Beechcraft®

Bonanza®

F33A

(Serials CE-674 and After)

F33C ACROBATIC

(Serials CJ-129 and After)
(See Flight Manual Supplement)

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

FAA Approved in Utility Category based on CAR 3. This document must be carried in the airplane at all times and be kept within reach of the pilot during all flight operations.

This handbook includes the material required to be furnished to the pilot by CAR 3.

Airplane Serial Number: _____

Airplane Registration Number: _____

FAA Approved: _____

A. C. Jackson
Beech Aircraft Corporation
DOA CE-2

This handbook supersedes all BEECH published owner's manuals, flight manuals, and check lists issued for this airplane with the exception of FAA Approved Airplane Flight Manual Supplements.

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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

Beech
Hawker

Member of GAMA

GAMA General Aviation Manufacturers Association

Bonanza F33A
Serial CE-674 and After

INTRODUCTION

The format and contents of this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual conform to GAMA (General Aviation Manufacturers Association) Handbook Specification Number 1. 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). BEECHCRAFT feels that it is very 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 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 ensure 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 approved parts.

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SECTION I

GENERAL

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THANK YOU for displaying confidence in us by selecting a BEECHCRAFT airplane. Our design engineers, assemblers and inspectors have utilized their skills and years of experience to ensure that the new BEECHCRAFT Bonanza F33A meets the high standards of quality and performance for which BEECHCRAFT airplanes have become famous throughout the world.

IMPORTANT NOTICE

This handbook should be read carefully by the owner and the operator in order to become familiar with the operation of the Bonanza F33A. 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.

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 FAR 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 Federal Aviation 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 to

maintain the airplane in a condition equal to that of its original manufacture.

Authorized BEECHCRAFT Aero Centers, Aviation Centers, International Distributors and International Dealers can provide recommended modification, service, and operating procedures issued by both the FAA and Beech Aircraft Corporation, which are designed to get maximum utility and safety from the airplane.

USE OF THE HANDBOOK

The Pilot's Operating Handbook is designed to maintain documents necessary for the safe and efficient operation of the Bonanza F33A. The handbook has been prepared in loose leaf form for ease in maintenance and in a convenient size for storage. The handbook has been arranged with quick reference tabs imprinted with the title of each section and contains ten basic divisions:

Section I	General
Section II	Limitations
Section III	Emergency Procedures
Section IV	Normal Procedures
Section V	Performance
Section VI	Weight and Balance/Equipment List
Section VII	Systems Description
Section VIII	Handling, Servicing and Maintenance
Section IX	Supplements
Section X	Safety Information

NOTE

Except as noted, all airspeeds quoted in this handbook are Indicated Airspeeds (IAS) and assume zero instrument error.

NOTES

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 manual. 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.

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

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

NOTICE

The following information may be provided to the holder of this manual automatically:

1. Original issues and revisions of Class I and Class II Service Instructions
2. Original issues and revisions of FAA Approved Airplane Flight Manual Supplements
3. Reissues and revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owner's Manuals, Pilot's Operating Manuals, and Pilot's Operating Handbooks

This service is free and will be provided only to airplane owners who are listed on the FAA Aircraft Registration Branch List or the BEECHCRAFT International Owners Notification Service List, and then only if listed by airplane serial number for the model for which this handbook is applicable. For detailed information on how to obtain "Revision Service" applicable to this handbook or other BEECHCRAFT Service Publications, consult any BEECHCRAFT Aero or Aviation Center, International Distributor, or International Dealer, or refer to the latest revision of BEECHCRAFT Service Instructions No. 0250-010.

REVISING THE HANDBOOK

Immediately following the Title Page is the Log of Revisions page(s). The Log of Revisions pages are used for maintaining a listing of all effective pages in the handbook (except the SUPPLEMENTS Section), and as a record of revisions to these pages. In the lower right corner of the outlined portion is a box containing a capital letter which denotes the issue or reissue of the handbook. It will be advanced one letter, alphabetically, per reissue. This letter will be suffixed by a number whenever the handbook is revised. When a revision to the handbook is made, a new Log of Revisions will be issued. All Log of Revisions must be retained in the handbook to provide a complete record of material status until a reissue is made.

WARNING

When this handbook is used for airplane operational purposes it is the pilot's responsibility to maintain it in current status.

SUPPLEMENTS REVISION RECORD

Section IX contains supplements and a Log of Supplements page. On the "Log" page is a listing of supplemental equipment available for installation on the BEECHCRAFT Bonanza F33A. When new supplements are received or existing supplements revised, a new "Log" page will replace the previous one, since it contains a listing of all previous supplements plus the new supplements. The supplemental material will be added to the grouping in accordance with the descriptive listing.

VENDOR-ISSUED STC 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 Beech Flight Manual Supplement for every installed item requiring a supplement. If a new handbook for operation of the airplane is obtained at a later date, it is the responsibility of the owner/operator to ensure that all required STC Supplements (as well as weight and balance and other pertinent data) are transferred into the new handbook.

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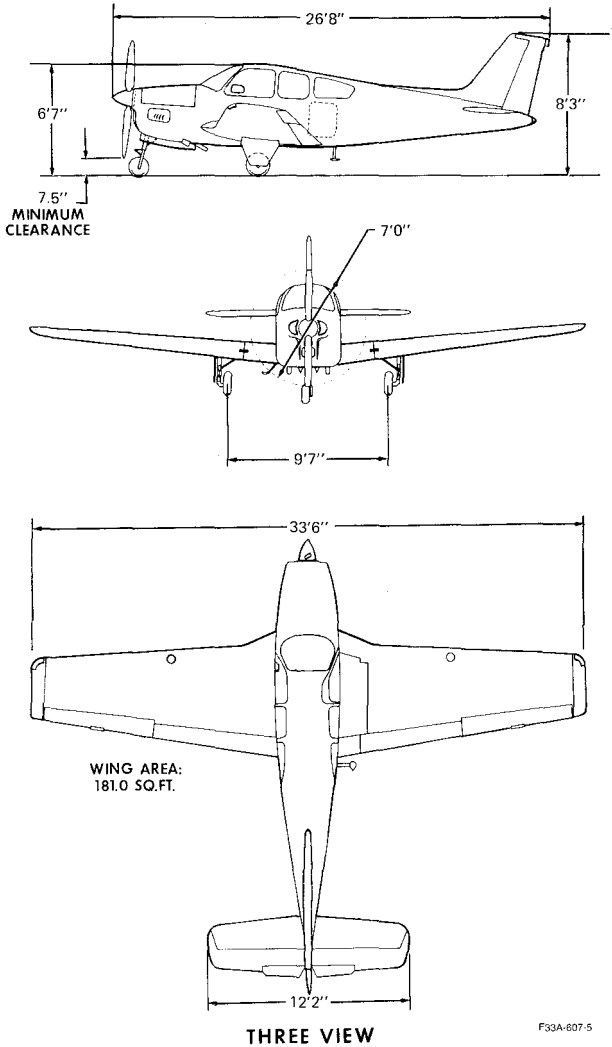
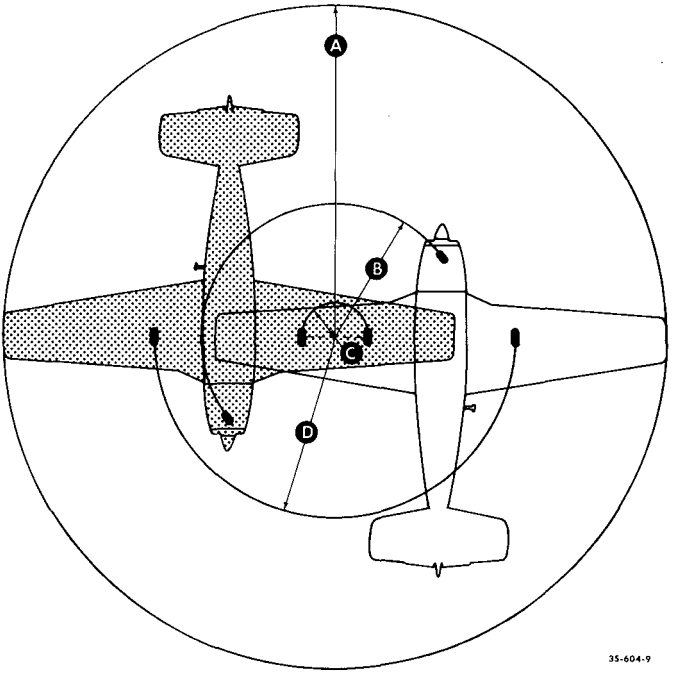


THREE VIEW

F33A-607-5

GROUND TURNING CLEARANCE



Ⓐ Radius for Wing Tip .....26 feet 4 inches
Ⓑ Radius for Nose Wheel.....12 feet 2 inches
Ⓒ Radius for Inside Gear ..... 5 feet 1 inch
Ⓓ Radius for Outside Gear.....14 feet 8 inches

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

DESCRIPTIVE DATA

ENGINE

One Teledyne Continental Motors Corporation engine model IO-520-BA or IO-520-BB. These are fuel-injected, direct-drive, air-cooled, horizontally opposed, 6-cylinder, 520-cubic-inch-displacement, 285-horsepower-rated engines.

Take-off and Maximum
Continuous Power ..... Full Throttle, 2700 rpm
Maximum Normal Operating Power
Serials CE-891 and after with
2-Blade Propeller Installed, and
Serials CJ-156 and after with 2-Blade
Propeller Installed ..... Full Throttle, 2550 rpm

PROPELLER

On IO-520-BA and IO-520-BB engines, one McCauley constant-speed, 2-blade propeller using 2A36C23 hub with 84B-0 blades; or one McCauley constant-speed, 3-blade propeller using 3A32C76 hub with 82NB-2 blades. Or, on IO-520-BB engines only, one McCauley constant-speed, 3-blade propeller using 3A32C406 hub with 82NDB-2 blades.

FUEL

Aviation Gasoline Grade 100LL (blue) or Grade 100 (green) minimum.

STANDARD SYSTEM (CE-674 thru CE-883) (CJ-129 thru CJ-155)
Total Capacity ..... 50 Gallons
Total Usable ..... 44 Gallons

STANDARD SYSTEM (CE-884 and after) (CJ-156 and after)
OPTIONAL SYSTEM (CE-674 thru CE-883) (CJ-129 thru CJ-155)

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

OIL

OIL CAPACITY

Total ..... 12 Quarts

APPROVED OIL TYPES

Ashless dispersant oils meeting the requirements of Teledyne Continental Motors Corporation Specification MHS-24B or the latest revision of MHS-24. Refer to HANDLING, SERVICING AND MAINTENANCE Section for a list of oils meeting this specification.

MAXIMUM CERTIFICATED WEIGHTS

Maximum Ramp Weight ..... 3412 lbs
Maximum Take-off Weight ..... 3400 lbs
Maximum Landing Weight ..... 3400 lbs
Maximum Zero Fuel Weight ..... No Structural Limit
Maximum Weight in Baggage Compartment ..... 270 lbs

CABIN AND ENTRY DIMENSIONS

Cabin Width (maximum) ..... 3 ft 6 in.
Cabin Length (maximum) ..... 10 ft 1 in.
Cabin Height (maximum) ..... 4 ft 2 in.
Cabin Door ..... 37 in. wide by 36 in. high

BAGGAGE SPACE AND ENTRY DIMENSIONS

Compartment Volume	35 cu ft
Door Width (minimum)	18.5 in.
Door Height (minimum)	22.5 in.
Volume Above Hat Shelf	1.7 cu ft

SPECIFIC LOADINGS

Wing Loading at Maximum Take-off Weight ... 18.8 lbs/sq ft
Power Loading at Maximum Take-off Weight .... 11.9 lbs/hp

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SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

GENERAL AIRSPEED

CAS	Calibrated Airspeed is the indicated speed of an airplane, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in knots.
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an airplane as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
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 speed at which an airplane can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{NE}	Never Exceed Speed is the speed limit that may not be exceeded at any time.
V_{NO} **or** V_C	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.
V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

METEOROLOGICAL

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 Hg (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 inflight temperature indications adjusted for instrument error and compressibility effects or ground meteorological sources.

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)

Pressure Altitude — Altitude measured from standard sea-level pressure (29.92 in. Hg) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero. Position errors may be obtained from the Altimeter Correction graph.

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

Take-off and Maximum Continuous — Highest power rating not limited by time.

Maximum Normal Operating Power (MNOP) — Highest power rating within the normal operating range. Noise characteristics requirements of FAR 36 have been demonstrated at this power rating.

Cruise Climb — Power recommended for cruise climb.

ENGINE CONTROLS AND INSTRUMENTS

Throttle Control — Used to control power by introducing fuel-air mixture into the intake passages of the engine. Settings are reflected by readings on the manifold pressure gage.

Propeller Control — This control requests the propeller governor to maintain engine/propeller rpm at a selected value by controlling propeller blade angle.

Mixture Control — This control is used to set fuel flow in all modes of operation and cuts off fuel completely for engine shut down.

EGT (Exhaust Gas Temperature) Indicator — This indicator is used to identify the lean and best power fuel flow mixtures for various power settings during cruise.

Tachometer Indicates the rpm of the engine/ propeller.

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.

AIRPLANE PERFORMANCE AND FLIGHT PLANNING

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 demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during take off and landing was actually demonstrated during certification tests. The value shown is not limiting.

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.

GPH U.S. Gallons per hour.

WEIGHT & BALANCE

Reference Datum An imaginary vertical plane from which all horizontal distances are measured for balance purposes.

Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Moment	The product of the weight of an item multiplied by its arm (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
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.
CG Arm	The arm 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.
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.

Basic Empty Weight	Standard Empty Weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between Take-off Weight (or Ramp Weight, if applicable) and Basic Empty Weight.
Maximum Ramp Weight	Maximum weight approved for ground maneuvering. (It includes weight of start, taxi, and take-off fuel)
Maximum Take-off Weight	Maximum weight approved for liftoff.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.
Tare	The weight of chocks, blocks, stands, etc., used on the scales when weighing an airplane.
Leveling Points	Those points which are used during the weighing process to level the airplane.
Jack Points	Points on the airplane identified by the manufacturer as suitable for supporting the airplane for weighing or other purposes.

SECTION II

LIMITATIONS

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

AIRSPEED LIMITATIONS

SPEED	KCAS	KIAS	REMARKS
Never Exceed V_{NE}	195	196	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	132	134	Do Not Make Full or Abrupt Control Movements Above This Speed.
Maximum Flap Extension/ Extended V_{FE} (Prior to CE-816 and CJ-150)	122	123	Do Not Extend Flaps or Operate With Flaps Extended Above This Speed.
(CE-816 and after, CJ-150 and after)			
Approach (15°)	152	154	
Full Down (30°)	122	123	
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	53-122	52-123	Full Flap Operating Range
White Triangle**	152	154	Maximum Speed for Approach Flaps
Green Arc	64-165	64-167	Normal Operating Range
Yellow Arc	165-195	167-196	Operate With Caution, Only in Smooth Air
Red Line	195	196	Maximum Speed For All Operations

*The airspeed indicator is marked in IAS values.
**Serials CE-884 and after, and CJ-156 and after.

POWER PLANT LIMITATIONS

ENGINE

One Teledyne Continental Motors Corporations model IO-520-BA or IO-520-BB engine.

OPERATING LIMITATIONS

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

Maximum Normal Operating Power
Serials CE-891 and after with 2-blade Propeller Installed and Serials CJ-156 and after with 2-blade Propeller Installed . . . . . Full Throttle, 2550 rpm

Cylinder Head Temperature ..... 238° C
Oil Temperature ..... 116° C
Oil Pressure
Minimum ..... 30 psi
Maximum ..... 100 psi
Fuel Pressure
Serials CE-674 thru CE-928; CJ-129 thru CJ-155:
Minimum ..... 1.5 psi
Maximum ..... 17.5 psi
Fuel Flow
Serials CE-929 and after; CJ-156 and after:
Maximum ..... 24.3 gph

FUEL GRADES

Aviation Gasoline Grade 100LL (blue) or Grade 100 (green) minimum.

OIL SPECIFICATIONS

Ashless dispersant oils meeting Teledyne Continental Motors Corporation Specification MHS-24B or the latest revision of MHS-24. Refer to the Approved Engine Oils table in the HANDLING, SERVICING AND MAINTENANCE Section for a list of oils meeting this specification.

PROPELLER SPECIFICATIONS

On IO-520-BA and IO-520-BB engines, one McCauley constant-speed, two-blade propeller using 2A36C23 hub with 84B-0 blades. Pitch setting at 30-inch station: low, 13.3°; high, 29.2°. Diameter: Maximum, 84 in.; Minimum, 82 in.

Or:

On IO-520-BA and IO-520-BB engines, one McCauley constant-speed, three-blade propeller using 3A32C76 hub with 82NB-2 blades. Or, on IO-520-BB engines only, one McCauley constant-speed, three-blade propeller using 3A32C406 hub with 82NDB-2 blades. Pitch setting at 30-inch station: low, 13.3° ± .2°; high, 29.0° ± .5°. Diameter: Maximum, 80 in.; Minimum, 78-1/2 in.

POWER PLANT INSTRUMENT MARKINGS

OIL TEMPERATURE
Caution (Yellow Radial).....38°C
Operating Range
(Green Arc) .....38° to 116°C
Maximum (Red Radial).....116°C

OIL PRESSURE
Minimum Pressure (Red Radial).....30 psi
Operating Range (Green Arc) .....30 to 60 psi
Maximum Pressure (Red Radial).....100 psi

TACHOMETER
Operating Range (Green Arc)
(Serials CE-674 thru CE-890 with 2- or 3-Blade Propeller Installed, and CE-891 and after with McCauley 3-Blade Propeller Installed)
(Serials CJ-129 thru CJ-155)..... 1800 to 2700 rpm
Operating Range (Green Arc)
(Serials CE-891 and after with 2-Blade Propeller Installed)
(Serials CJ-156 and after) ..... 1800 to 2550 rpm
Maximum rpm (Red Radial) .....2700 rpm

CYLINDER HEAD TEMPERATURE
Operating Range
(Green Arc) .....93° to 238°C
Maximum Temperature (Red Radial).....238°C

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

FUEL FLOW
Serials CE-674 thru CE-928; CJ-129 thru CJ-155:
Minimum (Red Radial) ..... 1.5 psi

Operating Range (Green Arc) ..... 6.9 to 24.3 gph
Maximum (Red Radial) ..... 17.5 psi
Serials CE-929 and after; CJ-156 and after:
Operating Range (Green Arc) ..... 6.9 to 24.3 gph
Maximum (Red Radial) ..... 24.3 gph

MISCELLANEOUS INSTRUMENT MARKINGS

INSTRUMENT PRESSURE
Operating Range (Green Arc).....4.3 to 5.9 in. Hg
FUEL QUANTITY
Yellow Band .....E to ½ full (44-gallon system)
Yellow Band .....E to ⅜ full (74-gallon system)

WEIGHT LIMITS

Maximum Ramp Weight .....3412 lbs
Maximum Take-off Weight.....3400 lbs
Maximum Landing Weight.....3400 lbs
Zero Fuel Weight.....No Structural Limitation
Maximum Baggage Compartment Load .....270 lbs

CENTER OF GRAVITY LIMITS (Landing Gear Extended)

FORWARD LIMITS

77.0 inches aft of datum to 2800 pounds with straight line variation to 82.1 inches at 3400 pounds.

AFT LIMITS

86.7 inches aft of datum at all weights.

REFERENCE DATUM

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

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 below. Maximum slip duration is 30 seconds.

APPROVED MANEUVERS (3400 POUNDS)

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

FLIGHT LOAD FACTOR LIMITS (3400 POUNDS)

Positive Maneuvering Load Factors:
Flaps Up ..... 4.4 G
Flaps Down ..... 2.0 G

MINIMUM FLIGHT CREW

One (1) Pilot

KINDS OF OPERATION LIMITS

1. VFR day and night
2. IFR day and night

REQUIRED EQUIPMENT FOR VARIOUS CONDITIONS OF FLIGHT

Part 91 of the Federal Aviation Regulations specifies the minimum numbers and types of airplane instruments and equipment which must be installed and operable for various kinds of flight conditions. This includes VFR day, VFR night, IFR day, and IFR night.

Regulations also require that all airplanes be certificated by the manufacturer for operations under various flight conditions. At certification, all required equipment must be in operating condition and should be maintained to assure continued airworthiness. If deviations from the installed equipment were not permitted, or if the operating rules did not provide for various flight conditions, the airplane could not be flown unless all equipment was operable. With appropriate limitations, the operation of every system or component installed in the airplane is not necessary, when the remaining operative instruments and equipment provide for continued safe operation. Operation in accordance with limitations established to maintain airworthiness can permit continued or uninterrupted operation of the airplane temporarily.

For the sake of brevity, the Required Equipment Listing does not include obviously required items such as wings, rudders, flaps, engine, landing gear, etc. Also the list does not include items which do not affect the airworthiness of the airplane such as galley equipment, entertainment systems, passenger convenience items, etc. However, it is important to note that ALL ITEMS WHICH ARE RELATED TO THE AIRWORTHINESS OF THE AIRPLANE AND NOT INCLUDED ON THE LIST ARE AUTOMATICALLY REQUIRED TO BE OPERATIVE.

To enable the pilot to rapidly determine the FAA equipment requirements necessary for a flight into specific conditions, the following equipment requirements and exceptions are presented. It is the final responsibility of the pilot to determine whether the lack of, or inoperative status of a piece of equipment on his airplane, will limit the conditions under which he may operate the airplane.

WARNING

FLIGHT IN KNOWN ICING CONDITIONS IS PROHIBITED.

LEGEND

(-) Indicates that the item may be inoperative for the specified condition.
(*) Refers to the REMARKS AND/OR EXCEPTIONS column for explicit information or reference.

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
GENERAL					
Overwater flight	*	*	*	*	-*Per FAR 91
COMMUNICATIONS					
VHF communications system	*	*	*	*	-*Per FAR 91
ELECTRICAL POWER					
Battery	1	1	1	1	-
DC alternator	1	1	1	1	-
DC alternator out indicator light	1	1	1	1	-
Standby generator	*	*	*	*	-*Optional

SYSTEM and/or COMPONENT	*VFR Day*	*VFR Night*	*IFR Day*	*IFR Night*	*Remarks and/or Exceptions*
ELECTRICAL POWER (cont'd)					
Starter Energized Warning Light (if installed)	1	1	1	1	-
EQUIPMENT AND FURNISHING					
Seat belts and Shoulder harnesses	1	1	1	1	- Per Person or Per FAR 91
Emergency locator transmitter	1	1	1	1	- Per FAR 91
FIRE PROTECTION					
Portable fire extinguisher	*	*	*	*	- *Optional

FLIGHT CONTROLS					
Elevator trim tab indicator	1	1	1	1	-
Flap position indicator	1	1	1	1	-
Stall warning	1	1	1	1	-
FUEL EQUIPMENT					
Auxiliary fuel pump	1	1	1	1	-
Engine driven fuel pump	1	1	1	1	-

SYSTEM and/or COMPONENT	*VFR Day*	*VFR Night*	*IFR Day*	*IFR Night*	*Remarks and/or Exceptions*
FUEL EQUIPMENT (Cont'd)					
Fuel quantity indicator	2	2	2	2	-
Fuel flow indicator	1	1	1	1	-
ICE AND RAIN PROTECTION					
Emergency static air source	*	*	*	*	-*Optional
Pitot heater	*	*	1	1	-*Optional

LANDING GEAR					
Landing gear motor	1	1	1	1	
Gear Up Annunciator	1	1	1	1	Serials CE-1301, CE-1307 and after, and CJ-180 and after.
Landing gear position lights	4	4	4	4	
Landing gear warning horn	1	1	1	1	
LIGHTS					
Cockpit and instrument lights	-	*	-	*	-*Lights must be operative.
Taxi light	-	-	-	-	-
Landing light	-	*	-	*	-*Per FAR 91
Rotating beacon	*	1	*	1	-*Optional
Position light	-	3	-	3	

SYSTEM and/or COMPONENT	*VFR Day*	*VFR Night*	*IFR Day*	*IFR Night*	*Remarks and/or Exceptions*
NAVIGATION INSTRUMENTS					
Altimeter	1	1	1	1	-
Airspeed indicator	1	1	1	1	-
Vertical speed	-	-	-	-	-
Magnetic compass	1	1	1	1	-
Attitude indicator	-	-	1	1	-
Turn and slip indicator	-	-	1	1	-
Directional gyro	-	-	1	1	-
Clock	-	-	1	1	-
Transponder	*	*	*	*	-*Per FAR 91
Navigation equipment	-	-	*	*	-*Per FAR 91
OXYGEN					
Oxygen system	*	*	*	*	-*Per FAR 91

PNEUMATIC					
Pressure system for instrument air	-	-	1	1	-
Pressure gage	-	-	1	1	-
ENGINE INDICATING INSTRUMENTS					
Engine tachometer indicator	1	1	1	1	-
Exhaust gas temperature indicator	-	-	-	-	-
Manifold pressure indicator	1	1	1	1	-
ENGINE OIL INSTRUMENTS					
Oil pressure indicator	1	1	1	1	-
Oil temperature indicator	1	1	1	1	-

FUEL

TOTAL FUEL with left and right wing fuel systems full:

Standard Fuel System (CE-674 thru CE-883) (CJ-129 thru CJ-156)

Capacity ..... 50 gallons
Usable ..... 44 gallons

Standard Fuel System (CE-884 and after, and CJ-156 and after)
Optional Fuel System (CE-674 thru CE-883, and CJ-129 thru CJ-156)

Capacity ..... 80 gallons
Usable ..... 74 gallons

FUEL MANAGEMENT

Do not take off when Fuel Quantity Gages indicate in Yellow Band or with less than 13 gallons in each wing fuel system.

Maximum slip duration is 30 seconds.

SEATING

All occupied seats must be in the upright position for takeoff and landing.

PLACARDS

On Left Side Panel (Airspeed Values are IAS): (Prior to CE-816 and CJ-150)

On Left Side Panel (Airspeed Values are IAS): (CE-816 and after, CJ-150 and after)

On Left Side Panel Near Firewall Air Controls:

IN CASE OF ENGINE FIRE
PULL FIREWALL AIR
CONTROL TO CLOSE

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

EMERGENCY
LANDING GEAR
INSTRUCTIONS
TO EXTEND

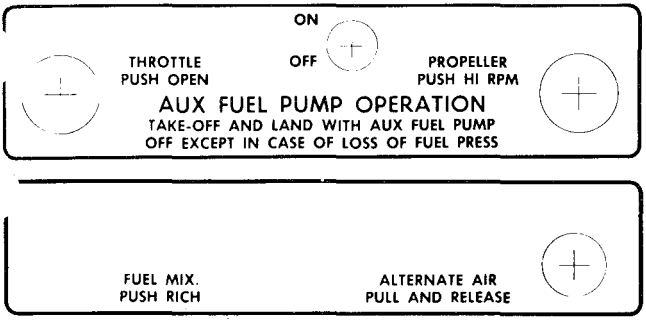
ENGAGE HANDLE IN REAR OF FRONT SEAT AND TURN COUNTERCLOCKWISE AS FAR AS POSSIBLE (50 TURNS)

On Emergency Crank Access Cover:

LANDING GEAR
EMERGENCY CRANK

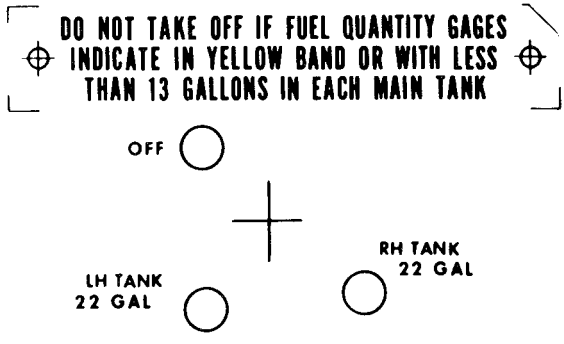
PULL OUT
LIFT UP

On Control Console:



On Fuel Selector Panel:

Standard 44-Gallon System (CE-674 thru CE-883) (CJ-129 thru CJ-155)



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Temporary Change to the Pilot's Operating Handbook *and* FAA Approved Airplane Flight Manual

P/N 33-590009-13TC1

Publication Affected	F33A & F33C Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (P/N 33-590009-13, Issued October, 1976 or Subsequent)
Airplane Serial Numbers Affected	CE-674 and After; CJ-129 and After
Description of Change	The addition of a placard to the fuel selector to warn of the no-flow condition that exists between the fuel selector detents.
Filing Instructions	Insert this temporary change into the F33A & F33C Pilot's Operating Handbook and FAA Approved Airplane Flight Manual immediately following page 2-20B (Section II, LIMITATIONS) and retain until rescinded or replaced.

LIMITATIONS

PLACARDS

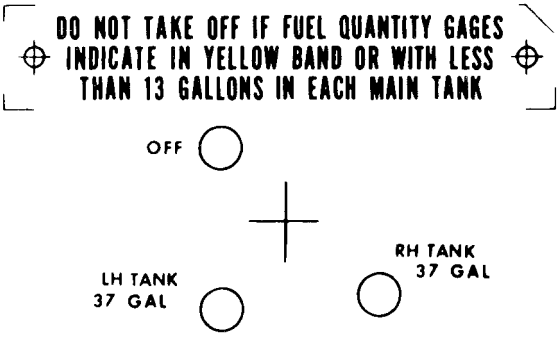
Located On The Face Of The Fuel Selector Valve, For Those Airplanes In Compliance With S.B. 2670:

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

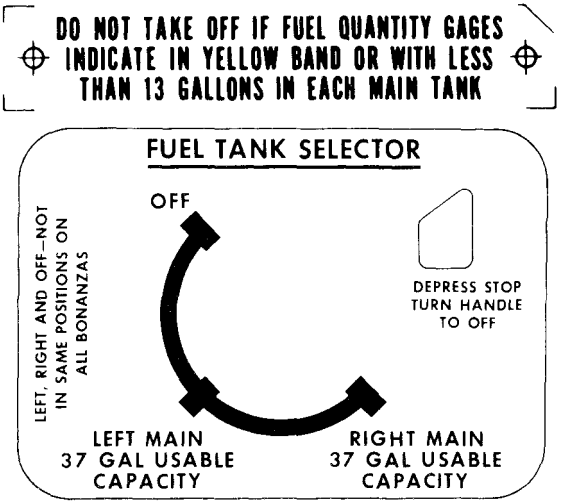
Approved:

A.C. Jackson
Raytheon Aircraft Company
DOA CE-2

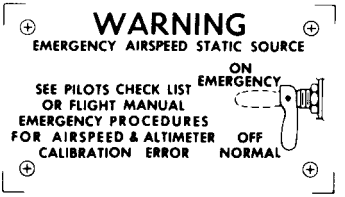
Optional 74-Gallon System (CE-674 thru CE-883)
(CJ-129 thru CJ-155)
Standard 74-Gallon System (CE-884 thru CE-1013)



Standard 74-Gallon System (CE-1014 and after) (CJ-156 and after)



On Left Side Panel Below Instrument Subpanel When Emergency Static Air System is Installed:

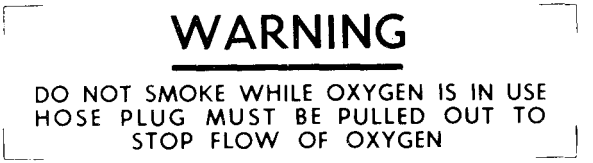


On Instrument Panel When Anti-collision Light is Not Installed:

THIS AIRCRAFT NOT FULLY
EQUIPPED FOR NIGHT FLIGHT

Below Controls on Control Console When Winter Baffles Are Installed:

On Oxygen Console (optional):



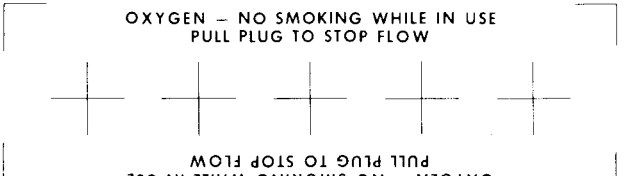
Adjacent to Oxygen Outlet when 5th Seat is Installed:

On Each Oxygen Mask Stowage Container:

OXYGEN MASK

On Each Passenger Outlet (Prior to CE-929, Except CE-919, CE-923, CE-925, and CE-927; Prior to CJ-156) and On All Pilot and Copilot Outlets (All Serials):

On Oxygen Manifold (Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after):



Below Left and Right Middle Windows after compliance with BEECHCRAFT Service Instructions 1241:

(Serials CE-674 thru CE-928, except CE-919, CE-923, CE-925, and CE-927; CJ-129 thru CJ-155):

EMERGENCY EXIT
LIFT LATCH - PULL PIN
PUSH WINDOW OUT

On the Face of Emergency Exit Latch Cover (Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after):

EMERGENCY EXIT

PULL COVER
ROTATE HANDLE UP
BREAKING SAFETY WIRE
PUSH WINDOW OUT

On Handle of Emergency Exit Handle (Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after):

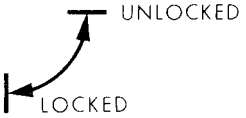
ROTATE HANDLE UP
BREAKING SAFETY
WIRE
PUSH WINDOW OUT

On Inside of Cabin Door Adjacent to Door Handle (Serials CE-1301, CE-1307 and after; CJ-180 and after):

On Middle Windows (openable):

DO NOT OPEN IN FLIGHT	LATCH WINDOW BEFORE TAKE-OFF

Above Middle-window Handles (Serials CE-984 and after; CJ-156 and after):



Above Inside Door Handle:

**ROTATE HANDLE TO
FULL LOCKED POSITION**

On Hat Shelf:

HAT SHELF
NO HEAVY OBJECTS

On Inside of Baggage Compartment Door:

BAGGAGE COMPARTMENT AND/OR FIFTH SEAT
LOAD IN ACCORDANCE WITH
AIRCRAFT FLIGHT MANUAL
MAXIMUM STRUCTURAL CAPACITY – 270 POUNDS

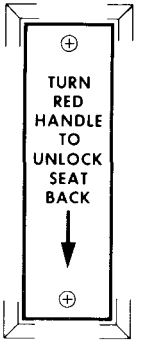
On Windows Adjacent To Pilot's And Copilot's Seats:

SHOULDER HARNESS
MUST BE WORN AT
ALL TIMES WHILE AT
PILOT POSITIONS

On Windows, Adjacent To 3rd, 4th & 5th Seats:

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

On Inboard Side Of Seat Back For 3rd & 4th Seats:



SECTION III
EMERGENCY PROCEDURES

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All airspeeds quoted in this section are indicated airspeeds (IAS).

EMERGENCY AIRSPEEDS (3400 LBS)

Emergency Descent	154 KTS
Maximum Glide Range	105 KTS
Emergency Landing Approach	83 KTS

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 practicable, the emergencies requiring immediate corrective action are treated in check list form for easy reference and familiarization. Other situations, in which more time is usually permitted to decide on and execute a plan of action, are discussed at some length.

ENGINE FAILURE

DURING TAKE-OFF GROUND ROLL

1. Throttle - CLOSED
2. Braking - MAXIMUM
3. Fuel Selector Valve - OFF
4. Battery and Alternator Switches - OFF

AFTER LIFTOFF AND IN FLIGHT

Landing straight ahead is usually advisable. If sufficient altitude is available for maneuvering, accomplish the following:

1. Fuel Selector Valve - SELECT OTHER TANK (feel for detent)
2. Auxiliary Fuel Pump - ON
3. Mixture - FULL RICH, then LEAN AS REQUIRED
4. Magnetos - CHECK LEFT RIGHT, then BOTH ON

NOTE

The most probable cause of engine failure would be loss of fuel flow or improper functioning of the ignition system.

If No Restart:

1. Select most favorable landing site.
2. The use of landing gear is dependent on the terrain where landing must be made.

ENGINE DISCREPANCY CHECKS

CONDITION: ROUGH RUNNING ENGINE

1. Mixture - FULL RICH, then LEAN as required
2. Magneto/Start Switch - "BOTH" position (check to verify)

CONDITION: LOSS OF ENGINE POWER

1. Fuel Flow Gage - CHECK

If fuel flow is abnormally low:

a. Mixture - FULL RICH
b. Auxiliary Fuel Pump - ON (then OFF if performance does not improve in a few moments)

2. Fuel Quantity Indicator - CHECK for fuel supply in tank being used

If tank being used is empty:

Fuel Tank Selector Valve - SELECT OTHER FUEL TANK (feel for detent)

AIR START PROCEDURE

1. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL (feel for detent)
2. Throttle - RETARD
3. Mixture Control - FULL RICH
4. Auxiliary Fuel Pump - ON until power is regained, then OFF (Leave On if Engine Driven Fuel Pump is inoperative.)
5. Throttle - ADVANCE to desired power
6. Mixture - LEAN as required

ENGINE FIRE

IN FLIGHT

The red FIREWALL AIR control 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. In the event of engine fire, shut down the engine as follows and make a landing:

1. Firewall Air Control - PULL TO CLOSE
2. Mixture - IDLE CUT-OFF
3. Fuel Selector Valve - OFF
4. Battery, Alternator, and Magneto/Start Switches - OFF (Extending the landing gear can be accomplished manually if desired.)
5. Do not attempt to restart engine. (See GLIDE and LANDING WITHOUT POWER Procedures)

ON THE GROUND

1. Fuel Selector Valve - OFF
2. Mixture - IDLE CUT-OFF
3. Battery, Alternator and Magneto/Start Switches - OFF
4. Fire Extinguisher - USE TO EXTINGUISH FIRE

EMERGENCY DESCENT

1. Power - IDLE
2. Propeller - HIGH RPM
3. Landing Gear - DOWN
4. Airspeed - ESTABLISH 154 KTS

MAXIMUM GLIDE CONFIGURATION

1. Landing Gear - UP

NOTE

On S/N CE-1301, CE-1307 and after, and CJ-180 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 for LOW RPM
5. Airspeed - 105 KTS

Glide distance is approximately 1.7 nautical miles (2 statute miles) 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. Airspeed - ESTABLISH 78 TO 83 KTS
2. Fuel Selector Valve - OFF
3. Mixture - IDLE CUT-OFF
4. Magneto/Start Switch - OFF
5. Flaps - AS REQUIRED
6. Landing Gear - DOWN or UP (depending on terrain)

NOTE

On S/N CE-1301, CE-1307 and after, and CJ-180 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.

7. Battery and Alternator Switches - OFF

LANDING GEAR RETRACTED - WITH POWER

If possible, choose firm sod or foamed runway. Make a normal approach, using flaps as necessary. When sure of reaching the selected landing spot:

NOTE

On S/N CE-1301, CE-1307 and after, and CJ-180 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.

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

SYSTEMS EMERGENCIES

PROPELLER OVERSPEED

1. Throttle - RETARD TO RED LINE

NOTE

On S/N CE-1301, CE-1307 and after, and CJ-180 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
3. Oil Pressure - CHECK

WARNING

If loss of oil pressure was the cause of over-speed, the engine will seize after a short period of operation.

4. Land - SELECT NEAREST SUITABLE SITE and follow LANDING EMERGENCIES procedure.

STARTER ENERGIZED WARNING LIGHT ILLUMINATED (If installed)

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

On the Ground:

1. Battery and alternator switches - OFF.
2. Do not take off.

In Flight After Air Start:

1. Battery and alternator switches - OFF.
2. Land as soon as practical.

ALTERNATOR-OUT PROCEDURE

An inoperative alternator will place the entire electrical operation of the airplane except engine ignition on the battery. An alternator failure will be indicated by

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illumination of the warning light, located on the instrument panel below the flight instruments.

The warning light will not illuminate until the alternator output is almost zero. A verification of alternator malfunction would be a discharge shown on the ammeter. There is no indication of overvoltage except that the warning light will illuminate as though the alternator is out.

Alternator Warning Light Illuminated:

1. Verify alternator out with ammeter - will show discharge.

NOTE

If the ammeter does not show a discharge, a malfunction in the warning light system is indicated, and the alternator switch should be left ON.

2. If ammeter shows a discharge, Alternator Switch - OFF MOMENTARILY, THEN ON (this resets the overvoltage relay)

If the warning light does not illuminate, continue to use the alternator.

3. If the warning light illuminates, Alternator Switch - OFF
4. Nonessential Electrical Equipment - OFF to conserve battery power.

UNSCHEDULED ELECTRIC ELEVATOR TRIM

1. Airplane Attitude - MAINTAIN using elevator control
2. Elevator Trim Thumb Switch (On Control Wheel) - MOVE IN DIRECTION OPPOSITE UNSCHEDULED PITCH TRIM to open circuit breaker
3. Elevator Trim ON-OFF Switch (On Instrument Panel) - OFF
4. Manual Elevator Trim Control Wheel - RETRIM AS DESIRED

NOTE

Do not attempt to operate the electric trim system until the cause of the malfunction has been determined and corrected.

LANDING GEAR MANUAL EXTENSION

Manual extension of the landing gear can be facilitated by first reducing airspeed. Then proceed as follows:

1. LDG GR MOTOR Circuit Breaker (Right Subpanel) - OFF (pull out)
2. Landing Gear Switch Handle - DOWN position
3. Handcrank Handle Cover (at rear of front seats) - REMOVE
4. Handcrank - ENGAGE and TURN COUNTERCLOCKWISE AS FAR AS POSSIBLE (approximately 50 turns)

CAUTION

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

5. If electrical system is operative, check landing gear position lights and warning horn (check LDG GR RELAY circuit breaker engaged).
6. Handcrank - DISENGAGE. Always keep it stowed when not in use.

WARNING

Do not operate the landing gear electrically with the handcrank engaged, as damage to the mechanism could occur.

After emergency landing gear extension, do not move any landing gear controls or reset any switches or circuit breakers until airplane is on jacks, as failure may have been in the gear-up circuit and gear might retract.

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 - CHECK, STOWED
2. Landing Gear Motor Circuit Breaker - IN
3. Landing Gear Switch Handle - UP

NOTE

On S/N CE-1301, CE-1307 and after, and CJ-180 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

If the induction system alternate air source door becomes frozen in the closed position, the Alternate Air Pull and Release Control T-handle should be pulled and released to force the door open.

EMERGENCY STATIC AIR SOURCE SYSTEM

THE EMERGENCY 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 emergency system and noting a sudden sustained change in rate of climb. This may be accompanied by abnormal indicated airspeed and altitude changes beyond normal calibration differences.

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

1. Pilot's Emergency Static Air Source - Switch to ON EMERGENCY.
2. For Airspeed Calibration and Altimeter Correction, refer to PERFORMANCE Section.

NOTE

The Emergency Static Air valve should be in the NORMAL position when the system is not needed.

EMERGENCY EXITS

Emergency exits, provided by the openable window on each side of the cabin, may be used for egress in addition to the cabin door and the optional cargo door.

NOTE

For access past the 3rd and/or 4th seats, rotate the red handle, located on the lower inboard side of the seat back, and fold the seat back over.

To Open Each Emergency Exit:

Serials CE-674 thru CE-928, Except CE-919, CE-923, CE-925 and CE-927; CJ-129 thru CJ-155:

An emergency exit placard is installed below the left and right openable windows.

1. Lift the latch.
2. Pull out the emergency release pin and push the window out.

Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after:

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

NOTE

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

UNLATCHED DOOR IN FLIGHT

If the cabin door is not locked it may unlatch in flight. This may occur during or just after takeoff. The door will trail open approximately 3 inches but the flight characteristics of the airplane will not be affected, except that rate of climb will be reduced. Return to the field in a normal manner. If practicable, during the landing flare-out have a passenger hold the door to prevent it swinging open.

SPINS

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 control position until rotation stops and then neutralize all controls and execute a smooth pullout. Ailerons should be neutral and throttle in idle position at all times during recovery.

EMERGENCY SPEED REDUCTION

In an emergency, the landing gear may be used to create additional drag. Should disorientation occur under instrument conditions, the lowering of the landing gear will reduce the tendency for excessive speed buildup. This procedure would also be appropriate for a non-instrument rated pilot who unavoidably encounters instrument conditions or in other emergencies such as severe turbulence.

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.

SECTION IV
NORMAL PROCEDURES

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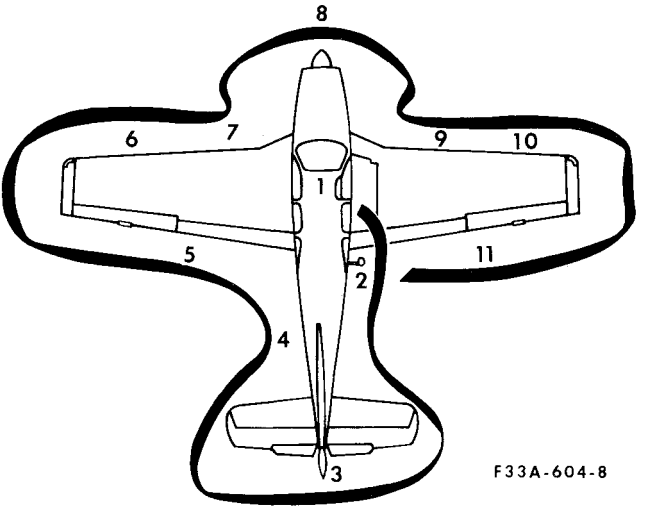
All airspeeds quoted in this section are indicated airspeeds (IAS).

AIRSPEEDS FOR SAFE OPERATION (3400 LBS)

Maximum Demonstrated Crosswind Component	17 KTS
Takeoff:	
Lift-off	71 KTS
50-ft Speed	77 KTS
Best Angle-of-Climb (V_X)	77 KTS
Best Rate-of-Climb (V_Y)	96 KTS
Cruise Climb	107 KTS
Turbulent Air Penetration	134 KTS
Landing Approach (Flaps Down)	70 KTS
Balked Landing Climb	70 KTS

PREFLIGHT INSPECTION



1. CABIN:
   a. Parking Brake - SET
   b. Control Lock - REMOVE
   c. All Switches - OFF

2. RIGHT FUSELAGE:
   a. Baggage Compartment Door - SECURE
   b. Static Pressure Button - UNOBSTRUCTED
   c. Emergency Locator Transmitter - ARMED

3. EMPENNAGE:
   a. Control Surfaces - CHECK
   b. Tie Down - REMOVE
   c. Position Light - CHECK
   d. Cabin Air Intake - CHECK

4. LEFT FUSELAGE:
   a. Static Pressure Button - UNOBSTRUCTED
   b. All Antennas - CHECK

5. LEFT WING TRAILING EDGE:
   a. Flap - CHECK
   b. Aileron - CHECK
   c. Wing Tip - CHECK
   d. Position Light - CHECK

6. LEFT WING LEADING EDGE:
   a. Stall Warning - CHECK
   b. Pitot Tube - CHECK; Cover - REMOVE
   c. Fuel Tank - CHECK QUANTITY; Filler Cap - SECURE
   d. Cabin Air Intake - CHECK
   e. Tie Down and Chocks - REMOVE

7. LEFT LANDING GEAR:
   a. Wheel Well Door, Tire and Strut - CHECK
   b. Fuel Vent - CHECK
   c. Fuel Sump - DRAIN
   d. Fuel Selector Valve Sump (located under access cover on fuselage) - DRAIN; Cover - SECURE

8. NOSE SECTION:
   a. Left Cowl Flap - CHECK
   b. Engine Oil - CHECK; Cap - SECURE
   c. Left Cowl - SECURE
   d. Propeller - CHECK
   e. Wheel Well Doors, Tire and Strut - CHECK
   f. Landing and Taxi Lights - CHECK
   g. Induction Air Intake - CLEAR
   h. Engine - CHECK GENERAL CONDITION
   i. Right Cowl - SECURE
   j. Right Cowl Flap - CHECK
   k. Chocks - REMOVE

9. RIGHT LANDING GEAR:
   a. Fuel Vent - CHECK
   b. Fuel Sump - DRAIN
   c. Wheel Well Door, Tire and Strut - CHECK

10. RIGHT WING LEADING EDGE:
   a. Cabin Air Intake - CHECK
   b. Tie Down and Chocks - REMOVE
   c. Fuel Tank - CHECK QUANTITY; Filler Cap SECURE

11. RIGHT WING TRAILING EDGE:
   a. Position Light - CHECK
   b. Wing Tip - CHECK
   c. Aileron - CHECK
   d. Flap - CHECK

BEFORE STARTING

1. Seats - POSITION AND LOCK; Seat Backs - UPRIGHT
2. Seat Belts and Shoulder Harnesses - FASTEN
3. Parking Brake - SET
4. All Avionics - OFF
5. Circuit Breakers - IN

6. Landing Gear Handle - DOWN
7. Flaps - UP
8. Cowl Flaps - OPEN
9. Light Switches - OFF
10. Electric Elevator Trim Switch - OFF
11. Fuel Selector Valve - CHECK OPERATION THEN SELECT TANK MORE NEARLY FULL
12. Battery and Alternator Switches - ON (If external power is used, turn Alternator Switch - OFF)
13. Fuel Quantity Indicators - CHECK QUANTITY

WARNING

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

EXTERNAL POWER

The following precautions shall be observed while using external power:

CAUTION

Never use external power without a battery installed in the system.

1. The Battery Switch shall be ON and all avionics and electrical switches OFF. This protects the voltage regulators and associated electrical equipment from voltage transients (power fluctuations).

2. The airplane has a negative ground system. Connect the positive and negative leads of the external power unit to the corresponding positive and negative terminals of the airplane's external power receptacle.

3. In order to prevent arcing, no power shall be supplied while the connection is being made.

STARTING ENGINE USING AUXILIARY POWER UNIT

1. Alternator, and Avionics Equipment - OFF
2. Battery Switch - ON
3. Auxiliary Power Unit - CONNECT
4. Auxiliary Power Unit - (28-volt system - SET OUTPUT 27.0 to 28.5 volts)
   (14-volt system - SET OUTPUT 13.5 to 14.25 volts)
5. Auxiliary Power Unit - ON
6. Engine START using normal procedures
7. Auxiliary Power Unit - OFF (after engine has been started)
8. Auxiliary Power Unit - DISCONNECT
9. Alternator Switch - ON

STARTING

CAUTION

Vernier-type engine controls should not be rotated clockwise after being advanced to the full forward position.

1. Mixture - FULL RICH
2. Propeller - HIGH RPM
3. Throttle - FULL OPEN

NOTE

If the engine is hot, and the ambient temperature is 90°F or above, place mixture control in IDLE CUT-OFF, switch aux fuel pump to ON for 30 to 60 seconds, then OFF. Return mixture control to FULL RICH.

4. Auxiliary Fuel Pump - ON until fuel flow peaks then OFF
5. Throttle - OPEN ¼ inch APPROXIMATELY
6. Magneto/Start Switch - START position; release to BOTH position when engine fires.

CAUTION

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

7. In Event of Overprime Condition:
   a. Mixture - IDLE CUT-OFF
   b. Throttle - OPEN
   c. Magneto/Start Switch - START position
   d. As engine fires, reduce throttle to IDLE and advance the mixture control to FULL RICH.

NOTE

During hot starts, turn the Auxiliary Fuel Pump ON momentarily after starting to purge the system, then turn OFF.

8. Throttle - 1000 to 1200 RPM
9. Oil Pressure - CHECK
10. External Power (if used) - DISCONNECT
11. Alternator Switch - ON; CHECK FOR CHARGING
12. All Engine Indicators - CHECK
13. Starter Energized Warning Light (if installed) - CHECK; should be illuminated during start and extinguished after start.

CAUTION

If starter energized warning light is inoperative or is not installed, the ammeter indication should be less than 25% of full charge at 1000 to 1200 rpm within two minutes, with no additional equipment on. If not, turn off the battery and alternator switches and do not take off.

AFTER STARTING, AND TAXI

CAUTION

Never taxi with a flat shock strut.

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

CAUTION

Do not operate engine above 1200 RPM until oil temperature reaches 24°C.

BEFORE TAKEOFF

1. Seat Belts and Shoulder Harnesses - CHECK
2. Parking Brake - SET
3. Radios - CHECK
4. Engine Instruments - CHECK
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. With a requirement of three or more air-driven gyros, maintain an engine speed of 1200 rpm.

6. Starter Energized Warning Light (if installed) - CHECK (should not be lit). If light is not installed or is inoperative, check ammeter for stabilized indication between 0 and 25% of full charge at 1000 to 1200 rpm.
7. Throttle - 1700 RPM
8. Propeller - EXERCISE to obtain 300 to 400 rpm drop, then return to high rpm
9. Magnetos - CHECK at 1700 rpm on each magneto (variance between individual magnetos should not exceed 50 rpm; maximum drop should not exceed 150 rpm.)
10. Trim - SET
    a. Aileron - NEUTRAL
    b. Elevator - 0° (3° nose up if only front seats are occupied)

11. Flaps - UP
12. Doors and Windows - SECURE (serials CE-1301, CE-1307 and after; CJ-180 and after - check cabin door lock indicator - CLOSED)
13. Flight Controls - CHECK PROPER DIRECTION AND FREEDOM OF MOVEMENT
14. Mixture - FULL RICH or as required by field elevation
15. Brakes - RELEASED
16. Instruments - CHECK (Make final check of manifold pressure, fuel flow, and rpm at the start of take-off run.)

TAKEOFF

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

1. Power - SET TAKE-OFF POWER (Mixture - SET as required by field elevation)
2. Brakes - RELEASE, THEN ACCELERATE to recommended speed
3. Landing Gear - RETRACT when positive rate of climb is established
4. Airspeed - ESTABLISH DESIRED CLIMB SPEED when clear of obstacles

CLIMB

Maximum Continuous Power

(Serials CE-674 thru CE-890 with 2- or 3-Blade Propeller Installed, and CE-891 and after with McCauley 3-Blade Propeller Installed)

(Serials CJ-129 thru CJ-155).....Full Throttle, 2700 rpm

Maximum Normal Operating Power

(Serials CE-891 and after with 2-Blade Propeller Installed)

(Serials CJ-156 and after).....Full Throttle, 2550 rpm

Cruise Climb Power.....25 in. Hg at 2500 rpm

1. Engine Temperatures - MONITOR
2. Power - SET
3. Mixture - SET FUEL FLOW

CRUISE

See Cruise Charts in PERFORMANCE Section

1. Cowl Flaps - CLOSED
2. Power - SET
3. Mixture - SET FUEL FLOW

LEANING USING THE EXHAUST GAS TEMPERATURE INDICATOR (EGT)

A thermocouple-type exhaust gas temperature (EGT) probe is mounted in the right side of the exhaust system. This probe is connected to an indicator on the right side of the instrument panel. The indicator is calibrated in degrees Fahrenheit. Use EGT system to lean the fuel/air mixture when cruising at 75% power or less in the following manner:

1. Lean the mixture and note the point on the indicator that the temperature peaks and starts to fall.
   a. CRUISE (LEAN) MIXTURE - Increase the mixture until the EGT shows a drop of 25°F below peak on the rich side of peak.
   b. BEST POWER MIXTURE - Increase the mixture until the EGT shows a drop of 100°F below peak on the rich side of peak.

CAUTION

Do not continue to lean mixture beyond that necessary to establish peak temperature.

2. Continuous operation is recommended at 25°F or more below peak EGT only on the rich side of peak.
3. Changes in altitude and power settings require the peak EGT to be rechecked and the mixture reset.

DESCENT

1. Altimeter - SET
2. Cowl Flaps - CLOSED

3. Power - AS REQUIRED (avoid prolonged idle settings and low cylinder head temperatures)
4. Mixture - ENRICH AS REQUIRED

BEFORE LANDING

1. Seat Belts and Shoulder Harnesses - FASTENED; Seat Backs - UPRIGHT
2. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL
3. Cowl Flaps - AS REQUIRED
4. Mixture - FULL RICH or as required by field elevation
5. Landing Gear - DOWN AND CHECK (Observe maximum extension speed)
6. Landing and Taxi Lights - AS REQUIRED
7. Flaps - FULL DOWN (Observe maximum extension speed)
8. Airspeed - ESTABLISH NORMAL LANDING APPROACH SPEED
9. Propeller - HIGH RPM

BALKED LANDING

1. Power - FULL THROTTLE, 2700 RPM
2. Airspeed - 70 KTS until clear of obstacles, then trim to normal climb speed
3. Flaps - UP
4. Landing Gear - UP
5. Cowl Flaps - OPEN

AFTER LANDING

1. Landing and Taxi Lights - AS REQUIRED
2. Flaps - UP
3. Trim Tab - SET TO 0°
4. Cowl Flaps - OPEN

SHUTDOWN

1. Brakes - SET
2. Electrical and Radio Equipment - OFF
3. Throttle - CLOSE
4. Mixture - IDLE CUT-OFF
5. Magneto/Start Switch - OFF after engine stops
6. Battery and Alternator Switches - OFF
7. Control Lock - INSTALL if conditions warrant
8. Wheel Chocks - INSTALL; Parking Brake - RELEASE

ENVIRONMENTAL SYSTEMS

OXYGEN SYSTEM

PREFLIGHT

1. Check Oxygen Pressure Gage for pressure reading.
2. Determine percent of full system.
3. Multiply oxygen duration in minutes by percent of full bottle.

EXAMPLE:

People.....5

Gage Pressure.....1500 psig

Percent Capacity (from chart).....80%

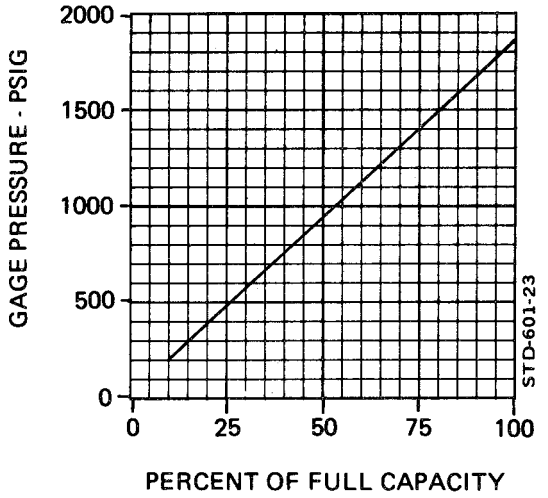
Cylinder Capacity (full).....49 cu ft

Altitude (planned flight).....15,000 ft

Duration (90% full).....149 min

Duration (80% full).....119 min

OXYGEN AVAILABLE WITH PARTIALLY FULL BOTTLE



OXYGEN DURATION

The recommended masks are provided with the system. They are designed to be adjustable to fit the average person, with minimum leakage of oxygen.

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.

The following data compiled on the basis of 90% of bottle capacity.

OXYGEN DURATION CHART

Duration in minutes at the following altitudes:

Bottle Capacity	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

WARNING

NO SMOKING when using oxygen.

IN FLIGHT

The use of oxygen is recommended to be in accordance with current FAR operating rules.

1. Oxygen Control Valve - OPEN SLOWLY
2. Mask - INSERT FITTING, DON MASK (adjust mask for proper fit)
3. Oxygen - CHECK INDICATOR FOR FLOW

AFTER USING

1. Discontinue use by unplugging mask from outlet.

NOTE

Closing the control valve 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 Valve - CLOSED (may be accomplished during shut-down)

HEATING AND VENTILATION

Refer to the SYSTEMS DESCRIPTION Section 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 shall 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 check of flight controls for complete freedom of movement.

ENGINE

Use engine oil in accordance with Consumable Materials in the HANDLING, SERVICING AND MAINTENANCE Section. 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.

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 the possibility of congealed oil.

NOTE

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

During warm-up, monitor engine temperatures closely, since it is 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 occasion-

ally in flight.

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

ICING CONDITIONS

Flight in known 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 levels established in compliance with FAR 36 are:

Serials CE-891 and after, and CJ-156 and after:

2-Blade Propeller Using MNOP	76.6 dB(A)
3-Blade Propeller	77.3 dB(A)

NOTE

Flyover noise levels given are not applicable for Serials CE-674 thru CE-890 and CJ-129 thru CJ-155.

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.

SECTION V
PERFORMANCE

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INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING

The graphs and tables in this section present performance information for flight planning at various parameters of weight, power, altitude and temperature. Examples have been presented on all performance graphs. In addition, the calculations for flight time, block speed and fuel required for a proposed flight are detailed below. All examples and calculations utilize the following conditions:

CONDITIONS

At Denver:

Outside Air Temperature.....15°C (59°F)
Field Elevation.....5330 ft
Altimeter Setting.....29.60 in. Hg
Wind.....270° at 10 kts
Runway 26L length.....10,010 ft

Route of Trip
*DEN-V81-AMA

For VFR Cruise at 11,500 feet

ROUTE SEGMENT	MAGNETIC COURSE	DIST NM	WIND 11500 FEET DIR/KTS	OAT 11500 FEET °C	ALT SETTING IN.HG
DEN-COS	161°	55	010/30	−5	29.60
COS-PUB	153°	40	010/30	−5	29.60
PUB-TBE	134°	74	100/20	0	29.56
TBE-DHT	132°	87	200/20	9	29.56
DHT-AMA	125°	65	200/20	10	29.56

*REFERENCE: Enroute Low Altitude Chart L-6

At Amarillo:

Outside Air Temperature .....25°C (77°F)
Field Elevation .....3605 ft
Altimeter Setting .....29.56 in. Hg
Wind .....180° at 10 kts
Runway 21 Length .....13500 ft

To determine pressure altitude at origin and destination airports, add 100 feet to field elevation for each .1 in. Hg below 29.92, and subtract 100 feet from field elevation for each .1 in. Hg above 29.92.

Pressure Altitude at DEN:

29.92 − 29.60 = .32 in. Hg

The pressure altitude at DEN is 320 feet above the field elevation.

5330 + 320 = 5650 ft

Pressure Altitude at AMA:

29.92 − 29.56 = .36 in. Hg

The pressure altitude at AMA is 360 feet above the field elevation.

3605 + 360 = 3965 ft

NOTE

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

Calculations for flight time, block speed and fuel requirement:

Cruise Climb:

Enter the graph for Time, Fuel, and Distance to climb at 15°C to 5650 ft and to 3400 lbs. Enter -5°C to 11500 ft and to 3400 lbs. Read:

Time to Climb = 21.0 − 8.0 = 13 min
Fuel Used to Climb = 6.3 − 2.7 = 3.6 gal
Distance Traveled = 42 − 15 = 27 NM

The cruise power setting is assumed to be at 2500 rpm. Since cruise at 11,500 feet requires full throttle, the manifold pressure and fuel flow should be read from the cruise power setting table for 75 percent maximum continuous power.

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 graph for ISA conversion at 11,500 feet and the temperature for the route segment:

DEN-PUB	OAT	=	−5°C
	ISA Condition	=	ISA + 3°C
PUB-TBE	OAT	=	0°C
	ISA Condition	=	ISA + 8°C
TBE-DHT	OAT	=	9°C
	ISA Condition	=	ISA + 17°C
DHT-AMA	OAT	=	10°C
	ISA Condition	=	ISA + 18°C

Enter the cruise power settings table for 75 percent maximum continuous power (or full throttle) at 11,000 ft. 12,000 ft. ISA and ISA + 20°C.

	TEMPERATURE					
	ISA			ISA + 20°C		
ALTITUDE FEET	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS
11000	19.2	13.1	167	19.2	12.6	167
12000	18.3	12.6	165	18.3	12.2	165

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

ROUTE SEGMENT	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS
DEN-PUB	18.8	12.8	166
PUB-TBE	18.8	12.7	166
TBE-DHT	18.8	12.5	166
DHT-AMA	18.8	12.5	166

NOTE

The above are exact values for the assumed conditions.

Time and fuel used were calculated as follows:

$$\text{Time} = \frac{\text{Distance}}{\text{Ground Speed}}$$

Fuel Used = (Time) (Fuel Flow)

Results are:

ROUTE SEGMENT	DISTANCE NM	EST GROUND SPEED KNOTS	TIME AT CRUISE ALTITUDE HRS: MIN	FUEL USED FOR CRUISE GAL
DEN-COS	*28	195	:09	1.9
COS-PUB	40	192	:13	2.8
PUB-TBE	74	153	:29	6.1
TBE-DHT	87	154	:34	7.1
DHT-AMA	65	156	:25	5.2

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

TIME - FUEL - DISTANCE

ITEM	TIME HRS: MINS	FUEL GAL	DISTANCE NM
Start, Runup, Taxi and Take-off acceleration	0:00	2.0	0
Climb	0:13	3.6	27
Cruise	1:50	23.1	294
Total	2:03	28.7	321

Total Flight Time: 2 hours, 3 minutes

Block Speed: 321 NM ÷ 2 hours, 3 min. = 157 knots

Reserve Fuel (45 minutes at 45 percent maximum continuous power)

Enter the cruise power settings table for 45 percent MCP (or full throttle). The fuel flow for 45 percent MCP is 9.6 gallons per hour.
Reserve fuel = (45 min) (9.6 GPH) = 7.2 gallons

Total Fuel = 28.7 + 7.2 = 35.9 gallons

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

Assumed ramp weight = 3412 lbs

Estimated fuel from DEN to AMA = (28.7 gal) (6 lbs/gal) = 172 lbs

Estimated landing weight = 3412 – 172 = 3240 lbs

Examples have been provided on the performance graphs. The above conditions have been used throughout. Rate of climb was determined for the initial cruise altitude conditions.

COMMENTS PERTINENT TO THE USE OF PERFORMANCE GRAPHS

1. The example, in addition to presenting an answer for a particular set of conditions, also presents the order in which the graphs should normally be used, i.e., if the first item in the example is OAT, then enter the graph at the known OAT.

2. The reference lines indicate where to begin following guide lines. Always project to the reference line first, then follow the guide lines to the next known item.

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 charts can only be achieved if specified conditions exist.

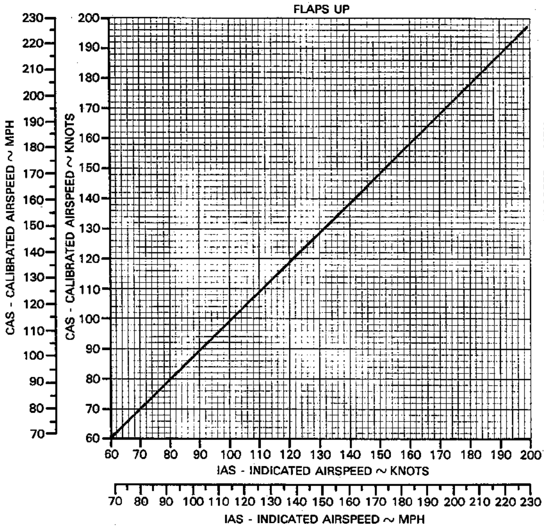
5. The full amount of usable fuel is available for all approved flight conditions.

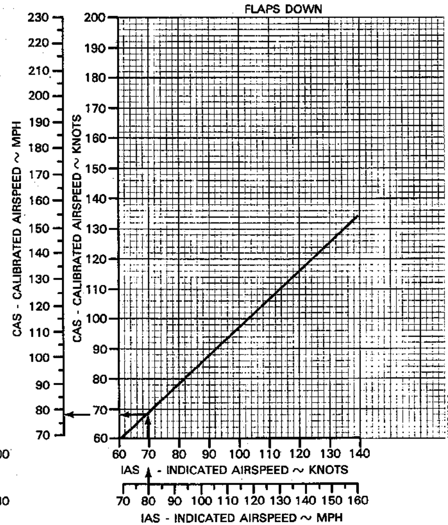
AIRSPEED CALIBRATION - NORMAL SYSTEM

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR

EXAMPLE:

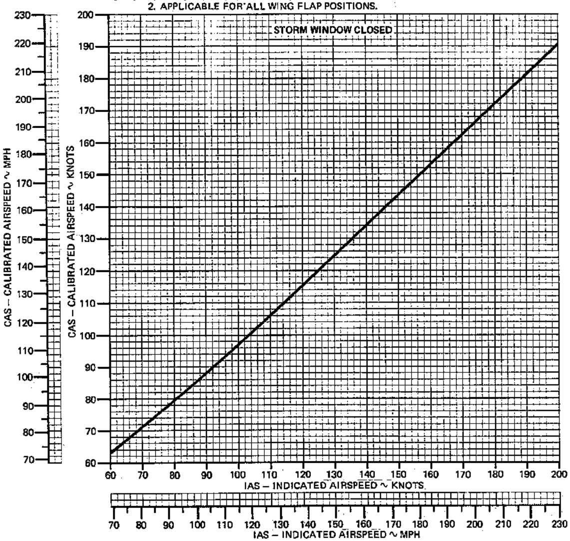
IAS	70 KNOTS (81 MPH)
FLAPS	DOWN
CAS	68 KNOTS (79 MPH)





AIRSPEED CALIBRATION - EMERGENCY SYSTEM

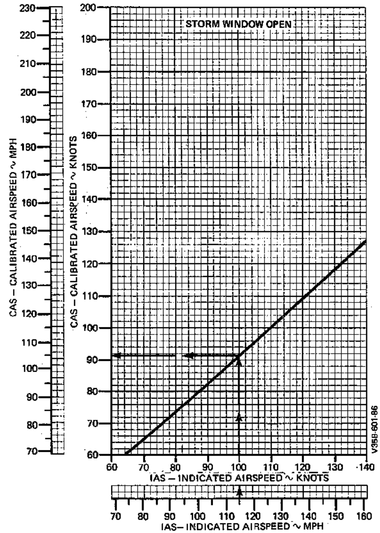
NOTES: 1. INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.
2. APPLICABLE FOR ALL WING FLAP POSITIONS.



EXAMPLE:

IAS . . . . 100 KTS (115 MPH)
STORM WINDOW . . . . OPEN

CAS . . . . 92 KTS (106 MPH)



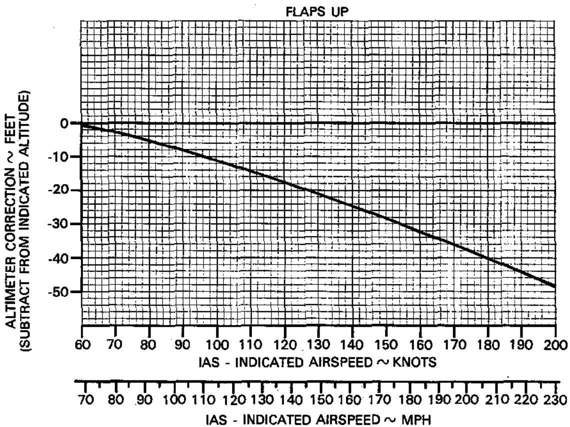
ALTIMETER CORRECTION - NORMAL SYSTEM

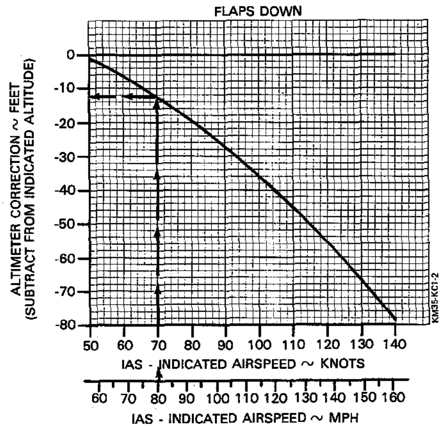
NOTE: INDICATED AIRSPEED AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR

EXAMPLE:

IAS	70 KNOTS (80 MPH)
FLAPS	DOWN
INDICATED PRESSURE ALTITUDE	4500 FT
ALTIMETER CORRECTION	-12 FT

ACTUAL PRESSURE ALTITUDE:
= 4500-12 = 4488 FT





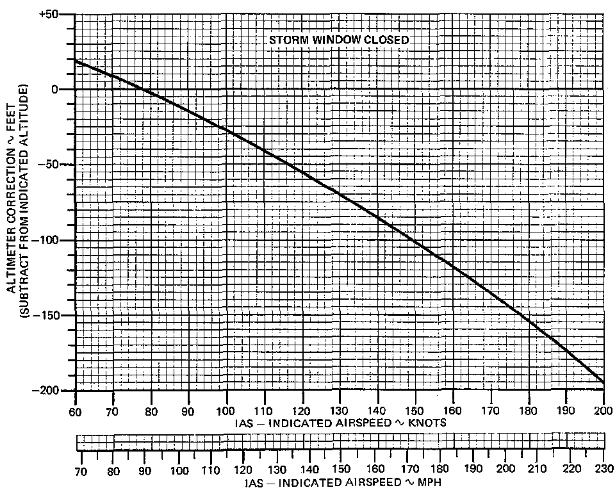
ALTIMETER CORRECTION - EMERGENCY SYSTEM

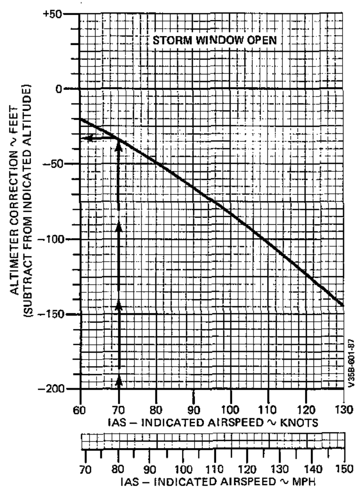
NOTES: 1. INDICATED AIRSPEED AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR.
2. APPLICABLE FOR ALL WING FLAP POSITIONS.

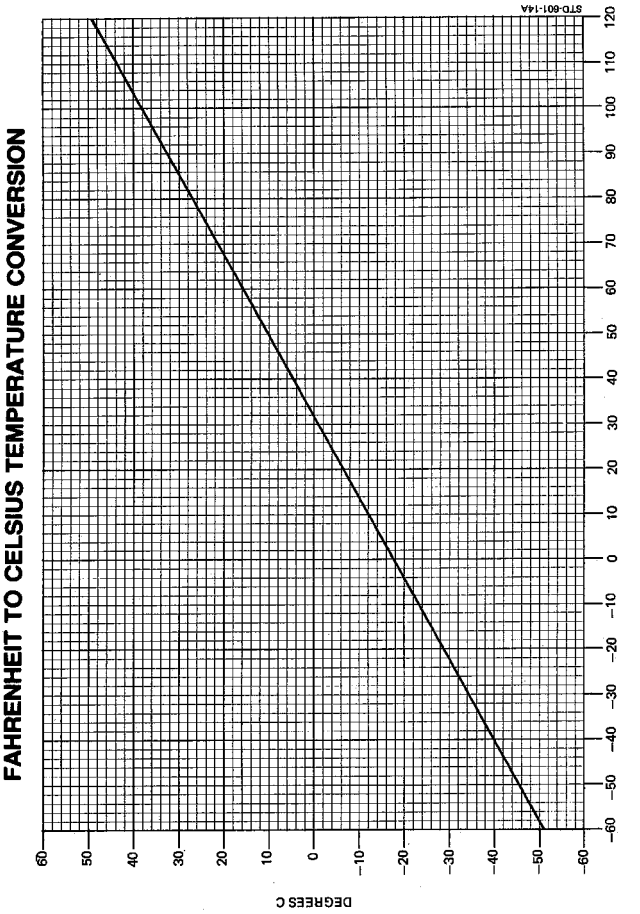
EXAMPLE:

IAS . . . . 70 KTS (81 MPH)
STORM WINDOW . . . . OPEN
INDICATED PRESSURE ALTITUDE. . . 5000 FT

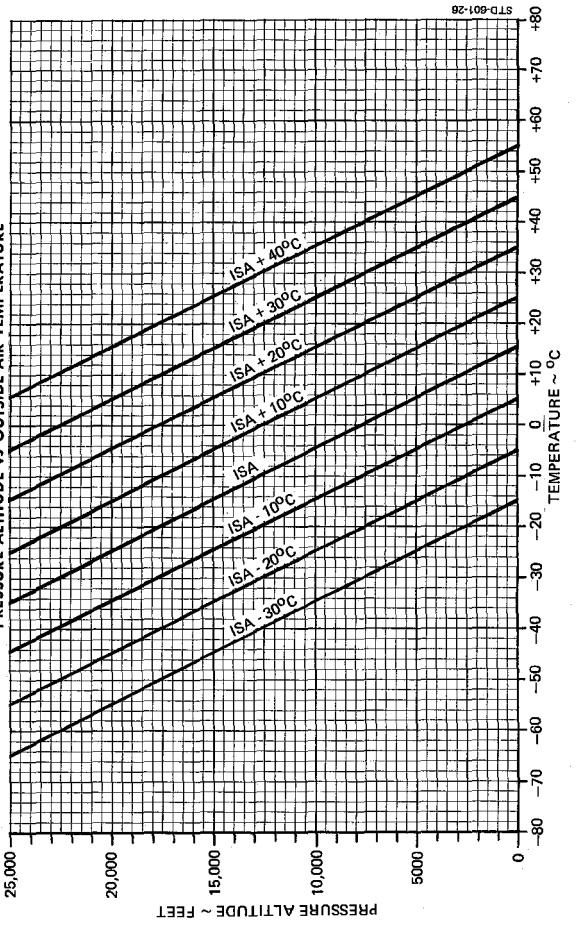
ALTITUDE CORRECTION. . . . . −33 FT
ACTUAL PRESSURE ALTITUDE . . . . 5000−33 = 4967 FT



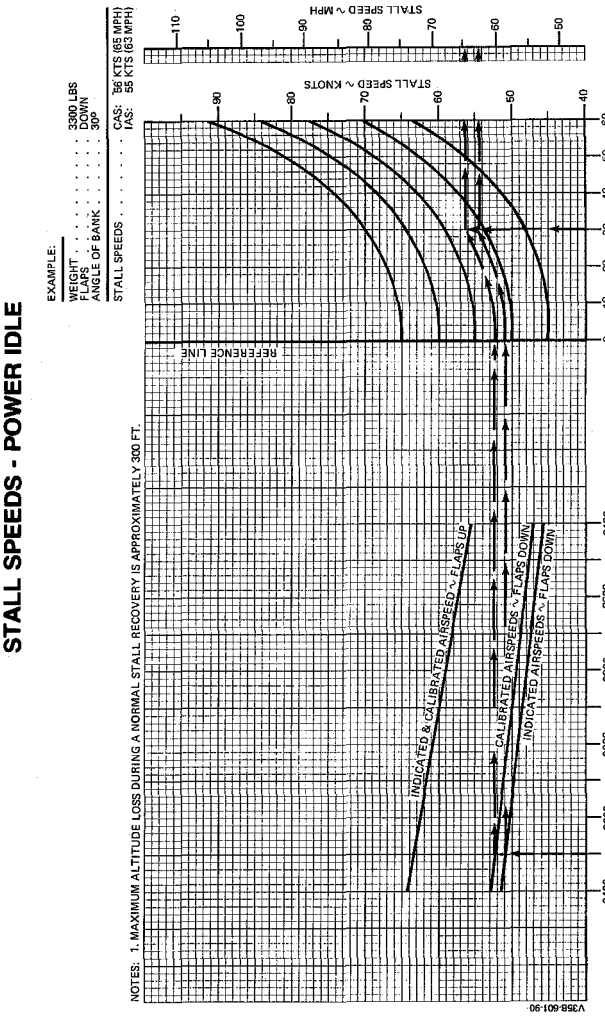



FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION
STD-601-14A
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
DEGREES C

ISA CONVERSION



STALL SPEEDS - POWER IDLE

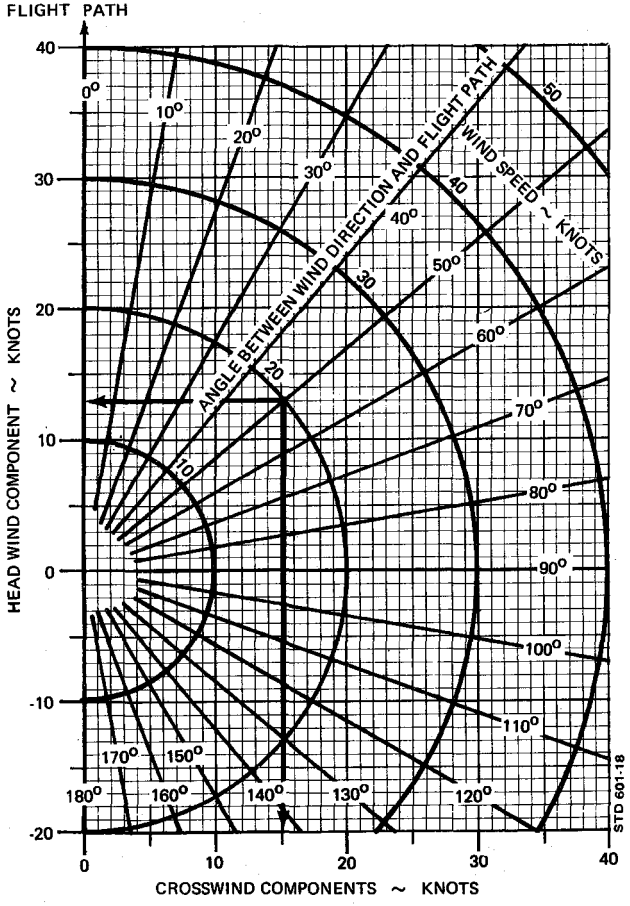


WIND COMPONENTS

Demonstrated Crosswind Component is 17 kts

EXAMPLE:

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



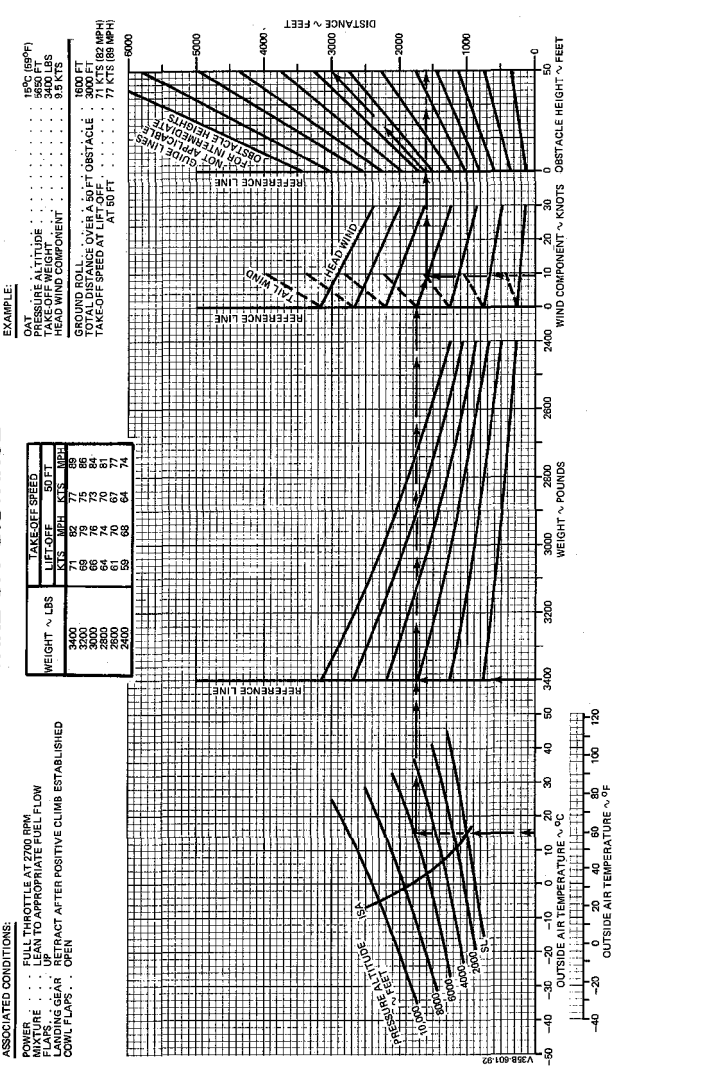
TAKE-OFF DISTANCE

ASSOCIATED CONDITIONS:
POWER . . . . FULL THROTTLE AT 2700 RPM
MIXTURE . . . . LEAN TO APPROPRIATE FUEL FLOW
FLAPS . . . . UP
LANDING GEAR . . . . RETRACT AFTER POSITIVE CLIMB ESTABLISHED
COWL FLAPS . . . . OPEN

WEIGHT ~ LBS	TAKE-OFF SPEED LIFT-OFF KTS	LIFT-OFF MPH	50 FT KTS	50 FT MPH
3400	71	82	75	86
3200	69	79	75	86
3000	66	76	73	84
2800	64	74	70	81
2600	61	70	67	77
2400	59	68	64	74

EXAMPLE:

OAT	15°C (59°F)
PRESSURE ALTITUDE	5650 FT
TAKE-OFF WEIGHT	3400 LBS
HEAD WIND COMPONENT	9.5 KTS
GROUND ROLL	1600 FT
TOTAL DISTANCE OVER A 50 FT OBSTACLE	2900 FT
TAKE-OFF SPEED AT LIFT-OFF	71 KTS (82 MPH)
AT 50 FT	77 KTS (88 MPH)



INTENTIONALLY LEFT BLANK

CLIMB

CLIMB SPEED 96 KNOTS (110 MPH) IAS (ALL WEIGHTS)

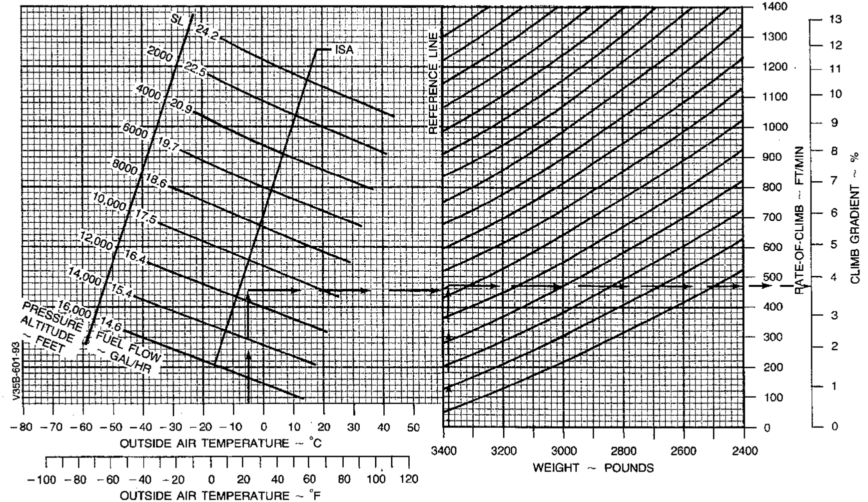
(SERIALS CE-674 THRU CE-890 WITH
2- OR 3-BLADE PROPELLER INSTALLED
AND CE-891 AND AFTER WITH McCAULEY
3-BLADE PROPELLER INSTALLED)
(SERIALS CJ-129 THRU CJ-155)

ASSOCIATED CONDITONS:

POWER	FULL THROTTLE AT 2700 RPM
MIXTURE	LEAN TO APPROPRIATE FUEL FLOW
FLAPS	UP
LANDING GEAR	UP
COWL FLAPS	AS REQUIRED

EXAMPLE:

OAT	−5°C (23°F)
PRESSURE ALTITUDE	11,500 FT
WEIGHT	3380 LBS
RATE-OF-CLIMB	470 FT/MIN
CLIMB GRADIENT	3.8%
CLIMB SPEED	96 KTS (110 MPH)



CLIMB

CLIMB SPEED 96 KNOTS (ALL WEIGHTS)

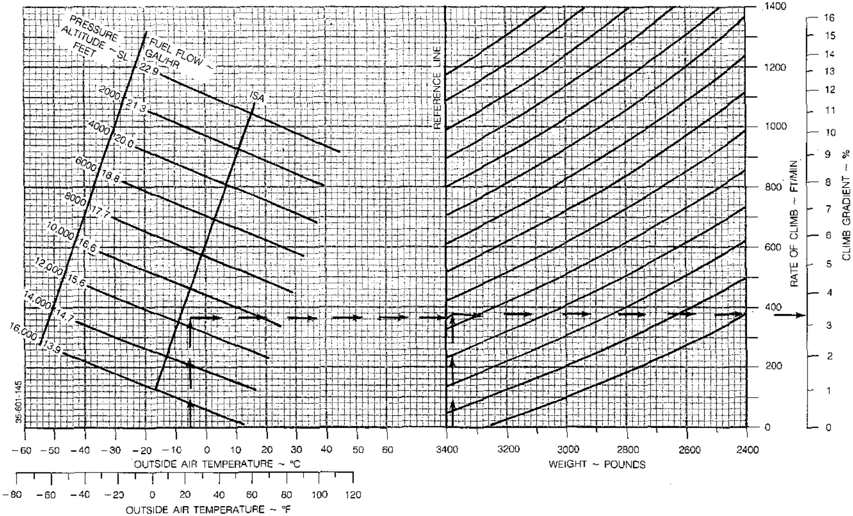
(SERIALS CE-891 AND AFTER WITH 2-BLADE PROPELLER INSTALLED)
(SERIALS CJ-156 AND AFTER)

ASSOCIATED CONDITIONS:

POWER	FULL THROTTLE AT 2550 RPM
MIXTURE	LEAN TO APPROPRIATE FUEL FLOW
FLAPS	UP
LANDING GEAR	UP
COWL FLAPS	AS REQUIRED

EXAMPLE:

OAT	−5°C (23°F)
PRESSURE ALTITUDE	11,500 FT
WEIGHT	3380 LBS
RATE OF CLIMB	375 FT/MIN
CLIMB GRADIENT	3.3%



TIME, FUEL, AND DISTANCE TO CLIMB

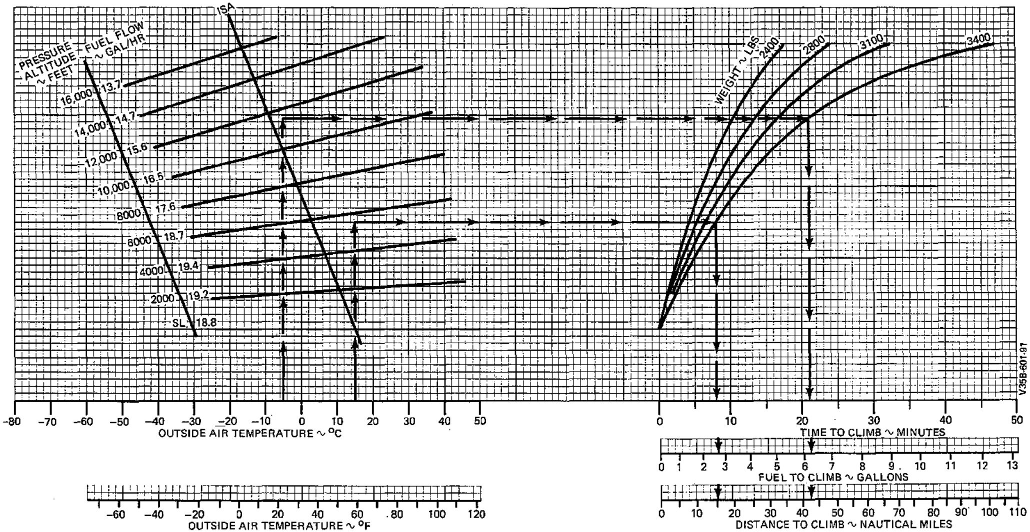
CLIMB SPEED - 107 KNOTS (123 MPH)

ASSOCIATED CONDITIONS:

POWER . . . . 25 IN. HG OR FULL THROTTLE, 2500 RPM
FUEL DENSITY . 6.0 LBS/GAL
MIXTURE . . . LEAN TO APPROPRIATE FUEL FLOW
COWL FLAPS . . CLOSED

EXAMPLE:

OAT AT TAKE-OFF	15°C
OAT AT CRUISE	-5°C
AIRPORT PRESSURE ALTITUDE	5650 FT
CRUISE PRESSURE ALTITUDE	11,500 FT
INITIAL CLIMB WEIGHT	3400 LBS
TIME TO CLIMB (21-8)	13 MIN
FUEL TO CLIMB (6.25 – 2.65)	3.6 GALS
DISTANCE TO CLIMB (42–15)	27 NM



CRUISE POWER SETTINGS

75% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2500 RPM
3200 POUNDS

	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
PRESS ALT.	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS
FEET	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS
SL	27	−3	2500	23.9	91.4	15.2	159	165	63	17	2500	24.6	91.4	15.2	163	163	100	38	2500	25.1	91.4	15.2	166	161
1000	24	−5	2500	23.6	91.4	15.2	161	164	60	16	2500	24.3	91.4	15.2	164	162	96	36	2500	24.8	91.4	15.2	168	160
2000	20	−7	2500	23.4	91.4	15.2	162	163	56	14	2500	24.1	91.4	15.2	166	161	93	34	2500	24.6	91.4	15.2	169	159
3000	17	−8	2500	23.1	91.4	15.2	164	163	53	12	2500	23.8	91.4	15.2	167	160	89	32	2500	24.3	91.4	15.2	171	158
4000	13	−10	2500	22.8	91.4	15.2	165	162	49	10	2500	23.5	91.4	15.2	169	159	86	30	2500	24.0	91.4	15.2	172	157
5000	10	−12	2500	22.5	91.4	15.2	167	161	46	8	2500	23.2	91.4	15.2	170	158	82	28	2500	23.7	91.4	15.2	173	156
6000	6	−14	2500	22.2	91.4	15.2	168	160	43	6	2500	23.0	91.4	15.2	172	157	79	26	2500	23.5	89.7	15.0	174	153
7000	3	−16	2500	22.0	91.4	15.2	169	159	39	4	2500	22.6	89.7	15.0	172	155	75	24	2500	22.6	86.7	14.5	172	150
8000	−1	−18	2500	21.7	89.4	14.9	169	156	35	2	2500	21.7	86.5	14.4	170	151	71	22	2500	21.7	83.6	13.9	171	147
9000	−4	−20	2500	20.8	86.5	14.4	168	153	32	0	2500	20.8	83.7	14.0	169	148	68	20	2500	20.8	81.0	13.5	170	143
10000	−8	−22	2500	20.0	83.7	14.0	167	150	28	−2	2500	20.0	81.0	13.5	168	145	64	18	2500	20.0	78.3	13.1	168	140
11000	−12	−24	2500	19.2	80.9	13.5	166	146	24	−4	2500	19.2	78.3	13.1	167	142	60	16	2500	19.2	75.7	12.6	167	137
12000	−15	−26	2500	18.3	78.2	13.0	165	143	21	−6	2500	18.3	75.7	12.6	165	138	57	14	2500	18.3	73.1	12.2	165	133
13000	−19	−28	2500	17.6	75.4	12.6	163	139	17	−8	2500	17.6	73.0	12.2	164	135	53	12	2500	17.6	70.6	11.8	163	129
14000	−23	−30	2500	16.8	72.9	12.2	162	136	13	−10	2500	16.8	70.6	11.8	162	131	49	10	2500	16.8	68.3	11.4	162	126
15000	−26	−32	2500	16.1	70.4	11.7	160	133	10	−12	2500	16.1	68.2	11.4	160	127	46	8	2500	16.1	66.0	11.0	159	122
16000	−30	−34	2500	15.4	68.1	11.4	158	129	6	−14	2500	15.4	65.9	11.0	158	124	42	6	2500	15.4	63.7	10.6	156	118

NOTES:
1. **Full throttle manifold pressure settings are approximate.**
2. **Shaded area represents operation with full throttle.**

CRUISE POWER SETTINGS

65% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2300 RPM
3200 POUNDS

	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
PRESS ALT.	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS
FEET	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS
SL	27	−3	2300	23.3	80.0	13.3	150	156	63	17	2300	23.9	80.0	13.3	154	153	99	37	2300	24.5	80.0	13.3	156	151
1000	23	−5	2300	23.1	80.0	13.3	152	155	59	15	2300	23.6	80.0	13.3	155	153	96	35	2300	24.2	80.0	13.3	158	150
2000	20	−7	2300	22.8	80.0	13.3	153	154	56	13	2300	23.4	80.0	13.3	156	152	92	33	2300	24.0	80.0	13.3	159	149
3000	16	−9	2300	22.5	80.0	13.3	154	153	52	11	2300	23.1	80.0	13.3	157	151	89	31	2300	23.7	80.0	13.3	160	148
4000	13	−11	2300	22.3	80.0	13.3	155	152	49	9	2300	22.9	80.0	13.3	159	150	85	29	2300	23.5	80.0	13.3	161	147
5000	9	−13	2300	22.0	80.0	13.3	157	151	45	7	2300	22.6	80.0	13.3	160	148	82	28	2300	23.2	80.0	13.3	163	146
6000	6	−15	2300	21.8	80.0	13.3	158	150	42	6	2300	22.4	80.0	13.3	161	147	78	26	2300	23.0	80.0	13.3	164	145
7000	2	−17	2300	21.5	80.0	13.3	159	149	38	4	2300	22.1	80.0	13.3	162	146	75	24	2300	22.6	79.0	13.2	164	143
8000	−1	−18	2300	21.3	80.0	13.3	160	148	35	2	2300	21.7	80.0	13.3	163	144	71	22	2300	21.7	76.3	12.7	163	139
9000	−5	−20	2300	20.9	78.1	13.0	160	145	31	0	2300	20.9	76.4	12.7	161	141	67	20	2300	20.9	73.9	12.3	161	136
10000	−8	−22	2300	20.0	76.2	12.7	159	143	28	−2	2300	20.0	73.8	12.3	160	138	64	18	2300	20.0	71.4	11.9	159	132
11000	−12	−24	2300	19.2	73.8	12.3	158	139	24	−4	2300	19.2	71.4	11.9	158	134	60	16	2300	19.2	69.1	11.5	158	129
12000	−16	−27	2300	18.4	71.3	11.9	157	136	20	−7	2300	18.4	69.0	11.5	157	131	56	13	2300	18.4	66.8	11.1	156	125
13000	−19	−29	2300	17.6	68.8	11.5	155	132	17	−9	2300	17.6	66.6	11.1	155	127	53	11	2300	17.6	64.5	10.8	153	121
14000	−23	−31	2300	16.9	66.4	11.1	153	129	13	−11	2300	16.9	64.4	10.7	152	123	49	9	2300	16.9	62.4	10.4	151	117
15000	−27	−33	2300	16.1	64.0	10.7	151	125	9	−13	2300	16.1	62.1	10.4	150	119	45	7	2300	16.1	60.2	10.0	147	113
16000	−30	−35	2300	15.5	61.9	10.3	148	121	6	−15	2300	15.5	60.0	10.0	147	116								

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.

CRUISE POWER SETTINGS

55% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2100 RPM
3200 POUNDS

	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
PRESS ALT.	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS
FEET	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS
SL	26	−3	2100	23.0	68.8	11.5	140	145	62	17	2100	23.6	68.8	11.5	143	143	99	37	2100	24.2	68.8	11.5	145	140
1000	23	−5	2100	22.8	68.8	11.5	141	144	59	15	2100	23.3	68.8	11.5	144	142	95	35	2100	24.0	68.8	11.5	146	139
2000	19	−7	2100	22.5	68.8	11.5	142	143	55	13	2100	23.1	68.8	11.5	145	141	91	33	2100	23.7	68.8	11.5	147	138
3000	16	−9	2100	22.3	68.8	11.5	143	142	52	11	2100	22.9	68.8	11.5	146	140	88	31	2100	23.5	68.8	11.5	148	137
4000	12	−11	2100	22.1	68.8	11.5	144	141	48	9	2100	22.6	68.8	11.5	147	138	84	29	2100	23.2	68.8	11.5	149	135
5000	9	−13	2100	21.8	68.8	11.5	145	140	45	7	2100	22.4	68.8	11.5	148	137	81	27	2100	23.0	68.8	11.5	150	134
6000	5	−15	2100	21.6	68.8	11.5	146	139	41	5	2100	22.1	68.8	11.5	148	136	77	25	2100	22.7	68.8	11.5	150	133
7000	2	−17	2100	21.3	68.8	11.5	147	138	38	3	2100	21.9	68.8	11.5	149	135	74	23	2100	22.5	68.8	11.5	151	132
8000	−2	−19	2100	21.1	68.8	11.5	148	137	34	1	2100	21.6	68.8	11.5	150	133	70	21	2100	21.9	67.5	11.3	151	129
9000	−5	−21	2100	20.9	68.4	11.4	149	135	31	−1	2100	21.0	67.3	11.2	149	131	67	19	2100	21.0	65.6	10.9	149	126
10000	−9	−23	2100	20.1	68.0	11.3	149	133	27	−3	2100	20.2	65.8	11.0	148	128	63	17	2100	20.1	63.8	10.6	147	122
11000	−13	−25	2100	19.3	66.0	11.0	147	130	23	−5	2100	19.3	64.0	10.7	147	124	59	15	2100	19.3	62.0	10.3	145	119
12000	−16	−27	2100	18.5	64.0	10.7	146	126	20	−7	2100	18.5	62.1	10.4	145	121	56	13	2100	18.5	60.2	10.0	142	114
13000	−20	−29	2100	17.7	62.0	10.3	144	123	16	−9	2100	17.7	60.2	10.0	142	117	52	11	2100	17.7	58.4	9.7	139	110
14000	−24	−31	2100	16.9	59.8	10.0	141	119	12	−11	2100	16.8	57.9	9.7	139	112								
15000	−27	−33	2100	16.2	57.6	9.6	138	114																
16000	−31	−35	2100	15.6	55.6	9.3	135	110																

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.

CRUISE POWER SETTINGS

45% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2100 RPM
3200 POUNDS

	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
PRESS ALT.	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS	IOAT		ENGINE SPEED	MAN. PRESS.	FUEL FLOW		TAS	CAS
FEET	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS	°F	°C	RPM	IN HG	PPH	GPH	KTS	KTS
SL	26	−4	2100	20.4	57.6	9.6	127	132	62	17	2100	20.8	57.6	9.6	130	130	98	37	2100	21.2	57.6	9.6	132	127
1000	22	−5	2100	20.1	57.6	9.6	128	131	58	15	2100	20.5	57.6	9.6	131	129	94	35	2100	20.9	57.6	9.6	133	126
2000	19	−7	2100	19.8	57.6	9.6	129	130	55	13	2100	20.2	57.6	9.6	131	128	91	33	2100	20.6	57.6	9.6	133	125
3000	15	−9	2100	19.4	57.6	9.6	130	129	51	11	2100	19.9	57.6	9.6	132	127	87	31	2100	20.3	57.6	9.6	134	124
4000	12	−11	2100	19.1	57.6	9.6	131	128	48	9	2100	19.6	57.6	9.6	133	126	84	29	2100	20.0	57.6	9.6	135	123
5000	8	−13	2100	18.8	57.6	9.6	132	127	44	7	2100	19.3	57.6	9.6	134	124	80	27	2100	19.7	57.6	9.6	136	122
6000	5	−15	2100	18.5	57.6	9.6	133	126	41	5	2100	19.0	57.6	9.6	135	123	77	25	2100	19.4	57.6	9.6	136	120
7000	1	−17	2100	18.2	57.6	9.6	134	125	37	3	2100	18.7	57.6	9.6	135	122	73	23	2100	19.1	57.6	9.6	137	119
8000	−3	−19	2100	17.9	57.6	9.6	134	124	34	1	2100	18.4	57.6	9.6	136	121	70	21	2100	18.8	57.6	9.6	137	118
9000	−6	−21	2100	17.6	57.6	9.6	135	123	30	−1	2100	18.1	57.6	9.6	137	120	66	19	2100	18.5	57.6	9.6	138	116
10000	−10	−23	2100	17.3	57.6	9.6	136	122	26	−3	2100	17.8	57.6	9.6	137	118	63	17	2100	18.2	57.6	9.6	138	115
11000	−13	−25	2100	17.0	57.6	9.6	136	120	23	−5	2100	17.5	57.6	9.6	138	117	59	15	2100	17.9	57.6	9.6	138	113
12000	−17	−27	2100	16.7	57.6	9.6	137	119	19	−7	2100	17.1	57.6	9.6	138	115	55	13	2100	17.6	57.6	9.6	138	111
13000	−20	−29	2100	16.4	57.6	9.6	137	117	16	−9	2100	16.8	57.6	9.6	138	113								
14000	−24	−31	2100	16.0	57.6	9.6	138	116	12	−11	2100	16.5	56.6	9.6	136	110								
15000	−27	−33	2100	15.7	57.6	9.6	138	114																
16000	−31	−35	2100	15.4	56.6	9.3	135	110																

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.

CRUISE SPEEDS

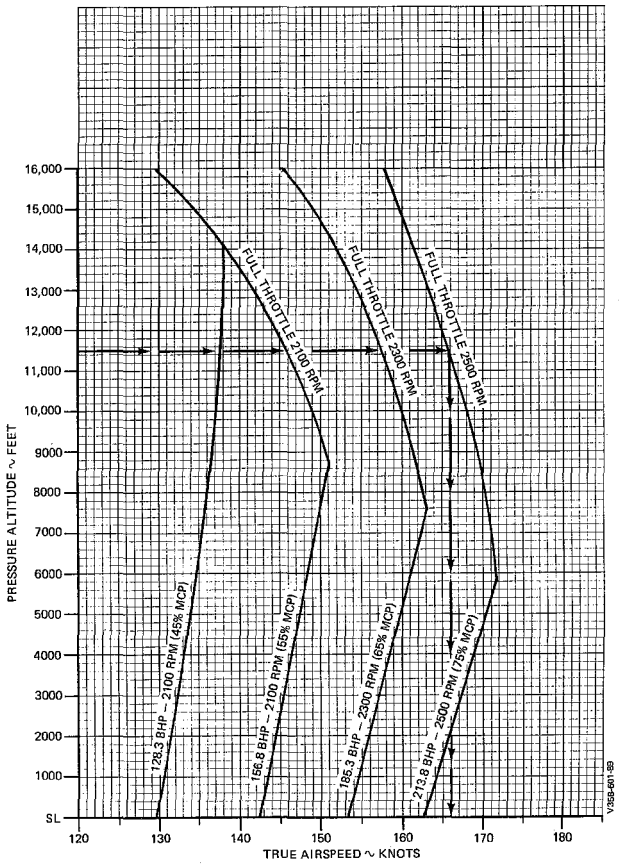
ASSOCIATED CONDITIONS:

AVERAGE CRUISE WEIGHT 3200 LBS
TEMPERATURE . . . . . STANDARD DAY (ISA)

EXAMPLE:

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

TRUE AIRSPEED . . 166 KTS

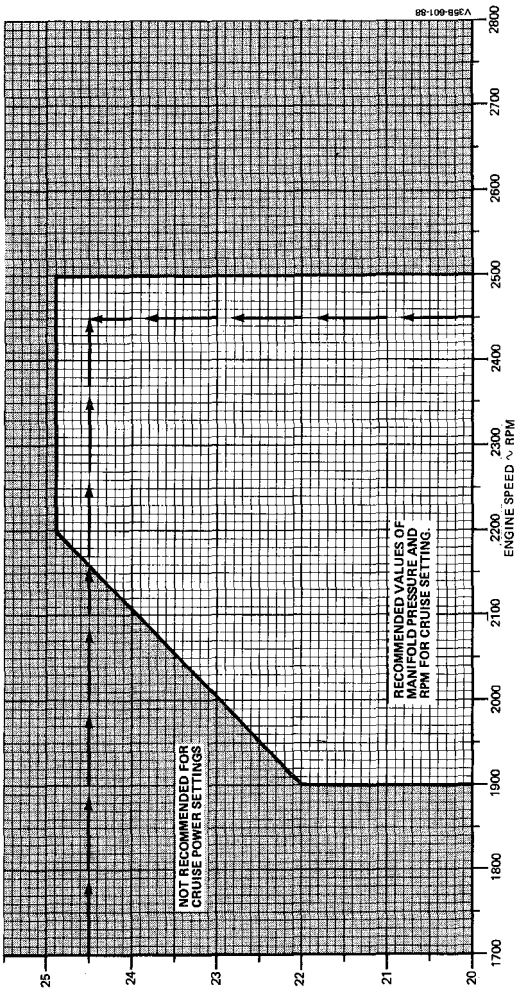


MANIFOLD PRESSURE vs RPM

EXAMPLE:

ENGINE SPEED . . . . . 2450 RPM
MANIFOLD PRESSURE . . . . . 24.5 IN. HG

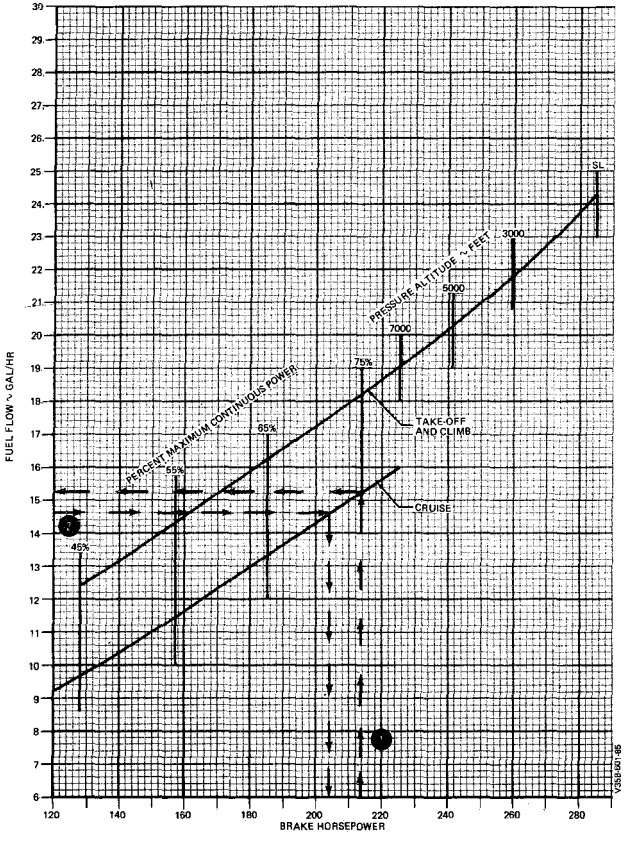
WITHIN RECOMMENDED LIMITS



FUEL FLOW vs BRAKE HORSEPOWER

EXAMPLE:

1	BRAKE HORSEPOWER	213.75 75% MCP
	CONDITION	LEVEL FLIGHT CRUISE
	FUEL FLOW	15.25 GAL/HR
2	FUEL FLOW	14.6 GAL/HR
	CONDITION	LEVEL FLIGHT CRUISE
	BRAKE HORSEPOWER	204



RANGE PROFILE - 74 GALLONS

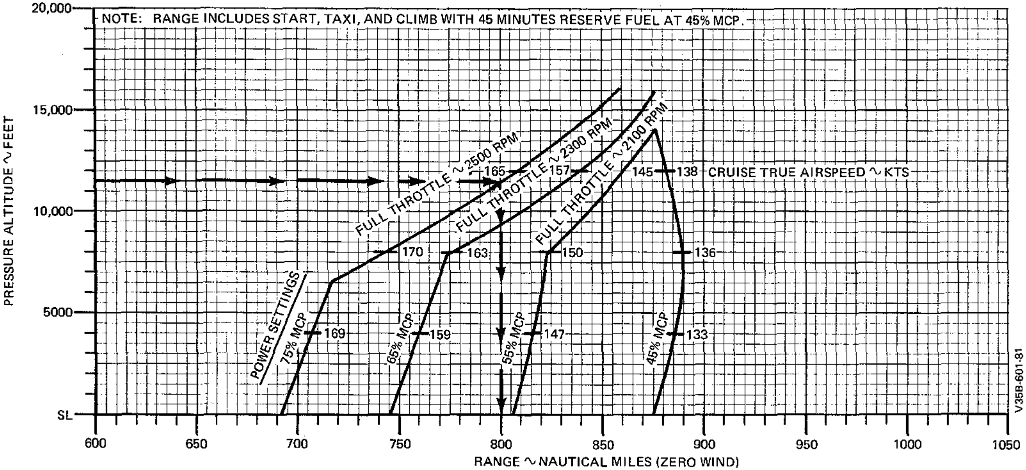
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT	3412 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	74 U.S. GAL (444 LBS)

EXAMPLE:

PRESSURE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE,2500 RPM
RANGE	800 NM



RANGE PROFILE - 44 GALLONS

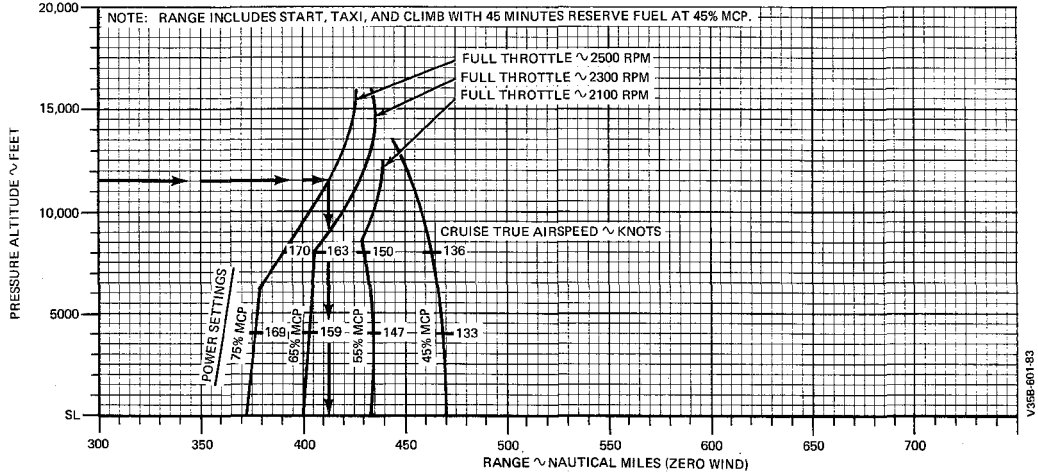
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT	3412 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	44 U.S. GAL (264 LBS)

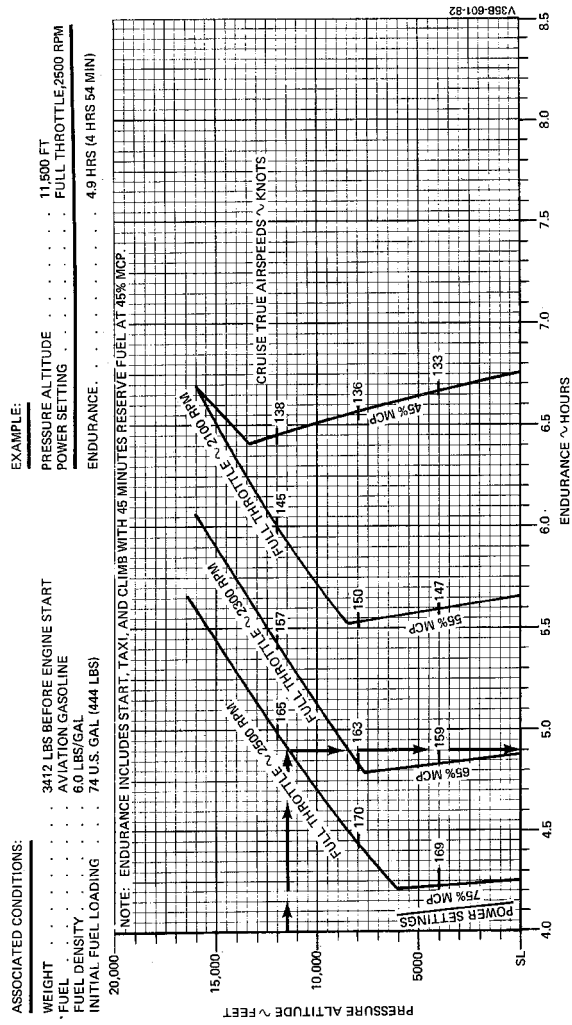
EXAMPLE:

PRESSURE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE,2500 RPM
RANGE	413 NM



ENDURANCE PROFILE - 74 GALLONS

STANDARD DAY (ISA)



ENDURANCE PROFILE - 44 GALLONS

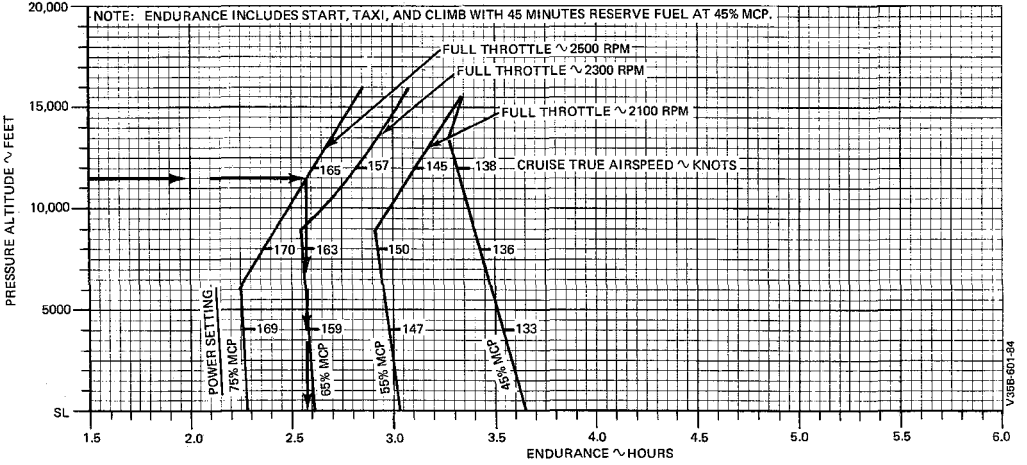
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT	3412 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	44 U.S. GAL (264 LBS)

EXAMPLE:

PRESSURE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE,2500 RPM
ENDURANCE	2.57 HRS (2 HRS 34 MIN)



LANDING DISTANCE

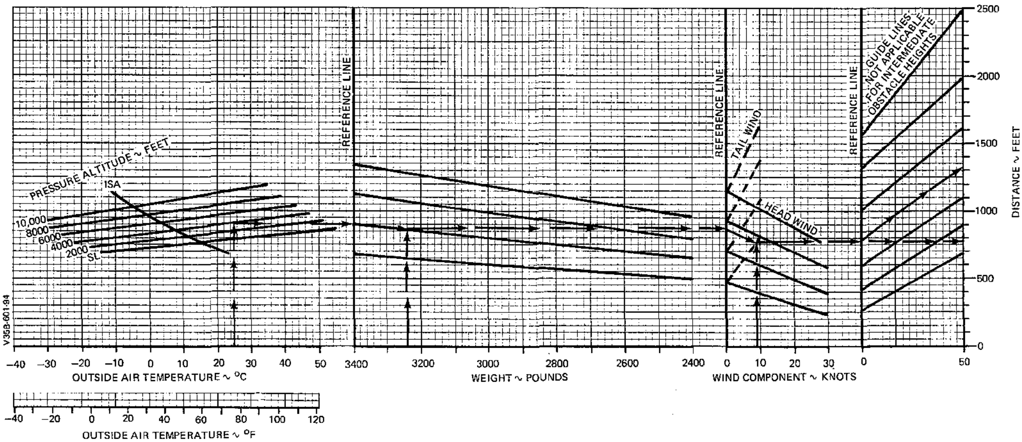
ASSOCIATED CONDITIONS:

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

WEIGHT ~ LBS	SPEED AT 50 FT	
	KTS	MPH
3400	70	81
3200	68	79
3000	66	76
2800	63	73
2600	61	71
2400	59	68

EXAMPLE:

OAT	25°C (77°F)
PRESSURE ALTITUDE	3965 FT
WEIGHT	3242 LBS
HEADWIND COMPONENT	9 KTS
GROUND ROLL	763 FT
TOTAL OVER 50 FT OBSTACLE	1324 FT
APPROACH SPEED	69 KTS (80 MPH)



SECTION VI

WEIGHT AND BALANCE/ EQUIPMENT LIST

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WEIGHING INSTRUCTIONS

Periodic weighing of the Bonanza F33A 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 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 preparatory 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 undrainable fuel remain in the airplane at Fuselage Station 76.0. The remainder of the unusable fuel to be added to a Basic Empty Weight 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 24.5. (Includes 3 pounds undrainable.)

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.

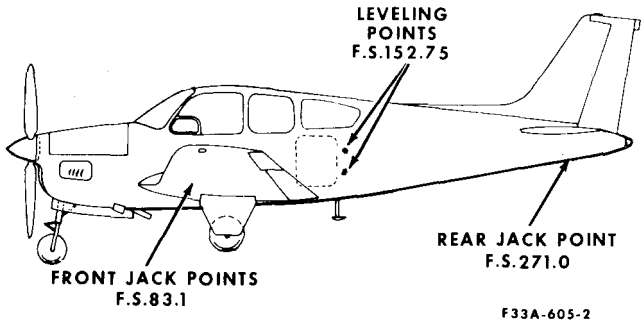
5. At the time of weighing, the airplane must be level both longitudinally and laterally, and the landing gear must be fully extended. Leveling screws are located on the left side of the fuselage at approximately Fuselage Station 152.25. Longitudinally level attitude is determined with a plumb bob. Laterally 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 tak-

en, 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 12.7 for the nose wheel.

7. Jack point weighings are accomplished by placing scales on 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 F33A SER. NO. _____ REG. NO. _____ DATE _____

STRUT POSITION - NOSE		MAIN	JACK POINT LOCATION		PREPARED BY
EXTENDED	11.8	96	*FORWARD*	83.1	*Company* _____
COMPRESSED	13.1	97	*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					
EMPTY WEIGHT					
ENGINE OIL			26	–	638
UNUSABLE FUEL			36	79	2844
BASIC EMPTY WEIGHT					

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.

That current equipment list and basic empty weight and CG information must be retained with the airplane when it changes ownership. Beech Aircraft Corporation cannot maintain this information; the current status is known only to the owner. If these papers become lost, the FAA will require that the airplane be re-weighed to establish the basic empty weight and CG and that an inventory of installed equipment be conducted to create a new equipment list.

WEIGHT AND BALANCE RECORD

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

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

WEIGHT AND BALANCE RECORD

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

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

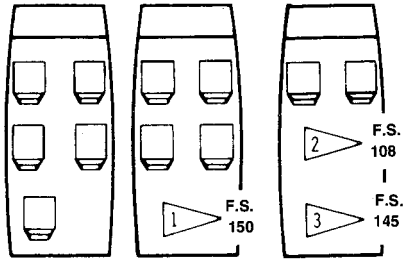
LOADING INSTRUCTIONS

It is the responsibility of the airplane operator to ensure that the airplane is properly loaded. At the time of delivery, Beech Aircraft Corporation 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

	F.S.
PILOT & F. PASS	
FWD. POS.	85
AFT POS.	89
3RD & 4TH SEAT PASS	
FWD. POS.	121
AFT POS.	127
5TH SEAT PASS	154



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.

NOTE

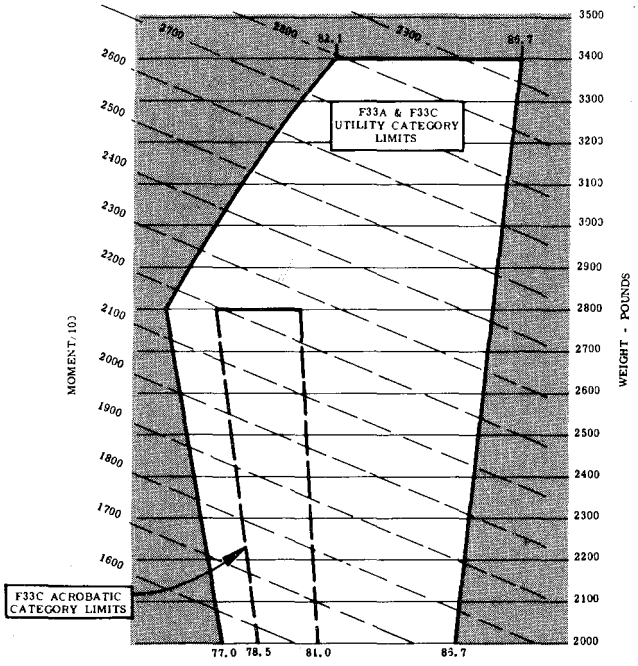
All baggage/cargo must be secured with an approved cargo net.

1 MAXIMUM WEIGHT 270 POUNDS INCLUDING EQUIPMENT AND BAGGAGE WITH 5th SEAT REMOVED OR STOWED.

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

3 MAXIMUM WEIGHT 270 POUNDS AFT OF REAR SPAR INCLUDING EQUIPMENT AND CARGO WITH 3rd, 4th and 5th SEATS REMOVED.

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
F33A & F33C UTILITY CATEGORY	3400 LB. (MAXIMUM TAKE-OFF OR LANDING)	82.1	86.7
	2800 LB. OR LESS	77.0	86.7
F33C ACROBATIC CATEGORY	2800 LB. OR LESS	78.5	81.0

COMPUTING PROCEDURE

1. Record the Basic Empty Weight and Moment from the Basic Empty Weight and Balance form (or from the latest superseding form) under the Basic Empty Condition block. The moment must be divided by 100 to correspond to Useful Load Weights and Moments tables.

2. Record the weight and corresponding moment from the appropriate table of each of the useful load items (except fuel) to be carried in the airplane.

3. Total the weight column and moment column. The SUB-TOTALS are the Zero Fuel Condition.

4. Determine the weight and corresponding moment for the fuel loading to be used. This fuel loading includes fuel for the flight, plus that required for start, taxi, and takeoff. Add the Fuel Loading Condition to Zero Fuel Condition to obtain the SUB-TOTAL Ramp Condition.

5. Subtract the fuel to be used for start, taxi, and takeoff to arrive at the SUB-TOTAL 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 Limit 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 OCCUPANT		
5. BAGGAGE		
6. CARGO		
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		

*Fuel for start, taxi, and run up is normally 12 lbs at an average mom/100 of 9.

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 OCCUPANT		
5. BAGGAGE		
6. CARGO		
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		

*Fuel for start, taxi, and run up is normally 12 lbs at an average mom/100 of 9.

USEFUL LOAD WEIGHTS AND MOMENTS

WEIGHT	OCCUPANTS					
	FRONT SEATS		3RD & 4TH SEATS		5TH SEAT	
	FWD. POSITION ARM 85	AFT POSITION ARM 89	FWD. POSITION ARM 121	AFT POSITION ARM 127	ARM 154	
	MOMENT/100				WEIGHT	MOM/100
120	102	107	145	152	20	31
130	110	116	157	165	40	62
140	119	125	169	178	60	92
150	128	134	182	190	80	123
160	136	142	194	203	100	154
170	144	151	206	216	120	185
180	153	160	218	229	140	216
190	162	169	230	241	160	246
200	170	178	242	254	170	262

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		CARGO	
ARM 150		Fwd of Spar (3rd & 4th Seats Removed) ARM 108	Aft of Spar (3rd,4th, & 5th Seats Removed) ARM 145
WEIGHT	MOM/100	MOM/100	MOM/100
10	15	11	15
20	30	22	29
30	45	32	44
40	60	43	58
50	75	54	73
60	90	65	87
70	105	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
210	315		305
220	330		319
230	345		334
240	360		348
250	375		363
260	390		377
270	405		392

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			

SECTION VII
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AIRFRAME

The BEECHCRAFT Bonanza F33A is an all-metal, low-wing, single-engine airplane with retractable tricycle landing gear and conventional horizontal and vertical stabilizers.

SEATING ARRANGEMENTS

The Bonanza F33A is a 4- or 5-place airplane. In the standard configuration 4 seats are installed. A 5th seat is optional.

FLIGHT CONTROLS

CONTROL SURFACES

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

CONTROL COLUMN

The throw-over type control column for elevator and aileron control can be placed in front of either front seat. Pull the T-handle latch at the back of the control arm and position the control wheel as desired. The aileron trimmer on the control column hub should be held until the column is repositioned

RUDDER PEDALS

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

TRIM CONTROLS

Elevator trim is controlled by a handwheel located to the left of the throttle. An elevator tab position indicator dial is located above and to the left of the trim control.

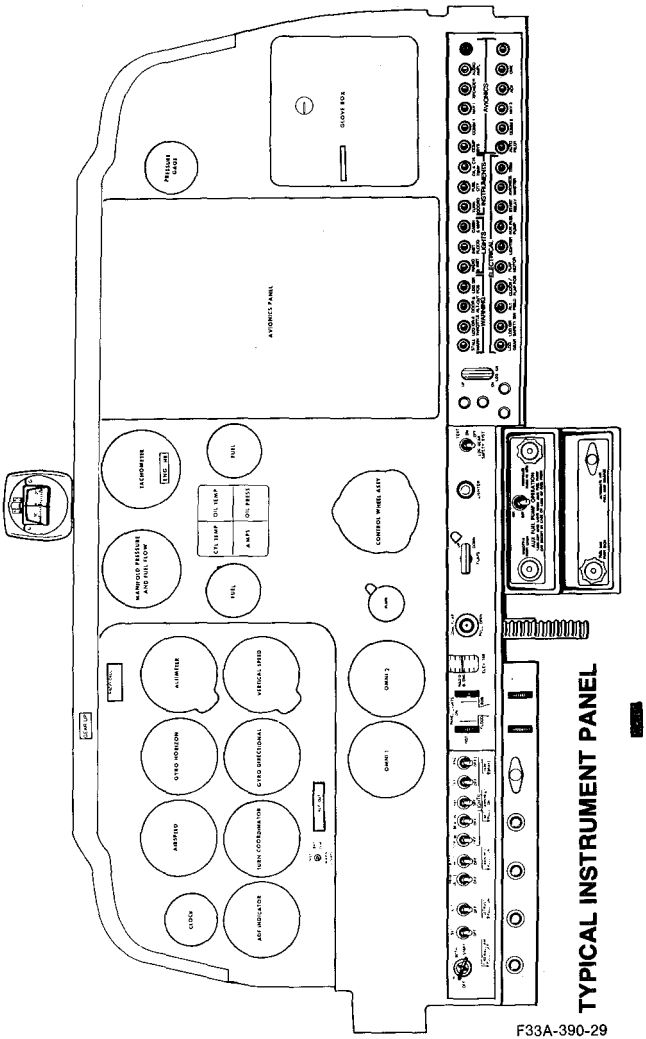
The aileron trimmer on the control column hub displaces the ailerons. Displacement is maintained by cable loads imposed by the trimmer.

ELECTRIC ELEVATOR TRIM

The optional electric elevator trim system controls include the ON-OFF switch located on the instrument panel, a thumb switch on the control wheel and a circuit breaker on the right subpanel. The ON-OFF switch must be in the ON position to operate the system. The thumb switch is moved forward for nose down, aft for nose up, and when released returns to the center OFF position. When the system is not being electrically actuated, the manual trim control wheel may be used.

INSTRUMENT PANEL

The standard instrument panel of the Bonanza F33A consists of the floating instrument panel on the upper left portion, the engine instrument grouping on the center of the panel above the control wheel yoke, a radio grouping to the right of the engine instruments, and a subpanel which provides for a



TYPICAL INSTRUMENT PANEL

F33A-390-29

compact circuit breaker group on the right side and switching panel on the left.

FLIGHT INSTRUMENTS

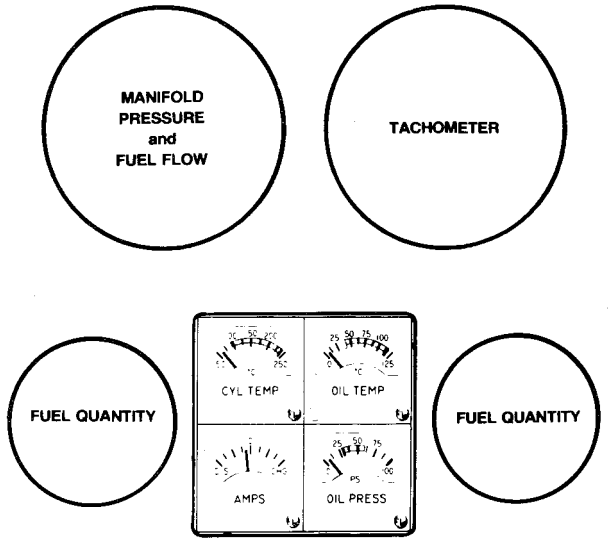
The floating instrument panel contains all flight instruments except the magnetic compass. On this panel are the airspeed indicator, gyro horizon, altimeter, turn coordinator, directional gyro, and vertical speed indicator, with provisions for an ADF indicator and a clock. Additional navigation equipment, such as dual omni indicators, can be mounted in the panel directly below the flight instrument grouping.

ENGINE INSTRUMENTS

The engine instruments, located on the center panel, include a fuel flow/manifold pressure indicator, an engine tachometer, a fuel quantity indicator for each side, and a cluster which includes an oil pressure indicator, an oil temperature indicator, a cylinder head temperature indicator, and an ammeter.

CLUSTER TYPE ENGINE INSTRUMENTS

The cluster type instruments, as shown in the accompanying illustration, are located in the center of the panel just below the fuel flow/manifold pressure indicator and tachometer. Included in the square cluster are the cylinder head temperature and oil temperature (both calibrated in degrees centigrade), ammeter, and oil pressure. A fuel quantity indicator is located on each side of the cluster, the left indicator for the left wing fuel and the right indicator for the right wing fuel.



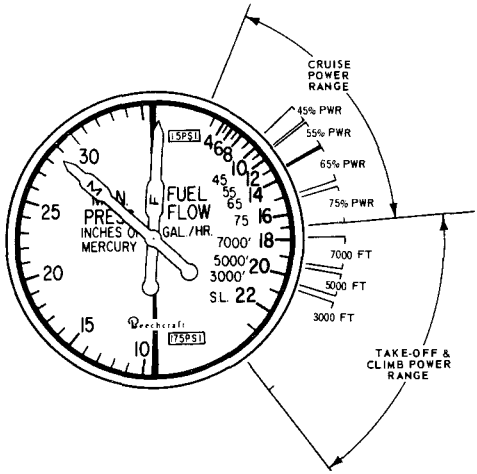
CLUSTER ARRANGEMENT

MANIFOLD PRESSURE AND FUEL FLOW INDICATOR

The manifold pressure portion of this instrument indicates the pressure in the engine manifold and is calibrated in inches of mercury. By observing the manifold pressure indication 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 the PERFORMANCE Section.

For Airplanes With Fuel Pressure Indicating Systems (Serials CE-674 thru CE-928; CJ-129 thru CJ-155)

The fuel flow portion of the indicator senses fuel pressure at the fuel distributor and is calibrated to indicate fuel flow in gallons per hour. The green arc indicates the normal fuel flow operating range while the red radials indicate the minimum and maximum allowable fuel pressures.



MANIFOLD PRESSURE AND FUEL FLOW INDICATOR (CE-674 THRU CE-928 AND CJ-129 THRU CJ-155)

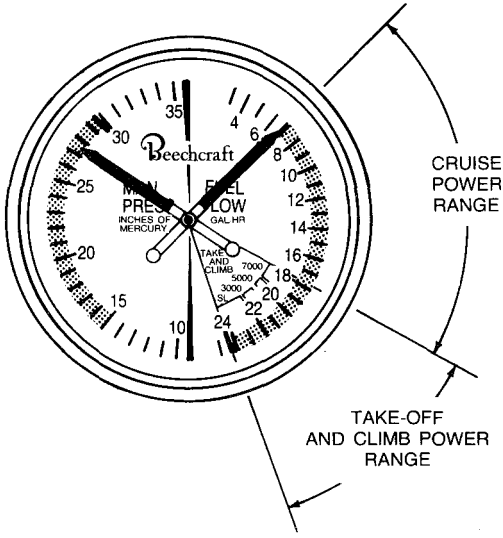
The higher end of the green arc includes a sawtooth segment to indicate the approximate fuel flow required for takeoff and climb at sea level, 3000, 5000 and 7000 feet. The pilot should use performance charts for the exact fuel flow requirements.

The lower end of the green arc includes a sawtooth segment labeled "% CRUISE POWER" which indicates the

approximate fuel flows for powers ranging from 45% to 75% of max continuous power. The lower fuel flow of each sawtooth corresponds to the cruise – lean fuel flow while the higher fuel flow of each sawtooth corresponds to the best power fuel flow. When power is set in accordance with the cruise power setting tables in the PERFORMANCE section, these sawtooth markings provide approximate percent power information.

For Airplanes With Fuel Flow Indicating Systems (Serials CE-929 and after; CJ-156 and after)

The fuel flow portion of the indicator is controlled electrically and indicates fuel flow in gallons per hour. A turbine meter installed in the fuel line rotates in proportion to the fuel flow. The speed of rotation is converted into an



MANIFOLD PRESSURE AND FUEL FLOW INDICATOR (CE-929 AND AFTER AND CJ-156 AND AFTER)

electrical signal which is then interpreted by the fuel flow indicator. The green arc indicates the normal operating range while the red radial indicates the maximum allowable fuel flow.

Fuel flow values at the higher end of the green arc are labeled "TAKE-OFF AND CLIMB" and indicate the approximate fuel flow required for takeoff and climb at sea level, 3000, 5000 and 7000 feet. The pilot should use these markings as a guide only and refer to the tables in the PERFORMANCE section for the exact fuel flow requirements.

AVIONICS PANEL

Tuning and selecting equipment for the radios, adjacent to the engine instrument grouping, is mounted in block form with switching on the left edge of the block and radio heads and tuning on the right.

SWITCHES

The magneto/start switch and switches for the battery, alternator, pitot heat, propeller deicer, and lights are located on the left end of the subpanel. Flap and tab position indicators, the cowl flap control, and the flap switch are near the center of the subpanel. On the right end of the subpanel are the circuit breakers, as well as the landing gear switch and landing gear position indicator lights. Attached to the lower center section of the subpanel are the powerplant controls and auxiliary fuel pump switch.

ANNUNCIATOR SYSTEM

WARNING LIGHTS (CE-674 thru CE-928 except CE-919, CE-923, CE-925 and CE-927; CJ-129 thru CJ-155)

A warning light placarded ALT OUT is located on the pilot's floating instrument panel below the flight instruments.

The warning light for the alternator will illuminate when the output from the alternator is nearly zero or when an alternator overvoltage occurs.

WARNING LIGHTS (CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after)

Two warning lights, placarded ALT and STARTER ENERGIZED, are located on the pilot's floating instrument panel below the flight instruments.

The warning light for the alternator will illuminate when the output from the alternator is nearly zero or when an alternator overvoltage occurs.

The starter energized warning light will remain illuminated after starting if the starter relay remains engaged after starting.

On serials CE-1301, CE-1307 and after, and CJ-180 and after, a red GEAR UP annunciator is installed in the glareshield. The GEAR UP annunciator will flash when the gear warning horn sounds (any throttle setting less than 12 in. Hg with the landing gear retracted or full flaps with the landing gear retracted).

WARNING LIGHT CONTROL SWITCH

Located on the pilot's floating instrument panel near the warning light(s) is a switch placarded TEST-BRT-DIM-WARN LIGHTS. When the switch is held upward in the spring-loaded TEST position, the warning light(s) and the four landing gear position indicator lights will illuminate if none of the lamps require replacement. When released, the switch will return to the BRT position.

If the switch is in the bright (BRT) position, the warning light(s) and the landing gear position indicator lights will light at high intensity whenever they illuminate. This position should be selected during the daytime and at other times when high ambient light levels are present in the cabin.

The DIM position allows the lamps to illuminate to a lower intensity. This position is generally reserved for night operations. The GEAR UP and STARTER ENERGIZED annunciators (if installed), are the only annunciators that 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 and 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 26 feet 4 inches.

WING FLAPS

On airplanes prior to CE-816 and CJ-150 the wing flaps are controlled by a three-position switch, UP, OFF and DOWN, located in the subpanel, above the power quadrant. The switch must be pulled out of detent before it can be repositioned. A dial type indicator has markings for UP, 10°, 20° and DN. The indicator is located to the left of the control column.

Limit switches automatically turn off the electric motor when the flaps reach the extremes of travel. Intermediate flap positions can be obtained by placing the switch in the OFF position as the flaps reach the desired position during flap extension or retraction.

On airplanes CE-816 and after and CJ-150 and after, the wing flaps have three positions; UP (0°), APPROACH (15°), and DOWN (30°), with no intermediate positions. A flap position indicator and a control switch are located on the subpanel, above the power quadrant. The switch must be pulled out of a detent to change the flap position.

LANDING GEAR

The landing gear is operated through 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.

CONTROL SWITCH

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

NOTE

On S/N CE-1301, CE-1307 and after, and CJ-180 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.

POSITION INDICATORS

The landing gear position indicator lights are located adjacent to the landing gear switch handle. Three green lights, one for each gear, are illuminated whenever the landing gears are down and locked. The red 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, as well as selection of either bright or dim illumination intensity, is accomplished with the warning light control switch located on the pilot's floating instrument panel.

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 - CE-1301, CE-1307 and after, and CJ-180 and after).

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.

NOTE

On serials CE-1301, CE-1307 and after, and CJ-180 and after, 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.

CIRCUIT BREAKER

The landing gear circuit breaker is located on the right subpanel. This circuit breaker is a pull-and-reset type breaker. The breaker will pop out under overload conditions.

BRAKES

The brakes on the main landing gear wheels are operated by applying toe pressure to the top of the rudder pedals. The parking brake T-handle control is located just left of the elevator tab wheel on the pilot's subpanel. To set the parking brakes, pull the control out and depress each toe pedal until firm. Push the control in to release the brakes.

NOTE

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

On serials CE-674 thru CE-838, and CJ-129 thru CJ-149 with shuttle valves installed only the pilot's brake pedals can be used in conjunction with the parking brake system to set the parking brake.

CAUTION

On serials CE-674 thru CE-838, and CJ-129 thru CJ-149 with shuttle valves installed, continuous brake application of either the pilot's or copilot's brake pedals, in conjunction with an overriding pumping action from the opposite brake pedals could result in the loss of braking action on the side which continuous pressure is being applied.

MANUAL EXTENSION

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

WARNING HORN (SERIALS CE-674 THRU CE-1306, EXCEPT CE-1301; CJ-129 THRU CJ-179)

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 the altitude and rpm.

WARNING HORN AND GEAR UP ANNUNCIATOR (SERIALS CE-1301, CE-1307 AND AFTER; CJ-180 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 baggage door 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 two sections, each having a different weight limitation. Loading within the baggage compartment must be in accordance with the data in the WEIGHT AND BALANCE Section. All baggage must be secured with a Beech approved cargo net.

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

SEAT ADJUSTMENTS

To adjust any of the four standard seats forward or aft, pull up on the release bar below the seat and slide the seat to the desired position. The seat backs of all standard seats can be placed in any of four positions by operating a release lever on the inboard side of each seat. An option is available that provides for the seat backs on the copilot, 3rd and 4th place seats to be placed in any position from vertical to fully reclined. Outboard armrests for all standard seats are built into the cabin sidewalls. Center armrests can be elevated or positioned flush with the seat cushions. The 3rd- and 4th-place chairs 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 seat can be folded up to provide additional floor space.

SHOULDER HARNESS INSTALLATION

The shoulder harness is a standard installation for all seats and should be used with the seats in the upright position. The spring loading at the inertia reel keeps the harness snug but will allow normal movement during flight operations. The inertia reel is designed with a locking device that will secure the harness in the event of sudden forward movement or an impact action.

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 inertia reel attached to the side canopy structure of the cockpit. The inertia reel is covered with an escutcheon and the strap runs up from the reel location to a looped fitting attached to the window frame just aft of the pilot seats. For

the third and fourth passenger seats, the inertia 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 passenger seat, 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.

DOOR, WINDOWS AND EXITS

CABIN DOOR

The outside cabin door handle is spring loaded to fit into a recess in the door to create a flat aerodynamically clean surface. 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 (serials CE-1301, CE-1307 and after; CJ-180 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.

OPENABLE CABIN WINDOWS

NOTE

Windows are to be closed before and during flight.

Prior to CE-929 except CE-919, CE-923, CE-925 and CE-927; Prior to CJ-156:

To Open Window For Ventilation (Only On Ground):

Release latch front of bar, pull bar at the bottom of the window out and upward. Window will open approximately two inches.

To Close Window:

Pull inward and down on the bar at the bottom of the window. Resistance will be felt as the bar moves downward. Continue moving bar downward to its lowest position. Check that bar is locked by the latch.

NOTE

While closing window, ascertain that the emergency release pin (which allows the window to open fully for emergency exit) is securely in place.

Serials CE-919, CE-923, CE-925, CE-927, CE-929 thru CE-983:

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

To Open Window For Ventilation (Only On Ground):

NOTE

Red handle for emergency exit only.

1. Lift thumb catch (window will release).
2. Push up and outward until mechanism clicks into detent.

To Close Window:

— Pull inward and down until locked. (Listen for detent.)

Serials CE-984 and after; CJ-156 and after:

To Open Window For Ventilation (Only On Ground):

NOTE

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 detent).
2. Rotate lock handle to LOCKED position.

EMERGENCY EXITS

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

Prior to CE-929, Except CE-919, CE-923, CE-925, and CE-927; Prior to CJ-156:

1. Lift the latch.
2. Pull out the emergency release pin and push the window out.

The above procedure is described on a placard installed below the left and right openable windows.

Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after:

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

NOTE

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

CONTROL LOCKS

To Install The Control Locks:

1. Rotate control wheel and move column so the hole in the bracket and the column align to accept pin.

2. Push the control column lock pin through the hole provided in the control column hanger and into the hole in the control column tube assembly.

3. Ensure positive retention of the lock pin by positioning the attached red plate on top of the throttle and propeller controls.

WARNING

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

POWER PLANT

The BEECHCRAFT F33A Bonanza is powered by a Continental IO-520-BA or IO-520-BB six-cylinder, horizontally opposed, fuel-injected engine rated at 285 horsepower.

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ENGINE CONTROLS

THROTTLE, PROPELLER, AND MIXTURE

The push-pull throttle, propeller, and mixture controls are located on the control console below the center of the upper subpanel. These controls are released for repositioning by pushing a button on the knob. With the button extended, fine adjustments are accomplished by rotating the knob, clockwise to increase and counterclockwise to decrease.

COWLING

The Bonanza F33A is equipped with Hartwell 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 only to lower the cowling to the closed position with the handle in the prelatch position. The handle has three positions: flush with the fuselage - latched; held fully forward - unlatched (open cowling); 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 catch. The cowl is locked by moving the latch handle to the full recessed position. The security of the forward latches can be checked by pulling out on the check tab attached to the lower forward 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 push-to-close, pull-to-open cowl flap control is located above and to the left of the control console on the subpanel. Except in extremely low temperatures, the cowl flaps should be open during ground operation, takeoff, and 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 air intake duct will open automatically and the induction system will operate 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. 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 warning light placarded STARTER ENERGIZED (CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after) will illuminate whenever electrical power is being supplied to the starter. If the light 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 light remains illuminated after starting. If the light does not illuminate during starting, the indicator system is inoperative and the ammeter should be monitored to ensure that the starter does not remain energized after starting. The starter energized warning light can be tested with the TEST-BRT-DIM-WARN LIGHTS switch adjacent to the warning lights on the floating instrument panel.

PROPELLER

Installed as standard equipment on the Bonanza is a constant speed, variable pitch, 84"-diameter propeller with two aluminum alloy blades. The pitch setting at the 30-inch station is 13.3° low and 29.2° high pitch.

An optional McCauley 80"-diameter, three-blade propeller is also available. The pitch setting at the 30-inch station is 13.3° ± .2° low and 29.0° ± .5° high pitch.

Propeller rpm is controlled by a governor which regulates hydraulic oil pressure to the hub. A push-pull knob on the

control console 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.

FUEL SYSTEM

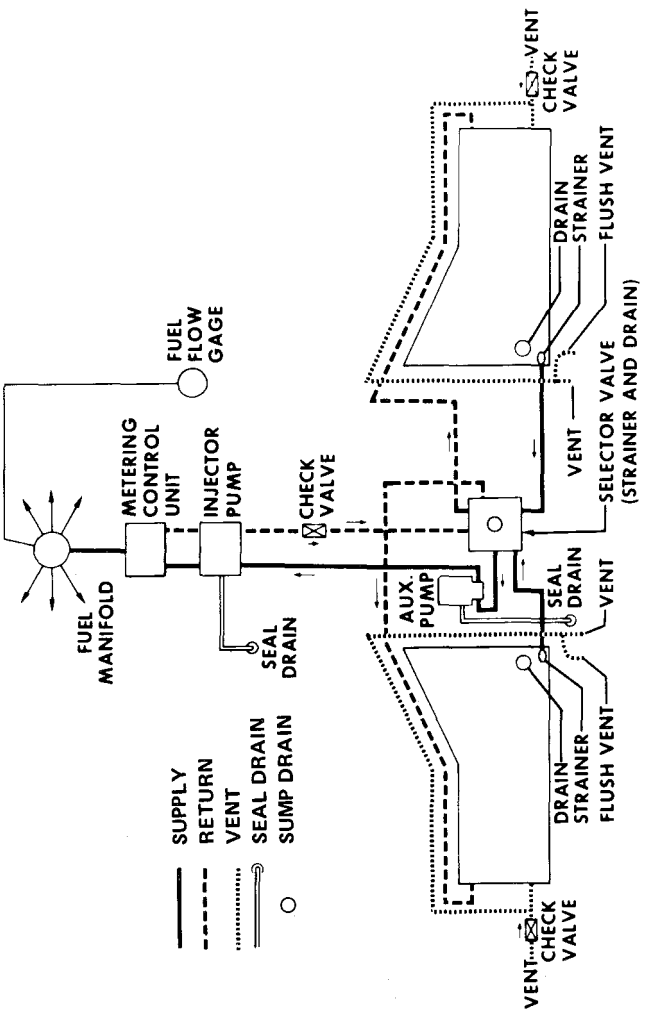
The airplane is designed for operation on 100/130 grade (green) aviation gasoline. However, the use of 100LL (blue) is preferred.

FUEL CELLS

On CE-674 thru CE-883, and CJ-129 thru CJ-155 either the 44-gallon usable (50-gallon capacity) or 74-gallon usable (80-gallon capacity) fuel system is available. The 74-gallon usable (80-gallon capacity) system only is available on CE-884 and after, and CJ-156 and after. The fuel system consists of a rubber fuel cell in each wing leading edge with a flush type filler cap. A visual measuring tab is attached to the filler neck of the optional system. The bottom of the tab indicates 27 gallons of usable fuel and the detent on the tab indicates 32 gallons of usable fuel in the tank. The engine driven fuel injector pump delivers approximately 10 gallons of excess fuel per hour, which bypasses the fuel control and returns to the tank being used. Three fuel drains are provided, one in each fuel sump on the underside of each wing and one in the fuel selector valve inboard of the left wing root. These points should be drained daily before the first flight.

FUEL QUANTITY INDICATION SYSTEM

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



FUEL SYSTEM SCHEMATIC

AUXILIARY FUEL PUMP

The electric auxiliary fuel pump is controlled by an ON-OFF toggle switch on the control console and provides pressure for starting and emergency operation. Immediately after starting, the auxiliary fuel pump can be used to purge the system of vapor caused by an extremely high ambient temperature or a start with the engine hot. The auxiliary fuel pump provides for near maximum engine fuel requirements, should the engine driven pump fail.

FUEL TANK SELECTION

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

On airplanes CE-1014 and after, the pilot is cautioned to observe that the short, pointed end of the handle aligns with the fuel tank position being selected. The tank positions are located on the aft side of the valve. The OFF position is forward and to the left. An OFF position lock-out feature has been added to prevent inadvertent selection of the OFF position. To select OFF, depress the lock-out stop and rotate the handle to the full clockwise position. Depression of the lock-out stop is not required when moving the handle counterclockwise from OFF to LEFT MAIN or RIGHT MAIN. When selecting the LEFT MAIN or RIGHT MAIN fuel tank, position handle by sight and by feeling for detent.

If the engine stops because of insufficient fuel, refer to the EMERGENCY PROCEDURES Section for the Air Start procedures.

FUEL REQUIRED FOR FLIGHT

It is the pilot's 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 be not less than 13 gallons per tank at takeoff. Plan for an ample margin of fuel for any flight.

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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. The circuit breaker panel is located on the right subpanel and contains circuit breakers for the various electrical systems. Some switch-type circuit breakers are located on the left subpanel.

BATTERY

28-VOLT SYSTEM (CE-748, CE-772 AND AFTER, CJ-149 AND AFTER)

A 15.5 ampere-hour, 24-volt battery is located on the right forward side of the firewall. Battery servicing procedures are described in the HANDLING, SERVICING, and MAINTENANCE Section.

14-VOLT SYSTEM (CJ-129 THRU CJ-148, CE-674 THRU CE-771 EXCEPT CE-748)

A 35-ampere-hour, 12-volt battery is located on the right forward side of the firewall. Battery servicing procedures are described in the HANDLING, SERVICING and MAINTENANCE Section.

ALTERNATOR

28-VOLT SYSTEM (CE-748, CE-772 AND AFTER, CJ-149 AND AFTER)

The airplane is equipped with a 50-, 60-, or 100-ampere, gear-driven alternator. The alternators are designed to maintain approximately 50-, 60-, or 100-amperes output respectively at 1700 rpm to provide airplane electrical power.

14-VOLT SYSTEM (CJ-129 THRU CJ-148, CE-674 THRU CE-771 EXCEPT CE-748)

A 70-ampere, 12-volt, gear-driven alternator is standard equipment. The alternator is designed to maintain approximately 70-amperes output at 1700 rpm, to provide airplane electrical power.

A transistorized electronic voltage regulator adjusts alternator output to the required electrical load, including battery recharge. Charging or discharging of the battery is indicated by the ammeter. A zero reading, which is normal for cruising flight, indicates that the battery is fully charged and that alternator output has been adjusted by the voltage regulator to balance the load of the electrical equipment in use.

The alternator-out warning light can be tested with the warning test switch on the instrument panel adjacent to the light. If an alternator failure occurs the light will illuminate.

EXTERNAL POWER RECEPTACLE

The external power receptacle accepts a standard AN-type plug. Before connecting an external power unit, verify that a battery is installed. The battery switch should be ON, and alternator and avionics equipment OFF.

NOTE

A negative ground external power source is required.

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.

LIGHTING SYSTEM

INTERIOR LIGHTING

Lighting for the instrument panel is controlled by thumb-rotated, disc-type rheostats, located on the pilot's subpanel to the left of the control column. The first rheostat is labeled

RADIO and ENG and controls the lighting of the avionics panel and the multiple readout engine instrument. The second rheostat, labeled INST, is optional and controls the lighting for the flight instruments and the instrument pressure gage.

On the lower subpanel are two more lighting rheostats. The first, labeled SUB, controls the intensity of the complete subpanel lighting. The second rheostat is labeled FLOOD and controls the glareshield lighting, which illuminates the full upper panel.

The cabin dome light is operated by an ON-OFF switch adjacent to the light. The optional reading lights above the rear seats have individual switches at the lights. The optional map light has a press-type switch on the control wheel. The OAT, map, and compass lights are controlled by a push-on, push-off switch located adjacent to the OAT or on the control wheel.

EXTERIOR LIGHTING

The switches for all of the exterior lights are located on the pilot's left subpanel. Each switch is a circuit-breaker-type switch, which will open if it becomes overloaded or shorted.

The exterior lights consist of navigation lights on the wing tips and tail cone, a landing light in the fuselage nose section, and a taxi light attached to the nose strut. The landing light can be used for approach and taxiing. For longer battery and lamp life, use the landing light and the taxi light sparingly; avoid prolonged operation which could cause overheating

during ground maneuvering.

NOTE

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 SYSTEMS

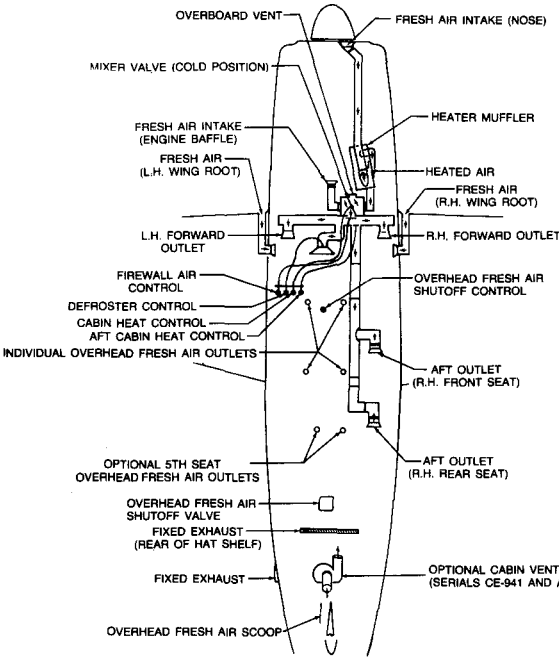
CABIN HEATING

A heater muffler on the right exhaust stack provides for heated air to five 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 on the right side of the nose, passes through the heater muffler, 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 at the rear engine baffle. 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 on the lower left pilot's subpanel. To obtain heated air to the cabin outlets, pull the



HEATING AND VENTILATING SYSTEM

CABIN HEAT control. The control regulates the amount of cold air that is mixed with the air from the heater muff. 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 located to the extreme left of the pilot's lower 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 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.

Optional Fresh Air Vent Blower

An optional fresh air vent blower controlled by an ON-OFF switch on the subpanel is available on serials CE-941 and

after. It provides ventilation through the individual overhead outlets during both ground and in-flight operations.

Individual Overhead Fresh Air Outlets

Fresh ram air from the air intake on the upper side of the aft fuselage is ducted to individual outlets above each seat, including the optional 5th seat. Each outlet can be positioned to direct the flow of air as desired. The volume of incoming air can be regulated by rotating the outlet. A system shutoff valve is installed in the duct between the overhead fresh air scoop and the individual fresh air outlets. The valve is operated by turning a knob on the overhead panel.

EXHAUST VENT

A fixed exhaust vent is located in the aft cabin.

OXYGEN SYSTEM

The oxygen cylinder is located beneath the cover under the front seats. The system is available with either 4 or 5 outlets and with a 49-cu-ft oxygen cylinder. Supply of oxygen to the system is controlled by a shut-off valve on the oxygen console. The pressure gage indicates the supply of oxygen available (1850 psig is nominal pressure for a full supply in the cylinder).

The system regulator is altitude-compensated to provide a varying flow of oxygen with altitude. Flow is varied automatically from 0.5 liters per minute at 5,000 feet to 2.8 liters per minute at 25,000 feet. The use of oxygen is recommended to be in accordance with current FAR operating rules.

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 on the leading edge of the left wing.

PITOT HEAT

The pitot mast is provided with an electric heating element which is turned on and off with a switch on the instrument panel. The switch should be ON when flying in visible moisture. It is not advisable to operate the pitot heating element 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. Aft of the rear closure bulkhead (rear seat panel) is a drain plug, located at the low point of the normal static system. It is provided in order to drain moisture accumulations from the system. The closure bulkhead is held in place with Velcro and may be removed by pulling forward. The drain plug should be removed and the moisture drained from the clear plastic line every 100 hours and after exposure to visible moisture, either in the air or on the ground.

EMERGENCY STATIC AIR SYSTEM

An emergency static air source may be installed to provide air for instrument operation should the static ports become blocked. Refer to the EMERGENCY PROCEDURES Section for procedures describing how and when to use this system.

INSTRUMENT PRESSURE SYSTEM

Instrument 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 upper right corner 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.

STALL WARNING

A stall warning horn on the forward side of the instrument panel sounds a warning signal (the battery switch must be ON for serials CE-748, CE-772 and after) as the airplane approaches a stall condition. The horn is triggered by a sensing vane on the leading edge of the left wing, and is effective at all attitudes. Irregular and intermittent at first, the warning signal will become steady as the airplane approaches a complete stall.

ENGINE BREAK-IN INFORMATION

Use a straight mineral oil, as recommended by the engine manufacturer, throughout the break-in period. Drain the initial oil at 20 to 30 hours. Replace with new mineral oil, which is to be used until oil consumption stabilizes (usually a total of 50 hours).

Drain and replace the engine oil as recommended in the HANDLING, SERVICING, and MAINTENANCE Section. If operating conditions are unusually dusty and dirty, more frequent oil changes may be necessary. Oil changes are more critical during the engine break-in period than at any other time.

Use full throttle at recommended rpm for every takeoff and maintain until at least 400 feet AGL. Then reduce as necessary for cruise climb or cruise. Maintain the highest power recommended for cruise operation during the break-in period, avoiding altitudes above 8000 feet. Interrupt cruise power every 30 minutes by smoothly advancing to take-off power settings for about 30 seconds, then returning to cruise

power setting. Avoid long power-off descents, especially during the break-in period. During descent, maintain sufficient power to maintain cylinder head temperatures in the green arc. Minimize ground operation time, especially during warm weather. During the break-in period, avoid engine idling in excess of 15 minutes, especially in high ambient temperatures.

SECTION VIII

HANDLING, SERVICING AND MAINTENANCE

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INTRODUCTION

The purpose of this section is to outline the requirements for maintaining the Bonanza F33A in a condition equal to that of its original manufacture. This information sets the time frequency intervals at which the airplane should be taken to a BEECHCRAFT Aero Center, Aviation Center, International Distributor or International Dealer for periodic servicing or preventive maintenance.

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

All limits, procedures, safety practices, time limits, servicing and maintenance requirements contained in this handbook are considered mandatory.

Authorized BEECHCRAFT Aero Centers, Aviation Centers, International Distrubutors and International Dealers can provide recommended modification, service, and operating procedures issued by both the FAA and Beech Aircraft Corporation, which are designed to get maximum utility and safety from the airplane.

If a question should arise concerning the care of the Bonanza F33A, it is important to include the airplane serial number in any correspondence. The serial number appears on the model designation placard attached to the right side of the fuselage just under the baggage door.

PUBLICATIONS

The following publications are available through BEECHCRAFT Aero Centers, Aviation Centers, International Distributors or International Dealers:

1. Maintenance/Shop Manual
2. Part Catalog
3. Service Instructions
4. Various Inspection Forms
5. Wiring Diagram Manual

NOTICE

The following information may be provided to the holder of this manual automatically:

1. Original issues and revisions of Class I and Class II Service Instructions
2. Original issues and revisions of FAA Approved Airplane Flight Manual Supplements
3. Reissues and revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owner's Manuals, Pilot's Operating Manuals, and Pilot's Operating Handbooks

This service is free and will be provided only to airplane owners who are listed on the FAA Aircraft Registration Branch List or the BEECHCRAFT International Owners Notification Service List, and then only if listed by airplane serial number for the model for which this handbook is applicable. For detailed information on how to obtain "Revision Service" applicable to this handbook or other BEECHCRAFT Service Publications, consult any BEECHCRAFT Aero or Aviation Center, International Dis-

tributor, or International Dealer, or refer to the latest revision of BEECHCRAFT Service Instructions No. 0250-010.

AIRPLANE INSPECTION PERIODS

1. FAA Required Annual Inspections.
2. BEECHCRAFT Recommended Inspection Guide.
3. Continuing Care Inspection Guide.
4. See "Recommended Servicing Schedule" and "Overhaul or Replacement Schedule" for further inspection schedules.

NOTE

In event of emergency gear or flap extension at speeds above the respective normal extension speeds and before the next flight, inspect gear retract rods, gear doors and flaps for damage or distortion.

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PREVENTATIVE MAINTENANCE THAT MAY BE ACCOMPLISHED BY A CERTIFICATED PILOT

1. A certificated pilot may perform limited maintenance. Refer to FAR Part 43 for the items which may be accomplished.

   To ensure proper procedures are followed, obtain a BEECHCRAFT Shop Manual before performing preventative maintenance.

2. All other maintenance must be performed by licensed personnel.

NOTE

Pilots operating airplanes of other than U.S. registry should refer to the regulations of the registering authority for information concerning preventative maintenance that may be performed by pilots.

ALTERATIONS OR REPAIRS TO 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.

GROUND HANDLING

The three-view drawing shows the minimum hangar clearances for a standard airplane. Allowances must be made for any special radio antennas.

CAUTION

To ensure adequate propeller clearance, always observe recommended shock strut servicing procedures and tire inflation pressures.

TOWING

One man 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 men can pivot the airplane on the main wheels. One man 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 tiedown 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 left side of the lower subpanel. To set the parking brakes, pull the control out and depress each toe pedal until firm. Push the control in to release the brakes.

NOTE

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 brakes 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 column lock pin.
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 OVER TIGHTEN; 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 - has been considered here. For more extended storage periods consult the Beech Airplane Maintenance Manual and Continental Service Bulletin M74-9 or later issue.

FLYABLE STORAGE - 7 to 30 DAYS

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. Attach a line to the nose gear.

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 shall 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 will not be removed from storage, engine shall be started and run. The preferred method is to fly the airplane for 30 minutes.

PREPARATION FOR SERVICE

Remove all covers, clean the airplane and give it a thorough inspection, particularly wheel wells, flaps, and control openings.

Preflight the airplane.

EXTERNAL POWER

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

1. 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.
2. To prevent arcing, make certain no power is being supplied when the connection is made.
3. Make certain that the battery switch is ON, all avionics and electrical switches OFF, and a battery is in the system before connecting an external power unit. This protects the electronic voltage regulators and associated electrical equipment from voltage transients (power fluctuations).

CHECKING ELECTRICAL EQUIPMENT

Connect an auxiliary power unit as outlined above. Ensure that the current is stabilized prior to making any electrical equipment or avionics check.

CAUTION

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

SERVICING

FUEL SYSTEM

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 standard fuel cell installation for serials CE-884 and After, and CJ-156 and After, consists of a 40-gallon capacity (37-gallon usable) fuel cell and filler cap in each wing leading edge. On serials CE-674 thru CE-883 and CJ-129 thru CJ-155, the 25-gallon capacity (22-gallon usable) was the standard installation and the 40-gallon

capacity (37-gallon usable) was the optional installation. 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, and filling to the slot on the tab indicates 32 gallons of usable fuel. The airplane must be level for the tabs to indicate accurately.

FUEL DRAINS

Open the three snap-type fuel drains daily during preflight to purge any water from the system. Each fuel cell drain is located on the bottom of the wing just outboard of the fuselage. The system low spot drain is at the bottom of the fuel selector valve. The drain is accessible through a door in the fuselage adjacent to the left wing.

FUEL STRAINERS

At each 50 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 break-in periods on new engines. Prolonged flights should be avoided and oil level brought to full after each flight during this period.

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

The oil should be changed and the oil filter should be 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 plug at the low point of the engine sump.
3. Remove the plug button below the sump drain and insert the oil drain duct.
4. Remove the oil sump drain plug.
5. Remove the oil filter and replace with a new unit. A torque of 18 to 20 ft lbs should be applied to the nut of the oil filter.
6. Replace the oil sump drain plug and fill the engine with oil.

See Consumable Materials and Approved Engine Oils for specified oils.

The engine manufacturer specifies ashless despersant oils only. However, a straight mineral oil may be used for the first oil change period of 20 to 30 hours, or until oil consumption

has stabilized, in order to promote faster ring seating and oil control. Oils must meet Continental Motors Corporation Specification MHS-24A. Refer to APPROVED ENGINE OILS.

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 past the bottom of the split ring.

CAUTION

Excessive overcharging can cause heating and boiling.

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

The battery box is vented overboard to dispose of hydrogen gas and electrolyte fumes discharged during the normal charging operation. To ensure disposal of these fumes 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.

NOTE

Beech Aircraft Corporation 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.

SHOCK STRUTS

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

TO INFLATE STRUT

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 the shock strut until the main gear piston is extended 3 inches (3½ inches on the nose gear).

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 (see Consumable Materials).
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 level 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 Shop 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 Consumable Materials 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 wing nuts securing the filter and remove the filter.

INSTRUMENT 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 500 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.

PROPELLER

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

the airplane.

WARNING

When servicing a propeller, always make certain 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.

PROPELLER BLADE BEARING LUBRICATION

1. Remove the propeller spinner.
2. Remove the safety wire and covers from grease zerks.
3. Remove one zerk from each blade.
4. Lubricate by placing the grease gun fitting on one zerk of each blade and filling until the grease is visible from the zerk opening on the opposite side of the blade.
5. Clean the excess grease from the propeller, reinstall the grease zerks, covers, and safety wire on each blade.
6. Reinstall the spinner.

OXYGEN SYSTEM

To service the oxygen system, use the following procedures:

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.

1. Read the pressure gage on the oxygen console panel just forward and to the left of the pilot's seat.
2. The gage will not indicate pressure unless the shutoff valve on the oxygen cylinder is open. The shutoff valve is located under the pilot's seat.

CAUTION

Open the cylinder shutoff valve slowly to prevent damage to the system.

3. Close the cylinder shutoff valve and the console panel shutoff valve.
4. 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 outlet. Open valve on supply bottle slowly.
5. Open the cylinder shutoff valve and slowly fill the cylinder to 1850 ± 50 psi at a temperature of 70°F. This pressure may be increased an additional 3.5 psi for each degree of increase in temperature. Similarly, for each degree of drop in temperature, reduce the cylinder pressure 3.5 psi.
6. Close the cylinder shutoff valve, close the supply bottle valve, remove the recharging outlet, and replace the filler valve cap.
7. Slowly open the cylinder shutoff valve to prepare the system for use.
8. Reinstall the access panel and slide the pilot's seat forward to its original position.
9. The console panel shutoff valve should remain closed until the system is used.

OXYGEN CYLINDER RETESTING

The oxygen cylinders, (light weight 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 employing 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 booster battery, 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 of the positive battery terminal and the negative lead of the charger to the negative battery terminal.

4. Do not operate an alternator on 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 BEECHCRAFT Aero or Aviation Center or International Distributor or Dealer.

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

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 Consumable Materials.

CAUTION

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

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.

Alkyd enamel (sometimes called "automotive enamel"), acrylic enamel, lacquer, and dope finishes require a curing period of approximately 90 days; Acrylic urethane, polyester urethane, and epoxy 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. Use special care to avoid removing lubricant from lubricated areas.

When using high-pressure washing equipment, keep the spray or stream clear of wheel bearings, propeller hub bearings, etc., and openings such as pitot tubes, static air buttons, and battery and avionics equipment cooling ducts, which should be securely covered or masked off. Avoid directing high-pressure sprays toward the fuselage, wings, and empennage from the rear, where moisture and chemicals might more easily enter the structure, causing corrosion damage to structural members and moving parts.

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.

There is some variation in the procedures required for proper care of the several types of exterior paint. 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. Alkyd enamel, lacquer, and dope finishes must be polished and waxed periodically to maintain luster, and to assure protection from the weather. Acrylic enamel should be waxed, and may be polished, if desired. Acrylic urethane may be waxed for protection from the elements, but should not be polished unless polishing or buffing is required to restore a damaged area. 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. Epoxy finishes should be waxed on a regular basis, and may be polished and buffed to restore appearance should "chalking" occur. For waxing, select a high quality automotive or aircraft waxing product. Do not use a wax containing silicones, as silicone polishes are difficult to remove from surfaces. A buildup of wax on any exterior paint finish will yellow with age; therefore, wax should be removed periodically. Generally, alphatic naptha (see Consumable Materials) is adequate and safe for this purpose.

NOTE

Before returning the airplane to service, remove all maskings and coverings, and re-lubricate as necessary.

WINDSHIELD AND WINDOWS

The windshield and plastic windows should be kept clean

and waxed at all times. To prevent scratches, wash the windows carefully with plenty of soap and water, using the palm of the hand to feel and dislodge dirt and mud. A soft cloth, chamois or sponge may be used, but only to carry water to the surface. Rinse thoroughly, then dry with a clean, moist chamois. Rubbing the surface of the plastic with a dry cloth builds up an electrostatic charge which attracts dust particles in the air.

Remove oil and grease with a cloth moistened with isopropyl alcohol. Never use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire extinguisher fluid, anti-ice fluid, lacquer thinner, or glass cleaner. These materials will soften the plastic and may cause it to craze.

After thoroughly cleaning, the surface should be waxed with a good grade of commercial wax. 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. Solutions which may attack rubber or plastic should not be used.

INTERIOR

To remove dust and loose dirt from the upholstery, headliner, and carpet, clean the interior regularly with a vacuum cleaner.

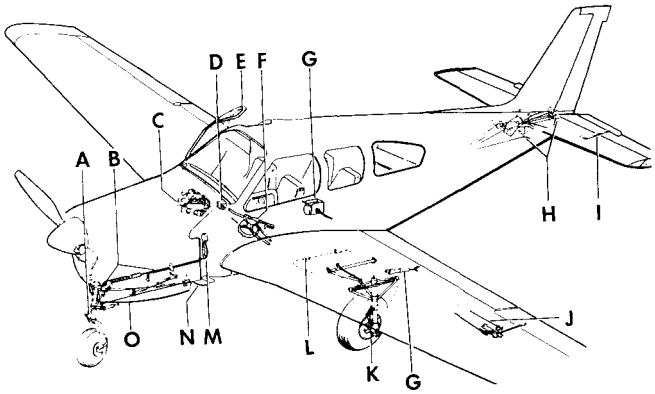
Blot up any spilled liquid promptly with cleansing tissue or rags. Do not pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot-clean the area.

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

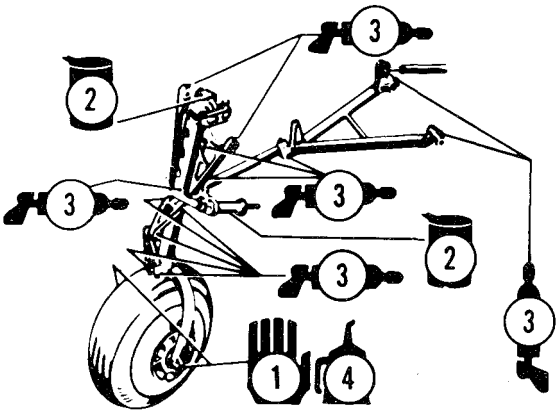
Soiled upholstery and carpet may be cleaned with foam-type detergent used according to the manufacturer's instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner.

The plastic trim, instrument panels, and control knobs need only be wiped with a damp cloth. Oil and grease on these surfaces can be removed with a cloth moistened with isopropyl alcohol. Volatile solvents, such as gasoline, benzine, acetone, carbon tetrachloride, fire extinguisher fluid, anti-ice fluid, lacquer thinner, or glass cleaner should not be used. These materials will soften the plastic and may cause it to craze.

LUBRICATION POINTS

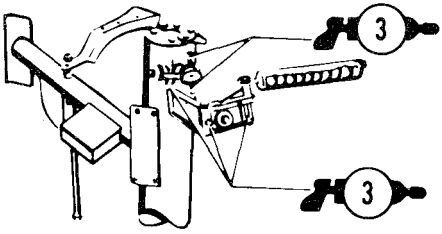


A



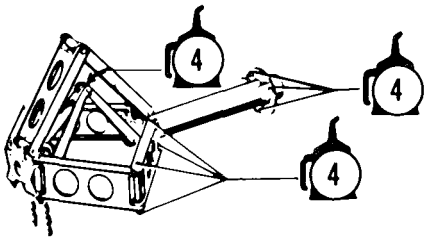
NOSE GEAR RETRACT

B



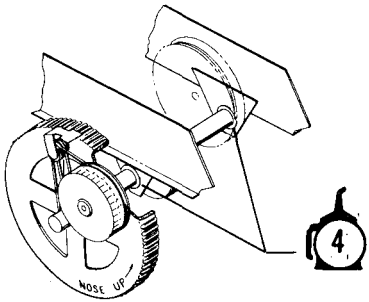
NOSE WHEEL STEERING

C



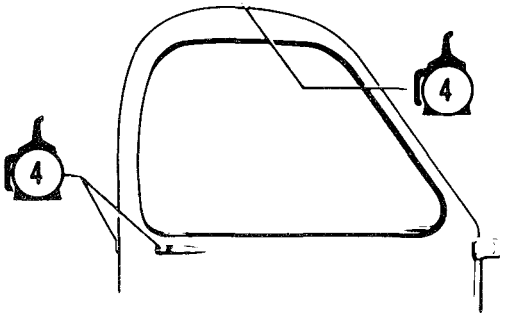
CONTROL COLUMN LINKAGE

D



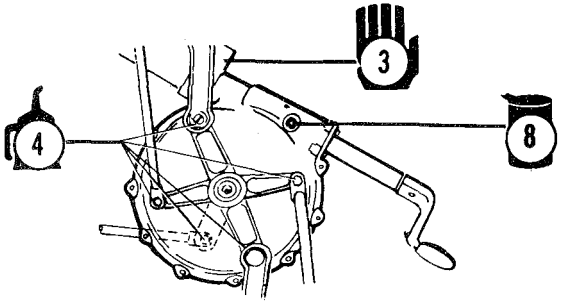
ELEVATOR TRIM CONTROL

E



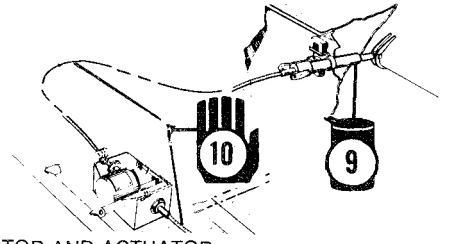
CABIN DOOR

F



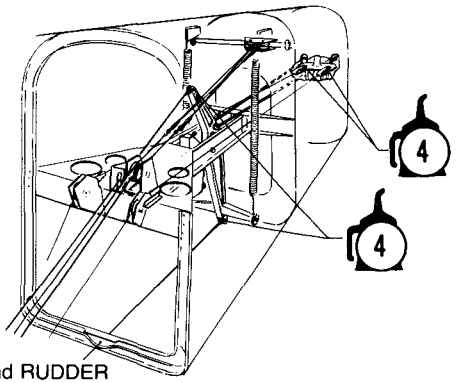
LANDING GEAR ACTUATOR GEAR BOX

G



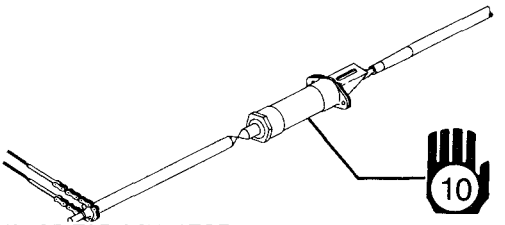
FLAP MOTOR AND ACTUATOR

H



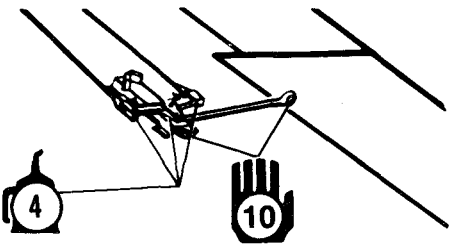
ELEVATOR and RUDDER
CONTROL MECHANISM

I



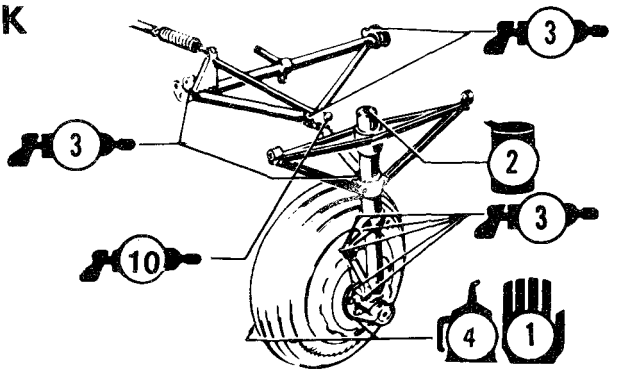
ELEVATOR TAB ACTUATOR

J



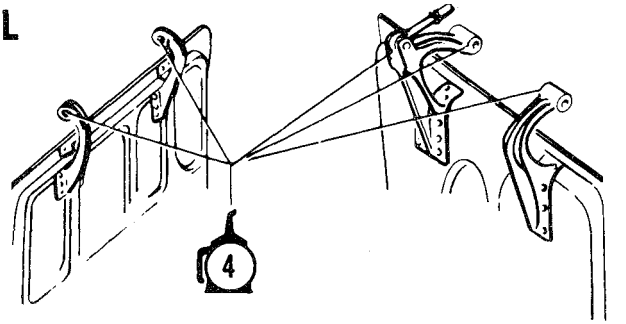
AILERON BELL CRANKS

K



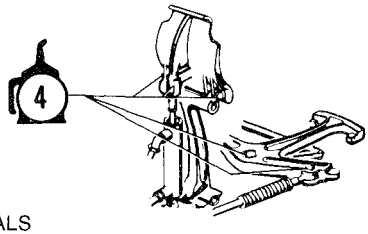
MAIN GEAR RETRACT

L



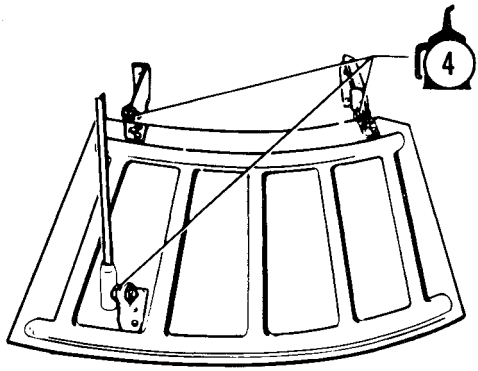
MAIN GEAR DOOR HINGES

M



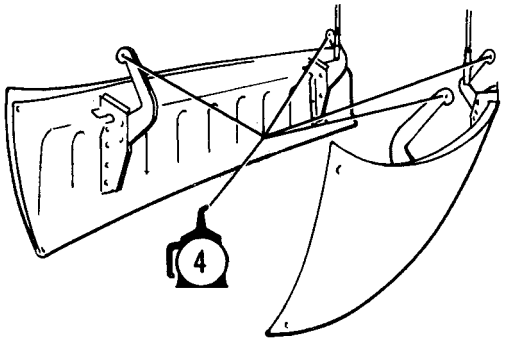
RUDDER PEDALS

N



COWL FLAP HINGES

O



NOSE GEAR DOOR HINGES

HAND OR PACK

ZERK FITTING

FLUID CONTAINER

SQUIRT CAN

NOTE: Letters are keyed to the Service Schedule; Numbers refer to items in the Consumable Materials Chart.

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RECOMMENDED SERVICING SCHEDULE

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	(Number refers to item on Consumable Materials)
Pre-flight	Check engine oil level	Upper left side of engine	5
	Drain fuel cell drains	Bottom of wing near wing root	—
	Drain fuel system low spot drain	Bottom of fuselage, left side	—
	Service fuel cells	Top of wings, leading edge	6
25 Hrs	Check battery electrolyte	Under right cowling door	See Shop Manual
50 Hrs	Clean fuel injection control valve screen	Lower engine compartment	7
	Clean induction air filter	Behind nose section grill	—
	Drain static air lines	Behind aft cabin bulkhead and at Emergency Static Source	—

100 Hrs	Check air conditioner evaporator module filter; replace if required	Forward of left front seat	–
	Change engine oil	Lower side of engine	5
	Install oil filter	Upper left side of engine	–
	Clean fuel selector valve strainer	Left side belly	7
†	Lub aileron control linkage and control rod ends	Each wing (J)	4 & 10
	Lub cabin door mechanism	Aft edge of cabin door (E)	4
	Lub control column linkage	Forward of instrument panel (C)	4
	Lub cowl flap hinges	Bottom of cowl (N)	4
	Lub elevator and rudder control mechanism	Forward of tail bulkhead (H)	4
	Lub landing gear door hinges	Edge of wheel well (L) (O)	4
	Lub landing gear retract mechanism and uplock rollers	Wheel wells (A) (K)	3, 10
	Lub nose wheel steering mechanism	Nose wheel well (B)	3
	Lub rudder pedals	Cockpit (M)	4
	Lub wheel bearings	Nose and main wheels (A) (K)	1
††	Lub wheel bearings and felt seals	Nose and main wheels (A) (K)	4 & 1

RECOMMENDED SERVICING SCHEDULE (Continued)

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	(Number refers to item on Consumable Materials)
300 Hrs	Flap motor (brushes) (Prior to CE-683 and CJ-129)	Under floor in cabin (G)	
	Service landing gear actuator gear box	Under front seat (F)	8
	Change pressure system in-line filter	Forward of instrument panel	Airborne Mfg. 1J4-7
500 Hrs	Change pressure pump intake filter	Engine compartment	Airborne Mfg. 1J2-1
600 Hrs	Service landing gear motor reduction gears	Under front seat (F)	3
	Flap motor gear box (prior to CE-683 and CJ-129)	Under floor in cabin (G)	10
900 Hours	Flap Flex drive shafts	Under floor in cabin (G)	10
	Flap actuators	Inside wing aft of wheel well (G)	9

	Lub elevator tab actuators	Elevator (I)	10
As Req	Air conditioner compressor oil level	See shop manual	Suniso No. 5 or Texaco Capella E 500 viscosity
	Air conditioner refrigerant		Refrigerant No. 12
Note 3	Replace emergency locator transmitter battery	Right side of aft fuselage	

NOTES:

1. Anytime the control surfaces are altered, repaired, or repainted, they must be rebalanced per the Shop Manual.
2. Check the wing bolts for proper torque at the first 100-hour inspection and at the first 100-hour inspection after each reinstallation of the wing attach bolts.
3. ELT Rechargeable Batteries: Recharge after one cumulative hour of use or after 50% of the useful charge life.
   ELT Non-rechargeable Batteries: Replace after one cumulative hour or after 50% of the useful life.

† Lubricate aileron control rod ends in place using SAE 20 or SAE 10W30 oil or remove aileron control rod assembly, clean and relubricate control rod ends using MIL-G-23827 grease. Rotate rod end eyeball to assure adequate lubricant coverage. Check aileron rigging after reinstallation of rod end assembly.

†† Lightly saturate felt seals with 10W30 oil (remove excess by pressing slightly) also coat the sides and outer diameter with the same type of grease used on the bearings.

CONSUMABLE MATERIALS

Only the basic number of each Military Specification is included in the Consumable Materials Chart. No attempt has been made to update the basic number with the letter suffix that designates the current issues of the various specifications.

Vendors listed as meeting Federal and Military Specifications are provided as reference only and are not specifically recommended by Beech Aircraft Corporation; consequently, any product conforming to the specification listed may be used. The products listed below have been tested and approved for aviation usage by Beech Aircraft Corporation, by the vendor, or by compliance with the applicable specifications. Other products that are locally procurable which conform to the requirements of the applicable Military Specification may be used even though not specifically included herein.

It is the responsibility of the operator/user to determine the current revision of the applicable Military Specification prior to usage of that item. This determination may be made by contacting the vendor of a specific item.

CONSUMABLE MATERIALS

ITEM	*MATERIAL*	*SPECIFICATION*
1.	Lubricating Grease Wheel Bearing *DO NOT MIX*	Aeroshell 5 or MIL-G-81322
2.	Hydraulic Fluid	MIL-H-5606
*3.	Lubricating Grease, General Purpose Wide Temperature	MIL-G-81322
4.	Lubricating Oil	SAE No. 20 or 10W30
**5.	Engine Oil	SAE No. 30 (Below 40°F) SAE No. 50 (Above 40°F) Approved Multiviscosity Oils
***6.	Engine Fuel	100LL (Blue)
7.	Solvent	Federal Specification, PD680
8.	Lubricant	Mobil Compound GG or Mobil 636
9.	Lubricating Oil, Gear	MIL-L-10324 or MIL-L-2105C, Grade 75W
10.	Grease, Aircraft and Instruments, Gear and Actuator Screw	MIL-G-23827
†11.	Lubricant, Rubber Seal	Oakite 6 Compound

ITEM	*MATERIAL*	*SPECIFICATION*
12.	Naphtha, Aliphatic	Federal Specification TT-N-95
††13.	Tape, Anti-Seize, Tetrafluorethylene	MIL-T-27730
14.	Leak Test Compound, Oxygen Systems	MIL-L-25567
15.	Oxygen, Aviators Breathing	MIL-O-27210
16.	Lubricating Oil, General Purpose, Preservative (Water-Displacing, Low Temperature)	●Brayco 300 per Federal Specification VV-L-800 (Preferred)
	Alternates for Brayco 300:	
	Lubricant	●●CRC 3-36 ●●●LPS No. 1 ●●●●WD-40

* In extremely cold climates use MIL-G-23827 grease in place of MIL-G-81322. (These greases harmful to paint.)

** Ashless dispersant oil (latest revision of Teledyne Continental Motors Corp. Spec. MHS-24) recommended; straight mineral oils recommended during break-in period. See servicing data.

***100LL (Blue) preferred, or 100 (Green).

† Product of Oakite Products, Inc., 50 Valley Road, Berkley Heights, N.J. 07922.

†† For sealing tapered threads on high pressure oxygen lines.

● Product of Bray Oil Co.,
1925 North Marianna
Los Angeles, Calif. 90032

●● Product of CRC Chemicals, Inc.,
Warminster, Pa. 18974

●●● Product of LPS Research Laboratories, Inc.,
2050 Cotner Ave,
W. Los Angeles, Calif. 90025

●●●● Product of WD-40 Company,
1061 Cudahy Place,
San Diego, Calif. 92110

APPROVED ENGINE OILS

COMPANY	*BRAND NAME*
BP Oil Corporation	BP Aero Oil D65/80
Castrol Limited (Australia)	Grade 40, Castrolaero AD, Type III Grade 50, Castrolaero AD, Type II
Continental Oil Co.	Conoco Aero S(SAE 10W30)
Delta Petroleum Co.	Delta Avoil - Grades 30, 40 & 50
Gulf Oil Corporation	Gulfpride Aviation AD
Humble Oil & Refining Co.	Esso Aviation Oil Enco Aviation Oil
Pennzoil Company	Pennzoil Aircraft Engine Oil Heavy Duty Dispersant Grades 30, 40, & 50
Phillips Petroleum Co.	Phillips 66 Aviation Oil Type A
Quaker State Oil & Ref. Corp.	Quaker State AD Aviation Engine Oil Grades 20W/30, 40 & 50
Sinclair Refining Co.	Sinclair Avoil 20W40
Shell Oil Co.	Aeroshell Oil W (in 4 grades) Grade 120 (Nominal SAE 60) Military Grade 1120 Grade 100 (Nominal SAE 50) Military Grade 1100 Grade 80 (Nominal SAE 40) Military Grade 1080

COMPANY	*BRAND NAME*
	Grade 65 (Nominal SAE 20 or 30) Military Grade 1065
Socony - Mobil	Mobil Aero Oil 65 Mobil Aero Oil 80 Mobil Aero Oil 100 Mobil Aero Oil 120
Texaco, Inc.	Texaco Aircraft Engine Oil Premium AD, Grades 65, 80, 100
Union Oil Co. of California	Union Engine Oil H D Grades 80 & 100

This chart lists all oils which were certified as meeting the requirements of Teledyne Continental Motors Corporation Specification MHS-24B at the time this handbook was published. Any other oil which conforms to this specification may be used.

BULB REPLACEMENT CHART

LOCATION	*NUMBER* *14-VOLT*	*28-VOLT*
Compass light	330	327
Dome light, cabin	89	1864
Elevator tab position indicator light	53R	1819
Fuel selector placard light	53	327
Instrument flood light, overhead	1813(GE)	313
Instrument light, post	330	327
Instrument wedge light	58-380022-9	58-380022-11
Landing gear position light	330	327
Landing light, nose section	4313	4596
Taxi light, nose shock strut	4313	4596
Navigational light, tail cone	1073	A-2064-1683
Combination strobe/navigational light	633	NONE
Navigational light, wing	1512	A-7512-24
Overvoltage warning light	330	327
Rotating beacon (Grimes)	A-7079B-12	A-7079B-24
Rotating beacon (Whelen)	Not applicable	WRM-1939
Strobe lights (Grimes)		
Wing	See Shop Manual	
Tail/navigation	See Shop Manual	

OVERHAUL OR REPLACEMENT SCHEDULE

The first overhaul or replacement should be performed not later than the required period. The condition of the item at the end of the first period can be used as a criterion for determining subsequent periods applicable to the individual airplane or fleet operation, providing the operator has an approved monitoring system.

The time periods for inspection noted in this handbook are based on an average usage and average environmental conditions.

SPECIAL CONDITIONS CAUTIONARY NOTICE

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.

COMPONENT	*OVERHAUL OR REPLACE*
LANDING GEAR	
Main gear	Every 2000 hours
Nose gear	Every 2000 hours
Actuator assembly	Every 4000 hours
Retract motor	Every 1000 hours
Retract motor brushes	Every 500 hours or on condition
Shimmy Damper	Every 1000 hours
Wheels and tires	On condition
Brake assembly	On condition
Brake lining	On condition
Master cylinder	On condition
Shuttle valve assembly (CE-674 thru CE-838, and CJ-129 thru CJ-149)	On condition
Parking brake valve	On condition
All hose	On condition
POWER PLANT	
Engine	*Every 1500 hours
Engine controls	On condition
Engine vibration isolator mounts	Engine change
Exhaust system	On condition

NOTE

When an engine has been overhauled, or a new engine installed, it is recommended that low power settings not be used until oil consumption has stabilized. The average time for piston ring seating is approximately 50 hours.

COMPONENT	*OVERHAUL OR REPLACE*
Starter	Inspect at engine overhaul; overhaul or replace on condition
Alternator	On condition
Oil cooler	On condition (replace when contaminated)
Propeller	At engine overhaul or at unscheduled engine change but not to exceed 1500 hours or 5 years
Propeller controls	On condition
Propeller governor	At engine overhaul but not to exceed 1500 hours or 3 years
Fuel pressure pump	Every 1500 hours
Cabin heat muff	Inspect every 100 hours

FUEL SYSTEM

Fuel cells	On condition
Wing fuel quantity transmitters	On condition
Fuel cell drain valve	On condition
Fuel system check valves	On condition
Fuel selector valve	Inspect every 600 hours; **overhaul every 10 years (See Maintenance Manual)**
Auxiliary fuel boost pump	Every 1200 hours
Hose carrying flammable liquid	At engine overhaul or every 5 years
All hose not carrying flammable liquid	On condition

COMPONENT	*OVERHAUL OR REPLACE*
INSTRUMENTS	
Turn coordinator	On condition
Altimeter	**Inspect and calibrate every 24 months per FAA directive**
Directional gyro	On condition
Gyro horizon	On condition
Gyro pressure	On condition
Engine indicator units	On condition
Airspeed indicator	On condition
Rate-of-climb	On condition
Fuel quantity indicator	On condition
Manifold pressure/fuel flow indicator	On condition
Tachometer	On condition
Flap Position Indicator	On condition
Free air temperature indicator	On condition
All hose	On condition
Pressure system filter	Every 300 hours
Air pressure regulator valve	On condition
ELECTRICAL SYSTEM	
Battery master relay	On condition
All other relays	On condition
Voltage regulator	On condition
Starter relay	On condition
Standby generator	**Inspect every 100 hours: Overhaul or replace every 1500 hours,**

COMPONENT	*OVERHAUL OR REPLACE*
FLAPS AND FLIGHT CONTROLS	
Flight controls	On condition
Elevator tab actuator	On condition
Flap motor and drives (Prior to CE-683 and CJ-129)	Every 2000 hours or on condition
Flap motor brushes (Prior to CE-683 and CJ-129)	On condition
Flap Motor (CE-683 and after, CJ-129 and after)	**Every 5000 hours or 10,000 cycles**
Flap actuators	Every 2000 hours
Flap flexible shaft	Every 2000 hours
MISCELLANEOUS	
Seat belts and shoulder harnesses	Inspect every 12 months or on condition
Hand fire extinguisher	Inspect every 12 months, recharge as necessary
Cabin heating and ventilating ducts	On condition, inspect every 12 months
Oxygen regulator	Every 48 months or 2000 hours
Oxygen cylinder	3HT cylinders: Hydrostatic test every three years, replace after 4,380 pressurizations or **24 years.**

* The recommended engine overhaul period applies only to engines with nickel-coated exhaust valves or nimonic exhaust valves, provided that normal periodic inspections are properly carried out. Engines that should conform to a shorter TBO period are listed in Teledyne Continental Motors Corporation Service Bulletin M74-20, Rev. I, dated November 7, 1974, or later issue. Continental recommends a maximum of 1200 hours TBO on engines employed in aerial top dressing, dusting, or spraying.

With particular attention to throttle response, smooth power and oil consumption, a qualified certificated mechanic must determine that the engine is operating normally at the time of each periodic inspection.

Hawker Beechcraft Technical Publications

F33A/C Bonanza Pilot's Operating Handbook/ Airplane Flight Manual Supplement Pack

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.

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Hawker Beechcraft

33-590009-13 Supplement Pack

SECTION IX
SUPPLEMENTS

NOTE

The supplemental data contained in this section is for equipment that was delivered on the airplane, and for standard optional equipment that was available whether or not it was installed. 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 Supplements for other equipment that was installed after the airplane was delivered new from the factory should be placed in this SUPPLEMENTS Section of this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

INTENTIONALLY LEFT BLANK

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL P/N 33-590009-13 (CE-674 AND AFTER) LOG OF SUPPLEMENTS

FAA Supplements must be in the airplane for flight operation when subject equipment is installed.

Part Number	Subject	Rev No.	Date
SA785CE	Hartzell Propellers	2	02/80
*33-590006-13	Acrobatic Supplement for the F33C	4	05/86
33-590009-19	Collins ANS-351 Area Navigation System	1	12/78
33-590009-25	Standby Generator Power System (28-Volt)		10/78
*33-590009-29	Operation of United Kingdom Registered Aircraft		04/89
35-590110-13	Landing Gear Safety System	4	12/78
35-590118-13	King KN-74 Area Navigation System	3	12/78
35-590118-19	Standby Generator Power System (14-Volt)	5	09/78
35-590118-25	Electrothermal Propeller Deice (2 and 3-Blade)	2	11/77
35-590118-35	Air Conditioning System	1	11/77
35-590118-43	King KNS-80 Integrated Navigation System	1	12/78
36-590002-29	28-Volt Propeller Deice	1	12/78
36-590002-31	Bendix NP-2041A Nav Computer Programmer	1	01/80
36-590002-33	AirData AD-511/AD-511G Area Navigation System		03/80

FAA Supplements must be in the airplane for flight operation when subject equipment is installed.

Part Number	Subject	Rev No.	Date
36-590002-35	Hartzell Constant-Speed Three-Bladed Propeller		04/80
36-590002-39	Fuel Selector Valve Stop Installation		03/83
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
36-590003-11	King KNS-81 Integrated Navigation System	2	10/83
36-590006-23	Standby Instrument Air Pressure System	2	02/86
58-590000-49	Inside Cabin Door Handle With Open/Closed Placard		12/90

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

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

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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 counter-roll obtainable in a light airplane. The turbulent areas may remain for as long as three minutes or more, depending on wind conditions, and may extend several miles behind the airplane. Plan to fly slightly above and to the windward side of other airplanes. Because of the wide variety of conditions that can be encountered, there is no set rule to follow to avoid wake turbulence in all situations. However, the Airman's Information Manual, and to a greater extent Advisory Circular 90-23, Aircraft Wake Turbulence, provide a thorough discussion of the factors you should be aware of when wake turbulence may be encountered.

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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