Raytheon Aircraft Company

Beechcraft

Beech Bonanza® A36

(Serials E-1946, E-2104, E-2111 thru E-3629 and E-3631 thru E-3635)

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

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

Airplane Serial Number:____________________________

Airplane Registration Number:______________________

FAA Approved
by:____
John Tigue
Raytheon Aircraft Company
DOA-230339-CE

P/N 36-590002-37B
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NOTE

Where Beech Aircraft Corporation or Beechcraft is referred to in this publication, it will be taken to read Raytheon Aircraft Company.

Raytheon Aircraft Company

Member of GAMA
General Aviation Manufacturers Association

LIST OF EFFECTIVE PAGES

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 Always destroy superseded pages when you insert revised pages.

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Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

P/N 36-590002-37B

Revision B2 - January, 2006

Raytheon Aircraft Company

LOG OF REVISIONS

Beech Bonanza® A36

(Serials E-1946, E-2104, E-2111 thru E-3629 and E-3631 thru E-3635)

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

P/N 36-590002-37B

Revision B2 - January, 2006

PAGE	DESCRIPTION
Title Page	New
List of Effective Pages	
1 of 2	New
2 of 2	New
Log of Revisions	
1 of 1	New
1-7	Revised "Revising The Handbook"
2-11	Revised "Maneuver Limits"
7-40 and 7-41	Revised "Interior Lighting" and Shifted Data
8-1 and 8-2	Revised Table of Contents
8-4	Revised "Airplane Inspection Periods"
8-20	Revised "Brakes"
8-26 and 8-28	Revised "Exterior Painted Surfaces"
8-30	Revised "Consumable Materials", Deleted and Shifted Data
	B2

Raytheon Aircraft

LOG OF REVISIONS

Beech Bonanza® A36

(Serials E-1946, E-2104, E-2111 and After)

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

P/N 36-590002-37B

Revision B1 - March, 2003

PAGE	DESCRIPTION
Title Page	New
List of Effective Pages	
1 of 2	New
2 of 2	New
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1 of 1	New
4-27 and 4-28	Added CAUTION and Shifted Data
5-1 and 5-2	Revised Table of Contents and Shifted Data
5-3	Revised TIME, FUEL, AND DISTANCE TO CRUISE CLIMB calculation
5-9	Revised Table
5-10	Revised "Total Fuel Requirement"
6-4	Revised "Sample Loading"
8-43 and 8-44	Revised "Consumable Materials"
8-46	Revised "Lamp Replacement Guide"
	B1

Raytheon Aircraft

LOG OF REVISIONS

Beech Bonanza® A36

(Serials E-1946, E-2104, E-2111 and After)

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

P/N 36-590002-37B

B - Reissue - November, 2002

Original Issue - October, 1983

PAGE	DESCRIPTION
Title Page	New
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10-1 thru 10-48	May, 1994
	B

SECTION I
GENERAL
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SUBJECT *PAGE*

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

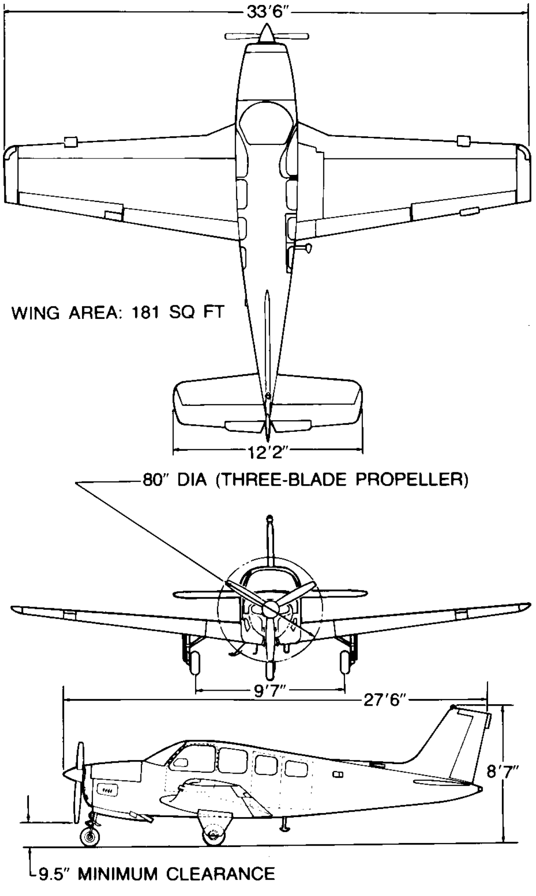
When a new airplane is delivered from the factory, the handbook delivered with it contains either an STC (Supplemental Type Certificate) Supplement or a Raytheon Aircraft Flight Manual Supplement for every installed item requiring a supplement. If a new handbook for operation of the airplane is obtained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

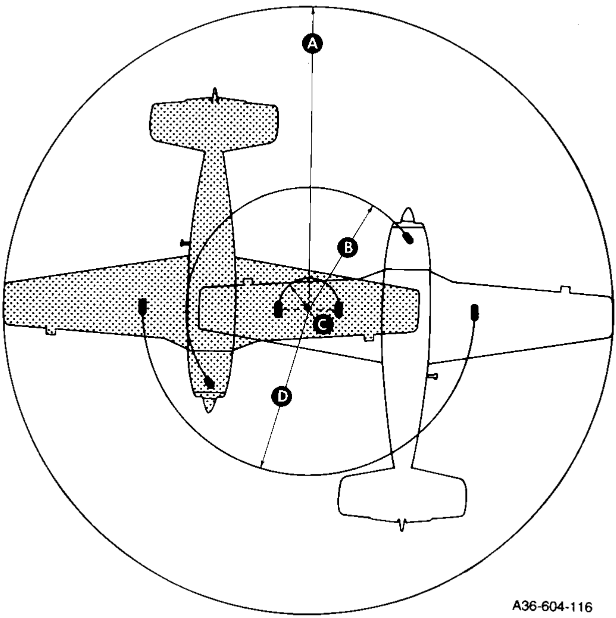
Section IX, Supplements, contains the FAA-approved Airplane Flight Manual Supplements, headed by a Log of Supplements page. When new supplements are received or existing supplements are revised, a new Log page will replace the previous one, since it contains a listing of all previous approvals, plus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

A Radius for Wing Tip .27 feet 7 inches

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

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

D 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

SUBJECT *PAGE*

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):

AIRSPEED LIMITATIONS (IAS)

MAX. LDG GEAR EXTENDED(NORMAL)......154 KTS
MAX. APPROACH FLAPS(12°)............154 KTS
MAX. FULL DOWN FLAPS(30°)...........124 KTS
MAX. MANEUVERING....................141 KTS

UTILITY CATEGORY AIRPLANE
OPERATE IN ACCORDANCE WITH FAA APPROVED AIRPLANE FLIGHT MANUAL.

INTENTIONAL SPINS PROHIBITED

NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED IN THE AIRPLANE FLIGHT MANUAL.

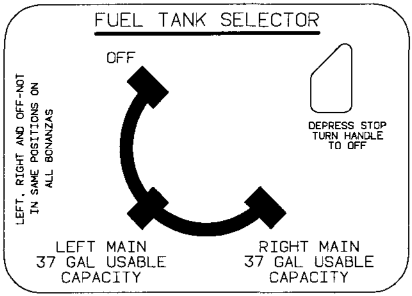
C94E#02C2438

74-Gallon System
On Fuel Tank Selector Cover:

DO NOT TAKE OFF IF FUEL QUANTITY GAGES
INDICATE IN YELLOW BAND OR WITH LESS
THAN 13 GALLONS IN EACH MAIN TANK

C95E#02C0073

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



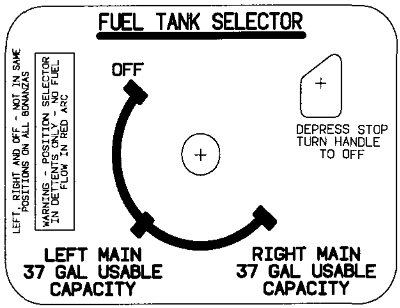
C95E#02C0072

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):



C96EA00C2515 C

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

REMOVE WINTER
BAFFLES WHEN
OAT EXCEEDS ISA +3° C

C94E#02C2440

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

TAKEOFF
& CLIMB-
LEAN AS
REQUIRED

DESCENT-
ENRICH
AS REQD

BEFORE
LANDING-
FULL
RICH
OR AS
REQD
BY
FIELD
ELEV

TH00C
973177AA

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):

LEANING
SCHEDULE
FOR
TAKEOFF
AND
CLIMB

SL-2000'
25.7

4000'
25.1

6000'
24.0

8000'
22.4

10,000'
20.9

E#00C
973254AA

On Fuel Gages:

**37 GALLONS
USABLE**

C94E#02C2439

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

EMERGENCY
LANDING GEAR
INSTRUCTIONS
TO EXTEND

ENGAGE HANDLE IN REAR
OF FRONT SEAT AND TURN
COUNTERCLOCKWISE AS FAR
AS POSSIBLE (50 TURNS)

C94CE02C1976

On Landing Gear Emergency Crank Access Cover:

LANDING GEAR
EMERGENCY CRANK

PULL OUT
LIFT UP

C94CE02C1977

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

THIS AIRCRAFT NOT FULLY
EQUIPPED FOR NIGHT FLIGHT

C94CE02C1946

On Left Side Panel:

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

C94EH02C2441 C

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

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

C94E#02C2442

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

MASK STOWED UNDER
REAR SEAT

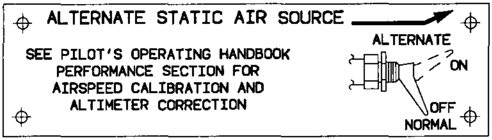
C94CE02C1949

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

OXYGEN MASK

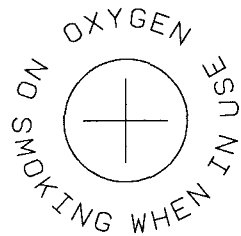
C94CE02C1950

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



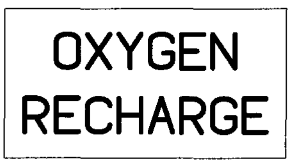
C94E#02C2443

Copilot's Outlet (When Oxygen Is Installed):



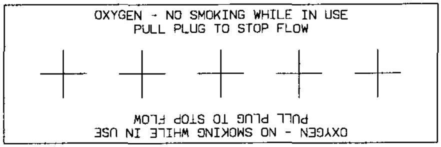
C94CE02C1951

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:

SHOULDER HARNESS
MUST BE WORN DURING
TAKE-OFF AND LANDING
WITH SEAT BACK UPRIGHT

C94CE02C1962 C

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

SHOULDER HARNESS
MUST BE WORN DURING
TAKE-OFF AND LANDING
WITH SEAT BACK UPRIGHT
AND AFT FACING SEATS
MUST HAVE HEADREST
FULLY EXTENDED

C94CE02C2447 C

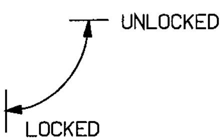
On Openable Windows:

DO NOT OPEN
IN FLIGHT

LATCH WINDOW
BEFORE TAKE-OFF

C94CE02C1957

Above Openable Window Thumbcatch:



C94CE02C1978

On the Face of Emergency Exit Latch Cover:

EMERGENCY EXIT

PULL COVER

ROTATE HANDLE UP

BREAKING SAFETY WIRE

PUSH WINDOW OUT

C94CE02C1954

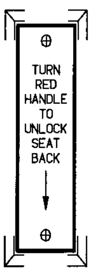
On Emergency Exit Handle:

ROTATE HANDLE UP
BREAKING SAFETY
WIRE

PUSH WINDOW OUT

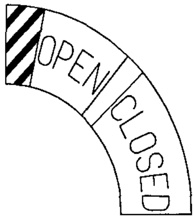
C94CE02C1955

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



C94CE02C1963

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:

BAGGAGE/CARGO COMPARTMENTS
MAXIMUM STRUCTURAL CAPACITY
1. BETWEEN SPARS - 200 POUNDS
2. REAR SPAR TO STA. 170 - 400 POUNDS
3. AFT COMPARTMENT - 70 POUNDS

MAXIMUM COMBINED WEIGHT OF AFT SEAT OCCUPANTS - 250 LBS

LOAD IN ACCORDANCE WITH WEIGHT AND BALANCE DATA

WHEN UTILITY DOORS ARE REMOVED THE FOLLOWING RESTRICTIONS APPLY TO CABIN AREA
1. NO SMOKING
2. ALL LOOSE OBJECTS MUST BE SECURED
3. PERSONNEL NOT SECURED IN SEATS BY SAFETY BELTS MUST WEAR PARACHUTES

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:

BAGGAGE AND CARGO COMPARTMENT
LOAD IN ACCORDANCE WITH
WEIGHT AND BALANCE DATA
MAXIMUM STRUCTURAL CAPACITY-400 POUNDS

MAXIMUM 5TH AND 6TH SEAT CAPACITY_____POUNDS

WHEN UTILITY DOORS ARE REMOVED THE FOLLOWING RESTRICTIONS APPLY TO CABIN AREA:
1. NO SMOKING
2. ALL LOOSE OBJECTS MUST BE SECURED
3. PERSONNEL NOT SECURED IN SEATS BY SAFETY BELTS MUST WEAR PARACHUTES

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)

SUBJECT *PAGE*

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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SUBJECT *PAGE*

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

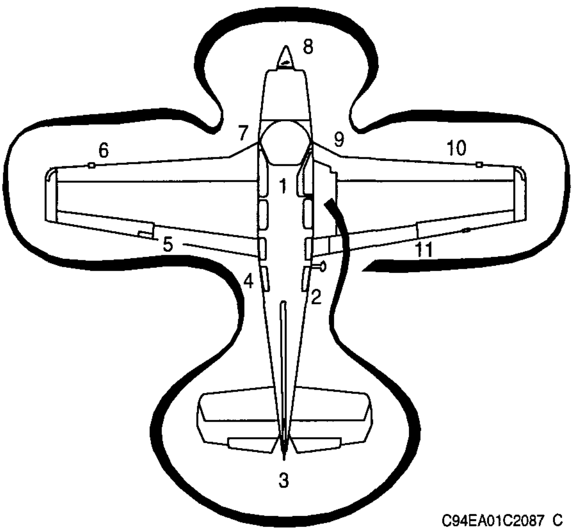
Landing Approach

- 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



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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

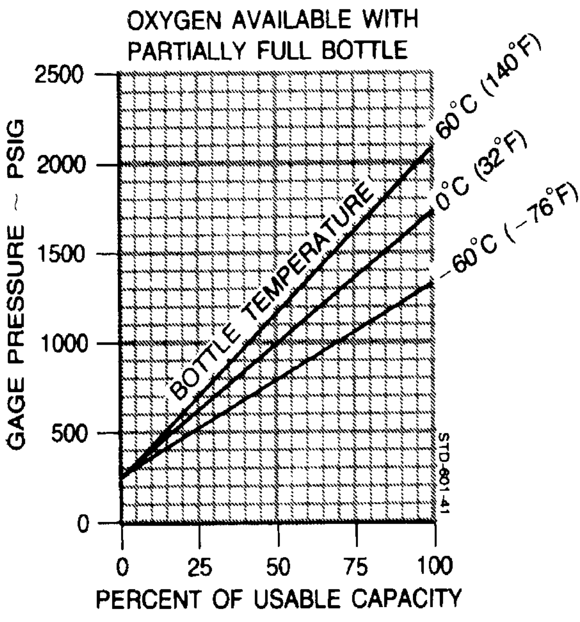
Since 90% of the system efficiency is determined by the fit of the oxygen mask, make certain the masks fit properly and are in good condition.

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)

SUBJECT *PAGE*

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:

	TEMPERATURE			
	ISA		ISA + 20°C	
ALTITUDE FEET	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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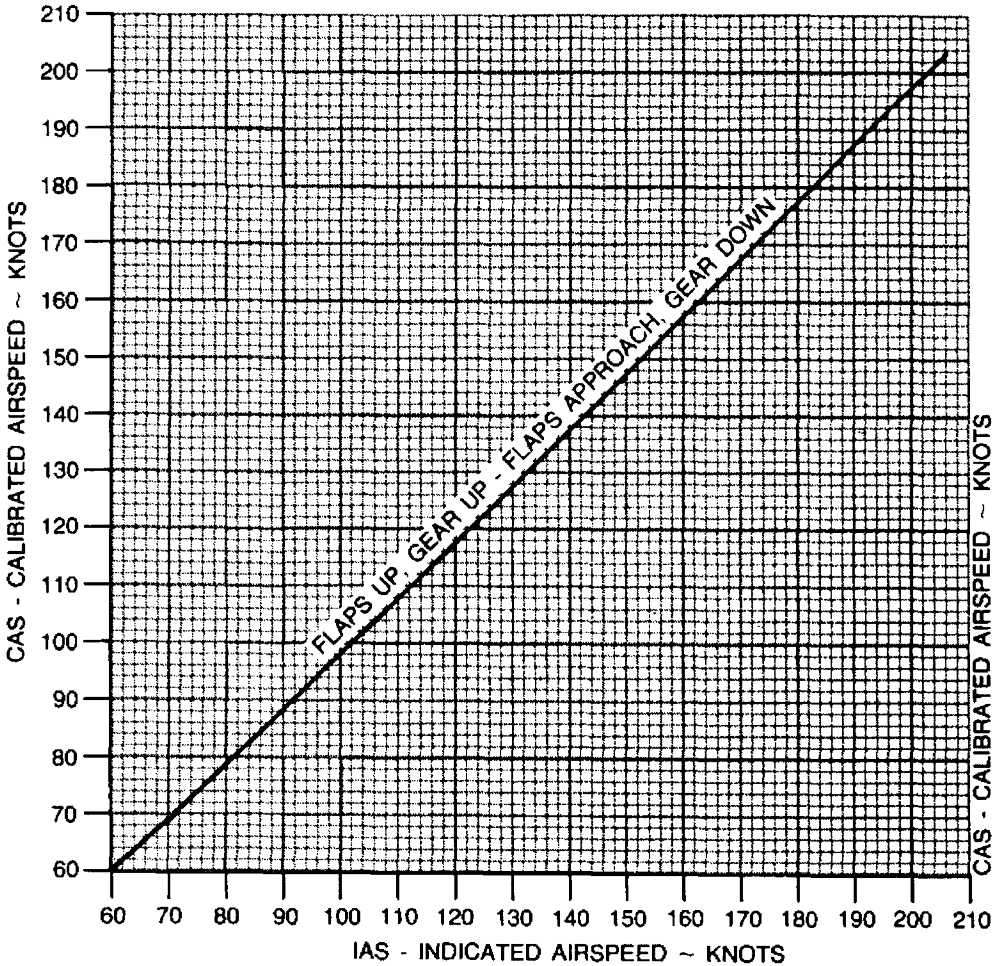
AIRSPEED CALIBRATION – NORMAL SYSTEM

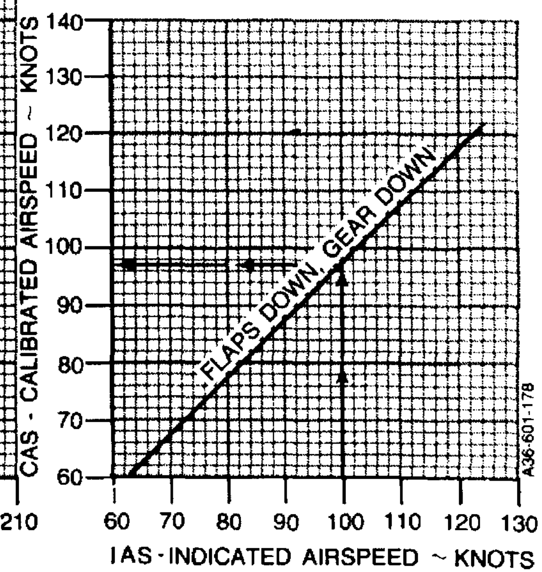
NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR



EXAMPLE:

FLAPS .... DOWN
IAS .... 100 KTS

CAS .... 97 KTS



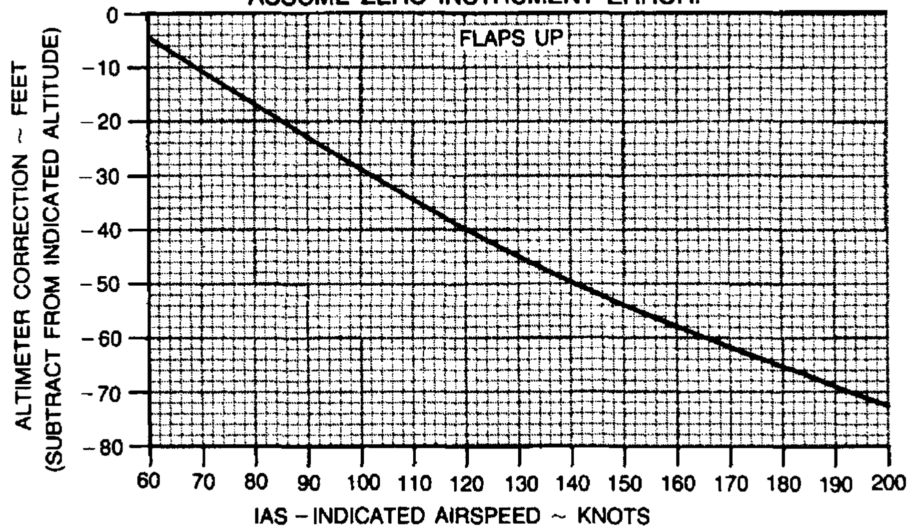
EXAMPLE:

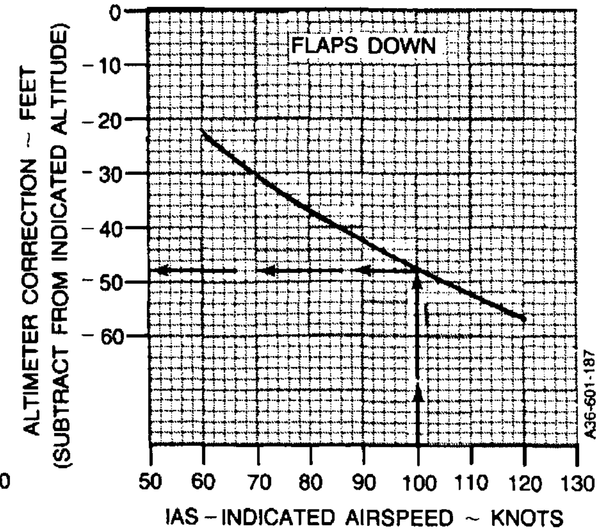
FLAPS .... DOWN
IAS .... 100 KTS
INDICATED PRESSURE
ALTITUDE .... 4500 FT

ALTITUDE CORRECTION .... -48 FT
ACTUAL PRESSURE ALTITUDE ... 4452 FT

ALTIMETER CORRECTION - NORMAL SYSTEM

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





AIRSPEED CALIBRATION - ALTERNATE SYSTEM

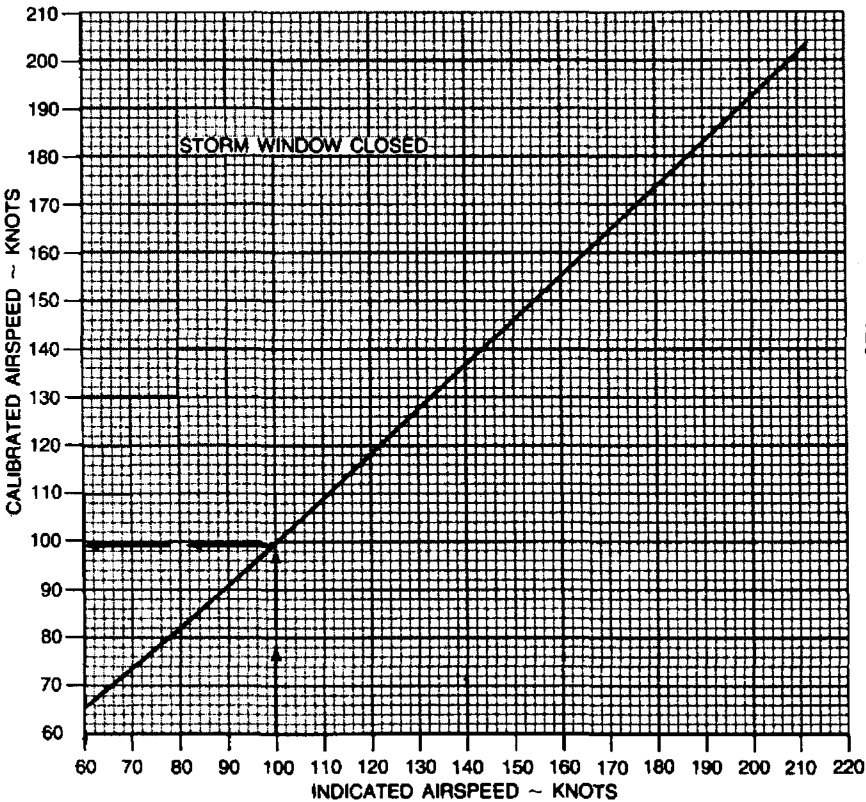
ALL FLAP POSITIONS

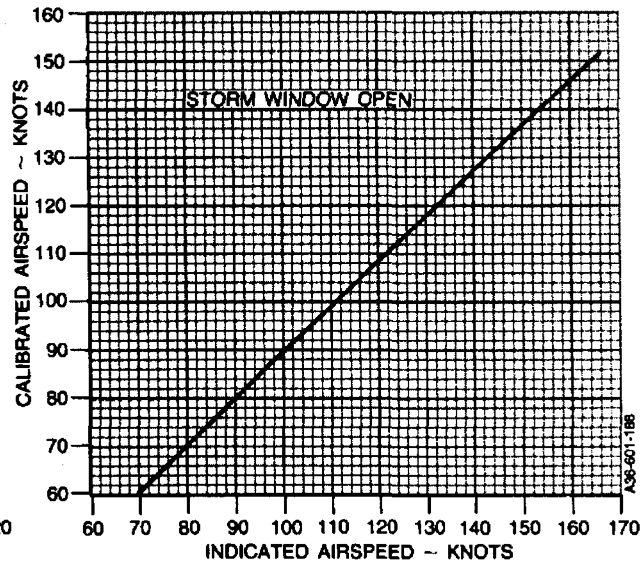
NOTES: 1. INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.
2. NORMAL STATIC PORTS ARE OBSTRUCTED.

EXAMPLE:

IAS .... 100 KNOTS
STORM WINDOW .... CLOSED

CAS .... 99.5 KNOTS





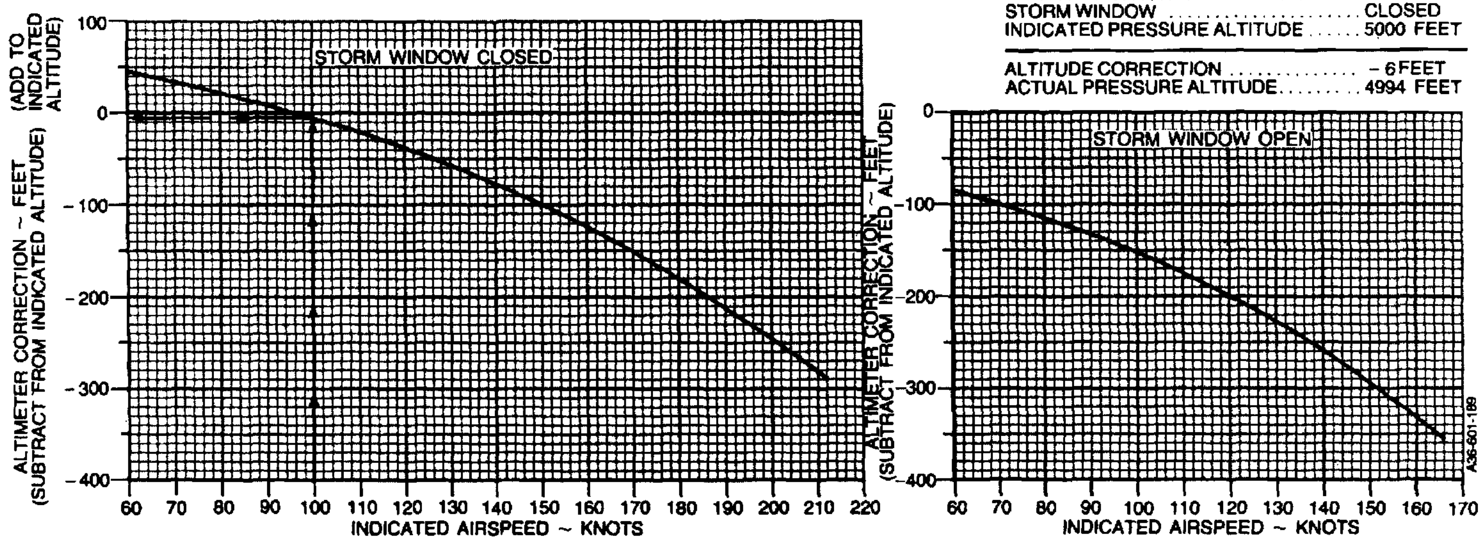
ALTIMETER CORRECTION - ALTERNATE SYSTEM

ALL FLAP POSITIONS

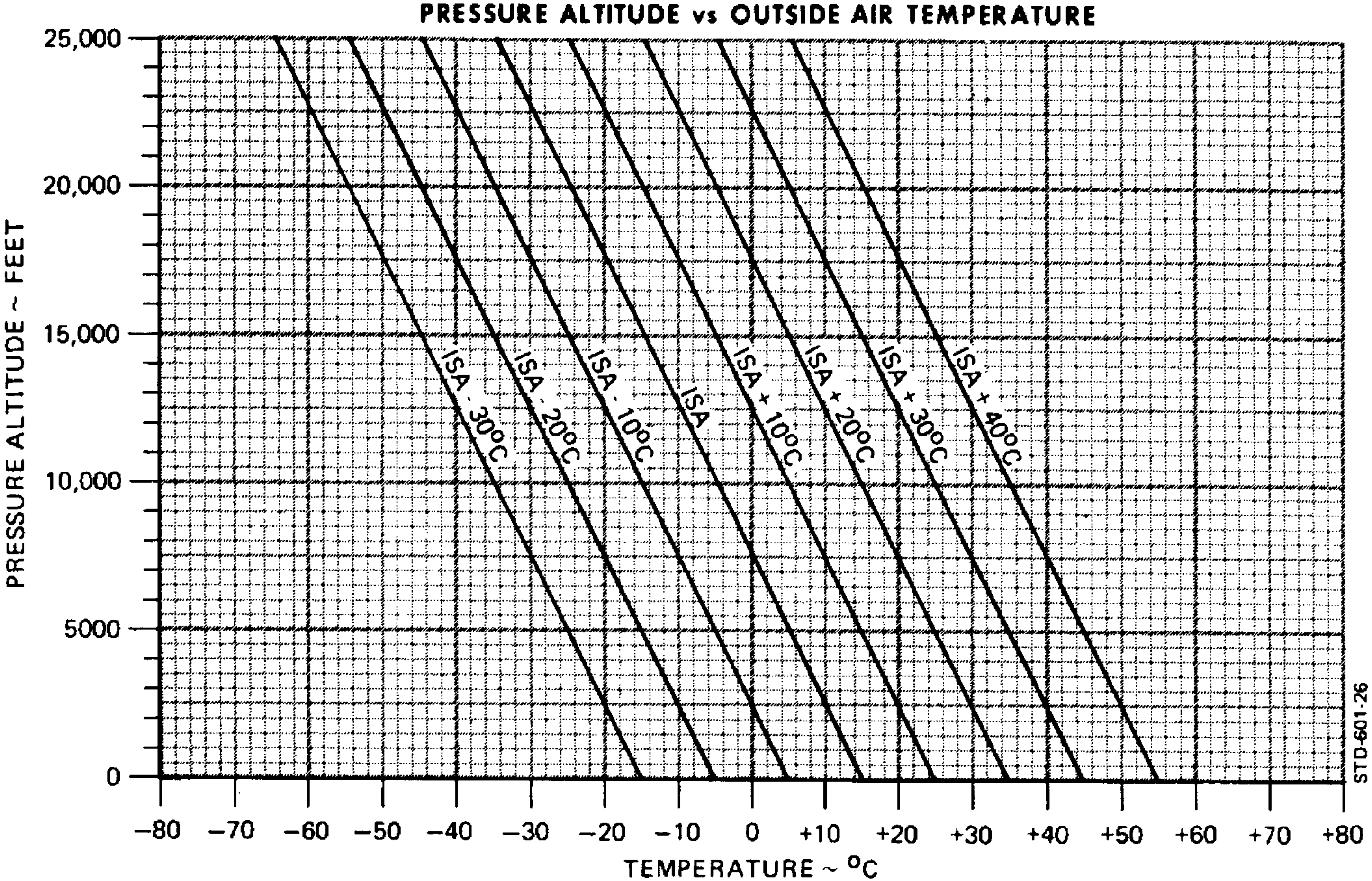
NOTES: 1. INDICATED AIRSPEED AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR.
2. NORMAL STATIC PORTS ARE OBSTRUCTED.

EXAMPLE:

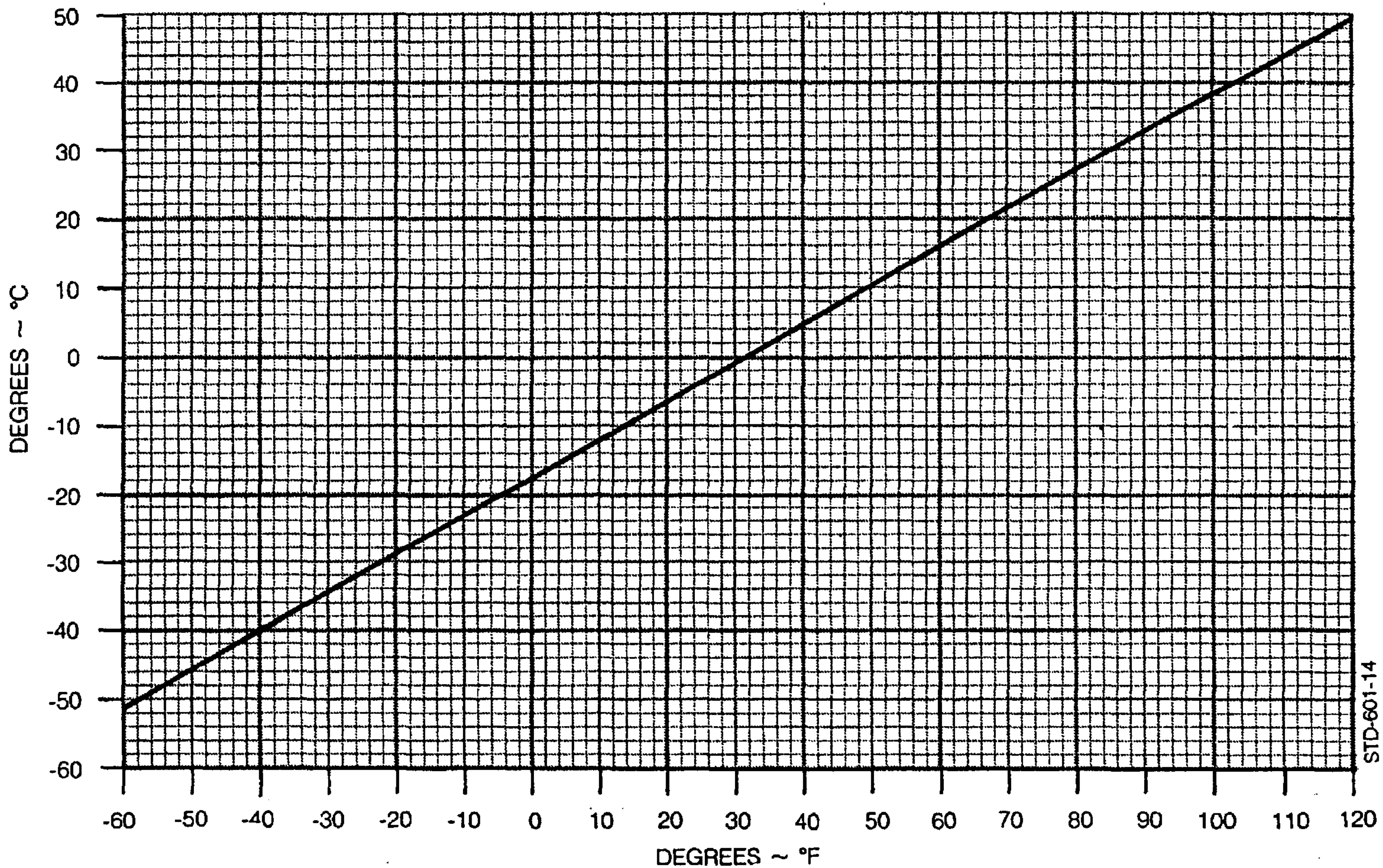
IAS	100 KNOTS
STORM WINDOW	CLOSED
INDICATED PRESSURE ALTITUDE	5000 FEET
ALTITUDE CORRECTION	- 6 FEET
ACTUAL PRESSURE ALTITUDE	4994 FEET



ISA CONVERSION



FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION



STALL SPEEDS – POWER IDLE

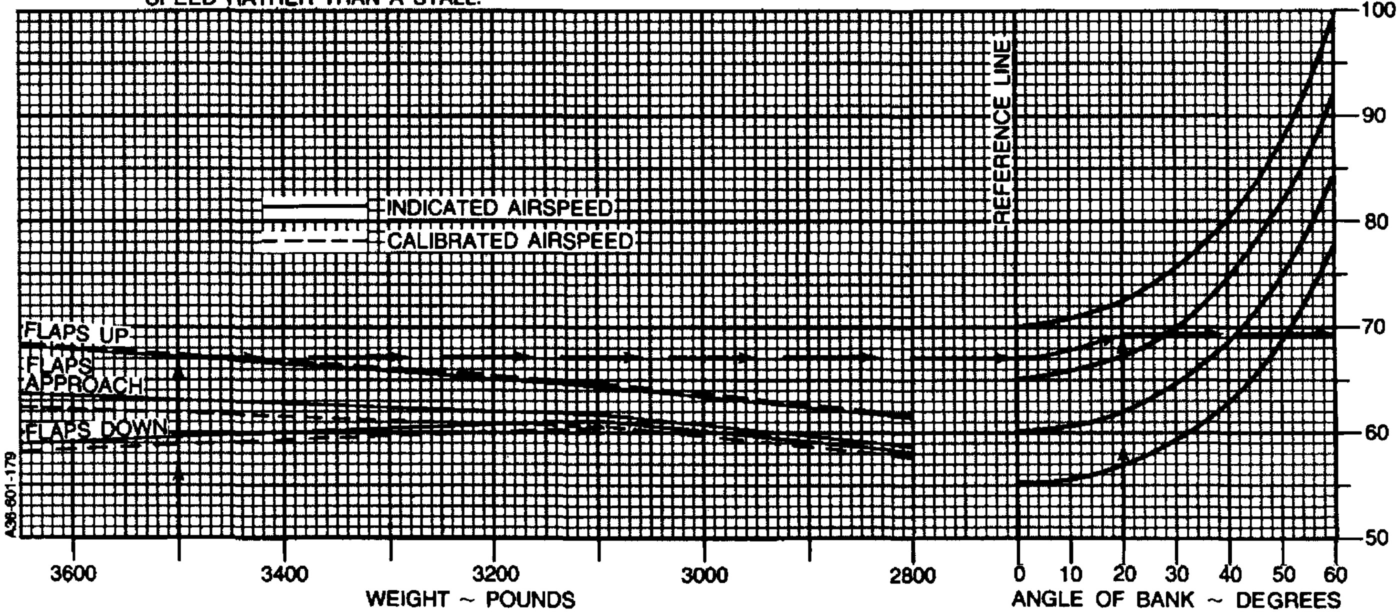
Notes: 1. THE MAXIMUM ALTITUDE LOSS EXPERIENCED WHILE CONDUCTING STALLS IN ACCORDANCE WITH CAR 3.120 WAS 320 FEET.

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



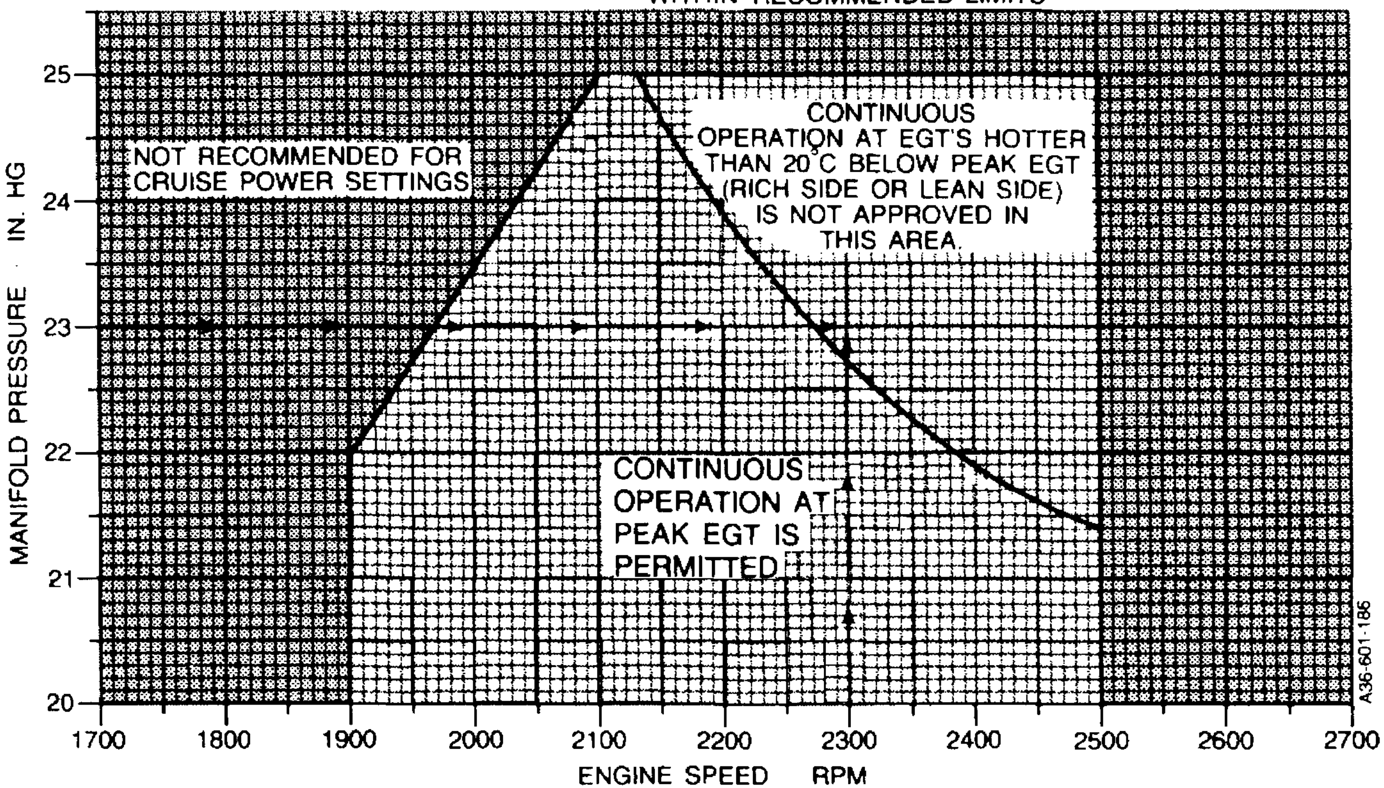
MANIFOLD PRESSURE vs RPM

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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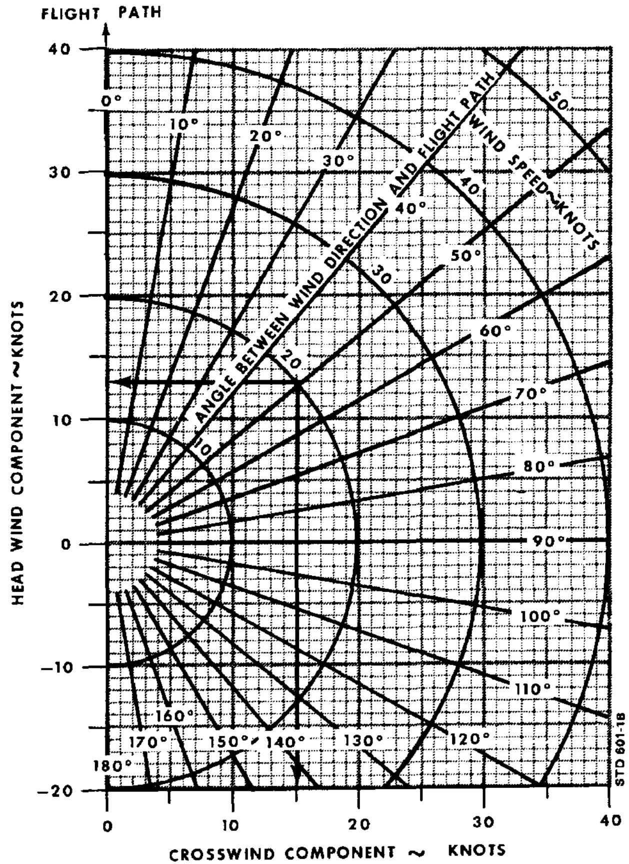
WIND COMPONENTS

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:

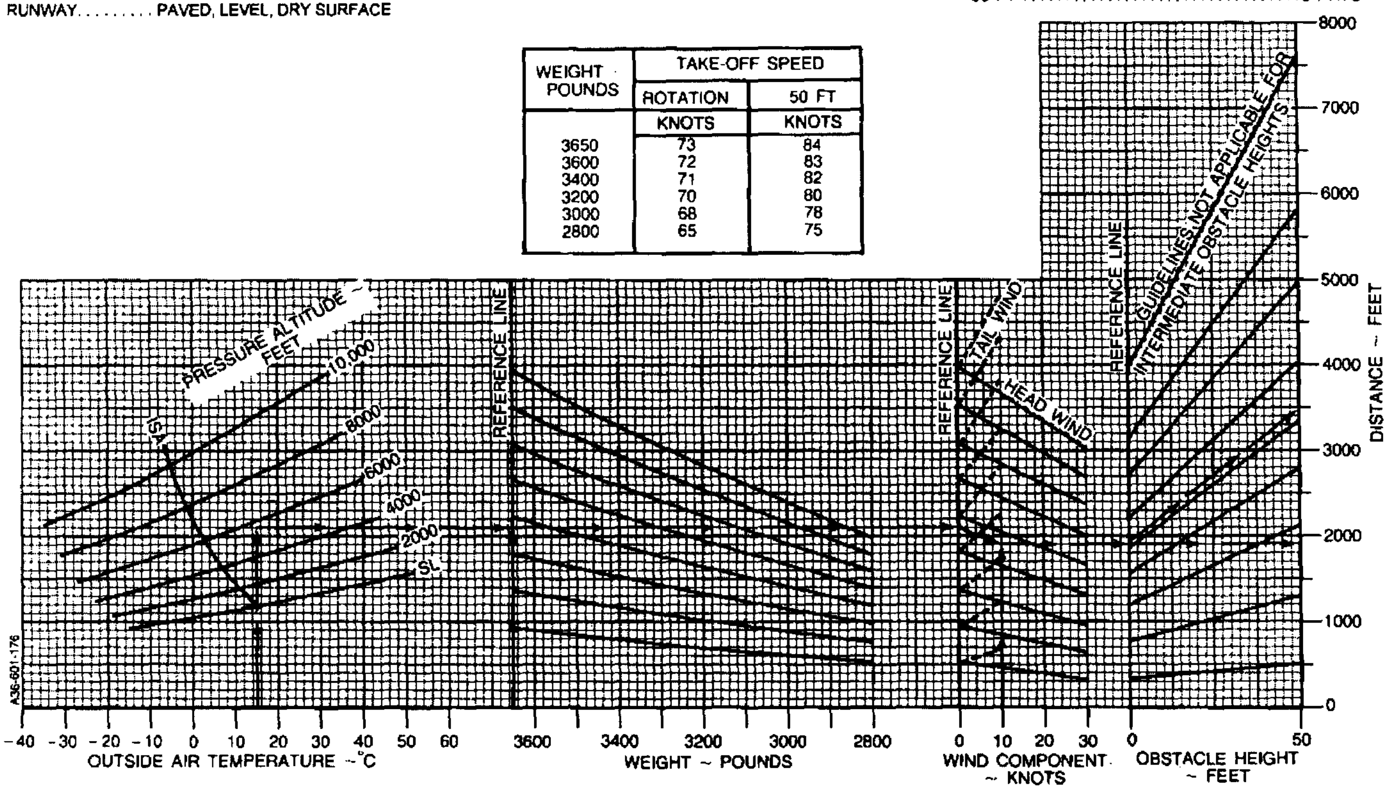
POWER.......... TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE......... FULL RICH (E-1946, E-2104, E-2111 THRU E-3144, NOT IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
AS REQUIRED BY FIELD ELEVATION (E-3145 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH RAYTHEON AIRCRAFT S.B. 28-3052)
FLAPS...........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

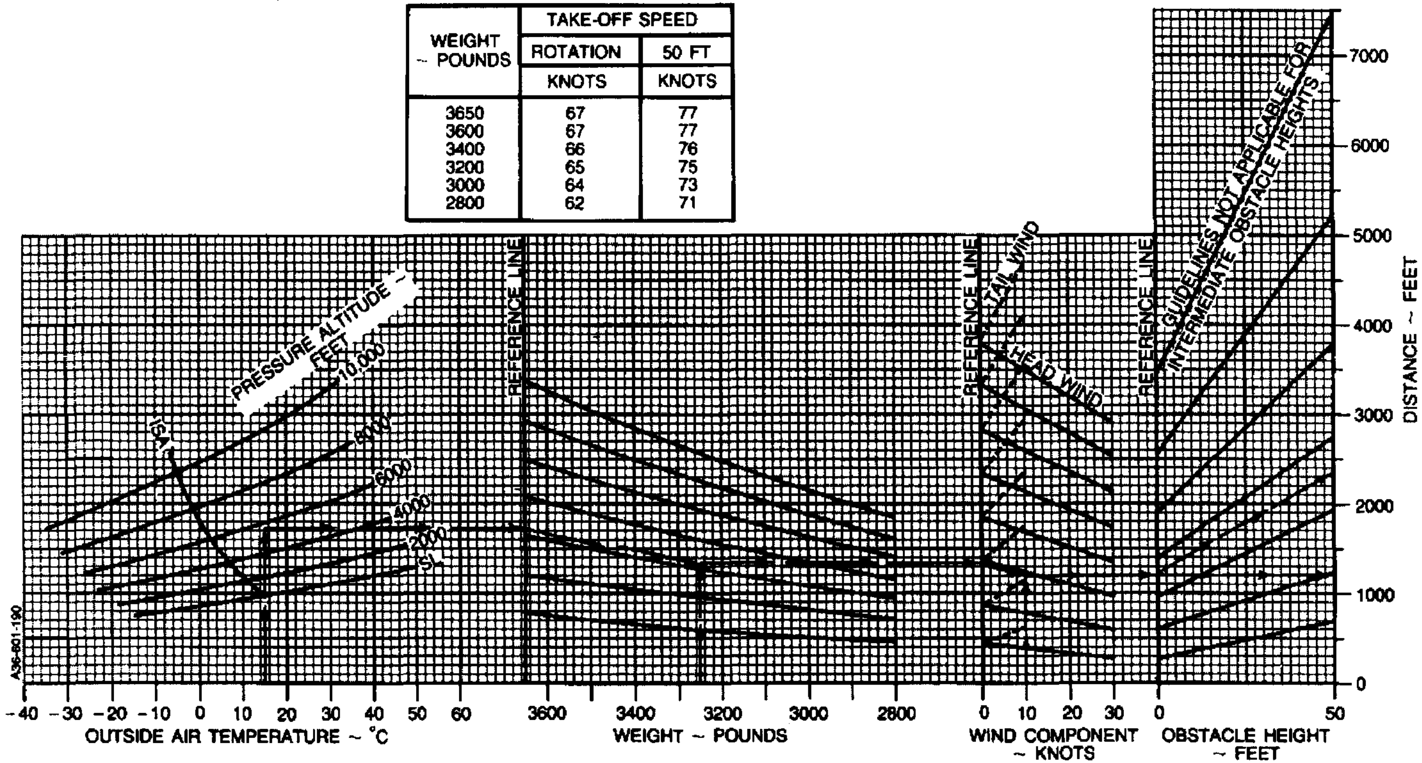
ASSOCIATED CONDITIONS:

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

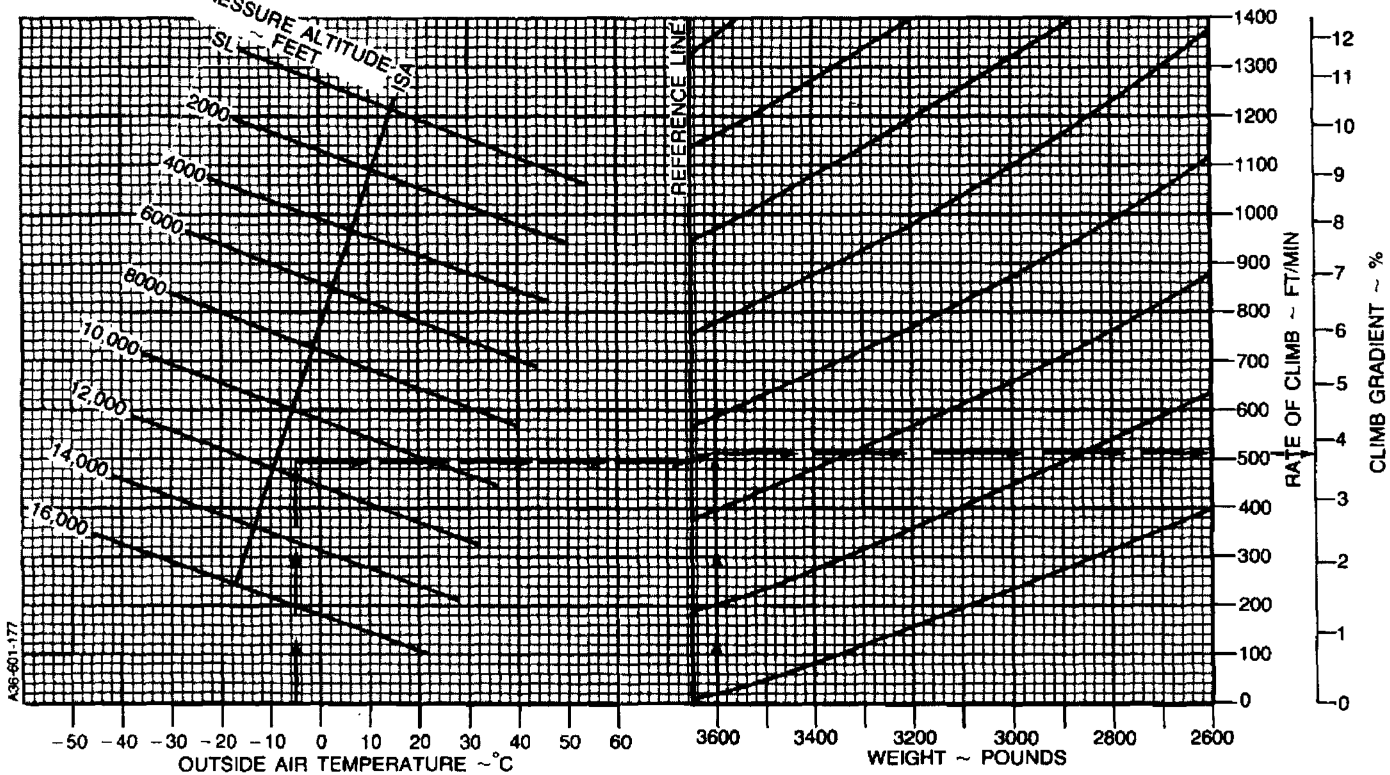
ASSOCIATED CONDITIONS:

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

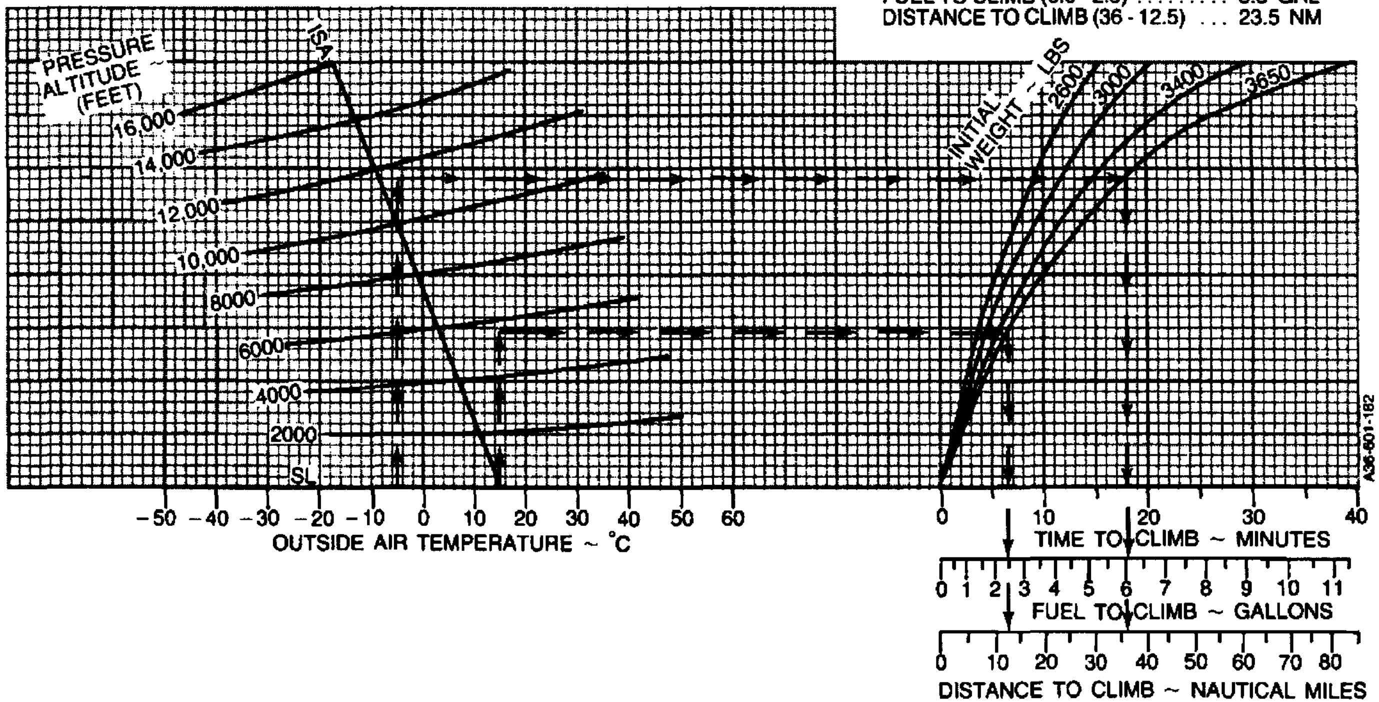
CLIMB SPEED: 110 KNOTS ALL WEIGHTS

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



Raytheon Aircraft

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	158
	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	156
	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.

Raytheon Aircraft

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

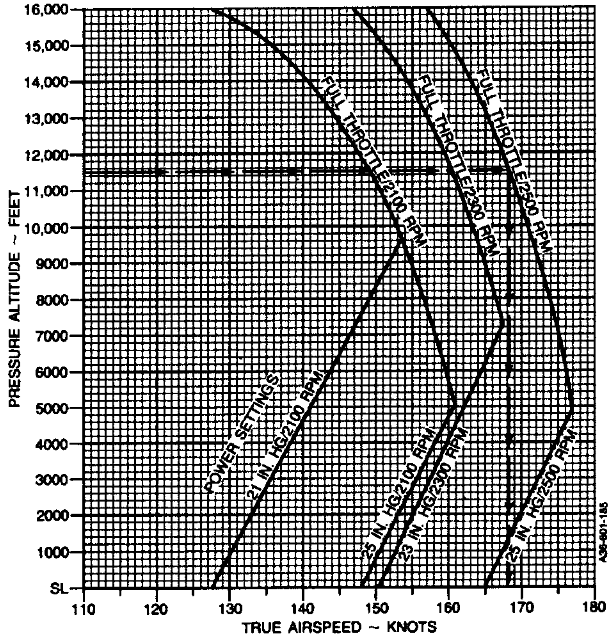
NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

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

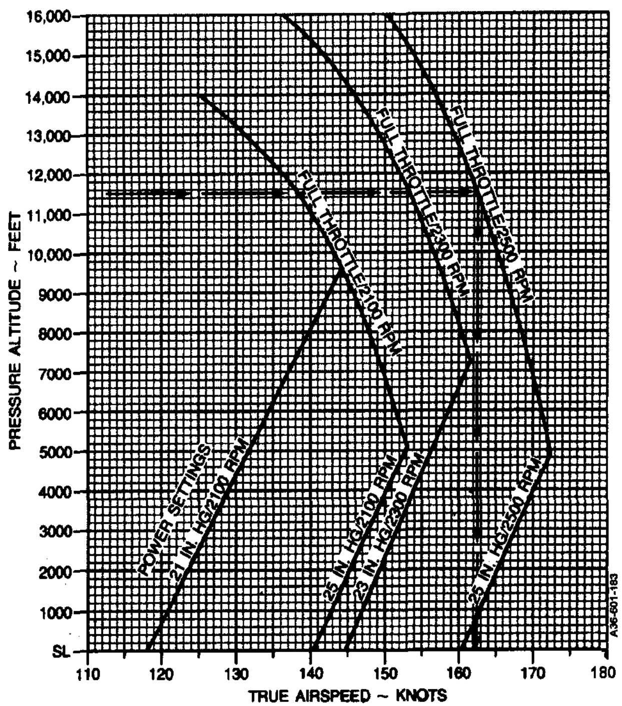


CRUISE SPEEDS

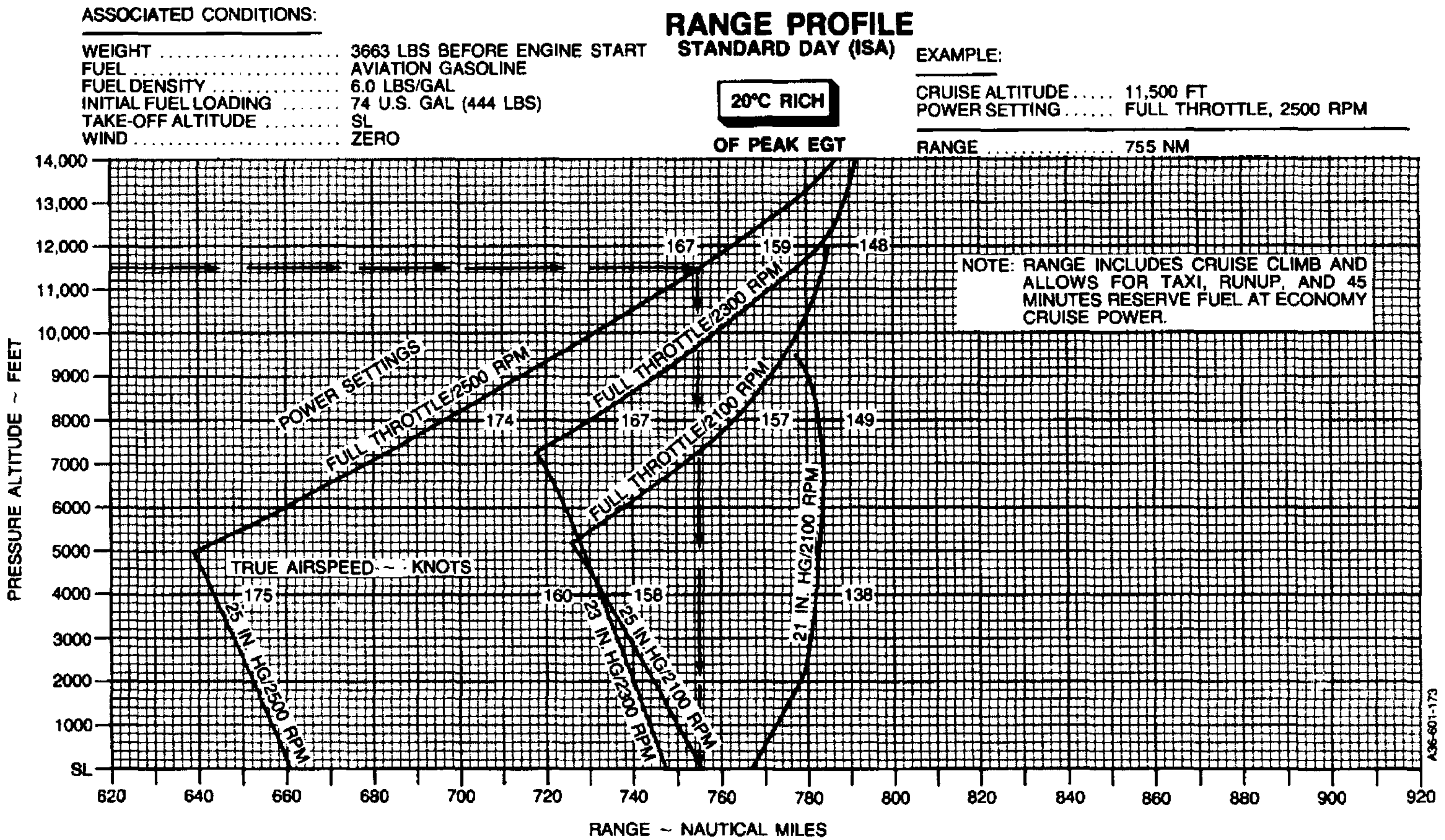
20°C LEAN

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	163 KTS



RANGE PROFILE



RANGE PROFILE

STANDARD DAY (ISA)

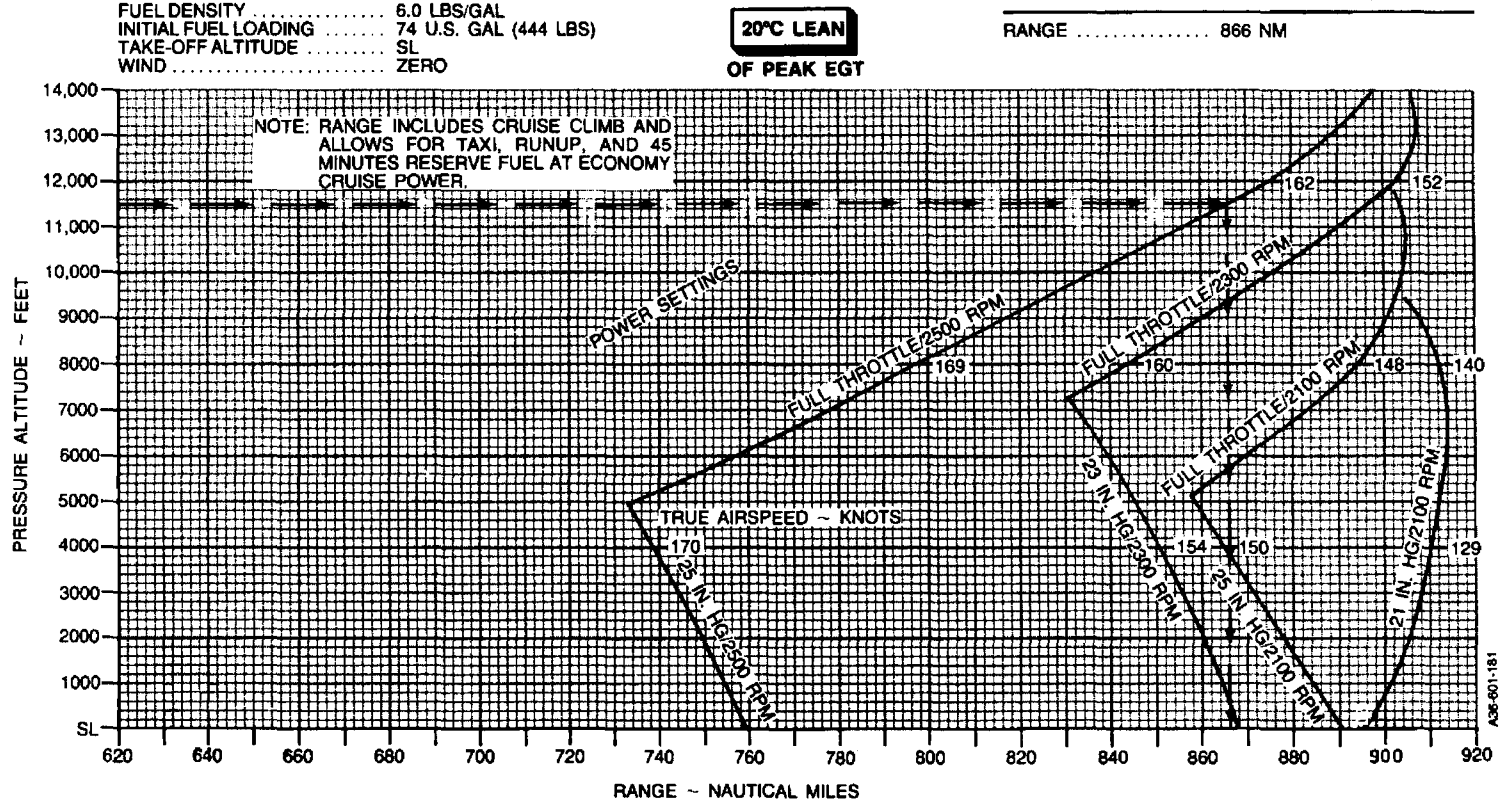
ASSOCIATED CONDITIONS:

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

EXAMPLE:

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

RANGE .... 866 NM



ENDURANCE PROFILE
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

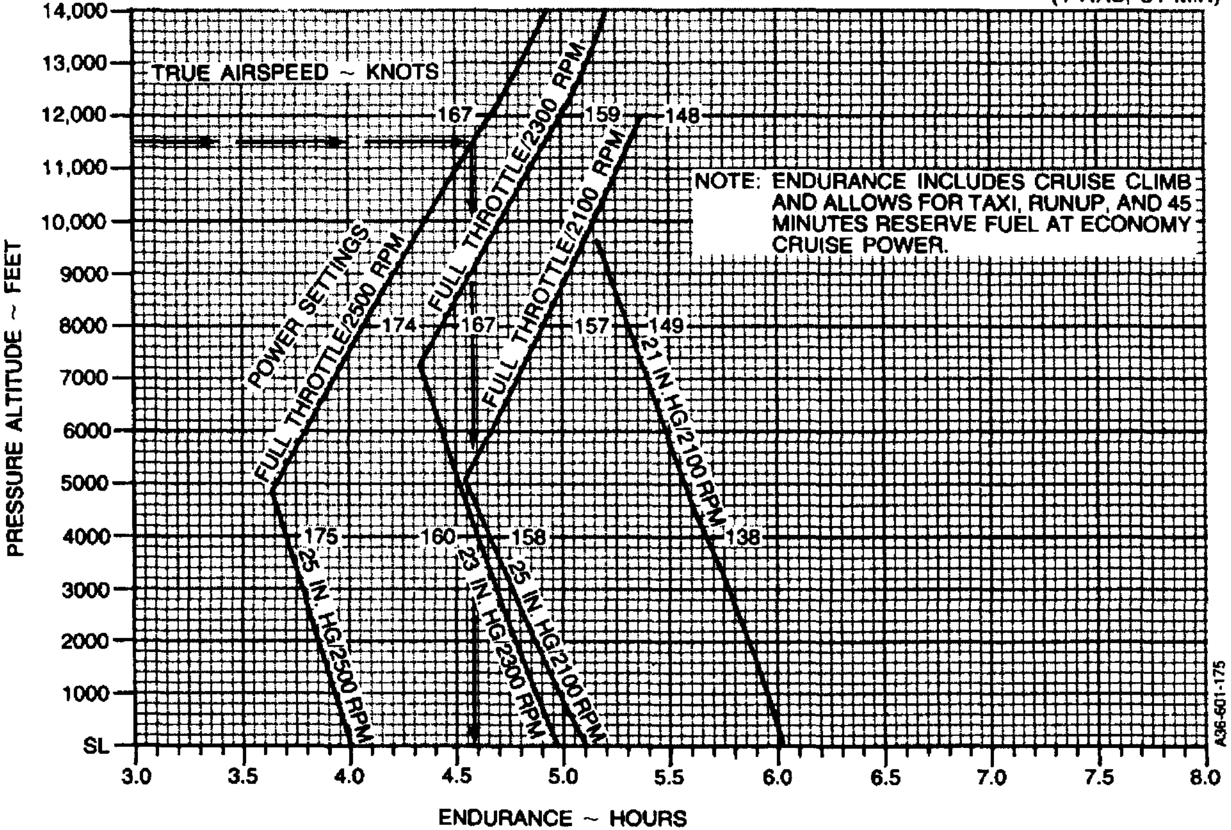
WEIGHT .... 3663 LBS BEFORE ENGINE START
FUEL .... AVIATION GASOLINE
FUEL DENSITY .... 6.0 LBS/GAL
INITIAL FUEL LOADING ..... 74 U.S. GAL (444 LBS)
TAKE-OFF ALTITUDE .... SL

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)

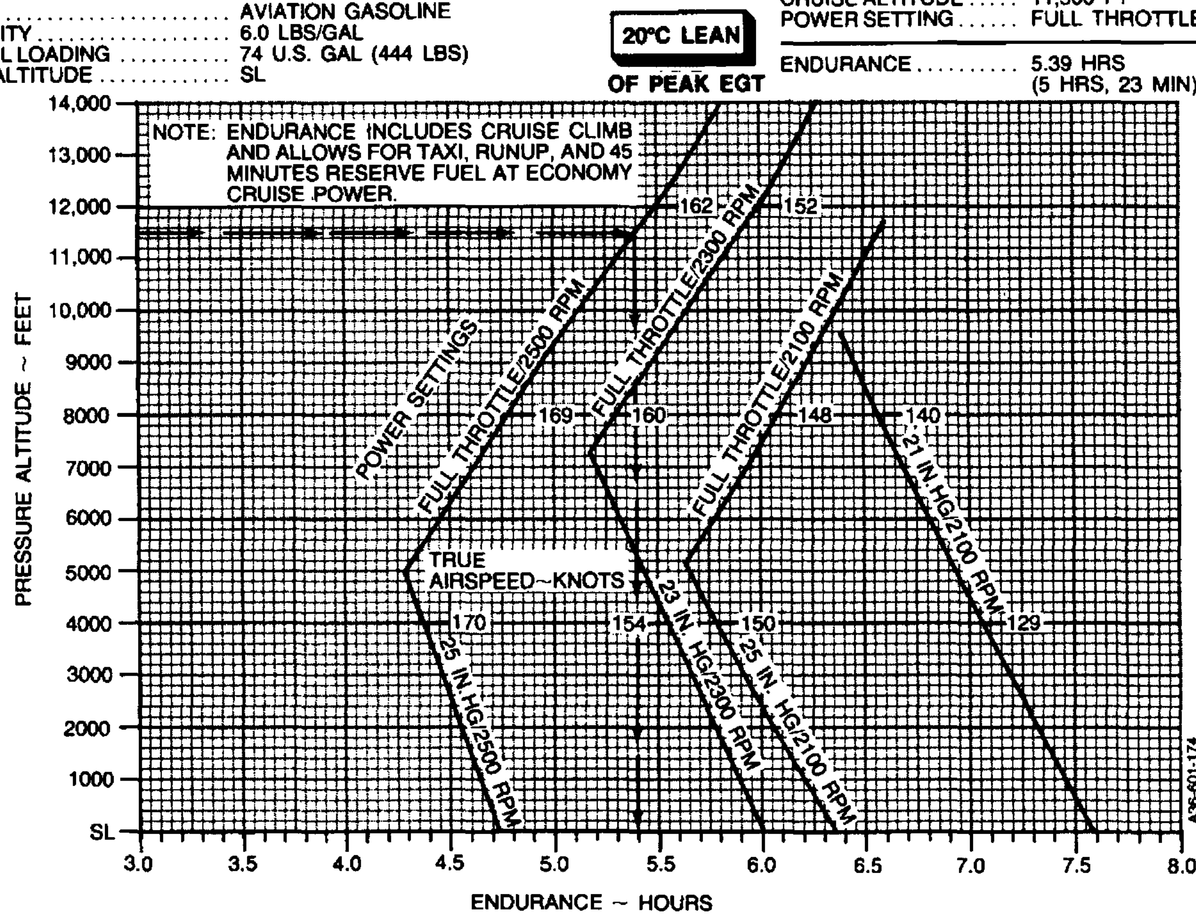
ASSOCIATED CONDITIONS:

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

EXAMPLE:

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

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



LANDING DISTANCE

ASSOCIATED CONDITIONS:

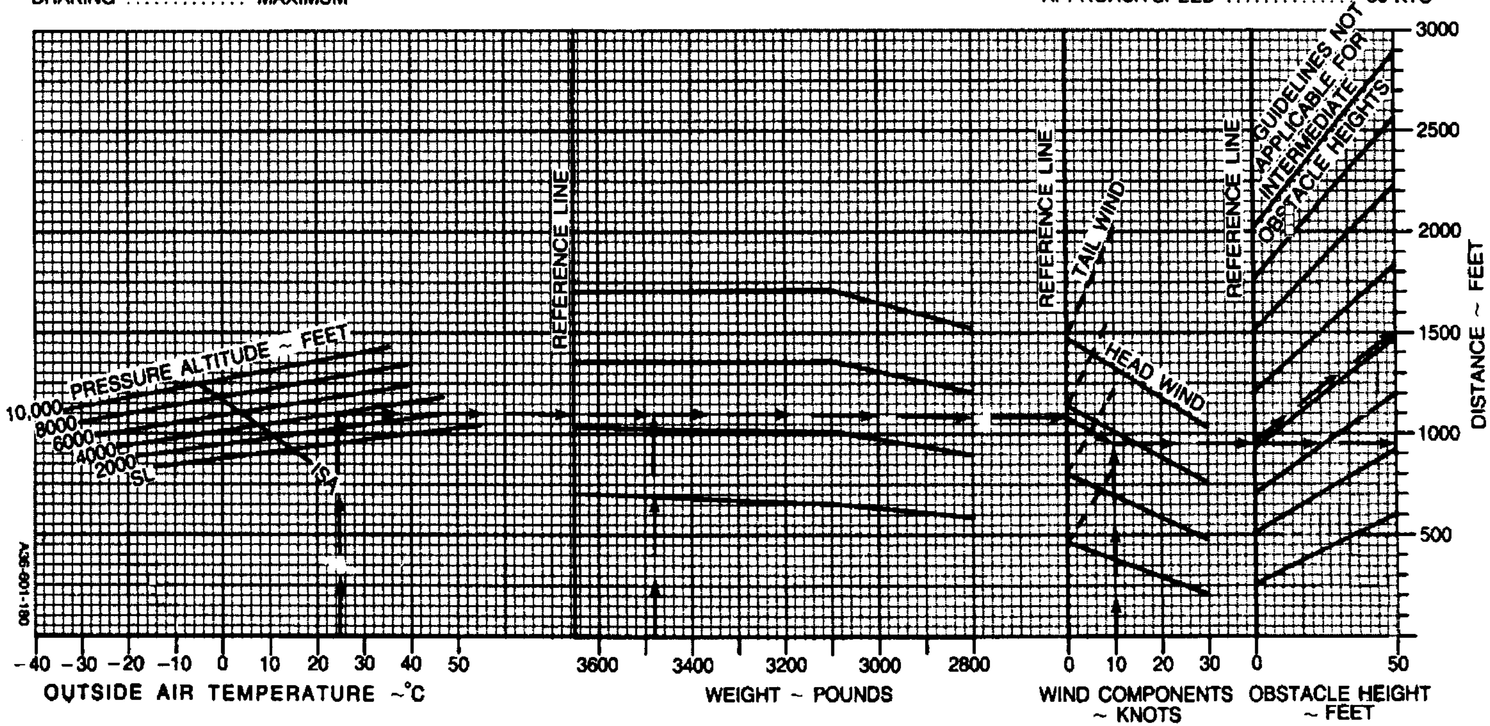
POWER .... RETARDED TO MAINTAIN 900 FT/MIN ON FINAL APPROACH
FLAPS .... DOWN (AMBER)
LANDING GEAR .... DOWN
RUNWAY .... PAVED, LEVEL, DRY SURFACE
APPROACH SPEED .... IAS AS TABULATED
BRAKING .... MAXIMUM

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
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SUBJECT *PAGE*

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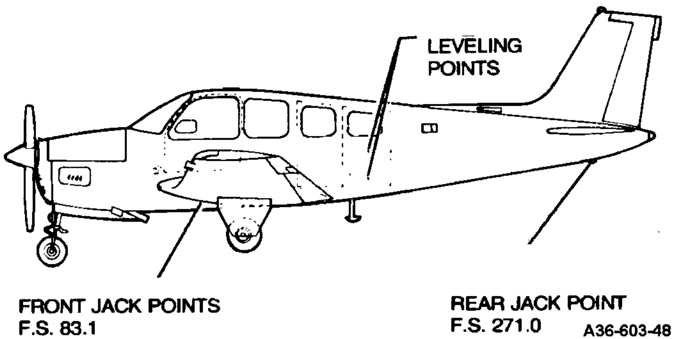
BASIC EMPTY WEIGHT AND BALANCE - ACTUAL (THIS PAGE TO BE REPLACED UPON AIRCRAFT DELIVERY)

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

WEIGHING INSTRUCTIONS



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.

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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.)	$\frac{\text{MOM}}{100}$	WT (LBS)	$\frac{\text{MOM}}{100}$

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.)	$\frac{MOM}{100}$	WT (LBS)	$\frac{MOM}{100}$

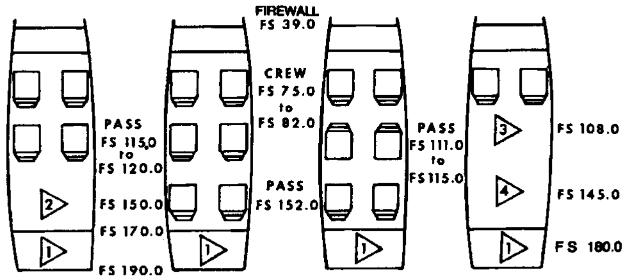
BT04946

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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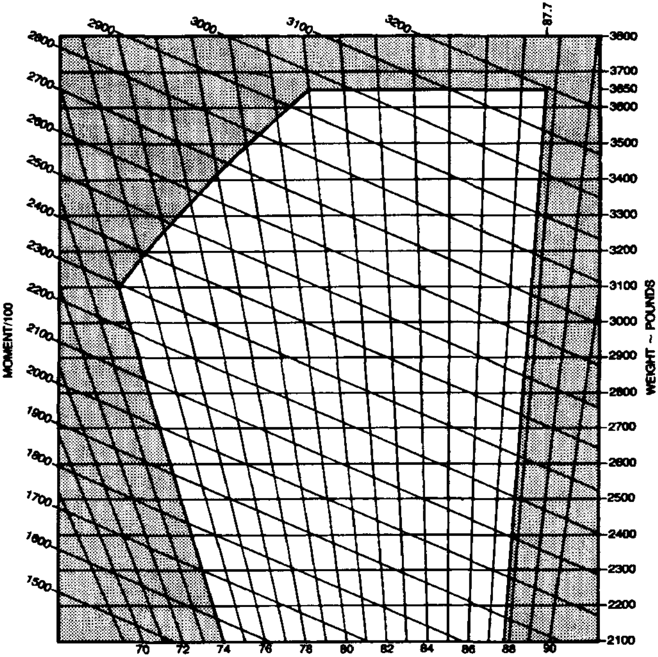
MOMENT LIMITS VS WEIGHT



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				

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

SUBJECT *PAGE*

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

SUBJECT *PAGE*

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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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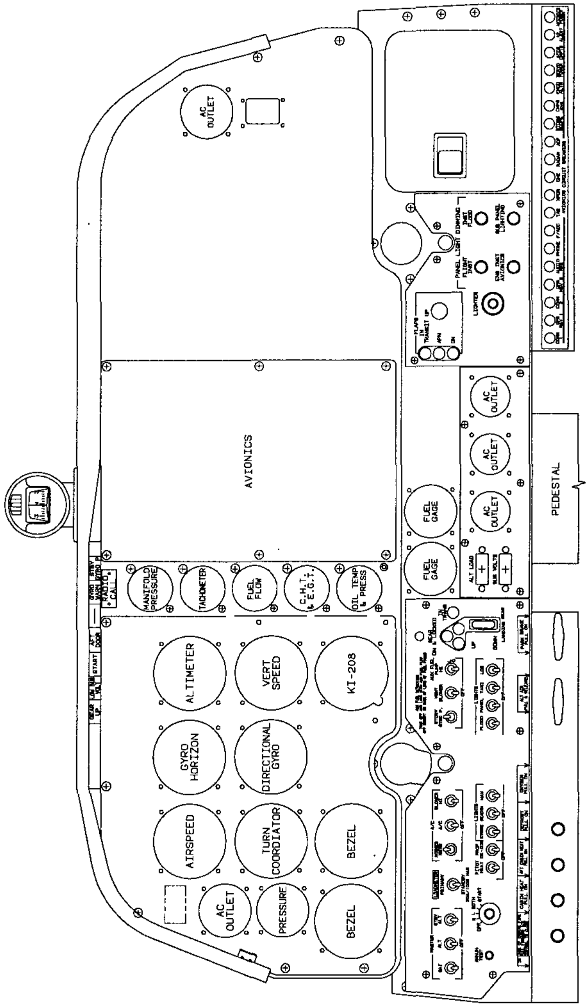

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TYPICAL INSTRUMENT PANEL

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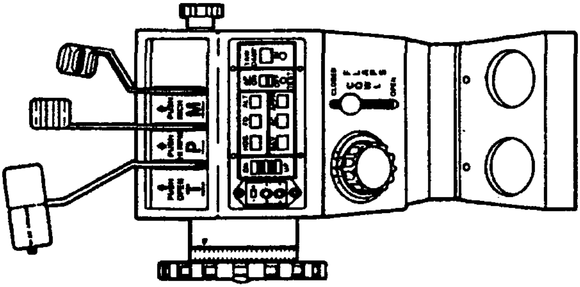
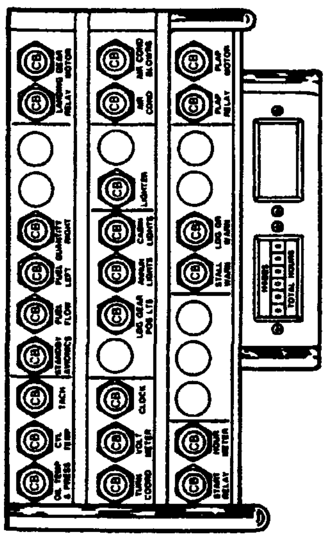


PEDESTAL



LEFT SIDE PANEL

ENGINE INSTRUMENT PANEL

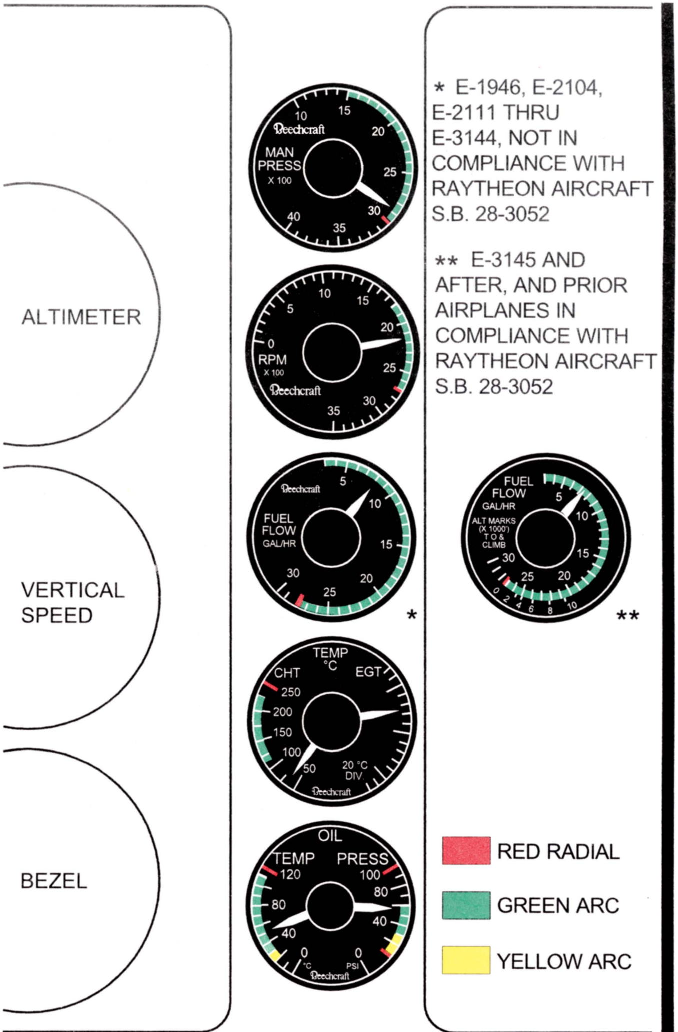
The engine instrument panel contains a manifold pressure gage, an engine tachometer, a fuel flow gage, a combination cylinder head temperature/exhaust gas temperature gage, and a combination oil temperature/oil pressure gage.

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 photo-electric 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:

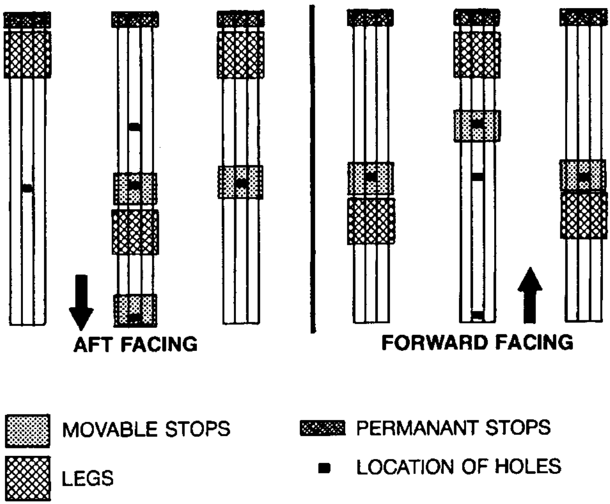
1. One stop in each of the two aft holes of the center track (position center leg between stops).
2. One stop stowed in one of the outer tracks.

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

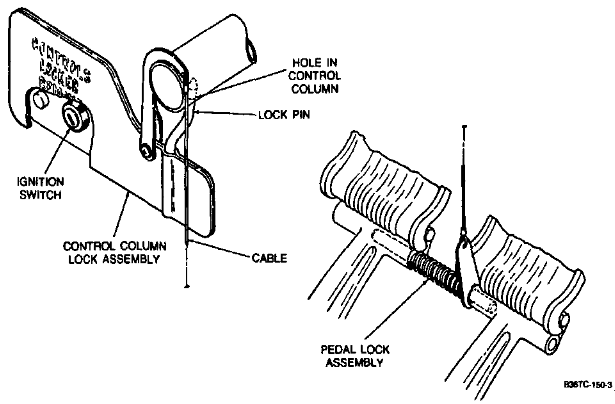
To Install The Control Locks:

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.

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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

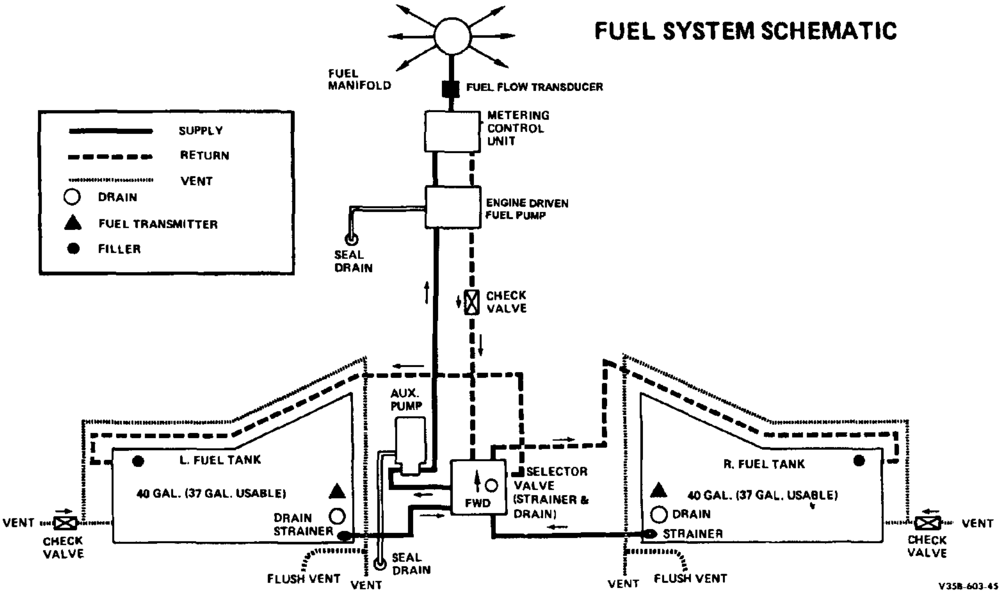
> Position selector valve handle in detents only. There is no fuel flow to the engine between detents (indicated by red arc).

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



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

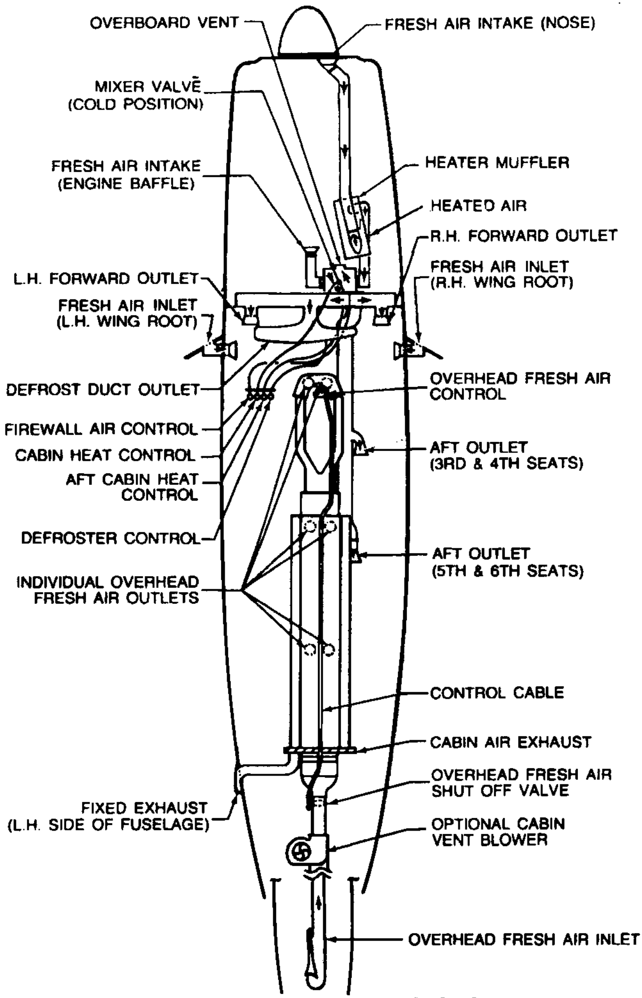
Fresh ram air enters the cabin through the overhead fresh air scoop located on the left side of the dorsal fairing. This air is ducted through the optional cabin vent blower and overhead fresh air shutoff valve to the six overhead fresh air outlets. Each outlet can be adjusted to control the volume and 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
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SUBJECT *PAGE*

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 covered or masked off. Avoid directing high-pressure sprays toward the fuselage, wings, and empennage from the rear, where moisture and chemicals might more easily enter the structure, causing corrosion damage to structural members and moving parts.

CAUTION

When cleaning 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

A36 Bonanza Pilot's Operating Handbook/ Airplane Flight Manual Supplement Pack

(E-1946, E-2104, E-2111 thru E-3629, E-3631 thru E-3635)

The supplements contained in this supplement pack may not have been approved yet by foreign regulatory agencies. To determine approval status, view our web page at http://pubs.hawkerbeechcraft.com and perform a search for the supplement part number. Any information pending foreign regulatory agency approval will be listed in the description.

Hawker Beechcraft

36-590002-37 Supplement Pack

SUPPLEMENTS

NOTE

The supplemental data contained in this section is for equipment that was delivered on the airplane including standard optional equipment that was available, whether it was installed or not. Airplane Flight Manual Supplements for equipment for which the vendor obtained a Supplemental Type Certificate were included as loose equipment with the airplane at the time of delivery. These and other Airplane Flight Manual Supplements for other equipment that was installed after the airplane was delivered new from the factory should be placed in this section.

Raytheon Aircraft Company

LOG OF SUPPLEMENTS

Model A36 Bonanza®

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

P/N 36-590002-37

December, 2006

FAA Supplement must be in the airplane for all flight operations when subject equipment is installed.

PART NUMBER	SUBJECT	REV NO.	DATE
*33-590009-19	Collins ANS-351 Area Navigation System	1	12/78
*35-590118-13	King KN-74 Area Navigation System	3	12/78
*35-590118-43	King KNS-80 Integrated Navigation System	1	12/78
36-590002-41	Air Conditioning System	1	4/84
*36-590002-43	Operation of United Kingdom Registered Aircraft	1	4/89
36-590002-47	Full Flap Warning Horn System		12/90
36-590002-49	Landing Gear Warning Light System		12/90
36-590002-51	Low Throttle Landing Gear Retract Prevention, Gear Warning System		12/90
*36-590002-53	Bendix/King KLN-88 Multi-Chain Loran Navigation System		10/90

Log Of Supplements (Cont'd)
36-590002-37
December, 2006

PART NUMBER	SUBJECT	REV NO.	DATE
*36-590002-55	A36 Bonanza Modified for Reduced External Noise	1	11/91
*36-590002-57	Four Position Flap Indicator		4/91
36-590002-59	Dual Garmin GNS 430 or Garmin GNS 530 & Garmin GNS 430 VHF Communications Transceivers/ VOR/ILS Receivers/GPS Receivers with Garmin Course Deviation Indicator with Mid-Continent Instruments GPS Annunciator Control Unit with PS Engineering PMA7000M-S Audio Panel with BF Goodrich WX-500 Weather Mapping Sensor with Shadin F/ADC 200 or 200+ Fuel/Air Data Computer when used with Allied Signal KFC 225 Automatic Flight Control System	1	08/00
36-590002-0061	Honeywell KMH880 Multi-Hazard Awareness System with the Honeywell KMD 550 Multi-Function Display and Mid-Continent Instrument Company MD41-1208 Terrain Awareness Annunciator Control Unit		01/03
36-590002-0063	Honeywell KMH880 Multi-Hazard Awareness System with the Mid-Continent Instrument Company MD41-1208 Terrain Awareness Annunciator Control Unit		03/03

Log Of Supplements (Cont'd)
36-590002-37
December, 2006

PART NUMBER	SUBJECT	REV NO.	DATE
36-590002-0065	Dual Garmin GNS 430 or Garmin GNS 530 & Garmin GNS 430 VHF Communications Transceivers/ VOR/ILS Receivers/GPS Receivers with Garmin Course Deviation Indicator with Mid-Continent Instruments GPS Annunciator Control Unit with PS Engineering PMA7000B-Series Audio Panel with BF Goodrich WX-500 Weather Mapping Sensor with Shadin F/ADC 200 or 200+ Fuel/Air Data Computer when used with Allied Signal KFC 225 Automatic Flight Control System	1	09/03
*36-590002-0069	Israel Air Force Light Transport And Utility Aircraft (RAC approved only)	2	12/06
36-590003-11	King KNS-81 Integrated Navigation System	2	10/83
36-590006-9	Electrothermal Propeller Deice (28-Volt)	2	4/84
36-590006-21	Standby Generator Power System (28-Volt)		10/83
36-590006-23	Standby Instrument Air Pressure System	2	2/86
36-590006-25	Deleted		
58-590000-49	Inside Cabin Door Handle With Open/Closed Placard		12/90
58-590000-55	ARTEX ELT 110-4-002 With Remote Cockpit Switch	1	12/99

Log Of Supplements (Cont'd)
36-590002-37
December, 2006

PART NUMBER	SUBJECT	REV NO.	DATE
HPA36-2	Hartzell 3-Bladed Propeller per STC SA00719LA	C	01/06
FMS410-1	B&C Specialty Products BC410-1 Standby Alternator System per STC SA00724WI and STC SE00729WI	A	4/2/03 or later
**006-00838-0000	Bendix/King KLN 90B GPS Navigation System per STC SA00242WI-D	A	8/21/98 or later
**006-00862-0000	Bendix/King KFC 225 Automatic Flight Control System per STC SA00667WI-D	A	1/20/99 or later

NOTE: Supplements applicable to equipment other than that installed may, at the discretion of the owner/operator, be removed from the manual.

** Supplements marked with an asterisk will not be supplied with handbooks sold through Authorized Raytheon Outlets due to their limited applicability. If a document is required for your airplane, please order the document through normal channels.*

*** Supplements marked with a double asterisk will not be supplied with manuals sold through Authorized Raytheon Aircraft Outlets. If a document is required for your airplane, order through the applicable STC system manufacturer.*

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BEECHCRAFT LANDPLANES F33A, V35B, A36, AND A36TC

PILOT'S OPERATING HANDBOOK AND
FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

COLLINS ANS-351 AREA NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA approved material and must be attached to the *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* when the airplane has been modified by installation of the Collins ANS-351 Area Navigation System in accordance with Beech FAA Approved Data.

The information in this supplement supersedes or adds to the basic *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The Area Navigation function may not be used as a primary system under IFR conditions except on approved approach procedures, approved area navigation airways, and random area navigation routes when approved by Air Traffic Control.

2. The Area Navigation function can only be used with collocated facilities. (VOR and DME signals originate from the same geographical location.)

3. The maximum distance for waypoint location is 199 nautical miles from the VOR/DME facility.

4. Approach mode should be restricted to distance of 50 nautical miles or less from the waypoint in use.

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude, and angle of bank.

1. If NAV flag appears while in the enroute mode, check for correct frequency.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

1. NAV receivers - ON

2. Presetting waypoints on the ground:

NOTE

When power is first applied to the ANS-351 and the system is in the RNAV mode, WPT 1 will be active and waypoint bearing and distance indicators will read zero.

a. WPT 1 coordinates are set into the ANS-351 using the concentric knobs under the bearing and distance display fields.

b. The waypoint selection knob is then rotated to select WPT 2. Note that the waypoint number is blinking, indicating that the waypoint is inactive at this point. WPT 2 bearing and distance definitions are then set into the ANS-351.

c. Set up the rest of the desired waypoints as described above. The ANS-351 has memory capacity for 8 waypoints.

d. Press the RTN (return) push button to display the active waypoint.

3. Changing waypoints in flight:

a. Select heading mode on the autopilot if engaged.

b. Rotate the waypoint selector until the desired waypoint number and coordinates are displayed.

c. Verify that the new waypoint definition is correct by comparing the display to the flight plan.

d. Select the desired reference frequency on the associated navigation receiver and positively identify by listening to the "ident" tone.

e. Select the desired course on the OBS (Omni Bearing Selector).

f. Press the USE button on the ANS-351 and note that the waypoint identification number stops blinking.

g. Select the NAV mode on the autopilot after the deviation and distance-to-waypoint indications have stabilized.

4. Presetting waypoints in flight (RNAV mode):

   Waypoints may be preset in flight without disturbing the navigational outputs.

   a. Rotate the waypoint selector knob to display the waypoint number to be preset. Note blinking waypoint number.

   b. Set into the ANS-351 the desired waypoint bearing and distance.

   c. Press the RTN (return) push button and note that the presently used waypoint is displayed.

5. Presetting waypoint in flight (VOR/LOC modes):

   If the system is in VOR or LOC mode the ANS-351 will annunciate these modes on the display.

   a. Rotate the waypoint selector knob and note that the VOR or LOC annunciator is replaced by waypoint number, bearing, and distance. The waypoint number will always be blinking and the USE push button will be inactive.

   b. Preset the waypoint bearing and distances.

c. Press the RTN (return) push button and observe the annunciation of VOR or LOC on the ANS-351 panel.

PERFORMANCE

No change.

SYSTEM DESCRIPTION

1. Navigation System Mode Control - A four position switch, located on the instrument panel or DME control head, is used to select the navigational mode of operation, either RNAV or VOR.

2. The Collins DME indicator used with the computer in the RNAV mode displays distance to the active waypoint in nautical miles, time to the waypoint in minutes, and all angle ground speed in knots (i.e. the airplane does not have to be on a course directly to a waypoint to display a valid groundspeed). A green annunciator light on the indicator is illuminated any time the system is in the RNAV mode and power is applied to the NAV receiver.

   After initiating the RNAV mode, always observe the ground speed over a period of 2 minutes or more to ensure that the indication has reached a steady-state value.

3. ANS-351 Area Navigation Computer

   a. Collins Mode Control (ENR/APPR) - Use of this control allows selection of either ENR (enroute) or APPR (approach) modes of operation. In the enroute mode the course deviation is 5 nautical miles full scale. In the approach mode the course deviation is 1.25 nautical miles full scale deflection of the CDI, (Course Deviation Indicator).

b. Waypoint Selector (WPT) - Sequences display waypoints from 1 through 8. Winking waypoint number indicates nonactive waypoints; steadily on waypoint number indicates the active waypoint.

c. Radial Selector - Two concentric knobs can be used to set radial information into the display. Knobs control information as follows:

Large knob: Changes the display in 10-degree increments.

Small knob, pushed in: Changes the display in 1-degree increments.

Small knob, pulled out: Changes the display in 0.1-degree increments.

d. Distance Selector - Two concentric control knobs can be used to set distance information in nautical miles into the display.

Knobs control information as follows:

Large knob: Changes the display in 10-nautical mile increments.

Small knob, pushed in:	Changes the display in 1-nautical mile increments.
Small knob, pulled out:	Changes the display in 0.1-nautical mile increments from 00.0 through 100 miles. Beyond 100 NM, changes the display in 1-mile increments.

e. Return Button (RTN) - Pressing RTN returns the display to the active waypoint when a nonactive waypoint is currently being displayed.

f. Use Button (USE) - Pressing the USE button converts the waypoint being displayed into the active waypoint.

g. Check Button (CHK) - Pressing the CHK button causes normal slant range DME distance to the VOR/DME station to be presented on the DME indicator. The WPT annunciator on the DME indicator will extinguish during this time. If TO or FROM is selected on the Collins NAV receiver, the magnetic bearing to or from the VOR/DME station will be displayed. The WPT annunciator light on the NAV receiver will extinguish during the time the CHK button is held down. If an RMI is installed, and is compatible with the ANS-351, pressing the check button will cause the bearing pointer to indicate the bearing to the active VOR station. RNAV computation, CDI deviation, TO/FROM display, and autopilot tracking of RNAV path remain unaffected. The check button is spring loaded to prevent prolonged actuation.

h. Ambient Light Sensor - Automatically adjusts display lighting intensity as a function of cockpit ambient light.

4. Collins Navigation Receiver (NAV).

   a. OFF - Controls power to the NAV receiver and to the Area Navigation Computer.
   b. FREQ - Allows the selection of VOR and Localizer frequencies.

   c. TO - Displays airplane magnetic bearing to the VOR station in the normal mode and airplane magnetic bearing to the waypoint in the RNAV mode.

   d. FROM - Displays airplane magnetic bearing from the VOR station in the normal mode, and airplane bearing from the waypoint in the RNAV mode.

   e. WPT Annunciator - Light is illuminated any time the NAV receiver is on, the RNAV mode is selected, and CHK button is not depressed.

   f. Ambient Light Sensor - Automatically adjusts display lighting intensity as a function of cockpit ambient light.

5. CDI (Course Deviation Indicator)

   a. Operation of the CDI in the RNAV mode differs from the operation in the VOR mode as follows:

1. Indicator movement represents a linear deviation from the selected course.
2. In the enroute mode, full scale deviation is 5 NM. In the approach mode, the full scale deflection is 1.25 NM.

3. An annunciator light on the instrument panel illuminates any time power is applied to the NAV receivers and the system is in the RNAV mode.

6. RMI Bearing

An output is provided by the ANS-351 that allows an RMI with builtin NAV converter to display bearing to or from the waypoint while operating in the RNAV mode. (NOTE: An RMI may or may not be installed to work in conjunction with the RNAV computer).

Approved: Donald H Petter

for W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT F33A, F33C, G33, V35B, A36, and A36TC LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT for the KING KN-74 AREA NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane is equipped with a King KN-74 Area Navigation System which has been installed in accordance with BEECHCRAFT FAA approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below.

LIMITATIONS

1. This system shall not be used as a primary system under IFR conditions except on approved approach procedures, approved area navigation airways, and random area navigation routes when approved by Air Traffic Control.

2. This system is to be used only with colocated facilities (VOR and DME signals originate from the same geographic location).

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude, and angle of bank.

1. VOR or Distance flag appears while in RNAV mode:

   a. Selected Frequency - CHECK FOR CORRECT FREQUENCY
   b. VOR or Distance flag intermittent or lost - UTILIZE OTHER NAVIGATION EQUIPMENT AS REQUIRED.

2. VOR or Distance flag appears while in APPR mode:

   If flag appears while on an approach, execute a missed approach and utilize another approved facility.

NORMAL PROCEDURES

1. VHF NAV - ON
2. DME - ON
3. Mode Selector - SELECT VOR/DME, RNAV, or APPR
4. NAV Frequency - SET
5. DME Frequency - SET
6. Waypoint Bearing - SET WAYPOINT RADIAL FROM VORTAC
7. Waypoint Distance - SET WAYPOINT DISTANCE FROM VORTAC
8. OBS Control - DESIRED MAGNETIC COURSE
9. Self-Test - ACTUATE (must have VOR reception)

PERFORMANCE

No change.

Approved: Donald H Peters

for W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT for the KING KNS 80 INTEGRATED NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA-approved material and must be attached to the FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the King KNS-80 Navigation System in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic FAA Approved Airplane Flight Manual only as set forth within this document. Users of this manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The Area Navigation mode may not be used as a primary system under IFR conditions except on approved approach procedures, approved airways, and random area navigation routes when approved by Air Traffic Control.

2. The Area Navigation mode can only be used with colocated facilities (VOR and DME signals originate from the same geographical location).

3. VOR or VOR-PAR modes must be selected when flying directly to or from a VORTAC facility.

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude and angle of bank.

1. If NAV flag appears while in the Area Navigation mode, check for correct frequency.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

PREFLIGHT

AREA NAVIGATION FUNCTIONAL TEST

The following procedure applies only to airports equipped with, or in range of, a colocated VOR/DME station.

1. Place the KNS-80 in VOR mode.

2. Find and record the angle to the VOR station by centering the D-Bar with a TO TO/FROM flag.

3. Program a waypoint radial angle 120° greater than the indicated VOR radial.

4. Program a waypoint distance equal to the indicated DME value.

5. Place the KNS-80 in RNAV ENR.

6. Rotate the OBS until the D-Bar centers with a TO flag.

The KNS-80 distance-to-station should now read a value equal to the DME distance (±.5NM) and the indicated selected course should read 60° greater than the recorded VOR angle to station.

PROGRAMMING

Pertinent information (waypoint number, station frequency, waypoint bearing, and waypoint distance) for up to four waypoints is entered into the memory from the control unit. Programming may be completed prior to takeoff or during the flight. Any combination of navigational facilities (RNAV waypoint, VOR/DME, ILS) may be loaded into the computer; however, it is desirable that each facility be numbered and loaded in the sequence it is to be used.

RNAV WAYPOINTS

1. Turn the system on by rotating the ON/OFF switch clockwise.

2. Put waypoint 1 in the DSP window by depressing the DSP button. Push button as many times as necessary to go through the 1-2-3-4-1 sequence to reach "1".

3. Select the waypoint 1 frequency using the data input controls which are the two concentric knobs on the right.

4. Select the waypoint 1 radial by depressing the DATA button. This will cause the radial for the previous waypoint 1

to appear over the annunciation RAD. Select the new radial with the data input controls.

5. Select the waypoint 1 distance by again depressing the DATA button. This will cause the distance for the previous waypoint 1 to appear over the annunciation DST. Select the new distance with the data input controls.

6. This completes the programming for the first waypoint. Follow these procedures for all selected waypoints up to a maximum of four.

CONVENTIONAL VOR

The programming technique for conventional navigation directly toward or away from a VOR facility without a colocated DME is similar to that for RNAV waypoints. Inputting the waypoint number and frequency into the memory is accomplished in the same manner. Since the station has no DME, it cannot be electronically "moved" to a new location (waypoint). Therefore, no values are programmed in the RAD or DST displays.

ILS APPROACH (Front course and Back course)

Programming an ILS approach is accomplished in the same manner as programming conventional VOR.

MISSED APPROACH

If the published missed approach utilizes an RNAV waypoint or VOR facility, it may be entered into the memory any time prior to the approach. This is accomplished in the same manner set forth in CONVENTIONAL VOR and RNAV WAYPOINTS in this section.

INFLIGHT

Preset waypoints may be recalled from memory and put into active use as required.

1. Press the DSP button as required to select the desired waypoint. The preset waypoint frequency will replace the active waypoint frequency on the display. The selected waypoint number will appear (blinking) over the DSP annunciation. This blinking display is to indicate that the frequency displayed is other than the active waypoint. The waypoint radial and distance may also be checked at this time by pressing the DSP button for each.

2. Verify that the data is correct.

NOTE

Revisions to the waypoint data can be programmed at this time by entering the new waypoint parameters.

3. When navigation to the displayed waypoint is desired, press the USE button. The waypoint number will appear above the USE annunciation on the display board and the number above the DSP annunciation will cease blinking. The new waypoint frequency will automatically appear.

NOTE

When "Time To Station" indicates "0" actual time may be anything from 0 to 59 seconds.

RNAV OPERATION

If the system is receiving valid signals from a colocated VOR-LOC facility, it will supply linear deviation information to the Horizontal Situation Indicator (or Course Deviation Indicator). Enroute (RNV ENR) sensitivity, available by pressing the RNAV button, provides a constant course width of ±5NM. Approach (RNV APR) sensitivity, available by pushing the RNAV button again, provides a constant course width of ±1¼ NM. Approach sensitivity should be used when within 10 miles of the terminal waypoint. Time and distance to the waypoint, and computed groundspeed are displayed at the top of the display panel.

CONVENTIONAL VOR OPERATION

VOR or VOR-PAR modes are selected by pressing the VOR button; once for VOR and a second time for VOR-PAR. In VOR mode DME is automatically tuned, and distance, groundspeed and time-to-station to the VORTAC station will be displayed upon lock-on. The HSI (CDI) will display conventional angular crosstrack deviation from the selected course (±10° full scale). In VOR-PAR mode operation is identical to VOR except the HSI (CDI) will display crosstrack deviation of ±5NM full scale from the selected course. Course width will be constant irrespective of distance from the VORTAC.

ILS OPERATION

The ILS mode is annunciated whenever an ILS frequency is put "in use". LOC/GS functions are annunciated by the LOC and GS flags in the HSI (CDI). Only angular deviation is provided in the ILS mode.

DME HOLD OPERATION

The DME Hold (HLD) function inhibits changing the DME receiver frequency. Pressing the HOLD button and then selecting a new waypoint forces the KNS-80 into either a conventional VOR or ILS mode of operation according to the newly selected frequency.

Engage DME HOLD as follows:

1. Press the HOLD button.

2. Select the new frequency using the data input controls. HLD will now annunciate. Distance will continue to be read to the VORTAC and information to the HSI (CDI) will be from the newly selected station.

RNAV APPROACH

The RNAV Approach (RNV-APR) mode may be used for runway location (by placing a waypoint at the approach end of the runway) during an approach to an airport. Press the RNAV button to select RNV-APR. In RNV-APR the deviation needle on the HSI (CDI) will display crosstrack deviation of ± 1¼ NM full scale. All other aspects of the RNV-APR mode are identical to the RNV-ENR mode.

PERFORMANCE - No change

WEIGHT AND BALANCE - No change

SYSTEMS DESCRIPTION

The King KNS-80 is an integrated navigation system combining a 200 channel VOR/Localizer receiver, a 40 channel glideslope receiver, a 200 channel DME, and a digital RNAV computer with a capability for preselection and storage of 4 VOR/LOC frequencies and RNAV waypoint parameters.

The KNS-80 can be operated in any one of three basic modes: VOR, RNAV, or ILS. To change from one mode to another the appropriate pushbutton switch is pressed, except that the ILS mode is entered automatically whenever an ILS frequency is channeled in the USE waypoint. The display will annunciate the mode by lighting a message above the pushbutton. In addition to the standard VOR and RNAV enroute (RNV ENR) modes, the KNS-80 has a constant course width or parallel VOR mode (VOR-PAR) and an RNAV approach mode (RNV APR). To place the unit in either of these secondary modes, the VOR pushbutton or the RNAV pushbutton, as the case may be, is pushed a second time. Repetitive pushing of the VOR button will cause the system to alternate between the VOR and VOR-PAR modes, while repetitive pushing of the RNAV button causes the system to alternate between RNV ENR and RNV APR modes.

All waypoint information, station frequency, waypoint distance, and waypoint radial are entered with the increment/decrement rotary switch on the right side of the panel and displayed in the right hand readout. The small knob affects the lower significant digits while the large knob changes the most significant digits. The tenth's position of waypoint radial and distance can be changed by pulling the small knob to the out position. The type of data being displayed is indicated by the illuminated messages (FRQ, RAD, DST) located directly below the displayed data. Frequency, radial, or distance information for a waypoint can be displayed sequentially by pressing the "DATA" pushbutton. The increment/decrement switch changes only the information being displayed.

The KNS-80 can store frequency, radial, and distance information for up to four waypoints. The waypoint number of the data being displayed is located above the message DSP. The DSP waypoint number is changed by pressing the DSP button. The number of the waypoint being used for navigation is indicated by the number above the message USE. If the waypoint in use is different from the displayed waypoint, the DSP waypoint number blinks. Pressing the USE button causes the waypoint in use to match the displayed waypoint.

Normally, the DME is tuned to the station paired with the VOR frequency. The tuning of the DME may be frozen by depressing the HOLD button. Subsequent rechanneling of the NAV receiver will cause the HLD light to illuminate. The DME will "hold" the frequency it was tuned to at the time the button was depressed.

DISPLAYS

1. NM Display

   a. VOR and VOR-PAR modes

      Displays DME distance in 0.1 NM increments from 0 to 99.9 NM and in 1 NM increments from 100 to 200 NM. Displays dashes whenever DME goes into search.

   b. RNV APR and RNV ENR modes

      Displays RNAV distance to waypoint in 0.1 NM increments from 0 to 99.9 NM and in 1 NM increments from 100 to 400 NM. Displays dashes if DME is in search, if VOR flags, or if the VOR is rechanneled with the HOLD button depressed.

2. KT Display

a. VOR and VOR-PAR modes

Displays ground speed to the DME ground station in 1 knot increments from 0 to 999 knots. Displays dashes whenever DME goes into search.

b. RNV APR and RNV ENR modes

Displays ground speed to the active waypoint in increments of 1 knot from 0 to 999 knots. Displays dashes whenever DME goes into search, if VOR flags or if the VOR is rechanneled with the HOLD button depressed.

3. MIN Display

a. VOR and VOR-PAR modes

Displays time to DME ground station in 1 minute increments from 0 to 99 minutes. Displays dashes whenever DME goes into search or when calculated time exceeds 99 minutes.

b. RNV APR and RNV ENR modes

Displays time to the active waypoint in 1 minute increments from 0 to 99 minutes. Displays dashes if DME is in search, if VOR flags, if the VOR is rechanneled with the HOLD button depressed, or if calculated time exceeds 99 minutes.

4. FRQ, RAD, DST Display

a. FRQ mode

Displays frequency from 108.00 to 117.95 MHz in increments of .05 MHz. Least significant digit displays only zero or five.

b. RAD mode

Displays ground station radial on which waypoint is located from 0.0 to 359.9 degrees.

c. DST mode

Displays the offset distance of the waypoint from the ground station over a range of 0.0 to 199.9 NM.

5. USE Display

Displays waypoint number of data (1 to 4) actually being used by the system. In VOR modes only the frequency has meaning. When changed, always takes on DSP value.

6. DSP Display

Displays waypoint number (1 to 4) of data being displayed.

7. PAR, VOR, ENR, APR, RNV Displays

System status lights.

8. HLD Display

Indicates when the station to which the DME is actually tuned is different than the station to which the VOR is tuned.

9. DATA Display

Displays waypoint data. The messages FRQ, DST, and

RAD tell what is being displayed at any one time.

10. ILS Display

    Indicates that the frequency in use is an ILS frequency.

CONTROL

1. VOR Button

   Momentary pushbutton which, when pushed while the system is in either RNV mode, causes the the system to go to VOR mode. Otherwise the button causes the system to toggle between VOR and VOR-PAR modes.

2. RNAV Button

   Momentary pushbutton which, when pushed while the system is in either VOR mode, causes the system to go to RNV ENR mode. Otherwise the button causes the system to toggle between RNV ENR and RNV APR modes.

3. HOLD Button

   Two position pushbutton which, when in the depressed position, inhibits DME from channeling to a new station when the VOR frequency is changed. Pushing the button again releases the button and channels the DME to the station paired with the VOR station.

4. USE Button

   Momentary pushbutton which, when pressed, causes the active waypoint to take on the same value as the displayed waypoint and the DATA display to go to FRQ mode.

5. DSP Button

Momentary pushbutton which, when pushed, causes displayed waypoint to increment by 1 and DATA display to go to FREQUENCY mode.

6. DATA Button

Momentary pushbutton which, when pressed, causes waypoint DATA display to change from FRQ to RAD to DST and back to FRQ.

7. OFF/PULL ID Control

Rotary switch/potentiometer which, when turned clockwise, applies power to the KNS-80 and increases audio level. Turned counterclockwise it will decrease audio level and switch off power. The switch may be pulled out to hear VOR ident.

8. DATA INPUT Control

Dual concentric knobs with the center knob having an "in" and "out" position.

a. Frequency Data

The outer knob varies the 1MHz digit and the center knob varies the frequency in .05 MHz increments regardless of whether the switch is in its "in" or "out" position.

b. Radial Data

The outer knob varies the 10 degree digit with a carryover occuring from the tens to hundreds position. The center knob in the "in" position varies the 1 degree digit and in the "out" position varies the 0.1 degree digit.

c. Distance Data

The outer knob varies the 10 NM digit with a carryover occuring from the tens to hundreds place. The center knob in the "in" position varies the 1 NM digit and in the "out" position varies the 0.1 NM digit.

HANDLING SERVICE AND MAINTENANCE

BATTERY REPLACEMENT

The waypoint memory is powered by two silver oxide watch cells located in the lower left hand corner of the front panel. Typical life of the cells is two years although high temperature and humidity conditions can shorten this period. If the batteries should become weak, waypoint storage will be lost and the radio will "wake up" tuned to 110.00 MHz in the VOR mode. The cells can be replaced by opening the battery pocket with a thin blade screwdriver. The holder was designed so that the cells can only be inserted with the correct polarity.

APPROVED: Donald H Petro

for W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT BONANZA A36
(E-1946, E-2104, E-2111 and after)
and B36TC
(EA-320, EA-440 and after)
LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT for the AIR CONDITIONING SYSTEM

GENERAL

The information in this supplement is FAA approved material and must be attached to the *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* when the airplane is equipped with an Air Conditioning System, which has been installed in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The air conditioning system must be off during takeoff. The AC DOOR EXTEND annunciator must be extinguished (condenser retracted) before takeoff.

2. The air conditioning system must be off when using the magnetic compass.

PLACARDS

On Forward Left Window Post:

> **– CAUTION –**
> **MAGNETIC**
> **COMPASS IS**
> **ERRATIC**
> **WHEN AIR**
> **CONDITIONER**
> **IS IN**
> **OPERATION**

EMERGENCY PROCEDURES

ENGINE FAILURE

(IN FLIGHT)

Air conditioning system must be turned off before attempting restart.

AIR CONDITIONING SYSTEM MALFUNCTION

Turn off air conditioning system.

If air conditioning system circuit breakers trip, do not reset until the cause of the malfunction has been determined and corrected.

NORMAL PROCEDURES

PREFLIGHT INSPECTION

NOSE SECTION

Air Conditioner Condenser — CHECK SECURITY AND ATTACHMENT.

STARTING

Air conditioner may be on as desired after engine start for cabin cooling before takeoff.

BEFORE TAKEOFF

WARNING

> **AC DOOR EXTEND annunciator, located in the glareshield, must be extinguished before takeoff.**

The air conditioning system switch must be turned OFF before takeoff. After landing gear is retracted and airplane is clear of all obstacles, air conditioning system may be turned on as desired.

SHUTDOWN

Turn off air conditioner before engine shutdown.

PERFORMANCE

CRUISE PERFORMANCE

NOTE

> Using the power settings given in the PERFORMANCE section, with the air conditioner in operation, range and airspeed will decrease by approximately 5% due to the extension of the condenser to the flight extension position. This is to be taken into consideration during flight planning.

SYSTEMS DESCRIPTION

Cabin cooling is provided by a 12,000 Btu, 30-cfm, refrigerative type air conditioning system. The principal components of the air conditioning system are the compressor and clutch unit (belt-driven from a drive pulley on the engine), the retractable condenser on the center line of the fuselage bottom skin, the dehydrator beneath the right front seat, the evaporator module beneath the left front seat, the air conditioner condenser-extended annunciator (AC DOOR EXTEND), located in the glareshield, the various retractable condenser limit switches, the system controls on the subpanel, and the circuit breakers. The circuit breakers are located in the left side circuit breaker panel.

The three-position retractable condenser is operated by an electric motor and jackscrew actuator, and controlled by two internal stops in the motor, two limit switches on the condenser, the landing gear safety switch, and a throttle limit switch. The three retractable condenser positions are ground extension, flight extension, and retracted.

When the airplane is on the ground and the air conditioner is turned on, the condenser extends to the ground extension (lowest) position below the fuselage bottom to facilitate condenser cooling by ambient air from the propeller slipstream. The compressor may shut down on hot days unless the airplane is nosed into the wind with the engine running at 1200 rpm or higher. It may be turned back on after a shutdown. With the condenser in the ground extension position, the air conditioner condenser-extended annunciator in the glareshield is illuminated.

When the airplane is in flight with the landing gear retracted and the air conditioner is turned on, the condenser extends only to the flight extension position. The flight extension position produces less drag than the ground extension position, but provides adequate condenser cooling from the airstream. The AC DOOR EXTEND annunciator is not illuminated in the flight extension position.

When the air conditioner is turned off, the condenser returns to the retracted position, which produces minimum drag.

NOTE

> The air conditioning system has a time-delay relay that requires 20 seconds after air conditioning system shutdown to restart the air conditioner compressor.

For cooling, cabin air is drawn into the evaporator module plenum below the forward edge of the left front seat. When cabin ambient air at a temperature of approximately 90°F passes over the evaporator coils, the temperature of the air is reduced to approximately 56°F. The evaporator module electric blower then forces the cooled air through outlet ducting to adjustable eyeball outlets in the instrument panel and subpanel. The cabin air continues to circulate as described until the air conditioner is turned off.

After engine start the air conditioner may be turned on by actuating a toggle switch in the subpanel placarded A/C - OFF. Either HI or LO blower speed may be selected and the airflow can be distributed by moving the eyeball outlets. The blower may be used separately from the air conditioner as well as in conjunction with the air conditioner.

Before takeoff, make certain that the air conditioner is off and that the AC DOOR EXTEND annunciator is extinguished. Pressing the ANNUN TEST pushbutton on the pilot's subpanel will verify that the bulb is functioning. After takeoff with the landing gear retracted and the airplane clear of all obstacles, the air conditioner may be turned on if desired.

The A/C toggle switch should be turned OFF before engine shutdown.

The throttle limit switch is a safety device designed to operate only at full throttle with the landing gear extended, and is installed inside the pedestal by the throttle control. When the air conditioner is on during landing approach with the landing gear extended and partial throttle, the condenser is in the flight extension position. However, should a go-around be necessary, the application of full throttle will cause the throttle limit switch to shut down the compressor for maximum engine power and retract the condenser to the retracted position to minimize drag. When the landing gear is retracted and/or the throttle is retarded, the compressor, after a 20 second delay, will resume operation and the condenser will return to the flight extension position.

Approved: Donald H Peter

For W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT BONANZA A36 LANDPLANES
(SERIALS E-1946, E-2104, E-2111 AND AFTER)

PILOT'S OPERATING HANDBOOK
SUPPLEMENT

FOR

OPERATION OF UNITED KINGDOM
REGISTERED AIRCRAFT

THIS SUPPLEMENT IS APPLICABLE TO
PILOT'S OPERATING HANDBOOK AND
FAA APPROVED AIRPLANE FLIGHT MANUAL
P/N 36-590002-37

Airplane Serial Number:____________________

Airplane Registration Number:________________

CONTENTS

GENERAL

This document must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when operating on the United Kingdom Register. The contents are in addition to, or override, the contents of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

LIMITATIONS

CERTIFICATION CATEGORY

The BEECHCRAFT Bonanza A36 is eligible for certification in the United Kingdom in the Transport Category (Passenger). This particular aeroplane may, however, be restricted to another category and a particular use, and this will be stated in the Certificate of Airworthiness.

PERFORMANCE

When certified in the Transport Category (Passenger), the aeroplane is classified in Performance Group E. For the purpose of establishing compliance with the Air Navigation Performance Group E Regulations, the Performance

Data in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, Beech Part No. 36-590002-37, except as modified by this supplement, is to be used.

CRUISE

For the purpose of compliance with legislation governing flight over water, the true airspeed to be assumed is 160 knots.

MAXIMUM PASSENGER SEATING CONFIGURATION

The total number of persons carried shall not exceed six, nor exceed the number for which seating accommodations approved for use during takeoff and landing is provided. Children under the age of three years who are carried in the arms of passengers may be left out of account for this purpose.

MINIMUM CREW

The minimum crew is one pilot.

KINDS OF OPERATION LIMITS

The aeroplane shall not be flown at night or in IFR conditions unless the required equipment is carried, and it is permitted by the Air Navigation Legislation.

All flights in icing conditions are prohibited.

AUTOMATIC FLIGHT CONTROL SYSTEM

When an autopilot is installed in the aeroplane, the flight manual shall contain the appropriate approved airplane flight manual supplement.

KING KFC 200

An autopilot shall not be engaged when the aeroplane is flying at a height less than 1,000 feet above the terrain, except when coupled to an ILS glide slope, it shall not remain engaged when the aeroplane is flying at a height of less than 320 feet above the terrain.

EMERGENCY PROCEDURES

No Change

NORMAL PROCEDURES

FLAPLESS LANDING

Manoeuvre to final approach, maintain 90 KIAS. Extend landing gear. Maintain this speed down to the 50-foot height point.

PERFORMANCE

TAKEOFF

The total distances shown on the Normal Take-off Distance graph should be increased 20% for operation on short dry grass with a firm subsoil.

TAKE-OFF SAFETY SPEED AND DISTANCE

At weights below 3,000 lbs the airspeed at 50 feet should be 78 knots IAS and the distance to 50 feet height must be assumed to be not less than the distance appropriate to 3,000 lbs. The distance must also be factored as required by the previous paragraph if the take-off is to be made on short, dry grass.

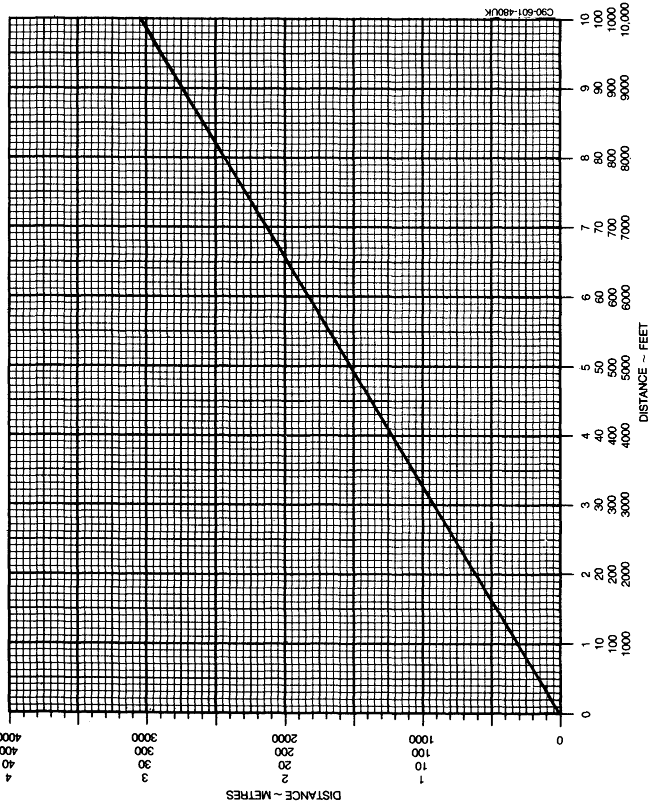
LANDING

The total distances shown on the Normal Landing Distance graph should be increased 20% for operation on short dry grass with a firm subsoil.

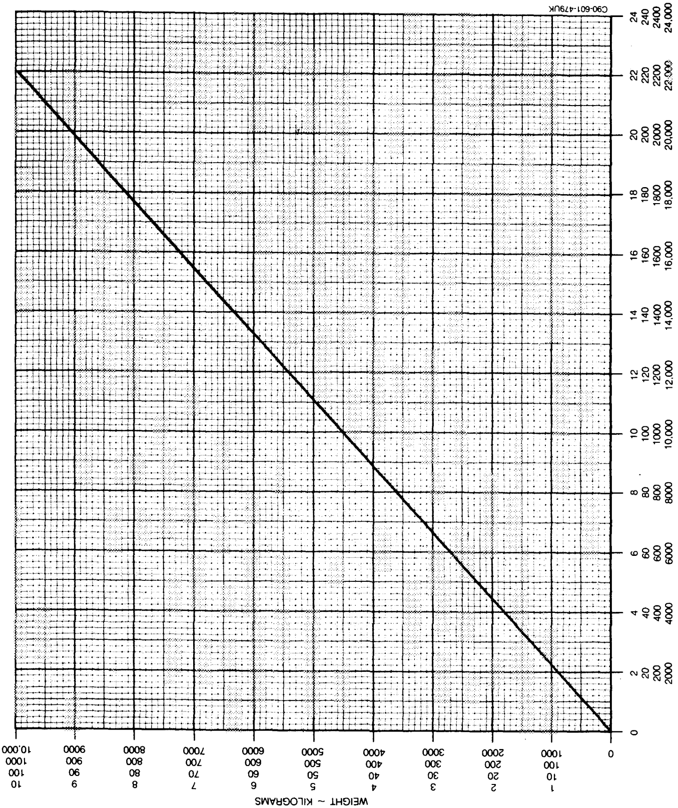
LANDING WITH FLAPS RETRACTED

When approaching to land with wing flaps retracted, a final approach speed of 90 knots IAS is recommended. The resulting landing distance from a height of 50 feet must be assumed to be 35% greater than the normal landing distance given in the Performance Section of the Pilot's Operating Handbook.

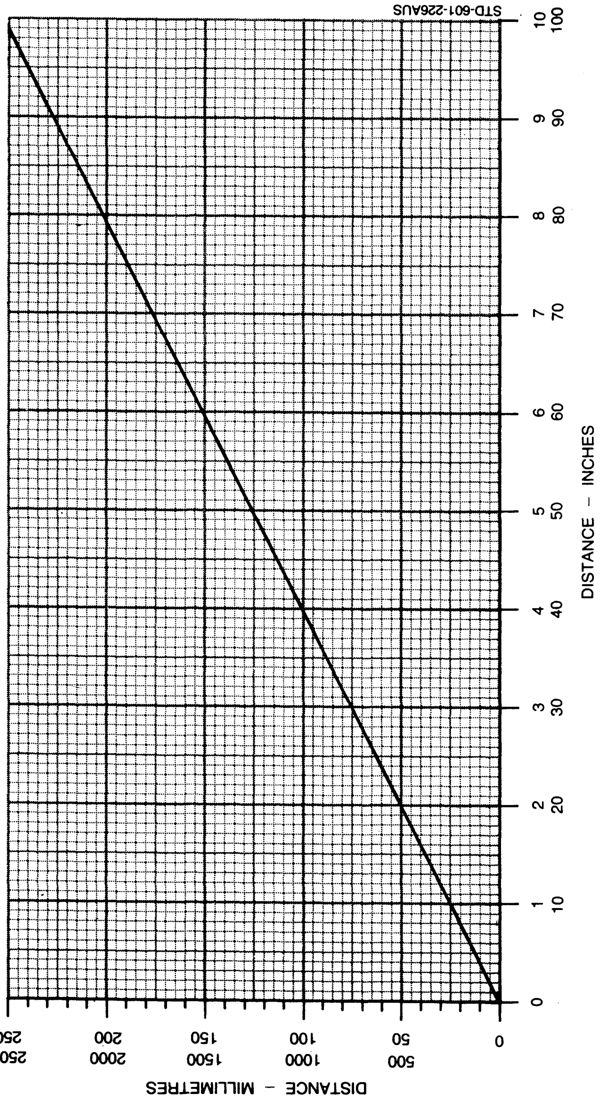
FEET - METRES CONVERSION



POUNDS - KILOGRAMS CONVERSION

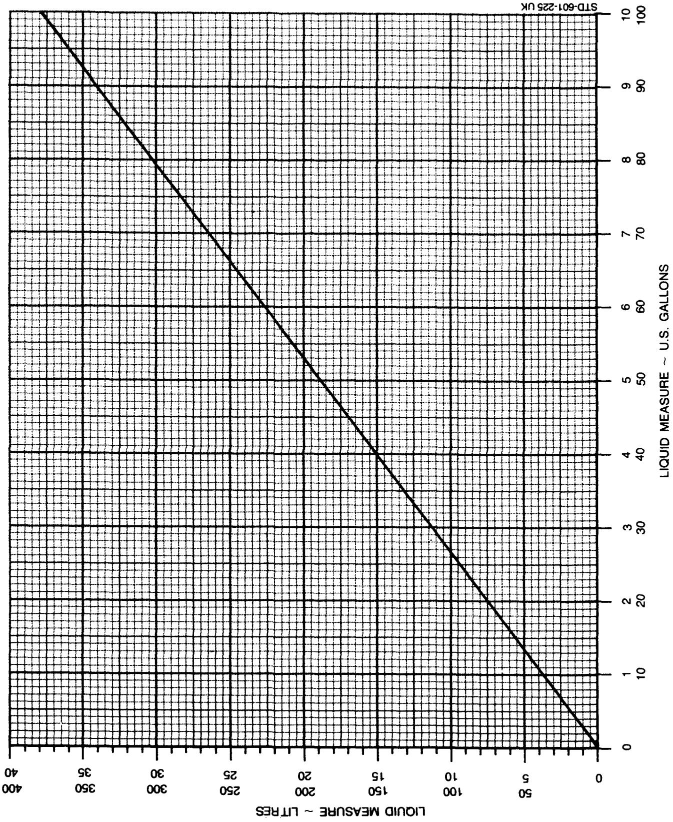


INCHES — MILLIMETRES CONVERSION



Revised: April, 1989
P/N 36-590002-43

U.S. GALLONS – LITRES CONVERSION



WEIGHT & BALANCE

No Change

SYSTEMS DESCRIPTION

No Change

HANDLING, SERVICE, AND MAINTENANCE

No Change

BEECHCRAFT 33, 35, 36, 55, 58 SERIES LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR THE

FULL FLAP WARNING HORN SYSTEM

THIS SUPPLEMENT IS APPLICABLE TO PILOT'S OPERATING HANDBOOKS AND FAA APPROVED AIRPLANE FLIGHT MANUALS:

(SEE NEXT PAGE FOR APPLICABILITY)

Airplane Serial Number:______________________________

Airplane Registration Number:______________________

FAA Approved:

W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

The supplement noted herein applies to the following Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals:

33-590009-13	F33A Serials CE-816 thru CE-1306, except CE-1301 F33C Serials CJ-149 thru CJ-179
35-590118-29	V35B Serials D-10179 thru D-10403
36-590002-17	A36 Serials E-1371 thru E-2110, except E-1946 and E-2104
36-590002-37	A36 Serials E-1946, E-2104, E-2111 thru E-2467, except E-2458
36-590003-3	A36TC Serials EA-1 thru EA-272, except EA-242
36-590006-3	B36TC Serials EA-242, EA-273 thru EA-388, except EA-320
36-590006-19	B36TC Serials EA-320, EA-389 thru EA-487
96-590011-17	95B55 Serials TC-2003 thru TC-2456
96-590010-29	95C55 Serials TC-350, TE-1 thru TE-451 D55 Serials TE-452 thru TE-767 E55 Serials TE-768 thru TE-942, except TE-938

96-590010-31	E55 Serials TE-938, TE-943 thru TE-1083
96-590010-17	E55 Serials TE-1084 thru TE-1201
58-590000-31	58 Serials TH-1 thru TH-772
58-590000-21	58 Serials TH-773 thru TH-1395, except TH-1389
58-590000-35	58 Serials TH-1389, TH-1396 thru TH-1471, TH-1476, TH-1487, TH-1489, TH-1498
58-590000-39	58 Serials TH-1472 thru TH-1543, except TH-1476, TH-1487, TH-1489, and TH-1498

CONTENTS

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Full Flap Warning Horn System in accordance with Beech Kit Drawing 36-3012.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

No change.

EMERGENCY PROCEDURES

No change.

NORMAL PROCEDURES

No change.

PERFORMANCE

No change.

WEIGHT AND BALANCE

No change.

SYSTEMS DESCRIPTION

LANDING GEAR

WARNING HORN AND (IF INSTALLED BY KIT) GEAR UP ANNUNCIATOR

With the landing gear retracted and the flaps fully extended, a warning horn will sound intermittently and the GEAR UP annunciator (if installed) will flash.

HANDLING, SERVICING, AND MAINTENANCE

No change.

BEECHCRAFT 33, 35, 36, 55, 58 SERIES LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR THE

LANDING GEAR WARNING LIGHT SYSTEM

THIS SUPPLEMENT IS APPLICABLE TO PILOT'S OPERATING HANDBOOKS AND FAA APPROVED AIRPLANE FLIGHT MANUALS:

(SEE NEXT PAGE FOR APPLICABILITY)

Airplane Serial Number:____________________

Airplane Registration Number:____________________

FAA Approved:

W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

The supplement noted herein applies to the following Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals:

33-590009-13	F33A Serials CE-748, CE-772 thru CE-1306, except CE-1301 F33C Serials CJ-149 thru CJ-179
35-590118-29	V35B Serials D-10097, D-10120 thru D-10403
36-590002-17	A36 Serials E-1111, E-1241 thru E-2110, except E-1946 and E-2104
36-590002-37	A36 Serials E-1946, E-2104, E-2111 thru E-2467, except E-2458
36-590003-3	A36TC Serials EA-1 thru EA-272, except EA-242
36-590006-3	B36TC Serials EA-242, EA-273 thru EA-388, except EA-320
36-590006-19	B36TC Serials EA-320, EA-389 thru EA-487
96-590011-17	95B55 Serials TC-2003 thru TC-2456
96-590010-17	E55 Serials TE-1084 thru TE-1201
58-590000-21	58 Serials TH-773 thru TH-1395, except TH-1389

58-590000-35	58 Serials TH-1389, TH-1396 thru TH-1471, TH-1476, TH-1487, TH-1489, and TH-1498
58-590000-39	58 Serials TH-1472 thru TH-1475, TH-1477 thru TH-1486, TH-1488, TH-1490 thru TH-1497, TH-1499 thru TH-1542, and TH-1544

CONTENTS

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Landing Gear Warning Light System in accordance with Beech Kit Drawing 36-3013.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

KINDS OF OPERATIONS EQUIPMENT LIST

The required items listed below supersede those items listed under "LANDING GEAR" published in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual:

SYSTEM and/or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING COND-ITIONS
LANDING GEAR					
1. Emergency Landing Gear Extension System	1	1	1	1	1
2. Landing Gear Position Indicator Lights	4	4	4	4	4
3. Landing Gear Motor and Gearbox	1	1	1	1	1
4. Landing Gear Warning Horn	1	1	1	1	1
5. Gear Up Warning Light	1	1	1	1	1

EMERGENCY PROCEDURES

No change.

NORMAL PROCEDURES

No change.

PERFORMANCE

No change.

WEIGHT AND BALANCE

No change.

SYSTEMS DESCRIPTION

INSTRUMENT PANEL

GEAR-UP WARNING LIGHT SYSTEM

This kit installs a landing gear warning light (GEAR UP) that flashes whenever the gear warning horn sounds. Depending upon the particular airplane in which this kit is installed, the light will be located either; (1)as a part of the Glareshield Annunciator Panel or, (2) as a separate light in the glareshield.

The warning annunciators have both a "bright" and "dim" mode of illumination intensity. On some airplanes, certain annunciators do not dim, eg., START, AFT DOOR. On these airplanes, the GEAR UP light (annunciator) also will not dim.

LANDING GEAR SYSTEM

GEAR-UP WARNING LIGHT

A gear-up warning light is installed which will flash whenever the gear-up warning horn sounds. The light is cancelled as the warning horn cancels.

HANDLING, SERVICING, AND MAINTENANCE

No change.

BEECHCRAFT 33, 35, 36 SERIES LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR THE

LOW THROTTLE LANDING GEAR RETRACT PREVENTION, GEAR WARNING SYSTEM

THIS SUPPLEMENT IS APPLICABLE TO PILOT'S OPERATING HANDBOOKS AND FAA APPROVED AIRPLANE FLIGHT MANUALS:

(SEE NEXT PAGE FOR APPLICABILITY)

Airplane Serial Number: ______________________________

Airplane Registration Number: ________________________

FAA Approved:

W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

The supplement noted herein applies to the following Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals:

33-590009-13	F33A Serials CE-862 thru CE-1307 except CE-1301 F33C Serials CJ-150 thru CJ-179
35-590118-29	V35B Serials D-10249 thru D-10403
36-590002-17	A36 Serials E-1519 thru E-2110, except E-1946, E-2104
36-590002-37	A36 Serials E-1946, E-2104, E-2111 thru E-2467, except E-2458
36-590006-19	B36TC Serials EA-320, EA-389 thru EA-487

CONTENTS

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Low Throttle Landing Gear Retract Prevention, Gear Warning System in accordance with either Beech Kit Drawing 36-3014 or Beech Kit Drawing 36-3017.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

No change.

EMERGENCY PROCEDURES

MAXIMUM GLIDE CONFIGURATION

1. Landing Gear - UP

NOTE

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 (If applicable)
4. Propeller - PULL LEVER FULL AFT (LOW RPM)
5 Airspeed - 105 kts (F33A, V35B, B36TC), 110 kts (A36)
6 Air Conditioning (if installed) and Nonessential Electrical Equipment - OFF

Glide distance is approximately 2.0 nautical miles/2.3 statute miles (B36TC) or 1.7 nautical miles/2.0 statute miles (F33A, V35B, A36) per 1000 feet of altitude above the terrain.

LANDING EMERGENCIES

LANDING WITHOUT POWER

When assured of reaching the landing site selected, and on final approach:

1. Fuel Selector Valve - OFF
2. Mixture - IDLE CUT-OFF
3. Magneto/Start Switch - OFF
4. Flaps - DOWN (30°, or AS REQUIRED)
5. Landing Gear - DOWN or UP (depending upon terrain)

NOTE

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 (or as specified, see POH Sec III)
7. Alternator Switch - OFF
8. Battery Switch - OFF
9. Oxygen System - OFF (if installed)

LANDING GEAR RETRACTED - WITH POWER

If possible, choose firm sod or foamed runway. Make a normal approach, using flaps as necessary.

NOTE

The landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

When assured of reaching the selected landing spot:

1. Throttle - CLOSED
2. Mixture - IDLE CUT-OFF
3. Alternator, Battery, and Magneto/Start Switches - OFF
4. Fuel Selector Valve - OFF
5. Oxygen System - OFF (if installed)
6. Keep wings level during touchdown.
7. Get clear of the airplane as soon as possible after it stops.

PROPELLER OVERSPEED

1. Throttle - RETARD

NOTE

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 sieze after a short period of operation (see LANDING WITHOUT POWER Procedure in this section).

4. Land as soon as practical.

LANDING GEAR RETRACTION AFTER PRACTICE MANUAL EXTENSION

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

1. Handcrank - CHECK, STOWED
2. LDG GEAR MOTOR Circuit Breaker - IN
3. Landing Gear Switch Handle - UP

NOTE

The landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

NORMAL PROCEDURES

No change.

PERFORMANCE

No change.

WEIGHT AND BALANCE

No change.

SYSTEMS DESCRIPTION

LANDING GEAR

CONTROL SWITCH

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

NOTE

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 gear is in transit, as this could cause damage to the retract mechanism.

SAFETY SWITCHES

Inadvertent retraction of the landing gear on the ground is prevented by compressing the two main strut safety switches, or by retarding the throttle below approximately 17 in. Hg manifold pressure position.

NOTE

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 or on takeoff, landing roll, or in a static position. Always make certain that the landing gear switch is in the down position during these operations.

HANDLING, SERVICING, AND MAINTENANCE

No change.

BEECHCRAFT BONANZA
F33A, F33C, A36, AND B36TC
LANDPLANES

PILOT'S OPERATING HANDBOOK
AND FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR THE

BENDIX/KING KLN88
MULTI-CHAIN
LORAN NAVIGATION SYSTEM

THIS SUPPLEMENT IS APPLICABLE TO
PILOT'S OPERATING HANDBOOK AND
FAA APPROVED AIRPLANE FLIGHT MANUALS:

P/N 33-590009-13
P/N 36-590002-37
P/N 36-590006-19

Airplane Serial Number:________________________

Airplane Registration Number:____________________

FAA Approved:

W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

CONTENTS

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Bendix/King KLN88 LORAN Navigation System, in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth within this document. Users of the handbook are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

The KLN88 LORAN Pilot's Guide, Bendix/King P/N 006-08458-0000, dated 8/89 or later issue, is available from General Aviation Avionics Division, Bendix/King, Olathe, Kansas 66062-1212. It is the responsibility of the owner/operator to maintain the above Pilot's Guide in current status.

LIMITATIONS

1. The KLN88 LORAN Navigation System is approved as a two-dimensional LORAN-C navigation system

in accordance with Advisory Circular 20-121A for enroute VFR/IFR operations within the conterminous United States and Alaska.

2. The use of the KLN88 system for approaches is prohibited.

3. The KLN88 Pilot's Guide, P/N 006-08458-0000, 8/89 or later issue, must be immediately available to the pilot whenever navigation is predicated on the use of the LORAN-C system.

4. During KLN88 operation, other navigation equipment required for the specific type of operation must be installed and operable.

5. The KLN88 position information must be checked for accuracy (reasonableness) against a visual ground fix or other approved navigation equipment under the following conditions:

   a. Prior to compulsory reporting points during IFR operations when not under radar surveillance or control.
   b. At or prior to arrival at each enroute waypoint during operation on an approved RNAV route.
   c. Prior to and at hourly intervals during operation off of approved RNAV routes.

6. If the data base has expired, use of the KLN88 system for IFR operation is prohibited, unless the information used for navigation is verified for accuracy against current approved data.

EMERGENCY PROCEDURES

No change.

NORMAL PROCEDURES

Normal operating procedures for the KLN88 LORAN Navigation System are outlined in the KLN88 Pilot's Guide, P/N 006-08458-0000, 8/89 or later issue.

PERFORMANCE

No change.

WEIGHT & BALANCE

No change.

SYSTEMS DESCRIPTION

GENERAL

The KLN88 is a long-range, LORAN-C based navigation system which provides the pilot with present position information and display guidance information based upon a pilot-programmed flight plan. The basic system consists of a panel-mounted unit which contains the LORAN-C sensor, the navigation computer, a CRT display, and all the controls required to operate the unit. It also houses the data base cartridge which plugs directly into the back of the unit.

The KLN88 system has analog outputs which are capable of driving the left/right deviation bar of the pilot's HSI. In addition, the system is capable of being coupled to an Autopilot and Flight Director. Outputs to remote annunciators to indicate the status of certain KLN88 functions are also provided. The system uses its present position information to determine crosstrack error, distance-to-waypoint, ground speed, track angle, time-to-waypoint, bearing-to-waypoint, and advisory VNAV guidance.

The internal data base of the KLN88 contains a vast amount of information on airports, navaids, intersections, special use airspace, and other aeronautical information pertinent to navigation. A periodic update of the data base is made by replacing the obsolete cartridge with a current one. In addition to the published data base, up to 250 user-defined waypoints and up to 9 flight plans may be created and stored. The KLN88 contains an internal lithium battery to retain the stored information.

SYSTEM ANNUNCIATORS

The following remote annunciators are provided and are located on the pilot's instrument panel:

MSG: Illuminates whenever the system senses a condition requiring pilot attention.

WPT: Illuminates approximately 20 seconds prior to the beginning of turn anticipation or approximately 36 seconds prior to reaching a Direct To waypoint.

WRN: Illuminates whenever the system determines that its estimated position error is greater than 1.7 NM.

SYSTEM SWITCHES

A two-position selector switch, labeled FD/HSI, is located on the pilot's instrument panel. When the NAV portion of this switch is illuminated, the NAV1 Frequency Control Head provides basic VOR/LOC/GS navigation data to the pilot's HSI and Flight Director. When the LORAN portion is illuminated, control is transferred to the KLN88 which drives the pilot's HSI and the Flight Director command bars. Anytime an ILS/LOC frequency is selected on the NAV1 Frequency Control Head while operating with the LORAN mode selected, the system will automatically switch to NAV mode.

PILOT'S HSI

1. NAV SELECTED

   a. The course must be manually selected using the Course Knob.

   b. VOR and LOC tuning is controlled by the NAV1 Frequency Control Head.

   c. VOR and LOC signals provide left/right steering information to the Course Deviation Indicator.

   d. Course deviation is angular. Full scale left or right deviation is 10° in VOR mode and 2.5° in LOC mode.

2. LORAN SELECTED

   a. The course must be manually selected using the Course Knob.

   b. The KLN88 provides left/right steering information to the Course Deviation Indicator.

      1) Enroute-Leg Mode:

         The CDI displays left/right deviation from the Desired Track (the great circle distance between two waypoints).

2) Enroute-OBS Mode:

The CDI displays left/right deviation from the selected course.

c. Course deviation is linear. Full scale left or right deviation is 5 NM.

HANDLING, SERVICING, AND MAINTENANCE

To replace the KLN88 LORAN data base, refer to the Pilot's Guide, P/N 006-08458-0000, dated 8/89, or later issue.

BEECHCRAFT Bonanza
Model A36 Landplane

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual Supplement

for the

A36 Bonanza
Modified for
Reduced External Noise

This Supplement is applicable to:

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

P/N 36-590002-37

Airplane Serial Number: ______________________

Airplane Registration Number: ________________

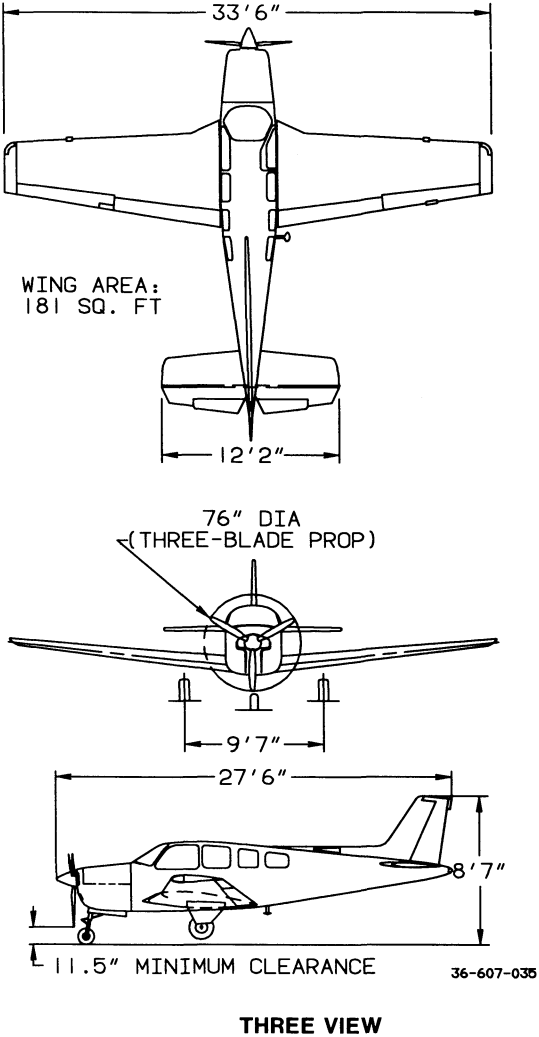
FAA Approved:

W.H. Schultz
Beech Aircraft Corporation
DOA CE-2

GENERAL

The information in this supplement is FAA approved material and must be attached to the *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* when the airplane has been modified for reduced external noise in accordance with Beech FAA approved data.

The information in this supplement supersedes or adds to the basic *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.


33'6"
WING AREA:
181 SQ. FT
12'2"
76" DIA
(THREE-BLADE PROP)
9'7"
27'6"
8'7"
11.5" MINIMUM CLEARANCE
36-607-035

THREE VIEW

ENGINE

The A36 Bonanza, modified for reduced external noise, is powered by one Teledyne Continental Motors Corporation engine model IO-550-B, fuel-injected, direct drive, air-cooled, horizontally opposed, 6-cylinder, 550-cubic-inch displacement, rated at 300 horsepower, but limited to 290 horsepower by reducing engine speed to 2550 rpm.

Take-Off and Maximum
Continuous Power ....Full Throttle, 2550 rpm

PROPELLER

The A36 Bonanza, modified for reduced external noise, is equipped with a Hartzell constant-speed three-blade propeller using a PHC-C3YF-IRF hub with Hartzell F7663-2R blades. The pitch settings at the 30-inch propeller blade station are: Low, 17.5° ± .1°; High, 33.0° ± 1°. The propeller diameter is: Maximum, 76 inches; Minimum, 75.5 inches.

MAXIMUM CERTIFICATED WEIGHTS

Maximum Ramp Weight ....3613 lbs

Maximum Take-off Weight ....3600 lbs

Maximum Landing Weight.....................................3600 lbs

Maximum Zero Fuel Weight..........No Structural Limitation

Maximum Weight in
Baggage Compartment ....(See LIMITATIONS Section)

SPECIFIC LOADINGS

Wing Loading at Maximum
Take-off Weight...19.9 lbs/sq ft

Power Loading at Maximum
Take-off Weight...12.4 lbs/hp

LIMITATIONS

ENGINE

The A36 Bonanza, modified for reduced external noise, is powered by one Teledyne Continental Motors Corporation engine model IO-550-B, fuel-injected, direct drive, air-cooled, horizontally opposed, 6-cylinder, 550-cubic-inch displacement, rated at 300 horsepower, but limited to 290 horsepower by reducing engine speed to 2550 rpm.

OPERATING LIMITATIONS

Take-off and Maximum
Continuous Power ....Full Throttle, 2550 rpm

PROPELLER SPECIFICATIONS

The A36 Bonanza, modified for reduced external noise, is equipped with a Hartzell constant-speed three-blade propeller using a PHC-C3YF-IRF hub with Hartzell F7663-2R blades. The pitch settings at the 30-inch propeller blade station are: Low, 17.5° ± .1°; High, 33.0° ± 1°. The propeller diameter is: Maximum, 76 inches; Minimum, 75.5 inches.

TACHOMETER

Operating Range (Green Arc) ....2000 to 2550 rpm
Maximum (Red Radial)...2550 rpm

WEIGHT LIMITS

Maximum Ramp Weight ....3613 lbs
Maximum Take-off Weight ....3600 lbs
Maximum Landing Weight.....................................3600 lbs
Maximum Zero Fuel Weight..........No Structural Limitation
Maximum Weights in Baggage Compartments:

Between Spars ....200 lbs

Floor Structural Load Limits:

Between Spars .... 50 lbs per sq ft

Rear Spar to Sta. 170 .... 400 lbs

Floor Structure Load Limit:

Rear Spar to Sta. 170 .... 100 lbs per sq ft

Aft Compartment (Sta. 170 to Sta. 190) .... 70 lbs

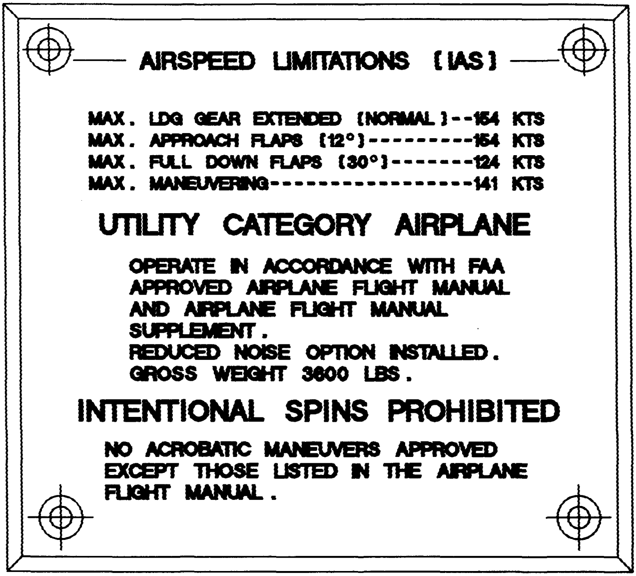
CENTER OF GRAVITY LIMITS (LANDING GEAR EXTENDED)

FORWARD LIMITS

74.0 inches aft of datum to 3100 pounds with straight line variation to 80.4 inches at 3600 pounds.

REQUIRED PLACARDS

ON LEFT SIDE PANEL (AIRSPEED VALUES ARE IAS):



36-016-073

EMERGENCY PROCEDURES

No Change.

AIRSPEEDS FOR SAFE OPERATION (3600 POUNDS)

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 ....72 Kts

50-ft ....83 Kts

Flaps APPROACH

Rotation ....67 Kts

50-ft ....77 Kts

Best Angle-of-Climb (V_X) ....*84 Kts
Best Rate-of-Climb (V_Y).......................................*100 Kts
Climb at Maximum Continuous Power...................105 Kts
Cruise Climb ....110 Kts
Maximum Turbulent Air Penetration ....141 Kts
Landing Approach

Flaps DOWN (30°)..80 Kts

Flaps UP (0°) ....90 Kts

Balked Landing Climb...*80 Kts

** Approved as long as engine temperatures remain in normal operating range.*

TAKEOFF

Take-Off Power - Full Throttle, 2550 rpm

Minimum Recommended Oil Temperature - 24°C

1. Power - FULL THROTTLE, (Propeller - High rpm, Mixture - FULL RICH)

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

CLIMB

Maximum Continuous Power; Mixture Full Rich, Full Throttle - 2550 rpm

Cruise Climb Power; Mixture Full Rich, Full Throttle - 2500 rpm

1. Mixture - FULL RICH
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 following fuel flow schedule:

MANUAL LEANING FUEL FLOW SCHEDULE FOR FULL THROTTLE AT 2,550 RPM OR 2,500 RPM

PRESSURE ALTITUDE (feet)	FUEL FLOW (gph)
SL	24.0
2000	22.5
4000	21.0
6000	19.5
8000	17.5
10,000	16.0
12,000	14.5
14,000	13.0
16,000	12.0

BT02714

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 preceding fuel flow schedule.

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

NOTE

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.

NOTE

The OAT gage will indicate a warmer than actual temperature during high power climbs at speeds below 100 KIAS.

BALKED LANDING

1. Throttle - FULL THROTTLE, 2550 rpm
2. Airspeed - 80 KTS until clear of obstacles, then trim to normal climb speed
3. Flaps - UP (0°)
4. Landing Gear - RETRACT
5. Cowl Flaps - OPEN

NOISE CHARACTERISTICS

Approach to and departure from an airport should be made so as to avoid porlonged 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, pilot's 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 altiude of less than 2000 feet is necessary to adequately exercise his duty to see and avoid other airplanes.

Take-off sound level established in compliance with FAR 36 is 76.9 dB(A)

Flyover sound level established in accordance with FAR 36 is 71.9 dB(A)

NOTE

Flyover sound level is not FAA Approved. No determination has been made by the Federal Aviation Administration that the sound level of this airplane is or should be acceptable or unacceptable for operation at, into, or out of any airport.

TAKE-OFF DISTANCE - FLAPS UP

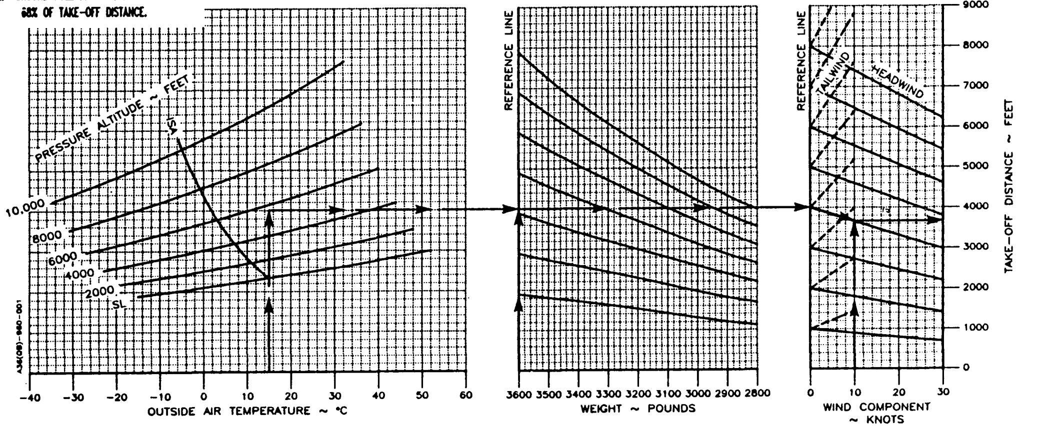
OVER 50-FT OBSTACLE

ASSOCIATED CONDITIONS:
POWER.......... TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE......... FULL RICH
FLAPS.......... UP
LANDING GEAR.... RETRACT AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS..... OPEN
RUNWAY......... PAVED, LEVEL, DRY SURFACE

NOTE: GROUND ROLL DISTANCE IS APPROXIMATELY 68% OF TAKE-OFF DISTANCE.

WEIGHT ~ POUNDS	TAKE-OFF SPEEDS	
	ROTATION ~ KNOTS	50 FEET ~ KNOTS
3600	72	83
3400	71	82
3200	70	80
3000	68	78
2800	65	75

EXAMPLE:
OAT.................. 15°C
PRESSURE ALTITUDE...... 5653 FT
TAKE-OFF WEIGHT........ 3600 LBS
HEADWIND COMPONENT.... 10 KTS
TAKE-OFF DISTANCE..... 3672 FT
TAKE-OFF SPEED AT:
ROTATION.......... 72 KTS
50 FT............ 83 KTS



TAKE-OFF DISTANCE - FLAPS APPROACH

OVER 50-FT OBSTACLE

ASSOCIATED CONDITIONS:

POWER.......... TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE......... FULL RICH
FLAPS........... APPROACH (BLUE)
LANDING GEAR.... RETRACT AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS..... OPEN
RUNWAY......... PAVED, LEVEL, DRY SURFACE

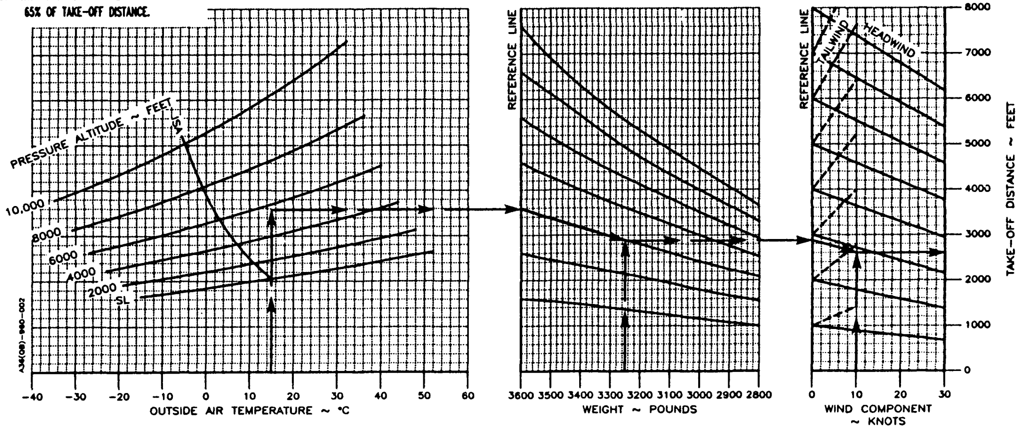
NOTE: GROUND ROLL DISTANCE IS APPROXIMATELY 65% OF TAKE-OFF DISTANCE.

WEIGHT ~ POUNDS	TAKE-OFF SPEEDS: ROTATION ~ KNOTS	TAKE-OFF SPEEDS: 50 FEET ~ KNOTS
3600	67	77
3400	66	76
3200	65	75
3000	64	73
2800	62	71

EXAMPLE:

OAT.................. 15°C
PRESSURE ALTITUDE...... 5653 FT
TAKE-OFF WEIGHT........ 3250 LBS
HEADWIND COMPONENT.... 10 KTS

TAKE-OFF DISTANCE ..... 2604 FT
TAKE-OFF SPEED AT:
ROTATION.......... 65 KTS
50 FT............ 75 KTS



CLIMB

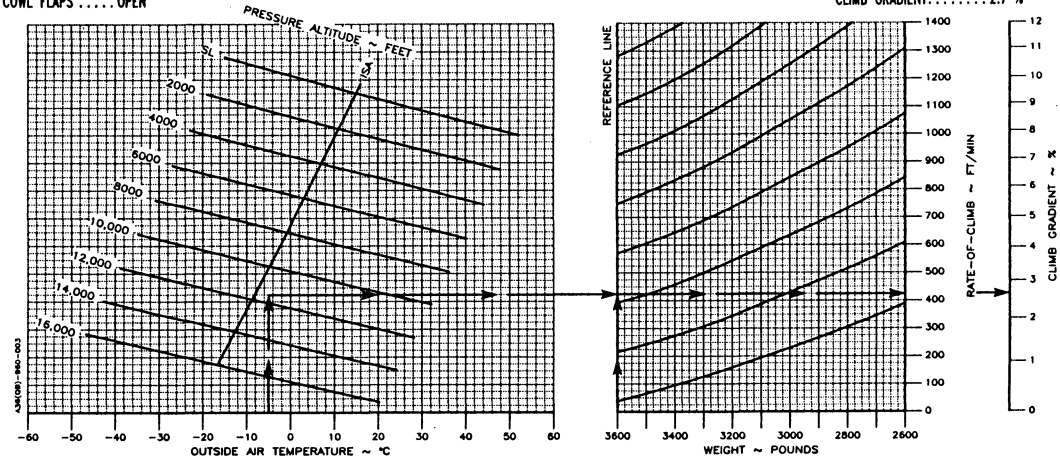
CLIMB SPEED: 105 KNOTS ALL WEIGHTS

ASSOCIATED CONDITIONS:

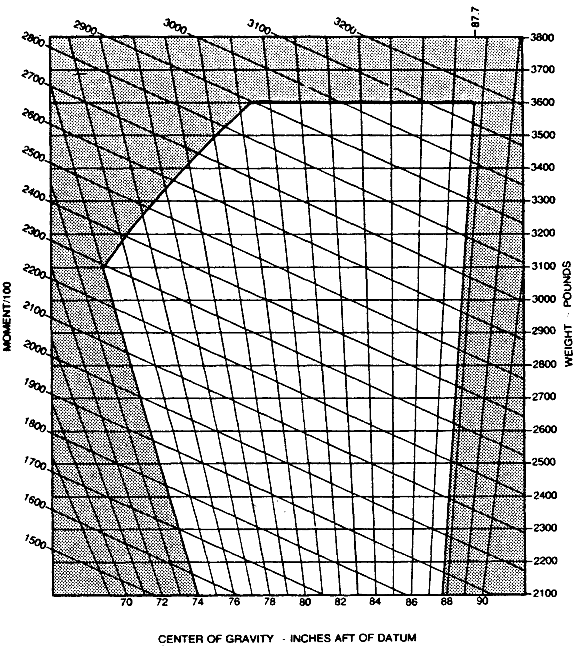
POWER.......... FULL THROTTLE, 2550 RPM
MIXTURE......... FULL RICH
FLAPS .... UP
LANDING GEAR.... UP
COWL FLAPS ..... OPEN

EXAMPLE:

OAT................. -5°C
PRESSURE ALTITUDE..... 11,550 FT
WEIGHT .... 3600 LBS
RATE-OF-CLIMB......... 424 FT/MIN
CLIMB GRADIENT......... 2.7 %



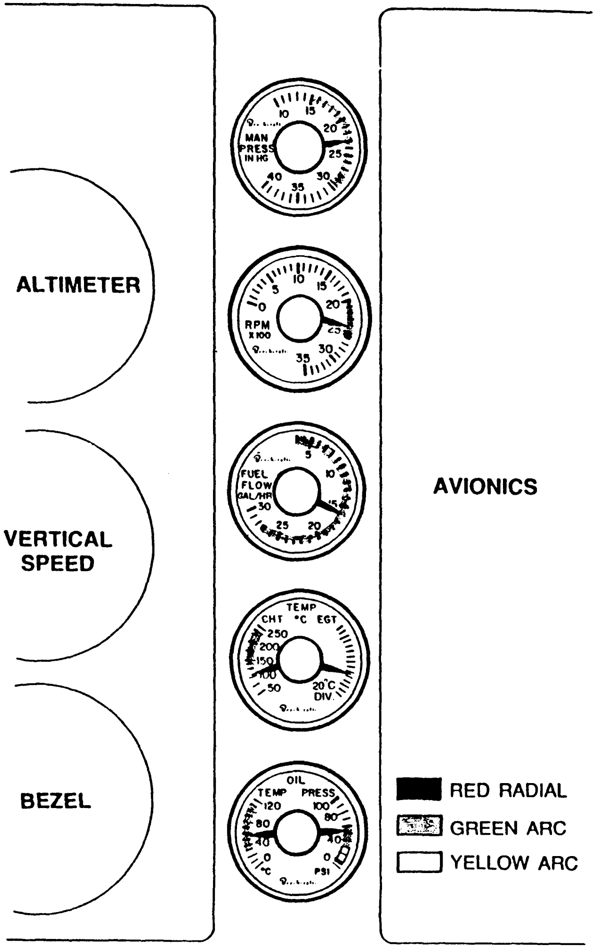
MOMENT LIMITS VS WEIGHT



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
3600 LB. (MAX. TAKE-OFF OR LANDING)	80.4	87.7
3100LB. OR LESS	74.0	87.7

36-601-204



ENGINE INSTRUMENT PANEL

36-390-030

POWER PLANT

The A36 Bonanza, modified for reduced external noise, is powered by one Teledyne Continental Motors Corporation engine model IO-550-B, fuel-injected, direct drive, air-cooled, horizontally opposed, 6-cylinder, 550-cubic-inch displacement, rated at 300 horsepower, but limited to 290 horsepower by reducing engine speed to 2550 rpm.

PROPELLER

The A36 Bonanza, modified for reduced external noise, is equipped with a Hartzell constant-speed three-blade propeller using a PHC-C3YF-IRF hub with Hartzell F7663-2R blades. The pitch settings at the 30-inch propeller blade station are: Low, 17.5° ± .1°; High, 33.0° ± 1°. The propeller diameter is: Maximum, 76 inches; Minimum, 75.5 inches.

HANDLING, SERVICING, AND MAINTENANCE

No Change.

BEECHCRAFT Bonanza
Model A36 Landplane

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual Supplement

for the

Four-Position
Flap Control Switch

This Supplement is applicable to:

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

P/N 36-590002-37

Airplane Serial Number: ______________________

Airplane Registration Number: ________________

FAA Approved:

W.H. Schultz
Beech Aircraft Corporation
DOA CE-2

GENERAL

The information in this supplement is FAA approved material and must be attached to the *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* when the airplane has been modified with the Four-Position Flap Control switch in accordance with Beech FAA approved data.

The information in this supplement supersedes or adds to the basic *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* only as set forth within this document. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

AIRSPEED LIMITATIONS

Maximum Flap Extension/Extended V_{FE}

(5°) .... 154 KIAS, 152 KCAS

Approach (12°) .... 154 KIAS, 152 KCAS

Full Down (30°) .... 124 KIAS, 122 KCAS

NOTE

Do not extend flaps or operate with the flaps deflected past the prescribed position above these speeds.

KINDS OF OPERATION EQUIPMENT LIST

SYSTEM and/or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	Remarks and/or Exceptions
FLIGHT CONTROLS						
1. Flap position indicator	1	1	1	1	1	Replaces Flap Position Indicator Lights

BT02778

EMERGENCY PROCEDURES

No Change.

NORMAL PROCEDURES

No Change.

PERFORMANCE

No Change.

WEIGHT AND BALANCE

No Change.

SYSTEMS DESCRIPTION

WING FLAPS

The flap position control switch is located on the inboard right subpanel. The flap switch provides multiple flap positions which allow for travel to any selected position from any pre-selected position. Side detents allow for quick selection of 5° and 12° flap positions. Intermediate flap positions exist between; UP and 5°, 5° and 12°, 12° and DOWN. The left side of the switch guard (facing the pilot) is placarded UP, AP and DN. The aft facing placard is UP and DN with a white index corresponding to the AP position between UP and DN. When the flap handle is moved to the AP/white index position, the flaps move to the 12° (APPROACH) setting.

A flap position indicator with UP, 5°, 12° and DN markings is located immediately to the left of the flap position control switch.

Limit switches automatically turn off the electric motor when the flaps reach the extremes of travel.

HANDLING, SERVICING, AND MAINTENANCE

No Change.

Raytheon Aircraft

Beech Bonanza® A36 and B36TC Landplanes
(E-3313 and After and EA-653 and After)

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT
MANUAL SUPPLEMENT

for

Dual Garmin GNS 430
or
Garmin GNS 530 & Garmin GNS 430
VHF Communications Transceivers/VOR/ILS Receivers/GPS Receivers
with
Garmin Course Deviation Indicator
with
Mid-Continent Instruments GPS Annunciator Control Unit
with
PS Engineering PMA7000M-S Audio Panel
with
BF Goodrich WX-500 Weather Mapping Sensor
with
Shadin F/ADC 200 or 200+ Fuel/Air Data Computer
when used with
Allied Signal KFC 225 Automatic Flight Control System

This Supplement is applicable to the following Manual(s):
36-590002-37 and 36-590006-19

Airplane Serial Number: ____________________

Airplane Registration Number: ____________________

FAA Approved by: ____________________
A.C. Jackson
Raytheon Aircraft Company
DOA CE-2

CONTENTS

SECTION I - GENERAL

The information in this supplement is FAA approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Dual Garmin GNS 430 or Garmin GNS 530 & Garmin GNS 430 VHF Communications Transceivers/VOR and ILS Receivers/GPS Receivers, Mid-Continent Instruments GPS Annunciation Control Unit, Garmin Course Deviation Indicator, PS Engineering PMA7000M-S Audio Panel, BF Goodrich WX-500 Weather Mapping Sensor, and Shadin F/ADC 200 or 200+ Fuel/Air Data Computer interfaced with an Allied Signal KFC 225 Automatic Flight Control System in accordance with Raytheon Aircraft approved data.

The information contained herein supersedes or adds to the information in the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth within this document. Users of the Pilot's Operating Handbook are advised to always refer to the supplement for possibly superseding information and placarding applicable to the operation of the airplane.

Satellite navigation data is based upon use of only the Global Positioning System operated by the United States.

When installed, the GARMIN GNS 530 is the No. 1 GNS unit.

The No. 1 GNS, when operating with RAIM GPS as the only navigation sensor, is approved for IFR Enroute, Terminal and Approach operation in accordance with AC 20-138.

SECTION II - LIMITATIONS

1. The GARMIN GNS 430 Pilot's Guide, P/N 190-00140-00, Rev. D, dated July, 1999, or later appropriate revision, and GARMIN GNS 530 (if installed) Pilot's Guide, P/N 190-00181-00, Rev A, dated May, 2000, or later appropriate revision, must be immediately available to the flight crew whenever navigation is predicated on the use of the system.
2. Each GNS must utilize the following or later FAA approved software versions:

SYSTEM	SOFTWARE LEVEL	
	GNS 430	GNS 530
< MAIN >	<2.12*>	<2.04>
GPS	2.00	2.06
COMM	1.22	3.00
VOR/LOC	1.25	2.05
G/S	2.00	2.02

*Must be software level 2.19 or above when the F/ADC 200+ is installed.

The Main software version is displayed on the GNS self-test page immediately after turn-on for 5 seconds. The remaining system software versions can be verified on the AUX group subpage 2, SOFTWARE/DATABASE VER.

3. If not previously defined, the following default settings must be made in the SETUP 1 menu of the GNS prior to operation:

dis, spd nm, kt	Sets navigation units to nautical miles and knots.
alt, vs ft, fpm	Sets altitude units to feet and feet per minute.
map datum	WGS 84 (sets map datum to WGS-84)
posn deg-min	Sets navigation grid units to decimal minutes.

NOTE

In some areas outside the United States, datums other than WGS-84 or NAD-83 may be used. If the GNS 430 or GNS 530 are authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in each GNS unit prior to its use for navigation.

4. IFR enroute and terminal navigation predicated upon either GNS units' GPS receiver is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.
5. Instrument approaches must be accomplished in accordance with approved instrument approach procedures. GPS instrument approach procedures must be retrieved from the GPS equipment database. The GPS equipment database must incorporate the current update cycle.
   a. GPS instrument approaches must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.
   b. APR mode must be annunciated at the Final Approach Fix when using GPS for approach guidance.

c. GPS instrument approaches utilizing the No. 2 GNS for approach guidance is prohibited.

d. Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS, or any approach not approved for GPS overlay, with either GNS in GPS mode are prohibited.

e. Use of the No. 1 or No. 2 GNS in VLOC mode to fly ground-based instrument approaches require that the appropriate navigation data to be present on the HSI for the No. 1 GNS or the CDI for the No. 2 GNS.

f. When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the airplane must have the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.

g. VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in normal position to land.

6. Continued navigation using GPS data with a RAIM IS NOT AVAILABLE message displayed is authorized for enroute and terminal phases of flight providing airplane position is verified every 15 minutes using the GNS unit's VOR/ILS receiver or another IFR-approved navigation system.

7. Fuel display parameters are advisory only and do not replace primary fuel quantity or fuel flow gauges for fuel load and range planning.

8. Provided the No. 1 GNS unit's GPS receiver is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications for:

a. VFR/IFR enroute, terminal, and non-precision instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, and RNAV) operation within the U.S. National Airspace System in accordance with AC 20-138.

b. The required Navigation Performance Type 5 (RNP-5) of the European Basic Area Navigation (BRNAV) environment in accordance with AC 90-96, AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 1.

9. Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. Navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.

10. The following placard must be installed:

On Instrument Panel Adjacent to the Course Deviation Indicator:

No. 2 GPS NOT APPROVED FOR APPROACH

11. All portable electronic entertainment devices must be switched off for takeoff and landing.

SECTION III - EMERGENCY PROCEDURES

1. If RAIM POSITION WARNING message is displayed on either GNS, the appropriate indicator will flag and no longer provide GPS based navigation guidance. The pilot should revert to the VLOC mode of the GNS or an alternate means of navigation other than the GPS mode of the GNS.
2. If RAIM IS NOT AVAILABLE message is displayed while conducting a GPS instrument approach, terminate the approach. Execute the appropriate missed approach procedure if required.
3. In the event of an in-flight emergency, depressing and holding the Comm transfer button on the GNS unit for 2 seconds will select the emergency frequency of 121.500 MHz into the Active frequency window.
4. In the event of an audio panel failure, the Fail Safe mode may be selected by pushing the VOLUME knob in. The pilot's microphone and phone jacks (located below the left side panel) will be automatically connected to Com 1 when in the Fail Safe mode.

NOTE

When the audio panel is in the Fail Safe mode, the speaker audio will be inoperative.

5. If any unusual operation of airplane systems is observed during flight, immediately switch off all portable electronic entertainment devices.

SECTION IIIA- ABNORMAL PROCEDURES

No Change

SECTION IV - NORMAL PROCEDURES

WARNING

Familiarity with the enroute operation of the GNS does not constitute proficiency in approach operations. Do not attempt approach operations in Instrument Meteorological Conditions prior to attaining proficiency in the use of the GNS.

1. GNS operating procedures are described in the GARMIN GNS 430 Pilot's Guide, P/N 190-00140-00, Rev. D, dated July 1999, or later appropriate revision, and if installed, the GARMIN GNS 530 Pilot's Guide, P/N 190-00181-00, Rev. A, dated May, 2000, or later appropriate revision.
2. KFC 225 Automatic Flight Control System operating procedures are described in the Bendix/King KFC 225 Pilot's Guide, P/N 006-18035-0000, dated April 1999, or later appropriate revision, and the FAA Approved Airplane Flight Manual Supplement.
3. PMA7000 Audio Panel operating procedures are described in the PS Engineering Pilot's Guide and Operations Manual, P/N 200-074-002r2, dated Sept. 1999, or later appropriate revision.

NAVIGATION DATABASE VERIFICATION

After the GNS unit power-on self-tests have completed, the DATABASE CONFIRMATION page will display and the expiration date of the GPS database is shown. Database updates, issued every 28 days, are available from Jeppesen Sanderson Inc., Englewood Co., Phone: 800-621-5377.

SYSTEM ANNUNCIATORS

1. The following annunciators are displayed on the GPS Annunciator Control Unit located on the instrument panel above the pilot's altimeter:

MSG (Amber) Illuminates in conjunction with the No. 1 GNS message annunciator to indicate a message is to be acknowledged. The applicable GNS Pilot's Guide contains a list of all message page messages and their meanings.

VLOC (White) Illuminates in conjunction with the No. 1 GNS VLOC annunciator to indicate that the No. 1 GNS is in the VLOC mode and the HSI is displaying VLOC data.

GPS (Green) Illuminates in conjunction with the No. 1 GNS unit GPS annunciator to indicate that the No. 1 GNS is in the GPS mode and the HSI is displaying GPS data.

AUTO (White) Illuminates to indicate that the No. 1 GNS is in the normal mode and automatic waypoint sequencing is enabled.

OBS (Green) Illuminates in conjunction with the No. 1 GNS unit OBS annunciator to indicate that the No. 1 GNS is in the OBS mode and automatic waypoint sequencing is disabled.

ENR (Green) Illuminates in conjunction with the No. 1 GNS unit ENR annunciator to indicate that the No. 1 GNS is in enroute mode and the HSI is displaying enroute course deviation scaling.

TERM (Green) Illuminates in conjunction with the No. 1 GNS unit TERM annunciator to indicate that the No. 1 GNS is in terminal mode and the HSI is displaying terminal course deviation scaling.

APR (Green) Illuminates in conjunction with the No. 1 GNS unit APR annunciator to indicate that the No. 1 GNS is in approach mode and the HSI is displaying approach course deviation scaling.

WPT (Amber) Illuminates in conjunction with the No. 1 GNS waypoint alert messages to indicate arrival at a waypoint.

2. The following annunciators are displayed on the CDI:

VLOC (White) Illuminates in conjunction with the No. 2 GNS unit's VLOC annunciator to indicate that the No. 2 GNS is in the VLOC mode and the CDI is displaying VLOC data.

GPS (Green) Illuminates in conjunction with the No. 2 GNS unit's GPS annunciator to indicate that the No. 2 GNS is in the GPS mode and the CDI is displaying GPS data.

3. The following annunciators are located on the instrument panel above the pilot's airspeed indicator:

MM (Amber) Illuminates in conjunction with the audio panel amber **M** annunciator to alert passage of a Middle Marker beacon.

OM (Blue) Illuminates in conjunction with the audio panel blue **O** annunciator to alert passage of an Outer Marker beacon.

IM (White) Illuminates in conjunction with the audio panel white **I** annunciator to alert passage of an Inner Marker beacon.

AIRPLANE INTEGRATION

NAVIGATION DISPLAYS

The HSI displays No. 1 GNS navigation data. The course needle must be manually set to the desired track (DTK) displayed on the No. 1 GNS when operating in the AUTO mode. The course needle may be set to any desired course when the No. 1 GNS is operating in the OBS mode and this course will automatically be transferred to the No. 1 GNS.

HSI FULL SCALE DEVIATION INCREMENTS GPS NAV SOURCE SELECTED	
PHASE	**LATERAL**
EN ROUTE	5.0 nm
TERMINAL	1.0 nm
APPROACH	0.3 nm

The CDI displays No. 2 GNS navigation data. The course must be manually set to the desired track (DTK) displayed on the No. 2 GNS when operating in the normal, non-OBS, mode. The course needle may be set to any desired course when the No. 2 GNS is operating in the OBS mode and this course will automatically be transferred to the No. 2 GNS.

CDI FULL SCALE DEVIATION INCREMENTS GPS NAV SOURCE SELECTED	
PHASE	**LATERAL**
EN ROUTE	5.0 nm
TERMINAL	1.0 nm
APPROACH	NOT APPROVED

GNS 530/430

CROSSFILL

Either GNS may send changes in the active flight plan or Direct-to waypoint commands to the other GNS unit. This crossfill function is pilot selectable to either automatic or manual mode. Crossfill is unavailable when OBS mode is selected.

NO. 1 GNS (GNS 530 OR GNS 430)

Selection of VLOC or GPS as the active navigation source may be accomplished by either pressing the CDI button on the GPS Annunciator Control Unit or by pressing the CDI button on the No. 1 GNS.

Selection of OBS mode may be accomplished by either pressing the OBS button on the GPS Annunciator Control Unit or by pressing the OBS button on the No. 1 GNS.

No. 2 GNS (GNS 430)

Selection of VLOC or GPS as the active navigation source can only be accomplished by pressing the CDI button on the No. 2 GNS.

Selection of OBS mode can only be accomplished by pressing the OBS button on the No. 2 GNS.

AUTOMATIC FLIGHT CONTROL SYSTEM

The KFC 225 Automatic Flight Control System is coupled to the No. 1 GNS when engaged.

Changing the navigation source for the CDI on the No. 1 GNS from GPS to VLOC or from VLOC to GPS, with NAV, APR or REV selected on the flight director, will cause the selected mode to be lost. This will occur if the switching is performed manually by pressing the CDI button on the No. 1 GNS or on the remote annunciation panel, or if the switching is performed automatically by the No. 1 GNS during ILS or LOC approaches. The loss will be indicated by a blinking of the selected mode annunciator and a wings level command by the flight director as it reverts to the ROL mode. The desired mode may be reselected by pressing the mode select button once to acknowledge the loss (the ROL annunciator will replace the blinking annunciator) and then pressing the mode select button a second time to re-engage it. If the selected mode does not re-engage, check the navigation source for a valid signal. Loss of the navigation source will also cause the flight director to revert to the ROL mode.

WARNING

Changing the navigation source for the CDI on the No. 1 GNS will result in the loss of the NAV, APR or REV modes of operation of the flight director and reversion to the ROL mode.

APPROACH OPERATIONS

The APR mode should be selected when conducting flight director/autopilot coupled GPS approaches.

AUTOMATIC SWITCHING OF THE CDI NAVIGATION SOURCE

The No. 1 GNS may be programmed to allow for the automatic switching of the navigation source for the CDI from GPS to VLOC during ILS and LOC approaches. This is accomplished by selecting the AUX Group of pages, then the SETUP PAGE. Select CDI/ALARMS, then program the ILS CDI CAPTURE window for AUTO or MANUAL. If AUTO is selected, the navigation source for the CDI will automatically switch from GPS to VLOC during the approach if the ILS or LOC approach is activated and the appropriate frequency has been tuned. The point of switching will occur as follows.

1. For GNS 430 units equipped with MAIN software through 2.14, the automatic switching will occur only if the airplane is precisely aligned with the final approach prior to the Final Approach Fix.
2. For GNS 430 units equipped with MAIN software of 2.15 and after, and GNS 530 units equipped with MAIN software of 2.04 and after, the automatic switching will occur in a much larger zone which extends 1.2 nm either side of the final approach course and from 2 to 15 nm from the final approach fix.

As noted previously, switching of the CDI navigation source automatically causes the flight director to revert to the ROL mode. During ILS approaches this automatic switching may occur at inopportune times, such as when the airplane is turning onto final approach, causing added workload and possible confusion for the pilot. Thus, it is highly recommended that the ILS CDI CAPTURE option be set to MANUAL for all autopilot/flight director operations.

WARNING

Use of the AUTO option of the GNS 530/430 ILS CDI CAPTURE feature in conjunction with flight director/autopilot operations is not recommended.

FLYING VECTORS-TO-FINAL APPROACHES

If the VECTORS transition or VECTORS-TO-FINAL procedure is activated with the flight director engaged in the NAV or APR mode, the flight director will command an immediate turn to intercept the final approach course, regardless of the position of the airplane with respect to the airport. To prevent this from happening, select the HDG mode prior to activating the VECTORS option. Maneuver the airplane in the HDG mode until an appropriate intercept angle is established with the final approach, then arm the APR mode.

WARNING

Do not activate the VECTORS transition or VECTORS-TO-FINAL procedure with the flight director in the NAV or APR modes.

LATERAL GUIDANCE DURING PROCEDURE TURNS, HOLDING, AND MISSED APPROACH

The GNS unit does not provide lateral navigation guidance for procedure turns, holding pattern entry, holding patterns, or missed approach procedures. The pilot is responsible for navigation during these operations.

WARNING

Procedure turns, holding, and missed approach procedures must be accomplished using HDG as the lateral mode when the flight director/autopilot is engaged. The pilot is responsible for navigation during these operations.

A lateral navigation mode (NAV, APR, or REV) may be engaged when the airplane is heading inbound to the active TO waypoint.

LOCALIZER BACK COURSE APPROACHES

With the localizer back course approach loaded into the No. 1 GNS for use as supplemental navigation guidance, a waypoint alert, "NEXT DTK [###]°", corresponding to the back course heading, will appear just prior to arrival at the Initial Approach Fix. Localizer back course approaches must be conducted with the ILS inbound course set on the HSI.

WARNING

Localizer back course approaches must be conducted with VLOC selected as the active navigation source and the ILS inbound course must be set on the HSI.

MISSED APPROACH

The throttle-mounted GO AROUND button is not interfaced to either GNS. When the airplane reaches the missed approach waypoint during approach procedures, the GNS transitions to the SUSP mode and continues to provide guidance along an extension of the final course segment.

Pressing the GO AROUND button will disconnect the autopilot, if engaged, and select the flight director go around (GA) mode. To exit the SUSP mode and sequence to the missed approach waypoint, press the OBS button on the GPS Annunciator Control Unit or press the OBS button on the No. 1 GNS.

STORMSCOPE

Lightning strike data may be cleared by momentary forward activation of the AUD/STRM switch located on the pilot's control wheel.

AUDIO PANEL

Before takeoff, operate all portable electronic entertainment devices that will be operated during flight to determine if there is any adverse effect on other airplane systems. If any adverse effects are observed, do not operate that equipment during flight.

Playback of the last outgoing or incoming radio transmission may be initiated by momentary aft activation of the AUD/STRM switch located on the pilot's control wheel. Subsequent activation of this switch will playback previously recorded transmissions (up to 16). Holding this switch aft for more than one second will terminate playback and sequence back to the most recent recording.

SECTION V - PERFORMANCE

No Change

SECTION VI - WEIGHT AND BALANCE/EQUIPMENT LIST

No Change

SECTION VII - SYSTEMS DESCRIPTION

GARMIN GNS 530/430

Each GNS unit is a fully integrated, panel mounted unit, which contains a VHF Communications Transceiver, a VOR / ILS receiver, and a Global Positioning System (GPS) Navigation computer. Each system consists of the GNS unit, a GPS antenna, VHF VOR/LOC (shared) antenna, GS (shared) antenna and a VHF COMM antenna.

The No. 1 GNS navigation data (the top GNS unit) is presented on the horizontal situation indicator (HSI) and can be coupled to the automatic flight control system. Remote annunciators and switches related to operation of the unit are located on the GPS Annunciation Control Unit above the pilot's altimeter. The No. 1 GNS is protected by two 5-amp circuit breakers labeled COMM 1 and GPS/NAV 1. The circuit breakers are located on the avionics circuit breaker panel.

The No. 2 GNS navigation data is presented on the course deviation indicator (CDI) and can not be coupled to the automatic flight control system. Remote navigation source annunciators are located on the CDI. The No. 2 GNS is protected by two 5-amp circuit breakers labeled COMM 2 and GPS/NAV 2. The circuit breakers are located on the avionics circuit breaker panel.

Both GNS's are capable of remote tuning an optional DME.

Either GNS unit may send changes in the active flight plan or Direct-to-waypoint commands to the other GNS unit.

Both GNS units can display fuel flow provided by the Shadin F/ADC 200 or 200+.

Both GNS units can display air data information from the KEA 130 Encoding Altimeter and Shadin F/ADC 200 or 200+.

Both GNS units can display WX 500 Stormscope information.

For details on operation refer to the Garmin Pilot's Guide, P/N

190-00140-00, and when the GNS 530 is installed, Garmin Pilot's Guide, P/N 190-00181-00.

PS ENGINEERING PMA7000M-S AUDIO PANEL

The audio panel provides audio distribution and a six-place voice activated intercom.

The audio panel provides integration and distribution of audio from optionally installed equipment such as DME and ADF, and external entertainment devices.

AUDIO PANEL

The microphone selector switch controls radio transceiver selection. When either Com 1 or Com 2 are selected, the appropriate receive audio is automatically selected. Additional receiver audio sources may be selected by pressing the desired receive audio selector buttons. Selected audio sources are identified by illumination of the green LED located on each selector button.

A split mode communication capability exists that allows dedicated and simultaneous use of both radios.

1. When Com 1/2 is selected, the pilot position jacks are dedicated to the Com 1 and the co-pilot jacks are dedicated to the Com 2.
2. When Com 2/1 is selected, the pilot position jacks are dedicated to the Com 2 and the co-pilot jacks are dedicated to Com 1.
3. When either Com 1/2 or Com 2/1 are selected, the intercom between the pilot and copilot is disabled. Pressing the ICS audio selector button will restore the crew intercom function.

A Fail Safe mode is incorporated that facilitates radio communications after an audio panel failure. The dual function VOLUME knob controls intercom volume through rotary action and also controls selection of the Fail Safe mode using a push/pull action. The knob is pulled out for normal operation. When the knob is pushed in (Fail Safe), the pilot's station headset and microphone jacks are connected to Com 1 regardless of audio panel selections. The airplane speaker audio is inoperative when the audio panel is in the Fail Safe mode.

The audio panel also incorporates a digital recorder capable of automatic recording of up to 16 incoming or outgoing radio transmissions. Playback of the recorded messages is limited to the pilot's headset.

1. All radio communications heard over the pilot position headset will be recorded, regardless of audio panel selections.
2. The AUD/STRM switch, located on the pilot's control wheel, controls the audio playback function. Momentary aft movement of this switch will replay the last recording. Additional momentary aft movements will playback the previous recordings. Aft movement of this switch for more than one second will terminate playback and sequence back to the most recent recording.

INTERCOM SYSTEM

The VOLUME knob located on the audio panel controls intercom volume.

The airplane is equipped with seven sets of intercom jacks and two audio input jacks as follows:

Pilot's Station	Located below the left side panel.
Copilot's Station	Located below the right subpanel.
Center Station (Hand microphone only)	Located below the center armrest between the pilot's and copilot's seat.
Station Number 3	Located behind the pilot's seat on the left sidewall.
Station Number 4	Located behind the copilot's seat on the right sidewall.
Station Number 5	Located behind seat number 5 on the left sidewall.
Station Number 6	Located behind seat number 6 on the right sidewall.
Music Input No. 1	Located below the center armrest between the pilot's and copilot's seat.
Music Input No. 2	Located behind the pilot's seat on the left sidewall.

The Music Input No. 1 provides an entertainment device input to the pilot and copilot. The Music Input No. 2 provides an entertainment device input to stations 3 through 6. Radio transmissions and intercom voice traffic will normally mute the external audio signal. Automatic muting of the Music Input No. 1 audio signal may be disabled by depressing the ICS button on the audio panel.

Entertainment device audio volume is controlled by the input device.

NOTE

All portable electronic entertainment devices must be switched off for takeoff and landing.

The intercom mode selector switch controls intercom mode selection. The following modes are available:

Mode	Pilot Hears	Copilot Hears	Pass. Hears
ISO	Radio Pilot Sidetone	Copilot and passenger intercom Music Input No. 1	Copilot and passenger intercom Music Input No. 2
ALL	Pilot Copilot Radio Passengers Music Input No. 1	Copilot Pilot Radio Passengers Music Input No. 1	Passengers Pilot Copilot Radio Music Input No. 2
CREW	Pilot Copilot Radio Music Input No. 1	Copilot Pilot Radio Music Input No. 1	Passengers Music Input No. 2

MARKER BEACON

The audio panel incorporates built-in marker beacon receiver and annunciators. Additional marker beacon annunciators are located in the instrument panel above the pilot's airspeed indicator.

Marker beacon sensitivity, audio muting, and annunciator testing is controlled by the three-position marker mode switch. The HIGH and LOW switch positions select high and low marker beacon sensitivity respectively. The T/M position tests the marker beacon annunciators and also mutes the marker beacon audio for approximately 12 seconds.

Marker beacon audio may be selected by depressing the MKR audio selector button.

For details on operation, refer to the PS Engineering Pilot's Guide and Operations Manual, P/N 200-074-002.

STORMSCOPE

The BF Goodrich WX-500 system consists of a remote mounted processor and externally mounted antenna. This system passively detects electrical discharges associated with thunderstorm activity within 200 nm of the airplane. The No. 1 GNS controls the remote processor but both GNS units can display thunderstorm activity.

Momentary forward activation of the AUD/STRM switch, located on the pilot's control wheel, will clear lightning strike and cell data from both GNS units.

For details on operation refer to BF Goodrich WX-500 Operator's Manual, P/N 009-11501-001, the GARMIN GNS 430 Pilot's Guide Addendum, P/N 190-00140-10 Rev. A, Oct. 1999, and, if installed, the GARMIN GNS 530 Pilot's Guide, P/N 190-00181-00.

FUEL / AIR DATA COMPUTER

The Shadin F/ADC 200 or 200+ (if installed) is a remote mounted computer that measures pitot-static pressures, heading, and fuel flow and sends the data to both GNS units. In addition, the Shadin F/ADC 200+ automatically provides the altimeter barometric setting to both GNS units and also allows the units to provide fuel totalizer functions. When the INSTRUMENT PANEL SELF-TEST page is presented during initial power up, windows are provided to set the FUEL CAPACITY of the airplane and the FUEL ON-BOARD. The usable capacity should be entered in the FUEL CAPACITY window. If the fuel on board is less than total usable, the actual amount may be entered in the FUEL ON-BOARD window. If the airplane is fully serviced, the SET FULL FUEL? query may be highlighted and the ENT button pressed. This will automatically enter the amount shown in the FUEL CAPACITY window into the FUEL ON-BOARD window.

ANNUNCIATORS

Annunciators related to operation of the No. 1 GNS are located on the GPS Annunciator Control Unit located on the instrument panel above the pilot's altimeter. Depressing the ANNUN TEST switch button on the pilot's subpanel illuminates all of these annunciators. Annunciator dimming is controlled by a built-in photocell.

Annunciators related to operation of the No. 2 GNS are on the CDI. These annunciators are illuminated during initial power-up of the No. 2 GNS. Annunciator dimming is controlled by a built-in photocell.

Marker beacon annunciators are located on the audio panel and also located above the pilot's airspeed indicator. Selecting the T/M position of the marker mode selector switch will test all of these annunciators. Annunciator dimming is controlled by a built-in photocell.

INTERIOR LIGHTING

The PANEL switch, located on the pilot's subpanel, controls instrument panel lighting. Knob-type rheostats, located on the copilot's subpanel, control lighting intensity. The ENG INST/AVIONICS rheostat controls the intensity of the audio panel and GNS backlighting. The FLIGHT INST rheostat controls the GPS Annunciator Control Unit and CDI backlighting.

The GNS display intensity is normally controlled by a built-in photocell. Manual adjustment of the display may also be accomplished through the GNS unit's AUX pages.

SECTION VIII - HANDLING, SERVICING & MAINTENANCE

No Change

Raytheon Aircraft

Beech Bonanza® A36

(E-3482 and After)

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual
Supplement

for the
Honeywell KMH880 Multi-Hazard Awareness System
with the
Honeywell KMD 550 Multi-Function Display
and
Mid-Continent Instrument Company MD41-1208
Terrain Awareness Annunciator Control Unit

This Supplement is Applicable to the Following Manual(s):
36-590002-37

Airplane Serial Number: ______________________

Airplane Registration Number: ______________________

FAA Approved by: Thomas Trenner
for John Tigue
Raytheon Aircraft Company
DOA-230339-CE

Raytheon Aircraft

LOG OF REVISIONS

Beech Bonanza® A36
(E-3482 and After)

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Supplement

for the
Honeywell KMH880 Multi-Hazard Awareness System
with the
Honeywell KMD 550 Multi-Function Display
and
Mid-Continent Instrument Company MD41-1208
Terrain Awareness Annunciator Control Unit

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CONTENTS

SECTION I - GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) when the airplane has been modified by installation of the Honeywell KMH880 Multi-Hazard Awareness System, the Honeywell KMD 550 Multifunction Display and Mid-Continent Instrument Company MD41-1208 Annunciator Control Panel in accordance with Raytheon Aircraft-approved data. The KMH880 system provides a General Aviation-Enhanced Ground Proximity Warning System (GA-EGPWS) and a Traffic Advisory System (TAS). Additionally, the TAS may also be displayed on the existing Garmin GNS 530 and GNS 430 Nav/Com systems.

The information in this supplement supersedes or adds to the basic POH/AFM only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

Refer to the following Honeywell documents for specific operating details of the KMH880 system.

Bendix/King KMD 550/850 Multi-Function Display Pilot's Guide, Honeywell P/N 006-18222-0000, Revision 3, dated May 2002, or later revision. This guide must contain the following Pilot's Guide Addendums:

Terrain Function (EGPWS), Honeywell P/N 006-18236-0000, Revision 2, dated September 2002, or later revision.

Traffic Avoidance Function (TCAS/TAS), Honeywell P/N 006-18238-0000, Revision 1, dated February 2002, or later revision.

Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell P/N 006-18265-0000, Revision 1, dated March 2002, or later revision.

Refer to the Garmin GNS 530 Pilot's Guide & Reference, P/N 190-00181-00, Revision B, May 2001, or later revision, for control and display of the KMH880 Traffic Advisory System.

SECTION II - LIMITATIONS

1. The Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell P/N 006-18265-0000, Revision 1, dated March 2002, or later revision, must be readily accessible to the pilot when operating the KMH880 system.
2. The Garmin GNS 530 Pilot's Guide & Reference, P/N 190-00181-00, Revision B, May 2001, or later revision, must be readily accessible to the pilot when operating the KMH880 system.
3. Navigation must not be predicated upon the use of the Terrain Awareness Display. The Terrain Awareness Display is intended to serve as a situational awareness tool only, and may not provide the accuracy and/or reliability on which to solely base terrain or obstacle avoidance maneuvering decisions.

4. The Terrain Page of the KMD 550 presents an EGPWS Geometric Altitude, labeled MSL, in the upper left corner of the screen. Use of this altitude for navigational purposes is not approved. See Altimeter System Failure in Section III, EMERGENCY PROCEDURES, and Geometric Altitude Display in Section VII, SYSTEMS DESCRIPTION.
5. The terrain visual and aural alerts must be inhibited using the TERR INHB switch when landing at an airport that is not included in the airport database.
6. The pilot should not maneuver the airplane based only on the traffic display. The traffic display is intended to assist in visually locating traffic and lacks the resolution necessary for use in evasive maneuvering.
7. If the pilot is advised by Air Traffic Control to disable the altitude reporting function of the transponder, the Traffic Advisory System must be placed in standby.

SECTION III - EMERGENCY PROCEDURES

The following procedures supplement those found in the basic POH/AFM.

GA-EGPWS LOOK-AHEAD TERRAIN WARNING or- EXCESSIVE RATE OF DESCENT WARNING (Below 2000 Feet AGL)

Voice Alert: **"TERRAIN TERRAIN, PULL UP"**, or **"OBSTACLE OBSTACLE, PULL UP"**
or-
"PULL UP, PULL UP"

In either case, the voice alert "PULL UP" will be continually repeated until the threat is eliminated.

Annunciator: **Illumination of the red TERR annunciator.**

Terrain Display for Look-Ahead Warning: **Threat area displayed in solid red color.**

Definition of Threat:

- A terrain or obstacle threat exists approximately 30 seconds ahead of the airplane.

or

- Airplane is descending at a high sink rate with respect to its altitude above the terrain.

NOTE

Pilots are authorized to deviate from their current air traffic control (ATC) clearance to the extent necessary to comply with an EGPWS warning.

NOTE

If the GA-EGPWS issues a terrain warning, the Terrain Page on the KMD 550 will automatically be displayed if not currently selected.

In IMC or at Night:

1. **Wings .... LEVEL**
2. **Power .... MAXIMUM ALLOWABLE**
3. **Pitch ....INCREASE**
   a. **Promptly and smoothly increase pitch towards an initial pitch attitude of 15° - 20°.**
   b. **Adjust to maintain 84 KIAS.**
   c. **Adjust as required to avoid a continuous stall warning.**
4. **Gear and Flaps .... RETRACT**
5. Continue climb at 84 KIAS until terrain clearance is assured.
6. Advise Air Traffic Control as necessary.

WARNING

Only vertical maneuvers are recommended unless the pilot, using all available information and instruments, determines that a turn, in addition to the vertical escape maneuver, is the safest course of action.

In Day VMC:

1. Evaluate flight path with respect to terrain.
2. Take action as necessary to recover safe terrain clearance.
3. Advise Air Traffic Control as necessary.

GA-EGPWS LOOK-AHEAD TERRAIN ALERT

Voice Alert: **"CAUTION TERRAIN, CAUTION TERRAIN"** or **"CAUTION OBSTACLE, CAUTION OBSTACLE"**

Annunciator: **Illumination of the amber TERR annunciator.**

Terrain Display: **Threat area displayed in solid yellow color.**

Definition of Threat: A terrain or obstacle threat exists approximately 1 minute ahead of the airplane.

NOTE

If the GA-EGPWS issues a terrain alert, the Terrain Page on the KMD 550 will automatically be displayed if not currently selected.

1. Stop descending, or climb, and/or turn as necessary, based on analysis of all available instruments and visual observations, in order to cancel the alert. (The voice alert will be repeated every 7 seconds until the threat no longer exists.)
2. Advise Air Traffic Control as necessary.

PENETRATION OF RUNWAY FIELD CLEARANCE FLOOR

Voice Alert: **"TOO LOW, TOO LOW"**

Annunciator: **Illumination of the amber TERR annunciator.**

Definition of Threat: The airplane has descended below the Runway Field Clearance Floor.

Protection is provided from 5 nm from the end of the runway to 1 nm from the end of the runway. The floor begins at 300 feet AGL at 5 nm and decreases to zero feet AGL at 1 nm from the end of the runway.

1. Increase altitude as required to cancel the alerts.
2. The voice alert will sound with increasing frequency if the altitude continues to decrease.

EXCESSIVE RATE OF DESCENT ALERT (Below 5000 Feet AGL)

Voice Alert: **"SINK RATE, SINK RATE"**

Annunciator: **Illumination of the amber TERR annunciator.**

Definition of Threat: Airplane is descending at a high sink rate with respect to its altitude above the terrain.

Level wings and reduce rate of descent until visual and aural alerts cease. If the high rate of descent continues, the voice alert will continue at an increasing frequency.

INADVERTENT DESCENT OR LOSS OF ALTITUDE AFTER TAKE-OFF (Below 700 Feet Above Runway Elevation)

Voice Alert: **"DON'T SINK, DON'T SINK"**

Annunciator: **Illumination of the amber TERR annunciator.**

Definition of Threat: Airplane experiences an inadvertent descent or loss of altitude after takeoff.

• Level wings and immediately establish a positive rate of climb.

DITCHING OR OFF-AIRPORT LANDING

Inhibit the visual and aural alerts using the following procedure. The Terrain Page will remain operational on the KMD 550.

1. TERR INHB Switch .... PRESS
   a. TERR INHB annunciator .... ILLUMINATED
   b. WARNINGS INHIBITED message is displayed in the center of the KMD 550 Terrain Page.
   c. TERR INHBT message is displayed at the bottom left of the KMD 550 Terrain Page.

DEACTIVATION OF THE GA-EGPWS

If the pilot in command determines that activation of the GA-EGPWS will interfere in dealing with emergency conditions, the system may be deactivated by pulling the HAZ AVOID circuit breaker.

ALTIMETER SYSTEM FAILURE

Voice Alert: **"CHECK ALTITUDE"**

Annunciator: **Illumination of the amber CHECK ALT annunciator on the Terrain Page of the KMD 550.**

Definition of Threat: The GA-EGPWS altitude monitor has detected an unreasonable difference between the pilot's altimeter system and the GA-EGPWS calculated geometric altitude.

1. Pilot's Altimeter .... CHECK
   a. Verify correct barometric setting.
   b. Check for reasonableness against existing known elevations.

If pilot's altimeter system is found to be malfunctioning:

2. Monitor Geometric Altitude on the Terrain Page of the KMD 550 for general altitude awareness.

WARNING

The Geometric MSL altitude displayed on the Terrain Page of the KMD 550 is a calculated value and must not be considered as a primary source of altitude. It may be in error by 100 feet or more. It must be considered as only an approximation of the airplane's altitude above mean sea level (MSL).

SECTION IV - NORMAL PROCEDURES

The following procedures supplement those found in the basic POH/AFM:

NOTE

Items marked with an "*" may be omitted at pilot's discretion after the first flight of the day.

Traffic Advisory System (TAS) Considerations

WARNING

The TAS does not provide protection from aircraft that do not have an operating transponder. The TAS can detect and track aircraft with either an ATCRBS (operating in Mode A or C) or a Mode S transponder. The TAS is only an aid in detecting other traffic and provides a means for the pilot to visually acquire and avoid aircraft which may impose a collision threat. Evasive maneuvers should not be made based solely on the TAS display.

CAUTION

Optimum TAS performance is realized when intruder aircraft are reporting their altitude.

NOTE

Although the TAS has operating and appearance similarities to a TCAS I system, it does not satisfy the TCAS I requirements of operational regulations.

1. In addition to being displayed on the KMD 550, traffic information may also be displayed on the GNS 530 and the GNS 430 as described below.
   a. NAV 3 page. The STBY, OPER and TEST functions are not controllable on this page. These functions are controlled only by the KMD 550. Selected settings will be repeated on the GNS 530 and 430. The range of the TAS may be controlled on the GNS 530 and 430 (using the RNG buttons) independently of each other and of the KMD 550. The viewing angle (altitude display) is also independently controllable using the following procedure.
      1) Press the small knob to activate the cursor.
      2) Use the large knob to select the upper left field.
      3) Use the small knob to select the required view (BLW, NORM, ABV or UNR)
      4) Press the small knob to turn the cursor off.
   b. NAV 2 page (MAP). Traffic may be displayed on this page using the following procedures.
      1) Press Menu
      2) Use the small knob to select SETUP MAP.
      3) Use the small knob to select TRAFFIC.
      4) Press ENT.
      5) Press CLR to return to the MAP page.
   c. A thumbnail display of traffic may be shown on the NAV 2 page of the GNS 530 and GNS 430 in place of one of the data fields on the right side of the display.

Refer to the Garmin GNS 530 and GNS 430 Pilot's Guides.

d. A thumbnail display of traffic may be displayed on all pages of the GNS 530 in the field below the Nav frequency data. Refer to the Garmin GNS 530 Pilot's Guide.

2. Traffic Advisories (TA's) can be expected to occur during normal flight operation. Generally, TA's will occur more frequently in terminal areas during arrival, and less frequently during departure and enroute operations. In the vast majority of these cases, the aircraft displayed will be safely separated and there will be no need for the pilot to initiate any avoidance maneuvers.

3. The TAS provides the following Traffic Advisory:

Voice Alert: **"TRAFFIC, TRAFFIC"** (inhibited when any GA-EGPWS voice alert is in progress and when the landing gear is down.)

Traffic Display: **A filled yellow circle.**

Pilot Response:

WARNING

Maneuvers based solely on the TAS display may result in reduced separation from the intruder.

a. Attempt to visually acquire the intruder aircraft and maintain/attain safe separation in accordance with regulatory requirements and good operating practice.

b. If the intruder aircraft is not visually acquired, air traffic control should be contacted to obtain any information that may assist the crew concerning the intruder aircraft.

c. Evasive maneuvers (rapid changes in pitch, roll, normal acceleration, thrust, or speed) should only be conducted after visual acquisition of the intruder, and then only when necessary to achieve or assure safe separation.

d. Minor adjustments to the vertical flight path, consistent with air traffic control requirements, are not considered evasive maneuvers.

4. The TAS self-test function is inhibited in flight.

Enhanced Ground Proximity Warning System Considerations

1. The green/yellow boundary on the Terrain Display normally represents an altitude that is less than the airplane's altitude. This provides an added degree of safety by accounting for altimeter errors and terrain and obstacle height errors. In addition, when the airplane is descending at a rate greater than 1000 feet per minute, the boundary is biased upward by one half of the rate-of-descent. Regardless of these facts, the prudent pilot should always assume that any yellow or red depictions represent terrain or obstacles that are at or above the altitude of the airplane.
2. If there is no terrain data in the database for a particular area, it will be displayed with a magenta dot pattern. Terrain and obstacle warnings and alerts are not available for such areas.

BEFORE TAKEOFF

* 1. GA-EGPWS .... TEST

a. Garmin GNS 530 .... ON AND AIRPLANE POSITION ACQUIRED

b. KMD 550 .... ON

c. KMD 550 .... SELECT TERR FUNCTION KEY

d. TERR INHB Switch .... NOT ENGAGED (TERR INHB annunciator extinguished)

e. GA-EGPWS TEST Switch . . . PUSH AND RELEASE

1) Amber TERR N/A Annunciator . . . . ILLUMINATED

2) Red TERR Annunciator . . . . ILLUMINATED

3) Voice message "EGPWS SYSTEM OK" is heard over the cockpit speakers.

4) Yellow "EGPWS TEST" message is displayed in the lower left of the KMD 550 screen.

5) Red TERR Annunciator . . . . EXTINGUISHED

6) Amber TERR Annunciator . . . . ILLUMINATED

7) The terrain self-test pattern is displayed on the KMD 550 for several sweeps, then disappears.

8) Amber TERR Annunciator . . . . . EXTINGUISHED

9) Amber TERR N/A Annunciator . . EXTINGUISHED

10) Yellow "EGPWS TEST" message . . . . EXTINGUISHED

NOTE

See the KMH880 Pilot's Guide for additional self test levels and a list of aural messages.

* 2. TAS . . . . TEST

a. KMD 550 . . . . SELECT TRFC FUNCTION KEY

b. KMD 550 . . . . SELECT 5 NM RANGE USING THE RNG CONTROL KEY

c. KMD 550 . . . . SELECT TST USING THE OUTER CONTROL KNOB.

(The KMD 550 will perform the following test over a period of approximately 8 seconds. The test pattern will be repeated on the GNS 530 and/or 430 if page 3 of the NAV Group is selected.)

- A Traffic Advisory (yellow circle) will appear at 9 o'clock, range 2 miles, 200 feet below and climbing.

- Proximity Traffic (solid white diamond) will appear at 1 o'clock, range 3.6 miles, 1000 feet below and descending.
- Non-Threat Traffic (open white diamond) will appear at 11 o'clock, range 3.6 miles, flying level 1000 feet above.
- A blue TAS TST message will appear in the lower left corner of the display.
- A Voice Message "TAS System Test OK" will be heard over the cockpit speakers at the conclusion of a successful test.
- The TAS TST message will be replaced by the TAS SBY message.

3. TAS . . . . LEAVE IN SBY UNTIL JUST PRIOR TO TAKEOFF

Just prior to takeoff:

4. TAS . . . . ON
   a. Range. . . . . .5 NM
   b. View . . . . ABOVE

NOTE

Some range selections on the KMD 550 are different from the range selections on the GNS 530 and GNS 430 units. Available selections are:
KMD 550: 2, 2.5, 5, 7, 10, 15, 20, and 40 nm
GNS 530 and 430: 2, 6, 12, 24, and 40 nm

CRUISE

1. TAS . . . . .SET
   a. Range. 10 NM OR GREATER
   b. Mode . . . . NORMAL (or as desired)

NOTE

The maximum tracking range is 18 nm; however, intruders may be seen out to 36 nm.

DESCENT

1. TAS .... SET
   a. Range .... 10 NM OR LESS
   b. Mode .... BELOW (or as desired)

BEFORE LANDING

TRAFFIC ADVISORY CONSIDERATIONS

The voice alert "TRAFFIC, TRAFFIC" is inhibited with the landing gear down.

GA-EGPWS CONSIDERATIONS

1. If landing on a runway less than 2000 feet in length, a runway that is not in the GA-EGPWS database, or a runway that may have unique terrain features in close proximity, inhibit the visual and aural alerts using the following procedure. The Terrain Page will remain operational on the KMD 550.
   a. TERR INHB Switch .... PRESS
      1) TERR INHB Annunciator .... ILLUMINATED
      2) WARNINGS INHIBITED message is displayed in the center of the KMD 550 Terrain Page.
      3) TERR INHBT message is displayed at the bottom left of the KMD 550 Terrain Page.
2. The GA-EGPWS provides a "FIVE HUNDRED" voice alert when the airplane is 500 feet AGL. This alert is based on the geometric altitude of the airplane as computed by the KMH880 GA-EGPWS.

3. During operations at certain locations, warning thresholds may be exceeded due to specific terrain or operating procedures. During day VFR, these expected warnings may be considered as cautionary and the approach continued.

AFTER LANDING

• TAS .... SBY

SECTION V - PERFORMANCE

No Change

SECTION VI - WEIGHT & BALANCE/EQUIPMENT LIST

No Change

SECTION VII - SYSTEMS DESCRIPTION

The addition of the Bendix/King KMH880 Multi-Hazard Awareness System to the airplane results in the creation of a Bendix/King IHAS 8000 Integrated Hazard Avoidance System. The system consists of the following components:

1. KMD 550 Multi-Function Display
2. KMH880 Multi-Hazard Awareness System Processor which provides a General Aviation-Enhanced Ground Proximity Warning System (GA-EGPWS) and a Traffic Advisory System (TAS). The KMH880 is protected by a 5-amp circuit breaker placarded HAZ AVOID.
3. Mid-Continent Instruments MD41-1208 GA-EGPWS Terrain Awareness Control Panel.

4. Bendix/King KA815 Directional Traffic Advisory Antennas located on the top and bottom of the fuselage.

The following additional items were previously available but are considered part of the IHAS 8000 system.

5. BFGoodrich WX-500 Stormscope.

KMD 550 MULTI-FUNCTION DISPLAY

Refer to the following document for a detailed description of the KMD 550 Multi-Function Display:

> Bendix/King KMD 550/850 Multi-Function Display Pilots Guide, P/N 006-18222-0000, Revision 3, dated May 2002, or later version.

The following additional information is provided:

The display receives power through the Avionics switch and the Off/On switch located in the lower left corner of the display. The display is protected by a 3-amp circuit breaker placarded MFD. Illumination is controlled by the KMD 550 brightness control in the upper left corner and the ENG INST AVIONICS rheostat located on the instrument subpanel.

The display allows the presentation of the following information:

1. Moving Map information with position data provided from the Garmin GNS 530 GPS system.
2. Lightning information from the existing BFGoodrich WX-500 Stormscope.
3. Terrain information from the KMH880 GA-EGPWS.
4. Traffic information from the KMH880 Traffic Advisory System (TAS).

Information from the BFGoodrich WX-500 Stormscope and the KMH880 Traffic Advisory System (TAS) may also be displayed on the Garmin GNS 530 and GNS 430 Nav/Com Systems.

The KMD 550 will orient the different displays as follows:

Map - Heading Up on the ground. Magnetic Track Up when airborne.

Stormscope - Heading Up.

Terrain - Magnetic Heading Up on the ground. Magnetic Track Up when airborne.

The following displays may be overlaid on other displays:

Display Selected	Displays Which May Be Overlaid
Map	Stormscope, Flight Plan, Traffic
Stormscope	Flight Plan
Traffic	Flight Plan
Terrain	Stormscope, Flight Plan, Traffic

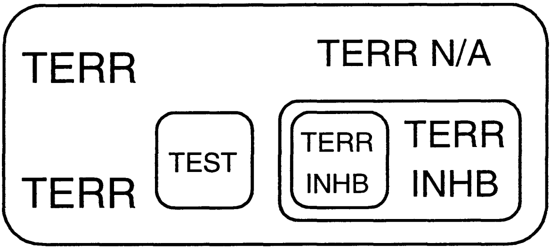
MID-CONTINENT INSTRUMENTS MD41-1208 GA-EGPWS TERRAIN AWARENESS CONTROL PANEL

The control panel includes the following items:

1. Red and amber TERR warning and alert annunciators.
2. A test switch.
3. A terrain inhibit switch (TERR INHB) and white TERR INHB annunciator.
4. An amber TERR N/A annunciator.

Illumination of the panel is controlled by the FLIGHT INST rheostat and the panel's internal photo cell. The configuration and description of the panel functions are shown below.

TERRAIN AWARENESS CONTROL PANEL



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TERRAIN AWARENESS CONTROL PANEL DESCRIPTION

Annunciator/ Control	Color	Cause for Illumination/ Function
TERR	Red	Terrain Warning
TERR	Amber	Terrain Alert
TERR N/A	Amber	Indicates terrain function INOP.
TEST Switch	– – –	Provides press-to-test function for the GA-EGPWS.
TERR INHB Ann/Switch	White	Push-on to inhibit all terrain alerting functions.

BENDIX/KING KMH880 GENERAL AVIATION ENHANCED GROUND PROXIMITY WARNING SYSTEM (GA-EGPWS)

Refer to the following documents for a detailed description of the GA-EGPWS and its integration with the KMD 550 Multi-Function Display.

Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, P/N 006-18265-0000, Revision 1, dated March 2002, or later revision.

Bendix/King KMD 550/850 Multi-Function Display Pilots Guide, P/N 006-18222-0000, Revision 3, dated May 2002, or later revision.

The following additional information is provided:

The following data is provided to the KMH880 GA-EGPWS from other airplane systems.

1. GPS position from the Garmin GNS 530.
2. Heading from the pilot's compass system.
3. Pressure altitude from the pilot's altimeter system.
4. Control input from the Mid-Continent Instruments MD41-1208 Control Panel.
5. Gear position from the left gear down limit switch.

Terrain Page Pop-Up feature

If a terrain alert or warning occurs and the Terrain Page is not currently being displayed, it will automatically be recalled. This feature is controlled by the setup configuration and may be re-programmed to replace the pop-up page with warning and alert messages.

Automatic Range Reduction

If a terrain alert or warning occurs, the displayed range will automatically reduce, if required, to show more detail.

Terrain Elevation Displays

Two elevation numbers in the upper right corner of the screen indicate the highest and lowest terrain currently displayed on the screen. The elevation numbers indicate the height of the terrain above Mean Sea Level (MSL) to the nearest 100 feet (e.g., "12^{500}" feet). They are obtained from the database and are color matched to the display. In the event that there is no appreciable difference between the highest and lowest elevation (flat terrain or over water), only the highest numeric value is displayed.

GA-EGPWS Geometric Altitude Display

This altitude is an approximation of the airplane's altitude above Mean Sea Level and is calculated by the GA-EGPWS system using GPS altitude obtained from the Garmin GNS 530 GPS system and uncorrected pressure altitude obtained from the pilot's altimeter system. It is displayed in the upper left corner of the screen and labeled MSL. The displayed geometric altitude will often differ from the altitude displayed on the airplane altimeter. Although small differences between the displayed geometric altitude value and the indicated value on the pilot's altimeter are normal (e.g. ± 100 feet), large differences are not. If the GA-EGPWS monitoring system detects an unreasonably large difference between the geometric altitude and the airplane altitude system, a yellow message, "CHECK ALT" will be displayed below the geometric altitude display for as long as the discrepancy exists and a voice alert, "CHECK ALTITUDE" will be heard. Since this is a calculated value, which may differ from the indicated value on the airplane altimeter, and the national airspace structure is based on barometric altitude, it is not permitted to be used for navigation except as an emergency backup if the airplane altimeter system fails. See Section II, LIMITATIONS, and Section III, EMERGENCY PROCEDURES. However, during normal flight operations the GA-EGPWS Geometric Altitude may be useful as a crosscheck for the reasonableness of the indicated altitude on the altimeter. If the two values differ by more than approximately 200 feet, it may be prudent to check the barometric pressure setting or request a current barometric setting.

BENDIX/KING KMH880 TRAFFIC ADVISORY SYSTEM (TAS)

Refer to the following documents for a detailed description of the TAS and its integration with the KMH 550, Garmin GNS 530 and 430 Com/Nav systems.

Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, P/N 006-18265-0000, Revision 1, dated March 2002, or later revision.

GNS 530 Pilot's Guide & Reference, P/N 190-00181-00, Revision B, or later revision.

500 Series Pilot's Guide Addendum (traffic system display interface), P/N 190-00181-14, Revision A.

400 Series Pilot's Guide Addendum (display interface for traffic and weather data), P/N 190-00140-10, Revision B.

The following additional information is provided:

TAS Sensitivity Level

Sensitivity level A is invoked when the gear is down. Sensitivity level B is invoked when the gear is up.

TAS Voice Alert Inhibits

The TAS voice alerts will be inhibited when the landing gear is down.

The following data is provided to the KMH880 TAS from other airplane systems:

1. Heading from the pilot's compass system.
2. Pressure altitude from the pilot's altimeter system.
3. Gear position from the left gear down limit switch.
4. Weight-On-Wheels switch from the left gear strut.

The following programmable functions have been configured at the Raytheon Aircraft factory. These functions may be reconfigured by a qualified technician when directed by the owner/operator.

1. The maximum number of displayed intruders is 15.
2. TAS operation is not inhibited on the ground.
3. The TAS Test feature is inhibited when airborne.

SECTION VIII - HANDLING, SERVICING AND MAINTENANCE

Troubleshooting, repair and maintenance of the installed EGPWS should be performed in accordance with the applicable Wiring Diagram Manual, Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Installation Manual and the Instructions for Continued Airworthiness document.

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Raytheon Aircraft

Beech Bonanza® A36

(E-3497 and After)

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for the
Honeywell KMH880 Multi-Hazard Awareness System
with the
Mid-Continent Instrument Company MD41-1208
Terrain Awareness Annunciator Control Unit

This Supplement is Applicable to the Following Manual(s):
36-590002-37

Airplane Serial Number: ____________________

Airplane Registration Number: ____________________

FAA Approved by: Thomas [signature] for
John Tigue
Raytheon Aircraft Company
DOA-230339-CE

Raytheon Aircraft

LOG OF REVISIONS

Beech Bonanza® A36

(E-3497 and After)

Pilot's Operating Handbook
and
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for the

Honeywell KMH880 Multi-Hazard Awareness System

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Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell P/N 006-18265-0000, Revision 1, dated March 2002, or later revision.

Refer to the following Garmin documents for procedures to control and display the KMH880 Traffic Advisory information on the GNS 530 and the GNS 430:

GNS 530 Pilot's Guide & Reference, P/N 190-00181-00, Revision B, May 2001, or later revision.

500 Series Pilot's Guide Addendum (traffic system display interface), P/N 190-00181-14, Revision A.

400 Series Pilot's Guide Addendum (display interface for traffic and weather data), P/N 190-00140-10, Revision B.

SECTION II - LIMITATIONS

1. The Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell P/N 006-18265-0000, Revision 1, dated March 2002, or later revision, must be readily accessible to the pilot when operating the KMH880 system.
2. The Garmin GNS 530 Pilot's Guide & Reference, P/N 190-00181-00, Revision B, May 2001, or later revision, must be readily accessible to the pilot when operating the KMH880 TAS system on the GNS 530.
3. 400 Series Pilot's Guide Addendum (display interface for traffic and weather data), P/N 190-00140-10, Revision B, or later revision, must be readily accessible to the pilot when operating the KMH880 TAS system on the GNS 430.
4. The terrain visual and aural alerts must be inhibited using the TERR INHB switch when landing at an airport that is not included in the airport database.
5. The pilot should not maneuver the airplane based only on the traffic display. The traffic display is intended to assist in visually locating traffic and lacks the resolution necessary for use in evasive maneuvering.

6. If the pilot is advised by Air Traffic Control to disable the altitude reporting function of the transponder, the Traffic Advisory System must be placed in standby.

SECTION III - EMERGENCY PROCEDURES

The following procedures supplement those found in the basic POH/AFM.

GA-EGPWS LOOK-AHEAD TERRAIN WARNING
or-
EXCESSIVE RATE OF DESCENT WARNING (Below 2000 Feet AGL)

Voice Alert: **"TERRAIN TERRAIN, PULL UP"**, or **"OBSTACLE OBSTACLE, PULL UP"**
or-
"PULL UP, PULL UP"

In either case, the voice alert "PULL UP" will be continually repeated until the threat is eliminated.

Annunciator: **Illumination of the red TERR annunciator.**

Definition of Threat:

- A terrain or obstacle threat exists approximately 30 seconds ahead of the airplane.

or

- Airplane is descending at a high sink rate with respect to its altitude above the terrain.

NOTE

Pilots are authorized to deviate from their current air traffic control (ATC) clearance to the extent necessary to comply with an EGPWS warning.

In IMC or at Night:

1. **Wings . . . . LEVEL**
2. **Power . . . . MAXIMUM ALLOWABLE**
3. **Pitch . . . . .INCREASE**
   a. **Promptly and smoothly increase pitch towards an initial pitch attitude of 15° - 20°.**
   b. **Adjust to maintain 84 KIAS.**
   c. **Adjust as required to avoid a continuous stall warning.**
4. **Gear and Flaps . . . . RETRACT**
5. Continue climb at 84 KIAS until terrain clearance is assured.
6. Advise Air Traffic Control as necessary.

WARNING

Only vertical maneuvers are recommended unless the pilot, using all available information and instruments, determines that a turn, in addition to the vertical escape maneuver, is the safest course of action.

In Day VMC:

1. Evaluate flight path with respect to terrain.
2. Take action as necessary to recover safe terrain clearance.
3. Advise Air Traffic Control as necessary.

GA-EGPWS LOOK-AHEAD TERRAIN ALERT

Voice Alert: **"CAUTION TERRAIN, CAUTION TERRAIN"** or **"CAUTION OBSTACLE, CAUTION OBSTACLE"**

Annunciator: **Illumination of the amber TERR annunciator.**

Definition of Threat: A terrain or obstacle threat exists approximately 1 minute ahead of the airplane.

1. Stop descending, or climb, and/or turn as necessary, based on analysis of all available instruments and visual observations, in order to cancel the alert. (The voice alert will be repeated every 7 seconds until the threat no longer exists.)
2. Advise Air Traffic Control as necessary.

PENETRATION OF RUNWAY FIELD CLEARANCE FLOOR

Voice Alert: **"TOO LOW, TOO LOW"**

Annunciator: **Illumination of the amber TERR annunciator.**

Definition of Threat: The airplane has descended below the Runway Field Clearance Floor.

Protection is provided from 5 nm from the end of the runway to 1 nm from the end of the runway. The floor begins at 300 feet AGL at 5 nm and decreases to zero feet AGL at 1 nm from the end of the runway.

1. Increase altitude as required to cancel the alerts.
2. The voice alert will sound with increasing frequency if the altitude continues to decrease.

EXCESSIVE RATE OF DESCENT ALERT (Below 5000 Feet AGL)

Voice Alert: **"SINK RATE, SINK RATE"**

Annunciator: **Illumination of the amber TERR annunciator.**

Definition of Threat: Airplane is descending at a high sink rate with respect to its altitude above the terrain.

Level wings and reduce rate of descent until visual and aural alerts cease. If the high rate of descent continues, the voice alert will continue at an increasing frequency.

INADVERTENT DESCENT OR LOSS OF ALTITUDE AFTER TAKE-OFF (Below 700 Feet Above Runway Elevation)

Voice Alert: **"DON'T SINK, DON'T SINK"**

Annunciator: **Illumination of the amber TERR annunciator.**

Definition of Threat: Airplane experiences an inadvertent descent or loss of altitude after takeoff.

- Level wings and immediately establish a positive rate of climb.

DITCHING OR OFF-AIRPORT LANDING

Inhibit the visual and aural alerts using the following procedure.

- TERR INHB Switch . . . . PRESS
    - TERR INHB annunciator . . . . ILLUMINATED

DEACTIVATION OF THE GA-EGPWS

If the pilot in command determines that activation of the GA-EGPWS will interfere in dealing with emergency conditions, the system may be deactivated by pulling the HAZ AVOID circuit breaker.

ALTIMETER SYSTEM FAILURE

Voice Alert: **"CHECK ALTITUDE"**

Definition of Threat: The GA-EGPWS altitude monitor has detected an unreasonable difference between the pilot's altimeter system and the GA-EGPWS calculated geometric altitude.

- Pilot's Altimeter . . . . CHECK
    a. Verify correct barometric setting.
    b. Check for reasonableness against existing known elevations.

SECTION IV - NORMAL PROCEDURES

The following procedures supplement those found in the basic POH/AFM:

NOTE

Items marked with an "*" may be omitted at pilot's discretion after the first flight of the day.

Traffic Advisory System (TAS) Considerations

WARNING

The TAS does not provide protection from aircraft that do not have an operating transponder. The TAS can detect and track aircraft with either an ATCRBS (operating in Mode A or C) or a Mode S transponder. The TAS is only an aid in detecting other traffic and provides a means for the pilot to visually acquire and avoid aircraft which may impose a collision threat. Evasive maneuvers should not be made based solely on the TAS display.

CAUTION

Optimum TAS performance is realized when intruder aircraft are reporting their altitude.

NOTE

Although the TAS has operating and appearance similarities to a TCAS I system, it does not satisfy the TCAS I requirements of operational regulations.

1. Traffic information may be displayed on the GNS 530 and the GNS 430 as discussed below.
   a. NAV 1 page (Default) (only on the GNS 530)
   b. NAV 2 page (MAP)
   c. NAV 3 page. The STBY, OPER, and TEST functions are controlled only by the GNS 530 from this page. Selected settings will be repeated on the GNS 430.
   d. A thumbnail display of traffic may be shown on the NAV 2 page of the GNS 530 and GNS 430 in place of one of the data fields on the right side of the display. Refer to the Garmin GNS 530 Pilot's Guide and the Garmin 400 Series Pilot's Guide Addendum.
   e. A thumbnail display of traffic may be displayed on all pages of the GNS 530 in the field below the Nav frequency data. Refer to the Garmin GNS 530 Pilot's Guide.
2. Traffic Advisories (TA's) can be expected to occur during normal flight operation. Generally, TA's will occur more frequently in terminal areas during arrival, and less frequently during departure and enroute operations. In the vast majority of these cases, the aircraft displayed will be safely separated and there will be no need for the pilot to initiate any avoidance maneuvers.
3. The TAS provides the following Traffic Advisory:

Voice Alert: **"TRAFFIC, TRAFFIC"** (inhibited when any GA-EGPWS voice alert is in progress and when the landing gear is down.)

Traffic Display: **A filled yellow circle.**

Pilot Response:

WARNING

Maneuvers based solely on the TAS display may result in reduced separation from the intruder.

a. Attempt to visually acquire the intruder aircraft and maintain/attain safe separation in accordance with regulatory requirements and good operating practice.
b. If the intruder aircraft is not visually acquired, air traffic control should be contacted to obtain any information that may assist the crew concerning the intruder aircraft.
c. Evasive maneuvers (rapid changes in pitch, roll, normal acceleration, thrust, or speed) should only be conducted after visual acquisition of the intruder, and then only when necessary to achieve or assure safe separation.
d. Minor adjustments to the vertical flight path, consistent with air traffic control requirements, are not considered evasive maneuvers.

4. The TAS self-test function is inhibited in flight.

BEFORE TAKEOFF

* 1. GA-EGPWS . . . . TEST

a. Garmin GNS 530. . . . . ON AND AIRPLANE POSITION ACQUIRED

b. TERR INHB Switch . . . . NOT ENGAGED (TERR INHB annunciator extinguished)

c. GA-EGPWS TEST Switch. . . PUSH AND RELEASE

1) Amber TERR N/A Annunciator. . . . ILLUMINATED

2) Red TERR Annunciator . . . . .ILLUMINATED

3) Voice message "EGPWS SYSTEM OK" is heard over the cockpit speakers.

4) Red TERR Annunciator . . . . EXTINGUISHED

5) Amber TERR Annunciator . . . . . . .ILLUMINATED

6) Amber TERR Annunciator . . . . . EXTINGUISHED

7) Amber TERR N/A Annunciator. . EXTINGUISHED

* 2. TAS . . . . TEST

a. GNS 530 - On and Airplane Position Acquired.

b. Select NAV Page 3 (TRAFFIC/WEATHER).

c. Push small right knob to activate cursor.

d. Rotate large right knob, if required, to place cursor over field in upper right corner.

e. Rotate small right knob, if required, to select STBY.

f. Press ENT

g. Press Menu

h. Press ENT

i. The GNS 530 (and the GNS 430 if selected) will display the following test pattern over a period of approximately 8 seconds.

- A Traffic Advisory (yellow circle) will appear at 9 o'clock, range 2 miles, 200 feet below and climbing.

- Proximity Traffic (solid white diamond) will appear at 1 o'clock, range 3.6 miles, 1000 feet below and descending.
- Non-Threat Traffic (open white diamond) will appear at 11 o'clock, range 3.6 miles, flying level 1000 feet above.
- A TEST message will appear in the upper right field to replace the STBY message.

j. A Voice Message "TAS System Test OK" will be heard over the cockpit speakers at the conclusion of a successful test.

k. The TEST message will be replaced by the STBY message.

3. TAS . . . . LEAVE IN SBY UNTIL JUST PRIOR TO TAKEOFF

Just prior to takeoff:

4. TAS . . . . ON

With NAV page 3 selected on the GNS 530:

a. Push small right knob to activate cursor.

b. Rotate large right knob, if required, to place cursor over field in upper right corner.

c. Rotate small right knob, if required, to select OPER.

d. Press ENT

On the GNS 530 and/or GNS 430:

e. With cursor on, rotate large right knob to place cursor over field in upper left corner.

f. Rotate small right knob to select ABV.

g. Push small right knob to turn cursor off.

h. Press RNG button to select 6 nm (or as desired).

CRUISE

1. TAS .... SET
   a. Range .... 12 NM OR GREATER
   b. Mode .... NRM (or as desired)

NOTE

The maximum tracking range is 18 nm; however, intruders may be seen out to 36 nm.

DESCENT

1. TAS .... SET
   a. Range .... 12 NM OR LESS
   b. Mode ....BLW (or as desired)

BEFORE LANDING

TRAFFIC ADVISORY CONSIDERATIONS

The voice alert "TRAFFIC, TRAFFIC" is inhibited with the landing gear down.

GA-EGPWS CONSIDERATIONS

1. If landing on a runway less than 2000 feet in length, a runway that is not in the GA-EGPWS database, or a runway that may have unique terrain features in close proximity, inhibit the visual and aural alerts using the following procedure.
   - TERR INHB Switch...................... PRESS
     - TERR INHB Annunciator .... ILLUMINATED
2. The GA-EGPWS provides a "FIVE HUNDRED" voice alert when the airplane is 500 feet AGL. This alert is based on the geometric altitude of the airplane as computed by the KMH880 GA-EGPWS.

3. During operations at certain locations, warning thresholds may be exceeded due to specific terrain or operating procedures. During day VFR, these expected warnings may be considered as cautionary and the approach continued.

AFTER LANDING

• TAS .... SBY

SECTION V - PERFORMANCE

No Change

SECTION VI - WEIGHT & BALANCE/EQUIPMENT LIST

No Change

SECTION VII - SYSTEMS DESCRIPTION

The following items comprise the Bendix/King IHAS 5000 Integrated Hazard Avoidance System:

1. KMH880 Multi-Hazard Awareness System Processor which provides a General Aviation-Enhanced Ground Proximity Warning System (GA-EGPWS) and a Traffic Advisory System (TAS). The KMH880 is protected by a 5-amp circuit breaker placarded HAZ AVOID.
2. Mid-Continent Instruments MD41-1208 GA-EGPWS Terrain Awareness Control Panel.
3. Bendix/King KA815 Directional Traffic Advisory Antennas located on the top and bottom of the fuselage.

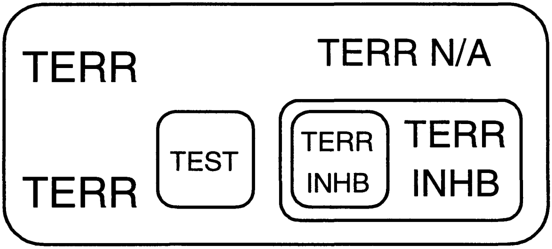
MID-CONTINENT INSTRUMENTS MD41-1208 GA-EGPWS TERRAIN AWARENESS CONTROL PANEL

The control panel includes the following items:

1. Red and amber TERR warning and alert annunciators.
2. A test switch.
3. A terrain inhibit switch (TERR INHB) and white TERR INHB annunciator.
4. An amber TERR N/A annunciator.

Illumination of the panel is controlled by the FLIGHT INST rheostat and the panel's internal photo cell. The configuration and description of the panel functions follows.

TERRAIN AWARENESS CONTROL PANEL



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TERRAIN AWARENESS CONTROL PANEL DESCRIPTION

Annunciator/ Control	Color	Cause for Illumination/ Function
TERR	Red	Terrain Warning
TERR	Amber	Terrain Alert
TERR N/A	Amber	Indicates terrain function INOP.
TEST Switch	– – –	Provides press-to-test function for the GA-EGPWS.
TERR INHB Ann/Switch	White	Push-on to inhibit all terrain alerting functions.

BENDIX/KING KMH880 GENERAL AVIATION ENHANCED GROUND PROXIMITY WARNING SYSTEM (GA-EGPWS)

Refer to the following documents for a detailed description of the GA-EGPWS.

Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, P/N 006-18265-0000, Revision 1, dated March 2002, or later revision.

The following additional information is provided:

The following data is provided to the KMH880 GA-EGPWS from other airplane systems.

1. GPS position from the Garmin GNS 530.
2. Heading from the pilot's compass system.
3. Pressure altitude from the pilot's altimeter system.
4. Control input from the Mid-Continent Instruments MD41-1208 Control Panel.
5. Gear position from the left gear down limit switch.

GEOMETRIC ALTITUDE

This altitude is an approximation of the airplanes altitude above Mean Sea Level and is calculated by the GA-EGPWS system using GPS altitude obtained from the Garmin GNS 530 GPS system and uncorrected pressure altitude obtained from the pilot's altimeter system. The geometric altitude will often differ from the altitude displayed on the airplane altimeter. Although small differences between the geometric altitude value and the indicated value on the pilot's altimeter are normal (e.g. ± 100 feet), large differences are not. If the GA-EGPWS monitoring system detects an unreasonably large difference between the geometric altitude and the airplane altitude system, a voice alert, "CHECK ALTITUDE", will be heard. See ALTIMETER SYSTEM FAILURE in Section III, Emergency Procedures.

BENDIX/KING KMH880 TRAFFIC ADVISORY SYSTEM (TAS)

Refer to the following documents for a detailed description of the TAS and its integration with the Garmin GNS 530 and GNS 430 Com/Nav systems.

Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, P/N 006-18265-0000, Revision 1, dated March 2002, or later revision.

GNS 530 Pilot's Guide & Reference, P/N 190-00181-00, Revision B, or later revision.

500 Series Pilot's Guide Addendum (traffic system display interface), P/N 190-00181-14, Revision A.

400 Series Pilot's Guide Addendum (display interface for traffic and weather data), P/N 190-00140-10, Revision B.

The following additional information is provided:

TAS Sensitivity Level

Sensitivity level A is invoked when the gear is down. Sensitivity level B is invoked when the gear is up.

TAS Voice Alert Inhibits

The TAS voice alerts will be inhibited when the landing gear is down.

The following data is provided to the KMH880 TAS from other airplane systems:

1. Heading from the pilot's compass system.
2. Pressure altitude from the pilot's altimeter system.
3. Gear position from the left gear down limit switch.
4. Weight-On-Wheels switch from the left gear strut.

The following programmable functions have been configured at the Raytheon Aircraft factory. These functions may be reconfigured by a qualified technician when directed by the owner/operator.

1. The maximum number of displayed intruders is 15.
2. TAS operation is not inhibited on the ground.
3. The TAS Test feature is inhibited when airborne.

SECTION VIII - HANDLING, SERVICING AND MAINTENANCE

Troubleshooting, repair and maintenance of the installed EGPWS should be performed in accordance with the applicable Wiring Diagram Manual, Bendix/King KTA870/KMH880 Traffic Advisory System/Multi-Hazard Awareness System Installation Manual and the Instructions for Continued Airworthiness document.

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Raytheon Aircraft Company

Beechcraft

Model A36 & B36TC Bonanza®

(E-3518 and After)

and

(E-3306 thru E-3517 and EA-652 thru EA-695 Modified By Raytheon Aircraft Company Kit 58-3017)

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Supplement

for

Dual Garmin GNS 430

or

Garmin GNS 530 & Garmin GNS 430

VHF Communications Transceivers/VOR/ILS Receivers/GPS Receivers with Garmin Course Deviation Indicator

with

Mid-Continent Instruments GPS Annunciator Control Unit

with

PS Engineering PMA7000B- Series Audio Panel

with

BF Goodrich WX-500 Weather Mapping Sensor

with

Shadin F/ADC 200 or 200+ Fuel/Air Data Computer

when used with

Allied Signal KFC 225 Automatic Flight Control System

This Supplement is Applicable to the Following Manual(s):
36-590002-37 and 36-590006-19

Airplane Serial Number: ______________________

Airplane Registration Number: ______________________

FAA Approved by: Thomas Tremain
for John Tigue
Raytheon Aircraft Company
DOA-230339-CE

Raytheon Aircraft Company

LOG OF REVISIONS

Model A36 and B36TC Bonanza®

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual
Supplement

for

Dual Garmin GNS 430 or Garmin GNS 530 & Garmin GNS 430 VHF Communications Transceivers/VOR/ ILS Receivers/GPS Receivers with Garmin Course Deviation Indicator with Mid-Continent Instruments GPS Annunciator Control Unit with PS Engineering PMA7000B- Series Audio Panel with BF Goodrich WX-500 Weather Mapping Sensor with Shadin F/ ADC 200 or 200+ Fuel/Air Data Computer when used with Allied Signal KFC 225 Automatic Flight Control System

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF REV
0	1 thru 26	Original Issue	August, 2003
1	1 thru 26	Revised Serialization to add Kit effectivities.	September, 2003

CONTENTS

SECTION I - GENERAL

The information in this supplement is FAA approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Dual Garmin GNS 430 or Garmin GNS 530 & Garmin GNS 430 VHF Communications Transceivers/VOR and ILS Receivers/GPS Receivers, Mid-Continent Instruments GPS Annunciation Control Unit, Garmin Course Deviation Indicator, PS Engineering PMA7000B-series Audio Panel, BF Goodrich WX-500 Weather Mapping Sensor, and Shadin F/ADC 200 or 200+ Fuel/Air Data Computer interfaced with an Allied Signal KFC 225 Automatic Flight Control System in accordance with Raytheon Aircraft approved data.

The information contained herein supersedes or adds to the information in the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth within this document. Users of the Pilot's Operating Handbook are advised to always refer to the supplement for possibly superseding information and placarding applicable to the operation of the airplane.

Satellite navigation data is based upon use of only the Global Positioning System operated by the United States.

When installed, the GARMIN GNS 530 is the No. 1 GNS unit.

The No. 1 GNS, when operating with RAIM GPS as the only navigation sensor, is approved for IFR Enroute, Terminal and Approach operation in accordance with AC 20-138.

SECTION II - LIMITATIONS

1. The GARMIN GNS 430 Pilot's Guide, P/N 190-00140-00, Rev. D, dated July, 1999, or later appropriate revision, and GARMIN GNS 530 (if installed) Pilot's Guide, P/N 190-00181-00, Rev A, dated May, 2000, or later appropriate revision, must be immediately available to the flight crew whenever navigation is predicated on the use of the system.
2. Each GNS must utilize the following or later FAA approved software versions:

SYSTEM	SOFTWARE LEVEL	
	GNS 430	GNS 530
< MAIN >	<2.12*>	<2.04>
GPS	2.00	2.06
COMM	1.22	3.00
VOR/LOC	1.25	2.05
G/S	2.00	2.02

*Must be software level 2.19 or above when the F/ADC 200+ is installed.

The Main software version is displayed on the GNS self-test page immediately after turn-on for 5 seconds. The remaining system software versions can be verified on the AUX group sub-page 2, SOFTWARE/DATABASE VER.

3. If not previously defined, the following default settings must be made in the SETUP 1 menu of the GNS prior to operation:

dis, spd nm, kt	Sets navigation units to nautical miles and knots.
alt, vs ft, fpm	Sets altitude units to feet and feet per minute.
map datum	WGS 84 (sets map datum to WGS-84)
posn deg-min	Sets navigation grid units to decimal minutes.

NOTE

In some areas outside the United States, datums other than WGS-84 or NAD-83 may be used. If the GNS 430 or GNS 530 are authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in each GNS unit prior to its use for navigation.

4. IFR enroute and terminal navigation predicated upon either GNS units' GPS receiver is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.
5. Instrument approaches must be accomplished in accordance with approved instrument approach procedures. GPS instrument approach procedures must be retrieved from the GPS equipment database. The GPS equipment database must incorporate the current update cycle.
   a. GPS instrument approaches must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.
   b. APR mode must be annunciated at the Final Approach Fix when using GPS for approach guidance.

c. GPS instrument approaches utilizing the No. 2 GNS for approach guidance is prohibited.

d. Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS, or any approach not approved for GPS overlay, with either GNS in GPS mode are prohibited.

e. Use of the No. 1 or No. 2 GNS in VLOC mode to fly ground-based instrument approaches require that the appropriate navigation data to be present on the HSI for the No. 1 GNS or the CDI for the No. 2 GNS.

f. When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the airplane must have the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.

g. VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in normal position to land.

6. Continued navigation using GPS data with a RAIM IS NOT AVAILABLE message displayed is authorized for enroute and terminal phases of flight providing airplane position is verified every 15 minutes using the GNS unit's VOR/ILS receiver or another IFR-approved navigation system.

7. Fuel display parameters are advisory only and do not replace primary fuel quantity or fuel flow gauges for fuel load and range planning.

8. Provided the No. 1 GNS unit's GPS receiver is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications for:

a. VFR/IFR enroute, terminal, and non-precision instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, and RNAV) operation within the U.S. National Airspace System in accordance with AC 20-138.

b. The required Navigation Performance Type 5 (RNP-5) of the European Basic Area Navigation (BRNAV) environment in accordance with AC 90-96, AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 1.

9. Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. Navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.

10. The following placard must be installed:

On Instrument Panel Adjacent to the Course Deviation Indicator:

No. 2 GPS NOT APPROVED FOR APPROACH

11. All portable electronic entertainment devices must be switched off for takeoff and landing.

SECTION III - EMERGENCY PROCEDURES

1. If RAIM POSITION WARNING message is displayed on either GNS, the appropriate indicator will flag and no longer provide GPS based navigation guidance. The pilot should revert to the VLOC mode of the GNS or an alternate means of navigation other than the GPS mode of the GNS.
2. If RAIM IS NOT AVAILABLE message is displayed while conducting a GPS instrument approach, terminate the approach. Execute the appropriate missed approach procedure if required.
3. In the event of an in-flight emergency, depressing and holding the Comm transfer button on the GNS unit for 2 seconds will select the emergency frequency of 121.500 MHz into the Active frequency window.
4. In the event of an audio panel failure, the Fail Safe mode may be selected by pushing the VOLUME knob in. The pilot's microphone and phone jacks (located below the left side panel) will be automatically connected to Com 1 when in the Fail Safe mode.

NOTE

When the audio panel is in the Fail Safe mode, the speaker audio will be inoperative.

5. If any unusual operation of airplane systems is observed during flight, immediately switch off all portable electronic entertainment devices.

SECTION IIIA- ABNORMAL PROCEDURES

No Change

SECTION IV - NORMAL PROCEDURES

WARNING

Familiarity with the enroute operation of the GNS does not constitute proficiency in approach operations. Do not attempt approach operations in Instrument Meteorological Conditions prior to attaining proficiency in the use of the GNS.

1. GNS operating procedures are described in the GARMIN GNS 430 Pilot's Guide, P/N 190-00140-00, Rev. D, dated July 1999, or later appropriate revision, and if installed, the GARMIN GNS 530 Pilot's Guide, P/N 190-00181-00, Rev. A, dated May, 2000, or later appropriate revision.
2. KFC 225 Automatic Flight Control System operating procedures are described in the Bendix/King KFC 225 Pilot's Guide, P/N 006-18035-0000, dated April 1999, or later appropriate revision, and the FAA Approved Airplane Flight Manual Supplement.
3. PMA7000B Audio Panel operating procedures are described in the PS Engineering Pilot's Guide and Operations Manual, P/N 202-780-000r1, dated May 2002, or later appropriate revision.

NAVIGATION DATABASE VERIFICATION

After the GNS unit power-on self-tests have completed, the DATABASE CONFIRMATION page will display and the expiration date of the GPS database is shown. Database updates, issued every 28 days, are available from Jeppesen Sanderson Inc., Englewood Co., Phone: 800-621-5377.

SYSTEM ANNUNCIATORS

1. The following annunciators are displayed on the GPS Annunciator Control Unit located on the instrument panel above the pilot's altimeter:

MSG (Amber) Illuminates in conjunction with the No. 1 GNS message annunciator to indicate a message is to be acknowledged. The applicable GNS Pilot's Guide contains a list of all message page messages and their meanings.

VLOC (White) Illuminates in conjunction with the No. 1 GNS VLOC annunciator to indicate that the No. 1 GNS is in the VLOC mode and the HSI is displaying VLOC data.

GPS (Green) Illuminates in conjunction with the No. 1 GNS unit GPS annunciator to indicate that the No. 1 GNS is in the GPS mode and the HSI is displaying GPS data.

AUTO (White) Illuminates to indicate that the No. 1 GNS is in the normal mode and automatic waypoint sequencing is enabled.

OBS (Green) Illuminates in conjunction with the No. 1 GNS unit OBS annunciator to indicate that the No. 1 GNS is in the OBS mode and automatic waypoint sequencing is disabled.

ENR (Green) Illuminates in conjunction with the No. 1 GNS unit ENR annunciator to indicate that the No. 1 GNS is in enroute mode and the HSI is displaying enroute course deviation scaling.

TERM (Green) Illuminates in conjunction with the No. 1 GNS unit TERM annunciator to indicate that the No. 1 GNS is in terminal mode and the HSI is displaying terminal course deviation scaling.

APR (Green) Illuminates in conjunction with the No. 1 GNS unit APR annunciator to indicate that the No. 1 GNS is in approach mode and the HSI is displaying approach course deviation scaling.

WPT (Amber) Illuminates in conjunction with the No. 1 GNS way-point alert messages to indicate arrival at a way-point.

2. The following annunciators are displayed on the CDI:

VLOC (White) Illuminates in conjunction with the No. 2 GNS unit's VLOC annunciator to indicate that the No. 2 GNS is in the VLOC mode and the CDI is displaying VLOC data.

GPS (Green) Illuminates in conjunction with the No. 2 GNS unit's GPS annunciator to indicate that the No. 2 GNS is in the GPS mode and the CDI is displaying GPS data.

3. The following annunciators are located on the instrument panel above the pilot's airspeed indicator:

MM (Amber) Illuminates in conjunction with the audio panel amber **M** annunciator to alert passage of a Middle Marker beacon.

OM (Blue) Illuminates in conjunction with the audio panel blue **O** annunciator to alert passage of an Outer Marker beacon.

IM (White) Illuminates in conjunction with the audio panel white **I** annunciator to alert passage of an Inner Marker beacon.

AIRPLANE INTEGRATION

NAVIGATION DISPLAYS

The HSI displays No. 1 GNS navigation data. The course needle must be manually set to the desired track (DTK) displayed on the No. 1 GNS when operating in the AUTO mode. The course needle may be set to any desired course when the No. 1 GNS is operating in the OBS mode and this course will automatically be transferred to the No. 1 GNS.

HSI FULL SCALE DEVIATION INCREMENTS GPS NAV SOURCE SELECTED	
PHASE	**LATERAL**
EN ROUTE	5.0 nm
TERMINAL	1.0 nm
APPROACH	0.3 nm

The CDI displays No. 2 GNS navigation data. The course must be manually set to the desired track (DTK) displayed on the No. 2 GNS when operating in the normal, non-OBS, mode. The course needle may be set to any desired course when the No. 2 GNS is operating in the OBS mode and this course will automatically be transferred to the No. 2 GNS.

CDI FULL SCALE DEVIATION INCREMENTS GPS NAV SOURCE SELECTED	
PHASE	**LATERAL**
EN ROUTE	5.0 nm
TERMINAL	1.0 nm
APPROACH	NOT APPROVED

CROSSFILL

Either GNS may send changes in the active flight plan or Direct-to waypoint commands to the other GNS unit. This crossfill function is pilot selectable to either automatic or manual mode. Crossfill is unavailable when OBS mode is selected.

NO. 1 GNS (GNS 530 OR GNS 430)

Selection of VLOC or GPS as the active navigation source may be accomplished by either pressing the CDI button on the GPS Annunciator Control Unit or by pressing the CDI button on the No. 1 GNS.

Selection of OBS mode may be accomplished by either pressing the OBS button on the GPS Annunciator Control Unit or by pressing the OBS button on the No. 1 GNS.

No. 2 GNS (GNS 430)

Selection of VLOC or GPS as the active navigation source can only be accomplished by pressing the CDI button on the No. 2 GNS.

Selection of OBS mode can only be accomplished by pressing the OBS button on the No. 2 GNS.

AUTOMATIC FLIGHT CONTROL SYSTEM

The KFC 225 Automatic Flight Control System is coupled to the No. 1 GNS when engaged.

Changing the navigation source for the CDI on the No. 1 GNS from GPS to VLOC or from VLOC to GPS, with NAV, APR or REV selected on the flight director, will cause the selected mode to be lost. This will occur if the switching is performed manually by pressing the CDI button on the No. 1 GNS or on the remote annunciation panel, or if the switching is performed automatically by the No. 1 GNS during ILS or LOC approaches. The loss will be indicated by a blinking of the selected mode annunciator and a wings level command by the flight director as it reverts to the ROL mode. The desired mode may be reselected by pressing the mode select button once to acknowledge the loss (the ROL annunciator will replace the blinking annunciator) and then pressing the mode select button a second time to re-engage it. If the selected mode does not re-engage, check the navigation source for a valid signal. Loss of the navigation source will also cause the flight director to revert to the ROL mode.

WARNING

> Changing the navigation source for the CDI on the No. 1 GNS will result in the loss of the NAV, APR or REV modes of operation of the flight director and reversion to the ROL mode.

APPROACH OPERATIONS

The APR mode should be selected when conducting flight director/autopilot coupled GPS approaches.

AUTOMATIC SWITCHING OF THE CDI NAVIGATION SOURCE

The No. 1 GNS may be programmed to allow for the automatic switching of the navigation source for the CDI from GPS to VLOC during ILS and LOC approaches. This is accomplished by selecting the AUX Group of pages, then the SETUP PAGE. Select CDI/ALARMS, then program the ILS CDI CAPTURE window for AUTO or MANUAL. If AUTO is selected, the navigation source for the CDI will automatically switch from GPS to VLOC during the approach if the ILS or LOC approach is activated and the appropriate frequency has been tuned. The point of switching will occur as follows.

1. For GNS 430 units equipped with MAIN software through 2.14, the automatic switching will occur only if the airplane is precisely aligned with the final approach prior to the Final Approach Fix.
2. For GNS 430 units equipped with MAIN software of 2.15 and after, and GNS 530 units equipped with MAIN software of 2.04 and after, the automatic switching will occur in a much larger zone which extends 1.2 nm either side of the final approach course and from 2 to 15 nm from the final approach fix.

As noted previously, switching of the CDI navigation source automatically causes the flight director to revert to the ROL mode. During ILS approaches this automatic switching may occur at inopportune times, such as when the airplane is turning onto final approach, causing added workload and possible confusion for the pilot. Thus, it is highly recommended that the ILS CDI CAPTURE option be set to MANUAL for all autopilot/flight director operations.

WARNING

Use of the AUTO option of the GNS 530/430 ILS CDI CAPTURE feature in conjunction with flight director/autopilot operations is not recommended.

FLYING VECTORS-TO-FINAL APPROACHES

If the VECTORS transition or VECTORS-TO-FINAL procedure is activated with the flight director engaged in the NAV or APR mode, the flight director will command an immediate turn to intercept the final approach course, regardless of the position of the airplane with respect to the airport. To prevent this from happening, select the HDG mode prior to activating the VECTORS option. Maneuver the airplane in the HDG mode until an appropriate intercept angle is established with the final approach, then arm the APR mode.

WARNING

Do not activate the VECTORS transition or VECTORS-TO-FINAL procedure with the flight director in the NAV or APR modes.

LATERAL GUIDANCE DURING PROCEDURE TURNS, HOLDING, AND MISSED APPROACH

The GNS unit does not provide lateral navigation guidance for procedure turns, holding pattern entry, holding patterns, or missed approach procedures. The pilot is responsible for navigation during these operations.

WARNING

Procedure turns, holding, and missed approach procedures must be accomplished using HDG as the lateral mode when the flight director/autopilot is engaged. The pilot is responsible for navigation during these operations.

A lateral navigation mode (NAV, APR, or REV) may be engaged when the airplane is heading inbound to the active TO waypoint.

LOCALIZER BACK COURSE APPROACHES

With the localizer back course approach loaded into the No. 1 GNS for use as supplemental navigation guidance, a waypoint alert, “NEXT DTK [###]°”, corresponding to the back course heading, will appear just prior to arrival at the Initial Approach Fix. Localizer back course approaches must be conducted with the ILS inbound course set on the HSI.

WARNING

> Localizer back course approaches must be conducted with VLOC selected as the active navigation source and the ILS inbound course must be set on the HSI.

MISSED APPROACH

The throttle-mounted GO AROUND button is not interfaced to either GNS. When the airplane reaches the missed approach waypoint during approach procedures, the GNS transitions to the SUSP mode and continues to provide guidance along an extension of the final course segment.

Pressing the GO AROUND button will disconnect the autopilot, if engaged, and select the flight director go around (GA) mode. To exit the SUSP mode and sequence to the missed approach waypoint, press the OBS button on the GPS Annunciator Control Unit or press the OBS button on the No. 1 GNS.

STORMSCOPE

Lightning strike data may be cleared by momentary forward activation of the AUD/STRM switch located on the pilot’s control wheel.

AUDIO PANEL

Before takeoff, operate all portable electronic entertainment devices that will be operated during flight to determine if there is any adverse effect on other airplane systems. If any adverse effects are observed, do not operate that equipment during flight.

Playback of the last outgoing or incoming radio transmission may be initiated by momentary aft activation of the AUD/STRM switch located on the pilot's control wheel. Subsequent activation of this switch will playback previously recorded transmissions (up to 16). Holding this switch aft for more than one second will terminate playback and sequence back to the most recent recording.

SECTION V - PERFORMANCE

No Change

SECTION VI - WEIGHT AND BALANCE/EQUIPMENT LIST

No Change

SECTION VII - SYSTEMS DESCRIPTION

GARMIN GNS 530/430

Each GNS unit is a fully integrated, panel mounted unit, which contains a VHF Communications Transceiver, a VOR / ILS receiver, and a Global Positioning System (GPS) Navigation computer. Each system consists of the GNS unit, a GPS antenna, VHF VOR/LOC (shared) antenna, GS (shared) antenna and a VHF COMM antenna.

The No. 1 GNS navigation data (the top GNS unit) is presented on the horizontal situation indicator (HSI) and can be coupled to the automatic flight control system. Remote annunciators and switches related to operation of the unit are located on the GPS Annunciation Control Unit above the pilot's altimeter. The No. 1 GNS is protected by two 5-amp circuit breakers labeled COMM 1 and GPS/NAV 1. The circuit breakers are located on the avionics circuit breaker panel.

The No. 2 GNS navigation data is presented on the course deviation indicator (CDI) and can not be coupled to the automatic flight control system. Remote navigation source annunciators are located on the CDI. The No. 2 GNS is protected by two 5-amp circuit breakers labeled COMM 2 and GPS/NAV 2. The circuit breakers are located on the avionics circuit breaker panel.

Both GNS's are capable of remote tuning an optional DME.

Either GNS unit may send changes in the active flight plan or Direct-to-waypoint commands to the other GNS unit.

Both GNS units can display fuel flow provided by the Shadin F/ADC 200 or 200+.

Both GNS units can display air data information from the KEA 130 Encoding Altimeter and Shadin F/ADC 200 or 200+.

Both GNS units can display WX 500 Stormscope information.

For details on operation refer to the Garmin Pilot's Guide, P/N 190-00140-00, and when the GNS 530 is installed, Garmin Pilot's Guide, P/N 190-00181-00.

PS ENGINEERING PMA7000B-SERIES AUDIO PANEL

The audio panel provides audio distribution and a six-place voice activated intercom.

The audio panel provides integration and distribution of audio from optionally installed equipment such as DME and ADF, and external entertainment devices.

AUDIO PANEL

Push-button switches control radio transceiver selection. When either Com 1 or Com 2 are selected, the appropriate receive audio is automatically selected. Additional receiver audio sources may be selected by pressing the desired receive audio selector buttons. Selected audio sources are identified by illumination of the green LED located on each selector button.

A split mode communication capability exists that allows dedicated and simultaneous use of both radios.

1. When the Com 1 button is held, and the Com 2 button is pressed, the pilot position jacks are dedicated to the Com 1 and the copilot jacks are dedicated to the Com 2.
2. When Com 1/Com 2 split has been selected, the intercom between the pilot and copilot is disabled. Pressing the ICS audio selector button will restore the crew intercom function.

A Fail Safe mode is incorporated that facilitates radio communications after an audio panel failure. The dual function VOLUME knob controls intercom volume through rotary action and also controls selection of the Fail Safe mode using a push/pull action. The knob is pulled out for normal operation. When the knob is pushed in (Fail Safe), the pilot's station headset and microphone jacks are connected to Com 1 regardless of audio panel selections. The airplane speaker audio is inoperative when the audio panel is in the Fail Safe mode.

The audio panel also incorporates a digital recorder capable of automatic recording of up to 16 incoming or outgoing radio transmissions. Playback of the recorded messages is limited to the pilot's headset.

1. All radio communications heard over the pilot position headset will be recorded, regardless of audio panel selections.
2. The AUD/STRM switch, located on the pilot's control wheel, controls the audio playback function. Momentary aft movement of this switch will replay the last recording. Additional momentary aft movements will playback the previous recordings. Aft movement of this switch for more than one second will terminate playback and sequence back to the most recent recording.

INTERCOM SYSTEM

The VOLUME knob located on the audio panel controls intercom volume.

The airplane is equipped with seven sets of intercom jacks and two audio input jacks as follows:

Pilot's Station	Located below the left side panel.
Copilot's Station	Located below the right subpanel.
Center Station (Hand microphone only)	Located below the center armrest between the pilot's and copilot's seat.
Station Number 3	Located behind the pilot's seat on the left sidewall.
Station Number 4	Located behind the copilot's seat on the right sidewall.
Station Number 5	Located behind seat number 5 on the left sidewall.
Station Number 6	Located behind seat number 6 on the right sidewall.
Music Input No. 1	Located below the center armrest between the pilot's and copilot's seat.
Music Input No. 2	Located behind the pilot's seat on the left sidewall.

The Music Input No. 1 provides an entertainment device input to the pilot and copilot. The Music Input No. 2 provides an entertainment device input to stations 3 through 6. Radio transmissions and intercom voice traffic will normally mute the external audio signal. Automatic muting of the Music Input No. 1 audio signal may be disabled by depressing the ICS button on the audio panel.

Entertainment device audio volume is controlled by the input device.

NOTE

All portable electronic entertainment devices must be switched off for takeoff and landing.

The intercom mode selector switch controls intercom mode selection. The following modes are available:

Mode	Pilot Hears	Copilot Hears	Pass. Hears
ISO	Radio Pilot Sidetone	Copilot and passenger intercom Music Input No. 1	Copilot and passenger intercom Music Input No. 2
ALL	Pilot Copilot Radio Passengers Music Input No. 1	Copilot Pilot Radio Passengers Music Input No. 1	Passengers Pilot Copilot Radio Music Input No. 2
CREW	Pilot Copilot Radio Music Input No. 1	Copilot Pilot Radio Music Input No. 1	Passengers Music Input No. 2

MARKER BEACON

The audio panel incorporates built-in marker beacon receiver and annunciators. Additional marker beacon annunciators are located in the instrument panel above the pilot's airspeed indicator.

Marker beacon sensitivity, audio muting, and annunciator testing is controlled by the three-position marker mode switch. The HIGH and LOW switch positions select high and low marker beacon sensitivity respectively. The T/M position tests the marker beacon annunciators and also mutes the marker beacon audio for approximately 12 seconds.

Marker beacon audio may be selected by depressing the MKR audio selector button.

For details on operation, refer to the PS Engineering Pilot's Guide and Operations Manual, P/N 202-780-000.

STORMSCOPE

The BF Goodrich WX-500 system consists of a remote mounted processor and externally mounted antenna. This system passively detects electrical discharges associated with thunderstorm activity within 200 nm of the airplane. The No. 1 GNS controls the remote processor but both GNS units can display thunderstorm activity.

Momentary forward activation of the AUD/STRM switch, located on the pilot's control wheel, will clear lightning strike and cell data from both GNS units.

For details on operation refer to BF Goodrich WX-500 Operator's Manual, P/N 009-11501-001, the GARMIN GNS 430 Pilot's Guide Addendum, P/N 190-00140-10 Rev. A, Oct. 1999, and, if installed, the GARMIN GNS 530 Pilot's Guide, P/N 190-00181-00.

FUEL / AIR DATA COMPUTER

The Shadin F/ADC 200 or 200+ (if installed) is a remote mounted computer that measures pitot-static pressures, heading, and fuel flow and sends the data to both GNS units. In addition, the Shadin F/ADC 200+ automatically provides the altimeter barometric setting to both GNS units and also allows the units to provide fuel totalizer functions. When the INSTRUMENT PANEL SELF-TEST page is presented during initial power up, windows are provided to set the FUEL CAPACITY of the airplane and the FUEL ON-BOARD. The usable capacity should be entered in the FUEL CAPACITY window. If the fuel on board is less than total usable, the actual amount may be entered in the FUEL ON-BOARD window. If the airplane is fully serviced, the SET FULL FUEL? query may be highlighted and the ENT button pressed. This will automatically enter the amount shown in the FUEL CAPACITY window into the FUEL ON-BOARD window.

ANNUNCIATORS

Annunciators related to operation of the No. 1 GNS are located on the GPS Annunciator Control Unit located on the instrument panel above the pilot's altimeter. Depressing the ANNUN TEST switch button on the pilot's subpanel illuminates all of these annunciators. Annunciator dimming is controlled by a built-in photocell.

Annunciators related to operation of the No. 2 GNS are on the CDI. These annunciators are illuminated during initial power-up of the No. 2 GNS. Annunciator dimming is controlled by a built-in photocell.

Marker beacon annunciators are located on the audio panel and also located above the pilot's airspeed indicator. Selecting the T/M position of the marker mode selector switch will test all of these annunciators. Annunciator dimming is controlled by a built-in photocell.

INTERIOR LIGHTING

The PANEL switch, located on the pilot's subpanel, controls instrument panel lighting. Knob-type rheostats, located on the copilot's subpanel, control lighting intensity. The ENG INST/AVIONICS rheostat controls the intensity of the audio panel and GNS backlighting. The FLIGHT INST rheostat controls the GPS Annunciator Control Unit and CDI backlighting.

The GNS display intensity is normally controlled by a built-in photocell. Manual adjustment of the display may also be accomplished through the GNS unit's AUX pages.

SECTION VIII - HANDLING, SERVICING & MAINTENANCE

No Change

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Raytheon Aircraft Company

Beechcraft

Model A36 Bonanza®

Pilot's Operating Handbook
and
RAC Approved Airplane
Flight Manual Supplement

for the

Israel Air Force Light Transport And

Utility Aircraft

(E-3399, E-3525, E-3588, E-3589, E-3591, E-3595,

E-3596, E-3597, E-3600, E-3603, E-3605, E-3606,

E-3608, E-3609, E-3610, E-3612, E-3613, E-3614,

E-3615, E-3616, E-3628, E-3629)

This Supplement is Applicable to the Following Manual(s):
36-590002-37

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LOG OF REVISIONS

Model A36 Bonanza®

Pilot's Operating Handbook
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**(E-3399, E-3525, E-3588, E-3589, E-3591, E-3595,
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E-3608, E-3609, E-3610, E-3612, E-3613, E-3614,
E-3615, E-3616, E-3628, E-3629)**

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF REV
0	1 thru 12	Original Issue	November, 2004
1	1 thru 35	Performance Data	February, 2005
2	1 thru 35	Aircraft Serial Effectivity	December, 2006

CONTENTS

SECTION I - GENERAL

The information in this supplement is RAC approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) for airplanes used as a Light Transport and Utility Aircraft by the Israel Air Force in accordance with Raytheon Aircraft Company approved data.

The information in this supplement supersedes or adds to the basic POH/AFM only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

MAXIMUM RAC APPROVED WEIGHTS

Maximum Ramp Weight..3863 lbs

Maximum Take-Off Weight.......................................3850 lbs

Maximum Landing Weight..3850 lbs

SECTION II - LIMITATIONS

WEIGHT LIMITS - RAC APPROVED

Maximum Ramp Weight..3863 lbs

Maximum Take-Off Weight..3850 lbs

Maximum Landing Weight...3850 lbs

Maximum Weights in Baggage Compartments:

Removed 5th or 6th Seat Location.............................200 lbs

CENTER OF GRAVITY LIMITS - RAC APPROVED (Landing Gear Extended)

FORWARD LIMITS

81.0 inches aft of datum at 3650 lbs, with a straight line variation to 83.55 inches at 3850 lbs.

AFT LIMIT

87.70 inches aft of datum at all weights.

FLIGHT LOAD FACTOR LIMITS

FLAPS UP	FLAPS DOWN
3.8 positive g's	3.0 positive g's
1.76 negative g's	0 g's

OTHER LIMITATIONS

The landing sink rate is restricted to 500 ft/min when operating at weights above 3700 lbs.

SECTION III - EMERGENCY PROCEDURES

NO CHANGE

SECTION IV - NORMAL PROCEDURES

NO CHANGE

SECTION V - PERFORMANCE

FLIGHT TIME, BLOCK SPEED AND FUEL REQUIREMENT

NOTE

See AFM/POH P/N 36-590002-37 Performance Section for conditions used for Performance and Flight Planning example.

CRUISE CLIMB

Enter the TIME, FUEL, and DISTANCE to CRUISE CLIMB Graph at 15° C to 5653 feet pressure altitude and to 3850 lbs. Again at -5° C to 11,500 feet pressure altitude and to 3850 lbs. and read:

Time to Climb = 21 - 7 = 14 min
Fuel Used to Climb = 8.4 - 2.8 = 5.6 gals
Distance Traveled = 43 - 14 = 29 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 (GPH)	TAS (KNOTS)	FUEL FLOW (GPH)	TAS (KNOTS)
10,000 12,000	14.5 13.5	169 165	14.0 13.0	160 153

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	164
LEG C	ISA + 8° C	13.6	161
LEG D	ISA + 17° C	13.4	156
LEG E	ISA + 18° C	13.3	156

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 FOR CRUISE (GAL)
LEG A	51 - 29 = 22*	192	:07	1.6
LEG B	40	191	:13	2.9
LEG C	74	147	:30	6.8
LEG D	87	145	:36	8.0
LEG E	70	146	:29	6.4
TOTAL	293		1:55	25.7

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

TIME - FUEL - DISTANCE CHART

ITEM	TIME (HRS:MIN)	FUEL (GAL)	DISTANCE (NM)
Start, Runup, Taxi, and Take-off Acceleration	0:00	2.2	0
Climb	:14	5.6	29
Cruise	1:55	25.7	293
TOTAL	2:09	33.5	322

Total Flight Time: 2 hours, 9 minutes (= 2.15 hrs)

Block Speed: 322 NM ÷ 2.15 hours = 150 knots

RESERVE FUEL

Enter the MAXIMUM 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...13.3 gph

Reserve Fuel (45 minutes x 13.3 gph) = 10.0 gallons

TOTAL FUEL REQUIREMENT

Total Fuel Required = Calculated Fuel Usage + Reserve Fuel
Total Fuel Required = 33.5 gallons + 10.0 gallons = 43.5 gallons

LANDING WEIGHT

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

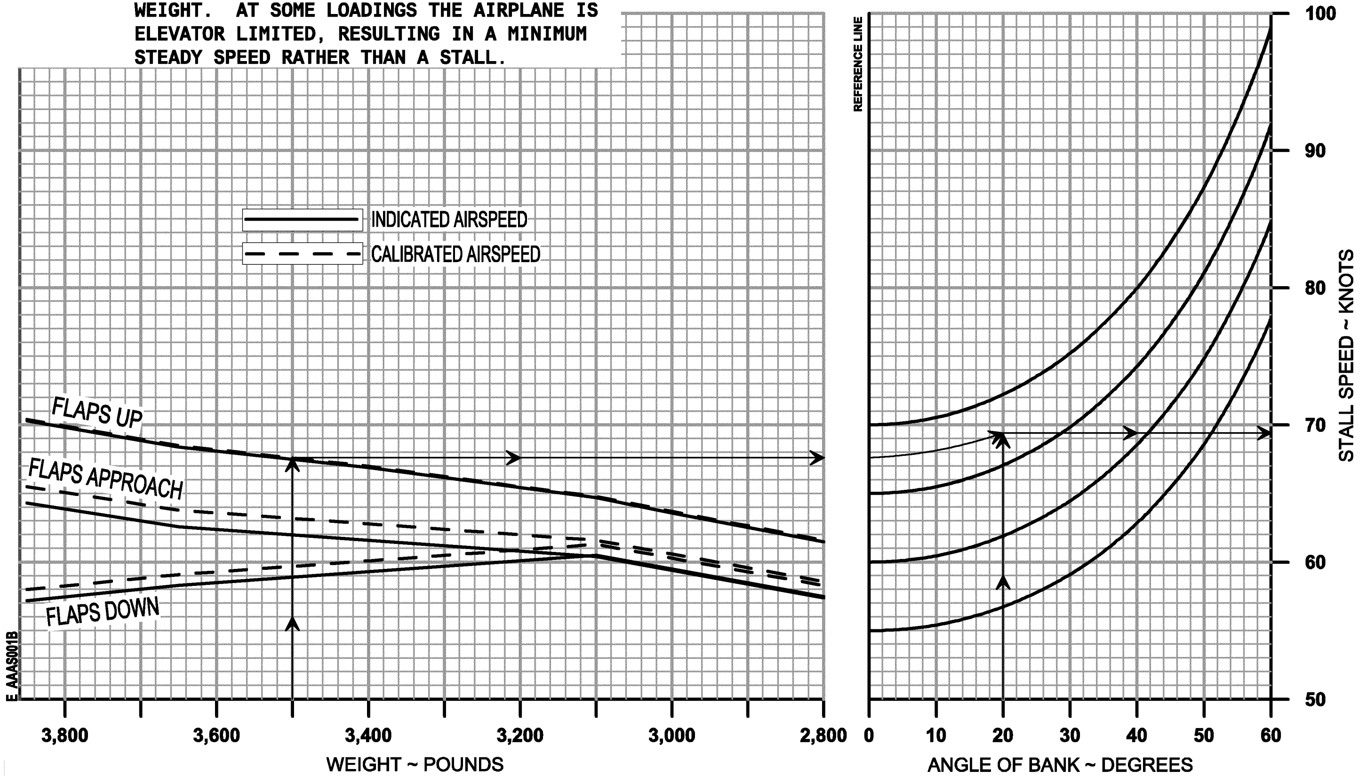
Assumed Ramp Weight.......................................3863 lbs
Estimated Fuel (43.4 gal at 6 lbs/gal).....................261 lbs
Estimated Landing Weight (3863 lbs - 261 lbs) = 3602 lbs

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..................3,500 LBS
FLAPS...................UP
BANK ANGLE.............20°
STALL SPEED............69.4 KTS INDICATED

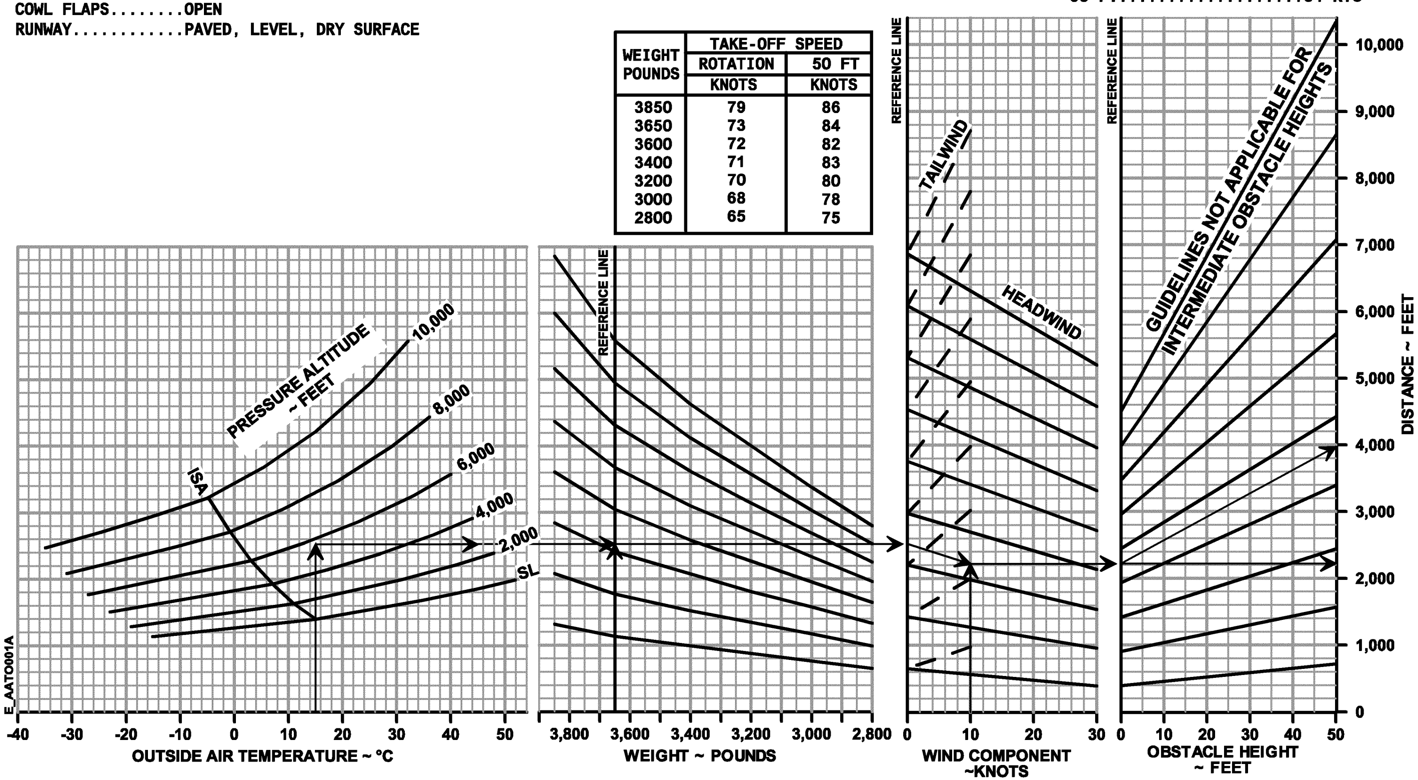


TAKE-OFF DISTANCE - FLAPS UP

ASSOCIATED CONDITIONS:
POWER............TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE..........FULL RICH (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).
FLAPS............UP
LANDING GEAR......RETRACTED AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS........OPEN
RUNWAY...........PAVED, LEVEL, DRY SURFACE

EXAMPLE:
OAT.......................15°C
PRESSURE ALTITUDE..........5,653 FT
WEIGHT.....................3,650 LB
HEADWIND COMPONENT.........10 KTS
OBSTACLE HEIGHT............50 FT
GROUND ROLL................2,220 FT
TOTAL DISTANCE OVER 50-FT OBSTACLE..................3,970 FT
TAKE-OFF SPEED
ROTATION................73 KTS
50-FT...................84 KTS

WEIGHT POUNDS	TAKE-OFF SPEED	
	ROTATION KNOTS	50 FT KNOTS
3850	79	86
3650	73	84
3600	72	82
3400	71	83
3200	70	80
3000	68	78
2800	65	75



TAKE-OFF DISTANCE - FLAPS APPROACH

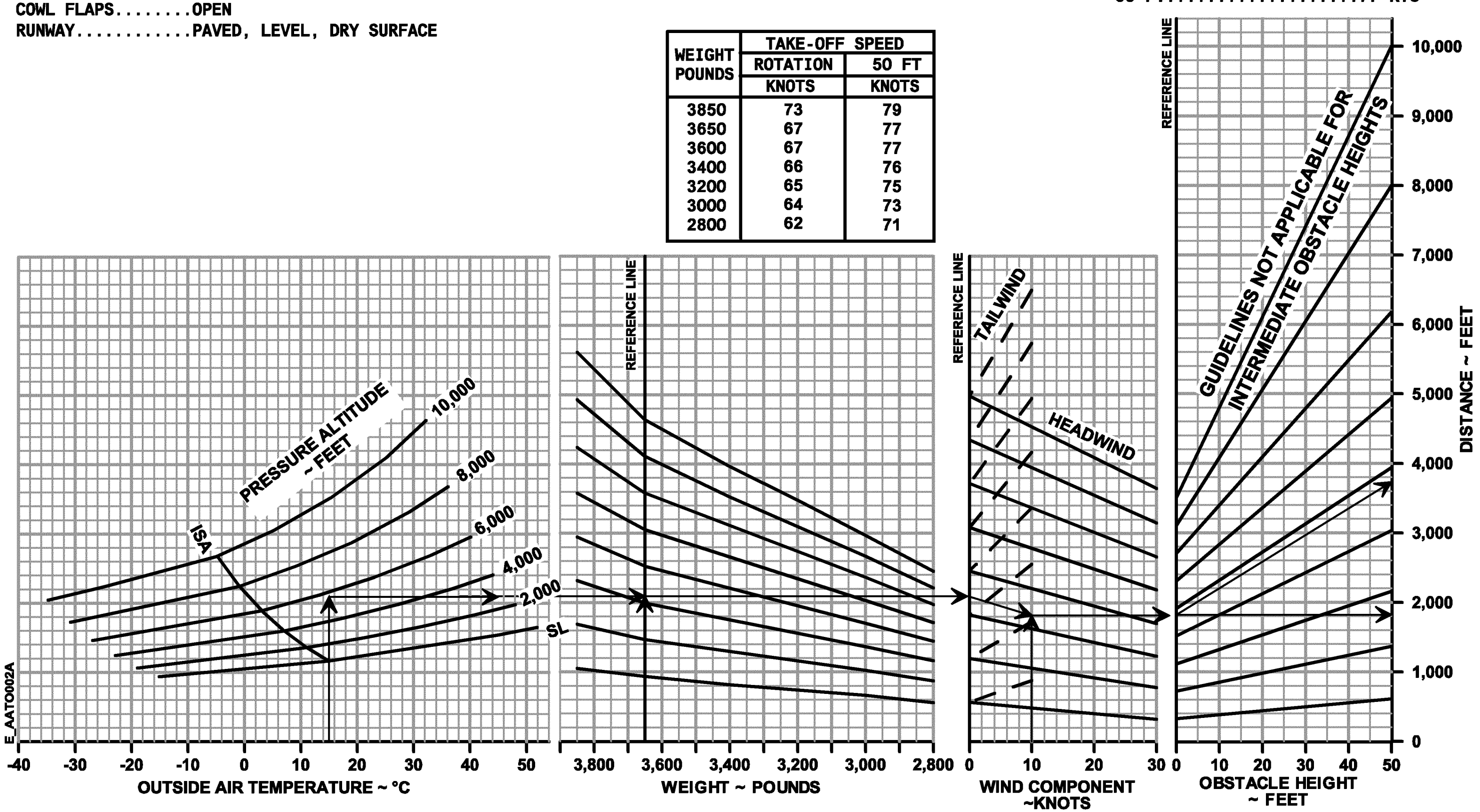
EXAMPLE:

OAT........................15°C
PRESSURE ALTITUDE..........5,653 FT
WEIGHT.....................3,650 LB
HEADWIND COMPONENT.........10 KTS
OBSTACLE HEIGHT............50 FT
GROUND ROLL................1,820 FT
TOTAL DISTANCE OVER 50-FT
OBSTACLE...................3,730 FT
TAKE-OFF SPEED
ROTATION...................67 KTS
50-FT......................77 KTS

ASSOCIATED CONDITIONS:

POWER.............TAKE-OFF POWER SET BEFORE BRAKE RELEASE
MIXTURE...........FULL RICH (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).
FLAPS.............APPROACH (BLUE)
LANDING GEAR......RETRACTED AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS........OPEN
RUNWAY............PAVED, LEVEL, DRY SURFACE

WEIGHT POUNDS	TAKE-OFF SPEED ROTATION KNOTS	TAKE-OFF SPEED 50 FT KNOTS
3850	73	79
3650	67	77
3600	67	77
3400	66	76
3200	65	75
3000	64	73
2800	62	71



CLIMB

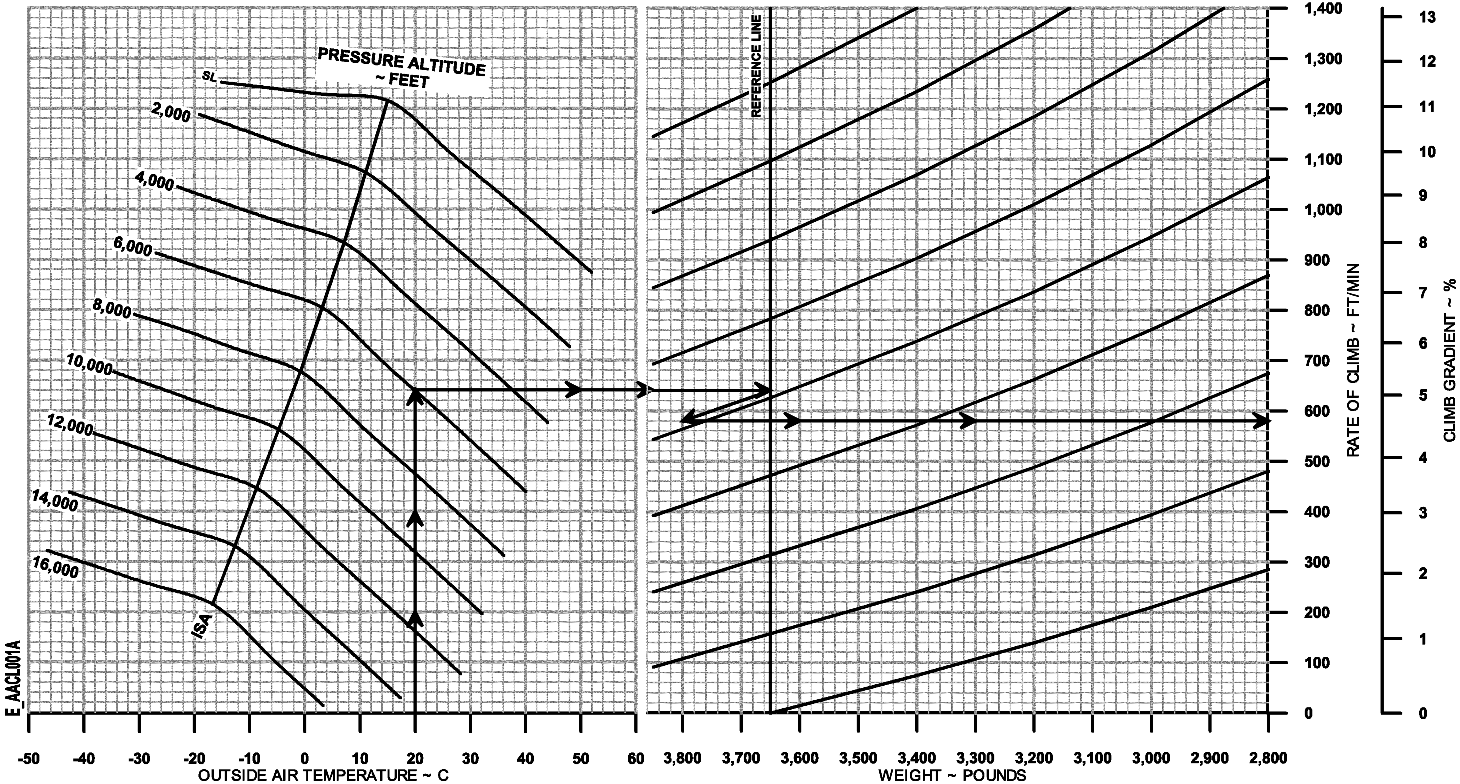
CLIMB SPEED: 100 KNOTS ALL WEIGHT

ASSOCIATED CONDITIONS:

POWER.................FULL THROTTLE, 2700 RPM
MIXTURE ....FUEL RICH (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).
FLAPS..................UP
LANDING GEAR...........RETRACTED AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS.............OPEN

EXAMPLE:

OAT .... 20°C
PRESSURE ALTITUDE ..... 6,000 FT
WEIGHT .... 3,800 LB
RATE OF CLIMB .... 580 FT/MIN
CLIMB GRADIENT 4.6%

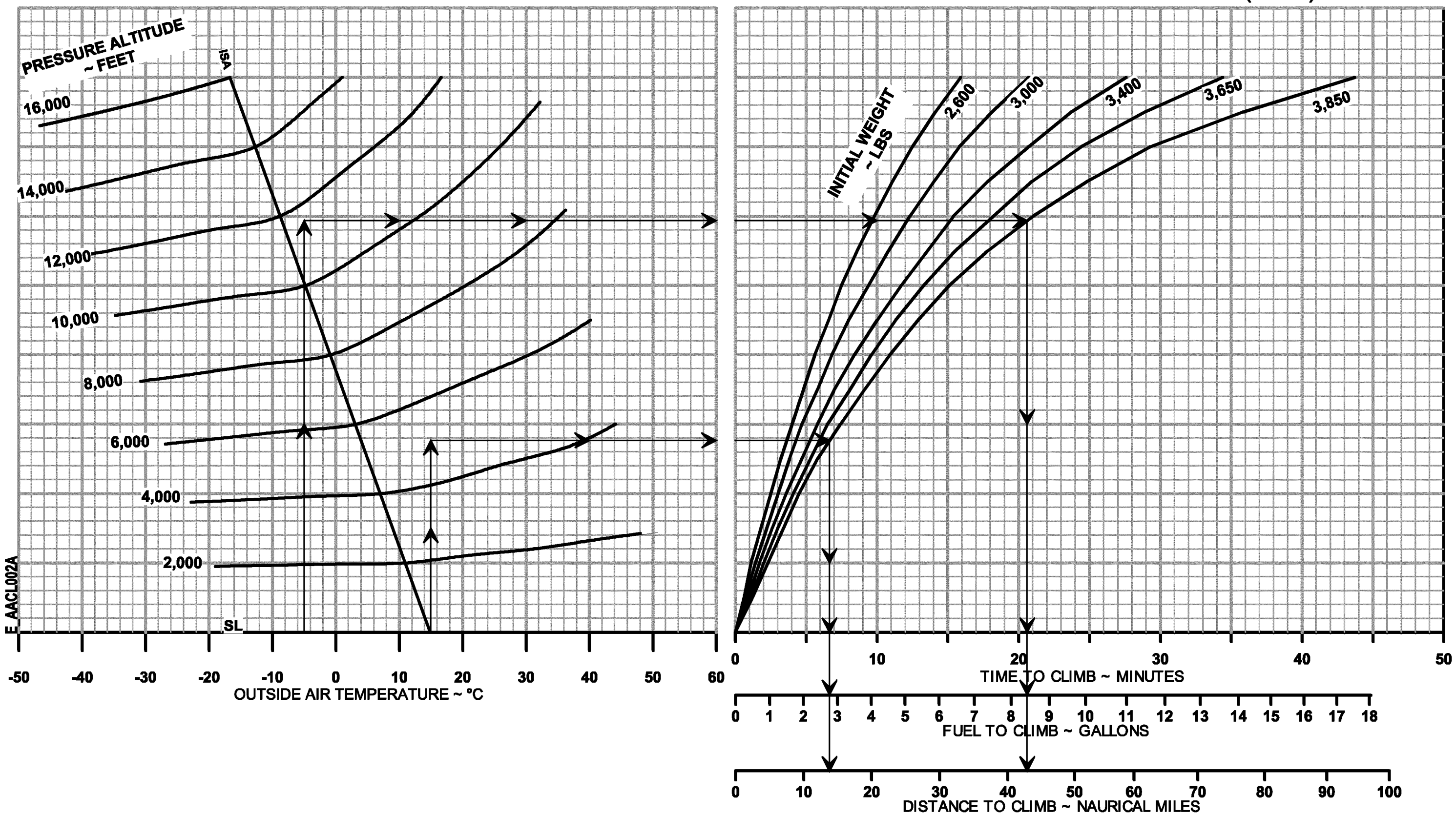


TIME, FUEL, AND DISTANCE TO CRUISE CLIMB

CLIMB SPEED: 110 KNOTS ALL WEIGHT

ASSOCIATED CONDITIONS:
POWER..........FULL THROTTLE, 2500 RPM
FUEL DENSITY   6.0 LBS/GAL
MIXTURE ....FUEL RICH (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).
COWL FLAPS.....AS REQUIRED

EXAMPLE:
OAT AT TAKEOFF............. 15°C
OAT AT CRUISE.............. -5°C
AIRPORT PRESSURE ALTITUDE.. 5,653 FT
CRUISE PRESSURE ALTITUDE... 11,500 FT
INITIAL CLIMB WEIGHT....... 3,850 LB
TIME TO CLIMB (21-7)........14 MIN
FUEL TO CLIMB (8.4-2.8).....5.6 GAL
DISTANCE TO CLIMB (43-14)...29 NM



MAXIMUM RECOMMENDED CRUISE POWER SETTINGS

20°C RICH
OF PEAK EGT

25.0 IN. HG (OR FULL THROTTLE) @ 2500 RPM
CRUISE RICH MIXTURE
3600 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	171	163
	2,000	-6	21	25.0	105.5	17.6	171	168
	4,000	-10	14	25.0	109.1	18.2	171	173
	6,000	-14	7	24.1	106.1	17.7	168	174
	8,000	-18	0	22.3	97.7	16.3	160	171
	10,000	-22	-8	20.6	90.2	15.0	153	168
	12,000	-26	-15	19.1	83.5	13.9	146	165
	14,000	-30	-22	17.7	78.2	13.0	138	160
	16,000	-34	-29	16.3	73.0	12.2	128	154
STANDARD DAY (ISA)	SL	17	63	25.0	98.1	16.3	166	164
	2,000	14	57	25.0	101.3	16.9	166	169
	4,000	10	50	25.0	104.6	17.4	166	173
	6,000	6	43	24.1	101.8	17.0	162	175
	8,000	2	36	22.3	93.9	15.6	155	172
	10,000	-2	28	20.6	86.9	14.5	148	169
	12,000	-6	21	19.1	80.7	13.5	140	165
	14,000	-10	14	17.7	75.9	12.7	131	160
	16,000	-15	5	16.3	71.2	11.9	121	152
ISA + 20° C (ISA + 36° F)	SL	37	99	25.0	94.1	15.7	155	158
	2,000	33	91	25.0	97.2	16.2	155	163
	4,000	30	86	25.0	100.3	16.7	155	168
	6,000	26	79	24.1	97.6	16.3	151	169
	8,000	22	72	22.3	90.3	15.0	144	165
	10,000	18	64	20.6	83.7	14.0	135	160
	12,000	13	55	19.1	78.0	13.0	125	153
	14,000	9	48	17.7	73.9	12.3	114	144
	16,000	—	—	—	—	—	—	—

E-AACR005-1

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
3600 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	166	158
	2,000	-7	19	25.0	89.3	14.9	167	163
	4,000	-10	14	25.0	92.3	15.4	167	168
	6,000	-14	7	24.1	89.7	15	163	169
	8,000	-18	0	22.3	82.5	13.8	156	166
	10,000	-22	-8	20.6	76	12.7	148	163
	12,000	-26	-15	19.1	70.2	11.7	141	159
	14,000	-31	-24	17.7	65.5	10.9	132	154
	16,000	-35	-31	16.3	60.7	10.1	122	148
STANDARD DAY (ISA)	SL	17	63	25.0	82.9	13.8	161	159
	2,000	14	57	25.0	85.6	14.3	162	164
	4,000	10	50	25.0	88.5	14.7	161	169
	6,000	6	43	24.1	86	14.3	158	170
	8,000	2	36	22.3	79.3	13.2	150	167
	10,000	-2	28	20.6	73.2	12.2	143	163
	12,000	-6	21	19.1	67.8	11.3	135	159
	14,000	-11	12	17.7	63.4	10.6	126	153
	16,000	-15	5	16.3	59.1	9.85	115	144
ISA + 20° C (ISA + 36° F)	SL	37	99	25.0	79.5	13.3	150	153
	2,000	33	91	25.0	82.1	13.7	150	157
	4,000	30	86	25.0	84.7	14.1	150	162
	6,000	26	79	24.1	82.5	13.7	146	163
	8,000	21	70	22.3	76.1	12.7	138	158
	10,000	17	63	20.6	70.4	11.7	129	153
	12,000	13	55	19.1	65.5	10.9	119	145
	14,000	9	48	17.7	61.5	10.2	104	131
	16,000	—	—	—	—	—	—	—

E-AACR005-2

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
3600 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	156	148
	2,000	-7	19	23.0	84.1	14	156	153
	4,000	-11	12	23.0	86.9	14.5	157	158
	6,000	-14	7	23.0	89.7	14.9	157	162
	8,000	-18	0	22.4	88.9	14.8	154	164
	10,000	-22	-8	20.7	82.6	13.8	147	161
	12,000	-27	-17	19.2	77.1	12.8	139	157
	14,000	-31	-24	17.8	73.1	12.2	130	152
	16,000	-35	-31	16.4	69.2	11.5	120	144
STANDARD DAY (ISA)	SL	17	63	23.0	79	13.2	151	149
	2,000	13	55	23.0	81.4	13.6	151	153
	4,000	9	48	23.0	83.8	14	151	158
	6,000	6	43	23.0	86.4	14.4	151	163
	8,000	2	36	22.4	85.7	14.3	149	165
	10,000	-2	28	20.7	79.9	13.3	141	161
	12,000	-7	19	19.2	75	12.5	133	156
	14,000	-11	12	17.8	71.4	11.9	123	150
	16,000	-15	5	16.4	67.8	11.3	111	139
ISA + 20° C (ISA + 36° F)	SL	37	99	23.0	76.5	12.8	138	140
	2,000	33	91	23.0	78.6	13.1	139	145
	4,000	29	84	23.0	81	13.5	139	150
	6,000	25	77	23.0	83.3	13.9	139	155
	8,000	21	70	22.4	82.7	13.8	136	156
	10,000	17	63	20.7	77.3	12.9	127	150
	12,000	13	55	19.2	73	12.2	115	141
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

E-AACR005-3

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
3600 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	67.5	11.3	150	143
	2,000	-7	19	23.0	69.7	11.6	151	147
	4,000	-11	12	23.0	72	12	151	152
	6,000	-15	5	23.0	74.4	12.4	151	156
	8,000	-19	-2	22.4	73.8	12.3	148	158
	10,000	-23	-9	20.7	68.4	11.4	141	154
	12,000	-27	-17	19.2	63.7	10.6	132	150
	14,000	-31	-24	17.8	60	10	123	144
	16,000	-35	-31	16.4	56.3	9.38	111	134
STANDARD DAY (ISA)	SL	17	63	23.0	65.3	10.9	145	143
	2,000	13	55	23.0	67.4	11.2	146	147
	4,000	9	48	23.0	69.4	11.6	146	152
	6,000	5	41	23.0	71.7	11.9	146	156
	8,000	1	34	22.4	71.1	11.8	143	158
	10,000	-3	27	20.7	66.1	11	135	154
	12,000	-7	19	19.2	61.8	10.3	126	148
	14,000	-11	12	17.8	58.5	9.75	115	140
	16,000	—	—	—	—	—	—	—
ISA + 20° C (ISA + 36° F)	SL	37	99	23.0	63.2	10.5	131	133
	2,000	33	91	23.0	65.1	10.8	131	138
	4,000	29	84	23.0	67	11.2	132	142
	6,000	25	77	23.0	69	11.5	132	147
	8,000	21	70	22.4	68.5	11.4	129	148
	10,000	17	63	20.7	63.9	10.7	119	140
	12,000	13	55	19.2	60	10	103	126
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

E-AACR005-4

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 POWER CRUISE SETTINGS

20°C RICH
OF PEAK EGT

25.0 IN. HG (OR FULL THROTTLE) @ 2100 RPM
CRUISE RICH MIXTURE
3600 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	79.4	13.2	154	146
	2,000	-7	19	25.0	82.6	13.8	155	151
	4,000	-11	12	25.0	85.8	14.3	155	156
	6,000	-15	5	24.3	85	14.2	152	158
	8,000	-19	-2	22.5	79.5	13.3	145	155
	10,000	-23	-9	20.8	74.8	12.5	137	151
	12,000	-27	-17	19.3	70.8	11.8	129	146
	14,000	-31	-24	17.9	68.2	11.4	119	139
	16,000	—	—	—	—	—	—	—
STANDARD DAY (ISA)	SL	17	63	25.0	76.9	12.8	149	146
	2,000	13	55	25.0	79.9	13.3	149	151
	4,000	9	48	25.0	82.9	13.8	150	156
	6,000	5	41	24.3	82.3	13.7	147	158
	8,000	1	34	22.5	77	12.8	139	154
	10,000	-3	27	20.8	72.9	12.1	131	149
	12,000	-7	19	19.3	69.5	11.6	122	143
	14,000	-11	12	17.9	67.1	11.2	109	133
	16,000	—	—	—	—	—	—	—
ISA + 20° C (ISA + 36° F)	SL	37	99	25.0	74.8	12.5	135	137
	2,000	33	91	25.0	77.2	12.9	136	143
	4,000	29	84	25.0	80.1	13.4	137	148
	6,000	25	77	24.3	79.5	13.2	134	149
	8,000	21	70	22.5	74.9	12.5	124	143
	10,000	17	63	20.8	71	11.8	113	133
	12,000	—	—	—	—	—	—	—
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

E-AACR005-5

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
3600 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	63.8	10.6	146	138
	2,000	-7	19	25.0	66.3	11.1	147	143
	4,000	-11	12	25.0	68.8	11.5	147	148
	6,000	-15	5	24.3	68.3	11.4	144	149
	8,000	-19	-2	22.5	63.9	10.6	137	146
	10,000	-23	-9	20.8	60	10	128	141
	12,000	-27	-17	19.3	56.6	9.44	119	134
	14,000	-31	-24	17.9	54.4	9.07	105	122
	16,000	—	—	—	—	—	—	—
STANDARD DAY (ISA)	SL	17	63	25.0	61.8	10.3	141	138
	2,000	13	55	25.0	64.2	10.7	141	143
	4,000	9	48	25.0	66.6	11.1	142	148
	6,000	5	41	24.3	66.1	11	139	149
	8,000	1	34	22.5	61.9	10.3	131	145
	10,000	-3	27	20.8	58.4	9.74	122	139
	12,000	-7	19	19.3	55.5	9.26	109	129
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—
ISA + 20° C (ISA + 36° F)	SL	36	97	25.0	60.1	10	125	127
	2,000	33	91	25.0	62.1	10.3	126	132
	4,000	29	84	25.0	64.4	10.7	127	137
	6,000	25	77	24.3	63.9	10.6	124	138
	8,000	21	70	22.5	60.1	10	112	128
	10,000	—	—	—	—	—	—	—
	12,000	—	—	—	—	—	—	—
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

E-AACR005-6

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
3600 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	65.9	11	132	126
	2,000	-7	19	21.0	67.4	11.2	134	131
	4,000	-11	12	21.0	69.2	11.5	136	136
	6,000	-15	5	21.0	71	11.8	137	142
	8,000	-19	-2	21.0	73.3	12.2	138	147
	10,000	-23	-9	20.8	74.8	12.5	137	151
	12,000	-27	-17	19.3	70.8	11.8	129	146
	14,000	-31	-24	17.9	68.2	11.4	119	139
	16,000	—	—	—	—	—	—	—
STANDARD DAY (ISA)	SL	16	61	21.0	65.2	10.9	127	124
	2,000	13	55	21.0	66.3	11	128	130
	4,000	9	48	21.0	67.9	11.3	130	135
	6,000	5	41	21.0	69.6	11.6	131	141
	8,000	1	34	21.0	71.4	11.9	132	146
	10,000	-3	27	20.8	72.9	12.1	131	149
	12,000	-7	19	19.3	69.5	11.6	122	143
	14,000	-11	12	17.9	67.1	11.2	109	133
	16,000	—	—	—	—	—	—	—
ISA + 20° C (ISA + 36° F)	SL	36	97	21.0	64.4	10.7	99.9	101
	2,000	32	90	21.0	65.5	10.9	106	111
	4,000	28	82	21.0	66.6	11.1	109	118
	6,000	25	77	21.0	68.3	11.4	112	124
	8,000	21	70	21.0	69.9	11.7	114	130
	10,000	17	63	20.8	71	11.8	113	133
	12,000	—	—	—	—	—	—	—
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

E-AACR005-7

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
3600 LBS.

	PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KCAS	KTAS
ISA - 20° C (ISA - 36° F)	SL	-4	25	21.0	52.6	8.8	122	116
	2,000	-8	18	21.0	54.0	9.0	125	122
	4,000	-11	12	21.0	55.4	9.2	127	127
	6,000	-15	5	21.0	56.8	9.5	128	132
	8,000	-19	-2	21.0	58.8	9.8	129	137
	10,000	-23	-9	20.8	60.0	10.0	128	141
	12,000	-27	-17	19.3	56.6	9.4	119	134
	14,000	-31	-24	17.9	54.4	9.1	105	122
	16,000	—	—	—	—	—	—	—
STANDARD DAY (ISA)	SL	16	61	21.0	51.7	8.6	116	114
	2,000	12	54	21.0	53.0	8.8	118	119
	4,000	9	48	21.0	54.4	9.1	120	125
	6,000	5	41	21.0	55.7	9.3	121	130
	8,000	1	34	21.0	57.2	9.5	122	135
	10,000	-3	27	20.8	58.4	9.7	122	139
	12,000	-7	19	19.3	55.5	9.3	109	129
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—
ISA + 20° C (ISA + 36° F)	SL	—	—	—	—	—	—	—
	2,000	—	—	—	—	—	—	—
	4,000	—	—	—	—	—	—	—
	6,000	—	—	—	—	—	—	—
	8,000	—	—	—	—	—	—	—
	10,000	—	—	—	—	—	—	—
	12,000	—	—	—	—	—	—	—
	14,000	—	—	—	—	—	—	—
	16,000	—	—	—	—	—	—	—

E-AACR005-8

NOTES:

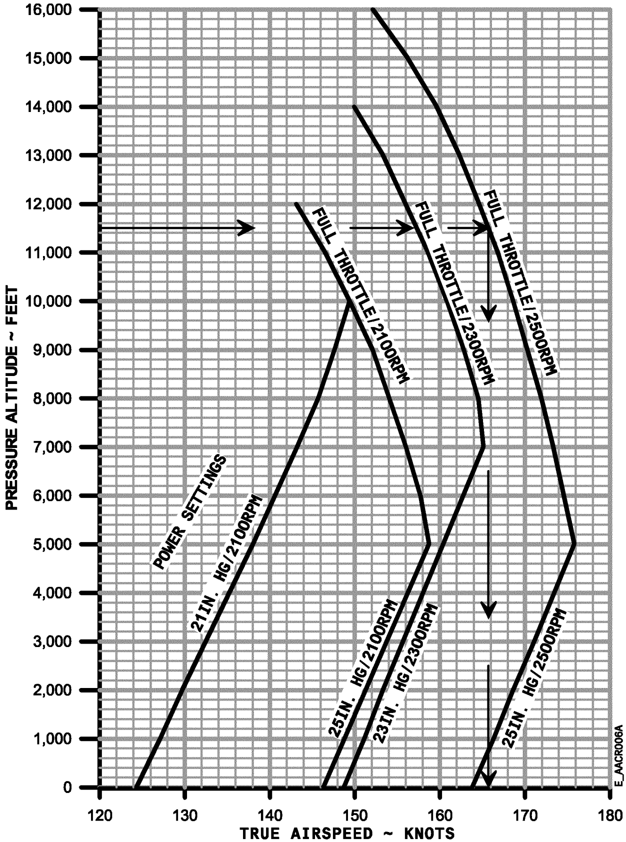
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

CRUISE SPEEDS

20°C RICH OF PEAK EGT

ASSOCIATED CONDITIONS:
AVERAGE CRUISE WT....... 3600 LBS
TEMPERATURE............. STD DAY (ISA)

EXAMPLE:
PRESSURE ALTITUDE... 11,500 FT
POWER SETTING....... FULL THROTTLE, 2500 RPM
TRUE AIRSPEED....... 166 KTS

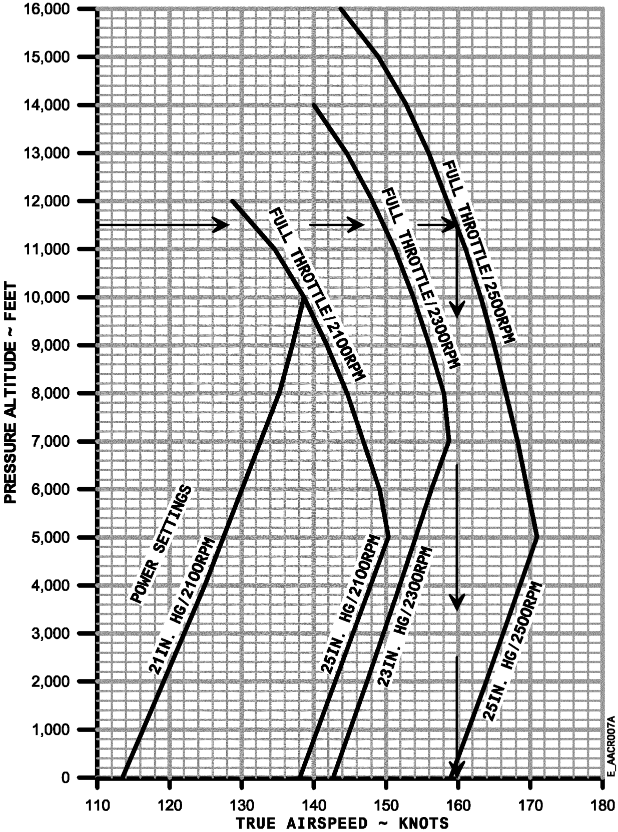


CRUISE SPEEDS

2O°C LEAN OF PEAK EGT

ASSOCIATED CONDITIONS:
AVERAGE CRUISE WT....... 3600 LBS
TEMPERATURE............. STD DAY (ISA)

EXAMPLE:
PRESSURE ALTITUDE... 11,500 FT
POWER SETTING....... FULL THROTTLE, 2500 RPM
TRUE AIRSPEED....... 160 KTS

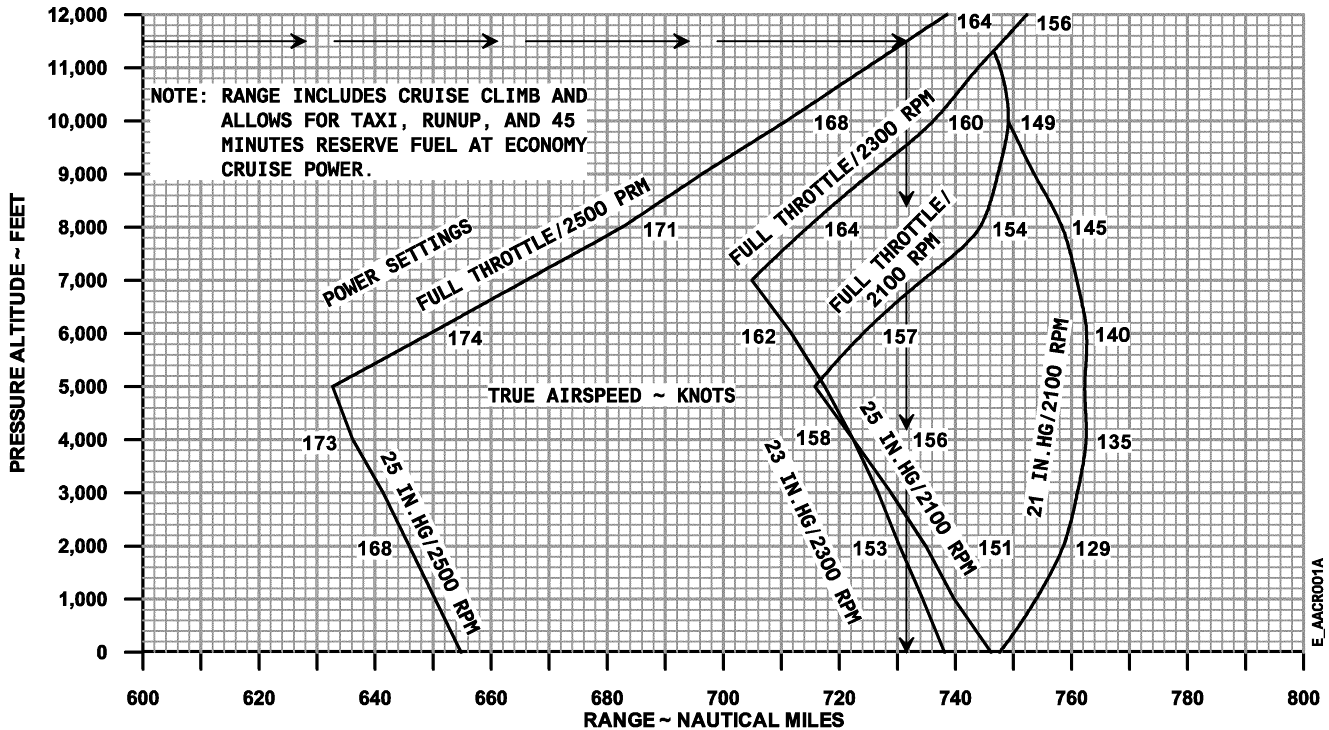


RANGE PROFILE
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:
WEIGHT.................... 3,863 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............... 731 NM



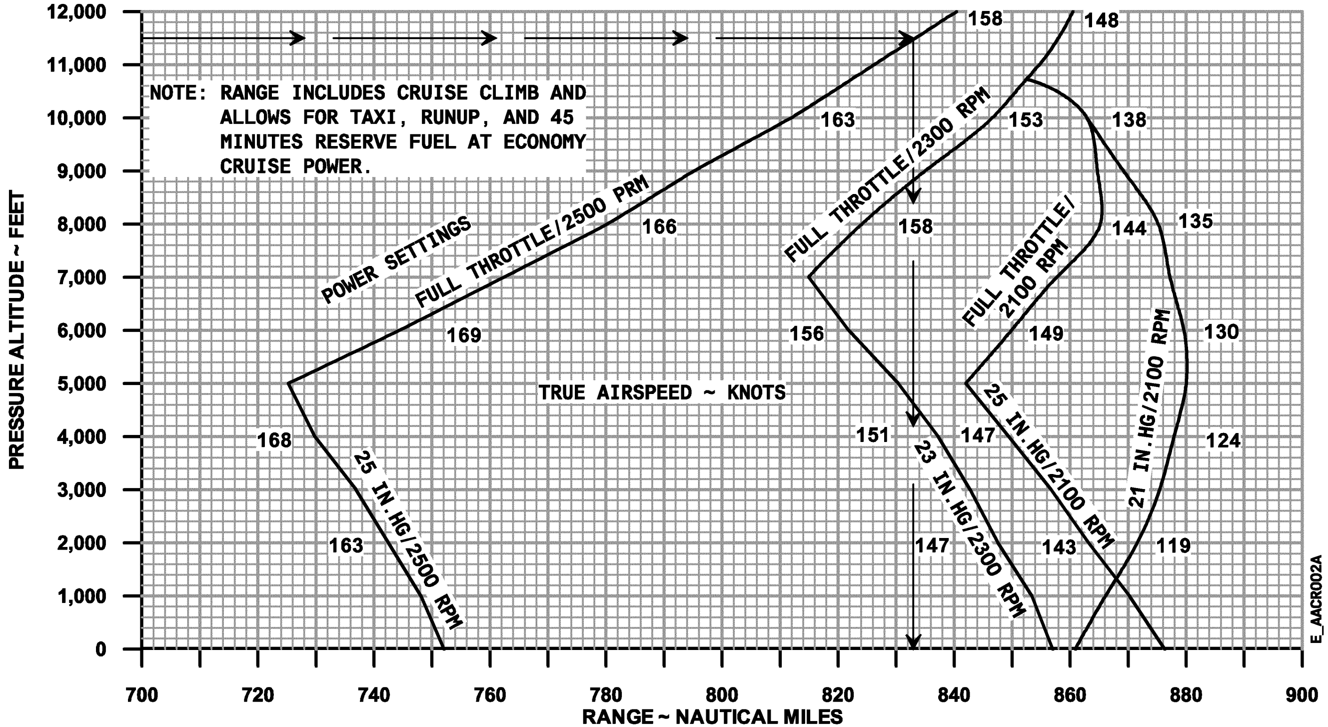
L

RANGE PROFILE
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:
WEIGHT.................... 3863 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............... 833 NM



ENDURANCE PROFILE

STANDARD DAY (ISA)

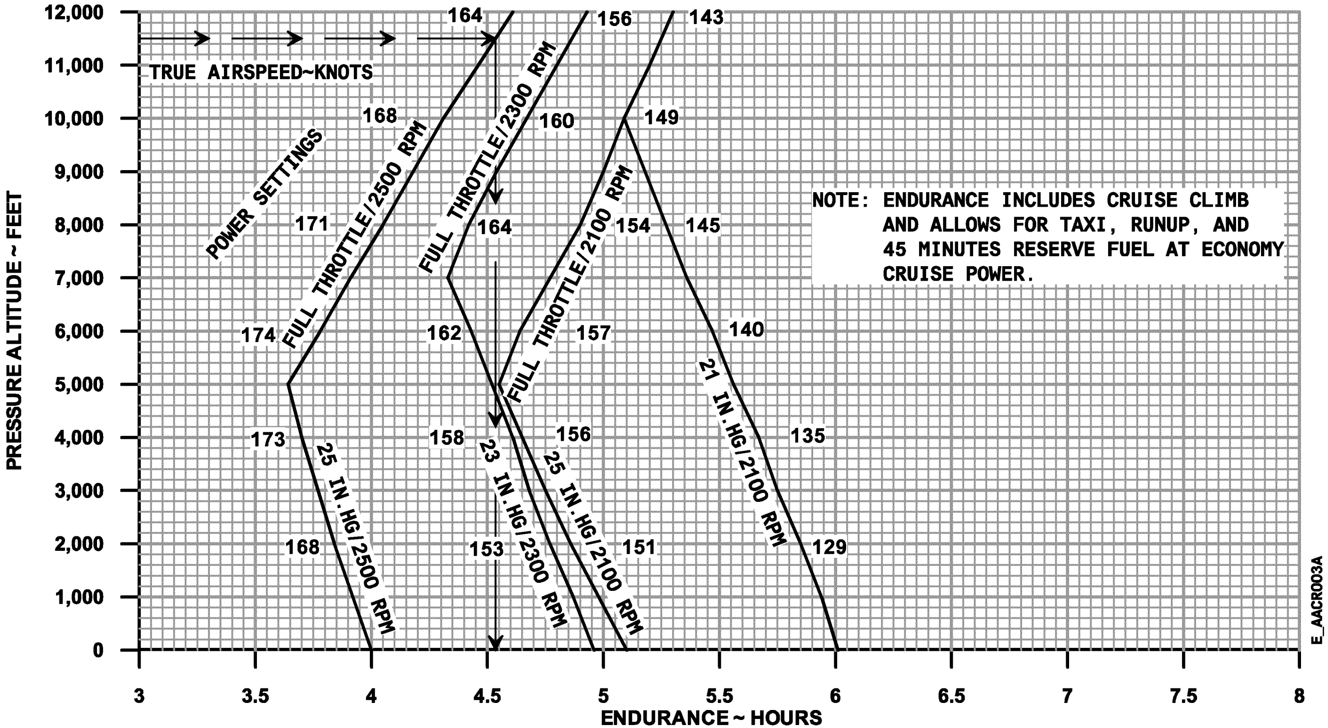
ASSOCIATED CONDITIONS:

WEIGHT.................... 3863 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............4.53 HRS (4 HRS, 34 MIN)



ENDURANCE PROFILE

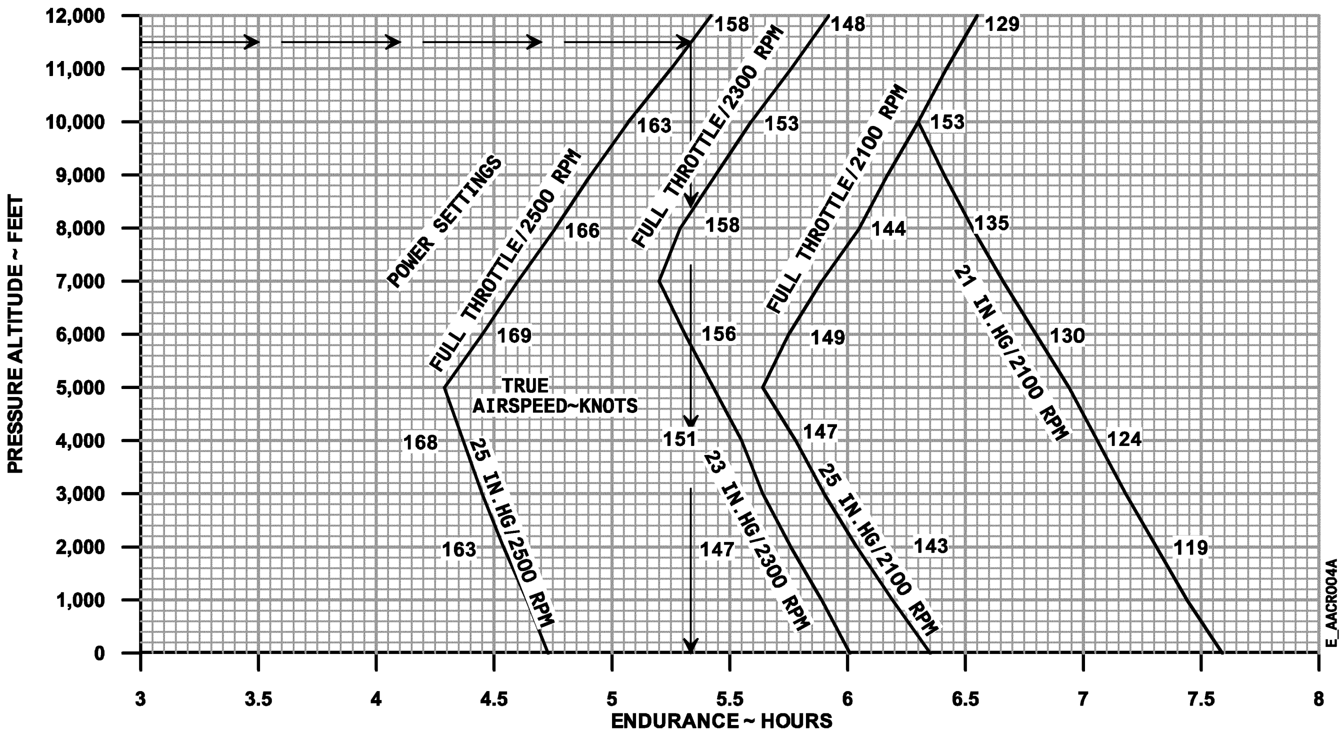
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:
WEIGHT.................... 3863 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............5.33 HRS (5 HRS, 23 MIN)

NOTE: ENDURANCE INCLUDES CRUISE CLIMB AND ALLOWS FOR TAXI, RUNUP, AND 45 MINUTES RESERVE FUEL AT ECONOMY CRUISE POWER.



RAC Approved
Revised: December, 2006
P/N 36-590002-0069

LANDING DISTANCE

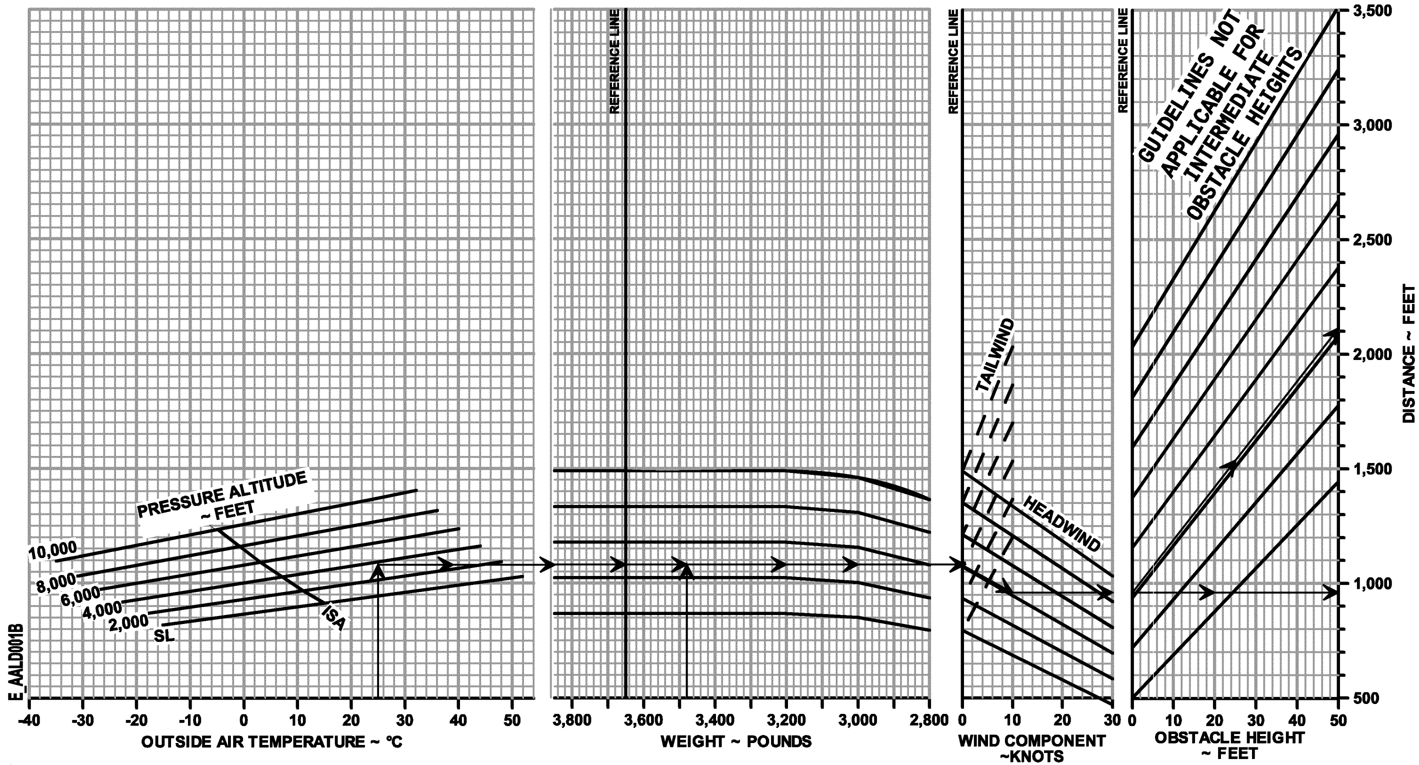
ASSOCIATED CONDITIONS:

POWER.............RETARED TO MAINTAIN 500 FT/MIN
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
3850	79
3650	79
3400	80
3200	81
3000	81
2800	78

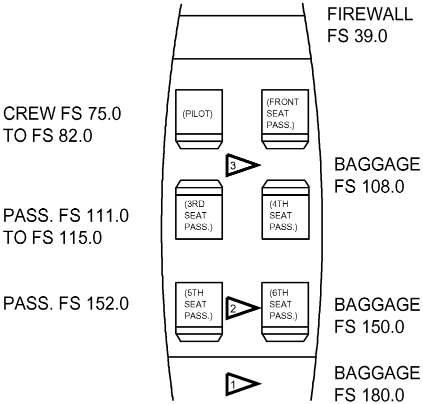
EXAMPLE:

OAT.........................25°C
PRESSURE ALTITUDE...........3,965 FT
WEIGHT......................3,479 LBS
HEADWIND COMPONENT..........10 KTS
GROUND ROLL.................960 FT
TOTAL OVER 50-FT OBSTACLE...2112 FT
APPROACH SPEED..............80 KTS



SECTION VI - WEIGHT & BALANCE/EQUIPMENT LIST

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 IS 70 POUNDS.

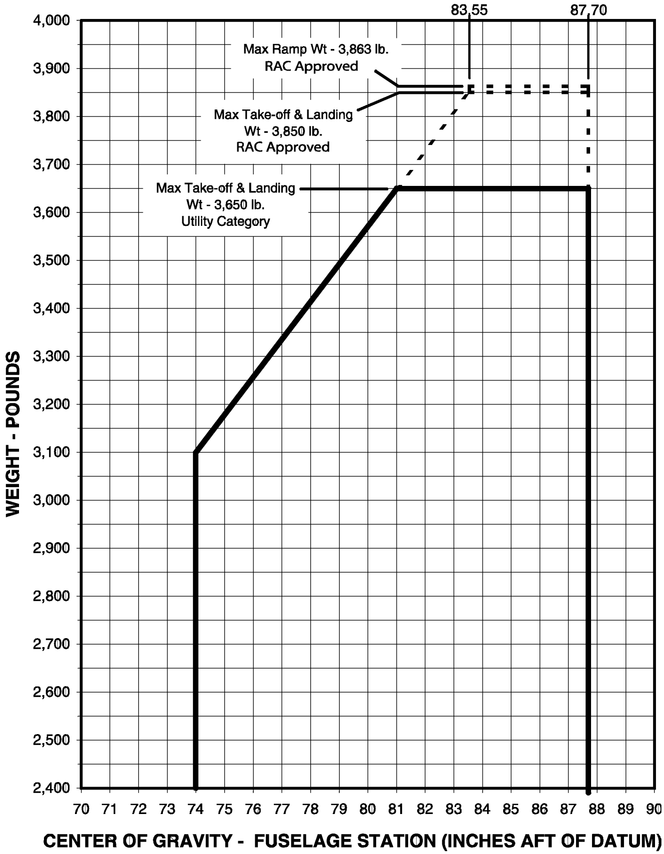
2 MAXIMUM BAGGAGE WEIGHT IS 200 POUNDS WITH THE 5TH OR 6TH SEAT REMOVED.

3 MAXIMUM WEIGHT IS 200 POUNDS BETWEEN SPARS WITH AFT FACING 3RD AND 4TH SEATS. THIS LOCATION IS NOT APPROVED FOR BAGGAGE WHEN THE 3RD AND 4TH SEATS ARE FACING FORWARD.

ALL MAXIMUM WEIGHTS INCLUDE BAGGAGE AND INSTALLED EQUIPMENT, AS APPLICABLE. ALL BAGGAGE MUST BE SECURED WITH AN APPROVED RETENTION SYSTEM.

EA06C
045639AA.AI

FLIGHT ENVELOPE



EA06C
045638AB.

COMPUTING PROCEDURE

1. Record the most current Basic Empty Weight, Arm and Moment on Line 1. The Moment must be divided by 100 to correspond to the Useful Load Weights and Moments Tables.
2. Record the weight, arm and corresponding moment/100 from the appropriate Useful Load Weights and Moments Table, of each useful load item, except fuel, on Lines 2. through 8.
3. Total the weight column and moment/100 column, on Line 9. Divide the total moment/100 by the total weight and multiply the result by 100 to determine the arm.
4. Record the weight and corresponding moment/100 for the total fuel loaded on Line 10. Add the fuel weight and moment/100 to the Zero Fuel Weight values to determine the Ramp Weight on Line 11. Divide the total moment/100 by the total weight and multiply the result by 100 to determine the arm.
5. Record the weight and corresponding moment/100 for the fuel to be used for start, taxi and take-off on Line 12. Remove the fuel weight and moment/100 from the Ramp Weight values to determine the Take-Off Weight on Line 13. Divide the total moment/100 by the total weight and multiply the result by 100 to determine the arm.
6. Record the weight and corresponding moment/100 for the fuel used to destination on Line 14. Remove the fuel weight and moment/100 from the Take-Off Weight values to determine the Landing Weight on Line 15. Divide the total moment/100 by the total weight and multiply the result by 100 to determine the arm.
7. Refer to the Flight Envelope graph and ensure that the Zero Fuel Weight, Take-Off Weight and Landing Weight are all within the Weight and C.G. limits. If not, rearrange or remove Useful Load Item(s) to stay within the limits.

WEIGHT AND BALANCE LOADING FORM

SERIAL NO:___________ DATE:___________

ITEM	WEIGHT (lb)	ARM (in.)	MOMENT / 100 (lb- in.)
1. **BASIC EMPTY WEIGHT**			
2. Pilot and Front Seat Passenger			
3. 3rd and 4th Seat Passengers			
4. 5th and 6th Seat Passengers			
5. Baggage - Between Spars		108.0	
6. Baggage - 5th or 6th Seat Location		150.0	
7. Baggage - Aft Compartment		180.0	
8. Other -			
9. **ZERO FUEL WEIGHT**			
10. Fuel Load		75.0	
11. **RAMP WEIGHT**			
12. *Less Fuel for Start, Taxi and Run-up			
13. **TAKE-OFF WEIGHT** *(DO NOT EXCEED 3,650 LBS - UTILITY CATEGORY OR 3,850 LBS - RAC APPROVED)*			
14. Less Fuel to Destination		75.0	
15. **LANDING WEIGHT**			

*Typically 13 lbs with a Moment/100 of 10 lb-in., which may vary in operation.

USEFUL LOAD WEIGHTS AND MOMENTS

BAGGAGE		
Weight	Between Spars (3rd and 4th Seats Aft Facing) ARM 108	Removed 5th or 6th Seat Location ARM 150
LB	MOMENT/100	
10	11	15
20	22	30
30	32	45
40	43	60
50	54	75
60	65	90
70	76	105
80	86	120
90	97	135
100	108	150
110	119	165
120	130	180
130	140	195
140	151	210
150	162	225
160	173	240
170	184	255
180	194	270
190	205	285
200	216	300

SECTION VII - SYSTEMS DESCRIPTION

NO CHANGE

SECTION VIII - HANDLING, SERVICING AND MAINTENANCE

NO CHANGE

BEECHCRAFT BONANZA F33A, V35B, A36, A36TC & B36TC LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT for the KING KNS-81 INTEGRATED NAVIGATION SYSTEM

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight manual when the airplane has been modified by installation of the King KNS-81 Navigation System in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth within this document. Users of this manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The Area Navigation mode may not be used as a primary system under IFR conditions except on approved approach procedures, approved airways, and random area navigation routes when approved by Air Traffic Control.

2. The Area Navigation and VOR-PAR modes can only be used with colocated facilities (VOR and DME signals originate from the same geographical location).

3. VOR or VOR-PAR modes must be selected when flying directly to or from a VORTAC facility.

EMERGENCY PROCEDURES

CAUTION

DME may unlock due to loss of signal with certain combinations of distance from station, altitude and angle of bank.

1. If NAV flag appears while in the Area Navigation mode, use CHK button to check for validity of raw DME and VOR data.

2. If VOR or DME equipment is intermittent or lost, utilize other navigation equipment as required.

3. If NAV flag appears and/or DME information is lost during an approach, execute published missed approach and utilize another approved facility.

NORMAL PROCEDURES

PREFLIGHT

AREA NAVIGATION FUNCTIONAL TEST

The following procedure applies only to airports equipped with, or in range of, a colocated VOR/DME station.

1. Place the KNS-81 in VOR mode.

2. Find and record the angle from the VOR station by centering the course deviation needle with the TO/FROM flag giving a "FROM" indication.

3. Program a waypoint radial angle equal to the OBS value determined in Step 2.

4. Program a waypoint distance equal to the indicated DME value.

5. Place the KNS-81 in RNAV.

The KNS-81 is operating properly if the distance to waypoint is 0 + 1.0 NM and the course deviation needle is within a dot of being centered.

PROGRAMMING

Pertinent information (waypoint number, station frequency, waypoint radial, and waypoint distance) can be entered into the memory. Programming may be completed prior to takeoff or during the flight. Any combination of navigational facilities (RNAV waypoint, VOR/DME, ILS) may be loaded into the computer; however, it is desirable that each facility be numbered and loaded in the sequence it is to be used.

RNAV WAYPOINTS

1. Turn the system on by rotating the ON/OFF switch clockwise.

2. Put waypoint 1 in the WPT window by turning the WPT knob. Turn the knob in either direction to get "1".

3. Select the waypoint 1 frequency using the data input controls which are the two concentric knobs on the right.

4. Select the waypoint 1 radial by depressing the DATA button. This will move the >< (caret) from FRQ to RAD. Select the new radial with the data input controls.

5. Select the waypoint 1 distance by again depressing the DATA button. This will move the >< from RAD to DST. Select the new distance with the data input controls.

6. This completes the programming for the first waypoint. Follow these procedures for all selected waypoints.

CONVENTIONAL VOR

1. The programming technique for conventional navigation directly toward or away from a VOR facility without a colocated DME is similar to that for RNAV waypoints. Putting the waypoint number and frequency into the memory is accomplished in the same manner. The RAD and DST displays will display dashes during VOR and VOR-PAR operation.

ILS APPROACH (Front course and Back course)

1. Programming an ILS approach is accomplished in the same manner as programming conventional VOR.

MISSED APPROACH

1. If the published missed approach utilizes an RNAV waypoint or VOR facility, it may be entered into the memory any time prior to the approach. This is accomplished in the same manner set forth in CONVENTIONAL VOR and RNAV WAYPOINTS in this section.

INFLIGHT

1. Preset waypoints may be recalled from memory and put into active use as required.

Turn the WPT knob as required to select the desired waypoint. The preset waypoint number, frequency, radial and distance will appear in their respective displays. The WPT display will blink to indicate that the waypoint displayed is other than the active waypoint.

2. Verify that the data is correct.

NOTE

Revisions to the waypoint data can be programmed at this time by entering the new waypoint parameters.

3. When return to the active waypoint is desired press the RTN button. The active waypoint along with its data will be displayed.

4. When navigation to the displayed (blinking WPT) waypoint is desired, press the USE button. The WPT display will cease blinking and the displayed waypoint becomes the active waypoint.

5. The raw VOR & DME data can be checked at any time by pressing the CHK button. The radial from the VOR will be displayed above RAD and the DME distance will be displayed above DST.

RNAV OPERATION

If the system is receiving valid signals from a colocated VOR-DME facility, it will supply linear deviation information to the Horizontal Situation Indicator (or Course Deviation Indicator). Enroute (RNAV) sensitivity, available by turning the MODE selector knob until RNAV is displayed, provides a constant course width of ± 5 NM full scale.

Approach (RNAV-APR) sensitivity, available by turning the MODE selector knob until RNAV-APR is displayed, provides a constant course width of ± 1 1/4 NM full scale. Approach sensitivity should be selected just prior to final approach course interception. Time and distance to the waypoint, and computed groundspeed are displayed on the DME display.

CONVENTIONAL VOR OPERATION

VOR or VOR-PAR modes are selected by turning the MODE selector knob until VOR or VOR-PAR is displayed. In VOR mode the remote DME is automatically tuned when the KNS-81 is selected as the tuning source. Upon lock-on, distance, groundspeed and time to the VORTAC station will be displayed on the DME display. The HSI (CDI) will display conventional angular crosstrack deviation from the selected course ($\pm 10^\circ$ full scale). In VOR-PAR mode, operation is identical to VOR except the HSI (CDI) will display crosstrack deviation of ±5 NM full scale from the selected course. Course width will be constant irrespective of distance from the VORTAC.

Anytime the RAD button is engaged, the radial from the waypoint/station will be displayed on the DME knots display along with an "F" on the DME time to station display.

NOTE

The RAD switch is not the momentary type, therefore, the switch must be pressed again for the normal DME information to be displayed.

ILS OPERATION

Whenever an ILS Frequency is put "IN USE" the mode display will remain the same (either VOR, VOR-PAR, RNAV, RNAV-APR displayed) but the RAD & DST displays will be blanked. Absence of the LOC/GS functions is annunciated by the NAV and GS flags in the HSI (CDI). Only angular deviation is provided in the ILS Mode.

RNAV APPROACH

The RNAV Approach (RNAV-APR) mode may be used for runway location (by placing a waypoint at the approach end of the runway) during an approach to an airport. Turn the MODE selector knob to select RNAV-APR. In RNAV-APR the deviation needle on the HSI (CDI) will display crosstrack deviation of ± 1 1/4 NM full scale. All other aspects of the RNAV-APR mode are identical to the RNAV mode.

PERFORMANCE - No change

WEIGHT AND BALANCE - No change

SYSTEM DESCRIPTION

The King KNS-81 is an integrated navigation system combining a 200 channel VOR/Localizer receiver, a 40 channel glideslope receiver and a digital RNAV computer with a capability of preselection and storage of 9, or on later models 10, VOR/LOC frequencies and equivalent sets of RNAV waypoint parameters. A DME System must be used in conjunction with the KNS-81.

The KNS-81 can be operated in any one of three basic modes: VOR, RNAV, or ILS. To change from one mode to another the rotary MODE selector knob on the left side of the panel is rotated, except that the ILS Mode is entered automatically whenever an ILS frequency is channeled as the ACTIVE frequency. The display will annunciate the mode by lighting a message beside the WPT display, except in the ILS mode in which case the RAD & DST displays are blanked to denote the ILS mode. In addition to the standard VOR & RNAV enroute (RNAV) modes, the KNS-81 has a constant course width or parallel VOR mode (VOR-PAR) and an RNAV approach mode (RNAV-APR). The same rotary MODE selector knob is used to place the unit in either of these secondary modes.

All waypoint information (station frequency, waypoint distance and waypoint radial) is entered with the increment/decrement rotary switch on the right side of the panel and displayed in their respective displays. The small knob affects the least significant digits while the large knob changes the most significant digits. The tenth's position of waypoint radial and distance can be changed by pulling the small knob to the out position. The type of data being selected is indicated by the illuminated carets (><) located by either FRQ, RAD or DST. Frequency, radial or distance information for a waypoint can be selected sequentially by pressing the DATA push button. The increment/decrement switch changes only the information being displayed with the carets.

The KNS-81 can store frequency, radial and distance information for up to nine waypoints. The waypoint number of the data being displayed is located above the message WPT. This waypoint number is changed by rotating the WPT selector knob (small center knob) on the left side of the panel. If the waypoint in use is different from the displayed Waypoint (WPT blinking), pressing the USE button will cause the displayed WPT to become the waypoint in use.

DISPLAYS

1. FRQ, RAD, DST Display

   a. FRQ Display

      Displays frequency from 108.00 to 117.95 MHz in increments of .05 MHz. Least significant digit displays only zero or five.

   b. RAD Display

      Displays ground station radial on which waypoint is located from 0.0 to 359.9 degrees.

   c. DST Display

      Displays the offset distance of the waypoint from the ground station over a range of 0.0 to 199.9 NM.

2. VOR, PAR, RNAV, RNAV-APR Displays

   System mode lights

3. WPT Display

   Displays waypoint number of data being displayed.

4. Carets (><) Display

   Indicates which waypoint data (FRQ, RAD or DST) the increment/decrement rotary switch will change.

5. DME Indicator (Remote)

   Displays NM to/from the waypoint/station, KT ground speed and MIN time to the waypoint/station. Also, the waypoint radial is displayed whenever the KNS-81 RAD Button is pressed.

6. RMI Display (Optional)

   Displays the bearing to the waypoint/station.

CONTROLS

1. WPT/MODE Control

   Dual concentric knobs.

   a. The outer knob selects the MODE of unit operation. Turning the knob clockwise causes the mode to sequence thru VOR, VOR-PAR, RNAV, RNAV-APR and then back to the VOR mode.

   b. The center knob selects the WPT to be displayed. Turning the knob causes the displayed waypoint to increment by one thru the waypoint sequence of 1, 2, ... 8, 9, 1, or, on later models, 0, 1 . . . . 8, 9, 0.

2. USE Button

   Momentary pushbutton which, when pressed, causes the active waypoint to take on the same value as the displayed waypoint.

3. RTN Button

   Momentary pushbutton which, when pressed, causes the active waypoint to return to the display.

4. RAD Button

   Push-on, push-off button which, when pushed on, causes the radial from the waypoint and "F" to be displayed on the remote DME display.

5. CHK Button

Momentary pushbutton which, when pressed, causes the raw data from the NAV Receiver and DME to be displayed. The radial from the VOR Ground Station will be displayed on the RAD display and the distance from the station will be displayed on the DST display. There is no effect on any other data output.

6. DATA Button

Momentary pushbutton which, when pressed, causes the caret (><) display to change from FRQ to RAD to DST and back to FRQ.

7. OFF/PULL ID Control

ON/OFF/Pull ID Control

Rotary switch/potentiometer which, when turned clockwise, applies power to the KNS-81 and increases NAV audio level. The switch may be pulled out to hear VOR ident.

8. DATA INPUT Control

Dual concentric knobs with the center knob having an "in" and "out" position.

a. Frequency Data

The outer knob varies the 1 MHz and 10 MHz digits and the center knob varies the frequency in .05 MHz increments which carry to/from the .1 MHz digit regardless of whether the switch is in its "in" or "out" position.

b. Radial Data

The outer knob varies the 10 degree digit with a carryover occuring from the tens to hundreds position. The center knob in the "in" position varies the 1 degree digit and in the "out" position varies the 0.1 degree digit.

c. Distance Data

The outer knob varies the 10 NM digit with a carryover occuring from the tens to hundreds place. The center knob in the "in" position varies the 1 NM digit and in the "out" position varies the 0.1 NM digit.

HANDLING, SERVICE AND MAINTENANCE - No change

Approved:

For W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT BONANZA A36 (E-1946, E-2104, E-2111 and after) AND B36TC LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

28-VOLT ELECTROTHERMAL PROPELLER DEICE

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane is equipped with a 28-Volt Electrothermal Propeller Deice System that has been installed in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. Do not operate the system unless engine is operating.

2. This system must be OFF when using the magnetic compass.

PLACARDS

B36TC (Serials prior to EA-389 except EA-320):

On Glareshield Below Magnetic Compass:

"MAG COMPASS ERRATIC WHEN PROP DEICE IS ON"

A36 (Serials E-1946, E-2104, E-2111 and after) and B36TC (Serials EA-320, EA-389 and after):

On Left Window Post Forward of Pilot:

- CAUTION - MAGNETIC COMPASS IS ERRATIC WHEN PROP DEICE IS ON

EMERGENCY PROCEDURES

LOSS OF ALTERNATOR

Propeller Deice Switch - Off

ABNORMAL READING ON PROPELLER DEICE AMMETER

1. *Zero amps*

   Check propeller deice system switch. If the circuit breaker in the switch has tripped, wait 30 seconds before resetting to the ON position. If the ammeter reads 0, turn the switch OFF, then ON. If the ammeter still reads 0, turn the switch OFF and consider the system inoperative.

2. *Zero to 14 amps*

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

3. *More than 18 amps*

If propeller deice system ammeter occasionally or regularly indicates more than 18 amps, the system should not be operated unless the need for propeller deice is urgent.

NORMAL PROCEDURES

PREFLIGHT

1. With the engine running, place the propeller deice switch in the ON position.

2. Check propeller deice ammeter for reading of 14 to 18 amps. If the ammeter reads 0 (indicating the system could be in the OFF cycle), turn the switch OFF, then ON. This resets the system. A reading in the green arc indicates the system is operating.

NOTE

The system is designed to cycle on and off in 90-second intervals. After heating for 90 seconds (with the ammeter indicating in the green arc) the system will cycle off for 90 seconds with no load showing on the ammeter.

IN FLIGHT

1. To place the system in operation, move the propeller deice switch to the ON position. The system will function automatically until the switch is turned off.

2. Propeller imbalance may be relieved by varying rpm. Increase rpm briefly and return to desired setting, repeating as necessary.

PERFORMANCE - No Change

SYSTEMS DESCRIPTION

The Electrothermal Propeller Deice system is an option intended for use in the event icing conditions are inadvertently encountered. This airplane is not approved for flight into icing conditions even with anti-ice or deice equipment installed.

Electrothermal boots, cemented to the propeller blades, are heated by the airplane's 28-volt power supply. Two rings on the slip ring assembly mounted on the propeller spinner are contacted by brush blocks to complete the circuit. A circuit-breaker-type on/off switch on the subpanel controls the system through an electronic timer which cycles the system for 90-second intervals of operation. A green arc on the propeller deice ammeter provides a range of normal operation while the system is heating the blades in the ON cycle. Between heat cycles (while in the OFF cycle), the ammeter needle will indicate a no-load condition. If icing is suspected, the system should be turned on and left on until it is certain the icing areas have been evaded. On the ground, the system should not be turned on unless the engine is running.

Approved: Donald H Peter

for W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT BONANZA A36
(E-1946, E-2104, E-2111 AND AFTER)
AND
BEECHCRAFT BONANZA B36TC
(EA-320, EA-389 AND AFTER)
LANDPLANES
PILOT'S OPERATING HANDBOOK AND FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

STANDBY GENERATOR POWER SYSTEM
(28-Volt Electrical System)

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by the Standby Generator Power System (28-Volt Electrical System) in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

The system is to be used only in the event of an alternator failure.

Maintain a minimum of 2300 rpm during system operation.

1. Following loss of electrical power from the alternator, Battery and Alternator Switches - OFF

2. Standby Generator Switch - RESET then RELEASE TO ON

3. Bus Voltmeter - CHECK VOLTAGE

   a. If Bus Voltmeter reads 28 Volts, Standby Generator is in operation and powers the standby bus. The following equipment may be operated:

      1) Engine Instruments and Fuel Gages

         (Auxiliary fuel pump will not be operative if the standby generator system is in operation.)

      2) Electric Turn Coordinator
      3) Transponder (If installed)
      4) Audio Amplifier (if installed)
      5) NAV/COMM I or NAV/COMM II
      6) Bus Voltmeter
      7) One glareshield flood light
      8) Clock
      9) Landing Gear Position Lights
      10) LOW BUS VOLTS Annunciator (bus voltmeter should indicate above 25 volts)

(Failure of any one instrument indicates a malfunction in that system only.)

NOTE

If an electric compass system is installed and the Standby Generator System is in operation, no directional gyro indication will be available unless an air-driven directional gyro is also installed.

b. If Bus Voltmeter reads 24 volts or less:

   1) Repeat steps 1, 2, & 3.
   2) If bus voltage still reads 24 volts or less, leave the Standby Generator switch in the ON position. (The battery will power instruments on the standby bus.)
   3) Reduce electrical load to conserve battery power.

c. NAV/COMM Switch - SELECT NAV/COMM I or NAV/COMM II

d. NAV I and COMM I Circuit Breakers - CHECK SET

NOTE

When Standby Generator is in operation, COMM I circuit breaker powers COMM radio selected and NAV I circuit breaker powers NAV radio selected.

4. Land as soon as practical.

NOTE

Manual extension of the landing gear may be necessary, depending upon battery condition. The battery switch may be turned on momentarily to extend the landing gear and flaps.

a. With Standby Generator ON or failed, extend landing gear as follows:

1) Battery Switch - TURN ON MOMENTARILY
2) Gear and Flaps - EXTEND (check position lights)
3) Battery Switch - OFF

NORMAL PROCEDURES

In the BEFORE TAKE-OFF check list, the standby generator TEST procedure follows the magneto check:

1. Throttle - 2300 rpm

2. Battery and Alternator Switches - OFF

3. Standby Generator Switch - ON (The bus voltmeter should indicate 24 volts.)

4. Standby Generator Switch - RESET MOMENTARILY, THEN RELEASE TO ON POSITION (The bus voltmeter should indicate 28 volts.)

5. Standby Generator Switch - OFF

6. Battery and Alternator Switches - ON

PERFORMANCE

No Change

SYSTEMS DESCRIPTION

The standby generator power system provides electrical power to the standby bus in the event of an alternator failure. The standby bus provides power to preselected instruments and lights necessary for continued flight.

A 28-volt, self-exciting, gear-driven standby generator is mounted on the accessory pad on the rear of the engine. This generator is controlled by a spring-loaded, three-position toggle switch, placarded OFF-ON-RESET, located on the instrument panel.

When the standby generator switch is placed in the ON position, battery power only (not standby generator power) is supplied to the standby bus.

When the standby generator switch is momentarily placed in the RESET position, then released to the ON position, the standby generator circuit is activated and the standby bus is energized by power from the standby generator as well as battery power.

System voltage is monitored by a bus voltmeter.

NOTE

> No provision is made for recharging the airplane battery using the Standby Generator Power System.

HANDLING, SERVICING AND MAINTENANCE

No Change

Approved: Donald H Peter

for W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT BONANZA F33A (CE-748, CE-772 and after), F33C (CJ-149 and after), V35B (D-10097, D-10120 and after), A36 (E-1111, E-1241 and after), A36TC (EA-1 thru EA-272 except EA-242), and B36TC (EA-242, EA-273 and after) LANDPLANES

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

STANDBY INSTRUMENT AIR PRESSURE SYSTEM

GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Standby Instrument Air Pressure System during manufacture or by subsequent incorporation of Beech Kit P/N 36-5009, P/N 36-5011, P/N 36-5014, or P/N 36-5015 in accordance with Beech-approved data.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised always to refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

1. The system is to be used only in the event of an instrument air pressure system failure.

2. Do not operate the system unless the engine is running (except in BEFORE STARTING procedures).

EMERGENCY PROCEDURES

SYSTEMS EMERGENCIES

INSTRUMENT AIR PRESSURE SYSTEM FAILURE

If failure of the instrument air pressure system occurs, indication of the failure will be noted by: illumination of either a red GYRO WARN annunciator mounted in the glareshield or a red GYRO WARN light installed in the instrument panel; loss of proper indication on the instrument air pressure gage; and loss of all air-driven gyro instruments. If a failure of the instrument air pressure system occurs:

1. STBY GYRO P Switch (located on pilot's subpanel) - ON. The following will result:

    a. The amber STBY GYRO P annunciator (or STBY GYRO PRESSURE light) will illuminate.
    b. The red GYRO WARN annunciator (or red GYRO WARN light) will extinguish.
    c. The instrument air pressure gage will indicate in the green arc.
    d. The two primary air-driven gyro instruments will resume normal operation.

CAUTION

If instrument air pressure system failure occurs during IFR conditions, land as soon as practical. The flight may be continued to the destination if it can be conducted in VFR conditions. Prior to the next flight, cause of the malfunction should be determined and corrected.

NOTE

When more than two air-driven gyro instruments, radar, or air-driven autopilot gyros are installed, the standby instrument air pressure system isolates additional instruments and radar, thus supplying air flow only to the two primary air-driven instruments.

NORMAL PROCEDURES

BEFORE STARTING

1. STBY GYRO P - CHECK

   a. Battery Switch - ON
   b. GYRO WARN Annunciator (or GYRO WARN light) - CHECK (should be illuminated)
   c. STBY GYRO P Switch - ON
   d. STBY GYRO P Annunciator (or STBY GYRO PRESSURE Light) - CHECK (should be illuminated). GYRO WARN annunciator (or GYRO WARN light) will extinguish.
   e. Instrument Air Pressure Gage - CHECK (should indicate within green arc)
   f. STBY GYRO P Switch - OFF
   g. Battery Switch - OFF

CAUTION

To conserve battery power, do not continue this procedure for more than 10-15 seconds.

PERFORMANCE

No change

WEIGHT AND BALANCE

No change

SYSTEMS DESCRIPTION

STANDBY INSTRUMENT AIR PRESSURE SYSTEM

The standby instrument air pressure system provides sufficient instrument air flow to power two air-driven gyro instruments in the event of an instrument air pressure system failure.

NOTE

> When more than two air-driven gyro instruments, radar, or air-driven autopilot gyros are installed, the standby instrument air pressure system isolates additional instruments and radar, thus supplying air flow only to the two primary air-driven instruments.

The standby instrument air pressure system has a pressure pump driven by an electric motor and incorporates two filters; a pump intake filter and an inline filter. The system is located in the engine compartment.

The standby instrument air pressure system is controlled by an on/off switch, placarded STBY GYRO P, located on the pilot's subpanel. A red GYRO WARN annunciator mounted in the glareshield or a red GYRO WARN light installed in the instrument panel will illuminate if failure of the instrument air pressure system occurs. During system operation, an amber STBY GYRO P annunciator mounted in the glareshield or an amber STBY GYRO P light installed in the instrument panel will be illuminated. Proper operation of the standby instrument air pressure system is monitored on the instrument air pressure gage Pressure should be maintained within the green arc.

NOTE

The standby instrument air pressure system is a backup system only and should not be used as a primary source of instrument air pressure.

HANDLING, SERVICING AND MAINTENANCE

STANDBY INSTRUMENT AIR PRESSURE SYSTEM

The standby instrument air pressure system incorporates two filters, a pump intake filter and an inline filter. The pump intake filter is attached to the keel structure on the underside of the engine and the inline filter is located between the pressure regulator and the instruments. The intake filter and the inline filter should be replaced on condition or every 300 hours. Replace both filters when a new pump is installed. The pressure pump should be replaced every 600 hours of system operation.

Approved: Donald H Vetter

For W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

BEECHCRAFT SERIES 33,35,36,55,58

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

INSIDE CABIN DOOR HANDLE WITH OPEN/ CLOSED PLACARD

THIS SUPPLEMENT IS APPLICABLE TO PILOT'S OPERATING HANDBOOKS AND FAA APPROVED AIRPLANE FLIGHT MANUALS:

(SEE NEXT PAGE FOR APPLICABILITY)

Airplane Serial Number:____________________________

Airplane Registration Number:_______________________

FAA Approved:

W. H. Schultz
Beech Aircraft Corporation
DOA CE-2

This supplement applies to the following Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals:

MODEL	PART NUMBER	A/C SERIALS
35-B33	33-590000-17B	All
35-C33, E33, F33	33-590002-9B	All
35-C33A, E33A, E33C	33-590003-7B	All
F33A, F33C	33-590009-13	CE-674 & after, CJ-129 & after
F33A, F33C	33-590009-15	CE-290 thru CE-673, CJ-26 thru CJ-128
G33	33-590027-3	All
F35	35-590071-13	All
G35	35-590072-9	All
H35	35-590073-15	All
N35, P35	35-590094-7	All
S35-TC	35-590110-3	All
S35	35-590110-11B	All
V35-TC	35-590113-3	All
V35A-TC	35-590116-3	All
V35B-TC	35-590118-23	D-9069 thru D-9947
V35B	35-590118-29	D-9948 & after
V35, V35A, V35B	35-590118-31B	D-7977 thru D-9947
A36	36-590002-17	E-927 thru E-2110 except E-1946 & E-2104
36, A36	36-590002-19C	E-1 thru E-926
A36	36-590002-37	E-1946, E-2104, E-2111 & after
A36-TC	36-590003-3	EA-1 thru EA-272 except EA-242

MODEL	PART NUMBER	A/C SERIALS
B36-TC	36-590006-3	EA-242, EA-273 thru EA-388 except EA-326
B36-TC	36-590006-19	EA-326, EA-389 & after
95-B55B	55-590000-49	All
95-55, 95-A55	55-590000-65B	TC-1 thru TC-501 except TC-350 & TC-371
58, 58A	58-590000-21	TH-773 thru TH-1395 except TH-1389
58, 58A	58-590000-31B	TH-1 thru TH-772
58, 58A	58-590000-35	TH-1389, TH-1396 thru TH-1471, TH-1476, TH-1487,TH-1489, TH-1498
58, 58A	58-590000-39	TH-1472 & after, except TH-1476, TH-1487, TH-1489, TH-1498
E55, E55A	96-590010-17	TE-1084 & after
95-C55, 95-C55A, D55, D55A, E55, E55A	96-590010-29B	TC-350, TE-1 thru TE-942, except TE-938
E55, E55A	96-590010-31	TE-938, TE-943 thru TE-1083
E55, E55A	96-590010-37	TE-1197 only
95-B55, 95-B55A	96-590011-17	TC-2003 & after
95-B55, 95-B55A	96-590011-23	TC-1608 thru TC-2002
95-B55, 95-B55A	96-590011-25	TC-371, TC-502 thru TC-1607
58TC	106-590000-5	TK-1 thru TK-84
58TC, 58TCA	106-590000-19	TK-85 thru TK-150, except TK-147

MODEL	PART NUMBER	A/C SERIALS
58TC, 58TCA	106-590000-21	TK-147, TK-151 & after

CONTENTS

GENERAL

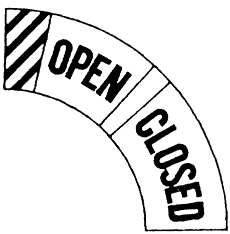
The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane has been modified by installation of the Inside Cabin Door Handle With Open/Closed Placard in accordance with Beech Kit 35-5050.

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

LIMITATIONS

PLACARDS

On inside of Cabin Door Adjacent to Door Handle:



EMERGENCY PROCEDURES

No change.

NORMAL PROCEDURES

BEFORE TAKEOFF

All procedures specified in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for the particular airplane shall be completed. In addition, accomplish the following:

— Doors and Windows - SECURE (Check cabin door lock indicator - CLOSED)

PERFORMANCE

No change.

WEIGHT AND BALANCE

No change.

SYSTEMS DESCRIPTION

DOORS, WINDOWS AND EXITS

CABIN DOOR

The airplane has a conventional cabin door on the forward right side of the fuselage and when closed, the outside cabin door handle is spring loaded to fit into a recess in the door to create 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. Then grasp the door and firmly pull the door closed. Rotate the door handle fully counterclockwise into the locked position. Observe that the door handle indicator is in the CLOSED position. 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.

HANDLING, SERVICING, AND MAINTENANCE

No change.

Raytheon Aircraft

BONANZA® A36 LANDPLANES
(Serials E-2956 and After and Prior Serials Modified by Raytheon Kit No. 36-3020)

BONANZA® B36TC LANDPLANES
(Serials EA-579 and After)

BARON® 58 and 58A LANDPLANE
(Serials TH-1750 and After)

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the

ARTEX ELT 110-4-002 WITH REMOTE COCKPIT SWITCH

(SEE PAGE 2 FOR APPLICABILITY)

Airplane Serial Number: ______________________________

Airplane Registration Number: __________________________

FAA Approved by: A. C. Jackson
A.C. Jackson
Raytheon Aircraft Company
DOA CE-2

This Supplement is applicable to the following Manual(s):

P/N: 36-590002-37
P/N: 36-590006-19
P/N: 58-590000-39

GENERAL

This document is to be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane is equipped with an ARTEX 110-4-002 Emergency Locator Transmitter (ELT) and remote cockpit switch which has been installed in accordance with Raytheon FAA approved data.

This document supersedes or adds to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only where covered in the items contained herein.

LIMITATIONS

No Change

EMERGENCY PROCEDURES

MAXIMUM GLIDE CONFIGURATION (MODELS A36 AND B36TC)

GLIDE (MODEL 58)

After last step in the POH/AFM, add the following:

- ELT Switch - ON, Red Transmit Light Blinking

NORMAL PROCEDURES

PREFLIGHT INSPECTION

RIGHT FUSELAGE

Delete the following step:

- Emergency Locator Transmitter - ARMED

BEFORE STARTING

Add the following step:

- ELT Switch - ARM, Transmit Light Extinguished

PERFORMANCE

No Change

WEIGHT AND BALANCE/EQUIPMENT LIST

No Change

SYSTEMS DESCRIPTION

The ARTEX 110-4-002 Emergency Locator Transmitter (ELT) System is designed to meet the requirements of TSO C91a. The system consists of the ELT transmitter, located in the aft fuselage area, an antenna mounted on the aft fuselage, and a remote switch with a red transmit light, usually located on the right side of the instrument panel. Neither the remote switch, nor the switch on the ELT transmitter, can be positioned to prevent the automatic activation of the ELT transmitter. The system is independent from other airplane systems except for the transmit light which is hot-wired to the airplane battery.

The ELT will automatically activate during a crash and transmit a sweeping tone on 121.5 and 243.0 MHz. This activation is independent of the remote switch setting or availability of airplane power. The remote switch is installed to perform the following functions:

- Test the ELT.
- Deactivate the ELT if it has been inadvertently activated by the "G" switch.
- Activate the ELT in an in-flight emergency if an off-airport landing is anticipated.
- Activate the ELT after an off-airport landing, if the impact did not automatically activate it.

The ELT should be tested every twelve months. The test consists of turning the unit on and then resetting it using the following procedures.

- Tests should be conducted between the times of on-the-hour until 5 minutes after the hour.
- Notify any nearby control towers.
- Provide power to an airplane radio and tune it to 121.5 MHz.
- Place the ELT remote switch to ON. Wait for at least 3 sweeping tones on the airplane radio, which will take about 1 second, then return the switch to ARM.
- The test is successful if the sweeping tones are heard and the transmit light next to the switch blinks immediately. If there is a delay in the illumination of the transmit light, the system is not working properly.

If the ELT should be inadvertently activated by the "G" switch, the transmit light next to the switch will blink. The ELT can be deactivated by momentarily placing the remote switch ON and then back to ARM.

HANDLING, SERVICING AND MAINTENANCE

No Change

Marsh Aviation Co.
5060 E. Falcon Dr.
Mesa, Arizona 85215
Supplement #HPA36-2

PILOT'S OPERATING HANDBOOK
and
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
to the
RAYTHEON A36, G36 BONANZA POH & FAA APPROVED AFM
(IO-550 engine)

Hartzell PHC-C3YF-1RF/F8468A (B,K)-6R propeller installation

REVISION C, January 5, 2006

Aircraft S/N: __________ Aircraft Reg. No: __________

General

This supplement must be attached to the FAA Approved Airplane Flight Manual when the airplane is modified by the installation of a Hartzell PHC-C3YF-1RF/F8468A(B,K) – 6R propeller in accordance with STC SA00719LA

The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this supplement, consult the POH & FAA Approved AFM P/N 36-590002-37 or 36-590002-71.

FAA Approved ____________________
Manager, Flight Test Branch ACE-117C
Federal Aviation Administration
Chicago Aircraft Certification Office

Date: JAN 20 2006

Marsh Aviation Co.
5060 E. Falcon Dr.
Mesa, Arizona 85215
Supplement #HPA36-2

PILOT'S OPERATING HANDBOOK
and
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
to the
RAYTHEON A36, G36 BONANZA POH & FAA APPROVED AFM (IO-550 engine)

STC No. SA00719LA

LOG OF PAGES

Revision Number	Page	Date	Description	FAA Approved
Original	1 2 3 4	12-31 1998	Complete Supplement	
A	All	4/6/05	Added G36 Model	
B	1	10/26/05	Added P/N for G36 AFM/POH	
C	1	1/5/06	Corrected P/N for G36 AFM/POH	ACE-117C

Revision denoted by change bar in the left margin
JAN 2 0 2006

Marsh Aviation Co.
5060 E. Falcon Dr.
Mesa, Arizona 85215
Supplement #HPA36-2

PILOT'S OPERATING HANDBOOK
and
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
to the
RAYTHEON A36, G36 BONANZA
POH & FAA APPROVED AFM (IO-550 engine)

STC No. SA00719LA

General Sec-I & Limitations Sec – II

Propeller:	Hartzell	PHC –C3YF-1RF/ F8468A(B,K)-6R
Pitch		High: 36.0 ± 1.0 degrees Low: 13.0 ± 0.2 degrees Measured at 30 inch station
		Maximum Diameter: 80 inches Minimum Diameter: 78 inches
Spinner:		Hartzell A-2295-2(P) and A-2476-7 spinner mounting kit.
Governor:		Woodward D210760 or McCauley C290D3-X/T23

Emergency Procedures Sec-III

No change.

FAA Approved Date: JAN 2 0 2006

Marsh Aviation Co.
5060 E. Falcon Dr.
Mesa, Arizona 85215
Supplement #HPA36-2

PILOT'S OPERATING HANDBOOK
and
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
to the
RAYTHEON A36, G36 BONANZA POH & FAA APPROVED AFM (IO-550 engine)

STC No. SA00719LA

Normal Procedures Sec – IV

No change.

Performance Sec – V
No change.

Weight and Balance/Equipment List Sec – VI
Weight and balance information is contained in the STC Installation Instructions HPA36-1 or HP36-1A, and the Aircraft Equipment List.

Systems Description Sec – VII
Constant speed, 3 blade propeller with aluminum hub and aluminum blades. A full description may be found in Hartzell Manual 115N.

Handling Service and Maintenance Sec – VIII
Refer to Hartzell Manual 115N. Recommended time-between-overhaul may be found in Hartzell Service Letter 61 or Hartzell Manual 113 B.

FAA Approved Date: JAN 2 0 2006

BEECHCRAFT BONANZA A36
(Serials E2104, E2111 AND AFTER)
BEECHCRAFT BONANZA B36TC
(Serials EA-320, EA-440 AND AFTER)

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

for the B&C Specialty Products BC410-1 Standby Alternator System

Airplane Serial Number____________________

Airplane Registration Number_______________

FAA Approved______________________
Ronald K. Rathgeber, Manager
Aircraft Certification Office
Federal Aviation Administration
Wichita, Kansas

LOG OF REVISIONS

Rev	Pg	Description	FAA App'd	Date
0	1-12	Original Release	E. W. Pittman	18 DEC 98
A	1-14	Re-Formatted & Re-Written	[illegible]	4/2/03

Table of Contents

SECTION I - GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) when the airplane has been modified by installation of the BC410-1 Standby Alternator System in accordance with B&C Specialty Products STC No. SA00724WI and STC No. SE00729WI.

The information in this supplement supersedes or adds to the basic POH/AFM only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

SECTION II - LIMITATIONS

The standby alternator is to be used only to back up the primary alternator. Flight shall not be attempted with a primary alternator that is known to be inoperative.

The standby alternator system is limited to 20 amps continuous output.

Transient operations which exceed 20 amps are limited to 5 minutes. Examples of transient operations include gear and flap operations and radio transmissions.

During conditions requiring the standby alternator, a minimum engine speed of 2300 RPM is required for full output.

SECTION III - EMERGENCY PROCEDURES

The following procedures supplement those found in the basic POH/AFM:

GENERAL CONSIDERATIONS

The emergency procedures numbered 1 - 9 below, and found in the A36 and B36TC POH/AFMs, require the primary alternator to be turned off. Since the standby alternator is continually running in the background at a slightly lower voltage than the primary alternator, turning the primary alternator off merely allows the standby alternator to start powering the battery bus. Thus, the standby alternator must be turned off at the same time the primary alternator is turned off when executing the following procedures. If the primary alternator is subsequently turned back on, the standby alternator should also be turned back on. Procedures apply to both the A36 and the B36TC except where noted.

1. ENGINE FAILURE DURING TAKEOFF ROLL (A36)
2. FAILURE, LOSS OF POWER, OR ROUGH RUNNING DURING TAKE-OFF GROUND ROLL (B36TC)
3. ENGINE FIRE IN FLIGHT
4. ENGINE FIRE ON THE GROUND (A36)
5. LANDING WITHOUT POWER
6. LANDING WITH GEAR RETRACTED-WITH POWER
7. STARTER ENGAGED (A36)
8. STARTER ANNUNCIATOR ILLUMINATED (B36TC)
9. ELECTRICAL SMOKE OR FIRE

ALTERNATOR FAILURE (STBY ALT ON Annunciator Illuminated and LOW BUS VOLT Anunciator Illuminated if load > 20 amps)

An inoperative alternator will place the entire electrical operation of the airplane, except engine ignition, on the battery and the standby alternator. An alternator failure will illuminate the STBY ALT ON annunciator to indicate that the standby alternator has automatically started supplying power to the battery bus. If the existing alternator load exceeds approximately 20 amps, the LOW BUS VOLT annunciator may also be illuminated until the load is reduced.

Attempt to reset the primary alternator:

1. Alternator Switch---- OFF MOMENTARILY, THEN ON (to reset the overvoltage relay)

If the STBY ALT ON annunciator extinguishes:

2. Continue to use the primary alternator

If the STBY ALT ON annunciator remains illuminated:

3. Alternator Switch ------------------------- OFF
4. Loadmeter Switch ------------------ STANDBY
5. Throttle and/or Prop Control --- 2300 RPM MINIMUM (for maximum 20 amp output)
6. Electrical Load ---------- REDUCE AS REQUIRED
   a. Loadmeter --- 100% OR LESS WITH 100 AMP ALT (Or) 20 AMPS OR LESS WITH 60 AMP ALT

b. LOW BUS VOLT annunciator - - - - EXTINGUISHED

c. See following table for equipment loads.

LOAD TABLE

Equipment	Nominal Amps
PROP DE-ICE (if installed)	19
Air Conditioning (if installed)	15
Standby Gyro Pressure (if installed)	4
Autopilot (if installed)	7
Rotating Beacon	3
Landing Lights	9
Avionics Stack	7
STROBE Lights	5
PITOT HEAT	5
VENT BLOWER	9
AUX FUEL PUMP	4

7. Loadmeter and Voltmeter and
   LOW BUS VOLT Annunciator --------- MONITOR

NOTE

The LOW BUS VOLT annunciator may illuminate during operations using the standby alternator indicating that the battery bus voltage has dropped below 25 volts. Decrease load as required to extinguish the annunciator.

DUAL ALTERNAOR FAILURE
(LOW BUS VOLT Annunciator Illuminated)

Illumination of the LOW BUS VOLT annunciator with the STBY ALT ON annunciator extinguished indicates a failure of the primary alternator and a failure of the standby alternator to assume the load. It may also merely indicate a failure of the primary alternator's indicating system.

1. Primary Alternator ------------------- CHECK
   a. Loadmeter Switch ----------------- PRIMARY
   b. Loadmeter --------------- CHECK FOR LOAD
   c. Voltmeter ------------------------- CHECK

If the Loadmeter shows a load and the Bus Voltmeter is above 25 volts, a malfunction in the annunciator system is indicated.

2. Continue to use the primary alternator.

If the Loadmeter shows no load and the Bus Voltmeter is below 25 volts, a failure of the primary alternator is indicated *and the standby alternator has failed to assume the load. Attempt to reset the primary alternator as follows:*

3. Alternator Switch -- OFF MOMENTARILY, THEN ON (to reset the overvoltage relay)

If the LOW BUS VOLT annunciator extinguishes:

4. Continue to use the primary alternator

If the Loadmeter continues to show no load and the Bus Voltmeter continues to indicate below 25 volts:

5. Alternator Switch ------------------------ OFF
6. Loadmeter Switch -------------------- STANDBY
7. Standby Alternator Switch ------------ VERIFY ON
8. STBY ALT SENSE and STBY ALT FIELD Circuit Breakers --- VERIFY IN

If circuit breakers are in, the switch is on, and the Loadmeter continues to show no load, failure of the standby alternator is indicated:

9. Standby Alternator Switch ----------------- OFF
10. Battery Power -------------------- CONSERVE
    a. Reduce electrical load as conditions permit
    b. See Load Table in ALTERNATOR FAILURE Procedure in this Section.
11. Land as soon as practical
12. The landing gear may have to be extended manually at the destination depending on battery condition. See

LANDING GEAR MANUAL EXTENSION in Section III of the POH/AFM

SECTION IV - NORMAL PROCEDURES

The following procedures supplement those found in the basic POH/AFM:

BEFORE STARTING

1. Standby Alternator Switch ------------------- ON

STARTING ENGINE USING EXTERNAL POWER UNIT

Before external power is connected to the airplane:

1. Standby Alternator Switch ------------------ OFF

After engine is started and Alternator Switch is turned on:

2. Standby Alternator Switch ------------------- ON

BEFORE TAKEOFF

1. Throttle --------------------------- 2300 RPM
2. Alternator Switch ----------------------- OFF
   a. STBY ALT ON annunciator ----- ILLUMINATED
   b. Loadmeter ---------------------- NO LOAD

NOTE

Depending upon the battery bus voltage, the electrical load may need to be increased (such as turning on the landing and/or taxi lights) to activate the standby alternator.

3. Loadmeter Switch ------------------ STANDBY
4. Alternator Load ----------------------- CHECK
   (Greater than 0, less than 100% or 20 Amps)
5. Bus Voltmeter --------------- APPROX. 26.0 volts
6. Throttle -------------------- 1000 – 1200 RPM
   (LOW BUS VOLT annunciator illuminated)
7. Standby Alternator Switch:
   a. OFF ---- STBY ALT ON annunciator extinguished
   b. ON ------ STBY ALT ON annunciator illuminated
8. Alternator Switch ------------------------- ON
   a. STBY ALT ON annunciator ---- EXTINGUISHED
   b. LOW BUS VOLT annunciator -- EXTINGUISHED
9. Loadmeter Switch ------------------ PRIMARY
10. Alternator Load --- VERIFY NORMAL INDICATION

SECTION V - PERFORMANCE

No change.

SECTION VI – WEIGHT AND BALANCE / EQUIPMENT LIST

No Change

SECTION VII – SYSTEMS DESCRIPTION

The Standby Alternator system consists of the following components:

1. Gear-driven 20 amp alternator
2. Controller/Voltage Regulator
3. STBY ALT SENSE and STBY ALT FIELD circuit breakers
4. Control switch, placarded STBY ALT
5. Loadmeter switch placarded PRIMARY - STANDBY - 20A/100% MAX
6. Amber STBY ALT ON annunciator

If the STBY ALT switch is on, the standby alternator will be on and regulated to approximately 26.0 volts. The system will then automatically power the battery bus in the event the primary alternator fails and/or the battery bus voltage drops below 26 volts. System activation is controlled by the standby alternator controller which monitors the battery bus voltage. The automatic switching from the primary alternator to the standby alternator will be indicated by the illumination of the amber STBY ALT ON annunciator. The primary alternator switch should be placed to the OFF position when the standby alternator is operating. If the existing electrical load is small, such as may occur during the preflight check, automatic switching of the standby alternator may be delayed until the battery voltage drops below 26 volts. Increasing the load, such a turning on the taxi or landing lights, will facilitate the lowering of the battery voltage allowing the standby alternator to power the battery bus more quickly.

The LOW BUS VOLT annunciator may be illuminated during the operation of the Standby Alternator. The illumination is a function of engine speed, the load on the standby alternator, and ambient conditions within the standby alternator. Maintaining an engine speed of 2300 RPM or more, and a standby alternator load of 20 amps or less, will normally keep the annunciator extinguished.

The standby alternator load may be monitored by placing the Loadmeter switch to STANDBY. On airplanes equipped with a 100 amp primary alternator, the maximum output of 20 amps will be indicated as 100% on the loadmeter. On airplanes equipped with a 60 amp primary alternator, the output of the standby alternator may be read in amps directly from the loadmeter, e.g. a 20 amp output will indicate 20 on the loadmeter.

Output voltage of the standby alternator will be indicated on the BUS VOLTS meter and will indicate approximately 26.0 volts with the engine RPM at 2300 RPM or above. If voltage drops below 25 volts, the electrical load should be checked and reduced if above the 20 amp limit. The standby alternator is capable of outputs greater than 20 amps for up to 5 minutes. Extended operation above 20 amps may cause immediate or premature alternator failure and depletion of the battery reserve.

SECTION VIII - HANDLING, SERVICE AND MAINTENANCE

No change.

SECTION IX - SUPPLEMENTS

Place this document in the POH/AFM supplements section.

SECTION X
SAFETY INFORMATION
TABLE OF CONTENTS

SUBJECT *PAGE*

SECTION X
SAFETY INFORMATION
TABLE OF CONTENTS (Continued)

SUBJECT *PAGE*

INTRODUCTION

Beech Aircraft Corporation has developed this special summary publication of safety information to refresh pilots' and owners' knowledge of safety related subjects. Topics in this publication are dealt with in more detail in FAA Advisory Circulars and other publications pertaining to the subject of safe flying.

The skilled pilot recognizes that safety consciousness is an integral - and never-ending - part of his or her job. Be thoroughly familiar with your airplane. Know its limitations and your own. Maintain your currency, or fly with a qualified instructor until you are current and proficient. Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action can be accomplished without reference to the manual. Periodically review this safety information as part of your recurrency training regimen.

BEECHCRAFT airplanes are designed and built to provide you with many years of safe and efficient transportation. By maintaining your BEECHCRAFT properly and flying it prudently you will realize its full potential.

. . . . Beech Aircraft Corporation

WARNING

Because your airplane is a high performance, high speed transportation vehicle, designed for operation in a three-dimensional environment, special safety precautions must be observed to reduce the risk of fatal or serious injuries to the pilot(s) and occupant(s).

It is mandatory that you fully understand the contents of this publication and the other operating and maintenance manuals which accompany the airplane; that FAA requirements for ratings, certifications and review be scrupulously complied with; and that you allow only persons who are properly licensed and rated, and thoroughly familiar with the contents of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual to operate the airplane.

IMPROPER OPERATION OR MAINTENANCE OF AN AIRPLANE, NO MATTER HOW WELL BUILT INITIALLY, CAN RESULT IN CONSIDERABLE DAMAGE OR TOTAL DESTRUCTION OF THE AIRPLANE, ALONG WITH SERIOUS OR FATAL INJURIES TO ALL OCCUPANTS.

GENERAL

As a pilot, you are responsible to yourself and to those who fly with you, to other pilots and their passengers and to people on the ground, to fly wisely and safely.

The following material in this Safety Information publication covers several subjects in limited detail. Here are some condensed Do's and Don'ts.

DO'S

Be thoroughly familiar with your airplane, know its limitations and your own.

Be current in your airplane, or fly with a qualified instructor until you are current. Practice until you are proficient.

Preplan all aspects of your flight - including a proper weather briefing and adequate fuel reserves.

Use services available - weather briefing, inflight weather and Flight Service Station.

Carefully preflight your airplane.

Use the approved checklist.

Have more than enough fuel for takeoff, plus the trip, and an adequate reserve.

Be sure your weight and C.G. are within limits.

Use seatbelts and shoulder harnesses at all times.

Be sure all loose articles and baggage are secured.

Check freedom and proper direction of operation of all controls during preflight inspection.

Maintain the prescribed airspeeds in takeoff, climb, descent, and landing.

Avoid wake turbulence (Vortices).

Preplan fuel and fuel tank management before the actual flight. Utilize auxiliary tanks only in level cruise flight. Take off and land on the fullest main tank, NEVER use auxiliary tanks for takeoff or landing.

Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action can be accomplished without reference to the manual.

Keep your airplane in good mechanical condition.

Stay informed and alert; fly in a sensible manner.

DON'TS

Don't take off with frost, ice or snow on the airplane.

Don't take off with less than minimum recommended fuel, plus adequate reserves, and don't run the tank dry before switching.

Don't fly in a reckless, show-off, or careless manner.

Don't fly into thunderstorms or severe weather.

Don't fly in possible icing conditions.

Don't fly close to mountainous terrain.

Don't apply controls abruptly or with high forces that could exceed design loads of the airplane.

Don't fly into weather conditions that are beyond your ratings or current proficiency.

Don't fly when physically or mentally exhausted or below par.

Don't trust to luck.

SOURCES OF INFORMATION

There is a wealth of information available to the pilot created for the sole purpose of making your flying safer, easier and more efficient. Take advantage of this knowledge and be prepared for an emergency in the event that one should occur.

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

You must be thoroughly familiar with the contents of your operating manuals, placards, and check lists to ensure safe utilization of your airplane. When the airplane was manufactured, it was equipped with one or more of the following: placards, Owner's Manual, FAA Approved Airplane Flight Manual, FAA Approved Airplane Flight Manual Supplements, Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Beech has revised and reissued many of the early manuals for certain models of airplanes in GAMA Standard Format as Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals. For simplicity and convenience, all official manuals in various models are referred to as the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If the airplane has changed ownership, the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual may have been misplaced or may not be current. Replacement handbooks may be obtained from any BEECHCRAFT Authorized Outlet.

BEECHCRAFT SERVICE PUBLICATIONS

Beech Aircraft Corporation publishes a wide variety of manuals, service letters, service instructions, service bulletins, safety communiques and other publications for the various models of BEECHCRAFT airplanes. Information on how to obtain publications relating to your airplane is contained in BEECHCRAFT Service Bulletin number 2001, entitled "General - BEECHCRAFT Service Publications - What is Available and How to Obtain It."

Beech Aircraft Corporation automatically mails original issues and revisions of BEECHCRAFT Service Bulletins (Mandatory, Recommended and Optional), FAA Approved Airplane Flight Manual Supplements, reissues and revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owners Manuals, Pilot's Operating Manuals and Pilot's Operating Handbooks, and original issues and revisions of BEECHCRAFT Safety Communiques to BEECHCRAFT Owner addresses as listed by the FAA Aircraft Registration Branch List and the BEECHCRAFT International Owner Notification Service List. While this information is distributed by Beech Aircraft Corporation, Beech can not make changes in the name or address furnished by the FAA. The owner must contact the FAA regarding any changes to name or address. Their address is: FAA Aircraft Registration Branch (AAC250) P.O. Box 25082, Oklahoma City, OK 73125, Phone (405) 680-2131.

It is the responsibility of the FAA owner of record to ensure that any mailings from Beech are forwarded to the proper persons. Often the FAA registered owner is a bank or financing company or an individual not in possession of the airplane. Also, when an airplane is sold, there is a lag in processing the change in registration with the FAA. If you are a new owner, contact your BEECHCRAFT Authorized Outlet and ensure your manuals are up to date.

Beech Aircraft Corporation provides a subscription service which provides for direct factory mailing of BEECHCRAFT publications applicable to a specific serial number airplane. Details concerning the fees and ordering information for this owner subscription service are contained in Service Bulletin number 2001.

For owners who choose not to apply for a Publications Revision Subscription Service, Beech provides a free Owner Notification Service by which owners are notified by post card of BEECHCRAFT manual reissues, revisions and supplements which are being issued applicable to the airplane owned. On receipt of such notification, the owner may obtain the publication through a BEECHCRAFT Authorized Outlet. This notification service is available when requested by the owner. This request may be made by using the owner notification request card furnished with the loose equipment of each airplane at the time of delivery, or by a letter requesting this service, referencing the specific airplane serial number owned. Write to:

Supervisor, Special Services
Dept. 52
Beech Aircraft Corporation
P.O. Box 85
Wichita, Kansas 67201-0085

From time to time Beech Aircraft Corporation issues BEECHCRAFT Safety Communiques dealing with the safe operation of a specific series of airplanes, or airplanes in general. It is recommended that each owner/operator maintain a current file of these publications. Back issues of BEECHCRAFT Safety Communiques may be obtained without charge by sending a request, including airplane model and serial number, to the Supervisor, Special Services, at the address listed above.

Airworthiness Directives (AD's) are not issued by the manufacturer. They are issued and available from the FAA.

FEDERAL AVIATION REGULATIONS

FAR Part 91, General Operating and Flight Rules, is a document of law governing operation of airplanes and the owner's and pilot's responsibilities. Some of the subjects covered are:

Responsibilities and authority of the pilot-in-command
Certificates required
Liquor and drugs
Flight plans
Preflight action
Fuel requirements
Flight rules
Maintenance, preventive maintenance, alterations, inspection and maintenance records

You, as a pilot, have responsibilities under government regulations. The regulations are designed for your protection and the protection of your passengers and the public. Compliance is mandatory.

AIRWORTHINESS DIRECTIVES

FAR Part 39 specifies that no person may operate a product to which an Airworthiness Directive issued by the FAA applies, except in accordance with the requirements of that Airworthiness Directive.

AIRMAN'S INFORMATION MANUAL

The Airman's Information Manual (AIM) is designed to provide airmen with basic flight information and ATC procedures for use in the national airspace system of the United States. It also contains items of interest to pilots concerning health and medical facts, factors affecting flight safety, a pilot/controller glossary of terms in the Air Traffic Control system, information on safety, and accident/hazard reporting. It is revised at six-month intervals and can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

This document contains a wealth of pilot information. Among the subjects are:

Controlled Airspace
Emergency Procedures
Services Available to Pilots
Weather and Icing
Radio Phraseology and Technique
Mountain Flying
Airport Operations
Wake Turbulence - Vortices
Clearances and Separations
Medical Facts for Pilots
Preflight
Bird Hazards
Departures - IFR
Good Operating Practices
En route - IFR
Airport Location Directory
Arrival - IFR

All pilots must be thoroughly familiar with and use the information in the AIM.

ADVISORY INFORMATION

NOTAMS (Notices to Airmen) are documents that have information of a time-critical nature that would affect a pilot's decision to make a flight; for example, an airport closed, terminal radar out of service, or enroute navigational aids out of service.

FAA ADVISORY CIRCULARS

The FAA issues Advisory Circulars to inform the aviation public in a systematic way of nonregulatory material of interest. Advisory Circulars contain a wealth of information with which the prudent pilot should be familiar. A complete list of current FAA Advisory Circulars is published in AC 00-2, which lists Advisory Circulars that are for sale, as well as those distributed free of charge by the FAA, and provides ordering information. Many Advisory Circulars which are for sale can be purchased locally in aviation bookstores or at FBO's. These documents are subject to periodic revision. Be certain the Advisory Circular you are using is the latest revision available. Some of the Advisory Circulars of interest to pilots are:

***00-6**	Aviation Weather
00-24	Thunderstorms
00-30	Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence
***00-45**	Aviation Weather Services
00-46	Aviation Safety Reporting Program
20-5	Plane Sense
20-32	Carbon Monoxide (CO) Contamination in Aircraft - Detection and Prevention
20-35	Tie-Down Sense
20-43	Aircraft Fuel Control
20-105	Engine Power-Loss Accident Prevention
20-113	Pilot Precautions and Procedures to be Taken in Preventing Aircraft Reciprocating Engine Induction System & Fuel System Icing Problems
20-125	Water in Aviation Fuel

21-4	Special Flight Permits for Operation of Overweight Aircraft
43-9	Maintenance Records: General Aviation Aircraft
43-12	Preventive Maintenance
60-4	Pilot's Spatial Disorientation
60-6	Airplane Flight Manuals (AFM), Approved Manual Materials, Markings and Placards - Airplanes
60-12	Availability of Industry-Developed Guidelines for the Conduct of the Biennial Flight Review
60-13	The Accident Prevention Counselor Program
*61-9	Pilot Transition Courses for Complex Single-Engine and Light Twin-Engine Airplanes
*61-21	Flight Training Handbook
*61-23	Pilot's Handbook of Aeronautical Knowledge
*61-27	Instrument Flying Handbook
61-67	Hazards Associated with Spins in Airplanes Prohibited from Intentional Spinning.
61-84	Role of Preflight Preparation
*67-2	Medical Handbook for Pilots
90-23	Aircraft Wake Turbulence
90-42	Traffic Advisory Practices at Nontower Airports

90-48	Pilot's Role in Collision Avoidance
90-66	Recommended Standard Traffic Patterns for Airplane Operations at Uncontrolled Airports
90-85	Severe Weather Avoidance Plan (SWAP)
91-6	Water, Slush and Snow on the Runway
91-13	Cold Weather Operation of Aircraft
*91-23	Pilot's Weight and Balance Handbook
91-26	Maintenance and Handling of Air Driven Gyroscopic Instruments
91-33	Use of Alternate Grades of Aviation Gasoline for Grade 80/87 and Use of Automotive Gasoline
91-35	Noise, Hearing Damage, and Fatigue in General Aviation Pilots
91-43	Unreliable Airspeed Indications
91-44	Operational and Maintenance Practices for Emergency Locator Transmitters and Receivers
91-46	Gyroscopic Instruments - Good Operating Practices
91-50	Importance of Transponder Operations and Altitude Reporting
91-51	Airplane Deice and Anti-ice Systems
91-59	Inspection and Care of General Aviation Aircraft Exhaust Systems
91-65	Use of Shoulder Harness in Passenger Seats

103-4	Hazards Associated with Sublimation of Solid Carbon Dioxide (Dry Ice) Aboard Aircraft
210-5A	Military Flying Activities

*** For Sale**

FAA GENERAL AVIATION NEWS

FAA General Aviation News is published by the FAA in the interest of flight safety. The magazine is designed to promote safety in the air by calling the attention of general aviation airmen to current technical, regulatory and procedural matters affecting the safe operation of airplanes. FAA General Aviation News is sold on subscription by the Superintendent of Documents, Government Printing Office, Washington D.C., 20402.

FAA ACCIDENT PREVENTION PROGRAM

The FAA assigns accident prevention specialists to each Flight Standards and General Aviation District Office to organize accident prevention program activities. In addition, there are over 3,000 volunteer airmen serving as accident prevention counselors, sharing their technical expertise and professional knowledge with the general aviation community. The FAA conducts seminars and workshops, and distributes invaluable safety information under this program.

Usually the airport manager, the FAA Flight Service Station (FSS), or Fixed Base Operator (FBO), will have a list of accident prevention counselors and their phone numbers available. All Flight Standards and General Aviation District Offices have a list of the counselors serving the District.

Before flying over unfamiliar territory, such as mountainous terrain or desert areas, it is advisable for transient pilots to consult with local counselors. They will be familiar with the more desirable routes, the wind and weather conditions, and the service and emergency landing areas that are available along the way. They can also offer advice on the type of emergency equipment you should be carrying.

ADDITIONAL INFORMATION

The National Transportation Safety Board and the Federal Aviation Administration periodically issue, in greater detail, general aviation pamphlets concerning aviation safety. FAA Regional Offices also publish material under the FAA General Aviation Accident Prevention Program. These can be obtained at FAA Offices, Weather Stations, Flight Service Stations or Airport Facilities. Some of these are titled:

12 Golden Rules for Pilots
Weather or Not
Disorientation
Plane Sense
Weather Info Guide for Pilots
Wake Turbulence
Don't Trust to Luck, Trust to Safety
Rain, Fog, Snow
Thunderstorm - TRW
Icing
Pilot's Weather Briefing Guide
Thunderstorms Don't Flirt ... Skirt 'em
IFR-VFR - Either Way Disorientation Can Be Fatal
IFR Pilot Exam-O-Grams
VFR Pilot Exam-O-Grams
Tips on Engine Operation in Small General Aviation Aircraft
Estimating Inflight Visibility
Is the Aircraft Ready for Flight
Tips on Mountain Flying
Tips on Desert Flying
Always Leave Yourself An Out

Safety Guide for Private Aircraft Owners
Tips on How to Use the Flight Planner
Tips on the Use of Ailerons and Rudder
Some Hard Facts About Soft Landings
Propeller Operation and Care
Torque "What it Means to the Pilot"
Weight and Balance. An Important Safety Consideration for Pilots

GENERAL INFORMATION ON SPECIFIC TOPICS

MAINTENANCE

Safety of flight begins with a well maintained airplane. Make it a habit to keep your airplane and all its equipment in airworthy condition. Keep a "squawk list" on board, and see that all discrepancies, however minor, are noted and promptly corrected.

Schedule your maintenance regularly, and have your airplane serviced by a reputable organization. Be suspicious of bargain prices for maintenance, repair and inspections.

It is the responsibility of the owner and the operator to assure that the airplane is maintained in an airworthy condition and that proper maintenance records are kept.

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

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

Salvaged airplane parts, reworked parts obtained from non-BEECHCRAFT approved sources or parts, components, or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component, or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

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

Airplanes operated for Air Taxi or other than normal operation, and airplanes operated in humid tropics, or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience.

NOTE

> The required periods do not constitute a guarantee that the item will reach the period without malfunction, as the aforementioned factors cannot be controlled by the manufacturer.

Corrosion and its effects must be treated at the earliest possible opportunity. A clean, dry surface is virtually immune to corrosion. Make sure that all drain holes remain unobstructed. Protective films and sealants help to keep corrosive agents from contacting metallic surfaces. Corrosion inspections should be made most frequently under high-corrosion-risk operating conditions, such as in areas of excessive airborne salt concentrations (e.g., near the sea) and in high-humidity areas (e.g., tropical regions).

If you have purchased a used airplane, have your mechanic inspect the airplane registration records, logbooks and maintenance records carefully. An unexplained period of time for which the airplane has been out of service, or unexplained significant repairs may well indicate the airplane has been seriously damaged in a prior accident. Have your mechanics inspect a used airplane carefully. Take the time to ensure that you really know what you are buying when you buy a used airplane.

HAZARDS OF UNAPPROVED MODIFICATIONS

Many airplane modifications are approved under Supplemental Type Certificates (STC's). Before installing an STC on your airplane, check to make sure that the STC does not conflict with other STC's that have already been installed. Because approval of an STC is obtained by the individual STC holder based upon modification of the original type design, it is possible for STC's to interfere with each other when both are installed. Never install an unapproved modification of any type, however innocent the apparent modification may seem. Always obtain proper FAA approval.

Airplane owners and maintenance personnel are particularly cautioned not to make attachments to, or otherwise modify, seats from original certification without approval from the FAA Engineering and Manufacturing District Office having original certification responsibility for that make and model.

Any unapproved attachment or modification to seat structure may increase load factors and metal stress which could cause failure of seat structure at a lesser "G" force than exhibited for original certification.

Examples of unauthorized attachments found are drilling holes in seat tubing to attach fire extinguishers and drilling holes to attach approach plate book bins to seats.

FLIGHT PLANNING

FAR Part 91 requires that each pilot in command, before beginning a flight, familiarize himself with all available information concerning that flight.

Obtain a current and complete preflight briefing. This should consist of local, enroute and destination weather and enroute navaid information. Enroute terrain and obstructions, alternate airports, airport runways active, length of runways, and takeoff and landing distances for the airplane for conditions expected should be known.

The prudent pilot will review his planned enroute track and stations and make a list for quick reference. It is strongly recommended a flight plan be filed with Flight Service Stations, even though the flight may be VFR. Also, advise Flight Service Stations of changes or delays of one hour or more and remember to close the flight plan at destination.

The pilot must be completely familiar with the performance of the airplane and performance data in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. The resultant effect of temperature and pressure altitude must be taken into account in performance if not accounted for on the charts. An applicable FAA Approved Airplane Flight Manual must be aboard the airplane at all times and include the weight and balance forms and equipment list.

PASSENGER INFORMATION CARDS

Beech has available, for most current production airplanes, passenger information cards which contain important information on the proper use of restraint systems, oxygen masks, emergency exits and emergency bracing procedures. Passenger information cards may be obtained at any BEECHCRAFT Authorized Outlet. A pilot should not only be familiar with the information contained in the cards, but should always, prior to flight, inform the passengers of the information contained in the information cards. The pilot should orally brief the passengers on the proper use of restraint systems, doors and emergency exits, and other emergency procedures, as required by Part 91 of the FAR's.

STOWAGE OF ARTICLES

The space between the seat pan and the floor is utilized to provide space for seat displacement. If hard, solid objects are stored beneath seats, the energy absorbing feature is lost and severe spinal injuries can occur to occupants.

Prior to flight, pilots should insure that articles are not stowed beneath seats that would restrict seat pan energy absorption or penetrate the seat in event of a high vertical velocity accident.

FLIGHT OPERATIONS

GENERAL

The pilot MUST be thoroughly familiar with ALL INFORMATION published by the manufacturer concerning the airplane, and is required by law to operate the airplane in accordance with the FAA Approved Airplane Flight Manual and placards installed.

PREFLIGHT INSPECTION

In addition to maintenance inspections and preflight information required by FAR Part 91, a complete, careful preflight inspection is imperative.

Each airplane has a checklist for the preflight inspection which must be followed. USE THE CHECKLIST.

WEIGHT AND BALANCE

Maintaining center of gravity within the approved envelope throughout the planned flight is an important safety consideration.

The airplane must be loaded so as not to exceed the weight and center of gravity (C.G.) limitations. Airplanes that are loaded above the maximum takeoff or landing weight limitations will have an overall lower level of performance compared to that shown in the Performance section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If loaded above maximum takeoff weight, takeoff distance and the landing distance will be longer than that shown in the Performance section; the stalling speed will be higher, rate of climb, the cruising speed, and the range of the airplane at any level of fuel will all be lower than shown in the Performance section.

If an airplane is loaded so that the C.G. is forward of the forward limit, it will require additional control movements for maneuvering the airplane with correspondingly higher control forces. The pilot may have difficulty during takeoff and landing because of the elevator control limits.

If an airplane is loaded aft of the aft C.G. limitation, the pilot will experience a lower level of stability. Airplane characteristics that indicate a lower stability level are; lower control forces, difficulty in trimming the airplane, lower control forces for maneuvering with attendant danger of structural overload, decayed stall characteristics, and a lower level of lateral-directional damping.

Ensure that all cargo and baggage is properly secured before takeoff. A sudden shift in balance at rotation can cause controllability problems.

AUTOPILOTS AND ELECTRIC TRIM SYSTEMS

Because there are several different models of autopilots and electric trim systems installed in Beech airplanes and different installations and switch positions are possible from airplane to airplane, it is essential that every owner/operator review his Airplane Flight Manual (AFM) Supplements and ensure that the supplements properly describe the autopilot and trim installations on his specific airplane. Each pilot, prior to flight, must be fully aware of the proper procedures for operation, and particularly disengagement, for the system as installed.

In addition to ensuring compliance with the autopilot manufacturer's maintenance requirements, all owners/operators should thoroughly familiarize themselves with the operation, function and procedures described in the Airplane Flight Manual Supplements. Ensure a full understanding of the methods of engagement and disengagement of the autopilot and trim systems.

Compare the descriptions and procedures contained in the Supplements to the actual installation in the airplane to ensure that the supplement accurately describes your installation. Test that all buttons, switches and circuit breakers function as described in the Supplements. If they do not function as described, have the system repaired by a qualified service agency. If field service advice or assistance is necessary, contact Beech Aircraft Corporation, Customer Support Department.

As stated in all AFM Supplements for autopilot systems and trim systems installed on Beech airplanes, the preflight check must be conducted before every flight. The preflight check assures not only that the systems and all of their features are operating properly, but also that the pilot, before flight, is familiar with the proper means of engagement and disengagement of the autopilot and trim system.

Autopilot Airplane Flight Manual Supplements caution against trying to override the autopilot system during flight without disengaging the autopilot because the autopilot will continue to trim the airplane and oppose the pilot's actions. This could result in a severely out of trim condition. This is a basic feature of all autopilots with electric trim follow-up.

Do not try to manually override the autopilot during flight.

IN CASE OF EMERGENCY, YOU CAN OVERPOWER THE AUTOPILOT TO CORRECT THE ATTITUDE, BUT THE AUTOPILOT AND ELECTRIC TRIM MUST THEN IMMEDIATELY BE DISENGAGED.

It is often difficult to distinguish an autopilot malfunction from an electric trim system malfunction. The safest course is to deactivate both. Do not re-engage either system until after you have safely landed. Then have the systems checked by a qualified service facility prior to further flight.

Depending upon the installation on your airplane, the following additional methods may be available to disengage the autopilot or electric trim in the event that the autopilot or electric trim does not disengage utilizing the disengage methods specified in the Supplements.

CAUTION

Transient control forces may occur when the autopilot is disengaged.

1. Turn off the autopilot master switch, if installed.
2. Pull the autopilot and trim circuit breaker(s) or turn off the autopilot switch breaker, if installed.
3. Turn off the RADIO MASTER SWITCH, if installed, and if the autopilot system and the trim system are wired through this switch.

CAUTION

Radios, including VHF COMM are also disconnected when the radio master switch is off.

4. Turn off the ELECTRIC MASTER SWITCH.

WARNING

Almost all electrically powered systems will be inoperative. Consult the AFM for further information.

5. Push the GA switch on throttle grip, if installed (depending upon the autopilot system).
6. Push TEST EACH FLT switch on the autopilot controller, if installed.

NOTE

After the autopilot is positively disengaged, it may be necessary to restore other electrical functions. Be sure when the master switches are turned on that the autopilot does not re-engage.

The above ways may or may not be available on your autopilot. It is essential that you read your airplane's AFM SUPPLEMENT for your autopilot system and check each function and operation on your system.

The engagement of the autopilot must be done in accordance with the instructions and procedures contained in the AFM SUPPLEMENT.

Particular attention must be paid to the autopilot settings prior to engagement. If you attempt to engage the autopilot when the airplane is out of trim, a large attitude change may occur.

IT IS ESSENTIAL THAT THE PROCEDURES SET FORTH IN THE APPROVED AFM SUPPLEMENTS FOR YOUR SPECIFIC INSTALLATION BE FOLLOWED BEFORE ENGAGING THE AUTOPILOT.

FLUTTER

Flutter is a phenomenon that can occur when an aerodynamic surface begins vibrating. The energy to sustain the vibration is derived from airflow over the surface. The amplitude of the vibration can (1) decrease, if airspeed is reduced; (2) remain constant, if airspeed is held constant and no failures occur; or (3) increase to the point of self-destruction, especially if airspeed is high and/or is allowed to increase. Flutter can lead to an in-flight break up of the airplane. Airplanes are designed so that flutter will not occur in the normal operating envelope of the airplane as long as the airplane is properly maintained. In the case of any airplane, decreasing the damping and stiffness of the structure or increasing the trailing edge weight of control surfaces will tend to cause flutter. If a combination of those factors is sufficient, flutter can occur within the normal operating envelope.

Owners and operators of airplanes have the primary responsibility for maintaining their airplanes. To fulfill that responsibility, it is imperative that all airplanes receive a thorough preflight inspection. Improper tension on the control cables or any other loose condition in the flight control system can also cause or contribute to flutter. Pilot's should pay particular attention to control surface attachment hardware including tab pushrod attachment during preflight inspection. Looseness of fixed surfaces or movement of control surfaces other than in the normal direction of travel should be rectified before flight. Further, owners should take their airplanes to mechanics who have access to current technical publications and prior experience in properly maintaining that make and model of airplane. The owner should make certain that control cable tension inspections are performed as outlined in the applicable Beech Inspection Guide. Worn control surface attachment hardware must be replaced. Any repainting or repair of a moveable control surface will require a verification of the control surface balance before the airplane is returned to service. Control surface drain holes must be open to prevent freezing of accumulated moisture, which could create an increased trailing-edge-heavy control surface and flutter.

If an excessive vibration, particularly in the control column and rudder pedals, is encountered in flight, this may be the onset of flutter and the procedure to follow is:

1. IMMEDIATELLY REDUCE AIRSPEED (lower the landing gear if necessary).
2. RESTRAIN THE CONTROLS OF THE AIRPLANE UNTIL THE VIBRATION CEASES.
3. FLY AT THE REDUCED AIRSPEED AND LAND AT THE NEAREST SUITABLE AIRPORT.
4. HAVE THE AIRPLANE INSPECTED FOR AIRFRAME DAMAGE, CONTROL SURFACE ATTACHING HARDWARE CONDITION/SECURITY, TRIM TAB FREE PLAY, PROPER CONTROL CABLE TENSION, AND CONTROL SURFACE BALANCE BY ANOTHER MECHANIC WHO IS FULLY QUALIFIED.

TURBULENT WEATHER

A complete and current weather briefing is a requirement for a safe trip.

Updating of weather information enroute is also essential. The wise pilot knows that weather conditions can change quickly, and treats weather forecasting as professional advice, rather than an absolute fact. He obtains all the advice he can, but stays alert to any sign or report of changing conditions.

Plan the flight to avoid areas of reported severe turbulence. It is not always possible to detect individual storm areas or find the in-between clear areas.

The National Weather Service classifies turbulence as follows:

Class of Turbulence	Effect
Extreme	Airplane is violently tossed about and is practically impossible to control. May cause structural damage.
Severe	Airplane may be momentarily out of control. Occupants are thrown violently against the belts and back into the seat. Unsecured objects are tossed about.
Moderate	Occupants require seat belts and occasionally are thrown against the belt. Unsecured objects move about.
Light	Occupants may be required to use seat belts, but objects in the airplane remain at rest.

Thunderstorms, squall lines and violent turbulence should be regarded as extremely dangerous and must be avoided. Hail and tornadic wind velocities can be encountered in thunderstorms that can destroy any airplane, just as tornadoes destroy nearly everything in their path on the ground.

Thunderstorms also pose the possibility of a lightning strike on an airplane. Any structure or equipment which shows evidence of a lightning strike, or of being subjected to a high current flow due to a strike, or is a suspected part of a lightning strike path through the airplane should be thoroughly inspected and any damage repaired prior to additional flight.

A roll cloud ahead of a squall line or thunderstorm is visible evidence of extreme turbulence; however, the absence of a roll cloud should not be interpreted as denoting that severe turbulence is not present.

Even though flight in severe turbulence must be avoided, flight in turbulent air may be encountered unexpectedly under certain conditions.

The following recommendations should be observed for airplane operation in turbulent air:

Flying through turbulent air presents two basic problems, the answer to both of which is proper airspeed. On one hand, if you maintain an excessive airspeed, you run the risk of structural damage or failure; on the other hand, if your airspeed is too low, you may stall.

If turbulence is encountered, reduce speed to the turbulent air penetration speed, if given, or to the maneuvering speed, which is listed in the Limitations section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. These speeds give the best assurance of avoiding excessive stress loads, and at the same time provide the proper margin against inadvertent stalls due to gusts.

Beware of overcontrolling in an attempt to correct for changes in attitude; applying control pressure abruptly will build up G-forces rapidly and could cause structural damage or even failure. You should watch particularly your angle of bank, making turns as wide and shallow as possible. Be equally cautious in applying forward or back pressure to keep the airplane level. Maintain straight and level attitude in either up or down drafts. Use trim sparingly to avoid being grossly out of trim as the vertical air columns change velocity and direction. If necessary to avoid excessive airspeeds, lower the landing gear.

WIND SHEAR

Wind shears are rapid, localized changes in wind direction, which can occur vertically as well as horizontally. Wind shear can be very dangerous to all airplanes, large and small, particularly on approach to landing when airspeeds are slow.

A horizontal wind shear is a sudden change in wind direction or speed that can, for example, transform a headwind into a tailwind, producing a sudden decrease in indicated airspeed because of the inertia of the airplane. A vertical wind shear, is a sudden updraft or downdraft. Microbursts are intense, highly localized severe downdrafts.

The prediction of wind shears is far from an exact science. Monitor your airspeed carefully when flying near storms, particularly on approach. Be mentally prepared to add power and go around at the first indication that a wind shear is being encountered.

WEATHER RADAR

Airborne weather avoidance radar is, as its name implies, for avoiding severe weather--not for penetrating it. Whether to fly into an area of radar echoes depends on echo intensity, spacing between the echoes, and the capabilities of you and your airplane. Remember that weather radar detects only precipitation drops; it does not detect turbulence. Therefore, the radar scope provides no assurance of avoiding turbulence. The radar scope also does not provide assurance of avoiding instrument weather due to clouds and fog. Your scope may be clear between intense echoes; this clear area does not necessarily mean you can fly between the storms and maintain visual sighting of them.

Thunderstorms build and dissipate rapidly. Therefore, do not attempt to plan a course between echoes using ground based radar. The best use of ground radar information is to isolate general areas and coverage of echoes. You must avoid individual storms from in-flight observations either by visual sighting or by airborne radar. It is better to avoid the whole thunderstorm area than to detour around individual storms unless they are scattered.

Remember that while hail always gives a radar echo, it may fall several miles from the nearest visible cloud and hazardous turbulence may extend to as much as 20 miles from the echo edge. Avoid intense or extreme level echoes by at least 20 miles; that is, such echoes should be separated by at least 40 miles before you fly between them. With weaker echoes you can reduce the distance by which you avoid them.

Above all, remember this: never regard any thunderstorm lightly. Even when radar observers report the echoes are of light intensity, avoiding thunderstorms is the best policy. The following are some do's and don'ts of thunderstorm avoidance:

1. Don't land or take off in the face of an approaching thunderstorm. A sudden gust front of low level turbulence could cause loss of control.
2. Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be disastrous.
3. Don't fly without airborne radar into a cloud mass containing scattered embedded thunderstorms. Embedded thunderstorms usually can not be visually circumnavigated.
4. Don't trust visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.

5. Do avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
6. Do circumnavigate the entire area if the area has 6/10 or greater thunderstorm coverage.
7. Do remember that vivid and frequent lightning indicates the probability of a severe thunderstorm.
8. Do regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher, whether the top is visually sighted or determined by radar.

If you cannot avoid penetrating a thunderstorm, the following are some do's BEFORE entering the storm:

9. Tighten your safety belt, put on your shoulder harness, and secure all loose objects.
10. Plan and hold your course to take you through the storm in minimum time.
11. To avoid the most critical icing, establish a penetration altitude below the freezing level or above the level of -15°C.
12. Verify that pitot heat is on and turn on carburetor heat or engine anti-ice. Icing can be rapid at any altitude and cause almost instantaneous power failure and/or loss of airspeed indication.

MOUNTAIN FLYING

Pilots flying in mountainous areas should inform themselves of all aspects of mountain flying, including the effects of topographic features on weather conditions. Many good articles have been published, and a synopsis of mountain flying operations is included in the FAA Airman's Information Manual, Part 1.

Avoid flight at low altitudes over mountainous terrain, particularly near the lee slopes. If the wind velocity near the level of the ridge is in excess of 25 knots and approximately perpendicular to the ridge, mountain wave conditions are likely over and near the lee slopes. If the wind velocity at the level of the ridge exceeds 50 knots, a strong mountain wave is probable with extreme up and down drafts and severe turbulence. The worst turbulence will be encountered in and below the rotor zone, which is usually 8 to 10 miles downwind from the ridge. This zone is sometimes characterized by the presence of "roll clouds" if sufficient moisture is present; altocumulus standing lenticular clouds are also visible signs that a mountain wave exists, but their presence is likewise dependent on moisture. Mountain wave turbulence can, of course, occur in dry air and the absence of such clouds should not be taken as assurance that mountain wave turbulence will not be encountered. A mountain wave downdraft may exceed the climb capability of your airplane. Avoid mountain wave downdrafts.

VFR - LOW CEILINGS

If you are not instrument rated, do not attempt "VFR on Top" or "Special VFR" flight or clearances. Being caught above a solid cloud layer when an emergency descent is required (or at destination) is an extremely hazardous position for the VFR pilot. Accepting a clearance out of airport control zones with no minimum ceiling and one-mile visibility as permitted with "Special VFR" is a foolish practice for the VFR pilot.

Avoid areas of low ceilings and restricted visibility unless you are instrument rated and proficient and have an instrument equipped airplane. Then proceed with caution and with planned alternates.

VFR AT NIGHT

When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain a safe minimum altitude as dictated by terrain, obstacles such as

TV towers, or communities in the area flown. This is especially true in mountainous terrain, where there is usually very little ground reference. Minimum clearance is 2,000 feet above the highest obstacle enroute. Do not depend on your ability to see obstacles in time to miss them. Flight on dark nights over sparsely populated country can be the same as IFR, and must be avoided by inexperienced or non-IFR rated pilots.

VERTIGO - DISORIENTATION

Disorientation can occur in a variety of ways. During flight, inner ear balancing mechanisms are subjected to varied forces not normally experienced on the ground. This, combined with loss of outside visual reference, can cause vertigo. False interpretations (illusions) result, and may confuse the pilot's conception of the attitude and position of his airplane.

Under VFR conditions, the visual sense, using the horizon as a reference, can override the illusions. Under low visibility conditions (night, fog, clouds, haze, etc.) the illusions predominate. Only through awareness of these illusions, and proficiency in instrument flight procedures, can an airplane be operated safely in a low visibility environment.

Flying in fog, dense haze or dust, cloud banks, or very low visibility, with strobe lights or rotating beacons turned on can contribute to vertigo. They should be turned off in these conditions, particularly at night.

All pilots should check the weather and use good judgment in planning flights. The VFR pilot should use extra caution in avoiding low visibility conditions.

Motion sickness often precedes or accompanies disorientation and may further jeopardize the flight.

Disorientation in low visibility conditions is not limited to VFR pilots. Although IFR pilots are trained to look at their instruments to gain an artificial visual reference as a replacement for the loss of a visual horizon, they do not always do so. This can happen when the pilot's physical condition will not permit him to concentrate on his instruments; when the pilot is not proficient in flying instrument conditions in the airplane he is flying; or, when the pilot's work load of flying by reference to his instruments is augmented by such factors as turbulence. Even an instrument rated pilot encountering instrument conditions, intentional or unintentional, should ask himself whether or not he is sufficiently alert and proficient in the airplane he is flying, to fly under low visibility conditions and in the turbulence anticipated or encountered.

If any doubt exists, the flight should not be made or it should be discontinued as soon as possible.

The result of vertigo is loss of control of the airplane. If the loss of control is sustained, it will result in an excessive speed accident. Excessive speed accidents occur in one of two manners, either as an inflight airframe separation or as a high speed ground impact; and they are fatal accidents in either case. All airplanes are subject to this form of accident.

For years, Beech Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals have contained instructions that the landing gear should be extended in any circumstance in which the pilot encounters IFR conditions which approach the limits of his capability or his ratings. Lowering the gear in IFR conditions or flight into heavy or severe turbulence, tends to stabilize the airplane, assists in maintaining proper airspeed, and will substantially reduce the possibility of reaching excessive airspeeds with catastrophic consequences, even where loss of control is experienced.

Excessive speed accidents occur at airspeeds greatly in excess of two operating limitations which are specified in the manuals: Maximum maneuvering speed and the "red line" or "never exceed" speed. Such speed limits are set to protect the structure of an airplane. For example, flight controls are designed to be used to their fullest extent only below the airplane's maximum maneuvering speed. As a result, the control surfaces should never be suddenly or fully deflected above maximum maneuvering speed. Turbulence penetration should not be performed above that speed. The accidents we are discussing here occur at airspeeds greatly in excess of these limitations. No airplane should ever be flown beyond its FAA approved operating limitations.

STALLS, SLOW FLIGHT AND TRAINING

The stall warning system must be kept operational at all times and must not be deactivated by interruption of circuits, circuit breakers, or fuses. Compliance with this requirement is especially important in all high performance single engine airplanes during simulated engine-out practice or stall demonstrations, because the stall speed is critical in all low-speed operation of airplanes.

Training should be accomplished under the supervision of a qualified instructor-pilot, with careful reference to the applicable sections of the FAA Practical Test Standards and FAA Pilot Transition Courses for Complex Single Engine and Light Twin Engine Airplanes (AC 61-9). In particular, observe carefully the warnings in the Practical Test Standards.

SPINS

A major cause of fatal accidents in general aviation airplanes is a spin. Stall demonstrations and practice are a means for a pilot to acquire the skills to recognize when a stall is about to occur and to recover as soon as the first signs of a stall are evident.
If a stall does not occur - A spin cannot occur.

It is important to remember, however, that a stall can occur in any flight attitude, at any airspeed, if controls are misused.

Unless your airplane has been specifically certificated in the aerobatic category and specifically tested for spin recovery characteristics, it is placarded against intentional spins.

The pilot of an airplane placarded against intentional spins should assume that the airplane may become uncontrollable in a spin, since its performance characteristics beyond certain limits specified in the FAA regulations may not have been tested and are unknown. This is why airplanes are placarded against intentional spins, and this is why stall avoidance is your protection against an inadvertent spin.

Pilots are taught that intentional spins are entered by deliberately inducing a yawing moment with the controls as the airplane is stalled. Inadvertent spins result from the same combination - stall plus yaw. That is why it is important to use coordinated controls and to recover at the first indication of a stall when practicing stalls.

Always remember that extra alertness and pilot techniques are required for slow flight maneuvers, including the practice or demonstration of stalls. In addition to the foregoing mandatory procedure, always:

- Be certain that the center of gravity of the airplane is as far forward as possible. Forward C.G. aids stall recovery, spin avoidance and spin recovery. An aft C.G. can create a tendency for a spin to stabilize, which delays recovery.
- Whenever a student pilot will be required to practice slow flight, be certain that the qualified instructor pilot has a full set of operable controls available. FAA regulations prohibit flight instruction without full dual controls.

- Conduct any maneuvers which could possibly result in a spin at altitudes in excess of five thousand (5,000) feet above ground level in clear air only.
- Remember that an airplane, at or near traffic pattern and approach altitudes, cannot recover from a spin, or perhaps even a stall, before impact with the ground. On final approach maintain at least the airspeed shown in the flight manual.
- Remember that if an airplane flown under instrument conditions is permitted to stall or enter a spin, the pilot, without reference to the horizon, is certain to become disoriented. He may be unable to recognize a stall, spin entry, or the spin condition and he may be unable to determine even the direction of the rotation.
- Finally, never forget that stall avoidance is your best protection against an inadvertent spin. MAINTAIN YOUR AIRSPEED.

In airplanes not certificated for aerobatics, spins are prohibited. If a spin is entered inadvertently:

Immediately move the control column full forward and simultaneously apply full rudder opposite to the direction of the spin; continue to hold this position until rotation stops and then neutralize all controls and execute a smooth pullout. Ailerons should be neutral and the throttle in idle position at all times during recovery.

DESCENT

In single engine piston-powered airplanes, supercharged or normally aspirated, it is necessary to avoid prolonged descents with low power, as this produces two problems: (1) excessively cool cylinder head temperatures which cause premature engine wear, and (2) excessively rich mixtures due to idle enrichment (and altitude) which causes soot and lead deposits on the spark plugs (fouling). The second of these is the more serious consideration; the engine may not respond to the throttle when it is desired to discontinue the descent. Both problems are amenable to one solution: maintain adequate power to keep cylinder head temperature in the "green" range during descent, and lean to best power mixture (that is, progressively enrich the mixture from cruise only slightly as altitude decreases). This procedure will lengthen the descent, of course, and requires some advance planning. If it is necessary to make a prolonged descent at or near idle, as in practicing forced landings, at least avoid the problem of fouled spark plugs by frequently advancing the throttle until the engine runs smoothly, and maintain an appropriate mixture setting with altitude. (Refer to pre-landing check list.)

VORTICES - WAKE TURBULENCE

Every airplane generates wakes of turbulence while in flight. Part of this is from the propeller or jet engine, and part from the wing tip vortices. The larger and heavier the airplane, the more pronounced and turbulent the wakes will be. Wing tip vortices from large, heavy airplanes are very severe at close range, degenerating with time, wind and distance. These are rolling in nature, from each wing tip. In tests, vortex velocities of 133 knots have been recorded. Encountering the rolling effect of wing tip vortices within two minutes after passage of large airplanes is most hazardous to light airplanes. This roll effect can exceed the maximum counterroll obtainable in a light airplane. The turbulent areas may remain for as long as three minutes or more, depending on wind conditions, and may extend several miles behind the airplane. Plan to fly slightly above and to the windward side of other airplanes. Because of the wide variety of conditions that can be encountered, there is no set rule to follow to avoid wake turbulence in all situations. However, the Airman's Information Manual, and to a greater extent Advisory Circular 90-23, Aircraft Wake Turbulence, provide a thorough discussion of the factors you should be aware of when wake turbulence may be encountered.

TAKEOFF AND LANDING CONDITIONS

When taking off on runways covered with water or freezing slush, the landing gear should remain extended for approximately ten seconds longer than normal, allowing the wheels to spin and dissipate the freezing moisture. The landing gear should then be cycled up, then down, wait approximately five seconds and then retracted again. Caution must be exercised to insure that the entire operation is performed below Maximum Landing Gear Operating Airspeed.

Use caution when landing on runways that are covered by water or slush which cause hydroplaning (aquaplaning), a phenomenon that renders braking and steering ineffective because of the lack of sufficient surface friction. Snow and ice covered runways are also hazardous. The pilot should also be alert to the possibility of the brakes freezing.

Use caution when taking off or landing during gusty wind conditions. Also be aware of the special wind conditions caused by buildings or other obstructions located near the runway.

MEDICAL FACTS FOR PILOTS

GENERAL

When the pilot enters the airplane, he becomes an integral part of the man-machine system. He is just as essential to a successful flight as the control surfaces. To ignore the pilot in preflight planning would be as senseless as failing to inspect the integrity of the control surfaces or any other vital part of the machine. The pilot has the responsibility for determining his reliability prior to entering the airplane for flight. When piloting an airplane, an individual should be free of conditions which are harmful to alertness, ability to make correct decisions, and rapid reaction time.

FATIGUE

Fatigue generally slows reaction time and causes errors due to inattention. In addition to the most common cause of fatigue; insufficient rest and loss of sleep, the pressures of business, financial worries, and family problems can be important contributing factors. If you are tired, don't fly.

HYPOXIA

Hypoxia, in simple terms, is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. There is a wide individual variation in susceptibility to hypoxia. In addition to progressively insufficient oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (anemias, carbon monoxide, and certain drugs). Also, alcohol and various drugs decrease the brain's tolerance to hypoxia.

Your body has no built-in alarm system to let you know when you are not getting enough oxygen. It is impossible to predict when or where hypoxia will occur during a given flight, or how it will manifest itself. Some of the common symptoms of hypoxia are increased breathing rate, a lightheaded or dizzy sensation, tingling or warm sensation, sweating, reduced visual field, sleepiness, blue coloring of skin, fingernails, and lips, and behavior changes. A particularly dangerous feature of hypoxia is an increased sense of well-being, called euphoria. It obscures a person's ability and desire to be critical of himself, slows reaction time, and impairs thinking ability. Consequently, a hypoxic individual commonly believes things are getting progressively better while he nears total collapse.

The symptoms are slow but progressive, insidious in onset, and are most marked at altitudes starting above ten thousand feet. Night vision, however, can be impaired starting at an altitude of 5,000 feet. Persons who have recently overindulged in alcohol, who are moderate to heavy smokers, or who take certain drugs, may be more susceptible to hypoxia. Susceptibility may also vary in the same individual from day to day or even morning to evening. Use oxygen on flights above 10,000 feet and at any time when symptoms appear.

Depending upon altitude, a hypoxic individual has a limited time to make decisions and perform useful acts, even though he may remain conscious for a longer period. The time of useful consciousness is approximately 3-5 minutes at 25,000 feet of altitude and diminishes markedly as altitude increases.

Should symptoms occur that cannot definitely be identified as either hypoxia or hyperventilation, try three or four deep breaths of oxygen. The symptoms should improve markedly if the condition was hypoxia (recovery from hypoxia is rapid).

Pilots who fly to altitudes that require or may require the use of supplemental oxygen should be thoroughly familiar with the operation of the airplane oxygen systems. A preflight inspection of the system should be performed, including proper fit of the mask. The passengers should be briefed on the proper use of their oxygen system before flight.

Pilots who wear beards should be careful to ensure that their beard is carefully trimmed so that it will not interfere with proper sealing of the oxygen masks. If you wear a beard or moustache, test the fit of your oxygen mask on the ground for proper sealing. Studies conducted by the military and oxygen equipment manufacturers conclude that oxygen masks do not seal over beards or heavy facial hair.

Federal Aviation Regulations related to the use of supplemental oxygen by flight crew and passengers must be adhered to if flight at higher altitudes is to be accomplished safely. Passengers with significant circulatory or lung disease may need to use supplemental oxygen at lower altitudes than specified by these regulations.

HYPERVENTILATION

Hyperventilation, or overbreathing, is a disturbance of respiration that may occur in individuals as a result of emotional tension or anxiety. Under conditions of emotional stress, fright, or pain, breathing rate may increase, causing increased lung ventilation, although the carbon dioxide output of the body cells does not increase. As a result, carbon dioxide is "washed out" of the blood. The most common symptoms of hyperventilation are: dizziness, nausea, sleepiness, and finally, unconsciousness. If the symptoms persist, discontinue use of oxygen and consciously slow your breathing rate until symptoms clear, and then resume normal breathing rate. Normal breathing can be aided by talking aloud.

ALCOHOL

Common sense and scientific evidence dictate that you must not fly as a crew member while under the influence of alcohol. Alcohol, even in small amounts, produces (among other things):

- A dulling of critical judgement.
- A decreased sense of responsibility.
- Diminished skill reactions and coordination.
- Decreased speed and strength of muscular reflexes (even after one ounce of alcohol).
- Decreases in efficiency of eye movements during reading (after one ounce of alcohol).
- Increased frequency of errors (after one ounce of alcohol).
- Constriction of visual fields.
- Decreased ability to see under dim illuminations.
- Loss of efficiency of sense of touch.
- Decrease of memory and reasoning ability.

- Increased susceptibility to fatigue and decreased attention span.
- Decreased relevance of response.
- Increased self confidence with decreased insight into immediate capabilities.

Tests have shown that pilots commit major errors of judgment and procedure at blood alcohol levels substantially less than the minimum legal levels of intoxication for most states. These tests further show a continuation of impairment from alcohol up to as many as 14 hours after consumption, with no appreciable diminution of impairment. The body metabolizes ingested alcohol at a rate of about one-third of an ounce per hour. Even after the body completely destroys a moderate amount of alcohol, a pilot can still be severely impaired for many hours by hangover. The effects of alcohol on the body are magnified at altitudes, as 2 oz. of alcohol at 18,000 feet produce the same adverse effects as 6 oz. at sea level.

Federal Aviation Regulations have been amended to reflect the FAA's growing concern with the effects of alcohol impairment. FAR 91 states:

"Alcohol or drugs.

(a) No person may act or attempt to act as a crewmember of a civil aircraft -

(1) Within 8 hours after the consumption of any alcoholic beverage;

(2) While under the influence of alcohol;

(3) While using any drug that affects the person's faculties in any way contrary to safety; or

(4) While having .04 percent by weight or more alcohol in the blood.

(b) Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care) to be carried in that aircraft."

Because of the slow destruction of alcohol by the body, a pilot may still be under influence eight hours after drinking a moderate amount of alcohol. Therefore, an excellent rule is to allow at least 12 to 24 hours between "bottle and throttle," depending on the amount of alcoholic beverage consumed.

DRUGS

Self-medication or taking medicine in any form when you are flying can be extremely hazardous. Even simple home or over-the-counter remedies and drugs such as aspirin, antihistamines, cold tablets, cough mixtures, laxatives, tranquilizers, and appetite suppressors, may seriously impair the judgment and coordination needed while flying. The safest rule is to take no medicine before or while flying, except after consultation with your Aviation Medical Examiner.

SCUBA DIVING

Flying shortly after any prolonged scuba diving could be dangerous. Under the increased pressure of the water, excess nitrogen is absorbed into your system. If sufficient time has not elapsed prior to takeoff for your system to rid itself of this excess gas, you may experience the bends at altitudes even under 10,000 feet, where most light planes fly.

CARBON MONOXIDE AND NIGHT VISION

The presence of carbon monoxide results in hypoxia which will affect night vision in the same manner and extent as hypoxia from high altitudes. Even small levels of carbon monoxide have the same effect as an altitude increase of 8,000 to 10,000 feet. Smoking several cigarettes can result in a carbon monoxide saturation sufficient to affect visual sensitivity equal to an increase of 8,000 feet altitude.

DECOMPRESSION SICKNESS

Pilots flying unpressurized airplanes at altitudes in excess of 10,000 feet should be alert for the symptoms of 'decompression sickness'. This phenomenon, while rare, can impair the pilot's ability to perform and in extreme cases, can result in the victim being rendered unconscious. Decompression sickness, also known as dysbarism and aviators "bends", is caused by nitrogen bubble formation in body tissue as the ambient air pressure is reduced by climbing to higher altitudes. The symptoms are pain in the joints, abdominal cramps, burning sensations in the skin, visual impairment and numbness. Some of these symptoms are similar to hypoxia. The only known remedy for decompression sickness is recompression, which can only be accomplished in an unpressurized airplane by descending. The pilot should immediately descend if it is suspected that this condition exists, since the effects will only worsen with continued exposure to the reduced pressure environment at altitude and could result, if uncorrected, in complete incapacitation. The possibility of decompression sickness can be greatly reduced by pre-breathing oxygen prior to flight and by commencing oxygen breathing well below the altitudes where it is legally mandatory.

A FINAL WORD

Airplanes are truly remarkable machines. They enable us to shrink distance and time, and to expand our business and personal horizons in ways that, not too many years ago, were virtually inconceivable. For many businesses, the general aviation airplane has become the indispensable tool of efficiency.

Advances in the mechanical reliability of the airplanes we fly have been equally impressive, as attested by the steadily declining statistics of accidents attributed to mechanical causes, at a time when the airframe, systems and power plants have grown infinitely more complex. The explosion in capability of avionics systems is even more remarkable. Radar, RNAV, LORAN, sophisticated autopilots and other devices which, just a few years ago, were too large and prohibitively expensive for general aviation size airplanes, are becoming increasingly commonplace in even the smallest airplanes.

It is thus that this Safety Information is directed to the pilot, for it is in the area of the skill and proficiency of you, the pilot, that the greatest gains in safe flying are to be made over the years to come. Intimate knowledge of your airplane, its capabilities and its limitations, and disciplined adherence to the procedures for your airplane's operation, will enable you to transform potential tragedy into an interesting hangar story when - as it inevitably will - the abnormal situation is presented.

Know your airplane's limitations, and your own. Never exceed either.

Safe flying,

BEECH AIRCRAFT CORPORATION

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