Beechcraft

SIERRA 200

B24R

(Serials MC-152 thru MC-451, except MC-449)

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

FAA APPROVED IN NORMAL CATEGORY BASED ON CAR 3. THIS DOCUMENT MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES AND BE KEPT WITHIN REACH OF THE PILOT DURING ALL FLIGHT OPERATIONS.

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY CAR 3.

Mfr's Serial Nc

Registration N

FAA Approved

THIS HANDBOOK SUPERSEDES ALL BEECH PUBLISHED OWNERS MANUALS AND CHECK LISTS ISSUED FOR THIS AIRPLANE WITH THE EXCEPTION OF FAA APPROVED AIRPLANE FLIGHT MANUALS.

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Issued: February, 1980

P/N 169-590023-15A2
Revised: October, 1990

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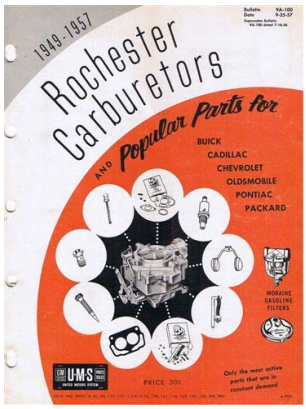

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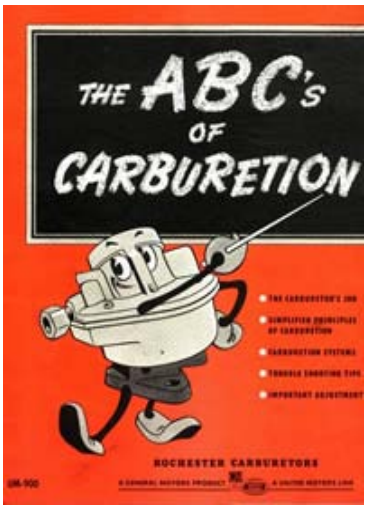

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Manufacturers Association

SIERRA 200
B24R
(MC-152 THRU MC-451, EXCEPT MC-449)

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

A2 Revision . . . . . October, 1990

LOG OF REVISIONS

Page	Description
Title Page	Updated
Page A (A2)	New
10-1 thru 10-48	Revised Section X, Safety Information (October, 1990)

A2

LOG OF REVISIONS

A1 . . . . . October 1984

PAGES	DESCRIPTION
Title Page	Update Title Page
Logo Page	Added
Page A (A1)	Update
a and b	Revise "Introduction"
1-1	Update "Table of Contents"
1-4	Revise "Important Notice"
1-5 & 1-6	Revise "NOTE" and Shift Material
1-7	Shifted Material
1-8	Revise "Airplane Flight Manual Supplements Revision Record" and Shift Material
4-9	Revise "Before Takeoff" and "Takeoff"
4-10	Revise "Cruise"
4-11	Revise "Before Landing"
4-12	Revise "Shutdown"
7-23	Revise "Fuel Boost Pump"

A1

LOG OF REVISIONS

Original (A) . . . . . February 1980

PAGES	DESCRIPTION
Title Page "A" Page a and b 1-1 thru 1-20 2-1 thru 2-28 3-1 thru 3-12 4-1 thru 4-14 5-1 thru 5-24 6-1 thru 6-20 7-1 thru 7-32 8-1 thru 8-46 Section 9 10-1 thru 10-30	See Log of Supplements **10-1 Thru 10-67 Revised Safety Section Dated March 1981.**

A

INTRODUCTION

This Pilot's Operating Handbook and FAA Approved Airplane Flight Manual is in the format and contains data recommended in the GAMA (General Aviation Manufacturers Association) Handbook Specification Number 1. Use of this specification by all manufacturers will provide the pilot the same type data in the same place in all of the handbooks.

In recent years BEECHCRAFT handbooks contained most of the data now provided, however, the new handbooks contain more detailed data and some entirely new data.

For example, attention is called to Section X SAFETY INFORMATION. While little of the information is new and every pilot has been exposed to the basic fundamentals, BEECHCRAFT feels it is highly important to have SAFETY INFORMATION in a condensed form in the hands of the pilots. The SAFETY INFORMATION should be read and studied. Periodic review will serve as a reminder of good piloting techniques.

WARNING

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

Genuine BEECHCRAFT parts are produced and inspected under rigorous procedures to ensure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than BEECHCRAFT, even though outwardly identical in appearance, may not have

had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from non-BEECHCRAFT approved sources, or parts, components, or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

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

TABLE OF DIVISIONS

SECTION I

GENERAL

TABLE OF CONTENTS

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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 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 airplane. Suggestions and recommendations have been made within it to aid in obtaining maximum performance without sacrificing economy. Be familiar with, and operate the airplane in accordance with the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, and/or placards which are located in the airplane.

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 should ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements established for this airplane.

All limits, procedures, safety practices, time limits, servicing, and maintenance requirements contained in

this handbook are considered mandatory for 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 airplane. The handbook has been prepared in loose leaf form for ease in maintenance and in a convenient size for storage. The handbook has been arranged with quick reference tabs imprinted with the title of each section and contains ten basic divisions:

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

NOTE

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

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

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

1. Original issues and revisions of BEECHCRAFT Service Bulletins

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 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 BEECH-

CRAFT Service Publications, consult a BEECHCRAFT Aero or Aviation Center, International Distributor or Dealer, or refer to the latest revision of BEECHCRAFT Service Bulletin No. 2001.

BEECH AIRCRAFT CORPORATION EXPRESSLY RESERVES THE RIGHT TO SUPERSEDE, CANCEL, AND/OR DECLARE OBSOLETE, WITHOUT PRIOR NOTICE, ANY PART, PART NUMBER, KIT OR PUBLICATION REFERENCED IN THIS HANDBOOK.

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

REVISING THE HANDBOOK

Immediately following the title page is the "Log of Revisions" page(s). The Log of Revisions pages are used for maintaining a listing of all effective pages in the handbook (except the SUPPLEMENTS section), and as a record of revisions to these pages. In the lower right corner of the outlined portion of the Log of Revisions is a box containing a capital letter which denotes the issue or reissue of the handbook. This letter may be suffixed by a number which indicates the numerical revision. When a revision to any information in the handbook is made, a new Log of Revisions will be issued. All Logs of Revisions must be retained in the handbook to provide a current record of material status until a reissue is made.

WARNING

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

AIRPLANE FLIGHT MANUAL SUPPLEMENTS REVISION RECORD

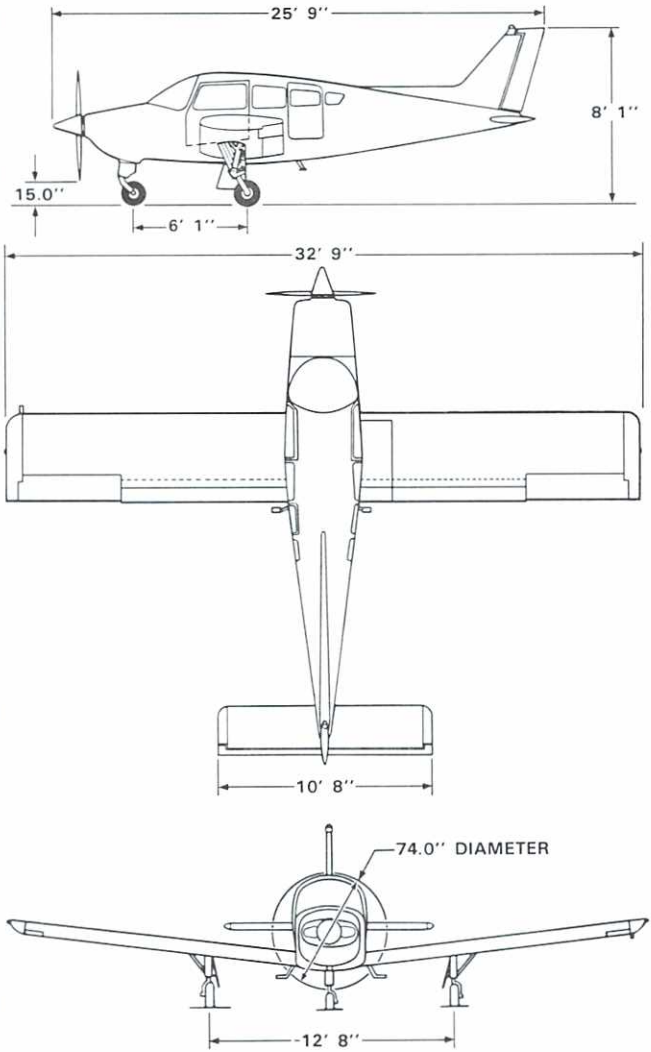
Section IX contains the FAA Approved Airplane Flight Manual Supplements headed by a Log of Supplements page. On the "Log" page is a listing of the FAA Approved Supplemental Equipment available for installation on the airplane. When new supplements are received or existing supplements are revised, a new "Log" page will replace the previous one, since it contains a listing of all previous approvals, plus the new approval. The supplemental material will be added to the grouping in accordance with the descriptive listing.

NOTE

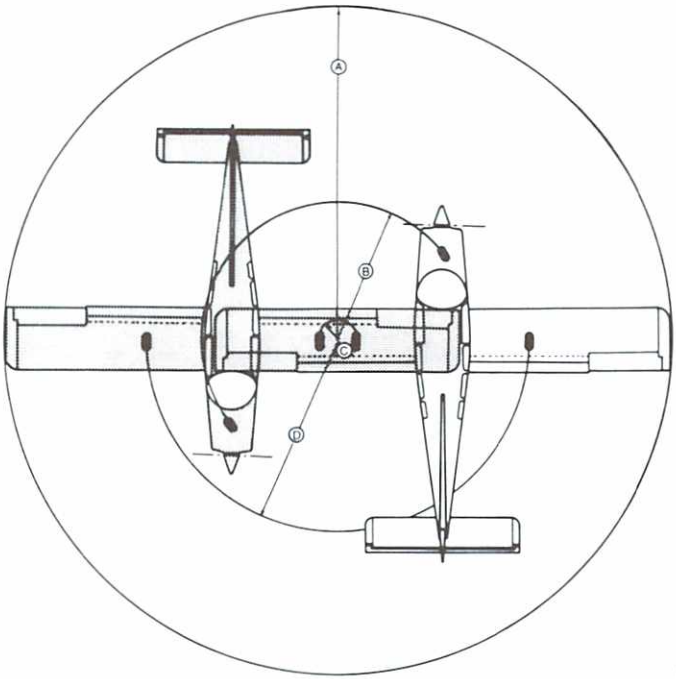
Upon receipt of a new or revised supplement, compare the "Log" page just received with the existing "Log" page in the manual. Retain the "Log" page with the later date on the bottom of the page and discard the other log.

VENDOR-ISSUED STC SUPPLEMENTS

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



AIRPLANE THREE-VIEW



GROUND TURNING CLEARANCE

Ⓐ Radius for Wing Tip ..... 26 ft. 10 in.
Ⓑ Radius for Nose Wheel ..... 12 ft. 1 in.
Ⓒ Radius for Inside Gear ..... 4 ft. 1 in.
Ⓓ Radius for Outside Gear ..... 16 ft. 9 in.

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

DESCRIPTIVE DATA

ENGINE

One Avco Lycoming engine model IO-360-A1B6. It is a fuel-injected, direct-drive, air-cooled, horizontally-opposed, 4 cylinder, 200-hp-rated engine.

Take-off and maximum continuous operation (sea level): 2700 rpm, full throttle.

PROPELLER

Hartzell constant-speed, two-blade, aluminum-alloy propeller using HC-M2YR-IBF hub with F7666A-2R blades. Diameter is 74 inches. No cutoff permitted.

FUEL

Aviation Gasoline 100 (green), or 100LL (blue) minimum grade.

*59.8-gallon system
(29.9 gallons each tank) ..... *52.2 gallons usable

Each tank has provisions for partial filling to:

20 gallons each tank ..... 32.2 gallons usable
15 gallons each tank ..... 22.2 gallons usable

*Value given is nominal. Tank capacity will vary with temperature and manufacturing tolerances.

OIL CAPACITY

The oil capacity is 8 quarts.

APPROVED OIL TYPES

Avco Lycoming Specification Number 301E approves for use lubricating oils which conform to both MIL-L-6082B straight mineral type and MIL-L-22851 ashless dispersant lubricants for airplane engines. Refer to the Approved Engine Oils table in the HANDLING, SERVICING AND MAINTENANCE section for a list of approved products.

MAXIMUM CERTIFICATED WEIGHTS

Maximum Ramp Weight	2758 lbs
Maximum Take-Off Weight	2750 lbs
Maximum Landing Weight	2750 lbs
Maximum Zero Fuel Weight	No Structural Limit
Maximum Weight in Baggage Compartment	270 lbs.

CABIN AND ENTRY DIMENSIONS

Length (maximum)	7 ft 11 in.
Height (maximum)	4 ft 0 in.
Width (maximum)	3 ft 8 in.
Cabin Door	36 in. wide by 38 in. high

BAGGAGE SPACE AND ENTRY DIMENSIONS

Compartment Volume	19.5 cu ft
Door Width (Minimum)	22 in.
Door Height (Minimum)	33 in.

SPECIFIC LOADINGS (2750 lbs.)

Wing Loading	18.84 lbs/sq ft
Power Loading	13.75 lbs/hp

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following Abbreviations and Terminologies have been listed for convenience and ready interpretation where used within this handbook. Whenever possible, they have been categorized for ready reference.

GENERAL AIRSPEED TERMINOLOGY

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. 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.
Cruise Climb	Recommended Climb Speed for enroute climb.

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).
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.

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.

POWER TERMINOLOGY

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

ENGINE CONTROLS AND INSTRUMENTS

Throttle Control	Used to control power by introducing fuel-air mixture into the intake passages of the engine. Settings are reflected by readings on the manifold pressure gage.
Propeller Control	This control requests the propeller governor to maintain engine/propeller rpm at a selected value by controlling propeller blade angle.
Mixture Control	This control is used to set fuel flow in all modes of operation and cuts off fuel completely for engine shut down.
EGT (Exhaust Gas Temperature Indicator)	This indicator is used to identify the lean and best power fuel flow 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 demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during take-off and landing was actually demonstrated during certification tests.
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

TABLE OF CONTENTS

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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}	168	193	168	193	Do not exceed this speed in any operation
Maximum Structural Cruising V_{NO} or V_C	143	165	143	165	Do not exceed this speed except in smooth air and then only with caution
Maneuvering V_A	125	144	125	144	Do not make full or abrupt control movements above this speed
Maximum Flap Extension/ Extended V_{FE}	96	110	96	110	Do not extend flaps or operate with flaps extended above this speed
Maximum Landing Gear Operating/ Extended V_{LO} and V_{LE}	135	155	135	155	Do not extend or operate with landing gear extended above this speed
Maximum Landing Gear Retraction	113	130	113	130	Do not retract landing gear above this speed.

*AIRSPEED INDICATOR MARKINGS

MARKING	CAS		IAS		SIGNIFICANCE
	KTS	MPH	KTS	MPH	
White Arc	55-96	63-110	55-96	63-110	Full Flap Operating Range
Green Arc	62-143	71-165	62-143	71-165	Normal Operating Range
Yellow Arc	143-168	165-193	143-168	165-193	Operate With Caution, Only in Smooth Air
Red Line	168	193	168	193	Maximum Speed For All Operations

* The limits of the arcs on the airspeed indicator are marked in CAS values.

POWER PLANT LIMITATIONS

ENGINE

One Avco Lycoming engine model IO-360-A1B6.

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

OPERATING LIMITATIONS

Engine Speed ..... 2700 rpm
*Oil Temperature ..... 245°F
Oil Pressure
Minimum ..... 25 psi
Maximum ..... 100 psi
Fuel Pressure
Minimum ..... 0.5 psi
Maximum ..... 12.0 psi
Mixture - Set per leaning instructions on performance charts.

*All temperatures are established for a 100°F day.

FUEL GRADES

Aviation Gasoline 100 (green), or 100LL (blue) minimum grade.

FUEL ADDITIVES

Alcor TCP Concentrate mixed according to the instructions provided by Alcor, Inc.

APPROVED OIL TYPES

Avco Lycoming Specification Number 301E approves for use lubricating oils which conform to both MIL-L-6082B straight mineral type and MIL-L-22851 ashless dispersant lubricants for airplane engines. Refer to the Approved Engine Oils table in the HANDLING, SERVICING AND MAINTENANCE section for a list of approved products.

PROPELLER SPECIFICATIONS

Hartzell constant speed, two-blade aluminum alloy propeller using HC-M2YR-1BF hub with F7666A-2R blades. Pitch settings at 30-inch station, Low 14.4° ± .2°, High 29° ± 2°. Diameter is 74 inches, no cutoff permitted.

POWER PLANT INSTRUMENT MARKINGS

OIL TEMPERATURE
- Caution (Yellow Arc) ..... 60° to 120°F
- Operating Range (Green Arc) ..... 120° to 245°F
- Maximum (Red Line) ..... 245°F

OIL PRESSURE
- Minimum Pressure (Red Line) ..... 25 psi
- Minimum Pressure (Yellow Arc) ..... 25 to 60 psi
- Operating Range (Green Arc) ..... 60 to 90 psi
- Maximum Pressure (Red Line) ..... 100 psi

FUEL FLOW
- Minimum (Red Line) ..... 0.5 psi
- Operating Range (Green Arc) ..... 4.0 to 16.6 gph
- Maximum (Red Line) ..... 12.0 psi

TACHOMETER
- Normal Operating Range (Green Arc) ..... 2200 to 2700 rpm
- Maximum RPM (Red Radial) ..... 2700 rpm

MANIFOLD PRESSURE
- Operating Range ..... 15 to 28.7 in. Hg

MISCELLANEOUS INSTRUMENT MARKINGS

INSTRUMENT AIR
- Operating Range ..... 4.3 to 5.9 in. Hg

FUEL QUANTITY
- Yellow Band ..... E to 3/8 full

WEIGHT LIMITS

Maximum Ramp Weight ..... 2758 lbs
Maximum Take-off
and Landing Weight ..... 2750 lbs

Zero Fuel Weight ..... No Structural Limitation
Maximum Baggage Compartment
Load ..... 270 lbs

CENTER OF GRAVITY LIMITS (Gear Down)

Forward: 110 inches aft of datum to 2375 lbs with straight line variation to 113 inches at 2750 lbs.

Aft: 118.3 inches aft of datum at all weights.

REFERENCE DATUM

Datum is 103 inches forward of wing leading edge.

MAC length is 52.7 inches.

MANEUVER LIMITS

This is a normal category airplane. Spins are prohibited. No acrobatic maneuvers are approved except those listed below. Maximum slip duration is 30 seconds.

APPROVED MANEUVERS (2750 POUNDS)

MANEUVER	*ENTRY SPEED (CAS)*
(Bank angles, no more than 60°)	
Chandelle	125 kts/144 mph
Steep Turn	125 kts/144 mph
Lazy Eight	125 kts/144 mph
Stall (Except Whip)	Use slow deceleration

FLIGHT LOAD FACTORS (2750 POUNDS)

Flight maneuvering load factor
Flaps Up ..... +3.8, -1.9
Flaps Down ..... +1.9

TAKEOFF

Set 15° flaps for takeoff.

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

Federal Aviation Regulations (91.3(a), 91.24, 91.25, 91.32, 91.33, 91.52, 91.90, 91.97, 91.170) specify 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 KNOWN ICING CONDITIONS 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 91.33
COMMUNICATIONS					
VHF communications system	*	*	*	*	-*Per FAR 91.33
ELECTRICAL POWER					
Battery	1	1	1	1	
DC alternator	1	1	1	1	

EQUIPMENT AND FURNISHING					
Seat belts and Shoulder harness	1	1	1	1	- Per Person or Per FAR 91.33
Emergency locator transmitter	1	1	1	1	- Per FAR 91.52
FIRE PROTECTION					
Portable fire extinguisher	*	*	*	*	-*Optional

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
FLIGHT CONTROLS					
Stabilator trim tab indicator	1	1	1	1	- May be inoperative for ferry flight provided tabs are visually checked in the neutral position prior to takeoff and checked for full range of operation.
Flap position indicator (On electric flap system)	1	1	1	1	- May be inoperative provided flap travel is visually inspected prior to takeoff.
Stall warning	1	1	1	1	

FUEL EQUIPMENT					
Auxiliary fuel pump	1	1	1	1	
Engine driven fuel pump	1	1	1	1	
Fuel quantity indicator	2	2	2	2	- One may be inoperative provided other side is operational and amount of fuel on board can be established to be adequate for the intended flight.
Fuel flow indicator	1	1	1	1	
ICE AND RAIN PROTECTION					
Emergency static air source	*	*	*	*	-*Optional
Pitot heater	*	*	1	1	-*Optional

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
LANDING GEAR					
Landing gear motor	1	1	1	1	- May be inoperative provided operations are continued only to a point where repairs can be accomplished. Gear must be left down.
Landing gear position lights	4	4	4	4	
Landing gear warning horn	1	1	1	1	

LIGHTS					
Cockpit and instrument lights	-	*	-	*	-*Lights must be operative.
Taxi light	-	-	-	-	
Landing light	-	*	-	*	-*Per FAR 91.33
Rotating beacon	*	1	*	1	-*Optional
Position light	-	3	-	3	
NAVIGATION INSTRUMENTS					
Altimeter	1	1	1	1	
Airspeed indicator	1	1	1	1	
Vertical speed	-	-	-	-	
Magnetic compass	1	1	1	1	
Attitude indicator	-	-	1	1	
Turn coordinator	-	-	1	1	
Directional gyro	-	-	1	1	
Clock	-	-	1	1	
Transponder	*	*	*	*	-*Per FAR 91.24, 91.90, 91.97
Navigation equipment	-	-	*	*	-*Per FAR 91.33

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
VACUUM					
Vacuum system for instrument air	-	-	1	1	
Vacuum gage	-	-	1	1	
ENGINE INDICATING INSTRUMENTS					
Engine tachometer indicator	1	1	1	1	
Exhaust gas temperature indicator	*	*	*	*	-*Optional
Manifold pressure indicator	1	1	1	1	

ENGINE OIL INSTRUMENTS					
Oil pressure indicator	1	1	1	1	
Oil temperature indicator	1	1	1	1	

FUEL

TOTAL FUEL with left and right wing fuel systems full:

Two *29.9-gallon tanks in wings with a total of *52.2 gallons usable.

*Value given is nominal. Tank capacity will vary with temperature and manufacturing tolerances.

FUEL MANAGEMENT

Do not take off when the Fuel Quantity Gages indicate in the Yellow Band or with less than 11 gallons in each main tank.

Maximum slip duration: 30 seconds

PLACARDS

On Left Cabin Door (CAS):

THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.

NORMAL CATEGORY

MAXIMUM DESIGN WEIGHT	2750 LBS
REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS	
FLIGHT MANEUVERING LOAD FACTOR	FLAPS UP +3.8 -1.9 DOWN +1.9
MAXIMUM MANEUVERING SPEED	144 MPH

NO ACROBATIC MANEUVERS
INCLUDING SPINS APPROVED

NO ACROBATIC MANEUVERS APPROVED
EXCEPT THOSE LISTED BELOW:

MANEUVER, BANK ANGLES NO MORE THAN 60°

	MAXIMUM ENTRY SPEED
CHANDELLES	144 MPH
LAZY EIGHTS	144 MPH
STEEP TURNS	144 MPH
STALLS (EXCEPT WHIP STALLS)	SLOW DECELERATION
NOTE: MAXIMUM ALTITUDE LOSS DURING STALL	300 FT

LANDING GEAR

MAXIMUM GEAR EXTENDED SPEED	155 MPH
MAXIMUM GEAR OPERATING SPEED	EXTENSION 155 MPH RETRACTION 130 MPH

On Upper Right Instrument Panel:

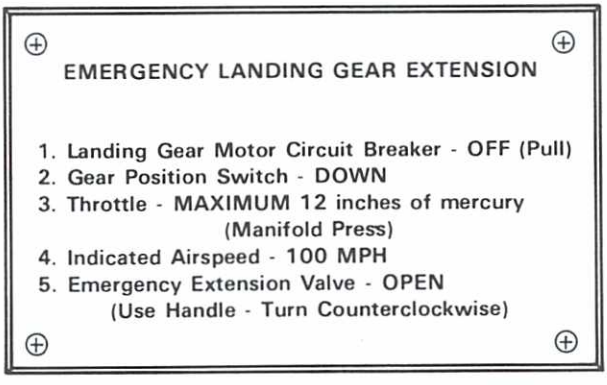
IN CASE OF FIRE IN ENGINE
COMPARTMENT CLOSE
DEFROST & CABIN AIR VALVE

PLACARDS (Cont'd)

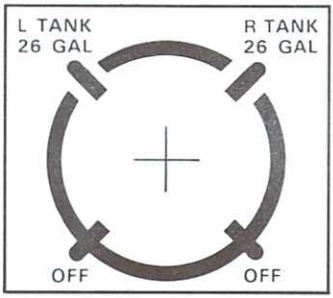
On Left Cabin Door:

On Floorboard in Front of Pilot's Seat:

On Inside of Emergency Gear Extension Access Door:



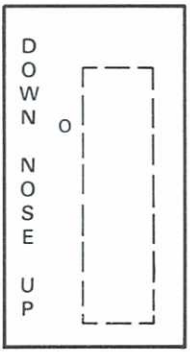
On Fuel Selector Panel:



Adjacent to Engine Instrument Cluster:

DO NOT TAKE OFF WHEN FUEL QUANTITY GAUGE INDICATES IN YELLOW OR WITH LESS THAN 11 GALLONS IN EACH MAIN TANK MAXIMUM SLIP DURATION IS 30 SECONDS

On Pedestal Between Front Seats:



PLACARDS (Cont'd)

Adjacent to Flap Switch on Right Subpanel:

USE 15° FLAPS
FOR TAKE OFF

On Flap Extension Handle (CAS):

FLAPS PULL TO EXTEND, MAX SPEED 110 MPH

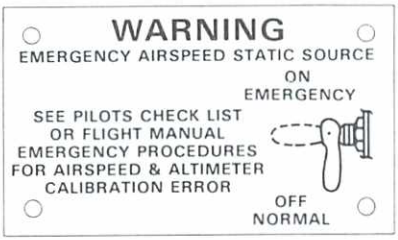
RETRACTED	0°
FIRST NOTCH	15°
SECOND NOTCH	25°
THIRD NOTCH	35°

On Upper Right Instrument Panel:

RAISE FLAPS

TO INCREASE
BRAKE
EFFECTIVENESS

On Lower Sidewall Adjacent to Pilot (when installed):



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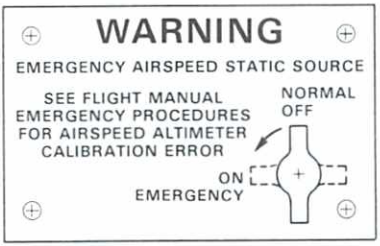


or

PLACARDS (Cont'd)

On Upper Aft Corner of Each Cabin Door:

INSTRUCTIONS – SHOULDER STRAP

1. OCCUPANT SHORTER THAN 4FT 7IN. DO NOT USE SHOULDER STRAP
2. NEVER USE SHOULDER STRAP WITHOUT LAP BELTS

or

INSTRUCTION-SHOULDER STRAP

1. OCCUPANTS SHORTER THAN 4 FT 7 IN. **DO NOT** USE SHOULDER STRAP.
2. PLACE SEAT BACK IN THE UPRIGHT POSITION DURING TAKEOFF AND LANDING.

Adjacent to 5th and 6th Seats When Installed:

INSTRUCTION-SHOULDER STRAP

1. OCCUPANTS SHORTER THAN 4 FT 7 IN. **DO NOT** USE SHOULDER STRAP.

On Lower Left Sidewall Panel:

TO LEVEL AIRCRAFT – LEVEL
BAGGAGE COMPARTMENT FLOOR

On Baggage Compartment Door:

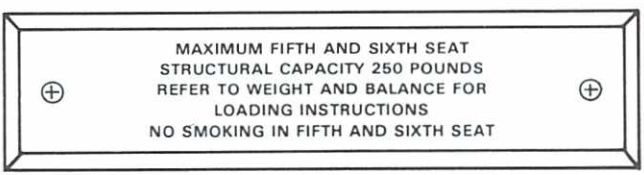
BAGGAGE COMPARTMENT
270 POUNDS
MAXIMUM CAPACITY

On Aft Cabin Bulkhead:

HAT SHELF
NO HEAVY OBJECTS

PLACARDS (Cont'd)

On Bulkhead Below Hat Shelf When 5th and 6th Seats Are Installed:

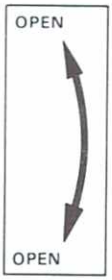


On Second Window Frame on Right Side. Installed on MC-354 and After When Required by Weight and Balance Data:

On Right Sidewall Below Third Window When 5th and 6th Seats Are Installed:

On Inside of Baggage Door (MC-261 and after or after compliance with Beechcraft S.I. No. 0685-106):

On Baggage Door Adjacent to Handle: (Prior to MC-181)



(MC-181 thru MC-426)

(MC-427 thru MC-451 and MC-181 thru MC-426 after compliance with Beechcraft S.I. No. 0793-106)

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SECTION III

EMERGENCY PROCEDURES

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

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

EMERGENCY AIRSPEEDS

Emergency Descent ..... 135 kts/155 mph

Glide ..... 91 kts/105 mph

Emergency Landing Approach ..... 74 kts/85 mph

Stall warning horn is inoperative when BATTERY & ALT switch is turned off.

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

NOTE

Conduct the following procedures immediately if it appears certain that the airplane will run off the runway. (Otherwise conduct these procedures at the pilot's discretion.)

3. Fuel Selector Valve - OFF
4. BATTERY & ALT, ALT, and FUEL BOOST switches - OFF
5. Magneto/Start Switch - OFF

AFTER LIFTOFF AND IN FLIGHT

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

1. Mixture - FULL RICH
2. Fuel Boost Pump - ON
3. Fuel Selector Valve - SELECT OTHER TANK (Check to feel detent and check visually)
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. Establish maximum glide configuration
2. Throttle - CLOSE
3. Fuel Selector Valve - OFF
4. Mixture - IDLE CUT-OFF
5. Magneto/Start Switch - OFF
6. FUEL BOOST switch - OFF

When certain of reaching the selected landing site:

7. Airspeed - 74 kts/85 mph
8. Flaps - AS REQUIRED
9. Landing Gear - DOWN or UP (depending on terrain)
10. BATTERY & ALT and ALT switches - OFF

ENGINE DISCREPANCY CHECKS

CONDITION: ROUGH RUNNING ENGINE

1. Mixture - FULL RICH, then LEAN as required
2. Magneto/Start Switch - CHECK LEFT and RIGHT, then BOTH

CONDITION: LOSS OF ENGINE POWER

1. Fuel Flow Gage - CHECK

If fuel flow is abnormally low:

a. Mixture - FULL RICH
b. Auxiliary Fuel Pump - ON (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 OTHER FUEL TANK (feel for detent and check visually)

AIR START PROCEDURE

1. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL (check to feel detent and check visually)
2. Throttle - AS REQUIRED
3. Mixture - FULL RICH
4. Propeller - AS REQUIRED
5. Fuel Boost Pump - ON OR OFF as required
6. Magneto/Start switch - BOTH

NOTE

When engine starts, adjust throttle, propeller, and mixture controls.

ENGINE FIRE

IN FLIGHT

The ventilation controls must be closed to shut off all heating system outlets so that smoke and fumes will not enter the cabin. The control labeled CABIN AIR must be pulled aft to close. The control labeled DEFROST must be pushed forward to close. In the event of an engine fire, shut down the engine as follows and make a landing:

1. Fuel Selector Valve - OFF
2. Mixture - IDLE CUT-OFF
3. Propeller - FULL FORWARD position
4. Throttle - CLOSE
5. Cabin Air Control (Red Knob) - pull OFF
6. Defrost Valve (Red Knob) - push OFF
7. BATTERY & ALT switch - OFF (Extending the gear can be accomplished manually if desired)
8. Magneto/Start Switch - OFF
9. Do not attempt to restart engine

ON THE GROUND

1. Fuel Selector Valve - OFF
2. Throttle - CLOSED
3. Mixture - IDLE CUT-OFF
4. BATTERY & ALT Switch - OFF
5. Magneto/Start Switch - OFF
6. Extinguish with Fire Extinguisher.

EMERGENCY DESCENT

1. Propeller - FULL FORWARD position
2. Throttle - IDLE
3. Landing Gear - DOWN
4. Airspeed - ESTABLISH 135 kts/155 mph

MAXIMUM GLIDE CONFIGURATION

1. Landing Gear - UP (Landing gear safety switch OFF if safety system is installed)
2. Flaps - UP
3. Propeller - FULL AFT position
4. Airspeed - 91 kts/105 mph

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

LANDING EMERGENCIES

LANDING WITHOUT POWER

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

1. Airspeed - 74 kts/85 mph
2. Fuel Selector Valve - OFF
3. Mixture - IDLE CUT-OFF
4. Magneto/Start Switch - OFF
5. Flaps - AS REQUIRED
6. Landing Gear - DOWN or UP, DEPENDING ON TERRAIN
7. BATTERY & ALT, ALT, and FUEL BOOST 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. Airspeed - NORMAL APPROACH SPEED
3. Fuel Selector Valve - OFF
4. Mixture - IDLE CUT-OFF
5. Flaps - AS REQUIRED
6. BATTERY & ALT, ALT and Magneto/Start Switches - OFF
7. Keep wings level during touchdown.
8. Get clear of the airplane as soon as possible after it stops.

SYSTEMS EMERGENCIES

PROPELLER OVERSPEED

1. Throttle - RETARD TO MINIMUM CRUISE RPM
2. Airspeed - REDUCE (initiate climb to load propeller if time permits)
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. If this occurs:

4. Land - SELECT NEAREST SUITABLE SITE and follow ENGINE FAILURE AFTER LIFTOFF AND IN FLIGHT procedures.

ALTERNATOR-OUT PROCEDURE

A failure of the alternator will place the entire electrical operation of the airplane on the battery. Alternator failure will be indicated by a discharging or fluctuating ammeter.

1. ALT switch - OFF
2. All nonessential electrical loads - OFF (to conserve the battery life)

WARNING

Deactivation of the battery switch, alternator switch, or alternator circuit breaker during flight is prohibited, except as required by an actual emergency.

UNSCHEDULED ELECTRIC STABILATOR TRIM

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

NOTE

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

LANDING GEAR MANUAL EXTENSION

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

1. LDG GEAR MOTOR Circuit Breaker - OFF (PULL OUT)
2. Landing Gear Switch Handle - DOWN position
3. Throttle - 12 in. Hg (or less) of manifold pressure
4. Airspeed - 87 kts/100 mph
5. Emergency Extension Valve - OPEN (Use Emergency Gear Extension Wrench - Turn Counterclockwise)

WARNING

After landing 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. Emergency Extension Valve - CLOSE (use Emergency Gear Extension Wrench, turn clockwise)
2. Landing Gear Motor Circuit Breaker - PUSH IN
3. Landing Gear Switch Handle - UP

EMERGENCY STATIC AIR SOURCE SYSTEM

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

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

1. Emergency Static Air Source - Switch to ON - EMERGENCY. (Lower Sidewall Adjacent to Pilot)
2. For Airspeed Calibration and Altimeter Correction, refer to PERFORMANCE section.

CAUTION

Be certain the emergency static air valve is in the OFF - NORMAL position when system is not needed.

UNLATCHED DOOR IN FLIGHT

If the cabin door latch is not fully engaged 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. A buffet may be encountered with the door open in flight. 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

WARNING

Intentional spins are prohibited.

RECOVERY

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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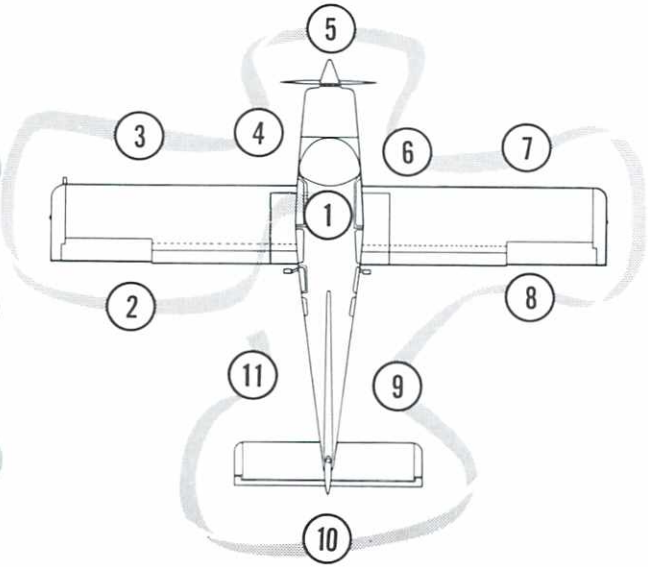
TABLE OF CONTENTS (Continued)

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

AIRSPEEDS FOR SAFE OPERATION

Take-off (15° flaps)	
Lift-off	62 kts/71 mph
50 Ft.	65 kts/75 mph
Maximum Climb	
Best Rate (V_Y)	80 kts/92 mph
Best Angle (V_X)	72 kts/83 mph
Cruise Climb	96 kts/110 mph
Maximum Turbulent Air Penetration	125 kts/144 mph
Balked Landing	74 kts/85 mph
Landing Approach	74 kts/85 mph
Maximum Demonstrated Crosswind	17 kts/20 mph

PREFLIGHT INSPECTION



1. *CABIN:*
   a. Parking Brake - SET
   b. Control Lock - REMOVE
   c. Landing Gear Handle - DOWN
   d. All Switches - OFF

2. *LEFT WING TRAILING EDGE:*
   a. Flap - CHECK
   b. Fuel Vent Line - UNOBSTRUCTED
   c. Aileron - CHECK
   d. Wing Tip - CHECK
   e. Position Light - CHECK

3. *LEFT WING LEADING EDGE:*
   a. Pitot Tube - CHECK, (Remove Cover)
   b. Landing Light - CHECK
   c. Tie Down and Chocks - REMOVE
   d. Stall Warning - CHECK for movement of vane
   e. Fuel Tank - CHECK QUANTITY; Filler Cap - SECURE.

4. *LEFT LANDING GEAR:*
   a. Wheel Well, Tire and Brake - CHECK
   b. Fuel Sump - DRAIN

5. *NOSE SECTION:*
   a. Left Cowl - SECURE
   b. Induction Air Intake - CLEAR, Filter - CHECK for condition and security of attachment.
   c. Propeller - CHECK, General Condition, Nicks, etc.
   d. Tire and Nose Gear - CHECK
   e. Engine Oil - CHECK (See Servicing, Section 8) Cap and Dipstick - SECURE
   f. Right Cowl - SECURE
   g. Fuel Strainer - DRAIN
   h. Chocks - REMOVE

6. *RIGHT LANDING GEAR:*
   a. Fuel Sump - DRAIN
   b. Wheel Well, Tire and Brake - CHECK

7. *RIGHT WING LEADING EDGE:*
   a. Fuel Tank - CHECK QUANTITY; Filler Cap - SECURE
   b. Tie Down and Chocks - REMOVE
   c. Taxi Light - CHECK
   d. Wing Tip - CHECK
   e. Position Light - CHECK

8. *RIGHT WING TRAILING EDGE:*
   a. Aileron - CHECK
   b. Flap - CHECK
   c. Fuel Tank Vent Line - UNOBSTRUCTED

9. *RIGHT FUSELAGE:*
   a. Static Pressure Button - UNOBSTRUCTED
   b. Emergency Locator Transmitter - ARMED

10. *EMPENNAGE:*
    a. Control Surfaces - CHECK
    b. Tie Down - REMOVE
    c. Position Light - CHECK

11. *LEFT FUSELAGE:*
    a. Static Pressure Button - UNOBSTRUCTED
    b. All Antennas - CHECK
    c. Baggage Door - CHECK

BEFORE STARTING

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

6. Landing Gear Handle - DOWN
7. Flaps - UP
8. Light Switches - AS REQUIRED
9. Electric Stabilator Trim Switch - OFF (if installed)
10. BATTERY & ALT Switch - ON
11. ALT Switch - ON (If external power is used, turn ALT Switch - OFF)
12. Fuel Boost Pump - ON (Check for operation, then OFF)
13. Fuel Selector - ROTATE thru 360° and check for freedom of movement, set on tank more nearly full (feel for detent and check visually)

WARNING

Do not take off if gages indicate in yellow arc on either gage.

EXTERNAL POWER

The following precautions shall be observed while using external power:

1. The BATTERY/ALT switch shall be ON. The ALT switch as well as all avionics and electrical switches should be OFF. This protects the voltage regulator and associated electrical equipment from transients (power fluctuations).

2. The airplane has a negative ground system. Exercise care to avoid reversed polarity. 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.

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

STARTING ENGINE USING AUXILIARY POWER UNIT

1. Alternator, Electrical, and Avionics Equipment - OFF
2. Auxiliary Power Unit - CONNECT
3. Auxiliary Power Unit - SET OUTPUT (13.75 to 14.25 volts)
4. Auxiliary Power Unit - ON
5. Engine - START using normal procedures
6. Auxiliary Power Unit - OFF (after engine has been started)
7. Auxiliary Power Unit - DISCONNECT
8. Alternator Switch - ON

STARTING

1. Propeller - FULL FORWARD (High rpm)
2. Engine Start

CAUTION

Starter cranking period should be limited to a maximum of 30 seconds, with at least 2 minutes between cranking periods.

Cold Start:

a. Mixture - FULL RICH
b. Throttle - FAST IDLE position
c. Fuel Boost Pump - ON (max. of 3 sec. then OFF)
d. Magneto/Start Switch - START position (release to BOTH position when engine fires)

Hot Start:

a. Mixture - IDLE CUT-OFF
b. Throttle - FAST IDLE -position
c. Magneto/Start Switch - ENGAGE
d. Mixture - ADVANCE MIXTURE SLOWLY until engine starts firing regularly

Flooded Engine:

a. Mixture - IDLE CUT-OFF
b. Throttle - FULL OPEN
c. Magneto/Starter Switch - ENGAGE
d. Mixture - ADVANCE MIXTURE SLOWLY as engine starts firing regularly
e. Throttle - RETARD (to fast idle position)

3. External Power (if used) - OFF - DISCONNECT
4. ALT switch - ON (If external power was used)
5. Oil Pressure - IN YELLOW ARC WITHIN 30 SECONDS
6. Warm-up - 1000 to 1200 RPM
7. Engine Instruments - CHECK
8. Throttle - 1500 RPM
9. Ammeter - CHECK

CAUTION

Charge indication should begin to decrease within 2 minutes after engine start and should be within 1/4 scale of zero prior to takeoff. If not, an electrical difficulty is indicated, and the airplane should be shut down.

10. Throttle - IDLE

AFTER STARTING, AND BEFORE TAXI

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

BEFORE TAKEOFF

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

NOTE

All reclining seats must be in the upright position during take-off.

3. Avionics - CHECK
4. Engine Instruments - CHECK
5. Flight Instruments - CHECK AND SET
6. Throttle - 2000 RPM
7. Magnetos - CHECK at 2000 rpm, maximum drop of 100 rpm on each magneto, variance between individual magnetos should not exceed 25 rpm.
8. Propeller - EXERCISE to obtain 300 to 400 rpm drop; return to high rpm.
9. Throttle - 1500 RPM
10. Ammeter - CHECK for stabilized indication within 1/4 scale of zero.
11. Throttle - FAST IDLE
12. Stabilator Trim - TAKE-OFF RANGE (White Band)
13. Flaps - CHECK and SET (15°)
14. Controls - CHECK FREE and for proper direction of travel
15. Mixture - FULL RICH (or as required by field elevation)
16. Doors and Window - SECURE
17. Parking Brake - RELEASE
18. Instruments - CHECK (make final check of manifold pressure, fuel flow, and rpm at the start of the takeoff run)

TAKEOFF

Takeoff ..... Full Throttle - 2700 RPM
Cruise Climb ..... Full Throttle - 2700 RPM

NOTE

Do not takeoff or land with the Fuel Boost Pump ON. The Fuel Boost Pump should be used only for starting and in the event of an emergency.

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

1. Flaps - UP
2. Power - AS REQUIRED
3. Mixture - LEAN AS REQUIRED
4. Temperature - MONITOR

CRUISE

1. Power - SET AS DESIRED (use tables in PERFORMANCE Section)
2. Mixture - LEAN AS REQUIRED (tighten friction on push-pull type control)

LEANING USING THE EXHAUST GAS TEMPERATURE INDICATOR (EGT)

For level flight at 75% power or less, the EGT unit should be used in the following manner:

1. Lean the mixture and note the point on the indicator that the temperature peaks and starts to fall.
   a. CRUISE (LEAN) MIXTURE - Enrich mixture until the EGT shows a drop of 25°F below peak on the rich side of peak.
   b. BEST POWER MIXTURE - Enrich mixture until the EGT shows a drop of 75°F below peak on the rich side of peak.

CAUTION

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

2. Continuous operation is recommended at 25°F or more below peak EGT only on the rich side of peak.

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

DESCENT

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

BEFORE LANDING

1. Seat Belts and Shoulder Harnesses - SECURE.

NOTE

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

2. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL (feel for detent and check visually).
3. Mixture - FULL RICH (or as required by field elevation)
4. Landing Gear - DOWN and CHECK (observe maximum extension speed)
5. Landing and Taxi Lights - AS REQUIRED
6. Flaps - DOWN (observe maximum extension speed)

WARNING

The distance for a Flaps Up landing will be greater than for a Flaps Down landing.

7. Airspeed - ESTABLISH LANDING APPROACH SPEED
8. Propeller - FULL FORWARD

BALKED LANDING

1. Mixture - FULL RICH (or as required by field elevation)
2. Propeller - FULL FORWARD
3. Power - FULL THROTTLE, 2700 RPM
4. Landing Gear - UP
5. Airspeed - 74 kts/85 mph until clear of obstacles, then trim to BEST RATE-OF-CLIMB
6. Flaps - UP

AFTER LANDING

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

SHUTDOWN

1. Parking Brakes - SET
2. Electrical and Avionics Equipment - OFF
3. Throttle - CLOSE
4. Mixture - IDLE CUT-OFF
5. Magneto/Start Switch - OFF, after engine stops
6. BATTERY & ALT Switch - OFF
7. ALT Switch - OFF
8. Control Lock - INSTALL if conditions warrant.
9. Install wheel chocks and release parking 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, pitot tube, static ports, antennas, 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.

WARNING

Ascertain that magneto switch and battery master switch are off before moving propeller by hand.

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 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 Known Icing Conditions Prohibited.

ENGINE BREAK-IN INFORMATION

See Systems Description section

SECTION V

PERFORMANCE

TABLE OF CONTENTS

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INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING

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

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 some performance charts. Calculations for flight time, block speed and fuel required for a sample VFR trip from Denver to Wichita are detailed below. All examples and calculations assume 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-V4-GLD-V132-HUT-V73-ICT

For VFR Cruise at 9,500 feet

ROUTE SEGMENT	MAGNETIC COURSE	DIST NM	WIND 9500 FEET DIR/KTS	OAT 9500 FEET °C	ALT SETTING IN.HG
DEN-TXC	090°	72	010/30	-5	29.60
TXC-GLD	092°	73	010/30	-5	29.60
GLD-HUT	102°	194	220/10	0	29.56
HUT-ICT	116°	28	220/10	9	29.56

*REFERENCE: Enroute Low Altitude Chart L-6

At Wichita:

Outside Air Temperature	25°C (77°F)
Field Elevation	1332 ft
Altimeter Setting	29.56 in. Hg
Wind	180° at 10 kts
Runway 19 Length	7301 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 ICT:

29.92 - 29.56 = .36 in. Hg

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

1332 + 360 = 1692 ft

NOTE

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

Enter the Cruise Power Settings table for 65 percent maximum continuous power (or full throttle) and 2400 RPM at 9000 ft, 10,000 ft, ISA and ISA + 20°C.

	TEMPERATURE					
	ISA			ISA + 20°C		
ALTITUDE FEET	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS
9000	20.8	9.0	124	21.6	9.0	124
10000	20.1	8.7	121	20.8	8.8	123

Interpolate for 9,500 feet and the temperature for the appropriate route segment. Results of the interpolations are:

ROUTE SEGMENT	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS
DEN-TXC	20.6	8.9	123
TXC-GLD	20.6	8.9	123
GLD-HUT	20.5	8.8	122
HUT-ICT	21.0	8.9	123

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-TXC	72	120	0:36	5.3
TXC-GLD	73	120	0:37	5.4
GLD-HUT	194	127	1:32	13.4
HUT-ICT	28	125	0:13	2.0

TIME - FUEL - DISTANCE

ITEM	TIME HRS: MINS	FUEL GAL	DISTANCE NM
Start, Runup, Taxi and Take-off acceleration	0:00	1.3	0
Cruise	2:58	26.1	367
Total	2:58	27.4	367

Total Flight Time: 2 hours, 58 minutes

Block Speed: 367 NM ÷ 2 hours, 58 minutes = 124 knots

Reserve Fuel (45 minutes at 55 percent maximum continuous power)

Enter the Cruise Power Settings table for 55 percent MCP (or full throttle) @ 2300 RPM. The fuel flow for 55 percent MCP is 8 gallons per hour.
Reserve fuel = (45 min) (8 GPH) = 6 gallons

Total Fuel = 27.4 + 6.0 = 33.4 gallons

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

Assumed ramp weight = 2758 lbs

Estimated fuel from DEN to ICT = (27.4 gal) (6 lbs/gal) = 164 lbs

Estimated landing weight = 2758 -164 = 2594 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. Indicated airspeeds (IAS) were obtained by using the AIRSPEED CALIBRATION NORMAL SYSTEM Table.

2. 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.

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

4. Engine and component cooling has been demonstrated for temperatures up to 100°F at sea level with a 3.57°F per 1000 ft lapse rate. (ISA + 41°F)

AIRSPEED CALIBRATION - NORMAL SYSTEM

INDICATED AIRSPEED		CALIBRATED AIRSPEED			
		FLAPS UP		FLAPS DOWN	
KNOTS	MPH	KNOTS	MPH	KNOTS	MPH
50	58	51	59	48	56
55	63	55	63	54	62
60	69	60	69	59	68
65	75	65	75	65	75
70	81	70	81	70	81
75	86	75	86	74	85
80	92	81	93	80	92
85	98	86	99	85	98
90	104	91	105	89	103
95	109	96	110	94	108
100	115	101	116		
105	121	106	122		
110	127	111	128		
115	132	116	133		
120	138	121	139		
125	144	126	145		
130	150	132	152		
135	155	137	157		
140	161	142	163		
145	167	147	169		
150	173	152	175		
155	178	157	180		
160	184	162	186		

AIRSPEED CALIBRATION - ALTERNATE SYSTEM

(DOES NOT VARY WITH
STORM WINDOW POSITION)

IAS (MPH)	FLAPS UP IAS (MPH)	FLAPS DOWN IAS (MPH)
70		65
80	74	73
90	83	84
100	93	95
110	104	107
120	114	
130	124	
140	134	
150	144	
160	154	
170	164	
180	174	

ALTIMETER CORRECTION - NORMAL SYSTEM

INDICATED AIRSPEED		ALTIMETER CORRECTION TO BE ADDED ~ FEET			
		FLAPS UP		FLAPS DOWN	
KNOTS	MPH	SL	10000 FT	SL	10000 FT
50	58				
55	63				
60	69			-9	-13
65	75			-7	-9
70	81	-5	-6	-8	-11
75	86	-3	-3	-11	-14
80	92	0	0	-7	-10
85	98	1	2	-5	-6
90	104	2	2	-6	-8
95	109	0	0	-12	-15
100	115	-6	-7	-20	-28
105	121	-7	-9		
110	127	-9	-11		
115	132	5	5		
120	133	4	6		
125	144	-4	-6		

ALTIMETER CORRECTION - ALTERNATE SYSTEM

(DOES NOT VARY WITH
STORM WINDOW POSITION)

IAS (MPH)	FLAPS UP (FEET)	FLAPS DOWN (FEET)
70	-37	-39
80	-45	-46
90	-50	-46
100	-54	-38
110	-58	-37
120	-62	
130	-65	
140	-68	
150	-72	
160	-76	
170	-80	

POWER OFF STALL SPEEDS

(WEIGHT 2750 LBS)

Maximum altitude loss during a normal stall recovery is approximately 300 ft.

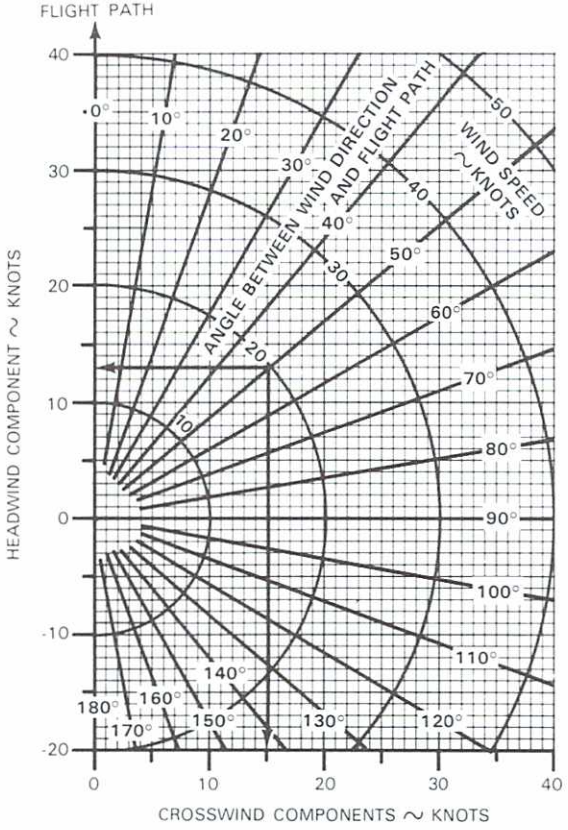
ANGLE OF BANK			
LEVEL	30°	45°	60°
FLAPS-UP, GEAR-UP			
74 mph 64 kts	79 mph 69 kts	87 mph 76 kts	103 mph 90 kts
FLAPS 15°, GEAR DOWN			
68 mph 59 kts	73 mph 63 kts	81 mph 70 kts	96 mph 83 kts
FLAPS 35°, GEAR DOWN			
63 mph 55 kts	68 mph 59 kts	75 mph 65 kts	89 mph 77 kts

WIND COMPONENTS

Demonstrated Crosswind Component is 17 kts

EXAMPLE

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



NORMAL TAKE-OFF DISTANCE - HARD SURFACE

ASSOCIATED CONDITIONS:

POWER	2700 RPM, FULL THROTTLE
MIXTURE	LEAN TO FIELD ELEVATION
FLAPS	15°
GEAR	RETRACTED, AFTER LIFT-OFF
RUNWAY	PAVED, LEVEL, DRY SURFACE
WEIGHT	2750 LBS
TAKE-OFF SPEEDS	LIFT-OFF 62 KTS/71 MPH IAS 50 FT 65 KTS /75 MPH IAS

NOTES

1. FOR EACH 100 POUNDS BELOW 2750 LBS. REDUCE TABULATED DISTANCE BY 7% AND TAKE-OFF SPEED BY 1 MPH.
2. RATE OF CLIMB IS BASED ON OPERATION AT TAKE-OFF POWER, WITH GEAR DOWN AND AT TAKE-OFF SPEED.
3. WHERE TOTAL DISTANCE VALUE HAS BEEN DELETED, CLIMB PERFORMANCE AFTER LIFT-OFF IS LESS THAN 150 FPM.

EXAMPLE:

PRESSURE ALT	4000 FT
WIND COMP	15 KTS
OAT	16°C
GROUND ROLL	1283 FT
TOTAL OVER 50 FT OBSTACLE	2213 FT

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL				2000 FT				4000 FT				6000 FT				8000 FT			
	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET
0	20	7	1003	1544	20	7	1172	1837	20	7	1374	2214	20	7	1614	2736	20	7	1905	3546
	40	4	1087	1674	40	4	1269	1996	40	4	1485	2416	40	4	1744	3018	40	4	2056	4026
	60	16	1174	1812	60	16	1370	2166	60	16	1601	2641	60	16	1879	3349	60	16	2212	4634
	80	27	1265	1957	80	27	1474	2346	80	27	1721	2889	80	27	2017	3727	80	27	2372	
	100	38	1359	2108	100	38	1590	2559	100	38	1845	3163	100	38	2160	4178	100	38	2538	
15	20	7	781	1258	20	7	922	1510	20	7	1090	1837	20	7	1293	2287	20	7	1539	3011
	40	4	851	1370	40	4	1003	1648	40	4	1185	2015	40	4	1403	2544	40	4	1669	3440
	60	16	924	1489	60	16	1088	1797	60	16	1283	2213	60	16	1518	2838	60	16	1803	3986
	80	27	1001	1615	80	27	1176	1955	80	27	1385	2432	80	27	1637	3176	80	27	1941	
	100	38	1080	1747	100	38	1267	2127	100	38	1491	2675	100	38	1760	3580	100	38	2085	
30	20	7	585	997	20	7	699	1211	20	7	837	1491	20	7	1004	1879	20	7	1209	2512
	40	4	642	1093	40	4	766	1330	40	4	916	1645	40	4	1097	2105	40	4	1319	2892
	60	16	702	1194	60	16	836	1457	60	16	997	1817	60	16	1194	2363	60	16	1432	3377
	80	27	765	1302	80	27	909	1594	80	27	1083	2008	80	27	1294	2662	80	27	1551	
	100	38	830	1416	100	38	985	1744	100	38	1172	2222	100	38	1398	3020	100	38	1673	

NORMAL TAKE-OFF DISTANCE - GRASS SURFACE

ASSOCIATED CONDITIONS

POWER	2700 RPM, FULL THROTTLE
MIXTURE	LEAN TO FIELD ELEVATION
FLAPS	15°
GEAR	RETRACTED AFTER LIFT-OFF
RUNWAY	GRASS, LEVEL, DRY SURFACE
WEIGHT	2750 LBS
TAKE-OFF SPEEDS	LIFT OFF 62 KTS/71 MPH IAS 50 FT 65 KTS/75 MPH IAS

NOTES:

1. FOR EACH 100 POUNDS BELOW 2750 LBS REDUCE TABULATED DISTANCE BY 7% AND TAKE-OFF SPEED BY 1 MPH.
2. RATE OF CLIMB IS BASED ON OPERATION AT TAKE-OFF POWER, WITH GEAR DOWN AND AT TAKE-OFF SPEED.
3. WHERE TOTAL DISTANCE VALUE HAS BEEN DELETED, CLIMB PERFORMANCE AFTER LIFT-OFF IS LESS THAN 150 FPM.

EXAMPLE:

PRESSURE ALT	2000 FT
WIND COMP	0 KTS
OAT	16°C
GROUND ROLL	1738 FT
TOTAL OVER 50 FT OBSTACLE	2579 FT

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL				2000 FT				4000 FT				6000 FT				8000 FT			
	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET
0	20	7	1237	1808	20	7	1466	2169	20	7	1746	2636	20	7	2090	3267	20	7	2521	4246
	40	4	1349	1969	40	4	1598	2367	40	4	1903	2887	40	4	2278	3621	40	4	2747	4811
	60	16	1467	2140	60	16	1738	2579	60	16	2067	3166	60	16	2475	4021	60	16	2983	5516
	80	27	1592	2321	80	27	1884	2805	80	27	2240	3471	80	27	2680	4475	80	27	3231	
	100	38	1722	2512	100	38	2036	3050	100	38	2421	3807	100	38	2896	5012	100	38	3492	
15	20	7	963	1466	20	7	1153	1775	20	7	1386	2176	20	7	1674	2724	20	7	2036	3583
	40	4	1056	1604	40	4	1263	1946	40	4	1518	2395	40	4	1833	3035	40	4	2229	4085
	60	16	1155	1751	60	16	1380	2129	60	16	1656	2638	60	16	2000	3388	60	16	2432	4713
	80	27	1259	1907	80	27	1503	2325	80	27	1803	2906	80	27	2176	3790	80	27	2644	
	100	38	1368	2072	100	38	1632	2539	100	38	1956	3202	100	38	2360	4267	100	38	2869	
30	20	7	721	1156	20	7	874	1416	20	7	1064	1756	20	7	1300	2225	20	7	1600	2969
	40	4	797	1272	40	4	965	1561	40	4	1173	1943	40	4	1432	2495	40	4	1761	3409
	60	16	877	1397	60	16	1061	1717	60	16	1288	2153	60	16	1572	2802	60	16	1932	3963
	80	27	962	1529	80	27	1162	1886	80	27	1409	2385	80	27	1720	3154	80	27	2112	
	100	38	1052	1670	100	38	1269	2069	100	38	1538	2642	100	38	1875	3574	100	38	2302	

NORMAL CLIMB

ASSOCIATED CONDITIONS:

POWER	FULL THROTTLE
FLAPS	UP
GEAR	UP

EXAMPLE:

WEIGHT	2750 POUNDS
PRESSURE ALT	4000 FT
OAT	16°C
CLIMB SPEED	80 KTS/92 MPH
RATE OF CLIMB	622 FT/MIN

WEIGHT POUNDS	SEA LEVEL			4000 FEET			8000 FEET			12000 FEET		
	OAT °F °C	R/C FT/MIN	CLIMB SPEED KTS/MPH	OAT °F °C	R/C FT/MIN	CLIMB SPEED KTS/MPH	OAT °F °C	R/C FT/MIN	CLIMB SPEED KTS/MPH	OAT °F °C	R/C FT/MIN	CLIMB SPEED KTS/MPH
2750	20 7	988	80/92	20 7	713	80/92	0 18	494	80/92	0 18	225	80/92
	40 4	937		40 4	668		20 7	447		20 7	178	
	60 16	891		60 16	622		40 4	403		40 4	131	
	80 27	846		80 27	578		60 16	360		60 16	88	
	100 38	804		100 38	536		80 27	317		80 27	47	
2600	20 7	1101	79/91	20 7	814	79/91	0 18	586	79/91	0 18	306	79/91
	40 4	1048		40 4	767		20 7	537		20 7	258	
	60 16	999		60 16	720		40 4	491		40 4	209	
	80 27	953		80 27	674		60 16	447		60 16	165	
	100 38	909		100 38	630		80 27	403		80 27	122	
2400	20 7	1272	77/89	20 7	966	77/89	0 18	723	77/89	0 18	426	77/89
	40 4	1215		40 4	916		20 7	671		20 7	375	
	60 16	1163		60 16	865		40 4	623		40 4	324	
	80 27	1114		80 27	817		60 16	576		60 16	278	
	100 38	1066		100 38	771		80 27	530		80 27	233	

CRUISE POWER SETTINGS

75% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE)

PRESS ALT.	ISA -36°F (-20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°)							
	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	PPH	GPH	KTS	MPH	°F	°C	RPM	IN HG	PPH	GPH	KTS	MPH	°F	°C	RPM	IN HG	PPH	GPH	KTS	MPH
SL	23	-5	2500	23.8	61.0	10.2	122	140	59	15	2500	24.4	61.0	10.2	124	143	95	35	2500	25.1	61.0	10.2	127	146
1000	19	-7	2500	23.6	61.0	10.2	123	141	55	13	2500	24.2	61.0	10.2	125	144	91	33	2500	24.8	61.0	10.2	128	147
2000	16	-9	2500	23.4	61.0	10.2	125	144	52	11	2500	24.0	61.0	10.2	127	146	88	31	2500	24.6	61.0	10.2	129	148
3000	12	-11	2500	23.2	61.0	10.2	125	144	48	9	2500	23.8	61.0	10.2	128	147	84	29	2500	24.4	61.0	10.2	131	150
4000	9	-13	2500	23.0	61.0	10.2	126	145	45	7	2500	23.6	61.0	10.2	129	148	81	27	2500	24.2	61.0	10.2	131	151
5000	5	-15	2500	22.8	61.0	10.2	127	146	41	5	2500	23.4	61.0	10.2	130	149	77	25	2500	24.0	61.0	10.2	132	152
6000	2	-17	2600	22.0	61.0	10.2	128	147	38	3	2600	22.5	61.0	10.2	131	150	74	23	2600	22.9	61.0	10.2	132	153
7000	2	-19	2600	21.8	61.0	10.2	130	149	34	1	2600	22.0	61.0	10.2	131	151	70	21	2600	22.2	59.6	9.9	132	152
8000	-5	-21	2600	21.3	61.0	10.2	131	150	31	-1	2600	21.5	59.6	9.9	131	151	67	19	2600	21.5	58.3	9.7	131	150
9000	-9	-23	2600	20.8	59.8	10.0	130	149	27	-3	2600	20.8	58.0	9.7	130	149	63	17	2600	20.8	56.5	9.4	129	149
10,000	-13	-25	2600	20.1	57.9	9.7	128	147	23	-5	2600	20.1	56.1	9.4	128	147	59	15	2600	20.1	54.6	9.1	127	146
11,000	-16	-27	2600	19.2	56.2	9.4	126	145	20	-7	2600	19.2	54.6	9.1	126	145	56	13	2600	19.2	53.1	8.9	124	143
12,000	-20	-29	2600	18.7	54.8	9.1	125	144	16	-9	2600	18.7	53.1	8.9	123	142	52	11	2600	18.7	51.7	8.6	123	141

NOTES 1 FULL THROTTLE MANIFOLD PRESSURE SETTINGS ARE APPROXIMATE.
2 SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE
3 CRUISE SPEEDS ARE PRESENTED AT AN AVERAGE WEIGHT OF 2600 LBS.

CRUISE POWER SETTINGS

65% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE)
2400 RPM

PRESS ALT.	ISA -36°F (-20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°)							
	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	PPH	GPH	KTS	MPH	°F	°C	RPM	IN HG	PPH	GPH	KTS	MPH	°F	°C	RPM	IN HG	PPH	GPH	KTS	MPH
SL	23	-5	2400	22.3	54.5	9.1	114	131	59	15	2400	22.8	54.5	9.1	117	134	95	35	2400	23.5	54.5	9.1	118	136
1000	19	-7	2400	22.0	54.5	9.1	115	132	55	13	2400	22.6	54.5	9.1	117	135	91	33	2400	23.2	54.5	9.1	119	137
2000	16	-9	2400	21.8	54.5	9.1	116	133	52	11	2400	22.4	54.5	9.1	118	136	88	31	2400	23.0	54.5	9.1	120	138
3000	12	-11	2400	21.6	54.5	9.1	117	134	48	9	2400	22.2	54.5	9.1	119	137	84	29	2400	22.8	54.5	9.1	121	139
4000	9	-13	2400	21.4	54.5	9.1	117	135	45	7	2400	21.9	54.5	9.1	120	138	81	27	2400	22.5	54.5	9.1	122	140
5000	5	-15	2400	21.2	54.5	9.1	118	136	41	5	2400	21.7	54.5	9.1	121	139	77	25	2400	22.3	54.5	9.1	123	141
6000	2	-17	2400	21.0	54.5	9.1	119	137	38	3	2400	21.5	54.5	9.1	121	139	74	23	2400	22.1	54.5	9.1	124	142
7000	-2	-19	2400	20.8	54.5	9.1	120	138	34	1	2400	21.3	54.5	9.1	122	140	70	21	2400	21.9	54.5	9.1	124	143
8000	-5	-21	2400	20.6	54.5	9.1	121	139	31	-1	2400	21.0	54.5	9.1	123	141	67	19	2400	21.6	54.2	9.0	124	143
9000	-9	-23	2400	20.4	54.5	9.1	122	140	27	-3	2400	20.8	54.1	9.0	124	142	63	17	2400	20.8	52.7	8.8	123	141
10,000	-13	-25	2400	20.1	53.9	9.0	122	140	23	-5	2400	20.1	52.4	8.7	121	139	59	15	2400	20.1	51.0	8.5	119	137
11,000	-16	-27	2400	19.3	52.6	8.8	120	138	20	-7	2400	19.3	51.0	8.5	118	136	56	13	2400	19.3	49.7	8.3	117	134
12,000	-20	-29	2400	18.6	51.0	8.5	117	135	16	-9	2400	18.6	49.6	8.3	116	133	52	11	2400	18.6	48.2	8.0	112	129

NOTES 1. FULL THROTTLE MANIFOLD PRESSURE SETTINGS ARE APPROXIMATE.
2. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
3. CRUISE SPEEDS ARE PRESENTED AT AN AVERAGE WEIGHT OF 2600 LBS.

CRUISE POWER SETTINGS

55% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE)
2300 RPM

PRESS ALT.	ISA -36°F (-20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°)							
	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	PPH	GPH	KTS	MPH	°F	°C	RPM	IN HG	PPH	GPH	KTS	MPH	°F	°C	RPM	IN HG	PPH	GPH	KTS	MPH
SL	23	-5	2300	20.6	48.2	8.0	104	120	59	15	2300	21.1	48.2	8.0	106	122	95	35	2300	21.6	48.2	8.0	108	124
1000	19	-7	2300	20.3	48.2	8.0	105	121	55	13	2300	20.8	48.2	8.0	107	123	91	33	2300	21.3	48.2	8.0	108	124
2000	16	-9	2300	20.1	48.2	8.0	106	122	52	11	2300	20.6	48.2	8.0	108	124	88	31	2300	21.1	48.2	8.0	110	125
3000	12	-11	2300	19.8	48.2	8.0	107	123	48	9	2300	20.4	48.2	8.0	108	124	84	29	2300	20.9	48.2	8.0	110	126
4000	9	-13	2300	19.6	48.2	8.0	107	123	45	7	2300	20.2	48.2	8.0	108	125	81	27	2300	20.7	48.2	8.0	110	126
5000	5	-15	2300	19.4	48.2	8.0	108	124	41	5	2300	19.9	48.2	8.0	109	126	77	25	2300	20.5	48.2	8.0	110	127
6000	2	-17	2300	19.2	48.2	8.0	109	125	38	3	2300	19.7	48.2	8.0	109	126	74	23	2300	20.3	48.2	8.0	111	128
7000	-2	-19	2300	18.9	48.2	8.0	109	125	34	1	2300	19.5	48.2	8.0	110	127	70	21	2300	20.1	48.2	8.0	111	128
8000	-5	-21	2300	18.7	48.2	8.0	110	126	31	-1	2300	19.3	48.2	8.0	110	127	67	19	2300	19.9	48.2	8.0	111	128
9000	-9	-23	2300	18.6	48.2	8.0	111	127	27	-3	2300	19.1	48.2	8.0	111	128	63	17	2300	19.7	48.2	8.0	112	129
10,000	-13	-25	2300	18.5	48.2	8.0	111	127	23	-5	2300	19.0	48.2	8.0	111	128	59	15	2300	19.5	48.2	8.0	112	129
11,000	-16	-27	2300	18.4	48.2	8.0	111	128	20	-7	2300	18.9	48.2	8.0	111	128	56	13	2300	19.2	47.7	7.9	111	128
12,000	-20	-29	2300	18.3	48.2	8.0	111	128	16	-9	2300	18.6	47.7	7.9	111	128	52	11	2300	18.6	46.5	7.8	106	122

NOTES: 1. FULL THROTTLE MANIFOLD PRESSURE SETTINGS ARE APPROXIMATE.
2. SHADED AREA REPRESENTS OPERATION WITH FULL THROTTLE.
3. CRUISE SPEEDS ARE PRESENTED AT AN AVERAGE WEIGHT OF 2600 LBS.

RANGE

PRESSURE ALTITUDE ~ FEET	RANGE ~ N.M. (ZERO WIND)					
	75% POWER		65% POWER		55% POWER	
	32 GAL	52 GAL	32 GAL	52 GAL	32 GAL	52 GAL
S.L.	302	547	316	571	327	591
1000	303	550	316	573	326	592
2000	303	552	316	575	326	593
3000	303	554	316	578	325	594
4000	303	556	316	579	324	595
5000	304	558	316	581	323	595
6000	304	560	315	582	322	595
7000	303	562	314	583	321	595
8000			314	585	319	595
9000					317	594
10000					315	593
11000					310	588
12000						

ASSOCIATED CONDITIONS:

STANDARD DAY

WEIGHT 2758 POUNDS BEFORE ENGINE START

FUEL 100 OCTANE AVIATION GASOLINE

FUEL DENSITY 6.0 POUNDS/GALLON

EXAMPLE:

ALTITUDE	7000 FT
POWER	65%
FUEL LOADING	52 GALLONS
RANGE	583 NM

1. RANGE INCLUDES START, TAXI, CLIMB AND 45 MINUTES RESERVE FUEL AT 55% POWER.

ENDURANCE

PRESSURE ALTITUDE ~ FEET	ENDURANCE ~ HRS					
	75% POWER		65% POWER		55% POWER	
	32 GAL	52 GAL	32 GAL	52 GAL	32 GAL	52 GAL
S.L.	2.4	4.2	2.7	4.9	3.1	5.6
1000	2.4	4.4	2.7	4.9	3.1	5.5
2000	2.4	4.4	2.7	4.9	3.0	5.5
3000	2.4	4.4	2.7	4.9	3.0	5.5
4000	2.4	4.4	2.7	4.9	3.0	5.5
5000	2.4	4.3	2.6	4.8	3.0	5.5
6000	2.4	4.3	2.6	4.8	2.9	5.4
7000	2.4	4.3	2.6	4.8	2.9	5.4
8000			2.6	4.8	2.9	5.4
9000					2.9	5.4
10000					2.8	5.3
11000					2.8	5.3
12000						

ASSOCIATED CONDITIONS:

STANDARD DAY
WEIGHT 2758 POUNDS BEFORE ENGINE START
FUEL 100 OCTANE AVIATION GASOLINE
FUEL DENSITY 6.0 POUNDS/GALLON

EXAMPLE:

ALTITUDE 7000 FT
POWER 65%
FUEL LOADING 52 GALLONS
ENDURANCE 4.8 HOURS

NORMAL LANDING DISTANCE - HARD SURFACE

ASSOCIATED CONDITIONS

POWER	OFF
FLAPS	35°
GEAR	DOWN
RUNWAY	PAVED, LEVEL, DRY SURFACE
WEIGHT	2750 POUNDS
APPROACH SPEED	74 KTS / 85 MPH IAS

NOTES

1. GROUND ROLL IS APPROXIMATELY 54% OF TOTAL DISTANCE OVER 50 FT. OBSTACLE.
2. FOR EACH 100 LBS. BELOW 2750 LBS., REDUCE TABULATED DISTANCE BY 5% AND APPROACH SPEED BY 1 MPH.

EXAMPLE:

PRESSURE ALT	2000 FT
WIND COMP	15 KTS
OAT	16°C
TOTAL OVER 50 FT OBSTACLE	1331 FT

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL		2000 FT		4000 FT		6000 FT		8000 FT	
	OAT °F	°C	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	°C	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	°C	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	°C	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	°C	TOTAL OVER 50 FT OBSTACLE FEET
0	20	-7	1303	20	-7	1510	20	-7	1644	20	-7	1802	20	-7	1985
	40	4	1428	40	4	1582	40	4	1728	40	4	1897	40	4	2097
	60	16	1523	60	16	1658	60	16	1815	60	16	1998	60	16	2212
	80	27	1590	80	27	1736	80	27	1903	80	27	2102	80	27	2328
	100	38	1660	100	38	1816	100	38	1996	100	38	2207	100	38	2450
15	20	-7	1009	20	-7	1124	20	-7	1318	20	-7	1487	20	-7	1648
	40	4	1069	40	4	1213	40	4	1422	40	4	1571	40	4	1745
	60	16	1137	60	16	1331	60	16	1498	60	16	1659	60	16	1847
	80	27	1223	80	27	1430	80	27	1576	80	27	1749	80	27	1954
	100	38	1334	100	38	1499	100	38	1657	100	38	1842	100	38	2077
30	20	-7	789	20	-7	871	20	-7	971	20	-7	1116	20	-7	1346
	40	4	834	40	4	923	40	4	1042	40	4	1245	40	4	1429
	60	16	880	60	16	982	60	16	1132	60	16	1355	60	16	1518
	80	27	929	80	27	1049	80	27	1263	80	27	1433	80	27	1611
	100	38	984	100	38	1134	100	38	1353	100	38	1515	100	38	1707

NORMAL LANDING DISTANCE - GRASS SURFACE

ASSOCIATED CONDITIONS

POWER	OFF
FLAPS	35°
GEAR	DOWN
RUNWAY	GRASS, LEVEL, DRY SURFACE
WEIGHT	2750 POUNDS
APPROACH SPEED	74 KTS / 85 MPH IAS

NOTES

1. GROUND ROLL IS APPROXIMATELY 54% OF TOTAL DISTANCE OVER 50 FT. OBSTACLE.
2. FOR EACH 100 LBS. BELOW 2750 LBS, REDUCE TABULATED DISTANCE BY 5% AND APPROACH SPEED BY 1 MPH.

EXAMPLE:

PRESSURE ALT	2000 FT
WIND COMP	0 KTS
OAT	4°C
TOTAL OVER 50 FT OBSTACLE	1860 FT

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL		2000 FT.		4000 FT.		6000 FT.		8000 FT.	
	OAT °F °C	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F °C	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F °C	TOTAL OVER 50 FT QBSTACLE FEET	OAT °F °C	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F °C	TOTAL OVER 50 FT OBSTACLE FEET
0	20 7	1551	20 7	1777	20 7	1931	20 7	2112	20 7	2319
	40 4	1686	40 4	1860	40 4	2027	40 4	2219	40 4	2445
	60 16	1791	60 16	1947	60 16	2126	60 16	2333	60 16	2573
	80 27	1869	80 27	2036	80 27	2226	80 27	2450	80 27	2703
	100 38	1949	100 38	2127	100 38	2331	100 38	2568	100 38	2839
15	20 7	1201	20 7	1333	20 7	1545	20 7	1734	20 7	1916
	40 4	1271	40 4	1431	40 4	1659	40 4	1829	40 4	2026
	60 16	1347	60 16	1560	60 16	1746	60 16	1928	60 16	2140
	80 27	1443	80 27	1668	80 27	1834	80 27	2030	80 27	2260
	100 38	1562	100 38	1747	100 38	1926	100 38	2135	100 38	2382
30	20 7	933	20 7	1029	20 7	1144	20 7	1307	20 7	1556
	40 4	985	40 4	1089	40 4	1225	40 4	1447	40 4	1651
	60 16	1039	60 16	1157	60 16	1324	60 16	1567	60 16	1751
	80 27	1096	80 27	1233	80 27	1465	80 27	1654	80 27	1854
	100 38	1159	100 38	1327	100 38	1565	100 38	1747	100 38	1961

SECTION VI

WEIGHT AND BALANCE/ EQUIPMENT LIST

TABLE OF CONTENTS

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INTRODUCTION TO WEIGHT AND BALANCE

The necessity for proper computation of the airplane's weight and balance cannot be overemphasized. In the basic design, it is planned that under normal loading the weight distribution of pilot, passengers, baggage, and fuel will balance the airplane for flight. Since these items are all variables, it is possible to concentrate weight in such a way as to make the airplane unsafe for flight. The factors which must be considered in the weight and balance of the airplane are the installation of equipment after the airplane has been weighed, trapped or unusable fuel, engine oil, usable fuel, pilot and passenger weights, and baggage or cargo.

In order to simplify the computation of the weight and balance, Beech Aircraft Corporation has devised a form called Basic Empty Weight and Balance. When the airplane is delivered from the factory it will first be weighed and the data recorded on this form. Provision has been made on the form for listing additions of items to be installed before the delivery or subtractions of items to be removed before delivery from the "as weighed" condition. This then represents the empty weight of the airplane.

When the airplane is first fueled, a certain amount of fuel is trapped in the fuel lines and cells which cannot be drained. Also, in some regimes of flight there are certain amounts of fuel that cannot be used. The combination of these fuel amounts is classified as unusable fuel. Also, it has been found that all operators bring the oil level near full before each flight. Thus, these items are computed along with the empty weight, giving a Basic Empty Weight as a starting point to the pilot for each flight computation.

Once the Basic Empty Weight for a given airplane has been established, the pilot is then only concerned with the

variable items which will comprise his useful load. These items which are of a changing nature are: Pilot and Passengers (computed on an individual weight and the seat occupied), Baggage and/or Cargo (computed on weight and location within the airplane), and Usable Fuel (the remaining fuel after subtracting the unusable fuel from the measured fuel on board).

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 129.2 and one on the aft fuselage at Fuselage Station 285.9 (tail tie-down ring).

2. Fuel should be drained preparatory to weighing. Tanks are drained from the regular drain ports with the airplane in static ground attitude. The unusable fuel to be added to a Basic Empty Weight is: 45.6 lbs at Fuselage Station 125.0.

3. Engine oil must be at the full level or completely drained. Total engine oil when full is 15 pounds at Fuselage Station 50.

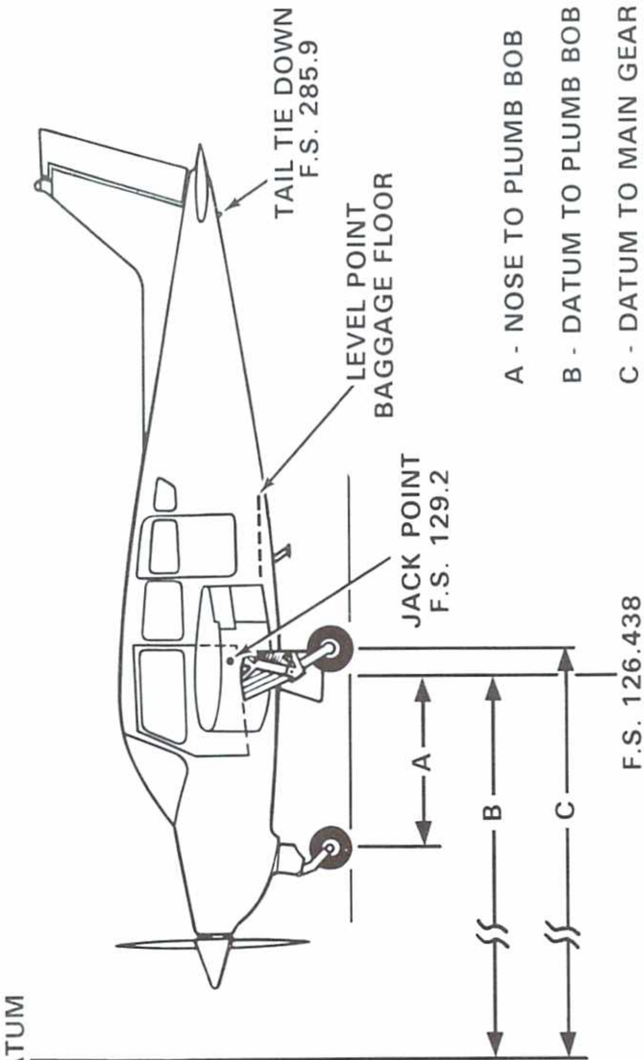
4. To determine airplane configuration at time of weighing, installed equipment is checked against the airplane equipment list or superseding forms. All installed equipment must be in its proper place during weighing.

5. At the time of weighing, the airplane must be level both longitudinally and laterally, and the landing gear must be fully extended. Longitudinally and laterally level attitude is determined with a level on the baggage compartment floor.

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 centerline of airplane at F.S. 126.438, forward screw in spar access cover, approximately 8 to 10 inches forward of centerline drain hole) to the axle centerline of the main gear and then to the nose wheel axle centerline. The main wheel axle centerline 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 centerline. The locations of the wheel reactions will be approximately at Fuselage Station 129.5 for main wheels and Fuselage Station 57.6 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 129.4, the tail reaction of the airplane will be in an up direction. This can be measured on regular scales by placing ballast of approximately 200 pounds on the scales to which the aft weighing point is attached by cable of adjustable length. The up reaction will then be total ballast weight minus the scale reading and is entered in the weighing form as a negative quantity.

8. Weighing should always be made in an enclosed area which is free from air currents. The scales used should be properly calibrated and certified.


TAIL TIE DOWN
F.S. 285.9
LEVEL POINT
BAGGAGE FLOOR
JACK POINT
F.S. 129.2
A - NOSE TO PLUMB BOB
B - DATUM TO PLUMB BOB
C - DATUM TO MAIN GEAR
F.S. 126.438
A
B
C
DATUM

BASIC EMPTY WEIGHT AND BALANCE

MODEL B24R SER. NO. _____ REG. NO. _____ DATE _____

JACK POINT LOCATION

FORWARD 129.2
AFT 285.9

PREPARED BY

Company _____
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			15.0	50.0	750
UNUSABLE FUEL			45.6	125.0	5700
BASIC EMPTY WEIGHT					

NOTE

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

It is recommended that duplicate copies of the Basic Empty Weight and Balance sheet and the Equipment List be made and kept in an alternate location in the event the original handbook is misplaced.

WEIGHT AND BALANCE RECORD

SERIAL NO. _____ REGISTRATION NO. _____ PAGE NO. 1

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

WEIGHT AND BALANCE RECORD

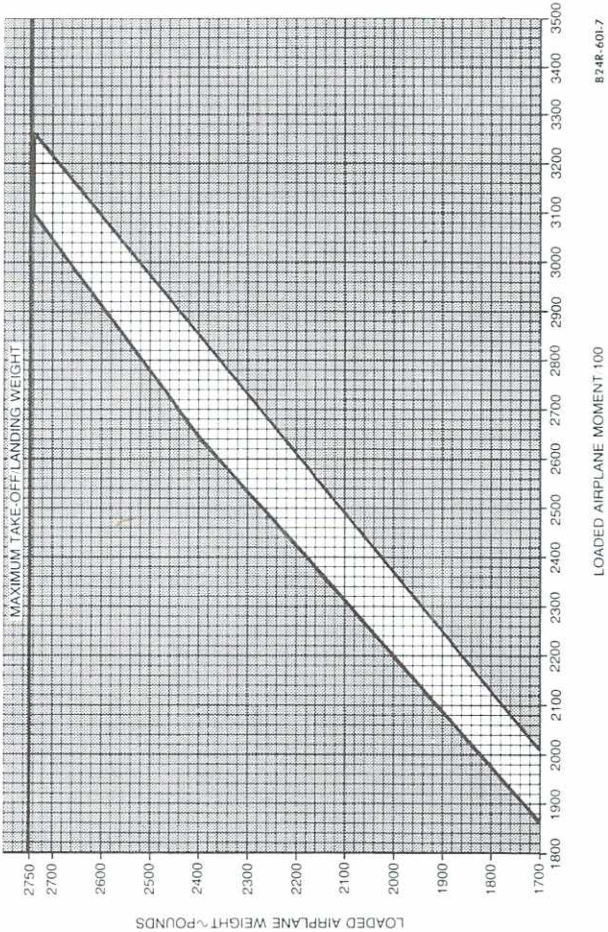
SERIAL NO. _____ REGISTRATION NO. _____ PAGE NO. 2

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

WEIGHT AND BALANCE RESPONSIBILITIES

The Basic Empty Weight and Moment of the airplane at the time of delivery are shown on the airplane Basic Empty Weight and Balance form. Useful load items which may be loaded into the airplane are shown on the Useful Load Weights and Moments tables. The minimum and maximum moments are shown on the Moment Limits vs Weight table and can also be plotted on the Moment Limits vs Weight graph as visual indication that the limit is within the operational envelope. These moments correspond to the forward and aft center-of-gravity flight limits for a particular weight. The airplane must be loaded in such a manner to keep the center-of-gravity within these limits.

WEIGHT VS MOMENT LIMITS



MOMENT LIMITS vs WEIGHT LIMITS

Weight	Minimum Moment / 100	Maximum Moment / 100	Weight	Minimum Moment / 100	Maximum Moment / 100	Weight	Minimum Moment / 100	Maximum Moment / 100
1700	1870	2011	2100	2310	2484	2500	2775	2958
1710	1881	2023	2110	2321	2496	2510	2788	2969
1720	1892	2035	2120	2332	2508	2520	2801	2981
1730	1903	2047	2130	2343	2520	2530	2814	2993
1740	1914	2058	2140	2354	2532	2540	2828	3005
1750	1925	2070	2150	2365	2543	2550	2841	3017
1760	1936	2082	2160	2376	2555	2560	2854	3028
1770	1947	2094	2170	2387	2567	2570	2867	3040
1780	1958	2106	2180	2398	2579	2580	2880	3052
1790	1969	2118	2190	2409	2591	2590	2894	3064
1800	1980	2129	2200	2420	2603	2600	2907	3076
1810	1991	2141	2210	2431	2614	2610	2920	3088
1820	2002	2153	2220	2442	2626	2620	2933	3099
1830	2013	2165	2230	2453	2638	2630	2947	3111
1840	2024	2177	2240	2464	2650	2640	2960	3123
1850	2035	2189	2250	2475	2662	2650	2973	3135
1860	2046	2200	2260	2486	2674	2660	2987	3147
1870	2057	2212	2270	2497	2685	2670	3000	3159
1880	2068	2224	2280	2508	2697	2680	3013	3170
1890	2079	2236	2290	2519	2709	2690	3027	3182
1900	2090	2248	2300	2530	2721	2700	3040	3194
1910	2101	2260	2310	2541	2733	2710	3054	3206
1920	2112	2271	2320	2552	2745	2720	3067	3218
1930	2123	2283	2330	2563	2756	2730	3081	3230
1940	2134	2295	2340	2574	2768	2740	3094	3241
1950	2145	2307	2350	2585	2780	2750	3108	3253
1960	2156	2319	2360	2596	2792			
1970	2167	2331	2370	2607	2804			
1980	2178	2342	2380	2619	2815			
1990	2189	2354	2390	2632	2827			
2000	2200	2366	2400	2645	2839			
2010	2211	2378	2410	2658	2851			
2020	2222	2390	2420	2671	2863			
2030	2233	2401	2430	2684	2875			
2040	2244	2413	2440	2697	2887			
2050	2255	2425	2450	2710	2898			
2060	2266	2437	2460	2723	2910			
2070	2277	2449	2470	2736	2922			
2080	2288	2461	2480	2749	2934			
2090	2299	2472	2490	2762	2946			

The above weight and moment limits are based on the following weight and center of gravity limit data:

NORMAL CATEGORY

WEIGHT CONDITION	FWD CG LIMIT	AFT CG LIMIT
2750 lb (Max. Take-Off or Landing)	113.0	118.3
2375 lb or less	110.0	118.3

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 Condition moment must be within the minimum and maximum moments shown on the Moment Limit vs Weight graph for that weight. If the total moment is less than the minimum moment allowed, useful load items must be shifted aft or forward load items reduced. If the total moment is greater than the maximum moment allowed, useful load items must be shifted forward or aft load items reduced. If the quantity or location of load items is changed, the calculations must be revised and the moments rechecked.

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

MODEL B24R DATE _____

SERIAL NO. MC-XXX REG NO. NXXX

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION	1720	1912
2. FRONT SEAT OCCUPANTS	340	374
3. 3rd and 4th SEAT OCCUPANTS	340	482
4. 5th and 6th SEAT OCCUPANTS	130	222
5. BAGGAGE	-	-
6. CARGO	-	-
7. SUB TOTAL ZERO FUEL CONDITION	2530	2990
8. FUEL LOADING (32 GAL)	192	225
9. SUB TOTAL RAMP CONDITION	2722	3215
10. *LESS FUEL FOR START, TAXI, AND TAKE-OFF	-8	-9
11. SUB TOTAL TAKE-OFF CONDITION	2714	3206
12. LESS FUEL TO DESTINATION (25 GAL)	-150	-176
13. LANDING CONDITION	2564	3030

SAMPLE

*Fuel for start, taxi and take-off is normally 8 lbs at an average mom/100 of 9.

WEIGHT AND BALANCE LOADING FORM

MODEL B24R DATE 1/8/94

SERIAL NO. MC-322 REG NO. N6970R NXXX

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION	1751	1957
2. FRONT SEAT OCCUPANTS		
3. 3rd and 4th SEAT OCCUPANTS		
4. 5th and 6th SEAT OCCUPANTS		
5. BAGGAGE		
6. CARGO		
7. SUB TOTAL ZERO FUEL CONDITION		
8. FUEL LOADING (GAL)		
9. SUB TOTAL RAMP CONDITION		
10. *LESS FUEL FOR START, TAXI, AND TAKE-OFF	(8)	(9)
11. SUB TOTAL TAKE-OFF CONDITION		
12. LESS FUEL TO DESTINATION (GAL)		
13. LANDING CONDITION		

*Fuel for start, taxi and take-off is normally 8 lbs at an average mom/100 of 9.

USEFUL LOAD WEIGHTS AND MOMENTS

OCCUPANTS

WEIGHT	*FRONT SEATS	3RD AND 4TH SEATS	
		BENCH SEAT	SPLIT SEAT
	ARM **110	ARM **142	ARM **144
	MOM / 100	MOM / 100	MOM / 100
120	132	170	173
130	143	185	187
140	154	199	202
150	165	213	216
160	176	227	230
170	187	241	245
180	198	256	259
190	209	270	274
200	220	284	288

*Reclining seat with back in full-up position.

**Values computed from a C.G. criterion based on a 170 pound male. Differences in physical characteristics can cause variation in center of gravity location.

USEFUL LOAD WEIGHTS AND MOMENTS
OCCUPANTS

5th & 6th SEATS ARM 171			
Weight	Moment 100	Weight	Moment 100
80	137	140	239
90	154	150	257
100	171	160	274
110	188	170	291
120	205	180	308
130	222	190	325
		200	342

USABLE FUEL

ARM 117		
GALLONS	WEIGHT	MOMENT/100
5	30	35
10	60	70
15	90	105
20	120	140
22	132	154
25	150	176
27	162	189
30	180	211
32	192	225
35	210	246
37	222	259
40	240	281
45	270	316
50	300	351
52	312	365

USEFUL LOAD WEIGHTS AND MOMENTS

BAGGAGE
ARM 167

Weight	Moment / 100	Weight	Moment / 100
10	17	150	251
20	33	160	267
30	50	170	284
40	67	180	301
50	84	190	317
60	100	200	334
70	117	210	351
80	134	220	367
90	150	230	384
100	167	240	401
110	184	250	418
120	200	260	434
130	217	270	451
140	234		

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SECTION VII

SYSTEMS DESCRIPTION

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AIRFRAME

The BEECHCRAFT Sierra 200 B24R is a four-to-six place, all-metal, single-engine airplane with retractable landing gear and conventional flight control surfaces except for a stabilator for the horizontal empennage surface.

SEATING ARRANGEMENTS

In the standard configuration two adjustable seats and one fixed-bench seat are installed. Optional split 3rd and 4th seats and a fixed bench children's seat are available.

FLIGHT CONTROLS

CONTROL SURFACES

The control surfaces are operated with conventional cable systems terminating in bellcranks.

CONTROL COLUMN

A single control column/wheel is installed as standard equipment on the left side. The optional control column/wheel may be installed on the right side.

RUDDER PEDALS

The standard installation provides pedals for rudder control on the left side only. The optional installation provides a set of rudder pedals for each side.

STABILATOR TRIM SYSTEM

MANUAL TRIM

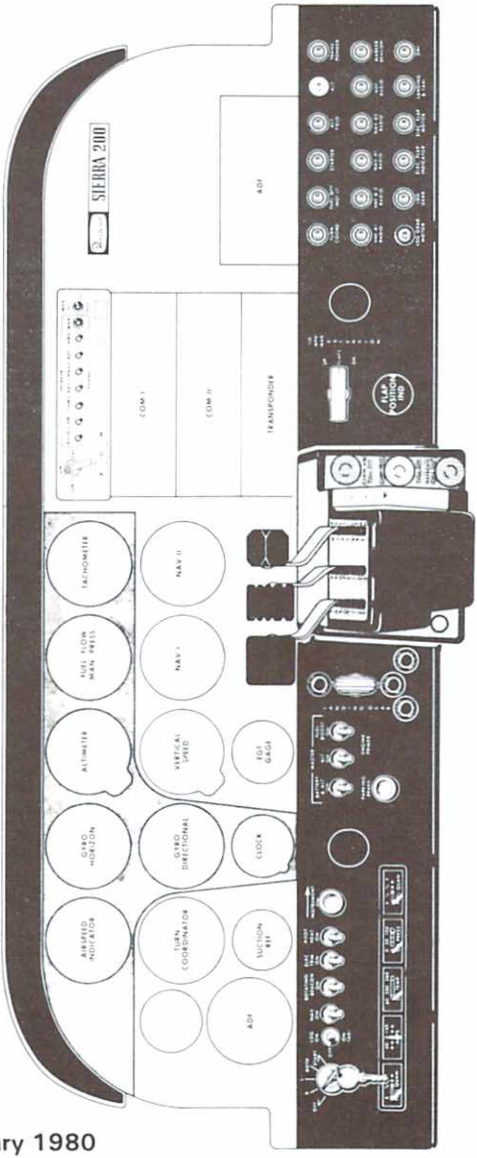
The manual stabilator trim is actuated by a handwheel located between the front seats. A stabilator tab position indicator is located adjacent to the trim control handwheel. Forward movement of the wheel trims the airplane's nose down, aft movement of the wheel trims the airplane's nose up.

ELECTRIC TRIM

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

INSTRUMENT PANEL

The standard instrument panel consists of flight and navigation instruments on the left, and an avionics section on the right. The switching panel and the engine gages are located on the left subpanel and the circuit breaker grouping is on the right subpanel.



TYPICAL INSTRUMENT PANEL

SWITCHES

The BATTERY & ALT, ALT, and FUEL BOOST switches are grouped on the subpanel to the right of the pilot's control column under the marking MASTER. The Pitot Heat, Electric Trim, Magneto/Start, and light switches are to the left of the pilot's control column.

CIRCUIT BREAKERS

The circuit breakers are located on the right subpanel.

FLIGHT INSTRUMENTS

The standard flight instruments are grouped in a "T" pattern on the main panel for the best presentation for the pilot. The magnetic compass is located above the instrument panel.

Ram air pressure for the airspeed indicator enters through the pitot tube under the left wing, static air pressure for the altimeter, vertical speed and airspeed indicator is supplied by a static port on each side of the fuselage, just aft of the cabin.

The instruments are illuminated either by an overhead flood light or post lights. The flood light is controlled by a rheostat switch located below the power quadrant on the pedestal, while the post light installation is controlled by a rheostat switch on the left subpanel.

GROUND CONTROL

Steering is accomplished by the use of rudder pedals through a spring-loaded linkage connecting the nose gear to the rudder pedals. The nose gear maximum travel is 30° right and 27° left. A hydraulic shimmy damper on the nose

gear yoke compensates for any tendency to shimmy. Toe brakes may be used to aid in steering the airplane on the ground.

The minimum wing-tip turning radius, using full steering, one brake and partial power is 26 feet 10 inches.

WING FLAPS

MANUAL

The four position flaps are operated by a manual lever located between the front seats. In addition to the full flap down position of 35°, intermediate positions are provided. As the handle is raised to lower the flaps, a definite detent and click of the thumb release button will be felt at the 15° and 25° flap extended positions. Another detent will indicate the 35° position. To retract the flaps, depress the thumb button and lower the handle to the floor. The thumb button does not need to be depressed, nor should it be, to lower the flaps.

ELECTRIC

The electric wing flaps are controlled by a three-position switch UP, OFF and DOWN, located to the right of the power quadrant. The switch must be pulled out of detent before it can be repositioned. A dial type indicator, located adjacent to the flap handle switch, has markings for UP, 10°, 15°, 20° and DOWN. In addition, a green radial is placed on the indicator at the 15° position to denote flap position for takeoffs.

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

EFFECT OF FLAPS ON FLIGHT

TAKEOFF

Retraction of take-off flaps (15° for takeoff), during climb-out, requires no change in trim and only light changes in control forces. The light forces dissipate without change in trim or significant change in airspeed.

CAUTION

Establish recovery altitude, recovery power, and airspeed before retracting flaps during slow flight, particularly during recoveries from approach configuration.

LANDING GEAR

The retractable tricycle landing gear, fabricated from magnesium castings and aluminum forgings, uses rubber disks for shock absorption.

The gears are identical except for the pivoting action during retraction and the steering provisions on the nose gear. Retraction and extension of the gear is accomplished through the use of an electric-driven hydraulic pump and hydraulic system. The landing gear may be hydraulically extended or retracted, and may be lowered manually. (See Emergency Extension Procedures)

CONTROL SWITCH

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

POSITION INDICATORS

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

Testing of the landing gear position indicator bulbs is accomplished by pressing each individual indicator. The intensity of the lamps can be controlled by turning the lens holder on each lamp.

SAFETY RETRACTION SWITCH

To prevent inadvertent retraction of the landing gear on the ground, a safety pressure switch located in the pitot system, deactivates the hydraulic pressure pump circuit when the impact air pressure is below 68 to 72 mph.

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 continuously.

CIRCUIT BREAKER

The landing gear motor circuit breaker is located on the right subpanel. This circuit breaker is a pull-and-reset type breaker. A white circle identifies this circuit breaker. The breaker will pop out under overload conditions. The remainder of the landing gear circuitry is protected by a push-to-reset circuit breaker marked LDG GEAR.

EMERGENCY EXTENSION

The landing gear can be extended by turning the hydraulic pressure bypass valve 90° counterclockwise. The valve is located on the floor in front of the pilot's seat. When the system pressure is released the gear will fall into the down-and-locked position. This extension procedure is outlined in EMERGENCY PROCEDURES Section.

NOTE

Repeated emergency extension of the landing gear may deplete the hydraulic fluid reservoir supply.

BRAKES

The brakes on the main landing gear wheels are operated by applying toe pressure to the rudder pedals. The parking brake push-pull control is located on the right side of the lower left subpanel. To set the parking brakes, pull the control out and depress the pilot's toe pedals until firm. Push the control in to release the brakes.

NOTE

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

LANDING GEAR SAFETY EXTENSION SYSTEM

The landing gear safety system is designed to prevent "gear up" landings. The system is to be used as a safety device only; normal usage of the landing gear position switch is mandatory.

To extend the landing gear, place the landing gear safety system ON-OFF switch in the ON position. The landing gear will be automatically extended when: (1) the airspeed is below approximately 100 kts/115 mph IAS and (2) the engine is operating at a throttle position corresponding to approximately 18 inches or less of manifold pressure.

To retract the landing gear, place the landing gear safety system ON-OFF switch in the ON position. The landing gear will not retract unless: (1) the landing gear position switch is in the UP position, (2) the airspeed is above approximately 63 kts/72 mph IAS and (3) the engine is operating at a throttle position corresponding to approximately 20 inches or more of manifold pressure.

If landing gear retraction is desired when the throttle position corresponds to 20 inches of manifold pressure or less, the landing gear safety system ON-OFF switch must be placed in the OFF position before placing the landing gear position switch in the UP position.

In the event of an emergency, automatic extension of the landing gear may be prevented by placing the landing gear safety system ON-OFF switch in the OFF position, thus deactivating the safety system.

BAGGAGE COMPARTMENT

A 19.5 cubic-foot baggage space is located behind the 3rd and 4th seats. In addition a hat shelf, near the top of the cabin enclosure provides an out-of-the-way space for light miscellaneous articles. Both the baggage compartment and hat shelf are accessible in flight.

WARNING

Do not carry hazardous material anywhere in the airplane.

Do not carry children in the baggage compartment.

SEATS, SEAT BELTS, AND SHOULDER HARNESSES

SEAT ADJUSTMENTS

To adjust either of the front seats, pull the release knob located below the left forward seat corner (pull to the right, then up) and slide the seat forward or aft as desired. Make certain the seat is locked securely in place after adjustment. The backs of the first, second and optional split third and fourth seats can be placed in any of four positions. The 5th and 6th bench-type children's seat is not adjustable. Outboard armrests for the front seats are attached to the cabin doors.

SEAT BELTS

All seats are provided with seat belts having a lever-action, quick-release, metal buckle. The seat belt length is adjustable. Holding the buckle at a right angle to the belt releases the binding action, allowing the belt to slip.

SHOULDER HARNESS

The shoulder harness installation is standard for both the pilot and the copilot seats. An inertia reel is located under the inboard side of the seat with a single strap. The strap is extended over the chest and shoulder and secured with a button type hook in the sidewall just aft of the upper cabin door corner. The spring loading at the inertia reel keeps the strap snug but will allow normal movement required during flight operations. The inertia reel is designed with a locking device that will secure in the event of sudden forward movement or an impact action.

WARNING

The seat belt is independent of the shoulder harness. However, the shoulder harness may be used only when the seat belt is fastened.

Occupants shorter than 4'7" are not to use shoulder harness.

DOORS AND EXITS

FORWARD CABIN DOORS

The airplane has a conventional cabin door on each side of the fuselage adjacent to the forward seats. The outside cabin door handle is spring-loaded to fit into a recess in the door. The door may be locked with a key. To open the door from the outside, lift the handle from its recess and pull until the door opens. To close the cabin door from the inside, grasp the armrest attached to the door and firmly pull the door closed. Opening the storm window will alleviate pressure inside the cabin as the door is being closed. Press firmly outward at the aft edge 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, lift the door release handle and pull until the door latch releases.

AFT UTILITY DOOR

A utility door, aft of the cabin door on the left side of the fuselage, is provided for loading cargo or passengers into the aft cabin. To open the door from the outside, grasp the flush handle and pull until the door opens. To open from the inside, (serials MC-427 and after and on MC-181 thru MC-426 after compliance with the latest revision of Beechcraft S.I. No. 0793-106) pull out on the pin adjacent to the door handle and rotate handle counterclockwise until door opens. This door can be locked with a key.

EMERGENCY EXITS

An emergency exit can be accomplished through any of the three doors.

CONTROL LOCK

A control lock is provided with the loose tools, to prevent movement of the control column and impairs access to the magneto/start switch.

To install the Control Lock:

1. Level the control wheel and move control column so the holes in the control column hanger and control column will align to accept the pin.
2. Push the control column lock pin through the hole provided in the control column hanger and into the hole in the underside of the control column tube assembly.
3. Ensure positive retention of the lock pin by positioning the hook over the control column.

WARNING

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

ENGINE

The BEECHCRAFT Sierra 200 B24R is powered by a Lycoming IO-360-A1B6 four-cylinder, horizontally opposed fuel injected engine, rated at 200 horsepower.

Normal operating engine speed range is 2200 to 2700 rpm.

ENGINE CONTROLS

The control levers are grouped along the upper face of the quadrant. Pushing forward on a control increases, while pulling back decreases the control's appropriate function. Their knobs are shaped to government standard configuration so they can be identified by touch. The controls are centrally located for ease of operation from either the left or right seats. A single controllable friction lock on the right side of the console permits manual adjusting of the pressure on the levers.

ENGINE INSTRUMENTS

The engine instrument cluster is located on the lower left subpanel and includes the left fuel quantity indicator, an ammeter, oil temperature, oil pressure and the right fuel quantity indicator. The tachometer and the manifold pressure/fuel flow indicators are located on the upper center of the instrument panel.

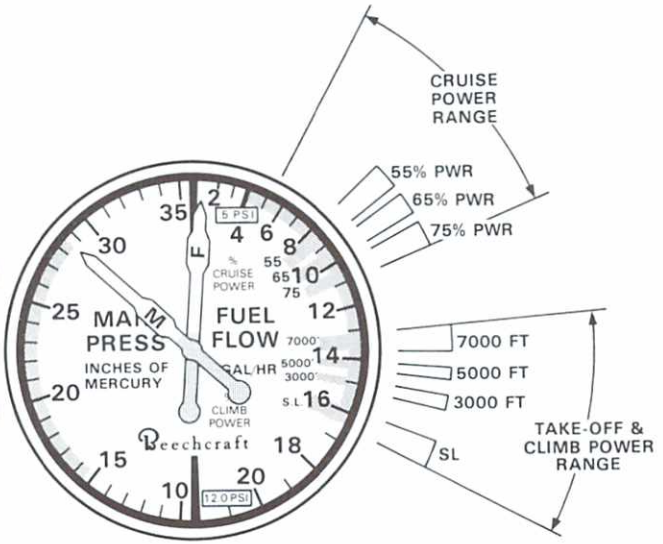
MANIFOLD PRESSURE AND FUEL FLOW INDICATOR

The manifold pressure portion of this 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 gage and adjusting the propeller and throttle controls, the power output of the engine can be adjusted to any of the power settings designated in the Cruise Power Setting tables in the PERFORMANCE Section.

The fuel flow portion of the indicator is calibrated in gallons per hour, the green arc indicating fuel flow for normal operating limits. Red radials are placed at the minimum and maximum allowable fuel pressures, as indicated at the fuel injection manifold valve.

In the cruise power range the green sectors cover the fuel flow required from 55% to 75% power. The lowest value of a given sector is the lean limit 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 full power markings represent the maximum performance mixtures for the altitudes shown, permitting leaning of the mixture for maximum power and performance during high-altitude takeoffs and full-power climbs.



EXHAUST GAS TEMPERATURE INDICATOR (EGT)

This installation provides for sensitive and rapid indication of exhaust gas temperature to assist in adjusting the fuel/air mixture during cruise.

ENGINE BREAK-IN INFORMATION

New engines have been carefully run-in by the engine manufacturer. However, the engine should be operated on straight mineral oil for a minimum of 50 hours or until oil consumption stabilizes. After the first 25 hours of operation, drain and replace the mineral oil. A change to an approved engine oil should be made after the break-in period. Refer to Lycoming Engine Operator's Manual.

NOTE

In order to promote proper ring seating, cruise power settings of 65% to 75% should be used until a total of 50 hours has accumulated or until oil consumption has stabilized. This recommendation is applicable to in-service engines following cylinder replacement or top-overhaul of one or more cylinders, as well as to new engines.

COWLING

The cowling is the split-type and is removable to expose the engine and mount assemblies.

LUBRICATION SYSTEM

The engine oil system is the wet-sump type and has an 8-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.

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.

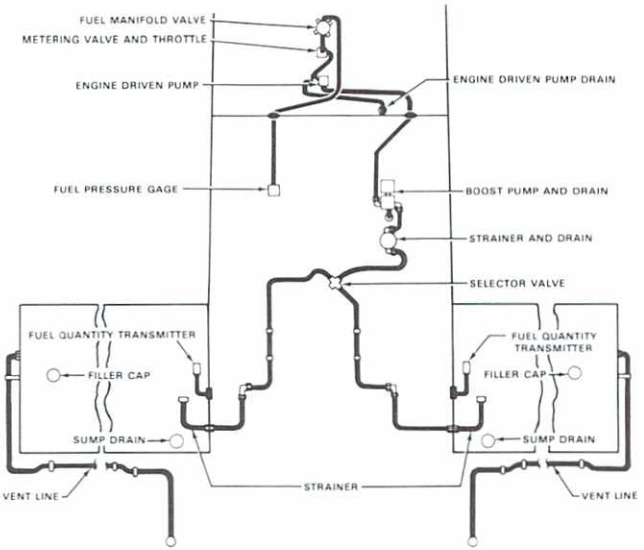
STARTER

The starter is relay-controlled and is actuated by a rotary type, momentary-on switch incorporated in the Magneto/Start switch. The magneto/start switch, located on the subpanel to the left of the pilot's control column, incorporates R (right), L (left), and BOTH magneto positions in addition to the normal OFF and START positions. After activation of the starter, the spring loaded switch returns to the BOTH position when released.

PROPELLER

Installed as standard equipment is a constant-speed, variable-pitch, 74-inch diameter propeller with two aluminum alloy blades. The pitch setting at the 30-inch station is 14.4° ±.2° low and 29° ± 2° high pitch. Normal operating range is 2200 to 2700 rpm.

Propeller rpm is controlled by a single-action, engine-driven propeller governor which regulates hydraulic oil pressure to the hub. The propeller control on the power quadrant allows the pilot to select the governor's rpm range. Governor-boosted oil pressure holds the propeller blades in a high pitch (low rpm) position during normal cruise operation. If oil pressure is lost, the propeller will go to the full high rpm (low pitch) position.



FUEL SYSTEM SCHEMATIC

FUEL SYSTEM

The airplane is designed for operation on 100 (Green) or 100LL (Blue) grade aviation gasoline.

FUEL TANKS

Fuel tanks located in each wing leading edge have a nominal capacity of 29.9 gallons. In the filler neck of each tank is a visual measuring tab which permits partial filling of the fuel system. When the fuel touches the bottom of the tab it indicates 15 gallons of fuel, and when filled to the slot in the tab it indicates 20 gallons of fuel. The indicating

system reads full at 20 gallons. The pilot must visually check the fuel level during preflight to ascertain desired level. Fuel is fed from the desired tank through a fuel selector valve in the center floorboard and then through a strainer to the engine-driven fuel pump.

FUEL QUANTITY INDICATORS

Fuel quantity is measured by a float operated sensor, located in each wing tank system. These transmit electrical signals that indicate fuel remaining in each tank. The indicators indicate full when 20 or more gallons are in each wing tank.

FUEL BOOST PUMP

The electric fuel boost pump, controlled by an ON-OFF toggle switch on the pilot's subpanel, provides pressure for starting and emergency operation. The fuel boost pump provides sufficient pressure for engine operation, should the engine-driven pump fail.

FUEL TANK SELECTION

The fuel selector valve handle is located on the floorboards between the pilot and copilot seats. Takeoffs and landings should be made using the tank that is more nearly full.

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

FUEL REQUIRED FOR FLIGHT

It is the pilot's responsibility to ascertain that the fuel quantity indicators are functioning and maintaining a reasonable degree of accuracy, and to be certain of ample fuel for a flight. Takeoff is prohibited if the fuel quantity indicators do not indicate above the yellow arc. The caps should be removed and fuel quantity checked to give the pilot an indication of fuel on board. The airplane must be approximately level for visual inspection of the tank. Fuel should be added so that the amount of fuel will be not less than is required for takeoff. Plan for an ample margin of fuel for any flight.

ELECTRICAL SYSTEM

The system circuitry is the single-wire, ground-return type, with the airplane structure used as the ground return. The BATTERY & ALT, ALT, FUEL BOOST, and magneto/start switches are located on the left subpanel. The circuit breaker panel, located on the right subpanel, contains the protective circuit-breakers for the various electrical systems. Some switch-type circuit breakers are located on the left subpanel.

In addition, there is an in-line fuse in the rotating beacon wire and in the strobe light wire forward of the left subpanel, with spare fuses adjacent to the fuse holder.

BATTERY

A 12-volt battery is located in the aft fuselage. Battery servicing procedures are described in the HANDLING, SERVICING AND MAINTENANCE Section.

ALTERNATOR

The alternator maintains its full-rated 60-ampere output at cruise engine rpm, and uses a voltage regulator to adjust alternator output.

Since the alternator is not self-exciting, dual switches are required to activate the circuit. The switch placarded BATTERY & ALT, when placed in the ON position, will only activate the battery circuit. When this switch is on and the ALT switch is placed in the ON position, the alternator is excited by power from the airplane battery. When the BATTERY & ALT switch is in the OFF position, the alternator will be off regardless of the ALT switch position.

The alternator-field circuit breaker and alternator-output circuit breaker are located on the right subpanel.

CAUTION

Do not pull alternator circuit breaker to turn off electrical system except in an emergency.

The alternator output is controlled by a regulator to keep the battery in a fully charged condition. Monitoring the ammeter for proper operation of the alternator is the same as for a generator installation. A zero reading, which is normal in cruising flight, indicates that the battery is fully charged and that the alternator output has been adjusted by the voltage regulator to balance the load of the electrical equipment in use.

Should an alternator or regulator become inoperative, indicated by a heavy discharging or widely fluctuating ammeter indication, turn the ALT switch to OFF, and minimize the electrical current consumption, since only battery power is available. Have the difficulty corrected before the next flight.

Refer to HANDLING, SERVICING AND MAINTENANCE Section for minor maintenance of the alternator.

EXTERNAL POWER RECEPTACLE (OPTIONAL)

An external power receptacle kit, which consists of a built in receptacle at the aft cabin bulkhead of the airplane and a power cable with a plug to fit the receptacle, is offered for the convenience of the operator. The cable is designed to be used with an auxiliary power unit or any acceptable power source to aid in starting in cold weather or with a low battery. When auxiliary power is desired, connect the clamps of the cable to the remote power source, ensuring proper polarity. Turn on the airplane BATTERY & ALT switch. Turn off the ALT switch and make certain that all avionics equipment is off. Insert the power cable plug into the receptacle and start the airplane using normal starting procedures.

NOTE

If the external power cable supplied with the kit, is not available, check the polarity and connect the positive lead from the external power source to the positive battery terminal and the negative lead to the negative battery terminal.

LIGHTING SYSTEMS

INTERIOR LIGHTING

Lighting for the instrument panel is controlled by a rheostat switch located on the pilot's subpanel to the left of the control column. The cabin dome light is operated by an ON-OFF switch adjacent to the light. The overhead instrument lighting and the map light are controlled by a rheostat switch located on the pedestal, below the power quadrant.

EXTERIOR LIGHTING

The switches for all of the exterior lights are located on the pilot's left subpanel. Each circuit is protected by a circuit breaker switch, circuit breaker, or fuse. The exterior lights consist of navigation lights on the wing tips and rudder, a landing light on the left outboard wing, an optional taxi light on each wing leading edge, and a rotating beacon located on top of the vertical stabilizer. The landing light can be used for approach and taxiing. For longer lamp life, use the landing light and taxi light sparingly; avoid prolonged operation which could cause overheating during ground maneuvering.

NOTE

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

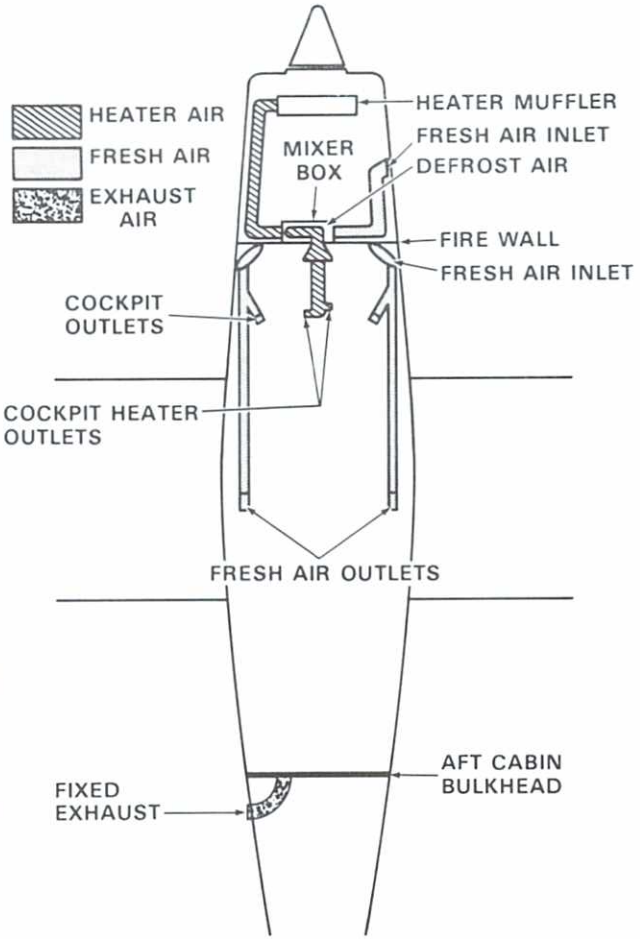
ENVIRONMENTAL SYSTEMS

CABIN HEATING

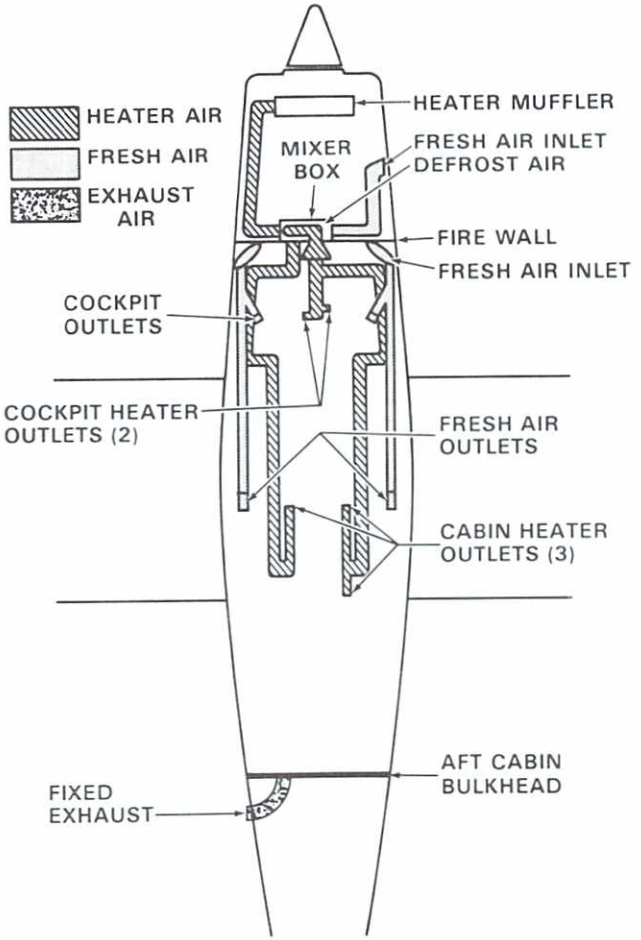
Air for warming the cabin and defrosting the windshield enters through an intake on the forward engine baffle, passes through the heater and into a mixer box where it is blended with cold air to obtain the desired cabin temperature. Hot or cold air enters the cabin through the firewall outlets. The knob marked CABIN AIR regulates the quantity of air entering the cabin through these outlets. With the CABIN AIR knob in, pull out the CABIN HEAT knob for heated air and push it in for fresh air. See the following environmental schematics for number and location of cabin heat distribution outlets. Pull out the DEFROST knob for maximum defrost. Under extremely cold conditions, heating in the back seats can be improved by partially pulling the defrost knob.

VENTILATION

Fresh air for the cabin enters two grill type intakes immediately forward of the windshield. The air is ducted to four outlets, one on either side of the instrument panel and to one on either side of the rear seats. The flow of air is controlled by the rotation of these outlets.



ENVIRONMENTAL SCHEMATIC
(MC-152 thru MC-304 except MC-293)



ENVIRONMENTAL SCHEMATIC
(MC-293, MC-305 thru MC-451)

PITOT AND STATIC SYSTEMS

PITOT SYSTEM

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

PITOT HEAT (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.

NORMAL STATIC AIR SYSTEM

The normal static air system provides a source of static air to the flight instruments through a flush static fitting on each side of the aft fuselage. A union located inside a cover plate on the belly of the airplane provides a drain point to remove moisture from the system.

EMERGENCY STATIC AIR SYSTEM

An alternate (emergency) static air source may be installed to provide air for instrument operation should the normal static ports become blocked. The alternate source is installed on the pilot's lower left sidewall. Turning the red handle to the ON EMERGENCY position allows cabin air into the system. Refer to EMERGENCY PROCEDURES section for proper use of the system. For Airspeed Calibration and Altimeter Correction, refer to PERFORMANCE section.

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.

A suction gage indicates system vacuum in inches of mercury. This instrument is located on the pilot's side of the instrument panel. The vacuum should be maintained within the green arc for proper operation of the air-driven instruments.

STALL WARNING SYSTEM

A stall warning horn located in the overhead speaker console is factory set to sound a warning 5 to 7 mph above a stall condition and continues steadily as the airplane approaches a complete stall. The stall warning horn, triggered by a sensing vane on the leading edge of the left wing, is equally effective in all flight configurations and at all weights.

WARNING

With the BATTERY & ALT switch in the OFF position the stall warning horn is inoperative. Airplane certification requires the stall warning system to be on during flight except in emergency conditions as stated in Section III.

SECTION VIII

HANDLING, SERVICING AND MAINTENANCE

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

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 a question should arise concerning the care of the airplane, it should be directed to Beech Aircraft Corporation, Liberal Division, Box 300, Liberal, Kansas 67901. Correspondence should contain the airplane serial number, which may be found on the manufacturer's placard located on the fuselage at the inboard end of the right flap.

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

NOTE

Neither Service Publications, Reissues, nor Revisions are automatically provided to the holder of this handbook. For information on how to obtain "Revision Service" applicable to this handbook, consult any 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, inspect gear retract rods, gear doors and flaps for damage or distortion before the next flight.

PREVENTATIVE MAINTENANCE THAT MAY BE ACCOMPLISHED BY A CERTIFICATED PILOT

1. A certificated pilot may perform limited maintenance. Refer to 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 shows the minimum hangar clearances for a standard airplane. Allowances must be made for any special radio antennas and the possibility of an underinflated nose tire.

TOWING

CAUTION

Extreme care should be used when moving with power equipment. Should the nose gear be turned in excess of the red limit marks, there is a very good possibility the nose gear steering yoke and/or linkage may be damaged.

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

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

CAUTION

Do not exert force on the propeller or control surfaces. Do not place weight on the stabilator to raise the nose wheel. Do not attempt to tow the airplane backward by the tail tie-down ring.

PARKING

The parking brake push-pull control is located on the left side of the lower subpanel. To set the parking brakes, pull control out and depress the pilot's toe pedals until firm. Push the control in to release the brakes.

NOTE

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

CONTROL COLUMN LOCK PIN

1. Level the control wheel and move control column so the holes in the control column hanger and the control column will align to accept the pin.
2. Push the control column lock pin through the hole provided in the control column hanger and into the hole in the underside of the control column tube assembly.
3. Ensure positive retention of the lock pin by positioning the hook over the control column.

WARNING

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

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 may be installed at the rear tie-down lug, and a tie-down line attached to the nose gear.

JACKING

Raise the individual gear for wheel and tire removal with a scissors jack under the axle. Also, jack pads are installed to facilitate landing gear retraction checks. Refer to the BEECHCRAFT Shop Manual for proper procedures.

WARNING

DO NOT enter the airplane while the airplane is on a wheel jack.

The landing gear circuit breaker should be pulled and the Emergency Gear Extension Valve should be open to relieve pressure in the hydraulic system, in order to prevent inadvertent retraction of the landing gear when an airplane is jacked.

FLYABLE STORAGE - 7 TO 30 DAYS

MOORING

If the 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 lightly compress the nose gear and reduce the angle of attack of the wings. Attach a line to the nose gear for additional tie-down.

FUEL CELLS

Fill to capacity to minimize fuel vapor.

FLIGHT CONTROL SURFACES

Lock with internal locks.

GROUNDING

Static ground airplane securely and effectively.

PITOT TUBE

Install cover.

WINDSHIELD AND WINDOWS

Close window vent.

DURING FLYABLE STORAGE

In a favorable atmospheric environment the engine of an airplane that is flown intermittently can be adequately protected from corrosion by turning the engine over five revolutions by means of the propeller. This will dispel any beads of moisture that may have accummulated and spread the residual lubricating oil around the cylinder walls. Unless the airplane is flown, repeat this procedure every five days.

WARNING

Be sure the ignition switch is "OFF", the throttle closed, and mixture control in the idle cut-off position before turning the propeller. Do not stand in the path of propeller blades. Also, ground running the engine for brief periods of time is not a substitute for turning the engine over by hand; in fact, the practice of ground running will tend to aggravate rather than minimize corrosion formation in the engine.

After 30 days, the airplane should be flown for 30 minutes or a ground runup should be made long enough to produce an oil temperature within the lower green arc range. Excessive ground runup should be avoided.

PREPARATION FOR SERVICE

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

Preflight the airplane.

PROLONGED OUT OF SERVICE CARE

The storage procedures listed are intended to protect the airplane from deterioration while it is not in use. The primary objectives of these measures are to prevent corrosion and damage from exposure to the elements.

If the airplane is to be stored longer than 30 days refer to the appropriate airplane shop manual and Avco Lycoming Service Letter L180 or subsequent.

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 BATT & ALT switch is ON, the ALT switch and 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 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 TANKS

See Consumable Materials for recommended fuel grades.

CAUTION

See Avco Lycoming Service Letter No. L185A or later revision for operation on alternate fuels.

Two 29.9 gallon fuel tanks are located in the wings just outboard of the wing root. A visual measuring tab located below the tank filler neck facilitates a fuel load of 15 gallons when the fuel reaches the bottom of the tab, or 20 gallons when the fuel reaches the top of the slot. This partial filling of the fuel tanks allows an increase in the payload. The fuel indicators on the instrument panel will indicate full tanks even though each tank contains only 20 gallons of fuel.

CAUTION

Connect a grounding cable from the fuel service unit to the airframe, and connect grounding cables from both the fuel service unit and the airplane to ground during fueling operations. This procedure reduces fire hazard.

FUEL DRAINS

Open each of the fuel drain valves daily to remove any condensation from the system. The two tank sump drains extend through the bottom of the wing skins, near the fuselage.

The system low spot drain is incorporated in the fuel strainer on the lower right side of the fuselage aft of the nose wheel.

Inspection and cleaning of the fuel strainers should be considered of the utmost importance as a regular part of preventive maintenance. The following inspection and cleaning intervals are recommendations only, since the frequency will depend upon service conditions and fuel handling cleanliness. When operating in localities where there is an excessive amount of sand or dirt, the strainers should be inspected at more frequent intervals.

The screen in the fuel strainer at the system low spot on the bottom of the fuselage should be removed and washed in fresh cleaning solvent at each 100-hour inspection of the airplane. Ordinarily, the finger strainers in the fuel tank outlets should not require cleaning unless there is a definite indication of solid foreign material in the tanks, or the airplane has been stored for an extended period.

After the fuel strainers have been reinstalled, the installations should be checked for leakage. Any fuel lines or fittings disconnected for maintenance purposes should be capped.

Frequently inspect the O-rings on the fuel filler caps for condition. Replace as required to prevent contamination of the fuel from precipitation.

OIL SYSTEM

CAUTION

During break-in periods on new engines, oil consumption tends to be higher, therefore, maximum range flights should be avoided and oil level brought to full after each flight during this period.

Check engine oil quantity before each flight. Under normal operating conditions, the oil should be changed after each 50 hours of engine operation. More frequent changes may be required under adverse operating conditions. Use engine oil as indicated in Consumable Materials in this section. The engine oil sump capacity is eight quarts. The normal operating range is six to eight quarts.

RECOMMENDED OIL GRADES FOR ENGINES

Average Ambient Air Temperature	MIL-L-6082 Grades	MIL-L-22851 Ashless Dispersant Grades
Above 60° F	SAE 50	SAE 40 or SAE 50
30° F to 90° F	SAE 40	SAE 40
0° F to 70° F	SAE 30	SAE 40 or SAE 30
Below 10° F	SAE 20	SAE 30

BATTERY

A 12-volt, 25 amp-hour, lead-acid battery, located directly aft of the cabin area may be reached by removing the rear panel.

Check the battery regularly for fluid level and add distilled water as required. Clean, tight connections should be maintained at all times. Battery vents should be checked periodically for obstructions and for proper protrusion (3 inches from top of chamfer to skin line). The intake vent is chamfered forward and the exhaust vent is chamfered aft.

External power should be used for checking airplane electrical systems to prevent excess battery power loss, and for starting the engine during cold weather when more power is needed for cranking. Charging batteries in the airplane is discouraged. If the battery is low and needs charging and servicing, it should be removed from the airplane and serviced and charged in the manner prescribed in the shop manual.

WARNING

Always connect charging cables at the battery terminals first, then to the charging unit, to avoid sparks near the battery fumes since explosion could occur.

TIRES

The airplane is equipped with tube type tires. Inflate the 17.50 x 6.00-6 main gear tires to 32 psi and the 14.20 x 5.00-5 nose gear tire to 35 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 retract mechanism, or jamming of the tire in the wheel well.

SHIMMY DAMPER

A hydraulic shimmy damper is mounted on the nose wheel strut yoke. Whenever this component develops an external leak or a skip in the damping action, it should be replaced.

BRAKES

The brake hydraulic fluid reservoir is located on the firewall in the engine compartment. Refer to Consumable Materials in this section for hydraulic fluid specification.

Since the pistons move to compensate for lining wear, the brakes require no adjustment. Complete information on brake, wheel, and tire maintenance is contained in the appropriate manual included in the loose tools and accessories kit.

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 filter retaining screws.
2. Remove the filter.
3. Clean and service as described in the manufacturer's instructions on the filter.
4. Reinstall the filter.
5. Reinstall retaining screws. Tighten screws to assure that the filter is secure.

VACUUM SYSTEM

The foam rubber suction relief valve screen may be removed for cleaning by slipping it off the bottom of the valve. The screen may be cleaned with soap and water.

In addition, the airplane is equipped with a replaceable paper filter, mounted under the instrument panel on the upper left side of the firewall.

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 doors, the seals should be coated with Oakite 6 compound or powdered soapstone or equivalent.

ALTERNATOR

Since the alternator 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 alternator are the same.

2. When connecting a booster battery, be sure to connect the negative battery terminals together and the positive battery terminals together.

3. When using a battery charger, connect the positive lead of the charger to the positive battery terminal and the negative lead of the charger to the negative battery terminal.

4. Do not operate an alternator on open circuit. Be sure all circuit connections are secure.

5. Do not short across or ground any of the terminals on the alternator or voltage regulator.

6. Do not attempt to polarize an alternator.

MAGNETOS

Ordinarily, the magnetos will require only occasional adjustment, lubrication, and breaker point replacement. This work should be done by a BEECHCRAFT Aero or Aviation Center or International Distributor or Dealer.

WARNING

To be safe, treat the magnetos as hot whenever a switch lead is disconnected at any point; they do not have an internal automatic grounding device. The magnetos can be grounded by replacing the switch lead at the noise filter capacitor with a wire which is grounded to the engine case. Otherwise, all spark plug leads should be disconnected or the cable outlet plate on the rear of the magneto should be removed.

CLEANING

EXTERIOR PAINT FINISHES

In the standard configuration the airplane is painted with a lacquer paint finish. Optional urethane paint finishes are available.

LACQUER PAINT FINISHES

Because wax seals the paint from the outside air, a new lacquer paint finish should not be waxed for a period of 90 days to allow the paint to cure. Wash uncured painted surfaces with only cold or lukewarm (never hot) water and a mild non-detergent soap. Any rubbing of the painted surface should be done gently and held to a minimum to avoid cracking the paint film.

CAUTION

When washing the airplane with mild soap and water, use special care to avoid washing away grease from any lubricated area. After washing with solvent, lubricate all lubrication points. Premature wear of lubricated surfaces may result if the above precautions are not taken.

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 the static air buttons before washing or waxing.

After the paint cures, a thorough waxing will protect painted and unpainted metal surfaces from a variety of highly corrosive elements. Flush loose dirt away first with clear water, then wash the airplane with a mild soap and

water. Harsh, abrasive, or alkaline soaps or detergents should never be used. Use a soft cleaning cloth or chamois to prevent scratches when cleaning and polishing. Any good grade automobile wax may be used to preserve painted surfaces. To remove stubborn oil and grease, use a soft cloth dampened with naptha. After cleaning with naptha, the surface should be polished or waxed.

URETHANE PAINT FINISHES

The same procedures should be followed for cleaning urethane paint finishes as for lacquer paint finishes; however, urethane paint finishes are fully cured at the time of delivery.

WINDSHIELD AND WINDOWS

Exercise extreme care to prevent scratches when cleaning the Plexiglas windshield and windows. Never wipe them when dry. Flush the surface with clean water or a mild soap solution, then rub lightly with a grit-free soft cloth, sponge, or chamois. Use trisodium phosphate completely dissolved in water to remove oil and grease film. To remove stubborn grease and oil deposits, use hexane, aliphatic naptha, or methanol. Rinse with clean water; avoid prolonged rubbing.

CAUTION

Do not use gasoline, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, deice fluid, or lacquer thinners on the windshield or windows, as these substances have a tendency to soften and craze the surface.

INTERIOR

The seats, rugs, upholstery panels, and headliner should be vacuum-cleaned frequently. Do not use water to clean fabric surfaces. Commercial foam-type cleaners or shampoos can be used to clean rugs, fabrics, and upholstery; however, the instructions on the container should be followed carefully.

Some plastic interior trim may be affected by ultra-violet rays from the sun over a period of time. The results of this exposure is a yellow stain that accumulates on the plastic.

It has been found that a commercial type scouring powder cleanser, used with a wet cloth, will successfully remove this stain without damaging the trim.

It must be noted that this type cleanser contains a high bleach content and should not be allowed to come in contact with any other interior material.

ENGINE

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

LUBRICATION

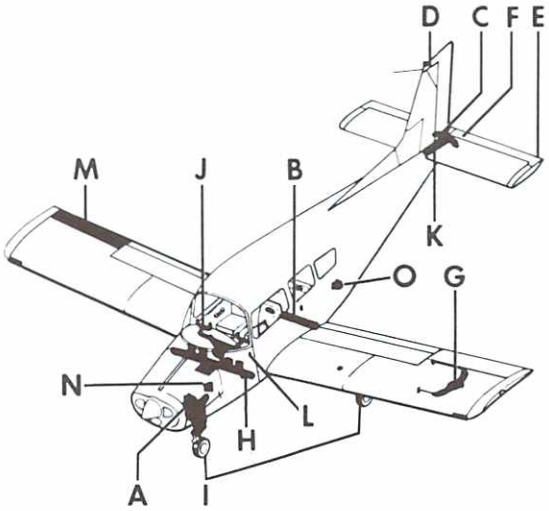
Proper lubrication is essential in keeping the airplane components in top condition. If this operation is performed thoroughly, general maintenance will be reduced and the service life of the airplane will be greatly increased.

The grease fittings or parts must be wiped clean to make sure that no dirt is carried into the part when lubricated. Apply lubricant sparingly, but with assurance that the bearing surfaces are adequately covered. Wipe off excess lubricant to prevent the accumulation of dust and foreign material.

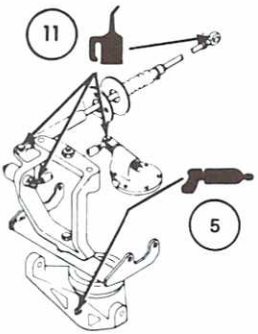
NOTE

Lubricate all pivotal points as shown on the Lubrication Diagram in the Shop Manual to ensure freedom of movement and proper functioning. More frequent lubrication may be required because of climate, or frequent usage of the airplane.

LUBRICATION POINTS

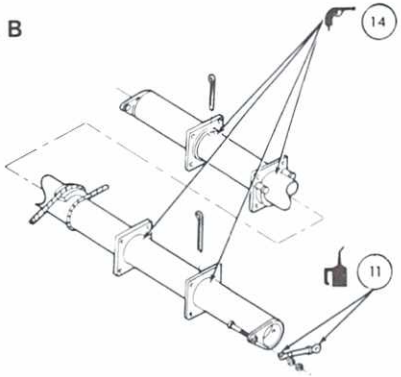


DETAIL A



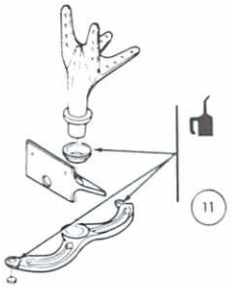
NOSE GEAR STEERING

DETAIL B



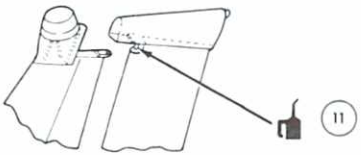
FLAP MECHANISM

DETAIL C



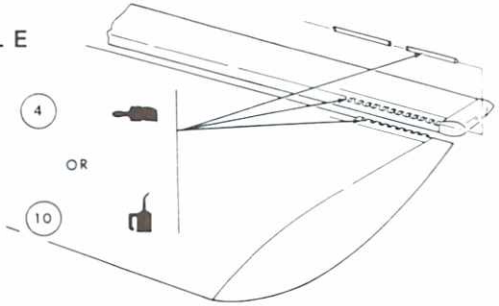
RUDDER BELLCRANK

DETAIL D



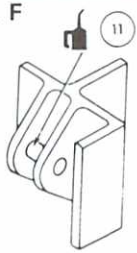
RUDDER HINGE

DETAIL E



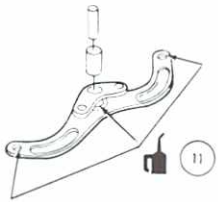
ELEVATOR HINGE

DETAIL F



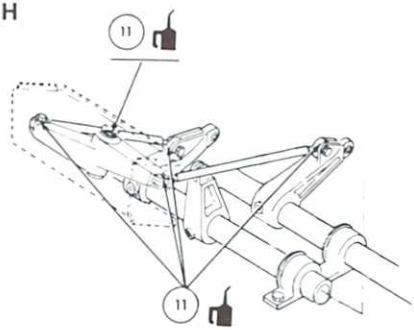
STABILATOR HINGE BRACKET

DETAIL G



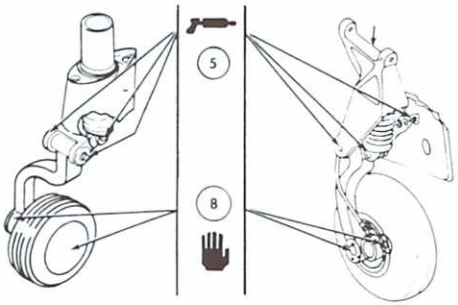
AILERON BELLCRANK

DETAIL H



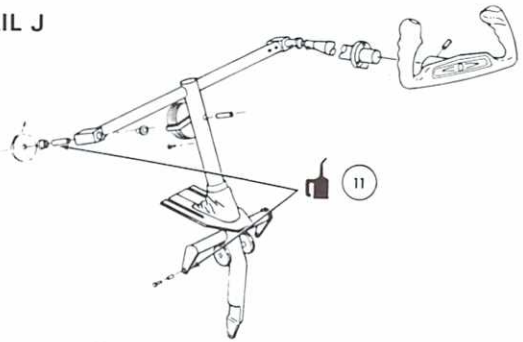
RUDDER PEDALS

DETAIL I



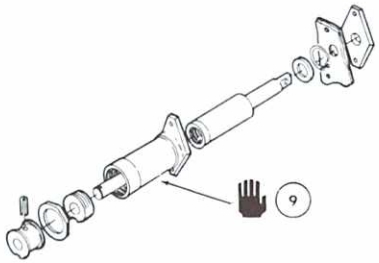
LANDING GEAR

DETAIL J



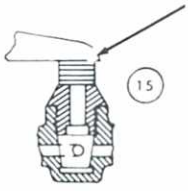
CONTROL COLUMN LINKAGE

DETAIL K



TRIM TAB ACTUATOR

DETAIL L



MC-152 thru MC-180

This screw must be completely tight to prevent binding.

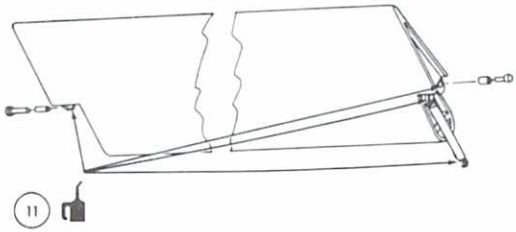
LOOSEN NUT, REMOVE VALVE CONE, AND LUBRICATE CONE WITH VERY THIN COATING OF LUBRICANT.

NOTE: MC-181 and after and airplanes having complied with BEECHCRAFT S.I. No. 0622-289 or S.I. No. 0838 need no lubrication.

NOTE: DO NOT OVER LUBRICATE VALVE CONE, APPLY MINIMUM AMOUNT OF LUBRICANT FOR COATING.

FUEL SELECTOR VALVE

DETAIL M



AILERON HINGE AND ROD ENDS

DETAIL N

BRAKE FLUID RESERVOIR

DETAIL O

LANDING GEAR RESERVOIR

NOTE

Numbers refer to items in the consumable materials chart. Lubricate all plain bearing bushings as required or every 500 hours with SAE No. 30 oil. Apply SAE No. 20 oil to push-pull control housings as required. Lubricate flight control pully bushings with SAE No. 30 oil every 1000 hours.

SAE 10w/30 oil is an acceptable replacement for SAE 20 or SAE 30 oil.

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 right side of engine	1
	Drain fuel tank drains	Inboard bottom of wings	-
	Drain fuel system low spot	Bottom of fuselage	-
	Service fuel tanks	Top of wings	3
25 Hrs.	Check battery electrolyte	Behind aft cabin bulkhead	See Shop Manual
	Clean induction air filter	In lower forward cowl	-
	Lubricate landing gear knee pins	On landing gear (I)	5
50 Hrs.	Change engine oil	Lower side of engine	1
	Clean oil screens	Aft right side of accessory case and bottom of sump	2
	Central brake reservoir	On firewall (N)	7
	Hydraulic gear pump reservoir	Aft of rear seat bulkhead (O)	7

100 Hrs.	Clean fuel system screens and strainers	Bottom of wings and fuselage	2
	Clean suction relief valve screen	Forward of firewall	-
	Lubricate wheel bearings	Landing gear (I)	8
	Lubricate nose gear rod end bearings	On top of nose gear (A)	11
	Lubricate nose gear swivel	On aft side of nose gear (A)	5
	Lubricate flap torque tubes	Under floorboards (B)	14
	Lubricate flap rod end bearings	Inboard end of flaps (B)	11
	Lubricate rudder bellcrank pivot points	Bottom of rudder (C)	11
	Lubricate rudder hinges	On rudder leading edge (D)	11
	Lubricate stabilator trim tab hinge and pin	On trailing edge of stabilator (E)	4, 10
	Lubricate stabilator hinge pivot point	In aft tail section (F)	11
	Lubricate aileron bellcrank	In wing forward of aileron (G)	11
	Lubricate aileron pivotal points and rod ends	Outboard trailing edge of wings (M)	11

RECOMMENDED SERVICING SCHEDULE

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	LUBRICANT (Number refers to item on Consumable Materials)
300 Hrs.	Replace induction air filter	In front nose cowl	-
500 Hrs.	Lubricate rudder pedal bellcrank	Forward cabin floor (H)	11
	Lubricate rudder pedal rod ends	Forward cabin floor (H)	11
	Replace gyro instrument central filter	Behind instrument panel	-
	Check gear motor brushes	Aft fuselage	-
1000 Hrs.	Lubricate control column pivot points	Behind instrument panel (J)	11
1200 Hrs.	Lubricate trim tab actuator	In aft tail section (K)	9

As Req.	Fuel selector valve Clean spark plugs	Center floorboard (L) In engine compartment	15 -
Per Applicable FAR	Replace Emergency Locator Transmitter Battery	-	-

NOTES:

1. Anytime the control surfaces are altered, repaired, or repainted, they must be rebalanced per the Shop Manual.

2. Non-rechargeable Batteries: Replace after one cumulative hour or as noted on the battery.

CONSUMABLE MATERIALS

ITEM	MATERIAL	SPECIFICATION
*1.	Engine Oil	MIL-L-22851
2.	Solvent	PD680
**3.	Fuel, Engine	100 (green) or 100LL (blue) Grade
***4.	Lubricant, Powdered Graphite	MIL-C-6711
†5.	Grease (High & Low Temperature)	Aero Lubriplate
6.	Corrosion Preventive, Engine	MIL-C-6529
7.	Hydraulic Fluid	MIL-H-5606
††8.	Grease (General Purpose, Wide Temperature)	MIL-G-81322
††9.	Grease (High & Low Temperature)	MIL-G-23827
10.	Lubricating Oil (Low Temperature)	MIL-L-7870
11.	Lubricating Oil	SAE No. 20 or 10W/30
12.	Lubricating Oil	SAE No. 30 or 10W/30
†††13.	Lubricant, Rubber Seal	Oakite 6 Compound

ITEM	MATERIAL	SPECIFICATION
††††14.	Lubricant, Silicone Spray	Krylon No. 1329 (or equivalent)
15.	Lubricant, Fluorosilicone	Corning FS-1292
•16.	Engine Fuel Additive	Alcor TCP Concentrate

* Ashless dispersant oil complying with MIL-L-22851 is recommended after the oil consumption has stabilized or after the first 50 hours of operation. A straight mineral oil conforming to MIL-L-6082 may be used until the oil consumption has stabilized. Oil of seasonal viscosity, added to maintain the proper oil level during this break-in period, must comply with MIL-L-6082.

** If grade 100 (green) fuel is not available, use 100LL (blue).

*** Mix with quick-evaporating liquid naphtha and apply with a brush.

† Product of BRC Bearing Company, Wichita, Kansas.

†† In extremely cold climates, MIL-G-23827 grease should be used in place of MIL-G-81322 grease. Care should be exercised when using either MIL-G-81322 or MIL-G-23827 grease, as they contain a rust-preventing additive which is harmful to paint.

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

†††† Product of Krylon Inc., Norristown, Pa.

• Alcor TCP Concentrate mixed according to the instructions provided by Alcor Inc., Alcor Inc. 10130 Jones-Maltsberger Road P.O. Box 32516 San Antonio, Texas 78284.

APPROVED ENGINE OILS

COMPANY	BRAND NAME
Delta Petroleum Co., Inc.	*Global Concentrate A
Enjay Chemical Company	*Paranox 160 and 165
Mobil Oil Corporation	*RT-451, RM-173E, RM-180E
Shell Oil Company	*Shell Concentrate A - Code 60068 *Aeroshell W120 *Aeroshell W80
Texaco Incorporated	*TX-6309 *Aircraft Engine Oil Premium AD120 *Aircraft Engine Oil Premium AD80
American Oil and Supply Co.	*PQ Aviation Lubricant 753
Chevron Oil Company	*Chevron Aero Oil Grade 120
Humble Oil and Refining Co.	*Esso Aviation Oil E-120 *Enco Aviation Oil E-120 *Esso Aviation Oil A-100 *Enco Aviation Oil A-100 *Esso Aviation Oil E-80 *Enco Aviation Oil E-80
Standard Oil Company of California	*Chevron Aero Oil Grade 120

COMPANY	BRAND NAME
Castrol Oils, Canada Ltd.	**Castrolaero 113, Grade 1065 **Castrolaero 117, Grade 1100
Champlin Oil and Refining Co.	**Grade 1065 **Grade 1100
Chevron Oil Company	**Chevron Aviation Oil 65 **Grade 1100
Continental Oil Company	**Conoco Aero Oil 1065 **Conoco Aero Oil 1100
Mobil Oil Corporation	**Avrex 101/1065 **101/1100
Phillips Petroleum Co.	**Phillips 66 Aviation Engine Oil, Grade 1065 **Phillips 66 Aviation Engine Oil, Grade 1100
Shell Oil Company	**Aeroshell Oil 65 **Aeroshell Oil 100

* Ashless Dispersant Oils Complying with MIL-L-22851

NOTE

Ashless dispersant oil complying with MIL-L-22851 is recommended after the oil consumption has stabilized or after the first 50 hours of operation.

** Straight Mineral Oils Complying with MIL-L-6082

NOTE

A straight mineral oil conforming to MIL-L-6082 may be used until the oil consumption has stabilized. Oil of seasonal viscosity, added to maintain the proper oil level during this break-in period, must comply with MIL-L-6082.

Vendors listed as meeting Federal and Military Specifications are provided as reference only and are not specifically recommended by Beech Aircraft Corporation. Any product conforming to the specification may be used.

BULB REPLACEMENT GUIDE

LOCATION	NUMBER
Compass light	330
Dome light, cabin	89
Instrument flood light, overhead	89
Landing light, wing	4313
Navigation light, tail cone	1777
Navigation light, wing	1512
Rotating beacon	WRM-44K or WRM-1940
Taxi light	4595
Landing gear position light	330

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 shown, as the aforementioned factors cannot be controlled by the manufacturer.

COMPONENT	OVERHAUL OR REPLACE
LANDING GEAR	
Hydraulic Pump, Motor Assembly	On Condition
(Brushes)	Inspect every 500 hours Replace 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
Retract Actuators	On Condition
Shimmy Damper	On Condition
Wheels and Tires	On Condition
POWER PLANT	
Engine	Every 1600 hours
Engine Controls	On Condition
Engine Vibration Isolator Mounts	Engine change or on condition
Exhaust System	On Condition
Starter	Inspect at engine overhaul, overhaul or replace 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. Refer to Lycoming Engine Operator's Manual.

COMPONENT	OVERHAUL OR REPLACE
Alternator	On Condition
Oil Cooler	On Condition (replace when contaminated)
Propeller (Hartzell)	*At engine overhaul or at unscheduled engine change but not to exceed 1500 hours or 4 years.
Propeller controls	On condition
Propeller governor	At engine overhaul but not to exceed 1500 hours or 3 years
Engine Driven Fuel Pump	At engine overhaul or on condition
Cabin Heat Muff	Inspect every 100 hours
All Hose carrying flammable liquid	At engine overhaul or every 5 years. All other hoses on condition.
Vacuum System Filter	Every 300 Hours
Vacuum Regulator Valve	On Condition
Vacuum Pump	At engine overhaul or on condition.

*See Hartzell Service Letter 61F or subsequent.

FUEL SYSTEM

Fuel Boost Pump	On condition
All Hose carrying flammable liquid	At engine overhaul or every 5 years
All Hose not carrying flammable liquid	On Condition
Fuel Selector Valve	Inspect every 100 hours; overhaul on condition
Fuel Cell Drain Valve	On Condition
Wing Fuel Quantity Transmitters	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
Instrument Air	On Condition
Engine Indicator Units	On Condition
Airspeed Indicator	On Condition
Rate-of-Climb Indicator	On Condition
Fuel Quantity Indicator	On Condition
Manifold Pressure/ Fuel Flow Indicator	On Condition
Tachometer	On Condition
Free Air Temperature Indicator	On Condition
Flap Position Indicator	On Condition
ELECTRICAL SYSTEM	
Battery Master Relay	On Condition
All other Relays	On Condition
Voltage Regulator	On Condition
Starter Relay	On Condition
FLAPS AND FLIGHT CONTROLS	
Flight Controls	On Condition
Stabilator Tab Actuator	On Condition
Flap Motor and Actuator Drive Assembly	On Condition
Flap Motor Brushes	On Condition

COMPONENT	OVERHAUL OR REPLACE
MISCELLANEOUS	
Seat Belts and Shoulder Harness	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
Transponder	Test and inspect every 24 months

INSPECTIONS

The FAA requires that an airplane used for hire be inspected at each 100 hours of operation by qualified personnel. Airplanes which are not used for hire are required to have an inspection by qualified personnel on an annual basis.

Good operating practice requires that the airplane be preflighted prior to takeoff. Items found during preflight and engine run-up should be corrected on the basis of their importance to the safe operation of the airplane; however, in any event, early correction of items found is good preventative maintenance.

Although it is not a requirement that FAA qualified personnel change the oil and inspect the airplane, except at the 100-hour/annual inspection, as noted above, it is recommended the airplane be given an inspection at the recommended oil change period. Any unsatisfactory items should be corrected, either at that time or as soon as practical, depending on the nature of the item.

The inspection at the recommended oil change interval should include the following:

Operational Inspection

1. Alternator/voltage regulator functioning
2. Engine instruments
3. Flight instruments
4. Idle rpm and mixture
5. Engine controls operation
6. All lights
7. Radio operation
8. Magneto check
9. Brake operation
10. Tank selector operation
11. Heat and vent system operation
12. Starter operation
13. Electrical switches and circuit breakers
14. Power check 2650 to 2700 rpm static

Power Plant

1. Oil screens cleaned.
2. Induction air filter cleaned.
3. Check engine controls, wiring harness, and plumbing for clearance and security.
4. Check propeller for rock damage, and spinner and spinner bulkheads for cracks and security; engine for oil leaks.
5. Check engine baffles and cowling for cracks and security.
6. Check exhaust system and air ducts for condition and security.
7. Check for indications of oil leaks, condition and security of engine accessories.
8. Check brake system reservoir(s).
9. Clean and gap spark plugs.

Cabin and Aft Fuselage

1. Flight control operation through full travel and proper direction of travel.
2. Storm window and door operation.
3. Check interior furnishings and seat belts.
4. Check battery water level.
5. Check hydraulic pump reservoir.

Exterior

1. Check flight control surfaces for condition and security.
2. Check tires, brake pucks and discs.
3. Check static ports, pitot mast and fuel vent lines for obstructions.
4. Check general condition of fuselage and wings.

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SECTION IX

SUPPLEMENTS

NOTE

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

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PILOT'S OPERATING HANDBOOK
and
FAA APPROVED AIRPLANE FLIGHT MANUAL

LOG OF SUPPLEMENTS

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

Supp. No.	Part Number	Subject	Rev. No.	Date
1	169-590023-9	Certification in the United Kingdom		10/73

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BEECHCRAFT B24R LANDPLANES

SUPPLEMENTAL DATA

for

CERTIFICATION IN THE UNITED KINGDOM

The following information in this document is supplied to meet CAA requirements, for BEECHCRAFT B24R Landplane Certification in the United Kingdom in the General Purpose Category, Performance Group E.

Date: October 31, 1973
P/N 169-590023-9

NORMAL TAKE-OFF DISTANCE – HARD SURFACE
(UNITED KINGDOM)

ASSOCIATED CONDITIONS

POWER	2700 RPM, FULL THROTTLE
MIXTURE	LEAN TO FIELD ELEVATION
FLAPS	15°
GEAR	RETRACTED, AFTER LIFT OFF
RUNWAY	PAVED, LEVEL, DRY SURFACE
WEIGHT	2750 LBS
TAKE-OFF SPEEDS	LIFT-OFF: 71 MPH/62 KTS IAS 50 FT: 81 MPH/70 KTS IAS

NOTES:

1. FOR EACH 100 POUNDS BELOW 2750 LBS, REDUCE TABULATED DISTANCE BY 7% AND TAKE-OFF SPEED BY 1 MPH.
2. RATE OF CLIMB IS BASED ON OPERATION AT TAKE-OFF POWER, WITH GEAR DOWN AND AT TAKE-OFF SPEED.
3. WHERE TOTAL DISTANCE VALUE HAS BEEN DELETED, CLIMB PERFORMANCE AFTER LIFT-OFF IS LESS THAN 150 FPM.

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL			2000 FT			4000 FT			6000 FT			8000 FT		
	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	OAT °C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET
0	20	7	1003	1728	20	7	1172	2060	20	7	1374	2490	20	7	1614	3077	20	-7	1905	3981
	40	4	1087	1872	40	4	1269	2236	40	4	1485	2713	40	4	1744	3393	40	4	2056	4422
	60	16	1174	2022	60	16	1370	2422	60	16	1601	2959	60	16	1879	3755	60	16	2212	4890
	80	27	1265	2181	80	27	1474	2620	80	27	1721	3227	80	27	2017	4147	80	27	2372	----
	100	38	1359	2346	100	38	1590	2832	100	38	1845	3524	100	38	2160	4541	100	38	2538	----
15	20	7	781	1437	20	7	922	1727	20	7	1090	2106	20	7	1293	2626	20	-7	1539	3443
	40	4	851	1563	40	4	1003	1882	40	4	1185	2303	40	4	1403	2908	40	4	1669	3829
	60	16	924	1694	60	16	1088	2046	60	16	1283	2522	60	16	1518	3232	60	16	1803	4252
	80	27	1001	1833	80	27	1176	2221	80	27	1385	2760	80	27	1637	3583	80	27	1941	----
	100	38	1080	1979	100	38	1267	2409	100	38	1491	3025	100	38	1760	3937	100	38	2085	----
30	20	7	585	1145	20	7	699	1394	20	7	837	1721	20	7	1004	2175	20	-7	1209	2834
	40	4	642	1253	40	4	766	1527	40	4	916	1893	40	4	1097	2423	40	4	1319	3236
	60	16	702	1365	60	16	836	1669	60	16	997	2084	60	16	1194	2708	60	16	1432	3614
	80	27	765	1485	80	27	909	1821	80	27	1083	2293	80	27	1294	3018	80	27	1551	----
	100	38	830	1611	100	38	985	1985	100	38	1172	2525	100	38	1398	3332	100	38	1673	----

NOTE: INCREASE TOTAL DISTANCES OVER 50 FT. OBSTACLE BY 18% TO OBTAIN DISTANCES APPLICABLE TO A SHORT DRY GRASS SURFACE WITH FIRM SUBSOIL.

Date: October 31, 1973
P/N 169-590023-9

NORMAL CLIMB
(UNITED KINGDOM)

ASSOCIATED CONDITIONS:

POWER	2700 RPM, FULL THROTTLE
FLAPS	UP
GEAR	UP

WEIGHT POUNDS	SEA LEVEL				4000 FEET				8000 FEET				12000 FEET			
	OAT °F	OAT °C	R/C FT/MIN	CLIMB SPEED MPH/KTS	OAT °F	OAT °C	R/C FT/MIN	CLIMB SPEED MPH/KTS	OAT °F	OAT °C	R/C FT/MIN	CLIMB SPEED MPH/KTS	OAT °F	OAT °C	R/C FT/MIN	CLIMB SPEED MPH/KTS
2750	20	-7	988		20	-7	713		0	-18	494		0	-18	225	
	40	4	937		40	4	668		20	-7	447		20	-7	178	
	60	16	891	92/80	60	16	622	92/80	40	4	403	92/80	40	4	131	92/80
	80	27	846		80	27	578		60	16	360		60	16	88	
	100	38	804		100	38	536		80	27	317		80	27	47	
2600	20	-7	1101		20	-7	814		0	-18	586		0	-18	306	
	40	4	1048		40	4	767		20	-7	537		20	-7	258	
	60	16	999	91/79	60	16	720	91/79	40	4	491	91/79	40	4	209	91/79
	80	27	953		80	27	674		60	16	447		60	16	165	
	100	38	909		100	38	630		80	27	403		80	27	122	
2400	20	-7	1272		20	-7	966		0	-18	723		0	-18	426	
	40	4	1215		40	4	916		20	-7	671		20	-7	375	
	60	16	1163	89/77	60	16	865	89/77	40	4	623	89/77	40	4	324	89/77
	80	27	1114		80	27	817		60	16	576		60	16	278	
	100	38	1066		100	38	771		80	27	530		80	27	233	

NOTES: THE ABOVE NORMAL CLIMB DATA HAS BEEN FOUND SUBJECT TO A 70 FPM LOSS, WHICH IS DUE TO HIGH HUMIDITY AND/OR USE OF RICH MIXTURE. THIS FACTOR MUST BE TAKEN INTO ACCOUNT IN PLANNING PUBLIC TRANSPORT OPERATIONS, IN CONJUNCTION WITH THE AN(G)R'S. THE USE OF THIS FACTOR IS ALSO RECOMMENDED WHEN PLANNING OTHER FLIGHTS WITHIN THE UNITED KINGDOM.

SECTION X
SAFETY INFORMATION
TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

INTRODUCTION

Beech Aircraft Corporation has developed this special summary publication of safety information to refresh pilots' and owners' knowledge of safety related subjects. Topics in this publication are dealt with in more detail in FAA Advisory Circulars and other publications pertaining to the subject of safe flying.

The skilled pilot recognizes that safety consciousness is an integral - and never-ending - part of his or her job. Be thoroughly familiar with your airplane. Know its limitations and your own. Maintain your currency, or fly with a qualified instructor until you are current and proficient. Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action can be accomplished without reference to the manual. Periodically review this safety information as part of your recurrency training regimen.

BEECHCRAFT airplanes are designed and built to provide you with many years of safe and efficient transportation. By maintaining your BEECHCRAFT properly and flying it prudently you will realize its full potential.

. . . . . Beech Aircraft Corporation

WARNING

Because your aircraft is a high performance, high speed transportation vehicle, designed for operation in a three-dimensional environment, special safety precautions must be observed to reduce the risk of fatal or serious injuries to the pilot(s) and occupant(s).

It is mandatory that you fully understand the contents of this manual and the other manuals which accompany the aircraft; that FAA requirements for ratings, certifications and review be scrupulously complied with; and that you allow only persons who are properly licensed and rated, and thoroughly familiar with the contents of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual to operate the aircraft. IMPROPER OPERATION OR MAINTENANCE OF AN AIRCRAFT, NO MATTER HOW WELL BUILT INITIALLY, CAN RESULT IN CONSIDERABLE DAMAGE OR TOTAL DESTRUCTION OF THE AIRCRAFT ALONG WITH SERIOUS OR FATAL INJURIES TO ALL OCCUPANTS.

GENERAL

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

The following material in this Safety 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.

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

VFR AT NIGHT

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

VERTIGO - DISORIENTATION

Disorientation can occur in a variety of ways. During flight, inner ear balancing mechanisms are subjected to varied forces not normally experienced on the ground. This, combined with loss of outside visual reference, can cause vertigo. False interpretations (illusions) result, and may confuse the pilot's conception of the 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,

. . . . . .BEECH AIRCRAFT CORPORATION