane or its system, third person wording should be used. (For example: The nose wheel is provided with a shimmy damper to keep the wheel from shimmying while rolling on the ground.) Nomenclature and terminology should be consistent. Terms which are not well known should be defined. Standard abbreviations listed in Section 1 are acceptable.

Reference to other books or to other sections of the manual should be kept to a minimum.

Where applicable the following topics should be included:
Airframe
Flight controls
Ground control
Wing flaps, dive brakes and spoiler systems
Landing gear
Baggage compartments
Airplane tie-down provisions and jack points
Seats, seat belts, and shoulder harnesses
Doors, windows, and exits
Control locks
Engine
Propeller
Fuel system
Hydraulic system
Brake system
Power steering system
Electrical system
Lighting
Auxiliary power unit
Heating, ventilating, defrosting and air conditioning systems
Cabin pressurization system
Oxygen system
Instrument panel
Pitot pressure system
Static pressure system
Vacuum or pneumatic system
Flight instruments
Autopilot, flight director, and automatic devices in the control system
Stall warning or angle-of-attack system
Icing equipment
Avionics
Comfort features
Cabin features
Windshield wipers

7.3 Airframe

(a) Describe structure of fuselage, wings, and empennage.
(b) Describe seating arrangements available.

7.5 Flight Controls

(a) Describe control surfaces.
(b) Describe operating mechanism-sketches may be provided.
(c) Explain trimming arrangements.
(d) Explain any interconnect arrangement.
(e) If controls are boosted explain the systems.

7.7 Instrument Panel

(a) Provide a drawing or picture of the instrument panel.
(b) Name and explain the use of the instruments, lights, switches and controls found on the panel.
(c) If an annunciator panel is installed, explain how it operates.

7.9 Flight Instruments

(a) Briefly describe and explain principle of operation of any new kinds of flight instruments.
(b) Explain how to check them for proper operation and how to recognize a malfunction.

7.11 Ground Control

(a) Describe how the pilot mechanically controls nose wheel or tail wheel.

(b) Describe minimum radius of turn for taxiing and ground handling.

7.13 Wing Flaps, Dive Brake or Spoiler Systems

(a) Describe aerodynamic surfaces.
(b) Explain how they are operated.
(c) Describe how application of these affects pitch attitude, airspeed, trim, and stall speed.
(d) Explain what provisions are made to prevent asymmetric conditions.

7.15 Landing Gear

(a) Describe construction.
(b) Describe retraction mechanism if provided.
(c) Describe shock absorption system.
(d) Describe wheel brakes.
(e) Explain emergency extension system.
(f) Explain how warning system functions.

7.17 Baggage Compartments

(a) Explain locations.
(b) Explain restrictions.
(c) Describe tie down provisions and explain how to tie down baggage.
(d) Explain door warning system.
(e) Give tips on loading.
(f) Warn against putting or allowing children in a baggage compartment.
(g) Warn against carrying hazardous material anywhere in the airplane.

7.19 Seats, Seat Belts, and Shoulder Harnesses

(a) Describe how to adjust the seats.
(b) Explain how to use the seat belts and shoulder harnesses.
(c) Include warnings and restrictions.

7.21 Doors, Windows and Exits

(a) Describe how to operate and lock doors, windows and exits.
(b) Explain any procedures or warnings necessary for the doors, exits, windows or windshield wipers.
(c) Discuss how to close a door or window if it opens accidentally in flight and any restrictions there may be on purposely opening in flight.
(d) Give precise instructions for using emergency exits.

7.23 Control Locks

(a) Explain how to engage control locks or secure control surfaces.
(b) Warn against forgetting to remove control locks.

7.25 Engine

(a) Describe the engine, giving the following as deemed necessary:
    1. Manufacturer and model number
    2. Type of engine-number of cylinders, type of compressor, etc.
    3. Rated power
    4. Rated engine speed
    5. Gear reduction if applicable
    6. Accessories normally installed
    7. Supercharging/Turbocharging or other augmentation
    8. Explain restrictions, warnings, tips
(b) Describe the engine controls including:
    1. Throttle or power control
    2. Propeller control
    3. Mixture control
    4. Cooling controls
    5. Turbocharger controls
    6. Friction lock
(c) Describe the engine instrumentation
    1. Describe briefly the method of operation
    2. Give limits of readings and typical values where applicable
(d) Proper operation and care of the engine when new and after the break in period should be described.
(e) Describe the lubrication system including:
    1. Type of system
    2. Instrumentation
(f) Describe ignition system
(g) Describe the air induction system including:
    1. Path of flow of the air
    2. Icing protection
    3. Filtering
    4. Supercharging/Turbocharging
    5. Explain restrictions, warnings, tips
(h) Describe the exhaust system including carburetor heat, muff heater, and flow to turbocharger (if appropriate).
(i) Describe the carburetor or fuel injection system including provisions for priming.
(j) Describe the cooling system including cowl flaps.
(k) Describe the engine starting system.
(l) Describe simply the accessories including:
    1. Oil pump
    2. Fuel pumps

Issued: February 15, 1975
Revised: October 18, 1996

3. Hydraulic pump
4. Air pump
5. Tachometer
6. Torque meter
7. Electrical power source
8. Propeller synchronizer
9. Exhaust gas temperature probe

(m) Describe any unique engine mounts including shock mounts.

(n) If an engine fire detection or extinguishing system is available, describe, give principle of operation, and explain how to use these.

(o) Describe any gear reduction system in the engine.

(p) Abnormal operations should be discussed briefly. This should be held to the minimum that will help a pilot to correct a situation or enable him to describe it to a mechanic. It should not be a maintenance procedure.

7.27 Propeller

(a) Describe the propeller and its operation if pitch can be varied.

(b) Explain how the propeller should operate.

(c) If appropriate, discuss feathering, unfeathering, and reversing.

(d) Explain cautions, warnings, restrictions, and idiosyncrasies.

(e) A cutaway drawing of variable pitch propellers may be included.

7.29 Fuel System

(a) Describe the system, provide a good schematic. and explain the operation.

(b) Discuss unusable fuel.

(c) Explain fuel management.

(d) Explain how to avoid and notice fuel contamination.

(e) Explain and discuss how the heater gets fuel (if appropriate).

(f) Explain crossfeed and fuel transfer (if appropriate).

(g) Discuss the fuel venting system and consequence of allowing it to become plugged.

(h) Explain the fuel measurement system and discuss need for monitoring and calibrating.

(i) Explain restrictions, warnings and operating tips.

7.31 Hydraulic System

(a) Explain what items use hydraulic pressure.

(b) Describe the primary and auxiliary systems.

(c) Provide one or more schematic diagrams of the system.

(d) Describe controls and instrumentation of the system.

(e) Discuss normal operation.

(f) Discuss abnormal operation.

(g) Explain restrictions, warnings and operating tips.

7.33 Brake System

(a) Describe the brake system.

(b) Discuss how to get maximum braking and maximum life out of the brakes.

(c) Explain how to recognize impending problems and what to do if malfunctions occur.

NOTE: At the manufacturer's option, brake system description and discussion may be covered under paragraph 7.15, Landing Gear.

7.35 Power Steering

If nose wheel power steering is installed:

(a) Describe the system.

(b) Explain how to use it.

(c) Discuss restrictions.

7.37 Electrical System

(a) Making use of simplified schematics and drawings explain how this system operates, including warning devices and control features in use.

(b) Discuss capacity and load shedding.

(c) Explain circuit protection.

(d) Discuss use of ground power units and battery charging.

(e) Explain restrictions, warnings and operating tips.

7.39 Lighting Systems

(a) Describe the various interior and exterior lighting systems.

(b) Explain how to troubleshoot malfunctions.

(c) Discuss how to check and operate the systems.

7.41 Auxiliary Power Unit

(a) If the airplane has a built-in auxiliary power unit, describe it and explain how it fits in with the electrical system.

(b) Explain operation of the unit.

(c) Explain restrictions and warnings.

7.43 Heating, Ventilating, Defrosting And Air-Conditioning Systems

(a) Using drawings as aids, describe each of the systems.
(b) Explain how to get maximum benefit and control using the controls provided.

7.45 Cabin Pressurization System

If the airplane is pressurized:
(a) Describe the system.
(b) Explain how to operate it.
(c) Explain how this system ties in with the heating, ventilating, defrosting and air-conditioning systems.
(d) Explain how to recognize potential problems and handle emergencies.

7.47 Oxygen System

(a) Describe the oxygen system if one is offered.
(b) Discuss restrictions or warnings.

7.49 Pitot Pressure Systems

(a) Describe the pitot pressure systems.
(b) Explain anti-icing provisions, if installed.

7.51 Static Pressure Systems

(a) Describe the static pressure systems.
(b) Explain the alternate static systems if available.
(c) Discuss effects of heating and ventilating systems and of open windows on the alternate static system.
NOTE: At the manufacturer's option, static pressure systems description and discussion may be combined with Paragraph 7.49, Pitot Pressure Systems.

7.53 Vacuum Or Pneumatic System

(a) Using schematic diagrams describe the system and the items which use it.
(b) Explain how de-icing boots tie in with the system, if installed.
(c) Explain how the system can be checked.
(d) Discuss how a failing system can be recognized.
(e) Discuss restrictions and warnings.

7.55 Automatic Devices In The Control System

(To be included at manufacturer's option)
(a) Describe in simple terms the devices which are offered.
(b) Explain how to check and operate the devices.
(c) Discuss how to recognize a malfunction and how to handle the situation.

7.57 Stall Warning Or Angle of Attack System

(a) If either of these devices is installed explain whether it is required equipment.
(b) Explain the principle of operation.
(c) Explain how to check the system and use it.
(d) Discuss how to recognize a malfunction and when not to depend on it.

7.59 Icing Equipment

(a) Describe anti-icing or de-icing equipment available, and list that required for flight through known icing conditions.
(b) Describe how each item
1. Operates,
2. Can be checked,
3. Can be recognized as malfunctioning,
4. Might be corrected if malfunctioning.
(c) Explain restrictions imposed on each item.

7.61 Avionics (To be included at manufacturer's option)

(a) Describe items which are standard and explain their function and how they are operated.
(b) Refer to Section 9, supplements for description and/or operating instructions for avionic equipment which is installed.

7.63 Comfort Features

(a) Items such as toilets, relief tubes, sinks, etc. may be described and explained.

7.65 Cabin Features

(a) Special features such as storm window, fire extinguisher, food bar, tape players, special doors, etc. may be described and their use explained, if standard.

7.67 Windshield Wipers

(a) Explain how to operate windshield wipers if installed.
(b) Explain any restrictions.
(c) Describe how to correct a malfunction.

Issued: February 15, 1975
Revised: October 18, 1996

SECTION 8

HANDLING, SERVICING AND MAINTENANCE

TABLE OF CONTENTS

SECTION 8

HANDLING, SERVICING AND MAINTENANCE

8.1 General

This Section of the Pilot's Operating Handbook shall describe ways an operator of an airplane can ensure that the necessary handling, servicing and maintenance of the airplane can be accomplished. The user of this Handbook is the pilot - a person of undefined background - not a mechanic or technician.

An appropriate warning or note shall be contained in this Section to inform the operator that he is responsible for ensuring that all airworthiness directives are complied with and that the handling, servicing and maintenance of the airplane is done when required and in accordance with the Federal Aviation Regulations. In order to meet this responsibility, this Section should contain -

(a) A recommendation that airplane operator establish contact with the dealer or certified service station for service and information;

(b) A recommendation that all correspondence regarding the airplane include the airplane serial number (state where the serial number can be found); and

(c) A notation that service manuals and part catalogs are available and an explanation as to how these may be procured and kept up to date.

8.3 Airplane Inspection Periods

This paragraph shall contain information on the airplane (and components thereof) inspection periods. It should cover FAA required inspections (such as the annual and, in some cases, the 100 hour inspections) and manufacturer recommended inspections (such as the daily, 25-hour, 50-hour, etc.). Special inspection intervals for airplane systems and, possibly, for life limited parts, may be covered in this paragraph or there may be a reference to another section or another document where such inspection intervals may be found. This paragraph should also explain that, in addition to the established inspections, other inspections may be required by Airworthiness Directive. There should be a reference to the Federal Aviation Regulation (FAR's 43 and 91 or other applicable regulations) as to who may perform the required and manufacturer recommended inspections.

8.5 Preventive Maintenance That May Be Accomplished By A Certificated Pilot

(a) A certificated pilot who owns or operates an airplane not used as an air carrier is authorized by FAR Part 43 to perform limited preventive maintenance on his airplane. The Handbook should refer to FAR Part 43 for list of things the pilot may do.

Pilots operating aircraft of other than U.S. registry should refer to the regulations of the country of certification for information on preventive maintenance that may be performed by pilots.

(b) Include note to state that all other maintenance required on airplane is to be accomplished by appropriately licensed personnel and that airplane dealer or service station should be contacted for further information.

(c) Include note to state that preventive maintenance should be accomplished in accordance with the appropriate airplane service or maintenance manual. The Handbook should advise pilots to obtain a service manual prior to performing preventive maintenance to be sure that proper procedures are followed.

8.7 Alterations or Repairs to Airplane

(a) Note that alterations or repairs to airplane must be accomplished by licensed personnel.

(b) Point out that the FAA should be contacted prior to any alterations on airplane to insure that airworthiness of the airplane is not violated.

8 .9 Ground Handling

Discuss the following items:

1. Towing procedure
2. Parking
3. Tie down or mooring
4. Jacking and leveling

8.11 Servicing

Include information for servicing the aircraft with proper fuel and oil. Note any necessary precautions that should be observed.

8.13 Cleaning and Care

(a) Cleaning procedures for the following aircraft elements should be provided:

1. Exterior Cleaning such as:
   Painted surfaces
   Propeller
   Engine
2. Interior Cleaning such as:
   Wood surfaces
   Metal surfaces
   Cloth surfaces
   Leather surfaces
   Plastic trim
   Carpets
   Toilets

(b) Items to be included in the cleaning procedure should be:
Recommended cleaning agents.
Caution notes regarding use of unauthorized cleaning agents and possible hazards of using authorized ones.

8.15 Prolonged Out-of-Service Care

Include information for preparing the airplane for prolonged out-of-service care and for returning the airplane to service.

Issued: February 15, 1975
Revised: October 18 1996

SECTION 9

TABLE OF CONTENTS SUPPLEMENTS

SECTION 9

SUPPLEMENTS

9.1 General

(a) This Section of the Pilot's Operating Handbook shall contain the appropriate Supplements (operating information) necessary to safely and efficiently operate the airplane when equipped with the various optional systems and equipment not provided with the standard airplane.

(b) Supplements may be prepared by the Handbook producer, supplied to the Handbook producer by the equipment supplier and inserted, as supplied, into the Handbook, or supplied to the airplane owner when he purchases new equipment after the airplane (and Handbook) has been delivered. The content of this Section of the Specification should be interpreted so as to foster the goal of providing the necessary information to the pilot.

(c) The Table of Contents required by paragraph 0.9 of this Specification may be in the form of a log (or list) of the Supplements. A log of additions of or revisions to Supplements, if needed ,may be incorporated into this Section instead of the Log required by paragraph 0.43 of this specification.

9.3 Supplement Scope

Each Supplement shall normally cover only a single system, device, or piece of equipment such as an autopilot, electric trim, or an area navigation system. Systems consisting of several components, such as ice protection systems, may have Supplements for each component, such as propeller boots, wing and empennage boots, or heated airspeed static source, if the equipment is FAA Approved by component and marketed individually. The effect of anti-icing or de-icing systems on the approval of the airplane for operating in known icing conditions should be clearly defined in the limitations section of the supplements.

9.5 Supplement Issuance

All Supplements for any particular airplane shall be issued by one or the other of the methods below:

(a) All Supplements may be issued to all owners of the airplane model covered by the Handbook. This method is recommended as minimizing errors of distribution, and also informs owners of the availability of systems and equipment.

(b) Supplements may be issued only to owners of airplanes equipped with the subject systems or equipment. This results in tailored Pilot's Operating Handbook and considerable record keeping;

9.7 Supplement Identification

Unless the Supplements are integrated within this Section of the Handbook (and thus derive their approval from approval of the Handbook), each Supplement shall have a cover or title page with the unique supplement identification, date of issue (or revision, it appropriate) and signature and title of the certificating or approving authority.

9.9 Page Numbering

Supplement page numbers shall consist of a statement of the consecutive page numbers, such as "1 of 5", "2 of 5", etc.

9.11 Structure of Supplements

Each Supplement shall be a self-contained, miniature Pilot's Operating Handbook with the following as a minimum:

(a) Section 1, General. The purpose of the Supplement and the systems or equipment to which it specifically applies shall be stated. FAA Approved Supplements shall be identified as such, and it shall be made clear that when the subject system or equipment is installed, the associated Supplement must be in the Pilot's Operating Handbook at all times.

(b) *Section 2, Limitations.* Any changes to the limitations, instrument markings, or placards of the basic Limitations (Section 2) of the Pilot's Operating Handbook shall be stated. If there is no change, a statement to that effect shall be made.

(c) *Section 3, Emergency Procedures.* Emergency Procedures associated with the subject installation shall be presented in a checklist form when order of action is essential to safety, and any changes to the basic Emergency Procedures (Section 3) of the Pilot's Operating Handbook shall be stated. If there is no change, a statement to that effect shall be made.

(d) *Section 4, Normal Procedures.* Normal Procedures associated with the subject installation shall be presented in a check list form when order of action is essential to safety, and any changes to the basic Normal Procedures (Section 4) of the Pilot's Operating Handbook shall be stated. If there is no change, a statement to that effect shall be made.

(e) *Section 5, Performance.* The effect, if any, of the subject installation upon airplane Performance as shown in the basic Performance (Section 5) of the Pilot's Operating Handbook shall be indicated. If there is no change, a statement to that effect shall be made.

Issued: February 15, 1975
Revised: October 18, 1996

SECTION 10

SAFETY AND OPERATIONAL TIPS (OPTIONAL)

TABLE OF CONTENTS

SECTION 10

SAFETY AND OPERATIONAL TIPS (OPTIONAL)

10.1 General

A Safety and Operational Tips section may be incorporated in the Handbook. It may contain:

Safety information of a general nature, such as--

(1) kinds of information and rules to be found in FAA publications;

(2) how to conduct various airplane inspections;

(3) medical problems and information (vertigo, hypoxia, fatigue, affects of scuba diving, etc.); and

(4) any other information that would enhance the safe use of the airplane.

(5) Child restraint systems:

A small child should use an approved child restraint seat. The child should not be held or share a seat belt with another person.

Acceptable child restraint seats are defined in publications such as Advisory Circular 91-62.

Operational tips of a general nature, such as -

(1) general weather information and sources and how to use the information;

(2) general fuel conservation information (such as why it pays to keep the exterior of the airplane clean);

(3) tips on operating in mountainous areas (or in desert areas or on grass or gravel runways, etc.); and

(4) any other information that would enhance the operational use of the airplane.

ALPHABETICAL ORDER

At the option of the manufacturer, a comprehensive alphabetical index may be included following the last section in the handbook.

(Optional)

SPECIFICATION FOR CONTINUING AIRWORTHINESS PROGRAM

(A Supplement to the Airplane's Maintenance Manual)

GAMA SPECIFICATION NO. 7

issued: March, 1991
1st edition

prepared and published by
GENERAL AVIATION MANUFACTURERS ASSOCIATION
Suite 801
1400 K Street, NW
Washington, DC 20005
(202) 393-1500

The primary document containing the procedures for the continued airworthiness of an airplane is the airplane's maintenance manual. A document prepared in accord with this Specification supplements, and is designed for use with, that manual.

LIST OF EFFECTIVE PAGES

CHAPTER SECTION SUBJECT	PAGE	DATE
COVER		March, 1991
TITLE PAGE		March, 1991
LIST OF EFFECTIVE PAGES	i	March, 1991
RECORD OF REVISIONS	ii	March, 1991
PREFACE	iii	March, 1991
	iv	March, 1991
CONTENTS	v	March, 1991
SECTION I - PHYSICAL REQUIREMENTS	1-1	March, 1991
	1-2	March, 1991
	1-3	March, 1991
SECTION II - CONTINUING AIRWORTHINESS PROGRAM DOCUMENT PRESENTATION	2-1	March, 1991
	2-2	March, 1991
	2-3	March, 1991
	2-4	March, 1991
	2-5	March, 1991
	2-6	March, 1991
SECTION III - SAMPLE CAP	3-1	March, 1991
	3-2	March, 1991
	3-3	March, 1991
	3-4	March, 1991
	3-5	March, 1991
	3-6	March, 1991
	3-7	March, 1991
	3-8	March, 1991
	3-9	March, 1991
	3-10	March, 1991
	3-11	March, 1991
	3-12	March, 1991
	3-13	March, 1991
	3-14	March, 1991
	3-15	March, 1991
	3-16	March, 1991
	3-17	March, 1991
	3-18	March, 1991

THIS PAGE INTENTIONALLY BLANK

PREFACE

This Specification was developed by the General Aviation Manufacturers Association as guidance for airplane, engine and component manufacturers in preparing Continuing Airworthiness Program Inspection Documents (which may also be called Continuing Airworthiness Programs or CAPs). CAPs may be prepared for all types of general aviation airplanes and components certificated under the applicable Federal Aviation Regulations.

A CAP supplements the airplane's maintenance manual (or Instructions for Continuing Airworthiness) which is the primary document containing the procedures for the continuing airworthiness of the airplane. Some airplanes, particularly relatively simple airplanes, may not need CAPs because adequate information to maintain their continuing airworthiness throughout their useful lives is contained in the airplane's maintenance manual. In such cases, a CAP need not be published. If a manufacturer elects to provide comprehensive inspection information to supplement the basic airplane maintenance manual, this Specification is an example of, and establishes a standard for, a Continuing Airworthiness Program Inspection Document. Instead of, or in addition to, this example of style and format for a CAP, a manufacturer may use its publication style manual or another appropriate style manual.

The Specification was developed with the objective of minimizing the cost to, and efforts of, general aviation airplane owners and operators and maintenance personnel by standardizing the format and general content of Continuing Airworthiness Programs. Standardization will enhance safety through uniform interpretation of inspection requirements contained in Continuing Airworthiness Programs prepared in accord with this Specification. For the purposes of this Specification, "airplane" refers to the airframe and all related components specified in the Type Certificate or made available as options by the airplane manufacturer.

This Specification has been developed in response to Federal Aviation Administration (FAA) Advisory Circular AC 91-60, The Continued Airworthiness of Older Airplanes, and Advisory Circular AC 91-56, Supplemental Structural Inspection Program for Large Transport Category Airplanes. These FAA advisory circulars provide specific information regarding continued airworthiness requirements for the manufacturer and owner/operator. Advisory Circular 91-56 provides "Guidelines for Development of Continuing Airworthiness Programs" to which this Specification closely adheres.

In addition to understanding FAA Advisory Circulars AC 91-60 and AC 91-56, familiarity with GAMA Specification No. 2, Manufacturers Maintenance Data and Air Transport Association of America Specification No. 100, Specification for Manufacturers Technical Data, will aid in the preparation of a CAP for a specific airplane.

It is intended that manufacturers retain and exercise reasonable judgement and latitude in the content of their publications with respect to depth and scope of coverage. In order to achieve the objectives of this Specification (enhance safety, reduce efforts, minimize

Issued: March, 1991

costs), each manufacturer is expected to reasonably adhere to the Specification content and arrangement in order to provide consistent, industry standardized Continuing Airworthiness Programs. If a company publication style manual is used (so as to maintain continuity of the company "style" for all of its publications), the format and layout should follow this Specification to the extent practicable.

This Specification contains references to the Federal Aviation Administration (FAA) and the Federal Aviation Regulations (FARs). If the Specification is used to prepare a Continuing Airworthiness Program for acceptance by an airworthiness authority other than FAA, the appropriate authority and its regulations may be substituted.

Questions on interpretation and proposed changes to this Specification should be submitted to General Aviation Manufacturers Association, Suite 801, 1400 K Street, N.W., Washington, D.C. 20005.

CONTENTS

Issued: March, 1991

THIS PAGE INTENTIONALLY BLANK

SECTION I - PHYSICAL REQUIREMENTS

1. **Binder Type and Page Size**

Documents must be readily revisable. They may be in loose-leaf form with a durable, multi-ring cover, permanently bound, "Fiche", or another appropriate form. If in loose-leaf form, use "standard", or commonly used page sizes.

2. **Paper, Printing and Type Size**

Use white paper with good strength characteristics and of sufficient weight and substance to eliminate excessive show-through when printed on both sides. In meeting these requirements, consideration may be given to limiting paper bulk. Use a form of printing that results in a black image suitable for reproduction. Copy density must be uniform throughout the page.

Print interim changes (interim to a republication of the document), except fiche or microfilm copy, on colored stock. Weight and substance may be governed by the printing process used.

Prepare basic text in 10- or 12-point type. Use 14-point uppercase bold for the word **WARNING** and 10-point uppercase bold for the **WARNING TEXT**. Use 12-point uppercase bold for the word **CAUTION** and 10-point uppercase for the CAUTION TEXT. Use 10-point uppercase bold for the word **NOTE** and 10-point mixed case for the Note Text. First, second and third level heads and captions should be distinctive in size or style or both. Type style is determined by the Document producer based on the equipment available and good judgement. See Figure 1-1.

3. **Page Identification**

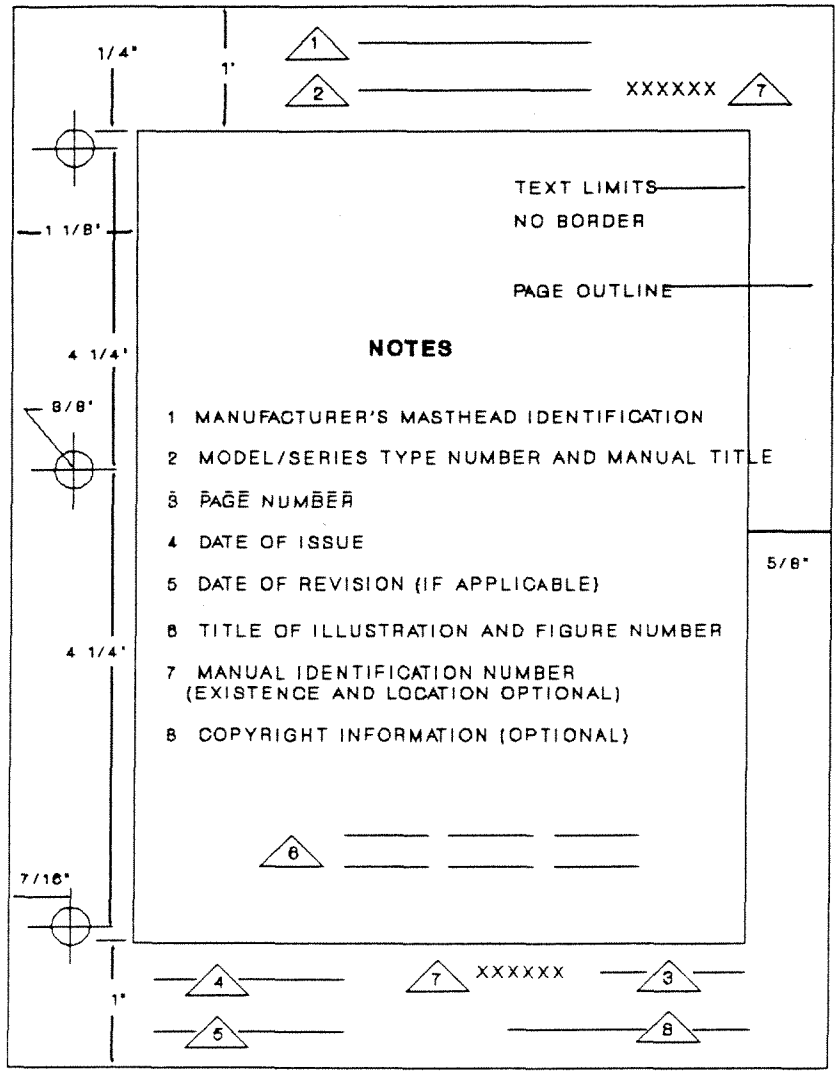
Number the pages of CAPs containing only one section in sequence with section identification. Number the pages of multi-section CAPs with section number and a dash (i.e., "1-" for all pages in the "Physical Requirements" section) followed by the serial number of the page beginning with "1" for each section (e.g., Page 1-1, 1-2, etc.)

Number the pages in each appendix with the Appendix letter (or number) and a dash (i.e., "G-" for all pages in the appendix) followed by the serial number of the page beginning with "1" for each appendix (e.g., Page G-1, G-2, etc.)

Print the page number and date of issue or revision at the bottom of each page. Locate the page number in the lower right corner and the date of issue in the lower left corner, for odd pages. Locate the page number in the lower left corner and the date of issue in the lower right corner, for even pages. See Figure 1-1.

Pages of permanently bound or "Fiche" Documents need not be dated. Table of Contents pages must be dated but need not be numbered.

Issued: February, 1991



Page Layout (Odd Page, Even Page Opposite)
Figure 1-1

Each page must bear the date of the original issue until revised and, when revised, that of the latest revision. Instead of using the actual date of issue on each page of an original issue of a Document, the words "original issue" may be used. In such a case, the Title Page and the Table of Contents pages preceding each section of the Document must bear the actual date of issue following the words "original issue".

On pages requiring folding, make the fold in a manner that permits the page number to be visible. Except as provided below, identify a normal blank page within a page block (other than the back of a foldout page) with a phrase such as "This page intentionally blank".

Instead of printing "This page intentionally blank" on blank pages, the Document producer may use dual page numbering on pages preceding or following a blank page. For example: 3-9 (3-10 blank) or (3-9 blank/3-10).

In the event a page must be added after the initial printing, use the number of the preceding page with a letter suffix added for the added page(s) (e.g., Page 1-6A, 1-6B, etc.).

4. **Copy Standards**

Text may be prepared in one or two columns with or without justification. Warnings, cautions and notes may be used to highlight or emphasize important points. Print all pages except wiring diagrams and foldouts on both sides. Start each section on a right-hand page. The manufacturer's masthead, publication title, airplane model, and issue or revision date must appear on all pages of loose-leaf Documents that have text, illustrations, figures or tables .

5. **Tab Dividers**

Separate each Section and Appendix of a loose-leaf Document with a plasticized tab divider. Stagger the tab dividers and label them with section numbers or titles, or both. Separation of sections in permanently bound CAPs is not required.

6. **Identifying Revised Material**

Identify revisions, additions and deletions by a vertical black line along the outside of the page (or the column side opposite the gutter on two column pages) opposite only that portion of the printed matter that was changed. Identify a revision to an illustration with a black vertical line in the left margin opposite the revised portion or use a "pointing hand" (☞). Show the date of the revision on each revised page. See Figure 1-1.

THIS PAGE INTENTIONALLY BLANK

SECTION II - CONTINUING AIRWORTHINESS PROGRAM DOCUMENT PRESENTATION

1. **Contents**

A Continuing Airworthiness Program Inspection Document contains the following information:

A. Cover (optional).

B. Title Page.

C. Preface (optional if necessary information is covered in the Objectives).

D. List of Effective Pages.

E. Record of Revisions. (Optional if information is provided elsewhere.)

F. Table of Contents.

G. Applicability.

H. Objectives (optional if necessary information is covered in the Preface).

I. Technical Document Reference.

J. List of Continuing Airworthiness Program Inspections.

K. Continuing Airworthiness Program Inspections (in Chapter Number order).

2. **Explanation of Contents**

A. Cover.

(1) The cover title is Continuing Airworthiness Program Inspection Document for (list airplane names or models, or both, or the components).
(2) In the alternative, the acronym CAP may be used (with the airplane model or component names).
(3) Other information may be displayed on the cover. See Figure 3-1.

B. Title Page.

The Title Page contains the following information:

Issued: February, 1991

(1) The title, Continuing Airworthiness Program Inspection Document or the acronym CAP.
(2) The airplane model name or description or the components covered.
(3) The manufacturer's masthead or logo.
(4) A statement conveying the intent of the following example:

"The primary document containing the procedures for the continuing airworthiness of an airplane is the airplane's maintenance manual (Instructions for Continuing Airworthiness). A document prepared in accord with this Specification supplements, and is designed for use with, that maintenance manual."

(5) The effective date and revision number and date if applicable.
(6) The manufacturer's address.
(7) The part number, if applicable.

Additional information, such as GAMA membership identification, copyright notice, etc., may be included. Format and layout is to be determined by the CAP producer, recognizing that it is desirable that the format and layout be similar to the producer's existing documents.

NOTE: Back of the Title Page should be left blank except for items such as a Manufacturer's logo.

See Figure 3-2

C. Preface (optional if necessary information is covered in the Objectives).

The Preface contains the following information:
(1) The reasons for establishing the CAP program (discussion of service history) and the underlying problems to be prevented by compliance with the specific CAP.
(2) The relationship of the CAP to normal inspection programs for the product.

NOTE: The Preface has been omitted in the sample CAP in Section III and the necessary information has been included in the Objectives.

D. List of Effective Pages.

(1) The List of Effective Pages is formatted to provide:
  (a) A Chapter/Section/Subject column.
  (b) A page number column.
  (c) A date column.
(2) Revision instruction information (such as, "Insert Latest Revised Pages; Destroy Superseded or Deleted Pages") or revision history information, or both, may also be included.

See Figure 3-4.

E. Record of Revisions. (Optional if information is provided elsewhere.)

The Record of Revisions is formatted to provide:

(1) A Revision Number column.
(2) A Date Inserted column.
(3) A Date Removed column (optional).
(4) A Page Number column.

See Figure 3-5.

F. Table of Contents.

The Table of Contents is formatted to provide:

(1) A Title column.
(2) A Page Number column.

See Figure 3-6.

G. Applicability.

The Applicability Statement contains the following information, appropriately formatted:

(1) A list of models or components affected, in a column on the left side of the page, and a list of corresponding serial/unit numbers (or other identifying information), in a corresponding column on the right side of the page.
(2) Special information, such as exclusions or additions, in note form.

The listed model or components and listed serials/units are to be cumulative for all inspections in the Continuing Airworthiness Program Inspection Document. This will allow the user to identify an affected airplane by examining one list rather than having to check each individual Continuing Airworthiness Program's Inspection for applicability.

See Figure 3-7.

H. Objectives.

The Objectives Statement contains the following information:

(1) The relationship of the CAP to existing inspection programs and the manufacturer's objectives for the CAP.
(2) Optional information including (but not limited to) the rationale utilized to select CAPs - how the CAP requirements were determined (discussions of service history, tests and analyses).

The manufacturer may establish procedures to provide feedback (from operators and maintenance facilities who comply with a CAP) on unairworthy conditions (whether covered or not covered by the CAP) that were discovered when complying.

See Figures 3-8, -9, and -10.

I. Technical Document Reference.

The Technical Document Reference contains a listing of necessary service documents (e.g., service bulletins, service letters, service kits, etc.) and related information directly identified in a Continuing Airworthiness Program Inspection. Only service documents directly involved with a CAP need be listed, in order, with document number (if numbered), full title and date. Show a source for all listed documents.

See Figure 3-12.

J. Listing of Continuing Airworthiness Program Inspections.

(1) The *Listing of CAP Inspections contains all Continuing Airworthiness Program* Inspections in the CAP, in numerical order by CAP inspection number, with full title, date, effectivity and inspection compliance. See Figure 3-14.

(2) In the alternative, a block diagram, showing only Continuing Airworthiness Program Inspection numbers and time blocks may be used. See Figure 3-15.

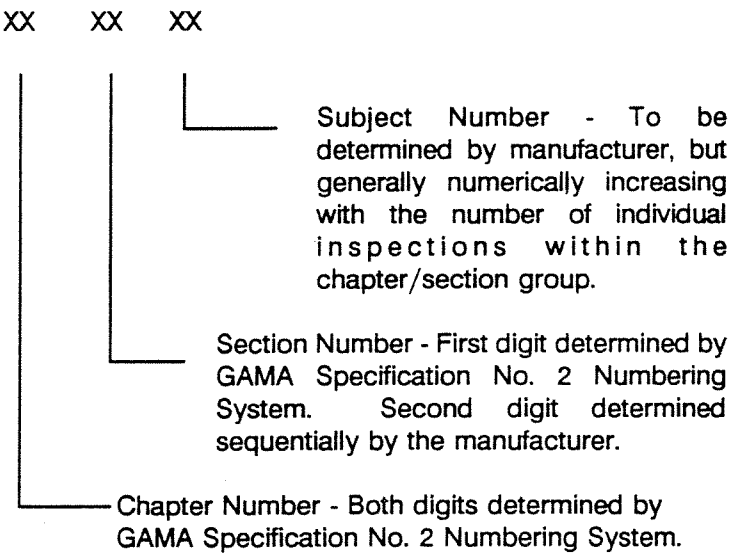
K. Continuing Airworthiness Program Inspections.

(1) Continuing Airworthiness Program Inspections usually consist of two pages: one text page (see Figure 3-16) and one illustration page (see Figure 3-17).

(2) The Continuing Airworthiness Program Inspection contains the following sections, in order, from the top of the page to the bottom (except as noted), in bold face type or underscored:

(a) CONTINUING AIRWORTHINESS PROGRAM INSPECTION NUMBER - in the upper right corner of the image area on the text page(s) and, optionally, on the illustration page(s). The Continuing Airworthiness Program Inspection number is also displayed at the bottom of the page and is the CAP section number (see Note).

NOTE: The Continuing Airworthiness Program Inspection number is determined as follows:



(b) TITLE - at the top of the text page, at the left margin.

For example: FUSELAGE/WING ATTACHMENT INSPECTION.

(c) EFFECTIVITY - directly below the title; show both model and serial/unit numbers as applicable. Exceptions and additions are also noted here (such as "except airplanes incorporating Service Kit Number 999").

(d) INSPECTION COMPLIANCE - directly to the right of the effectivity and near the right margin. Instructions regarding "when" an inspection is required, and if repetitive, are located here. Also state if additional repetitive inspections are required based upon initial inspection results.

(e) PURPOSE - directly below the Effectivity and Inspection Compliance sections, extending from the left to the right margins. Any service history discussion is also located here.

(f) INSPECTION INSTRUCTIONS - directly below the Purpose section and extending from the left to the right margins.

(g) ACCESS/LOCATION - directly below the Inspection Instructions section, extending from the left to the right margins. Access and location instructions are provided here unless obvious.

For example: Remove wing attach fairings.

(h) SIGNIFICANT INSPECTION CONDITION (detectable crack size, wear limits, corrosion condition, etc.) - directly below the Access/Location section at

the left margin. Specifies, for a crack inspection, the minimum size crack expected to be discovered or, if no minimum is defined, a statement to this effect. Specifies, for other inspection conditions, the wear limits, corrosion pit depth, etc.

(i) INSPECTION PROCEDURE - located directly below the Significant Inspection Condition section, extending from the left to the right margins. Sets forth the inspection procedure(s) to be utilized, such as; magnetic particle, visual, etc., and may reference another document for the actual procedure, such as a nondestructive testing manual.

(j) REPAIR/MODIFICATION - located directly below the Inspection Procedure section, extending from the left to the right margins. Sets forth repair or modification instructions and may refer to a standard repair in another document or a special repair or modification defined elsewhere, such as in a service kit, service bulletin, etc.

(k) COMMENTS - located directly below the Repair/Modification section, extending from the left to the right margins. Additional information or instructions, such as "Report any cracks found to this manufacturer", are contained here.

(l) SECTION NUMBER, PAGE NUMBER AND PAGE DATE - as indicated in Figure 3-16 or optionally, as shown in Section I - Page Numbers and Dates. The Continuing Airworthiness Program Inspection number becomes the section number and defines its placement within the CAP.

(m) RECOMMENDED OR REQUIRED RETIREMENT TIMES OF LIFE LIMITED PARTS (if established) - on the right side of the page in an appropriate space. Use of the word CAUTION, with appropriate 10-point uppercase for the text, enclosed in a box, is recommended. Sets forth manufacturer recommended retirement times for parts or assemblies (using hours, cycles or another appropriate determinant) and FAA required retirement (removal from service) times for life limited parts or assemblies.

SECTION III - SAMPLE CAP

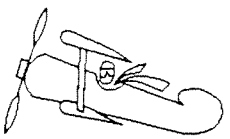
Issued: June, 1990

THIS PAGE INTENTIONALLY BLANK

CONTINUING AIRWORTHINESS PROGRAM INSPECTION DOCUMENT (CAP)

FOR

Light Single Engine Aircraft
Model XXX Series



ABC Aircraft Company

CAP Cover
Figure 3-1

Issued: June, 1990

THIS PAGE INTENTIONALLY BLANK

CONTINUING AIRWORTHINESS PROGRAM INSPECTION DOCUMENT (CAP)

LIGHT SINGLE ENGINE AIRCRAFT
MODEL XXX SERIES

issued: June, 1990
1st edition

prepared and published by
ABC AIRCRAFT COMPANY
1234 Anystreet Drive
Anytown, VA 99999
(555) 555-5555

This document provides **supplemental information** to the applicable airplane maintenance manual(s).

Member of GAMA

MANUAL IDENTIFICATION NUMBER

CAP Title Page
Figure 3-2

THIS PAGE INTENTIONALLY BLANK

Intentionally Blank Page
Figure 3-3

CAP  ABC Model XXX

LIST OF EFFECTIVE PAGES

CHAPTER SECTION SUBJECT	PAGE	DATE
COVER		
TITLE PAGE		6/90
LIST OF EFFECTIVE PAGES	i	6/90
RECORD OF REVISIONS	ii	6/90
CONTENTS	iii	6/90
APPLICABILITY	iv	6/90
OBJECTIVES	v	6/90
	vi	6/90
	vii	6/90
SECTION I - TECHNICAL DOCUMENT REFERENCE	1-1	6/90
SECTION II - LISTING OF CONTINUING AIRWORTHINESS PROGRAM INSPECTIONS	2-1	6/90
	2-2	
SECTION III - CONTINUING AIRWORTHINESS PROGRAM INSPECTION	3-1	6/90
	3-2	6/90

Insert Latest Revised Pages
Destroy Superseded or Deleted Pages

i

Issued: June, 1990

List of Effective Pages
Figure 3-4

ABC Model XXX CAP

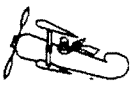
RECORD OF REVISIONS

REVISION NUMBER	DATE INSERTED	DATE REMOVED	PAGE NUMBER	REVISION NUMBER	DATE INSERTED	DATE REMOVED	PAGE NUMBER

 Issued: June, 1990

Record of Revisions
Figure 3-5

 Issued: June, 1990

CAP  ABC Model XXX

CONTENTS

Issued: June, 1990

Table of Contents
Figure 3-6

Issued: June, 1990

ABC Model XXX CAP

APPLICABILITY

MODEL	SERIAL
XXX	XXX-0001 THRU XXX-0577
XXX	XXX-0001 THRU XXX-0275
XXXX	XXXX-0276 THRU XXXX-1700
XXXX	XXXX-0001 THRU XXXX-0647 REFER TO NOTE 1
XXX	XXX-57841 THRU XXX-58818
XXXX	XXX-0001 THRU XXX-0197

NOTE 1: XXX-0001 thru -0647 except airplanes incorporating SKXXX-XX.

 Issued: June, 1990

Applicability Statement
Figure 3-7

 Issued: June, 1990

CAP  ABC Model XXX

OBJECTIVE

1. Introduction

A. The Continuing Airworthiness Program Inspection Document (CAP) is inspection data that, when combined with the operator's existing maintenance program, will help maintain the structural integrity and continued airworthiness of the ABC XXX Series airplanes.

B. Although the airplanes addressed in this document are out of production, ABC continues to support them as outlined in our stated company policies. The factory has maintained technical assistance and parts support within stated policies. Service letters and owner information have been made available as necessary to maintain the airworthiness of the fleet. ABC has utilized condition report inputs to ensure maintenance and inspection guidelines are adequate and current by issuing updated guidelines when appropriate.

C. The airplanes were delivered with recommended inspection programs to keep them airworthy. Because of the varied missions the airplanes performed, type of care given, and age and utilization rates, ABC has determined, based on inspections, tests, and analyses, that it is necessary to provide additional inspection requirements to further ensure that the airplanes can continue to carry the design loads it was originally certified for.

D. This CAP has been developed in accordance with guidelines in FAA Advisory Circulars 91-56 and 91-60. The CAP is not intended to change or replace any portion of the applicable airplane Maintenance Manual or Service Letters.

E. Each Section, such as "Technical Document Reference", "Listing of Continuing Airworthiness Program Inspections", etc., starts a new page numbering sequence.

2. Objective

A. This CAP has been prepared with the intent to expand present inspection requirements as a further assurance of the ability of the airplane to perform within the limits of the original certification. The CAP will add confidence in using the airplane for its assigned mission.

B. The CAP will address primary and secondary airframe components, and primary and secondary systems to accomplish the stated objective of continued airworthiness.

C. To establish the basis for those items to be included, the following assumptions have been made.

Issued: June, 1990

Objectives Statement
Figure 3-8

(1) The airplane has been maintained in accordance with ABC recommendations or equivalent.

(2) Wherever the CAP is directed to a specific part or component, it is implied that the inspection will include observation and evaluation of the surrounding area of parts and equipment. Any maintenance anomaly would subsequently be brought to the attention of both the owner and maintenance personnel. Any anomaly should be reported to ABC, through the Condition Reporting System, so that additions and/or revisions can be made to the CAP where deemed necessary.

(3) Airplanes modified by STC are not the responsibility of ABC. Any item affected by STCs in ABC Manuals or CAPs must be brought to the attention of the STC holder by the owner or maintenance organization in order to obtain FAA-approved guidelines for the inspection, repair, preservation, etc. of that item.

3. Rationale Utilized to Select Inspection Items

A. Service Experience.

(1) Customer correspondence and service reports were reviewed during the section process for the critical inspection items. Some reports were used to select items that were similar in application, design and loading even though no failures have occurred.

(2) High-time airplanes, disassembled for major overhaul, were inspected to assist in selecting inspection items. Other high-time airplanes' special Continuing Airworthiness Program Inspection results supplement these inspections.

(3) The effects of corrosion have not been considered in the rationale in selecting inspection times or in the effects on the fatigue stresses. It is very difficult to determine the effects of corrosion but, as the reports from the CAP inspections are received, the inspection times will be adjusted for any severe problems.

B. Testing.

(1) A review of test results applicable to the design was made. The loading conditions together with the resulting margins of safety were evaluated. The resulting data were used to determine if the component should be considered for incorporation into the CAP.

C. Analysis.

(1) Existing analyses were reviewed to identify components and areas that may have exhibited lower margins of safety.

Objectives Statement (Continued)
Figure 3-9

4. Reporting/Compliance

A. For the CAP to be successful on a continuing basis, it is essential that a free flow of information exist between the operator, FAA and ABC Aircraft Company. The significant details of inspection results, repairs and modifications accomplished must be communicated to ABC Aircraft Company in order to assess the effectiveness of the recommended inspection procedures and time intervals. In some cases, extension of inspection frequencies may be possible if the data suggests that the onset of fatigue problems occurs at a greater number of flight hours than initially predicted.

B. Additionally, items not previously considered for inclusion in the CAP may be uncovered through operator inspections. These items will be evaluated by ABC and, if applicable to the airplane configurations concerned, will be added to the document for the benefit of all.

C. A reporting system, consistent with the systems employed by ABC Service Organization, has been established and incorporated into this document. Copies of the appropriate forms and a description of the entries to be completed are available to you from an ABC dealer or Factory Customer Service Representative.

NOTE: This system does not supersede the normal channels of communication for items not covered by the CAP.

The discrepancy report should include the following:

Continuing Airworthiness Program Inspection Number
Airplane Model and Serial Number
Airplane Hours
Title of Continuing Airworthiness Program Inspection
Location and Description of the Damage
How Detected

The operator may use standard ABC Condition Report form(s) or an equivalent containing the same information.

Send all available data, including repairs, Polaroid photos, etc., to:

Service Department
Attn: CAP Program
ABC Aircraft Company
1234 Anystreet Drive
Anytown, VA 99999

Issued: June, 1990

Objectives Statement (Continued)
Figure 3-10

Issued: June, 1990

THIS PAGE INTENTIONALLY BLANK

Intentionally Blank Page
Figure 3-11

CAP  ABC Model XXX

SECTION I - TECHNICAL DOCUMENT REFERENCE

MAINTENANCE MANUALS

Number	Title	Date
Model XXX	Maintenance Manual	8/1/85

SERVICE BULLETINS

SBXXX-XX-X	Wings - Main Wing Spar Modification	9/1/89
SBXXX-XX-X	Stabilizers - Vertical Stabilizer Tip Rib Modification	8/1/89

To obtain a Maintenance Manual for the Model XXX Series airplane and the listed Service Bulletins, write to:

Documents Department
ABC Aircraft Company
1234 Anystreet Drive
Anytown, VA 99999

1-1

Issued: June, 1990

Tech^Xxcal Document Reference
Figure 3-12

THIS PAGE INTENTIONALLY BLANK

Intentionally Blank Page
Figure 3-13

CAP  ABC Model XXX

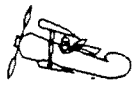
SECTION II - LISTING OF CONTINUING AIRWORTHINESS PROGRAM INSPECTIONS

Continuing Airworthiness Program Inspection Number	Title	Date	Effectivity	Inspection Compliance Initial	Repeat
32-30-01	Main Landing Gear Act Mounting Bolts	7/28/89	1970 Model XXX Series & On	500 Hrs.	500 Hrs.
32-30-02	Main Gear Downlock Actuator	7/28/89	Model XXX, XXXX & XXXX (1970 thru 1986 Models)	1000 Hrs. or Annual	1000 Hrs. or Annual
32-50-01	Nose Gear Turning Stop	6/28/89	Models XXX, XXX and XXX Series	3000 Hrs.	1000 Hrs.
32-50-02	Nose Gear Steering Collar and Upper	7/28/89	All Models XXX's and XXX's, 2157841 & On	3000 Hrs.	1000 Hrs. See 32-50-02
53-10-01	Pressurized Cabin Inspection	7/28/89	XXXXXXXX & On	5000 Hrs.	3000 Hrs.

2-1

Issued: June, 1990

Listing of Continuing Airworthiness Program Inspections (List Form)
Figure 3-14



ABC Model XXX CAP

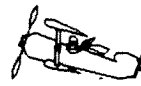
CONTINUING AIRWORTHINESS PROGRAM INSPECTIONS CHECK LIST

Continuing Airworthiness Program Inspection Number	500 Hrs.	1000 Hrs.	3000 Hrs.	5000 Hrs.
32-30-01	Initial & Repeat			
32-30-02		Initial & Repeat		
32-50-01		Repeat	Initial	
32-50-02		Repeat	Initial	
53-10-01			Repeat	Initial

2-2

 Issued: June, 1990

Listing of Continuing Airworthiness Program Inspections (Block Form)
Figure 3-15

CAP  ABC Model XXX

SECTION III - CONTINUING AIRWORTHINESS PROGRAM INSPECTIONS

TITLE CONTINUING AIRWORTHINESS INSPECTION NUMBER: **53-40-03**

Fuselage/Wing Attachment Fitting

EFFECTIVITY

All XXX Series Aircraft - 1967 & On

INSPECTION COMPLIANCE

INITIAL XXXX Hrs. or Annual
REPEAT XXXX Hrs. or Annual

PURPOSE

To check Fuselage/Wing Attachment Fitting.

INSPECTION INSTRUCTIONS

1. Reference SEB83-XX and Item 53-40-04 of this CAP.
2. See Figure on page 2.
3. Refer to the appropriate manufacturer's Service Manual.

ACCESS/LOCATION

Main spar wing attach fittings. - Remove wing attach fairings. Do not remove dowel pins unless required in complying with Continuing Airworthiness Inspection Number 53-40-04.

DETECTABLE CRACK SIZE

.060 Inch.

CAUTION:
REPLACE NUTS AND WASHERS IF REMOVED DURING INSPECTION. DO NOT REUSE.

INSPECTION PROCEDURE

Visual.

REPAIR/MODIFICATION

Replacement.

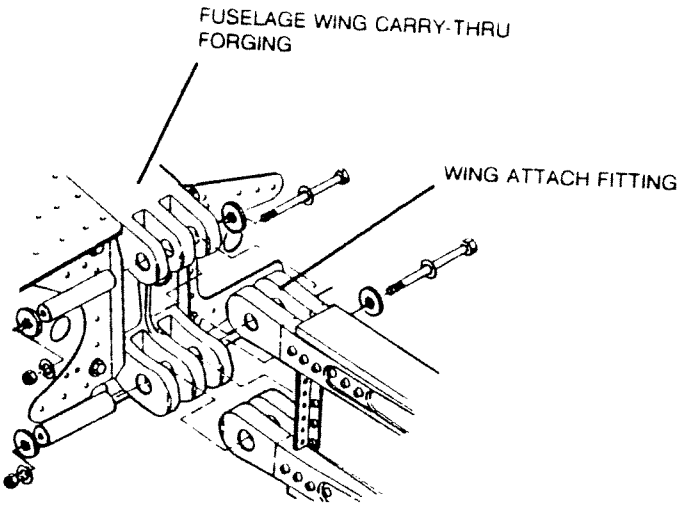
COMMENTS

Report any cracks found to this manufacturer.

53-40-03 3-1

Issued: June, 1990

Continuing Airworthiness Program Inspection
Figure 3-16



NOTE

REMOVE FILLETS AND INSPECT FUSELAGE-TO-WING ATTACHMENT AT EACH XXXX-HOUR INSPECTION. CHECK DOWEL PIN RETAINING HARDWARE, CARRY-THRU SPAR, AND WING FITTINGS THOROUGHLY.

Figure 3-1 - Fuselage/Wing Attachment Fitting

Continuing Airworthiness Program Inspection
Figure 3-17