PILOT'S OPERATING HANDBOOK

and

FAA APPROVED AIRPLANE FLIGHT MANUAL

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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 BEECHCRAFT Debonair meets the high standards of quality and performance for which BEECHCRAFT airplanes have become famous throughout the world.

IMPORTANT NOTICE

This handbook must be read carefully by the owner and operator in order to become familiar with the operation of the BEECHCRAFT Debonair. The handbook presents suggestions and recommendations to help obtain safe and maximum performance without sacrificing economy. The BEECHCRAFT Debonair must be operated according to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, and/or placards located in the airplane.

As a further reminder, the owner and operator of this airplane 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 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 for the continued airworthiness of this airplane, in a condition equal to that of its original manufacture.

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

USE OF THE HANDBOOK

The Pilot's Operating Handbook is designed so that necessary documents may be maintained for the safe and efficient operation of the BEECHCRAFT Debonair. 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 1 General

Section 2 Limitations

Section 3 Emergency Procedures

Section 4 Normal Procedures

Section 5 Performance

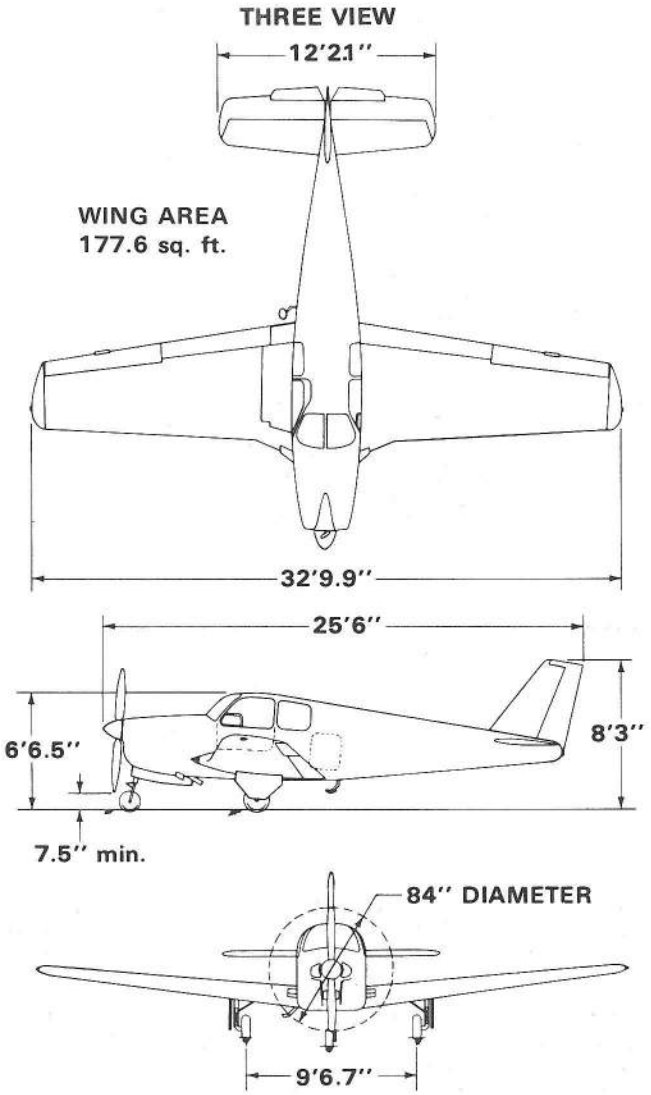
Section 6 Weight and Balance/Equipment List

Section 7 Systems Description

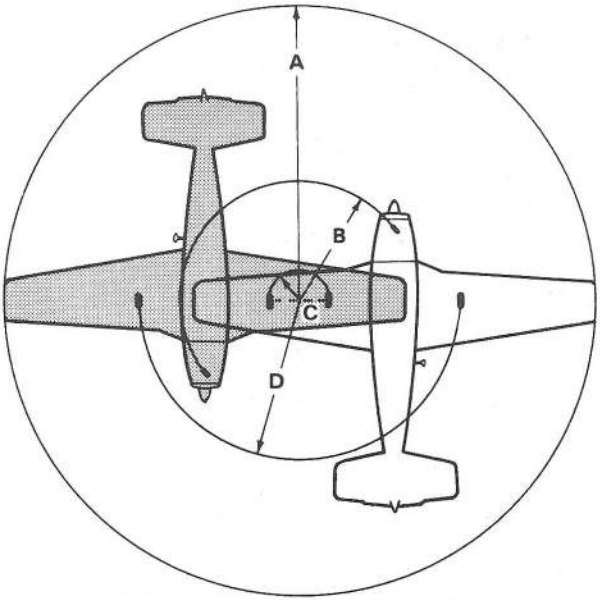
Section 8 Handling, Servicing and Maintenance

Section 9 Supplements

Section 10 Safety Information


THREE VIEW
12'2.1"
WING AREA
177.6 sq. ft.
32'9.9"
25'6"
6'6.5"
8'3"
7.5" min.
84" DIAMETER
9'6.7"

GROUND TURNING CLEARANCE



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

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

DESCRIPTIVE DATA

ENGINE

The BEECHCRAFT Debonair 33 is powered by a Continental IO-470-J wet sump, fuel injection engine. This six-cylinder powerplant is rated at 225 hp at 2600 rpm for take-off and maximum continuous operation. The IO-470-K engine is eligible for installation but not directly interchangeable with the IO-470-J engine.

PROPELLER

Hartzell constant speed, two blade, 84 inch diameter propeller using a Hartzell BHC-92ZF-1D1 hub with 8447 blades.

NOTE

Other propellers are approved but not installed as original equipment. These are listed in the FAA Aircraft Specification 3A15 or approved by Supplemental Type Certificate.

FUEL

Aviation Gasoline 80/87 (red) minimum grade or alternate grades 100LL (blue) or 100 (green). See Engine Manufacturer's Bulletin.

STANDARD SYSTEM

Total Capacity	50 gal.
Total Usable	44 gal.

OPTIONAL SYSTEM

Total Capacity	70 gal.
Total Usable	63 gal.

OIL CAPACITY

The oil capacity is 10 quarts.

WEIGHTS

Maximum Ramp Weight	2910 lbs
Maximum Take-Off Weight	2900 lbs
Maximum Landing Weight	2900 lbs
Maximum Zero Fuel Weight	No Structural Limit
Maximum Weight in Baggage Compartment	270 lbs

CABIN AND ENTRY DIMENSIONS

Length	6 ft 11 in.
Height	4 ft 2 in.
Width	3 ft 6 in.
Cabin Door	37 in. wide by 36 in. high

BAGGAGE SPACE AND ENTRY DIMENSIONS

Compartment Volume	16.5 cu ft
Door Width (Minimum)	18.5 in.
Door Height (Minimum)	22.5 in.

SPECIFIC LOADINGS (Maximum Take-Off Weight)

Wing Loading	16.3 lbs/sq ft
Power Loading	12.9 lbs/hp

GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

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.

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

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

KCAS Calibrated Airspeed expressed in "knots".

KIAS Indicated Airspeed expressed in "knots".

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

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 TERMINOLOGY

ISA	International Standard Atmosphere in which (1) The air is a dry perfect gas; (2) The temperature at sea level is 15° Celsius (59° Fahrenheit); (3) The pressure at sea level is 29.92 in 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 in Hg. (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 TERMINOLOGY

Take off and Maximum Continuous	Highest power rating not limited by time.
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 pressure (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 pressure (flow) for various power settings.
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 TERMINOLOGY

Climb Gradient	The ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.
Demonstrated Crosswind Velocity	The maximum 90° crosswind component for which adequate control of the airplane during take-off and landing was actually demonstrated during certification tests.

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.
PPH	Pounds per hour.

WEIGHT AND BALANCE TERMINOLOGY

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 (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.

C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between take-off weight, or ramp weight if applicable, and basic empty weight.
Maximum Ramp Weight	Maximum weight approved for ground maneuvering. (It includes weight of start, taxi, and run-up fuel).
Maximum Take-off Weight	Maximum weight approved for the start of the take-off run.

Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Zero Fuel Weight	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.

The following limitations must be observed in the operation of this airplane.

AIRSPEED LIMITATIONS

SPEED	CAS		IAS		REMARKS
	KNOTS	MPH	KNOTS	MPH	
Never Exceed V_{NE}	195	225	197	227	Do not exceed this speed in any operation
Maximum Structural Cruising V_{NO} or V_C	161	185	162	186	Do not exceed this speed except in smooth air and then only with caution
Maneuvering V_A	123	142	123	142	Do not make full or abrupt control movements above this speed
Maximum Flap Extension/ Extended V_{FE}	104	120	107	123	Do not extend flaps or operate with flaps extended above this speed
Maximum Landing Gear Operating/ Extended V_{LO} and V_{LE}	122	140	122	140	Do not extend, retract or operate with landing gear extended above this speed except in emergency

*AIRSPEED INDICATOR MARKINGS

MARKING	CAS		IAS		SIGNIFICANCE
	KNOTS	MPH	KNOTS	MPH	
White Arc	52-104	60-120	51-107	59-123	Full Flap Operating Range
Green Arc	62-161	71-185	60-162	69-186	Normal Operating Range
Yellow Arc	161-195	185-225	162-197	186-227	Operate with caution only in smooth air
Red Line	195	225	197	227	Maximum speed for ALL operations

*The Airspeed Indicator is marked in CAS values

POWER PLANT LIMITATIONS

ENGINE

Continental IO-470-J or IO-470-K fuel injected engine.

OPERATING LIMITATIONS

Engine Speed	2600 rpm
Cylinder Head Temperature	460°F/238°C
Oil Temperature	225°F/107°C
Oil Pressure	
Minimum	30 psi
Maximum	80 psi
Fuel Pressure	
Minimum	1.5 psi
Maximum	17.5 psi

FUEL GRADES

Aviation Gasoline 80/87 (red) minimum grade or alternate grades 100LL (blue) or 100 (green). See Engine Manufacturer's Bulletin.

OIL SPECIFICATIONS

Ashless dispersant oils must meet Teledyne Continental Motors Corporation Specification MHS-24B. Refer to APPROVED ENGINE OILS in the Handling, Servicing, and Maintenance section

PROPELLER SPECIFICATIONS

Hartzell constant speed propeller
Hub: BHC-92ZF-1D1
Blades: 8447
Diameter: Maximum 84 in., Minimum 82 in.
Pitch settings at 33 in. sta.: Low 11°, High not under 26°
Spinner: Hartzell 837-3
Governor: Hartzell hydraulic (B4-3) or Woodward hydraulic (210335)

NOTE

Other propellers are approved but not installed as original equipment. These are listed in the FAA Aircraft Specification 3A15 or approved by Supplemental Type Certificate.

POWER PLANT INSTRUMENT MARKINGS

OIL TEMPERATURE
Caution (Yellow Radial) ..... 100°F/38°C
Operating Range
(Green Arc) ..... 100° to 225°F/38° to 107°C
Maximum (Red Radial) ..... 225°F/107°C

OIL PRESSURE
Minimum Pressure (Red Radial) ..... 30 psi
Operating Range (Green Arc) ..... 30 to 60 psi
Maximum Pressure (Red Radial) ..... 80 psi

TACHOMETER
Operating Range (Green Arc) ... 2000 to 2600 rpm
Maximum RPM (Red Radial) ..... 2600 rpm

FUEL PRESSURE
Minimum (Red Radial) ..... 1.5 psi
Operating Range (Green Arc) ..... 4.25 to 17 psi
Maximum (Red Radial) ..... 17.5 psi

CYLINDER HEAD TEMPERATURE
Operating Range
(Green Arc) ..... 200° to 460°F/93° to 238°C
Maximum Temperature
(Red Radial) ..... 460°F/238°C

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

MISCELLANEOUS INSTRUMENT MARKINGS

INSTRUMENT VACUUM

With Autopilot

Minimum (Red Radial) ..... 3.75 in. Hg
Operating Range (Green Arc) .. 3.75 to 4.25 in. Hg
Maximum (Red Radial) ..... 4.6 in. Hg

Without Autopilot

Minimum (Red Radial) ..... 4.4 in. Hg
Operating Range (Green Arc) ..... 4.8 to 5.2 in. Hg
Maximum (Red Radial) ..... 5.5 in. Hg

FUEL QUANTITY
Yellow Band (44-gallon system) ..... E to 1/2 full

WEIGHT LIMITS

Maximum Ramp Weight ..... 2910 lbs
Maximum Take-off
and Landing Weight ..... 2900 lbs
Zero Fuel Weight ..... No Structural Limitation
Maximum Baggage Compartment
Load ..... 270 lbs

CENTER OF GRAVITY LIMITS (Gear Down)

Forward: 78.0 inches aft of datum to 2550 lbs with straight line variation to 82.1 inches at 2900 lbs.

Aft: 86.7 inches aft of datum to 2525 lbs with straight line variation to 85.7 inches at 2900 lbs.

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:

30 seconds for airplanes with baffled main fuel cells in both wings.

20 seconds for airplanes with unbaffled main fuel cells in either wing.

APPROVED MANEUVERS (2900 POUNDS)

MANEUVER	ENTRY SPEED (CAS)
Chandelle	123 kts/142 mph
Steep Turn	123 kts/142 mph
Lazy Eight	123 kts/142 mph
Stall (Except Whip)	Use slow deceleration

Minimum fuel for above maneuvers - 10 gallons each main tank.

Spins are prohibited.

FLIGHT LOAD FACTORS (2900 POUNDS)

Positive Maneuvering Load Factors

Flaps Up	4.4G
Flaps Down	2.0G

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 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 ICING CONDITIONS IS PROHIBITED.

LEGEND

Numbers refer to quantities required to be operative for a specified condition.

(-) Indicates that the item may be inoperative for the specified condition.
(*) Refer 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
ATA 100 CHAPTER 23 COMMUNICATIONS					
VHF communications system	*	*	*	*	-*Per FAR 91
ATA 100 CHAPTER 24 ELECTRICAL POWER					
Battery	1	1	1	1	
DC generator	1	1	1	1	

ATA 100 CHAPTER 25 EQUIPMENT AND FURNISHING					
Seat belts	1	1	1	1	- Per Person or Per FAR 91
Shoulder harness	*	*	*	*	-*Pilot and copilot if installed
Emergency locator transmitter	1	1	1	1	- Per FAR 91
ATA 100 CHAPTER 26 FIRE PROTECTION					
Portable fire extinguisher	*	*	*	*	-*Optional
ATA 100 CHAPTER 27 FLIGHT CONTROLS					
Elevator trim tab indicator	1	1	1	1	-

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
Flap position indication lights	2	2	2	2	-
Stall warning	1	1	1	1	
ATA 100 CHAPTER 28 FUEL EQUIPMENT					
Auxiliary fuel pump	1	1	1	1	
Engine driven fuel pump	1	1	1	1	
Fuel quantity indicator	2	2	2	2	-
Fuel pressure indicator	1	1	1	1	

ATA 100 CHAPTER 30 ICE AND RAIN PROTECTION					
Pitot heater	*	*	1	1	-*Optional
ATA 100 CHAPTER 32 LANDING GEAR					
Landing gear motor	1	1	1	1	-
Landing gear position indication lights	2	2	2	2	
Landing gear aural warning horn	1	1	1	1	

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
ATA 100 CHAPTER 33 LIGHTS					
Cockpit and instrument lights	-	*	-	*	-*Lights must be operative.
Landing light	-	*	-	*	-*Per FAR 91
Rotating beacon	-	1	-	1	
Position light	-	3	-	3	
ATA 100 CHAPTER 34 NAVIGATION INSTRUMENTS					
Altimeter	1	1	1	1	
Airspeed indicator	1	1	1	1	

Vertical speed	*	*	*	*	-*Optional
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
ATA 100 CHAPTER 35 OXYGEN					
Oxygen system	*	*	*	*	-*Per FAR 91
ATA 100 CHAPTER 37 VACUUM					
Vacuum system for instrument air	-	-	1	1	
Vacuum gage	-	-	1	1	

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
ATA 100 CHAPTER 77 ENGINE INDICATING INSTRUMENTS					
Engine tachometer indicator	1	1	1	1	
Manifold pressure indicator	1	1	1	1	
ATA 100 CHAPTER 79 ENGINE OIL INSTRUMENTS					
Oil pressure indicator	1	1	1	1	
Oil temperature indicator	1	1	1	1	

FUEL

STANDARD SYSTEM

Total Capacity	50 gal.
Total Usable	44 gal.

OPTIONAL SYSTEM

Total Capacity	70 gal.
Total Usable	63 gal.

FUEL MANAGEMENT

Take-off on left main tank.

Use auxiliary fuel in level flight only and do not use for take off or landing. Use at least 10 gallons from left main tank before use of auxiliary fuel.

When operating fuel selector, feel for detent position.

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

Maximum slip duration:

30 seconds for airplanes with baffled main fuel cells in both wings.

20 seconds for airplanes with unbaffled main fuel cells in either wing.

SEATING

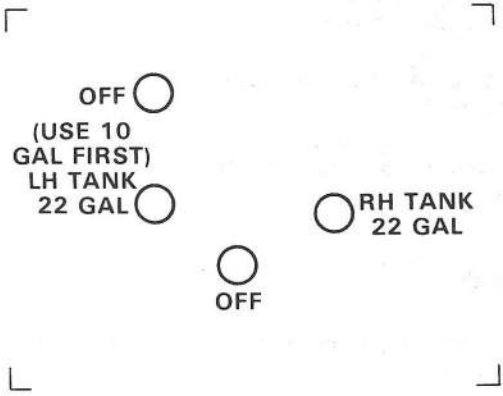
All occupied seats must be in the upright position for take-off and landing.

PLACARDS

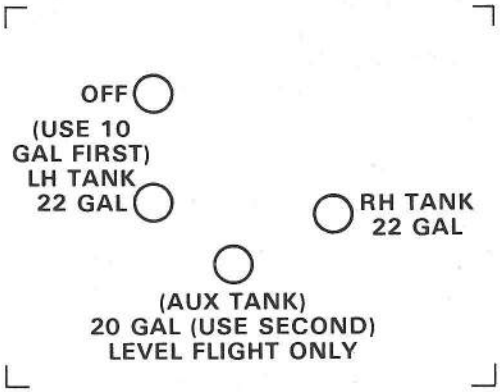
On Fuel Selector Panel:

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

Standard 44 Gallon (Usable) System:



Optional 63 Gallon (Usable) Fuel System:



Above Emergency Landing Gear Extension Handle:

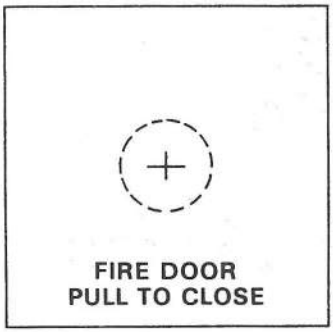
EMERGENCY LANDING GEAR
INSTRUCTIONS TO EXTEND
ENGAGE HANDLE IN REAR OF FRONT SEAT AND TURN COUNTERCLOCKWISE AS FAR AS POSSIBLE (50 TURNS)

Above Landing Gear Mechanical Position Indicator When Winter Baffles Are Installed:

NOTICE
REMOVE WINTER BAFFLES WHEN OAT EXCEEDS 70° F

PLACARDS (Cont'd)

On Right Hand Subpanel:



On Inner Side Of Baggage Compartment Door:

BAGGAGE COMPARTMENT
LOAD IN ACCORDANCE WITH
AIRPLANE FLIGHT MANUAL
MAXIMUM STRUCTURAL CAPACITY — 270 POUNDS

On Storm Window:

CAUTION

DO NOT OPEN ABOVE
145 MPH (126 KNOTS)

In Full View of Pilot (CAS):

UTILITY CATEGORY AIRPLANE

OPERATE IN ACCORDANCE WITH FAA APPROVED AIRPLANE FLIGHT MANUAL

INTENTIONAL SPINS PROHIBITED

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

AUX FUEL PUMP OPERATION

TAKE-OFF AND LAND WITH AUX FUEL PUMP OFF EXCEPT IN CASE OF LOSS OF FUEL PRESSURE

AIRSPEED LIMITATION

MAXIMUM SPEED WITH LANDING GEAR EXTENDED (NORMAL) 140 MPH
MAXIMUM DESIGN MANEUVERING SPEED 142 MPH

Above Inside Door Handle:

CAUTION
AFTER CLOSING DOOR ROTATE HANDLE TO FULL LOCKED POSITION

PLACARDS (Cont'd)

In Full View of The Pilot:

(Unless baffled main fuel cells are installed in both wings).

TURNING TYPE TAKEOFFS, AND TAKEOFF IMMEDIATELY FOLLOWING FAST TAXI TURN PROHIBITED. AVOID PROLONGED SLIPS (20 SECONDS OR MORE) WITH FUEL TANKS LESS THAN HALF FULL.

SECTION III

EMERGENCY PROCEDURES

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

EMERGENCY AIRSPEEDS

Emergency Descent	122 kts/140 mph
Glide	105 kts/121 mph
Emergency Landing Approach	80 kts/92 mph

CAUTION

The approach airspeed is higher than normal to assure the availability of control during flare without power.

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 Generator 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 MAIN TANK (Check to feel detent)
2. Auxiliary Fuel Pump - ON
3. Mixture - FULL RICH, then LEAN as required
4. Magnetos - CHECK LEFT and RIGHT, then BOTH

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. See EMERGENCY LANDING procedure.
3. 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. Ignition Switch - CHECK LEFT and RIGHT, then BOTH

CONDITION: LOSS OF ENGINE POWER

1. Fuel Pressure Gage - CHECK

If fuel pressure is abnormally low:
   a. Mixture - FULL RICH
   b. Auxiliary Fuel Pump - ON (Lean as required)
   c. Auxiliary Fuel Pump - 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 ANOTHER MAIN FUEL TANK (feel for detent)

AIR START PROCEDURE

   a. Fuel Selector Valve - SELECT MAIN TANK MORE NEARLY FULL (check to feel detent)
   b. Throttle - RETARD
   c. Mixture - FULL RICH
   d. Auxiliary Fuel Pump - ON until power is regained, then OFF. (Leave on if engine driven fuel pump is inoperative.)
   e. Throttle - ADVANCE to desired power
   f. Mixture - LEAN as required

ENGINE FIRE

IN FLIGHT

The FIRE DOOR control on the outboard side of the right lower subpanel is used 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. Fire Door Control - PULL TO CLOSE
2. Mixture - IDLE CUT-OFF
3. Fuel Selector Valve - OFF
4. Battery and Generator Switches - OFF (Extending the landing gear can be accomplished manually if desired.)
5. Do not attempt to restart engine.

ON THE GROUND

1. Mixture - IDLE CUT-OFF
2. Fuel Selector Valve - OFF
3. Battery, Generator and Ignition Switches - OFF
4. Extinguish with Fire Extinguisher.

MAXIMUM GLIDE CONFIGURATION

1. Landing Gear - UP
2. Flaps - UP
3. Propeller - PULL for LOW RPM
4. Airspeed - 105 kts/121 mph

Glide distance is approximately 1.7 nautical miles (2 statute miles) per 1000 feet of altitude above the terrain.

EMERGENCY DESCENT

1. Power - IDLE
2. Propeller - HI RPM
3. Landing Gear - DOWN
4. Airspeed - ESTABLISH 122 kts/140 mph

LANDING EMERGENCIES

LANDING WITHOUT POWER

The approach speed is higher than normal to assure the availability of control during flare without power. When assured of reaching the landing site selected, and on final approach:

1. Airspeed - 80 kts/92 mph
2. Fuel Selector Valve - OFF
3. Mixture - IDLE CUT-OFF
4. Flaps - AS REQUIRED
5. Landing Gear - DOWN OR UP, DEPENDING ON TERRAIN
6. Battery and Generator Switches - OFF

LANDING GEAR RETRACTED - WITH POWER

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

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

SYSTEMS EMERGENCIES

PROPELLER OVERSPEED

1. Throttle - RETARD TO RED LINE
2. Airspeed - REDUCE
3. Oil Pressure - CHECK

WARNING

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

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

GENERATOR OUT PROCEDURE

A failure of the generator will place the entire electrical operation of the aircraft on the battery. Generator failure may be indicated by the ammeter. When a generator failure occurs in flight, all non-essential electrical load should be discontinued to conserve the battery life.

LANDING GEAR MANUAL EXTENSION

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

1. LDG GEAR Circuit Breaker - 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 GEAR INDICATOR and LDG GEAR WARNING circuit breakers engaged).
6. Check mechanical landing gear indicator - DOWN
7. 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 on the ground.

LANDING GEAR RETRACTION AFTER PRACTICE MANUAL EXTENSION

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

1. Handcrank - CHECK, STOWED
2. Landing Gear Motor Circuit Breaker - IN
3. Landing Gear - RETRACT

UNLATCHED DOOR IN FLIGHT

If the cabin door is not locked it may come unlatched in flight. This may occur during or just after take-off. The door will trail in a position approximately 3 inches open, 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 from 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 build-up. 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 shop manual procedures is required, with repair as necessary.

SECTION IV

NORMAL PROCEDURES

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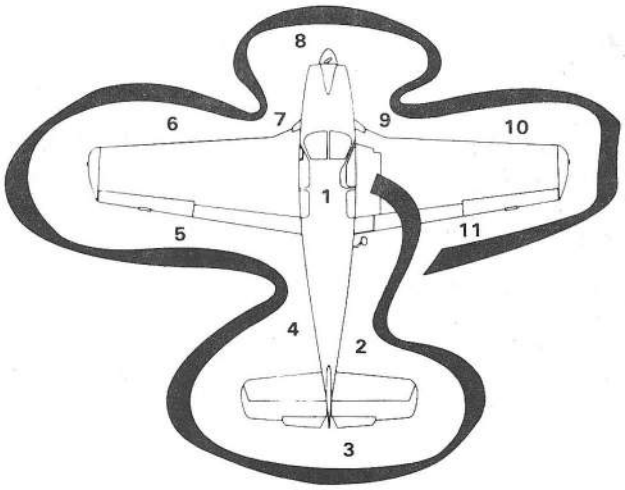
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All airspeeds quoted in this section are indicated airspeeds (IAS)

AIRSPEEDS FOR SAFE OPERATION

Take-off	
Lift-off	67 kts/77 mph
50 Ft.	73 kts/84 mph
Maximum Climb	
Best Rate (V_Y)	90 kts/104 mph
Best Angle (V_X)	71 kts/82 mph
Cruise Climb	113 kts-130 mph
Maximum Turbulent Air Penetration	123 kts/142 mph
Balked Landing Climb	70 kts/81 mph
Landing Approach	70 kts/81 mph
Maximum Demonstrated Crosswind	17 kts/20 mph

PREFLIGHT INSPECTION



Emergency Locator Transmitter - ARMED
Location may vary with individual airplanes

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

3. EMPENNAGE:
   a. Control Surfaces - CHECK
   b. Tie Down - REMOVE
   c. Position Light - 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, (Remove Cover)
   c. Fuel Tank(s) - CHECK QUANTITY; Filler Cap(s) - 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(s) - DRAIN
   d. Fuel Selector Valve Sump and Auxiliary Fuel Cell Interconnect Line - DRAIN; Cover - SECURE

8. NOSE SECTION:
   a. Engine Oil - CHECK (See Servicing, Section 8) Cap and Dipstick - SECURE
   b. Left Cowl - SECURE
   c. Propeller - CHECK, General Condition, Nicks, etc.
   d. Landing Light - CHECK
   e. Wheel Well Doors, Tire and Strut - CHECK
   f. Induction Air Intake - CLEAR
   g. Engine - CHECK GENERAL CONDITION
   h. Right Cowl - SECURE
   i. Chocks - REMOVE

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

10. RIGHT WING LEADING EDGE:
   a. Tie Down and Chocks - REMOVE
   b. Fuel Tank(s) - CHECK QUANTITY; Filler Cap(s) - SECURE

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

CAUTION

NEVER TAXI IF ANY STRUT IS FLAT.

BEFORE STARTING

1. Seats - POSITION AND LOCK; Seat Backs - UPRIGHT
2. Seat Belts - FASTEN
3. Parking Brake - SET
4. All Avionics - OFF
5. Circuit Breakers - IN
6. Landing Gear Handle - DOWN
7. Flaps - UP
8. Light Switches - As Required
9. Fuel Selector Valve - CHECK OPERATION; SELECT LEFT MAIN TANK.
10. Battery and Generator Switches - ON (If external power is used, turn Generator Switch - OFF. See Sections 7 and 8)
11. Fuel Quantity Indicators - CHECK QUANTITY

WARNING

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

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 - Approximately 1/2 inch open

NOTE

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

4. Ignition Switch - BOTH
5. Auxiliary Fuel Pump - ON (until fuel pressure stabilizes then OFF).
6. Starter Button - Press until engine starts.

CAUTION

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

7. In the Event of Overprime Condition:
   a. Mixture - IDLE CUT-OFF
   b. Throttle - OPEN
   c. Starter Button - PRESS
   d. As engine starts reduce throttle to IDLE and advance mixture to FULL RICH

NOTE

During hot starts, if there is an indication of vapor in the fuel system (fluctuating fuel pressure), switch the auxiliary fuel pump to ON to purge the system. Then turn it OFF.

8. Throttle - 1000 to 1200 rpm.
9. Oil Pressure - CHECK
10. External Power (if used) - DISCONNECT. Generator Switch - ON
11. All Engine Indicators - CHECK

CAUTION

The ammeter indication should be less than .25 charge at 1000 to 1200 rpm within two minutes, with no additional electrical equipment on. If not, this indicates a malfunction in the electrical system and the airplane should be shut down.

AFTER STARTING, AND TAXI

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 75°F (24°C).

BEFORE TAKEOFF

1. Parking Brake - SET
2. Seat Belts and Shoulder Harnesses - CHECK

NOTE

All reclining seats must be in the upright position during takeoff.

3. Avionics - CHECK
4. Engine Instruments - CHECK
5. Flight Instruments - CHECK AND SET

6. Ammeter - CHECK - for stabilized indication between 0 and .25 charge at 1000 to 1200 rpm. Ammeter should show some decrease from the initial indication.
7. Auxiliary Fuel Pump - CHECK OFF
8. Throttle - 1900 RPM
9. Propeller - EXERCISE to obtain 300 to 400 rpm drop; return to high rpm
10. Magnetos - CHECK at 1700 rpm (variance between individual magnetos should not exceed 50 rpm, maximum drop not to exceed 150 rpm.)
11. Trim - SET
    a. Aileron - NEUTRAL (if installed)
    b. Elevator - 0° (3° nose up if only front seats are occupied)
12. Flaps - Check operation, then UP
13. Door and Windows - SECURE
14. Controls - CHECK PROPER DIRECTION AND FREEDOM OF MOVEMENT
15. Mixture - FULL RICH (or as required by field elevation)
16. Brakes - RELEASED
17. Instruments - CHECK (Make final check of manifold pressure, fuel pressure, and rpm at the start of the take-off run.)

TAKE-OFF

Take-Off Power ..... Full Throttle, 2600 rpm

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

CLIMB

Maximum Continuous ..... Full throttle, 2600 rpm
Cruise Climb ..... 25 in. Hg (or full throttle) 2500 rpm

1. Engine Temperatures - MONITOR
2. Power - SET AS DESIRED.
3. Mixture - SET FUEL PRESSURE

CRUISE

See Cruise Charts in PERFORMANCE Section.

1. Power - SET
2. Mixture - SET FUEL PRESSURE

DESCENT

1. Altimeter - SET
2. Power - AS REQUIRED (avoid prolonged idle settings and low cylinder head temperatures)
3. Mixture - ENRICH AS REQUIRED

BEFORE LANDING

1. Seat Belts - SECURE

NOTE

All reclining seats must be in the upright position during landing.

2. Fuel Selector Valve - SELECT MAIN TANK MORE NEARLY FULL
3. Mixture - FULL RICH (or as required by field elevation)
4. Landing Gear - DOWN and CHECK. (Observe maximum extension speed)
5. Landing Light - AS REQUIRED
6. Flaps - DOWN (Observe maximum extension speed)
7. Airspeed - ESTABLISH LANDING APPROACH SPEED.
8. Propeller - HIGH RPM

BALKED LANDING

1. Power - FULL THROTTLE, 2600 RPM
2. Airspeed - 70 kts/81 mph until clear of obstacles, then trim to normal climb speed
3. Landing Gear - UP
4. Flaps - UP

AFTER LANDING

1. Landing Light - AS REQUIRED
2. Flaps - UP
3. Trim Tab - SET TO 0°

SHUTDOWN

1. Brakes - SET
2. Electrical and Radio Equipment - OFF
3. Throttle - CLOSE
4. Mixture - IDLE CUT-OFF
5. Ignition Switch - OFF, after engine stops
6. Battery and Generator Switches - OFF
7. Control Lock - INSTALL, if conditions warrant.
8. Install wheel chocks and release brakes if the airplane is to be left unattended.

ENVIRONMENTAL SYSTEMS

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 quite possible to exceed the cylinder head temperature limit in trying to bring up the oil temperature. Exercise the propeller several times to remove cold oil from the pitch change mechanism. The propeller should also be cycled occasionally in flight.

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

ICING CONDITIONS

Flight in Icing Conditions Is Prohibited.

ENGINE BREAK-IN INFORMATION

See Section 7, Systems

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 2900 lbs. Enter at -5°C to 11,500 ft and to 2900 lbs. Read:

Time to Climb = (22 - 9) = 13 min
Fuel Used to Climb = (6.2 - 2.5) = 3.7 gal
Distance Traveled = (45 - 18) = 27 NM

The cruise power setting is assumed to be at 2450 rpm. Since cruise at 11,500 feet requires full throttle, the manifold pressure and fuel flow should be read from either the cruise power setting table for 75 percent or 65 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% maximum continuous power (or full throttle) at 10,000 ft, 12,000 ft, ISA and ISA + 20°C.

	TEMPERATURE					
	ISA			ISA + 20°C		
ALTITUDE FEET	MAN. PRESS. IN. HG	FUEL FLOW PSI/ GPH	TAS KNOTS	MAN. PRESS. IN. HG	FUEL FLOW PSI/ GPH	TAS KNOTS
10000	20.1	6.1/12.0	156	20.1	5.6/11.2	155
12000	18.6	5.5/11.1	154	18.6	5.1/10.5	152

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 PSI/GPH	TAS KNOTS
DEN-PUB	18.9	5.6/11.2	154
PUB-TBE	18.9	5.5/11.1	154
TBE-DHT	18.9	5.3/10.8	153
DHT-AMA	18.9	5.3/10.7	153

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	183	0:09	1.7
COS-PUB	40	180	0:13	2.4
PUB-TBE	74	139	0:32	5.9
TBE-DHT	87	141	0:37	6.7
DHT-AMA	65	143	0:27	4.8

*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	1.7	0
Climb	0:13	3.7	27
Cruise	1:58	21.5	294
Total	2:11	26.9	321

Total Flight Time: 2 hours, 11 minutes

Block Speed: 321 NM ÷ 2 hours, 11 minutes = 146 knots

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

Enter the cruise power settings table for 45% MCP (or full throttle). The fuel flow for 45% MCP is 8.3 gallons per hour.
Reserve fuel = (45 min) (8.3 GPH) = 6.2 gallons

Total Fuel = 26.9 + 6.2 = 33.1 gallons

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

Assumed ramp weight = 2910 lbs

Estimated fuel from DEN to AMA = (26.9 gal) (6 lbs/gal) = 161 lbs

Estimated landing weight = 2910 - 161 = 2749 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.

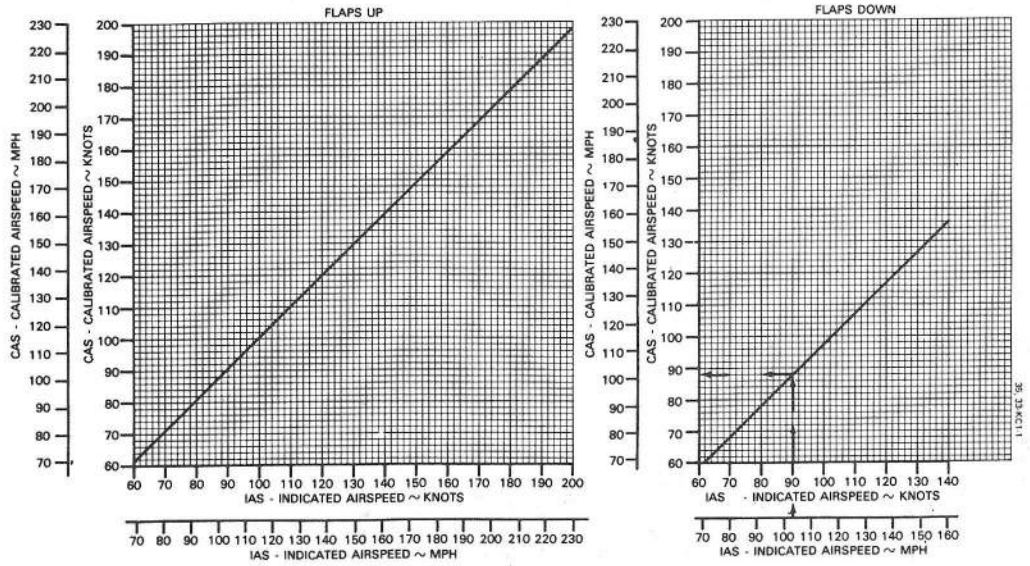
5. The full amount of usable fuel is available for all approved flight conditions.

AIRSPEED CALIBRATION - NORMAL SYSTEM

NOTE INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR

EXAMPLE

IAS	90 KNOTS (104 MPH)
FLAPS	DOWN
CAS	88 KNOTS (101 MPH)

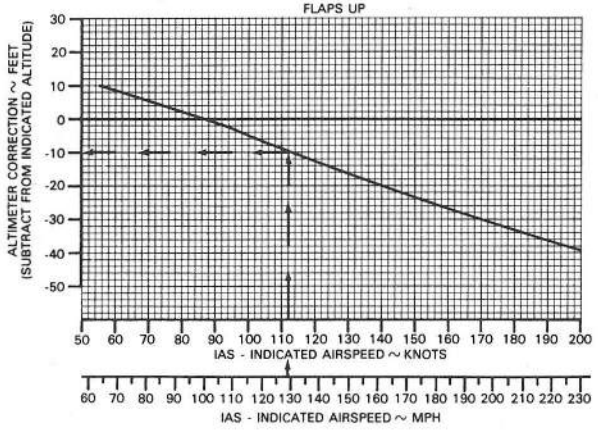


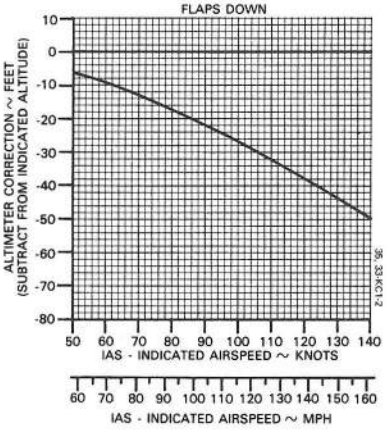
ALTIMETER CORRECTION - NORMAL SYSTEM

NOTE: INDICATED AIRSPEED AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR

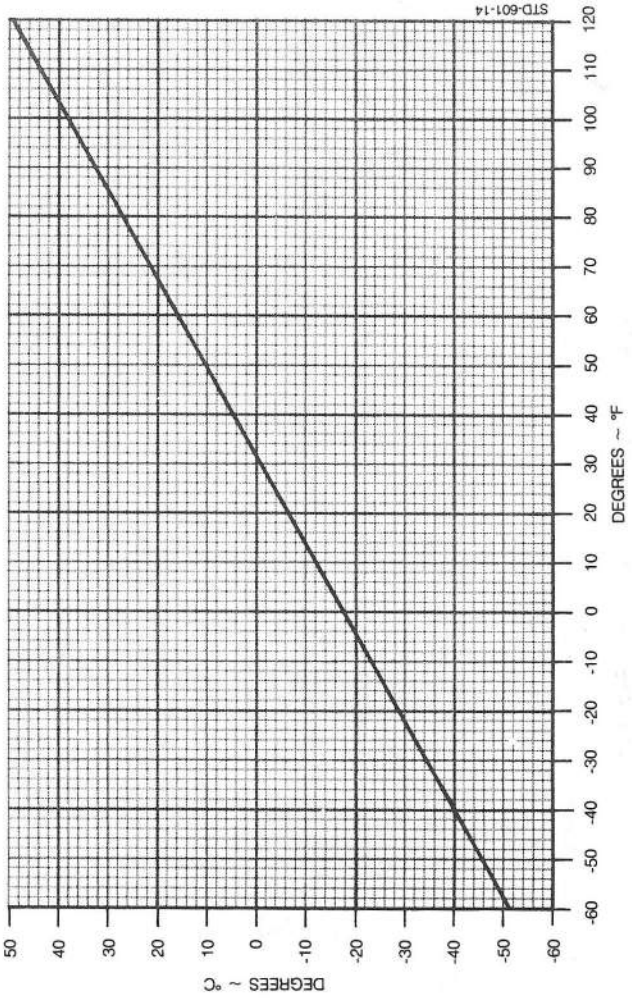
EXAMPLE

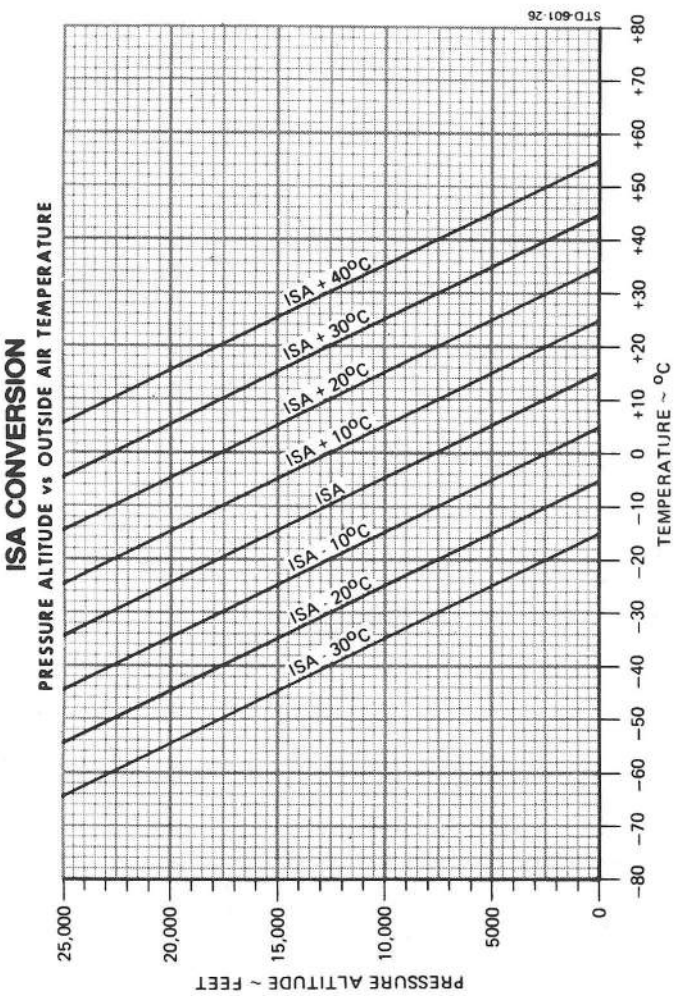
IAS	112 KNOTS
FLAPS	UP
INDICATED PRESSURE ALTITUDE	5000 FEET
ALTIMETER CORRECTION	-10 FEET
ACTUAL PRESSURE ALTITUDE	= 5000 - 10 = 4990 FEET





FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION



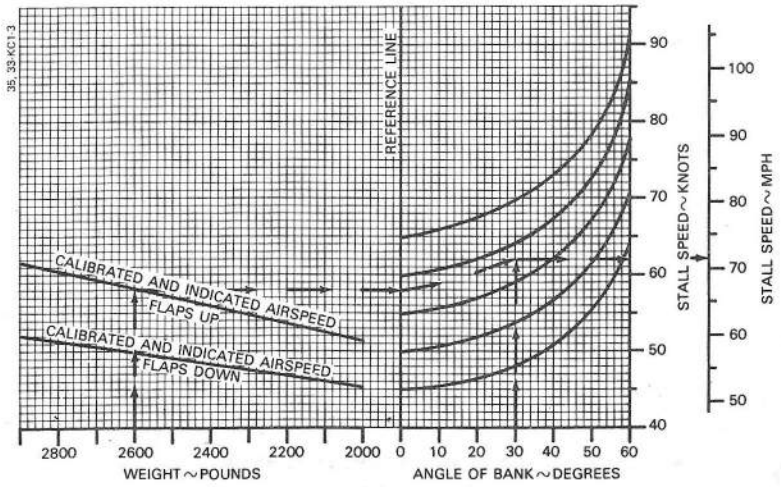

STD-601-26
ISA CONVERSION
PRESSURE ALTITUDE vs OUTSIDE AIR TEMPERATURE
ISA + 40°C
ISA + 30°C
ISA + 20°C
ISA + 10°C
ISA
ISA - 10°C
ISA - 20°C
ISA - 30°C
25,000
20,000
15,000
10,000
5000
0
PRESSURE ALTITUDE ~ FEET
-80 -70 -60 -50 -40 -30 -20 -10 0 +10 +20 +30 +40 +50 +60 +70 +80
TEMPERATURE ~ °C

STALL SPEEDS - POWER IDLE

NOTES: 1. THE MAXIMUM ALTITUDE LOSS EXPERIENCED WHILE CONDUCTING STALLS IN ACCORDANCE WITH CAM 3.120 WAS 200 FT.

2. A NORMAL STALL RECOVERY TECHNIQUE MAY BE USED

EXAMPLE	
WEIGHT	2600 LBS
FLAPS	UP
ANGLE OF BANK	30°
STALL SPEED	62 KNOTS 71 MPH

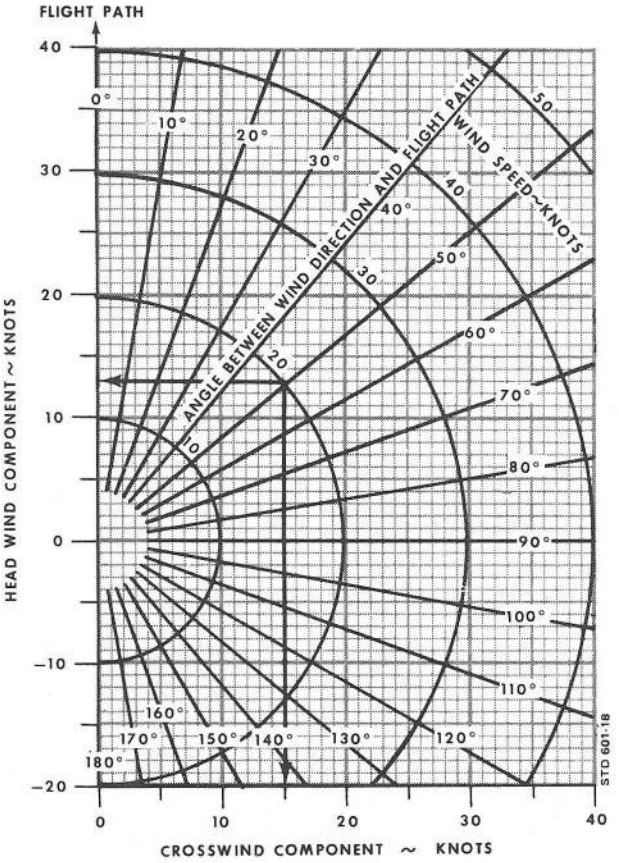


WIND COMPONENTS

Demonstrated Crosswind is 17 kts

EXAMPLE:

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



TAKE-OFF DISTANCE

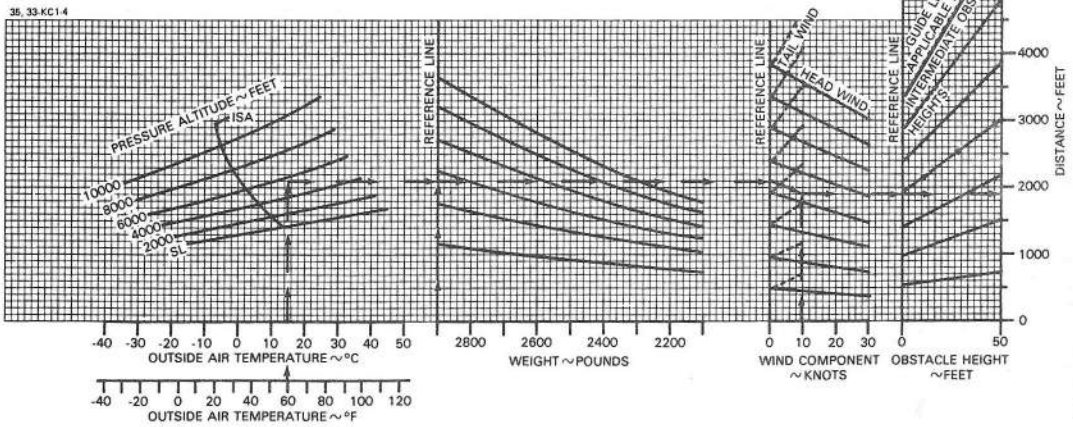
ASSOCIATED CONDITIONS

POWER	FULL THROTTLE 2600 RPM
MIXTURE	LEAN TO APPROPRIATE FUEL PRESSURE
FLAPS	UP
LANDING GEAR	RETRACT AFTER POSITIVE CLIMB ESTABLISHED

WEIGHT ~ POUNDS	TAKE-OFF SPEED			
	LIFT OFF		50 FT	
	KNOTS	MPH	KNOTS	MPH
2900	67	77	73	84
2800	66	76	72	83
2600	63	73	69	79
2400	60	69	66	76
2200	58	67	64	74

EXAMPLE

OAT	15°C (59°F)
PRESSURE ALTITUDE	5650 FT
TAKE OFF WEIGHT	2900 LBS
HEAD WIND COMP	9.5 KNOTS
GROUND ROLL	1900 FEET
TOTAL DISTANCE OVER A 50 FT OBSTACLE	3050 FEET
TAKE OFF SPEED AT	
LIFT OFF	67 KNOTS (77 MPH)
50 FT	73 KNOTS (84 MPH)



CLIMB

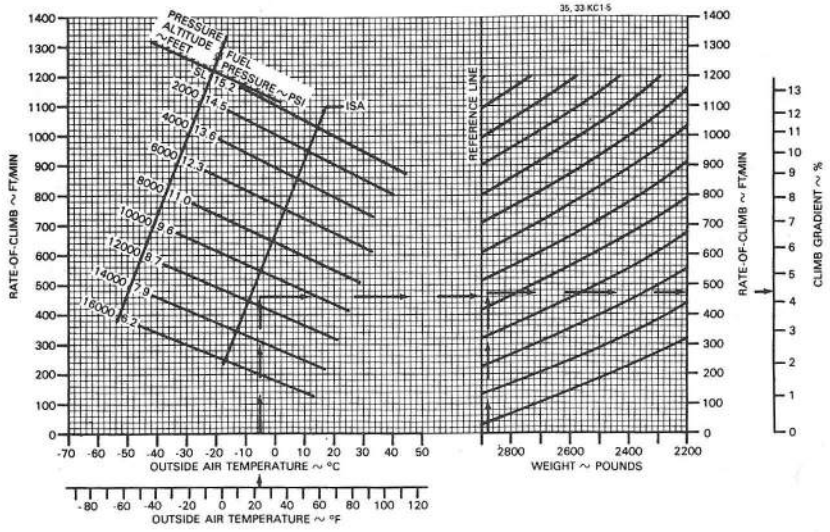
ASSOCIATED CONDITIONS

POWER	FULL THROTTLE AT 2600 RPM
MIXTURE	LEAN TO APPROPRIATE FUEL PRESSURE
FLAPS	UP
LANDING GEAR	UP

CLIMB SPEED 90 KNOTS (ALL WEIGHTS)
104 MPH

EXAMPLE

OAT	5°C (23°F)
PRESSURE ALTITUDE	11500 FT
WEIGHT	2878 LBS
RATE-OF-CLIMB	470 FT/MIN
CLIMB GRADIENT	4.3%
CLIMB SPEED	90 KNOTS (104 MPH)



TIME, FUEL AND DISTANCE TO CLIMB

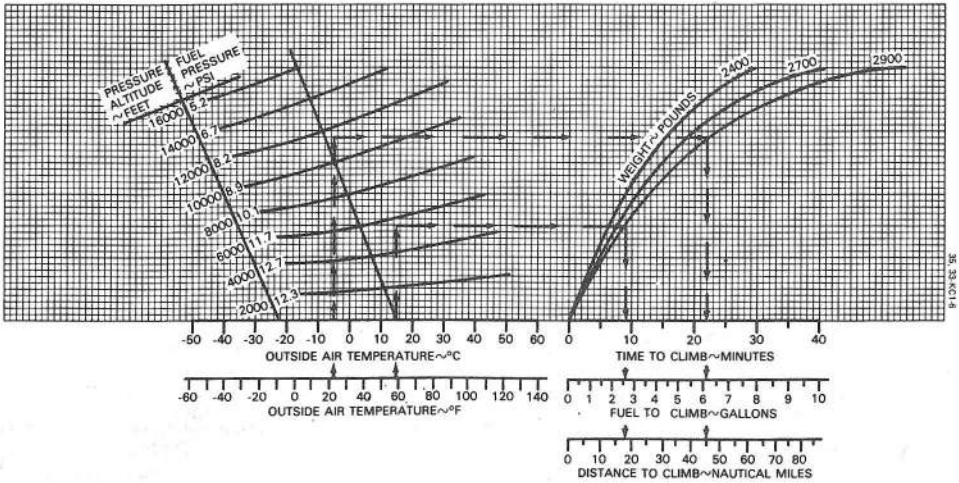
ASSOCIATED CONDITIONS

POWER	25 IN. HG. OR FULL THROTTLE 2500 RPM
FUEL DENSITY	6.0 LB/GAL
MIXTURE	LEAN TO APPROPRIATE FUEL PRESSURE

CLIMB SPEED - 113 KNOTS
130 MPH

EXAMPLE

OAT AT TAKE-OFF	15°C (59°F)
OAT AT CRUISE	-5°C (23°F)
AIRPORT PRESSURE ALTITUDE	5650 FT
CRUISE PRESSURE ALTITUDE	11500 FT
INITIAL CLIMB WEIGHT	2900 LBS
TIME TO CLIMB (22-9)	13 MIN
FUEL TO CLIMB (6.2-2.5)	3.7 GAL
DISTANCE TO CLIMB (45-18)	27 NM



CRUISE POWER SETTINGS

75% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE)
@ AVERAGE CRUISE WEIGHT = 2700 LBS.

PRESS ALT.	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
	OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS	
FEET	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH
SL	27	−3	2450	23.4	7.3	13.4	146	168	63	17	2450	24.0	7.3	13.4	149	172	99	37	2450	24.5	7.3	13.4	152	175
2000	20	−7	2450	22.9	7.3	13.4	148	171	56	13	2450	23.4	7.3	13.4	152	175	92	33	2450	24.0	7.3	13.4	155	178
4000	13	−11	2450	22.4	7.3	13.4	151	174	49	9	2450	22.8	7.3	13.4	155	178	85	29	2450	23.5	7.3	13.4	158	182
6000	6	−15	2450	21.8	7.3	13.4	154	178	42	5	2450	22.2	7.3	13.4	158	181	78	26	2450	23.1	7.1	13.2	160	184
8000	−2	−19	2450	21.3	7.3	13.4	157	181	35	2	2450	21.6	6.9	12.9	158	182	71	22	2450	21.7	6.2	12.1	157	181
10000	−9	−23	2450	20.1	6.7	12.7	157	180	27	−3	2450	20.1	6.1	12.0	156	180	63	17	2450	20.1	5.6	11.2	155	178
12000	−16	−27	2450	18.6	6.0	11.8	154	178	20	−7	2450	18.6	5.5	11.1	154	177	56	13	2450	18.6	5.1	10.5	152	175
14000	−23	−31	2450	17.3	5.3	10.9	151	174	13	−11	2450	17.3	5.0	10.3	150	173	49	9	2450	17.3	4.6	9.7	148	170
16000	−30	−35	2450	16.0	4.9	10.1	148	170	6	−15	2450	16.0	4.6	9.6	146	168	41	5	2450	16.0	4.3	9.1	143	165

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)
@ AVERAGE CRUISE WEIGHT = 2700 LBS.

PRESS ALT.	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
	OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS	
FEET	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH
SL	26	−3	2450	21.2	5.8	11.5	137	158	62	17	2450	21.7	5.8	11.5	140	162	98	37	2450	22.3	5.8	11.5	143	165
2000	19	−7	2450	20.7	5.8	11.5	140	161	55	13	2450	21.3	5.8	11.5	143	165	91	33	2450	21.8	5.8	11.5	146	168
4000	12	−11	2450	20.3	5.8	11.5	142	164	48	9	2450	20.8	5.8	11.5	145	167	84	29	2450	21.4	5.8	11.5	148	171
6000	5	−15	2450	19.8	5.8	11.5	145	167	41	5	2450	20.4	5.8	11.5	148	170	77	25	2450	20.9	5.8	11.5	151	174
8000	−2	−19	2450	19.4	5.8	11.5	147	170	34	1	2450	19.9	5.8	11.5	151	174	70	21	2450	20.4	5.8	11.5	154	177
10000	−9	−23	2450	18.9	5.8	11.5	150	173	27	−3	2450	19.5	5.8	11.5	153	177	63	17	2450	20.0	5.8	11.2	156	178
12000	−16	−27	2450	18.5	5.8	11.5	153	176	20	−7	2450	18.6	5.5	11.1	154	177	56	13	2450	18.6	5.1	10.5	152	175
14000	−23	−31	2450	17.3	5.3	10.9	151	174	13	−11	2450	17.3	5.0	10.3	150	173	49	9	2450	17.3	4.7	9.7	148	170
16000	−30	−35	2450	16.0	4.9	10.1	148	170	6	−15	2450	16.0	4.6	9.6	146	168	41	5	2450	16.0	4.3	9.1	143	165

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)
@ AVERAGE CRUISE WEIGHT = 2700 LBS.

PRESS ALT.	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
	OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS	
FEET	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH
SL	26	−4	2300	20.2	4.7	9.8	128	147	62	17	2300	20.7	4.7	9.8	131	150	98	37	2300	21.1	4.7	9.8	133	153
2000	19	−7	2300	19.7	4.7	9.8	130	150	55	13	2300	20.3	4.7	9.8	133	153	91	33	2300	20.7	4.7	9.8	135	156
4000	12	−11	2300	19.2	4.7	9.8	132	152	48	9	2300	19.8	4.7	9.8	135	155	84	29	2300	20.2	4.7	9.8	138	158
6000	5	−15	2300	18.7	4.7	9.8	135	155	41	5	2300	19.3	4.7	9.8	137	158	77	25	2300	19.8	4.7	9.8	140	161
8000	−2	−19	2300	18.2	4.7	9.8	137	157	34	1	2300	18.8	4.7	9.8	140	161	70	21	2300	19.3	4.7	9.8	142	164
10000	−10	−23	2300	17.8	4.7	9.8	139	160	27	−3	2300	18.3	4.7	9.8	142	163	63	17	2300	18.8	4.7	9.8	144	166
12000	−17	−27	2300	17.3	4.7	9.8	141	163	20	−7	2300	17.9	4.7	9.8	144	166	56	13	2300	18.4	4.6	9.6	145	167
14000	−24	−31	2300	16.8	4.7	9.8	143	165	13	−11	2300	17.3	4.5	9.5	143	165	48	9	2300	17.3	4.3	9.0	140	162
16000	−31	−35	2300	16.2	4.4	9.2	140	161	5	−15	2300	16.2	4.3	8.9	139	159	41	5	2300	16.2	4.1	8.5	134	154

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)
@ AVERAGE CRUISE WEIGHT = 2700 LBS.

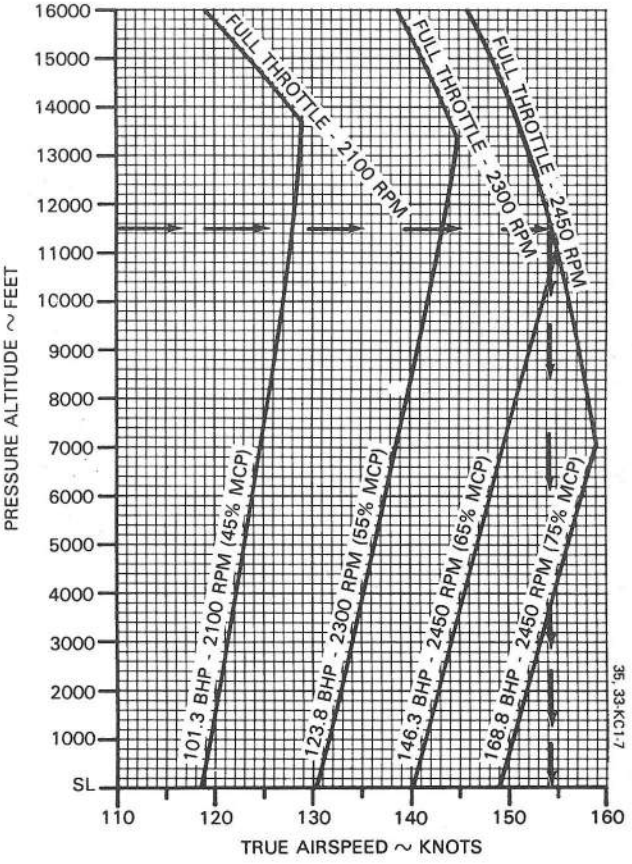
PRESS ALT.	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
	OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS		OAT		ENGINE SPEED	MAN. PRESS	FUEL FLOW		TAS	
FEET	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH	°F	°C	RPM	IN HG	PSI	GPH	KTS	MPH
SL	25	−4	2100	20.0	4.0	8.3	116	134	61	16	2100	20.4	4.0	8.3	119	136	97	36	2100	20.9	4.0	8.3	121	139
2000	18	−8	2100	19.5	4.0	8.3	118	136	54	12	2100	19.9	4.0	8.3	120	139	90	32	2100	20.5	4.0	8.3	122	141
4000	11	−12	2100	19.1	4.0	8.3	120	138	47	9	2100	19.5	4.0	8.3	122	141	83	29	2100	20.0	4.0	8.3	124	143
6000	4	−16	2100	18.6	4.0	8.3	122	140	40	5	2100	19.1	4.0	8.3	124	142	76	25	2100	19.5	4.0	8.3	126	145
8000	−3	−20	2100	18.2	4.0	8.3	123	142	33	1	2100	18.7	4.0	8.3	125	144	69	21	2100	19.1	4.0	8.3	127	146
10000	−10	−23	2100	17.7	4.0	8.3	125	144	26	−3	2100	18.2	4.0	8.3	127	146	62	17	2100	18.6	4.0	8.3	128	148
12000	−17	−27	2100	17.3	4.0	8.3	126	146	19	−7	2100	17.8	4.0	8.3	128	148	55	13	2100	18.2	4.0	8.3	129	149
14000	−24	−31	2100	16.8	4.0	8.3	128	147	12	−11	2100	17.3	3.9	8.2	128	147	48	9	2100	17.3	3.8	7.9	121	140
16000	−32	−35	2100	16.0	3.8	7.9	122	141	4	−15	2100	16.0	3.8	7.8	119	137	38	3	2100	16.0	3.6	7.5	0	0

NOTES:
1. FULL THROTTLE MANIFOLD PRESSURE SETTINGS ARE APPROXIMATE.
2. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.

CRUISE SPEEDS

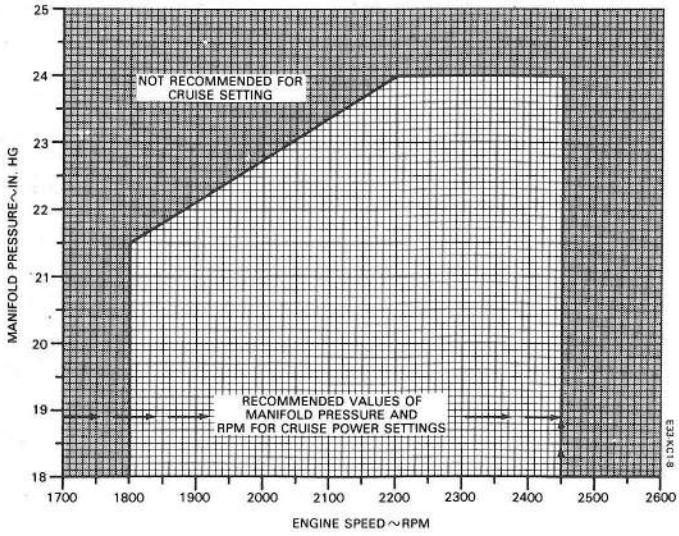
ASSOCIATED CONDITIONS	
AVERAGE CRUISE WEIGHT	2700 LBS
TEMPERATURE	STANDARD DAY (ISA)

EXAMPLE	
PRESSURE ALTITUDE	11500 FT
POWER SETTING	FULL THROTTLE 2450 RPM
TRUE AIRSPEED	154 KNOTS



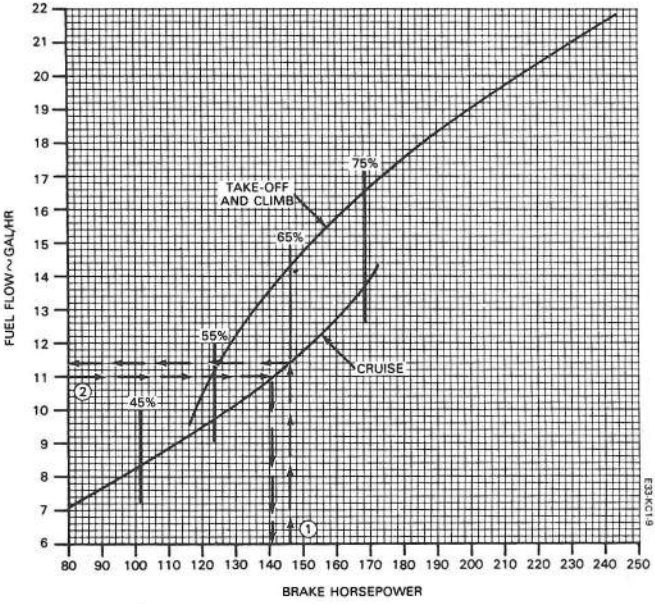
MANIFOLD PRESSURE vs RPM

EXAMPLE:
ENGINE SPEED 2450 RPM
MANIFOLD PRESSURE 18.9 IN. HG.
WITHIN RECOMMENDED LIMITS



FUEL FLOW vs BRAKE HORSEPOWER

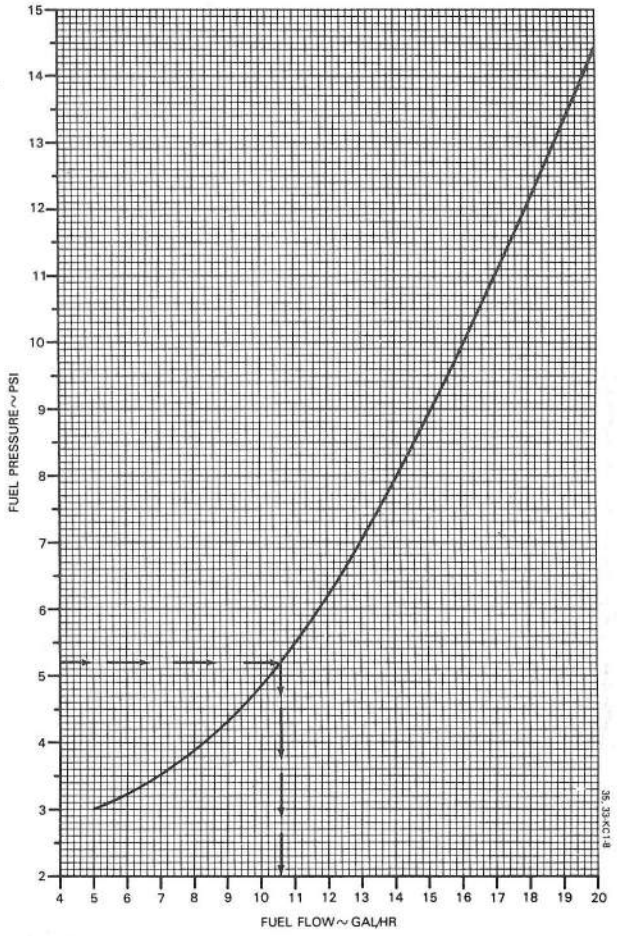
EXAMPLE	
① BRAKE HORSEPOWER	146.3 (65% MCP)
CONDITION	LEVEL FLIGHT CRUISE LEAN
FUEL FLOW	11.4 GAL/HR
② FUEL FLOW	11.0 GAL/HR
CONDITION	LEVEL FLIGHT CRUISE LEAN
BRAKE HORSEPOWER	141



FUEL FLOW vs FUEL PRESSURE

EXAMPLE:

FUEL PRESSURE	5.2 PSI
FUEL FLOW	10.6 GAL/HR



RANGE PROFILE - 63 GALLONS

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS

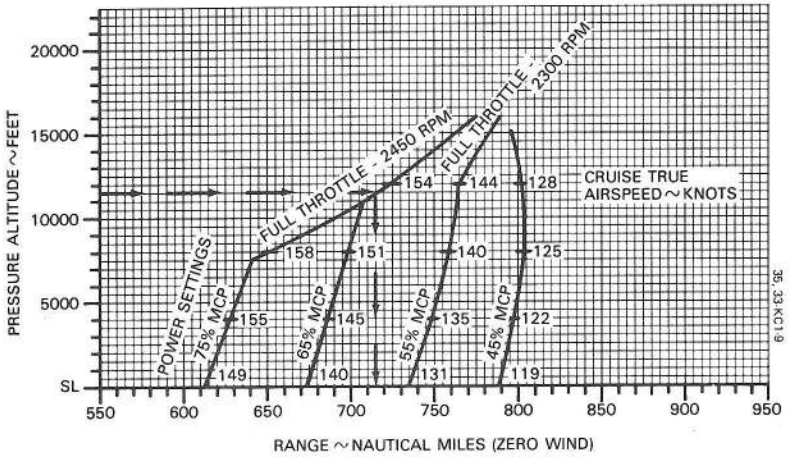
WEIGHT	2910 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	63 U.S. GAL (378 LBS)

NOTE

RANGE INCLUDES START, TAXI, AND CLIMB WITH 45 MINUTES RESERVE FUEL AT 45% MCP

EXAMPLE

PRESSURE ALTITUDE	11500 FT
POWER SETTING	FULL THROTTLE 2450 RPM
RANGE	715 NM



RANGE PROFILE - 44 GALLONS

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS

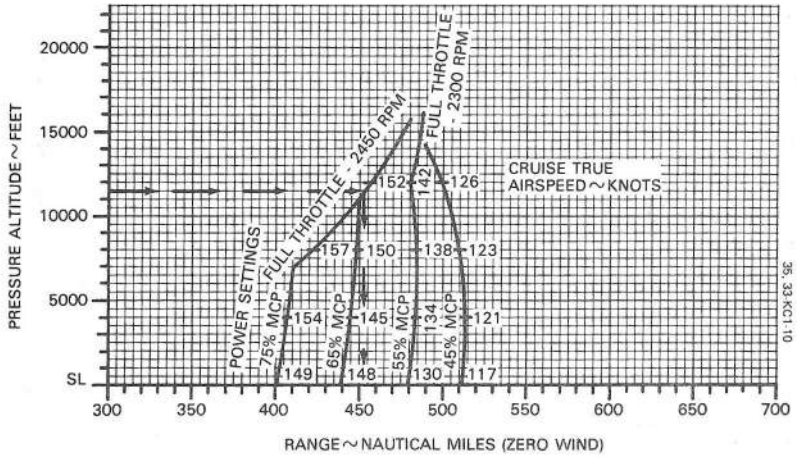
WEIGHT	2910 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	44 U.S. GAL (264 LBS)

NOTE

RANGE INCLUDES START, TAXI AND CLIMB WITH 45 MINUTES RESERVE FUEL AT 45% MCP

EXAMPLE

PRESSURE ALTITUDE	11500 FT
POWER SETTING	FULL THROTTLE 2450 RPM
RANGE	452 NM



ENDURANCE PROFILE - 63 GALLONS

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS

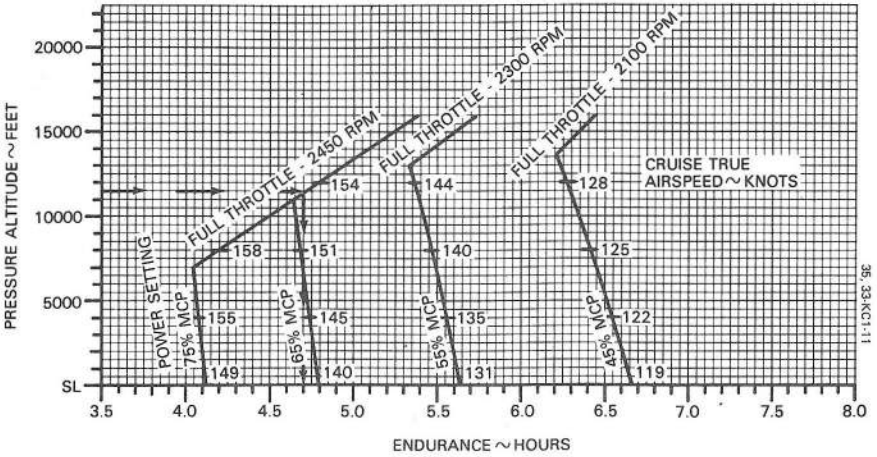
WEIGHT	2910 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	63 U.S. GAL (378 LBS)

NOTE

ENDURANCE INCLUDES START, TAXI, AND CLIMB WITH 45 MINUTES RESERVE FUEL AT 45% MCP

EXAMPLE

PRESSURE ALTITUDE	11500 FT
POWER SETTING	FULL THROTTLE 2450 RPM
ENDURANCE	4.7 HOURS (4 HOURS 42 MINUTES)



ENDURANCE PROFILE - 44 GALLONS

STANDARD DAY (ISA)

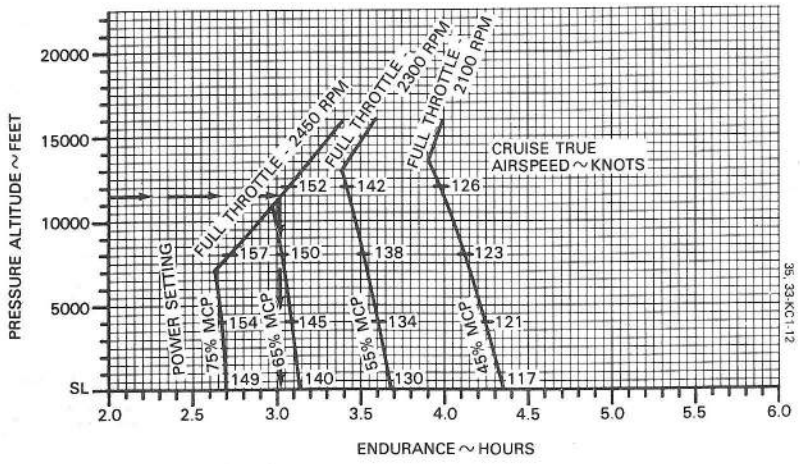
ASSOCIATED CONDITIONS:

WEIGHT	2910 LBS BEFORE ENGINE START
FUEL	AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	44 U.S. GAL (264 LBS)

NOTE
ENDURANCE INCLUDES START, TAXI, AND CLIMB WITH 45 MINUTES RESERVE FUEL AT 45% MCP

EXAMPLE

PRESSURE ALTITUDE	11500 FT
POWER SETTING	FULL THROTTLE 2450 RPM
ENDURANCE	3.02 HOURS (3 HOURS 1 MINUTE)



LANDING DISTANCE

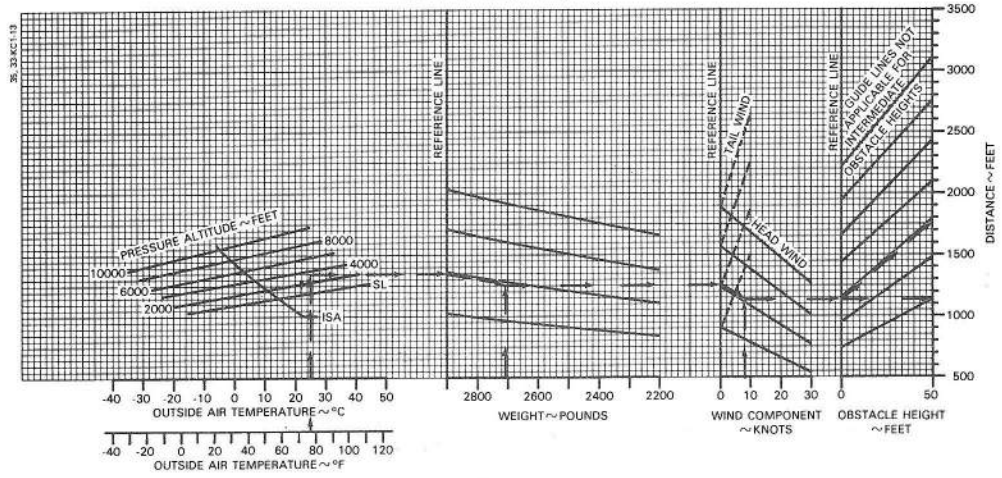
ASSOCIATED CONDITIONS

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 ~ POUNDS	SPEED AT 50 FT KNOTS	SPEED AT 50 FT MPH
2900	70	81
2800	69	79
2600	67	77
2400	65	75
2200	63	73

EXAMPLE

OAT	25°C (77°F)
PRESSURE ALTITUDE	3965 FT
WEIGHT	2708 LBS
WIND COMPONENT	8.0 KNOTS (HEADWIND)
GROUND ROLL	1140 FEET
TOTAL OVER 50 FT OBSTACLE	1750 FEET
APPROACH SPEED	68 KNOTS (78 MPH)



SECTION VI

WEIGHT AND BALANCE/ EQUIPMENT LIST

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WEIGHING INSTRUCTIONS

Periodic weighing of the airplane may be required to keep the Basic Empty Weight current. All changes to the airplane affecting weight and balance are the responsibility of the airplane's 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 drained system is 34.5 pounds at Fuselage Station 79.1 and 5 pounds at Fuselage Station 94.0 for airplanes with 10 gallon auxiliary tanks installed.

3. Engine oil must be at the full level or completely drained. Total engine oil when full is 22 pounds at Fuselage Station 25.3. (Includes 3 pounds undrainable oil.)

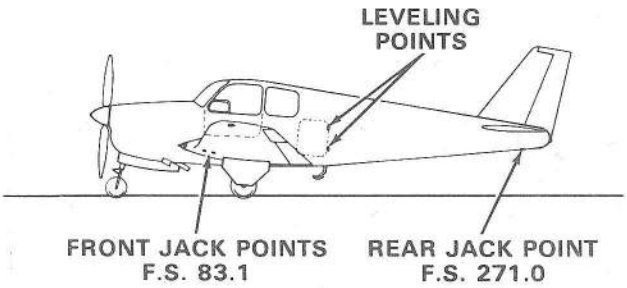
4. To determine airplane configuration at time of weighing, installed equipment is checked against the airplane equipment list or superseding forms. All installed equipment must be in its proper place during weighing.

5. At the time of weighing, the airplane must be level both longitudinally and laterally, and the landing gear must be fully extended. Leveling screws are located on the left side of the fuselage at approximately Fuselage Station 152.25. Longitudinally level attitude is determined with a plumb bob. Laterally level attitude is obtained when the vertical distance from each wing tip to the floor is equal.

6. Measurement of the reaction arms for a wheel weighing is made using a steel measuring tape. Measurements are taken, with the airplane level on the scales, from the reference (a plumb bob dropped from the center of either main jack point) to the axle center line of the main gear and then to the nose wheel axle center line. The main wheel axle center line is best located by stretching a string across from one main wheel to the other. All measurements are to be taken with the tape level with the hangar floor and parallel to the fuselage center line. The locations of the wheel reactions will be approximately at Fuselage Station 96.7 for main wheels and Fuselage Station 12.7 for the nose wheel.

7. Jack point weighings are accomplished by placing scales at the jack points specified in step 1 above. Since the center of gravity of the airplane is forward of Fuselage Station 83.1, the tail reaction of the airplane will be in an up direction. This can be measured on regular scales by placing ballast of approximately 200 pounds on the scales and attached to the aft weighing point 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

DEBONAIR SER. NO._____ REG. NO._____ DATE _____

STRUT POSITION -	NOSE	MAIN	JACK POINT LOC.		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 (DRY)					
ENGINE OIL			22	-	557
UNUSABLE FUEL			36	79	2844
WITH AUX. TANKS INSTALLED			5	94	470
BASIC EMPTY WEIGHT					

NOTE

Each new airplane is delivered with a completed sample loading, 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 empty weight and c.g. is a suitable means for meeting both requirements.

The current equipment list and empty weight and c.g. 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 empty weight and c.g. 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. _____

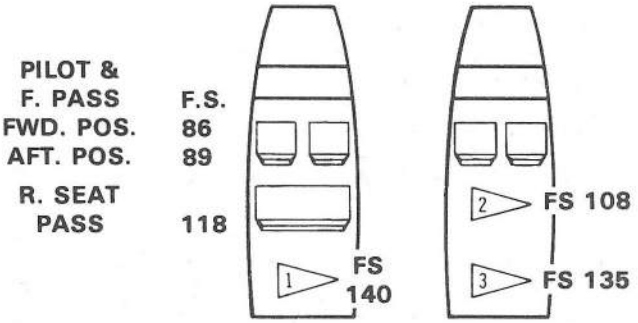
DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR CHANGE	WEIGHT CHANGE ADDED (+) OR REMOVED (-)			RUNNING BASIC EMPTY WEIGHT	
	IN	OUT		WT (LBS)	ARM (IN.)	MOM / 100	WT (LBS)	MOM / 100

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 empty weight and moment of the airplane at the time of delivery are shown on the airplane 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 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



1. MAXIMUM WEIGHT 270 POUNDS INCLUDING EQUIPMENT AND BAGGAGE.
2. MAXIMUM WEIGHT 200 POUNDS FORWARD OF REAR SPAR INCLUDING EQUIPMENT AND CARGO WITH REAR SEAT REMOVED.
3. MAXIMUM WEIGHT 270 POUNDS AFT OF REAR SPAR INCLUDING EQUIPMENT AND CARGO WITH REAR SEAT REMOVED.

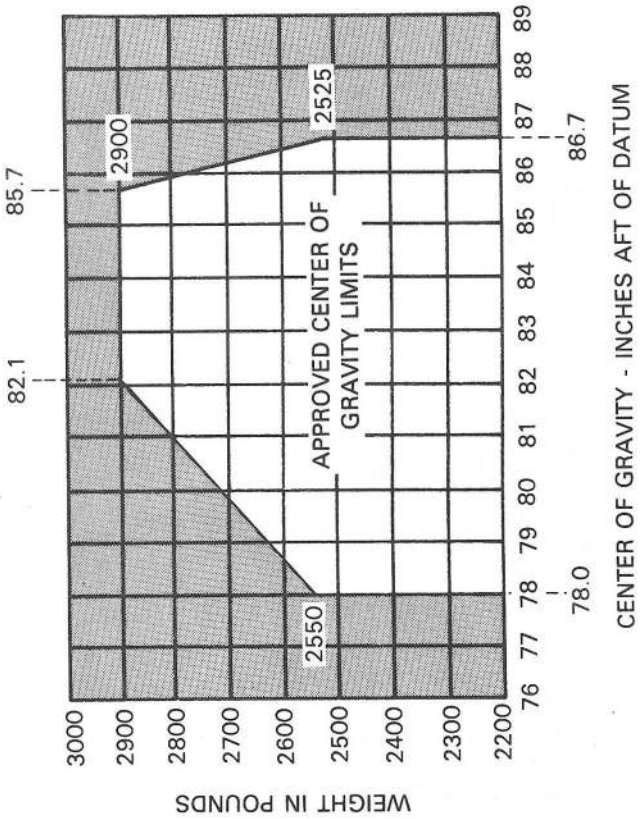
NOTE

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.

CENTER OF GRAVITY



MOMENT LIMITS vs WEIGHT

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

WEIGHT CONDITION	FORWARD CG LIMIT	AFT CG LIMIT
2900 lb. (take-off or landing)	82.1	85.7
2550 lb.	78.0	86.6
2525 lb. or less	78.0	86.7

Weight	Minimum Moment 100	Maximum Moment 100
2100	1638	1821
2110	1646	1829
2120	1654	1838
2130	1661	1847
2140	1669	1855
2150	1677	1864
2160	1685	1873
2170	1693	1881
2180	1700	1890
2190	1708	1899
2200	1716	1907
2210	1724	1916
2220	1732	1925
2230	1739	1933
2240	1747	1942
2250	1755	1951
2260	1763	1959
2270	1771	1968
2280	1778	1977
2290	1786	1985

MOMENT LIMITS vs WEIGHT (Continued)

Weight	Minimum Moment / 100	Maximum Moment / 100
2300	1794	1994
2310	1802	2003
2320	1810	2011
2330	1817	2020
2340	1825	2029
2350	1833	2037
2360	1841	2046
2370	1849	2055
2380	1856	2063
2390	1864	2072
2400	1872	2081
2410	1880	2089
2420	1888	2098
2430	1895	2107
2440	1903	2115
2450	1911	2124
2460	1919	2133
2470	1927	2141
2480	1934	2150
2490	1942	2159
2500	1950	2168
2510	1958	2176
2520	1966	2185
2530	1973	2193
2540	1981	2201
2550	1989	2209
2560	2000	2217
2570	2011	2225
2580	2021	2233
2590	2032	2241

MOMENT LIMITS vs WEIGHT (Continued)

Weight	Minimum Moment / 100	Maximum Moment / 100
2600	2043	2249
2610	2054	2257
2620	2065	2265
2630	2076	2273
2640	2087	2281
2650	2098	2289
2660	2109	2297
2670	2120	2305
2680	2131	2312
2690	2142	2320
2700	2153	2328
2710	2165	2336
2720	2176	2344
2730	2187	2352
2740	2198	2360
2750	2209	2368
2760	2221	2376
2770	2232	2383
2780	2243	2391
2790	2255	2399
2800	2266	2407
2810	2277	2415
2820	2289	2423
2830	2300	2431
2840	2312	2438
2850	2323	2446
2860	2335	2454
2870	2346	2462
2880	2358	2470
2890	2369	2478
2900	2381	2485

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-TOTAL is 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 take-off. Add the Fuel to Zero Fuel Condition to obtain the SUB-TOTAL Ramp Condition.

5. Subtract the fuel to be used for start, taxi, and take-off 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 Condi-

tion moment must be within the minimum and maximum moments shown on the Moment Limit vs Weight table 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.

* The Empty Weight for the airplane may be converted to Basic Empty Weight by adding the weight and moment for full oil. (19 lbs. and 494 lb. in.)

The following Sample Loading chart is presented to depict the sample method of computing a load. Weights used DO NOT reflect an actual airplane loading.

WEIGHT AND BALANCE LOADING FORM

DEBONAIR 33 DATE

SERIAL NO. CD-XXX REG NO. NXXX

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION	1870	1442
2. FRONT SEAT OCCUPANTS	340	292
3. REAR SEAT OCCUPANTS	340	402
4. BAGGAGE		-
5. CARGO		-
6. CARGO	-	-
7. SUB TOTAL ZERO FUEL CONDITION	2550	2136
8. FUEL - MAIN (44 GAL) FUEL - AUX. (16 GAL)	264 96	198 90
9. SUB TOTAL RAMP CONDITION	2910	2424
10. *LESS FUEL FOR START, TAXI, AND TAKE-OFF	-10	-8
11. SUB TOTAL TAKE-OFF CONDITION	2900	2416
12. LESS FUEL - LEFT MAIN (15 GAL)	-90	-68
13. SUB TOTAL	2810	2348
14. LESS FUEL - AUX (16 GAL)	-96	-90
15. SUB TOTAL	2714	2258
16. LESS FUEL - MAIN (20 GAL)	-120	-90
17. LANDING CONDITION	2594	2168

SAMPLE

*Fuel for start, taxi and take-off is normally 10 lbs at an average mom/100 of 8.

WEIGHT AND BALANCE LOADING FORM

DEBONAIR_____ DATE_____

SERIAL NO._____ REG NO. NXXX

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION		
2. FRONT SEAT OCCUPANTS		
3. REAR SEAT OCCUPANTS		
4. BAGGAGE		
5. CARGO		
6. CARGO		
7. SUB TOTAL ZERO FUEL CONDITION		
8. FUEL - MAIN (GAL) FUEL - AUX. (GAL)		
9. SUB TOTAL RAMP CONDITION		
10. *LESS FUEL FOR START, TAXI, AND TAKE-OFF		
11. SUB TOTAL TAKE-OFF CONDITION		
12. LESS FUEL - LEFT MAIN (GAL)		
13. SUB TOTAL		
14. LESS FUEL - AUX (GAL)		
15. SUB TOTAL		
16. LESS FUEL - MAIN (GAL)		
17. LANDING CONDITION		

*Fuel for start, taxi and take-off is normally 10 lbs at an average mom/100 of 8.

USEFUL LOAD WEIGHTS AND MOMENTS
OCCUPANTS

	Front Seats		Rear Seat
	Fwd Position	Aft Position	
	ARM 86	ARM 89	ARM 118
WEIGHT	MOM/100	MOM/100	MOM/100
120	103	107	142
130	112	116	153
140	120	125	165
150	129	134	177
160	138	142	189
170	146	151	201
180	155	160	212
190	163	169	224
200	172	178	236

NOTE: OCCUPANT POSITIONS FOR ADJUSTABLE SEATS ARE SHOWN AT THEIR EXTREME POSITIONS. INTERMEDIATE POSITIONS WILL REQUIRE INTERPOLATION OF THE MOMENT/100 VALUES.

BAGGAGE
ARM 140

Weight	Moment / 100	Weight	Moment / 100
10	14	60	84
20	28	70	98
30	42	80	112
40	56	90	126
50	70	100	140

BAGGAGE (Continued)
ARM 140

Weight	Moment 100	Weight	Moment 100
110	154	200	280
120	168	210	294
130	182	220	308
140	196	230	322
150	210	240	336
160	224	250	350
170	238	260	364
180	252	270	378
190	266		

CARGO (With Rear Seat Removed)

AHEAD OF SPAR ARM 108		AFT OF SPAR ARM 135	
Weight	Moment 100	Weight	Moment 100
20	22	20	27
40	43	40	54
60	65	60	81
80	86	80	108
100	108	100	135
120	130	120	162
140	151	140	189
160	173	160	216
180	194	180	243
200	216	200	270
		220	297
		240	324
		260	351
		270	364

USABLE FUEL

MAIN WING TANKS ARM 75		
Gallons	Weight	Moment / 100
5	30	22
10	60	45
15	90	68
20	120	90
25	150	112
30	180	135
35	210	158
40	240	180
44	264	198

AUXILIARY WING TANKS ARM 94		
Gallons	Weight	Moment / 100
5	30	28
10	60	56
15	90	85
19	114	107

*OIL

Quarts	Weight	Moment / 100
10	19	5

*Included in Basic Empty Weight

SECTION VII

SYSTEMS DESCRIPTION

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AIRFRAME

The BEECHCRAFT 33 Debonair is a 4-place all-metal, low-wing, single-engine airplane with retractable tricycle landing gear and conventional horizontal and vertical stabilizers.

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 optional aileron trimmer on the control column hub should be held until the column is repositioned. Check for full freedom of movement after repositioning the control.

The optional dual control column is required for flight instruction.

RUDDER PEDALS

To adjust the rudder pedals, press the spring-loaded lever on each pedal arm and move the pedal forward or aft. The adjustment lever can also be used to place the right set of rudder pedals against the floor when not in use.

TRIM CONTROLS

Elevator trim is controlled by a handwheel located to the left of the throttle. An elevator tab indicator dial is located immediately below the control column.

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

INSTRUMENT PANEL

The instrument panel for this airplane consists of fixed and floating panels, an engine instrument cluster on the center of the instrument panel above the control column, a radio grouping on the left side of the instrument panel, and subpanels which provide a compact circuit breaker group on the right side, and switch panels on both sides.

All configurations of the instrument panel are similar in grouping and convenient arrangement.

FLIGHT INSTRUMENTS

Standard flight instrumentation on the Debonair includes an airspeed indicator and altimeter mounted in the instrument panel and a magnetic compass mounted on the windshield divider.

In addition to several radio-navigation combinations, optional instruments for which openings are provided in the instrument panel include vertical speed and turn and bank indicators, a vacuum operated directional gyro and attitude gyro, and the suction gage necessary when these in-

struments are installed. An outside air temperature indicator and clock are also included as optional equipment.

POWER PLANT INSTRUMENTS

The engine instruments include: cylinder head temperature, oil temperature, oil pressure indicators, tachometer, manifold pressure, fuel pressure, fuel quantity indicators, and an ammeter.

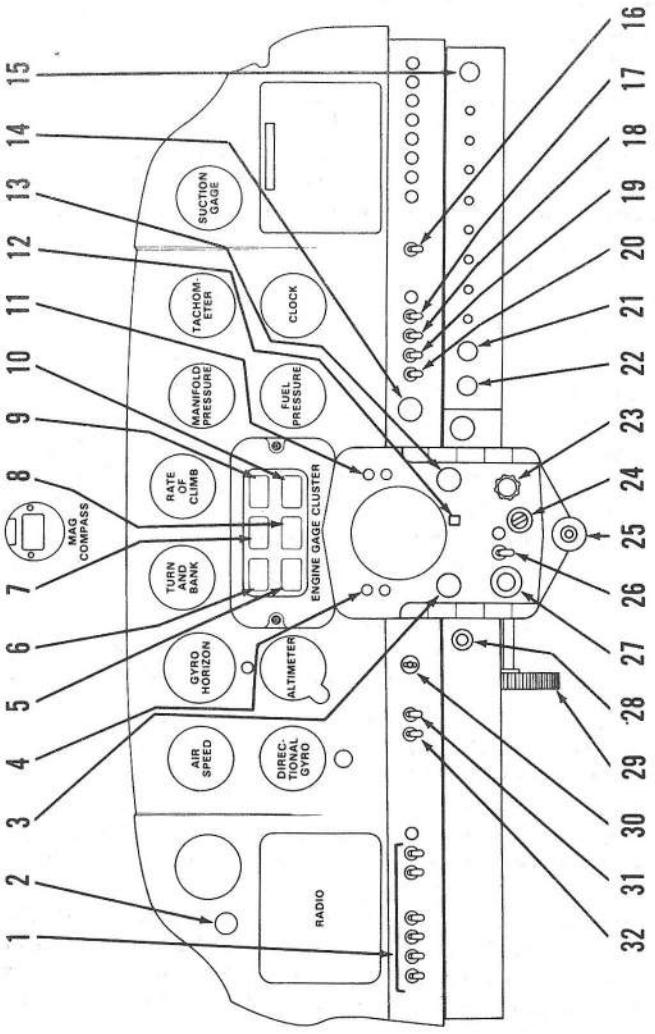
CLUSTER TYPE POWER PLANT INSTRUMENTS

Except for the tachometer, manifold pressure gage and fuel pressure gage, the power plant instruments are grouped together immediately above the control console. The engine gage cluster includes the fuel quantity gages, oil pressure gage, the oil temperature and cylinder head temperature indicators and ammeter. The fuel quantity gage is a single instrument; a switch on the left subpanel selects the cell on which a reading is desired. When the two ten-gallon auxiliary wing tanks are installed, an auxiliary fuel quantity gage is added to the cluster. Like the main cell system, a switch on the subpanel selects the auxiliary cell to which the gage is connected.

MANIFOLD PRESSURE, TACHOMETER AND FUEL PRESSURE GAGE

The manifold pressure gage, fuel pressure gage and tachometer are mounted in the instrument panel proper.

The tachometer is driven by a flexible shaft from the engine accessory section. Incorporated in the tachometer is an engine hour meter which automatically records the total engine operating time.


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RADIO
AIR SPEED
DIREC-TIONAL GYRO
GYRO HORIZON
ALTIMETER
TURN AND BANK
RATE OF CLIMB
MAG COMPASS
ENGINE GAGE CLUSTER
MANIFOLD PRESSURE
FUEL PRESSURE
TACHOM-ETER
CLOCK
SUCTION GAGE

TYPICAL INSTRUMENT PANEL LEGEND

1. Radio Switches
2. Stall Warning Indicator
3. Radio Lights
4. Flap Indicator Lights
5. Aux Fuel
6. Main Fuel
7. Oil Temperature
8. Cylinder Head Temperature
9. Ammeter
10. Oil Pressure
11. Landing Gear Indicator Lights
12. Elevator Tab Position Indicator
13. Instrument Lights
14. Landing Gear Switch
15. Fire Door Control
16. Beacon Switch
17. Generator Switch
18. Battery Switch
19. Nav Lights Switch
20. Landing Light Switch
21. Cabin Heat Control
22. Parking Brake Control
23. Propeller Control
24. Ignition Key Switch
25. Mixture Control
26. Aux Fuel Pump Switch
27. Throttle
28. Starter Switch
29. Elevator Trim Tab Control
30. Flap Switch
31. Aux Fuel Gage Switch
32. Main Fuel Gage Switch

The manifold pressure instrument indicates the pressure of the fuel-air mixture entering the engine cylinders and is calibrated in inches of mercury. By observing the manifold pressure indications and adjusting the propeller and throttle controls, the power output of the engine can be regulated. To avoid excessive cylinder pressures during cruise operations, observe the maximum recommended rpm and manifold pressure as indicated on the Manifold Pressure vs RPM graph in the PERFORMANCE Section.

The fuel pressure indicator is calibrated in psi, the green arc indicating fuel pressure for normal operating limits. Red radials are placed at the minimum and maximum allowable fuel pressures.

In the cruise power range, the green sectors cover the fuel pressure required from 45% to 75% power. The lowest value of a given sector is the cruise-lean setting, and the highest value of the sector is the best-power setting for that particular power range.

The take-off and climb range is covered by green sectors for full power at various altitudes. The high side of each green sector represents the fuel pressure setting required to achieve maximum power at the specified altitude when operating full throttle at 2600 rpm. These values should correspond to the fuel pressure values on the Climb graph in the PERFORMANCE Section.

SWITCHES

The battery master switch and generator switch are located on the inboard side of the right subpanel. The auxiliary fuel pump and key operated ignition switch are located below the control column and the push button starter switch to the left of the control column.

Switches on the right and left subpanels operate landing gear, flaps, exterior lighting, and radios. Attached to the lower center section of the subpanel are the powerplant controls and interior lighting rheostats. Flap indicator lights are to the left of the control column and landing gear indicator lights to the right.

GROUND CONTROL

Steering is accomplished by use of the rudder pedals through a linkage arrangement which connects the nose strut 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 strut 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

The wing flaps are controlled by a three-position switch, UP, OFF and DOWN, located on the subpanel to the left of the center console. The control must be pulled out of detent before it can be repositioned.

The flap position lights on the left side of the control console show green for the up position and red for the full-down landing position— intermediate 20-degree and 10-degree positions are indicated by lines painted on the

leading edge of the left flap. The intermediate positions are reached when the marks are aligned with the trailing edge of the wing.

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.

LANDING GEAR SYSTEM

CAUTION

Never taxi with a flat strut.

The landing gears are 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 gears may be electrically retracted and extended, and in an emergency may be extended 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.

CAUTION

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

POSITION INDICATORS

Landing gear position indicator lights on the right side of the control console show red when the gear is up, or green when it is down, illuminating only when the actuator assembly reaches either extreme. In addition, a mechanical indicator on the floorboard beneath the control console shows the position of the nose gear. Its pointer is linked by a cable to the actuating mechanism and moves simultaneously with it. Limit switches and a dynamic brake automatically stop the retract mechanism when the gear reaches its full up or full down position.

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.

SAFETY SWITCH

To prevent inadvertent retraction of the landing gear on the ground, a main strut safety switch opens the control circuit when the strut is compressed.

WARNING

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

WARNING HORN

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

BRAKES

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

CAUTION

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.

The parking brake push-pull control is located on the right subpanel. To set the parking brakes, pull control out and depress both toe pedals until firm. Push the control in to release the brakes.

CAUTION

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

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.

BAGGAGE COMPARTMENT

The baggage compartment is accessible through the baggage door on the right side of the fuselage. Loading within the baggage compartment must be in accordance with the data in the WEIGHT AND BALANCE Section. All baggage must be secured.

WARNING

Do not carry hazardous material anywhere in the airplane.

Do not carry children in the baggage compartment.

SEATS AND SEAT BELTS

SEAT ADJUSTMENTS

Both of the individual front seats are adjustable fore-and-aft, by pulling up on the small lever in front of each seat cushion and pulling or pushing on the seat. In addition, the front seat backs are adjustable by a set screw located on the inboard side of both seat backs. Moving the seat back forward and turning the set screw in or out regulates the position of the seat back either backward or forward.

Armrests for both front and rear seat passengers are built into the cabin sidewalls and the door.

SEAT BELTS

The BEECHCRAFT Debonair has quick-release seat belt buckles which are easily adjusted and fastened.

DOORS, 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 unlocked 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. 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.

CONTROL COLUMN LOCK PIN

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.

POWER PLANT

The BEECHCRAFT Debonair 33 is powered by a Continental IO-470-J wet sump, fuel injection engine. This six-cylinder powerplant is rated at 225 hp at 2600 rpm for take-off and maximum continuous operation. The IO-470-K engine is eligible for installation but not directly interchangeable with the IO-470-J engine.

ENGINE CONTROLS

THROTTLE, PROPELLER, AND MIXTURE

The push-pull throttle, propeller and mixture controls are located on the control console. The throttle and propeller 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. Do not rotate

clockwise with control fully advanced. The mixture control may be repositioned by pushing or pulling and locked into position by rotating the knob clockwise.

INDUCTION SYSTEM ICING

The possibility of induction system icing is reduced by the non-icing characteristics of the fuel injected engine and the 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.

LUBRICATION SYSTEM

The engine oil system is the full pressure, wet sump type and has a 10-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 to minimize the length of heavy cable required to carry the high amperage of the starter circuit. The starter is actuated by a push button type, momentary-on switch located on the left of the control column. To energize the starter circuit, rotate the magneto switch to the BOTH position, then press the starter button.

PROPELLER

Installed as standard equipment on the Debonair is a Hartzell constant speed, variable pitch, 84-inch diameter propeller with two aluminum alloy blades. The pitch setting at 33 inch station is 11° low and not under 26° high pitch.

Propeller rpm is controlled by a Hartzell governor which regulates hydraulic oil pressure to the blades. 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 80/87 grade (red) aviation gasoline. In the event this grade is not available only a higher rated fuel shall be used.

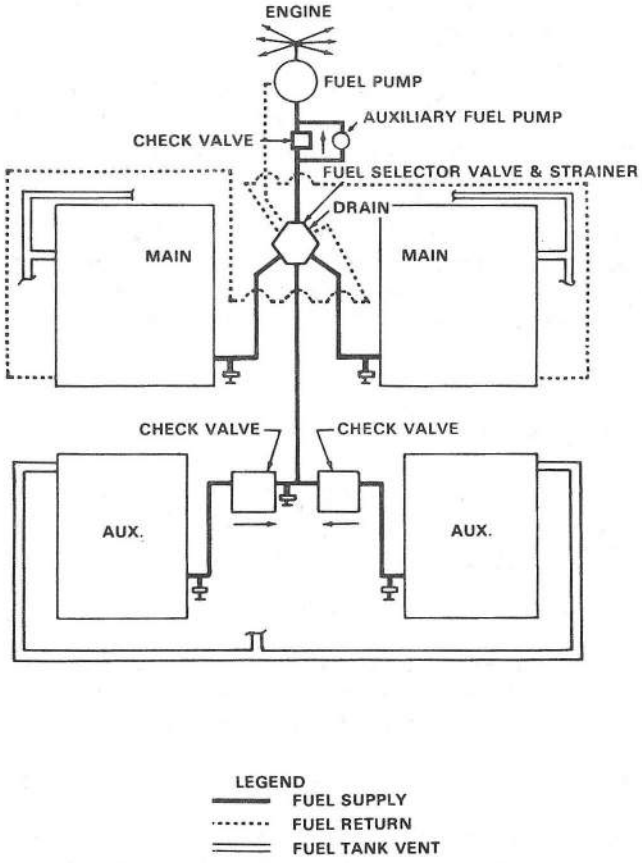
CAUTION

Before refueling, make certain the airplane and fuel dispensing unit are properly grounded. Failure to do so creates a fire hazard.

FUEL CELLS

Either the 44-gallon usable (50-gallon capacity) standard system or the 63-gallon usable (70-gallon capacity) optional system is available. The standard system consists of

FUEL SYSTEM SCHEMATIC



a rubber fuel cell in each wing leading edge with a flush type filler cap. If installed an additional 19 gallons of usable fuel is available in two auxiliary 10-gallon fuel cells in the wings, outboard of the wheel wells. Both auxiliary cells are connected to a common port in the fuel selector valve, so that both feed simultaneously when the fuel selector is set to AUX.

The two optional 10-gallon auxiliary tanks may be filled after removing the pressure-type filler caps, located aft and outboard of the main tank filler caps. Do not overfill the tanks.

The fuel injection system returns about 10 gallons per hour of excess fuel. Fuel return lines are routed through the selector valve to each main cell. Except for the auxiliary cells, fuel is returned to the cell from which it is drawn. The auxiliary cells return fuel to the left main cell only. To provide space for the returned fuel from the auxiliary cells, the left main cell should be used to approximately half full before switching to auxiliary.

If the engine is allowed to stop firing, due to insufficient fuel, refer to the EMERGENCY PROCEDURES section for the Air Start procedures.

FUEL QUANTITY INDICATION SYSTEM

Fuel quantity is measured by float operated sensors, located in each fuel tank. These transmit electrical signals to the individual indicators that indicate fuel remaining in the tank.

Individual main and auxiliary fuel quantity indicators are located on the engine instrument cluster. Fuel quantity for each main or auxiliary tank may be read by positioning the fuel gage selector switches (located on the left subpanel) either RIGHT or LEFT.

AUXILIARY FUEL PUMP

The electric auxiliary fuel pump is controlled by an ON-OFF toggle switch on the control console. It 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 performance should the engine driven pump fail.

FUEL TANK SELECTION

The fuel selector unit handle is located forward and to the left of the pilot's seat. Take-offs should be made using the left main tank and landings should be made using the main tank that is more nearly full. In no case should a take-off be made if the fuel indicators show less than 13 gallons of fuel in each main tank.

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 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 main tank before takeoff.

The filler 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 the pilot is not sure that at least 13 gallons are in each tank, add necessary fuel 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.

ELECTRICAL SYSTEM

The system circuitry is the single-wire, ground-return type, in which the airplane structure itself is used as the ground return.

The battery ON-OFF switch and the generator ON-OFF switch are located on the right subpanel. The IGNITION key switch is located below the control column. The circuit breaker panel is located on the right subpanel and contains the protective circuit breakers for the various electrical systems.

BATTERY

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

GENERATOR

Direct-current electric power is supplied by a 12-volt engine-driven generator of 35 ampere capacity, controlled by a voltage-current regulator which automatically adjusts generator output to its load, including recharging the battery. A 50 ampere generator is available.

The ammeter is of the conventional charge-discharge type, showing the rate of charge or discharge of the battery. A zero reading, which should be the normal condition in cruising flight, indicates that the battery is fully charged and the generator output has been adjusted by the regulator to balance the load of electrical equipment then in use.

EXTERNAL POWER RECEPTACLE

The external power receptacle accepts a standard AN type plug. Before connecting an external power unit turn generator/alternator switch and avionic equipment OFF.

CAUTION

A negative ground external power source is required. Check polarity before using external power.

If the external power unit does not have a standard AN type plug, 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 furnished by a light in the cabin ceiling. It is controlled by a rheostat control located below and to the right of the control column.

A control rheostat is located to the left of the instrument light rheostat. It controls the internal lights in the radio installation.

The cabin dome light is operated by an ON-OFF switch next to the light.

EXTERIOR LIGHTING

The switches for all of the exterior lights are located on the pilot's right subpanel.

The exterior lights consist of navigation lights on the wing tips and tail cone, rotating beacon (optional), and a landing light on the nose gear strut. For longer battery and lamp life, use the landing 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 left exhaust stack provides for heated air to outlets in forward and aft areas of the cabin. Two forward outlets are located above and forward of each set of rudder pedals. One aft outlet is installed behind the right front seat. Heated air is also supplied to the windshield for defrosting.

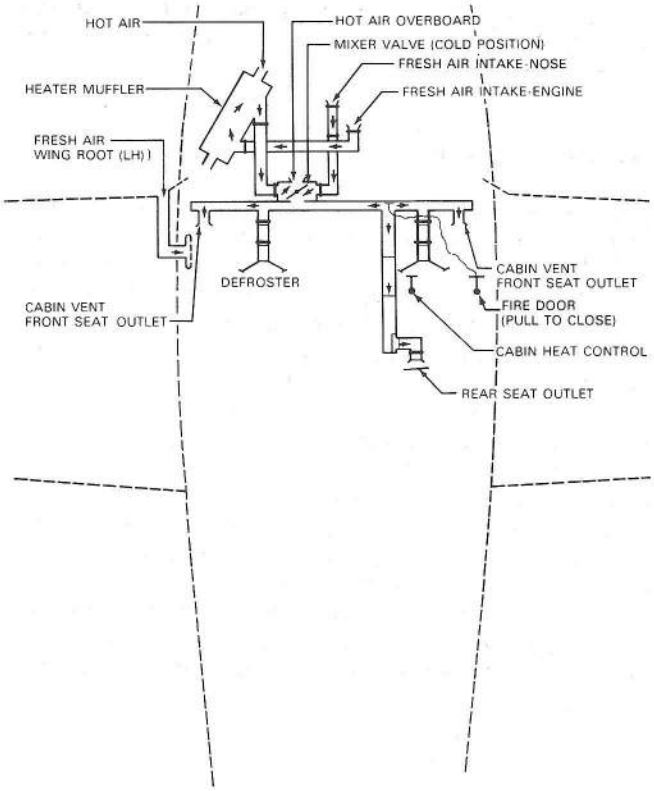
In flight, ram air enters an intake on the left side of the nose, passes through the heater muffler, then into a mixer valve on the forward side of the firewall. In the mixer valve, the heated air is combined with a controlled quantity of unheated ram air. Air of the desired temperature is then ducted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

HEATER AND DEFROSTER OPERATION

The cabin heat control is located on the lower right pilot's subpanel. To obtain heated air to the cabin outlets, pull the 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 control may be monitored at intermediate positions to obtain the desired cabin temperature.

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. For maximum heat the control is pulled fully out.

HEATING AND VENTILATION SYSTEM SCHEMATIC



To obtain increased heated air for defrosting the windshield, close the toe-pedal type valves at the front hot air outlets. To close off all air from the heater system, pull the FIRE DOOR control located to the extreme right 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 FIRE-DOOR control and use only the fresh air outlets described in the following paragraphs.

CABIN FRESH AIR OUTLETS

A duct in the left wing root is connected directly to an adjustable outlet in the upholstery panel, just below the instrument panel. The volume of air from the outlet is regulated, and the direction of airflow is controlled by rotating the louvered cover with the small knob on the rim. The large knob in the center of this outlet is a friction lock which may be tightened to hold the valve position selected.

PITOT AND STATIC SYSTEMS

PITOT SYSTEM

The pitot systems 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 (Optional)

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.

STATIC AIR SYSTEM

The static system provides a source of static air to the flight instruments through a flush static fitting on each side of the airplane fuselage. Drain moisture accumulations from the system by opening the access door on the side panel in the rear baggage compartment and removing the section of rubber hose. The rubber hose section should be removed and the moisture drained from the line every 100 hours and after exposure to visible moisture, either in the air or on the ground.

VACUUM SYSTEM

Vacuum for air driven gyroscopic flight instruments and other air driven equipment is supplied by an engine driven vacuum pump. An adjustable relief valve controls suction by bleeding outside air into the vacuum pump. The relief valve and an oil separator, which removes oil from the air, are located on the forward side of the firewall.

A suction gage indicates system vacuum in inches Hg. This instrument is located on the instrument panel; exact location may vary according to panel configuration. The vacuum should be maintained within the green arc for proper operation of the air driven instruments.

STALL WARNING

A red stall warning light flashes on the instrument panel as the airplane approaches a stall condition. The stall warning light is triggered by a sensing vane forward of the flap on the left wing.

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 about 50 hours.

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

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

Avoid long power-off descents especially during the break-in period. Maintain sufficient power during descent to permit cylinder head temperatures to remain in the green arc.

Minimize ground operation time, especially during warm weather. During the break-in period, avoid 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 airplane 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 or Aviation Center or International Distributor or 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 of the airplane 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 or Aviation Centers and International Distributors or Dealers will have recommended modification, service, and operating procedures issued by both FAA and Beech Aircraft Corporation, designed to get maximum utility and safety from the airplane.

If there is a question concerning the care of the airplane, it is important to include the airplane serial number in any correspondence. The serial number appears on the model designation placard attached to the underside of the fuselage just forward of the tiedown.

PUBLICATIONS

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

1. Shop Manual
2. Parts Catalog
3. Service Instructions
4. Various Inspection Forms

NOTICE

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

1. Original issues and revisions of Class I and 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 holders of this handbook who are listed on the FAA Aircraft Registration Branch List or the BEECHCRAFT International Owners Notification Service List, and then only if you are 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 a BEECHCRAFT Aero or Aviation Center or International Distributor or 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.

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 for 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 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 in Section 1 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 a hand tow bar. 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 stabilizers to raise the nose wheel. When towing with a tug, limit turns to prevent damage to the nose gear. Do not attempt to tow airplane backward by the tail tie down ring.

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 right side of the lower subpanel. To set the parking brakes, pull control out and depress both toe pedals until firm. Push the control in to release the brakes.

CAUTION

The parking brake should be left off and wheel chocks installed if the airplane is to be left 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.

PROLONGED OUT OF SERVICE CARE

Storage procedures 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 (7-30 days) has been considered here. For more extended storage periods, consult the Beech Airplane Shop Manual and Continental Service Bulletin M 81-3 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.

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

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

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° or 120° from the position it was in.

WARNING

Before rotation of propeller blades, ascertain ignition 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 airplane will not be removed from storage, the engine shall be started and run. The preferred method will be to fly the airplane for 30 minutes, and up to, but not exceeding normal oil and cylinder temperatures.

PREPARATION FOR SERVICE

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

See Consumable Materials for recommended fuel grades.

CAUTION

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

The standard fuel cell installation consists of a 25-gallon capacity fuel cell (22-gallon usable) and filler cap in each wing leading edge. In the optional installation an auxiliary tank in each wing adds 20 gallons (19-gallons usable) to the standard system. A filler neck for each auxiliary tank is outboard and aft of the main cell filler neck.

FUEL DRAINS

On the standard fuel system open the three snap-type fuel drains daily 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 wing. When the optional auxiliary fuel system is installed, also open the snap-type fuel drains on the auxiliary tanks, and a drain on the auxiliary cell interconnect line at the selector valve.

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 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, therefore, maximum range flights should be avoided and oil level brought to full after each flight during this period.

The engine oil filler cap and the dipstick are accessible by opening the access door on the left upper engine cowl. The sump capacity is 10 quarts. Normal operating level should be 8 to 10 quarts.

The oil should be changed and the oil screen should be cleaned every 50 hours under normal operating conditions. To assure complete drainage, the engine should be at operating temperature.

OIL CHANGE PROCEDURE

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 screen and flush thoroughly. Replace the screen.

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 recommends ashless dispersant oils. In order to promote faster ring seating and oil control, a straight mineral oil should be used for the first oil change period or until oil consumption stabilizes. Oils must meet Teledyne Continental Motors Specification MHS-24B. Refer to APPROVED ENGINE OILS.

BATTERY

The battery is accessible by opening the right door of the engine cowling then through the access door on the firewall. Check the electrolyte level after each 25 hours of operation and add distilled water as necessary. Do not overfill the battery.

Excessive water consumption may be an indication that the voltage regulator requires resetting. The specific gravity of the electrolyte should be checked periodically and maintained within the limits placarded on the battery.

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

TIRES

An inflation pressure of 30 psi should be maintained on the 6.00 x 6 main wheel tires. The 5.00 x 5 nose wheel tire should be inflated to 40 psi. Maintaining proper tire inflation will minimize tread wear and aid in preventing tire failure caused from running over sharp stones. When inflating tires, visually inspect them for cracks and breaks.

CAUTION

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 STRUTS:

1. Check to see that the airplane is empty except for full fuel and oil.

2. While rocking the airplane gently to prevent possible binding of the piston in the barrel, inflate the shock strut until the main gear piston is extended 3 inches (3-1/2 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. Depress the valve core and completely compress the strut to release excess air and oil.

8. Inflate the strut as described in the preceding inflation procedure.

SHOCK STRUT SHIMMY DAMPER

The shimmy damper has a reservoir of fluid carried in the piston rod. Two coil springs installed in the piston rod keep fluid in the shimmy damper under pressure. As fluid is lost through leakage it is automatically replenished from the reservoir until the reservoir supply is exhausted.

To check the fluid 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.

VACUUM SYSTEM

The vacuum system incorporates two screens; a relief valve screen and an oil separator screen. These screens should be cleaned every 100 hours. If the airplane is operated in dusty conditions, the screens should be cleaned more frequently.

Clean the suction relief valve screen by removing and washing in cleaning solvent. Remove and clean the oil separator screen by backflushing or submerging the unit in cleaning fluid. Blow dry with air pressure.

The filter assemblies on the air driven instruments should be replaced every 100 hours under normal operating conditions, and more often if operated under dusty conditions.

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 AND CLEAN THE FILTER:

1. Remove the fuselage nose section grill.

2. Remove the wing nuts securing the filter and remove the filter.

3. Clean as described in the manufacturer's instructions on the filter.

PROPELLER BLADES

The daily preflight inspection should include a careful examination of the propeller blades for nicks and scratches.

Each blade leading edge should receive particular attention. It is very important that all nicks and scratches be smoothed out and polished. The BEECHCRAFT Aero or Aviation Center and International Distributors or Dealers will be glad to answer any questions concerning propeller blade repair.

WARNING

When servicing a propeller, always make certain the ignition switch is off and that the engine has cooled completely. WHEN MOVING A PROPELLER, STAND IN THE CLEAR; there is always some danger of a cylinder firing when a propeller is moved.

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.

GENERATOR

Since the generator and voltage regulator are designed for use on only one polarity system, the following precautionary measures must be observed when working on the charging circuit, or serious damage to the electrical equipment will result:

1. When installing a battery, make certain that the ground polarity of the battery and the ground polarity of the generator 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 to the positive battery terminal and the negative lead of the charger to the negative battery terminal.

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 the elevator 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 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 with BRAYCO 300, CRC 3-36, LPS No. 1, or WD-40. (See Consumable Materials.)

CAUTION

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

Do not apply wax or polish to uncured painted surfaces. 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 cure in seven days at 75°F.

Wash uncured painted surfaces with cold or lukewarm water and a MILD NON-DETERGENT SOAP. Any rubbing of the surface should be done gently and held to a minimum to avoid cracking the paint film.

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 stream or spray clear of wheel bearings, propeller hub bearings, etc., and openings such

as pitot masts, static air buttons, and avionics equipment overboard cooling ducts, which should be securely plugged 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. To remove oily residue or exhaust soot use a cloth dampened with aliphatic naphtha (see Consumable Materials), then wax or polish the affected area.

There is some variation in the procedures required for proper care of the several types of exterior paint. 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, use of "cleaner" waxes or polishes should be avoided, 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.

A buildup of wax on all of the above exterior paint finishes will yellow with age; therefore, wax should be removed periodically. Generally, aliphatic naphtha is adequate and safe for this purpose.

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 plastic and may cause it to craze.

After thoroughly cleaning, the surface should be waxed wth a good grade of commercial wax. The wax will fill in the 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.

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 wth 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 panel, and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with isopropyl alcohol. Volatile solvents, such as mentioned in the article on care of plastic windows should never be used since they soften and craze the plastic.

ENGINE

Clean the engine with neutral solvent. Spray or brush the fluid over the engine, then wash off with water and allow to dry.

CAUTION

Do not use solutions which may attack rubber or plastic. Protect engine switches, controls, and seals; fluid applied at high pressure can unseat seals, resulting in contamination of the sealed systems.

RECOMMENDED SERVICING SCHEDULE

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	LUBRICANT (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	-
	Drain auxiliary fuel cells drain	Bottom of fuselage, left side	-
	Service fuel cells, main	Top of wings, leading edge	6
	Service auxiliary fuel cells	Aft and outboard of main cells	6
25 Hrs.	Check battery electrolyte	Under right cowling door and thru access door in firewall	See Shop Manual
50 Hrs.	Change engine oil	Lower side of engine	5

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.

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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	-
	Drain auxiliary fuel cells drain	Bottom of fuselage, left side	-
	Service fuel cells, main	Top of wings, leading edge	6
	Service auxiliary fuel cells	Aft and outboard of main cells	6
25 Hrs.	Check battery electrolyte	Under right cowling door and thru access door in firewall	See Shop Manual
50 Hrs.	Change engine oil	Lower side of engine	5

50 Hrs. (Cont.)	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 side panel access door	-
	Lubricate landing gear retract mechanism and *uplock rollers	Wheel wells (K)	4
100 Hrs.	Clean fuel selector valve strainer	Left side belly	7
	Clean vacuum pump regulator screen	Engine compartment	7
†	Lubricate aileron control linkage †	Each wing (J)	4, 10
	Lubricate cabin door mechanism	Aft edge of cabin door (E)	4
	Lubricate control column linkage	Forward of instrument panel (C)	4

*(Unless BEECHCRAFT S.I. 0448-211 has been complied with)

RECOMMENDED SERVICING SCHEDULE

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	LUBRICANT (Number refers to item on Consumable Materials)
100 Hrs. (Cont.)	Lubricate elevator and rudder control mechanism	Forward of tail bulkhead (H)	4
	Lubricate elevator tab chain	In each horizontal stabilizer (I)	4
	Lubricate landing gear door hinges	Edge of wheel well (L) (N)	4
	Lubricate landing gear retract mechanism and *uplock rollers	Wheel wells (A) (K)	3, 4
	Lubricate nose wheel steering mechanism	Nose wheel well (B)	3
	Lubricate rudder pedals	Cockpit (M)	4
	Lubricate trim tab control	Control pedestal (D)	4
††	Lubricate wheel bearings and felt seals ††	Nose and main wheels (A, K)	1, 4

*(After BEECHCRAFT S.I. 0448-211 has been complied with)

300 Hrs.	Flap motor (brushes) Service landing gear actuator gear box	Under front seats in cabin (G) Under front seats in cabin (F)	8
600 Hrs.	Service landing gear motor-reduction gears Service flap motor gear box	Under front seats in cabin (F) Under front seats in cabin (G)	3 10
900 Hrs.	Lubricate flap actuators Lubricate flap flex driveshafts	Inside wing aft of wheel well (G) Under floor in cabin	9 10
900 Hrs. or 5 years whichever comes first	Lubricate elevator tab actuators	Inside each horizontal stabilizer (I)	10
As Req.	Clean spark plugs Service main and nose shock struts	Engine compartment Landing gear	- 2

RECOMMENDED SERVICING SCHEDULE

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	LUBRICANT (Number refers to item on Consumable Materials)
As Req. (Cont.)	Service shimmy damper	Nose gear	2
	Drain static air lines	Behind aft cabin side panel access door	-
	Remove one end of the hose which forms the static line drain and permit the system to drain. NOTE The static air line should be drained frequently during periods of high humidity. Also drain the line each time the airplane is flown through heavy rain or is washed down.		
Note 3	Replace emergency locator transmitter battery	At emergency locator	-

NOTES:

1. Anytime the control surfaces are altered, repaired, or repainted, they must be re-balanced 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.

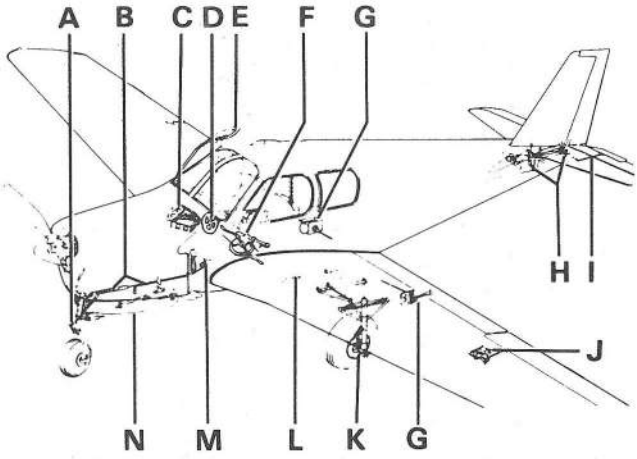
3. Rechargeable Batteries: Recharge after one cumulative hour of use or after 50% of the useful charge life.

   Non-rechargeable Batteries: Replace after one cumulative hour of use or after 50% of the useful charge life.

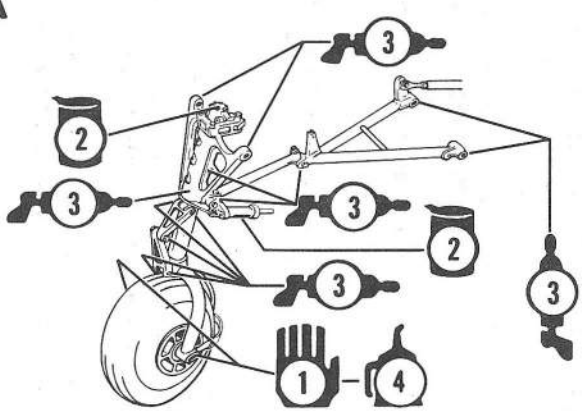
† Lubricate aileron control rod ends in place using SAE 20 or SAE 10W30 or remove aileron control rod assembly, clean and relubricate control rod ends using MIL-G-23827 grease. Rotate rod end bearings to assure adequate lubricant coverage. Check aileron rigging after reinstallation of rod end assembly.

†† 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.

LUBRICATION POINTS

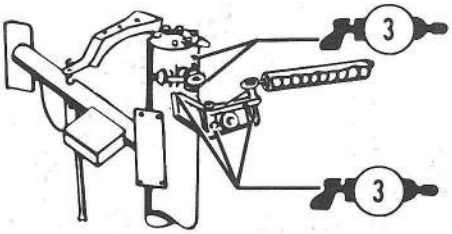


A



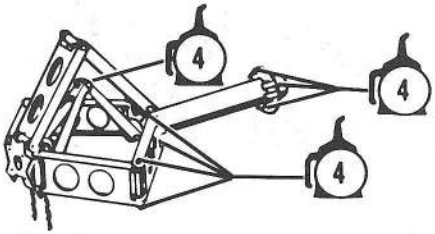
NOSE GEAR RETRACT

B



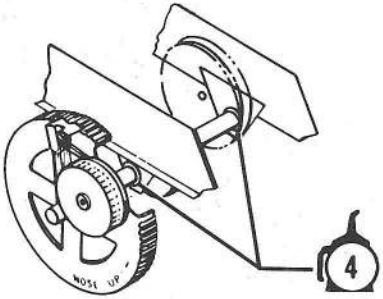
NOSE WHEEL STEERING

C



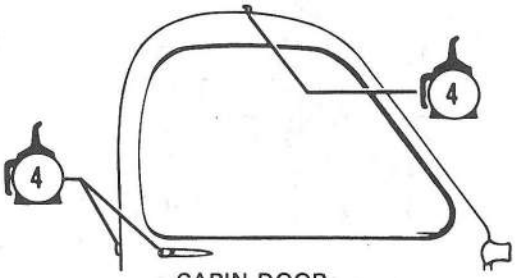
CONTROL COLUMN LINKAGE

D



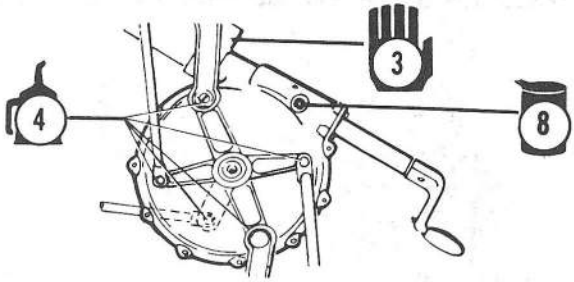
ELEVATOR TRIM CONTROL

E



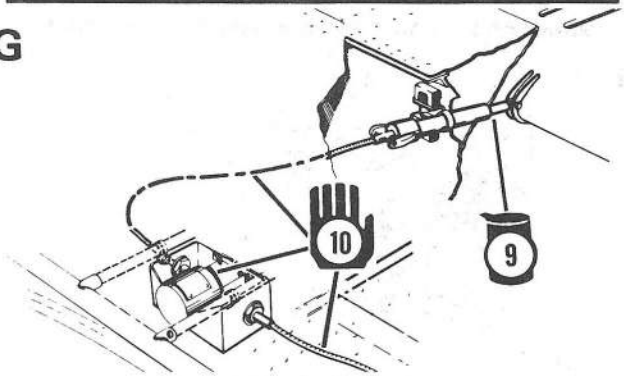
CABIN DOOR

F



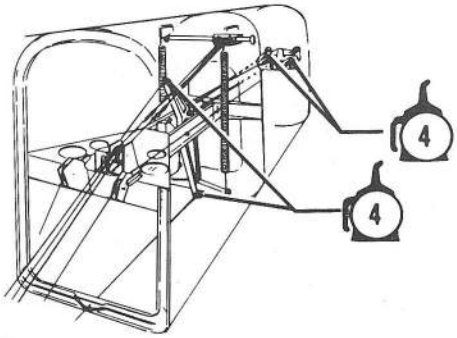
LANDING GEAR ACTUATOR GEAR BOX

G



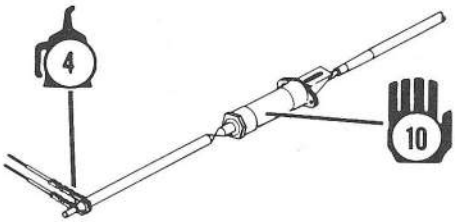
FLAP MOTOR AND ACTUATOR

H



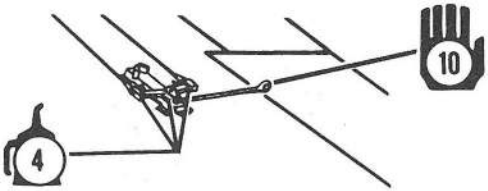
ELEVATORS AND RUDDER
CONTROL MECHANISM

I



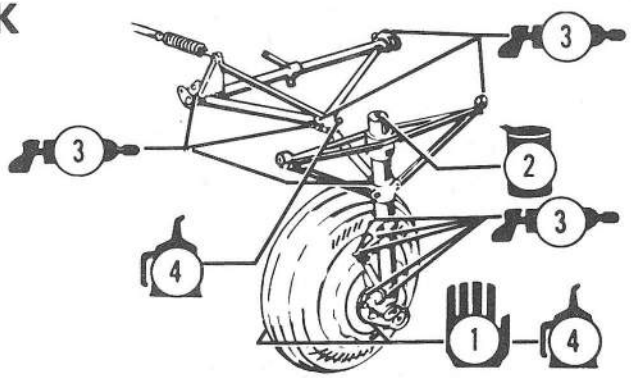
ELEVATOR TAB MECHANISM

J



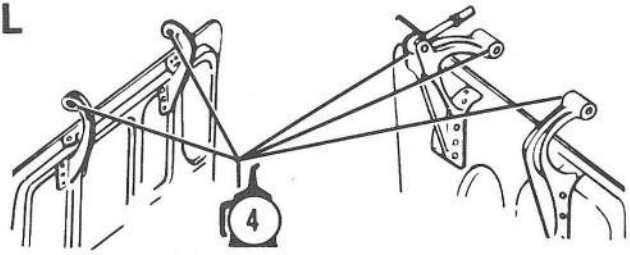
AILERON BELL CRANKS

K



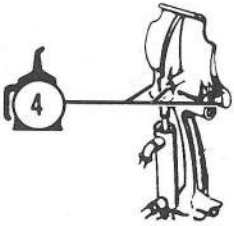
MAIN GEAR RETRACT

L



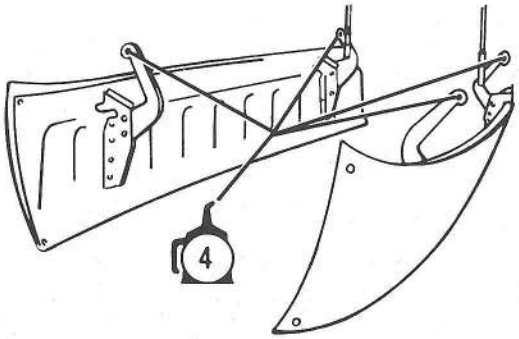
MAIN GEAR DOOR HINGES

M



RUDDER PEDALS

N



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.

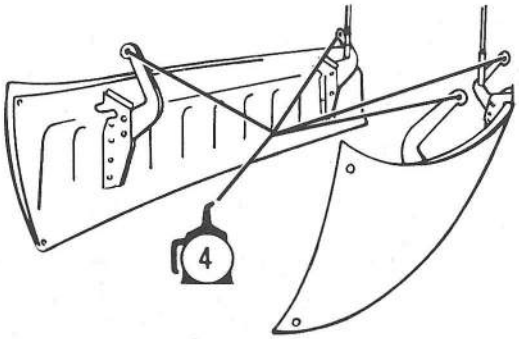
CONSUMABLE MATERIALS

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.

N



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.

CONSUMABLE MATERIALS

ITEM	MATERIAL	SPECIFICATION
1.	Lubricating Grease Wheel Bearing	Aeroshell No. 5 or MIL-G-81322

CAUTION

Do not mix Aeroshell No. 5 with MIL-G-81322. Thoroughly clean grease from bearings and bearing area before changing grease.

2.	Hydraulic Fluid	MIL-H-5606
*3.	Lubricating Grease, General Purpose, Wide Temperature	MIL-G-81322
4.	Lubricating Oil	SAE No. 20 or SAE10W-30
**5.	Engine Oil	SAE No. 30 (Below 40°F) SAE No. 50 (Above 40°F) Approved Multiviscosity Oils
***6.	Engine Fuel	Grade 80/87 (Red)
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

ITEM	MATERIAL	SPECIFICATION
10.	Grease, Aircraft and Instrument	MIL-G-23827
†11.	Lubricant, Rubber Seal	Oakite 6 Compound
12.	Naptha, Aliphatic	Federal Specification, TT-N-95
13.	Lubricant	•BRAYCO 300 ••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 (Teledyne Continental Motors Corp. Spec. MHS-24B) recommended; straight mineral oils recommended during break-in period. See servicing data.

*** If 80/87 (RED) grade fuel not available, use 100LL (BLUE) or 100 (GREEN) grade fuel.

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

•Product of Bray Oil Co.,
Los Angeles, Calif.

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

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

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

APPROVED ENGINE OILS

COMPANY	BRAND AND WEIGHT
BP Oil Corporation	BP Aero Oil
Castrol Limited (Australia)	Castrolaero AD Oil
Continental Oil Co.	Conoco Aero S
Delta Petroleum Co.	Delta Avoil Oil
Exxon Company, U.S.A.	Exxon Aviation Oil EE
Gulf Oil Corporation	Gulfpride Aviation AD
Mobil Oil Company	Mobil Aero Oil
Pennzoil Company	Pennzoil Aircraft Engine Oil
Phillips Petroleum Co.	Phillips 66 Aviation Oil Type A
	Phillips X/C Aviation Multiviscosity Oil SAE 20W-50
	Phillips X/C Aviation Multiviscosity Oil SAE 25W-60
Quaker State Oil & Refining Corp.	Quaker State AD Aviation Engine Oil
Red Ram Limited (Canada)	Red Ram X/C Aviation Oil 20W-50
Shell Canada, Ltd.	Aeroshell Oil W

COMPANY	BRAND AND WEIGHT
Shell Oil Company	Aeroshell Oil W SAE 15W/50 Aeroshell Oil W
Sinclair Refining Co.	Sinclair Avoil
Texaco, Inc.	Texaco Aircraft Engine Oil - Premium AD
Union Oil Co. of California	Union Aircraft Engine Oil

NOTE

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

BULB REPLACEMENT GUIDE

LOCATION	NUMBER
Compass light	330
Dome light, cabin	89
Elevator tab position indicator light	53R
Fuel pump placard light	1813
Instrument flood light, overhead	89
Landing gear position light	1813
Landing gear visual position light	53
Landing light	4522
Navigation light, tail cone	93
Navigation light, wing	1512
Rotating beacon (Grimes)	A7079-12
Stall warning light	1813

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 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	
All except -13	Every 2000 hours
P/N 35-810075-13	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	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 or on condition
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
Generator	On Condition
Oil Cooler	On Condition (replace when contaminated)
Propeller (Hartzell)	**1500 hours or 4 years.
Propeller (McCauley)	***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 1200 hours
Auxiliary fuel pump	Every 1200 hours
All hose	Hose carrying flammable liquids at engine overhaul or every 5 years. All other hose on condition.

COMPONENT	OVERHAUL OR REPLACE
INSTRUMENTS	
Turn coordinator	On condition
Altimeter	Every 24 months per FAA Directive (Inspect and calibrate)
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
Fuel pressure indicator	On condition
Manifold pressure indicator	On condition
Tachometer	On condition
Free air temperature indicator	On condition
All hose	On condition
Vacuum system filter	Every 100 hours
Vacuum regulator valve	On condition
ELECTRICAL SYSTEM	
Battery master relay	On condition
All other relays	On condition
Voltage regulator	On condition
Starter relay	On condition

COMPONENT	OVERHAUL OR REPLACE
FLAPS AND FLIGHT CONTROLS	
Flight controls	On condition
Elevator tab actuator	On condition
Flap motor and drives	Every 2000 hours
Flap motor brushes	On condition
Flap gear box	Every 2000 hours
Flap actuators	Every 2000 hours
Flap flexible shaft	Every 2000 hours
MISCELLANEOUS	
Seat belts	Inspect every 12 months, replace on condition
Hand fire extinguisher	Inspect every 12 months, recharge as necessary
Cabin heating and ventilating ducts	On condition, inspect every 12 months

* 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 M79-14, Rev. I, dated April 21, 1980, 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 mechanic must determine that the engine is operating normally at the time of each periodic inspection.

** Refer to Hartzell Propeller, Inc. Service Letter No. 61F, dated August 31, 1979, or later issue.

*** Applies only to propellers with hub serial number 71XXXX and higher; all other propellers; 1200 hours or 5 years.

NOTE

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

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SAFETY INFORMATION
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GENERAL

As a pilot, you are responsible to yourself and to those who fly with you, to other pilots and their passengers and to people on the ground, to fly wisely and safely.

The following material in this Safety Section 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 Flight Manual, Approved 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 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 Aviation Center.

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 Mandatory and Optional Service Bulletins, FAA Approved 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 Owners 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 dealer 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 Aviation Center, Aero Center or International Distributor. 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 aircraft 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 Director

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 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

NOTE:

* 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 aircraft. 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 aircraft 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 aircraft 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 aircraft, have your mechanic inspect the aircraft registration records, logbooks and maintenance records carefully. An unexplained period of time for which the aircraft has been out of service, or unexplained significant repairs may well indicate the aircraft has been seriously damaged in a prior accident. Have your mechanics inspect a used aircraft carefully. Take the time to ensure that you really know what you are buying when you buy a used aircraft.

HAZARDS OF UNAPPROVED MODIFICATIONS

Many aircraft 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.

Aircraft 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 en route 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 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 Aviation or Aero Center. 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 such 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.

TURBULENT WEATHER

A complete and current weather briefing is a requirement for a safe trip.

Updating of weather information en route is also essential. The wise pilot knows that weather conditions can change quickly, and treats weather forecasting as professional advice, rather than an absolute fact. He obtains all the advice he can, but stays alert to any sign or report of changing conditions.

Plan the flight to avoid areas of reported severe turbulence. It is not always possible to detect individual storm areas or find the in-between clear areas.

The National Weather Service classifies turbulence as follows:

Class of Turbulence	Effect
Extreme	Aircraft is violently tossed about and is practically impossible to control. May cause structural damage.
Severe	Aircraft 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 aircraft 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 aircraft. 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 aircraft 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 providing 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 aircraft, 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 aircraft. 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 aircraft. 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.

areas of low ceilings and restricted visibility unless you are instrument rated and proficient and have an instrument equipped airplane. Then proceed with caution and with planned alternates.

VFR AT NIGHT

When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain a safe minimum altitude as dictated by terrain, obstacles such as TV towers, or communities in the area flown. This is especially true in mountainous terrain, where there is usually very little ground reference. Minimum clearance is 2,000 feet above the highest obstacle en route. Do not depend on your ability to see obstacles in time to miss them. Flight on dark nights over sparsely populated country can be the same as IFR, and must be avoided by inexperienced or non-IFR rated pilots.

VERTIGO - DISORIENTATION

Disorientation can occur in a variety of ways. During flight, inner ear balancing mechanisms are subjected to varied forces not normally experienced on the ground. This, combined with loss of outside visual reference, can cause vertigo. False interpretations (illusions) result, and may confuse the pilot's conception of the altitude 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 pilot's should check the weather and use good judgment in planning flights. The VFR pilot should use extra caution in avoiding low visibility conditions.

Motion sickness often precedes or accompanies disorientation and may further jeopardize the flight.

Disorientation in low visibility conditions is not limited to VFR pilots. Although IFR pilots are trained to look at their instruments to gain an artificial visual reference as a replacement for the loss of a visual horizon, they do not always do so. This can happen when the pilot's physical condition will not permit him to concentrate on his instruments; when the pilot is not proficient in flying instrument conditions in the airplane he is flying; or, when the pilot's work load of flying by reference to his

instruments is augmented by such factors as turbulence. Even an instrument rated pilot encountering instrument conditions, intentional or unintentional, should ask himself whether or not he is sufficiently alert and proficient in the airplane he is flying, to fly under low visibility conditions and 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 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 aircraft, 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 (AC61-9). In particular, observe carefully the warnings in the Practical Test Standards.

SPINS

A major cause of fatal accidents in general aviation aircraft 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 aircraft 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 aircraft 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 aircraft 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 aircraft 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 ltimes 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 the 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 light-headed 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, an 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, an 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 aircraft 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 to higher altitudes is to be accomplished safely. Passengers with significant circulatory or lung disease may need to use supplemental oxygen at lower altitudes than specified by these regulations.

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 judgment; 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 increased 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:

"(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.

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 airplane 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 aircraft, its capabilities and its limitations, and disciplined adherence to the procedures for your aircraft'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 aircraft's limitations, and your own. Never exceed either.

Safe flying,

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