SENECA COLLEGE
SCHOOL OF AVIATION

FLIGHT MANUAL
FOR
RAYTHEON
BEECHCRAFT B58 BARON

VERSION B1

FOR CLASSROOM USE ONLY

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ONLY

Raytheon Aircraft

LIST OF EFFECTIVE PAGES

This listing contains all current pages with effective revision number or date. It should be used after posting changes to ensure the manual is complete and up-to-date. Always destroy superseded pages when you insert revised pages.

Baron® 58/58A

(Serials TH-1472 and After, except TH-1476, TH-1487, TH-1489, and TH-1498)

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

P/N 58-590000-39

Revision B1 - June, 2004

Title Page . . . . . June, 2004
Logo Page . . . . . Undated
List Of Effective Pages . . . . . June, 2004
Log Of Revisions
Revision B1 . . . . . June, 2004
Reissue B. . . . . June, 2003

1-1 thru 1-24 . . . . . June, 2003
2-1 thru 2-18 . . . . . June, 2003
2-19 . . . . . June, 2004
2-20 thru 2-36 . . . . . June, 2003
3-1 thru 3-17 . . . . . June, 2003
3-18 . . . . . June, 2004
3-19 thru 3-24 . . . . . June, 2003
4-1 and 4-2 . . . . . June, 2004
4-3 thru 4-11 . . . . . June, 2003
4-12 and 4-13 . . . . . June, 2004
4-14 thru 4-32 . . . . . June, 2003
4-33 thru 4-40 . . . . . June, 2004
5-1 thru 5-62 . . . . . June, 2003

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6-1 thru 6-24 ..... June, 2003
7-1 thru 7-4 ..... June, 2004
7-5 thru 7-27 ..... June, 2003
7-28 thru 7-32 ..... June, 2004
7-33 thru 7-39 ..... June, 2003
7-40 thru 7-52 ..... June, 2004
8-1 thru 8-56 ..... June, 2003
9-1 and 9-2 ..... June, 2003
Supplements ..... See Log of Supplements
10-1 thru 10-64 ..... May, 1994

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Title Page	New
LOEP	New
LOR	New
2-19	Revised Placard
3-18	Revised "Electrothermal Propeller Deice System"
4-1 and 4-2	Revised Table of Contents
4-12 and 4-13	Revised "Before Takeoff" and Shifted Data
4-33 thru 4-35	Added "Heater Operation" and revised "Windshield Defogging"
4-36 thru 4-40	Shifted Data
7-1 thru 7-4	Revised Table of Contents
7-28 and 7-29	Revised "Fuel Cells"
7-30 thru 7-32	Revised Illustrations
7-40 thru 7-52	Revised "Lighting System", "Environmental System" and Shifted Data
	B1

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INSTRUCTION SHEET

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(Serials TH-1472 thru TH-2124, except TH-1476, TH-1487, TH-1489, and TH-1498)

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

P/N 58-590000-39
Revision B2 - January, 2006

PAGE OR SECTION	REMOVE EXISTING PAGE	INSERT NEW PAGE
Title Page	June, 2004	January, 2006
Logo Page	- - -	- - -
List of Effective Pages		
1 of 2	June, 2004	January, 2006
2 of 2	June, 2004	January, 2006
Log of Revisions		
1 of 2	- - -	January, 2006
2 of 2	- - -	January, 2006
2-29	June, 2003	June, 2003
2-30	June, 2003	January, 2006

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PAGE OR SECTION	REMOVE EXISTING PAGE	INSERT NEW PAGE
3-7	June, 2003	June, 2003
3-8	June, 2003	January, 2006
3-21	June, 2003	January, 2006
3-22	June, 2003	June, 2003
6-7	June, 2003	January, 2006
6-8	June, 2003	June, 2003
Section 8	All	All

* NOTICE *

It is the responsibility of the owner/operator to ensure that all required Supplements, Weight and Balance, and other pertinent data are transferred into the revised or new handbook/manual, as applicable.

After Compliance, this Instruction Sheet may be Discarded

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Beechcraft

Baron® 58
and
58A Special Reduced Gross Weight Configuration

(Serials TH-1472 thru TH-2124, except TH-1476, TH-1487, TH-1489, and TH-1498)

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

FAA Approved in the Normal Category based on CAR 3. This document must be carried in the airplane at all times, and be kept within reach of the pilot during all flight operations. This handbook includes the material required to be furnished to the pilot by CAR 3.

Airplane Serial Number:_____

Airplane Registration Number:_____

FAA Approved by:_____

John Tigue
Raytheon Aircraft Company
DOA-230339-CE

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P/N 58-590000-39B
Reissued: June, 2003

P/N 58-590000-39B2
Revised: January, 2006

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2-1 thru 2-18 . . . . . June, 2003
2-19 . . . . . June, 2004
2-20 thru 2-29 . . . . . June, 2003
2-30 . . . . . January, 2006
2-31 thru 2-36 . . . . . June, 2003
3-1 thru 3-7 . . . . . June, 2003
3-8 . . . . . January, 2006
3-9 thru 3-17 . . . . . June, 2003
3-18 . . . . . June, 2004
3-19 and 3-20 . . . . . June, 2003
3-21 . . . . . January, 2006

FOR CLASSROOM USE ONLY

3-22 thru 3-24 ..... June, 2003
4-1 and 4-2 ..... June, 2004
4-3 thru 4-11 ..... June, 2003
4-12 and 4-13 ..... June, 2004
4-14 thru 4-32 ..... June, 2003
4-33 thru 4-40 ..... June, 2004
5-1 thru 5-62 ..... June, 2003
6-1 thru 6-6 ..... June, 2003
6-7 ..... January, 2006
6-8 thru 6-24 ..... June, 2003
7-1 thru 7-4 ..... June, 2004
7-5 thru 7-27 ..... June, 2003
7-28 thru 7-32 ..... June, 2004
7-33 thru 7-39 ..... June, 2003
7-40 thru 7-52 ..... June, 2004
8-1 thru 8-34 ..... January, 2006
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P/N 58-590000-39

Revision B2 - January, 2006

PAGE	DESCRIPTION
Title Page	New
LOEP	New
LOR	New
2-30	Revised Placards
3-8	Revised "Air Start"
3-21	Revised "Loss of One Alternator"
6-7	Revised Illustration
8-1 thru 8-4	Revised Table of Contents
8-5	Revised "Introduction to Servicing" and "Publications"
8-7	Revised "Preventive Maintenance that may be Accomplished by a Certificated Pilot"
8-12	Revised "Storage"
8-14	Revised "Fuel Cells"
8-18	Revised "Batteries"
8-22	Revised "Shimmy Damper" and "Brakes"

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PAGE	DESCRIPTION
8-25	Revised "Heating and Ventilating System"
8-26	Revised "Alternators"
8-28 and 8-29	Revised "Exterior Painted Surface"
8-32	Revised "Consumable Materials", Deleted and Shifted Data

B2

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Raytheon Aircraft

LOG OF REVISIONS

Baron® 58/58A

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	B1

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SECTION I
GENERAL
TABLE OF CONTENTS

SUBJECT *PAGE*

Introduction 1-3
Important Notice 1-4
Use of the Handbook 1-5
Warnings, Cautions, and Notes 1-5
Revising The Handbook 1-6
Revision Service 1-7
Supplements 1-8
Airplane Flight Manual Supplements Revision Record 1-9
Airplane Three View 1-10
Ground Turning Clearance 1-11
Descriptive Data 1-12
Engines 1-12
Number of Engines 1-12
Engine Manufacturer 1-12
Engine Model Number 1-12
Engine Type 1-12
Horsepower Rating 1-12
Number of Propellers 1-12
Propeller Manufacturer 1-12
Number of Blades 1-13
Propeller Type 1-13
Pitch Settings (30-inch Station) 1-13
Propeller Diameter 1-13
Fuel 1-13
Approved Engine Fuels 1-13
Fuel Capacity 1-13
Standard System 1-13
Optional Systems 1-14
Engine Oil 1-14

FOR CLASSROOM USE ONLY

SECTION I
GENERAL
TABLE OF CONTENTS (Cont'd)

SUBJECT	PAGE
Oil Capacity	1-14
Specification	1-14
Maximum Certificated Weights	1-15
Cabin and Entry Dimensions	1-15
Cabin Baggage Volumes	1-15
Specific Loadings (At Maximum Take-off Weight)	1-15
Symbols, Abbreviations and Terminology	1-16
General Airspeed Terminology	1-16
Meteorological Terminology	1-19
Power Terminology	1-20
Engine Controls and Instruments Terminology	1-20
Airplane Performance and Flight Planning Terminology	1-21
Weight and Balance Terminology	1-22

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INTRODUCTION

The format and contents of this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual conform to GAMA (General Aviation Manufacturers Association) Handbook Specification No. 1 through Revision No. 2, dated October 18, 1996. Use of this specification by all manufacturers will provide the pilot with the same type of data in the same place in all handbooks.

Attention is called to Section X, SAFETY INFORMATION. Raytheon Aircraft feels that it is highly important to have Safety Information in condensed form in the hands of the pilots. The Safety Information should be read and studied. Periodic review will serve as a reminder of good piloting techniques.

WARNING

Use only genuine Raytheon Aircraft or Raytheon Aircraft approved parts obtained from Raytheon Aircraft approved sources, in connection with the maintenance and repair of Beech airplanes.

WARNING

Genuine Raytheon Aircraft parts are produced and inspected under rigorous procedures to ensure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than Raytheon Aircraft, even if outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from non-Raytheon Aircraft approved sources, or parts, components, or structural assemblies, the

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service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component, or structural assembly, even though originally manufactured by Raytheon Aircraft, unsuitable or unsafe for airplane use.

Raytheon Aircraft expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-Raytheon Aircraft approved parts.

IMPORTANT NOTICE

This handbook should be read carefully by the owner and the operator in order to become familiar with the operation of the airplane. Suggestions and recommendations have been made within it to aid in obtaining maximum performance without sacrificing economy. Be familiar with, and operate the airplane in accordance with, the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual and/or placards which are located in the airplane. This handbook includes the material required to be furnished to the pilot by the Title 14 Code of Federal Regulations and additional information provided by the manufacturer and constitutes the FAA Approved Airplane Flight Manual.

As a further reminder, the owner and the operator should also be familiar with the Title 14 Code of Federal Regulations applicable to the operation and maintenance of the airplane, and, as appropriate 14 CFR Part 91 General Operating and Flight Rules. Further, the airplane must be operated and maintained in accordance with FAA Airworthiness Directives which may be issued against it.

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The Title 14 Code of Federal Regulations place the responsibility for the maintenance of this airplane on the owner and the operator, who should ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements established for this airplane.

All limits, procedures, safety practices, time limits, servicing, and maintenance requirements contained in this handbook are considered mandatory for continued airworthiness and to maintain the airplane in a condition equal to that of its original manufacture.

Raytheon Aircraft Authorized Outlets can provide recommended modification, service, and operating procedures issued by both the FAA and Raytheon Aircraft, which are designed to get maximum utility and safety from the airplane.

USE OF THE HANDBOOK

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to (WARNINGS), (CAUTIONS), and (NOTES) found throughout the handbook:

WARNING

Operating procedures, techniques, etc., which could result in personal injury or loss of life if not carefully followed.

CAUTION

Operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed.

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NOTE

An operating procedure, technique, etc., which is considered essential to emphasize.

REVISING THE HANDBOOK

The Pilot's Operating Handbook is designed to facilitate maintaining the documents necessary for the safe and efficient operation of the airplane. The handbook has been prepared in loose-leaf form for ease in maintenance. It incorporates quick-reference tabs imprinted with the title of each section.

NOTE

In an effort to provide as complete coverage as possible, applicable to any configuration of the airplane, some optional equipment has been included in the scope of the handbook. However, due to the variety of airplane appointments and arrangements available, optional equipment described or depicted herein may not be designated as such in every case.

Immediately following the Title Page is a List of Effective Pages. A complete listing of all pages is presented along with the current status of the material contained; i.e. Original Issue, Reissued or Revised. A reissue of the manual or the revision of any portion will be received with a new List of Effective Pages to replace the previous one. Reference to the List of Effective Page(s) enables the user to determine the current issue, revision, or reissue in effect for each page in the handbook, except for the Supplements Section.

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When the handbook is originally issued, and each time it is revised or reissued, a new Log of Revisions page is provided immediately following the List of Effective Pages. All Log of Revisions pages must be retained until the handbook is reissued. A capital letter in the lower right corner of the Log of Revisions page designates the Original Issue ("A") or reissue ("B", "C", etc.) covered by the Log of Revisions page. If a number follows the letter, it designates the sequential revision (1st, 2nd, 3rd, etc.) to the Original Issue or reissue covered by the Log of Revisions page. Reference to the Log of Revisions page(s) provides a record of changes made since the Original Issue or the latest reissue.

That portion of a text or an illustration which has been revised by the addition of, or a change in, information is denoted by a solid revision bar located adjacent to the area of change and placed along the outside margin of the page.

REVISION SERVICE

The following publications will be provided, at no charge, to the registered owner/operator of this airplane:

1. Reissues and revisions of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
2. Original issues and revisions of FAA Approved Airplane Flight Manual Supplements.
3. Original issues and revisions of Raytheon Aircraft Service Bulletins.

The above publications will be provided only to the registered owner/operator at the address listed on the FAA Aircraft Registration Branch List or the Raytheon Aircraft Domestic/International Owner's Notification Service List. Further, the owner/operator will receive only those publications pertaining to the registered airplane serial number. For detailed information on how to obtain "Revision Service" applicable to this handbook or other Raytheon Aircraft Service Publications, consult any Ray-

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theon Aircraft Authorized Outlet or refer to the latest revision of Raytheon Aircraft Service Bulletin No. 2001.

Raytheon Aircraft expressly reserves the right to supersede, cancel, and/or declare obsolete, without prior notice, any part, part number, kit, or publication referenced in this handbook.

The owner/operator should always refer to all supplements for possible placards, limitations, emergency, abnormal, normal and other operational procedures for proper operation of the airplane with optional equipment installed.

WARNING

It shall be the responsibility of the owner/operator to ensure that the latest revisions of publications referenced in this handbook are utilized during operation, servicing, and maintenance of the airplane.

SUPPLEMENTS

When a new airplane is delivered from the factory, the handbook delivered with it contains either an STC (Supplemental Type Certificate) Supplement or a Raytheon Aircraft Flight Manual Supplement for every installed item requiring a supplement. If a new handbook for operation of the airplane is obtained at a later date, it is the responsibility of the owner/operator to ensure that all required STC Supplements (as well as weight and balance and other pertinent data) are transferred into the new handbook.

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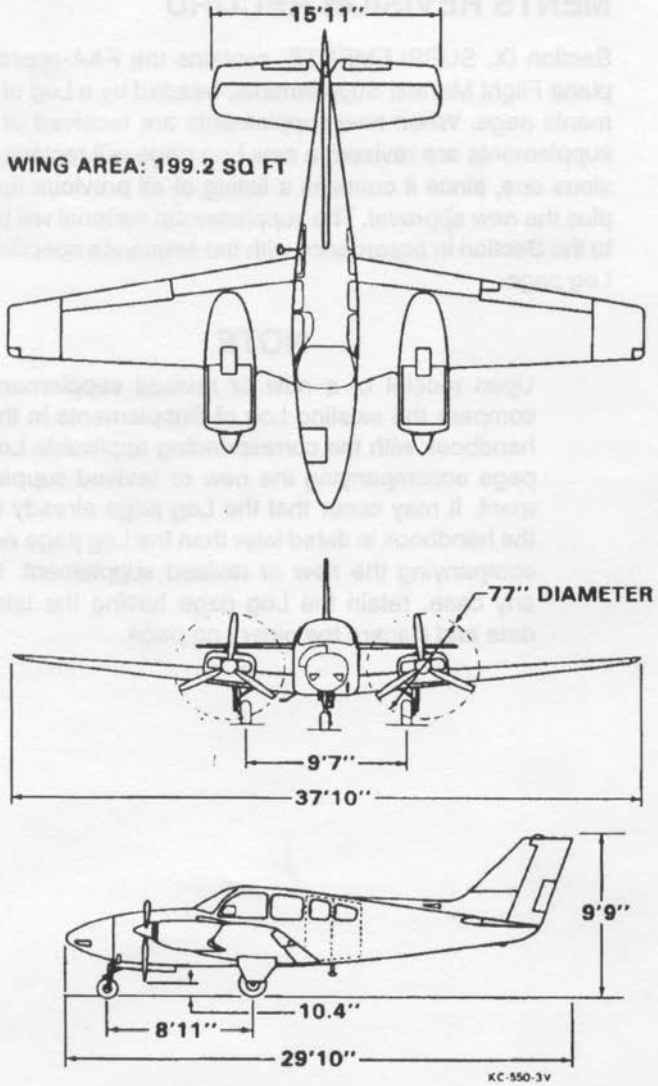
AIRPLANE FLIGHT MANUAL SUPPLEMENTS REVISION RECORD

Section IX, SUPPLEMENTS, contains the FAA-approved Airplane Flight Manual Supplements, headed by a Log of Supplements page. When new supplements are received or existing supplements are revised, a new Log page will replace the previous one, since it contains a listing of all previous approvals, plus the new approval. The supplemental material will be added to the Section in accordance with the sequence specified on the Log page.

NOTE

Upon receipt of a new or revised supplement, compare the existing Log of Supplements in the handbook with the corresponding applicable Log page accompanying the new or revised supplement. It may occur that the Log page already in the handbook is dated later than the Log page accompanying the new or revised supplement. In any case, retain the Log page having the later date and discard the older Log page.

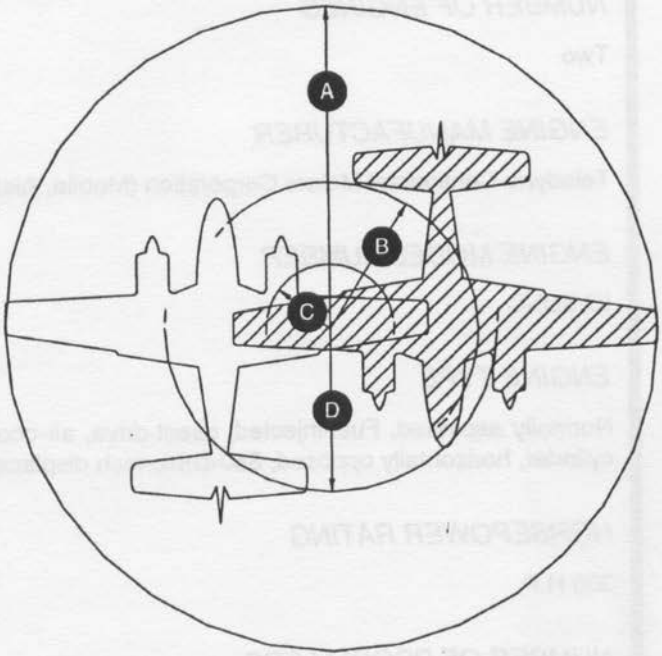
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AIRPLANE THREE-VIEW

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GROUND TURNING CLEARANCE



A	RADIUS FOR WING TIP.....31 FT. 6 IN.
B	RADIUS FOR NOSE WHEEL.....15 FT. 6 IN.
C	RADIUS FOR INSIDE GEAR.....7 FT. 11 IN.
D	RADIUS FOR OUTSIDE GEAR.....17 FT. 6 IN.

TURNING RADII ARE PREDICATED ON THE USE OF PARTIAL BRAKING ACTION AND DIFFERENTIAL POWER.

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DESCRIPTIVE DATA

ENGINES

NUMBER OF ENGINES

Two

ENGINE MANUFACTURER

Teledyne Continental Motors Corporation (Mobile, Alabama)

ENGINE MODEL NUMBER

IO-550-C

ENGINE TYPE

Normally aspirated, Fuel-injected, direct-drive, air-cooled, six-cylinder, horizontally opposed, 550-cubic-inch displacement

HORSEPOWER RATING

300 H.P.

NUMBER OF PROPELLERS

Two

PROPELLER MANUFACTURER

McCauley Propeller (Vandalia, Ohio)
(Refer to supplement HPBE58-2 for airplanes equipped with Hartzell propellers.)

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NUMBER OF BLADES

Three

PROPELLER TYPE

Constant-speed, variable-pitch, three-blade propeller using a 3AF32C512-(X) hub with (X)-82NEA-5 blades.

NOTE

The letters appearing in the place of the (X) represent minor variations in the propeller hub or blades. They do not affect eligibility or interchangeability.

PITCH SETTINGS (30-INCH STATION)

Low ..... 15.2° ± 0.2°
Feathered ..... 82.5° ± 0.5°

PROPELLER DIAMETER

77 inches

FUEL

APPROVED ENGINE FUELS

Aviation Gasoline Grade 100LL (blue)
Aviation Gasoline Grade 100 (green)
Aviation Gasoline Grade 115/145 (purple)

FUEL CAPACITY

STANDARD SYSTEM

Total Capacity ..... 142 Gallons
Total Usable..... 136 Gallons

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OPTIONAL SYSTEMS

Total Capacity . . . . . 172 Gallons
Total Usable . . . . . 166 Gallons

or

Total Capacity . . . . . 200 Gallons
Total Usable . . . . . 194 Gallons

ENGINE OIL

OIL CAPACITY

Total . . . . . 12 Quarts (each engine)

SPECIFICATION

Use MIL-L-22851 Ashless Dispersant Oils meeting the requirements of the latest revision of Teledyne Continental Motors Corporation Specification MHS-24B or current applicable Teledyne Continental Service Bulletin. Refer to Section VIII, HANDLING, SERVICING AND MAINTENANCE for a list of approved oils.

Ambient Air Temperature	Single Viscosity Grade Oil	Multiviscosity Grade Oil
Below 5°C	SAE 30 (max.)	15W-50, 20W-50
Above 5°C	SAE 50 (min.)	15W-50, 20W-50 25W-60

When operating temperatures overlap indicated ranges, use the lighter grade of oil.

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MAXIMUM CERTIFICATED WEIGHTS

Model 58:

Maximum Take-off Weight . . . . . 5500 lbs
Maximum Landing Weight . . . . . 5400 lbs
Maximum Ramp Weight. . . . . 5524 lbs

Model 58A:

Maximum Take-off Weight . . . . . 4990 lbs
Maximum Landing Weight . . . . . 4990 lbs
Maximum Ramp Weight. . . . . 5014 lbs

CABIN AND ENTRY DIMENSIONS

Cabin Length . . . . . 12 ft 7 in.
Cabin Width (max.) . . . . . 3 ft 6 in.
Cabin Height (max.). . . . . 4 ft 2 in.
Fwd Cabin Door . . . . . 37 in. wide x 36 in. high
Aft Utility Door . . . . . 45 in. wide x 35 in. high

CABIN BAGGAGE VOLUMES

Aft Cabin Compartment . . . . . 37 cu ft
Between Spars . . . . . 12 cu ft
Extended Rear Compartment . . . . . 10 cu ft
Nose Compartment . . . . . 18 cu ft

SPECIFIC LOADINGS
(At Maximum Take-off Weight)

Wing Loading . . . . . 27.6 lbs/sq ft
Power Loading . . . . . 9.16 lbs/hp

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SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following glossary is applicable within this handbook.

GENERAL AIRSPEED TERMINOLOGY

CAS — *Calibrated Airspeed* is the indicated airspeed of an airplane corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.

GS — *Ground Speed* is the speed of an airplane relative to the ground.

IAS — *Indicated Airspeed* is the speed of an airplane as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.

KCAS — *Calibrated Airspeed* expressed in knots.

KIAS — *Indicated Airspeed* expressed in knots.

TAS — *True Airspeed* is the airspeed of an airplane relative to undisturbed air, which is the CAS corrected for altitude, temperature, and compressibility.

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V_{MCA} *Air Minimum Control Speed* is the minimum flight speed at which the airplane is directionally controllable as determined in accordance with Title 14 Code of Federal Regulations. The airplane certification conditions include one engine becoming inoperative and windmilling; a 5° bank towards the operative engine; take-off power on operative engine; landing gear up; flaps in take-off position; and most rearward C.G. For some conditions of weight and altitude, stall can be encountered at speeds above V_{MCA} as established by the certification procedure described above, in which event stall speed must be regarded as the limit of effective directional control.

V_{SSE} *Intentional One-Engine-Inoperative Speed* is a speed above both V_{MCA} and stall speed, selected to provide a margin of lateral and directional control when one engine is suddenly rendered inoperative. Intentional failing of one engine below this speed is not recommended.

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

V_F *Design Flap Speed* is the highest speed permissible at which wing flaps may be actuated.

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

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V_{LE}	*Maximum Landing Gear Extended Speed* is the maximum speed at which an airplane 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_{NE}	*Never Exceed Speed* is the speed limit that may not be exceeded at any time.
V_{NO} or V_C	*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_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.

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METEOROLOGICAL TERMINOLOGY

Flight in Icing Conditions — Flight when the OAT is 5°C (41°F) or colder, and in the presence of visible moisture.

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 millibars).

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 of mercury (1013.2 millibars);

(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 (-0.003566°F) per foot and zero above that altitude.

OAT — *Outside Air Temperature* is the free air static temperature, obtained either from the temperature indicator (IOAT) adjusted for compressibility effects, or from ground meteorological sources.

Pressure Altitude — Altitude measured from standard sea-level pressure (29.92 in. Hg/1013.2 millibars) by a pressure (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. Position errors may be obtained from the Altimeter Correction graphs.

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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 winds.

POWER TERMINOLOGY

Cruise Climb	Power recommended for cruise climb.
Economy Cruise	The lowest power setting for which cruise power settings are presented.
Maximum Cruise	The highest power settings recommended for cruise.
Recommended Cruise	Intermediate power settings for which cruise power settings are presented.
Take-off and Maximum Continuous	Highest power rating not limited by time. To be used only for conditions which warrant the use of this rating.

ENGINE CONTROLS AND INSTRUMENTS TERMINOLOGY

Manifold Pressure Gage	An instrument that measures the absolute pressure in the intake manifold of an engine, expressed in inches of mercury (in. Hg).
Mixture Control	This lever, in the idle cut-off position, stops the flow of fuel at the injectors and in the intermediate through the full rich positions, regulates the fuel air mixture.

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ONLY

Propeller Governor — The governor maintains the selected rpm requested by the propeller control lever.

Propeller Control — This lever requests the governor to maintain rpm at a selected value and, in the full decrease rpm position, feathers the propeller.

Throttle Control — The lever used to control the forced introduction of a fuel-air mixture into the intake passages of an engine.

Tachometer — An instrument that indicates the rotational speed of the propeller in revolutions per minute (rpm).

AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

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, feather inoperative propeller and continue takeoff on the remaining engine to a height of 50 feet.

Climb Gradient — The ratio of the change in height during a portion of a climb to the horizontal distance traversed in the same time interval.

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Demonstrated Crosswind Velocity	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 is not limiting.
GPH	U.S. Gallons per hour.
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.

WEIGHT AND BALANCE TERMINOLOGY

Airplane 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.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Basic Empty Weight	Standard empty weight plus optional equipment.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing by the sum of the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.

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ONLY

Jack Points	Points on the airplane identified by the manufacturer as suitable for supporting the airplane for weighing or other purposes.
Leveling Points	Those points which are used during the weighing process to level the airplane.
Loading Condition	That combination of airplane weight and corresponding moment applicable to the various loadings computed for weight and balance purposes.
Maximum Ramp Weight	Maximum weight approved for ground maneuvering (includes weight of start, taxi, and run up fuel).
Maximum Take-off Weight	Maximum weight approved for the start of the take-off run.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
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)
Payload	Weight of occupants, cargo and baggage.
Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.

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ONLY

Station — A location along the airplane fuselage usually given in terms of distance from the reference datum.

Tare — The weight of chocks, blocks, stands, etc., used on the scales when weighing an airplane.

Unusable Fuel — The fuel remaining after consumption of usable fuel.

Useful Load — Difference between Ramp Weight, and Basic Empty Weight.

Usable Fuel — That portion of the total fuel which is avialable for consumption as determined in accordance with applicable regulatory standards.

Zero Fuel Weight — Weight exclusive of usable fuel.

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SECTION II
LIMITATIONS
TABLE OF CONTENTS

SUBJECT	PAGE
Airspeed Limitations	2-3
Airspeed Indicator Markings	2-4
Power Plant Limitations	2-4
Number of Engines	2-4
Engine Manufacturer	2-4
Engine Model Number	2-4
Engine Type	2-5
Engine Operating Limitations	2-5
Fuel Limits	2-5
Approved Engine Fuels	2-5
Fuel Capacity	2-5
Standard Fuel System	2-5
Optional Fuel Systems	2-6
Fuel Management	2-6
Oil Specification	2-6
Number of Propellers	2-6
Propeller Manufacturer	2-6
Number of Blades	2-7
Propeller Type	2-7
Pitch Settings (30-inch Station)	2-7
Propeller Diameter	2-7
Power Plant Instrument Markings	2-7
Oil Temperature	2-8
Oil Pressure	2-8
Fuel Flow	2-8
Manifold Pressure	2-8
Tachometer	2-8
Cylinder Head Temperature	2-8
Miscellaneous Instrument Markings	2-9
Instrument Pressure	2-9

FOR CLASSROOM USE ONLY

SECTION II
LIMITATIONS
TABLE OF CONTENTS (Cont'd)

SUBJECT	PAGE
Deice Pressure Gage	2-9
Propeller Deice Ammeter	2-9
Fuel Quantity	2-9
Weight Limits	2-9
Center of Gravity	2-10
Reference Datum	2-10
Mean Aerodynamic Chord	2-11
Maneuver Limits	2-11
Flight Load Factors (5500 Pounds)	2-11
Minimum Flight Crew	2-11
Maximum Passenger Seating Configuration	2-11
Seating	2-11
Icing Limitations	2-12
Limitations When Encountering Severe Icing Conditions (Required By FAA AD 98-04-24)	2-12
Placards	2-14
Kinds Of Operations	2-31
Kinds Of Operations Equipment List	2-31

FOR CLASSROOM USE ONLY

All airspeeds quoted in this section are indicated airspeeds (IAS) except as noted and assume zero instrument error.

The limitations included in this section have been approved by the Federal Aviation Administration and must be observed in the operation of this airplane.

AIRSPEED LIMITATIONS

SPEED	KCAS	KIAS	REMARKS
Never Exceed (V_{NE})	223	223	Do not exceed this speed in any operation.
Maximum Structural Cruising (V_{NO} or V_C)	195	195	Do not exceed this speed except in smooth air and then only with caution.
Maneuvering (V_A)	156	156	Do not make full or abrupt control movements above this speed.
Maximum Flap Extension/ Extended (V_{FE}) Approach (15°) Full Down (30°)	 152 122	 152 122	Do not extend flaps or operate with flaps extended above this speed.
Maximum Landing Gear Operating/ Extended (V_{LO}/V_{LE})	152	152	Do not extend, retract or operate with gear extended above this speed.
Single-Engine Minimum Control Speed (V_{MCA})	83	84	Minimum speed for directional controllability after sudden loss of engine.
Maximum With Utility Doors Removed	174	174	Utility door removal kit must be installed.

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AIRSPEED INDICATOR MARKINGS*

MARKING	KCAS VALUE OR RANGE	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	73 - 122	74 - 122	Full Flap Operating Range
White Triangle	152	152	Maximum Flap Approach Position 15°
Blue Radial	100	100	Single-Engine Best Rate-of-Climb Speed
Red Radial	83	84	Minimum Single-Engine Control (V_{MCA})
Green Arc	83 - 195	84 - 195	Normal Operating Range
Yellow Arc	195 - 223	195 - 223	Operate with caution, only in smooth air
Red Radial	223	223	Maximum speed for ALL operations

* The airspeed indicator is marked in IAS values.

POWER PLANT LIMITATIONS

NUMBER OF ENGINES

Two

ENGINE MANUFACTURER

Teledyne Continental Motors Corporation (Mobile, Alabama)

ENGINE MODEL NUMBER

IO-550-C

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ENGINE TYPE

Normally aspirated, fuel-injected, direct-drive, air-cooled, six-cylinder, horizontally opposed, 550-cubic-inch displacement, 300 hp.

ENGINE OPERATING LIMITATIONS

Take-off and Maximum
Continuous Power . . . . . Full Throttle, 2700 rpm
Maximum Cylinder Head Temperature . . . . . 238°C
Maximum Oil Temperature . . . . . 116°C
Minimum Take-off Oil Temperature . . . . . 24°C
Minimum Oil Pressure (idle). . . . . 10 psi
Maximum Oil Pressure. . . . . 100 psi

STARTERS (Time For Cranking)

Do not operate starter continuously for more than 30 seconds in any 4-minute period. Allow starter to cool again before cranking.

FUEL LIMITS

APPROVED ENGINE FUELS

100LL (blue)
100 (green)
115/145 (purple)

FUEL CAPACITY

STANDARD FUEL SYSTEM

Total Capacity . . . . . 142 Gallons
Total Usable. . . . . 136 Gallons

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OPTIONAL FUEL SYSTEMS

Total Capacity ..... 172 Gallons
Total Usable ..... 166 Gallons

or

Total Capacity ..... 200 Gallons
Total Usable ..... 194 Gallons

FUEL MANAGEMENT

Do not take off if fuel quantity gages indicate in yellow arc or with less than 13 gallons in each wing fuel system.

The fuel crossfeed system to be used during emergency conditions in level flight only.

Maximum slip duration 30 seconds

OIL SPECIFICATION

Use MIL-L-22851 Ashless Dispersant Oils meeting the requirements of the latest revision of Teledyne Continental Motors Corporation Specification MHS-24B or current applicable Teledyne Continental Service Bulletin. Refer to Section VIII, HANDLING, SERVICING and MAINTENANCE for a list of approved oils.

NUMBER OF PROPELLERS

Two

PROPELLER MANUFACTURER

McCauley Propeller (Vandalia, Ohio)
(Refer to supplement HPBE58-2 for airplanes equipped with a Hartzell propeller.)

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NUMBER OF BLADES

Three

PROPELLER TYPE

Constant-speed, variable-pitch, three-blade propeller using a 3AF32C512-(X) hub with (X)-82NEA-5 blades.

NOTE

The letters appearing in the place of the (X) represent minor variations in the propeller hub or blades. They do not affect eligibility or interchangeability.

PITCH SETTINGS (30-INCH STATION)

Low ..... 15.2° ± 0.2°
Feathered ..... 82.5° ± 0.5°

PROPELLER DIAMETER

77 inches

POWER PLANT INSTRUMENT MARKINGS

OIL TEMPERATURE

Caution (Yellow Radial) ..... 24°C
Normal Operating Range (Green Arc) ..... 24° to 116°C
Maximum (Red Radial) ..... 116°C

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ONLY

OIL PRESSURE

Minimum (Idle) (Red Radial) . . . . . 10 psi
Caution Range (Yellow Arc) . . . . . 10 to 30 psi
Normal Operating Range (Green Arc) . . . . . 30 to 60 psi
Maximum (Red Radial) . . . . . 100 psi

FUEL FLOW

Operating Range (Green Arc) . . . . . 3.0 gph to 30.0 gph
Maximum (Red Radial) . . . . . 30.0 gph

MANIFOLD PRESSURE

Normal Operating Range (Green Arc) . . . . . 15 to 29.6 in. Hg
Maximum (Red Radial) . . . . . 29.6 in. Hg

TACHOMETER

Operating Range (Green Arc) . . . . . 2000 to 2700 rpm
Maximum (Red Radial) . . . . . 2700 rpm

CYLINDER HEAD TEMPERATURE

Operating Range (Green Arc) . . . . . 116° to 238°C
Maximum Temperature (Red Radial) . . . . . 238°C

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MISCELLANEOUS INSTRUMENT MARKINGS

INSTRUMENT PRESSURE

Normal Operating Range (Green Arc) . . . . . 4.3 to 5.9 in. Hg
Red Button Source Failure Indicators

DEICE PRESSURE GAGE

Normal Operating Range (Green Arc) . . . . . 9-20 psi
Maximum Operating Range (Red Radial) . . . . . 20 psi

PROPELLER DEICE AMMETER

Normal Operating Range (Green Arc) . . . . . 14 to 18 amps

FUEL QUANTITY

Yellow Arc . . . . . E to 1/8 Full

WEIGHT LIMITS

Model 58:

Maximum Take-off . . . . . 5500 lbs
Maximum Landing . . . . . 5400 lbs
Maximum Ramp . . . . . 5524 lbs

Model 58A:

Maximum Take-off . . . . . 4990 lbs
Maximum Landing . . . . . 4990 lbs
Maximum Ramp . . . . . 5014 lbs

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ONLY

Maximum Baggage Compartment Weights:

Main Cabin Compartment
(less occupants and equipment) . . . . . 400 lbs

Extended Aft Compartment . . . . . 120 lbs

Nose Compartment
(baggage less equipment) . . . . . 300 lbs

Refer to Section VI, WEIGHT AND BALANCE/EQUIPMENT LIST for additional information.

CENTER OF GRAVITY (LANDING GEAR EXTENDED)

Model 58:

Forward Limits: 74.0 inches aft of datum at 4200 lbs and under, then straight line variation to 78.0 inches aft of datum at gross weight of 5400 lbs (maximum landing weight) and 78.3 inches aft of datum at gross weight of 5500 lbs.

Aft Limit: 86 inches aft of datum at all weights.

Model 58A:

Forward Limits: 74.0 inches aft of datum at 4200 lbs and under, then straight line variation to 76.6 inches aft of datum at gross weight of 4990 lbs.

Aft Limit: 86.0 inches aft of datum at all weights.

REFERENCE DATUM

Datum is 83.1 inches forward of center line through forward jack points.

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MEAN AERODYNAMIC CHORD

MAC leading edge is 67.2 inches aft of datum.
MAC length is 63.1 inches.

MANEUVER LIMITS

This is a normal category airplane. Acrobatic maneuvers, including spins, are prohibited.

FLIGHT LOAD FACTORS (5500 Pounds)

Positive Maneuvering Load Factors:

Flaps Up (0°) . . . . . 3.8 G
Flaps Down (30°) . . . . . 2.0 G

MINIMUM FLIGHT CREW

One (1) Pilot

MAXIMUM PASSENGER SEATING CONFIGURATION

Five (5) passengers and one (1) pilot

SEATING

Do not take off or land with the seat back of an occupied pilot's or copilot's seat in the full back position. The seat back of an occupied optional copilot's full reclining seat and the seat backs of all other occupied seats must be in the most upright position for takeoffs and landings. Occupied aft-facing seats must have headrests fully extended.

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ONLY

ICING LIMITATIONS

Minimum Airspeed During
Icing Conditions ..... 130 knots

Minimum Ambient Temperature for
Operation of Deicing Boots..... -40°C

Pneumatic pumps are time limited for engine operation to 400 hours.

Do not operate the propeller deice system when propellers are static.

Ground use of windshield heat is limited to 10 minutes at a time.

Sustained flight in icing conditions with flaps extended is prohibited except for approach and landings.

LIMITATIONS WHEN ENCOUNTERING SEVERE ICING CONDITIONS (Required By FAA AD 98-04-24)

WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

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ONLY

1. During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.
   a. Unusually extensive ice accumulation on the airframe and windshield in areas not normally observed to collect ice.
   b. Accumulation of ice on the upper surface of the wing, aft of the protected area.
   c. Accumulation of ice on the engine nacelles and propeller spinners farther aft than normally observed.
2. Since the autopilot, when installed and operating, may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.
3. All wing icing inspection lights must be operative prior to flight into known or forecast icing conditions at night. [NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL).]

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ONLY

PLACARDS

On Left Side Panel:

TURN STROBE LIGHTS OFF WHEN TAXING IN VICINITY OF OTHER AIRCRAFT, OR WHEN FLYING IN FOG OR CLOUDS. STANDARD POSITION LIGHTS TO BE USED FOR ALL NIGHT OPERATIONS

TH00C
020329AA.AI

On Left Windshield Post If Electrothermal Heated Windshield Segment is Installed:



On Left Sidewall (58 & 58A):

AIRSPEED LIMITATIONS

MAX. LDG GEAR EXTENDED (NORMAL)
----------152 KTS

MAX. FLAPS EXTENDED (15° DOWN)
----------152 KTS

MAX. FLAPS EXTENDED (NORMAL)
----------122 KTS

MAX. DESIGN MANEUVER SPEED----------156 KTS

MIN. CONTROL SPEED SINGLE ENGINE----------84 KTS

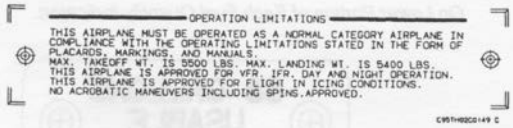
NEVER EXCEED SPEED----------223 KTS

MAX. STRUCTURAL CRUISE SPEED----------195 KTS

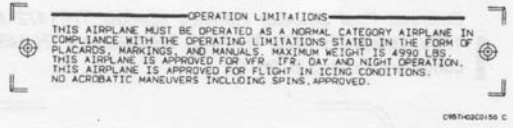
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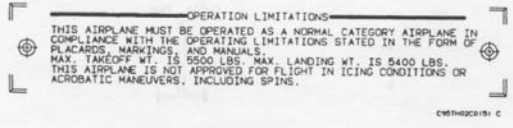
On Upper Left Side Panel (58), Airplanes Approved for Flight In Icing Conditions:



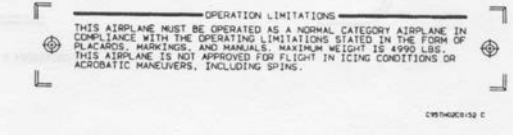
On Upper Left Side Panel (58A), Airplanes Approved for Flight In Icing Conditions:



On Upper Left Side Panel (58), Airplanes Not Approved for Flight In Icing Conditions:



On Upper Left Side Panel (58A), Airplanes Not Approved for Flight In Icing Conditions:



FOR CLASSROOM USE ONLY

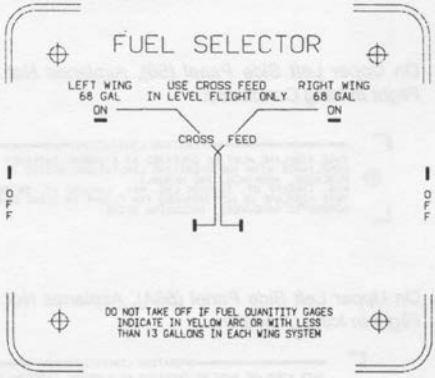
FOR STANDARD 136 GALLON CAPACITY FUEL SYSTEM

On Lower Portion of Each Fuel Quantity Indicator:



C95TH02C0153 C

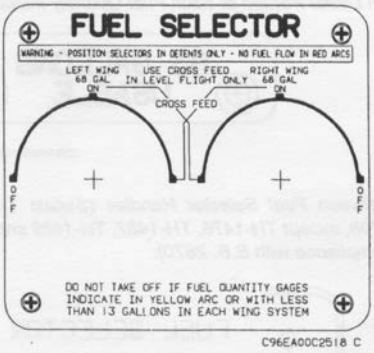
Between Fuel Selector Handles (Serials TH-1472 thru TH-1798, except TH-1476, TH-1487, TH-1489 and TH-1498, not in compliance with S.B. 2670):



TH02C960204 C

FOR CLASSROOM USE
ONLY

Between Fuel Selector Handles (Serials TH-1799 and after and prior serials in compliance with S.B. 2670):



FOR CLASSROOM USE
ONLY

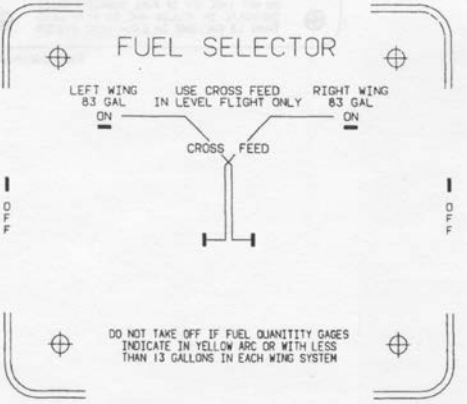
FOR OPTIONAL 166 GALLON CAPACITY FUEL SYSTEM

On Lower Portion of Each Fuel Quantity Indicator:



C95TH02C0155 C

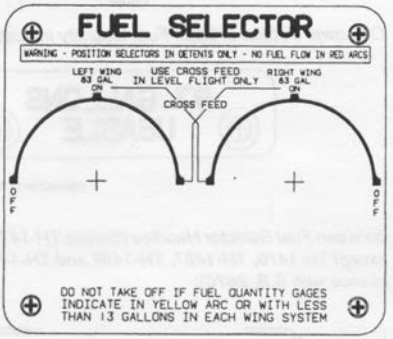
Between Fuel Selector Handles (Serials TH-1472 thru TH-1798, except TH-1476, TH-1487, TH-1489 and TH-1498, not in compliance with S.B. 2670):



TH02C960205 C

FOR CLASSROOM USE
ONLY

Between Fuel Selector Handles (Serials TH-1799 and after and prior serials in compliance with S.B. 2670):



C96EA00C2519 C

FOR CLASSROOM USE
ONLY

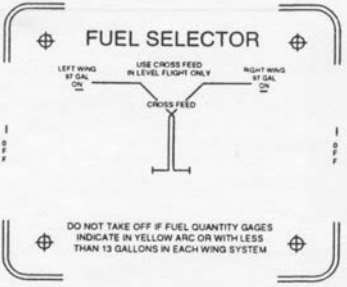
FOR OPTIONAL 194 GALLON CAPACITY FUEL SYSTEM

On Lower Portion of Each Fuel Quantity Indicator:



C95TH02C0157 C

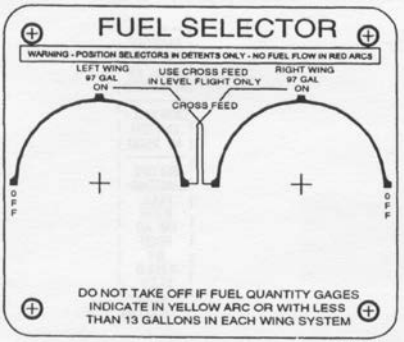
Between Fuel Selector Handles (Serials TH-1472 thru TH-1798 except TH-1476, TH-1487, TH-1489 and TH-1498, not in compliance with S.B. 2670):



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FOR CLASSROOM USE
ONLY

Between Fuel Selector Handles (Serials TH-1799 and after and prior serials in compliance with S.B. 2670):



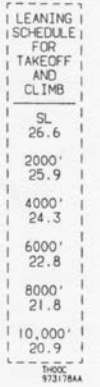
TH00C
020331AA.AI

FOR CLASSROOM USE
ONLY

On Instrument Panel Adjacent To Fuel Flow Gages (TH-1841 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052 (Option 1 or 2)):



On Instrument Panel Adjacent To Fuel Flow Gages (TH-1472 Thru TH-1840 In Compliance With Raytheon Aircraft S.B. 28-3052 (Option 2)):



FOR CLASSROOM USE ONLY

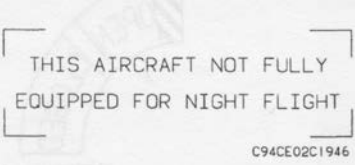
On Inboard Side of Seat Backs for 3rd and 4th Seats:



On Top of Front Spar Carry-Thru Structure Between Front Seats:



On Instrument Panel When Anti-Collision Lights Are Not Installed:



FOR CLASSROOM USE
ONLY

On Emergency Crank Access Cover:



Adjacent To Cabin Door Handle:

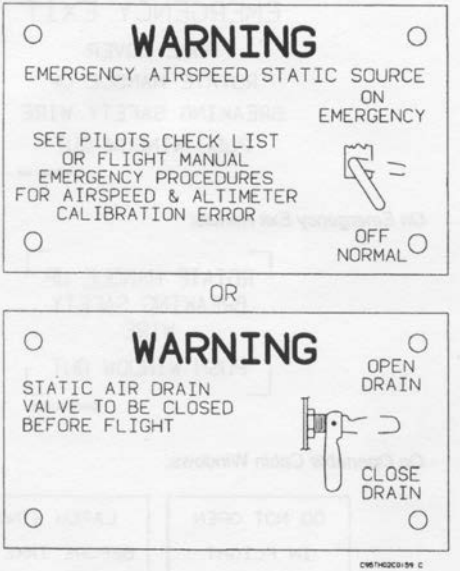


On Inside of Cabin Door Adjacent to Door Handle (Serials TH-1543, TH-1545 and after):

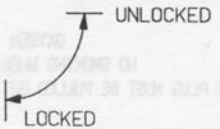


FOR CLASSROOM USE
ONLY

On Lower Sidewall Adjacent to Pilot:



Adjacent to Openable Cabin Window Handles:



C94CE02C1978

FOR CLASSROOM USE
ONLY

On Face of Emergency Exit Latch Cover:

EMERGENCY EXIT
PULL COVER
ROTATE HANDLE UP
BREAKING SAFETY WIRE
PUSH WINDOW OUT

C94CE02C1954

On Emergency Exit Handle:

ROTATE HANDLE UP
BREAKING SAFETY
WIRE
PUSH WINDOW OUT

C94CE02C1955

On Openable Cabin Windows:

DO NOT OPEN	LATCH WINDOW
IN FLIGHT	BEFORE TAKE-OFF

C94CE02C1957

On Oxygen Console:

OXYGEN
NO SMOKING WHEN IN USE
HOSE PLUG MUST BE PULLED OUT TO STOP OXYGEN FLOW

C94E#02C2442

FOR CLASSROOM USE
ONLY

On Each Oxygen Mask Stowage Container:



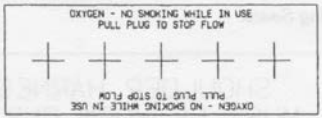
C94CE02C1950

Copilot Outlet:



C94CE02C1951

On Oxygen Manifold:



C94CE02C1952

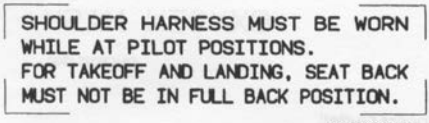
Adjacent to Oxygen Outlet When 5th and 6th Seats Are Installed:



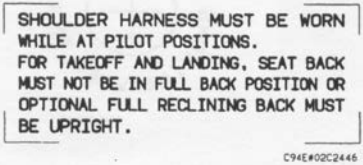
C94CE02C1949

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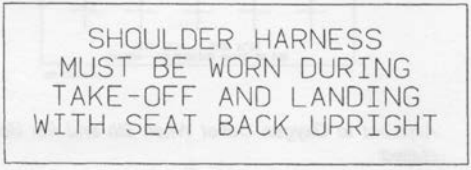
On Window Adjacent to Pilot's Seat:



On Window Adjacent to Copilot's Seat:

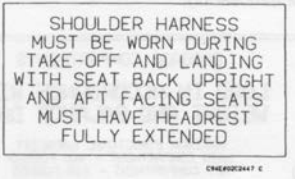


On Windows Adjacent to 5th and 6th Seats and 3rd & 4th Forward Facing Seats:



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On Windows Adjacent to 3rd & 4th Aft Facing Club Seats:



On Inside of Utility Door on Left Sidewall of Utility Compartment, or on Aft Bulkhead:

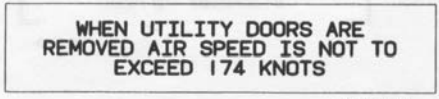


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On Left Sidewall of Utility Compartment or Aft Bulkhead (with utility door removal kit):



On Panel When Utility Doors are Removed:



In Plain View When Nose Baggage Compartment Door is Open:



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KINDS OF OPERATIONS

The Beech Baron 58 is approved for the following types of operations when the required equipment as shown in the KINDS OF OPERATIONS EQUIPMENT LIST, is installed and operable.

1. VFR day and night
2. IFR day and night
3. Icing Conditions

KINDS OF OPERATIONS EQUIPMENT LIST

This airplane may be operated in day or night VFR, day or night IFR, and icing conditions when the required systems and equipment are installed and operable.

The following equipment list identifies the systems and equipment upon which type certification for each kind of operation was predicated. The systems and equipment listed must be installed and operable for the particular kind of operation indicated unless:

1. The airplane is approved to be operated in accordance with a current Minimum Equipment List (MEL) issued by the FAA.

or;

2. An alternate procedure is provided in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for the inoperative state of the listed system or equipment and all limitations are complied with.

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Numbers in the Kinds of Operations Equipment List refer to quantities required to be operative for the specified condition. The list does not include all equipment that may be required by specific operating rules. It also does not include components obviously required for the airplane to be airworthy, such as wings, empennage, engine, etc.

SYSTEM and/or EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	REMARKS and/or EXCEPTIONS
ELECTRICAL POWER						
1. Alternator	2	2	2	2	2	100-ampere alternators are required for flight in icing conditions
2. Alternator Off-Line Annunciator	2	2	2	2	2	
3. Battery System	1	1	1	1	1	
4. Bus Voltmeter	1	1	1	1	1	
5. Loadmeter	2	2	2	2	2	
6. START Annunciator	1	1	1	1	1	
ENVIRONMENTAL						
1. Cabin Heater	0	0	0	0	1	
FLIGHT CONTROLS						
1. Aileron Trim Tab Indicator	1	1	1	1	1	
2. Elevator Trim Tab Indicator	1	1	1	1	1	
3. Rudder Trim Tab Indicator	1	1	1	1	1	
4. Flap System	1	1	1	1	1	
5. Flap Position Indicator Lights	3	3	3	3	3	
6. Stall Warning System	1	1	1	1	1	

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SYSTEM and/or EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	REMARKS and/or EXCEPTIONS
FUEL						
1. Electrically Driven Boost Pump	2	2	2	2	2	
2. Engine Driven Boost Pump	2	2	2	2	2	
3. Fuel Flow Indicator	2	2	2	2	2	
4. Fuel Selector Valve	2	2	2	2	2	
5. Fuel Quantity Indicator	2	2	2	2	2	
ICE AND RAIN PROTECTION						
1. Emergency Static Air System	0	0	1	1	1	
2. Fuel Vent Heater	0	0	2	2	2	
3. Pitot Heater	0	0	1	1	1	
4. Propeller Deice System	0	0	0	0	1	
5. Electrothermal Heated Windshield Segment	0	0	0	0	1	
6. Surface Deice System (Inboard and Outboard Wing, Horizontal and Vertical Stabilizer Deice Boots)	0	0	0	0	1	
7. Stall Warning Heat	0	0	0	0	1	
8. Wing Ice Light	0	0	0	0	1	
LANDING GEAR						
1. Emergency Landing Gear Extension System	1	1	1	1	1	
2. Landing Gear Position Indicator Lights	4	4	4	4	4	
3. Landing Gear Motor and Gearbox	1	1	1	1	1	
4. Landing Gear Warning Horn	1	1	1	1	1	

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SYSTEM and/or EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	REMARKS and/or EXCEPTIONS
5. Gear Up Annunciator	1	1	1	1	1	Serials TH-1543, TH-1545 and after
LIGHTS						
1. AFT DOOR Annunciator	1	1	1	1	1	
2. Cockpit and Instrument Lighting System	0	1	0	1	1	
3. Landing Light	0	1	0	1	1	
4. Navigation Lights	0	3	0	3	3	
5. Upper Anticollision Light	0	1	0	1	1	
6. Lower Anticollision Light	0	1	0	1	1	Serial TH-1842 Only
NAVIGATION INSTRUMENTS						
1. Airspeed Indicator (left)	1	1	1	1	1	
2. Altimeter (left)	1	1	1	1	1	
3. Attitude Indicator	0	0	1	1	1	
4. Clock	0	0	1	1	1	
5. Directional Gyro	0	0	1	1	1	
6. Magnetic Compass	1	1	1	1	1	
7. Outside Air Temperature Indicator	1	1	1	1	1	
VACUUM/PRESSURE SYSTEM						
1. Instrument Air System	0	2	2	2	2	
2. Pressure Gage	0	1	1	1	1	

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SYSTEM and/or EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	REMARKS and/or EXCEPTIONS
ENGINE INDICATIONS						
1. Cylinder Head Temperature Indicator	2	2	2	2	2	
2. Exhaust Gas Temperature Indicator	2	2	2	2	2	
3. Manifold Pressure Indicator	2	2	2	2	2	
4. Tachometer	2	2	2	2	2	
ENGINE OIL						
1. Oil Pressure Indicator	2	2	2	2	2	
2. Oil Temperature Indicator	2	2	2	2	2	
RESTRAINT SYSTEM						
1. Seat Belt (per seat)	1	1	1	1	1	
2. Shoulder Harness (crew compartment)	2	2	2	2	2	

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SECTION III
EMERGENCY PROCEDURES
TABLE OF CONTENTS

SUBJECT	*PAGE*
Emergency Airspeeds (5500 Lbs)	3-4
One-Engine-Inoperative Procedures	3-4
Controllability vs. Airspeed	3-4
Obtaining The Best Single-Engine Climb Performance	3-4
Determining Inoperative Engine	3-5
Engine Failure During Ground Roll	3-5
Engine Failure After Lift-off and in Flight	3-6
Air Start	3-7
Engine Fire	3-9
On The Ground	3-9
In Flight	3-9
Emergency Descent	3-9
Glide	3-10
Landing Emergencies	3-10
Gear-Up Landing	3-10
One-Engine-Inoperatve Landing	3-11
One-Engine-Inoperative Go-Around	3-12
Systems Emergencies	3-12
One-Engine-Inoperative Operation on Crossfeed	3-12
Electrical Smoke or Fire	3-13
Starter Engaged (START Annunciator Illuminated)	3-14
Alternator Failure (LEFT and/or RIGHT ALTR Annunciator)	3-15
Landing Gear Manual Extension	3-16
Landing Gear Retraction After Practice Manual Extension	3-17
Ice Protection	3-17
Surface Deice System	3-17
Electrothermal Propeller Deice System	3-18
Emergency Static Air Source System	3-19

FOR CLASSROOM USE ONLY

SECTION III
EMERGENCY PROCEDURES
TABLE OF CONTENTS (Cont'd)

SUBJECT *PAGE*

Electrothermal Heated Windshield Segment....3-20
Heated Pitot Tube....3-20
Loss Of One Alternator....3-21
Emergency Exits....3-21
Unlatched Door In Flight....3-22
Spins....3-22
Severe Icing Conditions (Alternate Method of Compliance With FAA AD 98-04-24)....3-23

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All airspeeds quoted in this section are indicated airspeeds (IAS) and assume zero instrument error.

NOTE

The following information is presented to enable the pilot to form, in advance, a definite plan of action for coping with the most probable emergency situations which could occur in the operation of the airplane. Where practical, the emergencies requiring immediate corrective action are treated in check list form for easy reference and familiarization. Other situations, in which more time is usually permitted to decide on and execute a plan of action, are discussed at some length.

In order to supply one safe speed for each type of emergency situation, the airspeeds presented were derived at 5500 lbs (5400 lbs for landing).

NOTE

Immediate action procedures are delineated by solid bold type with the remaining procedures following.

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EMERGENCY AIRSPEEDS (5500 LBS)

One-Engine-Inoperative Best Angle-of-Climb (V_{XSE})	95 kts
One-Engine-Inoperative Best Rate-of-Climb (V_{YSE})	100 kts
Air Minimum Control Speed (V_{MCA})	84 kts
One-Engine-Inoperative Enroute Climb	100 kts
Emergency Descent	152 kts
One-Engine-Inoperative Landing (5400 lbs):	
Maneuvering to Final Approach	107 kts
Final Approach (Flaps Down) (30°)	95 kts
Intentional One-Engine-Inoperative Speed (V_{SSE})	88 kts
Maximum Range Glide	115 kts

WARNING

The stall warning horn is inoperative when the battery and alternator switches are turned off.

ONE-ENGINE-INOPERATIVE PROCEDURES

CONTROLLABILITY VS. AIRSPEED

Airspeed is the single most important factor in maintaining airplane control during single engine operations. The airplane can be safely maneuvered or trimmed for normal hands-off operation and sustained in this configuration by the operative engine AS LONG AS SUFFICIENT AIRSPEED IS MAINTAINED.

OBTAINING THE BEST SINGLE-ENGINE CLIMB PERFORMANCE

To obtain best single-engine climb performance with one engine inoperative, the airplane must be banked 3° to 5° into the operative engine while maintaining a constant heading.

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DETERMINING INOPERATIVE ENGINE

The following checks will help determine which engine is inoperative:

1. DEAD FOOT - DEAD ENGINE - The rudder pressure required to maintain directional control will be on the side of the operative engine.
2. THROTTLE - Partially retard the throttle for the engine that is believed to be inoperative; there should be no change in control pressures or in the sound of the engine if the correct throttle has been selected. AT LOW ALTITUDE AND AIRSPEED THIS CHECK MUST BE ACCOMPLISHED WITH EXTREME CAUTION.

Do not attempt to determine the inoperative engine by means of the tachometers or the manifold pressure gages. These instruments often indicate near normal readings.

ENGINE FAILURE DURING GROUND ROLL

1. **Throttles ..... CLOSED**
2. **Braking ..... MAXIMUM**

NOTE

Braking effectiveness is improved if the brakes are not locked.

3. Fuel Selectors ..... OFF
4. Magnetos ..... OFF
5. Alternators ..... OFF
6. Battery ..... OFF

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ENGINE FAILURE AFTER LIFT-OFF AND IN FLIGHT

An immediate landing is advisable regardless of take-off weight. Continued flight cannot be assured if take-off weight exceeds the weight determined from the TAKE-OFF WEIGHT graph. Higher take-off weights will result in a loss of altitude while retracting the landing gear and feathering the propeller. Continued flight requires immediate pilot response to the following procedures.

1. **Landing Gear and Flaps .....UP**
2. **Throttle (inoperative engine) .....CLOSED**
3. **Propeller (inoperative engine) .....FEATHER**
4. **Power (operative engine) .....AS REQUIRED**
5. **Airspeed ..... MAINTAIN SPEED AT ENGINE FAILURE (100 kts MAX.) UNTIL OBSTACLES ARE CLEARED**

NOTE

The most important aspect of engine failure is the necessity to maintain lateral and directional control. If airspeed is below 84 kts, reduce power on the operative engine as required to maintain control. Refer to Section X, SAFETY INFORMATION for additional information regarding pilot technique.

After positive control of the airplane is established:

6. Secure inoperative engine:
   a. Mixture Control .....IDLE CUT-OFF
   b. Fuel Selector ..... OFF
   c. Fuel Boost Pump ..... OFF
   d. Magneto ..... OFF
   e. Alternator ..... OFF
   f. Cowl Flap .....CLOSED

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7. Electrical Load ..... MONITOR
   Maximum load of 60 amps (100 amps on optional alternator) on operating alternator. Reduce electrical load if voltmeter indicates less than 28 volts.

AIR START

CAUTION

The pilot should determine the reason for engine failure before attempting an airstart.

1. Fuel Selector Valve ..... ON
   (feel for detent & visually check)
2. Throttle ..... SET (approximately 1/4 travel)
3. Mixture Control:

(TH-1472 Thru TH-1840, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH, below 5000 ft (1/2 travel above 5000 ft)

4. Fuel Boost Pump ..... LOW
5. Magnetos ..... CHECK ON
6. Propellers:

   With Unfeathering Accumulators:

   a. Propeller Control ..... FORWARD OF FEATHERING DETENT
      (until engine obtains 600 rpm)
   b. Propeller Control ..... BACK TO DETENT
      (to avoid overspeeding)

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c. Starter (if necessary) ....ENGAGE MOMENTARILY
(to accomplish unfeathering)

d. If propeller does not unfeather or engine does not turn, proceed to Without Unfeathering Accumulators procedure.

Without Unfeathering Accumulators:

a. Propeller Control .....FORWARD OF FEATHERING DETENT

b. Starter ..... ENGAGE
(to accomplish unfeathering)

c. If engine fails to run, clear engine by allowing it to windmill with mixture in IDLE CUT-OFF. When engine fires, advance mixture to full rich.

7. After Engine Starts ..... ADJUST THROTTLE, PROPELLER and MIXTURE CONTROLS
8. Fuel Boost Pump..... OFF
(when reliable power has been regained)
9. Alternator..... ON
10. Oil Pressure.....CHECK
11. Warm Up Engine (approximately 1500 rpm and 15 in. Hg)
12. Power .....AS REQUIRED
13. Trim.....AS REQUIRED

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ENGINE FIRE

ON THE GROUND

1. Mixture Controls..... IDLE CUT-OFF
2. Starter (affected engine) .... CONTINUE TO CRANK
3. Fuel Selector Valves ..... OFF
4. Alternators ..... OFF
5. Battery..... OFF
6. Extinguish with fire extinguisher

IN FLIGHT

Shut down the affected engine according to the following procedure and land immediately. Follow the applicable one-engine-inoperative procedures in this section.

1. Fuel Selector Valve ..... OFF
2. Mixture Control..... IDLE CUT-OFF
3. Propeller ..... FEATHERED
4. Fuel Boost Pump ..... OFF
5. Magneto ..... OFF
6. Alternator ..... OFF

EMERGENCY DESCENT

1. Throttles ..... CLOSED
2. Propellers ..... 2700 RPM
3. Airspeed ..... 152 KTS
4. Landing Gear ..... DOWN
5. Flaps ..... APPROACH (15°)

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GLIDE

1. **Propellers.....FEATHERED**
2. **Flaps.....UP (0°)**
3. **Landing Gear.....UP**

NOTE

On Serials TH-1543, TH-1545 and after, the landing gear will not retract unless one of the throttles is in a position corresponding to approximately 15 in. Hg manifold pressure or above.

4. **Airspeed.....115 KTS**
5. Glide Ratio .....2 nautical miles for each 1000 feet of altitude

LANDING EMERGENCIES

GEAR-UP LANDING

NOTE

On Serials TH-1543, TH-1545 and after, the landing gear will not retract unless one of the throttles is in a position corresponding to approximately 15 in. Hg manifold pressure or above.

If possible, choose firm sod. When assured of reaching landing site:

1. Cowl Flaps .....CLOSED
2. Wing Flaps ..... AS DESIRED
3. Throttles .....CLOSED
4. Fuel Selectors..... OFF
5. Mixture Controls .....IDLE CUT-OFF
6. Magnetos ..... OFF

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7. Alternators ..... OFF
8. Battery ..... OFF
9. Wings ..... KEEP LEVEL DURING TOUCHDOWN
10. Get clear of the airplane as soon as possible after it stops.

NOTE

The gear up landing procedures are based on the best available information and no actual tests have been conducted.

ONE-ENGINE-INOPERATIVE LANDING

On final approach and when it is certain that the field can be reached:

1. Landing Gear ..... DOWN
2. Flaps ..... APPROACH (15°)
3. Airspeed ..... 107 KTS
4. Power ..... AS REQUIRED
   (to maintain 800 ft/min rate of descent)

When it is certain there is no possibility of go-around:

5. Flaps ..... DOWN (30°)
6. Airspeed ..... 95 KTS
7. Execute Normal Landing

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ONE-ENGINE-INOPERATIVE GO-AROUND

WARNING

Level flight might not be possible for certain combinations of weight, temperature and altitude. In any event, DO NOT attempt a one-engine-inoperative go-around after flaps have been fully extended.

1. Power ..... MAXIMUM ALLOWABLE
2. Landing Gear ..... UP
3. Flaps ..... UP (0°)
4. Airspeed ..... MAINTAIN 100 KTS MINIMUM

SYSTEMS EMERGENCIES

ONE-ENGINE-INOPERATIVE OPERATION ON CROSSFEED

NOTE

The fuel crossfeed system is to be used only during emergency conditions in level flight only.

Left Engine Inoperative:

1. Right Fuel Boost Pump ..... LOW
2. Left Fuel Selector ..... OFF
3. Right Fuel Selector ..... CROSSFEED
   (feel for detent & visually check)
4. Right Fuel Boost Pump ..... LOW or OFF (as required)

Right Engine Inoperative:

1. Left Fuel Boost Pump ..... LOW
2. Right Fuel Selector ..... OFF

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3. Left Fuel Selector ..... CROSSFEED
(feel for detent & visually check)
4. Left Fuel Boost Pump.....LOW or OFF (as required)

ELECTRICAL SMOKE OR FIRE

Action to be taken must consider existing conditions and equipment installed:

1. **Alternators ..... OFF**
2. **Battery ..... OFF**
3. **Heading Control ..... MAINTAIN USING STANDBY COMPASS IF REQUIRED**

WARNING

Turn Coordinator, HSI, engine instruments (except MAP) and stall warning horn will become inoperative with the battery and alternators off.

4. All Electrical Switches ..... OFF
5. Dissipation of smoke may be aided by the following:
   a. Cabin Air and Cabin Heat Controls ..... FULL FORWARD
   b. Pilot Air and Copilot Air ..... PULL OPEN
   c. Overhead Fresh Air Outlets..... OPEN

If smoke or fire ceases, individually restore electrical equipment to isolate defective equipment.

6. Battery ..... ON
7. Alternators ..... ON
8. Essential Electrical Equipment.... ON ONE AT A TIME

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WARNING

Dissipation of smoke is not sufficient evidence that the fire has been extinguished. If it cannot be visually confirmed that no fire exists, land at the nearest suitable airport.

9. Pilot's Storm Window (if required) ..... OPEN
10. Land as soon as practical.

STARTER ENGAGED (START Annunciator Illuminated)

After engine start, should the starter relay remain engaged, the starter will remain energized and the starter energized annunciator will remain illuminated. Continuing to supply power to the starter will result in eventual loss of electrical power.

Ground Operations:

1. Alternators ..... OFF
2. Battery ..... OFF

NOTE

Electrically driven flight/engine instruments will become inoperative.

3. Do Not Take Off.

Illuminated In Flight After Air Start:

1. Alternators ..... OFF
2. Battery ..... OFF

NOTE

Electrically driven flight/engine instruments and stall warning horn will become inoperative.

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3. Land as soon as practical.

ALTERNATOR FAILURE (LEFT and/or RIGHT ALTR Annunciator)

Illumination of a single ALTR annunciator:

1. Loadmeter (failed side) . .CHECK FOR ZERO OUTPUT

If loadmeter indicates a positive load:

2. A malfunction of the annunciator system is indicated. Continue to use the alternator.

If loadmeter indicates zero load:

3. Alternator (failed side) . . . . . .OFF MOMENTARILY, THEN ON (to reset overvoltage relay)

If annunciator extinguishes and a positive load is indicated:

4. Continue to use the alternator

If the annunciator remains illuminated:

5. Alternator (failed side) . . . . . OFF
6. Nonessential Electrical Equipment. . . . . OFF (Reduce load to single alternator capacity)
7. If Icing Conditions Exist . . . . . EXIT AS SOON AS POSSIBLE

If the other ALTR annunciator illuminates:

8. Repeat steps 1 thru 5 above for the other alternator.

If both alternators remain inoperative:

9. Nonessential Electrical Equipment. . . . . OFF TO CONSERVE BATTERY
10. If Icing Conditions Exist . . . . . EXIT AS SOON AS POSSIBLE
11. Land as soon as practical.

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LANDING GEAR MANUAL EXTENSION

1. Airspeed .....152 KTS OR LESS

NOTE

Manual extension of the gear can be facilitated by first reducing the airspeed as much as practical.

2. LANDING GEAR MOTOR Circuit Breaker (left side circuit breaker panel) .....PULL
3. Landing Gear Handle ..... DOWN
4. Handcrank Handle Cover (at rear of front seats) ..... REMOVE
5. Handcrank.....ENGAGE AND TURN COUNTERCLOCKWISE AS FAR AS POSSIBLE (approximately 50 turns)
6. If the electrical system is operative, a positive gear down indication can be made as follows:
   a. LDG GR WARN and LDG GR POS LTS Circuit Breakers ..... CHECK IN
   b. Landing GEAR DN & LOCKED Lights ..... ILLUMINATED (3 green)
   c. CHECK that the gear warning horn does not sound when either throttle is retarded to idle.
7. Handcrank.....DISENGAGE, THEN STOW
8. Do not move the Landing Gear Handle or reset the LANDING GEAR MOTOR Circuit Breaker.
9. The landing gear should be considered UNLOCKED until the airplane is on jacks and the system has been cycled and checked.

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CAUTION

Do not operate the landing gear electrically with the handcrank engaged. Damage to the mechanism could occur.

CAUTION

The manual extension system is designed to LOWER the landing gear only. DO NOT ATTEMPT TO RETRACT THE GEAR MANUALLY.

LANDING GEAR RETRACTION AFTER PRACTICE MANUAL EXTENSION

After practice manual extension of the landing gear, the gear may be retracted electrically, as follows:

1. Handcrank ..... CONFIRM STOWED
2. LANDING GEAR MOTOR Circuit Breaker ..... IN
3. Landing Gear Handle ..... UP

NOTE

On Serials TH-1543, TH-1545 and after, the landing gear will not retract unless one of the throttles is in a position corresponding to approximately 15 in. Hg manifold pressure or above.

ICE PROTECTION

SURFACE DEICE SYSTEM

Failure of the AUTO Mode:

- Surface Deice Switch ..... MANUAL
  (Do not hold more than 8 seconds.)

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ONLY

NOTE

The boots will inflate only as long as the switch is held in the MAN (manual) position. When the switch is released, the boots will deflate.

Failure of boots to deflate:

1. Pull Surface Deice Circuit Breaker on pilot's sidewall circuit breaker panel.
2. If boots reinflate after Surface Deice Circuit Breaker is reset, use circuit breaker as a manual surface deice switch, following the procedures outlined in Failure of the AUTO Mode.

Failure of AUTO and MAN modes of operation:

- Exit icing conditions as soon as possible.

ELECTROTHERMAL PROPELLER DEICE SYSTEM

An abnormal reading on the Propeller Deice Ammeter indicates need for the following action:

1. Zero Amps:

Check the propeller deice circuit breaker switch. If the circuit breaker portion of the switch has tripped the swich off, wait approximately 30 seconds before resetting. If the switch trips again, do not reset. If the ammeter reads zero and the switch has not tripped, check loadmeters for deflection as the switch is cycled on and off to confirm a malfunction of the ammeter. If loadmeters do not show a deflection, consider the propeller deice system to be inoperative.

2. Zero to 14 Amps:

If the propeller deice system ammeter occasionally or regularly indicates less than 14 amps, operation of the propeller deice system can continue unless serious propeller imbalance results from irregular ice shedding.

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3. 18 to 23 Amps:

   If the propeller deice system ammeter occasionally or regularly indicates 18 to 23 amps, operation of the propeller deice system can continue unless serious propeller imbalance results from irregular ice shedding.

4. More than 23 Amps:

   If the propeller deice system ammeter occasionally or regularly indicates more than 23 amps, the system should not be operated unless the need for propeller deicing is urgent.

NOTE

If the propeller deice system becomes inoperative, leave icing conditions as soon as possible. Cycling of the propeller rpm will assist the propellers in shedding ice.

EMERGENCY STATIC AIR SOURCE SYSTEM

THE EMERGENCY STATIC AIR SOURCE SHOULD BE USED FOR CONDITIONS ANYTIME THE NORMAL STATIC SOURCE HAS BEEN OBSTRUCTED. When the airplane has been exposed to moisture and/or icing conditions (especially on the ground), the possibility of obstructed static ports should be considered. Partial obstruction will result in the rate of climb indication being sluggish during a climb or descent. Verification of suspected obstruction is possible by switching to the emergency system and noting a sudden sustained change in rate of climb. This may be accompanied by abnormal indicated airspeed and altitude changes beyond normal calibration differences.

Whenever any obstruction exists in the Normal Static Air System, or the Emergency Static Air System is desired for use:

1. Emergency Static Air Source . . . . . .EMERGENCY (ON)
   (lower sidewall adjacent to pilot)

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2. For Airspeed Calibration and Altimeter Correction, refer to Section V, PERFORMANCE.

When the Emergency Static Air System is no longer needed:

3. Emergency Static Air Source ..... (NORMAL) OFF

ELECTROTHERMAL HEATED WINDSHIELD SEGMENT

Failure of the heated windshield segment can be confirmed by cycling the WSHLD HEAT switch to OFF, then ON. If a deflection of the loadmeters is not apparent, consider the system inoperative and exit icing conditions. Partial windshield deicing may be accomplished using the defroster. Maximum defrost heat is achieved as follows:

1. Heater Switch ..... HEATER
2. Cabin Air Control ..... PULL AFT (not more than 1/2 travel)
3. Cabin Heat Control ..... PULL OUT
4. Defrost Control ..... PULL OUT
5. Pilot Air Control ..... PUSH IN
6. Copilot Air Control ..... PUSH IN

HEATED PITOT TUBE

Failure of the pitot heat in icing conditions may be noticed by a rapid decrease in indicated airspeed, or some other inappropriate reading for the given flight condition. Leave icing conditions as soon as possible.

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LOSS OF ONE ALTERNATOR

Turn off unnecessary electrical equipment such as excess radios, navigation equipment, and one pitot heat if dual pitot heat is available, so as not to exceed alternator capacity of 60 amps or 100 amps, as indicated on the loadmeter. Leave icing conditions as soon as possible.

EMERGENCY EXITS

The openable windows on the left and right side of the cabin may be used for emergency egress in addition to the cabin door and utility doors. An emergency exit instructions placard is located on each openable Window/Emergency Exit latch cover.

FOR ACCESS PAST THE 3RD AND/OR 4TH SEATS:

1. Rotate red handle located on lower inboard side of seat back.
2. Fold seat back over.

TO OPEN THE OPENABLE WINDOW/EMERGENCY EXIT:

1. Remove cover as indicated by placard in the center of the openable Window/Emergency Exit latch cover.
2. Rotate exposed red latch handle up (as indicated by placard) breaking safety wire, and push window out.

NOTE

Anytime the window has been opened by breaking the safety wire on the red emergency latch handle, the window must be reattached and wired by a qualified mechanic using a single strand of QQ-W-343, Type S, .020 diameter copper wire prior to further airplane operation.

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UNLATCHED DOOR IN FLIGHT

If the cabin door is not properly latched, it may open in flight. The door may trail open approximately 3 inches, but the flight characteristics of the airplane will not be affected, except the rate of climb will be reduced.

1. Maintain control of the airplane.
2. Do not attempt to close the door until after landing.
3. All occupants fasten seatbelts.
4. Land as soon as practical using Normal Procedures.

If occupant can assist from right seat:

5. Hold door during and after landing to prevent it from swinging open.

SPINS

Intentional spins are prohibited. If an unintentional spin is encountered, perform the following procedure IMMEDIATELY - THE LONGER THE DELAY, THE MORE DIFFICULT RECOVERY WILL BECOME. Steps 1 through 3 should be done AGGRESSIVELY and SIMULTANEOUSLY. The full forward position of the control column may be reduced slightly, if required, to prevent the airplane from exceeding a 90° nose down (inverted) attitude.

1. **Control Column . . . . . FULL FORWARD, AILERONS NEUTRAL**
2. **Full Rudder . . . OPPOSITE THE DIRECTION OF SPIN**
3. **Power Levers . . . . . IDLE**
4. **Controls . . . NEUTRALIZE WHEN ROTATION STOPS**
5. **Execute a smooth pullout.**

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NOTE

Federal Aviation Administration Regulations do not require spin demonstration of airplanes of this class; therefore, no spin tests have been conducted. The recovery technique is based on the best available information.

SEVERE ICING CONDITIONS (ALTERNATE METHOD OF COMPLIANCE WITH FAA AD 98-04-24)

THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

- Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
- Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:

These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in Section II, LIMITATIONS for identifying severe icing conditions are observed, accomplish the following:

1. Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.
2. Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.

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3. Do not engage the autopilot.
4. If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.
5. If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.
6. Do not extend flaps when holding in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.
7. If the flaps are extended, do not retract them until the airframe is clear of ice.
8. Report these weather conditions to Air Traffic Control.

FOR CLASSROOM USE
ONLY

SECTION IV
NORMAL PROCEDURES
TABLE OF CONTENTS

SUBJECT *PAGE*

Airspeeds For Safe Operation (5500 Lbs) 4-3
Preflight Inspection 4-4
Before Starting 4-8
Engine Starting 4-9
After Starting and Taxi 4-11
Before Takeoff 4-11
Takeoff 4-13
Climb 4-16
Cruise Climb 4-17
Cruise 4-20
Leaning Using The Exhaust Gas Temperature Indicator (EGT) 4-20
Descent 4-21
Before Landing 4-23
Balked Landing 4-24
After Landing (Clear of Runway) 4-24
Shutdown 4-24
Oxygen System 4-25
Preflight 4-25
In Flight 4-28
After Using Oxygen 4-28
Cold Weather Operation 4-30
Preflight Inspection 4-30
After Starting 4-31
Taxiing 4-31
Before Takeoff 4-31
Takeoff 4-32
Descent 4-32
Landing 4-32
External Power 4-32

FOR CLASSROOM USE ONLY

Section IV
Normal Procedures
TABLE OF CONTENTS (CONT'D)

SUBJECT	PAGE
Starting Engines Using External Power	4-33
Heater Operation	4-33
Windshield Defogging	4-34
Ice Protection Systems	4-35
Before Takeoff	4-35
Surface Deice System	4-35
Electrothermal Propeller Deice	4-35
Fuel Vent Heat, Stall Warning Heat, Pitot Heat, Windshield Heat, and Ice Light	4-36
In Flight	4-36
Surface Deice System	4-37
Electrothermal Propeller Deice	4-37
Electrothermal Heated Windshield Segment	4-37
Pitot Heat, Stall Warning Heat, and Fuel Vent Heat	4-38
After Landing	4-38
Engine Break-In Information	4-38
Simulating One-Engine Inoperative (Zero Thrust)	4-38
Practice Demonstration of V_{MCA}	4-39
Noise Characteristics	4-40

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All airspeeds quoted in this section are indicated airspeeds (IAS) and assume zero instrument error.

AIRSPEEDS FOR SAFE OPERATION (5500 LBS)

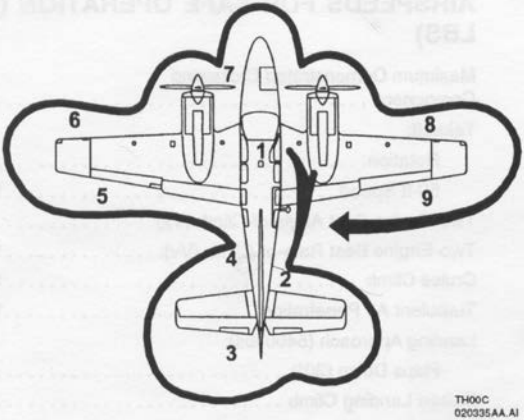
Maximum Demonstrated Crosswind Component	22 kts
Takeoff:	
Rotation	85 kts
50-ft Speed	100 kts
Two-Engine Best Angle-of-Climb (V_X)	92 kts
Two-Engine Best Rate-of-Climb (V_Y)	105 kts
Cruise Climb	136 kts
Turbulent Air Penetration	156 kts
Landing Approach (5400 lbs):	
Flaps Down (30°)	95 kts
Balked Landing Climb	95 kts
Intentional One-Engine-Inoperative Speed (V_{SSE})	88 kts
Air Minimum Control Speed (V_{MCA})	84 kts
Minimum During Icing Conditions	130 kts

NOTE

Refer to all applicable Raytheon Aircraft Supplements and STC Supplements for flight phase procedures for optional equipment installed in the airplane.

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PREFLIGHT INSPECTION



TH00C
020335AA.AI

1. COCKPIT
   a. Control Locks ..... REMOVE AND STOW
   b. Parking Brake ..... SET
   c. All Switches ..... OFF
   d. Trim Tabs ..... SET TO ZERO
   e. Oxygen ..... CHECK

NOTE

A bottle pressure of 1850 psig at 15°C is fully charged (100% capacity). Read duration directly from Oxygen Duration Chart when bottle is full.

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2. RIGHT FUSELAGE
   a. Load Distribution . . . . . CHECK AND SECURED
   b. Static Port . . . . . CLEAR OF OBSTRUCTIONS
   c. ELT (aft fuselage installations) . . . . . ARMED
3. EMPENNAGE
   a. Control Surfaces, Tabs and Deice Boots . . . CHECK (condition, security and attachment)
   b. Tail Cone, Tail Light and Rudder Beacon . . . CHECK
   c. Tie Down . . . . . REMOVE
4. LEFT FUSELAGE
   a. Cabin Air Inlet . . . . . CLEAR OF OBSTRUCTIONS
   b. Cabin Air Outlet . . . . . CLEAR OF OBSTRUCTIONS
   c. Static Port . . . . . CLEAR OF OBSTRUCTIONS
   d. All Antennas and Lower Beacon . . . . . CHECK
5. LEFT WING TRAILING EDGE
   a. Fuel Sump Aft of Wheel Well. . . . . DRAIN
   b. Fuel Vents . . . . . CHECK UNOBSTRUCTED
   c. Flaps . . . . . CHECK GENERAL CONDITION
   d. Aileron . . . . . CHECK (condition and freedom of movement, tab neutral when aileron neutral)
6. LEFT WING LEADING EDGE
   a. Lights and Deice Boots . . CHECK FOR CONDITION
   b. Stall Warning Vane . . . . . CHECK FOR FREEDOM OF MOVEMENT
   c. Fuel . . . . . CHECK QUANTITY/SECURE CAP(S) (always check wing tip tank first (if installed); do not remove inboard cap if fuel is visible in tip tank)
   d. Wing Tip Tank Sump (if installed) . . . . . DRAIN
   e. Fuel Sight Gage . . . . . CHECK
   f. Tie Down, Chocks . . . . . REMOVE

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ONLY

g. Engine Oil..... CHECK QUANTITY/SECURE CAP AND DOOR

h. Engine Cowling and Doors.....CHECK CONDITION AND SECURITY

i. Landing Light (if tip tanks are installed) .....CHECK

j. Engine Air Intake .....REMOVE COVER, EXAMINE FOR OBSTRUCTIONS

k. Propeller..... EXAMINE FOR NICKS, SECURITY, OIL LEAKS, AND CONDITION OF DEICE BOOTS

l. Cowl Flap .....CHECK

m. Wheel Well Doors, Tire, Brake Line and Shock Strut .....CHECK

n. Landing Gear Uplock Roller and Downlock Mechanism .....CHECK (for freedom to rotate)

o. Fuel Drains..... DRAIN

7. NOSE SECTION

a. Wheel Well Doors, Tire and Shock Strut ....CHECK

b. Pitot(s) .....REMOVE COVER, EXAMINE FOR OBSTRUCTIONS

c. Taxi Light .....CHECK

d. Heater Air Inlets .....CLEAR

e. Oxygen.....CHECK

f. Baggage Door .....SECURE

8. RIGHT WING LEADING EDGE

a. Wheel Well Doors, Tire, Brake Line, and Shock Strut.....CHECK

b. Landing Gear Uplock Roller and Downlock Mechanism .....CHECK (for freedom to rotate)

c. Cowl Flap .....CHECK

FOR CLASSROOM USE ONLY

d. Fuel Drains . . . . . .DRAIN
e. Engine Oil . . . . . .CHECK QUANTITY/SECURE CAP AND DOOR
f. Engine Cowling and Doors . . . .CHECK CONDITION AND SECURITY
g. Landing Light (if tip tanks are installed) . . . . . CHECK
h. Propeller . . . . . .EXAMINE FOR NICKS, SECURITY, OIL LEAKS, AND CONDITION OF DEICE BOOTS
i. Engine Air Intake . . . . . REMOVE COVER, EXAMINE FOR OBSTRUCTIONS
j. Fuel Sight Gage . . . . . CHECK
k. Fuel . . . . . CHECK QUANTITY/SECURE CAP(S) (always check wing tip tank first (if installed); do not remove inboard cap if fuel is visible in tip tank)
l. Wing Tip Tank Sump (if installed) . . . . . .DRAIN
m. Tie Down and Chocks . . . . . .REMOVE
n. Lights and Deice Boots . . CHECK FOR CONDITION

9. RIGHT WING TRAILING EDGE

a. Aileron . . . . . .CHECK CONDITION AND FREEDOM OF MOVEMENT
b. Fuel Vents . . . . . .CHECK UNOBSTRUCTED
c. Fuel Sump Aft of Wheel Well. . . . . DRAIN
d. Flaps . . . . . .CHECK GENERAL CONDITION
e. Utility Doors . . . . . .SECURE

NOTE

Check operation of lights if night flight is anticipated.

FOR CLASSROOM USE ONLY

BEFORE STARTING

1. Seats ..... POSITION AND LOCK; SEAT BACKS - POSITION FOR TAKEOFF
2. Seat Belts and Shoulder Harnesses ..... FASTEN AND ADJUST
3. Parking Brake ..... SET
4. All Avionics ..... OFF
5. Oxygen ..... CHECK QUANTITY AND OPERATION
6. Emergency Static Air Source (located on left side panel) .. EMERGENCY POSITION TO DRAIN, THEN RETURN TO NORMAL
7. Landing Gear Handle ..... DOWN
8. Cowl Flaps ..... OPEN
9. Fuel Selectors ..... ON (feel for detents & visually check)
10. All Circuit Breakers, Switches and Equipment Controls ..... CHECK
11. Battery and Alternator Switches ..... ON (if external power is to be used, Alternators - OFF)
12. Fuel Quantity Indicators ..... CHECK QUANTITY (see "Fuel Management" in Section II, LIMITATIONS for Take-off Fuel)
13. Landing Gear Position Lights ..... CHECK
14. Emergency Landing Gear Handcrank ..... STOWED

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ENGINE STARTING

WARNING

When using external power, start the right engine first, since the external power receptacle is on the left nacelle. Disconnect external power before starting left engine.

CAUTION

Do not engage starter for more than 30 seconds in any 4-minute period.

NOTE

When using external power, refer to EXTERNAL POWER procedures in this section.

1. Mixture Control . . . . . FULL RICH
2. Propeller Control . . . . . .HIGH RPM
3. Throttle . . . . . .FULL OPEN
4. Fuel Boost Pump . . . . . .HI
   (until fuel flow peaks, then OFF)
5. Throttle . . . . . CLOSE,
   THEN OPEN APPROXIMATELY 1/2 INCH
6. Magnetos . . . . . .START
   (release to BOTH when engine starts)
7. Throttle (after start) . . . . . .900 to 1000 RPM

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ONLY

NOTE

If the engine is hot, and the ambient temperature is 32°C or above, place mixture control in IDLE CUT-OFF, switch fuel boost pump to HI for 30 to 60 seconds, then OFF. Return mixture control to FULL RICH.

In the event of a balked start (or overprime condition) place mixture control in IDLE CUT-OFF and open the throttle; allow excess fuel to drain from the manifold drain; operate the starter to remove additional fuel. As engine starts, reduce the throttle to idle rpm and place the mixture control in FULL RICH.

8. Oil Pressure ..... 10 PSI WITHIN 30 SECONDS
9. Warm-up ..... 900 to 1000 RPM
10. External Power (if used) ..... DISCONNECT
11. Alternator..... ON (if external power was used)
12. Loadmeters and Voltmeter ....CHECK FOR BATTERY CHARGE
13. Voltmeter..... CHECK FOR 28 VOLTS
14. Red START Annunciator.....CHECK (should be illuminated during start and extinguished after start)

CAUTION

If the red START annunciator is inoperative and the total of both loadmeters exceeds 20 amperes after two minutes at 900 - 1000 rpm, with no additional electrical equipment on, and the indication shows no signs of decreasing, an electrical malfunction is indicated. The battery and both alternator switches should be placed in the OFF position. Do not take off.

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ONLY

15. Using the same procedure, start other engine.

AFTER STARTING AND TAXI

CAUTION

Do not operate engine above 1200 RPM until oil temperature reaches 24°C or above and oil pressure is in the green arc.

1. Avionics ..... ON, AS REQUIRED
2. Exterior Lights ..... AS REQUIRED
3. Brakes ..... RELEASE AND CHECK

BEFORE TAKEOFF

1. Parking Brake..... SET
2. Seat Belts and Shoulder Harnesses ..... CHECK
3. Fuel Boost Pumps .....OFF
   (if ambient temperature is 32°C or above, use LOW pressure boost)
4. All Instruments ..... CHECKED
5. Fuel Indicators ..... CHECK QUANTITY INDICATED

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ONLY

6. Mixture:

(TH-1472 Thru TH-1840, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- ADJUST AS REQUIRED BY FIELD ELEVATION WHEN SETTING FULL POWER FOR TAKEOFF

7. Fuel Selectors ..... CHECK ON
(feel for detents & visually check)
8. Starter Energized Annunciator .....CHECK
(Should be illuminated during start and extinguished after start. If annunciator is inoperative, check loadmeters for proper indication)
9. Throttles ..... 2200 RPM

CAUTION

When checking the minimum governing RPM, do not move the propeller controls past the detent. To do so will allow the propellers to feather, imposing high stresses on the blade shanks and engines.

10. Propeller Controls .....RETARD TO THE DETENT
(Verify RPM decreases to approx. 2000 RPM)
11. Throttles ..... 1700 RPM
12. Magnetos.....CHECK
(variance between individual magnetos should not exceed 50 rpm, max drop 150 rpm)
13. Throttles ..... 1500 RPM
14. Propellers .....FEATHERING CHECK
(do not allow an rpm drop of more than 300 RPM)

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ONLY

15. Throttles ..... IDLE (note RPM)
16. Throttles ..... 900 to 1000 RPM
17. Trim ..... AS REQUIRED FOR TAKE-OFF
18. Flaps ..... CHECK AND SET FOR TAKE-OFF
19. Flight Controls ..... CHECK
    (for proper direction and freedom of movement)
20. Ice Protection Systems ..... AS REQUIRED
21. Windows ..... LOCKED
22. Doors ..... LOCKED
    (On serials TH-1543, TH-1545 and After, Check Cabin Door Lock Indicator - CLOSED)
23. Parking Brake ..... OFF

TAKEOFF

CAUTION

Do not operate above 1200 rpm until oil temperature reaches 24°C or above and oil pressure is in the green.

1. Power ..... SET BEFORE BRAKE RELEASE
   a. Throttles ..... FULL FORWARD
   b. Propellers ..... HIGH RPM
   c. Mixture:

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ONLY

(TH-1472 thru TH-1840, Not In Compliance With Teledyne Continental Motors SID97-3 or Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(The altitude compensating fuel pump will automatically set the following fuel flow.)

FUEL FLOW SCHEDULE
FULL THROTTLE AND 2700 RPM

PRESSURE ALT (feet)	FUEL FLOW (gph/eng)	PRESSURE ALT (feet)	FUEL FLOW (gph/eng
SL	25.7 - 27.6	10,000	18.3 - 20.7
2000	24.2 - 25.9	12,000	16.9 - 19.5
4000	22.7 - 24.5	14,000	15.5 - 18.6
6000	21.2 - 23.2	16,000	14.0 - 17.2
8000	19.7 - 21.9	17,000	13.6 - 17.4

(TH-1472 thru TH-1840, In Compliance With Teledyne Continental Motors SID97-3):

- FULL RICH

(The altitude compensating fuel pump will automatically set the following fuel flow.)

FUEL FLOW SCHEDULE
FULL THROTTLE AND 2700 RPM

PRESSURE ALT (feet)	FUEL FLOW (gph/eng)	PRESSURE ALT (feet)	FUEL FLOW (gph/eng
SL	25.9 - 27.2	10,000	20.1 - 21.5
2000	25.2 - 26.6	12,000	19.3 - 20.6
4000	23.5 - 24.9	14,000	18.4 - 19.8
6000	22.1 - 23.5	16,000	17.5 - 18.9
8000	21.0 - 22.3	17,000	17.3 - 18.7

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ONLY

(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- MANUALLY LEAN TO THE FOLLOWING FUEL FLOW SCHEDULE

FUEL FLOW SCHEDULE
FULL THROTTLE AND 2700 RPM

PRESSURE ALT (feet)	FUEL FLOW (gph/eng)	PRESSURE ALT (feet)	FUEL FLOW (gph/eng
SL	26.6	10,000	20.9
2000	25.9	12,000	20.0
4000	24.3	14,000	19.1
6000	22.8	16,000	18.3
8000	21.8	17,000	18.0

2. Airspeed . . . . . .ACCELERATE TO AND MAINTAIN RECOMMENDED SPEEDS
3. Landing Gear . . . . . RETRACT (when positive rate of climb is established)
4. Airspeed . . . . . .ESTABLISH DESIRED CLIMB SPEED (when clear of obstacles)

FOR CLASSROOM USE ONLY

CLIMB

1. Power ..... SET
   a. Propellers ..... 2700 RPM
   b. Throttles ..... FULL FORWARD
   c. Mixture:

(TH-1472 thru TH-1840, Not In Compliance With Teledyne Continental Motors SID97-3 or Raytheon Aircraft S.B. 28-3052):

- FULL RICH
  (Refer to TAKEOFF in this section, for the appropriate fuel flow schedule.)

(TH-1472 thru TH-1840, In Compliance With Teledyne Continental Motors SID97-3):

- FULL RICH
  (Refer to TAKEOFF in this section, for the appropriate fuel flow schedule.)

(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- MANUALLY LEAN DURING THE CLIMB
  (Refer to TAKEOFF in this section, for the appropriate fuel flow schedule.)

CAUTION

Engine roughness at high altitudes, fuel flow fluctuation, or low fuel flow can occur when climbing on hot days. These conditions can be eliminated by switching the fuel boost pump to LO and manually leaning to the appropriate fuel flow schedule.

For those airplanes with altitude compensating fuel pumps, the fuel flow will continue to lean au-

FOR CLASSROOM USE
ONLY

tomatically after manually making the first adjustment.

CAUTION

Use mixture control to manually enrich fuel flow as needed before switching the fuel boost pump to OFF.

2. Cowl Flaps ..... OPEN
3. Airspeed ..... 105 KTS

CRUISE CLIMB

1. Power ..... SET
   a. Propellers ..... 2500 RPM
   b. Throttles ..... FULL FORWARD
   c. Mixture:

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ONLY

(TH-1472 thru TH-1840, Not In Compliance With Teledyne Continental Motors SID97-3 or Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(The altitude compensating fuel pump will automatically set the following fuel flow.)

FUEL FLOW SCHEDULE
FULL THROTTLE AND 2500 RPM

PRESSURE ALT (feet)	FUEL FLOW (gph/eng)	PRESSURE ALT (feet)	FUEL FLOW (gph/eng
SL	24.6 - 26.3	10,000	17.5 - 20.0
2000	23.2 - 24.2	12,000	16.3 - 19.0
4000	21.8 - 23.4	14,000	14.8 - 18.0
6000	20.3 - 22.3	16,000	13.4 - 17.0
8000	18.8 - 21.2	17,000	12.7 - 16.5

(TH-1472 thru TH-1840, In Compliance With Teledyne Continental Motors SID97-3):

- FULL RICH

(The altitude compensating fuel pump will automatically set the following fuel flow.)

FUEL FLOW SCHEDULE
FULL THROTTLE AND 2500 RPM

PRESSURE ALT (feet)	FUEL FLOW (gph/eng)	PRESSURE ALT (feet)	FUEL FLOW (gph/eng
SL	23.5 - 24.9	10,000	18.3 - 19.7
2000	23.0 - 24.3	12,000	17.5 - 18.9
4000	21.4 - 22.8	14,000	16.7 - 18.1
6000	20.1 - 21.4	16,000	16.0 - 17.3
8000	19.1 - 20.5	17,000	15.7 - 17.1

FOR CLASSROOM USE
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(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- MANUALLY LEAN TO THE FOLLOWING FUEL FLOW SCHEDULE

FUEL FLOW SCHEDULE
FULL THROTTLE AND 2500 RPM

PRESSURE ALT (feet)	FUEL FLOW (gph/eng)	PRESSURE ALT (feet)	FUEL FLOW (gph/eng
SL	24.2	10,000	19.0
2000	23.6	12,000	18.2
4000	22.1	14,000	17.4
6000	20.7	16,000	16.6
8000	19.8	17,000	16.4

CAUTION

Engine roughness at high altitudes, fuel flow fluctuation, or low fuel flow can occur when climbing on hot days. These conditions can be eliminated by switching the fuel boost pump to LO and manually leaning to the appropriate flow schedule.

For those airplanes with altitude compensating fuel pumps, the fuel flow will continue to lean automatically after manually making the first adjustment.

CAUTION

Use mixture control to manually enrich fuel flow as needed before switching the fuel boost pump to OFF.

2. Cowl Flaps . . . . . AS REQUIRED

FOR CLASSROOM USE
ONLY

3. Airspeed ..... 136 KTS
4. Engine Temperatures ..... MONITOR
5. Fuel Boost Pumps ..... AS REQUIRED

CRUISE

See Cruise Tables and MANIFOLD PRESSURE vs. RPM graph in Section V, PERFORMANCE.

1. Cowl Flaps ..... CLOSED
2. Power ..... SET
3. Fuel Boost Pumps ..... AS REQUIRED
4. Mixtures ..... SET USING EGT

LEANING USING THE EXHAUST GAS TEMPERATURE INDICATOR (EGT)

A thermocouple-type exhaust gas temperature (EGT) probe is mounted in the exhaust system of each engine. The probes are connected to indicators in the engine instrument array. The indicators are calibrated in degrees Celsius. The EGT system is used to lean the fuel/air mixture when cruising at 2500 rpm and 25 in. Hg manifold pressure power setting or less in the following manner:

1. Slowly lean the mixture and note the point on the indicator where the EGT temperature peaks. Further lean or enrich the mixture to the desired cruise mixture. Further leaning is referred to as operation on the lean side of peak EGT. Enriching the mixture is referred to as operation on the rich side of peak EGT.

FOR CLASSROOM USE ONLY

2. At lower power settings, the engines may be continuously operated at any mixture setting from FULL RICH to 27°C on the lean side of peak EGT. At higher power settings, as indicated on the MANIFOLD PRESSURE vs RPM graph (in Section V, PERFORMANCE), the engines should not be operated closer to peak EGT than 20°C (rich side or lean side).
3. If engine roughness is encountered operating at lower power settings on the lean side of peak, enrich the mixture slightly for smooth engine operation.
4. Performance Data is presented in Section V, PERFORMANCE for mixture settings of:
   a. Cruise LEAN Mixture - 20°C below peak on the lean side of peak.
   b. Cruise RICH Mixture - 20°C below peak on the rich side of peak.

NOTE

If Cruise RICH Mixture cannot be obtained at higher altitudes, switch the fuel boost pump from OFF to LOW and manually lean to 20°C below peak on the rich side of peak.

5. Changes in altitude and power settings require the peak EGT to be rechecked and the mixture reset.

DESCENT

1. Altimeter . . . . . SET

FOR CLASSROOM USE
ONLY

2. Mixture:

(TH-1472 thru TH-1840, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- ENRICH AS REQUIRED

3. Cowl Flaps ..... CONFIRM CLOSED
4. Flaps ..... AS REQUIRED
5. Power ..... AS REQUIRED
   (Avoid prolonged idle settings. Cylinder Head Temperatures are not to fall below green arc, 116°C.)

NOTE

(TH-1472 thru TH-1840, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

With the mixture control in the FULL RICH position, the Engine Driven Altitude Compensating Fuel Pump will automatically adjust the fuel mixture for the airplane's pressure altitude. i.e. as the airplane descends, the mixture will automatically enrich.

(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

The mixture must be manually enriched as the airplane descends.

6. Windshield Defroster ..... AS REQUIRED
   (ON before descent into warm, moist air)

Recommended Descent Speeds:

16,000 to 13,000 ft ..... 160 kts
Below 13,000 ft ..... 170 kts

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BEFORE LANDING

1. Seat Belts and Shoulder Harnesses ..... FASTENED
2. Seat Backs ..... POSITION FOR LANDING
3. Fuel Selector Valves ..... CHECK ON
   (feel for detent & visually check)
4. Fuel Boost Pumps ..... OFF OR LOW AS PER
   AMBIENT TEMPERATURE
5. Cowl Flaps ..... AS REQUIRED
6. Mixture Controls:

(TH-1472 thru TH-1840, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(TH-1841 and After, and Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- AS REQUIRED BY FIELD ELEVATION

7. Flaps (152 kts max.) ..... APPROACH (15°)
8. Landing Gear (152 kts max.) ..... DOWN
9. Flaps (122 kts max.) ..... FULL DOWN (30°)
10. Airspeed ..... ESTABLISH NORMAL
    LANDING APPROACH SPEED
11. Propellers ..... HIGH RPM

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BALKED LANDING

1. Propellers ..... HIGH RPM
2. Power ..... MAXIMUM ALLOWABLE
3. Airspeed .. BALKED LANDING CLIMB SPEED (95 kts)
4. Flaps ..... UP (0°)
5. Landing Gear ..... UP
6. Cowl Flaps ..... AS REQUIRED

AFTER LANDING (Clear of Runway)

1. Landing and Taxi Lights ..... AS REQUIRED
2. Flaps ..... UP
3. Trim Tabs ..... SET TO ZERO
4. Cowl Flaps ..... OPEN
5. Fuel Boost Pumps ..... AS REQUIRED

SHUTDOWN

1. Parking Brake ..... SET
2. Propellers ..... HIGH RPM
3. Throttles ..... 1000 RPM
4. Fuel Boost Pumps ..... OFF
5. Electrical and Avionic Equipment ..... OFF
6. Mixture Controls ..... IDLE CUT-OFF
7. Magnetos ..... OFF
   (AFTER ENGINES STOP)
8. Alternators ..... OFF
9. Battery ..... OFF
10. Controls ..... LOCKED

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11. If airplane is to be parked for an extended period of time, install wheel chocks and release the parking brake as greatly varying ambient temperatures may build excessive pressures on the hydraulic system.

NOTE

Induction air scoop covers, included in the loose tools and accessories, are to prevent foreign matter from entering the air scoops while the airplane is parked.

OXYGEN SYSTEM

WARNING

NO SMOKING permitted when using oxygen.

PREFLIGHT

1. Plug in all masks that will be used during flight.
   - Verify plug has a green color code.
2. Oxygen Control . . . . . PULL ON
3. Flow Indicator For Each Mask . . . . CHECK FOR FLOW
4. All Occupants . . . . . DON MASK, CHECK FOR PROPER FIT, STOW

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WARNING

Beards and mustaches should be carefully trimmed so that they will not interfere with the proper sealing of an oxygen mask. The fit of the oxygen mask around the beard or mustache should be checked on the ground for proper sealing. Studies conducted by the military and the FAA conclude that oxygen masks do not seal over beards and mustaches.

CAUTION

Since 90% of the system efficiency is determined by the fit of the oxygen mask, make certain the masks fit properly and are in good condition.

5. Oxygen Control . . . . . PUSH OFF
6. Oxygen Duration . . . . . DETERMINE

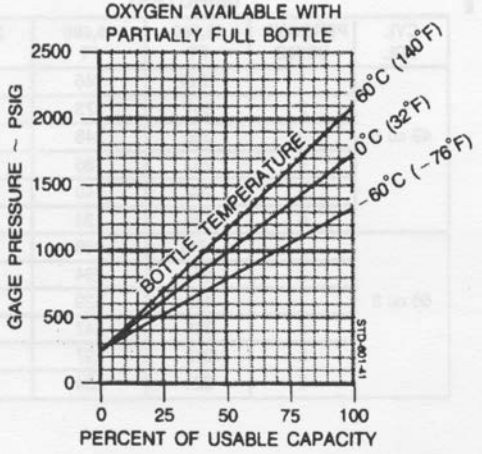
Oxygen duration is computed for a Scott Altitude Compensated System assuming 90% of cylinder volume usable and using Scott oxygen masks rated at 3.0 Standard Liters Per Minute (SLPM).

NOTE

A bottle pressure of 1850 psig at 15°C is fully charged (100% capacity). Read duration directly from the table.

a. Read oxygen pressure from gage.
b. Read the IOAT (Assume IOAT to be equal to BOTTLE TEMPERATURE)
c. Determine the percent of usable capacity from the following graph (e.g., 1100 psi at 0°C = 57%.)

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d. Compute the oxygen duration in minutes from the following table by multiplying the full bottle duration by the percent of usable capacity. For example.

Number Of People On Board	5
Gage Pressure	1500 psi
Bottle Temperature	0°C
Percent Of Usable Capacity	85%
Cylinder Capacity (full)	49 cu ft
Altitude (planned flight)	15,000 ft
Duration (full cylinder)	149 minutes
Duration (85% full)	134 minutes

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OXYGEN DURATION WITH FULL BOTTLE (MINUTES)

CYL VOL	PERSONS USING	12,500 FT	15,000 FT	20,000 FT
49 cu ft	1	1014	746	507
	2	507	373	253
	3	338	248	169
	4	253	186	126
	5	202	149	101
	6	169	124	84
66 cu ft	1	1344	988	672
	2	672	494	336
	3	448	329	224
	4	336	247	168
	5	268	197	134
	6	224	164	112

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IN FLIGHT

The use of oxygen is recommended to be in accordance with current 14 CFR operating regulations.

1. Oxygen Control . . . . . PULL ON SLOWLY
2. Mask . . . . . INSERT FITTING, DON MASK (adjust mask for proper fit)
3. Flow Indicator . . . . . CHECK FOR FLOW

AFTER USING OXYGEN

1. Discontinue use by unplugging mask from outlet.

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NOTE

Closing the oxygen control while in flight is not necessary due to automatic sealing of the outlet when the mask is unplugged. However, it is desirable to shut off supply when not in use.

2. Oxygen Control ..... PUSH CLOSED
(may be accomplished during shutdown)

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COLD WEATHER OPERATION

PREFLIGHT INSPECTION

Verify that the tires are not frozen to the ramp, and that the brakes are free of ice contamination. Deicing or anti-icing solutions may be used on the tires and brakes if they are frozen. Solutions which contain a lubricant, such as oil, must not be used as they will decrease the effectiveness of the brakes.

In addition to the normal exterior preflight inspection, special attention should be given all vents, openings, static ports, control surfaces, hinge points, the stall warning vane, the windshield, and the wing, tail, and fuselage surfaces for accumulations of ice or snow. Removal of these accumulations is necessary prior to takeoff. The removal of frozen deposits by chipping or scraping is not recommended. A soft brush, squeegee, or mop may be used to clear snow that is not adhering to the surfaces. Airfoil contours may be altered by the ice and snow to the extent that their lift qualities will be seriously impaired. Ice and snow on the fuselage can increase drag and weight. Frost that may accumulate on the wing, the tail surfaces, or on any control surface, must be removed prior to flight.

Conditions for accumulating moisture in the fuel tanks are most favorable at low temperatures due to the condensation increase and the moisture that enters as the system is serviced. Therefore, close attention to draining the fuel system will assume particular importance during cold weather.

Use engine oil in accordance with Consumable Materials in Section VIII, HANDLING, SERVICING AND MAINTENANCE. Always pull the propeller through by hand, opposite the direction of rotation several times to clear the engine and "limber up" the cold, heavy oil before using the starter. This will also lessen the load on the battery if external power is not used.

Under very cold conditions, it may be necessary to preheat the engines prior to a start. Particular attention should be given to the oil cooler, engine sump and propeller hub to ensure prope.

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preheat. A start with congealed oil in the system may produce an indication of normal pressure immediately after the start, but then the oil pressure may decrease when residual oil in the engine is pumped back with the congealed oil in the sump. If an engine heater capable of heating both the engine sump and cooler is not available, the oil should be drained while the engine is hot and stored in a warm area until the next flight.

AFTER STARTING

If there is no oil pressure within the first 30 seconds of running, or if oil pressure drops after a few minutes of ground operation shut down and check for broken oil lines, oil cooler leaks, or congealed oil.

NOTE

It is advisable to use external power for starting in cold weather.

During warm-up, monitor engine temperature closely, since it is quite possible to exceed the cylinder head temperature limit in trying to bring up the oil temperature. Exercise the propeller several times to remove cold oil from the pitch change mechanism. The propellers should also be cycled occasionally in flight.

TAXIING

Avoid taxiing through water, slush or muddy surfaces if possible. In cold weather, water, slush or mud splashed onto landing gear mechanisms or control surface hinges may freeze, preventing free movement and resulting in structural damage.

BEFORE TAKEOFF

After completion of the normal Before Takeoff checklist, verify that the airplane is still free of frozen contaminants.

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Ensure the runway is free from hazards such as snow drifts, glazed ice, and ruts.

TAKEOFF

Allow additional take-off distance when snow or slush is on the runway. Extra cycling of the landing gear when above 500 feet AGL may help clear any contamination from the gear system.

DESCENT

During descent and landing, give special attention to engine temperatures, since the engines will have a tendency toward overcooling.

LANDING

Braking and steering are less effective on slick runways. Also, hydroplaning may occur under wet runway conditions at higher speeds. Use the rudder to maintain directional control until the tires make solid contact with the runway surface.

EXTERNAL POWER

The following precautions shall be observed while using external power:

1. Batteries must be installed in the airplane. This protects the voltage regulators and associated electrical equipment from voltage transients (power fluctuations).
2. The airplane has a negative ground system. Connect the positive lead of the external power unit to the positive terminals of the airplane's external power receptacle and the negative lead of the external power unit to the negative terminal of the external power receptacle.
3. In order to prevent arcing, ensure external power unit is off while the connection is being made.

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STARTING ENGINES USING EXTERNAL POWER

1. Alternators, Electrical and Avionics Equipment ....OFF
2. External Power Unit ..... CONNECT
3. External Power Unit . SET OUTPUT (27.0 to 28.5 volts)
4. Battery .....ON
5. External Power Unit .....ON
6. Right Engine .... START (use normal start procedures)
7. External Power Unit .....OFF
   (after engine has been started)
8. External Power Unit ..... DISCONNECT
   (before starting left engine)
9. Alternators .....ON (check right loadmeter)
10. Left Engine ..... START (use normal start procedures)
11. Loadmeters.....CHECK

HEATER OPERATION

NOTE

During preflight, ensure the heater over-temperature switch located on the aft end of the heater is not tripped. Push the switch in to reset, if required.

1. Cabin Vent Air Control ..... ON (½ OR MORE)

NOTE

Heater will not operate if control is pulled aft more than half way.

2. Heater Switch .....ON
3. Heater Blower Switch .....ON

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NOTE

Blower will automatically turn off when the landing gear is retracted.

4. Cabin Heat Control .....PULL AFT TO INCREASE TEMPERATURE
5. Pilot Air, Copilot Air, Defrost Controls ..... PULL OUT TO INCREASE AIR FLOW

To Increase Heat To The Cabin:

6. Pilot Air, Copilot Air, Defrost Controls .....PUSH IN

To Turn Heater Off During Ground Operations:

7. Cabin Heat Control .....PUSH IN
8. Cabin Vent Air.....ON (Full Forward)
9. Heater ..... OFF
10. Heater Blower (a minimum of 2 minutes after turning heater off) ..... OFF

NOTE

Blower must be left on for a minimum of two minutes after turning the heater off to ensure heater does not over temp causing the over-temperature switch to open.

WINDSHIELD DEFOGGING

To Achieve Maximum Windshield Defogging:

1. Heater Switch ..... ON
2. Heater Blower Switch ..... ON
3. Cabin Heat Control .....PULL AFT TO INCREASE TEMPERATURE
4. Pilot Air and Copilot Air Controls.....PUSH IN
5. Defrost Control ..... PULL OUT

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If View Through Windshield Is Insufficient For Landing:

6. Pilot's Storm Window ..... OPEN

ICE PROTECTION SYSTEMS

Airplanes are approved for flight in icing conditions only when properly equipped and operated per the procedures herein and the applicable 14 CFR's (also refer to the Kinds Of Operations Equipment List in Section II, LIMITATIONS).

BEFORE TAKEOFF

SURFACE DEICE SYSTEM

1. Right Throttle ..... 2000 RPM
2. Surface Deice ..... AUTO (up), and RELEASE
   a. Check visually for inflation and 15 psi minimum deice pressure.
   b. Check visually for hold down when cycle is complete.
3. Right Throttle ..... IDLE
4. Left Throttle..... 2000 RPM (Repeat Step 2)
5. Surface Deice ..... MAN (down) UNTIL PRESSURE PEAKS (not more than 8 seconds) Then RELEASE
   a. Check visually for inflation and 15 psi minimum deice pressure.
   b. Check visually for hold down when cycle is complete.
6. Left Throttle..... IDLE

ELECTROTHERMAL PROPELLER DEICE

1. Propeller Deice ..... ON
2. Propeller Deice Ammeter ..... CHECK (14 to 18 amps)
3. Propeller Deice ..... OFF (if not required for takeoff)

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FUEL VENT HEAT, STALL WARNING HEAT, PITOT HEAT, WINDSHIELD HEAT, AND ICE LIGHT

1. Either Alternator ..... OFF
2. Switches ..... CYCLE ON AND OFF, ONE AT A TIME (Note needle deflection on operating alternator's loadmeter. The Stall Warning Heat and Ice Light produce only a slight needle movement on the loadmeter.)
3. Both Alternators..... ON
4. All Heat Switches ... ON (if take-off conditions require)

CAUTION

Prolonged operation on the ground can damage the pitot heat system.

IN FLIGHT

WARNING

Minimum airspeed for flight in icing conditions is 130 KIAS. This applies to all phases of flight except takeoff and landing. If airspeed is decreasing due to ice accumulation, and power or altitude changes fail to curtail airspeed deceleration, alter flight to exit icing conditions before speeds of less than 130 KIAS are reached.

CAUTION

Flight in icing conditions may eventually cause the cowling inlets to become partially blocked, resulting in higher cylinder head temperatures. If cowl flaps are required to keep cylinder head temperatures below the red line, the flight should be altered to leave the icing conditions as soon as possible.

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SURFACE DEICE SYSTEM

NOTE

Deicing pressure gage will indicate approximately 5 psi during periods when boots are not utilized.

When ice accumulates 1/2 to 1 inch:

1. Surface Deice . . . . . .AUTO (up)
2. Deice Pressure:
   a. While Boots Are Inflating . . . . . 9 TO 20 PSI
   b. When Boots Are Fully Inflated . . . . 15 PSI MINIMUM
3. Repeat . . . . . AS REQUIRED

CAUTION

Rapid cycles in succession or cycling before at least 1/2 inch of ice has accumulated may cause the ice to grow outside the contour of the inflated boots and prevent ice removal.

NOTE

Either engine will supply sufficient vacuum and pressure for deice operation.

ELECTROTHERMAL PROPELLER DEICE

- Propeller Deice . . . . . .ON
  (the system may be operated continuously in flight and will function automatically until the switch is turned OFF)

ELECTROTHERMAL HEATED WINDSHIELD SEGMENT

Prior to Entering Icing Conditions:

- Windshield Heat. . . . . .ON

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NOTE

Continuous operation is permitted. If directional gyro is to be reset, turn the Windshield Heat OFF for 15 seconds to allow a stable reading of the standby compass.

PITOT HEAT, STALL WARNING HEAT, AND FUEL VENT HEAT

Switches should be ON prior to entering icing conditions. Switches may be left ON during flight.

AFTER LANDING

- Fuel Vent, Stall Warning, Pitot, Propeller and Windshield Heat ..... OFF

ENGINE BREAK-IN INFORMATION

Refer to Section VII, Systems Description.

SIMULATING ONE-ENGINE-INOPERATIVE (ZERO THRUST)

Use the following power setting (only on one engine at a time) to establish zero thrust. Use of this power setting avoids the difficulties of restarting an engine and preserves the availability of power to counter potential hazards.

The following procedure should be accomplished by alternating small reductions of propeller and then throttle, until the desired setting has been reached.

1. Propeller Lever ..... RETARD TO FEATHER DETENT
2. Throttle Lever ..SET 12 in. Hg MANIFOLD PRESSURE

NOTE

This setting will approximate Zero Thrust using the recommended One-Engine-Inoperative Climb speed.

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PRACTICE DEMONSTRATION OF V_{MCA}

V_{MCA} demonstration may be required for multi-engine pilot certification. The following procedure shall be used at a safe altitude of at least 5000 feet above the ground in clear air only.

WARNING

INFLIGHT ENGINE CUTS BELOW V_{SSE} SPEED OF 88 KTS ARE PROHIBITED.

1. Landing Gear ..... UP
2. Flaps ..... UP
3. Airspeed ..... ABOVE 88 KTS (V_{SSE})
4. Propeller Levers ..... HIGH RPM
5. Throttle (simulated inoperative engine) ..... IDLE
6. Throttle (other engine) ..... MAXIMUM MANIFOLD PRESSURE
7. Airspeed ..... REDUCE APPROXIMATELY 1 KNOT PER SECOND UNTIL EITHER V_{MCA} OR STALL WARNING IS OBTAINED.

CAUTION

Use rudder to maintain directional control (heading) and ailerons to maintain 5° bank towards the operative engine (lateral attitude). At the first sign of either V_{MCA} or stall warning (which may be evidenced by: inability to maintain heading or lateral attitude, aerodynamic stall buffet, or stall warning horn sound) immediately initiate recovery: reduce power to idle on the operative engine and immediately lower the nose to regain V_{SSE}.

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NOISE CHARACTERISTICS

Approach to and departure from an airport should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas. Avoidance of noise-sensitive areas, if practical, is preferable to overflight at relatively low altitudes.

For VFR operations over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas, pilots should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.

NOTE

The preceding recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgement, an altitude of less than 2000 feet is necessary to adequately exercise his duty to see and avoid other airplanes.

Flyover noise level established in compliance with 14 CFR Part 36 is:

Using Maximum Continuous Power:

Full Throttle at 2700 RPM..... 77.6 dB(A)

No determination has been made by the Federal Aviation Administration that the noise level of this airplane is or should be acceptable or unacceptable for operation at, into, or out of any airport.

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SECTION V
PERFORMANCE
TABLE OF CONTENTS

SUBJECT *PAGE*

Introduction To Performance 5-5
Performance In Icing Conditions 5-5
How To Use The Graphs 5-6
Example Calculations 5-7
Conditions 5-7
Pressure Altitude 5-8
Take-Off Weight 5-9
Take-Off Distance 5-9
Flight Time, Block Speed and Fuel Requirement 5-12
Cruise Climb 5-12
Cruise 5-12
Descent 5-15
Reserve Fuel 5-15
Total Fuel Required 5-15
Landing 5-16
Graphs:
Airspeed Calibration - Normal System 5-17
Altimeter Correction - Normal System 5-18
Airspeed Calibration - Emergency System 5-19
Altimeter Correction - Emergency System 5-20
ISA Conversion 5-21
Fahrenheit to Celsius Temperature Conversion 5-22
Stall Speeds - Power Idle 5-23
Manifold Pressure vs RPM 5-24
Take-Off Weight 5-25
Wind Components 5-26
Take-Off Distance 5-27
Accelerate-Stop Distance 5-28
Accelerate-Go Distance 5-29
Take-Off Climb Gradient - One Engine Inoperative 5-30

FOR CLASSROOM USE ONLY

SECTION V
PERFORMANCE
TABLE OF CONTENTS (Cont'd)

SUBJECT *PAGE*

Climb - Two Engine 5-31
Climb - One Engine Inoperative 5-32
Service Ceiling - One-Engine-Inoperative 5-33
Time, Fuel, and Distance to Cruise Climb 5-34

Tables:

Maximum Cruise Power
25 in. Hg @ 2500 RPM, Rich 5-36
Recommended Cruise Power
25 in. Hg @ 2500 RPM, Lean 5-37
23 in. Hg @ 2300 RPM, Rich 5-38
23 in. Hg @ 2300 RPM, Lean 5-39
25 in. Hg @ 2100 RPM, Rich 5-40
25 in. Hg @ 2100 RPM, Lean 5-41
21 in. Hg @ 2100 RPM, Rich 5-42
Economy Cruise Power
21 in. Hg @ 2100 RPM, Lean 5-43

Graphs:

Cruise Speeds - Rich 5-44
Cruise Speeds - Lean 5-45
Range Profile - 136 Gallons - Rich 5-46
Range Profile - 136 Gallons - Lean 5-47
Endurance Profile - 136 Gallons - Rich 5-48
Endurance Profile - 136 Gallons - Lean 5-49
Range Profile - 166 Gallons - Rich 5-50
Range Profile - 166 Gallons - Lean 5-51
Endurance Profile - 166 Gallons - Rich 5-52
Endurance Profile - 166 Gallons - Lean 5-53
Range Profile - 194 Gallons - Rich 5-54
Range Profile - 194 Gallons - Lean 5-55
Endurance Profile - 194 Gallons - Rich 5-56

FOR CLASSROOM USE ONLY

SECTION V
PERFORMANCE
TABLE OF CONTENTS (Cont'd)

SUBJECT *PAGE*

Endurance Profile - 194 Gallons - Lean 5-57
Holding Time 5-58
Time, Fuel, and Distance to Descend 5-59
Climb - Balked Landing 5-60
Landing Distance 5-61

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Except as noted, all airspeeds quoted in this section are indicated airspeeds (IAS) and assume zero instrument error.

INTRODUCTION TO PERFORMANCE

The graphs and tables in this section present performance information for flight planning at various parameters of weight, power, altitude and temperature. Examples have been presented on all performance graphs.

NOTE

Performance with a gross weight of 4990 lbs (Beech Baron 58A) will be equal to or better than that of the higher gross weight Beech Baron 58.

PERFORMANCE IN ICING CONDITIONS

1. On a clean airplane (no ice build-up) stall speeds are increased 4 knots in all configurations when surface deice boots are inflated.
2. Residual ice on the airplane can disrupt the airflow over lifting surfaces and may cause an increase in the stall speeds and a change in the amount of warning provided by the stall warning vane.
3. The wings, stabilizers, and all control surfaces must be cleared of frost, ice or snow prior to takeoff.
4. Ice accumulations on unprotected surfaces will decrease climb rates, cruise speeds, and range. Therefore, flight planning should be accomplished for altitudes where adequate performance margins exist.
5. Two-engine climb performance at maximum continuous power will be reduced due to the 130 KIAS minimum climb speed.
6. The minimum recommended holding speed in icing conditions is 140 KIAS.

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HOW TO USE THE GRAPHS

1. In addition to presenting the answer for a particular set of conditions, the example on the graph also presents the order in which the various scales on the graph should be used. For instance, if the first item in the example is OAT, then enter the graph at the known OAT and proceed to the remaining item(s) in the order given in the example.
2. The reference lines indicate where to begin following the guidelines. Always project to the reference line first, then follow the guidelines to the next known item by maintaining the same PROPORTIONAL DISTANCE between the guideline above and guideline below the projected line. For instance, if the projected line intersects the reference line in the ratio of 30% down/70% up between the guidelines, then maintain this same 30%/70% relationship between the guidelines all the way to the next known item or answer.
3. The associated conditions define the specific conditions from which performance parameters have been determined. They are not intended to be used as instructions; however, performance values determined from charts can only be achieved if the specified conditions exist.
4. Indicated airspeeds (IAS) were obtained by using the AIRSPEED CALIBRATION-NORMAL SYSTEM graph.
5. The full amount of usable fuel is available for all approved flight conditions.

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EXAMPLE CALCULATIONS

The calculations for flight time, block speed and fuel required for a proposed flight are listed below:

CONDITIONS

At Departure:

Outside Air Temperature..... 15°C (59°F)
Field Elevation..... 5333 ft
Altimeter Setting .....29.60 in. Hg
Runway 26L Length .....10,004 ft
Wind ..... 300° at 13 kts

At Destination:

Outside Air Temperature..... 25°C (77°F)
Field Elevation..... 3605 ft
Altimeter Setting .....29.56 in. Hg
Wind ..... 190° at 12 kts
Runway 22 Length .....13,502 ft

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ROUTE SEGMENT	AVERAGE MAGNETIC COURSE	AVERAGE MAGNETIC VARIATION	DIST NM	WIND AT 11,500 FEET DIR/KTS	OAT 11,500 FEET °C
LEG A	155°	12°E	51	010°/30	-5
LEG B	153°	12°E	40	010°/30	-5
LEG C	135°	12°E	74	100°/20	0
LEG D	132°	11°E	87	200°/20	9
LEG E	126°	10°E	70	200°/20	10

PRESSURE ALTITUDE

- To determine pressure altitude at departure and destination airports, add 1000 ft to field elevation for each 1.00 in. Hg below 29.92, and subtract 1000 ft from field elevation for each 1.00 in. Hg above 29.92.
- Pressure Altitude at Departure:

  29.92 - 29.60 = 0.32 in. Hg
  0.32 x 1000 = 320 ft
- The Pressure Altitude at the departure airport is 320 ft above the field elevation.

  5333 + 320 = 5653 ft

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Pressure Altitude at Destination:

29.92 - 29.56 = 0.36 in. Hg

0.36 x 1000 = 360 ft

The Pressure Altitude at the destination airport is 360 ft above the field elevation.

3605 + 360 = 3965 ft

NOTE

For flight planning, the difference between cruise altitude and cruise pressure altitude has been ignored.

TAKE-OFF WEIGHT

Maximum Allowable Take-off Weight = 5500 lbs

Ramp Weight = 5500 + 24 = 5524 lbs

NOTE

Fuel for start, taxi and run-up is normally 24 lbs.

Enter the Take-Off Weight graph at 5653 ft pressure altitude and 15°C, to determine the maximum take-off weight to achieve a positive one-engine-inoperative rate-of-climb at lift-off.

Take-off Weight = 4870 lbs

TAKE-OFF DISTANCE

Enter the Take-Off Distance graph at 15°C, 5653 ft pressure altitude, 5500 lbs, and 10 knots headwind component:

Ground Roll . . . . . 2200 ft

Total Distance over 50-ft Obstacle . . . . . 3775 ft

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Enter the Accelerate-Stop graph at 15°C, 5653 ft pressure altitude, 5500 lbs, and 10 knots headwind component:

Accelerate-Stop Distance..... 3960 ft

NOTE

Since 3960 ft is less than the available field length of 10,004 ft, the accelerate-stop procedure can be performed at any weight.

Take-off at 5500 lbs can be accomplished. However, if an engine failure occurs before becoming airborne, the accelerate-stop procedure must be performed.

The following example assumes the airplane is loaded so that the take-off weight is 4700 lbs.

Although not required by regulations, information has been presented to determine the take-off weight, field requirements and take-off flight path assuming an engine failure occurs during the take-off procedure. The following illustrates the use of these graphs.

Enter the Accelerate-Go graph at 15°C, 5653 ft pressure altitude, 4700 lbs, and 10 knots headwind component:

Total Distance Over 50-ft Obstacle .....9400 ft

Ground Roll Distance..... 3760 ft

Enter the graph for Take-Off Climb Gradient - One-Engine-Inoperative at 15°C, 5653 ft pressure altitude, and 4700 lbs:

Climb Gradient.....2.6%

A 2.6% climb gradient is 26 ft of vertical height per 1000 ft of horizontal distance.

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ONLY

NOTE

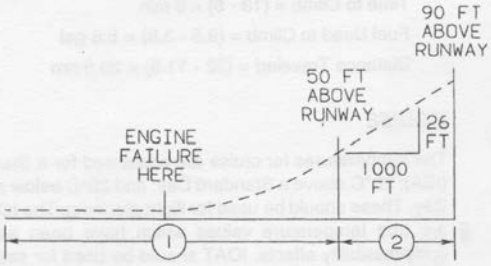
The Take-off Climb Gradient - One-Engine-Inoperative graph assumes zero wind conditions. Climbing into a headwind will result in higher angles of climb, and hence, better obstacle clearance capabilities.

Calculation of horizontal distance to clear an obstacle 90 ft above the runway surface:

Horizontal distance used to climb from 50 ft to 90 ft = (90-50) X (1000 ÷ 26) = 1539 ft

Total Distance = 9400 + 1539 = 10,939 ft

The above results are illustrated as follows:



① ACCELERATE - GO TAKE-OFF DISTANCE = 9400 FEET

② DISTANCE TO CLIMB FROM 50 FT TO 90 FT ABOVE RUNWAY = 1539 FEET

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FLIGHT TIME, BLOCK SPEED AND FUEL REQUIREMENT

CRUISE CLIMB

Enter the TIME, FUEL AND DISTANCE TO CRUISE CLIMB Graph at the takeoff temperature of 15°C and trace up to 5653 ft pressure altitude. Then trace right to 5500 lbs. and then down to obtain the time, fuel, and distance to climb from S.L to 5653 ft. Repeat the process starting with the cruise temperature of -5°C, cruise altitude of 11,500 ft, and initial cruise weight of 5500 lbs. to obtain the time, fuel and distance to climb from S.L. to 11,500 ft. Subtract the former values from the latter values to obtain the time, fuel and distance to climb from 5653 ft to 11,500 ft.

Time to Climb = (13 - 5) = 8 min

Fuel Used to Climb = (9.5 - 3.9) = 5.6 gal

Distance Traveled = (32 - 11.5) = 20.5 nm

CRUISE

The temperatures for cruise are presented for a Standard Day (ISA); 20°C above a Standard Day; and 20°C below a Standard Day. These should be used for flight planning. The IOAT values are true temperature values which have been adjusted for compressibility effects. IOAT should be used for setting cruise power while enroute.

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Enter the ISA CONVERSION Graph at 11,500 ft and the true temperature for the route segment:

ROUTE SEGMENT	OAT	ISA CONDITION
LEG A-B	-5°C	ISA + 3°C
LEG C	0°C	ISA + 8°C
LEG D	9°C	ISA + 17°C
LEG E	10°C	ISA + 18°C

Enter the MAXIMUM CRUISE POWER table at 10,000 ft and at 12,000 ft at ISA and ISA + 20°C:

ALTITUDE FEET	TEMPERATURE			
	ISA		ISA + 20°C	
	FUEL FLOW PER ENG GAL/HR	TAS KNOTS	FUEL FLOW PER ENG GAL/HR	TAS KNOTS
10,000	14.8	198	14.3	199
12,000	13.8	195	13.3	196

Interpolate for 11,500 ft and the temperature for the appropriate route segment. Results of the interpolations are:

ROUTE SEGMENT	ISA CONDITION	FUEL FLOW PER ENG GAL/HR	TAS KNOTS
LEG A-B	ISA + 3°C	14.0	196
LEG C	ISA + 8°C	13.9	196
LEG D	ISA + 17°C	13.6	197
LEG E	ISA + 18°C	13.6	197

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Time and fuel used are calculated as follows:

Time = Distance ÷ Ground Speed

Fuel Used = (Distance ÷ Ground Speed) x Fuel Flow

Results are:

ROUTE SEGMENT	DISTANCE NM	EST GROUND SPEED KNOTS	TIME AT CRUISE ALTITUDE HRS:MIN	FUEL USED CRUISE GAL
LEG A	*30.5	224	:08.2	3.8
LEG B	40.0	223	:10.8	5.0
LEG C	74.0	182	:24.4	11.3
LEG D	87.0	186	:28.1	12.7
LEG E	*22.0	188	:07.0	3.2
TOTAL	253.5		1:19	36.0

* Distance required to climb or descend has been subtracted from segment distance.

DESCENT

Enter the TIME, FUEL, and DISTANCE TO DESCEND Graph at the cruise pressure altitude of 11,500 ft and trace right to the reference line. Then trace down to obtain the time, fuel, and distance to descend to S.L. Repeat the process starting with destination field pressure altitude of 3965 ft. to obtain the time, fuel and distance to descend from 3965 feet to S.L. Subtract the former values from the latter values to obtain the time, fuel and distance to descend from 11,500 ft. to 3695 ft.

Time to Descend = (23 - 7.8) = 15.2 min

Fuel Used to Descend = (8.7 - 2.8) = 5.9 gal

Descent Distance = (70 - 22) = 48 NM

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TIME - FUEL - DISTANCE SUMMARY

ITEM	TIME HRS:MINS	FUEL GAL	DISTANCE NM
Start, Runup, Taxi, and Take-off acceleration	0:00	4.5	0
Climb	0:08.0	5.6	20.5
Cruise	1:19.0	36.0	253.5
Descent	0:15.2	5.9	48.0
Total	1:42.2	52.0	322.0

Total Flight Time: 1 hour, 42.2 min

Block Speed: 322 NM ÷ 1 hour, 42.2 min = 189 kts

RESERVE FUEL

Enter the ECONOMY CRUISE POWER table at ISA and ISA + 20°C at 10,000 ft and 12,000 ft. Interpolate to find the Fuel Flow at 11,500 ft at ISA + 18°C:

Total Fuel Flow . . . . . .17.4 gph

Reserve Fuel (45 minutes) (17.4 gph) . . . . . 13.1 gal

TOTAL FUEL REQUIRED

Total Fuel Required = Calculated Fuel Usage + Reserve Fuel

Total Fuel Required

= 52.0 + 13.1 = 65.1 gal

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LANDING

The estimated landing weight is determined by subtracting the fuel required for the trip from the ramp weight:

Assumed Ramp Weight ..... 5524 lbs
Estimated Fuel (52.0 gal at 6 lbs/gal)..... 312 lbs
Estimated Landing Weight (5524 - 312)..... 5212 lbs

NOTE

For the Landing Distance example, a 5039-lb weight and a 9.5-kt headwind component were assumed.

Enter the LANDING DISTANCE graph at 25°C, 3965 ft pressure altitude, 5039 lbs landing weight an 9.5 kts headwind component:

Ground Roll ..... 1450 ft
Total Distance over 50-ft. Obstacle ..... 2500 ft
Approach Speed ..... 91 kts

BALKED LANDING CLIMB PERFORMANCE

NOTE

For the Balked Landing Climb performance example, a weight of 5166 lbs was assumed.

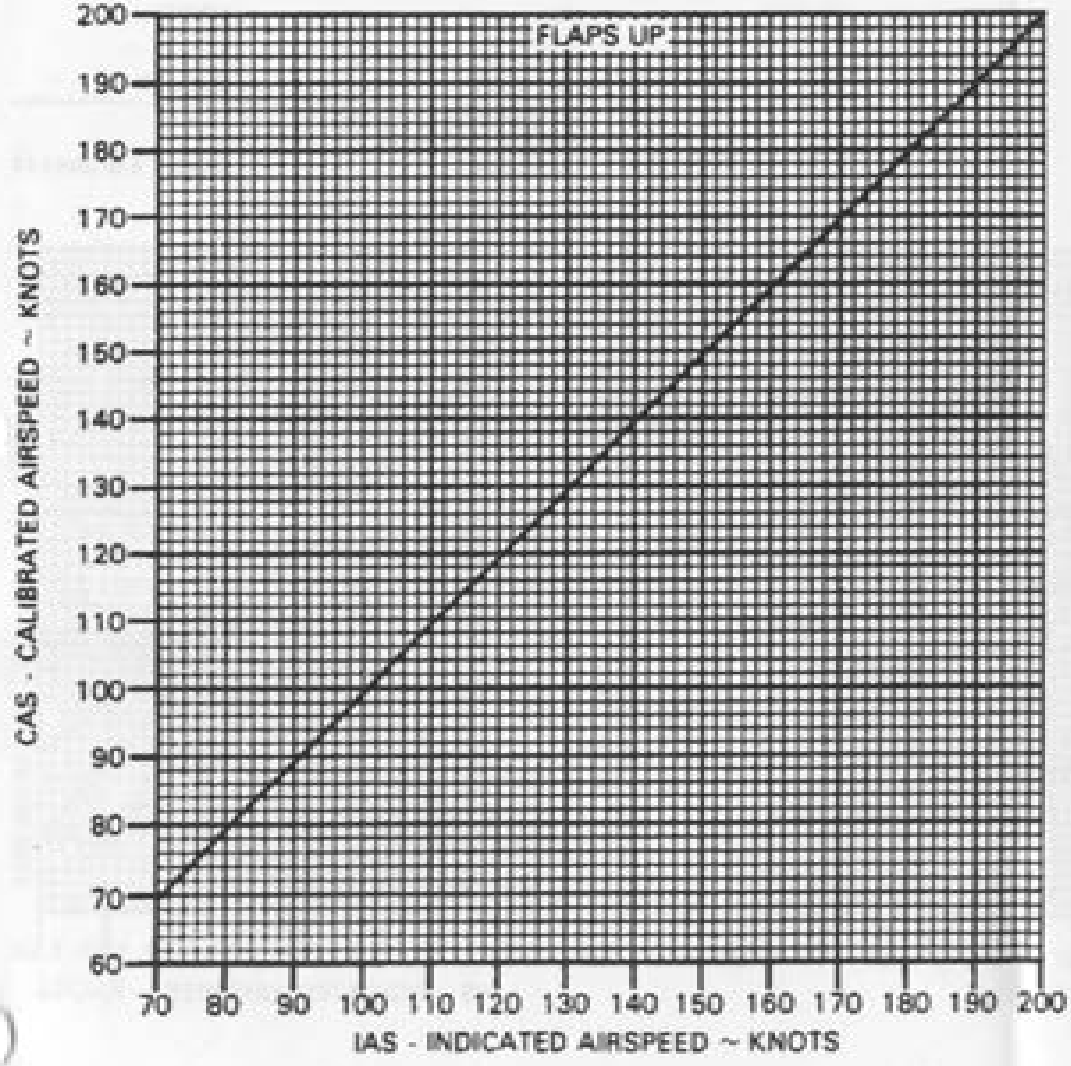
Enter the CLIMB-BALKED LANDING graph at 25°C, 3965 ft pressure altitude and 5166 lbs:

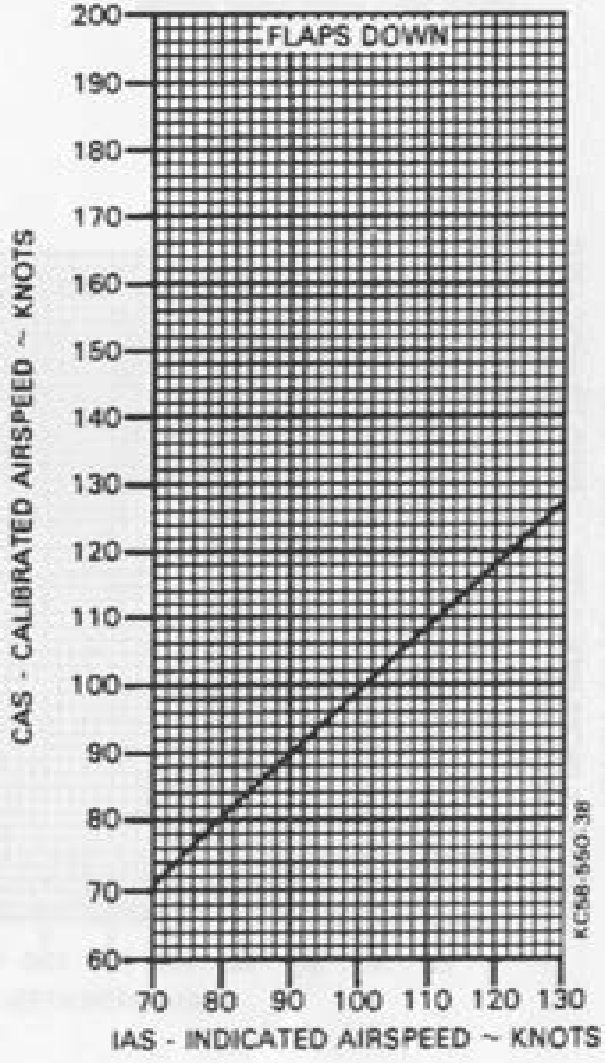
Rate-of-Climb..... 765 ft/min
Climb Gradient..... 6.9%

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AIRSPEED CALIBRATION — NORMAL SYSTEM

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR



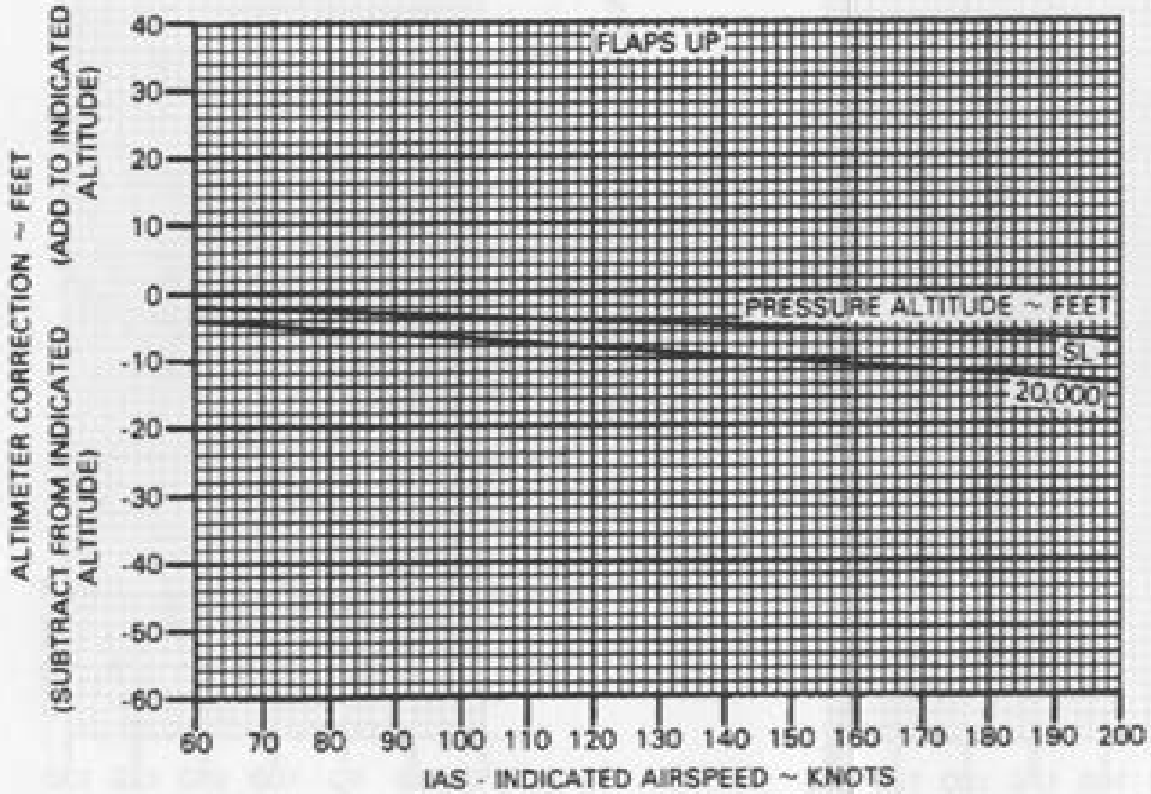


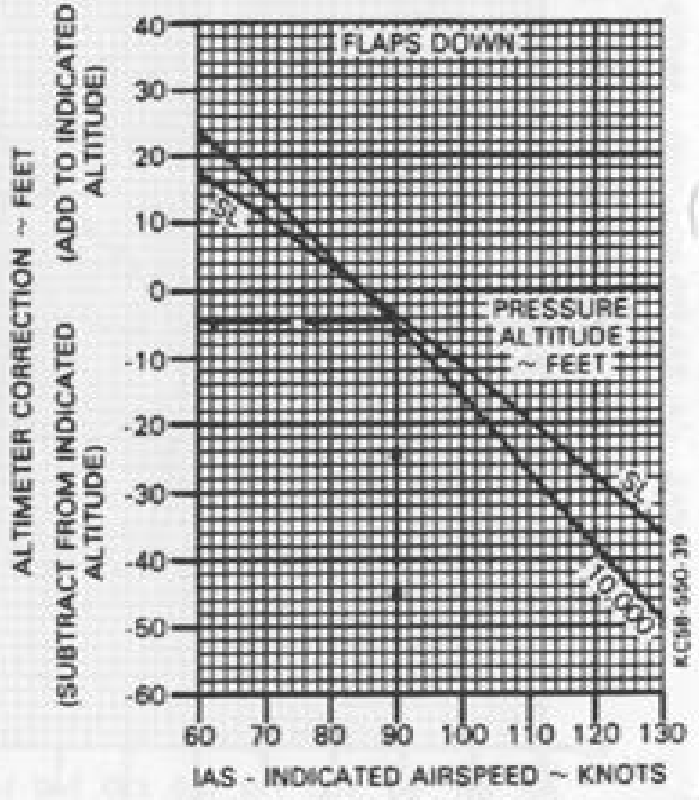
ALTIMETER CORRECTION — NORMAL SYSTEM

NOTE: INDICATED ALTITUDE AND INDICATED AIRSPEED ASSUME ZERO INSTRUMENT ERROR

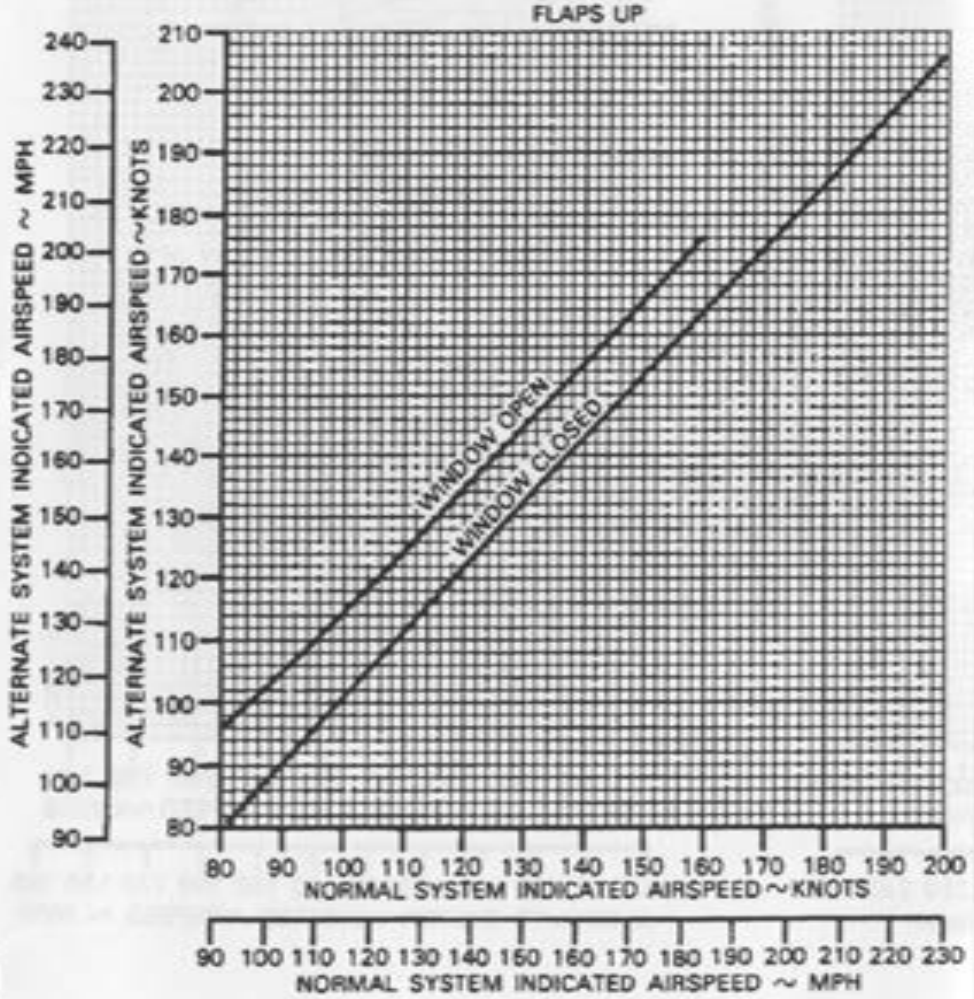
EXAMPLE:

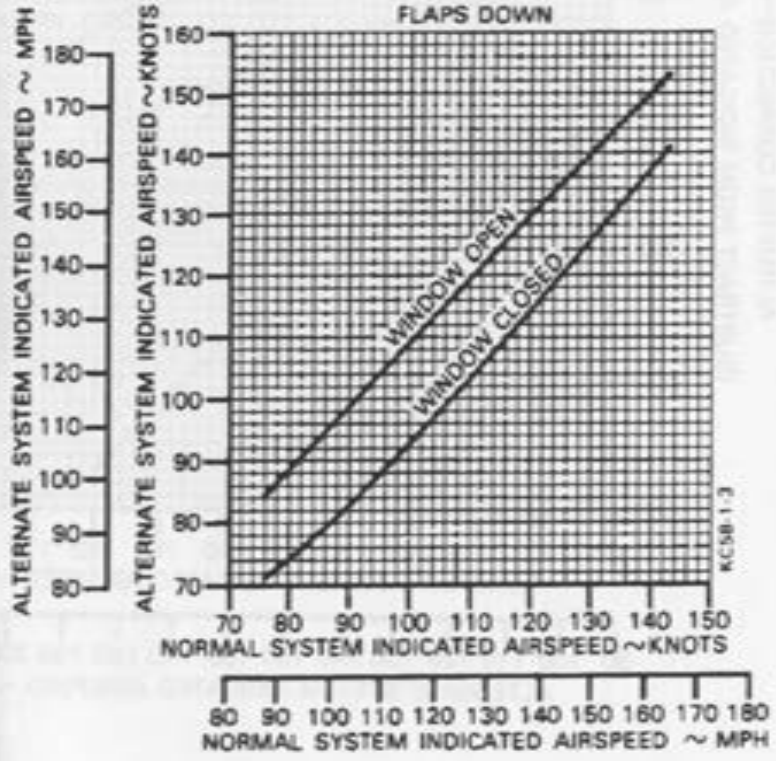
IAS	90 KTS
FLAPS	DOWN
INDICATED PRESSURE ALTITUDE	3965 FT
ALTIMETER CORRECTION	-4.5 FT
ACTUAL PRESSURE ALTITUDE	(3965 - 4.5) 3960 FT



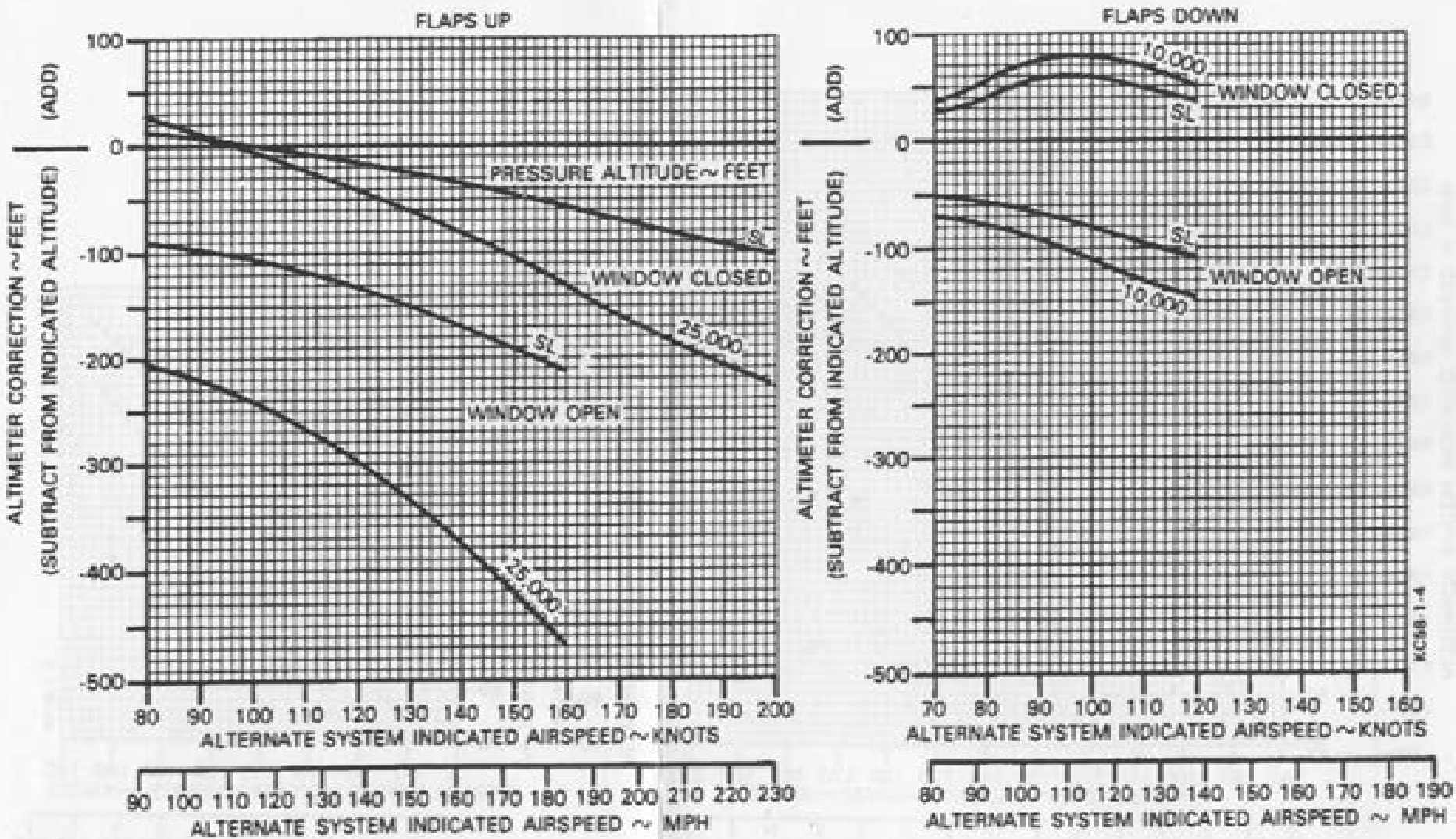


AIRSPEED CALIBRATION - EMERGENCY SYSTEM



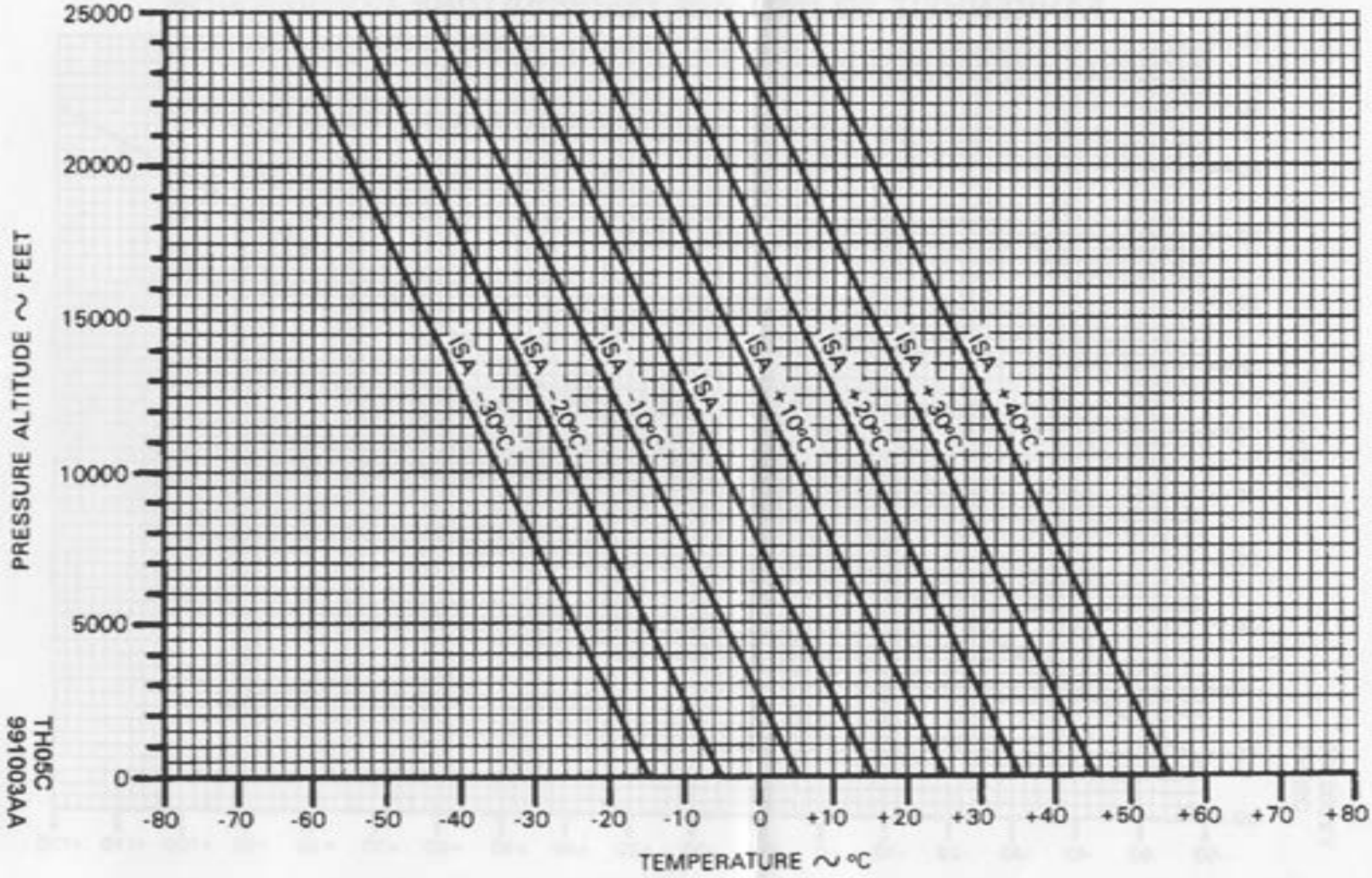


ALTIMETER CORRECTION - EMERGENCY SYSTEM

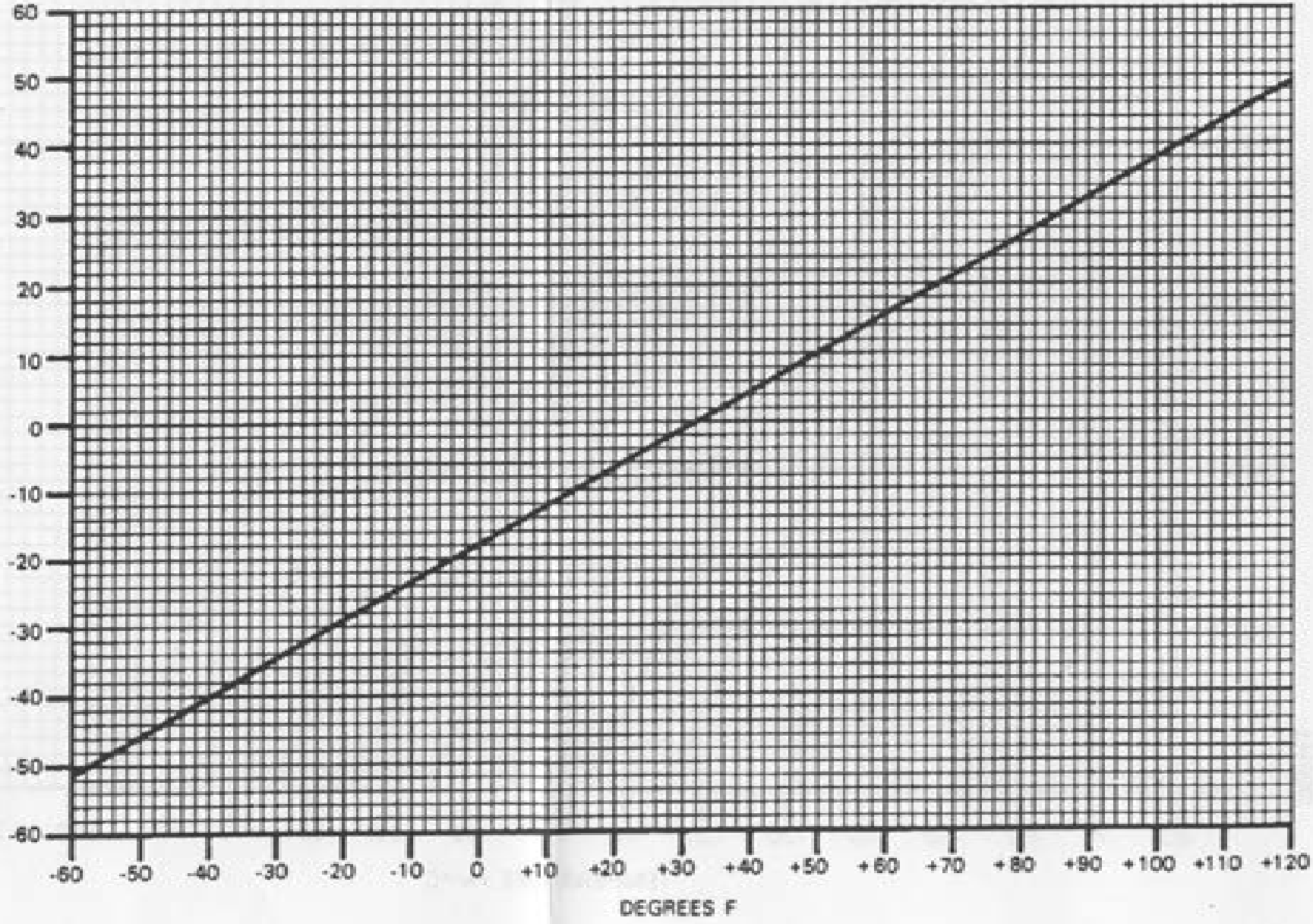


ISA CONVERSION

PRESSURE ALTITUDE vs OUTSIDE AIR TEMPERATURE



FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION



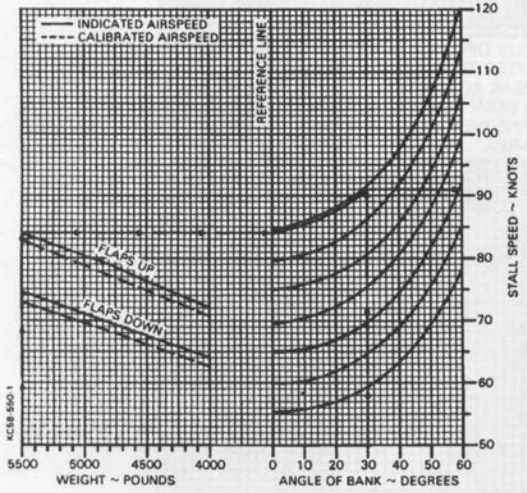
THOSC
9910044A

STALL SPEEDS - POWER IDLE

EXAMPLE
WEIGHT .....5500 LBS
FLAPS.....UP
ANLGE OF BANK.....30°
STALL SPEED .....91 KCAS

NOTE: 1. THE MAXIMUM ALTITUDE LOSS EXPERIENCED WHILE CONDUCTING STALLS IN ACCORDANCE WITH 14 CFR PART 3.120 WAS 400 FT.

2. A NORMAL STALL RECOVERY TECHNIQUE MAY BE USED.



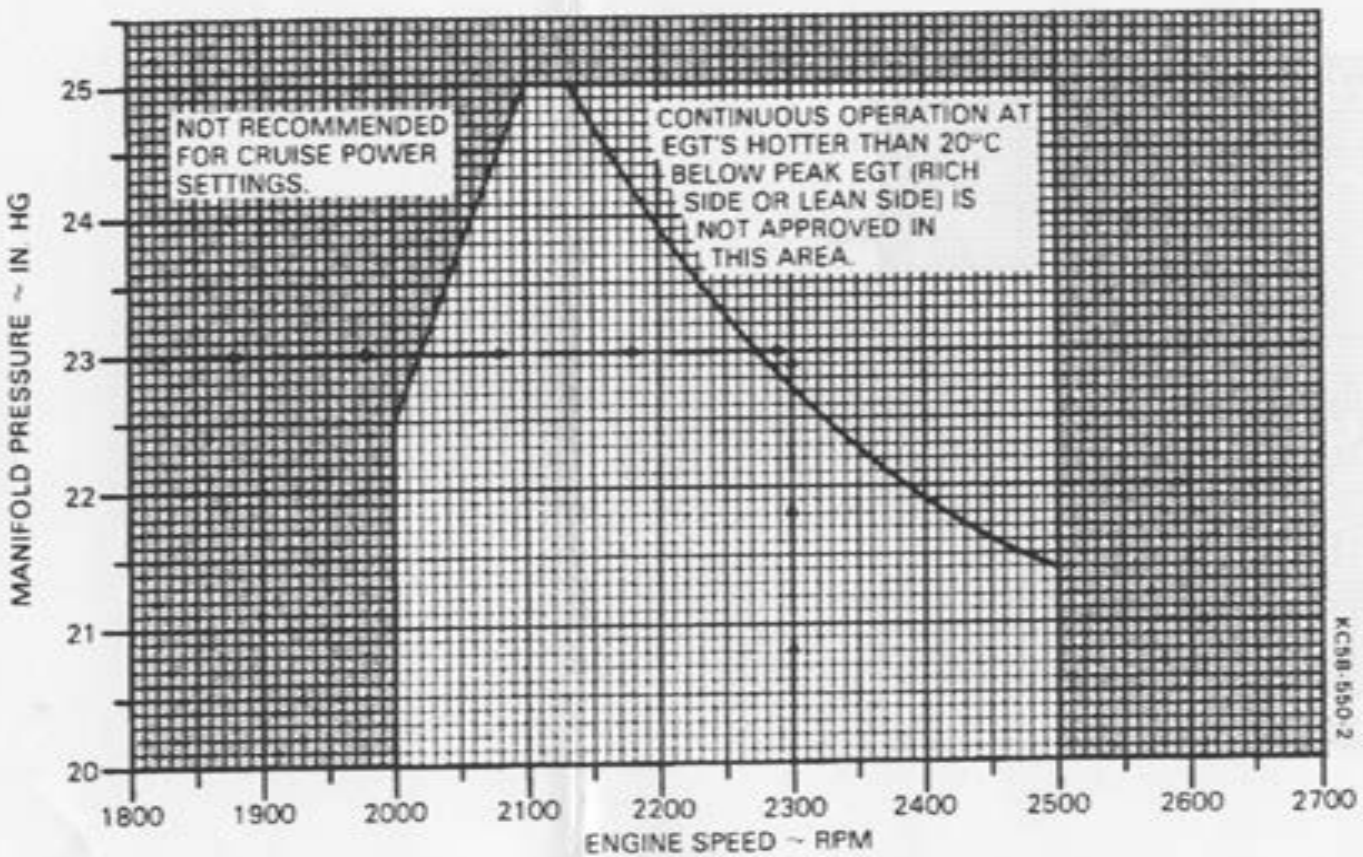
MANIFOLD PRESSURE vs RPM

NOTE OPERATION AT MIXTURE SETTINGS LEANER THAN 27°C LEAN OF PEAK EGT IS PROHIBITED.

EXAMPLE

ENGINE SPEED	2300 RPM
MANIFOLD PRESSURE	23 IN. HG
MIXTURE SETTING	20°C LEAN OF PEAK EGT

WITHIN RECOMMENDED LIMITS

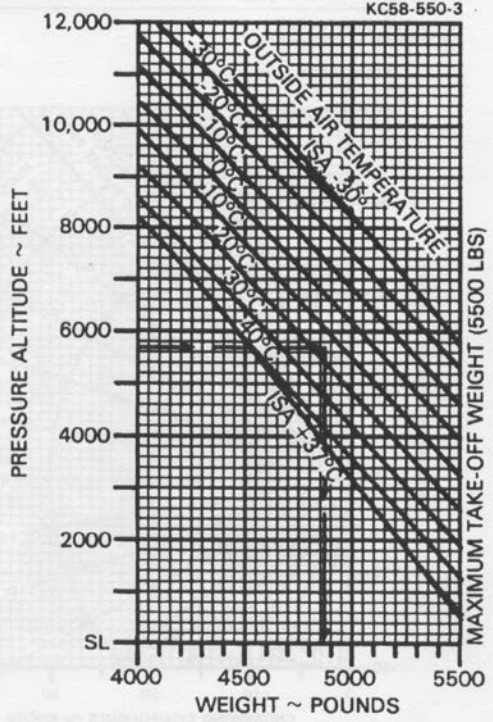


TAKE-OFF WEIGHT

TO ACHIEVE POSITIVE ONE-ENGINE-INOPERATIVE CLIMB AT LIFT-OFF

ASSOCIATED CONDITIONS:	
POWER	TAKE-OFF
FLAPS	UP
LANDING GEAR	DOWN
INOPERATIVE PROPELLER	FEATHERED

EXAMPLE	
PRESSURE ALTITUDE	5653 FT
OAT	15°C
TAKE-OFF WEIGHT	4870 LBS



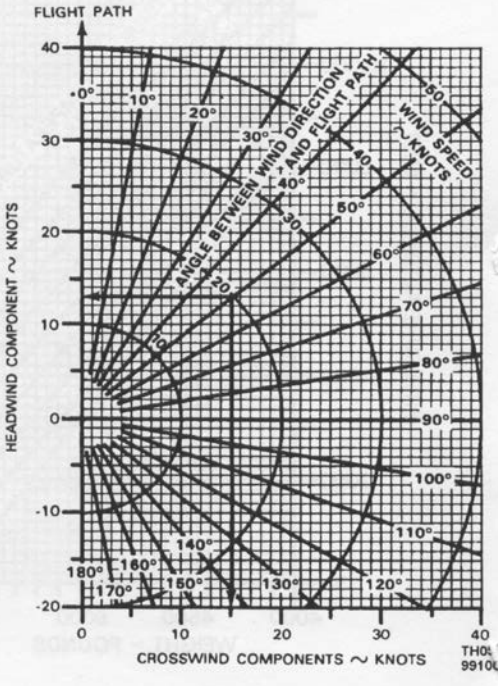
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WIND COMPONENTS

Demonstrated Crosswind Component is 22 kts

EXAMPLE:

WIND SPEED	20 KTS
ANGLE BETWEEN WIND DIRECTION AND FLIGHT PATH	50°
HEADWIND COMPONENT	13 KTS
CROSSWIND COMPONENT	15 KTS



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TAKE-OFF DISTANCE

TAKE-OFF SPEEDS (ALL WEIGHTS)

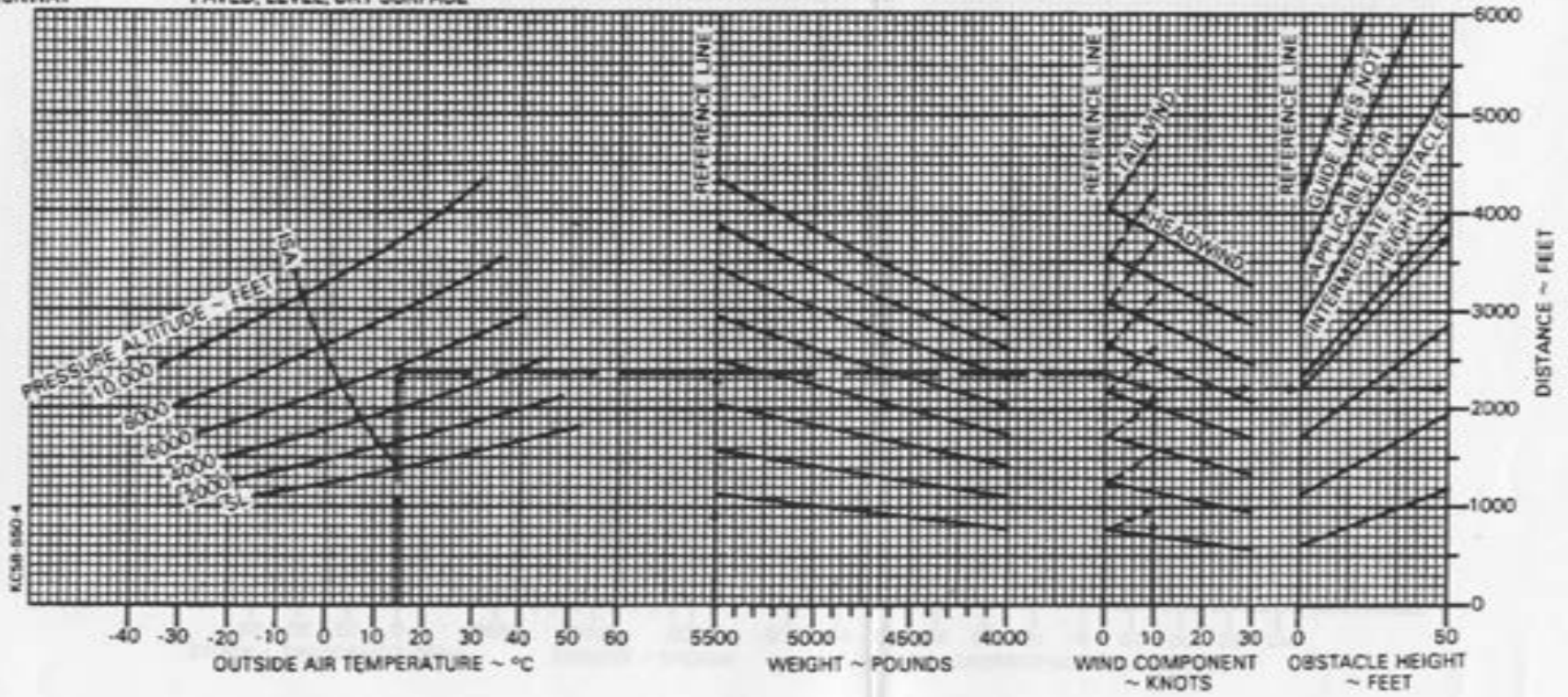
ASSOCIATED CONDITIONS:

POWER	TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE	FULL RICH (TH-1472 THRU TH-1840, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY FIELD ELEVATION (TH-1841 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS	UP
LANDING GEAR	RETRACT AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS	OPEN
RUNWAY	PAVED, LEVEL, DRY SURFACE

ROTATION	85 KNOTS
50 FEET	100 KNOTS

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5653 FT
TAKE-OFF WEIGHT	5500 LBS
HEADWIND COMPONENT	10 KTS
GROUND ROLL	2200 FT
TOTAL DISTANCE OVER 50-FT OBSTACLE	3775 FT



ACCELERATE - STOP DISTANCE

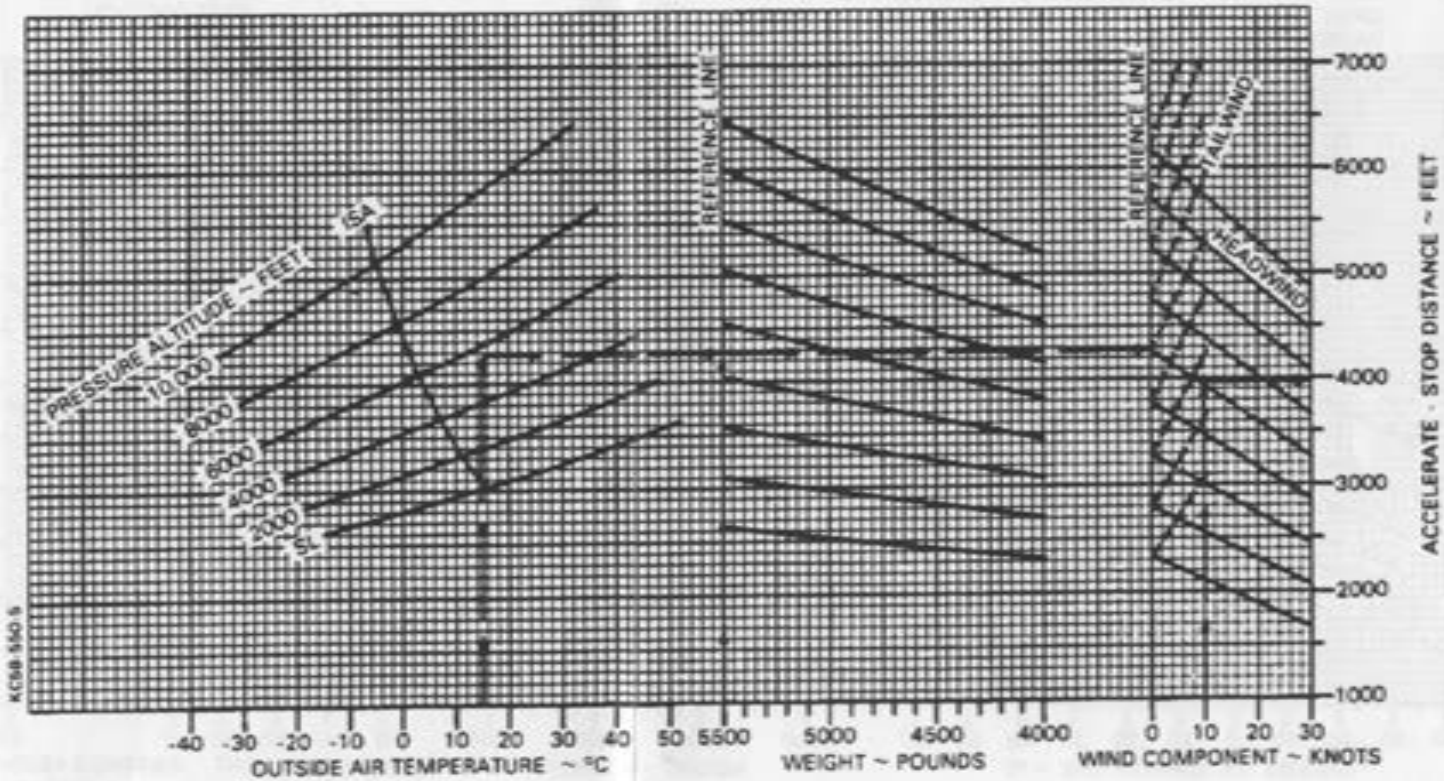
DECISION SPEED (ALL WEIGHTS)
85 KNOTS

ASSOCIATED CONDITIONS:

POWER	TAKE-OFF POWER SET BEFORE BRAKE RELEASE
FLAPS	UP
COWL FLAPS	OPEN
RUNWAY	PAVED, LEVEL, DRY SURFACE

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5653 FT
TAKE-OFF WEIGHT	5500 LBS
HEADWIND	10 KTS
ACCELERATE-STOP DISTANCE	3960 FT



ACCELERATE - GO DISTANCE

ASSOCIATED CONDITIONS:

POWER	TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE	FULL RICH (TH-1472 THRU TH-1840, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY FIELD ELEVATION (TH-1841 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS	UP
LANDING GEAR	RETRACT AFTER LIFT-OFF
RUNWAY	PAVED, LEVEL, DRY SURFACE

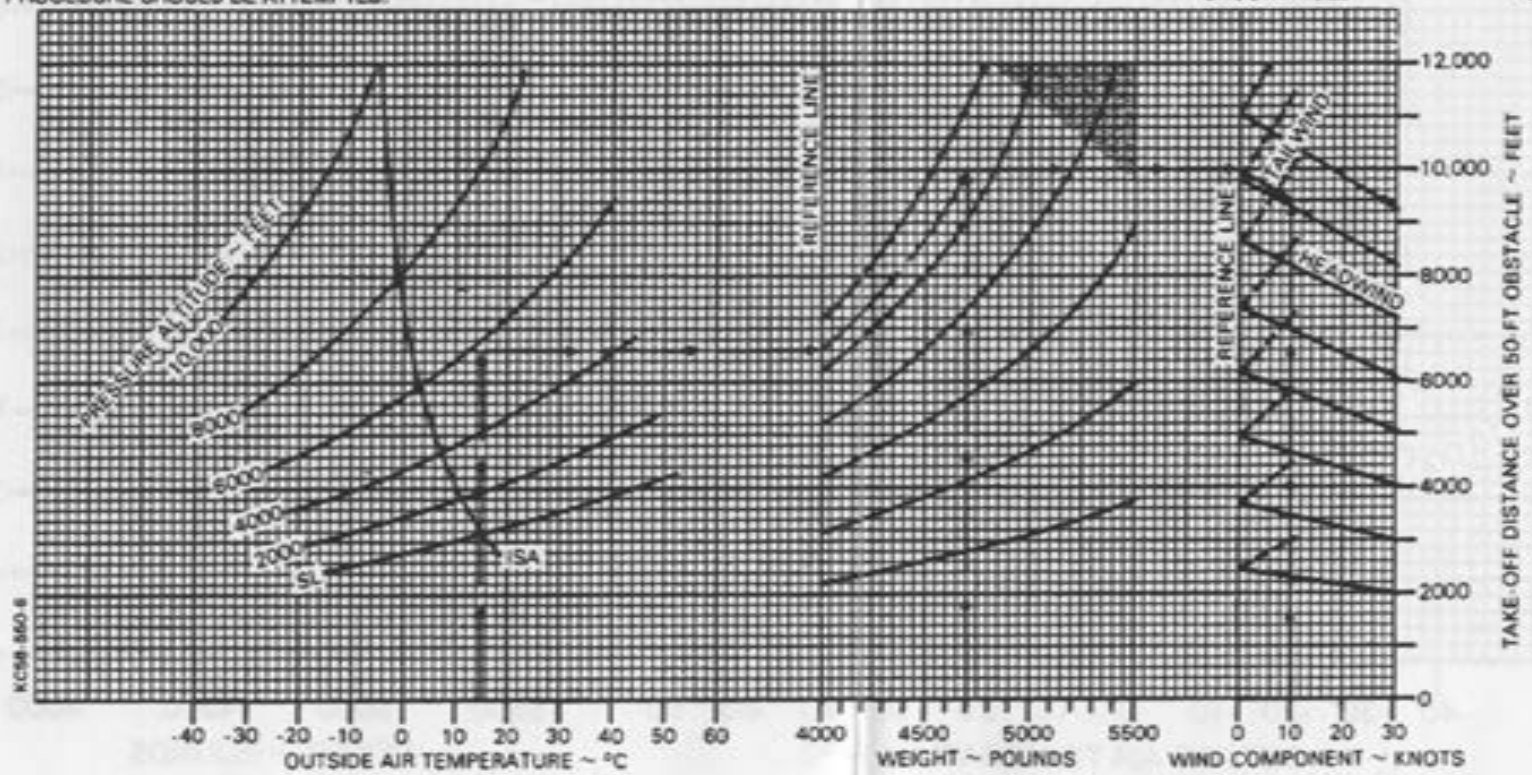
1. GROUND ROLL DISTANCE IS 40% OF TAKE-OFF DISTANCE OVER 50-FT OBSTACLE.
2. DISTANCES ASSUME AN ENGINE FAILURE AT ROTATION AND PROPELLER IMMEDIATELY FEATHERED.
3. WEIGHTS IN SHADED AREA MAY NOT PROVIDE POSITIVE ONE-ENGINE-INOPERATIVE CLIMB. REFER TO **TAKE-OFF WEIGHT** GRAPH FOR MAXIMUM WEIGHT AT WHICH THE ACCELERATE-GO PROCEDURE SHOULD BE ATTEMPTED.

TAKE-OFF SPEEDS (ALL WEIGHTS):

ROTATION	85 KNOTS
50 FEET	100 KNOTS

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5653 FT
TAKE-OFF WEIGHT	4700 LBS
HEADWIND COMPONENT	10 KTS
TAKE-OFF DISTANCE OVER 50-FT OBSTACLE	9400 FT
GROUND ROLL	3760 FT



TAKE-OFF CLIMB GRADIENT — ONE ENGINE INOPERATIVE

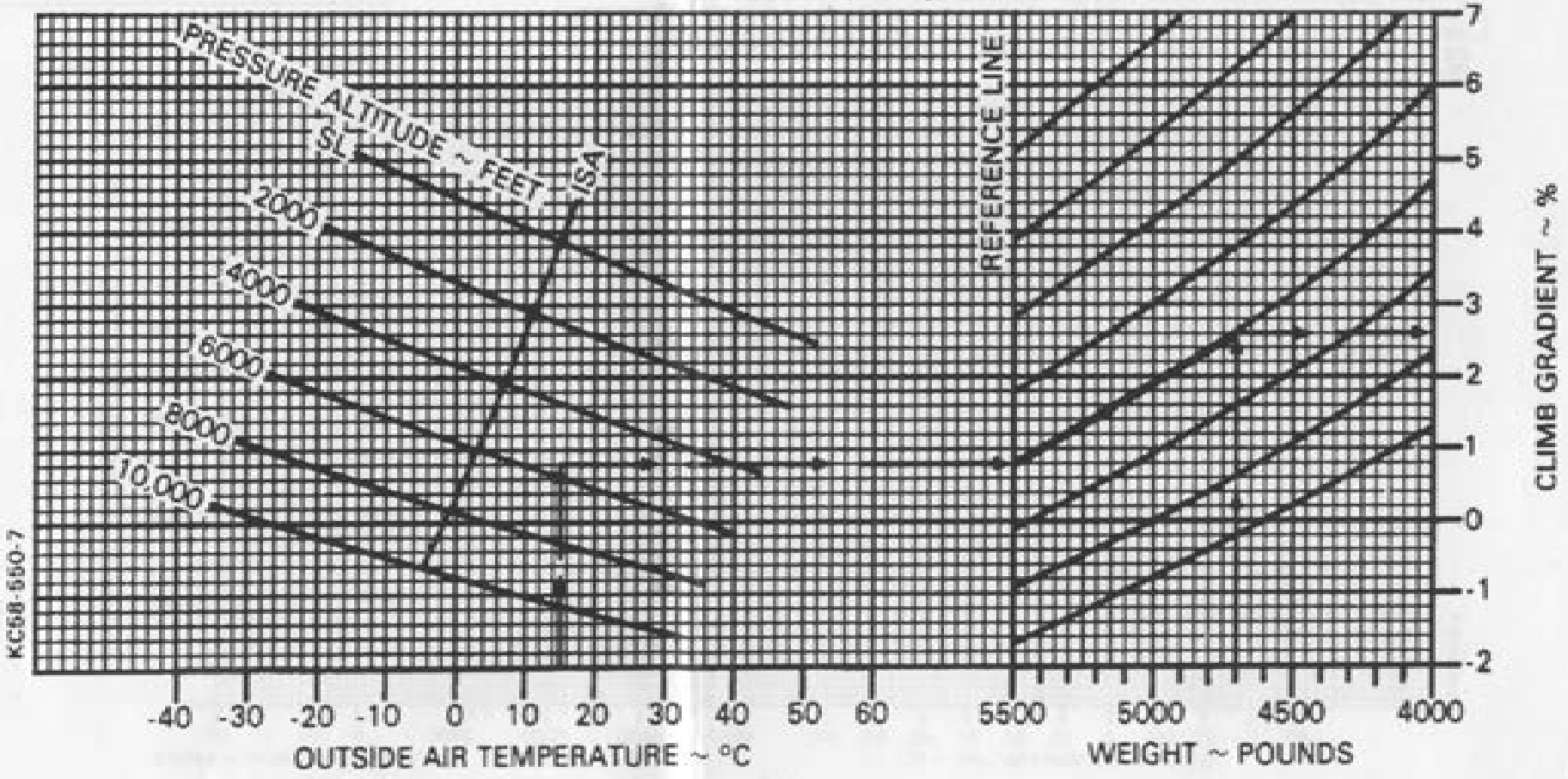
ASSOCIATED CONDITIONS

POWER	TAKE-OFF
LANDING GEAR	UP
FLAPS	UP
INOPERATIVE PROPELLER	FEATHERED

CLIMB SPEED: 100 KNOTS (ALL WEIGHTS)

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5853 FT
WEIGHT	4700 LBS
CLIMB GRADIENT	2.6%



CLIMB — TWO ENGINE

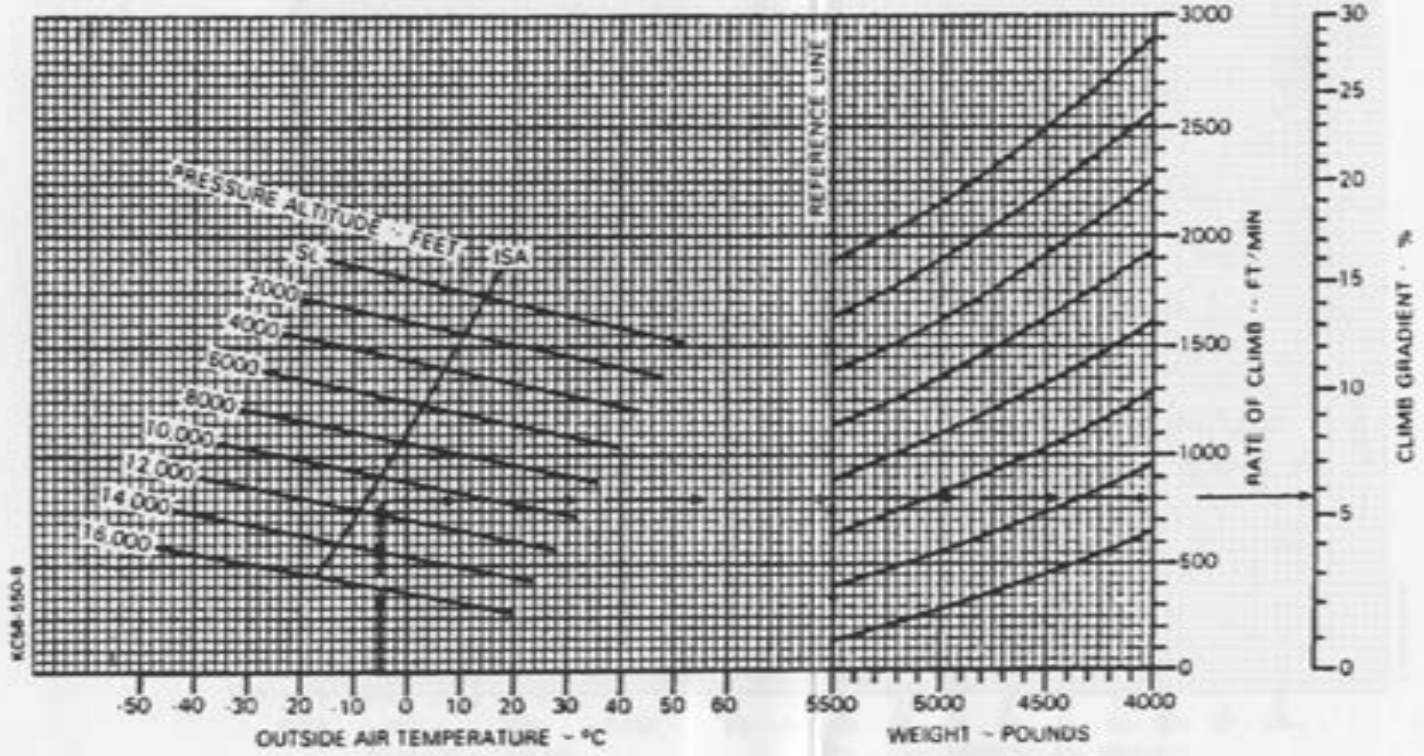
ASSOCIATED CONDITIONS:

CLIMB SPEED 105 KNOTS (ALL WEIGHTS)

POWER	MAXIMUM CONTINUOUS
MIXTURE	FULL RICH (TH-1472 THRU TH-1840, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY ALTITUDE (TH-1841 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS	UP
LANDING GEAR	UP
COWL FLAPS	OPEN

EXAMPLE

OAT	-5°C
PRESSURE ALTITUDE	11,500 FT
WEIGHT	5500 LBS
RATE OF CLIMB	800 FT MIN
CLIMB GRADIENT	5.7%



CLIMB — ONE ENGINE INOPERATIVE

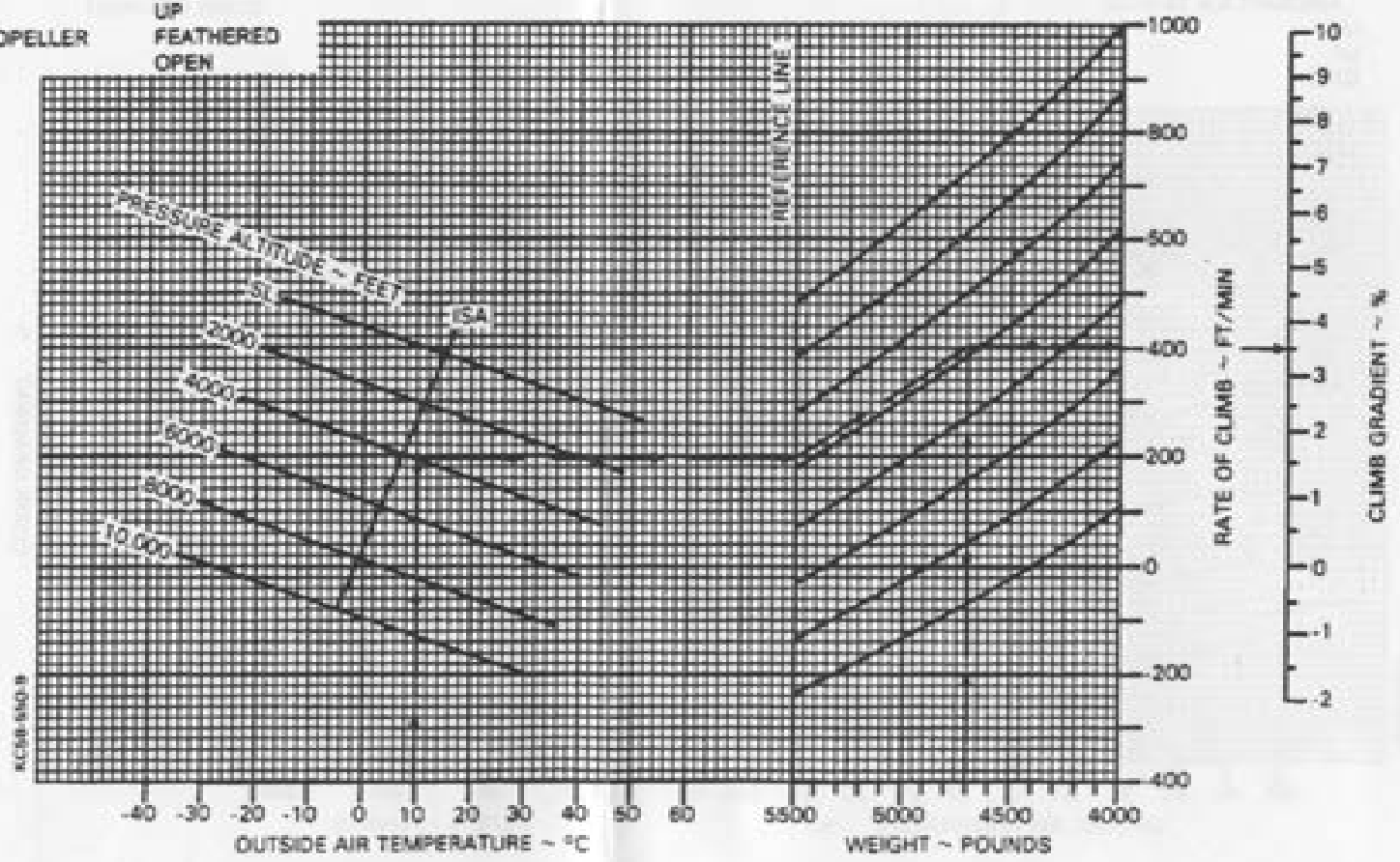
CLIMB SPEED: 100 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

POWER	MAXIMUM CONTINUOUS
MIXTURE	FULL RICH (TH-1472 THRU TH-1840, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY ALTITUDE (TH-1841 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS	UP
LANDING GEAR	UP
INOPERATIVE PROPELLER	FEATHERED
COWL FLAPS	OPEN

EXAMPLE:

OAT	10°C
PRESSURE ALTITUDE	4000 FT
WEIGHT	4700 LBS
RATE OF CLIMB	405 FT/MIN
CLIMB GRADIENT	3.5%



SERVICE CEILING - ONE-ENGINE-INOPERATIVE

CLIMB SPEED: 100 KNOTS (ALL WEIGHTS)

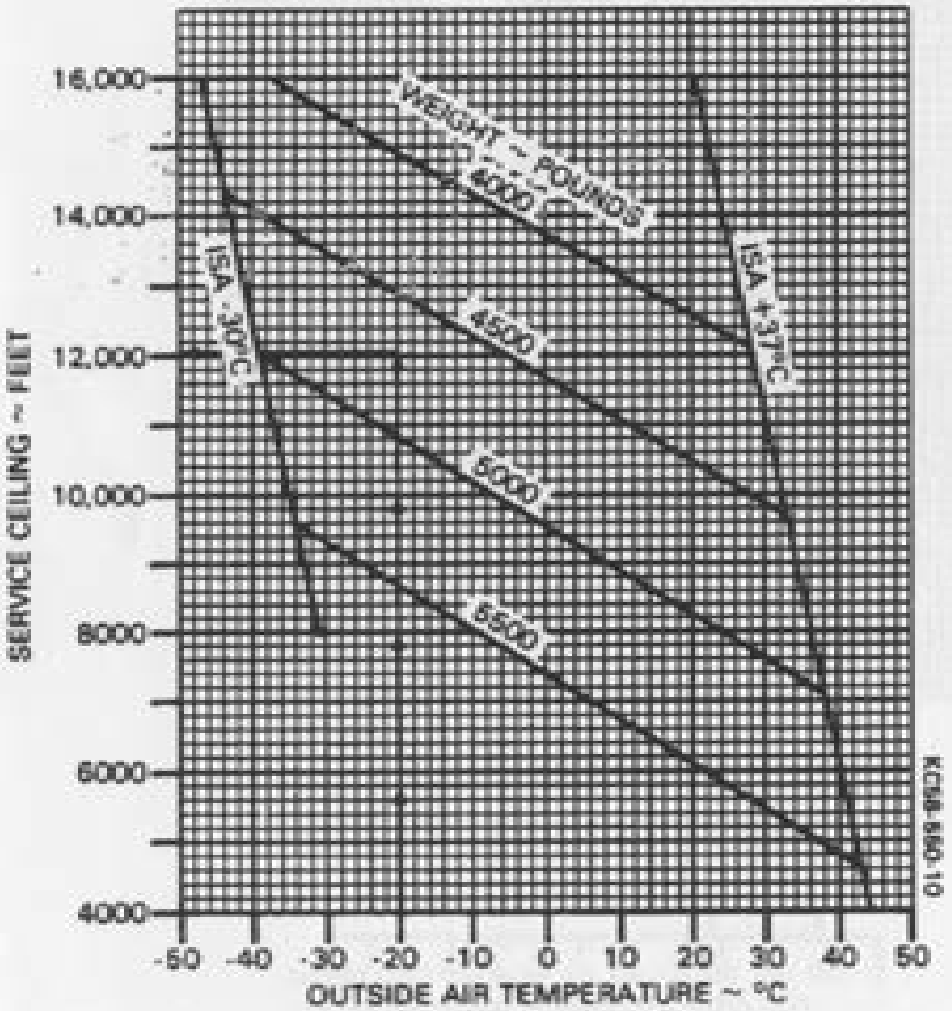
ASSOCIATED CONDITIONS:

POWER	MAXIMUM CONTINUOUS
LANDING GEAR	UP
INOPERATIVE PROPELLER	FEATHERED
FLAPS	UP
MIXTURE	FULL RICH (TH-1472 THRU TH-1840, NOT IN COMPLIANCE WITH RAYTHEON S.B. 28-3052) AS REQUIRED BY ALTITUDE (TH-1841 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON S.B. 28-3052)

EXAMPLE:

OAT	-28°C
WEIGHT	4700 LBS
SERVICE CEILING	12,815 FT

NOTE: ONE-ENGINE-INOPERATIVE SERVICE CEILING IS THE MAXIMUM PRESSURE ALTITUDE AT WHICH THE AIRPLANE HAS THE CAPABILITY OF CLIMBING AT 50 FT/MINUTE WITH ONE PROPELLER FEATHERED.



TIME, FUEL, AND DISTANCE TO CRUISE CLIMB

ASSOCIATED CONDITIONS:

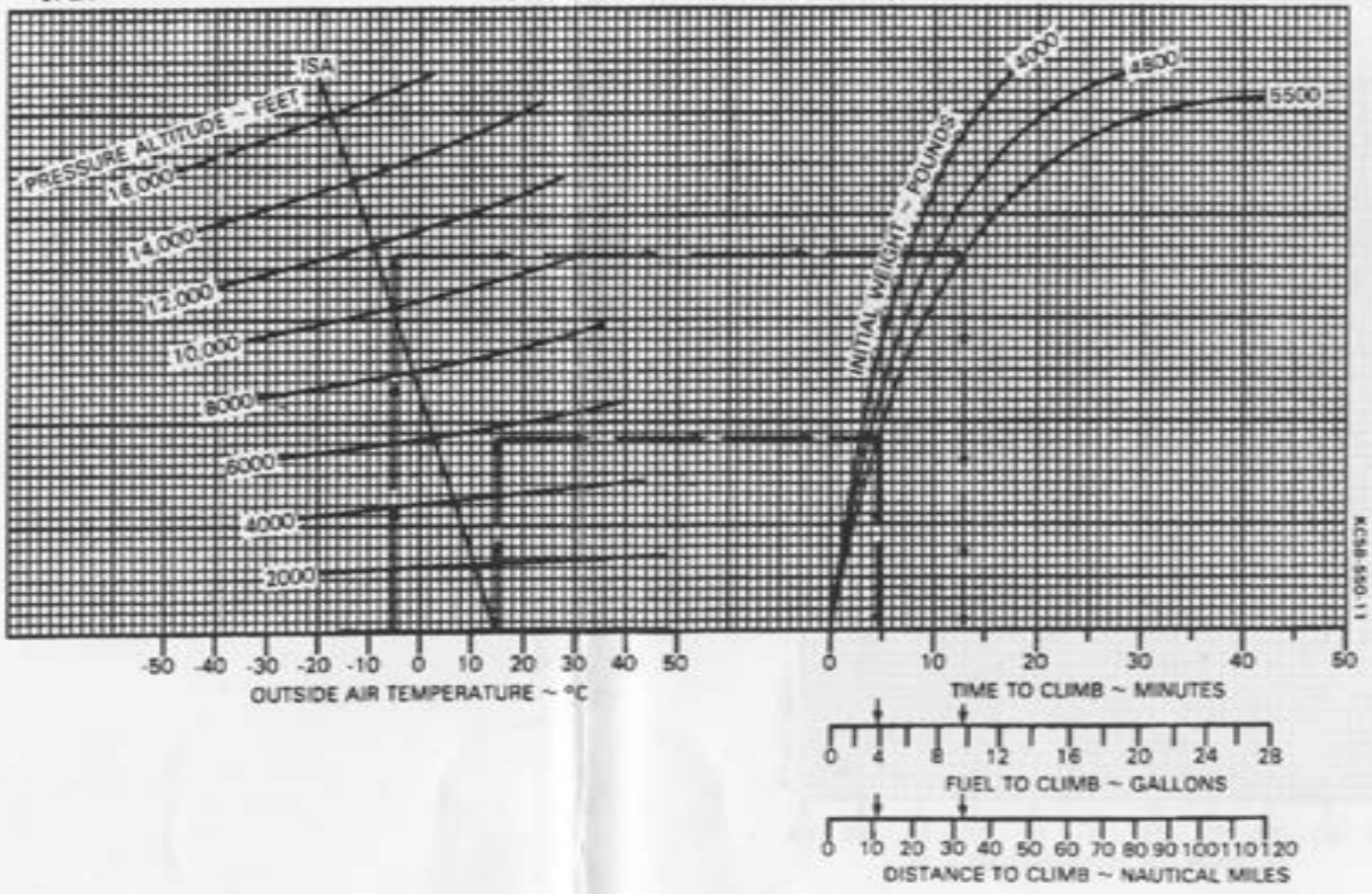
POWER	FULL THROTTLE, 2500 RPM
MIXTURE	FULL RICH (TH-1472 THRU TH-1840, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY ALTITUDE (TH-1841 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS	UP
FUEL DENSITY	6.0 LBS/GAL
COWL FLAPS	OPEN

EXAMPLE:

OAT AT TAKEOFF	15°C
OAT AT CRUISE	-5°C
AIRPORT PRESSURE ALTITUDE	5653 FT
CRUISE PRESSURE ALTITUDE	11,500 FT
INITIAL CLIMB WEIGHT	5500 LBS

TIME TO CLIMB	(13-5) = 8 MIN
FUEL TO CLIMB	(9.5-3.9) = 5.6 GAL
DISTANCE TO CLIMB	(32-11.5) = 20.5 NM

CLIMB SPEED: 136 KNOTS (ALL WEIGHTS)



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FOR CLASSROOM USE ONLY

CRUISE POWER SETTINGS

20° RICH OF PEAK EGT

MAXIMUM CRUISE POWER
25 IN. HG (OR FULL THROTTLE)
@ 2500 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	-2	29	25	101	16.8	194	187
	2000	-6	22	25	105	17.5	195	193
	4000	-9	15	25	109	18.2	196	199
	6000	-13	8	24	105	17.5	191	200
	8000	-17	1	22	98	16.3	184	198
	10000	-21	-6	21	92	15.3	177	196
	12000	-25	-14	19	86	14.3	169	194
	14000	-29	-21	18	80	13.3	162	191
	16000	-33	-28	16	74	12.3	154	187
STANDARD DAY (ISA)	SL	18	65	25	98	16.3	189	188
	2000	15	58	25	101	16.8	190	195
	4000	11	51	25	105	17.5	191	201
	6000	7	44	24	102	17.0	186	202
	8000	3	37	22	95	15.8	179	200
	10000	-1	30	21	89	14.8	171	198
	12000	-5	23	19	83	13.8	162	195
	14000	-9	15	18	77	12.8	156	192
	16000	-13	8	16	72	12.0	148	188
ISA +20°C (ISA +36°F)	SL	38	101	25	95	15.8	184	190
	2000	35	94	25	98	16.3	185	196
	4000	31	88	25	101	16.8	185	202
	6000	27	81	24	98	16.3	181	203
	8000	23	73	22	92	15.3	173	201
	10000	19	66	21	86	14.3	166	199
	12000	15	59	19	80	13.3	159	196
	14000	11	51	18	75	12.5	151	193
	16000	7	44	16	70	11.7	143	188

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC0527

FOR CLASSROOM USE
ONLY

CRUISE POWER SETTINGS

20° LEAN OF PEAK EGT

RECOMMENDED CRUISE POWER
25 IN. HG (OR FULL THROTTLE)
@ 2500 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	−2	28	25	87	14.5	189	182
	2000	−6	22	25	91	15.2	191	188
	4000	−9	15	25	94	15.7	191	194
	6000	−13	8	24	91	15.2	186	195
	8000	−17	1	22	84	14.0	179	193
	10000	−21	−7	21	78	13.0	172	191
	12000	−26	−14	19	72	12.0	164	188
	14000	−30	−21	18	67	11.2	157	185
	16000	−34	−29	16	62	10.3	149	181
STANDARD DAY (ISA)	SL	18	65	25	84	14.0	184	184
	2000	14	58	25	87	14.5	185	190
	4000	11	51	25	91	15.2	186	196
	6000	7	44	24	88	14.7	181	197
	8000	3	37	22	81	13.5	174	195
	10000	−1	30	21	75	12.5	167	193
	12000	−5	22	19	70	11.7	159	190
	14000	−10	15	18	65	10.8	152	186
	16000	−14	7	16	60	10.0	143	182
ISA +20°C (ISA +36°F)	SL	38	101	25	81	13.5	179	185
	2000	34	94	25	84	14.0	180	191
	4000	31	87	25	87	14.5	181	197
	6000	27	80	24	84	14.0	176	198
	8000	23	73	22	78	13.0	169	196
	10000	19	66	21	72	12.0	161	192
	12000	15	58	19	67	11.2	154	190
	14000	11	51	18	62	10.3	146	187
	16000	6	43	16	58	9.7	138	182

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC0528

FOR CLASSROOM USE
ONLY

CRUISE POWER SETTINGS

20° RICH OF PEAK EGT

RECOMMENDED CRUISE POWER
23 IN. HG (OR FULL THROTTLE)
@ 2300 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	2	28	23	81	13.5	176	170
	2000	−6	21	23	84	14.0	178	176
	4000	−10	14	23	87	14.5	179	182
	6000	−14	7	23	91	15.2	180	188
	8000	−18	0	22	89	14.8	177	190
	10000	−22	−7	21	84	14.0	169	188
	12000	−26	−14	19	78	13.0	162	185
	14000	−30	−21	18	73	12.2	154	182
	16000	−34	−29	17	68	11.3	146	178
STANDARD DAY (ISA)	SL	18	64	23	78	13.0	171	171
	2000	14	57	23	81	13.5	173	177
	4000	10	50	23	85	14.2	174	183
	6000	6	44	23	88	14.7	175	190
	8000	3	37	22	87	14.5	171	192
	10000	−2	29	21	81	13.5	164	189
	12000	−6	22	19	76	12.7	156	186
	14000	−10	15	18	71	11.8	149	183
	16000	−14	7	17	66	11.0	140	178
ISA +20°C (ISA +36°F)	SL	38	100	23	76	12.7	166	171
	2000	34	93	23	79	13.2	168	178
	4000	30	86	23	82	13.7	169	184
	6000	26	80	23	85	14.2	169	191
	8000	23	73	22	84	14.0	166	193
	10000	19	65	21	78	13.0	159	190
	12000	14	58	19	73	12.2	151	187
	14000	10	51	18	68	11.3	143	182
	16000	6	43	17	64	10.7	135	178

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC1030

FOR CLASSROOM USE
ONLY

CRUISE POWER SETTINGS

20° LEAN OF PEAK EGT

RECOMMENDED CRUISE POWER
23 IN. HG (OR FULL THROTTLE)
@ 2300 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	-3	27	23	67	11.2	171	164
	2000	-6	21	23	70	11.7	172	170
	4000	-10	14	23	73	12.2	173	176
	6000	-14	7	23	76	12.7	174	182
	8000	-18	0	22	75	12.5	171	184
	10000	-22	-7	21	69	11.5	164	182
	12000	-26	-14	19	64	10.7	156	179
	14000	-30	-22	18	60	10.0	149	176
	16000	-34	-29	17	56	9.3	140	171
STANDARD DAY (ISA)	SL	18	64	23	64	10.7	166	165
	2000	14	57	23	67	11.2	167	171
	4000	10	50	23	70	11.7	168	177
	6000	6	43	23	73	12.2	169	184
	8000	2	36	22	72	12.0	166	185
	10000	-2	29	21	67	11.2	158	183
	12000	-6	22	19	62	10.3	151	180
	14000	-10	14	18	58	9.7	143	176
	16000	-14	7	17	54	9.0	135	171
ISA +20°C (ISA +36°F)	SL	38	100	23	62	10.3	161	166
	2000	34	93	23	65	10.8	162	172
	4000	30	86	23	68	11.3	163	178
	6000	26	79	23	70	11.7	164	184
	8000	22	72	22	69	11.5	160	186
	10000	18	65	21	64	10.7	153	182
	12000	14	58	19	60	10.0	145	180
	14000	10	50	18	56	9.3	137	175
	16000	6	43	17	52	8.7	128	169

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC1031

FOR CLASSROOM USE
ONLY

CRUISE POWER SETTINGS

20° RICH OF PEAK EGT

RECOMMENDED CRUISE POWER
25 IN. HG (OR FULL THROTTLE)
@ 2100 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	−2	28	25	79	13.2	175	168
	2000	−6	21	25	82	13.7	176	174
	4000	−10	14	25	85	14.2	176	180
	6000	−14	7	24	83	13.8	173	181
	8000	−18	0	23	78	13.0	166	179
	10000	−22	−8	21	73	12.2	158	176
	12000	−26	−15	19	68	11.3	151	173
	14000	−30	−22	18	64	10.7	143	169
	16000	−34	−30	17	60	10.0	135	164
STANDARD DAY (ISA)	SL	18	64	25	77	12.8	170	169
	2000	14	57	25	80	13.3	171	175
	4000	10	50	25	82	13.7	171	181
	6000	6	43	24	81	13.5	167	182
	8000	2	36	23	76	12.7	160	180
	10000	−2	29	21	71	11.8	153	177
	12000	−6	21	19	66	11.0	145	173
	14000	−10	14	18	62	10.3	137	169
	16000	−14	6	17	58	9.7	128	163
ISA +20°C (ISA +36°F)	SL	38	100	25	74	12.3	165	170
	2000	34	93	25	77	12.8	166	176
	4000	30	86	25	80	13.3	166	181
	6000	26	79	24	78	13.0	162	183
	8000	22	72	23	73	12.2	155	180
	10000	18	65	21	69	11.5	148	177
	12000	14	57	19	64	10.7	140	173
	14000	10	50	18	60	10.0	131	168
	16000	6	42	17	56	9.3	122	160

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC1032

FOR CLASSROOM USE
ONLY

CRUISE POWER SETTINGS

20° LEAN
OF PEAK EGT

RECOMMENDED CRUISE POWER
25 IN. HG (OR FULL THROTTLE)
@ 2100 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	-3	27	25	63	10.5	167	160
	2000	-6	20	25	66	11.0	168	166
	4000	-10	14	25	68	11.3	168	171
	6000	-14	7	24	67	11.2	165	173
	8000	-18	-1	23	62	10.3	158	170
	10000	-22	-8	21	58	9.7	150	167
	12000	-26	-15	19	55	9.2	143	164
	14000	-30	-23	18	51	8.5	135	159
	16000	-35	-30	17	48	8.0	126	153
STANDARD DAY (ISA)	SL	17	63	25	61	10.2	162	161
	2000	14	56	25	64	10.7	163	167
	4000	10	50	25	66	11.0	163	172
	6000	6	43	24	65	10.8	160	174
	8000	2	35	23	60	10.0	152	171
	10000	-2	28	21	56	9.3	145	167
	12000	-6	21	19	53	8.8	137	163
	14000	-10	13	18	50	8.3	129	158
	16000	-15	6	17	46	7.7	119	151
ISA +20°C (ISA +36°F)	SL	37	99	25	59	9.8	157	162
	2000	34	93	25	61	10.2	158	167
	4000	30	86	25	64	10.7	158	173
	6000	26	79	24	62	10.3	155	174
	8000	22	71	23	58	9.7	147	171
	10000	18	64	21	55	9.2	139	167
	12000	14	57	19	51	8.5	131	162
	14000	10	49	18	48	8.0	122	156
	16000	5	42	17	45	7.5	111	146

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC1033

FOR CLASSROOM USE
ONLY

CRUISE POWER SETTINGS

20° RICH OF PEAK EGT

RECOMMENDED CRUISE POWER
21 IN. HG (OR FULL THROTTLE)
@ 2100 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	-3	27	21	62	10.3	155	149
	2000	-7	20	21	65	10.8	157	155
	4000	-11	13	21	67	11.2	158	161
	6000	-14	6	21	70	11.7	159	167
	8000	-18	-1	21	72	12.0	160	172
	10000	-22	-8	21	73	12.2	158	176
	12000	-26	-15	19	68	11.3	151	173
	14000	-30	-22	18	64	10.7	143	169
	16000	-34	-30	17	60	10.0	134	164
STANDARD DAY (ISA)	SL	17	63	21	60	10.0	150	150
	2000	13	56	21	63	10.5	152	156
	4000	9	49	21	65	10.8	153	162
	6000	6	42	21	68	11.3	154	167
	8000	2	35	21	70	11.7	155	173
	10000	-2	29	21	71	11.8	153	177
	12000	-6	21	19	66	11.0	145	173
	14000	-10	14	18	62	10.3	137	169
	16000	-14	6	17	58	9.7	128	163
ISA +20°C (ISA +36°F)	SL	37	99	21	59	9.8	145	150
	2000	33	92	21	61	10.2	147	156
	4000	30	85	21	63	10.5	148	162
	6000	26	78	21	66	11.0	149	167
	8000	22	72	21	68	11.3	149	173
	10000	18	65	21	69	11.5	148	177
	12000	14	57	19	64	10.7	140	173
	14000	10	50	18	60	10.0	131	168
	16000	6	42	17	56	9.3	122	160

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC1034

FOR CLASSROOM USE
ONLY

CRUISE POWER SETTINGS

20° LEAN OF PEAK EGT

ECONOMY CRUISE POWER
21 IN. HG (OR FULL THROTTLE)
@ 2100 RPM (5200 LBS)

	PRESS. ALT.	IOAT		MAN. PRESS.	FUEL FLOW/ ENGINE		AIRSPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA -20°C (ISA -36°F)	SL	-3	26	21	50	8.3	147	141
	2000	-7	19	21	52	8.7	149	147
	4000	-11	13	21	54	9.0	150	153
	6000	-15	6	21	56	9.3	151	158
	8000	-18	-1	21	58	9.7	152	164
	10000	-22	-8	21	58	9.7	150	167
	12000	-26	-15	19	55	9.2	143	164
	14000	-30	-23	18	51	8.5	135	159
	16000	-35	-30	17	48	8.0	126	153
STANDARD DAY (ISA)	SL	17	62	21	48	8.0	142	141
	2000	13	55	21	50	8.3	144	147
	4000	9	49	21	52	8.7	145	153
	6000	5	42	21	54	9.0	146	159
	8000	2	35	21	56	9.3	146	164
	10000	-2	28	21	56	9.3	145	167
	12000	-6	21	19	53	8.8	137	163
	14000	-10	13	18	50	8.3	129	158
	16000	-15	6	17	46	7.7	119	151
ISA +20°C (ISA +36°F)	SL	37	98	21	47	7.8	137	141
	2000	33	91	21	49	8.2	138	147
	4000	29	85	21	51	8.5	140	152
	6000	25	78	21	52	8.7	141	158
	8000	22	71	21	54	9.0	141	164
	10000	18	64	21	55	9.2	139	167
	12000	14	57	19	51	8.5	131	162
	14000	10	49	18	48	8.0	122	156
	16000	5	42	17	45	7.5	111	148

NOTES:
1. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
2. FULL-THROTTLE MANIFOLD VALUES ARE APPROXIMATE.
3. FUEL FLOWS ARE TO BE USED FOR FLIGHT PLANNING ONLY AND WILL VARY FROM AIRPLANE TO AIRPLANE. LEAN USING THE EGT.

SVC1035

FOR CLASSROOM USE
ONLY

CRUISE SPEEDS

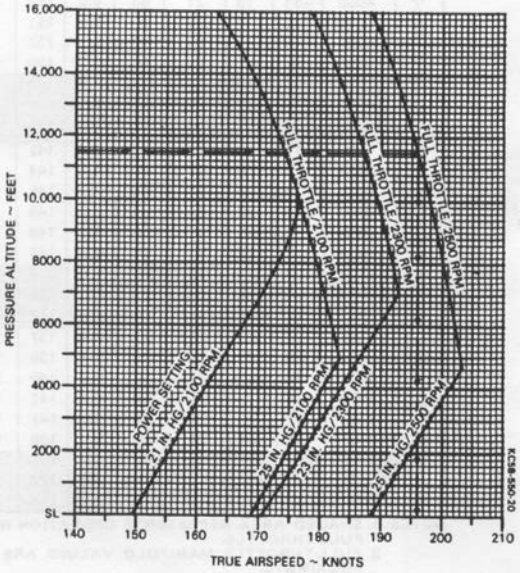
20°C RICH
OF PEAK EGT

ASSOCIATED CONDITIONS:

AVERAGE CRUISE WEIGHT 5200 LBS
TEMPERATURE STD DAY (ISA)

EXAMPLE:

CRUISE ALTITUDE 11,500 FT
POWER SETTING FULL THROTTLE, 2500 RPM
TRUE AIRSPEED 196 KTS



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CRUISE SPEEDS

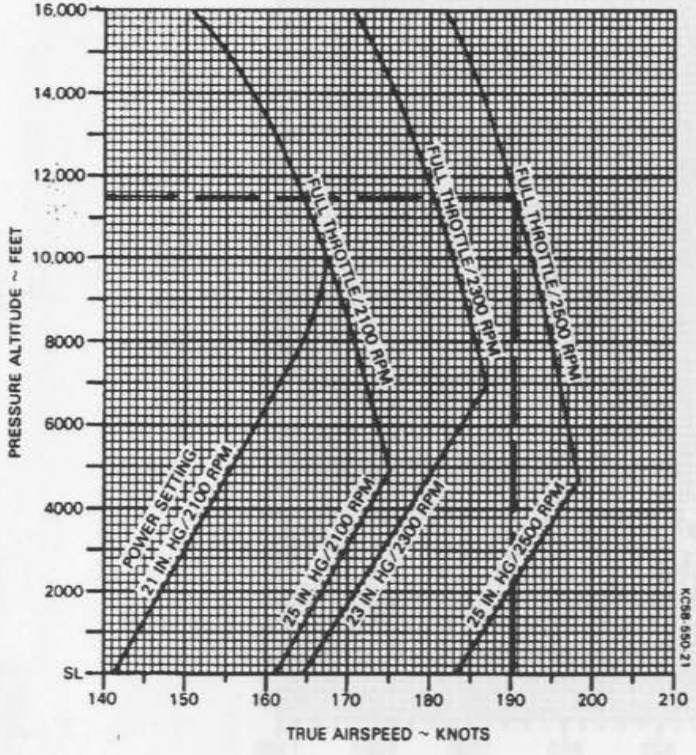
20°C LEAN
OF PEAK EGT

ASSOCIATED CONDITIONS:

AVERAGE CRUISE WEIGHT 5200LBS
TEMPERATURE STD DAY (ISA)

EXAMPLE:

CRUISE ALTITUDE 11,500 FT
POWER SETTING FULL THROTTLE, 2500 RPM
TRUE AIRSPEED 196 KTS



RANGE PROFILE - 136 GALLONS

STANDARD DAY (ISA)

20°C RICH OF PEAK EGT

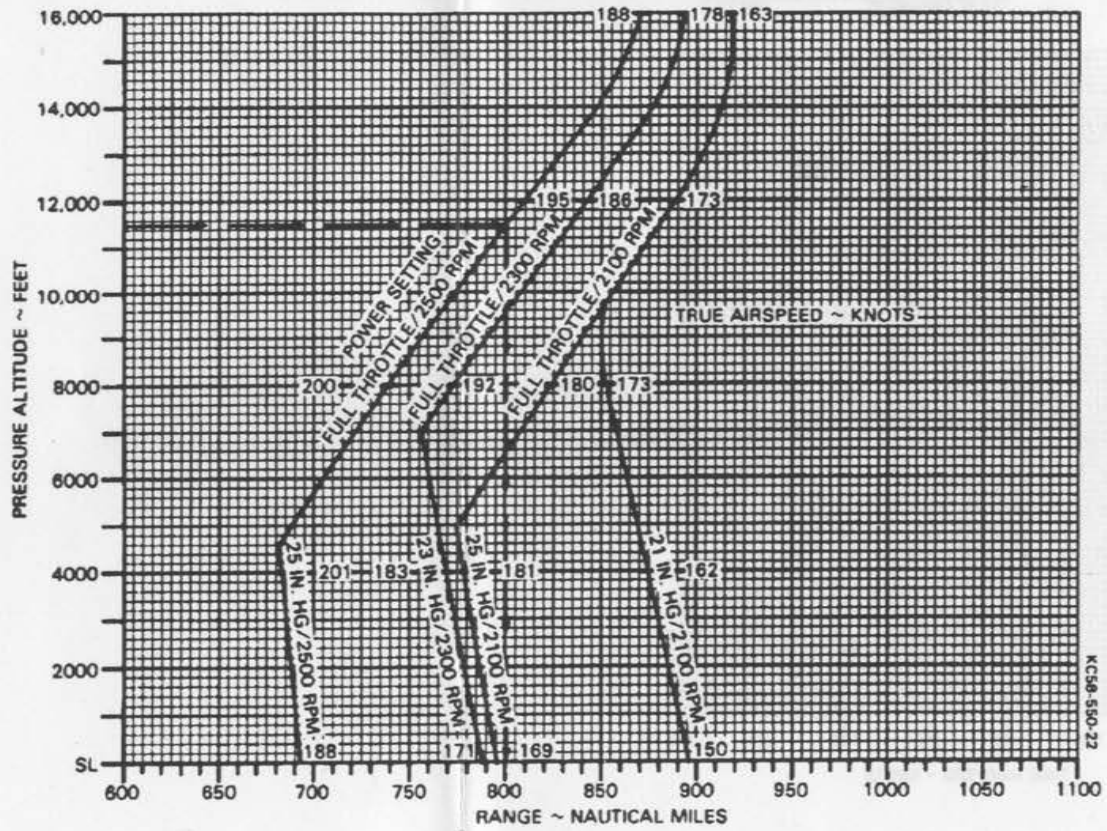
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	136 U.S. GAL (816 LBS)
TAKE-OFF ALTITUDE	SL
WIND	ZERO

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
RANGE	801 NM

NOTE: RANGE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



RANGE PROFILE - 136 GALLONS

STANDARD DAY (ISA)

20°C LEAN OF PEAK EGT

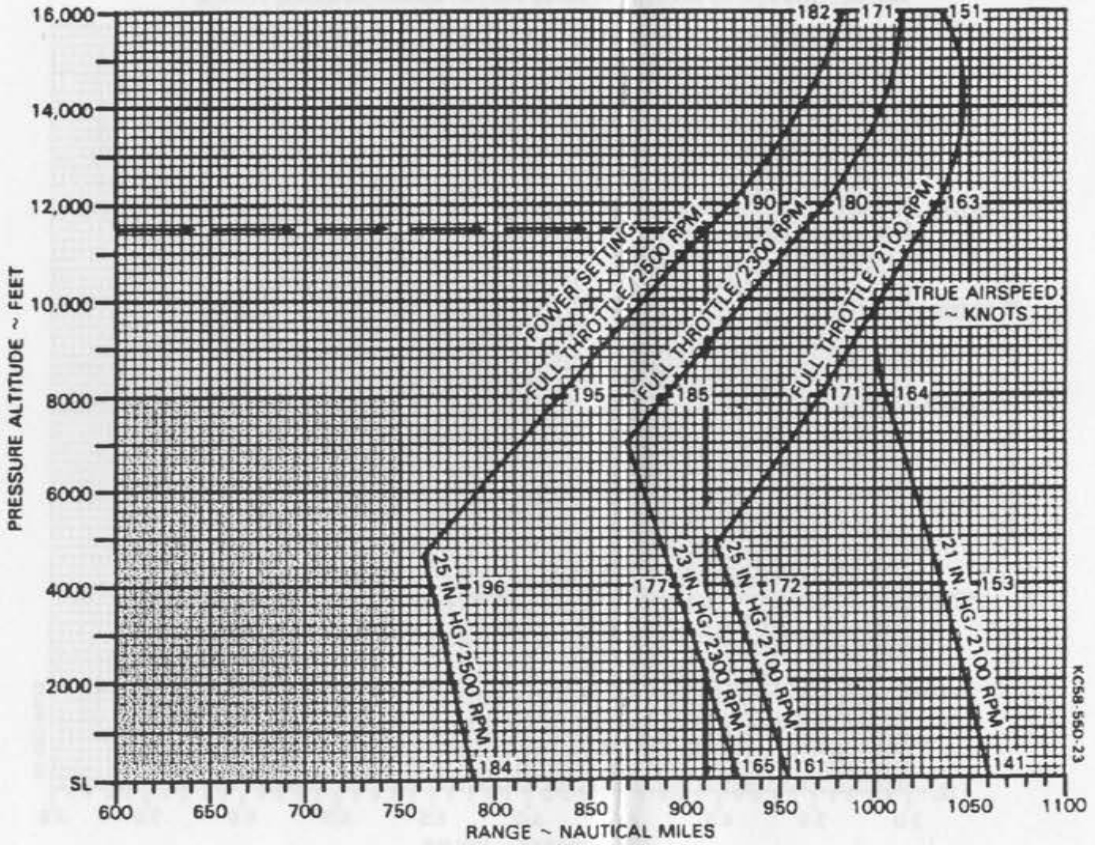
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	136 U.S. GAL (816 LBS)
TAKE-OFF ALTITUDE	SL
WIND	ZERO

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
RANGE	911 NM

NOTE: RANGE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



ENDURANCE PROFILE - 136 GALLONS

STANDARD DAY (ISA)

20°C RICH OF PEAK EGT

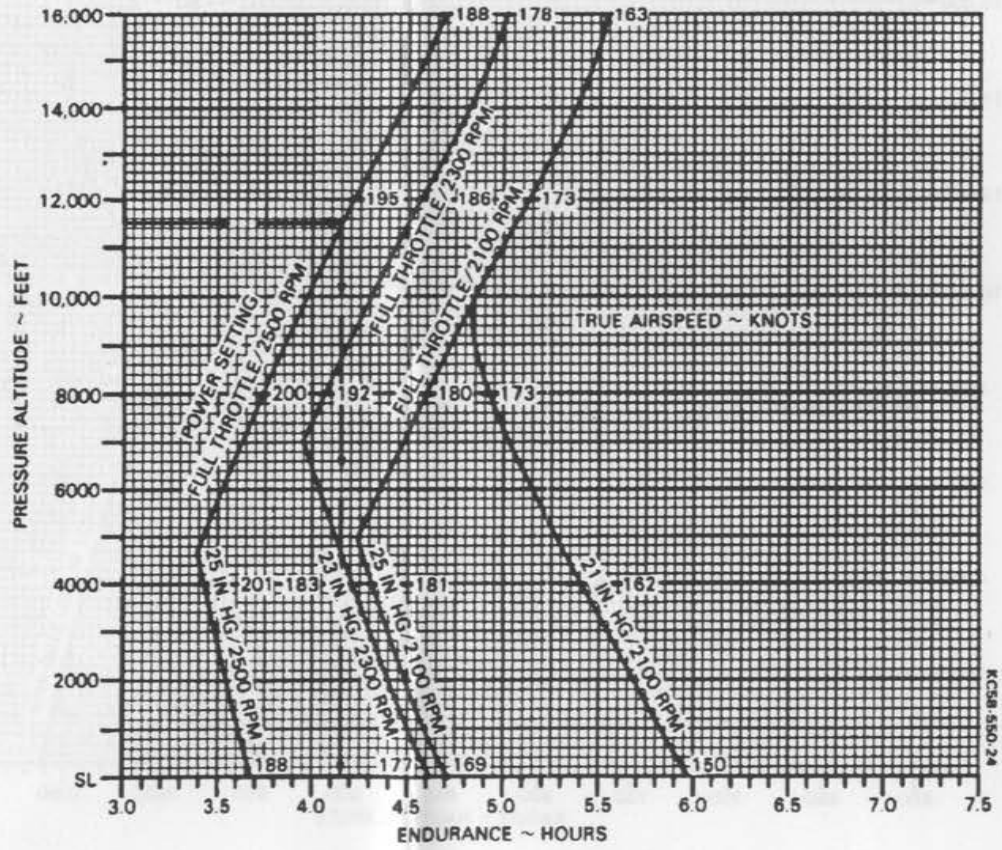
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	136 U.S. GAL (816 LBS)

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
ENDURANCE	4.15 HRS

NOTE: ENDURANCE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



ENDURANCE PROFILE - 136 GALLONS

STANDARD DAY (ISA)

20°C LEAN OF PEAK EGT

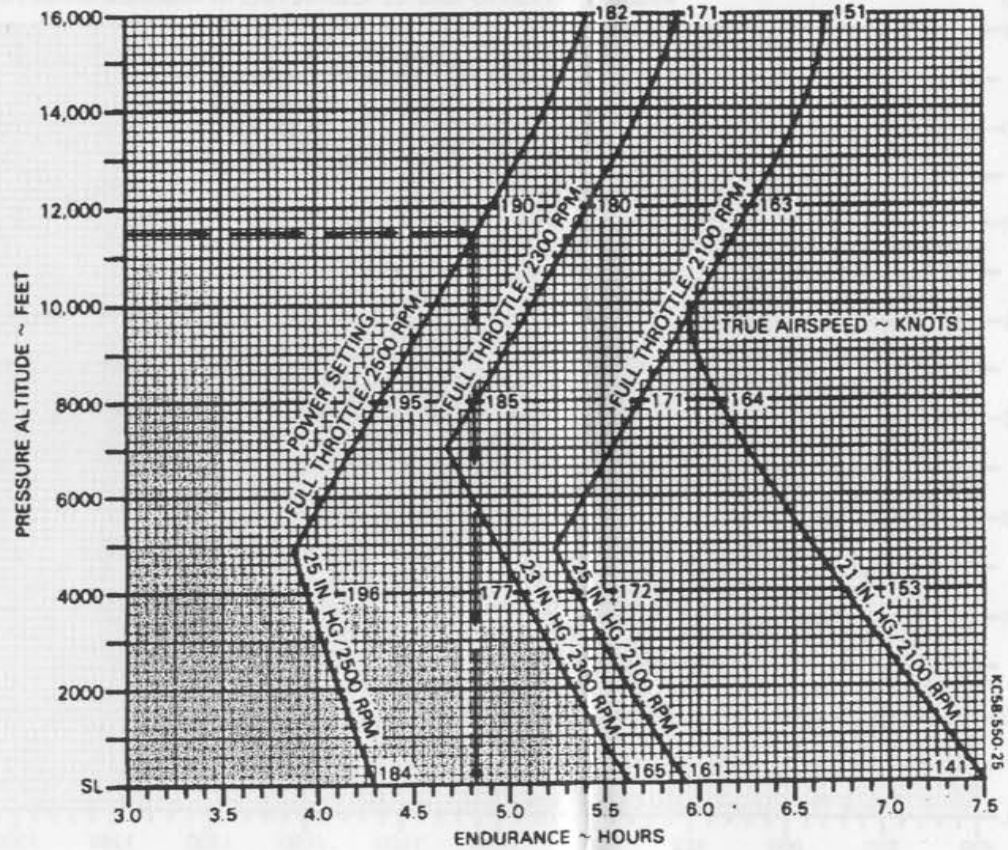
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	136 U.S. GAL (816 LBS)

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
ENDURANCE	4.82 HRS

NOTE: ENDURANCE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



RANGE PROFILE - 166 GALLONS

STANDARD DAY (ISA)

20°C RICH OF PEAK EGT

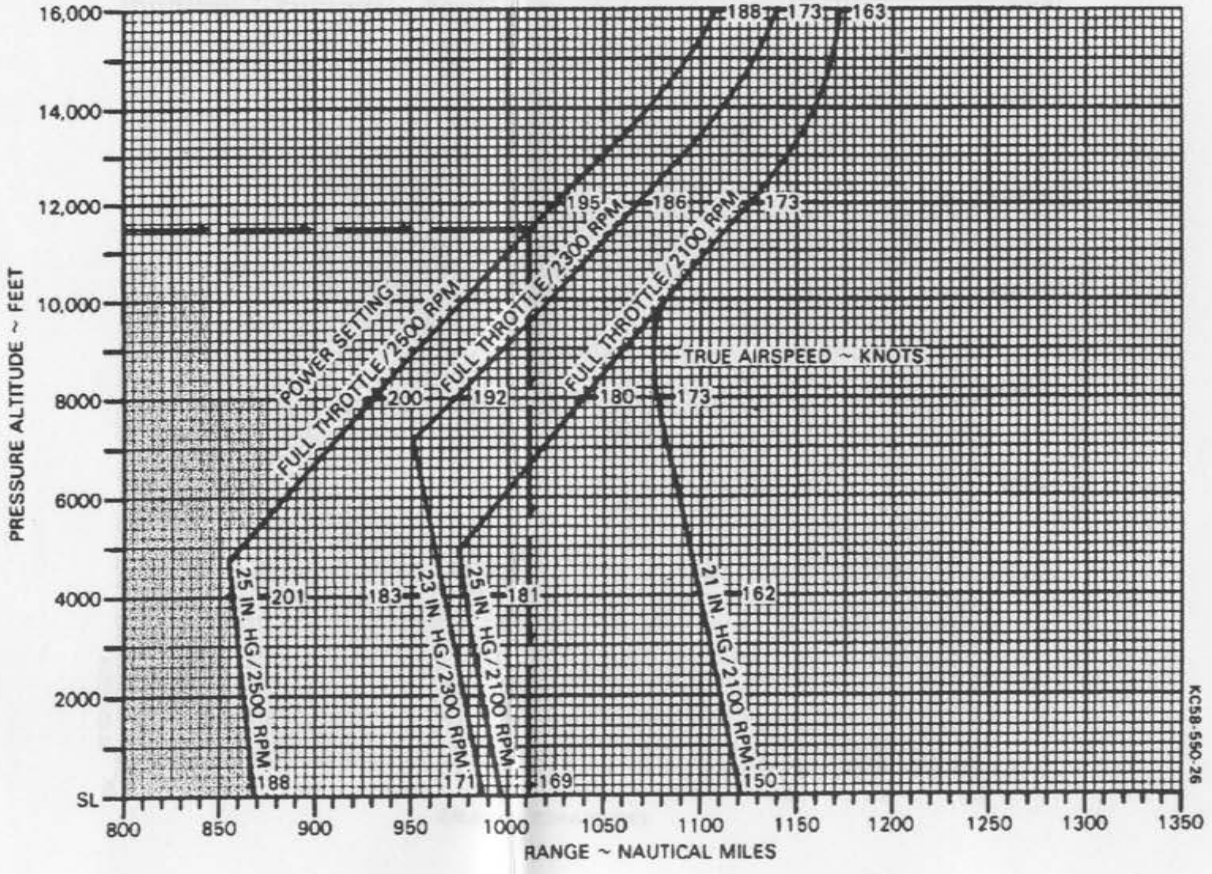
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	166 U.S. GAL (996 LBS)
TAKE-OFF ALTITUDE	SL
WIND	ZERO

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
RANGE	1012 NM

NOTE: RANGE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



RANGE PROFILE - 166 GALLONS

STANDARD DAY (ISA)

20°C LEAN OF PEAK EGT

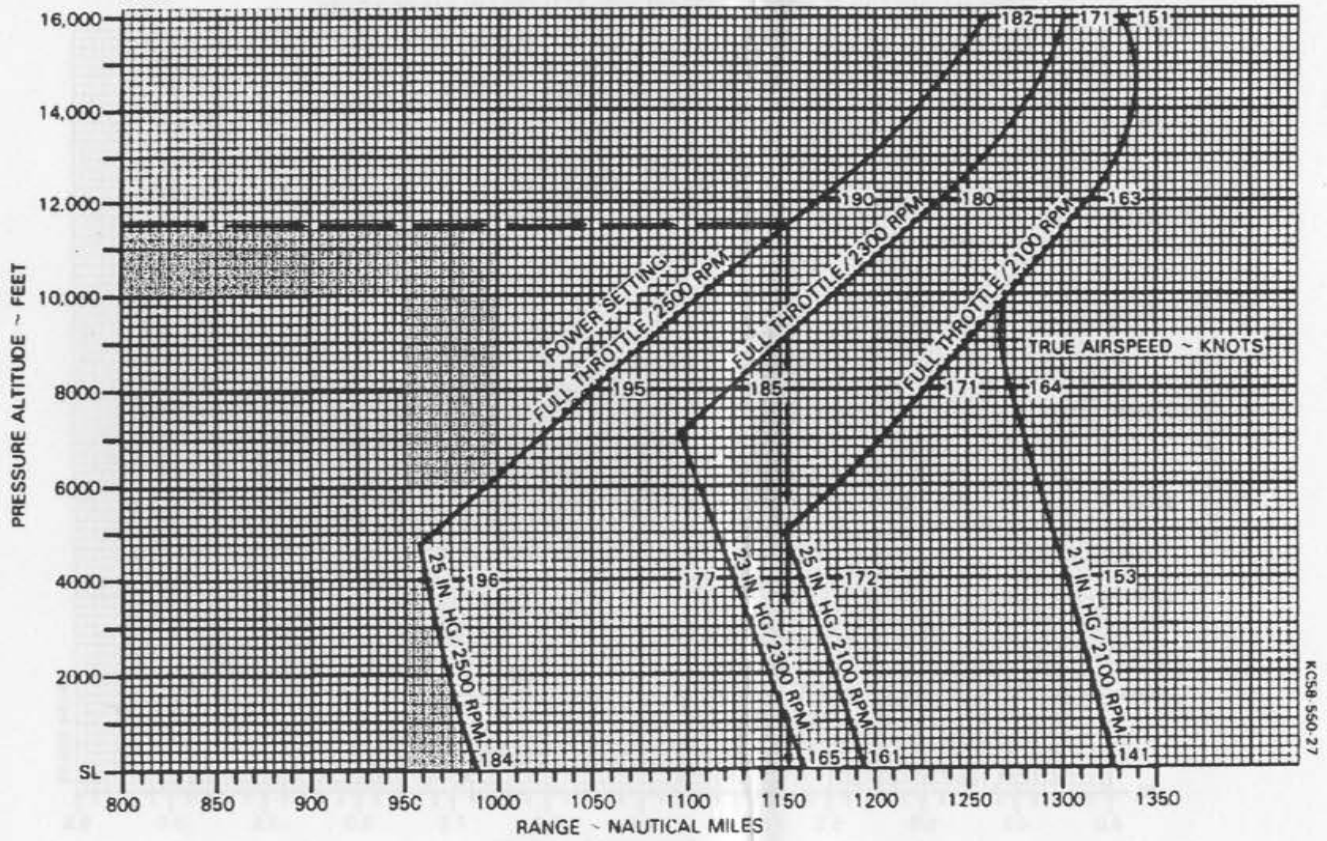
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	166 U.S. GAL (996 LBS)
TAKE-OFF ALTITUDE	SL
WIND	ZERO

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
RANGE	1154 NM

NOTE: RANGE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



ENDURANCE PROFILE - 166 GALLONS

STANDARD DAY (ISA)

20°C RICH OF PEAK EGT

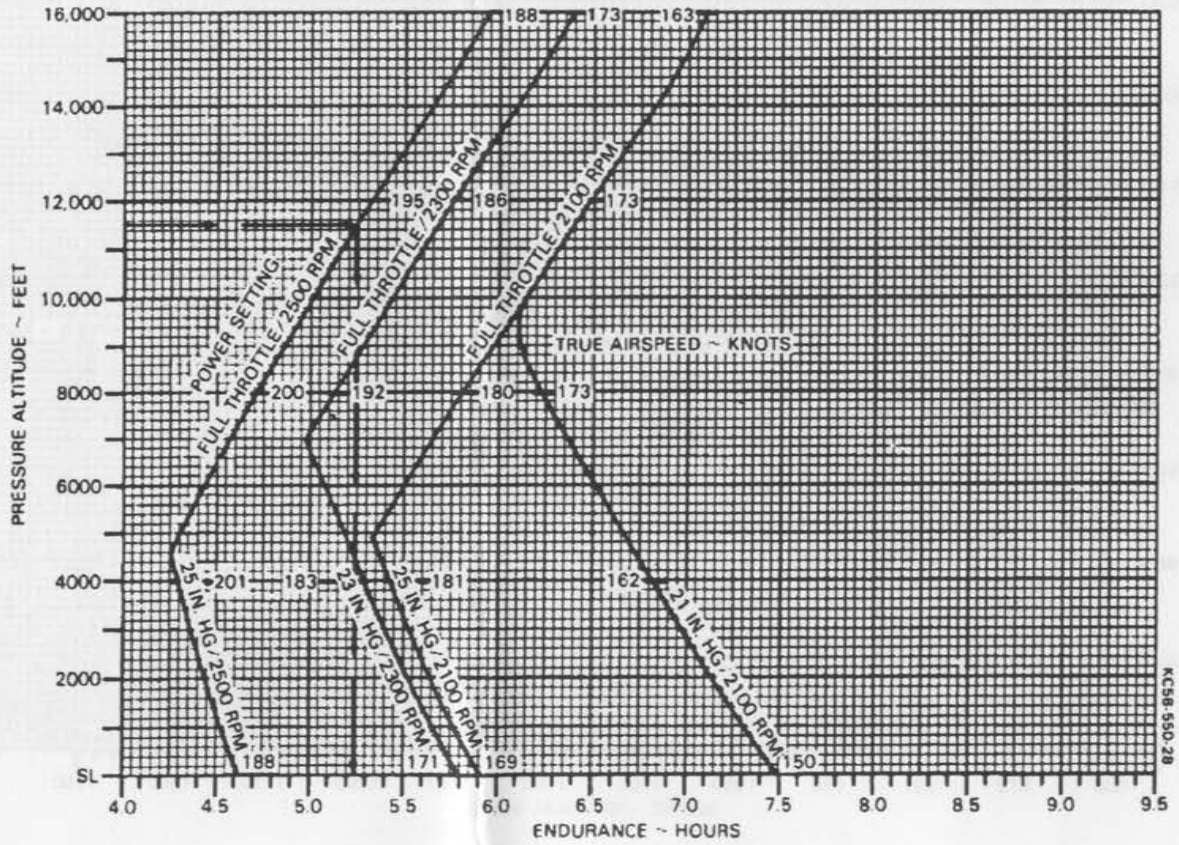
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	166 U.S GAL (996 LBS)

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
ENDURANCE	5.24 HRS

NOTE: ENDURANCE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



ENDURANCE PROFILE - 166 GALLONS

STANDARD DAY (ISA)

20°C LEAN OF PEAK EGT

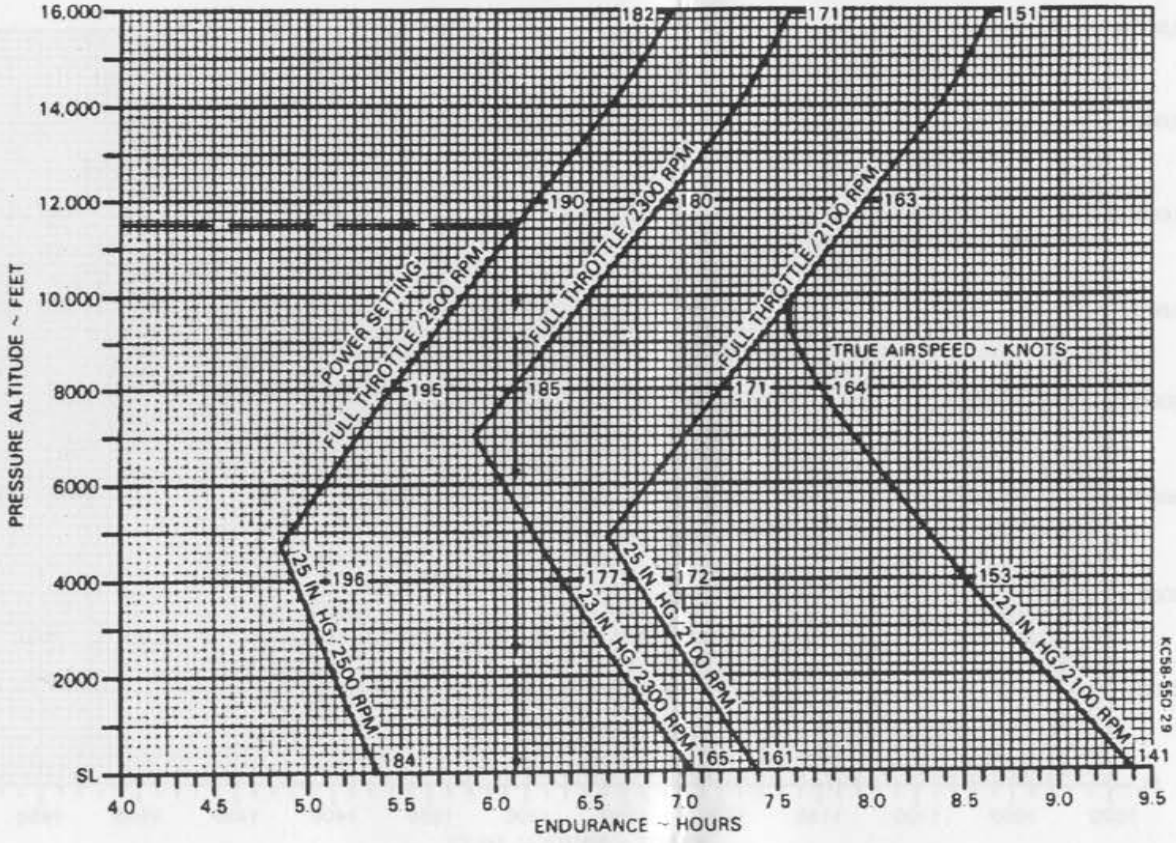
ASSOCIATED CONDITIONS

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	166 U.S. GAL (996 LBS)

EXAMPLE

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
ENDURANCE	6.11 HRS

NOTE: ENDURANCE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



RANGE PROFILE - 194 GALLONS

STANDARD DAY (ISA)

20°C RICH OF PEAK EGT

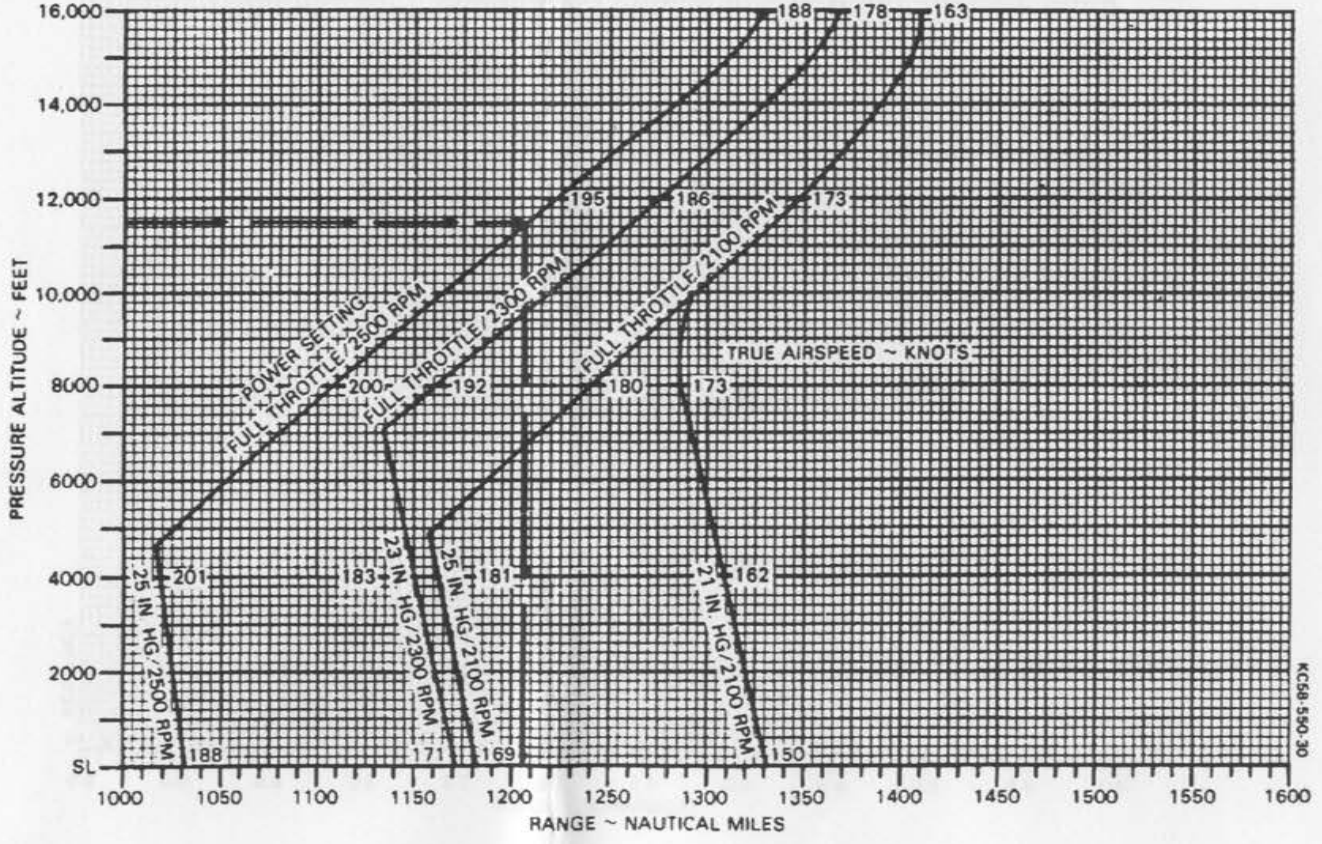
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	194 U.S. GAL (1164 LBS)
TAKE-OFF ALTITUDE	SL
WIND	ZERO

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
RANGE	1207 NM

NOTE: RANGE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



RANGE PROFILE - 194 GALLONS

ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	194 U.S. GAL (1164 LBS)
TAKE-OFF ALTITUDE	SL
WIND	ZERO

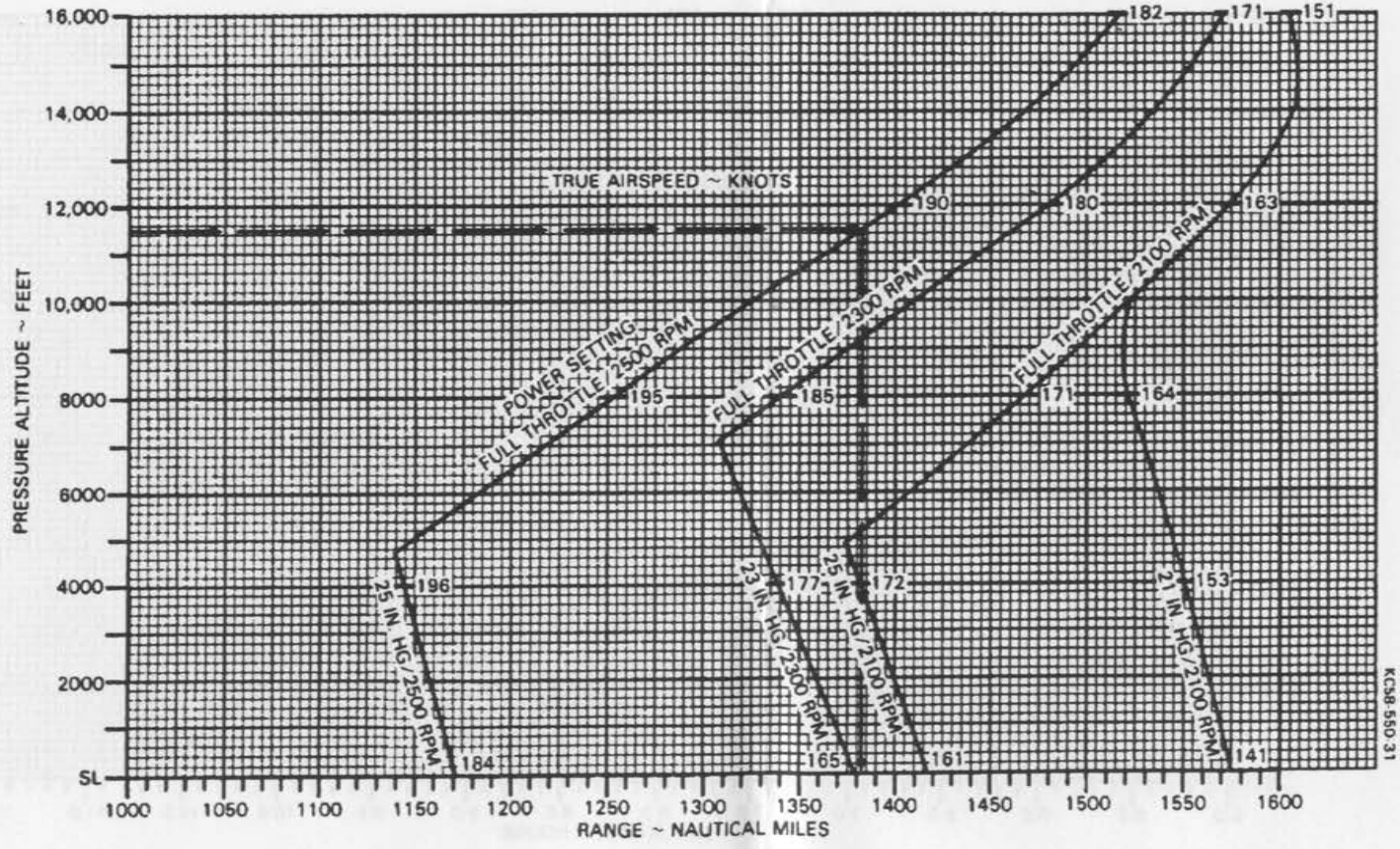
STANDARD DAY (ISA)

20°C LEAN OF PEAK EGT

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
RANGE	1382 NM

NOTE: RANGE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.



ENDURANCE PROFILE - 194 GALLONS

STANDARD DAY (ISA)

20°C RICH OF PEAK EGT

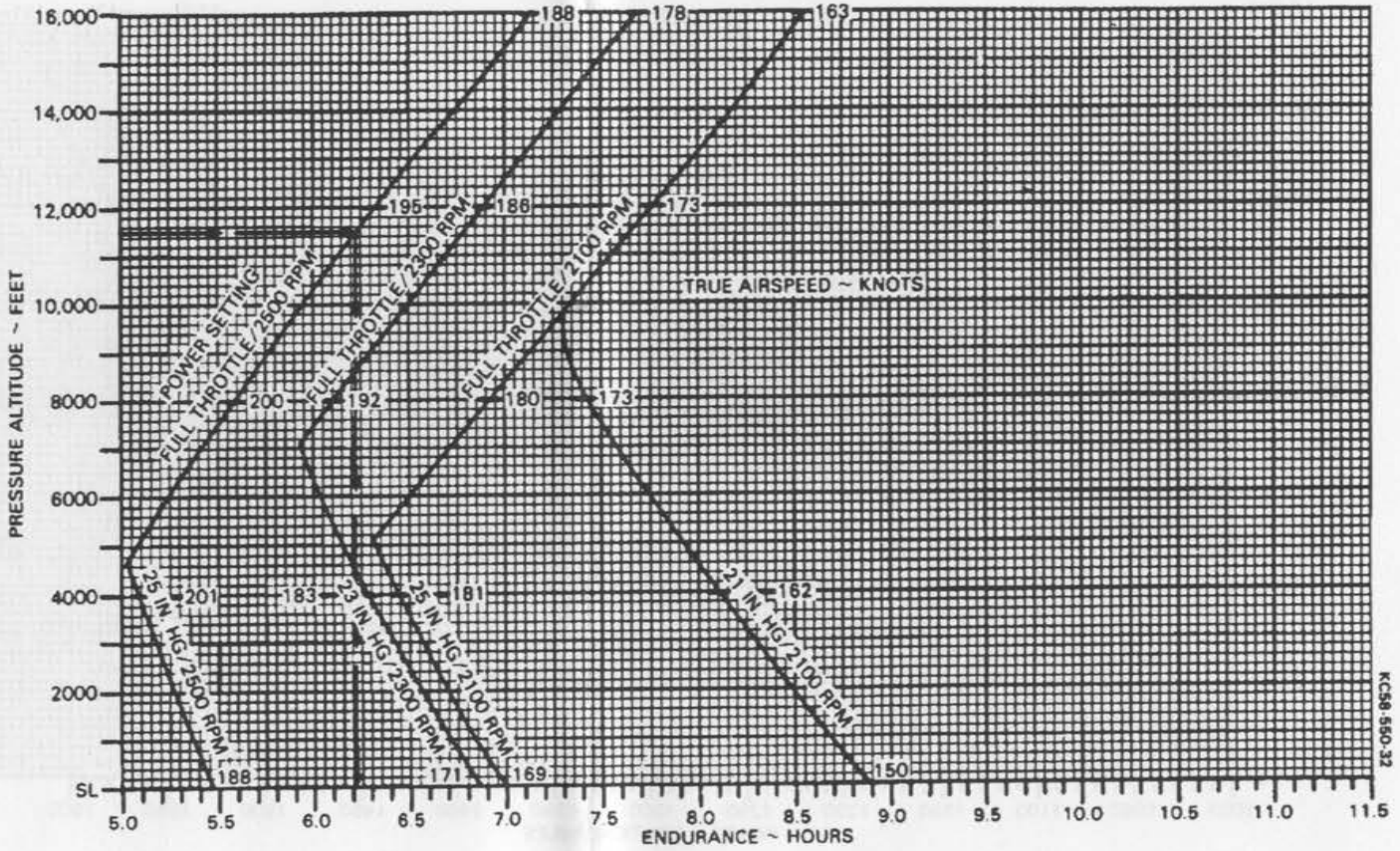
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	194 U.S. GAL (1164 LBS)

NOTE: ENDURANCE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
ENDURANCE	6.22 HRS



ENDURANCE PROFILE - 194 GALLONS

STANDARD DAY (ISA)

20°C LEAN OF PEAK EGT

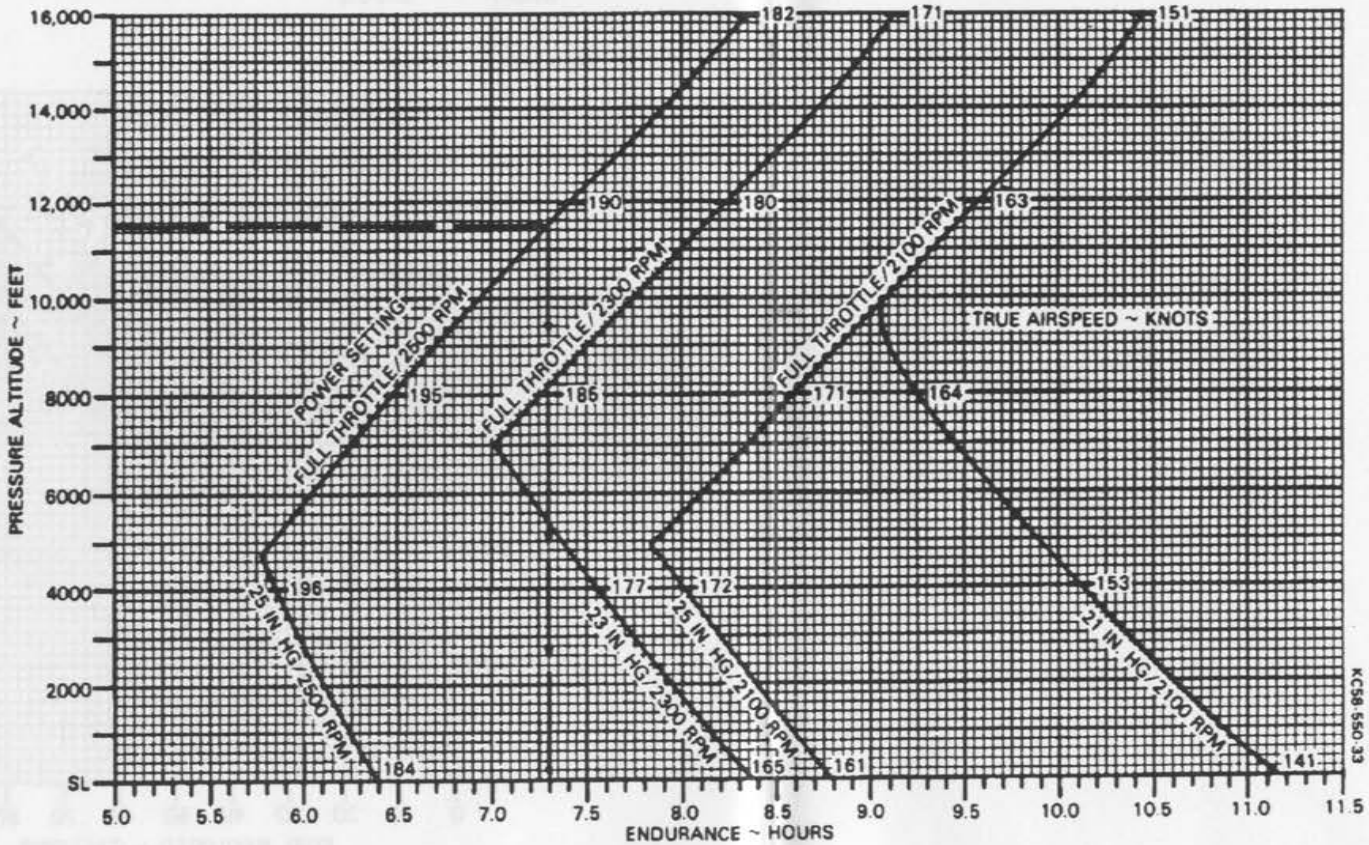
ASSOCIATED CONDITIONS:

WEIGHT	5524 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	194 U.S. GAL (1164 LBS)

NOTE: ENDURANCE ALLOWS FOR TAXI AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.

EXAMPLE:

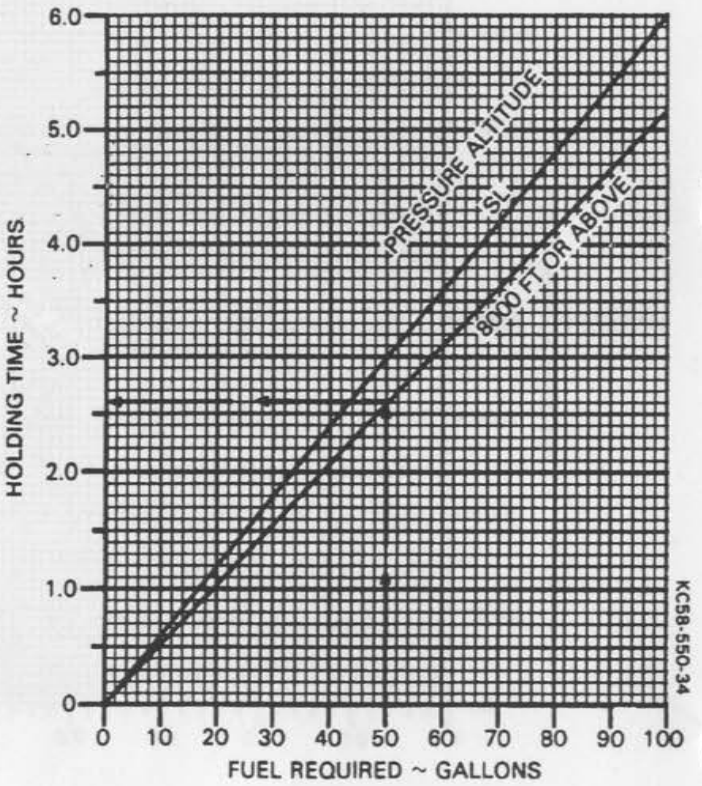
CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
ENDURANCE	7.3 HRS



HOLDING TIME

(APPLICABLE FOR ALL TEMPERATURES)

ASSOCIATED CONDITIONS:		EXAMPLE:	
POWER SETTINGS	21 IN. HG OR FULL THROTTLE AT 2100 RPM	FUEL AVAILABLE FOR HOLDING	50 GAL
		PRESSURE ALTITUDE	11,500 FT
MIXTURE	20°C LEAN OF PEAK EGT	HOLDING TIME	2.6 HRS
WEIGHT	5200 LBS		



TIME, FUEL, AND DISTANCE TO DESCEND

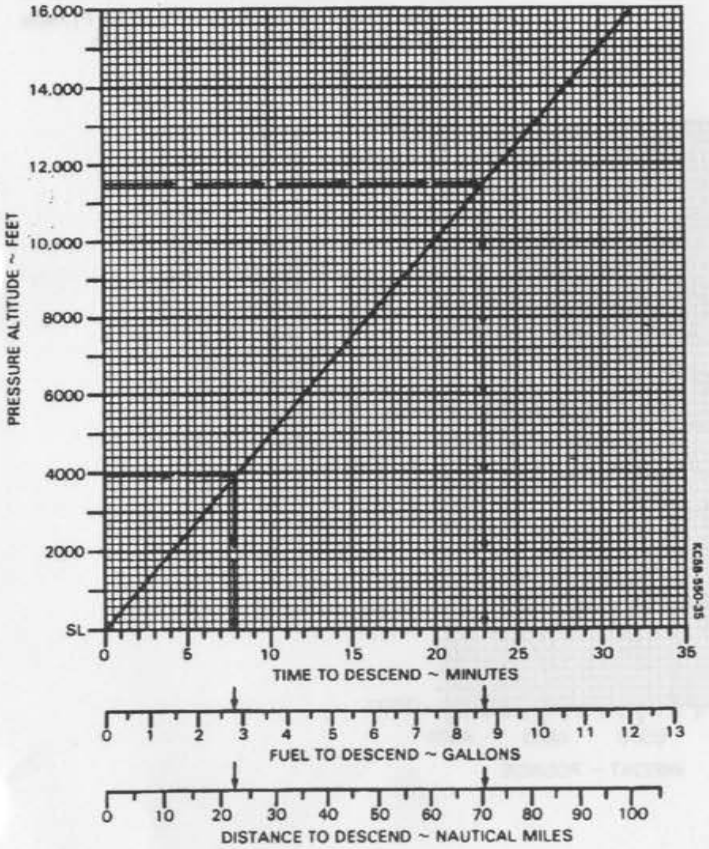
ASSOCIATED CONDITIONS:

POWER	AS REQUIRED TO MAINTAIN 500 FT/MIN RATE OF DESCENT
LANDING GEAR	UP
FLAPS	UP

EXAMPLE:

INITIAL ALTITUDE	11,500 FT
FINAL ALTITUDE	3965 FT
TIME TO DESCEND	(23-7.8) = 15.2 MIN
FUEL TO DESCEND	(8.7-2.8) = 5.9 GAL
DISTANCE TO DESCEND	(70-22) = 48 NM

DESCENT SPEED SCHEDULE	
ALTITUDE ~ FT	AIRSPEED ~ KTS
16,000 to 13,000	160
BELOW 13,000	170



CLIMB — BALKED LANDING

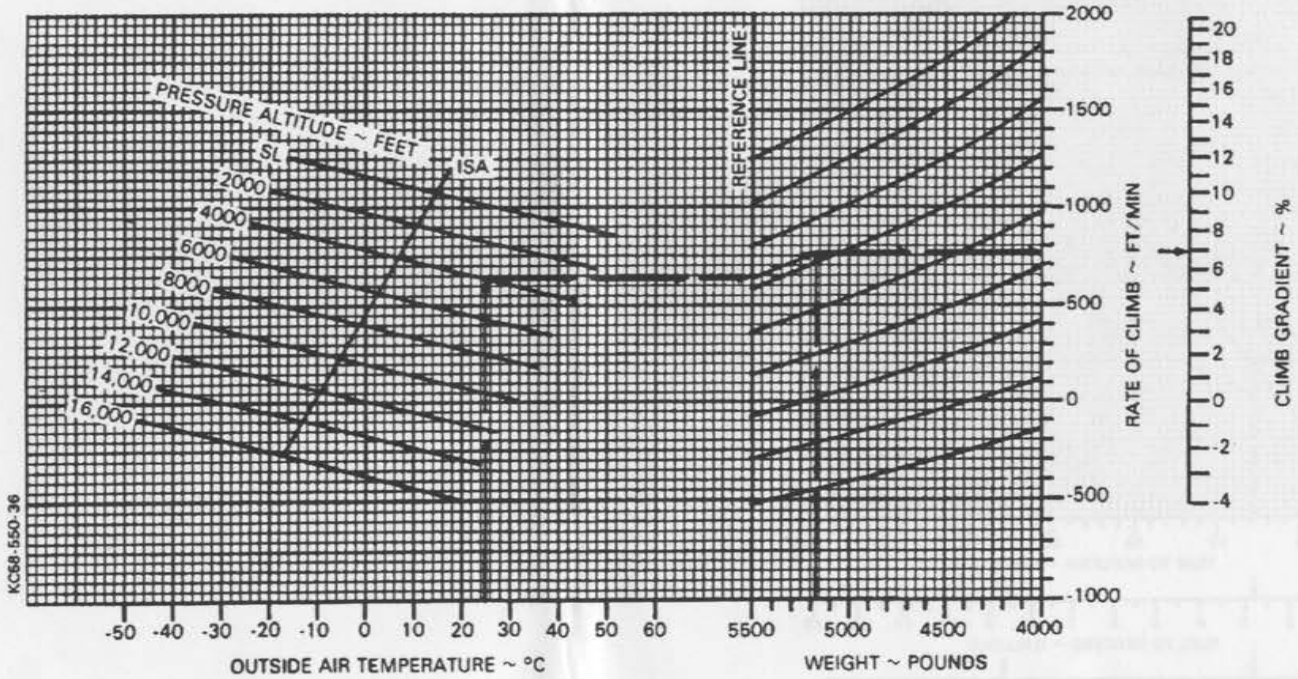
CLIMB SPEED: 95 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:

POWER	TAKE-OFF
MIXTURE	FULL RICH (TH-1472 THRU TH-1840, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY ALTITUDE (TH-1841 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS	DOWN (AMBER)
LANDING GEAR	DOWN

EXAMPLE:

OAT	25°C
PRESSURE ALTITUDE	3965 FT
WEIGHT	5166 LBS
RATE OF CLIMB	765 FT/MIN
CLIMB GRADIENT	6.9%



LANDING DISTANCE

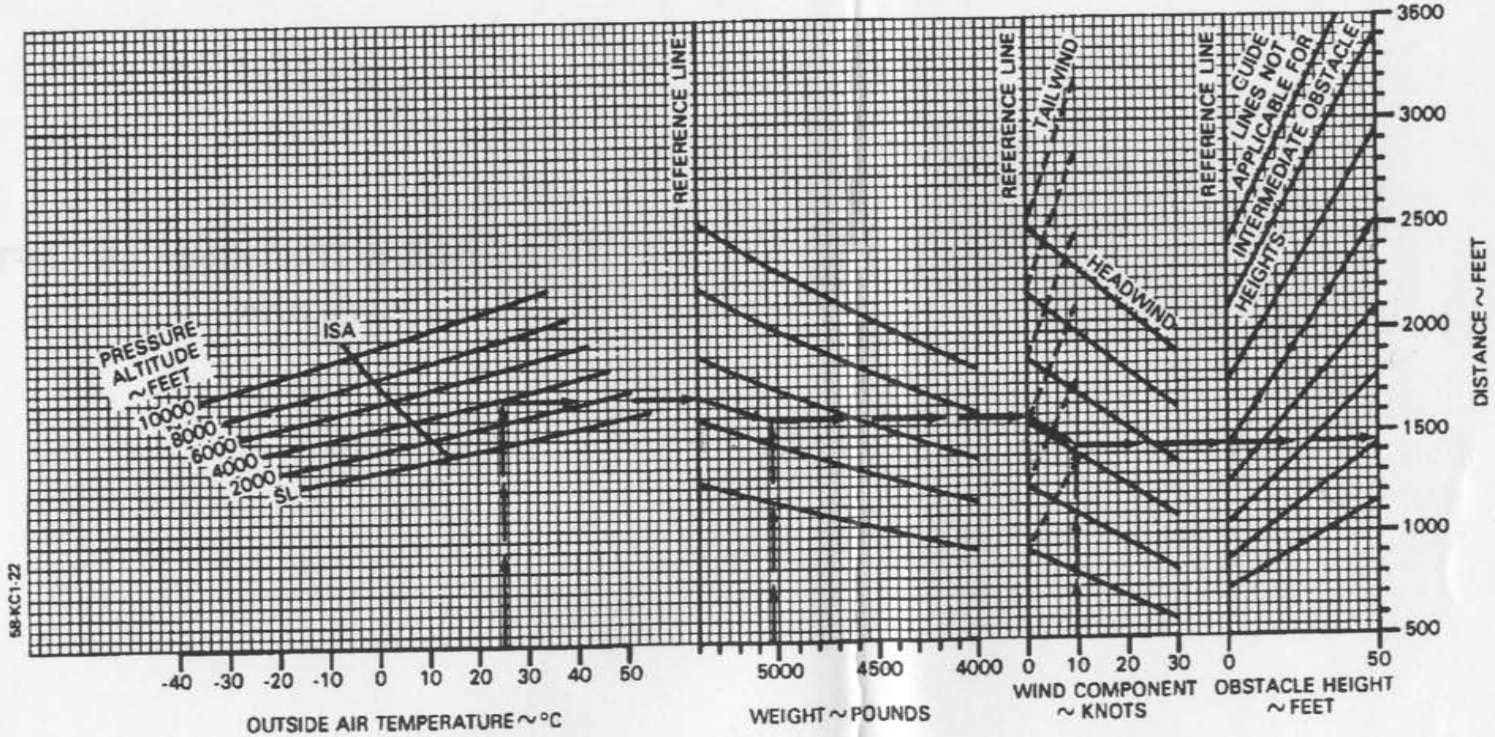
ASSOCIATED CONDITIONS:

POWER	RETARDED TO MAINTAIN 800 FT/MIN ON FINAL APPROACH
FLAPS	DOWN
LANDING GEAR	DOWN
APPROACH SPEED	IAS AS TABULATED
BRAKING	MAXIMUM
RUNWAY	PAVED, LEVEL, DRY SURFACE

WEIGHT ~ POUNDS	SPEED AT 50 FT KNOTS
5400	95
5000	91
4600	87
4000	81

EXAMPLE:

OAT	25°C (77°F)
PRESSURE ALTITUDE	3965 FT
WEIGHT	5039 LBS
WIND COMPONENT	9.5 KTS
GROUND ROLL	1450 FT
TOTAL OVER 50 FT OBSTACLE	2500 FT
APPROACH SPEED	91 KTS (105 MPH)



SECTION VI
WEIGHT AND BALANCE/EQUIPMENT LIST
TABLE OF CONTENTS

SUBJECT *PAGE*

Basic Empty Weight and Balance - Actual 6-3
Sample Loading 6-4
Weighing Instructions 6-5
Dimensional Data 6-7
Basic Empty Weight and Balance Form 6-8
Weight and Balance Record 6-10
Loading Instructions 6-12
Seating, Baggage and Equipment Arrangements 6-13
Moment Limits vs Weight Graph 6-14
Moment Limits vs Weight Table 6-15
Computing Procedure 6-16
Weight and Balance Loading Form 6-17
Useful Load Weights And Moments
Occupants 6-19
Baggage 6-20
Baggage, FWD of Spar
(Center Seats Removed) Arm 108 6-21
Baggage, AFT of Spar
(Center & Aft Seats Removed) Arm 145 6-22
Usable Fuel 6-23
Equipment List..... Prepared on an individual airplane basis

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BASIC EMPTY WEIGHT AND BALANCE - ACTUAL
(THIS PAGE TO BE REPLACED UPON AIRCRAFT DELIVERY)

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SAMPLE LOADING
(THIS PAGE TO BE REPLACED UPON AIRCRAFT DELIVERY)

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WEIGHING INSTRUCTIONS

Periodic weighing of the airplane may be required to keep the Basic Empty Weight current. All changes to the airplane affecting weight and balance are the responsibility of the airplane's owner and/or operator.

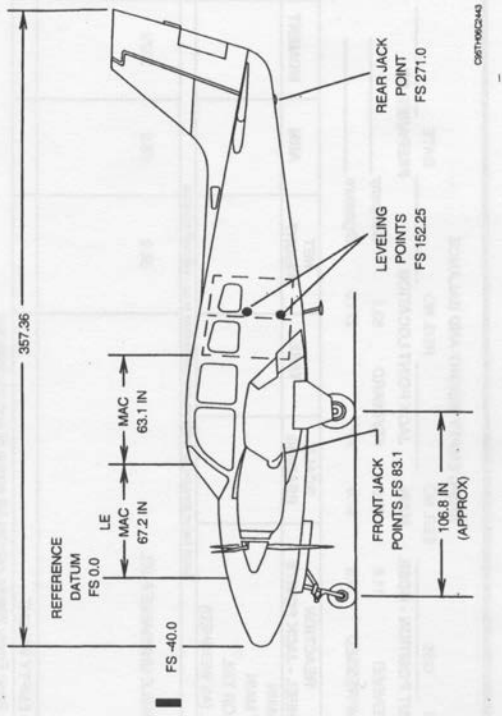
1. Three jack points are provided for weighing: two on the wing front spar at Fuselage Station 83.1 and one on the aft fuselage at Fuselage Station 271.0.
2. Fuel should be drained prior to weighing. Tanks are drained from the regular drain ports with the airplane in static ground attitude. When tanks are drained, 5.7 pounds of trapped fuel remain in the airplane at Fuselage Station 81.6. The remainder of the unusable fuel to be added to a drained system is 30.3 pounds at Fuselage Station 78.5.
3. Engine oil must be at the full level or completely drained. Total engine oil when full is 45 pounds at Fuselage Station 43.
4. To determine airplane configuration at time of weighing, installed equipment is checked against the airplane equipment list or superseding forms. All installed equipment must be in its proper place during weighing.
5. The airplane must be longitudinally and laterally level with the landing gear fully extended at the time of weighing. Leveling screws are located on the left side of the fuselage at Fuselage Station 152.25 (approximately). Longitudinally level attitude is determined with a plumb bob. Laterally level attitude is obtained when the vertical distance from each wing tip to the floor is equal.
6. Measurement of the reaction arms for a wheel weighing is made using a steel measuring tape. Measurements are taken with the airplane level on the scales, from the reference (a plumb bob dropped from the center of either main jack point) to the axle center line of the main gear and then to the nose wheel axle center line. The main wheel

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axle center line is best located by stretching a string across from one main wheel to the other. All measurements are to be taken with the tape level with the hangar floor and parallel to the fuselage center line. The locations of the wheel reactions will be approximately at Fuselage Station 96.7 for main wheels and Fuselage Station -10.3 for the nose wheel.

7. Jack point weighings are accomplished by placing scales at the jack points specified in step 1 above. Since the center of gravity of the airplane is forward of Fuselage Station 83.1, the tail reaction of the airplane will be in an up direction. This can be measured on regular scales by placing ballast of approximately 200 pounds on the scales to which the aft weighing point is attached by cable of adjustable length. The up reaction will then be total ballast weight minus the scale reading and is entered in the weighing form as a negative quantity.
8. Weighing should always be made in an enclosed area which is free from air currents. The scales used should be properly calibrated and certified.

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DIMENSIONAL DATA

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BASIC EMPTY WEIGHT AND BALANCE

BARON G58 SER. NO _____ REG. NO _____ DATE _____

STRUT POSITION - NOSE	MAIN	JACK POINT LOCATION		PREPARED BY
EXTENDED -11.6	96.0	*FORWARD* 83.1	*Company*	
COMPRESSED -9.8	97.0	*AFT* 271.0	*Signature*	

REACTION WHEEL - JACK POINTS	SCALE READING	TARE	NET WEIGHT	ARM	MOMENT
LEFT MAIN					
RIGHT MAIN					
NOSE OR TAIL					
TOTAL (AS WEIGHED)					
Space below provided for additions and subtractions to as - weighed condition					
ADD:					
DRAINABLE UNUSABLE FUEL			30.3	78.5	2379
BASIC EMPTY WEIGHT					

NOTE: Basic Empty Weight includes full engine oil and unusable fuel.

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NOTE

Each new airplane is delivered with a completed sample loading, basic empty weight and center of gravity, and equipment list, all pertinent to that specific airplane. It is the owner and/or operator's responsibility to ensure that changes in equipment are reflected in a new weight and balance and in an addendum to the equipment list. There are many ways of doing this; it is suggested that a running tally of equipment changes and their effect on basic empty weight and CG is a suitable means for meeting both requirements.

The current equipment list and basic empty weight and CG information must be retained with the airplane when it changes ownership. Raytheon Aircraft cannot maintain this information; the current status is known only to the owner.

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WEIGHT AND BALANCE RECORD

SERIAL NO. _____ REGISTRATION NO. _____ PAGE NO. _____

DATE	ITEM NO. IN	ITEM NO. OUT	DESCRIPTION OF ARTICLE OR CHANGE	WEIGHT CHANGE ADDED (+) OR REMOVED (-) WT (LBS)	WEIGHT CHANGE ADDED (+) OR REMOVED (-) ARM (IN.)	WEIGHT CHANGE ADDED (+) OR REMOVED (-) MOM / 100	RUNNING BASIC EMPTY WEIGHT WT (LBS)	RUNNING BASIC EMPTY WEIGHT MOM / 100

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WEIGHT AND BALANCE RECORD

SERIAL NO. _____ REGISTRATION NO. _____ PAGE NO. _____

DATE	ITEM NO. IN	ITEM NO. OUT	DESCRIPTION OF ARTICLE OR CHANGE	WEIGHT CHANGE ADDED (+) OR REMOVED (-) WT (LBS)	WEIGHT CHANGE ADDED (+) OR REMOVED (-) ARM (IN.)	WEIGHT CHANGE ADDED (+) OR REMOVED (-) MOM /100	RUNNING BASIC EMPTY WEIGHT WT (LBS)	RUNNING BASIC EMPTY WEIGHT MOM /100

BT04946

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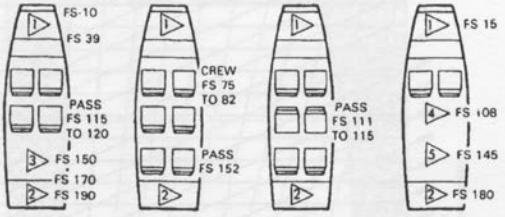
LOADING INSTRUCTIONS

It is the responsibility of the airplane operator to ensure that the airplane is properly loaded. At the time of delivery, Raytheon Aircraft provides the necessary weight and balance data to compute individual loadings. All subsequent changes in airplane weight and balance are the responsibility of the airplane owner and/or operator.

The basic empty weight and moment of the airplane at the time of delivery are shown on the airplane Basic Empty Weight and Balance form. Useful load items which may be loaded into the airplane are shown on the Useful Load Weight and Moment tables. The minimum and maximum moments are indicated by the heavy border line on the Moment Limits vs Weight graph. These moments correspond to the forward and aft center of gravity flight limits for a particular weight. All moments are divided by 100 to simplify computations.

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SEATING, BAGGAGE AND EQUIPMENT ARRANGEMENTS



NOTE

The floor structure load limit is 100 pounds per square foot, except for the area between the front and rear spars, where the floor structure load limit is 50 pounds per square foot.

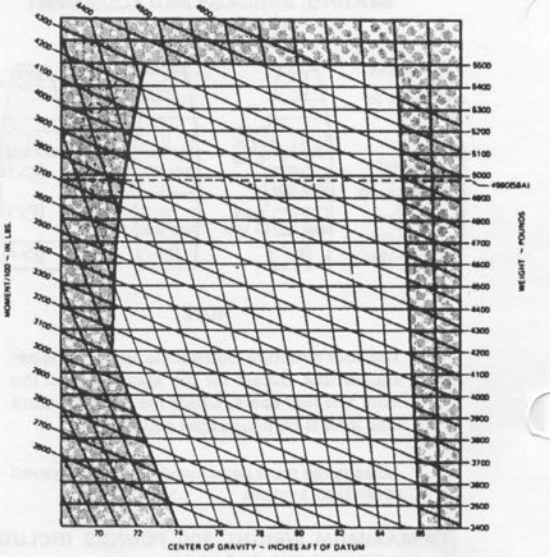
All baggage must be secured with an approved retention system.

1. MAXIMUM WEIGHT 300 POUNDS INCLUDING EQUIPMENT AND BAGGAGE.
2. MAXIMUM WEIGHT 120 POUNDS INCLUDING EQUIPMENT AND BAGGAGE.
3. MAXIMUM WEIGHT 400 POUNDS INCLUDING EQUIPMENT AND BAGGAGE WITH 5th and 6th SEATS REMOVED OR STOWED.
4. MAXIMUM WEIGHT 200 POUNDS FORWARD OF REAR SPAR INCLUDING EQUIPMENT AND BAGGAGE WITH 3rd and 4th SEATS REMOVED.
5. MAXIMUM WEIGHT 400 POUNDS AFT OF REAR SPAR INCLUDING EQUIPMENT AND BAGGAGE WITH 3rd, 4th, 5th and 6th SEATS REMOVED.

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MOMENT LIMITS vs WEIGHT



Moment limits are based on the following weight and center of gravity limit data (landing gear down). TH06C 991017AA

WEIGHT CONDITION	FORWARD CG LIMIT	AFT CG LIMIT
5500 lb. (58 max. take-off)	78.3	86.0
5400 lb. (58 max. landing)	78.0	86.0
4990 lb. (58A max. take-off or landing)	76.6	86.0
4200 lb. or less	74.0	86.0

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MOMENT LIMITS vs WEIGHT

WEIGHT POUNDS	MOMENT/100		WEIGHT POUNDS	MOMENT/100	
	FWD LIMIT	AFT LIMIT		FWD LIMIT	AFT LIMIT
3500	2590	3010	4550	3420	3913
3525	2609	3032	4575	3442	3935
3550	2627	3053			
3575	2646	3075	4600	3465	3956
			4625	3488	3978
3600	2664	3096	4650	3510	3999
3625	2683	3118	4675	3534	4021
3650	2701	3139			
3675	2720	3161	4700	3556	4042
			4725	3579	4064
3700	2738	3182	4750	3602	4085
3725	2757	3204	4775	3625	4107
3750	2775	3225			
3775	2794	3247	4800	3648	4128
			4825	3671	4150
3800	2812	3268	4850	3694	4171
3825	2831	3290	4875	3717	4193
3850	2849	3311			
3875	2868	3333	4900	3740	4214
			4925	3764	4236
3900	2886	3354	4950	3786	4257
3925	2905	3376	4975	3810	4279
3950	2923	3397	4990	3824	4291
3975	2942	3419			
			5000	3833	4300
4000	2960	3440	5025	3856	4322
4025	2979	3462	5050	3880	4343
4050	2997	3483	5075	3904	4365
4075	3016	3505			
			5100	3928	4386
4100	3034	3526	5125	3950	4408
4125	3053	3548	5150	3974	4429
4150	3071	3569	5175	3998	4451
4175	3090	3591			
			5200	4021	4472
4200	3108	3612	5225	4045	4494
4225	3130	3634	5250	4068	4515
4250	3152	3655	5275	4092	4537
4275	3174	3677			
			5300	4116	4558
4300	3196	3698	5325	4140	4580
4325	3218	3720	5350	4164	4601
4350	3240	3741	5375	4188	4623
4375	3263	3763			
			5400	4212	4644
4400	3285	3784	5425	4236	4666
4425	3308	3806	5450	4260	4687
4450	3330	3827	5475	4284	4709
4475	3352	3849			
			5500	4307	4730
4500	3374	3870			
4525	3398	3892			

SVC0418

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COMPUTING PROCEDURE

1. Record the Basic Empty Weight and Moment from the Basic Empty Weight and Balance form (or from the latest superseding form) under the Basic Empty Condition block. The moment must be divided by 100 to correspond to Useful Load Weights and Moments tables.
2. Record the weight and corresponding moment from the appropriate table of each of the useful load items (except fuel) to be carried in the airplane.
3. Total the weight column and moment column. The SUB-TOTALS are the Zero Fuel Condition.
4. Determine the weight and corresponding moment for the total fuel loading to be used. This fuel loading includes fuel for the flight, plus that required for start, taxi, and run-up. Add the Total Fuel Loading Condition to Zero Fuel Condition to obtain the SUB-TOTAL Ramp Condition.
5. Subtract the fuel to be used for start, taxi, and run-up, to arrive at the SUB-TOTAL Take-off Condition.
6. Subtract the weight and moment of the FUEL TO DESTINATION from the take-off weight and moment. (Determine the weight and moment of this fuel by subtracting the amount on board at landing from the amount on board at take-off.) The Zero Fuel Condition, the Take-Off Condition, and the Landing Condition moments must be within the minimum and maximum moments shown on the Moment Limits vs Weight graph for that weight. If the total moment is less than the minimum moment allowed, useful load items must be shifted aft or forward load items reduced. If the total moment is greater than the maximum moment allowed, useful load items must be shifted forward or aft load items reduced. If the quantity or location of load items is changed, the calculations must be revised and the moments rechecked.

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WEIGHT AND BALANCE LOADING FORM

BARON_____DATE _____

SERIAL NO. _____ REG NO. _____

ITEM		WEIGHT	MOM/100
1.	Basic Empty Condition		
2.	Front Seat Occupants		
3.	3rd and 4th Seat Occupants		
4.	5th and 6th Seat Occupants		
5.	Nose Baggage		
6.	AFT Baggage		
7.	Baggage		
8.	Subtotal: Zero Fuel Condition		
9.	Fuel Loading		
10.	Subtotal: Ramp Condition		
11.	*Less Fuel for Start, Taxi, and Run-up		
12.	Subtotal: Take-off Condition		
13.	Less Fuel To Destination		
14.	Landing Condition		

* Fuel for start, taxi, and run-up is normally 24 lbs at an average mom/100 of 20.

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WEIGHT AND BALANCE LOADING FORM

BARON_____DATE _____

SERIAL NO. _____ REG NO. _____

ITEM		WEIGHT	MOM/100
1.	Basic Empty Condition		
2.	Front Seat Occupants		
3.	3rd and 4th Seat Occupants		
4.	5th and 6th Seat Occupants		
5.	Nose Baggage		
6.	AFT Baggage		
7.	Baggage		
8.	Subtotal: Zero Fuel Condition		
9.	Fuel Loading		
10.	Subtotal: Ramp Condition		
11.	*Less Fuel for Start, Taxi, and Run-up		
12.	Subtotal: Take-off Condition		
13.	Less Fuel To Destination		
14.	Landing Condition		

* Fuel for start, taxi, and run-up is normally 24 lbs at an average mom/100 of 20.

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USEFUL LOAD WEIGHTS AND MOMENTS
OCCUPANTS

WEIGHT	Front Seats		Standard Seating 3rd and 4th Fwd Facing		Club Seating 3rd and 4th Aft Facing		5th and 6th Seats
	Fwd Position	Aft Position	Fwd Position	Aft Position	Fwd Position	Aft Position	Standard or Club Seating
	ARM 75	ARM 82	ARM 115	ARM 120	ARM 111	ARM 115	ARM 152
	MOM/100						
100	75	82	115	120	111	115	152
110	82	90	126	132	122	126	167
120	90	98	138	144	133	138	182
130	98	106	150	156	144	150	198
140	105	114	161	168	155	161	212
150	112	123	172	180	166	172	228
160	120	131	184	192	178	184	243
170	128	139	196	204	188	196	258
180	135	148	207	216	200	207	274
190	142	156	218	228	210	218	289
200	150	164	230	240	222	230	304

NOTE: OCCUPANT POSITIONS SHOWN ARE FOR THE SEATS ADJUSTED THE MAXIMUM RANGE. INTERMEDIATE POSITIONS WILL REQUIRE INTERPOLATION OF THE MOM/100 VALUES.

BT05079

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USEFUL LOAD WEIGHTS AND MOMENTS
BAGGAGE

Wt.	NOSE COMPT ARM 15 Mom/100	REAR FS 131 TO 170 ARM 150 Mom/100	AFT FS 170 TO 190 ARM 180 Mom/100
10	2	15	18
20	3	30	36
30	5	45	54
40	6	60	72
50	8	75	90
60	9	90	108
70	11	105	126
80	12	120	144
90	14	135	162
100	15	150	180
110	17	165	198
120	18	180	216
130	20	195	
140	21	210	
150	23	225	
160	24	240	
170	26	255	
180	27	270	
190	29	285	
200	30	300	
220	33	330	
240	36	360	
260	39	390	
280	42	420	
300	45	450	
320		480	
340		510	
360		540	
380		570	
400		600	

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USEFUL LOAD WEIGHTS AND MOMENTS
BAGGAGE
FWD OF SPAR
(CENTER SEATS REMOVED)
ARM 108

Weight	Moment / 100	Weight	Moment / 100
10	11	110	119
20	22	120	130
30	32	130	140
40	43	140	151
50	54	150	162
60	65	160	173
70	76	170	184
80	86	180	194
90	97	190	205
100	108	200	216

BT05074

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USEFUL LOAD WEIGHTS AND MOMENTS
BAGGAGE
AFT OF SPAR
(CENTER & AFT SEATS REMOVED)
ARM 145

Weight	Moment / 100	Weight	Moment / 100
10	15	210	305
20	29	220	319
30	44	230	334
40	58	240	348
50	73	250	363
60	87	260	377
70	102	270	392
80	116	280	406
90	131	290	421
100	145	300	435
110	160	310	450
120	174	320	464
130	189	330	479
140	203	340	493
150	218	350	508
160	232	360	522
170	247	370	537
180	261	380	551
190	276	390	566
200	290	400	580

BT05075

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USEFUL LOAD WEIGHTS AND MOMENTS
USABLE FUEL

Gallons	Weight	136 GAL	166 GAL	194 GAL
		Mom/100		
10	60	46	46	46
20	120	92	92	92
30	180	140	140	140
40	240	189	189	189
50	300	238	238	238
60	360	288	288	288
70	420	338	338	338
80	480	388	388	388
90	540	439	439	439
100	600	489	489	489
110	660	539	539	539
120	720	590	590	590
130	780	641	641	641
136	816	671		
140	840		692	692
150	900		743	743
160	960		793	793
166	996		824	
170	1020			845
180	1080			899
190	1140			953
194	1164			974

BT05071

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SECTION VII
SYSTEMS DESCRIPTION
TABLE OF CONTENTS

SUBJECT	*PAGE*
Airframe	7-5
Seating Arrangements	7-5
Flight Controls	7-5
Control Surfaces	7-5
Control Columns	7-5
Rudder Pedals	7-5
Trim Controls	7-6
Instrument Panel	7-6
Flight Instruments	7-6
Engine Instrumentation	7-6
Annunciator System	7-7
Annunciator Panel	7-8
Typical Illustrations	7-9
Left Side Panel	7-9
Typical Instrument Panel	7-10
Pedestal	7-11
Pilot's and Copilot's Subpanel	7-12
Ground Control	7-13
Wing Flaps	7-13
Landing Gear System	7-14
Control Switch	7-14
Position Lights	7-14
Safety Switches	7-15
Warning Horn and Gear Up Annunciator	7-15
Manual Extension	7-16
Brakes	7-17
Baggage Compartments	7-17
Aft Baggage Compartment	7-17
Nose Baggage Compartment	7-18
Seating	7-18

FOR CLASSROOM USE
ONLY

Section VII
Systems Description
TABLE OF CONTENTS (CONT'D)

SUBJECT	PAGE
Seat Belts and Shoulder Harnesses	7-19
Doors, Windows and Exits	7-20
Cabin Door	7-20
Utility Doors	7-21
Openable Cabin Windows	7-21
Emergency Exits	7-22
Control Locks	7-23
Engines	7-24
Engine Controls	7-24
Propeller, Throttle and Mixture	7-24
Induction Air	7-24
Engine Ice Protection	7-25
Engine Lubrication	7-25
Cowl Flaps	7-26
Propellers	7-26
Propeller Synchronizer	7-26
Propeller Synchroscope	7-27
Fuel System	7-27
Fuel Cells	7-28
Fuel Quantity Indicators	7-29
Fuel Flow Indicators	7-29
142 Gallon Capacity Fuel System	7-30
172 Gallon Capacity Fuel System	7-31
200 Gallon Capacity Fuel System	7-32
Fuel Crossfeed (One-Engine-Inoperative Only)	7-33
Engine Driven Fuel Pumps	7-33
Fuel Boost Pumps	7-34
LO Position	7-34
HI Position	7-34
Fuel Off-Loading	7-34
Fuel Required For Flight	7-34
Electrical System	7-35
Batteries	7-35

FOR CLASSROOM USE ONLY

Section VII
Systems Description
TABLE OF CONTENTS

SUBJECT	PAGE
Alternators	7-35
Starters	7-36
Electrical System Schematic	7-37
Power Distribution Schematic	7-38
External Power	7-39
Lighting System	7-39
Interior Lighting	7-39
Exterior Lighting	7-40
Environmental System	7-40
Cabin Heating	7-40
Enviromental Schematic	7-43
Cabin Ventilation	7-44
Individual Overhead Fresh Air Outlets	7-44
Exhaust Vents	7-44
Oxygen System (If Installed)	7-44
Pitot and Static System	7-45
Pitot System	7-45
Normal Static Air System	7-46
Emergency Static Air System	7-46
Instrument Air Pressure System	7-46
Stall Warning	7-47
Ice Protection Systems	7-47
Surface Deice System	7-47
Electrothermal Heated Windshield Segment	7-48
Electrothermal Propeller Deice	7-49
Pitot Heat	7-49
Stall Warning Anti-Ice	7-50
Heated Fuel Vents	7-50
Engine Break-In Information	7-50

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AIRFRAME

The Beech Baron 58 is an all-metal, low-wing, twin-engine monoplane with full retractable tricycle landing gear and a conventional horizontal and vertical stabilizer.

SEATING ARRANGEMENTS

The Beech Baron 58 is a four- to six-place airplane. In the standard configuration, four forward-facing seats are installed. The fifth and sixth forward-facing seats are optional.

In the optional club-seating configuration, the third and fourth seats are aft-facing and the fifth and sixth are forward-facing.

FLIGHT CONTROLS

CONTROL SURFACES

Control surfaces are bearing supported and operated through push-pull rods and conventional chain/cable systems terminating in bellcranks.

CONTROL COLUMNS

The airplane is equipped with dual control columns for the pilot and copilot. The control wheels are interconnected and provide aileron and elevator control.

RUDDER PEDALS

To adjust the rudder pedals, press the spring-loaded lever on the side of each pedal and move the pedal to its forward or aft position. The adjustment lever can also be used to place the right set of rudder pedals against the floor (when the copilot brakes are not installed) when not in use.

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TRIM CONTROLS

Trim tabs on the rudder, left aileron, and elevator are adjustable with the controls that are mounted on the center console. The trim tabs and controls are connected through closed cable systems. Mechanical position indicators for each of the trim tabs are integrated with their respective controls. The left aileron tab incorporates servo action in addition to its trimming purpose. Elevator trim is accomplished through the manual pitch trim system.

INSTRUMENT PANEL

FLIGHT INSTRUMENTS

The flight instruments are located on a panel directly in front of the pilot's seat. Standard flight instrumentation includes attitude and directional gyros, airspeed, altimeter, vertical speed, turn coordinator, and gyro pressure gages. A magnetic compass is mounted above the instrument panel and an outside air temperature indicator is located on the left side panel. A quartz digital readout clock is mounted in the center of the pilot's control wheel.

ENGINE INSTRUMENTATION

Most of the engine instruments are located in two columns on the left of the center instrument panel. Each column provides gages for its respective engine. At the top are the engine manifold pressure gages followed by the tachometers and the fuel flow gages. Below these are the four multiple readout indicators; two for cylinder head temperature (CHT) and exhaust gas temperature (EGT) and two for oil temperature and pressure. The left and right loadmeters, the bus voltmeter and the left and right fuel quantity indicators are located on the center subpanel.

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ANNUNCIATOR SYSTEM

The annunciator system consists of an annunciator panel mounted in the glareshield above the pilot's control column, an ANNUN TEST switch on the left side of the pilot's subpanel, and a photoelectric cell dimmer switch on the right side of the pilot's subpanel.

The annunciators are the legible-when-lit type. Whenever an advisory or a warning condition covered by the annunciator system occurs, a signal is generated and the appropriate annunciator is illuminated. Any illuminated lamps in the annunciator panel will remain on while the advisory or warning condition exists.

The annunciators have both a bright and a dim mode of illumination intensity, with the exception of the START, AFT DOOR and GEAR UP (if installed) annunciators, which are always in the bright mode. The dim mode will be selected automatically whenever the ambient light level in the cockpit as sensed by the photoelectric cell on the pilot's subpanel is below a preset value. If the ambient light level is above the preset value, the bright mode will be selected automatically.

The lamps in the annunciator panel should be tested before every flight, and anytime the integrity of a lamp is in question. Depressing the ANNUN TEST switch button on the pilot's subpanel illuminates all of the annunciators. Any lamp that fails to illuminate when tested should be replaced. Refer to LAMP REPLACEMENT GUIDE in Section VIII, HANDLING, SERVICING & MAINTENANCE.

The photoelectric cell dimmer switch can be tested by covering the switch with the finger, which should cause the applicable bright annunciators to dim.

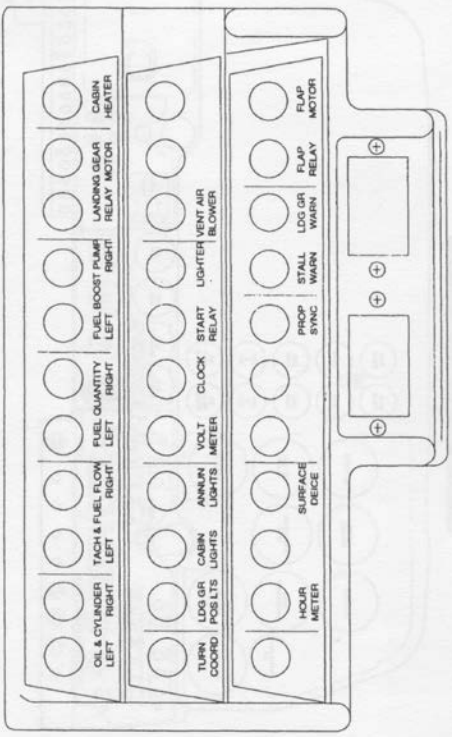
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ANNUNCIATOR PANEL

NOMENCLATURE	COLOR	PROBABLE CAUSE FOR ILLUMINATION
LEFT ALTR	Red	Left Alternator Off The Line
RIGHT ALTR	Red	Right Alternator Off The Line
START	Red	Starter Energized
AFT DOOR	Red	Aft Utility Door Unlatched
GEAR UP	Red	Landing gear is up with full flaps or landing gear is up and manifold pressure is below approximately 13 in. Hg on both engines (TH-1543, TH-1545 and After)

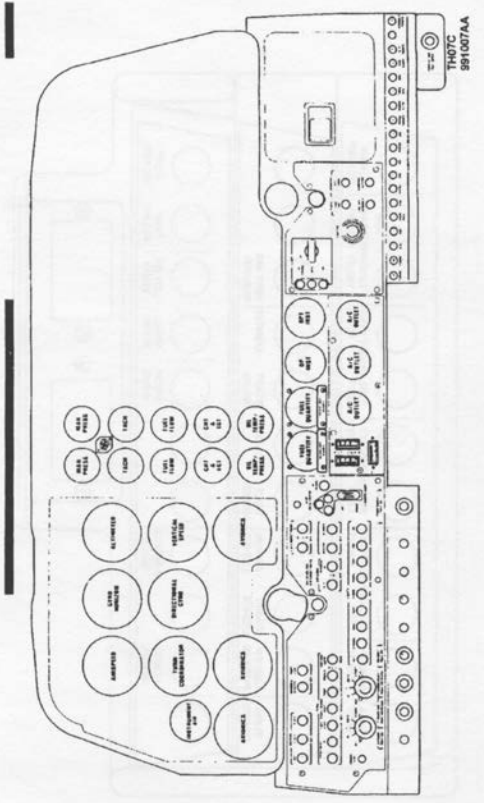
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TYPICAL ILLUSTRATIONS



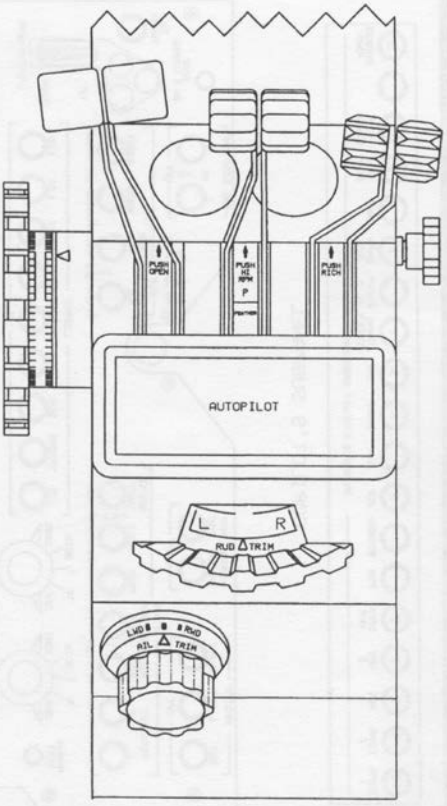
LEFT SIDE PANEL

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TYPICAL INSTRUMENT PANEL

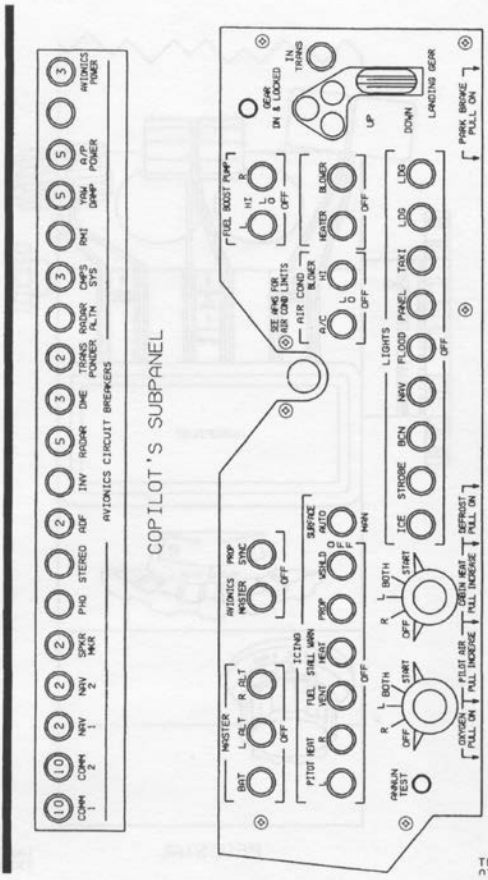
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PEDESTAL

TH07C
030053AA

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GROUND CONTROL

Spring-loaded linkage from the nose gear to the adjustable rudder pedals allows for nose wheel steering. Smooth turning is accomplished by allowing the airplane to roll while depressing the appropriate rudder pedal. Sharper turns require light brake pedal pressure on the depressed rudder pedal.

The minimum wing tip turning radius, using partial braking action and differential is 31 feet 6 inches.

WING FLAPS

A three-position wing flap switch, UP (0°), APH (15°), and DN (30°), is located on the copilot's subpanel. The switch must be pulled out of a detent to change flap position. The flaps can be moved to either position desired from any previously selected position; there are no intermediate positions.

Three flap position lights, placarded IN TRANSIT (red), APH (blue), and DN (amber), are located immediately to the left of the flap switch. All of the lights are extinguished when the flaps are in the UP position. The illumination intensity of the lights is controlled by the photoelectric cell dimmer switch on the above the landing gear handle. The lamps can be tested by pressing the ANNUN TEST button on the left side of the pilot's subpanel.

Lowering the flaps in flight will produce the following effects:

- Attitude - Nose Down
- Airspeed - Reduced
- Stall Speed - Lowered

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LANDING GEAR SYSTEM

CAUTION

Never taxi with a flat strut.

CONTROL SWITCH

The landing gear is controlled by a two-position switch on the right side of the pilot's subpanel. The switch handle must be pulled out of the safety detent before it can be moved to the opposite position. Never operate the landing gear electrically with the handcrank engaged.

WARNING

On serials TH-1543, TH-1545 and After, the landing gear will not retract unless one of the throttles is in a position corresponding to approximately 15 in. Hg manifold pressure or above.

CAUTION

Do not change the position of the control switch to reverse the direction of the landing gear while the gear is in transit, as this could cause damage to the retract mechanism.

POSITION LIGHTS

Landing gear position lights are located above the control switch. Three green lights, forming a triangle to represent the individual gears, are illuminated whenever the gears are down and locked. A red light, immediately to the right of the three green lights, illuminates anytime one or all of the landing gears are in transit or in any intermediate position. All of the lights are extinguished when the gears are up and locked.

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The photoelectric cell dimmer switch on the right side of the pilot's subpanel controls the illumination intensity of the landing gear position lights. The ANNUN TEST switch on the pilot's left subpanel is pressed to determine lamp integrity.

SAFETY SWITCHES

Retraction of the landing gear on the ground is prevented by compressing the two main strut safety switches (or, on serials TH-1543, TH-1545 and After, by retarding both throttles below approximately the 15 in. Hg manifold pressure position.) When either strut is compressed (or both throttles are below the preset position), the control circuit is open and the gear cannot retract. However, maneuvering over rough terrain with at least one throttle above approximately 15 in. Hg manifold pressure may allow the gear struts to extend momentarily, closing the circuit long enough to begin retraction. NEVER RELY ON THE SAFETY SWITCHES TO KEEP THE GEAR DOWN DURING GROUND MANEUVERING. CHECK TO SEE THAT THE LANDING GEAR HANDLE IS DOWN.

WARNING HORN AND GEAR UP ANNUNCIATOR

If either or both throttles are retarded below an engine setting sufficient to sustain two engine flight with the landing gear retracted, a warning horn will sound intermittently and, on serials TH-1543, TH-1545 and After, the GEAR UP annunciator will flash. During one engine operation, the horn can be silenced by advancing the throttle of the inoperative engine until the throttle warning horn switch opens the circuit.

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NOTE

The switches which activate the warning horn and GEAR UP annunciator are operated by the throttles, thus the horn (and GEAR UP annunciator, if installed) will always activate at the same throttle position. The resultant manifold pressure is dependent on altitude and rpm. On serials TH-1543, TH-1545 and After, the warning horn and GEAR UP annunciator are also activated when the flaps are full down and the landing gear is retracted.

MANUAL EXTENSION

The landing gear can be manually extended, but not retracted, by operating the handcrank at the rear of the pilot's seat. Make certain that the landing gear handle is in the down position and pull the landing gear MOTOR circuit breaker before manually extending the gear. When the electrical system is operative, the landing gear may be checked for full down with the gear position lights, provided the landing gear RELAY circuit breaker is engaged. After the landing gear is down, disengage the handcrank. For electrical retraction of the landing gear after a practice manual extension use the procedures outlined in Section III, EMERGENCY PROCEDURES.

If the landing gear was extended for emergency reasons, do not move any landing gear controls or reset any switches or circuit breakers until the airplane is on the ground and the malfunction has been determined and corrected, to prevent a gear retraction on the ground. These procedures are outlined in Section III, EMERGENCY PROCEDURES.

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BRAKES

The brakes on the main landing gear wheels are operated by applying toe pressure to the top of the rudder pedals.

The parking brake control is located just left of the elevator tab wheel on the pilot's subpanel. To set the parking brakes, pull the control out and pump each toe pedal until solid resistance is felt. Push the control in to release the brakes.

CAUTION

The parking brake should be left off and wheel chocks installed if the airplane is to be left unattended. Changes in ambient temperature can cause the brakes to release or exert excessive pressures.

The brake hydraulic fluid reservoir is accessible through the nose baggage door. Fluid level is checked with the dipstick attached to the reservoir cap. The brakes require no adjustments, since the pistons move outward to compensate for lining wear.

BAGGAGE COMPARTMENTS

AFT BAGGAGE COMPARTMENT

The aft baggage compartment is accessible through the utility door on the right side of the fuselage. This area extends aft of the pilot's seats to the rear bulkhead. Because of structural limitations, this area is divided into three sub-compartments, each having a different weight limitation. Loading within the baggage compartment must be in accordance with the data in Section VI, WEIGHT AND BALANCE/EQUIPMENT LIST. All baggage must be secured with the approved cargo retention systems.

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WARNING

Unless authorized by applicable Department of Transportation regulations, do not carry hazardous material anywhere in the airplane.

Do not carry children in the baggage compartment unless secured in a seat.

NOSE BAGGAGE COMPARTMENT

The forward baggage compartment is easily accessible through a large door on the right side of the nose. The door incorporates a pair of push-to-release type latches and a lift-to-release secondary latch. Hinged at the top, the door swings upward, clear of the loading area. Loading within this area must be within the limitations according to Section VI, WEIGHT AND BALANCE/ EQUIPMENT LIST. The nose baggage compartment incorporates the full width of the fuselage as usable space. This compartment also affords accessibility to the oxygen cylinder and to some of the airplane's avionics. Straps are provided and should be used to secure any baggage loaded into the nose baggage compartment.

SEATING

To adjust any of the four standard seats forward or aft, pull up on the release bar below the seat and slide the seat to the desired position. The pilot's seat (and optional copilot's seat) can be adjusted vertically by pulling up on the release lever below the forward right side of the seat and leaning forward. Weight must be shifted to the forward edge of the seat for proper adjustment. The seatbacks of all standard seats can be placed in any of four positions by operating a release lever on the inboard side of each seat. An option is available that provides for the seatbacks on all seats (except the pilot's) to be placed in any position from vertical to fully reclined. Outboard armrests for all

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standard seats are built into the cabin sidewalls. Center armrests can be elevated or positioned flush with the seat cushions. The 3rd and 4th place seats are equipped with a locking back to accommodate the shoulder harness, and the seatback can be folded over for access by rotating the red handle located on the lower inboard side of the seatback. The optional fifth and sixth seats can be folded up to provide additional floor space, or folded down to provide access to the extended baggage compartment.

Club seating is available. When occupied, aft facing chairs in the club seating arrangement must have the headrests in the fully raised position during takeoff and landing. When aft facing seats are reversed to the forward facing configuration, maintenance personnel must refer to the model 58 shop manual before making the conversion in order to assure proper installation.

SEAT BELTS AND SHOULDER HARNESSES

The shoulder harness is standard with all seats. The spring loading at the inertial reel keeps the harness snug but will allow normal movement during flight operations. The inertial reel is designed with a locking device that will secure the harness in the event of sudden forward movement or an impact action. When using the shoulder harness, the limitations stated on the cabin window placards must be observed.

Each strap is worn over the shoulder and down across the body, where it is fastened by a metal loop into the seat belt buckle. For the pilot seats, the harness strap is contained in an inertial reel attached to the side canopy structure of the cockpit. The inertial reel is covered with an escutcheon and the strap runs up from the reel location to a looped fitting attached to the window frame just aft of the pilot seats. For the third and fourth passenger seats, the inertial reel is attached into the seatback structure and is covered with the seatback upholstery. The strap runs up the seatback and over the outboard corner of the seatback. For the fifth and sixth passenger seats, the strap is

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contained in an inertial reel attached to the upper fuselage side structure, just aft of the seatback and is covered with an escutcheon.

NOTE

The seat belt is independent of the shoulder harness, but the outboard seat belt and the shoulder harness must be connected for stowage when the seat is not occupied.

DOORS, WINDOWS AND EXITS

CABIN DOOR

The airplane has a conventional cabin door on the forward right side of the fuselage. The spring-loaded outside handle will fit into the door recess creating a flat, aerodynamically clean surface. The door may be locked with a key.

To open the door from the outside, lift the handle from its recess and pull until the door opens.

To close the cabin door from the inside, observe that the door handle is in the open position. In this position, the latch handle is free to move approximately one inch in either direction before engagement of the locking mechanism. Grasp the door and firmly pull the door closed. Rotate the door handle fully counterclockwise into the locked position. Observe that the door handle indicator is in the CLOSED position (serials TH-1543, TH-1545 and After). When the door is properly locked, the door latch handle is free to move approximately one inch in either direction.

NOTE

When checking the door latch handle, do not move it far enough to engage the door latch release mechanism.

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Press firmly outward at the top rear corner of the door. If any movement of the door is detected, completely open the door and close again following the above instructions.

To open the door from the inside, depress the lock button and rotate the handle clockwise.

UTILITY DOORS

The utility doors located on the aft right side of the cabin provide for loading and unloading of passengers and baggage. Each door is half-hinged at the forward and aft edge of the door opening. The aft door must be closed first. A latch on the forward edge of the aft door moves downward to a locked position to secure the hooks at the top and bottom of the door to the door frame. The forward door cannot be fully closed until the latch of the aft door is latched and flush with the edge of the door. After the forward door is closed, it can be latched from the outside by rotating the half-moon shaped handle to the CLOSED position. A conventional handle on the inside of this door provides for opening or closing from the inside.

The AFT DOOR annunciator, located on the glareshield, remains illuminated until the doors are properly latched.

OPENABLE CABIN WINDOWS

NOTE

Windows are to be closed before and during flight.

A plastic covered multi-purpose latch on each openable window is used to provide partial opening of the window for ventilation during ground operations, and also quick unlatching for emergency egress.

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To Open Window For Ventilation (Only On Ground):

NOTE

Red handle for emergency exit only.

1. Lock Handle .... ROTATE TO UNLOCKED POSITION
2. Thumb Catch..... LIFT (window will release)
3. Latch ..... PUSH UP AND OUT TO OVER-CENTER POSITION

To Close Window:

1. Latch .....PULL INWARD AND PUSH DOWN UNTIL LOCKED (listen for detent)
2. Lock Handle .....ROTATE TO LOCKED POSITION

EMERGENCY EXITS

To open the emergency exit provided by the openable window on each side of the cabin:

1. Remove cover as indicated by placard in the center of the openable Window/Emergency Exit latch cover.
2. Rotate handle up as indicated by placard, breaking safety wire, and push window out.

NOTE

Anytime the window has been opened by breaking the safety wire on the red emergency latch, the window must be reattached and wired by a qualified mechanic using a single strand of QQ-W-343, Type S, .020 diameter copper wire prior to further airplane operation.

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CONTROL LOCKS

The control column lock assembly is placarded with the installation instructions. The placard reads:

On Instruction Side:

INSTALLATION INSTRUCTIONS

INSTALL OTHER SIDE FACING PILOT

1. ROTATE CONTROL WHEEL APPROX 12° TO THE RIGHT. INSTALL LOCK PIN THROUGH COLLAR LOCK & CONTROL COLUMN (PILOT'S) ROTATE HOOK OVER CONTROL COLUMN.
2. POSITION PEDALS IN AFT POSITION & INSTALL LOCK IN PILOT'S RUDDER PEDALS WITH CABLE AROUND RIGHT SIDE OF CONTROL COLUMN.
3. REMOVE IN REVERSE ORDER.

C95EA07C0574

On Side Facing Pilot with Locks Properly Installed:



C95EA07C0573

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ENGINES

The Beech Baron 58 is powered by two Teledyne Continental IO-550-C, normally aspirated, six-cylinder, horizontally-opposed, fuel-injected engines rated at 300 hp at 2700 rpm. Early airplanes (TH-1472 thru TH-1840, not in compliance with Raytheon Aircraft S.B. 28-3052) are equipped with engine driven fuel pumps that automatically lean the mixture as the airplane climbs; later airplanes (TH-1841 and After, and prior airplanes in compliance with Raytheon Aircraft S.B. 28-3052) require manual leaning.

ENGINE CONTROLS

PROPELLER, THROTTLE, AND MIXTURE

The control levers are grouped along the upper portion of the pedestal. Pushing forward on a control lever increases its appropriate function, pulling back decreases it. The knobs on the levers are shaped to standard FAA configuration so they can be identified by touch. The controls are centrally located for ease of operation from either the pilot's or the copilot's seat. An adjustable friction knob, located on the right side of the pedestal, is provided to prevent creeping of the control levers.

INDUCTION AIR

Induction air is available from filtered ram air or unfiltered alternate air. Filtered ram air enters from the intake air scoop on top of the cowling. Should the filter become obstructed, a spring-loaded door on the alternate air intake will open automatically and the induction system will operate on alternate air taken from the engine accessory section.

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ENGINE ICE PROTECTION

Engine ice protection consists of electrothermal fuel vent heaters controlled by a switch on the left panel, and an automatic alternate air induction system.

The only significant ice accumulation is impact ice on the inlet scoop and filter. Should the induction air scoop or filter become clogged with ice, a spring-loaded door on the firewall will open automatically, and the induction system will operate on alternate air.

ENGINE LUBRICATION

The engine oil system for each engine is the full pressure, wet sump type, with a full flow, integrally mounted oil filter and has a 12-quart capacity. Oil operating temperatures are controlled by an automatic thermostat bypass control. The bypass control will limit oil flow through the oil cooler when operating temperatures are below normal and will permit the oil to bypass the cooler if it should become blocked.

The oil system may be checked through access doors in the engine cowling. A calibrated dipstick attached to the filler cap indicates the oil level. Due to the canted position of the engines, the dipsticks are calibrated for either right or left engines and are not interchangeable.

The oil grades listed in Section VIII, HANDLING, SERVICING & MAINTENANCE are general recommendations only, and will vary with individual circumstances. The determining factor for choosing the correct grade of oil is the average ambient temperature.

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ONLY

COWL FLAPS

The cowl flap for each engine is controlled by a manual control lever located on the lower center console. The cowl flap is closed when the lever is in the up position and open when the lever is down.

PROPELLERS

Installed as standard equipment are two McCauley constant-speed, variable-pitch, 77-inch diameter propellers, each with three aluminum alloy blades. The pitch setting at the 30-inch station is 15.2° ± 0.2° low pitch and 82.5° ± 0.5° feathered.

Propeller rpm is controlled by a governor in each engine which regulates hydraulic oil pressure to the hubs. Push-pull levers on the center pedestal allow the pilot to select each governor's rpm range.

If engine oil pressure is lost, the propeller will go to the full high pitch position. This is because propeller low pitch is obtained by governor boosted engine oil pressure working against the centrifugal twisting moment of the blades.

The propellers should be cycled occasionally during cold weather operation. This will help maintain warm oil in the propeller hubs so that the oil will not congeal.

PROPELLER SYNCHRONIZER

The propeller synchronizer automatically matches the rpm of both propellers. The system's range of authority is limited to approximately 25 rpm. Normal governor operation is unchanged but the synchronizer will continuously monitor propeller rpm and adjust one governor as required.

A magnetic pickup mounted in each propeller governor transmits electric pulses to a transistorized control box installed behind the pedestal. The control box converts any pulse rate

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differences into correction commands, which are transmitted to the appropriate governor.

A toggle switch installed on the pilot's subpanel turns the system on. To operate the system, synchronize the propellers in the normal manner and turn the PROP SYNC switch ON. To change rpm, adjust both propeller controls at the same time. This will keep the setting within the limiting range of the system. If the PROP SYNC switch is ON but unable to adjust the propeller rpm, the system has reached its range limit. Turn the PROP SYNC switch OFF, synchronize the propellers manually, and turn the PROP SYNC switch ON.

PROPELLER SYNCHROSCOPE

A propeller synchroscope, located below the Manifold Pressure Gages, operates to give an indication of synchronization of propellers. If the right propeller is operating at a higher rpm than the left, the face of the synchroscope, a black and white cross pattern, spins in a clockwise rotation. Counterclockwise rotation indicates a higher rpm of the left propeller. This instrument aids the pilot in accomplishing manual synchronization of the propellers.

FUEL SYSTEM

The fuel system is an OFF-ON-CROSSFEED arrangement. The fuel selector panel, located on the floor forward of the front seats, contains the fuel selector for each engine and a schematic diagram of fuel flow.

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ONLY

WARNING

Position selectors in detents only. There is no fuel flow to the engines between detents (indicated by red arcs on serials TH-1799 and After and prior serials in compliance with S.B. 2670). Visually confirm fuel selector position.

FUEL CELLS

The standard wing fuel system has a total capacity of 142 gallons. Two optional systems are available. The first has a total capacity of 172 gallons; the second, comprising of the 172 gallon system plus wet wing tip tanks, provides a total capacity of 200 gallons. The fuel value placarded adjacent to each filler cap indicates fuel capacity and usable fuel when that wing fuel system is full. Refer to Section II, LIMITATIONS for usable fuel in each system.

A vapor return line returns excess fuel from the engine to its respective wing system. All of the fuel cells, standard or optional, in each wing are interconnected in order to make all the usable fuel in each wing available to its engine when the fuel selector valve is turned to ON. The standard 142 gallon and optional 172 gallon fuel systems are filled through a single filler located in each wing. When the wet wing tip option is installed (200 gallons total), there are two additional filler caps, one per wing. Refer to Section VIII, HANDLING, SERVICING & MAINTENANCE for additional information.

CAUTION

When the wet wing tip tanks are filled with fuel, DO NOT OPEN the inboard wing leading edge filler caps, as fuel will exit from respective filler port.

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The standard 142 gallon fuel system and the optional 172 gallon fuel system have six drain locations. There are two additional drain locations when the wet wing tip tanks are installed.

FUEL QUANTITY INDICATORS

Fuel quantity is measured by float type transmitter units which transmit the common level indication to a single indicator for each respective wing system.

NOTE

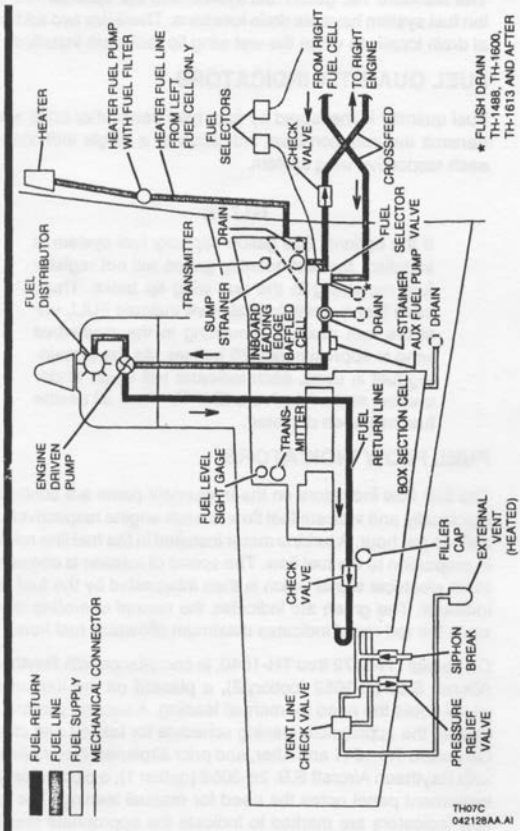
If the optional 200 gallon capacity fuel system is installed, the fuel quantity gages will not register fuel remaining in the wet wing tip tanks. Thus, each fuel quantity indicator will indicate FULL until the fuel quantity remaining in the respective wing is approximately 75 gallons. As the remaining fuel is used, each indicator will begin to decrease, and will indicate EMPTY when all usable fuel has been depleted.

FUEL FLOW INDICATORS

The fuel flow indicators on the instrument panel are controlled electrically and indicate fuel flow to each engine respectively, in gallons per hour. A turbine meter installed in the fuel line rotates in proportion to the fuel flow. The speed of rotation is converted to an electrical signal which is then interpreted by the fuel flow indicator. The green arc indicates the normal operating range while the red radial indicates maximum allowable fuel flow.

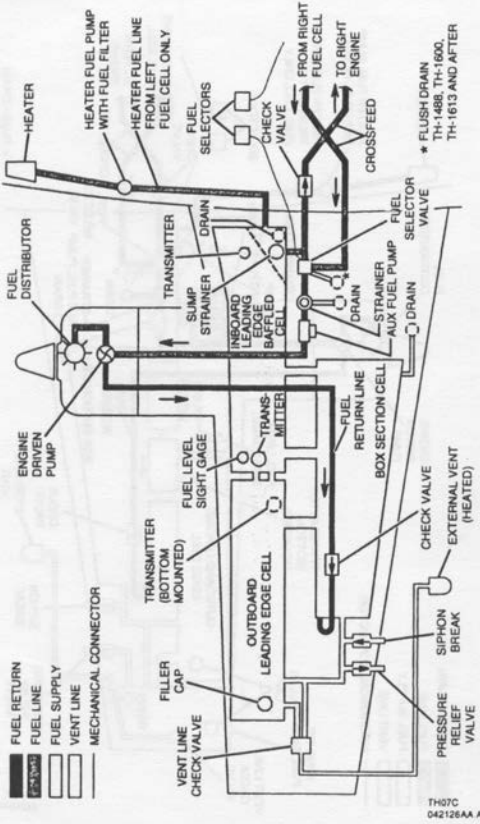
On serials TH-1472 thru TH-1840, in compliance with Raytheon Aircraft S.B. 28-3052 (option 2), a placard on the instrument panel notes the need for manual leaning. A second placard indicates the appropriate leaning schedule for takeoff and climb. On serials TH-1841 and After, and prior airplanes in compliance with Raytheon Aircraft S.B. 28-3052 (option 1), a placard on the instrument panel notes the need for manual leaning. The fuel flow indicators are marked to indicate the appropriate leaning schedule for takeoff and climb.

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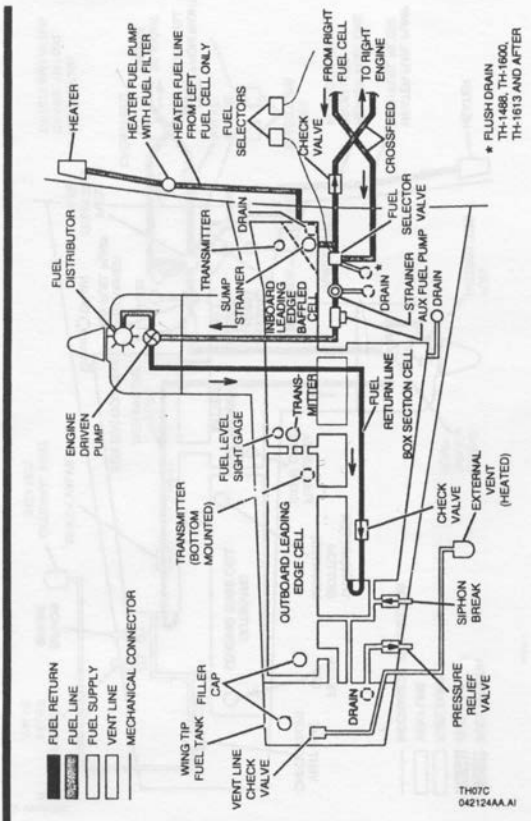
142 GALLON CAPACITY
(136 GALLONS USABLE) FUEL SYSTEM

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172 GALLON CAPACITY
(166 GALLONS USABLE) FUEL SYSTEM

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200 GALLON CAPACITY
(194 GALLONS USABLE) FUEL SYSTEM

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FUEL CROSSFEED (ONE-ENGINE-INOPERATIVE ONLY)

The fuel lines for the engines are interconnected by crossfeed lines. During normal operation each engine uses its own fuel pumps to draw fuel from its respective wing fuel system. However, on emergency crossfeed operations either engine can consume the available fuel from the opposite side.

WARNING

Position selectors in detents only. There is no fuel flow to the engines between detents (indicated by red arcs on serials TH-1799 and after and prior serials in compliance with S.B. 2670). Visually confirm fuel selector position.

The fuel crossfeed system is provided for use during emergency conditions. The system cannot transfer fuel from one wing system to the other. The procedure for using the crossfeed system is described in Section III, EMERGENCY PROCEDURES.

ENGINE DRIVEN FUEL PUMPS

On serials TH-1472 thru TH-1840, not in compliance with Raytheon Aircraft S.B. 28-3052, the IO-550-C engines are equipped with altitude compensating engine driven fuel pumps. These pumps automatically lean or enrich engine fuel mixture as the airplane changes altitudes. Leaner engine mixtures can be set by pulling the mixture levers aft from the full rich position while maintaining the EGT within limits.

On serials TH-1841 and After, and prior airplanes in compliance with Raytheon Aircraft S.B. 28-3052, the IO-550-C engines are equipped with engine driven fuel pumps that require manual leaning.

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FUEL BOOST PUMPS

The fuel boost pumps are dual-speed, dual-pressure, electrically-driven, vane-type pumps. HI pressure, LO pressure or OFF is selected with each fuel boost pump switch on the pilot's subpanel. The LO position is used to supply a low boost to the fuel flow during all flight conditions as required. The pumps are used to perform the following functions:

LO POSITION

1. Minor vapor purging
2. Increasing fuel flow
3. Crossfeeding fuel for One-Engine-Inoperative Operation

HI POSITION

1. Normal start, priming
2. Extreme vapor purging
3. to provide fuel pressure in the event of engine-driven fuel pump failure

FUEL OFF-LOADING

A visual fuel level sight gage in each wing leading edge, outboard of the engine nacelle, can be used for partial filling or off-loading of fuel. This gage is to be used only when it reads within the calibrated areas.

FUEL REQUIRED FOR FLIGHT

Flight planning and fuel loading is facilitated by the use of fuel quantity indicators that have been coordinated with the usable fuel supply. It is the pilot's responsibility to ascertain that the fuel quantity indicators are functioning and maintaining a reasonable degree of accuracy, and be certain of ample fuel for a flight. A minimum of 13 gallons of fuel is required in each wing system before takeoff.

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ELECTRICAL SYSTEM

In general, the airplane's circuitry is the single-wire, ground return type. The battery, magneto/start, and alternator switches are located on the pilot's subpanel. This panel contains most of the electrical system switches and switch type circuit breakers. Each is placarded as to its function. The remainder of the electrical equipment circuit breakers are located on the pilot's side panel. Avionic circuit breakers are located on the copilot's subpanel.

BATTERIES

The standard battery installation consists of two 25 ampere-hour, 12-volt, lead-acid batteries connected in series and located beneath the floor of the nose baggage compartment. Battery servicing procedures are described in Section VIII, HANDLING, SERVICING AND MAINTENANCE.

ALTERNATORS

Two standard 60-ampere, or optional 100-ampere, 28-volt, gear-driven alternators are individually controlled by alternator control units which regulate the voltage, balance the load and provide overvoltage protection. Each alternator system is controlled by a switch located on the subpanel.

Individual alternator output is indicated by two vertical scale loadmeters on the center subpanel, which register alternator load in amperes. A horizontal scale voltmeter immediately below the loadmeters monitors bus voltage. The normal voltmeter reading of 28 to 29 volts with the alternator operating will drop to 24 volts if both alternators are switched off and electrical power is received directly from the battery installation.

Two red annunciators placarded LEFT ALTR and RIGHT ALTR, located in the annunciator panel will flash whenever the respective alternator is disconnected from the bus by low voltage

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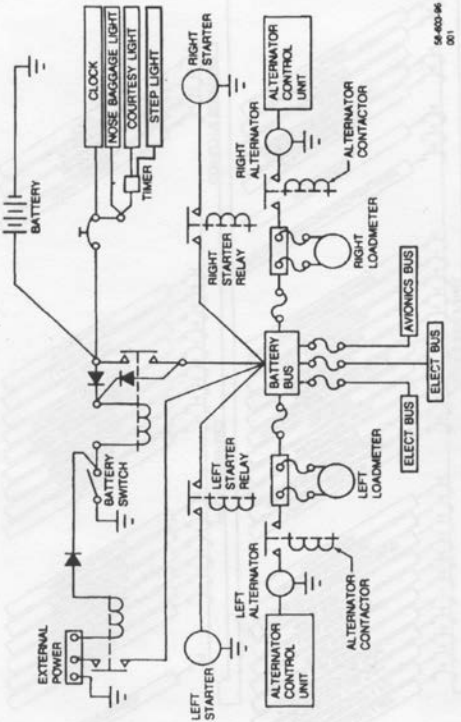
or an over-voltage condition. The annunciators will stay illuminated whenever the respective LEFT ALT or RIGHT ALT switches are placed in the OFF position. Any time a failure is detected, the appropriate alternator should be turned off. The LEFT ALTR and RIGHT ALTR annunciators are tested by pressing in on the ANNUN TEST switch located on the pilot's subpanel.

STARTERS

The starters are relay-controlled and are actuated by rotary type, momentary-on switches incorporated in the magneto/start switches located on the pilot's subpanel. To energize the starter circuit, hold the magneto/start switch in the START position.

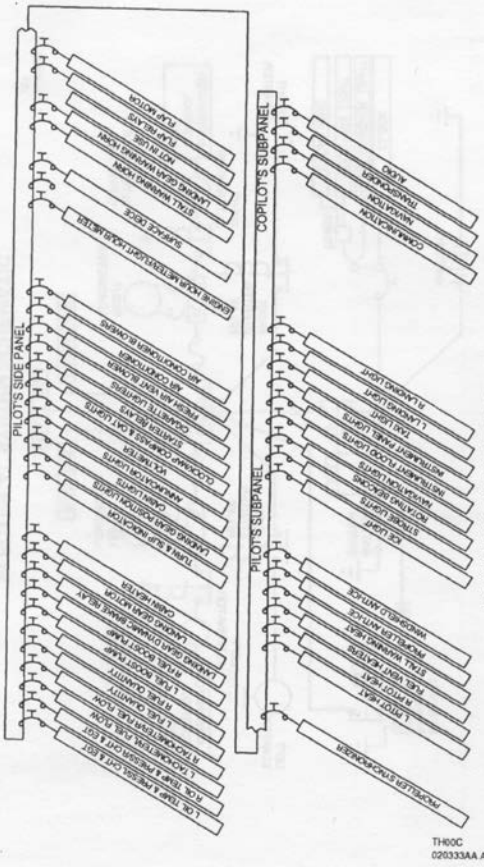
The red annunciator placarded START will illuminate whenever electrical power is being supplied to either the left or right starter. If the annunciator remains illuminated after starting, the starter relay has remained engaged and loss of electrical power may result. The battery and both alternator switches should be placed in the OFF position if the annunciator remains illuminated after starting. If the annunciator does not illuminate during starting, that portion of the annunciator system is inoperative and the loadmeters should be monitored to ensure that the starters do not remain energized after starting. This annunciator can be tested by the ANNUN TEST switch, located on the pilot's subpanel.

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ELECTRICAL SYSTEM SCHEMATIC

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EXTERNAL POWER

An external power receptacle is located in the outboard side of the left nacelle and accepts a standard AN-type plug. The power unit should be capable of delivering at least 300 amperes for starting. Make certain that the battery switch is ON, all avionic and electrical switches OFF, and a battery is in the system before connecting an external power unit. This protects the electronic voltage regulators and associated electrical equipment from voltage transients (power fluctuations). If polarity is reversed, a diode in the coil circuit will prevent contactor operation.

LIGHTING SYSTEM

INTERIOR LIGHTING

The instrument panel ON-OFF switches, placarded FLOOD and PANEL, are located on the pilot's subpanel. When these switches are ON, light intensity for the instrument panel is controlled by knob-type rheostats located on the copilot's subpanel. The rheostat placarded FLIGHT INST controls the lighting of the flight instrument panel and the rheostat placarded INST FLOOD controls the glareshield lighting which illuminates the full upper panel. The ENG INST AVIONICS rheostat controls the lighting for the vertical array of engine instruments and the avionic panel. All subpanel lighting is controlled by the rheostat placarded SUBPANEL LIGHTING. When FLOOD and PANEL light switches are OFF, the four rheostats mentioned above are OFF.

The cabin close focus reading lights, located on the overhead console, and the optional reading lights, located above the rear seats, are operated by a push-on, push-off switch adjacent to each light. The map, compass and OAT indicator lights are controlled by a push-on, push-off switch located on the pilot's control wheel.

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A step light, located above the step on the right fuselage and a courtesy light, located in the upper cabin door, will illuminate any time the utility door or cabin door is opened.

The step light and courtesy light are connected to a timer which will extinguish the lights approximately 15 minutes after the door is opened. To reset the timer for the step light and the courtesy light, both doors must be closed and latched. The lights will illuminate when either door or both doors are opened.

On TH-1825 and after, the courtesy light on the door is replaced by the illumination of the three cabin reading lights located on the right side of the cabin ceiling.

EXTERIOR LIGHTING

The switches for the navigation lights and landing lights plus the switches for the anticollision lights, nose gear taxi light, and wing ice light are grouped on the pilot's subpanel. The landing lights in the leading edge of each wing tip or on the front lower section of each engine cowling are operated by separate switches. For longer lamp service life, use the landing lights only when necessary. Avoid prolonged operation during ground maneuvering which could cause overheating. The nose gear taxi light should be used during ground operation. At night, reflections from anticollision lights on clouds, dense haze, or dust can produce optical illusions and vertigo. The use of these lights is not advisable under instrument or limited VFR conditions.

ENVIRONMENTAL SYSTEM

The environmental system consists of heating and ventilating systems and their associated controls. An optional cooling system is also available.

CABIN HEATING

A 50,000 BTU combustion heater, located in the nose gear wheel well, supplies heated air to the cabin. Ram air enters through intakes located on each side of the nose cone, or

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ONLY

through a single intake located on the left side of the nose cone if a radar is installed. After the air passes through the heater, it is distributed to five cabin outlets. Outlets are located above the pilot's and copilot's rudder pedals, at the rear of the copilot's chair, and at the rear of the No. 4 passenger chair position. A fifth outlet provides heated air for windshield defrosting. Fuel for the heater is obtained from the left fuel tank. Fuel consumption is approximately 1 GPH.

The heater is controlled by a HEATER and a BLOWER switch located on the pilot's subpanel, a CABIN VENT AIR control located on the pilot's left sidewall, a CABIN HEAT control knob located below the pilot's left subpanel, and a landing gear position switch.

HEATER switch - If sufficient air flow is present, this switch turns the heater on by activating the heater fuel pump, combustion air blower, igniter, and heater blower. The heater blower will automatically turn off when the landing gear is retracted and automatically turn back on when the landing gear is extended.

BLOWER switch - This switch also turns the heater blower on. It may be used independent of heater operation to increase air circulation during ground operations. If the heater blower is activated by this switch, it will automatically turn off when the landing gear is retracted and automatically turn back on when the landing gear is extended. If the heater is to be shut down during ground operations, the blower should be left on for approximately 2 minutes after turning the HEATER switch off to prevent over-temping the heater and activating the overtemperature switch.

CABIN VENT AIR control - This lever-type control adjusts the iris valve located in the forward portion of the heater. Pushing the control forward will increase the opening of the valve while pulling the control aft will decrease the opening of the valve. If the lever control is pulled aft more than half way, the resulting air flow will be insufficient for heater operation and the heater will automatically turn off.

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CABIN HEAT control knob - This control adjusts the thermostat sensor located in the heater duct. Pulling the knob out increases the thermostat setting to a maximum temperature of approximately 180°F. When the duct temperature reaches the thermostat setting, fuel is cut off to the heater.

The heater system is protected by the following items:

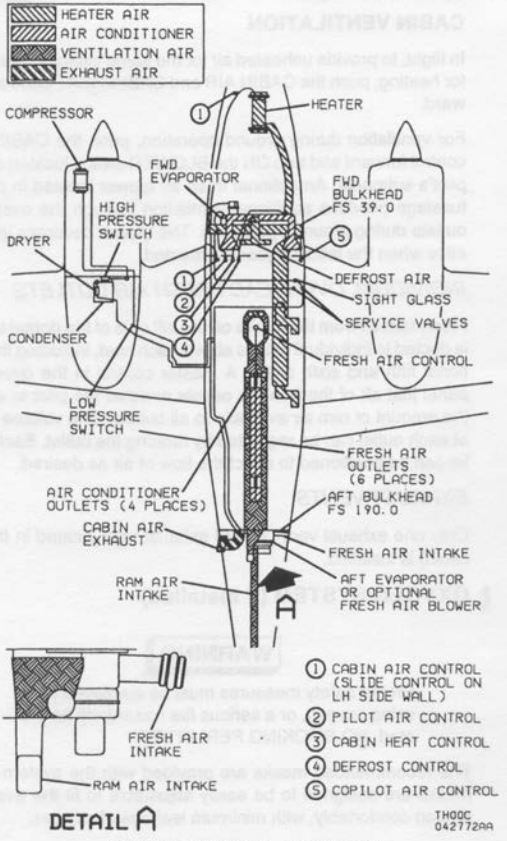
1. An over-temperature switch located on the aft end of the heater which is accessible from the nose gear wheel well. This switch will turn the heater system off if the Heater Burner Can reaches 300°F. The switch is manually resettable from the nose gear wheel well.
2. An air pressure switch which removes power from the ignition system and the heater fuel pump if the heater blower or combustion air blower fails.
3. A fuel pressure switch which removes power from the heater if heater fuel flow becomes insufficient.

The distribution of the heated air is controlled by the following controls:

1. Pilot Air control knob - This knob is located below the pilot's subpanel. Pulling the knob out increases the airflow at the pilot's feet.
2. Copilot Air control knob - This knob is located below the copilot's subpanel. Pulling the knob out increases the airflow at the copilot's feet.
3. Defrost control knob - This knob is located below the pilot's subpanel. Pulling the knob out increases the airflow to the defrost system.

The heater outlets located behind the copilot's chair and the No. 4 passenger chair are not directly controllable. To increase the air flow from these outlets, push in the controls for the Pilot's Air, Copilot's Air, and Defrost.

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ONLY



ENVIRONMENTAL SCHEMATIC

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CABIN VENTILATION

In flight, to provide unheated air for the same cabin outlets used for heating, push the CABIN AIR and CABIN HEAT controls forward.

For ventilation during ground operation, push the CABIN AIR control forward and turn ON the BLOWER switch located on the pilot's subpanel. An optional fresh air blower located in the aft fuselage provides additional ventilation through the overhead outlets during ground operations. The blower becomes inoperative when the landing gear is retracted.

INDIVIDUAL OVERHEAD FRESH AIR OUTLETS

Fresh ram air from the intake on the left side of the dorsal fairing is ducted to individual outlets above each seat, including the optional fifth and sixth seats. A master control in the overhead panel just aft of the front air outlets enables the pilot to adjust the amount of ram air available to all outlets. The volume of air at each outlet can be regulated by rotating the outlet. Each outlet can be positioned to direct the flow of air as desired.

EXHAUST VENTS

Only one exhaust vent (a fixed exhaust vent located in the aft cabin) is installed.

OXYGEN SYSTEM (If Installed)

WARNING

Proper safety measures must be employed when using oxygen, or a serious fire hazard will be created. NO SMOKING PERMITTED.

The recommended masks are provided with the system. The masks are designed to be easily adjustable to fit the average person comfortably, with minimum leakage of oxygen.

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CAUTION

Make certain the masks fit properly. 90% of the system efficiency is determined by the fit of the oxygen mask.

The oxygen cylinder is located at the aft end of the forward baggage compartment. The system is available with either four, five, or six outlets and with a 49.8 or 66 cu ft oxygen bottle. Supply of oxygen to the system is controlled by a push-pull control on the pilot's subpanel. The pressure indicator shows the supply of oxygen available (1850 psig at 15°C is nominal pressure for a full supply in the cylinder).

The system regulator is altitude compensated to provide a varying flow of oxygen with altitude. Flow is varied automatically from 0.5 liters per minute at 5000 feet to 3.5 liters per minute at 30,000 feet. The use of oxygen is recommended to be in accordance with current 14 CFR operating regulations.

PITOT AND STATIC SYSTEM

The pitot and static system provides a source of impact air and static air for the operation of flight instruments.

PITOT SYSTEM

A standard pitot tube for the pilot's flight instruments is located immediately to the left of the nose gear doors. The optional pitot tube for the copilot's flight instruments is located to the right of the nose gear doors.

Left and right pitot heat switches, located on the pilot's subpanel, supply heat to the left and right pitot masts respectively.

The pitot system needs no drain because of the location of the components.

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NORMAL STATIC AIR SYSTEM

The normal static air system opens to the atmosphere through two static air ports: one on each side of the aft fuselage. The static air obtained at these ports is routed to the airspeed indicator(s), altimeter(s), and the vertical speed indicator(s).

The static air line is drained by raising the lever to the OPEN DRAIN position. Return the lever to CLOSE DRAIN position after the line is completely drained.

EMERGENCY STATIC AIR SYSTEM

The emergency static air system is designed to provide a source of static pressure to the instruments from inside the cabin should the normal outside static air ports become blocked. An abnormal reading of the instruments supplied with normal static air could indicate a restriction in the outside static air ports. A two-position lever, located on the left sidewall adjacent to the pilot, is placarded OFF NORMAL, ON EMERGENCY. When it is desired or required, select the ON EMERGENCY position. Refer to the Airspeed Calibration and Altimeter Correction graphs in Section V, PERFORMANCE when operating on normal or emergency static air.

The static air plumbing is drained by placing the lever in the ON EMERGENCY position and then returning it to the OFF NORMAL position.

INSTRUMENT AIR PRESSURE SYSTEM

Pressure for the flight instruments, deice boots, and autopilot (if installed) is supplied by two, engine-driven, dry pressure pumps interconnected to form a single system. If either pump fails, check valves automatically close and the remaining pump continues to operate all gyro instruments. A pressure gage on the instrument panel indicates pressure in inches of mercury. Two red buttons on the pressure gage serve as source failure indicators, each for its respective side of the system. The pressure system incorporates two filters per engine. One is located on

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the rear baffle of the engine to filter intake air to the pressure pump. The other is downstream of the pump and is located aft of the firewall in the upper nacelle. This filter protects the instruments from carbon dust.

STALL WARNING

An electronic stall warning horn forward of the instrument panel sounds a warning signal while there is time for the pilot to correct the attitude. The signal is triggered by a sensing vane on the leading edge of the left wing and is effective in all flight attitudes and at all weights and airspeeds. Irregular and intermittent at first, the warning signal will become steady as the airplane approaches a complete stall.

NOTE

Stall warning horn is inoperative when the battery and alternator switches are turned off. Airplane certification requires the stall warning system to be on during flight except in emergency conditions as stated in Section III, EMERGENCY PROCEDURES.

A switch on the left subpanel placarded STALL WARN HEAT controls electrical power to the stall warning heater elements.

ICE PROTECTION SYSTEMS

SURFACE DEICE SYSTEM

Deice boots cemented to the leading edges of the wings, horizontal tail surfaces and vertical tail surface are operated by engine-driven pump pressure. Compressed air, after passing through the pressure regulators, goes to the distributor manifold. When the deice system is not in operation, the distributor valve applies vacuum to the boots to deflate and hold the boots flat against the surface. Then, when the deice system is operated, the distributor valve changes from vacuum to pressure

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and the boots inflate. After the cycle is completed, the valve returns to vacuum hold-down.

A three-position, spring loaded switch, with a center OFF position, a down MAN (manual inflate) position, and an up SURFACE AUTO position, controls the system. When the switch is in the auto position, the deice boots inflate for a period of approximately 12 seconds, then deflate automatically and return to the vacuum hold-down position. The switch must be tripped for each complete cycle. The MAN (manual) position will inflate the boots only as long as the switch is manually engaged. When the switch is released, the boots deflate.

Deice boots are intended to remove ice after it has accumulated, rather than prevent its formation. If the rate of ice accumulation is slow, best results are obtained by leaving the deice system off until 1/2 to 1 inch of ice accumulates. Bridging can occur if boots are actuated too early or too frequently.

CAUTION

Operation of the surface deice system in ambient temperatures below -40°C can cause permanent damage to the deice boots.

The wing ice light, used to check for ice accumulation during night operation, is located on the outboard side of the left nacelle. The light switch is on the pilot's subpanel.

ELECTROTHERMAL HEATED WINDSHIELD SEGMENT

The pilot's electrically heated windshield segment is controlled by a switch located on the pilot's subpanel. Windshield heat is designed for continuous in-flight use and should be applied prior to encountering icing conditions. This system is also beneficial as an aid in preventing frost and fogging due to rapid descents from higher altitudes into warm, moist air.

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Operation of the windshield heat will cause the standby compass to become erratic; therefore, windshield heat should be turned off for a period of 15 seconds to allow a stable reading of the standby compass.

CAUTION

Ground use of windshield heat is limited to 10 minutes.

ELECTROTHERMAL PROPELLER DEICE

Propeller ice removal is accomplished by the electrically heated deice boots bonded to each propeller blade. The system uses the airplane's electrical power to heat portions of the deice boots in a sequence controlled by a timer. The system is controlled by an ON-OFF circuit breaker switch on the pilot's subpanel. When the system is turned on, the ammeter will register 14 to 18 amperes. The system can be operated continuously in flight; it will function automatically until the switch is turned off. Propeller imbalance can be relieved by varying rpm. Increase rpm briefly, then return to the desired setting. Repeat if necessary.

CAUTION

Do not operate the system with the engines inoperative.

PITOT HEAT

Heating elements are installed in the pitot mast(s). Each heating element is controlled by an individual switch located on the pilot's subpanel. The switches are placarded PITOT HEAT - L - R and should remain off during ground operations, except for testing or for short intervals of time to remove ice or snow from the mast(s).

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STALL WARNING ANTI-ICE

The mounting pad and the stall warning vane are equipped with heating elements that are activated anytime the switch on the pilot's subpanel, placarded STALL WARN HEAT is turned on.

HEATED FUEL VENTS

The fuel system vents, one located on the underside of each wing outboard of the nacelle, are provided with heating elements controlled by the FUEL VENT switch on the pilot's subpanel.

ENGINE BREAK-IN INFORMATION

MIL-C-6529 Type II Multiviscosity 20W-50 Corrosion-Preventative Oil is installed in the engine at the factory. It is recommended that this oil be removed and the oil filter changed at 20 hours of engine operation or no later than 25 hours. If additional oil is needed during the first 25 hours of operation, use an approved straight mineral oil per MIL-L-6082. If oil consumption has not stabilized by this time, the engine should be drained and refilled with MIL-L-6082 Mineral Oil. This oil should be used until oil consumption stabilizes; usually a total of approximately 50 hours. After oil consumption has stabilized, MIL-L-22851 Ashless Dispersant Oil should be used. Oils must meet the requirements of the latest revision of Teledyne Continental Motors Corporation Specification MHS-24B or current applicable Teledyne Continental Service Bulletin. Refer to Section VIII, HANDLING, SERVICING and MAINTENANCE, for a list of approved oils.

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CAUTION

Do not exceed 25 hours of operation or 6 months, whichever occurs first, with factory break-in oil (MIL-C-6529, Type II, Multiviscosity, 20W-50 Corrosion-preventative). When changing to MIL-L-22851 Ashless Dispersant oil, change the oil and filter using the procedures outlined in Section VIII, HANDLING, SERVICING and MAINTENANCE.

Failure to remove the corrosion-preventative oil and replace the oil filter within the time interval specified may cause varnish deposits to form on the pistons and cylinder walls and deteriorate the filter element.

Drain and replace the engine oil as recommended in Section VIII, HANDLING, SERVICING and MAINTENANCE. If operating conditions are unusually dusty and dirty, more frequent oil changes may be necessary. Oil changes are more critical during break-in period than at any other time.

Use full throttle for every takeoff and maintain until at least 400 feet AGL, then reduce power as necessary for cruise climb. Maintain the highest power recommended for cruise operation during the break-in period (50 to 75 hrs) and interrupt cruise power every 30 minutes or so by smoothly advancing to takeoff power settings for about 30 seconds.

Avoid long power-off descents and altitudes above 8,000 feet during the break-in period. Maintain sufficient power during descent to permit cylinder head temperatures to remain in the green arc.

Minimize ground operation time, especially during warm weather. During the break-in period, avoid idling in excess of 15 minutes, especially in high ambient temperatures.

FOR CLASSROOM USE
ONLY

SECTION 8
HANDLING, SERV & MAINT
TABLE OF CONTENTS

SUBJECT	PAGE
Introduction To Servicing	8-5
Publications	8-5
Airplane Inspection Periods	8-6
Preventative Maintenance That May Be Accomplished By A Certificated Pilot	8-7
Alterations Or Repairs To The Airplane	8-7
Ground Handling	8-9
Towing	8-9
Parking	8-10
Tie-Down	8-10
Main Wheel Jacking	8-11
Prolonged Out of Service Care	8-11
Storage	8-11
Flyable Storage (7 to 30 Days)	8-12
Mooring	8-12
Engine Preparation For Storage	8-12
During Flyable Storage	8-12
Fuel Cells	8-13
Flight Control Surfaces	8-13
Grounding	8-13
Engines/Pitot Tube(s)	8-13
Windshield and Windows	8-13
Preparation For Service	8-13
External Power	8-13
Checking Electrical Equipment	8-14

FOR CLASSROOM USE ONLY

SECTION 8
HANDLING, SERV & MAINT
TABLE OF CONTENTS (CONT'D)

SUBJECT	PAGE
Servicing	8-14
Fuel System	8-14
Fuel Cells	8-14
Fuel Drains	8-16
Fuel Strainers	8-16
Oil System	8-17
Batteries	8-18
Tires	8-19
Shock Struts	8-19
Shimmy Damper	8-21
Brakes	8-22
Induction Air Filters	8-22
Propellers	8-23
Oxygen System	8-23
Oxygen Cylinder Retesting	8-24
Minor Maintenance	8-25
Rubber Seals	8-25
Heating and Ventilating System	8-25
Alternators	8-25
Magnetos	8-26
Cleaning	8-27
Exterior Painted Surfaces	8-27
Landing Gear	8-29
Windshield and Windows	8-30
Surface Deice Boots	8-30
Engine	8-31

FOR CLASSROOM USE
ONLY

SECTION 8
HANDLING, SERV & MAINT
TABLE OF CONTENTS

SUBJECT	*PAGE*
Interior	8-31
Consumable Materials	8-32
Approved Engine Oils	8-33
Lamp Replacement Guide	8-34

FOR CLASSROOM USE ONLY

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ONLY

INTRODUCTION TO SERVICING

The purpose of this section is to outline the requirements for maintaining the Baron 58 in a condition equal to that of its original manufacture. This information sets the time intervals at which the airplane should be taken to a Raytheon Aircraft authorized outlet for periodic servicing or preventive maintenance.

The Title 14 Code of Federal Regulations place the responsibility for the maintenance of this airplane on the owner and operator, who must ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements established for this airplane.

All limits, procedures, safety practices, time limits, servicing and maintenance requirements contained in this handbook are considered mandatory.

Authorized Raytheon Aircraft outlets can provide recommended modification, service, and operating procedures issued by both FAA and Raytheon Aircraft, which are designed to get maximum utility and safety from the airplane.

If a question arises concerning the care of the Baron 58, it is important that the airplane serial number be included in any correspondence. The serial number appears on the manufacturer's identification plate attached to the lower aft right side of the fuselage on airplanes prior to TH-1531 and on the right just beneath the horizontal stabilizer on TH-1531 thru TH-2124.

PUBLICATIONS

The following publications for the Baron 58 are available through Raytheon Aircraft authorized outlets.

1. Pilot's Operating Handbook and FAA Approved Airplane Flight Manual
2. Shop Manual
3. Parts Catalog

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4. Service Bulletins
5. Various Inspection Forms
6. Wiring Diagram Manual

The following information will be provided, at no charge, to the registered owner and/or operator of this airplane:

1. Reissues and revisions of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
2. Original issues and revisions of FAA Approved Airplane Flight Manual Supplements.
3. Original issues and revisions of Raytheon Aircraft Service Bulletins.

The above publications will be provided only to the owner and/or operator at the address listed on the FAA Aircraft Registration Branch List or the Raytheon Aircraft Domestic/International Owner's Notification Service List. Further, the owner and/or operator will receive only those publications pertaining to the registered airplane serial number. For detailed information on how to obtain "Revision Service" applicable to this handbook or other Raytheon Aircraft Service Publications, consult any Raytheon Aircraft Authorized Outlet or refer to the latest revision of Raytheon Aircraft Service Bulletin No. 2001.

AIRPLANE INSPECTION PERIODS

1. FAA Required Annual Inspection.
2. FAA Required 100-Hour Inspection (for airplanes operated for hire).
3. Raytheon Aircraft Recommended Inspection Guide.
4. Continuing Care Inspection Guide.

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NOTE

In event of any gear or flap extension at speeds above the respective normal extension speeds, inspect gear retract rods, gear doors and flaps, for damage or distortion before the next flight.

PREVENTATIVE MAINTENANCE THAT MAY BE ACCOMPLISHED BY A CERTIFICATED PILOT

1. A certificated pilot may perform limited maintenance. Refer to 14 CFR Part 43 for the items which may be accomplished.

NOTE

To ensure proper procedures are followed, obtain a *Baron Shop Manual* before performing preventative maintenance.

2. All other maintenance must be performed by licensed personnel.

NOTE

Pilots operating airplanes of other than U.S. Registry should refer to the regulations of the registering authority for information concerning preventative maintenance that may be performed by pilots.

ALTERATIONS OR REPAIRS TO THE AIRPLANE

The FAA should be contacted prior to any alterations on the airplane to ensure that the airworthiness of the airplane is not violated.

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NOTE

Alterations and repairs to the airplane must be made by properly licensed personnel.

WARNING

Use only genuine Raytheon Aircraft or Raytheon Aircraft approved parts obtained from Raytheon Aircraft approved sources, in connection with the maintenance and repair of Beech airplanes.

Genuine Raytheon Aircraft parts are produced and inspected under rigorous procedures to ensure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than Raytheon Aircraft, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from non-Raytheon Aircraft approved sources, or parts, components, or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by Raytheon Aircraft, unsuitable and unsafe for airplane use.

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Raytheon Aircraft expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-Raytheon Aircraft approved parts.

GROUND HANDLING

The three-view drawing in Section 1, GENERAL, shows the minimum hangar clearances for a standard airplane. Allowances must be made for any special radio antennas.

CAUTION

To ensure adequate propeller clearance, always observe recommended shock strut servicing procedures and tire inflation pressures.

TOWING

One person can move the airplane on a smooth and level surface using the hand tow bar furnished with the loose tools and equipment. Attach the tow bar to the tow pin on the nose gear lower torque knee. It is recommended to have someone in the airplane to operate the brakes.

CAUTION

Do not exert force on the propellers, control surfaces, or horizontal stabilizer. When towing with a tug, limit turns to prevent damage to the nose gear. Do not attempt to tow airplane backward by the tail tiedown ring. Do not tow when the main gear is obstructed by mud or snow. Also ensure the rudder lock is removed.

Care should be used when removing the tow bar to prevent damage to the lubrication fittings on the landing gear.

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PARKING

The parking brake control is located just left of the elevator tab wheel on the pilot's subpanel. To set the parking brakes, pull control out and depress each toe pedal until firm. Push the control in to release the brakes.

CAUTION

Excessive pedal pressure may prevent releasing of the parking brake.

The parking brake should be left off and wheel chocks installed if the airplane is to remain unattended. Changes in ambient temperature can cause the parking brake to release or to exert excessive pressures.

TIE-DOWN

It is advisable to nose the airplane into the wind. Three tie-down lugs are provided; one on the lower side of each wing and a third at the rear of the fuselage.

1. Install the control locks.
2. Chock the main wheels, fore and aft.
3. Using nylon line or chain of sufficient strength, secure the airplane at the three points provided. DO NOT OVERTIGHTEN; if the line at the rear of the fuselage is excessively tight, the nose may rise and produce lift due to the angle of attack of the wings.
4. Release the parking brake.

If high winds are anticipated, a vertical tail post should be installed at the rear tie-down lug, and a tie-down line attached to the nose gear.

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MAIN WHEEL JACKING

Individual main wheels may be jacked by placing a floor jack under the jacking point located under each axle.

CAUTION

Prior to jacking the airplane, ensure that an unbalanced fuel condition does not exist. Fuel should be distributed evenly in both wings to prevent an unbalanced condition which could cause the airplane to be unstable while on jacks.

1. Check the shock strut for proper inflation to prevent damage to the landing gear door by the jack adapter and to facilitate installation of the adapter.

NOTE

Persons should not be in or on the airplane while it is on a main wheel jack.

2. Insert the main wheel jack adapter into the main wheel axle.
3. A scissors-type jack is recommended for raising and lowering the wheel.
4. When lowering the wheel, exercise care to prevent compression of the shock strut, which would force the landing gear door against the jack adapter.

PROLONGED OUT OF SERVICE CARE

STORAGE

The storage procedures listed are intended to protect the airplane from deterioration while it is not in use. The primary objectives of these measures are to prevent corrosion and damage from exposure to the elements.

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Flyable Storage (7 to 30 days) has been considered here. For more extended storage periods, consult the *Baron Shop Manual* and Continental Service Bulletin M81-3 or later issue.

FLYABLE STORAGE (7 TO 30 DAYS)

MOORING

Place the airplane in a hangar. If the airplane cannot be placed in a hangar, tie down securely at the three tie-down points provided on the airplane. Do not use hemp or manila rope. It is recommended a tail support be used to lightly compress the nose strut and reduce the angle of attack of the wings.

ENGINE PREPARATION FOR STORAGE

Engines in airplanes that are flown only occasionally tend to exhibit cylinder wall corrosion much more than engines that are flown frequently.

Run engines at least five minutes at 1200 to 1500 rpm with oil and cylinder head temperatures in the normal operating range.

Check for correct oil level and add oil if necessary to bring level to full mark.

DURING FLYABLE STORAGE

WARNING

Before rotation of propeller blades, ascertain magneto/start switches are OFF, throttles are in the CLOSED position, and mixture controls are in the IDLE CUT-OFF position. Always stand in the clear while turning the propellers.

Each seven days during flyable storage, the propellers should be rotated by hand. After rotating the engine six revolutions, stop the propeller 60° to 120° from the position they were in.

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If at the end of 30 days, the airplane has not been removed from storage, the engines should be started and run. The preferred method is to fly the airplane for 30 minutes, and up to, but not exceeding normal oil and cylinder head temperatures.

FUEL CELLS

Fill to capacity to minimize fuel vapor and protect cell inner liners.

FLIGHT CONTROL SURFACES

Lock with internal locks.

GROUNDING

Static ground airplane securely and effectively.

ENGINES/PITOT TUBE(S)

Install cover(s).

WINDSHIELD AND WINDOWS

Close all windows and window vents. It is recommended that covers be installed over windshield and windows.

PREPARATION FOR SERVICE

Remove all covers and tape, clean the airplane and give it a thorough inspection, particularly landing gear, wheel wells, flaps, control surfaces, and all openings.

Preflight the airplane.

EXTERNAL POWER

An external power receptacle is located on the outboard side of the left nacelle and accepts a standard AN-type plug. The airplane has a negative ground system. Exercise care when utilizing any external power source to avoid reversed polarity. An external power unit (APU) should be capable of delivering at least 300 amperes for starting. Serviceable batteries must

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be installed in the airplane. Starting with external power when the battery is dead is not recommended. The battery manufacturer warns against this, also, the battery will not recharge sufficiently for use if an emergency arises.

Before connecting any external power source, turn the Battery switch ON, and all Avionic/Electrical switches OFF to avoid damage due to electrical surges. If the external power source does not have a standard AN-type plug, check for polarity (negative ground) and connect the positive lead from the external power source to the center and aft external power receptacle posts. Connect the negative lead to the most forward external power receptacle post.

NOTE

If polarity is reversed, a diode in the coil circuit will prevent contactor operation.

CHECKING ELECTRICAL EQUIPMENT

Connect an auxiliary power unit as outlined above. Ensure that the current is stabilized prior to making any electrical or avionic equipment check.

CAUTION

If the auxiliary power unit has poor voltage regulation or produces voltage transients, the airplane electrical equipment connected to the unit may be damaged.

SERVICING

FUEL SYSTEM

FUEL CELLS

See Section 2, LIMITATIONS for approved engines fuels.

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The standard 142 gallon capacity fuel system has a fuel filler cap in each wing box section. The optional 172 gallon capacity system has a filler cap in each outboard wing leading edge. The optional 200 gallon capacity system has a filler cap in each wet wing tip and in each outboard wing leading edge. Refer to Section 2, LIMITATIONS for the usable fuel in each system.

NOTE

To obtain the maximum capacity of the fuel system when the wet wing tips are installed, fill the fuel system from the wet wing tip tank filler caps.

CAUTION

Caution must be taken when the wet wing tip tanks are filled with fuel. DO NOT open the outboard wing leading edge filler cap, as fuel will exit from that opening. If this occurs, wash the fuel from the wing surface to prevent possible paint damage.

Ground the airplane with a static line before refueling and secure the filler caps immediately after filling. Before letting the airplane stand for several days, it is a good practice to fill the wing fuel system to ensure that the cell inner liners do not dry out and crack, allowing fuel to diffuse through the cell walls. Also, less moisture condensation will occur when fuel cells are full. If the cells are to be drained before storage, a coating of light engine oil should be sprayed or flushed onto the inner liners of the cells as a preservative.

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NOTE

The optional 200 gallon fuel system should be filled from the wing leading edge filler cap when airplane must stand for several days. Check and fill to capacity at wet wing tip filler cap before flight if required for the mission.

The fuel fillers are equipped with spring-loaded anti-syphon valves which may restrict large fuel nozzles. Push the valve plate down carefully to fully insert filler nozzle.

FUEL DRAINS

Open each of the snap-type fuel drains daily to purge any water from the system. The two sump drains extend through the bottom of each wing. The fuel strainer in each wheel well is provided with a drain extending through the wheel well skin. Two additional flush-type fuel drains are located at the mid-point, inboard lower surface of the wet wing tip fuel system (if installed). These tank drains should be purged daily with the drain wrench provided in the loose tools and accessories.

FUEL STRAINERS

To preclude the possibility of contaminated fuel, always cap any disconnected fuel lines or fittings. The fuel strainer in each wheel well should be inspected and cleaned with solvent at regular intervals. The frequency of inspection and cleaning will depend upon service conditions, fuel handling cleanliness, and local sand and dust conditions. At each 100-hour inspection, the strainer plug should be removed from the fuel injection control valve and the fuel injection control valve screen washed in fresh cleaning solvent. After the strainer plug has been reinstalled and safetied, the installation should be checked for leakage. A leading edge sump strainer, accessible through an access door on the bottom of the wing, should be cleaned periodically.

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OIL SYSTEM

The engines are equipped with a wet sump, pressure type oil system. Each engine sump has a capacity of 12 quarts. The oil system may be serviced through access doors in the engine cowling. A calibrated dipstick attached to the filler cap indicates the oil level. Due to the canted position of the engines, the dipsticks are calibrated for either right or left engines and are not interchangeable.

The oil and oil filter should be changed every 100 hours under normal operating conditions. The oil drain is accessible through the cowl flap opening. The engines should be warmed to operating temperature to assure complete draining of the oil.

The engine manufacture specifies Ashless Dispersant Oils only. However, for the first 20 hours, MIL-C-6529, Type II Multi viscosity 20W-50 Corrosion-Preventive Oil is used. It is recommended that this oil be removed and the oil filter changed at 20 hours of engine operation (not to exceed 25 hours). If oil consumption has not stabilized at this point, MIL-L-6082 Mineral Oil may be used.

After the break-in period, when oil consumption has stabilized, MIL-L-22851 Ashless Dispersant Oil should be used. Oils must meet the latest revision of Teledyne Continental Motors Corporation Specification MHS-24B or current applicable Teledyne Continental Service Bulletin. Refer to APPROVED ENGINE OILS in this section for a list of approved oils.

CAUTION

Do not exceed 25 hours of operation with factory break-in oil (MIL-C-6529, Type II, Multi viscosity, 20W-50 Corrosion-preventative). When changing to MIL-L-22851 Ashless Dispersant oil, change the oil and oil filter as previously described.

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Failure to remove the corrosion-preventative oil and replace the oil filter within the time interval specified may cause varnish deposits to form on the pistons and cylinder walls and deteriorate the filter element.

Ambient Air Temperature	Single Viscosity Grade Oil	Multiviscosity Grade Oil
Below 5°C	SAE 30 (Max.)	15W-50,20W-50
Above 5°C	SAE 50 (Min.)	15W-50,20W-50, 25W-60

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When operating temperatures overlap indicated ranges, use the lighter grade of oil.

BATTERIES

The lead-acid batteries are accessible by opening the forward baggage compartment door and removing the battery box cover from the floor of the compartment. Check the electrolyte level of each battery after each 25 hours of operation; maintain the electrolyte level to cover the plates by adding distilled battery water. Avoid filling over the baffles and never fill more than one-quarter inch over the separator tops.

Excessive water consumption may be an indication that the voltage regulators require resetting. The specific gravity of the electrolyte should be checked periodically.

The battery box is vented overboard to dispose of electrolyte and hydrogen gas fumes discharged during the normal charging operation. To ensure disposal of these fumes, the vent hose connections at the battery box should be checked frequently for obstructions.

Refer to the *Baron Shop Manual* for additional procedures in maintaining and servicing the batteries.

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TIRES

An inflation pressure of 52 to 56 psi should be maintained on the 6.50 x 8 main wheel tires. The 5.00 x 5 nose wheel tire should be inflated to 55-60 psi. Maintaining recommended tire inflation will minimize tread wear and aid in preventing tire failure caused from running over sharp stones and ruts. When inflating tires, visually inspect them for cracks and breaks, or evidence of internal damage.

CAUTION

Raytheon Aircraft cannot recommend the use of recapped tires. Recapped tires have a tendency to swell as a result of the increased temperature generated during takeoff. Increased tire size can jeopardize proper function of the landing gear retract system, with the possibility of damage to the landing gear doors and retract mechanism.

NOTE

While Raytheon Aircraft cannot recommend the use of recapped tires, tires retreaded by an FAA-approved repair station with a specialized service-limited rating in accordance with the latest revision of TSO-C62 may be used.

SHOCK STRUTS

CAUTION

DO NOT taxi with a flat shock strut.

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The shock struts are filled with dry air or nitrogen and hydraulic fluid. The same procedure is used for servicing both the main and the nose gear shock struts. To service a strut, proceed as follows:

1. Jack the airplane, remove the air valve cap, depress the valve core, and allow the strut to fully deflate.

WARNING

Do not unscrew the air valve assembly until all air pressure has been released or it may be blown off with considerable force, causing injury to personnel or damage to equipment.

2. Carefully remove the air valve assembly.
3. Compress the strut and fill through the air valve assembly hole with hydraulic fluid (approximately one pint) until the fluid overflows.
4. Cycle the strut from full extension to compressed and refill. Repeat until no more fluid can be added to the strut in the compressed position.

NOTE

Cycling of the shock strut is necessary to expel any trapped air within the strut housing.

5. Install the air valve assembly.
6. With the airplane resting on the ground and the fuel cells full, inflate the nose gear strut until 3-1/2 to 3-3/4 inches of the piston are exposed and inflate the main gear struts until 3 inches of the piston are exposed. Rock the airplane gently to prevent possible binding of the piston in the barrel while inflating.

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NOTE

It is recommended that the nose strut inflation dimension and the tire inflation pressures be carefully adhered to. Properly inflated tires and struts reduce the possibility of ground damage occurring to the propellers. Exercise caution when taxiing over rough surfaces.

7. The shock strut piston must be clean. Remove foreign material from the exposed piston with a soft cloth moistened with hydraulic fluid.

CAUTION

If a compressed air bottle containing air under extremely high pressure is used, exercise care to avoid over-inflating the shock strut.

WARNING

NEVER FILL SHOCK STRUTS WITH OXYGEN.

SHIMMY DAMPER

The shimmy damper has a reservoir of fluid carried in the piston rod. Two coil springs installed in the piston rod keep fluid in the shimmy damper under pressure. As fluid is lost through leakage it is automatically replenished from the reservoir until the reservoir supply is exhausted.

To check the fluid in the shimmy damper, insert a wire approximately 1/32 inch in diameter through the hole in the disc at the aft end of the piston rod until it touches the bottom of the hole in the floating piston. Mark the wire, remove it, and measure the depth of the insertion. When the shimmy damper is full, insertion depth is 2-3/16 inches; when empty, 3-1/16 inches.

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NOTE

The measuring wire should be inserted in the hole in the floating piston rather than against the piston face, to give a more accurate reading. To determine if the wire is inserted in the hole in the floating piston, insert the wire several times, noting insertion depth each time. When the wire is inserted in the hole, the depth will be about 1/4-inch greater than when it rests against the piston face.

When the shimmy damper is found empty or nearly empty, it should be refilled. See *Baron Shop Manual*.

BRAKES

The brake hydraulic fluid reservoir is accessible through the nose baggage compartment. A dipstick is attached to the reservoir cap. Refer to the *Baron Shop Manual* for hydraulic fluid specification.

The brakes require no adjustments since the pistons move to compensate for lining wear. The brake linings should be replaced before the metal back plate is exposed through the abrasive surface. The minimum allowable thickness for the abrasive surface is .010 inch. The brake disc should be replaced when its thickness measures .330 inch.

INDUCTION AIR FILTERS

The filters should be inspected for foreign matter at least once during each 50-hour operating period. In adverse climatic conditions, or if the airplane is stored, preflight inspection is recommended.

To Remove and Clean the Filter:

1. Remove the access plate in the top of the engine cowling.

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ONLY

2. Remove the filter and clean as noted by the manufacturer's instructions.
3. Reinstall the filter and the plate.

PROPELLERS

The daily preflight inspection should include a careful examination of the propeller blades for nicks and scratches.

Propeller operation, servicing, and maintenance instructions are contained in the propeller owner's manual furnished with the airplane.

WARNING

When servicing a propeller, always make certain that the ignition switch is off and that the engine has cooled completely. WHEN MOVING A PROPELLER, STAND IN THE CLEAR; THERE IS ALWAYS SOME DANGER OF A CYLINDER FIRING WHEN A PROPELLER IS MOVED.

OXYGEN SYSTEM

WARNING

Keep hands, tools, clothing, and oxygen equipment clean and free from grease and oil. KEEP FIRE AWAY FROM OXYGEN.

DO NOT USE MEDICAL or INDUSTRIAL OXYGEN. It caintains moisture which can cause the oxygen valve to freeze.

1. Read the pressure indicator on the cabin left side panel (The shutoff valve on the oxygen cylinder must be open). If the oxygen cylinder is equipped with a gage, system pressure may be checked at the cylinder.

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CAUTION

Always open the cylinder shutoff valve slowly to prevent damage to the system.

2. Make certain that the oxygen control valve is closed (PUSH IN).
3. Close the cylinder shutoff valve, remove the cap from the filler valve, and attach the recharging outlet. Open valve on supply bottle.
4. Open the cylinder shutoff valve and fill the cylinder to 1800 ± 50 psi (add 3.5 psi per degree above 70°F; subtract 3.5 psi per degree below 70°F).
5. Close the cylinder shutoff valve, close valve on the supply bottle, remove the recharging outlet, and replace the filler valve cap.
6. Reopen the cylinder shutoff valve to prepare system for use.

OXYGEN CYLINDER RETESTING

There are two types of oxygen cylinders used in the airplane. Light weight cylinders, stamped "3HT" on the plate on the side, must be hydrostatically tested every three years and the test date stamped on the cylinder. This cylinder has a service life of 4380 pressurizations or twenty-four years, whichever occurs first, and then must be discarded.

Regular weight cylinders, stamped "3A", or "3AA", must be hydrostatically tested every five years and stamped with the retest date. Service life on these cylinders is not limited.

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MINOR MAINTENANCE

RUBBER SEALS

To prevent sticking of the rubber seals around the windows, doors, and engine cowling, the seals should be coated with Oakite 6 compound. The compound is noninjurious to paint and can be removed by employing normal cleaning methods.

HEATING AND VENTILATING SYSTEM

The heater fuel pump filter in the nose wheel well should be removed and cleaned after each 100 hours of airplane operation. Remove the filter by turning the base of the pump counterclockwise. Wash the filter in fresh cleaning solvent and dry with compressed air.

The iris valve at the heater blower inlet should be lubricated occasionally with molybdenum disulfide. The valve should never be lubricated with oil or any liquid lubricant which would collect dust.

Do not reset the overheat circuit breaker until a thorough inspection of the system has determined the cause and the malfunction has been corrected.

ALTERNATORS

Since the alternator and electronic voltage regulator are designed for use on only one polarity system, the following precautionary measures must be observed when working on the charging circuit, or serious damage to the electrical equipment will result:

1. When installing a battery, make certain that the ground polarity of the battery and the ground polarity of the alternator are the same.

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ONLY

2. When utilizing an external power source, ensure polarity of the external power source and polarity of the airplane electrical system is maintained (Negative to Negative; Positive to Positive).
3. Do not operate an alternator on an open circuit. Be sure all circuit connections are secure.
4. Do not short across or ground any of the terminals on the alternator or electronic voltage regulator.
5. Do not attempt to polarize an alternator.
6. Do not charge batteries while installed in the airplane. Refer to the *Baron Shop Manual* for battery removal and charging procedures.

MAGNETOS

Ordinarily, the magnetos will require only occasional adjustment, lubrication, and breaker point replacement. This work should be done by a Raytheon Aircraft Authorized Outlet.

WARNING

To be safe, treat the magnetos as hot whenever a switch lead is disconnected at any point; they do not have an internal automatic grounding device. Otherwise, all spark plug leads should be disconnected or the cable outlet plate on the rear of the magneto should be removed.

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CLEANING

EXTERIOR PAINTED SURFACES

CAUTION

Polyester urethane finishes undergo a curing process for a period of 30 days after application. Wash uncured painted surfaces with a mild non-detergent soap (MILD detergents can be used on urethane finishes) and cold or lukewarm water only. Use soft cloths, keeping them free of dirt and grime. Any rubbing of the surface should be done gently and held to a minimum to avoid damaging the paint film. Rinse thoroughly with clear water. Stubborn oil or soot deposits may be removed with automotive tar removers.

Prior to cleaning, cover the wheels, making certain the brake discs are covered. Attach the pitot covers securely, and plug or mask off all other openings. Be particularly careful to mask off all static air buttons before washing or waxing. Use special care to avoid removing lubricant from lubricated areas.

Hand washing may be accomplished by flushing away loose dirt with clean water, then washing with a mild soap and water, using soft cleaning cloths or a chamois. Avoid harsh, abrasive, or alkaline soaps or detergents which could cause corrosion or scratches. Thorough clear-water rinsing prevents buildup of cleaning agent residue, which can dull the paint's appearance. To remove oily residue or exhaust soot, use a cloth dampened with an automotive tar remover. Wax or polish the affected area if necessary.

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WARNING

Do not expose control surface trim tab hinge lines and their pushrod systems to the direct stream or spray of high-pressure, soap and water washing equipment. Fluid dispensed at high pressure could remove the protective lubricant, allowing moisture from heavy or prolonged rain to collect at hinge lines, and then to freeze at low temperatures. After high pressure or hand washing, and at each periodic inspection, lubricate trim tab hinge lines and trim tab pushrod end fittings (Brayco 300 per Federal Specification VV-L-800 preferred).

When using high-pressure washing equipment, keep the spray or stream clear of wheel bearings, propeller hub bearings, etc., and openings such as pitot tubes, static air buttons, and battery and avionic equipment cooling ducts, which should be securely covered or masked off. Avoid directing high-pressure sprays toward the fuselage, wings, and empennage from the rear, where moisture and chemicals might more easily enter the structure, causing corrosion damage to structural members and moving parts.

CAUTION

When cleaning landing gear areas with solvent, especially if high-pressure equipment is used, exercise care to avoid washing away grease from landing gear components. After washing the landing gear areas with solvent, lubricate all lubrication points, or premature wear may result.

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During the curing period, do not make prolonged flights in heavy rain or sleet, and avoid all operating conditions which might cause abrasion or premature finish deterioration.

CAUTION

Do not apply wax, polish, rubbing compound or abrasive cleaner to any uncured painted surface. Use of such items can permanently damage the surface finish. Also, waxes and polishes seal the paint from the air and prevent curing.

Waxing of polyester urethane finishes, although not required, is permitted; however, never use abrasive cleaner-type waxes, polishes, or rubbing compounds, as these products cause eventual deterioration of the characteristic urethane gloss.

For waxing, select a high quality automotive or aircraft waxing product. Do not use a wax containing silicones, as silicone polishes are difficult to remove from surfaces. A buildup of wax on any exterior paint finish will yellow with age; therefore, wax should be removed periodically. Generally, aliphatic naphtha is adequate and safe for this purpose.

NOTE

Before returning the airplane to service, remove all maskings and coverings, and relubricate as necessary.

LANDING GEAR

After operation on salty or muddy runways, wash the main gear and nose landing gears with low-pressure water and a mild detergent as soon as practical. Rinse with clear water and blow dry with low-pressure air immediately after rinsing. Relubricate as necessary.

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WINDSHIELD AND WINDOWS

The windshield and plastic windows should be kept clean and waxed. To prevent scratches, wash the windows carefully with plenty of soap and water, using the palm of the hand to dislodge dirt and mud. Flood the surface with clean water to rinse away dirt and soap. After rinsing, dry the windows with a clean, moist chamois. Rubbing the surface of the plastic with a dry cloth should be avoided, as it builds up an electrostatic charge on the surface which attracts dust particles.

Remove any oil or grease with a cloth moistened with kerosene, then wash the surface with soap and water. Never use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire-extinguisher agent, anti-ice fluid, lacquer thinner, or glass cleaner. These materials will soften the plastic and may cause it to craze.

After a thorough cleaning, waxed the surface with a good grade of commercial wax that does not have an acrylic base. The wax will fill in minor scratches and help prevent further scratching. Apply a thin, even coat of wax and bring it to a high polish by rubbing lightly with a clean, dry, soft flannel cloth. Do not use a power buffer; the heat generated by the buffing pad may soften the plastic.

SURFACE DEICE BOOTS

The surfaces of the deice boots should be checked for indication of engine oil after servicing and at the end of each flight. Any oil spots that are found should be removed with a non-detergent soap and water solution. Care should be exercised during cleaning. Avoid scrubbing the surface of the boots as this will tend to remove the special graphite surfacing. The deice boots are made of soft, flexible stock which may be damaged if gasoline hoses are dragged over the surface of the boots or if ladders and platforms are rested against them.

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ENGINE

Clean the engine with a neutral solvent. Spray or brush the fluid over the engine, then wash off with water and allow to dry.

CAUTION

Do not use solutions which may attack rubber or plastic. Protect engine switches, controls and seals; fluid applied at high pressure can unseat seals, resulting in contamination of the sealed systems.

INTERIOR

To remove dust and loose dirt from the upholstery, headliner, and carpet, clean the interior regularly with a vacuum cleaner.

Blot up any spilled liquid promptly with cleansing tissue or rags. Do not pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot clean the area.

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

Soiled upholstery and carpet may be cleaned with a foam-type detergent, used according to the manufacturer's instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner.

The plastic trim, instrument panels, and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with isopropyl alcohol. Volatile solvents, such as mentioned in the article on care of plastic windows should never be used since they soften and craze the plastic.

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CONSUMABLE MATERIALS

For a complete list of Consumable Materials refer to the *Baron Shop Manual*.

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APPROVED ENGINE OILS

COMPANY	BRAND NAME
BP Oil Corporation	BP Aero Oil D65/80
Castrol Ltd (Australia)	Grade 40, Castrolaero AD Oil
Continental Oil Co.	Conoco Aero S (SAE 10W30)
Delta Petroleum Co.	Delta Avoil
Exxon Company, USA	Exxon Aviation Oil EE
Gulf Oil Corporation	Gulfpride Aviation AD
Mobil Oil Co.	Mobil Aero, Super Aero Oil 20W50
Phillips Petroleum Co.	Phillips 66 Aviation Oil Type A
Quaker State Oil and Ref. Corp.	Quaker State AD Aviation Engine Oil
Red Ram Ltd (Canada)	Red Ram X/C Aviation Oil 20W50
Sinclair Refining Co.	Sinclair Avoil 20W40
Shell Oil Co.	Aeroshell Oil W (in 4 grades)
Shell Canada, Ltd	Aeroshell Oil W
Socony - Mobil	Mobil Aero Oil
Texaco, Inc.	Texaco Aircraft Engine Oil Premium AD
Union Oil of California	Union Aircraft Engine Oil HD

This chart lists all oils which were certified as meeting the requirements of Teledyne Continental Motors Corporation Specification MHS-24 at the time this handbook was published. Any other oil which conforms to this specification may be used.

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LAMP REPLACEMENT GUIDE

Alternator Failure Annunciator 327
Anticollision Light, Flashing..... 34-0226010-91 (Whelen)
Anticollision Light, Oscillating ..... A-7079B-24 (Grimes)
Close Focus Reading Light..... 303
Compass Light 327
Courtesy Light, Cabin and Utility Door 1864
Electrical Panel Light 327
Flap Position Indicator Light 356
Ice Light A-7079B-24
Instrument Light, Flood..... 313
Instrument Light, Post..... 327
Landing Gear Position Light 327
Landing Light 4596
Map Light 1495
Navigation Light, Tail 93
Navigational Light,
Tail w/Strobe.....70 1557-6SD1, or 30-0815-5 (Grimes)
Navigation Light, Wing .....A7512-24 (Grimes)
Reading Light 303
Rotating Beacon .....A-7079B-24 (Grimes)
Step Light 1495
Tab Position Indicator Light 1819
Taxi Light 4596

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SECTION X
SAFETY INFORMATION
TABLE OF CONTENTS

SUBJECT	*PAGE*
Introduction	3
General	5
Do's	5
Don'ts	6
Sources of Information	7
Pilot's Operating Handbook and FAA Approved Airplane Flight Manual	7
BEECHCRAFT Service Publications	7
Federal Aviation Regulations	9
Airworthiness Directives	10
Airman's Information Manual	10
Advisory Information	11
FAA Advisory Circulars	11
FAA General Aviation News	15
FAA Accident Prevention Program	15
Additional Information	16
General Information on Specific Topics	17
Maintenance	17
Hazards of Unapproved Modifications	19
Flight Planning	20
Passenger Information Cards	20
Stowage of Articles	21
Flight Operations	21
General	21
Preflight Inspection	21
Weight and Balance	22
Autopilots and Electric Trim Systems	23
Flutter	26
Turbulent Weather	28
Wind Shear	30
Flight in Icing Conditions	31
Weather Radar	36
Mountain Flying	39
VFR - Low Ceilings	39

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SECTION X
SAFETY INFORMATION
TABLE OF CONTENTS (Continued)

SUBJECT	PAGE
VFR at Night	40
Vertigo - Disorientation	40
Flight of Multi-Engine Airplanes With One Engine Inoperative	42
Air Minimum Control Speed (V_{MCA})	44
Intentional One-Engine Inoperative Speed (V_{SSE})	45
One-Engine-Inoperative Best Rate-of-Climb Speed (V_{YSE})	45
One-Engine-Inoperative Best Angle-of-Climb Speed (V_{XSE})	46
Single Engine Service Ceiling	46
Basic Single Engine Procedures	46
Engine Failure on Takeoff	47
When to Fly V_X, V_Y, V_{XSE} and V_{YSE}	48
Stalls, Slow Flight and Training	48
Spins	51
Descent	53
Vortices - Wake Turbulence	54
Takeoff and Landing Conditions	55
Medical Facts for Pilots	55
General	55
Fatigue	56
Hypoxia	56
Hyperventilation	58
Alcohol	59
Drugs	60
Scuba Diving	61
Carbon Monoxide and Night Vision	61
Decompression Sickness	61
A Final Word	63

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ONLY

INTRODUCTION

Beech Aircraft Corporation has developed this special summary publication of safety information to refresh pilots' and owners' knowledge of safety related subjects. Topics in this publication are dealt with in more detail in FAA Advisory Circulars and other publications pertaining to the subject of safe flying.

The skilled pilot recognizes that safety consciousness is an integral - and never-ending - part of his or her job. Be thoroughly familiar with your airplane. Know its limitations and your own. Maintain your currency, or fly with a qualified instructor until you are current and proficient. Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action can be accomplished without reference to the manual. Periodically review this Safety Information as part of your recurrency training regimen.

BEECHCRAFT airplanes are designed and built to provide you with many years of safe and efficient transportation. By maintaining your BEECHCRAFT properly and flying it prudently you will realize its full potential.

. . . . . Beech Aircraft Corporation

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WARNING

Because your airplane is a high performance, high speed transportation vehicle, designed for operation in a three-dimensional environment, special safety precautions must be observed to reduce the risk of fatal or serious injuries to the pilot(s) and occupant(s).

It is mandatory that you fully understand the contents of this publication and the other operating and maintenance manuals which accompany the airplane; that FAA requirements for ratings, certifications and review be scrupulously complied with; and that you allow only persons who are properly licensed and rated, and thoroughly familiar with the contents of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual to operate the airplane.

IMPROPER OPERATION OR MAINTENANCE OF AN AIRPLANE, NO MATTER HOW WELL BUILT INITIALLY, CAN RESULT IN CONSIDERABLE DAMAGE OR TOTAL DESTRUCTION OF THE AIRPLANE, ALONG WITH SERIOUS OR FATAL INJURIES TO ALL OCCUPANTS.

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GENERAL

As a pilot, you are responsible to yourself and to those who fly with you, to other pilots and their passengers and to people on the ground, to fly wisely and safely.

The following material in this Safety Information publication covers several subjects in limited detail. Here are some condensed Do's and Don'ts.

DO'S

Be thoroughly familiar with your airplane, know its limitations and your own.

Be current in your airplane, or fly with a qualified instructor until you are current. Practice until you are proficient.

Preplan all aspects of your flight - including a proper weather briefing and adequate fuel reserves.

Use services available - weather briefing, inflight weather and Flight Service Station.

Carefully preflight your airplane.

Use the approved checklist.

Have more than enough fuel for takeoff, plus the trip, and an adequate reserve.

Be sure your weight loading and C.G. are within limits.

Use seatbelts and shoulder harnesses at all times.

Be sure all loose articles and baggage are secured.

Check freedom and proper direction of operation of all controls during preflight.

Maintain the prescribed airspeeds in takeoff, climb, descent, and landing.

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Avoid wake turbulence (Vortices).

Preplan fuel and fuel tank management before the actual flight. Utilize auxiliary tanks only in level cruise flight. Take off and land on the fullest main tank, NEVER use auxiliary fuel tanks for take off or landing.

Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action is instinctive.

Keep your airplane in good mechanical condition.

Stay informed and alert; fly in a sensible manner.

DON'TS

Don't take off with frost, ice or snow on the airplane.

Don't take off with less than minimum recommended fuel, plus adequate reserves, and don't run the tank dry before switching.

Don't fly in a reckless, show-off, or careless manner.

Don't fly into thunderstorms or severe weather.

Don't fly in possible icing conditions unless the airplane is approved, properly equipped, and all required equipment is operational for flight in icing conditions.

Don't fly close to mountainous terrain.

Don't apply controls abruptly or with high forces that could exceed design loads of the airplane.

Don't fly into weather conditions that are beyond your ratings or current proficiency.

Don't fly when physically or mentally exhausted or below par.

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Don't trust to luck.

SOURCES OF INFORMATION

There is a wealth of information available to the pilot created for the sole purpose of making your flying safer, easier and more efficient. Take advantage of this knowledge and be prepared for an emergency in the event that one should occur.

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

You must be thoroughly familiar with the contents of your operating manuals, placards, and check lists to ensure safe utilization of your airplane. When the airplane was manufactured, it was equipped with one or more of the following: placards, Owner's Manual, FAA Flight Manual, Approved Airplane Flight Manual Supplements, Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Beech has revised and reissued many of the early manuals for certain models of airplanes in GAMA Standard Format as Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals. For simplicity and convenience, all official manuals in various models are referred to as the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If the airplane has changed ownership, the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual may have been misplaced or may not be current. Replacement handbooks may be obtained from any BEECHCRAFT Authorized Outlet.

BEECHCRAFT SERVICE PUBLICATIONS

Beech Aircraft Corporation publishes a wide variety of manuals, service letters, service instructions, service bulletins, safety communiques and other publications for the various models of BEECHCRAFT airplanes. Information on how

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to obtain publications relating to your airplane is contained in BEECHCRAFT Service Bulletin number 2001, entitled "General - BEECHCRAFT Service Publications - What is Available and How to Obtain It."

Beech Aircraft Corporation automatically mails original issues and revisions of BEECHCRAFT Service Bulletins (Mandatory, Recommended and Optional), FAA Approved Airplane Flight Manual Supplements, reissues and revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owners Manuals, Pilot's Operating Manuals and Pilot's Operating Handbooks, and original issues and revisions of BEECHCRAFT Safety Communiques to BEECHCRAFT Owner addresses as listed by the FAA Aircraft Registration Branch List and the BEECHCRAFT International Owner Notification Service List. While this information is distributed by Beech Aircraft Corporation, Beech can not make changes in the name or address furnished by the FAA. The owner must contact the FAA regarding any changes to name or address. Their address is: FAA Aircraft Registration Branch (AAC250) P.O. Box 25082, Oklahoma City, OK 73125, Phone (405) 680-2131.

It is the responsibility of the FAA owner of record to ensure that any mailings from Beech are forwarded to the proper persons. Often the FAA registered owner is a bank or financing company or an individual not in possession of the airplane. Also, when an airplane is sold, there is a lag in processing the change in registration with the FAA. If you are a new owner, contact your BEECHCRAFT Authorized Outlet and ensure your manuals are up to date.

Beech Aircraft Corporation provides a subscription service which provides for direct factory mailing of BEECHCRAFT publications applicable to a specific serial number airplane. Details concerning the fees and ordering information for this owner subscription service are contained in Service Bulletin number 2001.

For owners who choose not to apply for a Publications Revision Subscription Service, Beech provides a free Owner

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Notification Service by which owners are notified by post card of BEECHCRAFT manual reissues, revisions and supplements which are being issued applicable to the airplane owned. On receipt of such notification, the owner may obtain the publication through a BEECHCRAFT Authorized Outlet. This notification service is available when requested by the owner. This request may be made by using the owner notification request card furnished with the loose equipment of each airplane at the time of delivery, or by a letter requesting this service, referencing the specific airplane serial number owned. Write to :

Supervisor, Special Services
Dept. 52
Beech Aircraft Corporation
P.O. Box 85
Wichita, Kansas 67201-0085

From time to time Beech Aircraft Corporation issues BEECHCRAFT Safety Communiques dealing with the safe operation of a specific series of airplanes, or airplanes in general. It is recommended that each owner/operator maintain a current file of these publications. Back issues of BEECHCRAFT Safety Communiques may be obtained without charge by sending a request, including airplane model and serial number, to the Supervisor, Special Services, at the address listed above.

Airworthiness Directives (AD's) are not issued by the manufacturer. They are issued and available from the FAA.

FEDERAL AVIATION REGULATIONS

FAR Part 91, General Operating and Flight Rules, is a document of law governing operation of airplanes and the owner's and pilot's responsibilities. Some of the subjects covered are:

Responsibilities and authority of the pilot-in-command

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Certificates required
Liquor and Drugs
Flight plans
Preflight action
Fuel requirements
Flight Rules

Maintenance, preventive maintenance, alterations, inspection and maintenance records

You, as a pilot, have responsibilities under government regulations. The regulations are designed for your protection and the protection of your passengers and the public. Compliance is mandatory.

AIRWORTHINESS DIRECTIVES

FAR Part 39 specifies that no person may operate a product to which an Airworthiness Directive issued by the FAA applies, except in accordance with the requirements of that Airworthiness Directive.

AIRMAN'S INFORMATION MANUAL

The Airman's Information Manual (AIM) is designed to provide airmen with basic flight information and ATC procedures for use in the national airspace system of the United States. It also contains items of interest to pilots concerning health and medical facts, factors affecting flight safety, a pilot/controller glossary of terms in the Air Traffic Control system, information on safety, and accident/hazard reporting. It is revised at six-month intervals and can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

This document contains a wealth of pilot information. Among the subjects are:

Controlled Airspace

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Emergency Procedures
Services Available to Pilots
Weather and Icing
Radio Phraseology and Technique
Mountain Flying
Airport Operations
Wake Turbulence - Vortices
Clearances and Separations
Medical Facts for Pilots
Preflight
Bird Hazards
Departures - IFR
Good Operating Practices
Enroute - IFR
Airport Location Directory
Arrival - IFR

All pilots must be thoroughly familiar with and use the information in the AIM.

ADVISORY INFORMATION

NOTAMS (Notices to Airmen) are documents that have information of a time-critical nature that would affect a pilot's decision to make a flight; for example, an airport closed, terminal radar out of service, or enroute navigational aids out of service.

FAA ADVISORY CIRCULARS

The FAA issues Advisory Circulars to inform the aviation public in a systematic way of nonregulatory material of interest. Advisory Circulars contain a wealth of information with which the prudent pilot should be familiar. A complete list of current FAA Advisory Circulars is published in AC 00-2, which lists Advisory Circulars that are for sale, as well as those distributed free of charge by the FAA, and provides

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ordering information. Many Advisory Circulars which are for sale can be purchased locally in aviation bookstores or at FBO's. These documents are subject to periodic revision. Be certain the Advisory Circular you are using is the latest revision available. Some of the Advisory Circulars of interest to pilots are:

*00-6	Aviation Weather
00-24	Thunderstorms
00-30	Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence
*00-45	Aviation Weather Services
00-46	Aviation Safety Reporting Program
20-5	Plane Sense
20-32	Carbon Monoxide (CO) Contamination in Aircraft - Detection and Prevention
20-35	Tie-Down Sense
20-43	Aircraft Fuel Control
20-105	Engine-Power Loss Accident Prevention
20-113	Pilot Precautions and Procedures to be Taken in Preventing Aircraft Reciprocating Engine Induction System and Fuel System Icing Problems
20-125	Water in Aviation Fuels
21-4	Special Flight Permits for Operation of Overweight Aircraft
43-9	Maintenance Records: General Aviation Aircraft

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43-12	Preventive Maintenance
60-4	Pilot's Spatial Disorientation
60-6	Airplane Flight Manuals (AFM), Approved Manual Materials, Markings and Placards - Airplanes
60-12	Availability of Industry-Developed Guidelines for the Conduct of the Biennial Flight Review
60-13	The Accident Prevention Counselor Program
***61-9**	Pilot Transition Courses for Complex Single-Engine and Light Twin-Engine Airplanes
***61-21**	Flight Training Handbook
***61-23**	Pilot's Handbook of Aeronautical Knowledge
***61-27**	Instrument Flying Handbook
61-67	Hazards Associated with Spins in Airplanes Prohibited from Intentional Spinning.
61-84	Role of Preflight Preparation
***67-2**	Medical Handbook for Pilots
90-23	Aircraft Wake Turbulence
90-42	Traffic Advisory Practices at Nontower Airports
90-48	Pilot's Role in Collision Avoidance
90-66	Recommended Standard Traffic Patterns for Airplane Operations at Uncontrolled Airports

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90-85	Severe Weather Avoidance Plan (SWAP)
91-6	Water, Slush and Snow on the Runway
91-13	Cold Weather Operation of Aircraft
*91-23	Pilot's Weight and Balance Handbook
91-26	Maintenance and Handling of Air Driven Gyroscopic Instruments
91-33	Use of Alternate Grades of Aviation Gasoline for Grade 80/.87
91-35	Noise, Hearing Damage, and Fatigue in General Aviation Pilots
91-43	Unreliable Airspeed Indications
91-44	Operational and Maintenance Practices for Emergency Locator Transmitters and Receivers
91-46	Gyroscopic Instruments - Good Operating Practices
91-50	Importance of Transponder Operations and Altitude Reporting
91-51	Airplane Deice and Anti-ice Systems
91-59	Inspection and Care of General Aviation Aircraft Exhaust Systems
91-65	Use of Shoulder Harness in Passenger Seats
103-4	Hazards Associated with Sublimation of Solid Carbon Dioxide (Dry Ice) Aboard Aircraft
135-9	FAR Part 135 Icing Limitations

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210-5A Military Flying Activities

* For Sale

FAA GENERAL AVIATION NEWS

FAA General Aviation News is published by the FAA in the interest of flight safety. The magazine is designed to promote safety in the air by calling the attention of general aviation airmen to current technical, regulatory and procedural matters affecting the safe operation of airplanes. FAA General Aviation News is sold on subscription by the Superintendent of Documents, Government Printing Office, Washington D.C., 20402.

FAA ACCIDENT PREVENTION PROGRAM

The FAA assigns accident prevention specialists to each Flight Standards and General Aviation District Office to organize accident prevention program activities. In addition, there are over 3,000 volunteer airmen serving as accident prevention counselors, sharing their technical expertise and professional knowledge with the general aviation community. The FAA conducts seminars and workshops, and distributes invaluable safety information under this program.

Usually the airport manager, the FAA Flight Service Station (FSS), or Fixed Base Operator (FBO), will have a list of accident prevention counselors and their phone numbers available. All Flight Standards and General Aviation District Offices have a list of the counselors serving the District.

Before flying over unfamiliar territory, such as mountainous terrain or desert areas, it is advisable for transient pilots to consult with local counselors. They will be familiar with the more desirable routes, the wind and weather conditions, and the service and emergency landing areas that are available along the way. They can also offer advice on the type of emergency equipment you should be carrying.

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ADDITIONAL INFORMATION

The National Transportation Safety Board and the Federal Aviation Administration periodically issue, in greater detail, general aviation pamphlets concerning aviation safety. FAA Regional Offices also publish material under the FAA General Aviation Accident Prevention Program. These can be obtained at FAA Offices, Weather Stations, Flight Service Stations or Airport Facilities. Some of these are titled:

12 Golden Rules for Pilots
Weather or Not
Disorientation
Plane Sense
Weather Info Guide for Pilots
Wake Turbulence
Don't Trust to Luck, Trust to Safety
Rain, Fog, Snow
Thunderstorm - TRW
Icing
Pilot's Weather Briefing Guide
Thunderstorms Don't Flirt ... Skirt 'em
IFR-VFR - Either Way Disorientation Can Be Fatal
IFR Pilot Exam-O-Grams
VFR Pilot Exam-O-Grams
Flying Light Twins Safely
Tips on Engine Operation in Small General Aviation Aircraft
Estimating Inflight Visibility
Is the Aircraft Ready for Flight
Tips on Mountain Flying
Tips on Desert Flying
Always Leave Yourself An Out
Safety Guide for Private Aircraft Owners
Tips on How to Use the Flight Planner
Tips on the Use of Ailerons and Rudder
Some Hard Facts About Soft Landings

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Propeller Operation and Care
Torque "What it Means to the Pilot"
Weight and Balance. An Important Safety Consideration for Pilots

GENERAL INFORMATION ON SPECIFIC TOPICS

MAINTENANCE

Safety of flight begins with a well maintained airplane. Make it a habit to keep your airplane and all of its equipment in airworthy condition. Keep a "squawk list" on board, and see that all discrepancies, however minor, are noted and promptly corrected.

Schedule your maintenance regularly, and have your airplane serviced by a reputable organization. Be suspicious of bargain prices for maintenance, repair and inspections.

It is the responsibility of the owner and the operator to assure that the airplane is maintained in an airworthy condition and that proper maintenance records are kept.

Use only genuine BEECHCRAFT or BEECHCRAFT approved parts obtained from BEECHCRAFT approved sources, in connection with the maintenance and repair of Beech airplanes.

Genuine BEECHCRAFT parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than BEECHCRAFT, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

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Salvaged airplane parts, reworked parts obtained from non-BEECHCRAFT approved sources or parts, components, or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

BEECHCRAFT expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-BEECHCRAFT parts.

Airplanes operated for Air Taxi or other than normal operation, and airplanes operated in humid tropics, or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience.

NOTE

The required periods do not constitute a guarantee that the item will reach the period without malfunction, as the aforementioned factors cannot be controlled by the manufacturer.

Corrosion and its effects must be treated at the earliest possible opportunity. A clean, dry surface is virtually immune to corrosion. Make sure that all drain holes remain unobstructed. Protective films and sealants help to keep corrosive agents from contacting metallic surfaces. Corrosion inspections should be made most frequently under high-corrosion-risk operating conditions, such as in areas of

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excessive airborne salt concentrations (e.g., near the sea) and in high-humidity areas (e.g., tropical regions).

If you have purchased a used airplane, have your mechanic inspect the airplane registration records, logbooks and maintenance records carefully. An unexplained period of time for which the airplane has been out of service, or unexplained significant repairs may well indicate the airplane has been seriously damaged in a prior accident. Have your mechanics inspect a used airplane carefully. Take the time to ensure that you really know what you are buying when you buy a used airplane.

HAZARDS OF UNAPPROVED MODIFICATIONS

Many airplane modifications are approved under Supplemental Type Certificates (STC's). Before installing an STC on your airplane, check to make sure that the STC does not conflict with other STC's that have already been installed. Because approval of an STC is obtained by the individual STC holder based upon modification of the original type design, it is possible for STC's to interfere with each other when both are installed. Never install an unapproved modification of any type, however innocent the apparent modification may seem. Always obtain proper FAA approval.

Airplane owners and maintenance personnel are particularly cautioned not to make attachments to, or otherwise modify, seats from original certification without approval from the FAA Engineering and Manufacturing District Office having original certification responsibility for that make and model.

Any unapproved attachment or modification to seat structure may increase load factors and metal stress which could cause failure of seat structure at a lesser "G" force than exhibited for original certification.

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Examples of unauthorized attachments found are drilling holes in seat tubing to attach fire extinguishers and drilling holes to attach approach plate book bins to seats.

FLIGHT PLANNING

FAR Part 91 requires that each pilot in command, before beginning a flight, familiarize himself with all available information concerning that flight.

Obtain a current and complete preflight briefing. This should consist of local, enroute and destination weather and enroute navaid information. Enroute terrain and obstructions, alternate airports, airport runways active, length of runways, and takeoff and landing distances for the airplane for conditions expected should be known.

The prudent pilot will review his planned enroute track and stations and make a list for quick reference. It is strongly recommended a flight plan be filed with Flight Service Stations, even though the flight may be VFR. Also, advise Flight Service Stations of changes or delays of one hour or more and remember to close the flight plan at destination.

The pilot must be completely familiar with the performance of the airplane and performance data in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. The resultant effect of temperature and pressure altitude must be taken into account in performance if not accounted for on the charts. An applicable FAA Approved Airplane Flight Manual must be aboard the airplane at all times and include the weight and balance forms and equipment list.

PASSENGER INFORMATION CARDS

Beech has available, for most current production airplanes, passenger information cards which contain important information on the proper use of restraint systems, oxygen

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masks, emergency exits and emergency bracing procedures. Passenger information cards may be obtained at any BEECHCRAFT Authorized Outlet. A pilot should not only be familiar with the information contained in the cards, but should always, prior to flight, inform the passengers of the information contained in the information cards. The pilot should orally brief the passengers on the proper use of restraint systems, doors and emergency exits, and other emergency procedures, as required by Part 91 of the FAR's.

STOWAGE OF ARTICLES

The space between the seat pan and the floor is utilized to provide space for seat displacement. If hard, solid objects are stored beneath seats, the energy absorbing feature is lost and severe spinal injuries can occur to occupants.

Prior to flight, pilots should insure that articles are not stowed beneath seats that would restrict seat pan energy absorption or penetrate the seat in event of a high vertical velocity accident.

FLIGHT OPERATIONS

GENERAL

The pilot MUST be thoroughly familiar with ALL INFORMATION published by the manufacturer concerning the airplane, and is required by law to operate the airplane in accordance with the FAA Approved Airplane Flight Manual and placards installed.

PREFLIGHT INSPECTION

In addition to maintenance inspections and preflight information required by FAR Part 91, a complete, careful preflight inspection is imperative.

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Each airplane has a checklist for the preflight inspection which must be followed. USE THE CHECKLIST.

WEIGHT AND BALANCE

Maintaining center of gravity within the approved envelope throughout the planned flight is an important safety consideration.

The airplane must be loaded so as not to exceed the weight and center of gravity (C.G.) limitations. Airplanes that are loaded above the maximum takeoff or landing weight limitations will have an overall lower level of performance compared to that shown in the Performance section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If loaded above maximum takeoff weight, takeoff distance and the landing distance will be longer than that shown in the Performance section; the stalling speed will be higher, rate of climb, the cruising speed, and the range of the airplane at any level of fuel will all be lower than shown in the Performance section.

If an airplane is loaded so that the C.G. is forward of the forward limit it will require additional control movements for maneuvering the airplane with correspondingly higher control forces. The pilot may have difficulty during takeoff and landing because of the elevator control limits.

If an airplane is loaded aft of the aft C.G. limitation, the pilot will experience a lower level of stability. Airplane characteristics that indicate a lower stability level are; lower control forces, difficulty in trimming the airplane, lower control forces for maneuvering with attendant danger of structural overload, decayed stall characteristics, and a lower level of lateral-directional damping.

Ensure that all cargo and baggage is properly secured before takeoff. A sudden shift in balance at rotation can cause controllability problems.

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AUTOPILOTS AND ELECTRIC TRIM SYSTEMS

Because there are several different models of autopilots and electric trim systems installed in Beech airplanes and different installations and switch positions are possible from airplane to airplane, it is essential that every owner/operator review his Airplane Flight Manual (AFM) Supplements and ensure that the supplements properly describe the autopilot and trim installations on his specific airplane. Each pilot, prior to flight, must be fully aware of the proper procedures for operation, and particularly disengagement, for the system as installed.

In addition to ensuring compliance with the autopilot manufacturer's maintenance requirements, all owners/operators should thoroughly familiarize themselves with the operation, function and procedures described in the Airplane Flight Manual Supplements. Ensure a full understanding of the methods of engagement and disengagement of the autopilot and trim systems.

Compare the descriptions and procedures contained in the Supplements to the actual installation in the airplane to ensure that the supplement accurately describes your installation. Test that all buttons, switches and circuit breakers function as described in the Supplements. If they do not function as described, have the system repaired by a qualified service agency. If field service advice or assistance is necessary, contact Beech Aircraft Corporation, Customer Support Department.

As stated in all AFM Supplements for autopilot systems and trim systems installed on Beech airplanes, the preflight check must be conducted before every flight. The preflight check assures not only that the systems and all of their features are operating properly, but also that the pilot, before flight, is familiar with the proper means of engagement and disengagement of the autopilot and trim system.

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Autopilot Airplane Flight Manual Supplements caution against trying to override the autopilot system during flight without disengaging the autopilot because the autopilot will continue to trim the airplane and oppose the pilot's actions. This could result in a severely out of trim condition. This is a basic feature of all autopilots with electric trim follow-up.

Do not try to manually override the autopilot during flight.

IN CASE OF EMERGENCY, YOU CAN OVERPOWER THE AUTOPILOT TO CORRECT THE ATTITUDE, BUT THE AUTOPILOT AND ELECTRIC TRIM MUST THEN IMMEDIATELY BE DISENGAGED.

It is often difficult to distinguish an autopilot malfunction from an electric trim system malfunction. The safest course is to deactivate both. Do not re-engage either system until after you have safely landed. Then have the systems checked by a qualified service facility prior to further flight.

Depending upon the installation on your airplane, the following additional methods may be available to disengage the autopilot or electric trim in the event that the autopilot or electric trim does not disengage utilizing the disengage methods specified in the Supplements.

CAUTION

Transient control forces may occur when the autopilot is disengaged.

1. Turn off the autopilot master switch, if installed.
2. Pull the autopilot and trim circuit breaker(s) or turn off the autopilot switch breaker, if installed.
3. Turn off the RADIO MASTER SWITCH, if installed, and

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if the autopilot system and the trim system are wired through this switch.

CAUTION

Radios, including VHF COMM are also disconnected when the radio master switch is off.

4. Turn off the ELECTRIC MASTER SWITCH.

WARNING

Most electrically powered systems will be inoperative. Consult the AFM for further information.

5. Push the GA switch on throttle grip, if installed (depending upon the autopilot system).
6. Push TEST EACH FLT switch on the autopilot controller, if installed.

NOTE

After the autopilot is positively disengaged, it may be necessary to restore other electrical functions. Be sure when the master switches are turned on that the autopilot does not re-engage.

The above ways may or may not be available on your autopilot. It is essential that you read your airplane's AFM

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SUPPLEMENT for your autopilot system and check each function and operation on your system.

The engagement of the autopilot must be done in accordance with the instructions and procedures contained in the AFM SUPPLEMENT.

Particular attention must be paid to the autopilot settings prior to engagement. If you attempt to engage the autopilot when the airplane is out of trim, a large attitude change may occur.

IT IS ESSENTIAL THAT THE PROCEDURES SET FORTH IN THE APPROVED AFM SUPPLEMENTS FOR YOUR SPECIFIC INSTALLATION BE FOLLOWED BEFORE ENGAGING THE AUTOPILOT.

FLUTTER

Flutter is a phenomenon that can occur when an aerodynamic surface begins vibrating. The energy to sustain the vibration is derived from airflow over the surface. The amplitude of the vibration can (1) decrease, if airspeed is reduced; (2) remain constant, if airspeed is held constant and no failures occur; or (3) increase to the point of self-destruction, especially if airspeed is high and/or is allowed to increase. Flutter can lead to an in-flight break up of the airplane. Airplanes are designed so that flutter will not occur in the normal operating envelope of the airplane as long as the airplane is properly maintained. In the case of any airplane, decreasing the damping and stiffness of the structure or increasing the trailing edge weight of control surfaces will tend to cause flutter. If a combination of those factors is sufficient, flutter can occur within the normal operating envelope.

Owners and operators of airplanes have the primary responsibility for maintaining their airplanes. To fulfill that responsibility, it is imperative that all airplanes receive a thorough

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preflight inspection. Improper tension on the control cables or any other loose condition in the flight control system can also cause or contribute to flutter. Pilots should pay particular attention to control surface attachment hardware including tab pushrod attachment during preflight inspection. Looseness of fixed surfaces or movement of control surfaces other than in the normal direction of travel should be rectified before flight. Further, owners should take their airplanes to mechanics who have access to current technical publications and prior experience in properly maintaining that make and model of airplane. The owner should make certain that control cable tension inspections are performed as outlined in the applicable Beech Inspection Guide. Worn control surface attachment hardware must be replaced. Any repainting or repair of a moveable control surface will require a verification of the control surface balance before the airplane is returned to service. Control surface drain holes must be open to prevent freezing of accumulated moisture, which could create an increased trailing-edge-heavy control surface and flutter.

If an excessive vibration, particularly in the control column and rudder pedals, is encountered in flight, this may be the onset of flutter and the procedure to follow is:

1. IMMEDIATELY REDUCE AIRSPEED (lower the landing gear, if necessary).
2. RESTRAIN THE CONTROLS OF THE AIRPLANE UNTIL THE VIBRATION CEASES.
3. FLY AT THE REDUCED AIRSPEED AND LAND AT THE NEAREST SUITABLE AIRPORT.
4. HAVE THE AIRPLANE INSPECTED FOR AIRFRAME DAMAGE, CONTROL SURFACE ATTACHING HARDWARE CONDITION/SECURITY, TRIM TAB FREE PLAY, PROPER CONTROL CABLE TENSION, AND CONTROL SURFACE BALANCE BY ANOTHER MECHANIC WHO IS FULLY QUALIFIED.

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TURBULENT WEATHER

A complete and current weather briefing is a requirement for a safe trip.

Updating of weather information en route is also essential. The wise pilot knows that weather conditions can change quickly, and treats weather forecasting as professional advice, rather than an absolute fact. He obtains all the advice he can, but stays alert to any sign or report of changing conditions.

Plan the flight to avoid areas of reported severe turbulence. It is not always possible to detect individual storm areas or find the in-between clear areas.

The National Weather Service classifies turbulence as follows:

Class of Turbulence	Effect
Extreme	Airplane is violently tossed about and is practically impossible to control. May cause structural damage.
Severe	Airplane may be momentarily out of control. Occupants are thrown violently against the belts and back into the seat. Unsecured objects are tossed about.
Moderate	Occupants require seat belts and occasionally are thrown against the belt. Unsecured objects move about.

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Light — Occupants may be required to use seat belts, but objects in the airplane remain at rest.

Thunderstorms, squall lines and violent turbulence should be regarded as extremely dangerous and must be avoided. Hail and tornadic wind velocities can be encountered in thunderstorms that can destroy any airplane, just as tornadoes destroy nearly everything in their path on the ground.

Thunderstorms also pose the possibility of a lightning strike on an airplane. Any structure or equipment which shows evidence of a lightning strike, or of being subjected to a high current flow due to a strike, or is a suspected part of a lightning strike path through the airplane should be thoroughly inspected and any damage repaired prior to additional flight.

A roll cloud ahead of a squall line or thunderstorm is visible evidence of extreme turbulence; however, the absence of a roll cloud should not be interpreted as denoting that severe turbulence is not present.

Even though flight in severe turbulence must be avoided, flight in turbulent air may be encountered unexpectedly under certain conditions.

The following recommendations should be observed for airplane operation in turbulent air:

Flying through turbulent air presents two basic problems, the answer to both of which is proper airspeed. On one hand, if you maintain an excessive airspeed, you run the risk of structural damage or failure; on the other hand, if your airspeed is too low, you may stall.

If turbulence is encountered, reduce speed to the turbulent air penetration speed, if given, or to the maneuvering speed, which is listed in the Limitations section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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These speeds give the best assurance of avoiding excessive stress loads, and at the same time provide the proper margin against inadvertent stalls due to gusts.

Beware of overcontrolling in an attempt to correct for changes in attitude; applying control pressure abruptly will build up G-forces rapidly and could cause structural damage or even failure. You should watch particularly your angle of bank, making turns as wide and shallow as possible. Be equally cautious in applying forward or back pressure to keep the airplane level. Maintain straight and level attitude in either up or down drafts. Use trim sparingly to avoid being grossly out of trim as the vertical air columns change velocity and direction. If necessary to avoid excessive airspeeds, lower the landing gear.

WIND SHEAR

Wind shears are rapid, localized changes in wind direction, which can occur vertically as well as horizontally. Wind shear can be very dangerous to all airplanes, large and small, particularly on approach to landing when airspeeds are slow.

A horizontal wind shear is a sudden change in wind direction or speed that can, for example, transform a headwind into a tailwind, producing a sudden decrease in indicated airspeed because of the inertia of the airplane. A vertical wind shear, is a sudden updraft or downdraft. Microbursts are intense, highly localized severe downdrafts.

The prediction of wind shears is far from an exact science. Monitor your airspeed carefully when flying near storms, particularly on approach. Be mentally prepared to add power and go around at the first indication that a wind shear is being encountered.

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FLIGHT IN ICING CONDITIONS

Every pilot should be intimately acquainted with the FAA Approved National Weather Service definitions for ice intensity and accumulation which we have reprinted below:

Intensity	Ice Accumulation
Trace	Ice becomes perceptible. Rate of accumulation slightly greater than rate of sublimation. It is not hazardous even though deicing/anti-icing equipment is not utilized, unless encountered for an extended period of time (over 1 hour).
Light	The rate of accumulation may create a problem if flight is prolonged in this environment (over 1 hour). Occasional use of deicing/anti-icing equipment removes/prevents accumulation. It does not present a problem if the deicing/anti-icing equipment is used.
Moderate	The rate of accumulation is such that even short encounters become potentially hazardous and use of deicing/anti-icing equipment or diversion is necessary.
Severe	The rate of accumulation is such that deicing/anti-icing equipment fails to reduce or control the hazard. Immediate diversion is necessary.

It is no longer unusual to find deicing and anti-icing equipment on a wide range of airplane sizes and types. Since the capability of this equipment varies, it becomes the pilot's primary responsibility to understand limitations which restrict the use of his airplane in icing conditions and the conditions which may exceed the systems capacity.

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Pilots and airplane owners must carefully review the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual in order to ascertain the required operable equipment needed for flight in icing conditions. In addition, they must ascertain from the same source the limits of approval or certification of their airplane for flight in icing conditions, and plan the flight accordingly, if icing conditions are known or forecast along the route.

Every owner and pilot of an airplane should understand that it is not uncommon to find airplanes equipped with less than the full complement of available systems and equipment. For example, propellers and pitot tube may be protected, but the airplane may not have wing boots or tail boots. The reverse might be true. Windshield, pitot and airfoil surfaces might be protected, but the propellers might not be. Before undertaking any flight into areas where icing conditions might be expected, inspect the airplane and review the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual to be certain that you are supported by the full complement of required IFR and deicing/anti-icing equipment.

Remember that regardless of its combination of deicing/anti-icing equipment, any airplane not fully equipped and functional for IFR flight is not properly equipped for flight in icing conditions. An airplane which is not approved or certificated for flight in icing conditions, or which does not have all critical areas protected in the required manner by fully operational anti-icing equipment must not be exposed to icing encounters of any intensity. When icing is detected, the pilot of such an airplane must make an immediate diversion by flying out of the area of visible moisture or going to an altitude where icing is not encountered.

Some models of Beech airplanes were approved for flight in certain limited icing conditions under the FAA's Bureau of Flight Standards Release No. 434. Under this release, properly equipped airplanes are approved for flight in light to

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moderate icing conditions only. Refer to Sections 2 and 4 of the above document for icing limitations. These airplanes are not approved for extended flight in moderate icing conditions or flights in any severe icing conditions. Flight in these conditions must be avoided.

Even airplanes fully equipped and certified for flight in the icing conditions described in Appendix C to FAR Part 25 must avoid flights into those conditions defined by the National Weather Service as "Severe". The National Weather Service definition of "Severe Icing" describes that conditions as: "the rate of accumulation is such that deicing/anti-icing equipment fails to reduce or control the hazard." No airplane equipped with any combination of deicing/anti-icing equipment can be expected to cope with such conditions. As competent pilots know, there appears to be no predictable limits for the severest weather conditions. For essentially the same reasons that airplanes, however designed or equipped for IFR flight, cannot be flown safely into conditions such as thunderstorms, tornadoes, hurricanes or other phenomena likely to produce severe turbulence, airplanes equipped for flight in icing conditions cannot be expected to cope with "Severe" icing conditions as defined by the National Weather Service. The prudent pilot must remain alert to the possibility that icing conditions may become "severe" and that his equipment will not cope with them. At the first indication that such condition may have been encountered or may lie ahead, he should immediately react by selecting the most expeditious and safe course for diversion.

Every pilot of a properly fully-equipped Beech airplane who ventures into icing conditions must maintain the minimum speed (KIAS) for operation in icing conditions, which is set forth in the Normal Procedures section, and in the Limitations section, of his Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If a minimum speed for flight in icing conditions is not specified in the manual, the following minimum indicated airspeeds must be maintained:

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All Baron and Travel Air Models - 130 KIAS
All other BEECHCRAFT twin-engine models - 140 KIAS

The pilot must remain aware of the fact that if he allows his airspeed to deteriorate below this minimum speed, he will increase the angle of attack of his airplane to the point where ice may build up on the under side of the wings aft of the area protected by the boots.

The fact or extent of ice build-up in unprotected areas will not be directly observable from the cockpit. Due to distortion of the wing airfoil, increased drag and reduced lift, stalling speeds will increase as ice accumulates on the airplane. For the same reasons, stall warning devices are not accurate and cannot be relied upon in icing conditions.

Even though the pilot maintains the prescribed minimum speeds for operating in icing conditions, ice is still likely to build up on the unprotected areas (the fuselage and unprotected wing leading edge inboard of the engine nacelle). Under some atmospheric conditions, it may even build up aft of the boots despite the maintenance of the prescribed minimum speed. The effect of ice accumulation on any unprotected surface is aggravated by length of exposure to the icing conditions. Ice buildup on unprotected surfaces will increase drag, add weight, reduce lift, and generally, adversely affect the aerodynamic characteristics and performance of the airplane. It can progress to the point where the airplane is no longer capable of flying. Therefore, the pilot operating even a fully-equipped airplane in sustained icing conditions must remain sensitive to any indication, such as observed ice accumulation, loss of airspeed, the need for increased power, reduced rate of climb, or sluggish response, that ice is accumulating on unprotected surfaces and that continued flight in these conditions is extremely hazardous, regardless of the performance of the deicing/anti-icing equipment.

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Since flight in icing conditions is not an everyday occurrence, it is important that pilots maintain a proper proficiency and awareness of the operating procedures necessary for safe operation of the airplane and that the airplane is in a condition for safe operation.

Ensure moisture drains in the airplane structure are maintained open as specified in the Aircraft Maintenance Manual, so that moisture will not collect and cause freezing in the control cable area. Also, control surface tab hinges should be maintained and lubricated as specified in the Aircraft Maintenance Manual.

In icing conditions the autopilot should be disengaged at an altitude sufficient to permit the pilot to gain the feel of the airplane prior to landing. In no case should this be less than the minimum altitude specified in the Autopilot Airplane Flight Manual Supplement.

Observe the procedures set forth in your Pilot's Operating Handbook and FAA Approved Airplane Flight Manual during operation in icing conditions.

Activate your deice and anti-icing systems before entering an area of moisture where you are likely to go through a freezing level, to make sure all necessary equipment is operative.

Rapid cycling of deice boots or cycling before at least one-half inch (1/2") of ice has accumulated (measured in the chordwise direction or forward from the leading edge), may cause the ice to grow outside the contour of the inflated boots and prevent ice removal.

For any owner or pilot whose use pattern for an airplane exposes it to icing encounters, the following references are required reading for safe flying:

- The airplane's Pilot's Operating Handbook and FAA

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Approved Airplane Flight Manual, especially the sections on Normal Procedures, Emergency Procedures, Abnormal Procedures, Systems, and Safety Information.

- FAA Advisory Circulars 91-51 Airplane Deice and Anti-ice Systems
- FAA Advisory Circulars 135-9 - Icing Limitations
- Weather Flying by Robert N. Buck.

Finally, the most important ingredients to safe flight in icing conditions - regardless of the airplane or the combination of deicing/anti-icing equipment - are a complete and current weather briefing, sound pilot judgement, close attention to the rate and type of ice accumulations, and the knowledge that "severe icing" as defined by the National Weather Service is beyond the capability of modern airplanes and immediate diversion must be made. It is the inexperienced or uneducated pilot who presses on "regardless", hoping that steadily worsening conditions will improve, only to find himself flying an airplane which has become so loaded with ice that he can no longer maintain altitude. At this point he has lost most, if not all, of his safety options, including perhaps a 180 degree turn to return along the course already traveled.

The responsible and well-informed pilot recognizes the limitations of weather conditions, his airplane and its systems, and reacts promptly.

WEATHER RADAR

Airborne weather avoidance radar is, as its name implies, for avoiding severe weather--not for penetrating it. Whether to fly into an area of radar echoes depends on echo intensity and shape, spacing between the echoes, and the capabilities of you and your airplane. Remember that weather radar detects only precipitation drops. Therefore, the radar scope provides no assurance of avoiding turbulence. The radar scope also does not provide assurance of avoiding

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instrument weather from clouds and fog. Your scope may be clear between intense echoes; this clear area does not necessarily mean you can fly between the storms and maintain visual sighting of them.

Thunderstorms build and dissipate rapidly. Therefore, do not attempt to plan a course between echoes using ground based radar. The best use of ground radar information is to isolate general areas and coverage of echoes. You must avoid individual storms from in-flight observations either by visual sighting or by airborne radar. It is better to avoid the whole thunderstorm area than to detour around individual storms unless they are scattered.

Remember that while hail always gives a radar echo, it may fall several miles from the nearest visible cloud and hazardous turbulence may extend to as much as 20 miles from the echo edge. The intensity of the radar echo from hail varies with the size and nature of the hailstone. A hailstone with a wet surface gives a strong radar return while a dry hailstone gives a relatively weak return. Avoid intense or extreme level echoes by at least 20 miles; that is, such echoes should be separated by at least 40 miles before you fly between them. With weaker echoes you can reduce the distance by which you avoid them.

Above all, remember this: never regard any thunderstorm lightly. Even when radar observers report the echoes are of light intensity, avoiding thunderstorms is the best policy. The following are some do's and don'ts of thunderstorm avoidance:

1. Don't land or take off in the face of an approaching thunderstorm. A sudden gust front of low level turbulence could cause loss of control.
2. Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be disastrous.

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3. Don't fly without airborne radar into a cloud mass containing scattered embedded thunderstorms. Embedded thunderstorms usually can not be visually circumnavigated.
4. Don't trust visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.
5. Do avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
6. Do circumnavigate the entire area if the area has 6/10 or greater thunderstorm coverage.
7. Do remember that vivid and frequent lightning indicates the probability of a severe thunderstorm.
8. Do regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher, whether the top is visually sighted or determined by radar.

If you cannot avoid penetrating a thunderstorm, the following are some do's BEFORE entering the storm:

9. Tighten your safety belt, put on your shoulder harness, and secure all loose objects.
10. Plan and hold your course to take you through the storm in minimum time.
11. To avoid the most critical icing, establish a penetration altitude below the freezing level or above the level of -15°C.
12. Verify that pitot heat is on and turn on carburetor heat or engine anti-ice. Icing can be rapid at any altitude and cause almost instantaneous power failure and/or loss of airspeed indication.

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MOUNTAIN FLYING

Pilots flying in mountainous areas should inform themselves of all aspects of mountain flying, including the effects of topographic features on weather conditions. Many good articles have been published, and a synopsis of mountain flying operations is included in the FAA Airman's Information Manual, Part 1.

Avoid flight at low altitudes over mountainous terrain, particularly near the lee slopes. If the wind velocity near the level of the ridge is in excess of 25 knots and approximately perpendicular to the ridge, mountain wave conditions are likely over and near the lee slopes. If the wind velocity at the level of the ridge exceeds 50 knots, a strong mountain wave is probable with extreme up and down drafts and severe turbulence. The worst turbulence will be encountered in and below the rotor zone, which is usually 8 to 10 miles downwind from the ridge. This zone is sometimes characterized by the presence of "roll clouds" if sufficient moisture is present; altocumulus standing lenticular clouds are also visible signs that a mountain wave exists, but their presence is likewise dependent on moisture. Mountain wave turbulence can, of course, occur in dry air and the absence of such clouds should not be taken as assurance that mountain wave turbulence will not be encountered. A mountain wave downdraft may exceed the climb capability of your airplane. Avoid mountain wave downdrafts.

VFR - LOW CEILINGS

If you are not instrument rated, do not attempt "VFR on Top" or "Special VFR" flight or clearances. Being caught above a solid cloud layer when an emergency descent is required (or at destination) is an extremely hazardous position for the VFR pilot. Accepting a clearance out of airport control zones with no minimum ceiling and one-mile visibility as permitted with "Special VFR" is a foolish practice for the VFR pilot.

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Avoid areas of low ceilings and restricted visibility unless you are instrument rated and proficient and have an instrument equipped airplane. Then proceed with caution and with planned alternates.

VFR AT NIGHT

When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain a safe minimum altitude as dictated by terrain, obstacles such as TV towers, or communities in the area flown. This is especially true in mountainous terrain, where there is usually very little ground reference. Minimum clearance is 2,000 feet above the highest obstacle en route. Do not depend on your ability to see obstacles in time to miss them. Flight on dark nights over sparsely populated country can be the same as IFR, and must be avoided by inexperienced or non-IFR rated pilots.

VERTIGO - DISORIENTATION

Disorientation can occur in a variety of ways. During flight, inner ear balancing mechanisms are subjected to varied forces not normally experienced on the ground. This, combined with loss of outside visual reference, can cause vertigo. False interpretations (illusions) result, and may confuse the pilot's conception of the attitude and position of his airplane.

Under VFR conditions, the visual sense, using the horizon as a reference, can override the illusions. Under low visibility conditions (night, fog, clouds, haze, etc.) the illusions predominate. Only through awareness of these illusions, and proficiency in instrument flight procedures, can an airplane be operated safely in a low visibility environment.

Flying in fog, dense haze or dust, cloud banks, or very low visibility, with strobe lights or rotating beacons turned on can

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contribute to vertigo. They should be turned off in these conditions, particularly at night.

All pilot's should check the weather and use good judgment in planning flights. The VFR pilot should use extra caution in avoiding low visibility conditions.

Motion sickness often precedes or accompanies disorientation and may further jeopardize the flight.

Disorientation in low visibility conditions is not limited to VFR pilots. Although IFR pilots are trained to look at their instruments to gain an artificial visual reference as a replacement for the loss of a visual horizon, they do not always do so. This can happen when the pilot's physical condition will not permit him to concentrate on his instruments; when the pilot is not proficient in flying instrument conditions in the airplane he is flying; or, when the pilot's work load of flying by reference to his instruments is augmented by such factors as turbulence. Even an instrument rated pilot encountering instrument conditions, intentional or unintentional, should ask himself whether or not he is sufficiently alert and proficient in the airplane he is flying, to fly under low visibility conditions and in the turbulence anticipated or encountered.

If any doubt exists, the flight should not be made or it should be discontinued as soon as possible.

The result of vertigo is loss of control of the airplane. If the loss of control is sustained, it will result in an excessive speed accident. Excessive speed accidents occur in one of two manners, either as an inflight airframe separation or as a high speed ground impact; and they are fatal accidents in either case. All airplanes are subject to this form of accident.

For years, Beech Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals have contained instructions that the landing gear should be extended in any circumstance in which the pilot encounters IFR conditions

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which approach the limits of his capability or his ratings. Lowering the gear in IFR conditions or flight into heavy or severe turbulence, tends to stabilize the airplane, assists in maintaining proper airspeed, and will substantially reduce the possibility of reaching excessive airspeeds with catastrophic consequences, even where loss of control is experienced.

Excessive speed accidents occur at airspeeds greatly in excess of two operating limitations which are specified in the manuals: Maximum maneuvering speed and the "red line" or maximum operating speed. Such speed limits are set to protect the structure of an airplane. For example, flight controls are designed to be used to their fullest extent only below the airplane's maximum maneuvering speed. As a result, the control surfaces should never be suddenly or fully deflected above maximum maneuvering speed. Turbulence penetration should not be performed above that speed. The accidents we are discussing here occur at airspeeds greatly in excess of these limitations. No airplane should ever be flown beyond its FAA approved operating limitations.

FLIGHT OF MULTI-ENGINE AIRPLANES WITH ONE ENGINE INOPERATIVE

The major difference between flying a twin-engine and single-engine airplane is knowing how to manage the flight if one engine loses power for any reason. Safe flight with one engine inoperative requires an understanding of the basic aerodynamics involved - as well as proficiency in engine out procedures.

Loss of power from one engine affects both climb performance and controllability of twin-engine airplanes. Climb performance depends on an excess of power over that required for level flight. Loss of power from one engine obviously represents a 50% loss of horsepower but, in virtually all twin-engine airplanes, climb performance is reduced by at least 80%. A study of the charts in your Pilot's Operating

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Handbook and FAA Approved Airplane Flight Manual will confirm this fact. Single-engine climb performance depends on four factors:

Airspeed	too little, or too much, will decrease climb performance
Drag	gear, flaps, cowl flaps, prop, and speed
Power	amount available in excess of that needed for level flight
Weight	passengers, baggage, and fuel load greatly affect climb performance

Loss of power on one engine creates yaw due to asymmetric thrust. Yaw forces must be balanced with the rudder. Loss of power on one engine also reduces airflow over the wing causing a roll toward the "dead" engine which must be balanced with the aileron. The net result of these forces cause the airplane to sideslip slightly toward the dead engine. This sideslip may be balanced by banking slightly (up to 5°) into the operating engine.

CAUTION

In the event of an engine failure with the main tanks less than one-quarter full, corrective action must be taken immediately to prevent large yaw angles from developing and causing stoppage of the remaining engine.

Airspeed is the key to safe single engine operations. For most twin-engine airplanes there is:

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Symbol	Description
V_{MCA}	Airspeed below which directional control cannot be maintained
V_{SSE}	Airspeed below which an intentional engine cut should never be made
V_{YSE}	Airspeed that will give the best single engine rate-of-climb (or the slowest loss of altitude)
V_{XSE}	Airspeed that will give the steepest angle-of-climb with one engine out

AIR MINIMUM CONTROL SPEED (V_{MCA})

V_{MCA} is designated by the red radial on the airspeed indicator and indicates the minimum control speed, airborne at sea level. V_{MCA} is determined by FAA regulations as the minimum airspeed at which it is possible to recover directional control of the airplane within 20 degrees heading change, and thereafter maintain straight flight, with not more than 5 degrees of bank if one engine fails suddenly with:

- Takeoff power on both engines
- Rearmost allowable center of gravity
- Flaps in takeoff position
- Propeller windmilling in takeoff pitch configuration

However, sudden engine failures rarely occur with all factors listed above, and therefore, the actual V_{MCA} in any particular situation may be a little slower than the red radial on the airspeed indicator. Most airplanes with an inoperative engine will not maintain level flight at maximum power at speeds at or near V_{MCA}. Consequently, it is not advisable to fly at speeds approaching V_{MCA}, except in training situations or during flight tests. Adhering to the practice of never flying at or below the published V_{MCA} speed for your airplane does not eliminate loss of directional control as a problem in the

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event of an engine failure. The pilot must be prepared to use assertive control input to maintain airplane control following an engine failure.

INTENTIONAL ONE-ENGINE INOPERATIVE SPEED (V_{SSE})

V_{SSE} is specified by the airplane manufacturer and is the minimum speed at which to perform intentional engine cuts. Use of V_{SSE} is intended to reduce the accident potential from loss of control after engine cuts at or near minimum control speed. V_{MCA} demonstrations are necessary in training but should only be made at safe altitude above the terrain and with power reduction on one engine made at or above V_{SSE}.

ONE-ENGINE-INOPERATIVE BEST RATE-OF-CLIMB SPEED (V_{YSE})

V_{YSE} is designated by the blue radial on the airspeed indicator. V_{YSE} delivers the greatest gain in altitude in the shortest possible time, and is based on the following criteria:

- Critical engine inoperative, and its propeller in the minimum drag position.
- Operating engine set at not more than the maximum continuous power.
- Landing gear retracted.
- Wing flaps up.
- Cowl flaps as required for engine cooling.
- Airplanes flown at recommended bank angle (up to 5° into operating engine).

Drag caused by a windmilling propeller, extending landing gear, or flaps in the landing position, will severely degrade or destroy single engine climb performance. Since climb

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performance varies widely with type of airplane, weight, temperature, altitude, and airplane configuration, the climb gradient (altitude gain or loss per mile) may be marginal - or even negative - under some conditions. Study the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for your airplane and know what performance to expect with one engine out.

ONE-ENGINE-INOPERATIVE BEST ANGLE-OF-CLIMB SPEED (V_{XSE})

V_{XSE} is used only to clear obstructions during initial climb-out as it gives the greatest altitude gain per unit of horizontal distance. It provides less engine cooling and requires more rudder control input than V_{YSE}.

SINGLE ENGINE SERVICE CEILING

The single engine service ceiling is the maximum altitude at which an airplane will climb at a rate of at least 50 feet per minute in smooth air, with one engine inoperative.

The single engine service ceiling chart should be used during flight planning to determine whether the airplane, as loaded, can maintain the Minimum En Route Altitude (MEA) if IFR, or terrain clearance if VFR, following an engine failure.

BASIC SINGLE ENGINE PROCEDURES

Know and follow, to the letter, the single-engine emergency procedures specified in your Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for your specific make and model airplane. However, the basic fundamentals of all the procedures are as follows:

1. Maintain airplane control and airspeed at all times. **THIS IS CARDINAL RULE NUMBER ONE.**
2. Usually, apply maximum power to the operating engine.

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However, if the engine failure occurs at a speed below V_{MCA}, during cruise or in a steep turn, you may elect to use only enough power to maintain a safe speed and altitude. If the failure occurs on final approach, use power only as necessary to complete the landing.

3. Reduce drag to an absolute minimum.
4. Secure the failed engine and related sub-systems.

The first three steps should be done promptly and from memory. The check list should then be consulted to be sure that the inoperative engine is secured properly and that the appropriate switches are placed in the correct position. The airplane must be banked about 5° into the operating engine, with the "slip/skid" ball slightly out of center toward the operating engine, to achieve rated performance.

Another note of caution: Be sure to identify the dead engine, positively, before securing it. Remember: First identify the suspected engine (i.e., "Dead foot means dead engine"), second, verify with cautious throttle movement, then secure.

ENGINE FAILURE ON TAKEOFF

If an engine fails before attaining lift-off speed or below V_{MCA}, the only proper action is to discontinue the takeoff. If the engine fails after lift-off with the landing gear still down, the takeoff should still be discontinued if touchdown and roll-out on the remaining runway is still possible.

If you do find yourself in a position of not being able to climb, it is much better to reduce the power on the good engine and land straight ahead than try to force a climb and lose control.

Your Pilot's Operating Handbook and FAA Approved Airplane Flight Manual contains charts that are used in calculating the runway length required to stop if the engine fails

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before reaching lift-off speed and also has charts showing the single-engine performance after lift-off.

Study your charts carefully. No airplane is capable of climbing out on one engine under all weight, pressure altitude, and temperature conditions. Know, before you take the actual runway, whether you can maintain control and climb out if you lose an engine while the gear is still down. It may be necessary to off-load some weight, or wait for more favorable temperatures.

WHEN TO FLY V_X, V_Y, V_{XSE} AND V_{YSE}

During normal two-engine operations, always fly V_Y (V_X if necessary for obstacle clearance) on initial climb out. Then, accelerate to your cruise climb airspeed, which may be V_Y plus 10 or 15 knots after you have obtained a safe altitude. Use of cruise climb airspeed will give you better engine cooling, increased inflight visibility and better fuel economy. However, at first indication of an engine failure during climb out, or while on approach, establish V_{YSE} or V_{XSE}, whichever is appropriate. (Consult your Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for specifics.)

STALLS, SLOW FLIGHT AND TRAINING

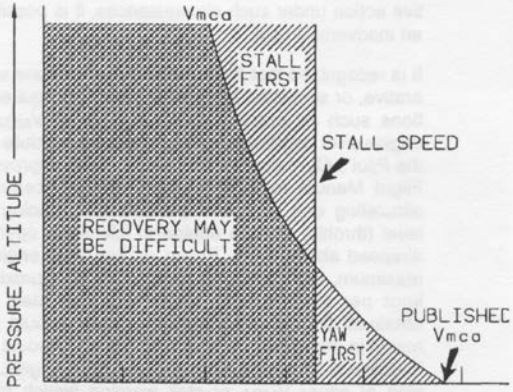
The stall warning system must be kept operational at all times and must not be deactivated by interruption of circuits, circuit breakers, or fuses. Compliance with this requirement is especially important in all high performance multi-engine airplanes during engine-out practice or stall demonstrations, because the stall speed is critical in all low speed operations of high-performance airplanes.

Training should be accomplished under the supervision of a qualified instructor-pilot, with careful reference to the applicable sections of the FAA Practical Test Standards and FAA Pilot Transition Courses for Complex Single Engine and

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Light Twin Engine Airplanes (AC61-9B). In particular, observe carefully the warnings in the Practical Test Standards.

The single-engine stall speed of a twin-engine airplane is generally slightly below the power off (engines idle) stall speed, for a given weight condition. Single-engine stalls should not be conducted in multi-engine airplanes by other than qualified engineering test pilots.



RELATIONSHIP BETWEEN STALL SPEED AND Vmca FOR AIRCRAFT WITH NORMALLY ASPIRATED ENGINES.

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Engine-out minimum control speed generally decreases with altitude, while the single engine stall speed remains approximately constant for normally aspirated engines. No such demonstration should be attempted when the altitude and temperature are such that the engine-out minimum control

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speed is known, or discovered to be, close to the stalling speed. Loss of directional or lateral control, just as a stall occurs, is potentially hazardous.

V_{SSE}, the airspeed below which an engine should not be intentionally rendered inoperative for practice purposes, was established because of the apparent practice of some pilots, instructors, and examiners, of intentionally rendering an engine inoperative at a time when the airplane is being operated at a speed close to, or below the power-idle stall speed. Unless the pilot takes immediate and proper corrective action under such circumstances, it is possible to enter an inadvertent spin.

It is recognized that flight below V_{SSE} with one engine inoperative, or simulated inoperative, may be required for conditions such as practice demonstration of V_{MCA} for multiengine pilot certification. Refer to the procedure set forth in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for your airplane. This procedure calls for simulating one engine inoperative by reducing the power level (throttle) on one engine to idle while operating at an airspeed above V_{SSE}. Power on the other engine is set at maximum, then airspeed is reduced at approximately one knot per second until either V_{MCA} or stall warning is obtained. During this transition, rudder should be used to maintain directional control, and ailerons should be used to maintain a 5° bank toward the operative engine. At the first sign of either V_{MCA} or stall warning (which may be evidenced by inability to maintain longitudinal, lateral or directional control, aerodynamic stall buffet, or stall warning horn sound), recovery must be initiated immediately by reducing power to idle on operative engine and lowering the nose to regain V_{SSE}. Resume normal flight. This entire procedure should be used at a safe altitude of at least 5,000 feet above the ground in clear air only.

If stall warning is detected prior to the first sign of V_{MCA}, an engine-out minimum control speed demonstration cannot be

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accomplished under the existing gross weight conditions and should not be attempted.

SPINS

A major cause of fatal accidents in general aviation airplanes is a spin. Stall demonstrations and practice are a means for a pilot to acquire the skills to recognize when a stall is about to occur and to recover as soon as the first signs of a stall are evident.
If a stall does not occur - A spin cannot occur. It is important to remember however, that a stall can occur in any flight attitude, at any airspeed, if controls are misused.

Unless your airplane has been specifically certificated in the aerobatic category and specifically tested for spin recovery characteristics, it is placarded against intentional spins. The pilot of an airplane placarded against intentional spins should assume that the airplane may become uncontrollable in a spin, since its performance characteristics beyond certain limits specified in the FAA regulations may not have been tested and are unknown. This is why airplanes are placarded against intentional spins, and this is why stall avoidance is your protection against an inadvertent spin.

Pilots are taught that intentional spins are entered by deliberately inducing a yawing moment with the controls as the airplane is stalled. Inadvertent spins result from the same combination - stall plus yaw. That is why it is important to use coordinated controls and to recover at the first indication of a stall when practicing stalls.

In any twin engine airplane, fundamental aerodynamics dictate that if the airplane is allowed to become fully stalled while one engine is providing lift-producing thrust, the yawing moment which can induce a spin will be present. Consequently, it is important to immediately reduce power on the operating engine, lower the nose to reduce the angle of attack, and increase the airspeed to recover from the stall.

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In any twin engine airplane, if application of stall recovery controls is delayed, a rapid rolling and yawing motion may develop, even against full aileron and rudder, resulting in the airplane becoming inverted during the onset of a spinning motion. Once the airplane has been permitted to progress beyond the stall and is allowed to reach the rapid rolling and yawing condition, the pilot must then immediately initiate the generally accepted spin recovery procedure for multi-engine airplanes, which is as follows:

Immediately move the control column full forward, apply full rudder opposite to the direction of the spin and reduce power on both engines to idle. These three actions should be done as near simultaneously as possible; then continue to hold this control position until rotation stops, then neutralize all controls and execute a smooth pullout. Ailerons should be neutral during recovery. THE LONGER THE PILOT DELAYS BEFORE TAKING CORRECTIVE ACTION, THE MORE DIFFICULT RECOVERY WILL BECOME.

Always remember that extra alertness and pilot techniques are required for slow flight maneuvers, including the practice or demonstration of stalls or V_{MCA}. In addition to the foregoing mandatory procedure, always:

- Be certain that the center of gravity of the airplane is as far forward as possible. Forward C.G. aids stall recovery, spin avoidance and spin recovery. An aft C.G. can create a tendency for a spin to stabilize, which delays recovery.
- Whenever a student pilot will be required to practice slow flight or single-engine maneuvers, be certain that the qualified instructor pilot has a full set of operable controls available. FAA regulations prohibit flight instruction without full dual controls.
- Conduct any maneuvers which could possibly result in a spin at altitudes in excess of five thousand (5,000) feet above ground level in clear air only.

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- Remember that an airplane, at or near traffic pattern and approach altitudes, cannot recover from a spin, or perhaps even a stall, before impact with the ground. For twin engine airplanes, when descending to traffic altitude and during pattern entry and all other flight operations, maintain speed no lower than V_{SSE}. On final final approach maintain at least the airspeed shown in the flight manual. Should a go-around be required, do not apply more power than necessary until the airplane has accelerated to V_{SSE}. Recognize that under some conditions of weight, density altitude, and airplane configuration, a twin engine airplane cannot climb or accelerate on a single engine. Hence a single engine go-around is impossible and the airplane is committed to a landing. Plan your approach accordingly.
- Remember that if an airplane flown under instrument conditions is permitted to stall or enter a spin, the pilot, without reference to the horizon, is certain to become disoriented. He may be unable to recognize a stall, spin entry, or the spin condition and he may be unable to determine even the direction of the rotation.
- Finally, never forget that stall avoidance is your best protection against an inadvertent spin. MAINTAIN YOUR AIRSPEED.

DESCENT

In twin engine piston-powered airplanes, supercharged or normally aspirated, it is necessary to avoid prolonged descents with low power, as this produces two problems: (1) excessively cool cylinder head temperatures which cause premature engine wear, and (2) excessively rich mixtures due to idle enrichment (and altitude) which causes soot and lead deposits on the spark plugs (fouling). The second of these is the more serious consideration; the engine may not respond to the throttle when it is desired to discontinue the descent. Both problems are amenable to one solution: maintain adequate power to keep cylinder head temperatures in

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the "green" range during descent, and lean to best power mixture (that is, progressively enrich the mixture from cruise only slightly as altitude decreases). This procedure will lengthen the descent, of course, and requires some advance planning. If it is necessary to make a prolonged descent at or near idle, as in practicing forced landings, at least avoid the problem of fouled spark plugs by frequently advancing the throttle until the engine runs smoothly, and maintain an appropriate mixture setting with altitude. (Refer to pre-landing check list.)

VORTICES - WAKE TURBULENCE

Every airplane generates wakes of turbulence while in flight. Part of this is from the propeller or jet engine, and part from the wing tip vortices. The larger and heavier the airplane, the more pronounced and turbulent the wakes will be. Wing tip vortices from large, heavy airplanes are very severe at close range, degenerating with time, wind and distance. These are rolling in nature, from each wing tip. In tests, vortex velocities of 133 knots have been recorded. Encountering the rolling effect of wing tip vortices within two minutes after passage of large airplanes is most hazardous to light airplanes. This roll effect can exceed the maximum counter-roll obtainable in a light airplane. The turbulent areas may remain for as long as three minutes or more, depending on wind conditions, and may extend several miles behind the airplane. Plan to fly slightly above and to the windward side of other airplanes. Because of the wide variety of conditions that can be encountered, there is no set rule to follow to avoid wake turbulence in all situations. However, the Airman's Information Manual, and to a greater extent Advisory Circular 90-23, Aircraft Wake Turbulence, provide a thorough discussion of the factors you should be aware of when wake turbulence may be encountered.

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TAKEOFF AND LANDING CONDITIONS

When taking off on runways covered with water or freezing slush, the landing gear should remain extended for approximately ten seconds longer than normal, allowing the wheels to spin and dissipate the freezing moisture. The landing gear should then be cycled up, then down, wait approximately five seconds and then retracted again. Caution must be exercised to insure that the entire operation is performed below Maximum Landing Gear Operating Airspeed.

Use caution when landing on runways that are covered by water or slush which cause hydroplaning (aquaplaning), a phenomenon that renders braking and steering ineffective because of the lack of sufficient surface friction. Snow and ice covered runways are also hazardous. The pilot should also be alert to the possibility of the brakes freezing.

Use caution when taking off or landing during gusty wind conditions. Also be aware of the special wind conditions caused by buildings or other obstructions located near the runway.

MEDICAL FACTS FOR PILOTS

GENERAL

When the pilot enters the airplane, he becomes an integral part of the man-machine system. He is just as essential to a successful flight as the control surfaces. To ignore the pilot in preflight planning would be as senseless as failing to inspect the integrity of the control surfaces or any other vital part of the machine. The pilot has the responsibility for determining his reliability prior to entering the airplane for flight. When piloting an airplane, an individual should be free of conditions which are harmful to alertness, ability to make correct decisions, and rapid reaction time.

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FATIGUE

Fatigue generally slows reaction time and causes errors due to inattention. In addition to the most common cause of fatigue; insufficient rest and loss of sleep, the pressures of business, financial worries, and family problems can be important contributing factors. If you are tired, don't fly.

HYPOXIA

Hypoxia, in simple terms, is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. There is a wide individual variation in susceptibility to hypoxia. In addition to progressively insufficient oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (anemias, carbon monoxide, and certain drugs). Also, alcohol and various drugs decrease the brain's tolerance to hypoxia.

Your body has no built-in alarm system to let you know when you are not getting enough oxygen. It is impossible to predict when or where hypoxia will occur during a given flight, or how it will manifest itself. Some of the common symptoms of hypoxia are increased breathing rate, a lightheaded or dizzy sensation, tingling or warm sensation, sweating, reduced visual field, sleepiness, blue coloring of skin, fingernails, and lips, and behavior changes. A particularly dangerous feature of hypoxia is an increased sense of well-being, called euphoria. It obscures a person's ability and desire to be critical of himself, slows reaction time, and impairs thinking ability. Consequently, a hypoxic individual commonly believes things are getting progressively better while he nears total collapse.

The symptoms are slow but progressive, insidious in onset, and are most marked at altitudes starting above ten thousand feet. Night vision, however, can be impaired starting at an altitude of 5,000 feet. Persons who have recently overindulged in alcohol, who are moderate to heavy smokers, or

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who take certain drugs, may be more susceptible to hypoxia. Susceptibility may also vary in the same individual from day to day or even morning to evening. Use oxygen on flights above 10,000 feet and at any time when symptoms appear.

Depending upon altitude, a hypoxic individual has a limited time to make decisions and perform useful acts, even though he may remain conscious for a longer period. If pressurization equipment fails at certain altitudes the pilot and passengers have only a certain amount of time to get an oxygen mask on before they exceed their time of useful consciousness. The time of useful consciousness is approximately 3-5 minutes at 25,000 feet of altitude for the average individual and diminishes markedly as altitude increases. At 30,000 feet altitude, for example, the time of useful consciousness is approximately 1-2 minutes. Therefore, in the event of depressurization, oxygen masks should be used immediately.

Should symptoms occur that cannot definitely be identified as either hypoxia or hyperventilation, try three or four deep breaths of oxygen. The symptoms should improve markedly if the condition was hypoxia (recovery from hypoxia is rapid).

Pilots who fly to altitudes that require or may require the use of supplemental oxygen should be thoroughly familiar with the operation of the airplane oxygen systems. A preflight inspection of the system should be performed, including proper fit of the mask. The passengers should be briefed on the proper use of their oxygen system before flight.

Pilots who wear beards should be careful to ensure that their beard is carefully trimmed so that it will not interfere with proper sealing of the oxygen masks. If you wear a beard or moustache, test the fit of your oxygen mask on the ground for proper sealing. Studies conducted by the military and oxygen equipment manufacturers conclude that oxygen masks do not seal over beards or heavy facial hair.

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Federal Aviation Regulations related to the use of supplemental oxygen by flight crew and passengers must be adhered to if flight to higher altitudes is to be accomplished safely. Passengers with significant circulatory or lung disease may need to use supplemental oxygen at lower altitudes than specified by these regulations.

Pilots of pressurized airplanes should receive physiological training with emphasis on hypoxia and the use of oxygen and oxygen systems. Pilots of airplanes with pressure demand oxygen systems should undergo training, experience altitude chamber decompression, and be familiar with pressure breathing before flying at high altitude. This training is available throughout the United States at nominal cost. Information regarding this training may be obtained by request from the Chief, Civil Aeromedical Institute, Attention: Aeromedical Education Branch, AAC-140, Mike Monroney Aeronautical Center, P. O. Box 25082, Oklahoma City, Oklahoma 73125

HYPERVENTILATION

Hyperventilation, or overbreathing, is a disturbance of respiration that may occur in individuals as a result of emotional tension or anxiety. Under conditions of emotional stress, fright, or pain, breathing rate may increase, causing increased lung ventilation, although the carbon dioxide output of the body cells does not increase. As a result, carbon dioxide is "washed out" of the blood. The most common symptoms of hyperventilation are: dizziness, nausea, sleepiness, and finally, unconsciousness. If the symptoms persist discontinue use of oxygen and consciously slow your breathing rate until symptoms clear, and then resume normal breathing rate. Normal breathing can be aided by talking aloud.

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ALCOHOL

Common sense and scientific evidence dictate that you must not fly as a crew member while under the influence of alcohol. Alcohol, even in small amounts, produces (among other things):

- A dulling of critical judgement.
- A decreased sense of responsibility.
- Diminished skill reactions and coordination.
- Decreased speed and strength of muscular reflexes (even after one ounce of alcohol).
- Decreases in efficiency of eye movements during reading (after one ounce of alcohol).
- Increased frequency of errors (after one ounce of alcohol).
- Constriction of visual fields.
- Decreased ability to see under dim illuminations.
- Loss of efficiency of sense of touch.
- Decrease of memory and reasoning ability.
- Increased susceptibility to fatigue and decreased attention span.
- Decreased relevance of response.
- Increased self confidence with decreased insight into immediate capabilities.

Tests have shown that pilots commit major errors of judgment and procedure at blood alcohol levels substantially less than the minimum legal levels of intoxication for most states. These tests further show a continuation of impairment from alcohol up to as many as 14 hours after consumption, with no appreciable diminution of impairment. The body metabolizes ingested alcohol at a rate of about one-third of an ounce per hour. Even after the body completely

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destroys a moderate amount of alcohol, a pilot can still be severely impaired for many hours by hangover. The effects of alcohol on the body are magnified at altitudes, as 2 oz. of alcohol at 18,000 feet produce the same adverse effects as 6 oz. at sea level.

Federal Aviation Regulations have been amended to reflect the FAA's growing concern with the effects of alcohol impairment. FAR 91 states:

"Alcohol or drugs.

(a) No person may act or attempt to act as a crewmember of a civil aircraft -

(1) Within 8 hours after the consumption of any alcoholic beverage;

(2) While under the influence of alcohol;

(3) While using any drug that affects the person's faculties in any way contrary to safety; or

(4) While having .04 percent by weight or more alcohol in the blood.

(b) Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care) to be carried in that aircraft."

Because of the slow destruction of alcohol by the body, a pilot may still be under influence eight hours after drinking a moderate amount of alcohol. Therefore, an excellent rule is to allow at least 12 to 24 hours between "bottle and throttle," depending on the amount of alcoholic beverage consumed.

DRUGS

Self-medication or taking medicine in any form when you are flying can be extremely hazardous. Even simple home or

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over-the-counter remedies and drugs such as aspirin, antihistamines, cold tablets, cough mixtures, laxatives, tranquilizers, and appetite suppressors, may seriously impair the judgment and coordination needed while flying. The safest rule is to take no medicine before or while flying, except after consultation with your Aviation Medical Examiner.

SCUBA DIVING

Flying shortly after any prolonged scuba diving could be dangerous. Under the increased pressure of the water, excess nitrogen is absorbed into your system. If sufficient time has not elapsed prior to takeoff for your system to rid itself of this excess gas, you may experience the bends at altitudes even under 10,000 feet, where most light planes fly.

CARBON MONOXIDE AND NIGHT VISION

The presence of carbon monoxide results in hypoxia which will affect night vision in the same manner and extent as hypoxia from high altitudes. Even small levels of carbon monoxide have the same effect as an altitude increase of 8,000 to 10,000 feet. Smoking several cigarettes can result in a carbon monoxide saturation sufficient to affect visual sensitivity equal to an increase of 8,000 feet altitude.

DECOMPRESSION SICKNESS

Pilots flying unpressurized airplanes at altitudes in excess of 10,000 feet should be alert for the symptoms of 'decompression sickness'. This phenomenon, while rare, can impair the pilot's ability to perform and in extreme cases, can result in the victim being rendered unconscious. Decompression sickness, also known as dysbarism and aviator's "bends", is caused by nitrogen bubble formation in body tissue as the ambient air pressure is reduced by climbing to higher altitudes. The symptoms are pain in the joints, abdominal cramps, burning sensations in the skin, visual impairment

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and numbness. Some of these symptoms are similar to hypoxia. The only known remedy for decompression sickness is recompression, which can only be accomplished in an unpressurized airplane by descending. The pilot should immediately descend if it is suspected that this condition exists, since the effects will only worsen with continued exposure to the reduced pressure environment at altitude and could result, if uncorrected, in complete incapacitation. The possibility of decompression sickness can be greatly reduced by pre-breathing oxygen prior to flight and by commencing oxygen breathing well below the altitudes where it is legally mandatory.

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A FINAL WORD

Airplanes are truly remarkable machines. They enable us to shrink distance and time, and to expand our business and personal horizons in ways that, not too many years ago, were virtually inconceivable. For many businesses, the general aviation airplane has become the indispensable tool of efficiency.

Advances in the mechanical reliability of the airplanes we fly have been equally impressive, as attested by the steadily declining statistics of accidents attributed to mechanical causes, at a time when the airframe, systems and power plants have grown infinitely more complex. The explosion in capability of avionics systems is even more remarkable. Radar, RNAV, LORAN, sophisticated autopilots and other devices which, just a few years ago, were too large and prohibitively expensive for general aviation size airplanes, are becoming increasingly commonplace in even the smallest airplanes.

It is thus that this Safety Information is directed to the pilot, for it is in the area of the skill and proficiency of you, the pilot, that the greatest gains in safe flying are to be made over the years to come. Intimate knowledge of your airplane, its capabilities and its limitations, and disciplined adherence to the procedures for your airplane's operation, will enable you to transform potential tragedy into an interesting hangar story when - as it inevitably will - the abnormal situation is presented.

Know your airplane's limitations, and your own. Never exceed either.

Safe flying,

BEECH AIRCRAFT CORPORATION

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