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SECTION I
GENERAL
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INTRODUCTION

The format and contents of the 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 Company feels that it is highly important to have Safety Information in a 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.

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, 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 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 Flight Manual.

As a further reminder, the owner and the operator should also be familiar with the Federal Aviation 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.

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 Company, 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.

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.

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

Raytheon Aircraft Company 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

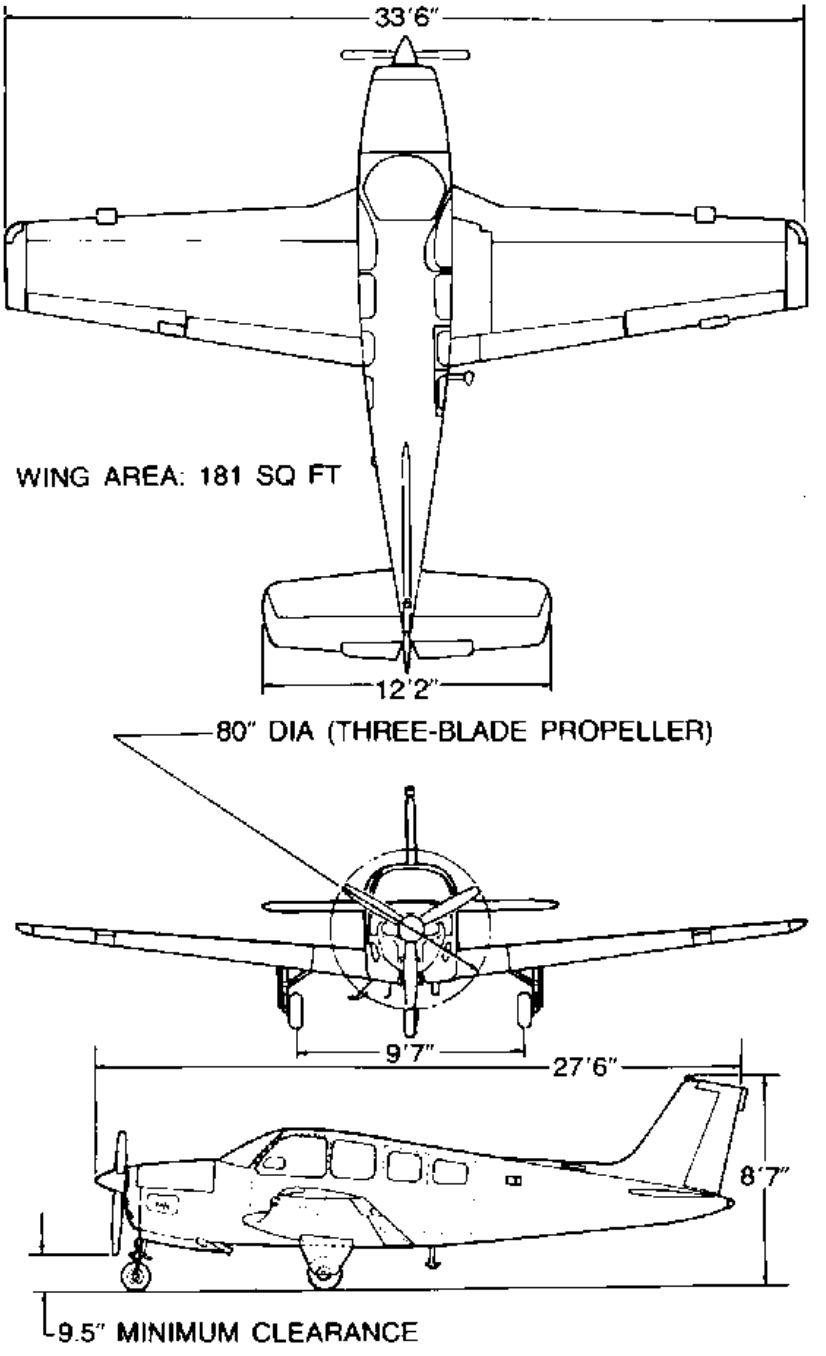
When a new airplane is delivered from the factory, the handbook delivered with it contains either an STC (Supplemental Type Certificate) Supplement or a Raytheon Aircraft Flight Manual Supplement for every installed item requiring a supplement. If a new handbook for operation of the airplane is obtained 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.

AIRPLANE FLIGHT MANUAL SUPPLEMENTS REVISION RECORD

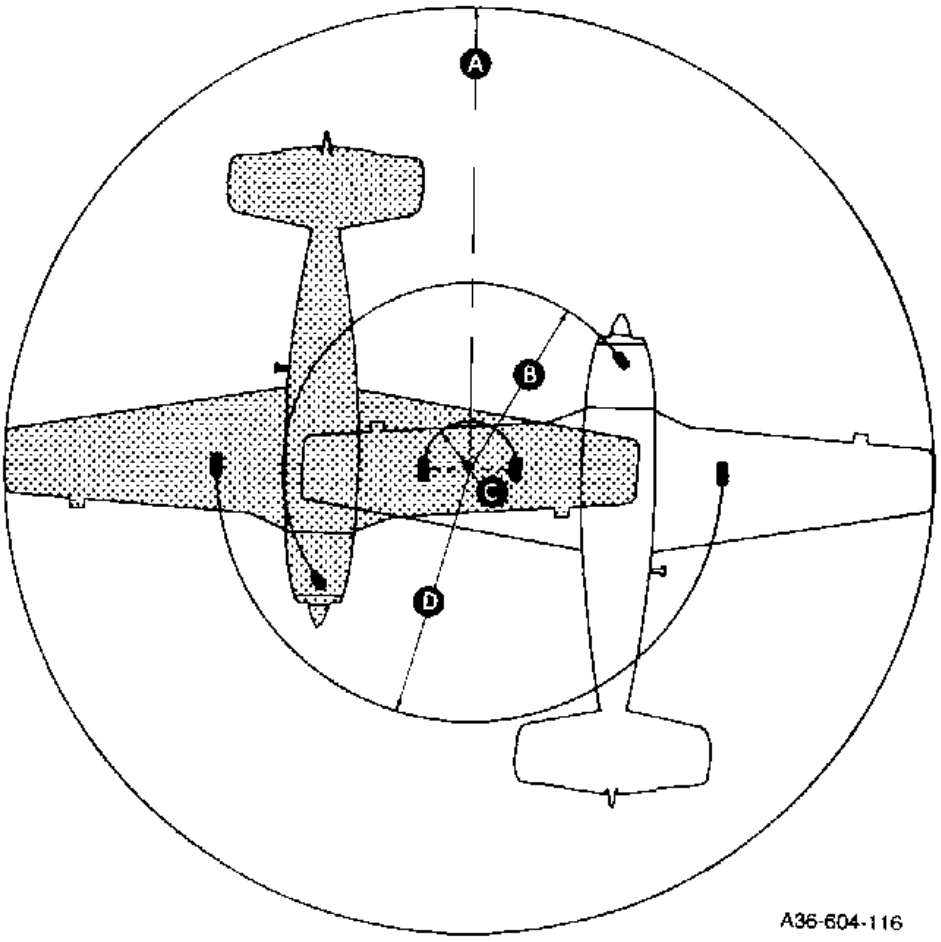
Section IX, Supplements, contains the FAA-approved Airplane Flight Manual Supplements, headed by a Log of Supplements page. When new supplements are received or existing supplements are revised, a new Log page will replace the previous one, since it contains a listing of all previous approvals, plus 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.



AIRPLANE THREE VIEW



GROUND TURNING CLEARANCE

Ⓐ Radius for Wing Tip . . . . . .27 feet 7 inches

Ⓑ Radius for Nose Wheel . . . . . .13 feet 8 inches

Ⓒ Radius for Inside Gear. . . . . .6 feet 3 inches

Ⓓ Radius for Outside Gear . . . . . .15 feet 10 inches

TURNING RADII ARE CALCULATED USING FULL STEERING, ONE BRAKE AND PARTIAL POWER.

DESCRIPTIVE DATA

ENGINE

NUMBER OF ENGINES

One

ENGINE MANUFACTURER

Teledyne Continental Motors Corporation (Muskegon, Michigan)

ENGINE MODEL NUMBER

IO-550-B

ENGINE TYPE

Normally aspirated, Fuel-injected, direct-drive, air-cooled, horizontally opposed, 6-cylinder, 550-cubic-inch displacement.

HORSEPOWER RATING

300 H.P.

NUMBER OF PROPELLERS

One

PROPELLER MANUFACTURER

McCauley Propeller (Vandalia, Ohio)
(Refer to supplement HPA36-2 for airplanes equipped with a Hartzell propeller.)

NUMBER OF BLADES

Three

PROPELLER TYPE

Constant-speed, Hydraulically Actuated consisting of (X)-82NDB-2 blades and a D3A32C409-(X) hub.

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 . . . . . 13.7° ± 0.2°
High . . . . . 28.8° ± 0.5°

PROPELLER DIAMETER

Maximum . . . . . .80 inches
Minimum . . . . . 78.5 inches

FUEL

APPROVED ENGINE FUELS

Aviation Gasoline Grade 100LL (blue)
Aviation Gasoline Grade 100 (green)

FUEL CAPACITY

Total Capacity . . . . . .80 Gallons
Total Usable . . . . . .74 Gallons

ENGINE OIL

OIL CAPACITY

Total . . . . . 12 Quarts

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.

MAXIMUM CERTIFICATED WEIGHTS

Maximum Ramp Weight . . . . . 3663 lbs
Maximum Take-off Weight . . . . . 3650 lbs
Maximum Landing Weight . . . . . 3650 lbs
Maximum Zero Fuel Weight . . . . . No Structural Limitation
Maximum Weight in Baggage Compartment . . . . . (See Section II, LIMITATIONS)

CABIN AND ENTRY DIMENSIONS

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

CABIN BAGGAGE VOLUMES

Rear Cabin Compartment
(Rear Spar to Sta. 170.0) . . . . . 37 cu ft

Extended Aft Compartment
(Sta. 170.0 to 190.0) . . . . . 10 cu ft

SPECIFIC LOADINGS

Wing Loading at Maximum Take-off Weight. . . . . 20.2 lbs/sq ft

Power Loading at Maximum Take-off Weight. . . . . 12.2 lbs/hp

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

V_{FE}	*Maximum Flap Extended Speed* is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	*Maximum Landing Gear Extended Speed* is the maximum airspeed 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 airspeed limit that may not be exceeded at any time.
V_{NO}	*Maximum Structural Cruising Speed* is the airspeed 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.

METEOROLOGICAL TERMINOLOGY

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.

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	Power recommended for cruise climb.
Economy Cruise Power	Minimum power setting for which specific values of fuel flow and airspeed are presented.
Maximum Cruise Power	Maximum power setting for which specific values of fuel flow and airspeed are presented.
Recommended Cruise Power	Power settings for which specific values of fuel flow and airspeed are presented.
Take-off and Maximum Continuous Power (MCP)	Highest power rating not limited by time.

ENGINE CONTROLS AND INSTRUMENTS TERMINOLOGY

EGT	The Exhaust Gas Temperature Indicator is used to identify the lean and best-power fuel flow mixtures for various power settings during cruise.
Manifold Pressure	The regulated absolute air pressure in the intake manifold of the engine located between the throttle valve and the cylinders.
Manifold Pressure Gage	Measures the absolute pressure in the intake manifold of an engine, expressed in inches of mercury (in.Hg).
Mixture Control	Used to set fuel flow in all modes of operation, and to cut off fuel completely for engine shutdown.
Propeller Control	Used to control the rpm setting of the propeller governor. Movement of the control results in an increase or decrease in prop rpm.
Propeller Governor	Regulates the rpm of the engine/propeller by increasing or decreasing the propeller pitch through a pitch change mechanism in the propeller hub.
Tachometer	Indicates the rotational speed of the propeller in revolutions per minute (rpm).
Throttle Control	Used to control power by introducing fuel-air mixture into the intake passages of an engine. Settings are reflected by readings on the manifold pressure gage.

AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

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.
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 (CG)	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	The weight of an empty airplane including full engine oil and unusable fuel. This equals empty weight plus the weight of unusable fuel, and the weight of all the engine oil required to fill the lines and tanks. Basic empty weight is the basic configuration from which loading data is determined.
CG Arm	The arm is obtained by adding the airplane's individual moments and dividing the sum by the total weight.
CG Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.
Empty Weight	The weight of an empty airplane before any oil or fuel has been added. This includes all permanently installed equipment, fixed ballast, full hydraulic fluid, full chemical toilet fluid, and all other operating fluids full, except that the engines, tanks, and lines do not contain any engine oil or fuel.
Engine Oil	Total system oil including undrainable.
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.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Ramp Weight	Maximum weight approved for ground maneuvering (includes weight of start, taxi, and runup fuel).

Maximum Take-off Weight	Maximum weight approved for the start of the take-off run.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.
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.
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	Fuel that is not available for flight planning.
Usable Fuel	Fuel available for flight planning.
Useful Load	Difference between Ramp Weight, and Basic Empty Weight.

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SECTION II
LIMITATIONS
TABLE OF CONTENTS

SECTION II
LIMITATIONS
TABLE OF CONTENTS (Cont'd)

SUBJECT *PAGE*

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

AIRSPEED LIMITATIONS

SPEED	KCAS	KIAS	REMARKS
Never Exceed (V_{NE})	203	205	Do not exceed this speed in any operation.
Maximum Structural Cruising (V_{NO} or V_C)	165	167	Do not exceed this speed except in smooth air and then only with caution.
Maneuvering (V_A)	139	141	Do not make full or abrupt control movements above this speed.
Maximum Flap Extension/ Extended (V_{FE}) Approach (12°) Full Down (30°)	 152 122	 154 124	Do not extend flaps or operate with flaps extended above this speed.
Maximum Landing Gear Operating Extended (V_{LO}/V_{LE})	152	154	Do not extend, retract or operate with gear extended above this speed, except in emergency.

AIRSPEED INDICATOR MARKINGS*

MARKING	KCAS VALUE OR RANGE	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	61-122	61-124	Full Flap Operating Range
White Triangle	152	154	Maximum Speed for Approach Flaps
Green Arc	68-165	68-167	Normal Operating Range
Yellow Arc	165-203	167-205	Operate with Caution, Only in Smooth Air
Red Line	203	205	Do Not Exceed This Speed In Any Operation.

*The airspeed indicator is marked in IAS values.

POWER PLANT LIMITATIONS

NUMBER OF ENGINES

One

ENGINE MANUFACTURER

Teledyne Continental Motors Corporation (Muskegon, Michigan)

ENGINE MODEL NUMBER

IO-550-B

ENGINE TYPE

Normally aspirated, fuel-injected, direct-drive, air-cooled, horizontally opposed, 6-cylinder, 550-cubic-inch displacement, 300-hp.

ENGINE OPERATING LIMITATIONS

Take-off and Maximum
Continuous Power ..... Full Throttle, 2700 rpm

Cylinder Head Temperature

Maximum ..... 238°C

Oil Temperature

Minimum (Take-Off) ..... 24°C

Maximum ..... 116°C

Oil Pressure

Minimum (idle) ..... 10 psi

Maximum ..... 100 psi

Fuel Flow

Serials prior to E-2165 except those serials complying with Raytheon Service Bulletin No. 2024:

Maximum ..... 26.2 gph

Serials E-2165 and After and those serials complying with Raytheon Service Bulletin No. 2024:

Maximum ..... 27.4 gph

Manual Leaning Limitations ..... See Manifold Pressure vs RPM Graph in Section V, Performance, for Engine Leaning Limitations.

Aux Fuel Pump

The HI position of the auxiliary fuel pump is not to be used during flight except when failure of the engine-driven fuel pump occurs.

Starter

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

FUEL LIMITS

APPROVED ENGINE FUELS

100LL (blue)
100 (green)

FUEL CAPACITY

Total Capacity . . . . . 80 gal
Total Usable . . . . . 74 gal

FUEL MANAGEMENT

Do not take off when Fuel Quantity Gages indicate in Yellow Arc or with less than 13 gallons in each main tank.

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

One

PROPELLER MANUFACTURER

McCauley Propeller (Vandalia, Ohio)
(Refer to supplement HPA36-2 for airplanes equipped with a Hartzell propeller.)

NUMBER OF BLADES

Three

PROPELLER TYPE

Constant-speed, Hydraulically Actuated consisting of (X)-82NDB-2 blades and a D3A32C409-(X) hub.

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 . . . . . 13.7° ±0.2°
High . . . . . 28.8° ±0.5°

PROPELLER DIAMETER

Maximum . . . . . 80 inches
Minimum . . . . . 78.5 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

OIL PRESSURE

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

TACHOMETER

Operating Range (Green Arc) . . . . . 1800 to 2700 rpm
Maximum (Red Radial) . . . . . 2700 rpm

CYLINDER HEAD TEMPERATURE

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

MANIFOLD PRESSURE

Operating Range (Green Arc) . . . . . 15.0 to 29.6 in. Hg
Maximum (Red Radial) . . . . . 29.6 in. Hg

FUEL FLOW

Serials prior to E-2165 except those serials complying with Raytheon Service Bulletin No. 2024:

Operating Range (Green Arc) . . . . . 3.0 to 26.2 gph
Maximum (Red Radial) . . . . . 26.2 gph

Serials E-2165 and After and those serials complying with Raytheon Service Bulletin No. 2024:

Operating Range (Green Arc) . . . . . 3.0 to 27.4 gph
Maximum (Red Radial) . . . . . 27.4 gph

MISCELLANEOUS INSTRUMENT MARKINGS

INSTRUMENT PRESSURE

Operating Range (Green Arc) . . . . . .4.3 to 5.9 in. Hg

FUEL QUANTITY

Yellow Arc. . . . . E to 3/8 full

WEIGHT LIMITS

Maximum Ramp Weight . . . . . 3663 lbs
Maximum Take-off Weight . . . . . 3650 lbs
Maximum Landing Weight . . . . . 3650 lbs
Maximum Zero Fuel Weight . . . . . .No Structural Limitation
Maximum Weights in Baggage Compartments:
Between Spars . . . . . 200 lbs
Rear Spar to Sta. 170 . . . . . 400 lbs
Aft Compartment (Sta. 170 to Sta. 190) . . . . . 70 lbs
Floor Structure Load Limits:
Between Spars . . . . . 50 lbs per sq ft
Rear Spar to Sta. 170 . . . . . 100 lbs per sq ft
Maximum combined weight of aft seat occupants is 250 lbs unless otherwise placarded.

CENTER OF GRAVITY LIMITS (Landing Gear Extended)

FORWARD LIMITS

74.0 inches aft of datum at 3100 lbs or less, with straight line variation to 81.0 inches at 3650 lbs.

AFT LIMIT

87.7 inches aft of datum at all weights.

REFERENCE DATUM

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

MEAN AERODYNAMIC CHORD

MAC leading edge is 66.7 inches aft of datum.
MAC length is 65.3 inches.

MANEUVER LIMITS

This is a utility category airplane. Spins are prohibited. No acrobatic maneuvers are approved except those listed under Approved Maneuvers.

APPROVED MANEUVERS

MANEUVER	ENTRY SPEED	
	KCAS	KIAS
Chandelle	132	134
Steep Turn	132	134
Lazy Eight	132	134
Stall (Except Whip)	Use Slow Deceleration	
Minimum fuel for above maneuvers - 10 gallons each main tank		

Maximum Slip Duration . . . . . 30 seconds

FLIGHT LOAD FACTOR LIMITS

FLAPS UP	FLAPS DOWN
4.4 Positive g's 1.76 negative g's	3.0 positive g's 0 g's

MINIMUM FLIGHT CREW

One (1) Piot

MAXIMUM PASSENGER SEATING CONFIGURATION

Six (6) people including pilot.

SEATING

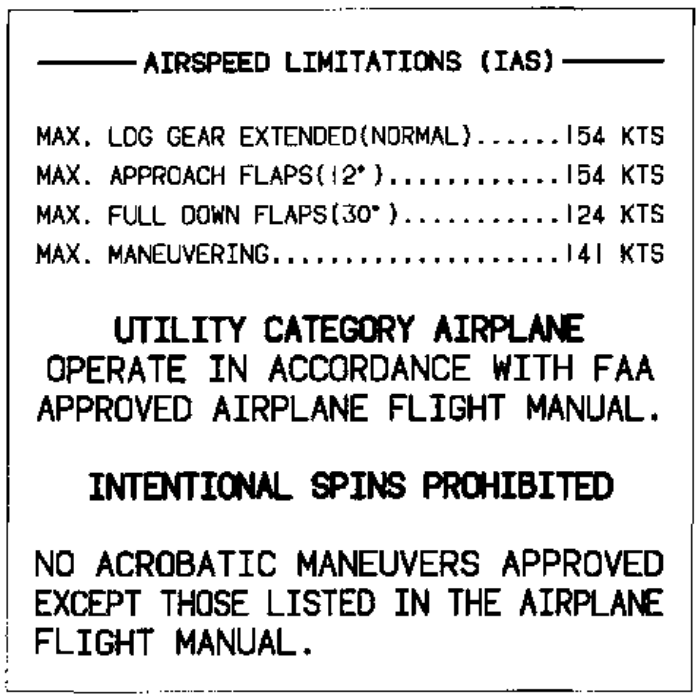
Do not take off or land with the seat back of an occupied pilot's or copilot's seat in the full back position. The seat back of an occupied optional copilot's full reclining seat and all other occupied seats must be in the most upright position for take-offs and landings. Occupied aft-facing seats must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

WINTER BAFFLES

Winter baffles are not to be installed when the airplane is flown at temperatures above ISA + 3°C.

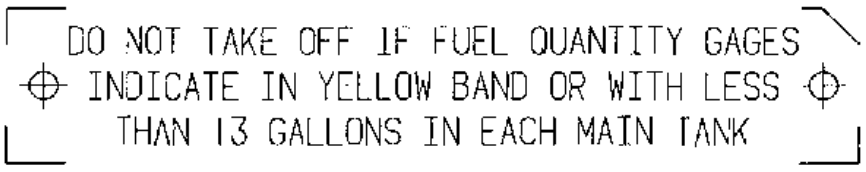
PLACARDS

On Left Side Panel (Airspeed Values are IAS):



C94E#02C2438

74-Gallon System
On Fuel Tank Selector Cover:



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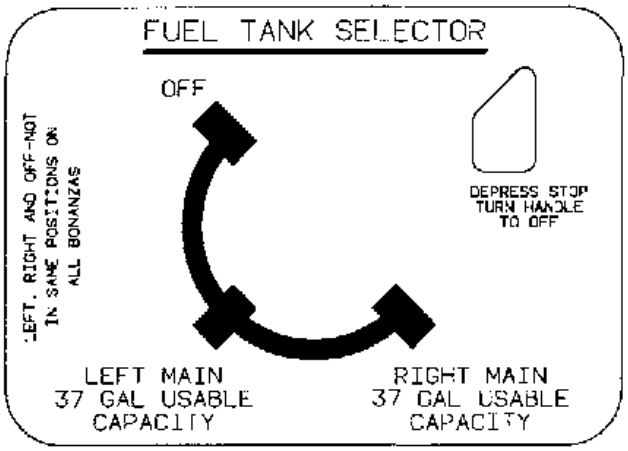
On Fuel Tank Selector Cover (Serials E-1946, E-2104, E-2111 thru E-3046):

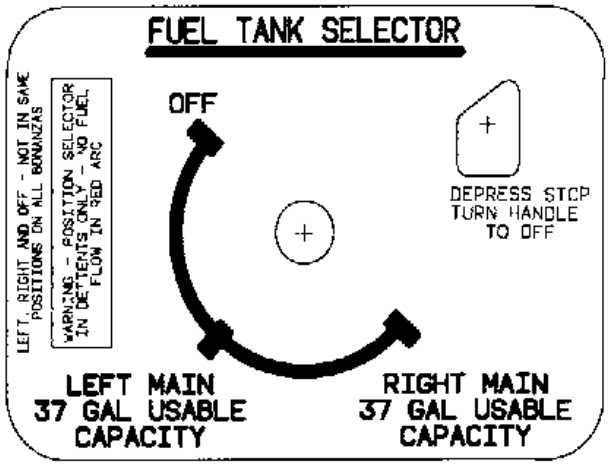


NOTE

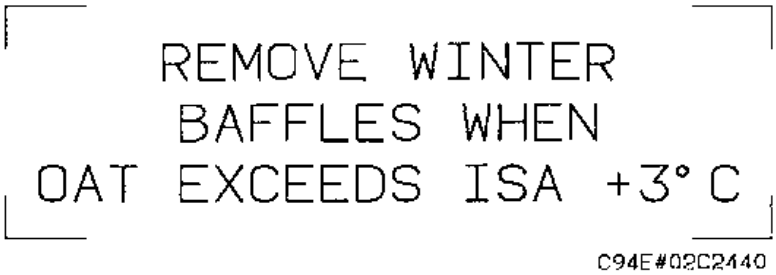
For Serials E-1946, E-2104, E-2111 thru E-3046, that are in compliance with Raytheon Aircraft S.B. 2670, a decal has been added to the face of the above placard that reads:

WARNING - POSITION SELECTOR IN DETENTS ONLY
NO FUEL FLOW TO ENGINE BETWEEN DETENTS

On Fuel Tank Selector Cover (Serials E-3047 and After):

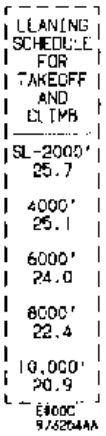


On Fuel Tank Selector Cover (E-2249 and After):



On Instrument Panel Adjacent To Fuel Flow Gage (E-3145 and After, And Prior Airplanes in Compliance With Raytheon Aircraft S.B. 28-3052):

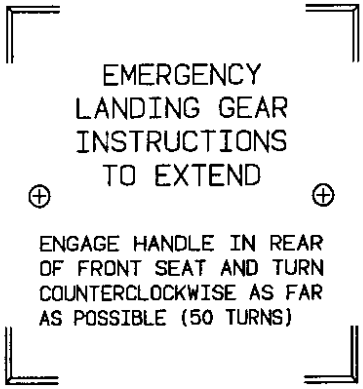
On Instrument Panel Adjacent To Fuel Flow Gage (E-1946, E-2104, E-2111 thru E-3144 In Compliance With Raytheon Aircraft S.B. 28-3052):



On Fuel Gages:

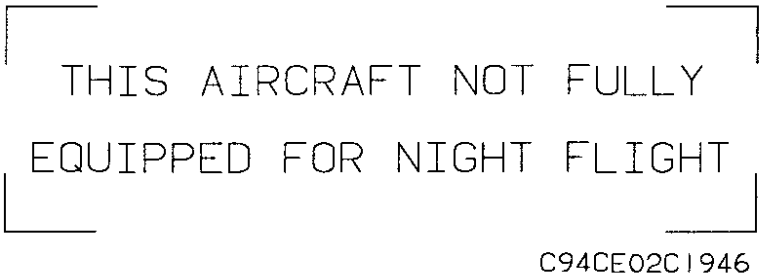
C94E#02C2439

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



On Landing Gear Emergency Crank Access Cover:

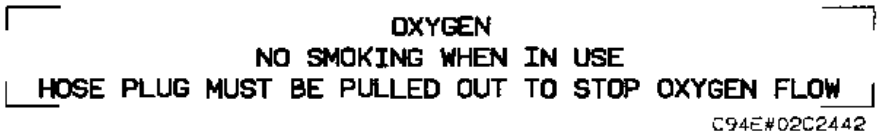
On Instrument Panel When Anti-Collision Light is Not Installed:



On Left Side Panel:

C94E02C2441 C

On Oxygen Console, Pilot's Side Wall (When Oxygen Is Installed):



C94E#02C2442

Adjacent to 5th & 6th Seats (When Oxygen Is Installed):

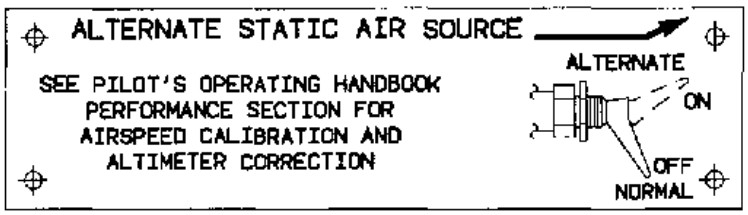
C94CE02C1949

On Each Oxygen Mask Stowage Container (When Oxygen Is Installed):

OXYGEN MASK

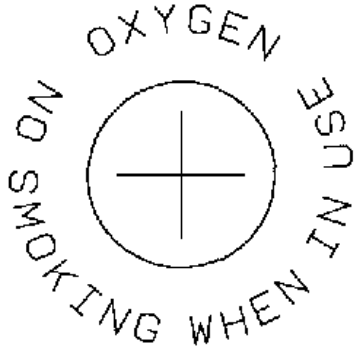
C94CE02C1950

On Left Sidepanel Circuit Breaker Escutcheon (When Alternate Static Air System is Installed):



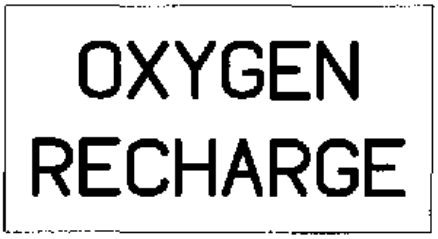
C94E#02C2443

Copilot's Outlet (When Oxygen Is Installed):



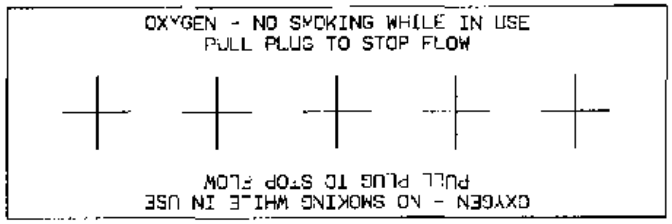
C94CE02C1951

On Forward Side of Front Spar Carry-Thru Cover Beneath Copilot's Seat (When Oxygen Is Installed):



C94E#02C2444

On Oxygen Manifold, Located On Ceiling (When Oxygen Is Installed):



C94CE02C1952

On Window Adjacent to Pilot's Seat:

SHOULDER HARNESS MUST BE WORN WHILE AT PILOT POSITIONS. FOR TAKEOFF AND LANDING, SEAT BACK MUST NOT BE IN FULL BACK POSITION.

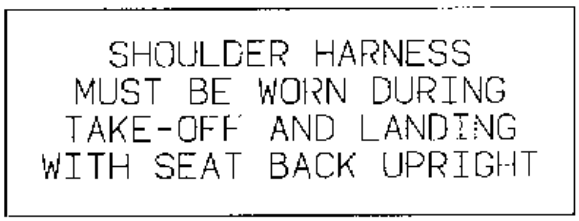
C94E#02C2445

On Window Adjacent to Copilot's Seat:

SHOULDER HARNESS MUST BE WORN WHILE AT PILOT POSITIONS. FOR TAKEOFF AND LANDING, SEAT BACK MUST NOT BE IN FULL BACK POSITION OR OPTIONAL FULL RECLINING BACK MUST BE UPRIGHT.

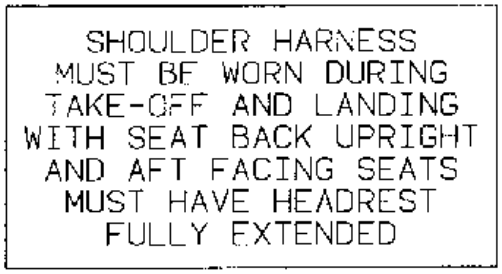
C94E#02C2446

On Windows Adjacent To 3rd & 4th Seats (When Forward Facing) And 5th & 6th Seats:



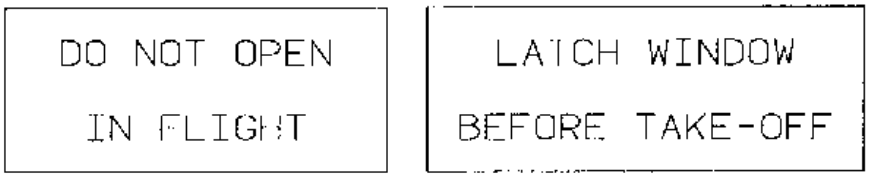
C94CE02C1962 C

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



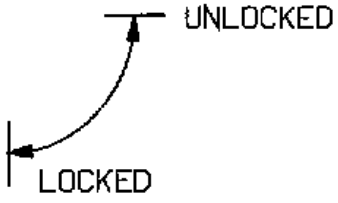
C94E02C1947 C

On Openable Windows:



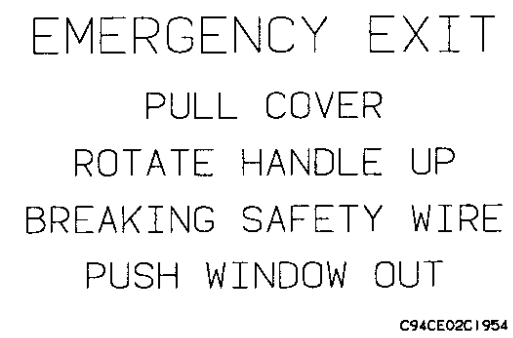
C94CE02C1957

Above Openable Window Thumbcatch:

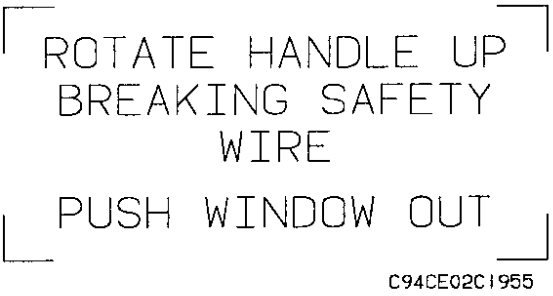


C94CE02C1978

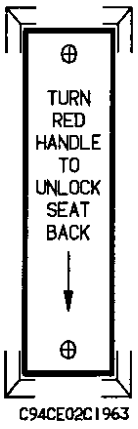
On the Face of Emergency Exit Latch Cover:



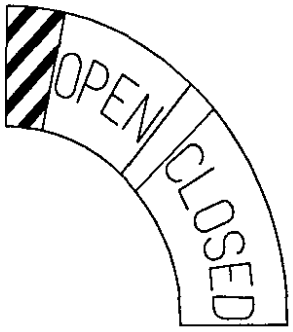
On Emergency Exit Handle:



On Inboard Side of Seat Back for 3rd & 4th Seats:



On Inside of Cabin Door Adjacent to Door Handle (Serials E-2458, E-2468 and After):



C94CE02C1956

Adjacent to Cabin Door Handle on Window Moulding Above Utility Door:

ROTATE HANDLE TO
FULL LOCKED POSITION

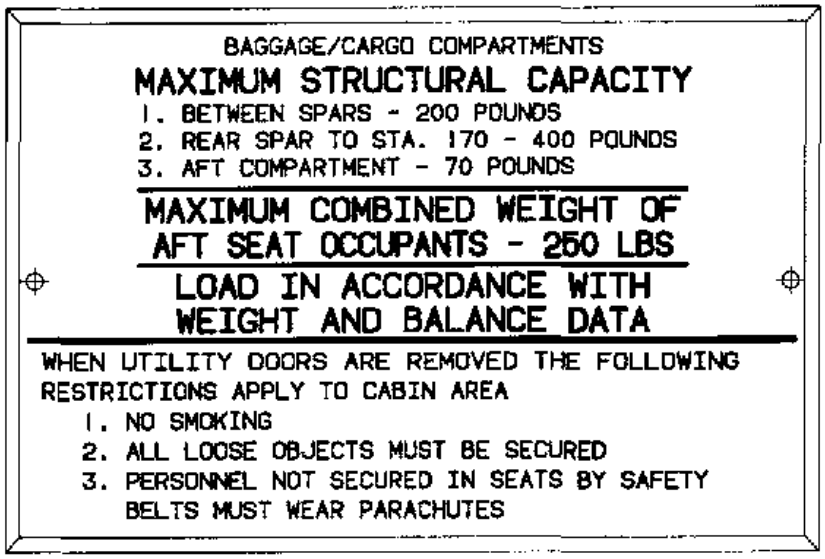
C94CE02C1958

On Instrument Panel In Full View of Pilot:

WHEN UTILITY DOORS ARE REMOVED - AIR SPEED IS NOT TO EXCEED 167 KNOTS IAS

C95E#02C0032

On Aft Cabin Bulkhead in Aft Baggage Compartment:

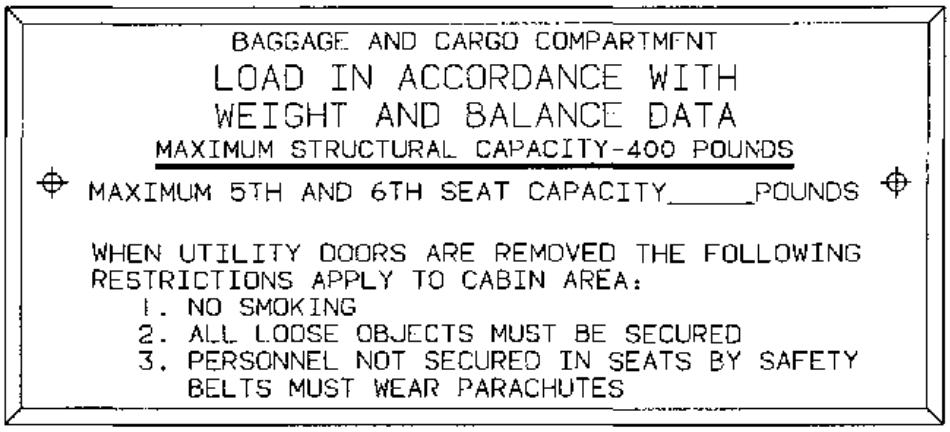


C94E#02C2449

NOTE

Maximum combined weight of aft seat occupants may be less than 250 lbs if required by CAR 3.74, due to optional equipment configuration.

In Lieu of Aft Cabin Bulkhead Placard:



C94E#02C2450

KINDS OF OPERATIONS

This airplane 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

WARNING

FLIGHT IN ICING CONDITIONS PROHIBITED.

NOTE

Refer to "REQUIRED EQUIPMENT FOR VARIOUS CONDITIONS OF FLIGHT" at the end of this section.

KINDS OF OPERATIONS EQUIPMENT LIST

This airplane may be operated in day or night VFR and day or night IFR 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.

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	REMARKS and/or EXCEPTIONS
ELECTRICAL POWER					
Alternator	1	1	1	1	
Battery System	1	1	1	1	
Bus Voltmeter	1	1	1	1	
Load Meter	1	1	1	1	
LOW BUS VOLTS Annunciator	1	1	1	1	
START Annunciator	1	1	1	1	
ENGINE INDICATIONS					
Cylinder Head Temp Indicator	1	1	1	1	
Exhaust Gas Temp Indicator	1	1	1	1	
Manifold Pressure Indicator	1	1	1	1	
Tachometer	1	1	1	1	
ENGINE OIL					
Oil Pressure Indicator	1	1	1	1	
Oil Temperature Indicator	1	1	1	1	
FLIGHT CONTROLS					
Aileron Trim Tab Indicator	1	1	1	1	
Elevator Trim Tab Indicator	1	1	1	1	
Flap Position Indicator Lights	3	3	3	3	
Flap System	1	1	1	1	
Stall Warning System	1	1	1	1	
FLIGHT INSTRUMENTS					
Airspeed Indicator	1	1	1	1	
Altimeter	1	1	1	1	
Attitude Indicator	0	0	1	1	
Directional Gyro	0	0	1	1	
Magnetic Compass	1	1	1	1	
Outside Air Temp Indicator	1	1	1	1	

SYSTEM and/or EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	REMARKS and/or EXCEPTIONS
FLIGHT INSTRUMENTS (Cont'd)					
Clock	0	0	1	1	
Slip-Skid Indicator	0	0	1	1	
Rate-of-Turn Indicator	0	0	1	1	
FUEL					
Auxiliary Fuel Pump System	1	1	1	1	
Fuel Flow Indicator	1	1	1	1	
Fuel Quantity Indicating System	2	2	2	2	
Fuel Selector Valve	1	1	1	1	
ICE AND RAIN PROTECTION					
Alternate Static Air System (if installed)	0	0	1	1	
Pitot Heat (if installed)	0	0	1	1	
LANDING GEAR					
Emergency Landing Gear Extension System	1	1	1	1	
Landing Gear Motor and Gearbox	1	1	1	1	
Landing Gear Position Indicator Lights	4	4	4	4	
Landing Gear Warning Horn	1	1	1	1	
GEAR UP Annunciator	1	1	1	1	Serials E-2458, E-2468 and After
LIGHTS					
AFT DOOR Annunciator	1	1	1	1	
Cockpit and Instrument Lighting System	0	1	0	1	
Landing light	0	1	0	1	
Navigation Lights	0	3	0	3	
Rotating Beacon	0	1	0	1	

SYSTEM and/or EQUIPMENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	REMARKS and/or EXCEPTIONS
PNUMATIC SYSTEM					
Instrument Air System	0	1	1	1	
Standby Instrument Air System (if installed)	0	1	1	1	Optional Equipment (Std on E-2217 and after)
Pressure Gage	0	1	1	1	
RESTRAINT SYSTEM					
Seat Belt (per seat)	1	1	1	1	
Shoulder Harness (per seat)	1	1	1	1	
Shoulder Harness (crew compartment)	2	2	2	2	

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SECTION III
EMERGENCY PROCEDURES
TABLE OF CONTENTS

SUBJECT *PAGE*

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

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 checklist 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 also discussed.

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

EMERGENCY AIRSPEEDS

Emergency Descent . . . . . 154 Kts
Maximum Range Glide . . . . . 110 Kts
Landing Approach - Without Power . . . . . 85 Kts

WARNING

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

ENGINE FAILURE

NOTE

The most probable causes of engine failure are loss of fuel flow, ignition system malfunction or blockage of the induction system.

DURING TAKE-OFF GROUND ROLL

1. **Throttle** ..... **CLOSED**
2. **Braking** ..... **MAXIMUM**
3. Fuel Selector Valve ..... OFF
4. Alternator ..... OFF
5. Battery ..... OFF

IN FLIGHT

If engine failure occurs immediately after takeoff, landing straight ahead is usually advisable.

1. **Airspeed**
   - **Immediately After Takeoff..... 85 KTS (minimum)**
   - **With Sufficient Altitude..... 110 KTS**

If sufficient time is available, accomplish the following:

2. **Fuel Selector Valve .....SELECT OTHER TANK (feel for detent & visually check)**
3. **Magnetos..... CHECK BOTH**
4. **Aux Fuel Pump..... HI**
5. **Mixture..... FULL RICH, THEN LEAN AS REQUIRED**

WARNING

If power is restored with the Auxiliary Fuel Pump - HI, then manual adjustment of the mixture control will be required for all power changes to prevent engine roughness. Do not retard throttle to idle until landing is assured.

If no restart then:

1. **Aux Fuel Pump.....OFF**
2. **Mixture .....FULL RICH**
3. **Magnetos .....CHECK LEFT, RIGHT, THEN BOTH**
4. **Alternate Air T-Handle..... PULL AND RELEASE**

If still no restart then:

1. Select most favorable landing site.
2. Use of the landing gear is dependent on the terrain.
3. See LANDING WITHOUT POWER Procedures in this Section.

ROUGH RUNNING ENGINE

1. **Aux Fuel Pump.....LO**
2. **Mixture ..... FULL RICH, THEN LEAN AS REQUIRED**
3. **Magnetos .....CHECK LEFT, RIGHT, THEN BOTH**
4. **Alternate Air T-Handle..... PULL AND RELEASE**

ENGINE FIRE

IN FLIGHT

1. **Firewall Air Control Knob .....PULL TO CLOSE**

WARNING

The red FIREWALL AIR control knob on the outboard side of the left lower subpanel should be pulled to close off all heating system outlets so that smoke and fumes will not enter the cabin.

2. **Engine.....SHUTDOWN**
   a. **Fuel Selector Valve .....OFF**
   b. **Mixture .....IDLE CUT-OFF**
   c. **Alternator .....OFF**
   d. **Battery .....OFF**
   e. **Magnetos .....OFF**
3. **ENGINE ..... DO NOT ATTEMPT TO RESTART**
   (See MAXIMUM GLIDE CONFIGURATION, LANDING WITHOUT POWER and LANDING GEAR MANUAL EXTENSION Procedures in this section.)

ON THE GROUND

1. **Fuel Selector Valve .....OFF**
2. **Mixture.....IDLE CUT-OFF**
3. **Alternator .....OFF**
4. **Battery.....OFF**
5. **Magnetos.....OFF**
6. Fire Extinguisher .....EXTINGUISH FIRE

EMERGENCY DESCENT

1. **Power ..... IDLE**
2. **Propeller ..... HIGH RPM**
3. **Landing Gear .....DOWN**
4. **Flaps .....APPROACH (12°)**
5. **Airspeed ..... ESTABLISH 154 KTS**

MAXIMUM GLIDE CONFIGURATION

1. **Landing Gear .....UP**

NOTE

On S/N's E-2458, E-2468 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

2. **Flaps ..... UP**
3. **Cowl Flaps ..... CLOSED**
4. **Propeller ..... PULL LEVER FULL AFT (low rpm)**
5. **Airspeed ..... 110 KTS**
6. ELT Switch (if installed) ..... ON, Red Transmit Light Illuminated
7. Air Conditioning (if installed) .....OFF
8. Nonessential Electrical Equipment.....OFF
9. Glide Ratio ..... 1.7 nautical miles (2 statute miles) per 1000 feet of altitude.

LANDING EMERGENCIES

LANDING WITHOUT POWER

When landing is assured:

1. **Fuel Selector Valve ..... OFF**
2. **Mixture..... IDLE CUT-OFF**
3. **Magnetos..... OFF**
4. **Flaps ..... DOWN (30°)**
5. **Landing Gear ....DOWN or UP (depending on terrain)**

CAUTION

On S/N's E-2458, E-2468 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

6. **Airspeed ..... ESTABLISH 85 KTS**
7. **Alternator ..... OFF**
8. **Battery..... OFF**

LANDING WITH GEAR RETRACTED - WITH POWER

If possible, choose firm sod. Make a normal approach, using flaps as necessary. When landing is assured:

1. **Throttle ..... CLOSED**
2. **Mixture..... IDLE CUT-OFF**
3. **Alternator ..... OFF**
4. **Battery..... OFF**
5. **Magnetos..... OFF**

6. **Fuel Selector Valve** ..... **OFF**
7. Maintain wings level during landing.
8. Evacuate the airplane as soon as possible after it stops.

SYSTEMS EMERGENCIES

PROPELLER OVERSPEED

1. **Throttle** ..... **RETARD**

NOTE

On S/N's E-2458, E-2468 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

2. **Airspeed** ..... **REDUCE UNTIL RPM IS AT OR BELOW 2700 RPM**
3. Oil Pressure ..... CHECK

WARNING

If loss of oil pressure was the cause of overspeed, the engine will seize after a short period of operation. (See LANDING WITHOUT POWER Procedures earlier in this Section)

4. Land ..... AS SOON AS PRACTICAL

STARTER ENGAGED (START Annunciator Illuminated)

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

GROUND OPERATIONS:

1. **Alternator .....OFF**
2. **Battery.....OFF**
3. **DO NOT TAKE OFF.**
4. **Mixture.....IDLE CUT-OFF**

ALTERNATOR FAILURE (LOW BUS VOLTS Annunciator Illuminated) (Not Equipped with a Standby Alternator)

An inoperative alternator will place the entire electrical operation of the airplane, except engine ignition, on the battery. An alternator failure will illuminate the LOW BUS VOLTS Annunciator, located in the glareshield.

1. Alternator ..... VERIFY INOPERATIVE
   a. Loadmeter ..... NO LOAD
   b. Voltmeter ..... LESS THAN 25 VOLTS

If Loadmeter shows a load and the Bus Voltmeter is above 25 volts (indicating a malfunction in the Annunciator System):

2. Alternator Switch .....CONFIRM ON

If Loadmeter Shows No Load Continue To Use The Alternator:

3. Alternator Switch . . . . . OFF MOMENTARILY, THEN ON (resetting the overvoltage relay)

If the LOW BUS VOLTS annunciator extinguishes:

4. Continue to use the alternator.

If LOW BUS VOLTS annunciator remains illuminated:

5. Alternator Switch . . . . . OFF
6. Non-essential Electrical Equipment . . . . . OFF TO CONSERVE BATTERY POWER
7. If equipped with a Standby Generator - Refer to applicable Supplement
8. Land . . . . . AS SOON AS PRACTICAL

ALTERNATOR FAILURE (STBY ALT ON Annunciator Illuminated) (When Equipped with a Standby Alternator)

- See Supplement

ELECTRICAL SMOKE OR FIRE

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

1. **Alternator ..... 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 alternator off.

4. **Firewall Air Control ..... PULL (if smoke or fire is present in engine compartment)**
5. All Electrical Switches ..... OFF
6. Dissipation of smoke may be aided by the following:
   a. Firewall Air Control (if engine is not source of smoke) . . FULL FORWARD
   b. Forward Sidewall Ventilation Outlets ..... OPEN
   c. Overhead Fresh Air Outlets ..... OPEN

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

7. Battery ..... ON
8. Alternator ..... ON
9. Essential Electrical Equipment ..... ON ONE AT A TIME

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.

If smoke persists or if extinguishing of fire is not confirmed:

10. Pilot's Storm Window (if required) . . . . . OPEN
11. Land . . . . . AS SOON AS PRACTICAL

LANDING GEAR MANUAL EXTENSION

1. Airspeed . . . . . .154 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 Circuit Breaker . . . . . .CHECK IN
   b. Landing GEAR DN & LOCKED Lights . . . . . ILLUMINATED (3 green)
   c. CHECK that the gear warning horn does not sound when the 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.

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 can only be retracted electrically, as follows:

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

NOTE

On S/N's E-2458, E-2468 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

INDUCTION SYSTEM ICING

An alternate induction air door, spring-loaded to the closed position, is located downstream from the induction air filter. If the induction air filter becomes blocked (e.g. with ice, etc.), the differential air pressure normally opens the alternate induction air door to provide induction air from the bottom of the engine compartment. If the alternate induction air door becomes stuck in the closed position, it can be opened by pulling and releasing the T-handle located on the lower left subpanel. This T-handle is placarded ALT AIR PULL & RELEASE.

ALTERNATE STATIC AIR SOURCE SYSTEM

THE ALTERNATE STATIC AIR SOURCE SHOULD BE USED FOR CONDITIONS WHERE 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 alternate 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 Alternate Static Air System is desired for use:

1. Alternate Static Air Source . . . . . (ALTERNATE) ON
2. For Airspeed Calibration and Altimeter Correction, refer to Section V, PERFORMANCE.

When the Alternate Static Air System is no longer needed:

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

NOTE

In the ALTERNATE ON position, static pressure at the normal static buttons is averaged with the static pressure in the cabin.

INSTRUMENT AIR PRESSURE SYSTEM FAILURE

An optional Standby Instrument Air Pressure System is available (standard on serial E-2217 and after). Refer to Supplement 36-590006-23 in the SUPPLEMENTS section for information on operation and procedures.

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 ventilation/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 center of openable window ventilation/emergency exit latch.
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 future airplane operation.

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 that 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.

If a Spin is Entered Inadvertently:

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

EMERGENCY SPEED REDUCTION

In an emergency, the landing gear may be used to create additional drag.

1. Throttle . . . . . IDLE
2. Landing Gear . . . . . DOWN
3. Airspeed . . . . . MONITOR
4. Throttle . . . . . AS REQUIRED
5. Landing Gear . . . . . AS REQUIRED

NOTE

If disorientation is possible, leave the landing gear down to reduce the tendency of subsequent speed buildups.

NOTE

Should the landing gear be used at speeds higher than the maximum extension speed, a special inspection of the gear doors in accordance with maintenance manual procedures is required, with repair as necessary.

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SECTION IV
NORMAL PROCEDURES
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AIRSPEEDS FOR SAFE OPERATION (3650 LBS)

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

Maximum Demonstrated Crosswind Component . . . . . 17 Kts

Take-off Speeds:

- Flaps UP (0°)
  - Rotation . . . . . 73 Kts
  - 50-ft . . . . . 84 Kts
- Flaps APPROACH (12°)
  - Rotation . . . . . 67 Kts
  - 50-ft . . . . . 77 Kts

Best Angle-of-Climb (V_X) . . . . . 84 Kts

Best Rate-of-Climb (V_Y) . . . . . 100 Kts

Cruise Climb . . . . . 110 Kts

Turbulent Air Penetration . . . . . 141 Kts

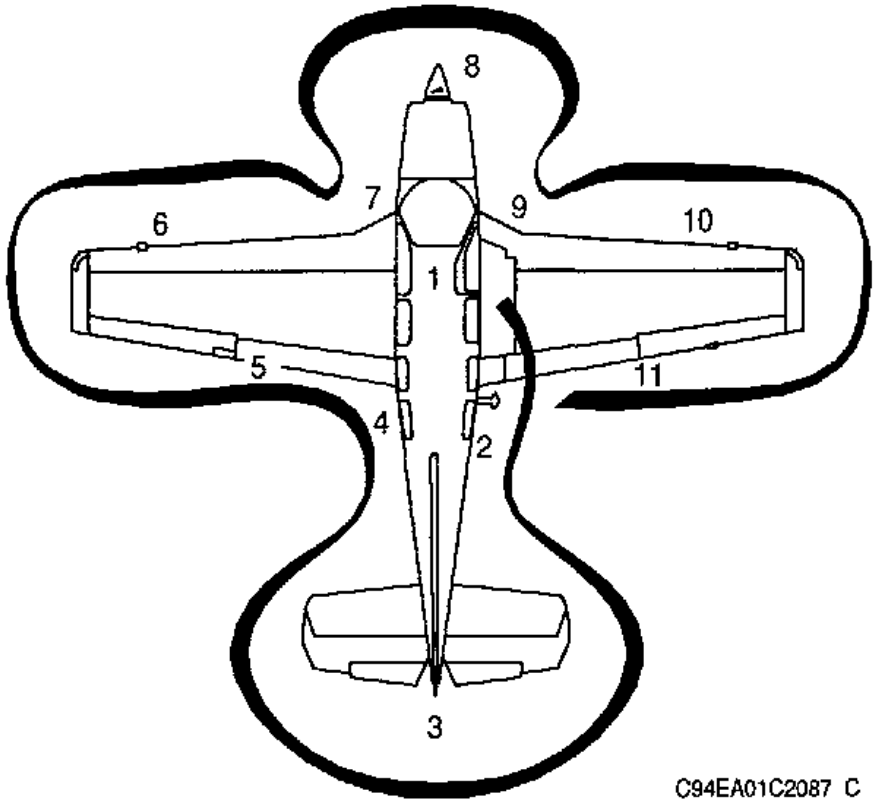
Landing Approach

- Flaps DOWN (30°) . . . . . 79 Kts
- Flaps UP (0°) . . . . . 90 Kts

Balked Landing Climb . . . . . 80 Kts

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

PREFLIGHT INSPECTION



C94EA01C2087 C

1. CABIN
   - a. Parking Brake . . . . . SET
   - b. Control Lock . . . . . REMOVE
   - c. Landing Gear Handle . . . . . DOWN
   - d. Battery . . . . . ON
   - e. Landing Gear Position Lights . . . . . CHECK (3 green)
   - f. Fuel Quantity . . . . . CHECK
   - g. Lights . . . . . CHECK, AS REQUIRED
   - h. All Switches . . . . . OFF

2. RIGHT FUSELAGE
   a. Utility Doors . . . . . SECURE
   b. Static Pressure Button. . . . . UNOBSTRUCTED
   c. All Antennas . . . . . CHECK
   d. Lower Rotating Beacon (if installed) . . . . . CHECK
   e. Emergency Locator Transmitter . . . . . ARMED
      (aft fuselage installations)
3. EMPENNAGE
   a. Control Surfaces . . . . . CHECK
   b. Tie Down . . . . . REMOVE
   c. Navigation Light and Rotating Beacon . . . . . CHECK
   d. Cabin Air Intake. . . . . CHECK
4. LEFT FUSELAGE
   a. Cabin Air Exhaust . . . . . CHECK
   b. Static Pressure Button. . . . . UNOBSTRUCTED
5. LEFT WING TRAILING EDGE
   a. Protruding Fuel System Vent . . . . UNOBSTRUCTED
   b. Flap . . . . . CHECK
   c. Aileron . . . . . CHECK
   d. Aileron Trim Tab . . . . . CHECK
   e. Wing Tip . . . . . CHECK
6. LEFT WING LEADING EDGE
   a. Navigation Light. . . . . CHECK
   b. Stall Warning Vane . . . . . CHECK
   c. Pitot Tube . . . . . REMOVE COVER;
      CHECK TUBE FOR OBSTRUCTIONS
   d. Tie Down . . . . . REMOVE
   e. Fuel Tank . . . . . CHECK QUANTITY;
      Filler Cap - SECURE
   f. Cabin Air Intake. . . . . CHECK

7. LEFT LANDING GEAR
   a. Wheel Well Doors, Tire, and Strut . . . . . CHECK
   b. Landing Gear Uplock Roller . . . . . CHECK FOR FREEDOM TO ROTATE
   c. Flush Fuel Vent . . . . . UNOBSTRUCTED
   d. Fuel Sump . . . . . DRAIN (check for contamination)
   e. Fuel Selector Valve Sump (located under access door on fuselage). . . . . DRAIN (check for contamination); Access Door - SECURE
   f. Chocks. . . . . REMOVE
8. NOSE SECTION
   a. Left Cowl Flap . . . . . CHECK
   b. Engine Oil . . . . . CHECK (10 qts minimum for flight); Cap - SECURE
   c. Engine . . . . . CHECK GENERAL CONDITION
   d. Left Cowl . . . . . SECURE
   e. Propeller . . . . . CHECK
   f. Wheel Well Doors, Tire, and Strut. . . . . CHECK
   g. Chocks. . . . . REMOVE
   h. Landing and Taxi Lights . . . . . CHECK
   i. Induction Air Intake . . . . . CLEAR
   j. Engine . . . . . CHECK GENERAL CONDITION
   k. Right Cowl . . . . . SECURE
   l. Right Cowl Flap . . . . . CHECK
9. RIGHT LANDING GEAR
   a. Fuel Sump . . . . . DRAIN (check for contamination)
   b. Flush Fuel Vent . . . . . CHECK
   c. Wheel Well Doors, Tire, and Strut. . . . . CHECK
   d. Landing Gear Uplock Roller . . . . . CHECK FOR FREEDOM TO ROTATE
   e. Chocks. . . . . REMOVE

10. RIGHT WING LEADING EDGE
    a. Cabin Air Intake . . . . . CHECK
    b. Fuel Tank . . . . . CHECK QUANTITY; Filler Cap - SECURE
    c. Tie Down . . . . . REMOVE
    d. Navigation Light . . . . . CHECK
11. RIGHT WING TRAILING EDGE
    a. Aileron . . . . . CHECK
    b. Flap . . . . . CHECK
    c. Protruding Fuel System Vent . . . . UNOBSTRUCTED

BEFORE STARTING

1. Seats . . . . . POSITION AND LOCK; Seat Backs - POSITION FOR TAKEOFF
2. Rudder Pedals . . . . . ADJUST
3. Seat Belts and Shoulder Harnesses . . . FASTEN/ADJUST
4. Parking Brake . . . . . SET
5. Emergency Gear Handle . . . . . STOWED
6. Avionics Circuit Breakers . . . . . IN
7. Flaps . . . . . UP
8. Avionics . . . . . OFF (Avionics Master Switch - OFF, if equipped)
9. Throttle . . . . . CLOSED
10. Propeller . . . . . HIGH RPM
11. Mixture . . . . . FULL RICH
12. Cowl Flaps . . . . . OPEN
13. Autopilot Switch . . . . . OFF (if installed)
14. Electric Elevator Trim Switch . . . . . OFF (if installed)
15. Landing Gear Handle . . . . . DOWN
16. All Subpanel Switches . . . . . OFF

17. Alternate Static Air Source . . . . . NORMAL
18. Left Side Circuit Breakers. . . . . IN
19. Fuel Selector Valve . . . . . CHECK OPERATION, THEN SELECT FULLER TANK (feel for detent/confirm visually)
20. Battery and Alternator Switches . . . . . ON
21. If a Standby Alternator is Installed . . . SEE SUPPLEMENT
22. Fuel Quantity Indicators . . . . . CHECK FUEL QUANTITY

WARNING

Do not take off if gages indicate in yellow arc or with less than 13 gallons in each tank.

23. ELT Switch (if installed) . . . . . ARM, Transmit Light Extinguished
24. Auxiliary Fuel Pump . . . . . LO (listen momentarily to confirm pump operation)
25. Auxiliary Fuel Pump . . . . . OFF
26. Standby Instrument Air (if installed) . . . . . CHECK

EXTERNAL POWER

The following precautions shall be observed while using external power.

1. Never use external power without a battery installed in the system.
2. The Battery must be ON and all avionics and electrical switches OFF prior to applying external power to the airplane. This protects the voltage regulators and associated electrical equipment from voltage transients (power fluctuations).

3. The airplane has a negative ground system. Connect the positive and negative leads of the external power unit to the corresponding positive and negative terminals of the airplane's external power receptacle.
4. In order to prevent arcing, no power shall be supplied while the connection is being made.

STARTING ENGINE USING EXTERNAL POWER UNIT

1. Alternator Switch, Battery Switch, Electrical and Avionics Equipment. . . . . .OFF
2. If a Standby Alternator is Installed . . . SEE SUPPLEMENT
3. External Power Unit . . . . . CONNECT
4. External Power Unit . . . . . SET OUTPUT (28-volt system - 27.0 to 28.5 volts)
5. Battery Switch . . . . . .ON
6. External Power Unit . . . . . .ON
7. Engine . . . . . START (using normal procedures)
8. External Power Unit . . . . . OFF (after engine has started)
9. External Power Unit . . . . . DISCONNECT
10. Alternator Switch . . . . . .ON (check for load)
11. If equipped with a Standby Alternator . . . . . REFER TO SUPPLEMENT

STARTING

CAUTION

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

COLD STARTS

1. Mixture . . . . . FULL RICH
2. Propeller . . . . . HIGH RPM
3. Throttle . . . . . FULL OPEN
4. Auxiliary Fuel Pump . . . . . HI UNTIL FUEL FLOW PEAKS THEN OFF
5. Throttle . . . . . CLOSE, THEN OPEN APPROXIMATELY 1/2 INCH
6. Magneto/Start Switch . . . . . START (Release to BOTH when engine starts)
7. Throttle . . . . . 1000 TO 1200 RPM AFTER START

FLOODED ENGINE

1. Mixture . . . . . IDLE CUT-OFF
2. Propeller . . . . . HIGH RPM
3. Throttle . . . . . 1/2 OPEN
4. Magneto/Start Switch . . . . . START (Release to BOTH when engine starts)
5. As Engine Starts:
   a. Throttle . . . . . IDLE
   b. Mixture . . . . . FULL RICH

HOT STARTS

1. Mixture . . . . . IDLE CUT-OFF
2. Propeller . . . . . HIGH RPM
3. Auxiliary Fuel Pump . . . . . HI FOR 30-60 SECONDS THEN OFF
4. Mixture . . . . . FULL RICH
5. Throttle . . . . . FULL OPEN
6. Auxiliary Fuel Pump . . . . . HI UNTIL FUEL FLOW PEAKS THEN OFF
7. Throttle . . . . . CLOSE; THEN OPEN APPROXIMATELY 1/2 INCH
8. Magneto/Start Switch . . . . . START (Release to BOTH when engine starts)
9. Auxiliary Fuel Pump (if required) . . . . . HI; (momentarily after starting to purge the system), THEN OFF

AFTER STARTING

1. Throttle . . . . . 1000 to 1200 RPM
2. Oil Pressure . . . . . CHECK

CAUTION

Engine oil temperature should be 24°C or above and oil pressure in the green arc prior to engine run-up above 1200 rpm.

3. START Annunciator . . . . . CHECK (should illuminate during start and extinguish after start)
4. LOW BUS VOLTS Annunciator . . . . . CHECK (should illuminate during start and extinguish after start)

5. ALT LOAD . . . . . CHECK
(load should decrease below 25 amps at 1000-1200 rpm after 2 minutes with no additional electrical equipment turned on)
6. BUS VOLTMETER:
   a. Before Start . . . . . 24 Volts
   b. After Start . . . . . 28.5 Volts
7. All Engine Instruments . . . . . CHECK
8. Lights . . . . . AS REQUIRED
9. Avionics Equipment . . . . . ON, AS REQUIRED
10. Brakes . . . . . RELEASE AND CHECK

CAUTION

Never taxi with flat shock strut.

BEFORE TAKEOFF

1. Parking Brake. . . . . SET
2. Seat Belts and Shoulder Harnesses . . . . . CHECK
3. Avionics . . . . . CHECK
4. Engine Instruments . . . . CHECK (within operating range)
5. Flight Instruments. . . . . CHECK AND SET

NOTE

To ensure adequate gyro pressure when operating two air-driven gyros during ground operation and/or holding prior to takeoff, maintain an engine speed of 700-800 rpm in order to hold a value of 4.3 in. Hg on the instrument pressure gage. If three or more air-driven gyros are installed, maintain an engine speed of 1200 rpm.

6. ANNUN TEST Push-Button . . . . . PRESS
(All Annunciators, Landing Gear Position Lights and Flap Position Lights should Illuminate.)
7. Throttle . . . . . 1700 RPM
8. Propeller . . . . . EXERCISE
(to obtain 200 to 300 rpm drop), THEN RETURN TO HIGH RPM
9. Magnetos . . . . . CHECK INDIVIDUALLY
   - Variance between individual magnetos should not exceed 50 rpm.
   - Maximum drop should not exceed 150 rpm.
10. Instrument Air Gage . . . . . CHECK PRESSURE
11. If equipped with a standby generator or a standby alternator . . . . . REFER TO SUPPLEMENT
12. Throttle . . . . . IDLE TO 1200 RPM
13. Autopilot and Electric Trim (if installed) . . . . . CHECK
14. Trim . . . . . SET
    a. Aileron . . . . . NEUTRAL
    b. Elevator . . . . . 3° NOSE UP
    (6° nose up if only front seats are occupied)
15. Flaps . . . . . CHECK OPERATION; SET FOR TAKEOFF
16. Doors and Windows . . . . . SECURE
    - Cabin Door Lock Indicator (On serials E-2458, E-2468 and after) . . . . . CHECK CLOSED
17. Flight Controls . . . . . CHECK FREEDOM OF MOVEMENT AND PROPER DIRECTION OF TRAVEL
18. Mixture:

(E-1946, E-2104, E-2111 Thru E-3144, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(E-3145 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.

19. Fuel Selector Valve . . . . . .CHECK TANK SELECTED (feel for detent/confirm visually)
20. Auxiliary Fuel Pump . . . . . .OFF
21. Parking Brake. . . . . RELEASE

TAKEOFF

Take-off Power.....Full Throttle, 2700 RPM

Minimum Recommended Oil Temperature. . . . . 24°C

1. Power . . . . . SET
   a. Throttle . . . . . FULL FORWARD
   b. Propeller . . . . . HIGH RPM
   c. Mixture:

(E-1946, E-2104, E-2111 Thru E-3144, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- AS REQUIRED BY FIELD ELEVATION

2. Brakes . . . . . RELEASE
3. Instruments. . . . . CHECK (make final check of manifold pressure, fuel flow, rpm, and oil pressure at the start of take-off run)
4. Airspeed. . . . . ACCELERATE TO AND MAINTAIN TAKE-OFF SPEED

5. Landing Gear . . . . . RETRACT
(when positive rate-of-climb is established)
6. Airspeed. . . . . ESTABLISH DESIRED CLIMB SPEED
(when clear of obstacles)

CLIMB

(E-1946, E-2104, E-2111 Thru E-3144 Not In Compliance With Raytheon Aircraft S.B. 28-3052):

1. Power. . . . . SET
(Maximum Continuous Power:)
   a. Mixture. . . . . FULL RICH
   b. Propeller . . . . . 2700 RPM
   c. Throttle . . . . . FULL FORWARD
(Cruise Climb Power:)
   a. Mixture. . . . . FULL RICH
   b. Propeller . . . . . 2500 RPM
   c. Throttle. . . . . FULL FORWARD
2. Cowl Flaps . . . . . AS REQUIRED
3. Power. . . . . SET
4. Engine Temperatures. . . . . MONITOR
5. Auxiliary Fuel Pump . . . . . OFF;
   If engine roughness, fuel flow fluctuations or low fuel flow occur - LO and manually lean to the appropriate fuel flow schedule as follows:

(E-1946, E-2104, and E-2111 thru E-2760 Not Incorporating Kit 36-9013 or Kit 36-9015, And Not In Compliance With Teledyne Continental Motors SID97-3 or Raytheon Aircraft S.B. 28-3052):

MANUAL LEANING FUEL FLOW SCHEDULE FOR FULL THROTTLE, AND 2700 RPM

PRESSURE ALTITUDE (ft)	FUEL FLOW (gph)
SL	26.0
2000	24.0
4000	22.5
6000	21.0
8000	19.5
10,000	18.0
12,000	16.5
14,000	15.0
16,000	13.5

SVC0431

Manual leaning fuel flows for full throttle and 2500 rpm are 1 gph less than those shown on the schedule.

(E-2761 thru E-3099, And Prior Airplanes Incorporating Kit 36-9013 or Kit 36-9015, Kit Serials 101 thru 134, And Not In Compliance With Teledyne Continental Motors SID97-3 or Raytheon Aircraft S.B. 28-3052):

MANUAL LEANING FUEL FLOW SCHEDULE FOR FULL THROTTLE, AND 2700 RPM

PRESSURE ALTITUDE (ft)	FUEL FLOW (gph)
SL	25.5
2000	25.5
4000	24.0
6000	22.0
8000	20.5
10,000	19.0
12,000	18.0
14,000	17.5
16,000	16.5

SVC0432

Manual leaning fuel flows for full throttle and 2500 rpm are 2 gph less than those shown on the schedule.

(E-3100 thru E-3144, And Prior Airplanes In Compliance With Teledyne Continental Motors SID97-3; Serials E-1946, E-2104, E-2111 thru E-2760 Incorporating Kit 36-9015, Kit Serials 135 And After; Not In Compliance With Raytheon Aircraft S.B. 28-3052):

MANUAL LEANING FUEL FLOW SCHEDULE FOR FULL THROTTLE, AND 2700 RPM

PRESSURE ALTITUDE (ft)	FUEL FLOW (gph)
SL	25.7
2000	25.7
4000	25.1
6000	24.0
8000	22.4
10,000	20.9
12,000	19.6
14,000	18.8
16,000	17.9

SVC0433

Manual leaning fuel flows for full throttle and 2500 rpm are 2 gph less than those shown on the schedule.

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

1. Power . . . . . SET

(Maximum Continuous Power:)

   a. Mixture . . . . . SET BY ALTITUDE
   b. Propeller . . . . . 2700 RPM
   c. Throttle . . . . . FULL FORWARD

(Cruise Climb Power:)

   a. Mixture . . . . . SET BY ALTITUDE
   b. Propeller . . . . . 2500 RPM
   c. Throttle . . . . . FULL FORWARD

2. Cowl Flaps . . . . . AS REQUIRED
3. Power . . . . . SET
4. Engine Temperatures . . . . . MONITOR
5. Auxiliary Fuel Pump . . . . . OFF;
   If engine roughness, fuel flow fluctuations or low fuel flow occur - LO and re-lean to the following fuel flow schedule:

MANUAL LEANING FUEL FLOW SCHEDULE FOR FULL THROTTLE, AND 2700 RPM

PRESSURE ALTITUDE (ft)	FUEL FLOW (gph)
SL	25.7
2000	25.7
4000	25.1
6000	24.0
8000	22.4
10,000	20.9
12,000	19.6
14,000	18.8
16,000	17.9

SVC0433

Manual leaning fuel flows for full throttle and 2500 rpm are 2 gph less than those shown on schedule.

CAUTION

Engine roughness, fuel flow fluctuation or low fuel flow can occur when climbing on hot days. These can be eliminated by switching the auxiliary fuel pump from OFF to LO and manually leaning to the applicable preceding fuel flow schedule.

Return the mixture control to FULL RICH before switching the auxiliary fuel pump back to OFF.

NOTE

(E-1946, E-2104, E-2111 Thru E-3144, 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 lean engine mixture. i.e. As the airplane climbs with the mixture control in the FULL RICH position, the pump will automatically reduce the fuel flow with increasing altitude.

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

The mixture must be manually leaned as the airplane climbs.

CRUISE

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

1. Cowl Flaps . . . . . CLOSE
2. Power . . . . . SET
3. Auxiliary Fuel Pump . . . . . OFF
4. Mixture . . . . . SET USING EGT

LEANING USING THE EXHAUST GAS TEMPERATURE (EGT) INDICATOR

A thermocouple-type exhaust gas temperature (EGT) probe is mounted in the right side of the exhaust system. The probe is connected to an indicator in the engine instrument array. The indicator is calibrated in degrees Celsius. Use the EGT system 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. Enrichening the mixture is referred to as operation on the rich side of peak EGT.
2. At lower power settings, the engine 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 (Section V, PERFORMANCE), the engine 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 auxiliary fuel pump from OFF to LO 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
2. Mixture:

(E-1946, E-2104, E-2111 Thru E-3144, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(E-3145 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 Temperature should not fall below green arc, 116°C.)

NOTE

(E-1946, E-2104, E-2111 Thru E-3144, 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.

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

The mixture must be manually enriched as the airplane descends.

An optional procedure is to retard the throttle as the airplane descends to maintain a desired manifold pressure and adjust the mixture control to maintain EGT within its limits.

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

BEFORE LANDING

1. Seat Belts and Shoulder Harnesses . . . . . .FASTENED
2. Seat Backs . . . . . POSITION FOR LANDING
3. Fuel Selector Valve . . . . . SELECT FULLER TANK
(feel for detent/confirm visually)
4. Cowl Flaps . . . . . AS REQUIRED

5. Mixture:

(E-1946, E-2104, E-2111 Thru E-3144, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH (Or As Required By Field Elevation)

6. Landing Gear (154 kts or below) . . . DOWN AND CHECK
7. Landing Lights . . . . . AS REQUIRED
8. Flaps (124 kts or below). . . . . DOWN
9. Airspeed. . . . ESTABLISH NORMAL APPROACH SPEED
10. Propeller. . . . . HIGH RPM

BALKED LANDING

1. Throttle. . . . . FULL THROTTLE, 2700 RPM
2. Mixture:

(E-1946, E-2104, E-2111 Thru E-3144, Not In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH

(E-3145 and After, And Prior Airplanes In Compliance With Raytheon Aircraft S.B. 28-3052):

- FULL RICH (Or As Required By Field Elevation)

3. Airspeed. . . . . 80 KTS
   (until clear of obstacles, then trim to normal climb speed)
4. Flaps . . . . . UP (0°)
5. Landing Gear . . . . . RETRACT
6. Cowl Flaps . . . . . OPEN

AFTER LANDING

1. Cowl Flaps . . . . . OPEN
2. Flaps. . . . . UP (0°)
3. Landing, Taxi, and Strobe Lights . . . . . AS REQUIRED
4. Trim Tabs . . . . . RESET AS REQUIRED

SHUTDOWN

1. Parking Brake. . . . . SET
2. Electrical Switches and Avionics Equipment . . . . . OFF
3. Throttle . . . . . 1000 RPM
4. Mixture . . . . . IDLE CUT-OFF
5. Magneto/Start Switch . . . . . OFF (after engine stops)
6. Alternator Switch . . . . . OFF
7. Battery Switch . . . . . OFF
8. Control Locks . . . . . INSTALL
9. Wheel Chocks . . . . . INSTALL
10. Parking Brake. . . . . RELEASE

ENVIRONMENTAL SYSTEMS

OXYGEN SYSTEM

WARNING

NO SMOKING while 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

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

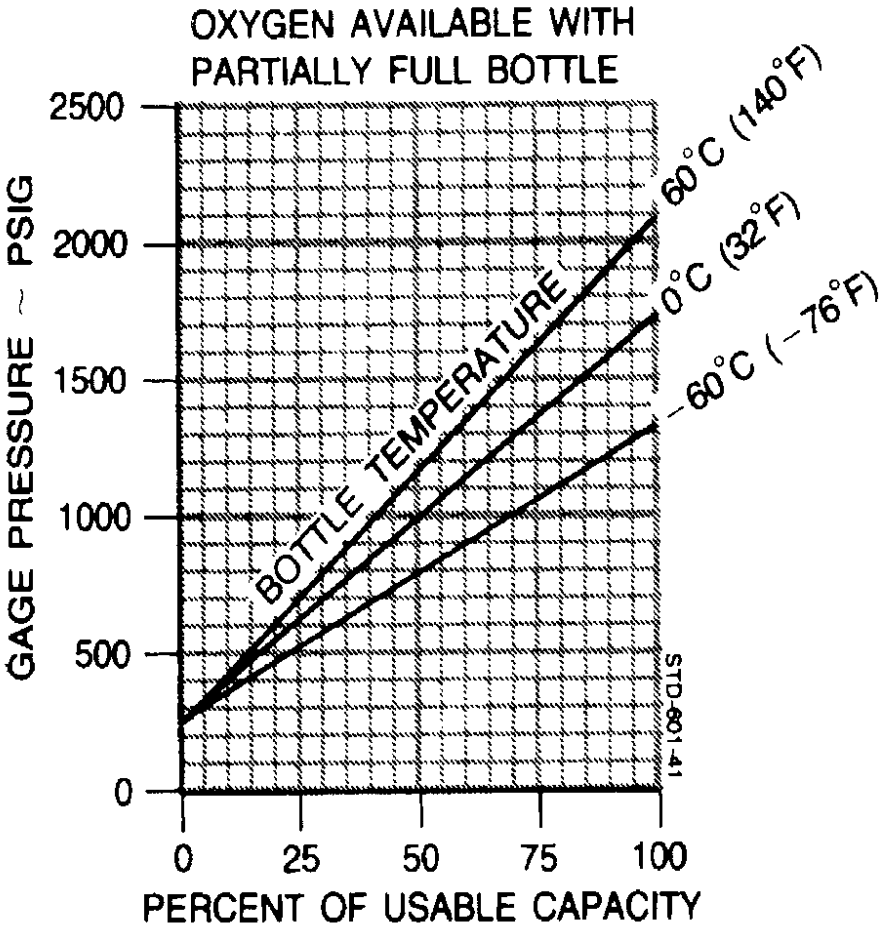
Since 90% of the system efficiency is determined by the fit of the oxygen mask, make certain the masks fit properly and are in good condition.

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

NOTE

A bottle at 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%.)



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 . . . . . 1100 psi
Bottle Temperature . . . . . 0°C
Percent Of Usable Capacity 57%
Planned Cruising Altitude . . . . . 15,000 ft
Duration (49 cu ft cylinder) . . . . . .0.57 x 149 = 85 minutes
Duration (76 cu ft cylinder) . . . . . .0.57 x 229 = 130 minutes

OXYGEN DURATION WITH A FULL BOTTLE (100% CAPACITY)

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
76 cu ft	1	1558	1146	779
	2	779	572	389
	3	519	381	259
	4	389	286	194
	5	311	229	155
	6	259	190	129

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IN FLIGHT

Refer to 14 CFR for operating rules pertaining to the use of oxygen.

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.

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)

HEATING AND VENTILATION

Refer to Section VII, SYSTEMS DESCRIPTION, for operation of heating and ventilation controls.

COLD WEATHER OPERATION

PREFLIGHT INSPECTION

All accumulations of ice, snow and frost must be removed from the wings, tail, control surfaces and hinges, propeller, windshield, fuel cell filler caps, crankcase vents, and fuel vents. If such accumulations are not removed completely, the airplane should not be flown. The deposits will not blow off in flight. While an adverse weight factor is clearly involved in the case of heavy deposits, it is less obvious that even slight accumulations will disturb or completely destroy the designed aerodynamic properties of the airfoils.

The normal preflight procedures should then be completed, with particular attention given to checking flight controls for complete freedom of movement.

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 engine prior to a start. Particular attention should be given to the oil cooler, engine sump, and propeller hub to ensure proper 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 propeller should also be cycled occasionally in flight.

DESCENT

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

Refer to Engine Manufacturers' Operator's Manual for more detailed information on COLD WEATHER OPERATION.

ICING CONDITIONS

Flight in icing conditions is prohibited.

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 76.7 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*

SECTION V
PERFORMANCE
TABLE OF CONTENTS (Cont'd)

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

INTRODUCTION TO PERFORMANCE

REQUIRED CORRECTIONS TO PERFORMANCE GRAPHS AND TABLES

1. For the airplanes specified below, the performance obtained from the following graphs must be adjusted by the specified percentage or fixed amount at all altitudes above sea level. The resulting performance is approximate and will vary with airspeed, temperature, and other ambient conditions.

- E-3100 and after, and-
- Prior airplanes in compliance with S. B. 28-3052, or
- Prior airplanes in compliance with TCM SID 97-3, or
- Prior airplanes incorporating kit 36-9015 with s/n's 135 and after.

TAKE-OFF DISTANCE - FLAPS UP

TAKE-OFF DISTANCE - FLAPS APPROACH

-Increase Distance by 6%

CLIMB

-Decrease Rate-of-Climb by 75 FT/MIN

TIME, FUEL, AND DISTANCE TO CRUISE CLIMB

-Increase Time to Climb by 8%

RANGE PROFILES and ENDURANCE PROFILES

-Decrease Range and Endurance by:

SL to 4000 ft 0.5%

4000 to 8000 ft. 1.0%

8000 to 12,000 ft 2.0%

12,000 to 16,000 ft. 4.0%

2. After the previous corrections have been made, the following additional corrections must be made for all airplanes when the ambient temperature exceeds that for a standard (ISA) day. Linearly interpolate to obtain corrections for other ambient temperatures between ISA and ISA + 30°C.

GRAPHS/TABLES	ISA + 10°C	ISA + 20°C	ISA + 30°C
TAKE-OFF DISTANCE - FLAPS UP TAKE-OFF DISTANCE - FLAPS APPROACH Increase Take-Off Distance by:	8%	15%	23%
CLIMB Decrease Rate-of-Climb by:	90 fpm	180 fpm	270 fpm
TIME, FUEL, AND DISTANCE TO CRUISE CLIMB Increase Time to Climb by:	15%	30%	45%
CRUISE POWER SETTINGS Decrease cruise speeds by:	4 KIAS	7 KIAS	11 KIAS

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 example in the order given.
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 the 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. Indicated airspeeds (IAS) were obtained by using the AIRSPEED CALIBRATION - NORMAL SYSTEM Graph.
4. 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 the charts can only be achieved if the specified conditions exist.
5. The full amount of usable fuel is available for all approved flight conditions.

EXAMPLE CALCULATIONS

Examples have been presented on all performance graphs. In addition, the calculations for flight time, block speed and fuel required for a proposed flight are listed below. All examples and calculations utilize the following conditions:

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

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

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 = .32 in. Hg

.32 X 1000 ft = 320 ft

The Pressure Altitude at the departure airport is 320 ft above the field elevation.

5333 ft + 320 ft = 5653 ft

Pressure Altitude at Destination:

29.92 - 29.56 = .36 in. Hg
.36 X 1000 ft = 360 ft

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

3605 ft + 360 ft = 3965 ft

NOTE

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

FLIGHT TIME, BLOCK SPEED AND FUEL REQUIREMENT

CRUISE CLIMB

Enter the TIME, FUEL, and DISTANCE to CRUISE CLIMB Graph at 15°C to 5653 feet pressure altitude and to 3650 lbs. Again at -5°C to 11,500 feet pressure altitude and to 3650 lbs, and read:

Time to Climb = 18.0 - 6.5 = 11.5 min

Fuel Used to Climb = 6.0 - 2.5 = 3.5 gal

Distance Traveled = 36.0 - 12.5 = 23.5 nm

CRUISE

The temperatures for cruise are presented for a Standard Day (ISA); 20°C (36°F) above a Standard Day (ISA + 20°C); and 20°C (36°F) below a Standard Day (ISA - 20°C). These should be used for flight planning. The IOAT values are true temperature values which have been adjusted for the compressibility effects. IOAT should be used for setting cruise power while enroute.

Enter the ISA CONVERSION Graph at 11,500 ft and the 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 GAL/HR	TAS KNOTS	FUEL FLOW GAL/HR	TAS KNOTS
10,000	14.5	171	14.0	171
12,000	13.5	167	13.0	167

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

ROUTE SEGMENT	ISA CONDITION	FUEL FLOW GPH	TAS KNOTS
LEG A-B	ISA + 3°C	13.7	168
LEG C	ISA + 8°C	13.6	168
LEG D	ISA + 17°C	13.4	168
LEG E	ISA + 18°C	13.3	168

Time and fuel used were 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	51 - 23.5 = 27.5*	195	:08.5	2.0
LEG B	40	195	:12	2.9
LEG C	74	156	:29	6.6
LEG D	87	156	:33.5	7.5
LEG E	70	158	:27	5.9
TOTAL	298.5		1:50	24.9

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

TIME - FUEL - DISTANCE CHART

ITEM	TIME HRS:MINS	FUEL GAL	DISTANCE NM
Start, Runup, Taxi, and Take-off acceleration	0:00	2.2	0
Climb	:11.5	3.5	23.5
Cruise	1:50	24.9	298.5
Total	2:01.5	30.6	322

Total Flight Time: 2 hours, 1.5 minutes (= 2.03 hrs)

Block Speed: 322 NM ÷ 2.03 hours = 159 knots

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 . . . . . 9.3 gph

Reserve Fuel (45 minutes x 9.3 gph) = 7.0 gallons

TOTAL FUEL REQUIREMENT

Total Fuel Required = Calculated Fuel Usage + Reserve Fuel

Total Fuel Required = 30.6 gal + 7.0 gal = 37.6 gallons

LANDING WEIGHT

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

Assumed Ramp Weight . . . . . 3663 lbs

Estimated Fuel (30.6 gal at 6 lbs/gal) . . . . . 184 lbs

Estimated Landing Weight (3663 lbs - 184 lbs) = 3479 lbs

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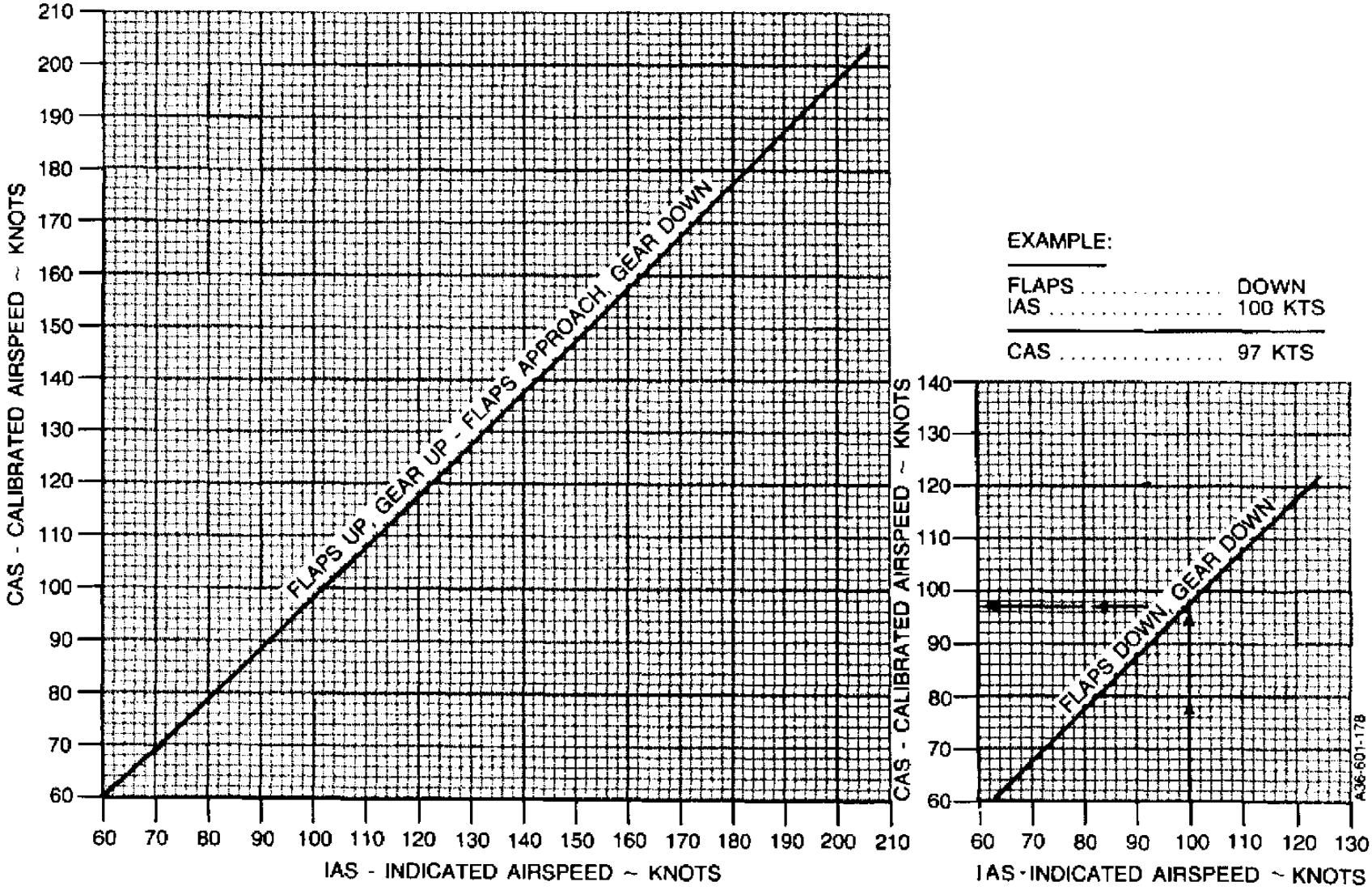
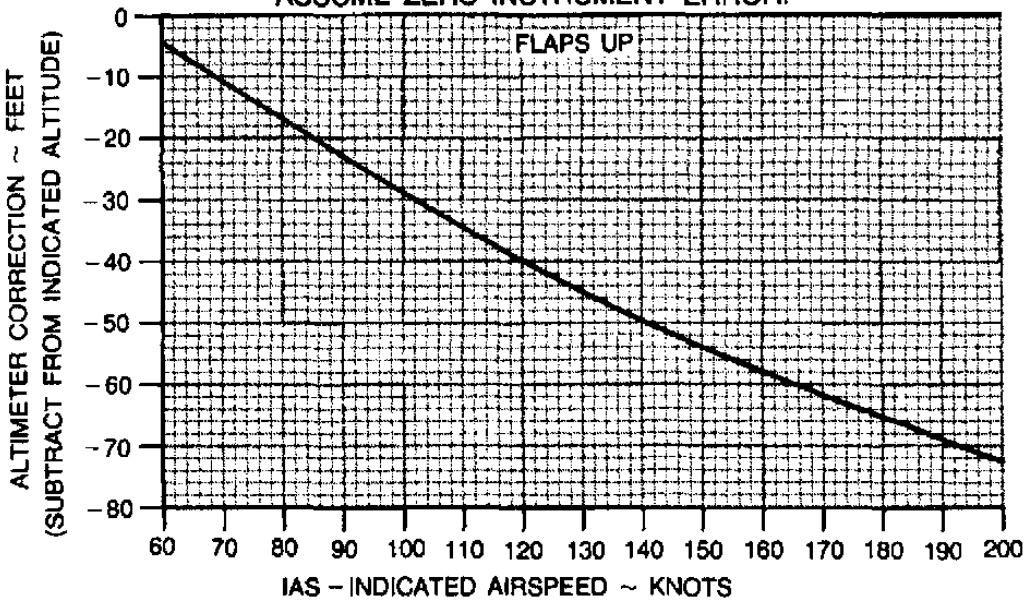
AIRSPEED CALIBRATION – NORMAL SYSTEM

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR



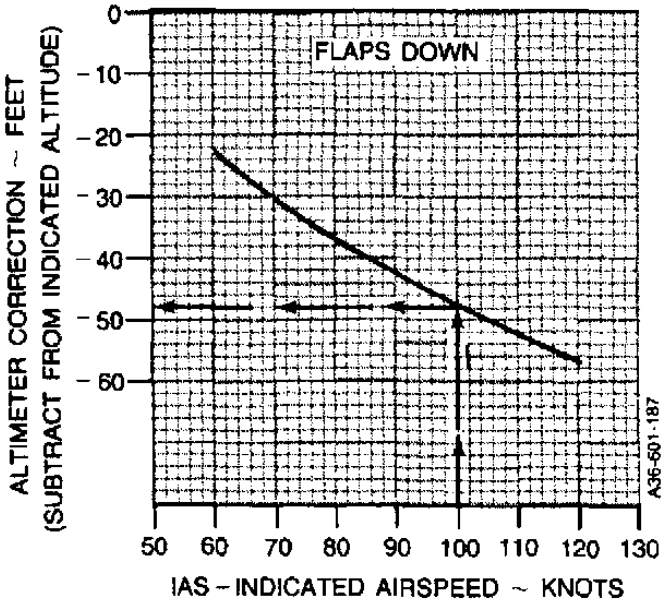
ALTIMETER CORRECTION – NORMAL SYSTEM

NOTE: INDICATED AIRSPEED AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR.



EXAMPLE:

FLAPS	DOWN
IAS	100 KTS
INDICATED PRESSURE ALTITUDE	4500 FT
ALTITUDE CORRECTION	–48 FT
ACTUAL PRESSURE ALTITUDE	4452 FT



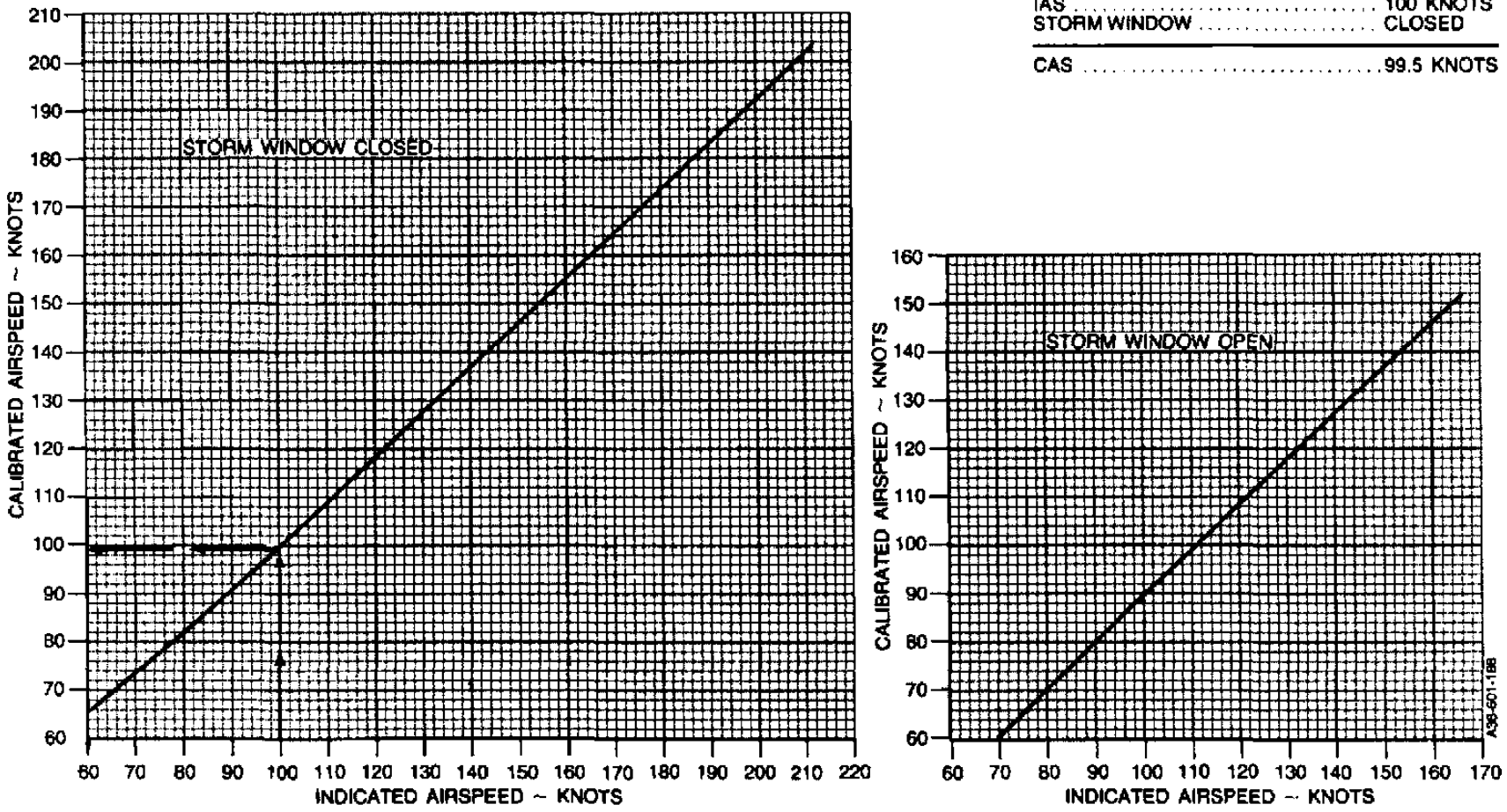
AIRSPEED CALIBRATION - ALTERNATE SYSTEM

ALL FLAP POSITIONS

NOTES: 1. INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.
2. NORMAL STATIC PORTS ARE OBSTRUCTED.

EXAMPLE:

IAS	100 KNOTS
STORM WINDOW	CLOSED
CAS	99.5 KNOTS



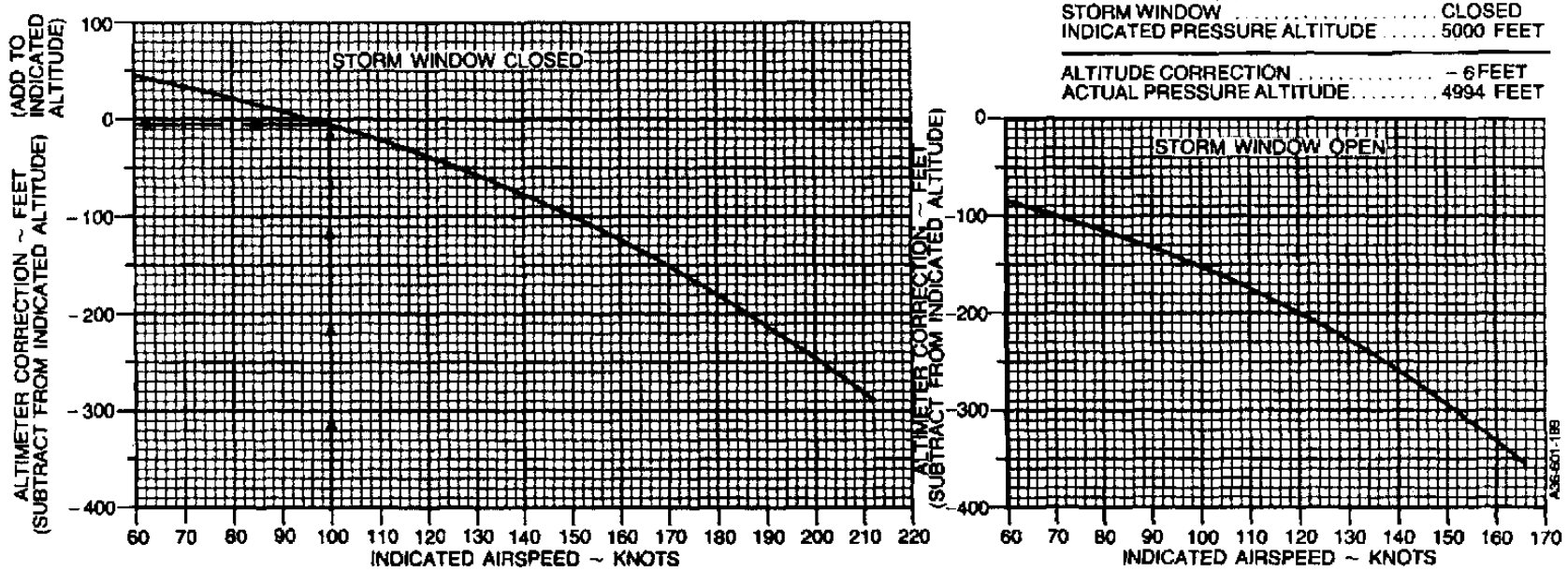
ALTIMETER CORRECTION - ALTERNATE SYSTEM

ALL FLAP POSITIONS

NOTES:
1. INDICATED AIRSPEED AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR.
2. NORMAL STATIC PORTS ARE OBSTRUCTED.

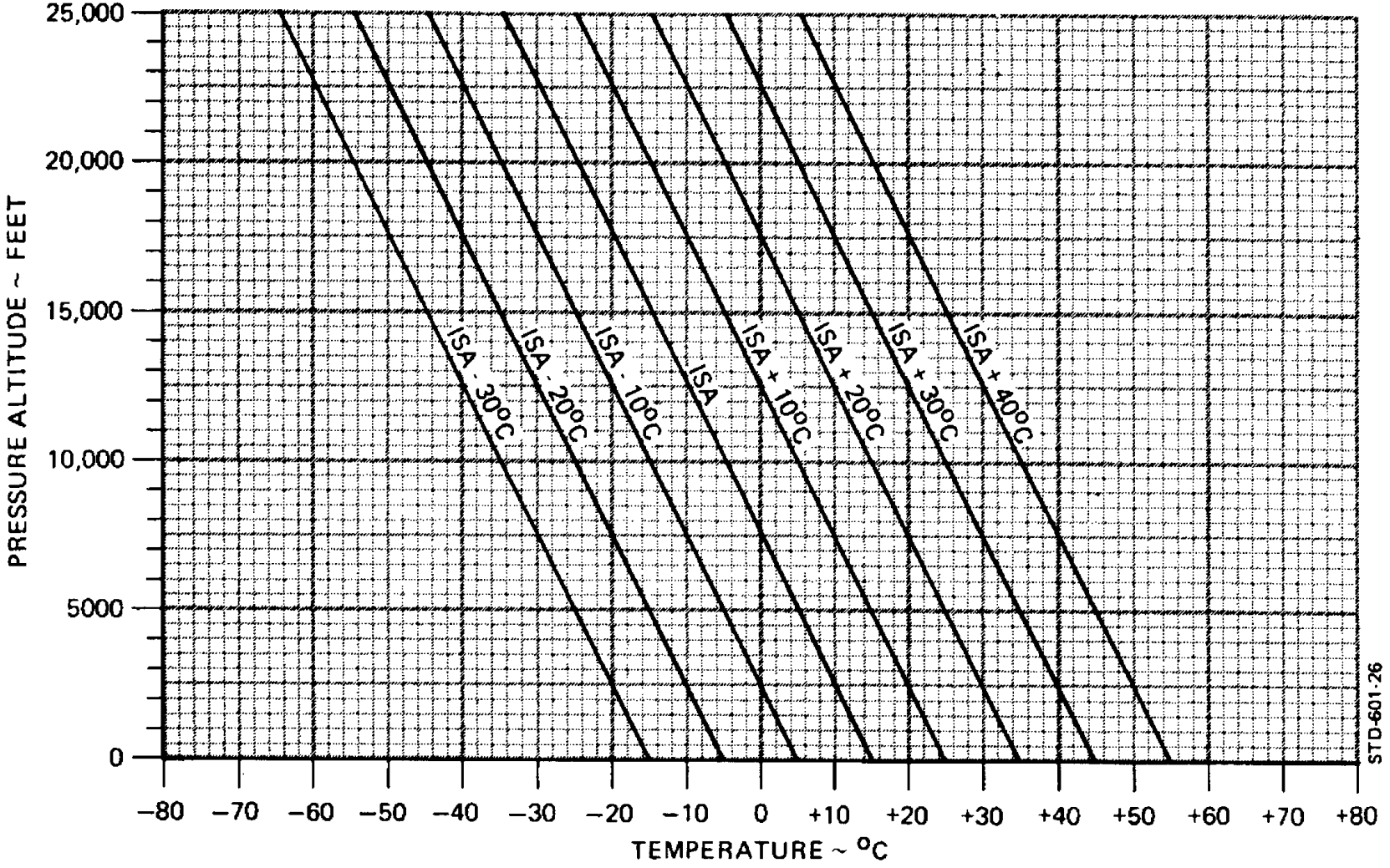
EXAMPLE:

IAS	100 KNOTS
STORM WINDOW	CLOSED
INDICATED PRESSURE ALTITUDE	5000 FEET
ALTITUDE CORRECTION	– 6 FEET
ACTUAL PRESSURE ALTITUDE	4994 FEET

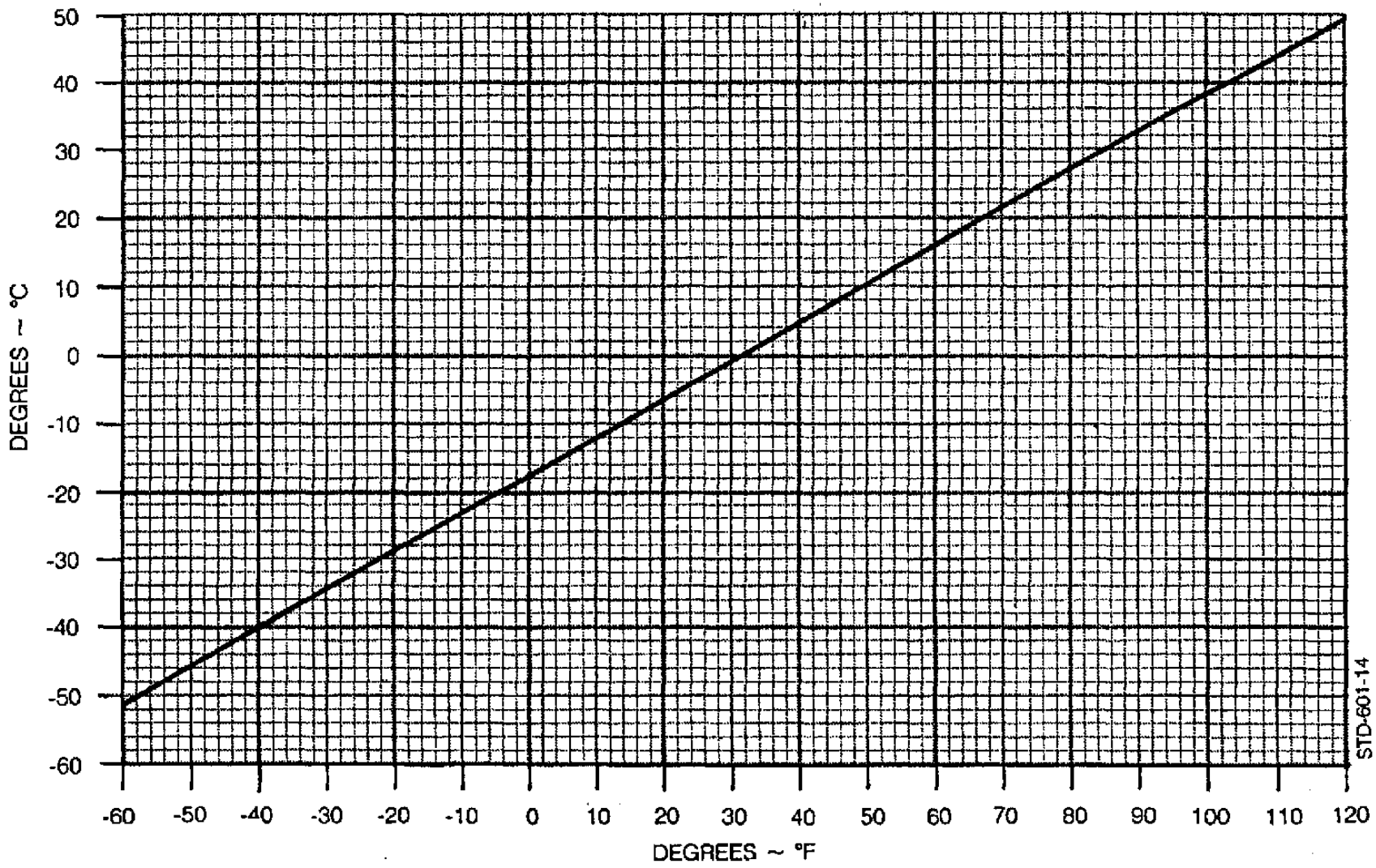


ISA CONVERSION

PRESSURE ALTITUDE vs OUTSIDE AIR TEMPERATURE



FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION



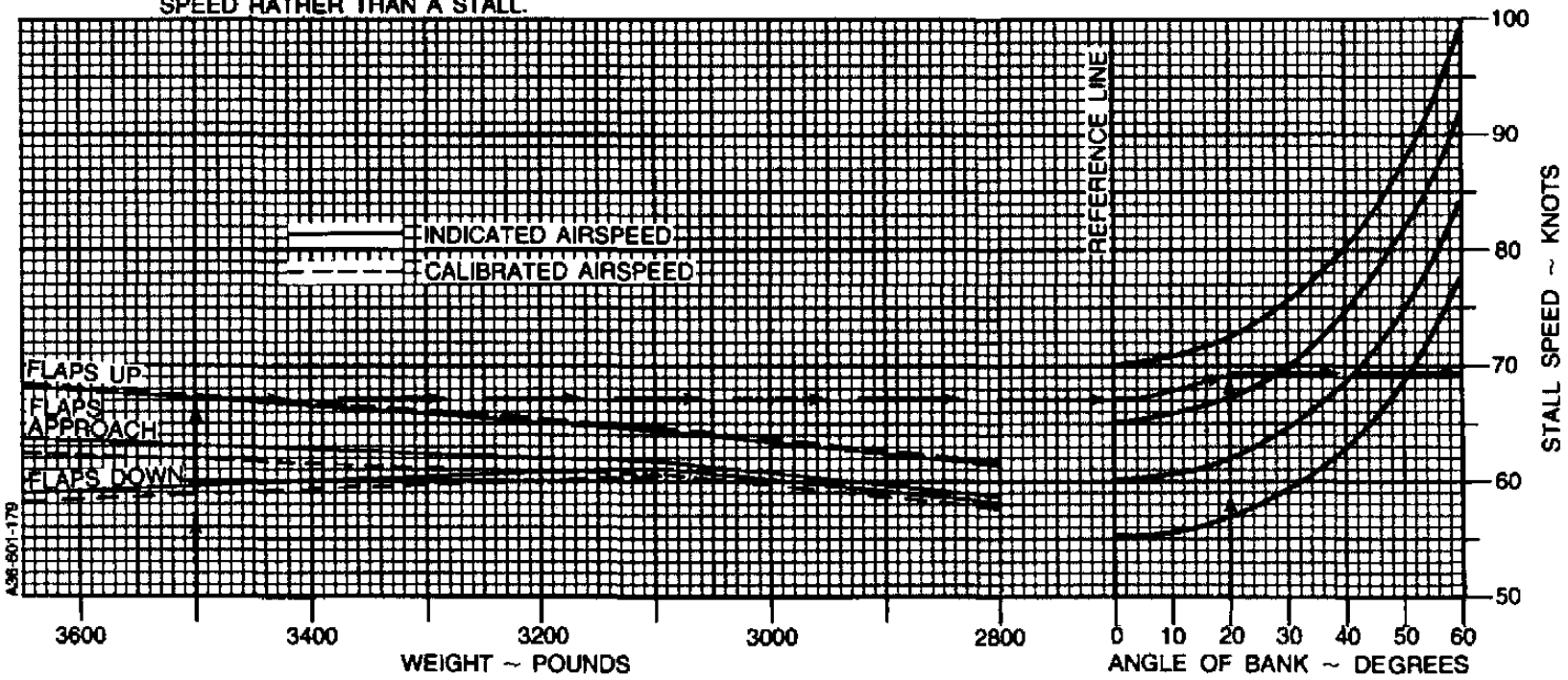
STALL SPEEDS – POWER IDLE

Notes: 1. THE MAXIMUM ALTITUDE LOSS EXPERIENCED WHILE CONDUCTING STALLS IN ACCORDANCE WITH CAR 3.120 WAS 320 FEET.

2. THESE STALL SPEEDS WERE DETERMINED AT THE FORWARD CENTER OF GRAVITY LIMIT FOR EACH WEIGHT. AT SOME LOADINGS THE AIRPLANE IS ELEVATOR LIMITED, RESULTING IN A MINIMUM STEADY SPEED RATHER THAN A STALL.

EXAMPLE:

WEIGHT	3500 LBS
FLAPS	UP
BANK ANGLE	20°
STALL SPEED	69.4 KTS INDICATED



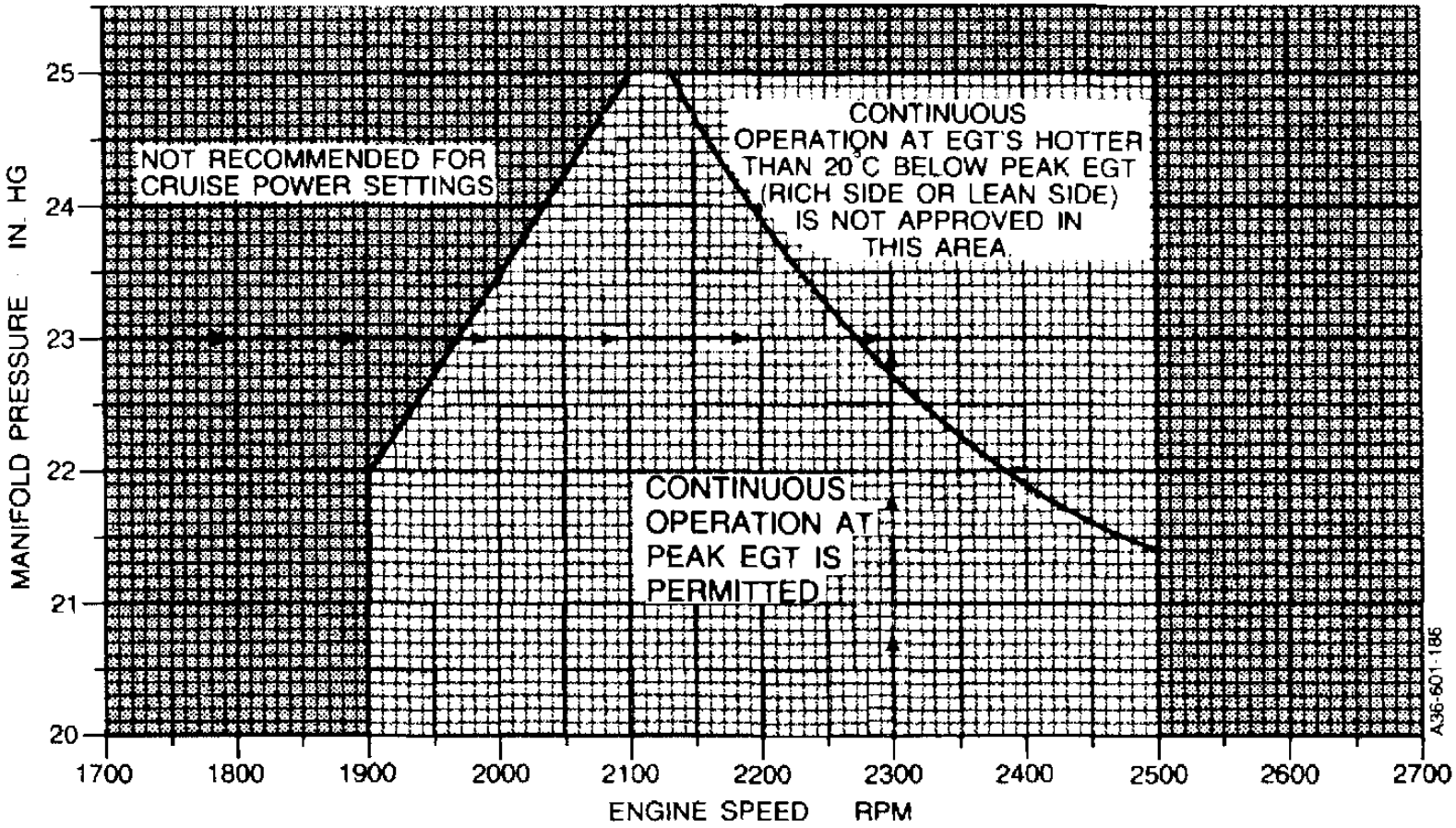
MANIFOLD PRESSURE vs RPM

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



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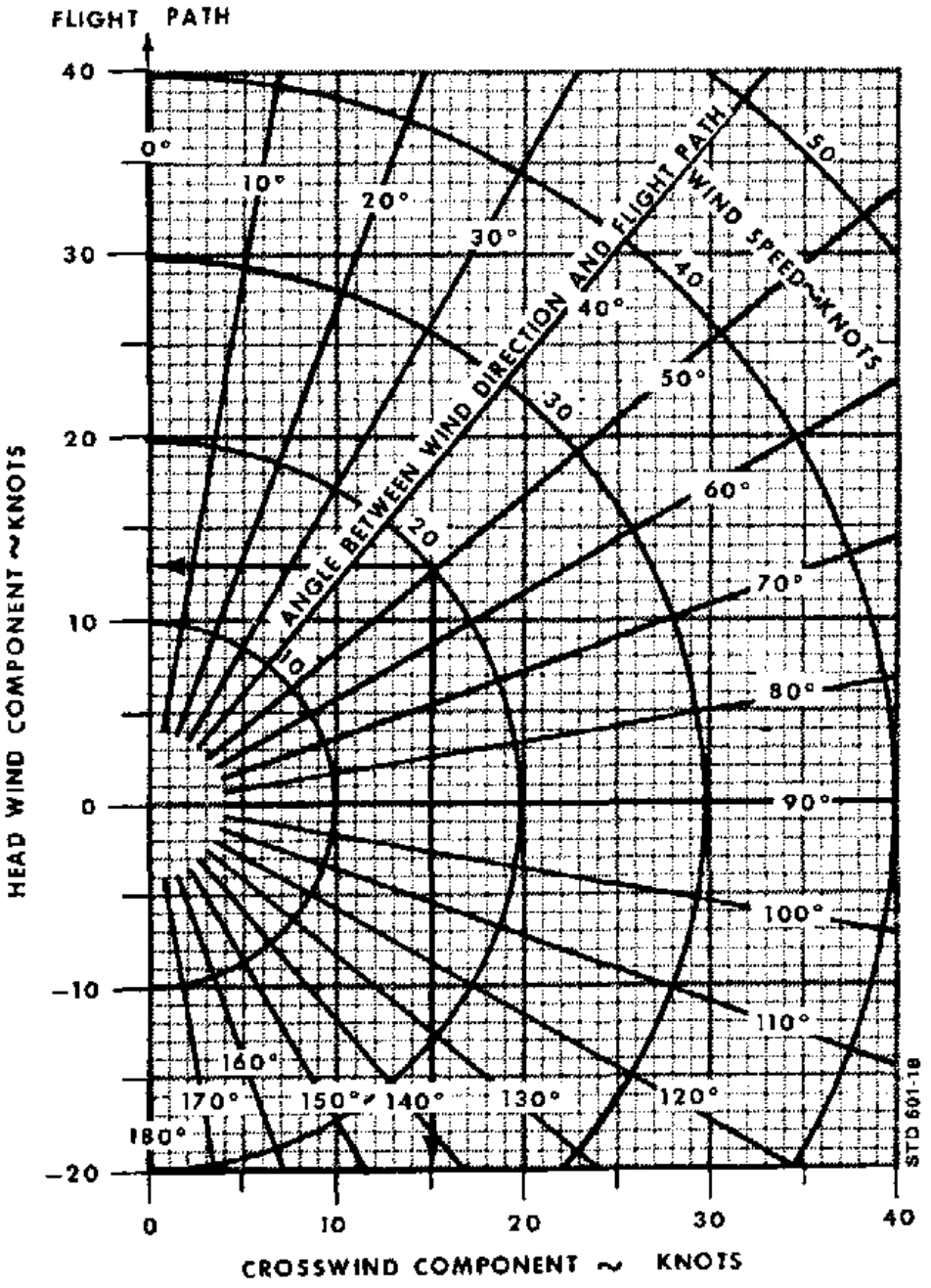
WIND COMPONENTS

Demonstrated Crosswind is 17 kts

EXAMPLE:

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



TAKE-OFF DISTANCE – FLAPS UP

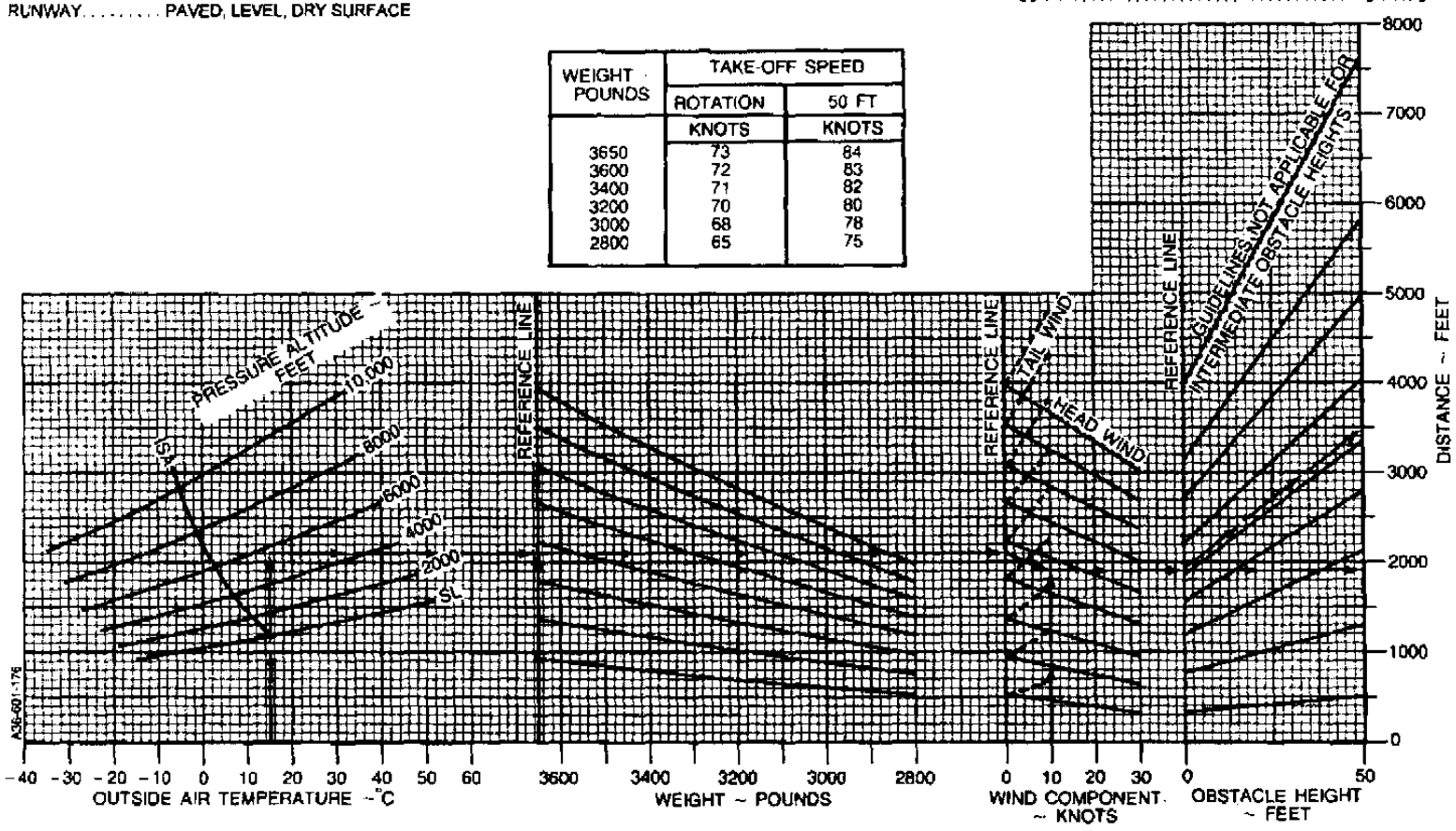
ASSOCIATED CONDITIONS:

POWER . . . . . TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE . . . . . FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY FIELD ELEVATION (E-3145 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

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5653 FT
TAKE-OFF WEIGHT	3650 LBS
HEAD WIND COMPONENT	10 KTS
GROUND ROLL	1900 FT
TOTAL DISTANCE OVER 50-FT OBSTACLE	3475 FT
TAKE-OFF SPEED AT	
ROTATION	73 KTS
50-FT	84 KTS

WEIGHT POUNDS	TAKE-OFF SPEED	
	ROTATION	50 FT
	KNOTS	KNOTS
3650	73	84
3600	72	83
3400	71	82
3200	70	80
3000	68	78
2800	65	75



TAKE-OFF DISTANCE – FLAPS APPROACH

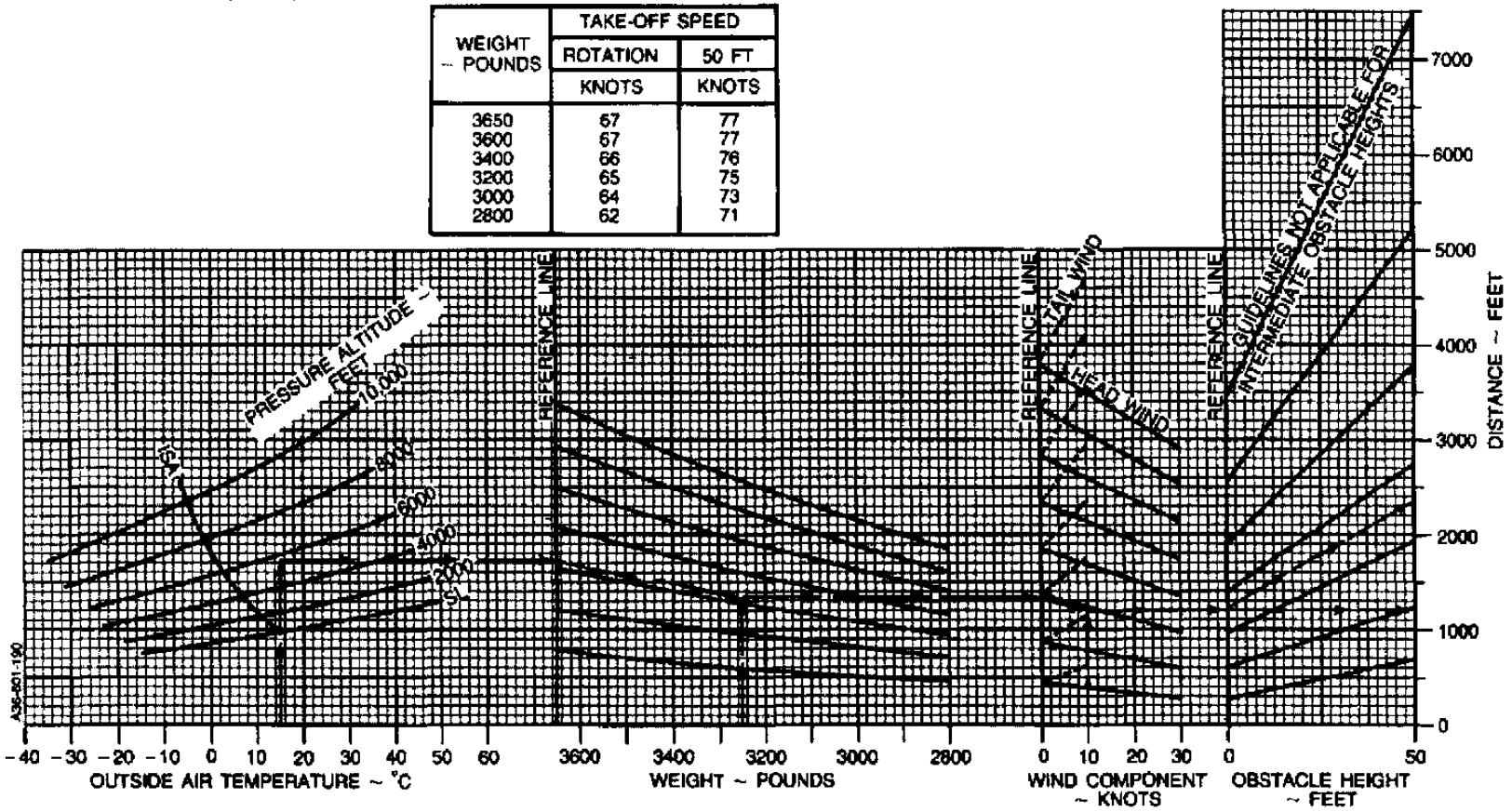
ASSOCIATED CONDITIONS:

POWER. . . . . TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE. . . . . FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052) AS REQUIRED BY FIELD ELEVATION (E-3145 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS . . . . . APPROACH (BLUE)
LANDING GEAR . . . RETRACT AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS . . . . . OPEN
RUNWAY. . . . . PAVED, LEVEL, DRY SURFACE

EXAMPLE:

OAT	15°C
PRESSURE ALTITUDE	5653 FT
TAKE-OFF WEIGHT	3250 LBS
HEAD WIND COMPONENT	10 KTS
GROUND ROLL	1200 FT
TOTAL DISTANCE OVER 50-FT OBSTACLE	2350 FT
TAKE-OFF SPEED AT	
ROTATION	65 KTS
50 FT	75 KTS

WEIGHT – POUNDS	TAKE-OFF SPEED	
	ROTATION – KNOTS	50 FT – KNOTS
3650	67	77
3600	67	77
3400	66	76
3200	65	75
3000	64	73
2800	62	71



CLIMB

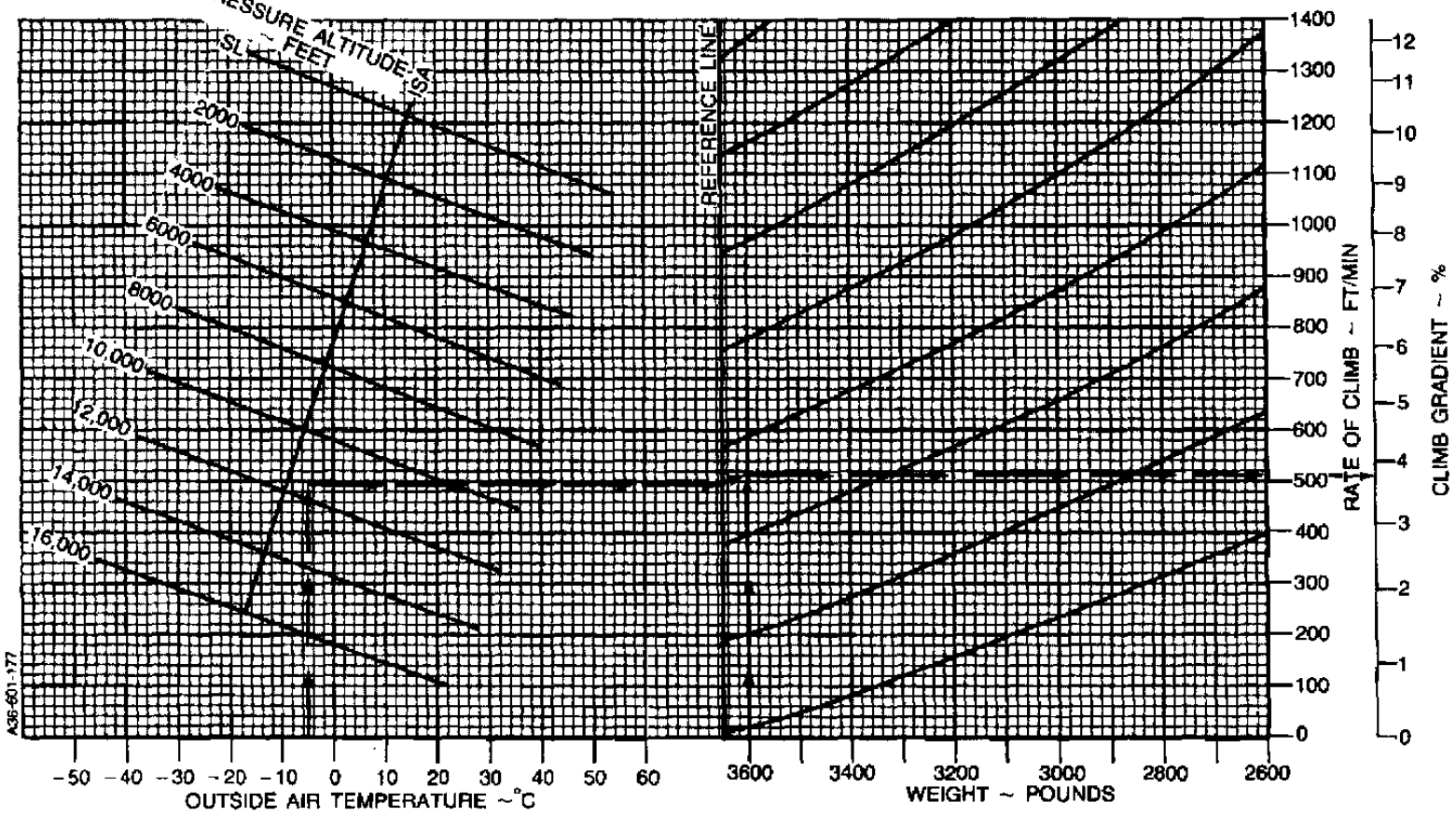
CLIMB SPEED: 100 KNOTS ALL WEIGHTS

ASSOCIATED CONDITIONS:

POWER. . . . . FULL THROTTLE, 2700 RPM
MIXTURE. . . . . FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
AS REQUIRED BY ALTITUDE (E-3145 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS . . . . . UP
LANDING GEAR . . . UP
COWL FLAPS . . . . . AS REQUIRED

EXAMPLE:

OAT	−5°C
PRESSURE ALTITUDE	11,500 FT
WEIGHT	3600 LBS
RATE OF CLIMB	515 FT/MIN
CLIMB GRADIENT	3.8%



TIME, FUEL, AND DISTANCE TO CRUISE CLIMB

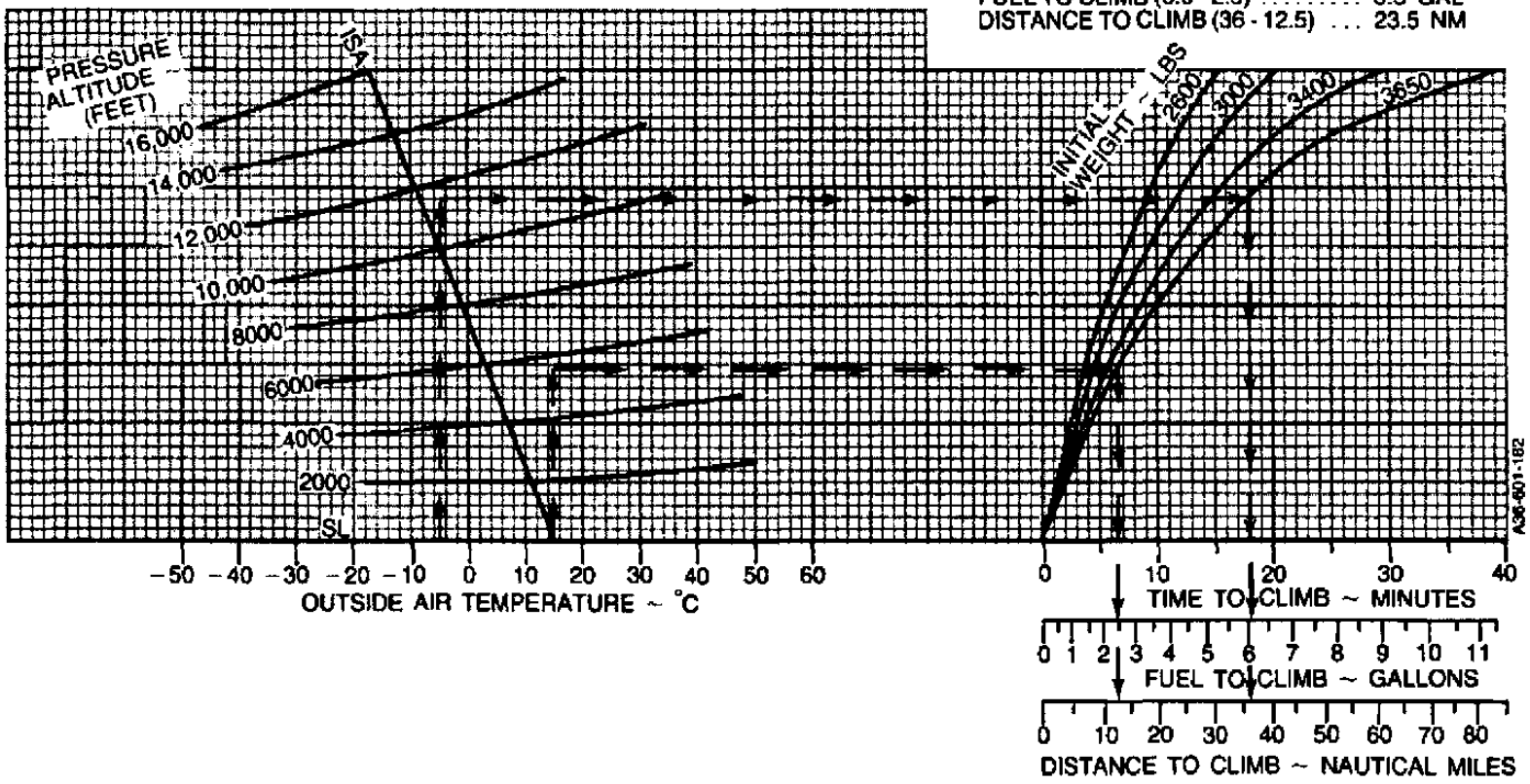
CLIMB SPEED: 110 KNOTS ALL WEIGHTS

ASSOCIATED CONDITIONS:

POWER. . . . . FULL THROTTLE, 2500 RPM
FUEL DENSITY. . 6.0 LBS/GAL
MIXTURE. . . . . FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
AS REQUIRED BY ALTITUDE (E-3145 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
COWL FLAPS . . . AS REQUIRED

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	3650 LBS
TIME TO CLIMB (18 - 6.5)	11.5 MIN
FUEL TO CLIMB (6.0 - 2.5)	3.5 GAL
DISTANCE TO CLIMB (36 - 12.5)	23.5 NM



MAXIMUM RECOMMENDED CRUISE POWER SETTINGS

20°C RICH OF PEAK EGT

25.0 IN. HG (OR FULL THROTTLE) @ 2500 RPM
CRUISE RICH MIXTURE
3400 LBS.

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA – 20° C (ISA – 36° F)	SL	–3	27	25.0	102.1	17.0	172	164
	2000	–6	21	25.0	105.6	17.6	172	169
	4000	–10	14	25.0	109.1	18.2	172	174
	6000	–14	7	24.1	106.1	17.7	169	175
	8000	–18	–1	22.3	97.7	16.3	162	173
	10,000	–22	–8	20.6	90.2	15.0	155	170
	12,000	–26	–15	19.1	83.5	13.9	147	167
	14,000	–30	–22	17.7	78.3	13.1	140	163
	16,000	–34	–30	16.3	73.1	12.2	131	158
STANDARD DAY (ISA)	SL	18	64	25.0	98.1	16.4	167	165
	2000	14	57	25.0	101.3	16.9	167	170
	4000	10	50	25.0	104.6	17.4	167	175
	6000	6	43	24.1	101.8	17.0	164	176
	8000	2	36	22.3	93.9	15.7	157	174
	10,000	–2	28	20.6	86.9	14.5	150	171
	12,000	–6	21	19.1	80.8	13.5	142	167
	14,000	–10	14	17.1	76.0	12.7	134	163
	16,000	–14	6	16.3	71.2	11.9	125	157
ISA + 20° C (ISA + 36° F)	SL	38	100	25.0	94.1	15.7	163	166
	2000	34	93	25.0	97.2	16.2	163	171
	4000	30	86	25.0	100.3	16.7	162	176
	6000	26	79	24.1	97.7	16.3	159	177
	8000	22	72	22.3	90.3	15.1	152	174
	10,000	18	64	20.6	83.8	14.0	144	171
	12,000	14	57	19.1	78.1	13.0	137	167
	14,000	10	50	17.7	73.9	12.3	129	162
	16,000	6	42	16.3	69.8	11.6	119	155

SVC0437

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

RECOMMENDED CRUISE POWER SETTINGS

20°C LEAN
OF PEAK EGT

25.0 IN. HG (OR FULL THROTTLE) @ 2500 RPM
CRUISE LEAN MIXTURE
3400 LBS.

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA −20° C (ISA − 36° F)	SL	−3	27	25.0	86.3	14.4	168	159
	2000	−6	20	25.0	89.3	14.9	168	164
	4000	−10	13	25.0	92.3	15.4	168	169
	6000	−14	6	24.1	89.8	15.0	164	170
	8000	−18	−1	22.3	82.6	13.8	157	168
	10,000	−22	−8	20.6	76.0	12.7	150	165
	12,000	−26	−15	19.1	70.2	11.7	143	162
	14,000	−30	−23	17.7	65.5	10.9	135	156
	16,000	−35	−30	16.3	60.8	10.1	126	152
STANDARD DAY (ISA)	SL	17	63	25.0	82.9	13.8	163	160
	2000	14	56	25.0	85.6	14.3	163	165
	4000	10	50	25.0	88.5	14.8	163	170
	6000	6	42	24.1	86.1	14.4	159	171
	8000	2	35	22.3	79.3	13.2	152	169
	10,000	−2	28	20.6	73.3	12.2	145	166
	12,000	−6	21	19.1	67.8	11.3	137	162
	14,000	−10	13	17.7	63.5	10.6	129	157
	16,000	−15	6	16.3	59.1	9.9	120	150
ISA + 20° C (ISA + 36° F)	SL	37	99	25.0	79.5	13.3	158	161
	2000	34	92	25.0	82.1	13.7	158	166
	4000	30	86	25.0	84.7	14.1	158	171
	6000	26	79	24.1	82.5	13.8	154	172
	8000	22	71	22.3	76.2	12.7	147	169
	10,000	18	64	20.6	70.5	11.8	140	165
	12,000	14	57	19.1	65.5	10.9	132	161
	14,000	10	49	17.7	61.5	10.3	123	155
	16,000	5	42	16.3	57.5	9.6	113	146

SVC0438

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

RECOMMENDED CRUISE POWER SETTINGS

20°C RICH
OF PEAK EGT

23.0 IN. HG (OR FULL THROTTLE) @ 2300 RPM
CRUISE RICH MIXTURE
3400 LBS

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA −20° C (ISA − 36° F)	SL	−3	27	23.0	81.6	13.6	158	150
	2000	−7	20	23.0	84.2	14.0	158	154
	4000	−11	13	23.0	86.9	14.5	158	159
	6000	−14	6	23.0	89.7	15.0	158	164
	8000	−18	−1	22.4	89.0	14.8	156	166
	10,000	−22	−8	20.7	82.7	13.8	148	163
	12,000	−26	−16	19.2	77.1	12.9	141	160
	14,000	−31	−23	17.8	73.2	12.2	133	155
	16,000	−35	−30	16.4	69.2	11.5	124	150
STANDARD DAY (ISA)	SL	17	63	23.0	79.0	13.2	153	150
	2000	13	56	23.0	81.4	13.6	153	155
	4000	9	49	23.0	83.9	14.0	153	160
	6000	6	42	23.0	86.5	14.4	153	165
	8000	2	35	22.4	85.8	14.3	150	167
	10,000	−2	28	20.7	80.0	13.3	143	163
	12,000	−6	20	19.2	75.1	12.5	135	159
	14,000	−11	13	17.8	71.5	11.9	127	154
	16,000	−15	6	16.4	67.9	11.3	117	147
ISA + 20° C (ISA + 36° F)	SL	37	99	23.0	76.5	12.8	148	151
	2000	33	92	23.0	78.7	13.1	148	155
	4000	29	85	23.0	81.0	13.5	148	160
	6000	26	78	23.0	83.4	13.9	148	165
	8000	22	71	22.4	82.8	13.8	145	167
	10,000	18	64	20.7	77.3	12.9	138	163
	12,000	14	56	19.2	73.0	12.2	130	158
	14,000	9	49	17.8	69.8	11.6	121	152
	16,000	5	41	16.4	66.6	11.1	109	142

SVC0439

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

RECOMMENDED CRUISE POWER SETTINGS

20°C LEAN
OF PEAK EGT

23.0 IN. HG (OR FULL THROTTLE) @ 2300 RPM
CRUISE LEAN MIXTURE
3400 LBS

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA −20° C (ISA − 36° F)	SL	−3	26	23.0	67.6	11.3	152	144
	2000	−7	20	23.0	69.7	11.6	152	149
	4000	−11	13	23.0	72.1	12.0	153	154
	6000	−15	6	23.0	74.4	12.4	153	158
	8000	−18	−1	22.4	73.8	12.3	150	160
	10,000	−23	−9	20.7	68.4	11.4	143	157
	12,000	−27	−16	19.2	63.8	10.6	135	153
	14,000	−31	−23	17.8	60.0	10.0	127	148
	16,000	−35	−31	16.4	56.3	9.4	117	141
STANDARD DAY (ISA)	SL	17	62	23.0	65.4	10.9	147	145
	2000	13	56	23.0	67.4	11.2	147	149
	4000	9	49	23.0	69.4	11.6	148	154
	6000	5	42	23.0	71.7	12.0	148	159
	8000	2	35	22.4	71.1	11.9	145	160
	10,000	−3	27	20.7	66.2	11.0	137	157
	12,000	−7	20	19.2	61.8	10.3	129	152
	14,000	−11	13	17.8	58.5	9.8	120	146
	16,000	−15	5	16.4	55.3	9.2	109	137
ISA + 20° C (ISA + 36° F)	SL	37	98	23.0	63.2	10.5	142	145
	2000	33	92	23.0	65.1	10.9	143	149
	4000	29	85	23.0	67.1	11.2	143	154
	6000	25	78	23.0	69.0	11.5	142	158
	8000	22	71	22.4	68.5	11.4	140	160
	10,000	17	63	20.7	64.0	10.7	132	158
	12,000	13	56	19.2	60.0	10.0	123	151
	14,000	9	48	17.8	57.1	9.5	113	142
	16,000	—	—	—	—	—	—	—

SVC0440

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

RECOMMENDED CRUISE POWER SETTINGS

20°C RICH
OF PEAK EGT

25.0 IN. HG (OR FULL THROTTLE) @ 2100 RPM
CRUISE RICH MIXTURE
3400 LBS

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA −20° C (ISA − 36° F)	SL	−3	27	25.0	79.5	13.3	155	148
	2000	−7	20	25.0	82.6	13.8	156	153
	4000	−11	13	25.0	85.8	14.3	157	158
	6000	−15	6	24.3	85.1	14.2	154	159
	8000	−19	−1	22.5	79.5	13.3	147	157
	10,000	−23	−9	20.8	74.9	12.5	140	153
	12,000	−27	−16	19.3	70.9	11.8	132	149
	14,000	−31	−23	17.9	68.2	11.4	123	144
	16,000	−35	−31	16.5	65.6	10.9	112	135
STANDARD DAY (ISA)	SL	17	63	25.0	77.0	12.8	150	148
	2000	13	56	25.0	79.9	13.3	151	153
	4000	9	49	25.0	82.9	13.8	152	158
	6000	5	42	24.3	82.3	13.7	149	160
	8000	1	35	22.5	77.1	12.9	142	157
	10,000	−3	27	20.8	72.9	12.2	134	153
	12,000	−7	20	19.3	69.5	11.6	126	148
	14,000	−11	12	17.9	67.2	11.2	116	141
	16,000	−15	5	16.5	64.9	10.8	101	127
ISA + 20° C (ISA + 36° F)	SL	37	99	25.0	74.9	12.5	146	148
	2000	33	92	25.0	77.3	12.9	146	153
	4000	29	85	25.0	80.1	13.4	146	158
	6000	25	78	24.3	79.5	13.3	143	160
	8000	21	71	22.5	74.9	12.5	136	156
	10,000	17	63	20.8	71.0	11.8	128	152
	12,000	13	56	19.3	68.1	11.4	119	145
	14,000	9	48	17.9	66.1	11.0	107	135
	16,000	—	—	—	—	—	—	—

SVC0441

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

RECOMMENDED CRUISE POWER SETTINGS

20°C LEAN
OF PEAK EGT

25.0 IN. HG (OR FULL THROTTLE) @ 2100 RPM
CRUISE LEAN MIXTURE
3400 LBS

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA −20° C (ISA − 36° F)	SL	−3	26	25.0	63.8	10.6	148	140
	2000	−7	19	25.0	66.4	11.1	149	145
	4000	−11	12	25.0	68.9	11.5	149	150
	6000	−15	5	24.3	68.3	11.4	147	152
	8000	−19	−2	22.5	63.9	10.7	139	148
	10,000	−23	−9	20.8	60.1	10.0	132	144
	12,000	−27	−17	19.3	56.7	9.5	123	139
	14,000	−31	−24	17.9	54.5	9.1	113	132
	16,000	−35	−32	16.5	52.2	8.7	95	114
STANDARD DAY (ISA)	SL	17	62	25.0	61.9	10.3	143	140
	2000	13	55	25.0	64.2	10.7	143	145
	4000	9	48	25.0	66.6	11.1	144	150
	6000	5	41	24.3	66.1	11.0	141	152
	8000	1	34	22.5	61.9	10.3	134	148
	10,000	−3	27	20.8	58.5	9.8	126	143
	12,000	−7	19	19.3	55.6	9.3	116	136
	14,000	−11	12	17.9	53.5	8.9	103	125
	16,000	—	—	—	—	—	—	—
ISA + 20° C (ISA + 36° F)	SL	37	98	25.0	60.1	10.0	138	140
	2000	33	91	25.0	62.1	10.4	138	145
	4000	29	84	25.0	64.4	10.7	139	150
	6000	25	77	24.3	63.9	10.7	136	151
	8000	21	70	22.5	60.2	10.0	128	147
	10,000	17	63	20.8	56.8	9.5	119	141
	12,000	13	55	19.3	54.5	9.1	108	131
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

SVC0442

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

RECOMMENDED CRUISE POWER SETTINGS

20°C RICH
OF PEAK EGT

21.0 IN. HG (OR FULL THROTTLE) @ 2100 RPM
CRUISE RICH MIXTURE
3400 LBS

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA − 20° C (ISA − 36° F)	SL	−4	26	21.0	66.0	11.0	135	128
	2000	−7	19	21.0	67.5	11.3	137	134
	4000	−11	12	21.0	69.3	11.6	138	139
	6000	−15	5	21.0	71.1	11.9	139	144
	8000	−19	−2	21.0	73.4	12.2	140	149
	10,000	−23	−9	20.8	74.9	12.5	140	153
	12,000	−27	−16	19.3	70.9	11.8	132	149
	14,000	−31	−23	17.9	68.2	11.4	123	144
	16,000	−35	−31	16.5	65.6	10.9	112	135
STANDARD DAY (ISA)	SL	17	62	21.0	65.2	10.9	130	127
	2000	13	55	21.0	66.3	11.1	131	133
	4000	9	48	21.0	67.9	11.3	133	138
	6000	5	41	21.0	69.7	11.6	134	144
	8000	1	34	21.0	71.5	11.9	135	149
	10,000	−3	27	20.8	72.9	12.2	134	153
	12,000	−7	20	19.3	69.5	11.6	126	148
	14,000	−11	12	17.9	67.2	11.2	116	141
	16,000	−15	5	16.5	64.9	10.8	101	127
ISA + 20° C (ISA + 36° F)	SL	36	98	21.0	64.5	10.8	124	126
	2000	33	91	21.0	65.5	10.9	126	132
	4000	29	84	21.0	66.6	11.1	127	137
	6000	25	77	21.0	68.3	11.4	128	143
	8000	21	70	21.0	70.0	11.7	129	148
	10,000	17	63	20.8	71.0	11.8	128	152
	12,000	13	56	19.3	68.1	11.4	119	145
	14,000	9	48	17.9	66.1	11.0	107	135
	16,000	—	—	—	—	—	—	—

SVC0443

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

ECONOMY CRUISE POWER SETTINGS

20°C LEAN
OF PEAK EGT

21.0 IN. HG (OR FULL THROTTLE) @ 2100 RPM
CRUISE LEAN MIXTURE
3400 LBS

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA −20° C (ISA − 36° F)	SL	−4	25	21.0	52.7	8.8	126	120
	2000	−8	18	21.0	54.0	9.0	128	125
	4000	−11	12	21.0	55.4	9.2	130	130
	6000	−15	5	21.0	56.9	9.5	131	136
	8000	−19	−2	21.0	58.9	9.8	132	141
	10,000	−23	−9	20.8	60.1	10.0	132	144
	12,000	−27	−17	19.3	56.7	9.5	123	139
	14,000	−31	−24	17.9	54.5	9.1	113	132
	16,000	−35	−32	16.5	52.2	8.7	95	114
STANDARD DAY (ISA)	SL	16	61	21.0	51.8	8.6	120	118
	2000	12	54	21.0	53.1	8.9	123	124
	4000	9	48	21.0	54.4	9.1	124	129
	6000	5	41	21.0	55.7	9.3	125	134
	8000	1	34	21.0	57.3	9.6	126	140
	10,000	−3	27	20.8	58.5	9.8	126	143
	12,000	−7	19	19.3	55.6	9.3	116	137
	14,000	−11	12	17.9	53.5	8.9	103	125
	16,000	—	—	—	—	—	—	—
ISA + 20° C (ISA + 36° F)	SL	36	97	21.0	50.8	8.5	114	115
	2000	32	90	21.0	52.1	8.7	116	121
	4000	29	83	21.0	53.4	8.9	118	127
	6000	25	77	21.0	54.7	9.1	119	132
	8000	21	70	21.0	55.9	9.3	120	137
	10,000	17	63	20.8	56.8	9.5	119	141
	12,000	13	55	19.3	54.5	9.1	108	131
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

SVC0444

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

CRUISE SPEEDS

20°C RICH
OF PEAK EGT

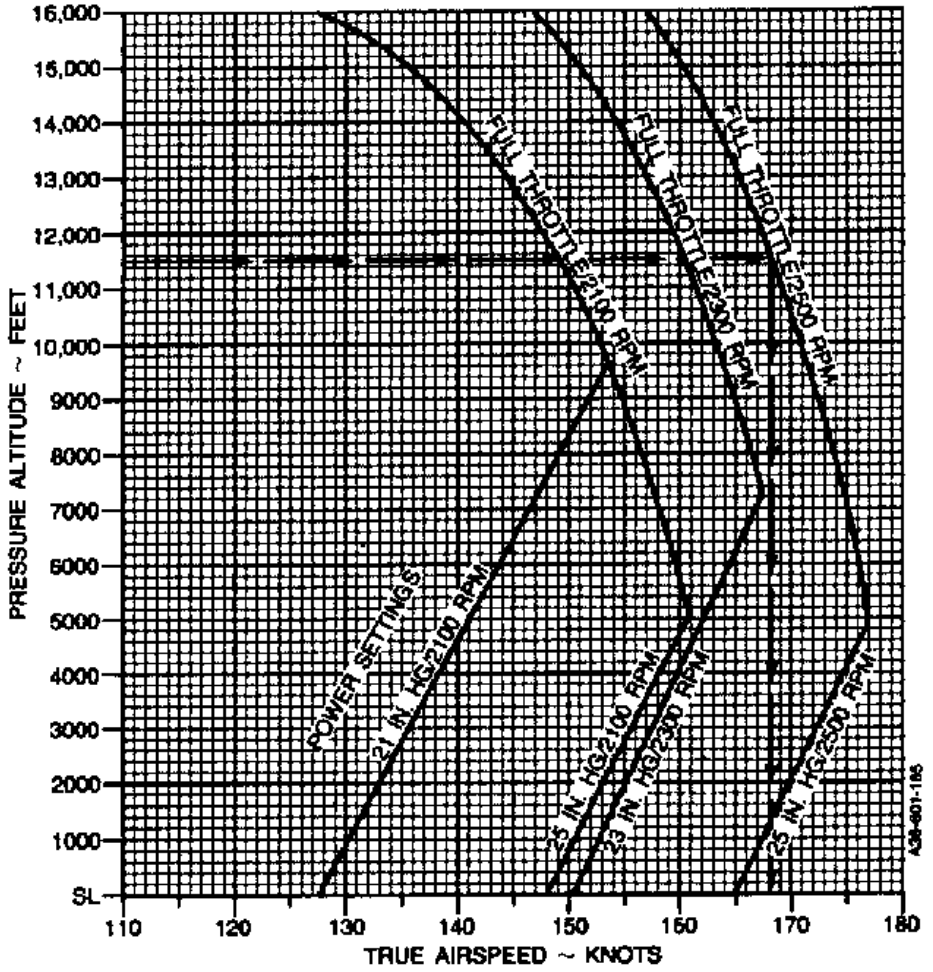
ASSOCIATED CONDITIONS:

AVERAGE CRUISE WT ..... 3400 LBS
TEMPERATURE ..... STD DAY (ISA)

EXAMPLE:

CRUISE ALTITUDE ..... 11,500 FT
POWER SETTING ..... FULL THROTTLE, 2500 RPM

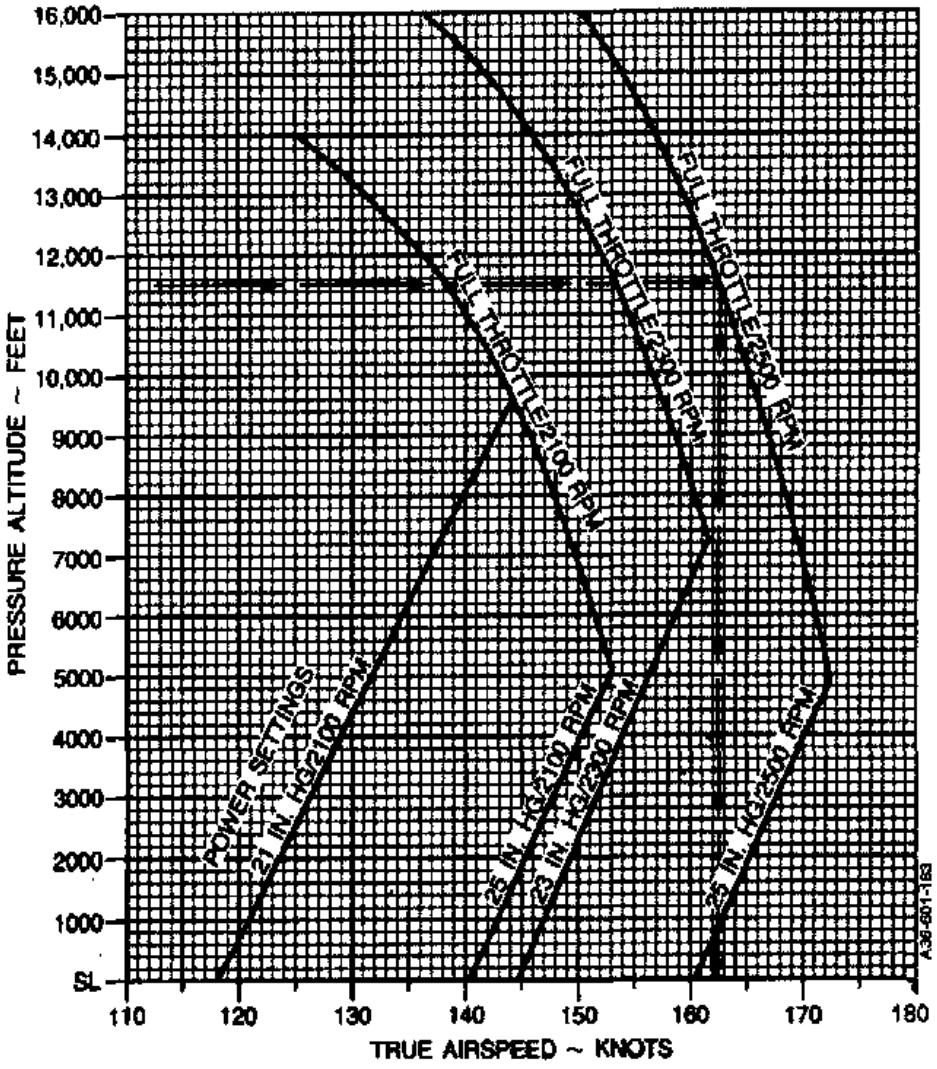
TRUE AIRSPEED ..... 168 KTS



CRUISE SPEEDS

20°C LEAN
OF PEAK EGT

ASSOCIATED CONDITIONS:		EXAMPLE:	
AVERAGE CRUISE WT	3400 LBS	PRESSURE ALTITUDE	11,500 FT
TEMPERATURE	STD DAY (ISA)	POWER SETTING	FULL THROTTLE, 2500 RPM
		TRUE AIRSPEED	153 KTS



RANGE PROFILE

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

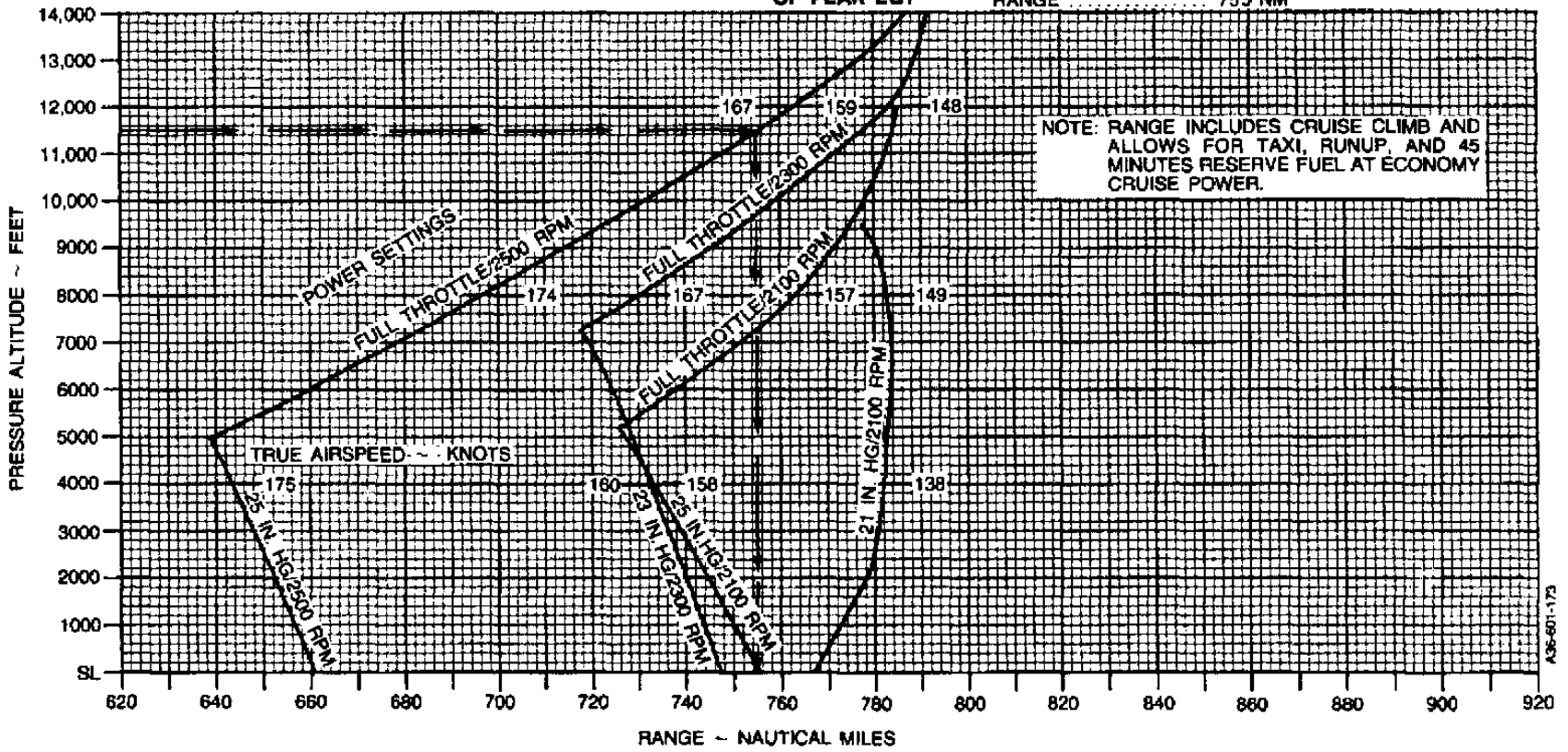
WEIGHT ..... 3663 LBS BEFORE ENGINE START
FUEL ..... AVIATION GASOLINE
FUEL DENSITY ..... 6.0 LBS/GAL
INITIAL FUEL LOADING ..... 74 U.S. GAL (444 LBS)
TAKE-OFF ALTITUDE ..... SL
WIND ..... ZERO

20°C RICH OF PEAK EGT

EXAMPLE:

CRUISE ALTITUDE ..... 11,500 FT
POWER SETTING ..... FULL THROTTLE, 2500 RPM

RANGE ..... 755 NM



RANGE PROFILE

STANDARD DAY (ISA)

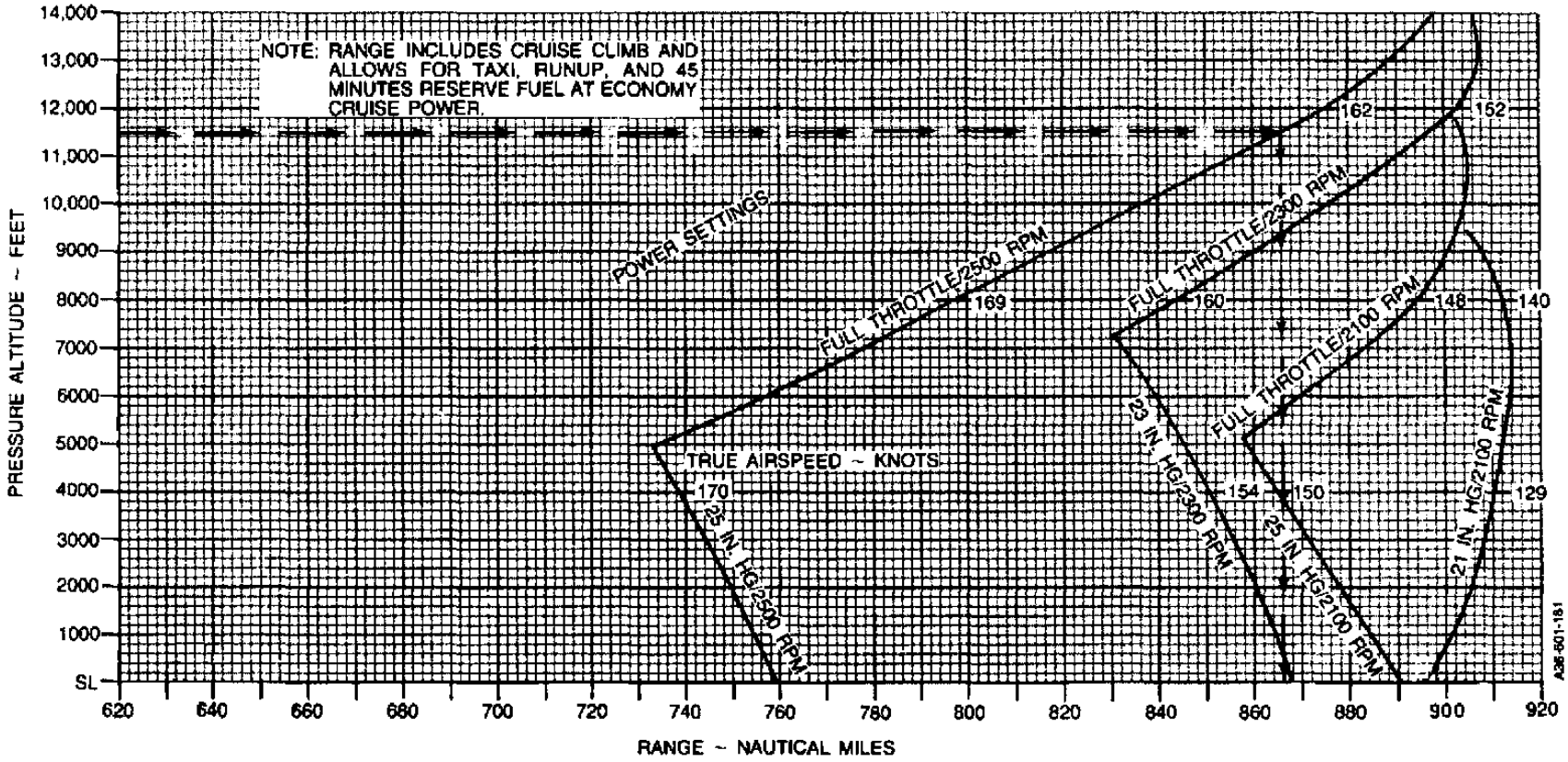
ASSOCIATED CONDITIONS:

WEIGHT	3663 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	74 U.S. GAL (444 LBS)
TAKE-OFF ALTITUDE	SL
WIND	ZERO

20°C LEAN OF PEAK EGT

EXAMPLE:

CRUISE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE, 2500 RPM
RANGE	866 NM



ENDURANCE PROFILE
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

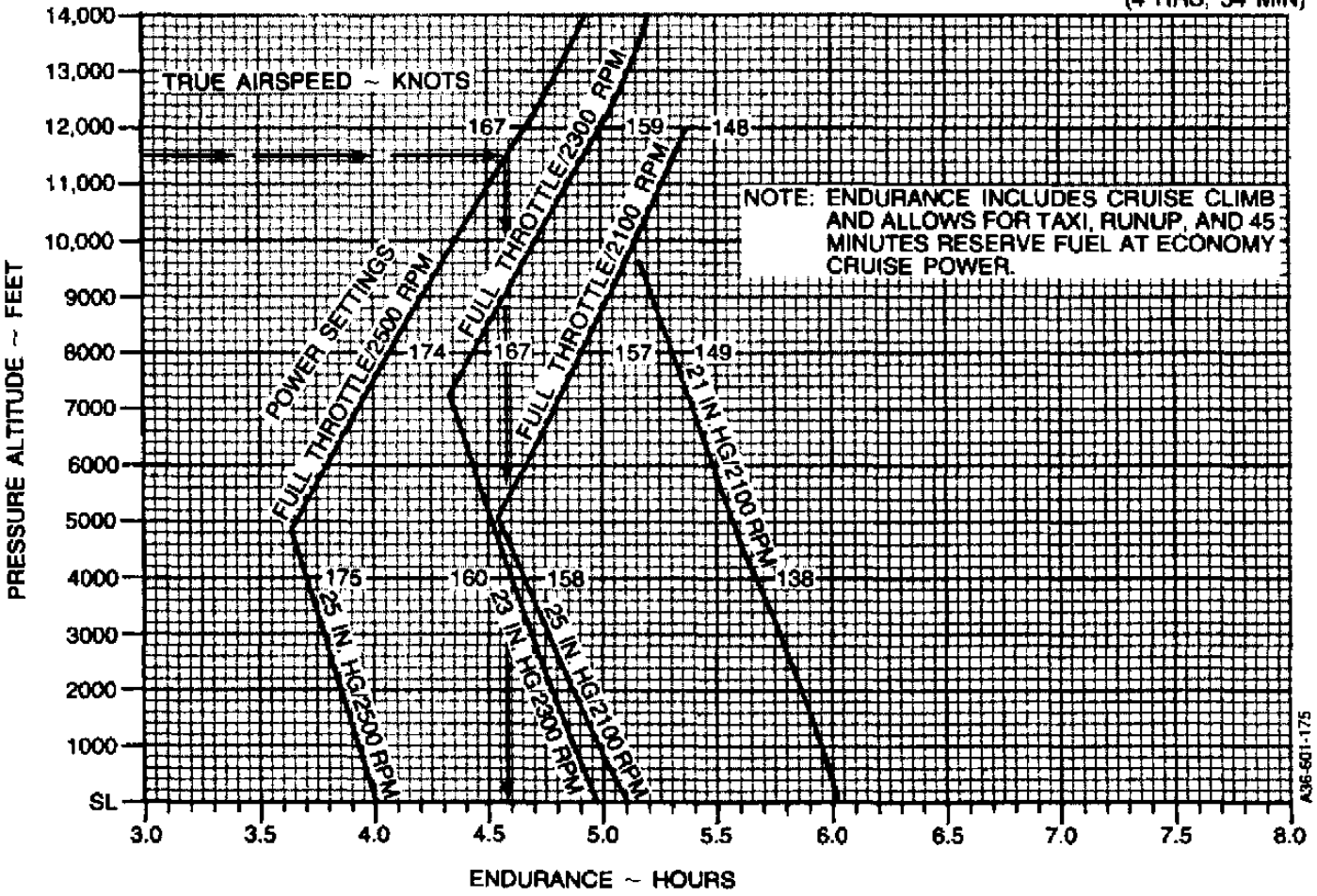
WEIGHT ..... 3663 LBS BEFORE ENGINE START
FUEL ..... AVIATION GASOLINE
FUEL DENSITY ..... 6.0 LBS/GAL
INITIAL FUEL LOADING ..... 74 U.S. GAL (444 LBS)
TAKE-OFF ALTITUDE ..... SL

20°C RICH OF PEAK EGT

EXAMPLE:

CRUISE ALTITUDE ..... 11,500 FT
POWER SETTING ..... FULL THROTTLE, 2500 RPM

ENDURANCE ..... 4.58 HRS (4 HRS, 34 MIN)



ENDURANCE PROFILE

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

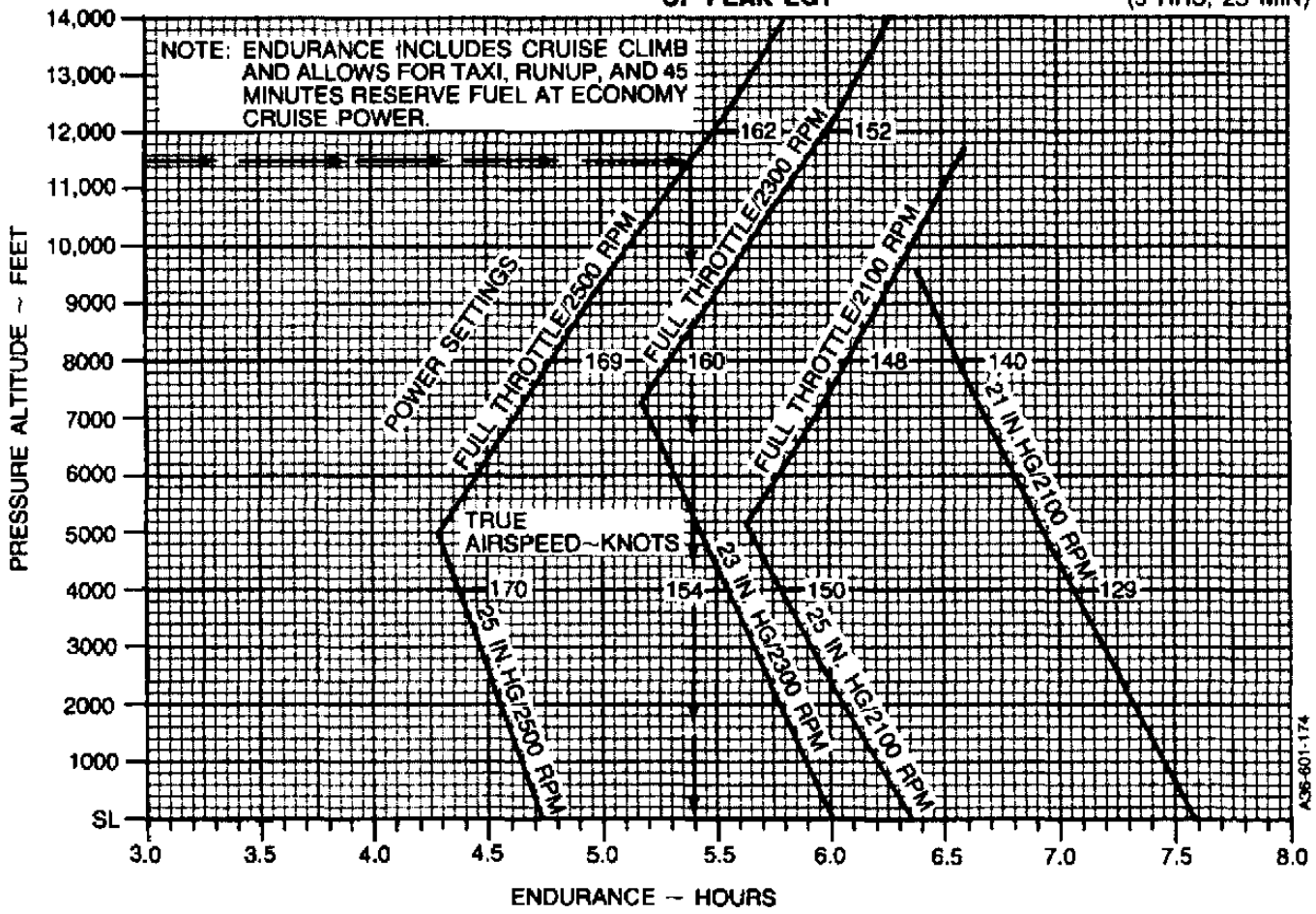
WEIGHT ..... 3663 LBS BEFORE ENGINE START
FUEL ..... AVIATION GASOLINE
FUEL DENSITY ..... 6.0 LBS/GAL
INITIAL FUEL LOADING ..... 74 U.S. GAL (444 LBS)
TAKE-OFF ALTITUDE ..... SL

20°C LEAN OF PEAK EGT

EXAMPLE:

CRUISE ALTITUDE ..... 11,500 FT
POWER SETTING ..... FULL THROTTLE, 2500 RPM

ENDURANCE ..... 5.39 HRS (5 HRS, 23 MIN)



LANDING DISTANCE

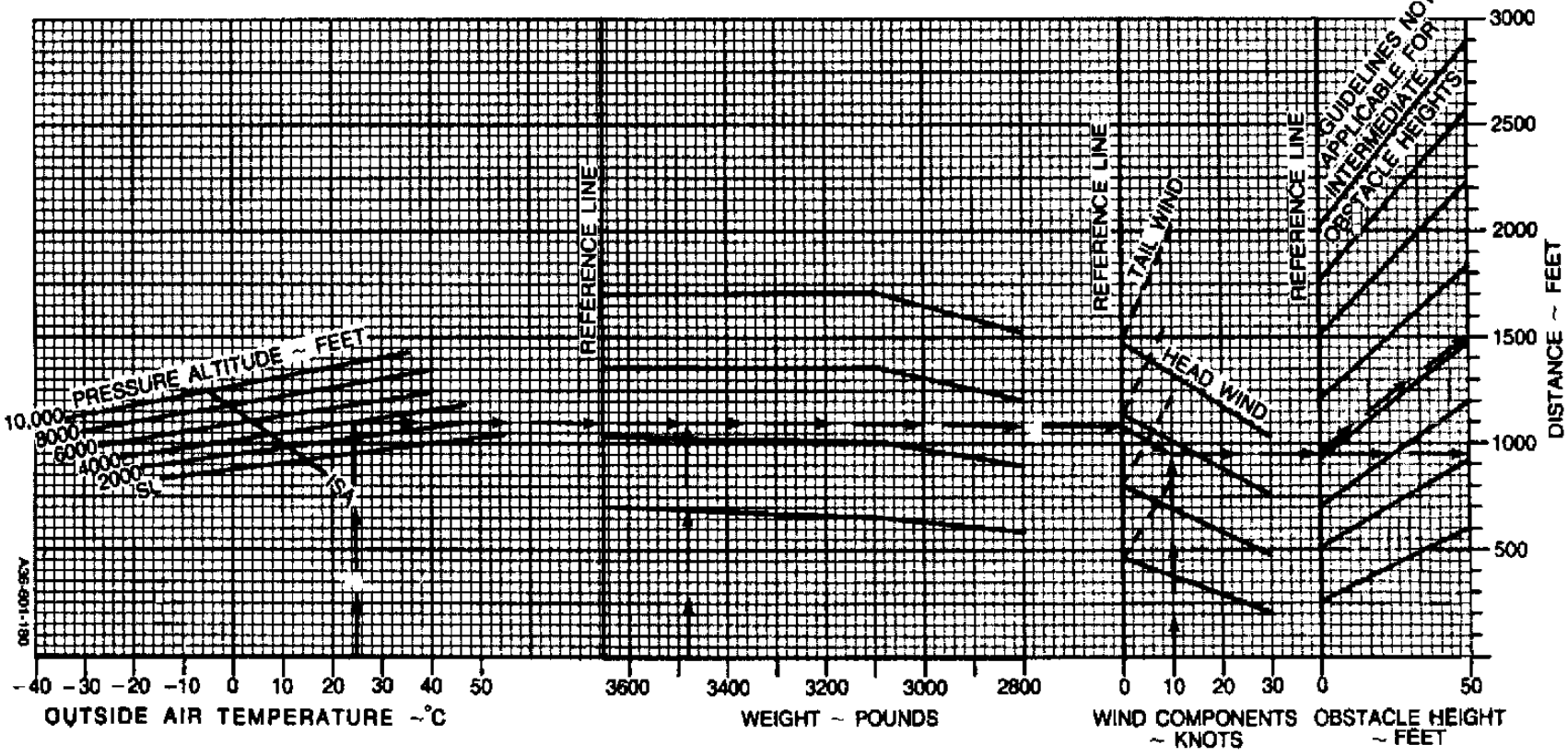
ASSOCIATED CONDITIONS:

POWER	RETARDED TO MAINTAIN 900 FT/MIN ON FINAL APPROACH
FLAPS	DOWN (AMBER)
LANDING GEAR	DOWN
RUNWAY	PAVED, LEVEL, DRY SURFACE
APPROACH SPEED	IAS AS TABULATED
BRAKING	MAXIMUM

WEIGHT ~ POUNDS	SPEED AT 50 FT KNOTS
3650	79
3400	80
3200	81
3000	81
2800	78

EXAMPLE:

OAT	25°C
PRESSURE ALTITUDE	3965 FT
WEIGHT	3479 LBS
HEADWIND COMPONENT	10 KTS
GROUND ROLL	960 FT
TOTAL OVER 50-FT OBSTACLE	1515 FT
APPROACH SPEED	80 KTS



SECTION VI
WEIGHT AND BALANCE/EQUIPMENT LIST
TABLE OF CONTENTS

SUBJECT *PAGE*

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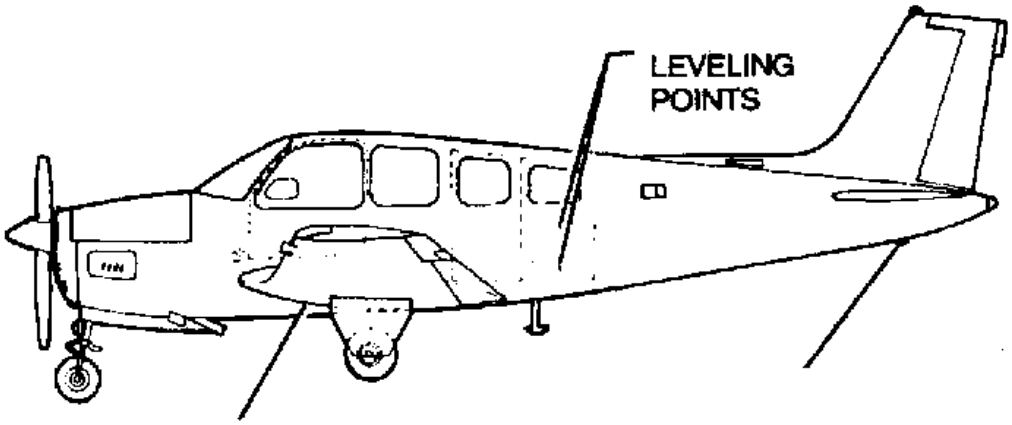
BASIC EMPTY WEIGHT AND BALANCE - ACTUAL (THIS PAGE TO BE REPLACED UPON AIRCRAFT DELIVERY)

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

WEIGHING INSTRUCTIONS



FRONT JACK POINTS
F.S. 83.1

REAR JACK POINT
F.S. 271.0

A36-603-48

Periodic weighing of the Bonanza A36 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, 1.5 pounds of trapped fuel remain in the airplane at Fuselage Station 76.0. The remainder of the unusable fuel to be added to a drained system is 34.5 pounds at Fuselage Station 79.1.
3. Engine oil must be at the full level or completely drained. Total engine oil when full is 26 pounds at Fuselage Station 14.5. (Includes 3 pounds trapped.)
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. At the time of weighing, the airplane must be level both longitudinally and laterally, and the landing gear must be fully extended. Leveling screws are located on the left side of the fuselage at approximately Fuselage Station 152.25. 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 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 2.7 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.

BASIC EMPTY WEIGHT AND BALANCE

BONANZA A36 SER. NO _____ REG. NO _____ DATE _____

STRUT POSITION - NOSE		MAIN	JACK POINT LOCATION		PREPARED BY
EXTENDED	1.8	96.0	*FORWARD*	83.1	*Company* _____
COMPRESSED	3.1	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 USABLE FUEL			34.5	79.1	2729
BASIC EMPTY WEIGHT					

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

E#06C
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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'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.

WEIGHT AND BALANCE RECORD

SERIAL NO. ____________ REGISTRATION NO. ____________ PAGE NO. ________

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

BT04946

WEIGHT AND BALANCE RECORD

SERIAL NO. ____________ REGISTRATION NO. ____________ PAGE NO. ____________

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

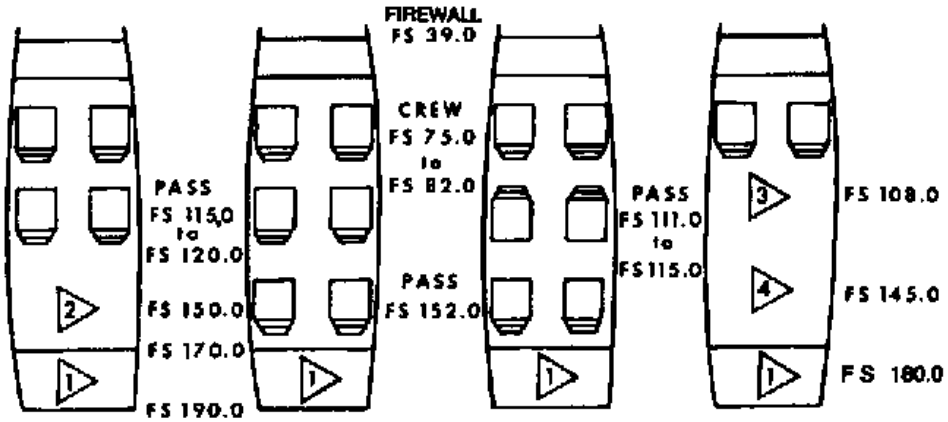
BT04946

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.

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.

1 MAXIMUM WEIGHT 70 POUNDS INCLUDING EQUIPMENT AND BAGGAGE.

2 MAXIMUM WEIGHT 400 POUNDS INCLUDING EQUIPMENT AND BAGGAGE.

3 MAXIMUM WEIGHT 200 POUNDS FORWARD OF REAR SPAR INCLUDING EQUIPMENT AND BAGGAGE WITH 3rd AND 4th SEATS REMOVED.

4 **MAXIMUM WEIGHT 400 POUNDS AFT OF REAR SPAR INCLUDING EQUIPMENT AND BAGGAGE WITH 3rd, 4th, 5th AND 6th SEATS REMOVED.**

All baggage must be secured with an approved retention system.

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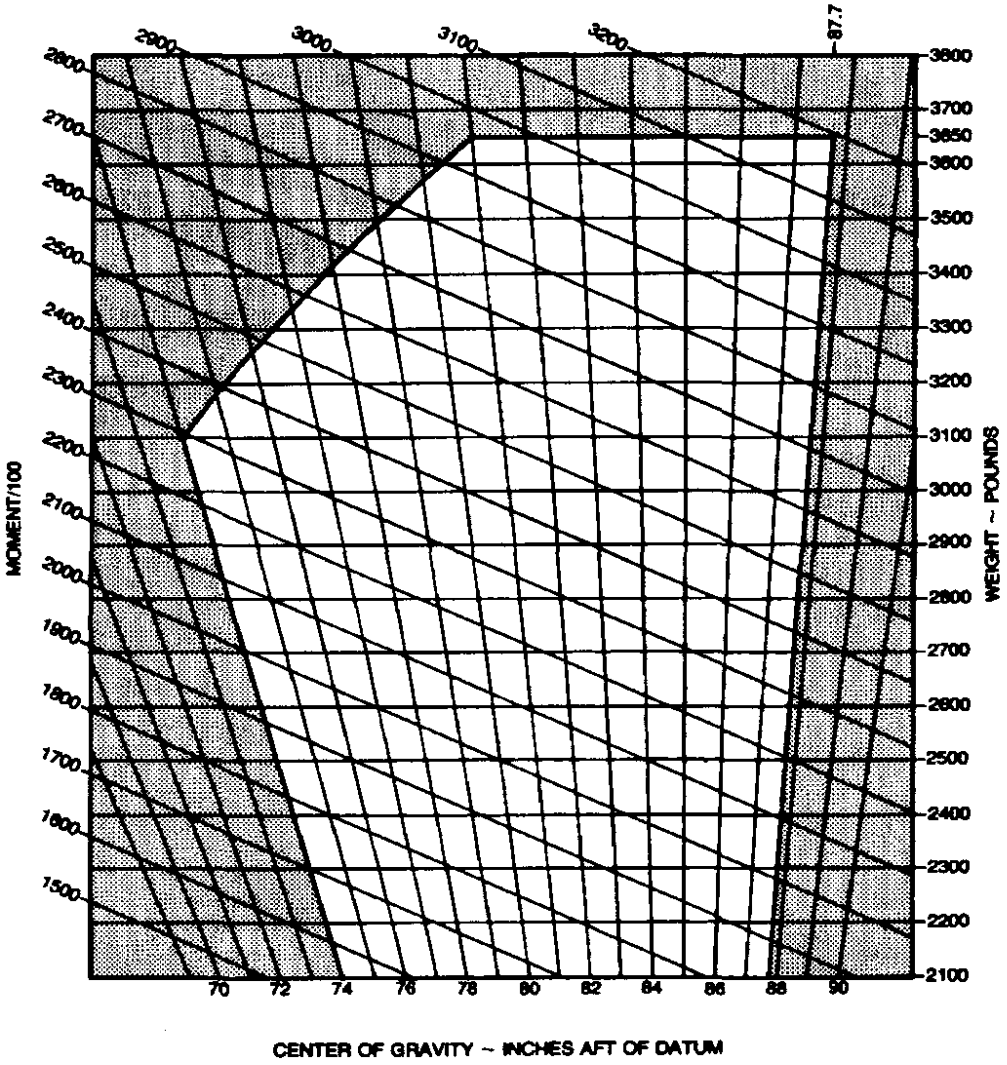
MOMENT LIMITS VS WEIGHT



Envelope Based On The Following Weight And Center Of Gravity Limit Data (Landing Gear Down)

Weight Condition	Forward C.G. Limit	Aft C.G. Limit
3650 Lb (Max. Take-Off or Landing)	81.0	87.7
3100 Lb or Less	74.0	87.7

A36-601-171

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 SUBTOTALS are the Zero Fuel Condition.
4. Determine the weight and corresponding moment for the fuel loading to be used. This fuel loading includes fuel for the flight, plus that required for start, taxi, and run up. Add the Fuel Loading Condition to Zero Fuel Condition to obtain the SUBTOTAL Ramp Condition.
5. Subtract the fuel to be used for start, taxi, and run up to arrive at the SUBTOTAL Take-off Condition.
6. Subtract the weight and moment of the fuel in the incremental sequence in which it is to be used from the take-off weight and moment. 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.

WEIGHT AND BALANCE LOADING FORM

BONANZA _____ 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 SEAT & 6th SEAT OCCUPANTS		
5. BAGGAGE		
6. BAGGAGE		
7. SUB TOTAL ZERO FUEL CONDITION		
8. FUEL LOADING		
9. SUB TOTAL RAMP CONDITION		
10. *LESS FUEL FOR START, TAXI, AND RUN UP		
11. SUB TOTAL TAKE-OFF CONDITION		
12. LESS FUEL TO DESTINATION		
13. LANDING CONDITION		

BT04942

*Fuel for start, taxi, and run up is normally 13 lbs at an average mom/100 of 10.

WEIGHT AND BALANCE LOADING FORM

BONANZA _____ 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 SEAT & 6th SEAT OCCUPANTS		
5. BAGGAGE		
6. BAGGAGE		
7. SUB TOTAL ZERO FUEL CONDITION		
8. FUEL LOADING		
9. SUB TOTAL RAMP CONDITION		
10. *LESS FUEL FOR START, TAXI, AND RUN UP		
11. SUB TOTAL TAKE-OFF CONDITION		
12. LESS FUEL TO DESTINATION		
13. LANDING CONDITION		

BT04942

*Fuel for start, taxi, and run up is normally 13 lbs at an average mom/100 of 10.

USEFUL LOAD WEIGHTS AND MOMENTS

WEIGHT	OCCUPANTS							
	FRONT SEATS		STANDARD SEATING			CLUB SEATING		
			3rd & 4TH SEATS FWD FACING		5TH & 6TH SEATS	3RD & 4TH SEATS AFT FACING		5TH & 6TH SEATS
	FWD. POS. ARM 75	AFT POS. ARM 82	FWD. POS. ARM 115	AFT POS. ARM 120	ARM 152	FWD. POS. ARM 111	AFT POS. ARM 115	ARM 152
	MOMENT/100							
100	75	82	115	120	152	111	115	152
110	82	90	126	132	167	122	126	167
120	90	98	138	144	182	133	138	182
130	98	106	150	156	198	144	150	198
140	105	114	161	168	212	155	161	212
150	112	123	172	180	228	166	172	228
160	120	131	184	192	243	178	184	243
170	128	139	196	204	258	188	196	258
180	135	148	207	216	274	200	207	274
190	142	156	218	228	288	210	218	288
200	150	164	230	240	304	222	230	304

BT04943

NOTE: Occupant Positions for Adjustable Seats are shown at their extreme positions. Intermediate Positions will require interpolation of the Moment/100 Values.

USEFUL LOAD WEIGHTS AND MOMENTS

BAGGAGE				
WT	BEHIND 3rd and 4th SEATS ARM 150	AFT COMPT ARM 180	FORWARD OF SPAR (3rd and 4th SEATS REMOVED) ARM 108	AFT OF SPAR (3rd, 4th & 5th, 6th SEATS REMOVED) ARM 145
	MOMENT/100			
10	15	18	11	15
20	30	36	22	29
30	45	54	32	44
40	60	72	43	58
50	75	90	54	73
60	90	108	65	87
70	105	126	76	102
80	120		86	116
90	135		97	131
100	150		108	145
110	165		119	160
120	180		130	174
130	195		140	189
140	210		151	203
150	225		162	218
160	240		173	232
170	255		184	247
180	270		194	261
190	285		205	276
200	300		216	290
220	330			319
240	360			348
260	390			377
280	420			406
300	450			435
320	480			464
340	510			493
360	540			522
380	570			551
400	600			580

BT04944

USEFUL LOAD WEIGHTS AND MOMENTS

USABLE FUEL

LEADING EDGE TANKS ARM 75

GALLONS	WEIGHT	MOM/100	GALLONS	WEIGHT	MOM/100
5	30	23	44	264	198
10	60	45	50	300	225
15	90	68	55	330	248
20	120	90	60	360	270
25	150	113	65	390	293
30	180	135	70	420	315
35	210	158	74	444	333
40	240	180			

BT04945

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SECTION VII
SYSTEM DESCRIPTION
TABLE OF CONTENTS

SUBJECT *PAGE*

SECTION VII
SYSTEM DESCRIPTION
TABLE OF CONTENTS (Cont'd)

SUBJECT *PAGE*

SECTION VII
SYSTEM DESCRIPTION
TABLE OF CONTENTS (Cont'd)

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AIRFRAME

The Beech Bonanza A36 is an all-metal, low-wing, single-engine airplane with retractable tricycle landing gear.

SEATING ARRANGEMENTS

The Bonanza A36 is a four- to six-place airplane. In the standard configuration, four forward-facing seats are installed. Fifth and sixth seats are optional.

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

FLIGHT CONTROLS

CONTROL SURFACES

Control surfaces are operated through push-pull rods and conventional 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 not in use (when the copilot brakes are not installed).

TRIM CONTROLS

Elevator trim is controlled by a handwheel located on the left of the pedestal. An elevator tab position indicator dial is located to the right of the elevator trim handwheel.

Aileron trim is controlled by a knob located on the front of the pedestal. The aileron tab position indicator is located adjacent to the knob.

INSTRUMENT PANEL

The standard instrument panel of the Bonanza A36 consists of the flight instrument panel on the upper left portion, the engine instrument panel located adjacent to the flight instrument panel, the avionics panel on the upper center portion, and a subpanel.

The subpanel provides for electrical switches and the landing gear handle on the left, instruments in the center portion, and the flap switch, panel lighting rheostat switches, and glove compartment on the right.

The avionics circuit breaker panel is located below the lower right subpanel and the electrical circuit breaker panel is on the side panel to the left of the pilot's seat.

FLIGHT INSTRUMENT PANEL

The flight instrument panel contains all flight instruments except the magnetic compass. On this panel are the airspeed indicator, gyro horizon, altimeter, instrument air gage, turn coordinator, directional gyro, and vertical speed indicator with provisions for additional instruments. The magnetic compass is located on the glareshield.

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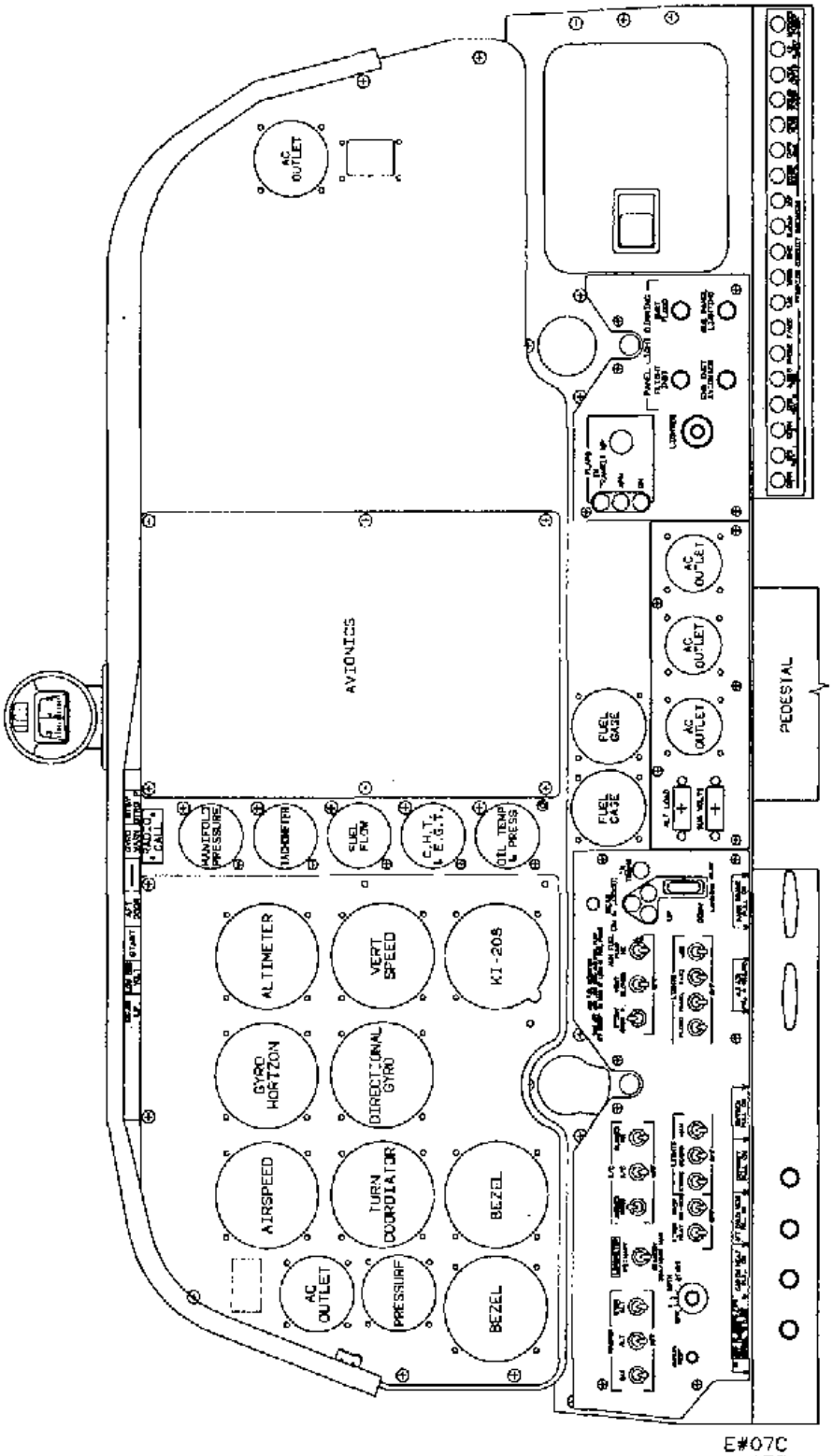
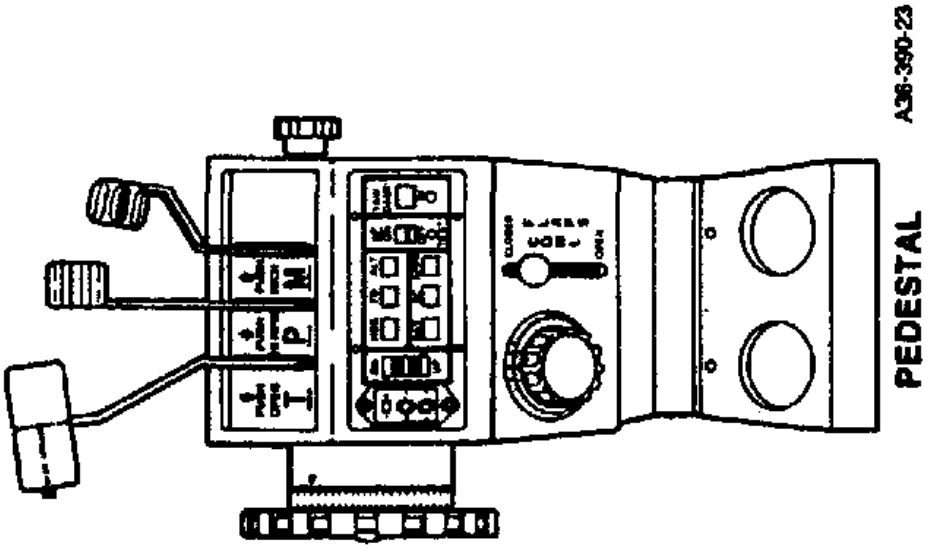


TYPICAL INSTRUMENT PANEL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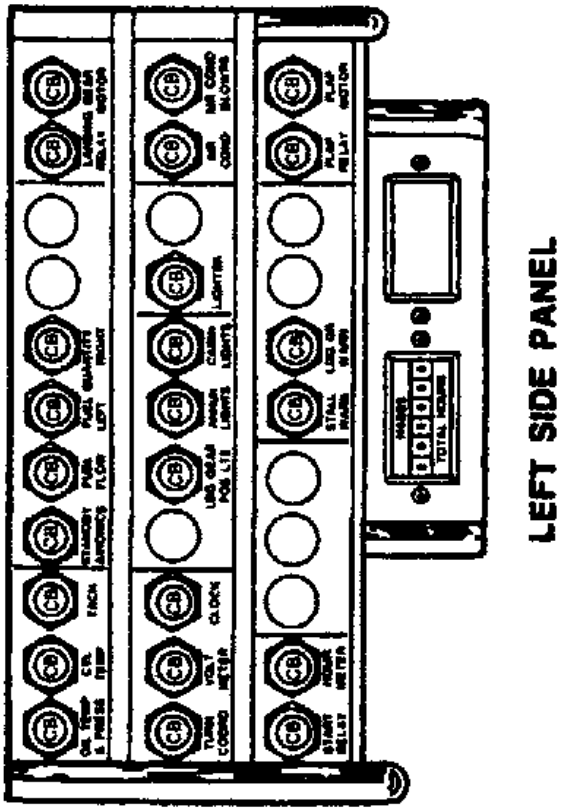
PEDESTAL


LEFT SIDE PANEL

ENGINE INSTRUMENT PANEL

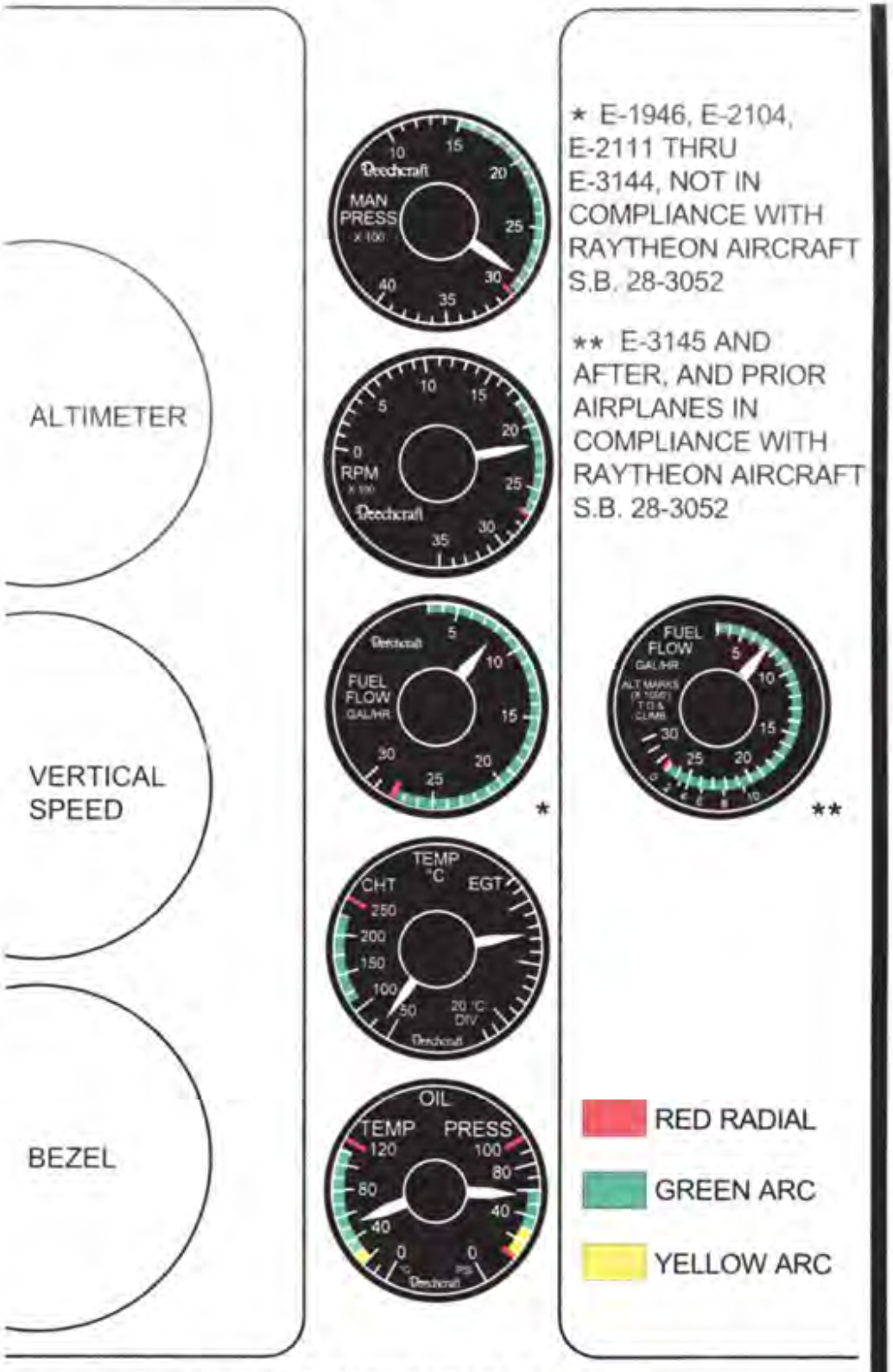
The engine instrument panel contains a manifold pressure gage, an engine tachometer, a fuel flow gage, a combination cylinder head temperature/exhaust gas temperature gage, and a combination oil temperature/oil pressure gage.

The manifold pressure gage indicates the absolute pressure in the engine manifold and is calibrated in inches of mercury. It is connected directly to a port on the induction manifold. By observing the manifold pressure and adjusting the propeller and throttle controls, the power output of the engine can be adjusted. To avoid excessive cylinder pressures during cruise operations, observe the maximum recommended rpm and manifold pressure limits as indicated on the Manifold Pressure vs RPM graph in Section V, PERFORMANCE.

The tachometer indicates engine speed in revolutions per minute (rpm). A transducer attached to the engine sends electrical pulses which are then interpreted by the tachometer. Loss of electrical power will cause the instrument to indicate 0 rpm.

The fuel flow indicator is controlled electrically and indicates fuel flow in gallons per hour. A turbine rotor 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. Loss of electrical power will cause the gage to indicate no fuel flow.

Early airplanes (E-1946, E-2104, E-2111 thru 3144, not in compliance with Raytheon Aircraft S.B. 28-3052) are equipped with altitude compensating fuel pumps which automatically lean or enrichen the engine's fuel mixture as the airplane changes altitude. Later airplanes (E-3145 and after, and prior airplanes in compliance with Raytheon Aircraft S.B. 28-3052) require manual leaning or enrichment. The recommended fuel flow is shown on the fuel flow indicator or a placard for operation at full throttle/ 2700 rpm at various altitudes.



ENGINE INSTRUMENT PANEL

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The combination cylinder head temperature/exhaust gas temperature gage is electrically-powered and indicates in degrees Celsius (C°). The cylinder head temperature portion of the gage indicates the head temperature of a single cylinder. The exhaust gas temperature portion of the gage indicates the temperatures of the exhaust gas at the exhaust stack. Both gages will indicate the minimum value if electrical power is lost.

The combination oil temperature/oil pressure gage indicates in degrees Celsius (°C) and PSI respectively and is electrically-powered. The oil temperature gage indicates oil temperature as it enters the engine from the oil cooler. Both gages will indicate minimum value if electrical power is lost.

AVIONICS PANEL

Avionics equipment and arrangement is per customer specification.

INSTRUMENT AIR GAGE

Instrument air pressure is supplied by an engine-driven pressure pump. Pressure is controlled by an adjustable pressure regulator on the forward side of the firewall.

A gage located on the left side of the flight instrument panel indicates the system pressure in inches of mercury. The pressure should be maintained within the green arc for proper operation of the pressure-operated instruments.

SUBPANEL

The magneto/start switch and switches for the battery, alternator, avionics master, pitot heat, propeller deice, exterior and interior lights, vent blower, and auxiliary fuel pump are located in the left subpanel. Also located in the left subpanel are the landing gear position indicator lights and the landing gear handle. The alternator loadmeter, bus

AVIONICS PANEL

Avionics equipment and arrangement is per customer specification.

INSTRUMENT AIR PRESSURE GAGE

Instrument air pressure is supplied by an engine-driven pressure pump. Pressure is controlled by an adjustable pressure regulator on the forward side the firewall. An optional Standby Instrument Air Pressure System is available (standard on serials E-2217 and after). Refer to Supplement 36-590006-23 in Section IX, SUPPLEMENTS, for information on operation and procedures.

A gage located on the left side of the flight instrument panel indicates the system pressure in inches of mercury. The pressure should be maintained within the green arc for proper operation of the pressure-operated instruments.

SUBPANEL

The magneto/start switch and switches for the battery, alternator, avionics master, pitot heat, propeller deice, exterior and interior lights, vent blower, and auxiliary fuel pump are located in the left subpanel. Also located in the left subpanel are the landing gear position indicator lights and landing gear handle. The alternator loadmeter, bus voltmeter, fuel quantity gages and prop deice ammeter are in the center subpanel. Located in the right subpanel are the flap switch, flap position lights, lighter, panel lighting rheostats, and glove compartment. The avionics circuit breaker panel is below the right subpanel and the electrical circuit breaker panel is on the side panel to the left of the pilot's seat.

OAT GAGE

The OAT (Outside Air Temperature) gage is located on the left cabin side panel just aft of the instrument panel. Its temperature-sensing probe extends through the cabin sidewall into the outside air to measure outside air temperature.

PEDESTAL

The pedestal is located below the center portion of the instrument subpanel. The upper portion of the pedestal houses the throttle (black), propeller (blue), and mixture (red) control levers. The elevator trim handwheel and elevator trim indicator are located on the left of the pedestal. The trim tab on the left aileron is adjustable with the knob mounted on the front of the pedestal.

ANNUNCIATOR SYSTEM

ANNUNCIATOR PANEL

Three annunciators, placarded LOW BUS VOLTS, START, and AFT DOOR, are mounted in the glareshield. On Airplane Serials E-2428, E-2468 and after, a red GEAR UP annunciator is also installed.

The LOW BUS VOLTS annunciator will illuminate when the alternator is not maintaining the battery bus voltage above 25 volts. If the battery bus voltage falls below 24 volts, the electrical load will discharge the battery.

The starter energized annunciator (START) will remain illuminated after starting if the starter relay remains engaged.

CAUTION

Operation of the engine with the starter engaged can result in damage to both engine and starter.

The AFT DOOR annunciator will illuminate if the utility doors are not securely closed.

On Airplane Serials E-2458, E-2468 and after, the GEAR UP annunciator will flash when the gear warning horn sounds. (The gear warning horn sounds at any throttle setting less than 12 in. Hg with the landing gear retracted or at any throttle setting with full flaps with the landing gear retracted).

ANNUNCIATOR TEST BUTTON AND PHOTOELECTRIC CELL

The annunciator test button (ANNUN TEST) is located on the left side of the pilot's subpanel. It is a momentary push-button which, when pushed, will illuminate (bright setting) the annunciators, the landing gear position lights and the flap position lights. A photoelectric cell located above the landing gear handle automatically dims (for night) or brightens (for day) the lights depending on how much ambient light is entering the cabin. The START, AFT DOOR and GEAR UP (Airplane Serials E-2458, E-2468, and after) annunciators do not dim.

GROUND CONTROL

Steering is accomplished by use of the rudder pedals through a linkage arrangement which connects the nose gear to the rudder pedal shaft. Nose wheel straightening is accomplished by engagement of a roller with a track as the nose wheel is retracted. The steering link attaches to the steering mechanism on the nose gear with a swivel connection which permits the mechanism to disengage when the nose gear is retracted. Operation of the rudder pedals will have no tendency to turn the nose wheel with the gear retracted.

The minimum wing tip turning radius, using full steering, one brake and partial power, is 27 feet 7 inches.

WING FLAPS

The wing flaps have three positions; UP (0°), APH (12°), and DN (30°). To extend the flaps, the flap switch, located on the copilot's subpanel, must be pulled out and down for each position change. The flap switch may be selected to the UP position without pulling it out.

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 located above the landing gear handle. The lamps can be tested by pressing the annunciator test button (ANNUN TEST) 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

LANDING GEAR

The landing gear is operated through an adjustable linkage connected to an actuator assembly mounted beneath the front seats. The actuator assembly is driven by an electric motor. The landing gear may be electrically retracted and extended, and may be lowered manually using the handcrank.

CONTROL SWITCH

The landing gear is controlled by a two-position switch located on the pilot's subpanel. The switch handle must be pulled out of the safety detent before it can be moved to the opposite position.

WARNING

On Airplane Serials E-2458, E-2468 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 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 landing gear is in transit. This could cause damage to the retract mechanism.

POSITION INDICATORS

The landing gear position indicator lights are located above the landing gear switch handle. Three green lights, one for each gear, are illuminated whenever the landing gear is down. The red IN TRANS light illuminates any time one or all of the landing gears are in transit or in any intermediate position. All of the lights will be out when the gear is up.

Testing of the landing gear position indicator lamps is accomplished with the annunciator test button (ANNUN TEST) located on the pilot's left subpanel.

SAFETY SWITCHES

Inadvertent retraction of the landing gear on the ground is prevented by compressing the two main strut safety switches.

On serials E-2458, E-2468 and after, inadvertent retraction of the landing gear while on the ground is prevented by either compressing the two main strut safety switches or by retarding the

throttle below approximately 17 in. Hg manifold pressure. The throttle switch which deactivates the landing gear control circuit will always activate at the same throttle position. The resultant manifold absolute pressure is dependent upon altitude and rpm.

WARNING

Never rely on the safety switches to keep the gear down during taxi, takeoff, landing roll, or in a static position. Always make certain that the landing gear switch is in the DN position during these operations.

CIRCUIT BREAKERS

The LANDING GEAR RELAY, LANDING GEAR MOTOR, LDG GEAR POS LTS, and LDG GR WARN circuit breakers are located on the left side circuit breaker panel and will pop out under overload conditions. These circuit breakers are the pull-and-reset type.

If the LANDING GEAR RELAY or LANDING GEAR MOTOR circuit breakers are pulled, the landing gear will not operate electrically.

BRAKES

The brakes on the main landing gear wheels are operated by applying toe pressure to the rudder pedals. The parking brake control knob (T-handle on serials E-2191 and after) is located on the lower left subpanel. To set the parking brake, pull the control out and depress each toe pedal until firm.

Push the control in to release the parking brake.

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 parking brake to release or to exert excessive pressures.

MANUAL EXTENSION

The landing gear can be manually extended by operating a hand-crank at the rear of the front seats. This procedure is described in Section III, EMERGENCY PROCEDURES.

WARNING HORN (Serials E-1946, E-2104, E-2111 thru E-2467, except E-2458)

With the landing gear retracted, if the throttle is retarded below approximately 12 in. Hg manifold pressure, a warning horn will sound intermittently.

NOTE

The switch which activates the warning horn is operated by the throttle; thus the horn will always sound at the same throttle position. The resultant manifold absolute pressure is dependent on altitude and rpm.

WARNING HORN AND GEAR UP ANNUNCIATOR (Serials E-2458, E-2468 and After)

With the landing gear retracted, a warning horn will sound intermittently and the GEAR UP annunciator will flash if the throttle is retarded below approximately 12 in. Hg manifold pressure or if the flaps are fully extended.

NOTE

The switch which activates the warning horn/GEAR UP annunciator is operated by the throttle; thus the horn and GEAR UP annunciator will always activate at the same throttle position. The resultant manifold absolute pressure is dependent on altitude and rpm.

BAGGAGE COMPARTMENT

The baggage compartment is accessible through the utility doors on the right side of the fuselage. This area extends aft of the pilot and copilot seats to the rear bulkhead. Because of structural limitations, this area is divided into subcompartments, each having a different weight limitation. Loading within the baggage compartment must be in accordance with the data in the Section VI, WEIGHT AND BALANCE. All baggage must be secured with an approved cargo retention system.

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.

SEATS, SEAT BELTS, AND SHOULDER HARNESSES

SEATS

To adjust any of the four standard seats forward or aft, pull up on the release bar below the forward left side of 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 seat backs of all standard seats can be placed in any of four positions by operating a release lever on the aft inboard side of each seat. An option is available that provides for the seat backs on all standard seats (except the vertically adjusting seat) to be placed in any position from vertical to fully reclined. Outboard armrests for all 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 seat back can be folded over for access by rotating the red handle located on the lower inboard side of the seat back. The optional 5th and 6th seats can be folded up to provide additional floor space, or folded down to provide access to the extended baggage compartment.

When the club seating arrangement is utilized, the aft-facing seats must have the headrests in the fully raised position during takeoff and landing.

If desired, the 3rd and 4th seats can be arranged to face forward in the cabin. Three movable stops are located on the tracks under each seat. The stops should be located as follows:

For Aft-facing Seats:

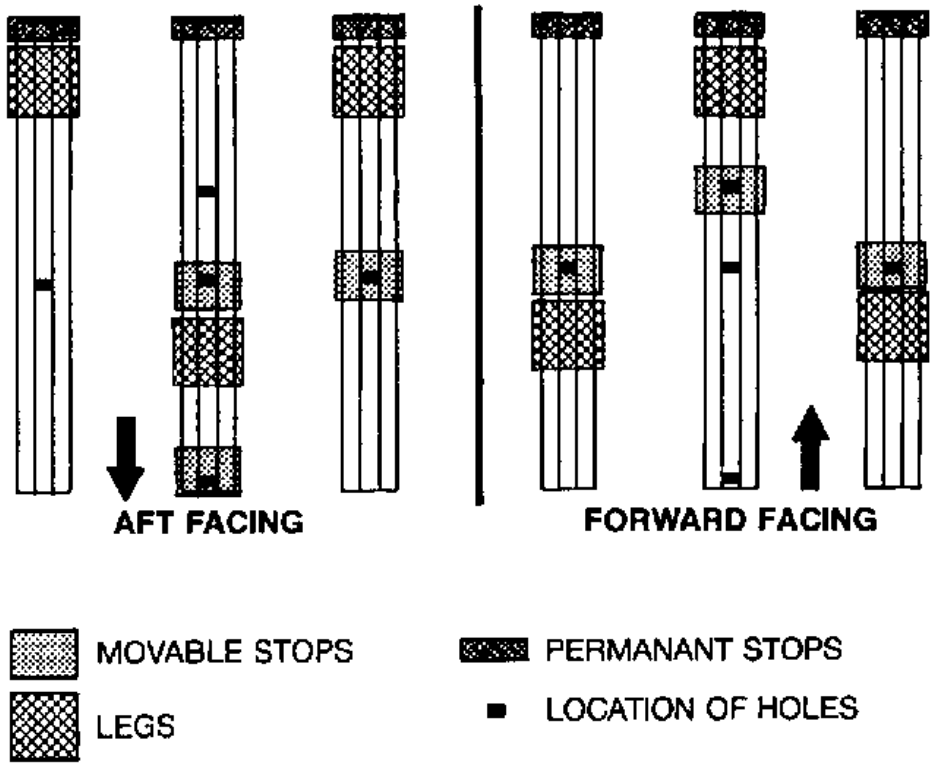
1. One stop in each of the two aft holes of the center track (position center leg between stops).
2. One stop stowed in one of the outer tracks.

For Forward-facing Seats:

1. One stop in the only hole in each outer track (for convenience, install these stops prior to installation of seats).
2. One stop in the most forward available hole of the center track.

NOTE

When installing the seats, ensure that the armrests are toward the center of the airplane.



SEAT CHANGE SCHEMATIC

SEAT BELTS

Every seat in the airplane is equipped with a seat belt. The seat belt can be lengthened by turning the male half of the buckle at a right angle to the belt, then pulling the male half in the direction away from the anchored end of the belt. The buckle is locked by sliding the male half into the female half of the buckle. The belt is then tightened by pulling the short end of the belt through the

male half of the buckle until a snug fit is obtained. The belt is released by lifting the large, hinged release lever on the female buckle half and pulling the male half of the buckle free. All occupants must wear seat belts during takeoff and landing.

SHOULDER HARNESSES

A 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 harnesses, the limitations stated on the cabin window placards must be observed.

The 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 3rd and 4th passenger seats, the inertial reel is attached into the seat back structure and is covered with the seat back upholstery. The strap runs up the seat back and over the outboard corner of the seat back. For the 5th and 6th passenger seats, the strap is contained in an inertia reel attached to the upper fuselage side structure, just aft of the seat back 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

FORWARD 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 counter-clockwise into the locked position. Observe that the door handle indicator is in the CLOSED position (Airplane serials E-2458, E-2468, 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.

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. 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 ajar annunciator, located on the annunciator panel, remains illuminated until the doors are properly latched.

OPERATION WITH AFT UTILITY DOORS REMOVED

The Beech Bonanza A36 is approved for operation with the aft utility doors removed. The factory installed placards pertaining to airspeed and other operating restrictions when the utility doors are removed are shown in Section II, LIMITATIONS.

OPENABLE CABIN WINDOWS

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

To Open Window For Ventilation (Only on Ground):

NOTE

Use red handle for emergency exit only.

1. Rotate lock handle to UNLOCKED position.
2. Lift thumb catch (window will release).

3. Push latch up and outward to over-center position.

To close window:

1. Pull latch inward and push down until locked (listen for catch engagement).
2. Rotate lock handle to LOCKED position.

To operate the window as an emergency exit:

1. Remove Emergency Exit Latch Cover.
2. Rotate exposed red handle up, 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.

CONTROL LOCKS

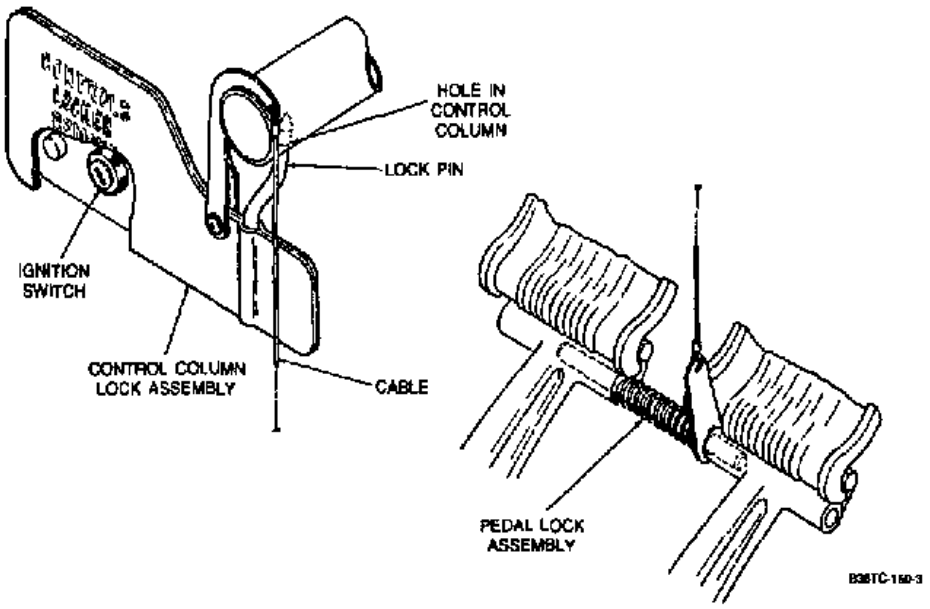
To Install The Control Locks:

1. Rotate pilot's control wheel and move column so the hole in the bottom of the collar lock and the hole in the column align to accept the lock pin.
2. Push the control column lock pin through the hole provided in the collar lock and into the hole in the control column. Push pin through hole as far as possible.
3. Rotate control lock hanger over control column so interconnecting cable is to the right of control column.
4. Assure positive retention of the lock pin by checking for movement in the control wheel.

5. Position pilot's rudder pedals in aft position and install spring lock between pedals.

WARNING

Before starting engine, remove the lock, reversing the above procedure.



The Control Column Pin Assembly Is Placarded As Follows:

Placard Facing Pilot with Control Locks Properly Installed:

CONTROLS
LOCKED
REMOVE
BEFORE
FLIGHT

C95EA07C0573

Placard Facing Instrument Panel with Control Locks Properly Installed:

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

POWER PLANT

The Bonanza A36 is powered by one Teledyne Continental Motors Corporation model IO-550-B, normally aspirated, fuel-injected, direct-drive, air-cooled, horizontally opposed, 6-cylinder, 550-cubic-inch displacement, 300-horsepower engine.

ENGINE CONTROLS

THROTTLE, PROPELLER, 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.

COWLING

The Bonanza A36 is equipped with latch mechanisms on the right and left upper engine cowling for quick and easy access to the engine compartments without the aid of tools. Each cowl latch is locked and released by a single recessed handle located in the lower cowling panel on each side of the engine. To close the cowling requires lowering the cowling to the closed position with the handle in the prelatched position.

The handle has three positions:

1. Flush with the fuselage - Latched
2. Held fully forward - Unlatched (open cowling)
3. Approximately 90° to the fuselage - Prelatch (ready to close cowl)

An audible click denotes the bayonet fittings, located forward and aft on the upper cowl, sliding into the latch safety catches. The cowl is locked by moving the latch handle to the full recessed position. The security of the latches can be checked by pulling out and up on the check tabs attached to the lower edge of the upper cowling. If the cowling can be moved after latching, open the cowling, check the latch alignment and re-latch.

COWL FLAPS

The cowl flaps control is located on the center pedestal. Except in extremely low temperatures, the cowl flaps should be open during ground operations, takeoff, and are to be adjusted as required during flight.

INDUCTION SYSTEM ICING

The possibility of induction system icing is reduced by the non-icing characteristics of the Bonanza's fuel injected engine and automatic alternate air source. Under certain conditions, however, impact ice can form at several points in the induction system. If the air intake or filter becomes clogged with ice, a spring-loaded door in the intake duct will open automatically and the induction system will operated on alternate air. If the alternate air source door becomes frozen in the closed position, a pull-and-release T-handle is provided to force the door open.

LUBRICATION SYSTEM

The engine oil system is the full-pressure, wet-sump type and has a 12-quart capacity, 8 of which are usable. 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.

STARTER

The starter is relay controlled and is actuated by a rotary type, momentary-on switch incorporated in the magneto/start switch. To energize the starter circuit, rotate the magneto/start switch beyond the BOTH position to START. After starting, release the switch to the BOTH position.

The START annunciator will illuminate whenever electrical power is being supplied to the starter. If the annunciator remains illuminated after starting, the starter relay has remained engaged and loss of electrical power may result. The battery and alternator switches should be turned off if the annunciator remains illuminated after starting. If the annunciator does not illuminate during starting, the annunciator system is inoperative. The starter energized annunciator (START) can be tested by pressing the annunciator test button (ANNUN TEST) located on the lower left subpanel.

PROPELLER

MCCAULEY

The Bonanza A36 is equipped with a McCauley constant-speed three-blade propeller using a D3A32C409-(X) hub and an (X)-82NDB-2 blade (with the letters appearing in the place of the (X) representing minor variations in the propeller hub or blades).

The pitch settings at the 30-inch propeller blade station are:

Low: 13.7° ± .2°

High: 28.8° ± .5°

The propeller diameter is:

Maximum: 80 in.

Minimum: 78.5 in.

Propeller rpm is controlled by a governor which regulates hydraulic oil pressure to the hub. A control lever (blue knob) on the pedestal allows the pilot to select the governor's rpm range.

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

HARTZELL

Refer to supplement HPA36-2 for airplanes equipped with a Hartzell propeller.

FUEL SYSTEM

The engine is designed to operate on aviation gasoline grade 100LL (blue) or grade 100 (green). However, the use of grade 100LL (blue) is preferred.

FUEL CELLS

The fuel system consists of a rubber fuel cell located in each wing leading edge. The fuel capacity consists of two 40-gallon cells (37 gallons usable.) A visual measuring tab is attached to each filler neck of each individual cell. The bottom of the tab indicates 27 gallons of usable fuel in the cell, and the detent slot on the tab indicates 32 gallons of usable fuel in the cell. The engine-driven fuel injector pump delivers approximately 10 gallons of excess fuel per hour, which bypasses the fuel control and returns to the cell being used. Three fuel drains are provided, one in each fuel cell sump on the underside of each wing, and one on the fuel selector valve inboard of the left wing root. These points should be drained before the first flight of the day.

FUEL DRAINS

The fuel system is drained at 3 locations: one under each wing just outboard of the fuselage, and a system low spot drain in the bottom of the fuel selector valve (accessible through a small door on the underside of the fuselage near the left wing root). These fuel drains are snap-type valves which are actuated by pushing up and twisting on the valve and then releasing when the desired amount of fuel has been drained. The drain may be locked open. The three fuel drains should be sampled daily before the first flight.

FUEL QUANTITY INDICATION SYSTEM

Fuel quantity is measured by float-operated fuel level sensors located in each wing tank system. These sensors transmit electrical signals to the individual indicators, which indicate usable fuel remaining in the tank.

ALTITUDE COMPENSATING FUEL PUMP

Early airplanes (E-1946, E-2104, E-2111 thru E-3144, not in compliance with Raytheon Aircraft S.B. 28-3052) are equipped with an altitude compensating engine-driven fuel pump. This pump automatically leans or enrichens the engine's fuel mixture as the airplane changes altitude.

Later airplanes (E-3145 and after, and prior airplanes in compliance with Raytheon Aircraft S.B. 28-3052) require manual adjustment of the mixture as the airplane changes altitude.

Leaner engine mixtures can be set by pulling the mixture lever aft from the full rich position while maintaining the EGT within its limits.

AUXILIARY FUEL PUMP

The auxiliary fuel pump is a dual-speed, dual-pressure, electrically driven, vane-type pump. The pump, located below the pilot's seat, is controlled by a single three-position switch. The

switch is located on the pilot's subpanel to the left of the landing gear handle. The pump is used to perform the following functions:

LO POSITION

1. Minor vapor purging
2. Increase fuel flow

HI POSITION

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

AUXILIARY FUEL PUMP SWITCH

The auxiliary fuel pump switch is placarded OFF-LO-HI. The LO position is used to supply a low boost to the fuel flow during all flight conditions.

The HI position is used for priming the engine during cold starts and also to provide an alternate source of fuel pressure in the event the engine-driven fuel pump fails. HI boost must not be used during flight unless the engine-driven fuel pump has failed. The increased pressure of the HI boost will over-drive the fuel control unit producing abnormally high fuel flows which, in turn, will cause engine roughness. In some cases, engine combustion may cease.

Normal takeoffs and landings are made with the auxiliary fuel pump in the OFF position.

FUEL TANK SELECTION

The fuel selector valve handle is located forward and to the left of the pilot's seat. Takeoffs and landings must be made using the tank that is nearest full.

The pilot is cautioned to observe that the long, pointed end of the handle aligns with the fuel tank position being selected. The tank positions are placarded adjacent to the respective LEFT MAIN, RIGHT MAIN or OFF detent. The OFF position is forward and to the left. A stop (lock-out) button prevents inadvertent selection of the OFF position. To select OFF, depress the stop button and rotate the handle to the full clockwise position. Depression of the lock-out stop is not required when moving the handle counter-clockwise from OFF to LEFT MAIN or RIGHT MAIN. When selecting the LEFT MAIN or RIGHT MAIN fuel tanks, position handle by sight and feel for the detent.

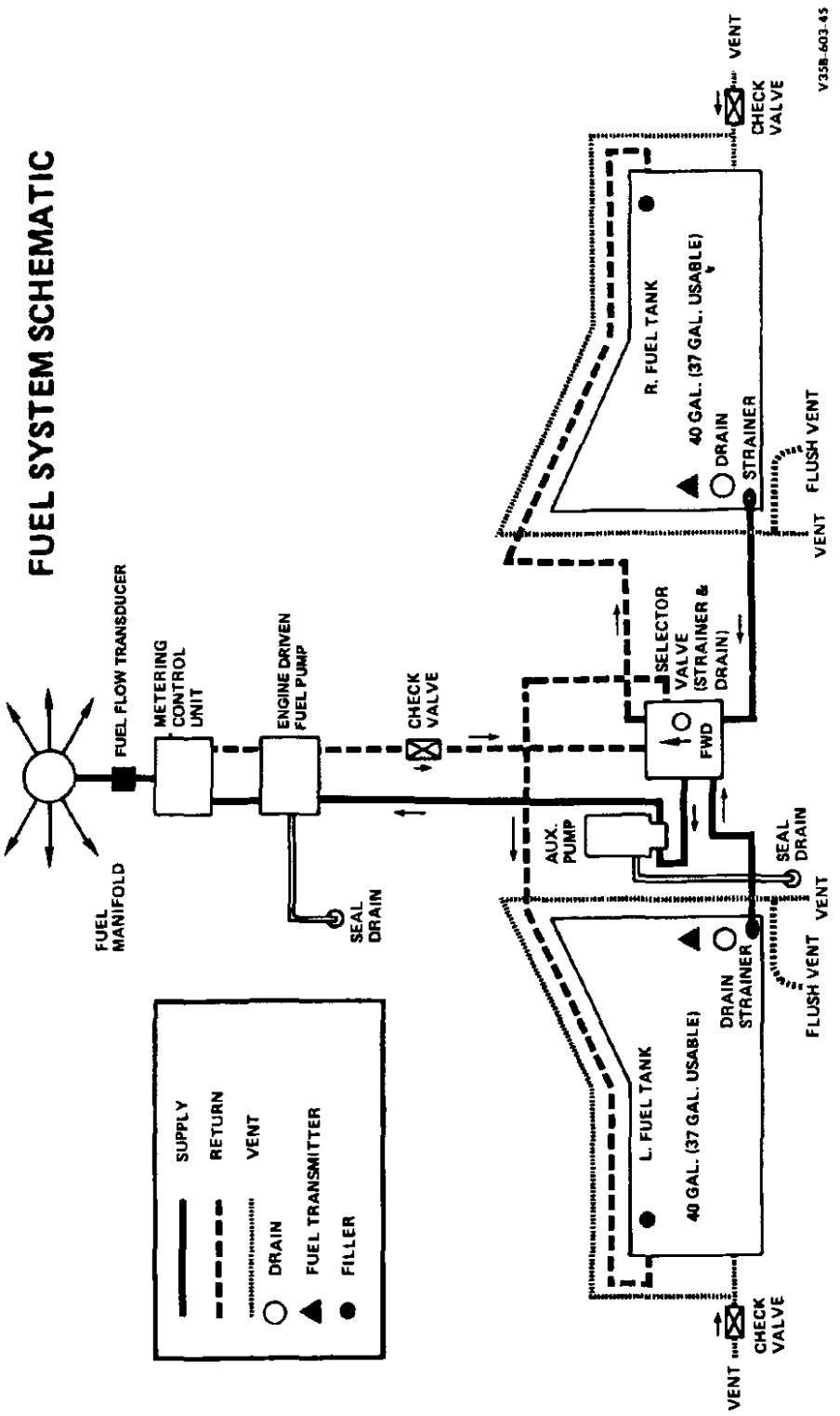
WARNING

Position selector valve handle in detents only. There is no fuel flow to the engine between detents (indicated by red arc).

If the engine stops because of insufficient fuel, refer to Section III, EMERGENCY PROCEDURES, for the ENGINE FAILURE IN FLIGHT procedures.

FUEL REQUIRED FOR FLIGHT

It is the pilots' responsibility to ascertain that the fuel quantity indicators are functioning and maintaining a reasonable degree of accuracy and to be certain of ample fuel for a flight. Takeoff is prohibited if the fuel quantity indicators do not indicate above the yellow arc. An inaccurate indicator could give an erroneous indication of fuel quantity. A minimum of 13 gallons of fuel is required in each tank before takeoff. The caps should be removed and fuel quantity checked to give the pilot an indication of fuel on board. The airplane must be approximately level for visual inspection of the tank. If it is not certain that at least 13 gallons are in each tank, fuel shall be added so that the amount of fuel will not be less than 13 gallons per tank at takeoff. Plan for an ample margin of fuel for any flight.


FUEL SYSTEM SCHEMATIC
V35B-603-45
FUEL MANIFOLD
FUEL FLOW TRANSDUCER
METERING CONTROL UNIT
ENGINE DRIVEN FUEL PUMP
CHECK VALVE
SEAL DRAIN
SELECTOR VALVE (STRAINER & DRAIN)
FWD
AUX. PUMP
SEAL DRAIN
R. FUEL TANK
40 GAL. (37 GAL. USABLE)
DRAIN
STRAINER
FLUSH VENT
VENT
CHECK VALVE
VENT
L. FUEL TANK
40 GAL. (37 GAL. USABLE)
DRAIN
STRAINER
FLUSH VENT
VENT
CHECK VALVE
VENT
SUPPLY
RETURN
VENT
DRAIN
FUEL TRANSMITTER
FILLER

ELECTRICAL SYSTEM

The system circuitry is the single-wire, ground-return type, with the airplane structure used as the ground return. The battery ON-OFF switch, the alternator ON-OFF switch and the magneto/start switch are located on the left subpanel.

CIRCUIT BREAKERS

The electrical system circuit breaker panel is located to the left of the pilot's seat. A panel located below the right subpanel contains avionic circuit breakers. The following switches are circuit-breaker-type switches: alternator, pitot heat, prop deice, strobe lights, rotating beacon, navigation lights, flood lights, panel lights, taxi light, landing light, and vent blower.

These circuit-breaker-type switches have a built-in circuit breaker and will trip to the OFF position if the circuit is shorted or becomes overloaded.

BATTERY

A 10-ampere-hour, 24-volt battery is located on the right forward side of the firewall. Battery servicing procedures are described in Section VIII, HANDLING, SERVICING, and MAINTENANCE.

BATTERY BUS

Turning the battery on feeds battery power to the battery bus. The battery bus directs electrical power to the airplane's electrical equipment. The alternator supplies electrical power to the battery bus to operate electrical equipment and to recharge the battery.

ALTERNATOR

The airplane is equipped with a 28.5-volt 60-ampere or an optional 100-ampere, gear-driven alternator. The alternator is designed to maintain up to 60- or 100-ampere output respectively at 2300 rpm to provide airplane electrical power.

VOLTAGE REGULATOR

A transistorized electronic voltage regulator adjusts the alternator output to maintain a constant voltage at the battery bus. The voltage regulator incorporates an overvoltage protection device which will automatically turn the alternator off should an overvoltage condition occur.

Following an over-voltage shutdown the LOW BUS VOLTS annunciator will illuminate when the bus voltage falls below 25 volts.

ALTERNATOR LOADMETER

The alternator loadmeter indicates the load (in amperes) being carried by the alternator.

EXTERNAL POWER RECEPTACLE

The external power receptacle, located on the right side of the engine cowling, accepts a standard AN-type plug. Before connecting an external power unit, ensure that a battery is installed in the airplane. Turn the battery switch ON and all avionics and electrical switches OFF. This protects the electronic voltage

ulators and associated electrical equipment from voltage transients (power fluctuations). If polarity is reversed, a diode in the coil circuit will prevent contactor operation.

If the external power unit does not have a standard AN-type plug, check the polarity and connect the positive lead from the external power source to the positive battery terminal and the negative lead to the negative battery terminal.

NOTE

A negative ground external power source is required. If the polarity is reversed, the polarity relay will not close. This prevents current flow to the airplane.

LIGHTING SYSTEM

INTERIOR LIGHTING

Flood lighting and instrument panel lighting switches are on the left subpanel. Light intensity is regulated by four knob-controlled rheostats located on the right 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 avionics panel. All subpanel lighting is controlled by the rheostat placarded SUBPANEL LIGHTING.

The cabin close focus reading lights, located in the overhead console, and the 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 control wheel.

An optional step light (standard on E-3107 and after), located above the step on the right fuselage and an optional courtesy light, located in the upper cabin door, will illuminate any time the utility door or cabin door is opened (E-3107 and after, the door mounted

courtesy light was removed and replaced by the illumination of the three reading lights on the right side of the cabin ceiling as standard equipment). To limit battery drain, the step light and courtesy light (or reading lights) 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 courtesy light, both doors must be closed and latched. The lights will illuminate when either door or both doors are opened.

EXTERIOR LIGHTING

The switches for all of the exterior lights are located on the left subpanel. The exterior lights consist of a landing light in the fuselage nose, a taxi light attached to the nose landing gear strut, and navigation lights located on the wing tips and tail cone. Use the landing light and the taxi light sparingly. Avoid prolonged operation which could cause overheating during ground maneuvering. An optional anti-collision light mounted on the vertical stabilizer is required for night flight.

> Particularly at night, reflections from anti-collision lights on clouds, dense haze or dust can produce optical illusions and intense vertigo. Such lights, when installed, should be turned off before entering an overcast; their use may not be advisable under instrument or limited VFR conditions.

ENVIRONMENTAL SYSTEM

CABIN HEATING

A heat exchanger behind the engine on the exhaust manifold from the right hand bank of cylinders provides for heated air to 5 outlets in the forward and aft areas of the cabin. The two forward outlets are located above and forward of each set of rudder pedals. The two aft outlets are installed behind the right front seat and the right rear seat. The fifth outlet provides heated air for windshield defrosting.

In flight, ram air enters an intake air scoop on the left side of the engine cowl, passes through the heater muff, then into a mixer valve on the forward side of the firewall. In the mixer valve, the heated air is combined with a controlled quantity of unheated ram air picked up at an intake on the right side of the nose. Air of the desired temperature is then ducted from the mixer valve to the outlets in the cabin.

HEATER AND DEFROSTER OPERATION

The heater controls are located below the pilot's left subpanel. To obtain heated air through the cabin outlets, pull the CABIN HEAT control. The control regulates the amount of hot air that is mixed with the unheated air. When the control is pulled fully out, the cold air is shut off and only heated air enters the cabin. The forward vents, located on the firewall forward of the rudder pedals, deliver heated air to the forward cabin when the CABIN HEAT control is pulled out. To deliver heated air to the aft seat outlets, pull the AFT CABIN HEAT control. For maximum heat, the control is pulled fully out. To obtain heated air for defrosting the windshield, pull the DEFROST control out. It may be necessary to vary or close the AFT CABIN HEAT control to obtain maximum air flow for defrosting. To close off all air from the heater system, pull the red FIREWALL AIR CONTROL knob located to the extreme left below the pilot's left subpanel.

CABIN VENTILATION

In moderate temperatures, ventilation air can be obtained from the same outlets used for heating by pushing the CABIN HEAT control full forward. However, in extremely high temperatures, it may be desirable to pull the red FIREWALL AIR CONTROL knob and use only the fresh air outlets described in the following paragraphs.

CABIN FRESH AIR OUTLETS

A duct in each wing root is connected directly to an adjustable outlet in the upholstery panel forward of each front seat. Airflow from each outlet is controlled by a center knob. The direction of airflow is controlled by rotating the louvered cover with the small knob on the rim.

INDIVIDUAL OVERHEAD FRESH AIR OUTLETS

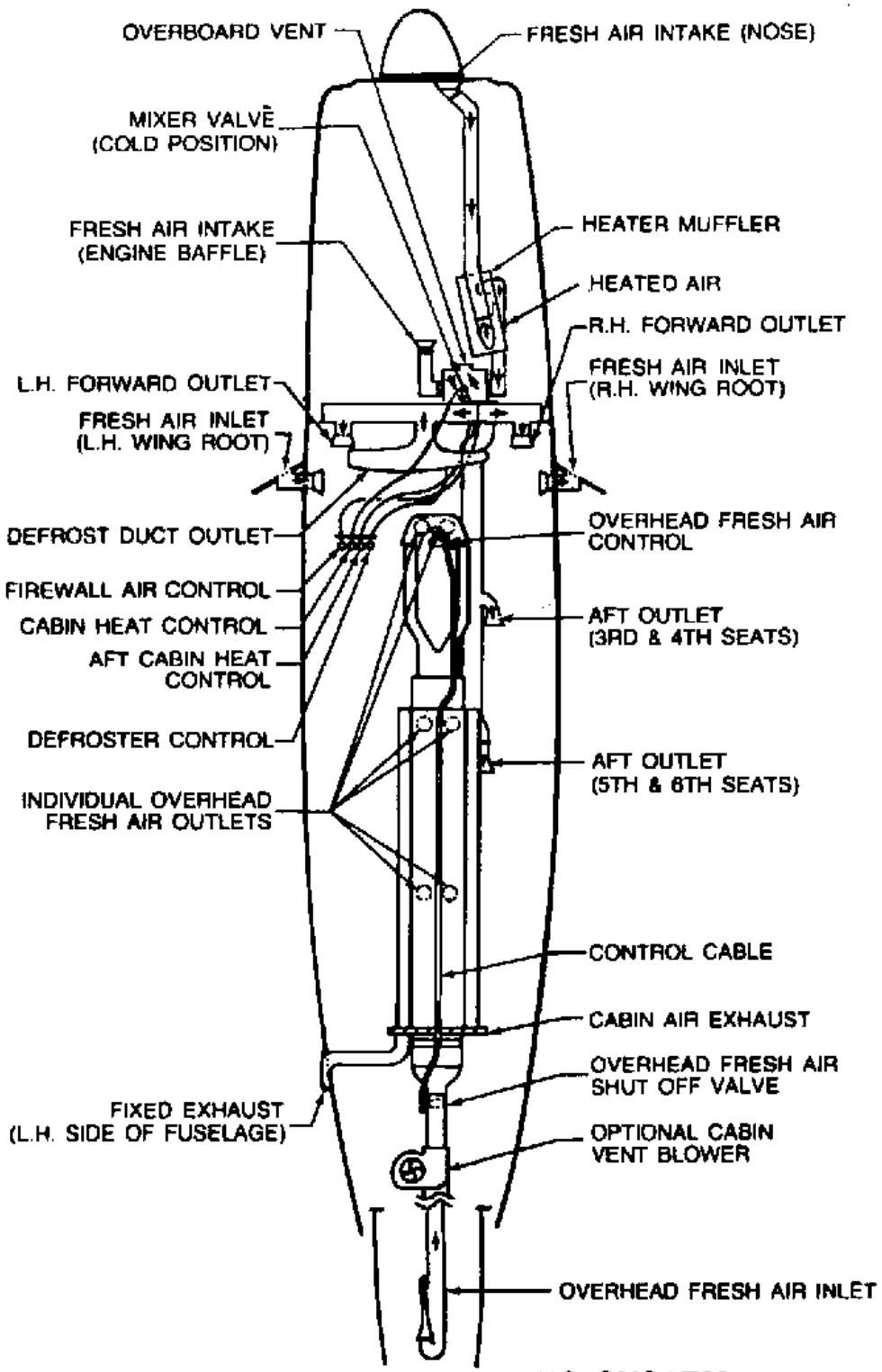
Fresh ram air enters the cabin through the overhead fresh air scoop located on the left side of the dorsal fairing. This air is ducted through the optional cabin vent blower and overhead fresh air shutoff valve to the six overhead fresh air outlets. Each outlet can be adjusted to control the volume and direction of airflow to its respective seat. The total air flow to the six outlets can be varied by turning the overhead fresh air shutoff control knob, which controls the shutoff valve.

FRESH AIR VENT BLOWER (If Installed)

An optional fresh air vent blower controlled by a switch placarded VENT BLOWER OFF on the subpanel is available. It provides ventilation through the individual overhead outlets during both ground and in-flight operations.

EXHAUST VENT

A fixed exhaust vent is located in the aft cabin.



HEATING AND VENTILATING SYSTEM

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OXYGEN SYSTEM (If Installed)

The optional oxygen systems consist of an oxygen supply cylinder, an oxygen shutoff valve (on the supply cylinder), a pressure gage (in the oxygen console), an oxygen regulator (mounted on the control console), a system of distribution tubing with oxygen outlets, and oxygen masks.

Oxygen supply cylinders are available in either 49 cu ft or 76 cu ft capacity. The cylinder is located under the spar cover beneath the front seats.

Supply of oxygen to the system is controlled by a push/pull knob, placarded OXYGEN PULL ON, on the pilot's subpanel. The knob operates the shutoff valve on the supply cylinder and is normally kept in the off position. A pressure gage in the oxygen console indicates the supply of oxygen available to the system. Nominal pressure for a full supply of oxygen is 1850 psig.

NOTE

The oxygen control knob must be pushed flush against pilot's subpanel to ensure system is off.

The system regulator is altitude compensated to provide a varying flow of oxygen as altitude varies. Oxygen flow is varied automatically by the regulator from 0.5 liters per minute per person at 5000 feet to 2.8 liters per minute per person at 25,000 feet.

Oxygen flows only when the mask hose is plugged into the oxygen outlet. The outlets have a detent to prevent accidental disconnection of the oxygen masks.

PITOT AND STATIC SYSTEMS

PITOT SYSTEM

The pitot system provides a source of impact air for operation of the airspeed indicator. The pitot mast is located under the leading edge of the left wing.

PITOT HEAT (If Installed)

Optional pitot heat provides an electrically heated pitot mast. The PITOT HEAT switch is located on the left subpanel and should be ON when flying in visible moisture. It is not advisable to operate the pitot heat on the ground except for testing or for short intervals of time to remove ice or snow.

NORMAL STATIC AIR SYSTEM

The normal static system provides a source of static air to the flight instruments through a flush static fitting on each side of the airplane fuselage. A low point drain tube is provided for water that may condense in the system. It is accessible through the fuel selector valve drain access door. The access door is located in the lower fuselage adjacent to the left wing. The tube is plugged and the plug is held in place with a hose clamp.

ALTERNATE STATIC AIR SYSTEM (If Installed)

An optional alternate static air source system is installed to provide air for instrument operation should the static ports become blocked. Refer to Section III, EMERGENCY PROCEDURES, for procedures describing how and when to use this system.

INSTRUMENT AIR PRESSURE SYSTEM

Instrument air pressure is supplied by an engine-driven pressure pump. Pressure is controlled by an adjustable pressure regulator on the forward side of the firewall.

A gage located in the left side of the instrument panel indicates the system pressure in inches of mercury. The pressure should be maintained within the green arc for proper operation of the pressure-operated instruments.

NOTE

An optional Standby Instrument Air Pressure System is available (standard on serial E-2217 and after.) Refer to Supplement 36-590006-23 in Section IX, SUPPLEMENTS, for information on operation and procedures.

STALL WARNING HORN

A stall warning horn located forward of the instrument panel sounds a warning signal (the battery switch must be ON) as the airplane approaches a stall condition. The signal is triggered by a sensing vane on the leading edge of the left wing and is effective at all attitudes. The warning signal will become steady as the airplane approaches a complete stall.

NOTE

The 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.

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-24 or current applicable Teledyne Continental Service Bulletin. Refer to Section VIII, HANDLING, SERVICING AND MAINTENANCE, for a list of approved oils.

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, 20W50 Corrosion-preventative). When changing to MIL-L-22851 Ashless Dispersant oil, change the oil and oil 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 take-off power for approximately 30 seconds, then return to cruise power.

Avoid long power-off descents above 8000 ft, especially 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.

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SECTION 8
HANDLING, SERV AND MAINT
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SECTION 8
HANDLING, SERV AND MAINT
TABLE OF CONTENTS (CONT'D)

INTRODUCTION TO SERVICING

The purpose of this section is to outline the requirements for maintaining the Beech Bonanza 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.

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.

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.

If a question arises concerning the care of the Beech Bonanza A36, it is important to include the airplane serial number in any correspondence. The serial number appears on the model designation plate attached to the right side of the fuselage just under aft utility door. On E-2400 and after, the plate is attached to the right side of the fuselage beneath the horizontal stabilizer.

PUBLICATIONS

The following publications for the Beech Bonanza A36 are available through Raytheon Aircraft Authorized Outlets.

1. Pilot's Operating Handbook and FAA Approved Airplane Flight Manual
2. Maintenance Manual
3. Parts Catalog

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.
5. Refer to the Maintenance Manual for further inspection schedules.

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 model *Bonanza Series Maintenance 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.

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.

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

The nose landing gear is designed with tow lugs on the lower nose gear torque knee. The tow lugs are the only area of attachment to be used when towing the airplane. *Under no circumstances should the airplane be towed using other points on the nose landing gear as an attach point for a tow bar.*

One person can move the airplane on a smooth and level surface using the hand tow bar furnished with the loose equipment. Attach the tow bar to the tow lugs on the nose gear lower torque knee.

Where movement is restricted, two people can pivot the airplane on the main wheels. One person should push on the wing leading edge or hold the wing tip, while the other operates the tow bar.

CAUTION

Do not exert force on the propeller or control surfaces. Do not place weight on the empennage to raise the nose wheel. When towing with a tug, limit turns to prevent damage to the nose gear. Do not attempt to tow airplane backward by the tail tie-down ring. Do not tow when the main gear is obstructed by mud or snow.

Care should be used when removing the tow bar to prevent damage to the lubrication fittings on the landing gear.

PARKING

The parking brake push-pull control is located on the lower left subpanel. To set the parking brake, pull the parking brake control Knob out (T-Handle on serials E-2191 and after) and depress each toe pedal until firm. 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 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.

MAIN WHEEL JACKING

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.

CAUTION

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

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.

FLYABLE STORAGE - 7 TO 30 DAYS

For more extended storage periods consult the *Bonanza Series Maintenance Manual* and Teledyne Continental Service Bulletin M81-3 or later issue.

MOORING

If airplane cannot be placed in a hangar, tie down securely at the three points provided. Do not use hemp or manila rope. It is recommended a tail support be used to 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.

Check for correct oil level and add oil if necessary to bring level to full mark.

Run engine at least five minutes at 1200 to 1500 rpm with oil and cylinder head temperatures in the normal operating range.

FUEL CELLS

Fill to capacity to minimize fuel vapor and protect cell inner liners.

FLIGHT CONTROL SURFACES

Lock with internal and external locks.

GROUNDING

Static ground airplane securely and effectively.

PITOT TUBE

Install cover.

WINDSHIELD AND WINDOWS

Close all windows and window vents. It is recommended that covers be installed over windshield and windows.

DURING FLYABLE STORAGE

Each seven days during flyable storage, the propeller should be rotated by hand. After rotating the engine six revolutions, stop the propeller 60° to 120° from the position it was in.

WARNING

Before rotation of propeller blades, ascertain magneto/start switch is OFF, throttle in CLOSED position, and mixture control is in the IDLE CUT-OFF position. Always stand in the clear while turning propeller.

If at the end of 30 days, the airplane has not been removed from storage, the engine should be started and run. The preferred method is to fly the airplane for 30 minutes.

PREPARATION FOR SERVICE

Remove all covers, tape and control locks. Clean the airplane and give it a thorough inspection, particularly landing gear, control surfaces, and static pressure and pitot openings.

Preflight the airplane thoroughly.

EXTERNAL POWER

When using external power, it is very important that the following precautions be observed:

1. A Battery must be installed in the airplane.
2. The airplane has a negative ground system. Exercise care to avoid reversed polarity. Be sure to connect the positive lead of the external power unit to the positive terminal of the airplane's external power receptacle and the negative lead to the negative terminal of the external power receptacle. A positive voltage must also be applied to the small guide pin.
3. To prevent arcing, make certain no power is being supplied when the connection is made.
4. Make certain that the BAT switch is ON, all avionics and electrical switches are 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).

CHECKING ELECTRICAL EQUIPMENT

Connect an external power unit as instructed. (See EXTERNAL POWER in Section 4, NORMAL PROCEDURES). Ensure that the current is stabilized prior to making any electrical equipment or avionics check.

CAUTION

If the external power unit has poor voltage regulation or produces voltage transients, the equipment connected to the unit may be damaged.

SERVICING

FUEL SYSTEM

Refer to Section 2, Limitations, for a list of approved engine fuels.

FUEL CELLS

CAUTION

Never leave the fuel cells completely empty for more than a few days, as the cell inner lining may dry out and crack, permitting fuel to diffuse through the walls of the cell after refueling. If the cells are to remain empty for a week or more, a thin coating of light engine oil should be sprayed or flushed onto the inner lining of the cells.

The fuel cell installation consists of a 40-gallon capacity (37 gallons usable) fuel cell and filler cap in each wing leading edge. The filler neck in this installation contains a visual measuring tab to permit partial filling of the tank. Filling the tank until the fuel touches the bottom of the tab indicates 27 gallons of usable fuel. Filling to the slot on the tab indicated 32 gallons of usable fuel. The airplane must be level for the tabs to indicate accurately.

FUEL DRAINS

The fuel system is drained at 3 locations: one under each wing just outboard of the fuselage, and a system low point drain in the bottom of the fuel selector valve. All three drains are of snap-type actuation. The fuel selector valve drain is accessible through a door in the fuselage adjacent to the left wing. Open the three drains daily during preflight to purge any water from the system.

FUEL STRAINERS

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 pressure checked for leakage. The strainer at the bottom of the fuel selector valve should also be removed and cleaned with solvent every 100 hours. To reduce the possibility of contaminated fuel, always cap any disconnected fuel lines or fittings.

Ordinarily, the finger strainers in the fuel cell outlets should not require cleaning unless there is a definite indication of solid foreign material in the cells or the airplane has been stored for an extended period.

OIL SYSTEM

CAUTION

Oil consumption tends to be higher during the break-in period on new engines. Maximum range flights should be avoided and oil level brought to full after each flight during this period.

The engine oil filler cap/dipstick is accessible by raising the left cowl door. Sump capacity is 12 quarts.

The oil should be changed and the oil filter replaced every 100 hours under normal operating conditions. To assure complete drainage, the engine should be at operating temperature. Change the oil as follows:

1. Remove the access plate from the engine cowl on the lower right side.
2. Locate the oil sump drain valve at the low point of the engine sump.
3. Locate drain adapter fitting packaged with loose tools and accessories (P/N 107B Probe Auto-Valve Inc.), and attach a piece of 1/2-inch inside-diameter plastic or rubber tubing (not supplied) of suitable length.
4. Insert drain adapter into quick-drain valve to begin draining oil from the engine.
5. Loosen the spin-off oil filter and remove the filter.
6. Clean and lubricate the new filter gasket with engine oil.
7. Position the new filter on the engine mounting adapter and tighten the filter to a torque of 18-20 foot-pounds.
8. Safety wire the filter to the engine adapter.
9. Remove the drain adapter fitting from the oil sump drain valve; the spring-loaded valve is self-closing. The engine may now be filled with oil.
10. Re-secure the cowl access plate.

The engine manufacturer specifies Ashless Dispersant Oils only. However, for the first 20 hours, MIL-C-6529 Type II Multi viscosity 20W50 Corrosion-Preventative 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, use MIL-L-22851 Ashless Dispersant Oil. Oils must meet the requirements of the latest revision of Teledyne Continental Motors Corporation Specification MHS-24 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, 20W50 Corrosion-preventive). When changing to MIL-L-22851 Ashless Dispersant oil, change the oil and oil filter as previously described.

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.

BATTERY

The battery is accessible by opening the right door of the engine cowling. Check the electrolyte level after each 25 hours of operation and add distilled water as necessary. Do not fill the battery above the bottom of the split ring.

CAUTION

Excessive overcharging can cause heating and boiling. If the charge condition of the battery is not known, water should be added to just cover the separators. Only when the battery is known to be fully charged should the electrolyte level be filled to the split ring. This will prevent electrolyte from percolating out of the battery due to over filling.

Excessive water consumption may be an indication that the voltage regulator requires resetting. The specific gravity of the electrolyte should be checked periodically *(see Bonanza Series Maintenance Manual).*

The battery box is vented overboard to dispose of the hydrogen gas and the electrolyte fumes that are discharged during normal charging operation. To ensure disposal of the fumes and gas, the vent tube should be checked frequently for obstructions.

TIRES

An inflation pressure of 33 to 40 psi should be maintained on the 7.00 x 6 main wheel tires. The 5.00 x 5 nose wheel tire should be inflated to 40 psi. Maintaining proper tire inflation will minimize tread wear and aid in preventing tire failure caused from running over sharp stones. When inflating tires, visually inspect them for cracks and breaks.

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

The following procedures may be used for servicing both the main and the nose gear shock struts.

To Inflate Struts:

1. Check to see that the airplane is empty except for full fuel and oil.
2. While rocking the airplane gently to prevent possible binding of the piston in the barrel, inflate each main gear shock strut until 3 inches of the piston is showing. Inflate the nose gear shock strut until the piston is extended 5 inches as indicated on the shock strut servicing instructions placard.

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.

3. Remove all foreign material from the exposed piston with a soft cloth moistened with hydraulic fluid.

To Replenish Strut Hydraulic Fluid:

1. Support the airplane on jacks at the wing jack points.
2. Remove the air valve cap, depress the valve core, and allow the strut to fully deflate.
3. Raise and block the strut 1/4 inch from the compressed position.

WARNING

Do not remove the valve body assembly until all air pressure has been released or it may blow off, causing injury to personnel or damage to equipment.

4. Carefully remove the valve body assembly.
5. Fill the strut to the level of the valve body assembly with hydraulic fluid (refer to the *Bonanza Series Maintenance Manual*).
6. Slowly extend the strut from the blocked position and replace the valve body assembly.
7. Completely compress the strut to release excess air and oil, then reinstall valve core.
8. Inflate the strut as described in the preceding inflation procedure.

SHIMMY DAMPER

The shimmy damper has a reservoir of fluid carried in the piston rod. Two coil springs installed in the piston rod keep the 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.

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 *Bonanza Series Maintenance Manual.*

BRAKES

The brake hydraulic fluid reservoir is located on the firewall in the engine compartment. A dipstick is attached to the reservoir cap. Refer to the *Bonanza Series Maintenance Manual* for hydraulic fluid specification.

The brakes require no adjustments, since the pistons move to compensate for lining wear.

INDUCTION AIR FILTER

This filter 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 Filter:

1. Remove the fuselage nose section grill.
2. Remove the threaded fasteners securing the filter and remove the filter.

INSTRUMENT AIR PRESSURE SYSTEM

The pressure system incorporates two filters; a pump intake filter and an in-line filter. The pump intake filter is mounted on the rear engine baffle. This filter should be changed every 300 hours. If the airplane is operated in dusty conditions, the filter should be changed more frequently.

The in-line filter is located between the pressure regulator and the instruments. This filter should be changed every 300 hours of operation.

Both filters are to be changed when the pressure pump is replaced at 600 hours.

PROPELLER

Propeller operation, servicing, and maintenance instructions are contained in the propeller operator's manual furnished with the airplane.

WARNING

When servicing a propeller, always make certain the ignition switch is off and that the engine has cooled completely. STAND IN THE CLEAR WHEN MOVING A PROPELLER. THERE IS ALWAYS SOME DANGER OF A CYLINDER FIRING WHEN A PROPELLER IS MOVED.

OXYGEN SYSTEM

To service the oxygen system, use the following procedures:

When filling the oxygen system, only use Aviator's Breathing Oxygen, MIL-O-27210.

WARNING

Keep hands, tools, clothing, and oxygen equipment clean and free from grease and oil. KEEP FIRE AND SPARKS AWAY FROM OXYGEN. Use only recommended leak testing soaps.

DO NOT USE MEDICAL OXYGEN. It contains moisture which can cause the oxygen valve to freeze.

1. Ensure that all airplane electrical power is off. Do not operate electrical switches, or connect or disconnect ground power generators during the oxygen charging operation.
2. Make sure that no fueling or other flammable fluid servicing is in process when servicing the oxygen system.
3. Always ground the airplane and the servicing equipment before connecting the recharging adapter.
4. Read the pressure gage on the oxygen console just forward and to the left of the pilot's seat. The gage will not indicate cylinder pressure unless the shutoff valve on the oxygen cylinder is open.

CAUTION

Pull open the cylinder shutoff valve slowly to prevent damage to the system.

5. Close the cylinder shutoff valve using the push/pull control knob on the pilot's subpanel. The oxygen control knob must be pushed flush against pilot's subpanel to ensure system is off.
6. Slide the pilot's or copilot's seat aft until the filler valve is clear, then remove the cap from the filler valve and attach the recharging adapter. Open valve on supply bottle slowly.
7. Open the cylinder shutoff valve and slowly fill the cylinder to 1850 ± 50 psig at a temperature of 70°F. This pressure may be increased an additional 3.5 psig for each degree above 70°F. Similarly, for each degree below 70°F, reduce the cylinder pressure 3.5 psig.
8. Close the supply bottle valve, remove the recharging adapter, and replace the filler valve cap.
9. Slide the seat forward to its original position.
10. The oxygen push/pull control knob should remain in the off position until the system is used.

OXYGEN CYLINDER RETESTING

The oxygen cylinders, (lightweight cylinders, stamped "3HT" on the plate on the side) must be hydrostatically tested every three years and the test data 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.

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 normal cleaning methods.

ALTERNATOR

Since the alternator and electronic voltage regulator are designed for use on a negative ground system only, 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.
2. When connecting a power source, be sure to connect the negative battery terminals together and the positive battery terminals together.
3. When using a battery charger, connect the positive lead of the charger to the positive battery terminal and the negative lead of the charger to the negative battery terminal.
4. Do not operate an alternator on an open circuit. Be sure all circuit connections are secure.
5. Do not short across or ground any of the terminals on the alternator or electronic voltage regulator.
6. Do not attempt to polarize an alternator.

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. The magnetos can be grounded by replacing the switch lead at the noise filter capacitor with a wire which is grounded to the engine case. Otherwise, all spark plug leads should be disconnected or the cable outlet plate on the rear of the magneto should be removed.

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 cover securely and plug or mask off all other openings. Be particularly careful to mask off all static air buttons before washing or waxing. When cleaning, 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.

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). See the *Bonanza Series Maintenance Manual*.

When using high-pressure washing equipment, keep the spray or stream clear of wheel bearings, propeller hub bearings, etc. Openings such as pitot tubes, static air buttons, and battery and avionics equipment cooling ducts should be securely cov-

ered 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 wheel well areas with solvent, especially if high-pressure equipment is used, exercise care to avoid washing away grease from landing gear components. After washing the wheel well areas with solvent, lubricate all lubrication points, or premature wear may result.

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 silicon 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 (see the *Bonanza Series Maintenance Manual*) is adequate and safe for this purpose.

NOTE

Before returning the airplane to service, remove all maskings and coverings and relubricate as necessary.

WINDOWS AND WINDSHIELDS

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.

NOTE

The manufacturer of the windshield/window material has approved the use of Permatex Plastic Cleaner and Whiz Aircraft Windshield Cleaner for cleaning the windshield and cabin windows. However, the use of soap and water is still the preferred method of cleaning.

Remove any oil or grease on the surface of the plastic with a cloth moistened with kerosene, then wash the surface with soap and water. Never use gasoline, benzene, alcohol, acetone, carbon tetrachloride, fire-extinguisher agent, anti-ice fluid, lacquer thinner, or glass cleaner other than noted above. These materials will soften the plastic and may cause it to craze.

After a thorough cleaning, wax 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.

ENGINE

Clean the engine with 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.

LANDING GEAR

After operation on salty or muddy runways, wash the main gear and nose gear 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.

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 tissues 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, as it may damage the padding and backing materials.

Soiled upholstery and carpet may be cleaned with 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 kerosene. Volatile solvents, such as those mentioned in the article on care of plastic windows should never be used, since they soften and craze the plastic.

CONSUMABLE MATERIALS

For a complete list of Consumable Materials refer to the *Bonanza Series Maintenance Manual*.

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.

LAMP REPLACEMENT GUIDE

LOCATION	*NUMBER*
Close Focus Reading Lights, Cabin	303
Combination Tail Strobe/Navigation Light	
Navigational	1999
Strobe	A500-B-28
Compass Light	327
Control Wheel Map Light	WL-41069R
Courtesy Light, Cabin and Utility Door	1864
Elevator Tab Position Indicator Light	1819
Flap Position Light	327
Fuel Selector Placard Light	327
Instrument Flood Light Overhead	313
Instrument Light, Post	327
Instrument Wedge Light	58-380022-11
Landing Gear Position Light	327
Landing Light, Nose Section	4596
Navigational Light, Tail Cone	1683
Navigational Light, Wing	A7512-24
Rotating Beacon (Grimes)	A-7079B-24
Rotating Beacon (Whelen)	X1939
Step Light	1495
Taxi Light, Nose Shock Strut	4596
Wing Strobe Lights	
Grimes	30-1331-3
SDI	701148-7-2