

# Beechcraft®

## Sundowner® 180 C23

### Pilot's Operating Handbook *and* FAA Approved Airplane Flight Manual

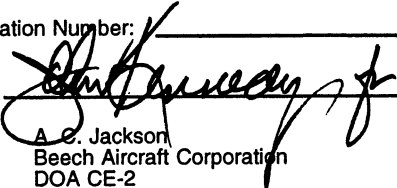
FAA Approved in Normal and Utility Category based on CAR 3. This document must be carried in the airplane at all times and be kept within reach of the pilot during all flight operations.

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

Airplane Serial Number: \_\_\_\_\_

Airplane Registration Number: \_\_\_\_\_

FAA Approved: \_\_\_\_\_

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

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

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**NOTE**

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**GAMA** General Aviation  
Manufacturers Association

# **Raytheon Aircraft**

## **Sundowner C23 Log of Temporary Changes to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual P/N 169-590008-23**

*Changes to this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be in the airplane for all flight operations.*

<b>Part Number</b>	<b>Subject</b>	<b>Date</b>
169-590008-23TC1	Fuel Selector Placard Installation	8/26/97

**Note:** This page should be filed in the front of the *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* immediately following the *Title* page. This page replaces any *Log of Temporary Changes* page dated prior to the date in the lower right corner of this page.

**SUNDOWNER 180**  
**C23**  
**(M-1285 AND AFTER)**  
**PILOT'S OPERATING HANDBOOK**  
**AND**  
**FAA APPROVED AIRPLANE FLIGHT MANUAL**  
 A7 Revision . . . . . July, 1994

**LOG OF REVISIONS**

<b>Page</b>	<b>Description</b>
Title Page	Updated
Page A (A7)	New
10-1 thru 10-48	Revised Section X, Safety Information (May, 1994)

**A7**





**SUNDOWNER 180  
MODEL C23 (M-1285 AND AFTER)  
PILOT'S OPERATING HANDBOOK AND  
FAA APPROVED AIRPLANE FLIGHT MANUAL  
P/N 169-590008-23**

A6 Revision . . . . . December, 1991

**LOG OF REVISIONS**

<b>Page</b>	<b>Description</b>
Title Page	Updated
Page A (A6)	New
2-11	Revised WARNING
2-28	Revised Placard
3-1 thru 3-12	New SECTION III, EMERGENCY PROCEDURES
4-9	Revised BEFORE TAKEOFF
4-11	Revised BEFORE LANDING
4-12	Revised BEFORE LANDING
4-14	Revised ICING LIMITATIONS
5-18	Revised CRUISE PERFORMANCE
7-14	Revised WARNING
10-34	Corrected Type
<b>A6</b>	



**SUNDOWNER 180  
C23  
(M-1285 AND AFTER)**

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

A5 Revision . . . . . October, 1990

**LOG OF REVISIONS**

Page	Description
Title Page	Updated
Page A (A5)	New
10-1 thru 10-48	Revised Section X, Safety Information (October, 1990)
A5	



**SUNDOWNER 180 C23**  
**Pilot's Operating Handbook**  
**and**  
**FAA Approved Airplane Flight Manual**

A4 ..... January, 1982

**LOG OF REVISIONS**

Page	Description
Title Page	Added Revision Date
Logo Page	Added
Page A (A4)	Updated
5-1	Revised "Table of Contents"
5-3 thru 5-6	Revised "Introduction to Performance and Flight Planning"
5-18	Revised "Cruise Performance" chart
5-19	Shifted Material and Added "Notes"
5-20	Shifted Material
5-21	Added New Page and Shifted Material
5-22	Added New Page
7-1	Revised "Table of Contents"
7-3	Revised "Table of Contents"
7-5	Shifted Material
7-6	Shifted Material
7-11	Shifted Material and Revised "Flight Instruments"
7-25	Shifted Material and Revised "Alternator"
7-26 and 7-27	Shifted Material and Revised "External Power Receptacle"
7-28	Shifted Material and Revised "Interior Lighting"
7-30	Shifted Material
7-31	Shifted Material

**A4**

98-38307

## LOG OF REVISIONS

Page	Description
7-32 8-1 8-10 and 8-11	Shifted Material Revised "Table of Contents" Shifted Material and Revised "External Power Receptacle"
A4	

98-38307

**SUNDOWNER 180 C23**  
**Pilot's Operating Handbook**  
**and**  
**FAA Approved Airplane Flight Manual**

A3 ..... August, 1980

**LOG OF REVISIONS**

Page	Description
Title Page	Added Revision Date
Page A (A3)	Updated
1-4 and 1-5	Revised "Use of Handbook"
1-6	Shifted Material
1-15	Revised "Engine Controls and Instruments"
2-5	Revised "Power Plant Limitations"
2-12	Revised "Electrical Power"
2-27	Revised "Fuel Selector Panel" Placard
2-28	Shifted Material
3-1	Revised "Table of Contents"
3-3	Revised "Emergency Airspeeds" and Added Note
3-7	Revised "Emergency Descent"
3-8 and 3-9	Added "Starter Engaged Warning Light Illuminated" and Revised "Alternator Out Procedure"
3-10 and 3-11	Shifted Material
4-1	Revised "Table of Contents"
4-5	Shifted Material
4-6	Revised "Before Starting"
4-7	Shifted Material
4-8	Revised "Starting"
4-9	Revised "Before Take-off"
4-10 thru 4-12	Shifted Material
6-5	Revised "Weighing Instructions"
6-11	Revised "Weight and Balance Responsibilities"
7-2	Revised "Table of Contents"
7-15	Revised "Shoulder Harnesses"
7-18 and 7-19	Shifted Material

**A3**

98-38307



## LOG OF REVISIONS

Page	Description
<p>7-20 7-21 and 7-23 8-15 8-34 and 8-35 8-41</p>	<p>Revised "Starter" Revised "Fuel System" Revised "Tires" Revised "Consumable Materials" Revised "Power Plant"</p> <div data-bbox="471 559 857 716" style="border: 2px solid black; padding: 10px; text-align: center;"> <p><b>10-1 Thru 10-67</b> <b>Revised Safety Section</b> <b>Dated March 1981.</b></p> </div>

98-38307

**Sundowner 180 C23**

**PILOT'S OPERATING HANDBOOK**

**and**

**FAA APPROVED AIRPLANE FLIGHT MANUAL**

**LOG OF REVISIONS**

A2 . . . . . October 1979

PAGE	DESCRIPTION
Title Page	Update
Page A (A2)	New
2-1	Update Table of Contents
2-5	Add "Fuel Additives"
2-6	Shift Material
2-7	Revise "Weight Limits" and "Center of Gravity Limits"
2-8	Revise "Maneuver Limits"
4-1	Update Table of Contents
4-8	Revise "After Starting and Before Taxi"
4-10	Shift Material
4-11	Revise "Descent"
4-15	Add "Noise Characteristics"
8-8	Revise "Jacking"
8-35	Revise "Consumable Materials"

A2



# Sundowner 180 C23

## PILOT'S OPERATING HANDBOOK

and

## FAA APPROVED AIRPLANE FLIGHT MANUAL

### LOG OF REVISIONS

A1 ..... APRIL 1979

PAGES	DESCRIPTION
Title Page	Update
A1	New
1-9	Add NOTE
3-3	Revise material
3-4	Revise material
3-7	Revise switch designation
3-8	Revise switch designation
4-6	Revise switch designation
4-7	Add 28-volt system information
4-8 & 4-9	Shift material
4-12	Revise switch designation
7-2 & 7-3	Update Table of Contents
7-11	Revise "Switches"
7-24 & 7-25	Revise switch designation
	Revise "Battery"
7-25	Revise "Alternator"
7-26 & 7-27	Shift material and add revised
	"External Power Receptacle"
7-32	Revise switch designation
8-2	Update Table of Contents
8-11	Revise "External Power"
8-14 & 8-15	Revise "Battery"
8-34	Revise "Consumable Materials"
8-38	Revise "Bulb Replacement Guide"

A1



**Sundowner 180 C23**

**PILOT'S OPERATING HANDBOOK**

**and**

**FAA APPROVED AIRPLANE FLIGHT MANUAL**

**LOG OF REVISIONS**

Original ..... February, 1979

PAGES	DESCRIPTION
Title Page	Original
"A" Page	Original
a and b	Original
1-1 thru 1-18	Original
2-1 thru 2-32	Original
3-1 thru 3-12	Original
4-1 thru 4-14	Original
5-1 thru 5-20	Original
6-1 thru 6-20	Original
7-1 thru 7-32	Original
8-1 thru 8-46	Original
Section 9	See Log of Supplements
10-1 thru 10-30	Original
A	



**C23 Sundowner 180  
Pilot's Operating Handbook  
and  
FAA Approved  
Airplane Flight Manual**

## **INTRODUCTION**

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

In recent years, BEEHCRAFT 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 fundamentals – BEEHCRAFT feels that it is highly important to have Safety Information in a condensed form in the hands of the pilots. The Safety Information should be read and studied. Periodic review will serve as a reminder of good piloting techniques.



**Sundowner 180 C23**  
**PILOT'S OPERATING HANDBOOK**  
**and**  
**FAA APPROVED AIRPLANE FLIGHT MANUAL**

**TABLE OF CONTENTS**

SECTION 1 .....	General
SECTION 2 .....	Limitations
SECTION 3 .....	Emergency Procedures
SECTION 4 .....	Normal Procedures
SECTION 5 .....	Performance
SECTION 6 .....	Weight and Balance/Equipment List
SECTION 7 .....	Systems Description
SECTION 8 .....	Handling, Servicing and Maintenance
SECTION 9 .....	Supplements
SECTION 10 .....	Safety Information

**SECTION I**

**GENERAL**

**TABLE OF CONTENTS**

<i>SUBJECT</i>	<i>PAGE</i>
Thank You .....	1-3
Important Notice .....	1-3
Use of the Handbook .....	1-4
Revising the Handbook .....	1-5
Supplements Revision Record .....	1-6
Vendor-Issued STC Supplements .....	1-6
Airplane Three View .....	1-7
Ground Turning Clearance .....	1-8
Descriptive Data	
Engine .....	1-9
Propeller .....	1-9
Fuel .....	1-9
Oil Capacity .....	1-10
<b>February 1979</b>	<b>1-1</b>

**TABLE OF CONTENTS (Continued)**

<i>SUBJECT</i>	<i>PAGE</i>
Approved Oil Types .....	1-10
Maximum Certificated Weights .....	1-11
Cabin and Entry Dimensions .....	1-11
Baggage Space and Entry Dimensions .....	1-11
Specific Loadings .....	1-11
Symbols, Abbreviations and Terminology	
General Airspeed .....	1-12
Meteorological .....	1-14
Power .....	1-15
Engine Controls and Instruments .....	1-15
Airplane Performance and Flight Planning ...	1-16
Weight and Balance .....	1-16

**THANK YOU . . .** for displaying confidence in us by selecting a BEEHCRAFT airplane. Our design engineers, assemblers and inspectors have utilized their skills and years of experience to ensure that the BEEHCRAFT meets the high standards of quality and performance for which BEEHCRAFT 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

**Section I**  
**General**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

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 and 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:

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

**NOTES**

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

Due to the large variety of airplane configurations available through optional equipment, it should be noted that in describing and illustrating the handbook, optional equipment may not be designated as such in every case. Through variations provided by custom designing, the illustrations in this handbook will not be typical of every airplane.

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.

Beech Aircraft Corporation expressly reserves the right to supersede, cancel and/or declare obsolete any part, part numbers, kits or publication that may be referenced in this handbook without prior notice.

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 purpose it is the pilot's responsibility to maintain it in current status.

### **SUPPLEMENTS REVISION RECORD**

Section IX contains supplements and a Log of Supplements page. On the "Log" page is a listing of the supplemental equipment available for installation on the BEECHCRAFT airplane.

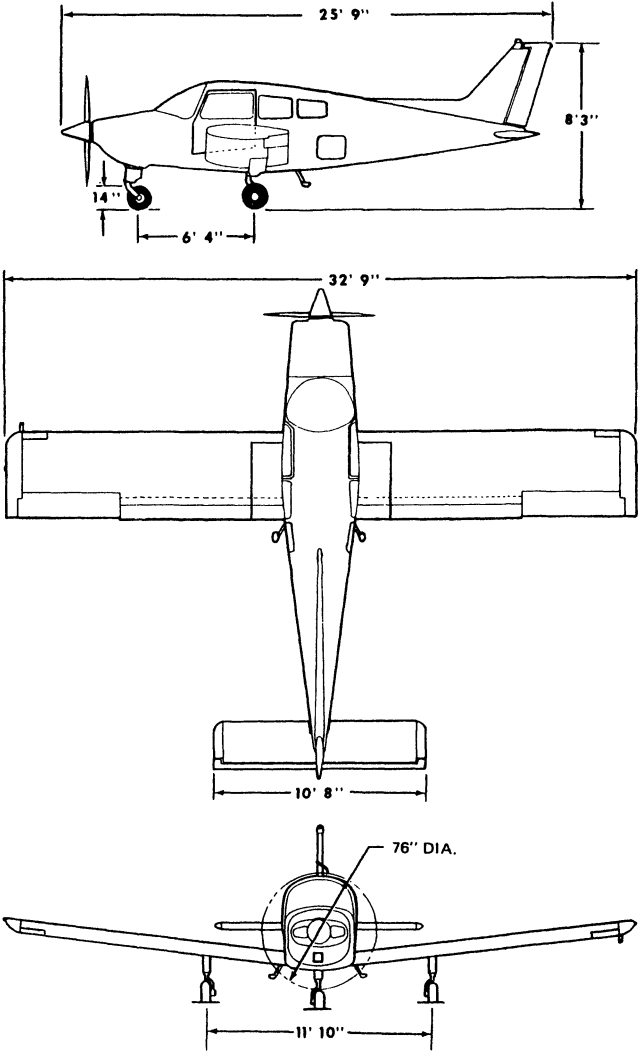
Upon receipt of a new or revised supplement, compare the "Log" page just received with the existing "Log" page in the manual. Retain the "Log" page with the latest date on the bottom of the page (this log will usually have the greater number of entries) and discard the other log.

### **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.

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

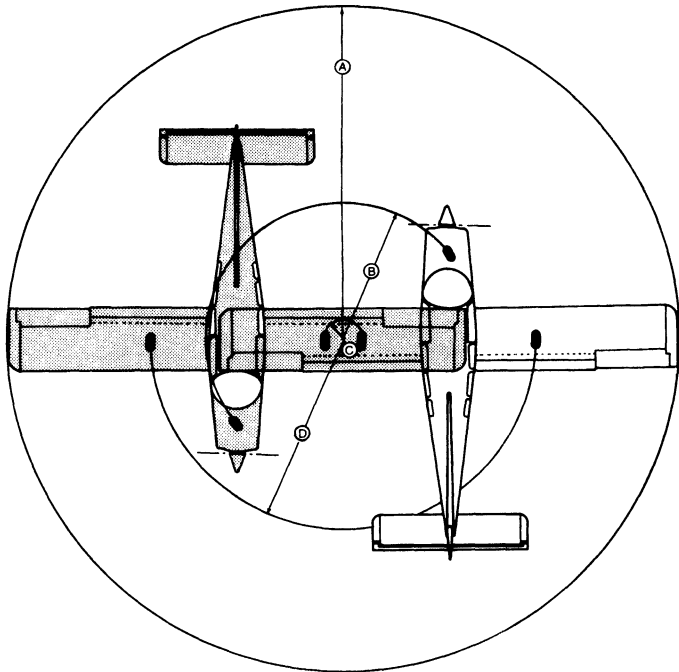
**Section I  
General**



**THREE VIEW**

C23-607-10





### **GROUND TURNING CLEARANCE**

- Ⓐ Radius for Wing Tip ..... 23 ft. 11 in.
- Ⓑ Radius for Nose Wheel ..... 9 ft. 10 in.
- Ⓒ Radius for Inside Gear ..... 2 ft. 0 in.
- Ⓓ Radius for Outside Gear ..... 13 ft. 0 in.

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

**DESCRIPTIVE DATA**

**NOTE**

M-1285 thru M-2178 are 14-volt systems. The battery switch is placarded BATTERY & ALT and the alternator switch is placarded ALT (or ALT FIELD). 28-volt systems, M-2179 and after, are placarded BATTERY for the battery switch and ALT FIELD for the alternator switch. All items throughout this handbook that refer to battery switch refer to either BATTERY & ALT switch or BATTERY switch depending upon configuration.

**ENGINE**

Airplane is equipped with an Avco Lycoming O-360-A2G, O-360-A4G, O-360-A4J or O-360-A4K engine rated at 180 horsepower.

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

Engine cooling has been demonstrated for a 100° F day.

**PROPELLER**

Sensenich M76EMMS-0-60 or 76EM8S5-0-60 fixed pitch, two blade propeller. Static rpm at maximum permissible throttle settings: Not over 2350 rpm and not under 2250 rpm. No additional tolerance permitted.

**FUEL**

Aviation Gasoline 91/96 (blue) minimum grade or 100 (green) or 100LL (blue).

*M-1285 thru M-1516:*

\*59.8-gallon system

(29.9 gallons each tank) . . . . . \*58 gallons usable

Each tank has provisions for partial filling to:

20 gallons each tank . . . . . 38.2 gallons usable

15 gallons each tank . . . . . 28.2 gallons usable

**Section I**  
**General**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

*M-1517 thru M-1879 except M-1875 and prior airplanes  
after compliance with Service Instructions No. 0624-281:*

\*59.8-gallon system  
(29.9 gallons each tank) ..... \*52 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

*M-1875, M-1880 and after:*

\*59.8-gallon system  
(29.9 gallons each tank) ..... \*57.2 gallons usable

Each tank has provisions for partial filling to:

20 gallons each tank ..... 37.4 gallons usable  
15 gallons each tank ..... 27.4 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**

***NORMAL CATEGORY***

Maximum Ramp Weight .....	2455 lbs
Maximum Take-Off Weight .....	2450 lbs
Maximum Landing Weight .....	2450 lbs

***UTILITY/ACROBATIC CATEGORY***

Maximum Ramp Weight .....	2035 lbs
Maximum Take-Off Weight .....	2030 lbs
Maximum Landing Weight .....	2030 lbs

***ALL CONFIGURATIONS***

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) .....	23.6 in.
Door Height (Minimum) .....	18.5 in.

**SPECIFIC LOADINGS (2450 lbs.)**

Wing Loading .....	16.78 lbs/sq ft
Power Loading .....	13.61 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 AND SYMBOLS**

- CAS** Calibrated Airspeed is the indicated speed of an airplane, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
- GS** Ground Speed is the speed of an airplane relative to the ground.
- IAS** Indicated Airspeed is the speed of an airplane as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
- KCAS** Calibrated Airspeed expressed in "knots".
- KIAS** Indicated Airspeed expressed in "knots".
- TAS** True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature, and compressibility.

- $V_A$       Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
- $V_{FE}$       Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
- $V_{NE}$       Never Exceed Speed is the speed limit that may not be exceeded at any time.
- $V_{NO}$       Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.  
or  $V_C$
- $V_S$       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      Recommended Climb Speed for enroute climb.  
Climb

**METEOROLOGICAL TERMINOLOGY**

ISA	<p>International Standard Atmosphere in which</p> <ol style="list-style-type: none"><li>(1) The air is a dry perfect gas;</li><li>(2) The temperature at sea level is 15° Celsius (59° Fahrenheit);</li><li>(3) The pressure at sea level is 29.92 in Hg. (1013.2 millibars);</li><li>(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.</li></ol>
OAT	<p>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.</p>
Indicated Pressure Altitude	<p>The number actually read from an altimeter when the barometric sub-scale has been set to 29.92 in Hg. (1013.2 millibars).</p>
Pressure Altitude	<p>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.</p>

Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this hand-book are to be understood as the head-wind or tailwind components of the reported winds.

#### **POWER TERMINOLOGY**

Take off and Maximum Continuous	Highest power rating not limited by time.
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#### **ENGINE CONTROLS AND INSTRUMENTS**

Throttle Control	Used to control power by introducing fuel-air mixture into the intake passages of the engine.
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 during cruise.
Tachometer	Indicates the rpm of the engine/propeller.



**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. The value shown is considered to be limiting.
MEA	Minimum enroute IFR altitude.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.
GPH	U.S. Gallons per hour.
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.

**Section I**  
**General**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

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.

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

## **SECTION II**

## **LIMITATIONS**

### **TABLE OF CONTENTS**

<i>SUBJECT</i>	<i>PAGE</i>
Airspeed Limitations .....	2-3
Airspeed Indicator Markings .....	2-4
Power Plant Limitations	
Engine.....	2-4
Operating Limitations.....	2-5
Fuel Grades.....	2-5
Fuel Additives .....	2-5
Oil Specifications .....	2-5
Propeller Specifications.....	2-5
Power Plant Instrument Markings .....	2-6
Oil Temperature .....	2-6
Oil Pressure .....	2-6
Fuel Pressure.....	2-6
Tachometer .....	2-6
Miscellaneous Instrument Markings.....	2-6
Instrument Air.....	2-6
Fuel Quantity.....	2-7
Weight Limits .....	2-7
Normal Category .....	2-7
Utility/Acrobatc Category.....	2-7
Center of Gravity Limits.....	2-7
Normal Category .....	2-7
Utility/Acrobatc Category.....	2-8
Reference Datum.....	2-8
Maneuver Limits .....	2-8
Normal Category (2450 Pounds).....	2-8

**TABLE OF CONTENTS (Continued)**

<i>SUBJECT</i>	<i>PAGE</i>
Utility Category (2030 Pounds) .....	2-8
Maneuver .....	2-8
Acrobatic Category (2030 Pounds) .....	2-8
Flight Load Factors .....	2-9
Normal Category (2450 Pounds) .....	2-9
Utility Category (2030 Pounds) .....	2-9
Acrobatic Category (2030 Pounds) .....	2-9
Minimum Flight Crew .....	2-9
Kinds of Operation Limits .....	2-9
Required Equipment for Various	
Conditions of Flight .....	2-9
Legend .....	2-11
Fuel	
Total Fuel .....	2-19
Fuel Management .....	2-19
Placards .....	2-20

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section II  
Limitations**

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 $V_{NE}$	152	175	152	175	Do not exceed this speed in any operation
Maximum Structural Cruising $V_{NO}$ or $V_C$	136	156	136	156	Do not exceed this speed except in smooth air and then only with caution
Maneuvering $V_A$	118	136	118	136	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

**Section II**  
**Limitations**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**\*AIRSPEED INDICATOR MARKINGS**

MARK- ING	CAS		IAS		SIGNIF- ICANCE
	KTS	MPH	KTS	MPH	
White Arc	①52-96	60-110	52-96	60-110	Full Flap Operating Range
	②51-96	59-110	51-96	59-110	
Green Arc	①63-136	72-156	62-136	71-156	Normal Operating Range
	②62-136	71-156	61-136	70-156	
Yellow Arc	136-152	156-175	136-152	156-175	Operate With Caution, Only in Smooth Air
Red Line	152	175	152	175	Maximum Speed For All Operations

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

① M-1285 thru M-1586

② M-1587 and after

**POWER PLANT LIMITATIONS**

**ENGINE**

One Avco Lycoming engine model O-360-A2G, O-360-A4G, O-360-A4J or O-360-A4K engine rated at 180 hp.

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 .....	6.0 psi
Mixture - Set per leaning instructions on performance charts.	

***FUEL GRADES***

Aviation Gasoline 91/96 (blue) minimum grade or 100 (green) or 100LL (blue).

***FUEL ADDITIVES***

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

***OIL SPECIFICATIONS***

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***

Sensenich M76EMMS-0-60 or 76EM8S5-0-60 fixed



**Section II**  
**Limitations**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

pitch, two blade propeller. Static rpm at maximum permissible throttle settings: Not over 2350 rpm and not under 2250 rpm. No additional tolerance 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 PRESSURE**

Operating Range (Green Arc) ..... 0.5 to 6.0 psi

**TACHOMETER**

Engine Warm-up ..... 1000 to 1200 rpm  
Restricted Operation for O-360-A2G  
engine only (Red Arc) ..... 2150 to 2350 rpm  
Normal Operating Range  
all engines (Green Arc) ..... 1800 to 2700 rpm  
Maximum RPM (Red Radial) ..... 2700 rpm

**MISCELLANEOUS INSTRUMENT MARKINGS**

**INSTRUMENT AIR**

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

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section II  
Limitations**

**FUEL QUANTITY**

On M-1517 thru M-1879 except M-1875, or prior air-  
planes after compliance with S.I. No. 0624-281

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

On M-1875, M-1880 and after

Yellow Band ..... E to 1/3 full

**WEIGHT LIMITS**

**NORMAL CATEGORY**

Maximum Ramp Weight ..... 2455 lbs

Maximum Take-off

and Landing Weight ..... 2450 lbs

Zero Fuel Weight ..... No Structural Limitation

Maximum Baggage Compartment

Load ..... 270 lbs

**UTILITY/ACROBATIC CATEGORY**

Maximum Ramp Weight ..... 2035 lbs

Maximum Take-off

and Landing Weight ..... 2030 lbs

Zero Fuel Weight ..... No Structural Limitation

Maximum Baggage Compartment

Load (Utility Category Only) ..... 270 lbs

**CENTER OF GRAVITY LIMITS**

**NORMAL CATEGORY**

Forward: 107.8 inches aft of datum to 1800 lbs with  
straight line variation to 114.5 inches at 2450  
lbs.

Aft: 118.3 inches aft of datum at all weights.

**Section II**  
**Limitations**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**UTILITY/ACROBATIC CATEGORY**

Forward: 107.8 inches aft of datum to 1800 lbs with  
straight line variation to 110.2 inches aft of  
datum at 2030 lbs.

Aft: 114.0 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 airplane is approved for 4 place in the Normal  
Category and for 2 place in the Utility and Acrobatic  
Category. Maximum slip duration is 30 seconds.

**NORMAL CATEGORY (2450 POUNDS)**

No acrobatic maneuvers approved.

**UTILITY CATEGORY (2030 POUNDS)**

No acrobatic maneuvers are approved except those listed  
below.

<i><b>MANEUVER</b></i>	<i><b>ENTRY SPEED (CAS)</b></i>
Chandelle .....	116 kts/133 mph
Steep Turn .....	116 kts/133 mph
Lazy Eight .....	116 kts/133 mph
Stall (Except Whip) .....	Use slow deceleration

Intentional Spins M-1494 and after (only if certificated as  
Acrobatic) or prior airplanes modified by

Kit No. 23-4007-1S per

S.I. No. 0619-090 ..... Use slow deceleration

**ACROBATIC CATEGORY (2030 POUNDS)**

For additional approved acrobatic maneuvers, see FAA  
Approved Airplane Flight Manual Supplement.

## **FLIGHT LOAD FACTORS**

### **NORMAL CATEGORY (2450 POUNDS)**

Flight maneuvering load factor

Flaps Up .....	+3.8, -1.9
Flaps Down .....	+1.9

### **UTILITY CATEGORY (2030 POUNDS)**

Flight maneuvering load factor

Flaps Up .....	+4.4, -2.2
Flaps Down .....	+2.2

### **ACROBATIC CATEGORY (2030 POUNDS)**

Flight maneuvering load factor

Flaps Up .....	+6.0, -3.0
Flaps Down .....	+2.0

## **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.

## **Section II Limitations**

## **BEECHCRAFT Sundowner 180 C23 (M-1285 and After)**

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

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

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

**WARNING**

**FLIGHT IN ICING CONDITIONS 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.

**Section II  
Limitations**

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

SYSTEM and/or COMPONENT	VFR Day				
	VFR Night		IFR Day		Remarks and/or Exceptions
	IFR Night				
<b>GENERAL</b>					
Overwater flight	*	*	*	*	- *Per FAR 91.33
<b>COMMUNICATIONS</b>					
VHF communications system	*	*	*	*	- *Per FAR 91.33
<b>ELECTRICAL POWER</b>					
Battery	1	1	1	1	
DC alternator	1	1	1	1	
Starter Engaged Warning Light (M-2278 and after)	1	1	1	1	- May be inoperative provided ammeter is operative and monitored

EQUIPMENT AND FURNISHING	1	1	1	- Per Person or Per FAR 91.33
	1	1	1	- Per FAR 91.52
FIRE PROTECTION				
	*	*	*	-*Optional
Portable fire extinguisher				



**Section II**  
**Limitations**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

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

## Section II Limitations

- 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.

**Section II**  
**Limitations**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

SYSTEM and/or COMPONENT	VFR Day					
	VFR Night			IFR Day		
	IFR Night			IFR Night		
	Remarks and/ or Exceptions					
LIGHTS						
Cockpit and instrument lights	-	*	-	*	-*	Lights must be operative.
Taxi light	-	-	-	-	-	
Landing light	-	*	-	*	*	-*Per FAR 91.33
Rotating beacon	*	1	*	1	1	-*Optional
Position light	-	3	-	3	3	

## Section II

### Limitations

-\*Per FAR 91.24, 91.90, 91.97  
 -\*Per FAR 91.33

**Section II**  
**Limitations**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

SYSTEM and/or COMPONENT	VFR Day				Remarks and/ or Exceptions
	VFR Night		IFR Day		
	IFR Night				
ENGINE INDICATING INSTRUMENTS	1	1	1	1	- *Optional
	*	*	*	*	
ENGINE OIL INSTRUMENTS	1	1	1	1	
	1	1	1	1	

## **FUEL**

TOTAL FUEL with left and right wing fuel systems full:

*M-1285 thru M-1516:*

Two \*29.9-gallon tanks in wings with a total of \*58 gallons usable.

*M-1517 thru M-1879 except M-1875 and prior airplanes after compliance with Service Instructions No. 0624-281:*

Two \*29.9-gallon tanks in wings with a total of \*52 gallons usable.

*M-1875, M-1880 and after:*

Two \*29.9-gallon tanks in wings with a total of \*57.2 gallons usable.

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

## **FUEL MANAGEMENT**

*On M-1517 thru M-1879 except M-1875, and prior airplanes if service Instruction No. 0624-281 is accomplished:*

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

*On M-1875, M-1880 and after:*

Do not take off when Fuel Quantity Gages indicate in Yellow Band on either gage.

Maximum slip duration: 30 seconds

**Section II**  
**Limitations**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**PLACARDS**

*On Left Cabin Door or Left Side Panel:*  
*(M-1285 thru M-1979 except M-1971) (CAS)*

<b>THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.</b>	
<b>NORMAL CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2450 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	136 MPH
<b>NO ACROBATIC MANEUVERS INCLUDING SPINS APPROVED</b>	
<b>UTILITY CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2030 LBS
REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS	
FLIGHT MANEUVERING LOAD FACTOR	FLAPS UP +4.4 -2.2 DOWN +2.2
<b>NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED BELOW:</b>	
MANEUVER	MAXIMUM ENTRY SPEED
CHANDELLES	133 MPH
LAZY EIGHTS	133 MPH
STEEP TURNS	133 MPH
STALLS (EXCEPT WHIP STALLS)	SLOW DECELERATION
NOTE: MAXIMUM ALTITUDE LOSS DURING STALL	300 FT

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section II  
Limitations**

*On Instrument Panel in Full View of Pilot (M-1285 through M-1493, unless modified by Kit No. 23-4007-1S and Service Instructions No. 0619-090):*

**"THIS AIRPLANE MUST BE OPERATED AS A  
NORMAL OR UTILITY CATEGORY AIRPLANE.  
INTENTIONAL SPINS ARE PROHIBITED. NO  
ACROBATIC MANEUVERS APPROVED EXCEPT:  
CHANDELLES, LAZY EIGHTS, STEEP TURNS,  
AND STALLS (EXCEPT WHIP STALLS)."**

*On Left Cabin Door or Left Side Panel  
(M-1971, M-1980 and after) (CAS)*

<b>THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.</b>	
<b>NORMAL CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2450 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	118 KTS/136 MPH
<b>NO ACROBATIC MANEUVERS INCLUDING SPINS APPROVED</b>	
<b>UTILITY CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2030 LBS
REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS	
FLIGHT MANEUVERING LOAD FACTOR	FLAPS UP +4.4 -2.2 DOWN +2.2
<b>NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED BELOW:</b>	
MANEUVER	MAXIMUM ENTRY SPEED
CHANDELLES	116 KTS/133 MPH
LAZY EIGHTS	116 KTS/133 MPH
STEEP TURNS	116 KTS/133 MPH
STALLS (EXCEPT WHIP STALLS)	SLOW DECELERATION
NOTE: MAXIMUM ALTITUDE LOSS DURING STALL	300 FT



**Section II  
Limitations**

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**PLACARDS**

*On Left Cabin Door or Left Side Panel (Acrobatic):  
(M-1285 thru M-1979 except M-1971) (CAS)*

<b>THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.</b>	
<b>NORMAL CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2450 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	136 MPH
<b>NO AEROBATIC MANEUVERS INCLUDING SPINS APPROVED</b>	
<b>UTILITY &amp; AEROBATIC CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2030 LBS
REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS	
FLIGHT MANEUVERING LOAD FACTOR	FLAPS UP +6.0 -3.0 DOWN +2.0
<b>NO AEROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED BELOW:</b>	
MANEUVER	MAXIMUM ENTRY SPEED
CHANDLLES	133 MPH
LAZY EIGHTS	133 MPH
STEEP TURNS	133 MPH
STALLS (EXCEPT WHIP STALLS)	SLOW DECELERATION
NOTE: MAXIMUM ALTITUDE LOSS DURING STALL	300 FT
SPINS (FOR OPERATIONAL LIMITATIONS SEE PLACARD ON SUN VISOR)	
	<b>RECOMMENDED ENTRY SPEED</b>
BARREL ROLL	130 MPH
AILERON ROLL	130 MPH
SNAP ROLL	100 MPH
SPLIT S	90 MPH
IMMELMANN LOOP	150 MPH 140 MPH

*On Right and Left Cabin Doors (Acrobatic):*

<b>REMOVE DOOR HOLD - OPEN ROD PRIOR TO OPERATION IN AEROBATIC CATEGORY</b>
---

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section II  
Limitations**

*On Left Door or Left Side Panel (Acrobatic): (M-1971, M-1980 and after) (CAS)*

<b>THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.</b>	
<b>NORMAL CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2450 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	118 KTS/136 MPH
<b>NO ACROBATIC MANEUVERS INCLUDING SPINS APPROVED</b>	
<b>UTILITY &amp; ACROBATIC CATEGORY</b>	
MAXIMUM DESIGN WEIGHT	2030 LBS
REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS	
FLIGHT MANEUVERING LOAD FACTOR	FLAPS UP +6.0 -3.0 DOWN +2.0
<b>NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED BELOW:</b>	
MANEUVER	MAXIMUM ENTRY SPEED
CHANDELLES	116 KTS/133 MPH
LAZY EIGHTS	116 KTS/133 MPH
STEEP TURNS	116 KTS/133 MPH
STALLS (EXCEPT WHIP STALLS)	SLOW DECELERATION
NOTE: MAXIMUM ALTITUDE LOSS DURING STALL 300 FT	
SPINS (FOR OPERATIONAL LIMITATIONS SEE PLACARD ON SUN VISOR)	
<b>RECOMMENDED ENTRY SPEED</b>	
BARREL ROLL	113 KTS/130 MPH
AILERON ROLL	113 KTS/130 MPH
SNAP ROLL	87 KTS/100 MPH
SPLIT S	79 KTS/90 MPH
IMMELMANN	130 KTS/150 MPH
LOOP	122 KTS/140 MPH

*On Right Side of Instrument Panel (Acrobatic):*

<b>CAUTION</b>
CONTINUOUS INVERTED FLIGHT WILL CAUSE LOSS OF OIL AND OIL PRESSURE. REAR CG LIMITED AND CARRYING OF BAGGAGE OR REAR SEAT PASSENGERS AND USE OF FLAPS PROHIBITED DURING ACROBATIC MANEUVERS.

**PLACARDS**

*On Upper Right Instrument Panel:*

**RAISE FLAPS**  
**TO INCREASE**  
**BRAKE**  
**EFFECTIVENESS**

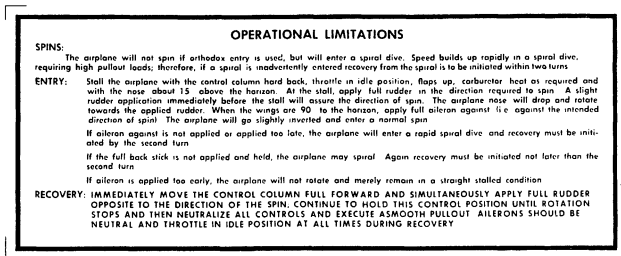
*On Flap Extension Handle: (M-1285 thru M-1979 except M-1971) (CAS)*

**FLAPS PULL TO EXTEND, MAX SPEED 110 MPH**  
**RETRACTED . . . . . 0°**  
**FIRST NOTCH . . . . . 15°**  
**SECOND NOTCH . . . . . 25°**  
**THIRD NOTCH . . . . . 35°**

*On Flap Extension Handle: (M-1971, M-1980 and after) (CAS)*

**FLAPS PULL TO EXTEND, MAX SPEED 96 KTS/110 MPH**  
**RETRACTED . . . . . 0°**  
**FIRST NOTCH . . . . . 15°**  
**SECOND NOTCH . . . . . 25°**  
**THIRD NOTCH . . . . . 35°**

*On Survivor Above Pilot's Seat (Acrobatic):*



*The above placard reads as follows:*

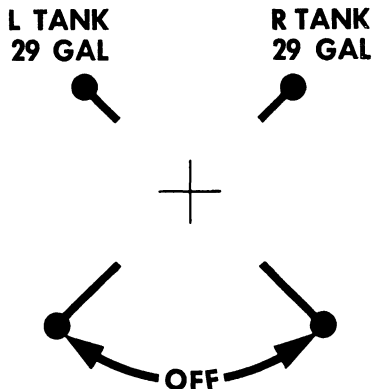
“OPERATIONAL LIMITATIONS SPINS: The airplane will not spin if orthodox entry is used, but will enter a spiral dive. Speed builds up rapidly in a spiral dive, requiring high pullout loads; therefore, if a spiral is inadvertently entered recovery from the spiral is to be initiated within two turns. ENTRY: Stall the airplane with the control column hard back, throttle in idle position, flaps up, carburetor heat as required and with the nose about 15° above the horizon. At the stall, apply full rudder in the direction required to spin. A slight rudder application immediately before the stall will assure the direction of spin. The airplane nose will drop and rotate towards applied rudder. When the wings are 90° to the horizon, apply full aileron against (i.e. against the intended direction of spin). The airplane will go slightly inverted and enter a normal spin. If aileron against is not applied or applied too late, the airplane will enter a spiral dive, and recovery must be initiated by the second turn. If the full back stick is not applied and held, the airplane may spiral. Again recovery must be initiated not later than the second turn. If the aileron is applied too early, the airplane will not rotate and merely remain in a straight stalled condition. RECOVERY: 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.”

**Section II  
Limitations**

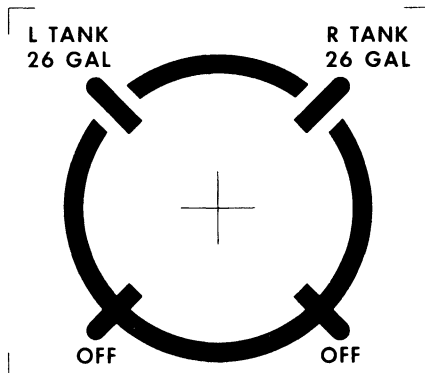
**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**PLACARDS**

*On Fuel Selector Panel (M-1285 through M-1516):*



*On Fuel Selector Panel (M-1517 through M-1879 except M-1875 or prior airplanes after compliance with Service Instructions No. 0624-281):*



**Temporary Change  
to the  
Pilot's Operating Handbook  
and  
FAA Approved Airplane Flight Manual  
P/N 169-590008-23TC1**

<b>Publication Affected</b>	C23 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (P/N 169-590008-23, issued February, 1979 or Subsequent)
<b>Airplane Serial Numbers Affected</b>	M-1285 and After
<b>Description of Change</b>	The addition of a placard to the fuel selector to warn of the no-flow condition that exists between the fuel selector detents.
<b>Filing Instructions</b>	Insert this temporary change into the C23 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual immediately following page 2-26 (Sec- tion II, LIMITATIONS) and retain until rescinded or replaced.

**LIMITATIONS**

**PLACARDS**

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

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

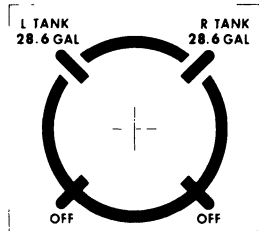
Approved:



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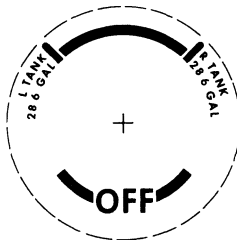
A.C. Jackson  
Raytheon Aircraft Company  
DOA CE-2

*On Fuel Selector Panel (M-1875, M-1880 thru M-2224):* ■



**OR**

*On Fuel Selector Panel (Serials M-2225 and after, or earlier airplane serials which have complied with BEECHCRAFT Service Instructions No. 1095):*



*Adjacent to Engine Instrument Cluster (M-1517 through M-1879 except M-1875 or prior airplanes after compliance with Service Instructions No. 0624-281):*

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

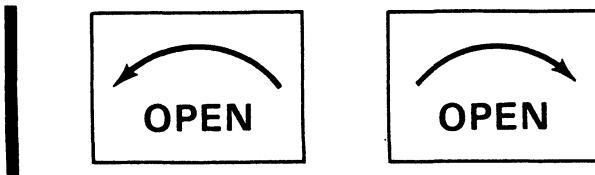
*Adjacent to Engine Instrument Cluster (M-1875, M-1880 and after):*

DO NOT TAKE OFF WHEN FUEL QUANTITY GAUGE INDICATES IN YELLOW ON EITHER GAUGE. MAXIMUM SLIP DURATION 30 SEC



**PLACARDS**

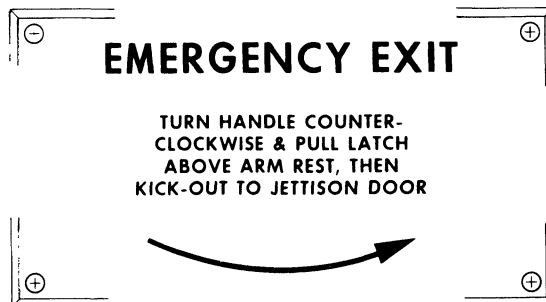
*Above Right and Left Cabin Doors (M-1285 thru M-1412 and M-1415, M-1419, M-1423, M-1439 and M-1447):*



*On Left Cabin Door (Acrobatic):*



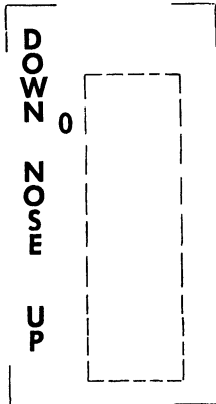
*On Right Cabin Door (Acrobatic):*



*On Baggage Compartment Door:*

**TO LEVEL AIRCRAFT — LEVEL  
BAGGAGE COMPARTMENT FLOOR**

*On Pedestal Between Front Seats:*



*On Second Window Frame Right Side (M-1658 and after as  
required by weight and balance data):*

**BAGGAGE, CARGO OR FAMILY SEATS  
LOAD IN ACCORDANCE  
WITH WEIGHT & BALANCE DATA**

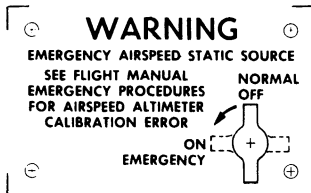
MAXIMUM SEAT CAPACITY \_\_\_\_\_ POUNDS

**Section II**  
**Limitations**

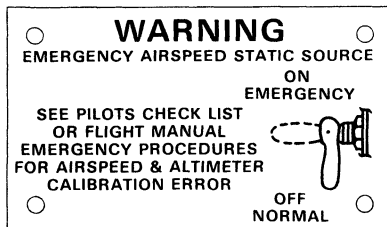
**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**PLACARDS**

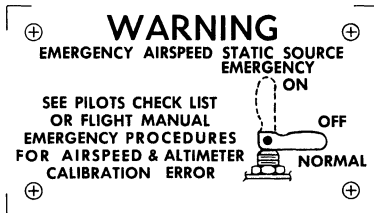
*On Lower Sidewall Adjacent to Pilot (when installed):*



*or;*



*or;*



*On Aft Cabin Bulkhead:*



*On Baggage Compartment Door:*

**BAGGAGE COMPARTMENT**

**270 POUNDS**

**MAXIMUM CAPACITY**

*On Upper Aft Corner of Each Cabin Door (when installed):*

**INSTRUCTIONS – SHOULDER STRAP**

- 1. OCCUPANT SHORTER THAN  
4FT 7IN DO NOT USE  
SHOULDER STRAP**
- 2. NEVER USE SHOULDER STRAP  
WITH OUT 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.**

**Section II  
Limitations**

**BEEHCRAFT Sundowner 180  
C23 (M-1285 and After)**

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# **SECTION III**

## **EMERGENCY PROCEDURES**

### **TABLE OF CONTENTS**

<b><i>SUBJECT</i></b>	<b><i>PAGE</i></b>
Emergency Airspeeds . . . . .	3-3
Engine Failure . . . . .	3-4
During Take-Off Ground Roll . . . . .	3-4
After Liftoff And In Flight . . . . .	3-4
If No Restart . . . . .	3-5
Engine Discrepancy Checks . . . . .	3-5
Condition: Rough Running Engine . . . . .	3-5
Condition: Loss Of Engine Power . . . . .	3-5
Air Start Procedure . . . . .	3-6
Engine Fire . . . . .	3-6
In Flight . . . . .	3-6
On The Ground . . . . .	3-7
Emergency Descent . . . . .	3-7
Maximum Glide Configuration . . . . .	3-7
Landing Emergencies . . . . .	3-8
Landing Without Power . . . . .	3-8
Systems Emergencies . . . . .	3-8
Starter Engaged Warning Light Illuminated . . . . .	3-8
Alternator-Out Procedure . . . . .	3-9
Unscheduled Electric Stabilator Trim . . . . .	3-9
Emergency Static Air Source System . . . . .	3-10
Unlatched Door In Flight . . . . .	3-10
Spins . . . . .	3-11
Entry . . . . .	3-11
Recovery . . . . .	3-12

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

## **EMERGENCY AIRSPEEDS**

Emergency Descent . . . . . 152 kts/175 mph  
Glide . . . . . 78 kts/90 mph  
Emergency Landing Approach . . . . . 68 kts/78 mph

*Stall warning horn is inoperative when the battery and alternator switches are turned off.*

## **NOTE**

On serials M-2225 and after, or on airplanes which have complied with BEECHCRAFT S.I. No. 1095, a fuel selector stop has been added to the selector valve guard. The fuel selector stop minimizes the possibility of inadvertently turning the fuel selector valve to the OFF detent position. The stop is a spring which must be depressed before the selector valve handle can be rotated to the OFF position.

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 - CLOSE
- 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 Switch, Alternator Switch, and Fuel Boost Switch - 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, then LEAN as required.
- 2. Fuel Boost Pump - ON
- 3. Fuel Selector Valve - SELECT OTHER TANK (feel for 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. BATTERY & ALT, ALT, and FUEL BOOST switches - OFF (With electric flaps installed, it will be necessary to set desired flaps before securing battery.)
7. Upper Cabin Door Latch (if installed) - OPEN ■

When certain of reaching the selected landing site:

8. Airspeed - 68 kts/78 mph
9. Flaps - AS REQUIRED

## **ENGINE DISCREPANCY CHECKS**

### ***CONDITION: ROUGH RUNNING ENGINE***

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

### ***CONDITION: LOSS OF ENGINE POWER***

1. Carburetor Heat - FULL HOT ■
2. Fuel Pressure Gage - CHECK

**Section III**  
**Emergency Procedures**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

*If fuel flow is abnormally low:*

- a. Mixture - FULL RICH
  - b. Fuel Boost Pump - ON (Lean as required.)
  - c. Fuel Boost 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:*

- a. Fuel Tank Selector Valve - SELECT OTHER FUEL TANK (feel for detent and check visually).
- b. Fuel Boost Pump - ON

**AIR START PROCEDURE**

1. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL (feel for detent and check visually).
2. Throttle - FULL FORWARD
3. Mixture - FULL RICH
4. Fuel Boost Pump - ON until power is regained, then OFF. (Leave on if engine driven fuel pump is inoperative.)
5. Throttle - ADJUST to desired power.
6. Mixture - LEAN as required.

**ENGINE FIRE**

**IN FLIGHT**

The red 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 out to close. The control labeled DEFROST must be pushed in 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. Throttle - CLOSE
4. Cabin Air Control (Red Knob) - pull OFF
5. Defrost Valve (Red Knob) - push OFF
6. Battery Switch - OFF
7. Alternator Switch - OFF
8. Magneto/Start Switch - OFF
9. Do not attempt to restart engine.

### **ON THE GROUND**

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

### **EMERGENCY DESCENT**

1. Carburetor Heat - FULL HOT or FULL COLD, AS REQUIRED
2. Throttle - IDLE
3. Airspeed - ESTABLISH 152 kts/175 mph

### **MAXIMUM GLIDE CONFIGURATION**

1. Flaps - UP
2. Airspeed - 78 kts/90 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 - 68 kts/78 mph
2. Fuel Selector Valve - OFF
3. Mixture - IDLE CUT-OFF
4. Magneto/Start Switch - OFF
5. Flaps - AS REQUIRED
6. Battery Switch, Alternator Switch, and Fuel Boost Switch - OFF
7. Upper Cabin Door Latch - OPEN (if installed)

## **SYSTEMS EMERGENCIES**

### **STARTER ENGAGED WARNING LIGHT**

#### **■ ILLUMINATED (IF INSTALLED)**

The STARTER ENGAGED warning light illuminates whenever the starter is engaged. If this light remains illuminated after Magneto/Start Switch is released from the START position, the starter relay is still energized. Consequently, electrical power is still being supplied to the starter, and it remains engaged. Continuing to supply power to the starter will eventually result in the complete loss of electrical system power, substantial starter damage, and possible damage to other electrical system components.

*If light remains illuminated on the ground:*

1. Battery Switch and Alternator Switch - OFF
2. Do Not Take Off.

*If light remains illuminated in flight after air start:*

1. Battery Switch and Alternator Switch - OFF
2. Land As Soon As Practical.

## **ALTERNATOR-OUT PROCEDURE**

An inoperative alternator will place the entire electrical operation of the airplane on the battery. Alternator malfunction will be indicated by a fluctuation of the ammeter needle, or by a discharge indication. If this condition develops:

1. Alternator Switch - OFF MOMENTARILY, THEN ON (this resets overvoltage relay)

*If alternator-out condition persists:*

2. Alternator Switch - OFF
3. Nonessential Electrical Equipment - OFF to conserve battery power.

### **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.

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

### **CAUTION**

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

## **UNLATCHED DOOR IN FLIGHT**

If the cabin door is not locked it may come unlatched in flight. This may occur during or just after take-off. The door will trail in a position approximately 3 inches open.

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 when operating in the Normal Category. Intentional spins are also prohibited in the Utility Category unless the airplane is approved for spins and equipped with a spin kit, or if the airplane is approved for operation in the Acrobatic Category. Refer to Service Instructions No. 0619-090.

The airplane will not spin if orthodox entry is used, but will enter a spiral dive. Speed builds rapidly in a spiral dive, requiring high pullout loads. Therefore, if a spiral is inadvertently entered, recovery from the spiral is to be initiated within two turns.

## **ENTRY**

Stall the airplane with the control column hard back, throttle in idle position, flaps up, carburetor heat as required and with the nose about 15° above the horizon. At the stall, apply full rudder in the direction required to spin. A slight rudder application immediately before the stall will assure the direction of spin. The airplane nose will drop and rotate towards the applied rudder. When the wings are 90° to the horizon, apply full aileron against the



intended direction of spin. The airplane will go slightly inverted and enter a normal spin.

If aileron against the direction of spin is not applied or applied too late, the airplane will enter a rapid spiral dive, and recovery must be initiated by the second turn.

If the full back stick is not applied and held, the airplane may spiral. Again, recovery must be initiated not later than the second turn.

If aileron is applied too early, the airplane will not rotate and merely remain in a straight stalled condition.

## **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.

# **SECTION IV**

## **NORMAL PROCEDURES**

### **TABLE OF CONTENTS**

<i>SUBJECT</i>	<i>PAGE</i>
Speeds for Safe Operation.....	4-3
Preflight Inspection .....	4-4
Before Starting .....	4-5
External Power .....	4-6
Starting Engine Using Auxiliary Power Unit.....	4-7
Starting .....	4-7
After Starting, And Taxi .....	4-8
Before Takeoff .....	4-8
Takeoff.....	4-9
Climb .....	4-10
Cruise .....	4-10
Leaning Using the Exhaust Gas Temperature	
Indicator (EGT).....	4-10
Descent .....	4-11
Before Landing .....	4-11
Balked Landing .....	4-12
After Landing .....	4-12
Shutdown.....	4-12
Environmental Systems.....	4-12
Heating and Ventilation .....	4-12
Cold Weather Operation .....	4-13
Preflight Inspection.....	4-13
Engine.....	4-13
Icing Conditions .....	4-14
Engine Break-In Information .....	4-14
Noise Characteristics .....	4-15

**Section IV**  
**Normal Procedures**

**BEEHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

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**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section IV  
Normal Procedures**

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

**SPEEDS FOR SAFE OPERATION**

**Take-off**

Lift-off	65 Knots/75 mph
50 Ft.	74 Knots/85 mph

**Maximum Climb**

Best Rate ( $V_Y$ )	75 Knots/86 mph
Best Angle ( $V_X$ )	69 Knots/79 mph

**Cruise Climb**

82 Knots/95 mph

**Maximum Turbulent Air**

**Penetration**

118 Knots/136 mph

**Balked Landing**

64 Knots/74 mph

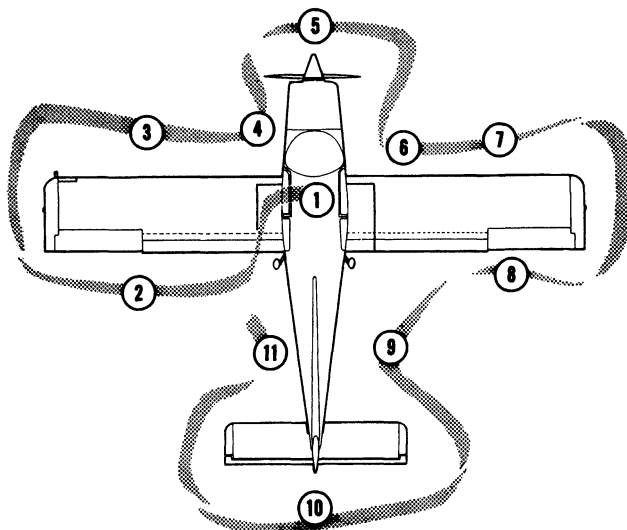
**Landing Approach**

68 Knots/78 mph

**Maximum Demonstrated**

**Crosswind**

17 Knots/20 mph



B19-604-10

**PREFLIGHT INSPECTION**

**1. CABIN:**

- a. Parking Brake - SET
- b. Control Lock - REMOVE
- c. All Switches - OFF
- d. Fuel Drain Tool (M-1971, M-1980 and after) - OBTAIN (See Section VIII for use) (See cabin door side pocket. This tool can be used for opening the oil and fuel filler caps.)

**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. 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. 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

**Section IV**  
**Normal Procedures**

**BEEHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

3. Parking Brake - SET
4. All Avionics - OFF
5. Circuit Breakers - IN
6. Flaps - UP
7. Light Switches - AS REQUIRED
8. Electric Stabilator Trim Switch - OFF (if installed)
9. Battery Switch - ON
10. Alternator Switch - ON (If external power is used, turn Alternator Switch - OFF)
11. Fuel Boost Pump - ON (Check for operation, then OFF)
12. Fuel Selector Valve - ROTATE thru 360° and check for freedom of movement; set on tank more nearly full (feel for detent and check visually)

**NOTE**

On serials M-2225 and after, or on airplanes which have complied with BEEHCRAFT S.I. No. 1095, a fuel selector stop has been added to the selector valve guard. The fuel selector stop minimizes the possibility of inadvertently turning the fuel selector valve to the OFF detent position. The stop is a spring which must be depressed before the selector valve handle can be rotated to the OFF position.

**WARNING**

Do not take off if either fuel quantity gage indicates in yellow arc.

**EXTERNAL POWER**

The following precautions shall be observed while using external power:

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

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

### **STARTING ENGINE USING AUXILIARY POWER UNIT**

1. Alternator, Electrical, and Avionics Equipment - OFF
2. Auxiliary Power Unit - CONNECT
3. Auxiliary Power Unit - SET OUTPUT (\*13.75 to 14.25 volts for 14-volt system and 27.75 to 28.25 volts for 28-volt system)
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**

#### *CAUTION*

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

1. Mixture - FULL RICH
2. Throttle - FAST IDLE position
3. Fuel Boost Pump - ON (cold weather starts, use eight to ten strokes of engine prime, as required)
4. Magneto/Start Switch - START position (release to BOTH position when engine fires)

#### *CAUTION*

**DO NOT PUMP THROTTLE TO START**

\*NOTE - M-1285 thru M-2178 are 14-volt systems. M-2179 and after are 28-volt systems.



*Flooded Engine:*

- a. Mixture - IDLE CUT-OFF
  - b. Throttle - FULL OPEN
  - c. Starter - ENGAGE (retard throttle to fast idle when engine fires)
  - d. Mixture - ADVANCE TO FULL RICH
5. Starter Engaged Warning Light (if installed) - EXTINGUISHED - CHECK; should be illuminated during start, and extinguished after start.

**CAUTION**

If the STARTER ENGAGED Warning Light is inoperative (or not installed), ensure that the ammeter indication is less than 25% of full charge at 1000 to 1200 rpm within two minutes with no additional electrical equipment on. If not, turn off the Battery Switch and Alternator Switch and do not take off.

6. External Power (if used) - OFF - DISCONNECT
7. ALT (alternator) switch - ON
8. Oil Pressure - ABOVE RED RADIAL WITHIN 30 SECONDS
9. Warm-up - 1000 to 1200 RPM
10. All Engine Indicators - CHECK
11. Fuel Boost Pump - OFF (for test of engine driven pump)
12. Parking Brakes - RELEASE

**AFTER STARTING, AND BEFORE TAXI**

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

**BEFORE TAKEOFF**

1. Seat Belts and Shoulder Harnesses - CHECK

**NOTE**

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

2. Parking Brake - SET
3. Avionics - CHECK
4. Engine Instruments - CHECK
5. Flight Instruments - CHECK AND SET
6. Starter Engaged Warning Light (if installed) - CHECK (should not be illuminated). If light is not installed or is inoperative, the ammeter indication should be less than 25% of full charge at 1000 to 1200 rpm and should show some decrease from the initial indication.
7. Throttle - 2200 RPM
8. Magnetos - CHECK at 2200 rpm, maximum drop of 125 rpm on each magneto, variance between individual magnetos should not exceed 50 rpm.
9. Carburetor Heat - CHECK (Set cold for takeoff)
10. Throttle - FAST IDLE
11. Stabilator Trim - TAKE-OFF RANGE (Green, White or Black Band)
12. Flaps - CHECK and SET
13. Flight Controls - CHECK PROPER DIRECTION AND FREEDOM OF MOVEMENT
14. Fuel Boost Pump - ON
15. Mixture - FULL RICH (or as required by field elevation) (tighten friction on push-pull type control)
16. Doors and Window - SECURE
17. Parking Brake - RELEASE
18. Instruments - CHECK (engine instruments in green range at the start of the takeoff run)

**TAKEOFF**

Takeoff ..... Full Throttle - 2700 RPM

1. Power - SET takeoff power and mixture before brake release.

**Section IV**  
**Normal Procedures**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

2. Airspeed - ACCELERATE to and maintain takeoff speed.
3. Airspeed - ESTABLISH DESIRED CLIMB SPEED when clear of obstacles.

**CLIMB**

**NOTE**

Do not turn Fuel Boost Pump off during climb.

1. Throttle - FULL FORWARD
2. Temperature - MONITOR
3. Mixture - LEAN AS REQUIRED FOR SMOOTH OPERATION

**CRUISE**

1. Power - SET AS DESIRED (Use tables in PERFORMANCE Section)
2. Fuel Boost Pump - OFF
3. 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. Carburetor Heat - FULL ON or FULL OFF, AS REQUIRED
3. Power - AS REQUIRED (avoid prolonged idle settings which may cause low cylinder head temperatures).
4. 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) (tighten friction on push-pull type control)
4. Fuel Boost Pump - ON
5. Landing Light - AS REQUIRED
6. Flaps - DOWN (maximum extension speed, 96 kts/110 mph)

### **NOTE**

The Flaps Up landing procedure will increase the Flaps Down landing distances (total over 50 foot obstacle) by 50%.

7. Airspeed - ESTABLISH LANDING APPROACH SPEED  
Flaps Down - 68 kts/78 mph  
Flaps Up - 80 kts/92 mph
8. Carburetor Heat - AS REQUIRED

**NOTE**

Carburetor heat should be in the full COLD (IN) position before full throttle application in the event of a go-around.

**BALKED LANDING**

1. Carburetor Heat - COLD
2. Power - FULL THROTTLE, 2700 RPM
3. Airspeed - 64 kts/74 mph until clear of obstacles, then trim to BEST RATE-OF-CLIMB
4. Flaps - UP

**AFTER LANDING**

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

**SHUTDOWN**

1. Brakes - SET
2. Fuel Boost Pump - OFF
3. Electrical and Avionics Equipment - OFF
4. Throttle - CLOSE
5. Mixture - IDLE CUT-OFF
6. Magneto/Start Switch - OFF, after engine stops
7. Battery Switch - OFF
8. Alternator Switch - OFF
9. Control Lock - INSTALL, if conditions warrant.
10. Install wheel chocks and release brakes if the airplane is to be left unattended.

**ENVIRONMENTAL SYSTEMS**

**HEATING AND VENTILATION**

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

## **COLD WEATHER OPERATION**

### **PREFLIGHT INSPECTION**

All accumulations of ice, snow and frost must be removed from the wings, tail, control surfaces and hinges, propeller, windshield, 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.

***CAUTION***

Do not pump throttle to start.

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 and engine sump 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.

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

**ICING CONDITIONS**

■ Flight in Icing Conditions Prohibited.

**ENGINE BREAK-IN INFORMATION**

See Systems Description section

## **NOISE CHARACTERISTICS**

Approach to and departure from an airport should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas. Avoidance of noise-sensitive areas, if practical, is preferable to overflight at relatively low altitudes.

For VFR operations over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas, pilots should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.

### **NOTE**

The preceding recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgement, an altitude of less than 2000 feet is necessary to adequately exercise his duty to see and avoid other airplanes.

Flyover noise level established in compliance with FAR 36 is:

73.3 dB(A)

No determination has been made by the Federal Aviation Administration that the noise level of this airplane is or should be acceptable or unacceptable for operation at, into, or out of any airport.





# **SECTION V**

## **PERFORMANCE**

### **TABLE OF CONTENTS**

<i>SUBJECT</i>	<i>PAGE</i>
Introduction to Performance and	
Flight Planning .....	5-3
Conditions .....	5-3
Comments Pertinent to the Use of	
Performance Graphs.....	5-7
Airspeed Calibration - Normal System .....	5-8
Airspeed Calibration - Alternate System .....	5-9
Altimeter Correction - Normal System.....	5-10
Altimeter Correction - Alternate System .....	5-11
Power Off Stall Speeds .....	5-12
Wind Components .....	5-13
Take-Off Distance - Hard Surface .....	5-14
Take-Off Distance - Grass Surface .....	5-15
Normal Climb .....	5-16
Time, Fuel, and Distance to Climb .....	5-17
Cruise Performance .....	5-18
Landing Distance - Hard Surface .....	5-20
Landing Distance - Grass Surface .....	5-21

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## **INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING**

The graphs and tables in this section present performance information for flight planning at various parameters of weight, power, altitude and temperature. Examples have been presented on 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 Stapleton International (DEN):

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..... 10,000 ft

Route of Trip

\*DEN-V4-GLD-V132-HUT-V73-ICT

For VFR Cruise at 9,500 feet

<b>ROUTE SEGMENT</b>	<b>AVG MAG CRS/AVG MAG VAR</b>	<b>DIST NM</b>	<b>WIND 9500 FEET DIR/KTS</b>	<b>OAT 9500 FEET °C</b>	<b>ALT SETTING IN.HG</b>
DEN-TXC	083°/12°E	80**	010/30	-5	29.60
TXC-GLD	093°/11°E	73	010/30	-5	29.60
GLD-HUT	105°/9°E	195	220/10	0	29.56
HUT-ICT	116°/8°E	33**	220/10	9	29.56

\*REFERENCE: Enroute Low Altitude Chart L-6

\*\*Includes distance between airport and VORTAC.

**Section V**  
**Performance**

**BEEHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

At Wichita Mid-Continent (ICT):

Outside Air Temperature ..... 25°C (77°F)  
Field Elevation..... 1332 ft  
Altimeter Setting..... 29.56 in. Hg  
Wind..... 180° at 10 kts  
Runway 19L Length ..... 7300 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:

$$29.92 - 29.60 = .32 \text{ in. Hg}$$

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

$$5330 + 320 = 5650 \text{ ft}$$

Pressure Altitude at ICT:

$$29.92 - 29.56 = .36 \text{ in. Hg}$$

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

$$1332 + 360 = 1692 \text{ ft}$$

**NOTE**

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

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section V  
Performance**

Enter the CRUISE PERFORMANCE table for 73 percent maximum continuous power (or full throttle) at 9500 feet:

ALTITUDE FEET	THROTTLE SETTING RPM	FUEL FLOW GPH	TAS KNOTS
9500	2662	10.5	123

Time and fuel used were calculated as follows:

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

$$\text{Fuel Used} = (\text{Time}) (\text{Fuel Flow})$$

Results are:

ROUTE SEGMENT	DISTANCE NM	EST GROUND SPEED KNOTS	TIME AT CRUISE ALTITUDE HRS: MIN	FUEL USED FOR CRUISE GAL
DEN-TXC	*65	117	:33	5.8
TXC-GLD	73	121	:36	6.3
GLD-HUT	195	125	1:34	16.4
HUT-ICT	33	124	:16	2.8

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

**Section V**  
**Performance**

**BEEHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**TIME - FUEL - DISTANCE**

ITEM	TIME HRS: MINS	FUEL GAL	DISTANCE NM
Start, Runup, Taxi and Take- off acceleration	0:00	1.3	0
Climb	0:11	2.0	15
Cruise	2:59	31.3	366
Total	3:10	34.6	381

Total Flight Time: 3 hours, 10 minutes

■ Block Speed:  $381 \text{ NM} \div 3 \text{ hours, 10 minutes} = 120 \text{ knots}$

Reserve Fuel (45 minutes at 57% maximum continuous power)

Enter the CRUISE POWER SETTINGS table for 57% MCP at 2300 RPM. The fuel flow at 57% MCP is 7.8 gallons per hour.

Reserve fuel = (45 min) (7.8 GPH) = 5.9 gallons

■ Total Fuel =  $34.6 + 5.9 = 40.5 \text{ gallons}$

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

Assumed ramp weight = 2450 lbs

■ Estimated fuel from DEN to ICT = (34.6 gal) (6 lbs/gal)  
= 208 lbs

■ Estimated landing weight =  $2450 - 208 = 2242 \text{ lbs}$

**COMMENTS PERTINENT TO THE USE OF  
PERFORMANCE GRAPHS**

1. Indicated airspeeds (IAS) were obtained by using the AIRSPEED CALIBRATION NORMAL SYSTEM Graph.
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)



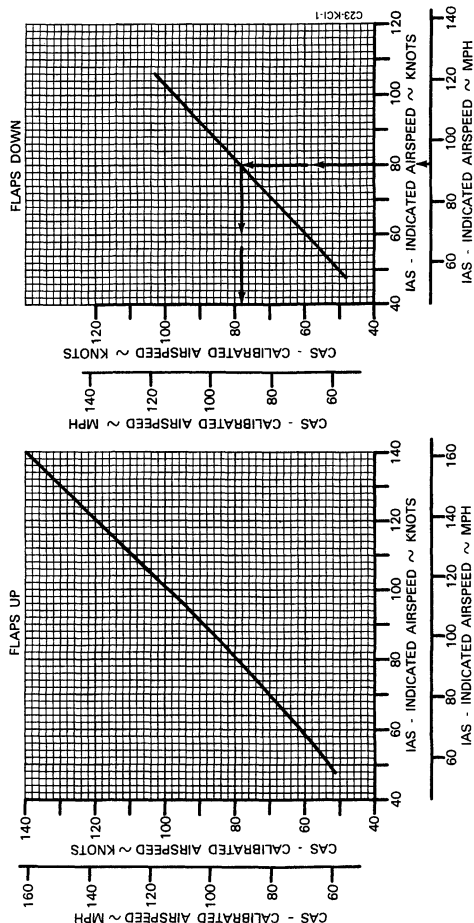
# Section V Performance

## BEECHCRAFT Sundowner 180 C23 (M-1285 and After)

### AIRSPEED CALIBRATION - NORMAL SYSTEM

NOTE: INDICATED AIRSPEED ASSUMES ZERO  
INSTRUMENT ERROR

EXAMPLE:  
FLAPS  
IAS  
CAS  
DOWN  
80 KTS  
80 KTS  
78 KTS



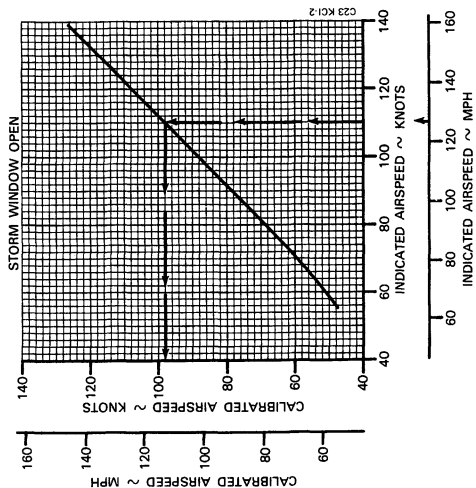
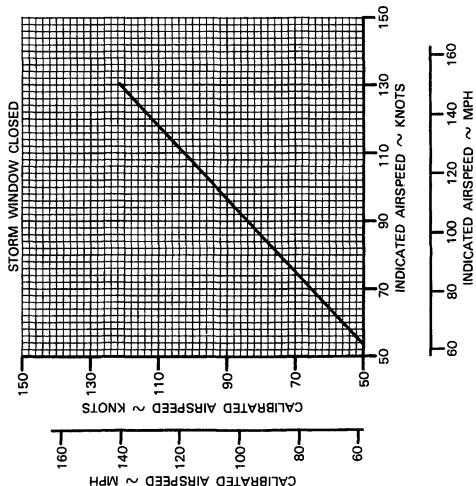
# **AIRSPEED CALIBRATION - ALTERNATE SYSTEM**

ALL FLAP POSITIONS

NOTE: INDICATED AIRSPEED ASSUMES ZERO  
 INSTRUMENT ERROR

EXAMPLE:

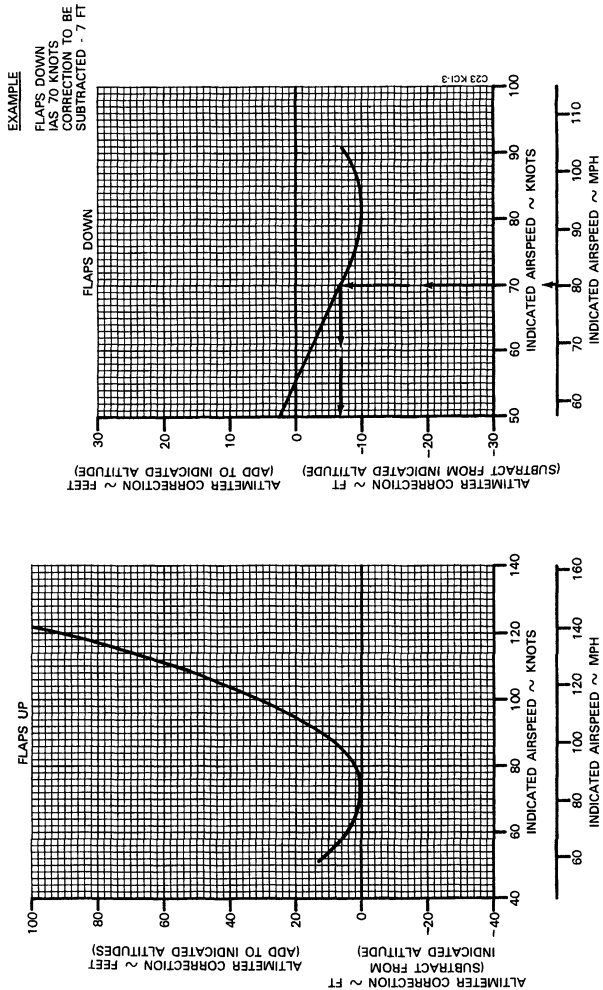
STORM WINDOW - OPEN  
 IAS - 110 KNOTS/126 MPH  
 CAS - 98 KNOTS/113 MPH

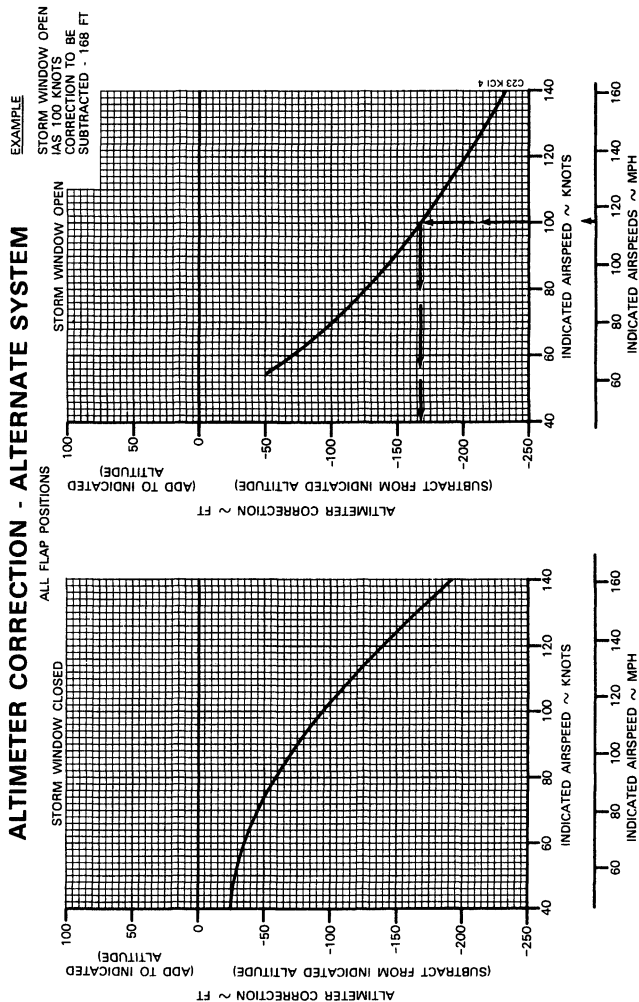


**Section V**  
**Performance**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**ALTITUDE CORRECTION - NORMAL SYSTEM**





**Section V**  
**Performance**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**POWER OFF STALL SPEEDS**

*(WEIGHT 2450 LBS)*

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

ANGLE OF BANK			
LEVEL	30°	45°	60°
FLAPS-UP			
72 mph 63 kts	77 mph 67 kts	85 mph 74 kts	101 mph 88 kts
FLAPS - DOWN (35°)			
59 mph 51 kts	63 mph 55 kts	70 mph 61 kts	83 mph 72 kts

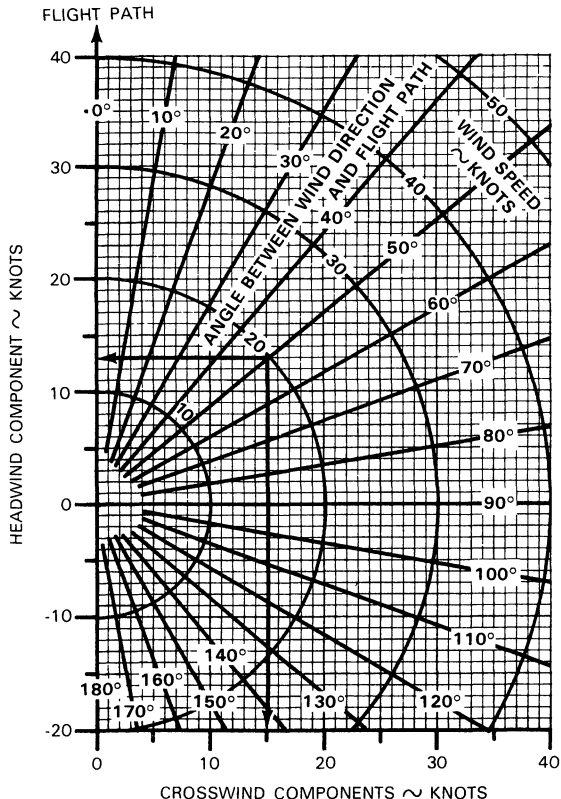
## WIND COMPONENTS

**Demonstrated Crosswind Component is 17kts/20mph**

### EXAMPLE:

WIND SPEED	20 KTS
ANGLE BETWEEN WIND DIRECTION AND FLIGHT PATH	50°

HEADWIND COMPONENT	13 KTS
CROSSWIND COMPONENT	15 KTS



**Section V**  
**Performance**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**TAKE-OFF DISTANCE — HARD SURFACE**

**ASSOCIATED CONDITIONS:**

POWER FULL THROTTLE  
MIXTURE LEAN TO MAXIMUM RPM, THEN ENRICH SLIGHTLY  
FLAPS UP  
RUNWAY LEVEL, DRY, HARD SURFACE  
WEIGHT 2450 LBS

**TAKE-OFF SPEEDS:**

LIFT OFF 65 KTS/75 MPH  
AT 50 FT 74 KTS/85 MPH

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL				2000 FT				4000 FT				6000 FT				8000 FT				
	OAT ° F	ROLL FEET	GROUND OVER 50 FT OBSTACLE FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	ROLL FEET	GROUND OVER 50 FT OBSTACLE FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	ROLL FEET	GROUND OVER 50 FT OBSTACLE FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	ROLL FEET	GROUND OVER 50 FT OBSTACLE FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	ROLL FEET	GROUND OVER 50 FT OBSTACLE FEET	TOTAL OVER 50 FT OBSTACLE FEET	
0	23 -5	917	1592	16 -9	1046	1805	9 -13	1195	2051	2 -17	1368	2334	-6 -21	1569	2662						
	41 5	1020	1767	34 1	1165	2007	27 -3	1333	2284	20 -7	1528	2604	13 -11	1756	2975						
	59 15	1130	1955	52 11	1293	2224	45 7	1481	2535	38 3	1701	2894	31 -1	1957	3311						
	77 25	1248	2155	70 21	1429	2455	63 17	1640	3087	56 13	1856	3204	49 9	2173	3671						
	95 35	1373	2369	88 31	1575	2701	81 27	1809	3087	74 23	2083	3535	67 19	2404	4055						
15	23 -5	728	1454	16 -9	836	1653	9 -13	961	1883	2 -17	1108	2149	-6 -21	1279	2456						
	41 5	813	1618	34 1	935	1842	27 -3	1077	2102	20 -7	1243	2402	13 -11	1438	2750						
	59 15	904	1793	52 11	1042	2045	45 7	1202	2336	38 3	1389	2674	31 -1	1609	3067						
	77 25	1003	1980	70 21	1156	2261	63 17	1336	2587	56 13	1546	2965	49 9	1793	3406						
	95 35	1107	2180	88 31	1279	2492	81 27	1479	2855	74 23	1714	3277	67 19	1990	3768						
30	23 -5	559	1337	16 -9	647	1523	9 -13	751	1739	2 -17	873	1988	-6 -21	1017	2278						
	41 5	628	1490	34 1	728	1700	27 -3	847	1944	20 -7	985	2227	13 -11	1149	2555						
	59 15	702	1654	52 11	816	1890	45 7	949	2164	38 3	1107	2483	31 -1	1292	2854						
	77 25	782	1829	70 21	910	2094	63 17	1060	2401	56 13	1237	2758	49 9	1446	3174						
	95 35	868	2017	88 31	1011	2311	81 27	1180	2653	74 23	1378	3052	67 19	1613	3518						

## TAKE-OFF DISTANCE - GRASS SURFACE

**ASSOCIATED CONDITIONS:**

POWER MIXTURE FLAPS RUNWAY WEIGHT

**TAKE-OFF SPEEDS:**

LIFT OFF	65 KTS/75 MPH
AT 50 FT	74 KTS/85 MPH
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
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86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

WIND COMPONENT	SEA LEVEL				2000 FT				4000 FT				6000 FT				8000 FT			
	OAT ° F ° C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET		OAT ° F ° C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET		OAT ° F ° C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET		OAT ° F ° C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET		OAT ° F ° C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	
0	23 -5	990	1685	16 -9	1129	1888	9 -13	1290	2146	2 -17	1477	2443	-6 -21	1693	2787					
	41 5	1101	1848	34 1	1258	2100	27 -3	1439	2391	20 -7	1650	2736	13 -11	1896	3115					
	59 15	1220	2045	52 11	1396	2327	45 7	1599	2653	38 3	1836	3030	31 -1	2113	3467					
	77 25	1347	2255	70 21	1543	2569	63 17	1771	2933	56 13	2036	3354	49 9	2346	3844					
	95 35	1482	2478	88 31	1700	2827	81 27	1954	3231	74 23	2249	3701	67 19	2595	4247					
15	23 -5	786	1512	16 -9	902	1720	9 -13	1038	1960	2 -17	1196	2237	-6 -21	1381	2558					
	41 5	978	1692	34 1	1009	1917	27 -3	1163	2187	20 -7	1342	2501	13 -11	1552	2865					
	59 15	977	1865	52 11	1125	2128	45 7	1298	2432	38 3	1500	2785	31 -1	1737	3195					
	77 25	1082	2060	70 21	1248	2353	63 17	1442	2693	56 13	1669	3088	49 9	1936	3548					
	95 35	1196	2268	88 31	1381	2594	81 27	1597	2972	74 23	1851	3413	67 19	2149	3927					
30	23 -5	603	1381	16 -9	699	1575	9 -13	811	1799	2 -17	943	2058	-6 -21	1098	2359					
	41 5	678	1540	34 1	786	1758	27 -3	914	2011	20 -7	1064	2305	13 -11	1240	2647					
	59 15	758	1710	52 11	881	1955	45 7	1025	2240	38 3	1195	2571	31 -1	1395	2957					
	77 25	845	1892	70 21	983	2166	63 17	1145	2495	56 13	1336	2856	49 9	1562	3289					
	95 35	935	2086	88 31	1092	2392	81 27	1273	2747	74 23	1488	3162	67 19	1741	3646					



**Section V**  
**Performance**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**NORMAL CLIMB**

ASSOCIATED CONDITIONS:

POWER FULL THROTTLE  
MIXTURE LEAN TO MAXIMUM RPM AND THEN  
ENRICH SLIGHTLY  
FLAPS UP

NOTE: HIGH HUMIDITY AND OR USE OF RICH MIXTURE HAS  
BEEN FOUND TO RESULT IN APPROXIMATELY 70 FPM  
LOSS IN RATE OF CLIMB FROM THAT SHOWN.

ANY AREA WITH LOW CLOUDS OR A DEWPOINT  
TEMPERATURE OF 60°F (16°C) OR HIGHER IS AN  
AREA OF HIGH HUMIDITY.

WEIGHT POUNDS	SEA LEVEL			4000 FEET			8000 FEET			12,000 FEET		
	OAT ° F	R/C FT/MIN	IAS KTS/MPH	OAT ° F	R/C FT/MIN	IAS KTS/MPH	OAT ° F	R/C FT/MIN	IAS KTS/MPH	OAT ° F	R/C FT/MIN	IAS KTS/MPH
2450	23 -5	841		9 -13	621		-6 -21	389		-20 -29	167	
	41 5	816		27 -3	596		13 -11	362		-2 -19	141	
	59 15	792	78/90	45 7	572	78/87	31 -1	338	74/85	16 -9	117	74/85
	77 25	769		63 17	549		49 9	315		34 1	94	
2200	95 55	747		81 27	527		67 19	293		52 11	72	
	23 -5	1047		9 -13	812		-6 -21	567		-20 -29	327	
	41 5	1021		27 -3	787		13 -11	539		-2 -19	302	
	59 15	997	76/88	45 7	763	74/85	31 -1	515	72/83	16 -9	277	72/83
2000	77 25	974		63 17	740		49 9	492		34 1	254	
	95 55	951		81 27	718		67 19	469		52 11	232	
	23 -5	1243		9 -13	994		-6 -21	735		-20 -29	478	
	41 5	1217		27 -3	969		13 -11	707		-2 -19	453	
2000	59 15	1193	75/86	45 7	945	72/83	31 -1	682	70/81	16 -9	428	70/81
	77 25	1169		63 17	922		49 9	659		34 1	405	
	95 55	1147		81 27	900		67 19	636		52 11	383	

# BEECHCRAFT Sundowner 180 C23 (M-1285 and After)

## Section V Performance

### TIME, FUEL, AND DISTANCE TO CLIMB

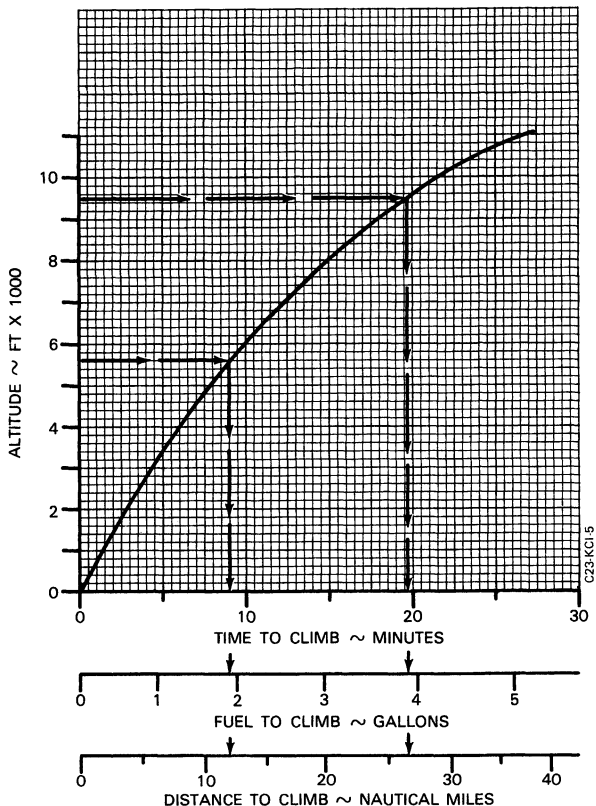
#### ASSOCIATED CONDITIONS

POWER FULL THROTTLE  
MIXTURE LEAN TO MAXIMUM RPM  
THEN ENRICH SLIGHTLY  
FLAPS UP  
WEIGHT 2450 LBS  
STANDARD DAY

#### EXAMPLE

AIRPORT PRESSURE ALTITUDE 5650 FT  
CRUISE ALTITUDE 9500 FT  
TIME TO CLIMB 20-9 = 11 MIN  
FUEL TO CLIMB 3.9-1.9 = 2 GAL  
DIST TO CLIMB 27-12 = 15 NM

78 KTS/90 MPH



**Section V**  
**Performance**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**CRUISE PERFORMANCE**  
**STANDARD DAY - 2350 LBS**

ALTITUDE FEET	POWER SETTINGS			TAS KTS/MPH	RANGE N.M. INITIAL FUEL ONBOARD (USABLE)	
	THROTTLE SETTINGS	BHP %	FUEL FLOW GAL/HR		37 GAL.	57 GAL.
	RPM					
2500	2700	88	13.2	126/145	283	475
	2500	73	10.4	116/134	330	555
	2300	60	8.2	106/122	377	633
3500	2700	86	12.8	126/145	290	484
	2500	71	10.1	116/133	337	567
	2300	59	8.1	105/121	379	638
4500	2700	84	12.5	126/145	298	497
	2500	70	9.8	116/133	346	581
	2300	59	8.0	105/121	381	641
5500	2696	82	12.0	126/145	308	517
	2500	68	9.6	116/133	352	593
	2300	58	7.9	104/120	382	644
6500	2688	79	11.6	125/144	318	534
	2500	67	9.4	115/132	359	606
	2300	58	7.9	103/119	379	640
7500	2680	77	11.2	124/143	324	546
	2500	66	9.2	115/132	365	616
	2300	57	7.9	102/117	378	638
8500	2670	75	10.8	124/143	335	564
	2500	65	9.0	114/131	368	623
	2300	57	7.8	101/116	373	631
9500	2662	73	10.5	123/141	342	577
	2500	64	8.8	114/131	371	629
	2300	57	7.8	100/115	368	623
10.500	2654	71	10.2	122/140	347	587
	2500	63	8.7	113/130	372	632
	2300	57	7.9	99/114	362	613

**NOTES:**

1. Range allows for start, taxi, climb, and a 45 minute reserve at 57% MCP @ 2300 RPM.
2. Cruise performance is based on best power mixture. Lean to maximum RPM for a given throttle setting.
3. It is recommended that use of tanks be alternated and that a fuel log be maintained showing time remaining in each tank.
4. Determination of in-flight fuel flow: Enter the table at the altitude nearest to the computed density altitude, and read the fuel flow for the TAS value presented that is nearest to the actual true airspeed.

**ASSOCIATED CONDITIONS:**

Pressure Altitude	4500 FEET
OAT	53°F
Indicated Airspeed	111 KTS

**EXAMPLE:**

Density Altitude*	5200 FEET
Actual True Airspeed*	121 KTS
Nearest Altitude on Table	5500 FEET
Interpolating Factor	.50
(121 KTS is 50% of the difference between 116 and 126 KTS)	

Fuel Flow	
$(12.0 - 9.6 = 2.4 \times .50 =$	
$1.2 + 9.6 = 10.8)$	10.8 gal/hr

\*Requires a Flight Computer.

**Section V  
Performance**

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**LANDING DISTANCE — HARD SURFACE**

ASSOCIATED CONDITIONS:

POWER IDLE  
MIXTURE RICH  
FLAPS 35°  
RUNWAY LEVEL, DRY, HARD SURFACE  
WEIGHT 2450 LBS

LANDING SPEEDS:

AT 50 FT 68 KTS/78 MPH  
TOUCHDOWN 61 KTS/70 MPH

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL					2000 FT					4000 FT					6000 FT					8000 FT				
	OAT ° F	° C	ROLL FEET	GROUND FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	° C	ROLL FEET	GROUND FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	° C	ROLL FEET	GROUND FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	° C	ROLL FEET	GROUND FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT ° F	° C	ROLL FEET	GROUND FEET	TOTAL OVER 50 FT OBSTACLE FEET
0	23	-5	654	1409	16	-9	693	1467	9	-13	735	1532	2	-17	780	1600	-6	-21	828	1672					
	41	5	678	1446	34	1	719	1509	27	-3	763	1575	20	-7	810	1644	13	-11	861	1724					
	59	15	703	1484	52	11	745	1548	45	7	791	1617	38	3	840	1691	31	-1	894	1776					
	77	25	727	1521	70	21	771	1587	63	17	819	1658	56	13	871	1740	49	9	926	1827					
	95	35	751	1558	88	31	798	1626	81	27	847	1703	74	23	901	1788	67	19	959	1882					
15	23	-5	496	1190	16	-9	530	1243	9	-13	567	1302	2	-17	607	1365	-6	-21	650	1431					
	41	5	518	1222	34	1	553	1280	27	-3	592	1342	20	-7	634	1407	13	-11	679	1476					
	59	15	539	1257	52	11	576	1317	45	7	617	1381	38	3	661	1448	31	-1	708	1520					
	77	25	560	1291	70	21	600	1354	63	17	642	1420	56	13	688	1489	49	9	737	1565					
	95	35	582	1326	88	31	623	1390	81	27	667	1458	74	23	715	1530	67	19	766	1614					
30	23	-5	361	1005	16	-9	390	1049	9	-13	421	1095	2	-17	456	1149	-6	-21	493	1211					
	41	5	379	1032	34	1	409	1078	27	-3	443	1127	20	-7	479	1188	13	-11	518	1252					
	59	15	397	1062	52	11	429	1107	45	7	464	1163	38	3	502	1226	31	-1	544	1293					
	77	25	416	1088	70	21	449	1138	63	17	486	1200	56	13	526	1254	49	9	569	1334					
	95	35	434	1114	88	31	469	1172	81	27	508	1235	74	23	550	1303	67	19	595	1375					

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**Section V**  
**Performance**

**LANDING DISTANCE - GRASS SURFACE**

ASSOCIATED CONDITIONS:

POWER Mixture  
 Flaps 35°  
 Runway  
 Weight 2450 LBS

IDLE

RICH

35°

SHORT, DRY, LEVEL GRASS SURFACE

2450 LBS

LANDING SPEEDS:

AT 50 FT

TOUCHDOWN

68 KTS/78 MPH

61 KTS/70 MPH

WIND COMPONENT DOWN RUNWAY KNOTS	SEA LEVEL				2000 FT				4000 FT				6000 FT				8000 FT			
	OAT °F	C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET	OAT °F	C	GROUND ROLL FEET	TOTAL OVER 50 FT OBSTACLE FEET
0	23	-5	765	1520	16	-9	810	1586	9	-13	859	1657	2	-17	912	1732	-6	-21	969	1812
	41	5	793	1562	34	1	841	1631	27	-3	892	1704	20	-7	948	1782	13	-11	1007	1870
	59	15	822	1603	52	11	872	1675	45	7	925	1751	38	3	983	1834	31	-1	1046	1927
	77	25	851	1644	70	21	903	1719	63	17	959	1797	56	13	1019	1888	49	9	1084	1985
15	23	-5	879	1685	88	31	933	1762	81	27	992	1847	74	23	1054	1941	67	19	1122	2045
	41	5	581	1274	16	-9	621	1333	9	-13	663	1399	2	-17	710	1468	-6	-21	760	1542
	59	15	606	1310	34	1	647	1374	27	-3	693	1442	20	-7	741	1515	13	-11	794	1591
	77	25	656	1387	52	11	674	1415	45	7	722	1486	38	3	773	1561	31	-1	828	1640
30	23	-5	681	1425	88	31	729	1496	81	27	780	1571	74	23	836	1652	67	19	887	1744
	41	5	422	1066	16	-9	456	1115	9	-13	493	1167	2	-17	533	1226	-6	-21	576	1294
	59	15	443	1097	34	1	479	1147	27	-3	518	1202	20	-7	560	1269	13	-11	606	1340
	77	25	465	1127	52	11	502	1180	45	7	543	1242	38	3	588	1312	31	-1	636	1385
	59	15	486	1157	70	21	526	1214	63	17	568	1282	56	13	615	1354	49	9	666	1431
	77	25	508	1187	88	31	549	1252	81	27	594	1321	74	23	643	1396	67	19	696	1476

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## **SECTION VI**

### **WEIGHT AND BALANCE/ EQUIPMENT LIST**

#### **TABLE OF CONTENTS**

<i>SUBJECT</i>	<i>PAGE</i>
Introduction To Weight And Balance .....	6-3
Weighing Instructions .....	6-4
Basic Weight And Balance Form .....	6-7
Weight And Balance Record .....	6-9
Weight And Balance Responsibilities .....	6-11
Gross Weight Moment Limits Graph .....	6-12
Gross Weight Moment Limits .....	6-12
Computing Procedure .....	6-15
Sample Weight And Balance Loading Form ..	6-16
Weight And Balance Loading Form .....	6-17
Useful Load Weights And Moments	
Occupants .....	6-18
Oil .....	6-19
Usable Fuel .....	6-19
Baggage .....	6-20
Equipment List .....	Provided For Each Airplane



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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

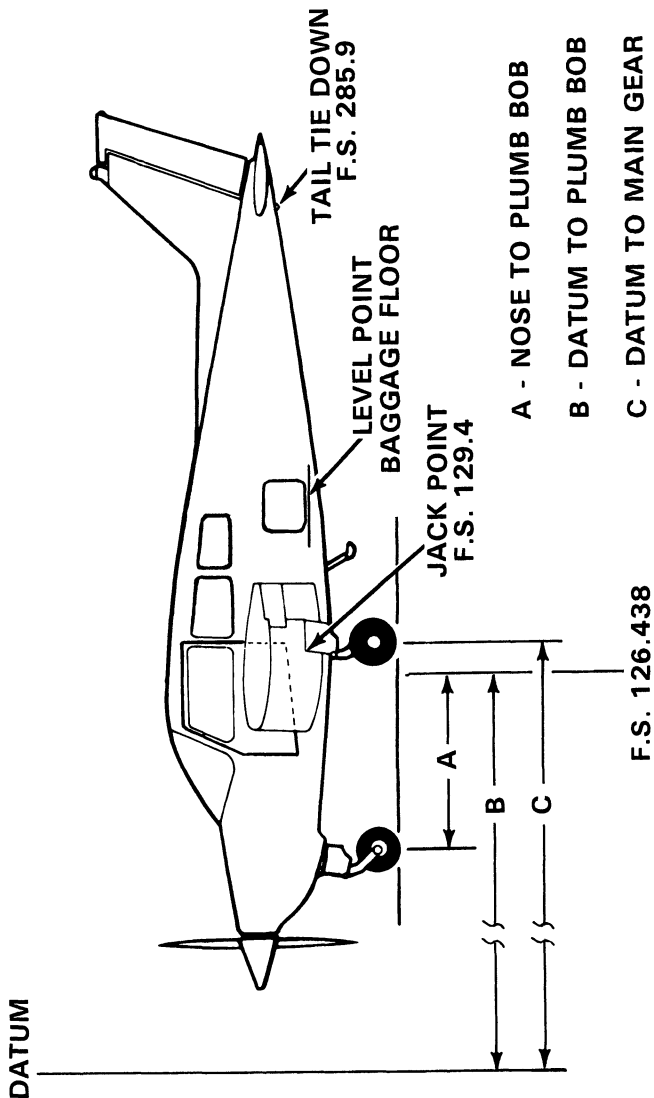
variable items which will comprise his useful load. These items which are of a changing nature are: Pilot and Passengers (computed on an individual weight and the seat occupied), Baggage and/or Cargo (computed on weight and location within the airplane), and Usable Fuel (the remaining fuel after subtracting 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. Provision for jack points are provided for weighing: two on the wing front spar at Fuselage Station 129.4 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: 6 lbs (M-1285 thru M-1516) at Fuselage Station 125.0. 45.6 lbs (M-1517 thru M-1879 except M-1875 or prior airplanes after compliance with Service Instructions No. 0624-281) at Fuselage Station 125.0. 15.6 lbs (M-1875, M-1880 & After) 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 48.
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. 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 134.0 for main wheels and Fuselage Station 58.5 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.



BASIC EMPTY WEIGHT AND BALANCE

MODEL \_\_\_\_\_ SER. NO. \_\_\_\_\_ REG. NO. \_\_\_\_\_ DATE \_\_\_\_\_  
JACK POINT LOCATION  
FORWARD 129.4  
AFT \_\_\_\_\_  
Company \_\_\_\_\_  
Signature \_\_\_\_\_  
PREPARED BY \_\_\_\_\_

REACTION	SCALE READING	TARE	NET WEIGHT	ARM	MOMENT
WHEEL - JACK POINTS					
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	48.0	720
UNUSABLE FUEL					
(M-1285 thru M-1516)			6.0	125.0	750
(M-1517 thru M-1879 except M-1875 or prior airplanes after compliance with S.I. No. 0624-281)			45.6	125.0	5700
(M-1875, M-1880 and after)			15.6	125.0	1950
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-weighted 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.

## Section VI

### Wt and Bal/Equip List

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## BEEHCRAFT Sundowner 180 C23 (M-1285 and After)

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## **WEIGHT AND BALANCE RESPONSIBILITIES**

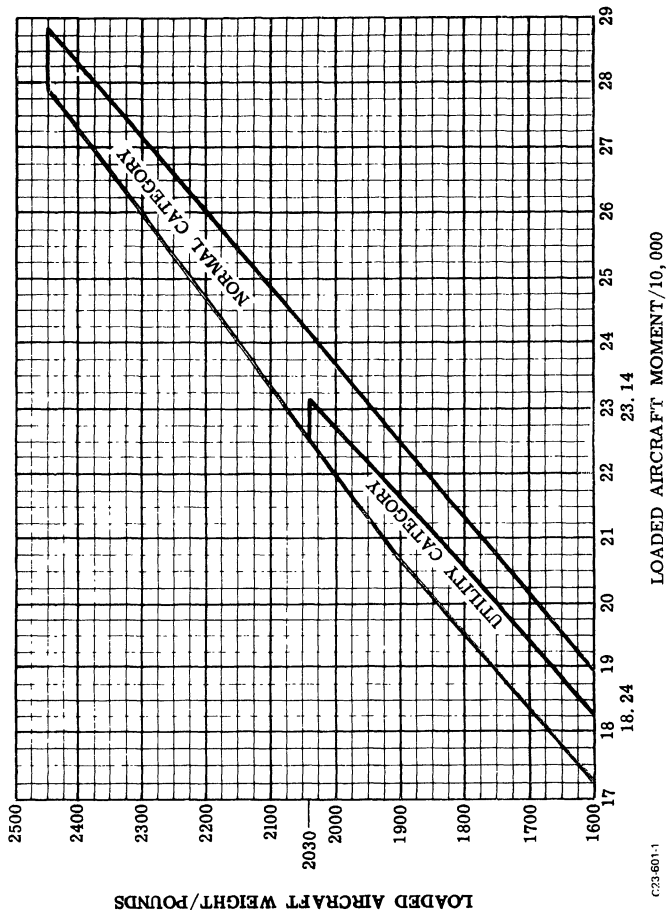
The Basic Empty Weight and Moment of the airplane at the time of delivery are shown on the airplane Basic Empty Weight and Balance form. Useful load items which may be loaded into the airplane are shown on the Useful Load Weights and Moments tables. The minimum and maximum moments are shown on the Moment 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.

### **NOTE**

**THE FLOOR STRUCTURE LOAD LIMIT IS  
100 POUNDS PER SQUARE FOOT.**

**ALL BAGGAGE/CARGO MUST BE SECURED.**

# GROSS WEIGHT MOMENT LIMITS GRAPH



**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**Section VI**  
**Wt and Bal/Equip List**

**GROSS WEIGHT MOMENT LIMITS**

(NORMAL CATEGORY)

Gross Weight	Minimum Moment 100	Maximum Moment 100	Gross Weight	Minimum Moment 100	Maximum Moment 100	Gross Weight	Minimum Moment 100	Maximum Moment 100
1500	1617	1775	1900	2068	2248	2300	2599	2721
1510	1628	1786	1910	2081	2260	2310	2613	2733
1520	1639	1798	1920	2094	2271	2320	2626	2745
1530	1649	1810	1930	2107	2283	2330	2640	2756
1540	1660	1822	1940	2120	2295	2340	2654	2768
1550	1671	1834	1950	2133	2307	2350	2668	2780
1560	1682	1845	1960	2145	2319	2360	2681	2792
1570	1692	1857	1970	2158	2331	2370	2695	2804
1580	1703	1869	1980	2172	2342	2380	2708	2816
1590	1714	1881	1990	2185	2354	2390	2722	2827
1600	1725	1893	2000	2198	2366	2400	2736	2839
1610	1736	1905	2010	2211	2378	2410	2750	2851
1620	1746	1916	2020	2224	2390	2420	2764	2863
1630	1757	1928	2030	2237	2401	2430	2777	2875
1640	1768	1940	2040	2250	2413	2440	2791	2887
1650	1779	1952	2050	2263	2425	2450	2805	2898
1660	1789	1964	2060	2276	2437			
1670	1800	1976	2070	2290	2449			
1680	1811	1987	2080	2303	2461			
1690	1822	1999	2090	2316	2472			
1700	1833	2011	2100	2329	2484			
1710	1843	2023	2110	2343	2496			
1720	1854	2035	2120	2356	2508			
1730	1865	2047	2130	2369	2520			
1740	1876	2058	2140	2383	2532			
1750	1887	2070	2150	2396	2543			
1760	1897	2082	2160	2409	2555			
1770	1908	2094	2170	2423	2567			
1780	1919	2106	2180	2436	2579			
1790	1930	2118	2190	2450	2591			
1800	1940	2129	2200	2463	2603			
1810	1953	2141	2210	2477	2614			
1820	1966	2153	2220	2490	2626			
1830	1978	2165	2230	2504	2638			
1840	1991	2177	2240	2517	2650			
1850	2004	2189	2250	2531	2662			
1860	2017	2200	2260	2544	2674			
1870	2029	2212	2270	2558	2685			
1880	2042	2224	2280	2572	2697			
1890	2055	2236	2290	2585	2709			

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

**NORMAL CATEGORY**

**WEIGHT CONDITION**

2450 lbs (max take-off or landing)  
 1800 lbs or less

**FWD CG LIMIT**

114 5  
 107 8

**AFT CG LIMIT**

118 3  
 118.3

**Section VI**  
**Wt and Bal/Equip List**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**GROSS WEIGHT MOMENT LIMITS**

(UTILITY CATEGORY &  
ACROBATIC CATEGORY)

Gross Weight	Minimum Moment 100	Maximum Moment 100	Gross Weight	Minimum Moment 100	Maximum Moment 100
1500	1617	1710	1800	1940	2052
1510	1628	1721	1810	1953	2063
1520	1639	1733	1820	1966	2075
1530	1649	1744	1830	1978	2086
1540	1660	1756	1840	1991	2098
1550	1671	1767	1850	2004	2109
1560	1682	1778	1860	2017	2120
1570	1692	1790	1870	2029	2132
1580	1703	1801	1880	2042	2143
1590	1714	1813	1890	2055	2155
1600	1725	1824	1900	2068	2166
1610	1736	1835	1910	2081	2177
1620	1746	1847	1920	2094	2189
1630	1757	1858	1930	2107	2200
1640	1768	1870	1940	2120	2212
1650	1779	1881	1950	2133	2223
1660	1789	1892	1960	2145	2234
1670	1800	1904	1970	2158	2246
1680	1811	1915	1980	2172	2257
1690	1822	1927	1990	2185	2269
1700	1833	1938	2000	2198	2280
1710	1843	1949	2010	2211	2291
1720	1854	1961	2020	2224	2303
1730	1865	1972	2030	2237	2314
1740	1876	1984			
1750	1887	1995			
1760	1897	2006			
1770	1908	2018			
1780	1919	2029			
1790	1930	2041			

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

**UTILITY CATEGORY & ACROBATIC CATEGORY**

WEIGHT CONDITION	FWD CG LIMIT	AFT CG LIMIT
2030 lbs (max take-off or landing)	110.2	114.0
1800 lbs or less	107.8	114.0

## **COMPUTING PROCEDURE**

1. Record the Basic Empty Weight and Moment from the Basic Empty Weight and Balance form (or from the latest superseding form) under the Basic Empty Condition block. The moment must be divided by 100 to correspond to Useful Load Weights and Moments tables.
2. Record the weight and corresponding moment from the appropriate table of each of the useful load items (except fuel) to be carried in the airplane.
3. Total the weight column and moment column. The SUB-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.

**Section VI**  
**Wt and Bal/Equip List**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

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** C23 **DATE** \_\_\_\_\_

**SERIAL NO.** M-XXXX **REG NO.** NXXX

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION	1500	1650
2. FRONT SEAT OCCUPANTS	340	374
3. 3rd & 4th SEAT OCCUPANTS	340	482
4. BAGGAGE OR CARGO	40	67
5. <b>SUB TOTAL</b> ZERO FUEL CONDITION	2220	2573
6. FUEL LOADING (37 GAL)	222	259
7. <b>SUB TOTAL</b> RAMP CONDITION	2442	2832
8. *LESS FUEL FOR TAXI, AND TAKE-OFF	-5	-6
9. <b>SUB TOTAL</b> TAKE-OFF CONDITION	2437	2826
10. LESS FUEL TO DESTINATION (25 GAL)	-150	-176
11. <b>LANDING CONDITION</b>	2287	2650

\*Fuel for start, taxi and take-off is normally 5 lbs at an average mom/100 of 6.

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section VI  
Wt and Bal/Equip List**

**WEIGHT AND BALANCE LOADING FORM**

**MODEL** \_\_\_\_\_ **DATE** \_\_\_\_\_

**SERIAL NO.** \_\_\_\_\_ **REG NO.**   NXXX  

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

\*Fuel for start, taxi and take-off is normally 5 lbs at an average mom/100 of 6.



# USEFUL LOAD WEIGHTS AND MOMENTS

## OCCUPANTS

WEIGHT	FRONT SEATS				3RD AND 4TH SEATS	
	*FWD POS.		*AFT POS.		BENCH SEAT	SPLIT SEAT
	††ARM	†ARM	†ARM	ARM	ARM	ARM
	**104	**105	**112	**112	**142	**144
	MOM	MOM	MOM	MOM	MOM	MOM
120	125	126	134	170	170	173
130	135	137	146	185	185	187
140	146	147	157	199	199	202
150	156	158	168	213	213	216
160	166	168	179	227	227	230
170	177	179	190	241	241	245
180	187	189	202	256	256	259
190	198	200	213	270	270	274
200	208	210	224	284	284	288

†Effective M-1285 thru M-2006

††Effective M-2007 and after

\*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**

**OIL**

(Included in Basic Empty Weight)

<b>ARM 48</b>		
<b>QTS</b>	<b>WT</b>	<b>MOMENT/100</b>
8	15	7

**USABLE FUEL**

<b>ARM 117</b>		
<b>GALLONS</b>	<b>WEIGHT</b>	<b>MOMENT/100</b>
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
55	330	386
57	342	400
58	348	407

**USEFUL LOAD WEIGHTS AND MOMENTS**

**BAGGAGE**

<b>ARM 167</b>	
<b>WEIGHT</b>	<b>MOMENT 100</b>
10	17
20	33
30	50
40	67
50	84
60	100
70	117
80	134
90	150
100	167
110	184
120	200
130	217
140	234

## **SECTION VII**

### **SYSTEMS DESCRIPTION**

#### **TABLE OF CONTENTS**

<i>SUBJECT</i>	<i>PAGE</i>
Airframe .....	7-5
Seating Arrangements .....	7-5
Flight Controls	
Control Surfaces .....	7-5
Control Column .....	7-5
Rudder Pedals .....	7-5
Stabilator Trim System	
Manual Trim .....	7-6
Electric Trim .....	7-6
Instrument Panel .....	7-6
Switches .....	7-6
Illustration (M-1285 thru M-1375) .....	7-7
Illustration (M-1376 thru M-1454) .....	7-8
Illustration (M-1455 thru M-1979 except M-1971) .....	7-9
Illustration (M-1971, M-1980 and after) .....	7-10
Circuit Breakers .....	7-11
Flight Instruments .....	7-11
Ground Control .....	7-11
Wing Flaps	
Manual .....	7-12
Electric .....	7-12
Landing Gear .....	7-13
Brakes .....	7-13

**TABLE OF CONTENTS (Continued)**

<i>SUBJECT</i>	<i>PAGE</i>
Baggage Compartment.....	7-14
Seats, Seat Belts, and Shoulder Harnesses	
Seat Adjustment.....	7-14
Seat Belts.....	7-14
Shoulder Harnesses.....	7-15
Doors and Exits	
Forward Cabin Doors .....	7-15
Aft Baggage Door.....	7-16
Control Locks.....	7-16
Engine .....	7-17
Engine Controls.....	7-17
Engine Instruments .....	7-18
Vertical Readout Type .....	7-18
Dial Type .....	7-18
Exhaust Gas Temperature Indicator (EGT).....	7-18
Engine Break-in Information.....	7-18
Cowling .....	7-19
Lubrication System.....	7-19
Carburetor Heat .....	7-19
Starter .....	7-20
Propeller .....	7-20
Fuel System.....	7-20
Fuel Tanks .....	7-21
Fuel Drains.....	7-21
Fuel System Schematic.....	7-22
Fuel Quantity Indicators .....	7-21
Fuel Boost Pump.....	7-23
Engine Primer .....	7-23
Fuel Tank Selection.....	7-23
Fuel Required For Flight.....	7-24
Electrical System .....	7-24
Battery.....	7-24

**TABLE OF CONTENTS (Continued)**

<i>SUBJECT</i>	<i>PAGE</i>
Alternator .....	7-25
External Power Receptacle .....	7-26
Lighting Systems	
Interior Lighting .....	7-28
Exterior Lighting .....	7-28
Environmental Systems	
Environmental Schematic .....	7-29
Cabin Heating .....	7-30
Ventilation .....	7-30
Exhaust Vent.....	7-31
Pitot and Static Systems	
Pitot System .....	7-31
Pitot Heat.....	7-31
Normal Static Air System.....	7-31
Emergency Static Air System .....	7-32
Vacuum System.....	7-32
Stall Warning System.....	7-32

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## **AIRFRAME**

The BEECHCRAFT Sundowner C23 is a four place, single-engine landplane with non-retractable landing gear and is powered by an Avco Lycoming four-cylinder, horizontally opposed engine with a fixed pitch propeller.

## **SEATING ARRANGEMENTS**

In the standard configuration two adjustable seats and one fixed-bench seat are installed. Optional split 3rd and 4th seats are available. To adjust either of the front seats, pull the release knob 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 all individual seats can be placed in any of three positions. Outboard armrests for the front seats are attached to the cabin doors.

## **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. These are provided for stabilator and aileron control.

### **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 both front seats.



## **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 trim system is controlled by the ON-OFF switch located on the instrument panel, a thumb switch on the control wheel and a circuit breaker on the right subpanel. The ON-OFF switch must be on 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.

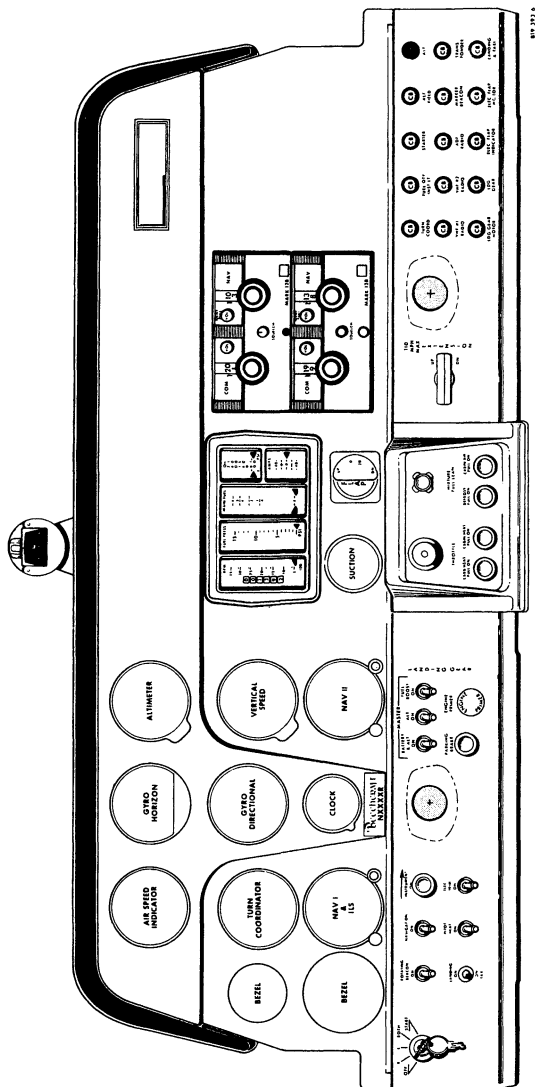
## **INSTRUMENT PANEL**

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.

### **SWITCHES**

The Battery, Alternator, 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. (See page 1-9 for battery switch description.)

**TYPICAL INSTRUMENT PANEL**

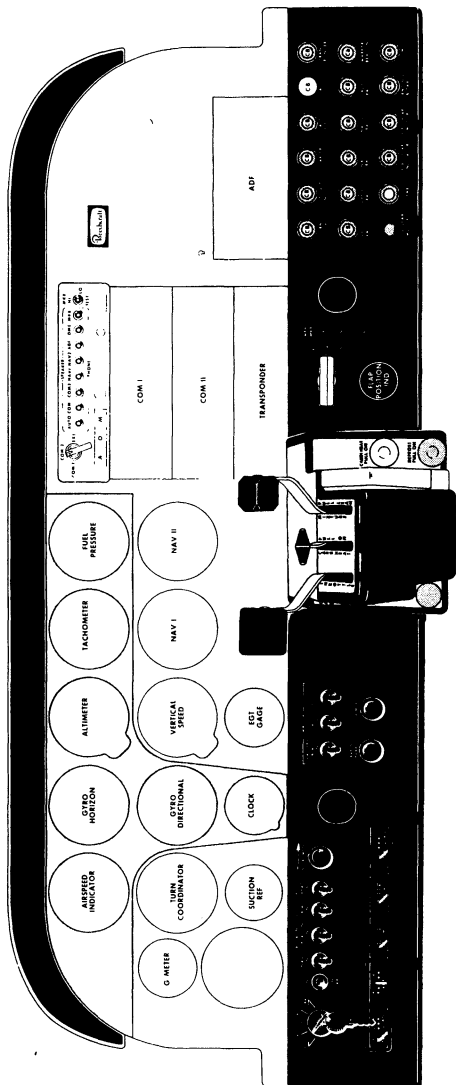


*M-1285 thru M-1375*

## BEECHCRAFT Sundowner 180 C23 (M-1285 and After)

*M-1376 thru M-1454*

**TYPICAL INSTRUMENT PANEL**



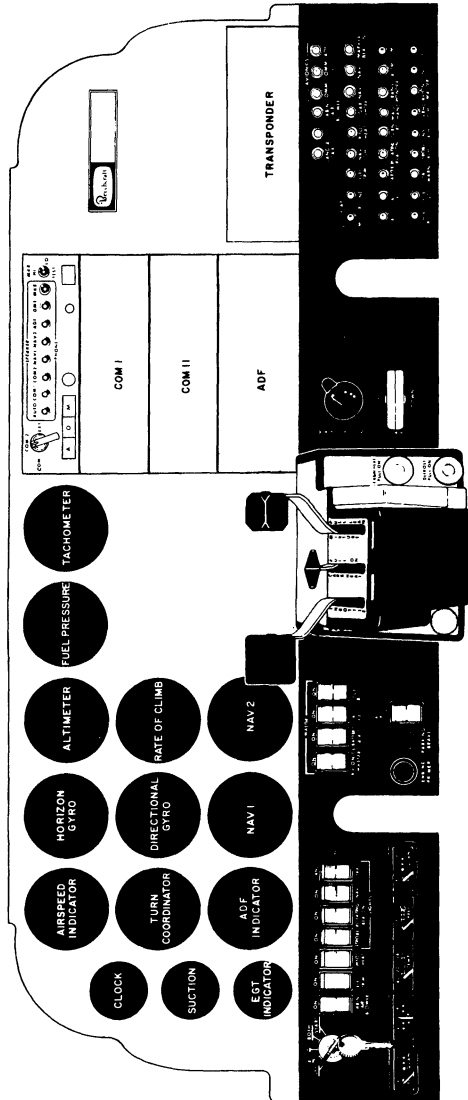
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*M-1455 thru M-1979 except M-1971*

Section VII  
Systems Description

BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)

TYPICAL INSTRUMENT PANEL



*(M-1971, M-1980 and after)*

### **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.

#### *M-1285 through M-1979 except M-1971:*

Instrument lights are turned on and dimmed by a rheostat switch located on the left subpanel, and a rheostat switch located below the power quadrant.

#### *M-1971, M-1980 and after:*

Instrument lights are turned on and dimmed by two rheostat switches located on the pedestal, below the power quadrant.

### **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 40° ± 2° right or left, and 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 23 feet 11 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 has markings for UP, 10 DEGREES, 20 DEGREES and DOWN. The indicator is located adjacent to the power quadrant.

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.

### ***CAUTION***

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

## **LANDING GEAR**

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

The gears are identical except for the pivoting and steering provisions on the nose gear and the brake attachment points on the main gear.

The nose wheel is steerable through a spring loaded linkage connected to the rudder pedals and has a maximum travel of  $40^{\circ} \pm 2^{\circ}$  in either direction. A hydraulic damper on the nose wheel strut compensates for any tendency to shimmy. Toe brakes will aid in steering the airplane on the ground.

## **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.



## **BAGGAGE COMPARTMENT**

A 19.5 cubic-foot baggage space is located behind the rear seat. 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**

Unless authorized by applicable Department of Transportation Regulations, do not carry hazardous material anywhere in the airplane.

### **WARNING**

Do not carry children in the baggage compartment unless secured in a seat.

## **SEATS, SEAT BELTS, AND SHOULDER HARNESSSES**

### **SEAT ADJUSTMENTS**

To adjust either of the front seats, pull up on the release bar below the left hand seat corner and slide the seat forward or aft, as desired. Make certain the seat is locked securely in place after adjustment. The backs of all individual seats can be placed in any of four positions. 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 HARNESSES**

The shoulder harness is a standard installation for all seats and should be used with the seats in the upright position. The spring loading at the inertia reel keeps the harness snug, but will allow normal movement during flight operations. The inertia reel is designed with a locking device that will secure the harness in the event of sudden forward movement or an impact action. The strap is worn over the shoulder and down across the body where it is fastened by a metal loop to the seat belt buckle. The inertia reels for the front and rear seats are attached to the lower cabin sidewall structure at the aft edge of the respective seat. The inertia reel is covered with an escutcheon, and the strap runs up from the reel to a looped fitting attached to the window frame just aft of the seat. For stowing these shoulder harness straps, stowage attach points are provided adjacent to the inertia reel on the cabin sidewall.

### **NOTE**

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

### **WARNING**

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 (standard on serials M-1362 and after) 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 out-

side, 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. On serials M-1285 thru M-1412 and M-1415, M-1419, M-1423, M-1439 and M-1447 a second door latch is installed on the upper aft door frame which must be rotated to the locked position. 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 BAGGAGE DOOR**

A baggage door, aft of the cabin door on either the left or right side of the fuselage, is provided for loading cargo into the aft cabin. To open the door on the right side from the outside, use the key provided to turn the cam lock. To open the door on the left side from the outside, grasp the flush handle and pull until the door opens. To open the right door from the inside, rotate handle counter clockwise until door opens. This right door lock can be locked with a key.

#### **CONTROL LOCKS**

A control lock is provided with the loose tools, to prevent movement of the control column and impairs access to the magnet/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 Sundowner C23 is powered by a Lycoming O-360-A2G, O-360-A4G, O-360-A4J, or O-360-A4K four-cylinder, horizontally opposed engine, rated at 180 horsepower at 2700 rpm.

Normal operating engine speed range is 1800 to 2700 rpm with a restricted operating range between 2150 and 2350 rpm, for the O-360-A2G engine only.

## **ENGINE CONTROLS**

The engine controls are centrally located for ease of operation from either the left or right seats. The throttle on the power quadrant incorporates both a locking button and a vernier arrangement for fine adjustments. The mixture control is locked with a clockwise turn of the friction nut located on the forward side of the knob.

When the engine controls are installed in the pedestal arrangement, the levers are grouped along the upper face of the pedestal. Their knobs are shaped to government standard configuration so they can be identified by touch. A single controllable friction lock on the right side of the console permits manual adjusting of the pressure on the levers.

## **ENGINE INSTRUMENTS**

### ***VERTICAL READOUT TYPE***

The engine instruments are the vertical readout type. The instrument cluster is installed in the panel directly above the engine controls. The cluster includes a tachometer with hourmeter, fuel pressure indicator, a left and a right fuel quantity indicator, an oil temperature and oil pressure indicator and an ammeter.

### ***DIAL TYPE***

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 fuel pressure indicator are located on the upper center of the instrument panel.

### ***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.

## **CARBURETOR HEAT**

There is a possibility of ice forming in the induction system under certain moist atmospheric conditions. Generally ice may form in the vicinity of the carburetor butterfly and may build up enough that a drop in power output could result. The induction installation is equipped with a system for preheating the incoming air to the carburetor. The air preheater is essentially a tube or jacket through which the exhaust pipe from one or more cylinders is passed, and the air flowing over these surfaces is heated. A push-pull control located on the power quadrant or the center lever on the pedestal, actuates a diverter gate which allows the hot air to mix with the cold air in the induction chamber before it enters the carburetor. For fur-

ther information concerning the use of carburetor heat consult engine manufacturer's operating manual.

## **STARTER**

A 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. Battery switch and alternator switch are grouped on the subpanel to the right of the pilot's control column.

The warning light placarded STARTER ENGAGED (M-2278 and after) illuminates whenever electrical power is being supplied to the starter. If the light remains illuminated after starting, the starter relay has remained engaged, and loss of electrical power and possible equipment damage will eventually result. Turn the Battery Switch and Alternator Switch OFF. If in flight, land as soon as practical. If the light does not illuminate during starting, the indicator system is inoperative and the ammeter must be monitored to ensure that the starter does not remain energized after releasing the magneto/start switch.

## **PROPELLER**

Sensenich M76EMMS-O-60 or 76EM8S5-O-60 fixed pitch, two blade propeller. Static rpm at maximum permissible throttle settings: Not over 2350 rpm and not under 2250 rpm. No additional tolerance permitted.

## **FUEL SYSTEM**

The airplane is designed for operation on 91/96 (Blue) grade aviation gasoline. In the event this grade is not

available, 100 (Green) or 100LL (Blue) grade aviation gasolines may be used.

### **CAUTION**

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

### **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 DRAINS**

Two tank sump drains extend through the bottom of the wing skins, near the fuselage. M-1971, M-1980 and after have flush-type drain valves. The system low spot drain is incorporated in the fuel strainer on the lower right side of the fuselage aft of the nose wheel. Sump drains provide a means to visually inspect the fuel for water or contaminants.

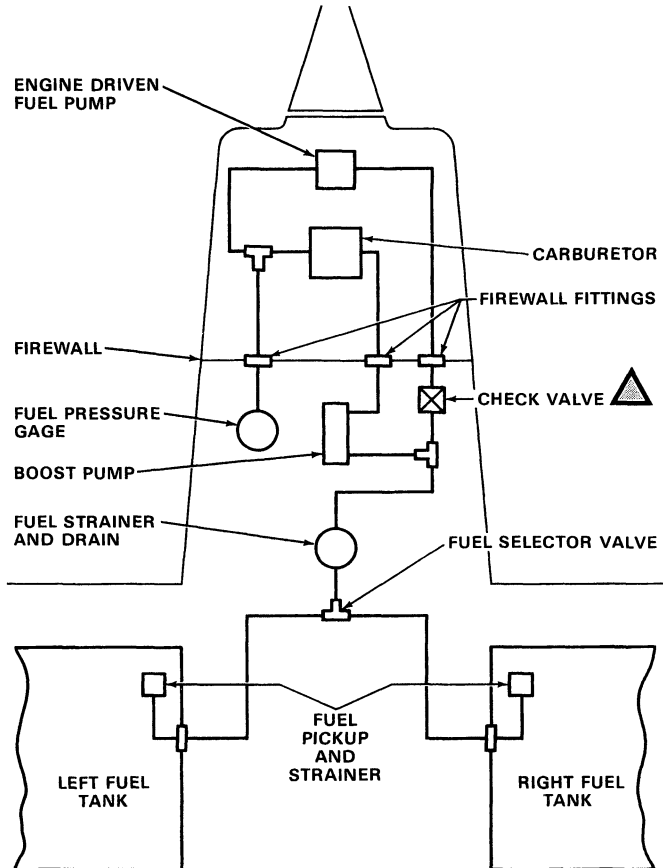
Refer to HANDLING, SERVICING AND MAINTENANCE Section for procedures describing how and when to use fuel tank sump drains.

### **FUEL QUANTITY INDICATORS**

Fuel quantity is measured by a float operated sensor, located in each wing tank system. These transmit electrical



FUEL SYSTEM SCHEMATIC



EFFECTIVE M-1820, M-1837, M-1842, M-1845, M-1853, M-1854, M-1856, M-1860, M-1861, M-1862, M-1865, M-1866, M-1869, M-1871 AND AFTER.

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 is controlled by an ON-OFF switch on the pilot's subpanel. It provides pressure for starting, taxiing, takeoff, climb, landing and emergency operation in cruise configuration. Immediately after starting the fuel boost pump should be turned off to test the engine driven fuel pump.

#### **ENGINE PRIMER**

The control for the engine primer is located directly below the master switches on the left subpanel. It is used to inject raw fuel into the induction system for cold starts. After use, secure the primer by turning it to lock it in the off position.

#### **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.

#### **NOTE**

On serials M-2225 and after, or on airplanes which have complied with BEECHCRAFT S.I. No. 1095, a fuel selector stop has been added to the selector valve guard. The fuel selector stop minimizes the possibility of inadvertently turning the fuel selector valve to the OFF detent position. The stop is a spring which must be depressed before the selector valve handle can be rotated to the OFF position.

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, alternator, 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, on serials M-1285 thru M-1979, there is an inline 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. There is also a fuse on the left side of the quadrant pedestal for the electric clock (if installed), or an inline fuse near the battery box.

## **BATTERY**

### **14-VOLT SYSTEM**

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

### *28-VOLT SYSTEM*

One 24-volt battery, or two 12-volt batteries in series, are located in the aft fuselage. The two 12-volt batteries in series are of a shape and size such that both will fit in the same battery compartment which is provided for the 24-volt battery. Battery servicing procedures are described in the HANDLING, SERVICING AND MAINTENANCE Section.

### **ALTERNATOR**

#### *14-VOLT SYSTEM*

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 (FIELD) 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 (FIELD) switch position.

The alternator-field circuit breaker and alternator-output circuit breaker are located on the right subpanel (serials M-1285 through M-2130). On airplanes M-2131 through M-2178 (and M-1491 through M-2130 with installation of Beech Kit No. 23-3009-1 S) the alternator circuit is protected by an alternator-field circuit breaker on the right subpanel, and an alternator-output current limiter on the firewall.

### *28-VOLT SYSTEM*

The 28-volt alternator is rated at 70 amps nominal output at cruise engine rpm. A self-exciting feature provides for activation of the alternator independent of battery power when the engine reaches a speed of 1200 to 1500 rpm. A switch on the pilot's subpanel placarded ALT FIELD controls the alternator circuit. Circuit breakers for the alternator 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**

The external power receptacle is optional on this airplane.

If installed, it is located on the right side of the fuselage (M-1285 through M-2354) or on the left side of the fuselage (M-2355 and after) aft of the wing. Airplanes equipped with a 14-volt electrical system require a power unit set to 13.75 to 14.25 volts, while those equipped with a 28-volt electrical system require a setting of 27.75 to 28.25 volts.

*CAUTION*

On 14-volt airplanes, the power pin for external power is connected directly to the battery and continually energized. Turn off battery and alternator switches and all electrical and avionics switches when connecting the auxiliary power unit plug. Assure correct polarity (negative ground) before connecting auxiliary power unit. Turn on the battery switch before turning on the auxiliary power unit.

On 28-volt airplanes, a reverse polarity diode protection system is between the external power receptacle and the main bus. With external power applied, the bus is powered. Turn on the battery switch only, with all other switches including avionics switches off, when connecting the auxiliary power unit. Assure correct polarity before connecting external power.

## **LIGHTING SYSTEMS**

### **INTERIOR LIGHTING**

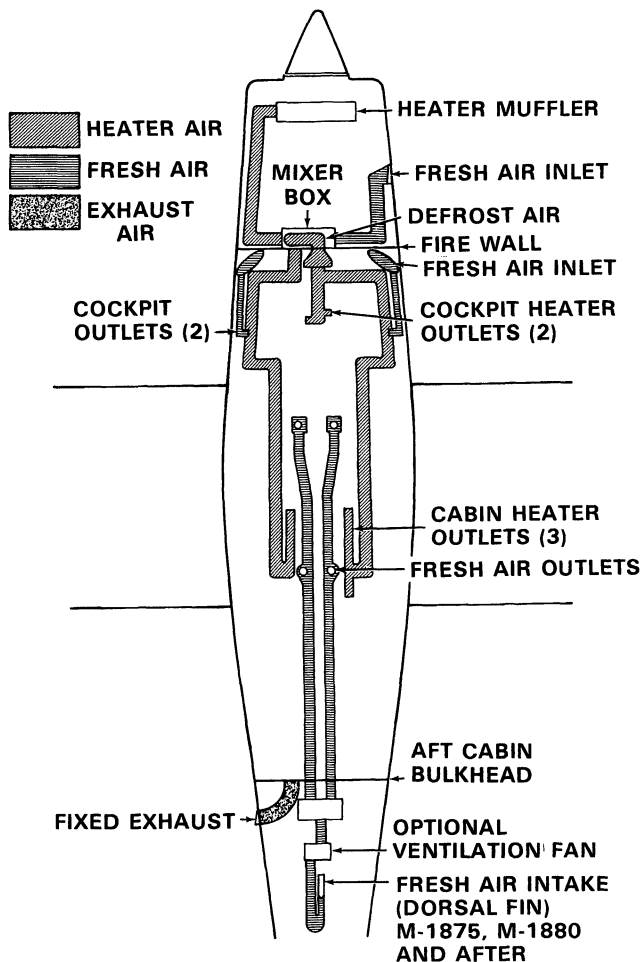
Lighting for the instrument panel is controlled by a rheostat switch located on the pilot's subpanel to the left of the control column (M-1285 through M-1979 except M-1971), or on the pedestal below the power quadrant (M-1971, M-1980 and after). The cabin dome light is operated by an ON-OFF switch adjacent to the light. The overhead instrument lighting and the map light (M-2224, M-2234 and after do not have a map light installed) 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 and taxi lights on both outboard wings. The landing light can be used for approach and taxiing. For longer battery and lamp life, use the landing light sparingly; avoid prolonged operation which could cause overheating during ground maneuvering.

#### **NOTE**

Particularly at night, reflections from rotating anti-collision lights or strobe 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 SCHEMATIC**



## **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 may enter the cabin through the firewall outlets. The knob marked CABIN AIR regulates the quantity of air entering the cabin through this firewall outlet. With the CABIN AIR knob in, pull out the CABIN HEAT knob for heated air and push it in for fresh air. There are 4 outlets for cabin heat distribution. 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**

**M-1285 thru M-1879 except M-1875:**

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 two overhead outlets for rear seat passengers. The flow of air is controlled by the rotation of these outlets.

**M-1875, M-1880 and after:**

Fresh air for the cabin enters through two grill type intakes immediately forward of the windshield and through a scoop type intake on the dorsal fin. The grill type intakes supply fresh air to the outlets on each side of the instrument panel. The scoop type intake supplies fresh air to the four overhead outlets. Air flow through the outlets is regulated by rotating the outlet. An optional fan, controlled by a

switch, facilitates ventilation for ground operation. The switch is located on the pedestal (M-1875, M-1880 thru M-1979, except M-1971), or on the left instrument subpanel (M-1971, M-1980 and after). The fan should be off when the airplane is airborne.

## **EXHAUST VENT**

A fixed exhaust vent is located in the aft cabin for flow-through ventilation.

## **PITOT AND STATIC SYSTEMS**

### **PITOT SYSTEM**

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

#### ***PITOT HEAT***

The pitot mast is provided with an electric heating element which is turned on and off with a switch on the instrument panel. The switch should be ON when flying in visible moisture. It is not advisable to operate the pitot heating element on the ground except for testing or for short intervals of time to remove ice or snow.

### **NORMAL STATIC AIR SYSTEM**

The normal static 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 emergency static air source may be installed to provide air for instrument operation should the static ports become blocked. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Supplement for procedures describing how and when to use this system.

## **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 sounds 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.*

### **NOTE**

With the battery 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**

<i>SUBJECT</i>	<i>PAGE</i>
Introduction.....	8-3
Publications .....	8-4
Airplane Inspection Periods .....	8-4
Preventative Maintenance That May Be Accomplished By A Certificated Pilot.....	8-5
Alterations or Repairs to Airplane.....	8-5
Ground Handling.....	8-6
Towing .....	8-6
Parking.....	8-7
Control Column Lock Pin.....	8-7
Tie-Down.....	8-7
Jacking.....	8-8
Flyable Storage - 7 to 30 Days	
Mooring.....	8-8
Fuel Cells .....	8-9
Flight Control Surfaces.....	8-9
Grounding .....	8-9
Pitot Tube.....	8-9
Windshield and Windows .....	8-9
During Flyable Storage.....	8-9
Preparation for Service.....	8-10
Prolonged Out of Service Care .....	8-10
External Power Receptacle.....	8-10
Checking Electrical Equipment.....	8-11

**TABLE OF CONTENTS (Continued)**

<i>SUBJECT</i>	<i>PAGE</i>
Servicing	
Fuel System .....	8-12
Fuel Drains .....	8-12
Oil System .....	8-14
Battery .....	8-14
Tires .....	8-15
Shimmy Damper .....	8-15
Brakes .....	8-16
Induction Air Filter .....	8-16
Vacuum System .....	8-16
Propeller Blades .....	8-17
Minor Maintenance	
Rubber Seals .....	8-17
Alternator .....	8-18
Magnetos .....	8-18
Cleaning	
Exterior Painted Surfaces .....	8-19
Windshields and Windows .....	8-20
Interior .....	8-21
Engine .....	8-22
Lubrication .....	8-22
Lubrication Points .....	8-23
Recommended Servicing Schedule .....	8-29
Consumable Materials .....	8-34
Approved Engine Oils .....	8-36
Bulb Replacement Guide .....	8-38
Overhaul or Replacement Schedule .....	8-39-8-43
Inspections .....	8-43
Operational Inspection .....	8-44
Power Plant .....	8-44
Cabin and Aft Fuselage .....	8-45
Exterior .....	8-45

## **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 and 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 manual. For information on how to obtain "Revision Service" applicable to this manual, 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.

**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 BEEHCRAFT 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.

### ***CAUTION***

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

## **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.

## **TIE-DOWN**

It is advisable to nose the airplane into the wind. Three tie-down lugs are provided: one on the lower side of each wing and a third at the rear of the fuselage.

1. Install the control column lock pin.

2. Chock the main wheels, fore and aft.
3. Using nylon line or chain of sufficient strength, secure the airplane at the three points provided. **DO NOT OVER TIGHTEN**; if the line at the rear of the fuselage is excessively tight, the nose may rise and produce lift due to the angle of attack of the wings.
4. Release the parking brake.

If high winds are anticipated, a vertical tail post should be installed at the rear tie-down lug, and a tie-down line attached to the nose gear.

### **JACKING**

Raise the individual gear for wheel and tire removal with a scissors jack under the axle. Refer to the BEECHCRAFT Shop Manual for proper procedures.

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

### **FLYABLE STORAGE - 7 TO 30 DAYS**

#### **MOORING**

If the airplane cannot be placed in a hanger, 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 aircraft 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 accumulated and spread the residual lubricating oil around the cylinder walls. Unless the aircraft 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 aircraft 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, clean the airplane, and give it a thorough inspection, particularly 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.

### **EXTERNAL POWER RECEPTACLE**

The external power receptacle is optional on this airplane. If installed, it is located on the right side of the fuselage (M-1285 through M-2354) or on the left side of the fuselage

(M-2355 and after) aft of the wing. Airplanes equipped with a 14-volt electrical system require a power unit set to 13.75 to 14.25 volts, while those equipped with a 28-volt electrical system require a setting of 27.75 to 28.25 volts.

*CAUTION*

On 14-volt airplanes, the power pin for external power is connected directly to the battery and continually energized. Turn off battery and alternator switches and all electrical and avionics switches when connecting the auxiliary power unit plug. Assure correct polarity (negative ground) before connecting auxiliary power unit. Turn on the battery switch before turning on the auxiliary power unit.

On 28-volt airplanes, a reverse polarity diode protection system is between the external power receptacle and the main bus. With external power applied, the bus is powered. Turn on the battery switch only, with all other switches including avionics switches off, when connecting the auxiliary power unit. Assure correct polarity before connecting external power.

**CHECKING ELECTRICAL EQUIPMENT**

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

*CAUTION*

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

## **SERVICING**

### **FUEL SYSTEM**

#### ***FUEL CELLS***

See Consumable Materials for recommended fuel grades.

#### ***CAUTION***

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 landing gear. M-1971, M-1980 and after have flush-type drain valves. Flush-type valves are actuated by pushing up with the Flush Fuel Drain Tool and holding until the desired amount of fuel has drained. The valve will

automatically close when the Flush Fuel Drain Tool is removed. The fuel drain valves can be locked open by pushing up with the Flush Fuel Drain Tool and turning counterclockwise. To close the valve, turn the valve clockwise and remove the Flush Fuel Drain Tool.

The Flush Fuel Drain Tool is provided with the loose tools and accessories.

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.

## **BATTERY**

### **14-VOLT SYSTEM**

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

### **28-VOLT SYSTEM**

One 24-volt, 15.5 amp hour, lead-acid battery, or two 12-volt 25 amp hour, lead-acid batteries connected in series, are located directly aft of the cabin area and 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 on Serials M-1285 thru M-1979 except M-1971 should be checked periodically for obstructions and for proper protrusion (3 inches from top of chamfer to skin line). Serials M-1971, M-1980 and after have a flush vent system.

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 x 6 main or nose gear tires to 22 psi and the 15 x 6.00 x 6 main or nose gear tires to 40 psi. Maintaining proper tire inflation will minimize tread wear and aid in preventing tire failure caused from running over sharp stones. When inflating tires, visually inspect them for cracks and breaks.

### **CAUTION**

Beech Aircraft Corporation cannot recommend the use of recapped tires. Recapped tires have a tendency to swell as a result of the increased temperature generated during takeoff. Increased tire size can jeopardize proper function of the landing gear with the possibility of damage to the landing gear.

### **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 fire-wall 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 or mounted on the left instrument panel brace immediately under the glareshield.

## **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 BEEHCRAFT 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 PAINTED SURFACES**

##### *CAUTION*

Do not apply wax or polish for a paint cure period of 90 days after delivery. Waxes and polishes seal the paint from the air and prevent curing. Wash uncured painted surfaces with cold or lukewarm water and a **MILD NON-DETERGENT SOAP**. Any rubbing of the surface should be done gently and held to a minimum to avoid cracking the paint film.

Prior to cleaning, cover the wheels, making certain the brake discs are covered. Attach the pitot cover securely, and plug or mask off all other openings. Be particularly careful to mask off both static air buttons before washing or waxing.

Flush loose dirt away with clean water, then wash with a mild soap and water. Avoid harsh, abrasive, or alkaline soaps or detergents which could cause corrosion or scratches. To remove stubborn oil and grease, use a cloth dampened with aliphatic naphtha (see Consumable Materials). After being cleaned with naphtha, the surface should be re-waxed and polished. To prevent scratches, use soft cleaning cloths or a chamois when cleaning and polishing. Any good grade of automotive wax or polish can be used on painted surfaces.

***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.

**WINDSHIELD AND WINDOWS**

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

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

After thoroughly cleaning, the surface should be waxed with a good grade of commercial wax. The wax will fill in minor scratches and help prevent further scratching. Apply a thin, even coat of wax and bring it to a high polish by rubbing lightly with a clean, dry, soft flannel cloth. Do not use a power buffer; the heat generated by the buffing pad may soften the plastic.

## **INTERIOR**

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

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

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

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

The plastic trim, instrument panel, and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with isopropyl alcohol. Volatile solvents,



such gasoline, benzine, acetone, carbon tetrachloride, fire extinguisher fluid, anti-ice fluid, laquer thinner, or glass cleaner should not be used. These materials will soften the plastic and may cause it to craze.

## **ENGINE**

Clean the engine with neutral solvent. Spray or brush the fluid over the engine, then wash off with water and allow to dry. Solutions which may attack rubber or plastic should not be used.

## **LUBRICATION**

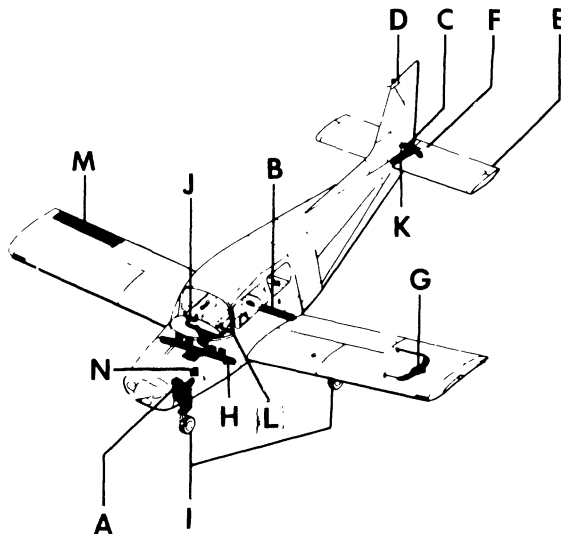
Proper lubrication is essential in keeping the airplane components in top condition. If this operation is performed thoroughly, general maintenance will be reduced and the service life of the airplane will be greatly increased.

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.

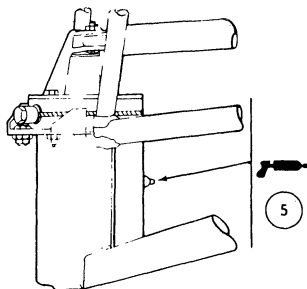
## **NOTE**

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**

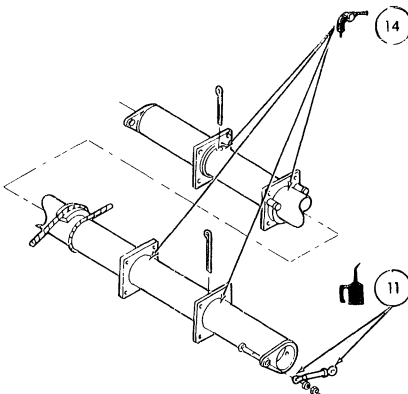


**DETAIL A**



**NOSE GEAR STEERING**

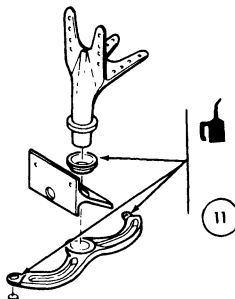
**DETAIL B**



**FLAP MECHANISM**

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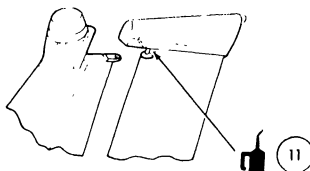
**DETAIL C**



**RUDDER BELLCRANK**

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**DETAIL D**

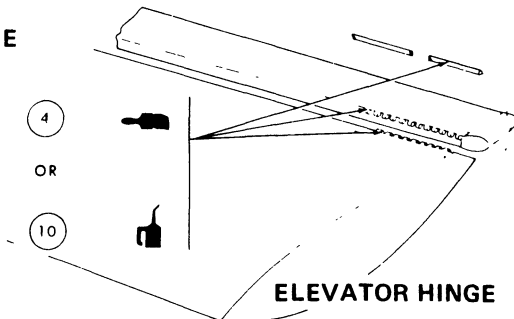


**RUDDER HINGE**

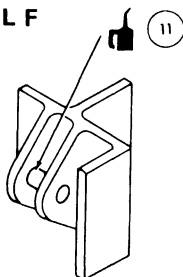
**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section VIII  
Handling, Serv - Maint**

**DETAIL E**

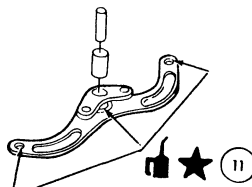


**DETAIL F**



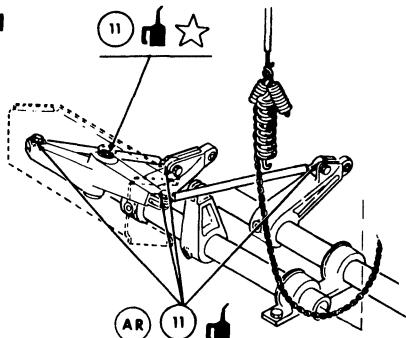
**STABILATOR HINGE  
BRACKET**

**DETAIL G**



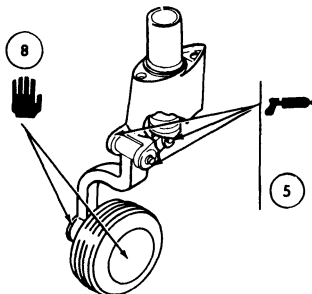
**AILERON BELLCRANK**

**DETAIL H**



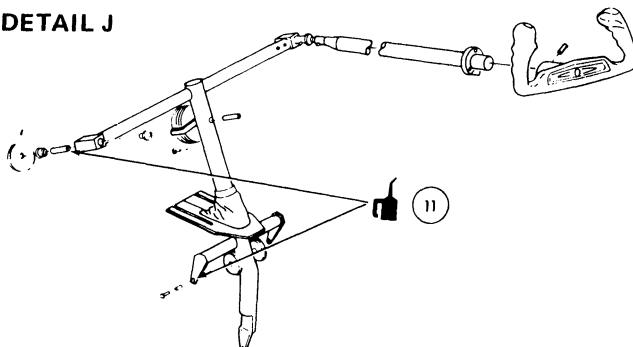
**RUDDER PEDALS**

**DETAIL I**



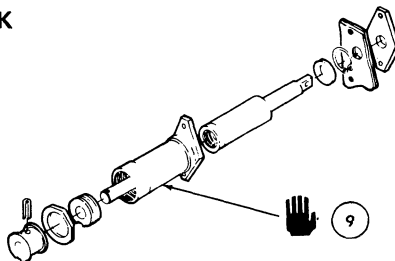
**LANDING GEAR**

**DETAIL J**



**CONTROL COLUMN LINKAGE**

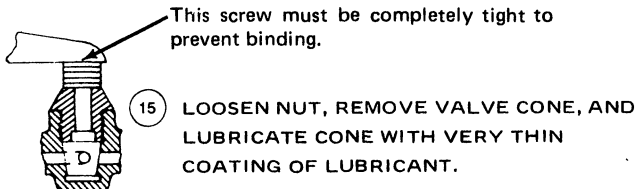
**DETAIL K**



**TRIM TAB ACTUATOR**

**DETAIL L**

**(For Airplanes Prior to M-1486)**



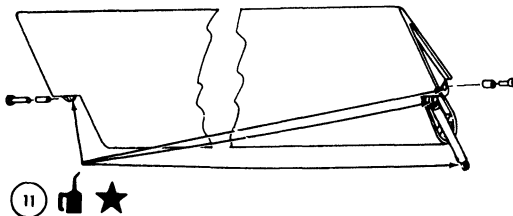
**NOTE:** DO NOT OVER LUBRICATE VALVE CONE APPLY MINIMUM AMOUNT OF LUBRICANT FOR COATING

**FUEL SELECTOR VALVE**

**NOTE:** FUEL SELECTOR VALVES ON M-1486 AND AFTER NEED NO LUBRICATION.

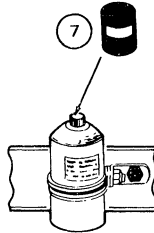
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**DETAIL M**



**AILERON HINGE AND ROD ENDS**

**DETAIL N**



**BRAKE FLUID RESERVOIR**

---



**SPRAY**



**GREASE GUN**



**HAND OR PACK**



**OIL CAN**



**BRUSH**



**HYDRAULIC FLUID**

**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 pulley 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**

<b>INTERVAL</b>	<b>ITEM</b>	<b>LOCATION</b> (Letters refer to Lubrication Points Diagram)	<b>LUBRICANT</b> (Number refers to item on Consumable Materials)
Pre-flight	Check engine oil level Drain fuel tank drains Drain fuel system low spot Service fuel tanks	Upper right side of engine Inboard bottom of wings Bottom of fuselage Top of wings	1 - - 3
25 Hrs.	Check battery electrolyte  Clean induction air filter Lubricate landing gear knee pins	Behind aft cabin bulkhead  In lower forward cowl On landing gear (I)	See Maintenance Manual - 5
50 Hrs.	Change engine oil Clean oil screens	Lower side of engine Aft right side of accessory case and bottom of sump	1 2



RECOMMENDED SERVICING SCHEDULE

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	LUBRICANT (Number refers to item on Consumable Materials)
100 Hrs.	Clean fuel system screens and strainers Clean suction relief valve screen Lubricate wheel bearings Lubricate nose gear rod end bearings Lubricate nose gear swivel Lubricate flap torque tubes Lubricate flap rod end bearings Lubricate rudder bellcrank pivot points Lubricate rudder hinges Lubricate stabilator trim tab hinge and pin	Bottom of wings and fuselage Forward of firewall  Landing gear (I) On top of nose gear (A)  On aft side of nose gear (A) Under floorboards (B) Inboard end of flaps (B)  Bottom of rudder (C)  On rudder leading edge (D) On trailing edge of stabilator (E)	2  -  8 11  5 14 11  11  11 4, 10

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**Section VIII**  
**Handling, Serv - Maint**

	Lubricate stabilator hinge pivot point Lubricate aileron bellcrank Lubricate aileron pivotal points and rod ends	In aft tail section (F)  In wing forward of aileron (G) Outboard trailing edge of wings (M)	11 11 11
300 Hrs.	Replace induction air filter	In front nose cowl	-
500 Hrs.	Lubricate rudder pedal bellcrank Lubricate rudder pedal rod ends Replace gyro instrument central filter	Forward cabin floor (H) Forward cabin floor (H) Behind instrument panel	11 11 -
1000 Hrs.	Lubricate control column pivot points	Behind instrument panel (J)	11
1200 Hrs.	Lubricate trim tab actuator	In aft tail section (K)	9

**RECOMMENDED SERVICING SCHEDULE**

<b>INTERVAL</b>	<b>ITEM</b>	<b>LOCATION</b> (Letters refer to Lubrication Points Diagram)	<b>LUBRICANT</b> (Number refers to item on Consumable Materials)
As Req.	Fuel selector valve Central brake reservoir Clean spark plugs	Center floorboard (L) On firewall (N) In engine compartment	15 7 -
Note 3	Replace Emergency Locator Transmitter Battery	Right side of aft fuselage	-

**NOTES:**

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

**CONSUMABLE MATERIALS**

ITEM	MATERIAL	SPECIFICATION
*1.	Engine Oil	SAE No. 30 (0° to 70°F) SAE No. 50 (Above 60°F) SAE No. 20 (Below 10°F)
2.	Solvent	PD680
**3.	Fuel, Engine	91/96 (blue), 100 (green) or 100LL (blue) Grade
***4.	Molybdenum Disulfide	MIL-M-7866
†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

**BEECHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section VIII  
Handling, Serv - Maint**

ITEM	MATERIAL	SPECIFICATION
†††13.	Lubricant, Rubber Seal	Oakite 6 Compound
†††14.	Lubricant, Silicone Spray	Krylon No. 1329 (or equivalent)
15.	Lubricant, Fluorosilicone	Corning FS-1292
****16.	Engine Fuel Additive	ALCOR TCP Concentrate

\* It is recommended that a straight mineral based (non-detergent) oil be used until the oil consumption has stabilized and then changed to an ashless dispersant oil for prolonged engine life.

Avco Lycoming Specification Number 301E approved for use lubricating oils which conform to both MIL-L-6082B straight mineral type and MIL-L-22851 ashless dispersant lubricants for airplane engines.

\*\* If grade 91/96 (blue) fuel is not available, use 100 (green) or 100LL (blue).

\*\*\* Mix with naphtha into paste and apply with a brush.

\*\*\*\* Product of Alcor, Inc., San Antonio, Texas 78284

† Product of BRC Bearing Company, Wichita, Kansas

†† In extremely cold climates, MIL-G-23827 grease should be used in place of MIL-G81322 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., Berkley Heights, N.J.

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

**APPROVED ENGINE OILS**

<b>COMPANY</b>	<b>BRAND NAME</b>
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

**BEEHCRAFT Sundowner 180  
C23 (M-1285 and After)**

**Section VIII  
Handling, Serv - Maint**

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, not to exceed 50 hours of operation. 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	
	14-VOLT	28-VOLT
Compass light	330	327
Dome light, cabin	89	303
Instrument flood light, overhead	89	303
Landing light, wing	4313	4596
Navigation light, tail cone	1777	1683
Navigation light, wing	1512	1524
Rotating beacon	WRM-44KA or WRM-1940	WRM-1939
Taxi light	4595	4594

## **OVERHAUL OR REPLACEMENT SCHEDULE**

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

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

## **SPECIAL CONDITIONS CAUTIONARY NOTICE**

Airplanes operated for Air Taxi or other than normal operation and airplanes operated in humid tropics or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas periodic inspections should be performed until the operator can set his own inspection periods based on experience.

## **NOTE**

The required periods do not constitute a guarantee that the item will reach the period without malfunction, as the aforementioned factors cannot be controlled by the manufacturer.

**Section VIII**  
**Handling, Serv - Maint**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**COMPONENT**

**OVERHAUL OR REPLACE**

**LANDING GEAR**

Brake Assembly	On Condition
Brake Lining	On Condition
Master Cylinder	On Condition
Parking Brake Valve	On Condition
All Hose	On Condition
Shimmy Damper	On Condition
Wheels and Tires	On Condition

**POWER PLANT**

**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.

Engine	
0-360-A2G	2000 hours
0-360-A4G	2000 hours
0-360-A4J	2000 hours
0-360-A4K	2000 hours
Engine Controls	On Condition
Engine Vibration	Engine Change
Isolator Mounts	

<b>COMPONENT</b>	<b>OVERHAUL OR REPLACE</b>
Exhaust System	800 hours or on condition
Magnetos	At engine overhaul (Bendix) 800 hours (Slick)
Starter	Inspect at engine overhaul; overhaul or replace on condition
Alternator	On Condition
Oil Cooler	On Condition (replace when contaminated)
Propeller	On Condition or 1000 hours
Engine Driven Fuel Pump	At Engine Overhaul
Exhaust Muffler & Shroud	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.

#### **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 System Check Valves	On Condition
Fuel Cell Drain Valve	On Condition
Wing Fuel Quantity Transmitters	On Condition

**Section VIII**  
**Handling, Serv - Maint**

**BEECHCRAFT Sundowner 180**  
**C23 (M-1285 and After)**

**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
Fuel Pressure 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 2250 to 2350 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.

**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.

**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  
SUPPLEMENT  
for the C23

when approved for ACROBATIC MANEUVERS

*The airplane must conform to Drawing Number 169-002001*

The following maneuvers are approved ONLY when the above modification has been completed and when the airplane is operated in the UTILITY CATEGORY at 2030 lbs or less. The pilot and copilot must be wearing approved parachutes before performing these maneuvers.

**WARNING**

The aircraft cabin area should be clean and free of any loose equipment before attempting these maneuvers.

***LOOP***

The maneuver is entered at 140 MPH/122 KTS IAS at 2700 RPM. A 3.0 to 3.5 G pull-up is recommended. The airspeed at the top of the loop will be 50 to 60 MPH/43 to 52 KTS IAS which is fast enough to retain positive acceleration and prevent a stall. Completion of the loop is accomplished by keeping the G level just below that where a buffet occurs. The altitude loss is 50 to 100 feet.

***IMMELMANN***

The maneuver is entered at 150 MPH/130 KTS IAS at 2700 RPM. A 3.5 G pull-up is recommended. The roll to the left should be initiated either just before or just as the airplane inverts. Adverse yaw during the roll will be encountered. A roll to the right will result in the airplane turning sideways and usually stalling.

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**Revised: February 1979**

**P/N 169-590008-9**

## *SNAP ROLL*

The maneuver is entered at 100 MPH/87 KTS IAS for a single roll or 105 to 110 MPH/91 to 96 KTS IAS for double rolls. Ailerons are kept neutral until initiation of recovery.

## *BARREL AND AILERON ROLL*

Both maneuvers are entered at 130 MPH/113 KTS IAS in a shallow dive.

## *SPLIT-S*

The maneuver is entered at 90 MPH/79 KTS IAS. The airplane is rolled either way to invert. The maximum speed is 140 MPH/122 KTS IAS, with acceleration at 3.5 G's. The altitude loss will be 800 feet. The throttle is to be retarded as the nose drops past the horizon in the inverted position.

## **WARNING**

Do not use abrupt or full control travel at speeds greater than the maximum design maneuvering speed.

Spins are approved. Spins have not been demonstrated in excess of 6 turns. For spin entry and recovery see pages 3-10 and 3-11 of this Pilot's Operating Handbook and FAA Approved Flight Manual.

Continuous inverted flight is prohibited.

Acrobatic maneuvers are prohibited with door hold-open installed.

Approved:

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

**FAA Approved**

**Revised: February 1979**

**P/N 169-590008-9**

# **BEECHCRAFT LANDPLANE**

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

for the

### **WALK-AROUND INSPECTION**

of the

#### **SINGLE DOOR C23**

##### **GENERAL**

This document is to be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane is modified with a single entrance door which has been installed in accordance with BEECH-CRAFT FAA approved data.

This document supersedes or adds to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only where covered in the items contained herein.

**LIMITATIONS** - No change

**EMERGENCY PROCEDURES** - No change

##### **NORMAL PROCEDURES**

###### **PREFLIGHT INSPECTION**

###### **1. CABIN:**

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

**FAA Approved**

**Revised: February 1979**

**P/N 169-590008-19**

**1 of 4**



**2. *RIGHT FUSELAGE:***

- a. Static Pressure Button - UNOBSTRUCTED
- b. Emergency Locator Transmitter - ARMED

**3. *EMPENNAGE:***

- a. Control Surfaces - CHECK
- b. Tie Down - REMOVE
- c. Position Light - CHECK

**4. *LEFT FUSELAGE:***

- a. Static Pressure Button - UNOBSTRUCTED
- b. All Antennas - CHECK
- c. Baggage Door - CHECK

**5. *LEFT WING TRAILING EDGE:***

- a. Flap - CHECK
- b. Fuel Vent Line - UNOBSTRUCTED
- c. Aileron - CHECK
- d. Wing Tip - CHECK
- e. Position Light - CHECK

**6. *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.

**7. *LEFT LANDING GEAR:***

- a. Tire and Nose Gear - CHECK
- b. Fuel Sump - DRAIN

**8. *NOSE SECTION:***

- a. Left Cowl - SECURE
- b. Induction Air Intake - CLEAR
- 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

**9. *RIGHT LANDING GEAR:***

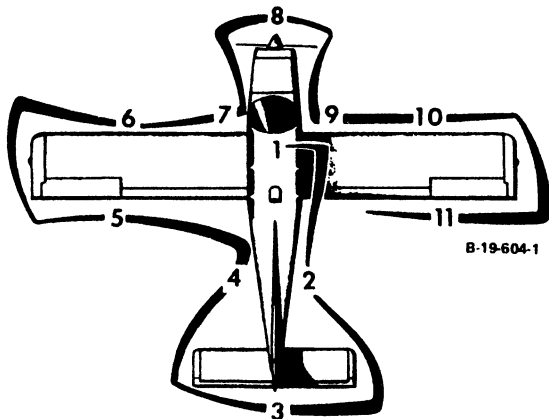
- a. Fuel Sump - DRAIN
- b. Tire and Brake - CHECK

**10. *RIGHT WING LEADING EDGE:***

- a. Fuel Tank - CHECK QUANTITY; Filler Cap SECURE
- b. Tie Down and Chocks - REMOVE
- c. Wing Tip - CHECK
- d. Position Light - CHECK

**11. *RIGHT WING TRAILING EDGE:***

- a. Aileron - CHECK
- b. Flap - CHECK
- c. Fuel Tank Vent Line - UNOBSTRUCTED



**FAA Approved**

**Revised: February 1979**

**P/N 169-590008-19**

**PERFORMANCE - No change**

Approved:

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

# BEECHCRAFT B19, C23, A24 LANDPLANE

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

for the

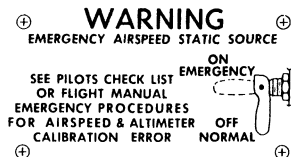
### EMERGENCY STATIC AIR SOURCE

#### GENERAL

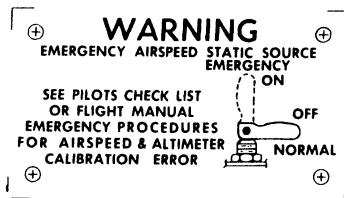
The information in this document is FAA Approved material which, together with the appropriate placards, is applicable and must be carried in the airplane when modified by the installation of the Beechcraft Emergency Static Air Source.

#### LIMITATIONS

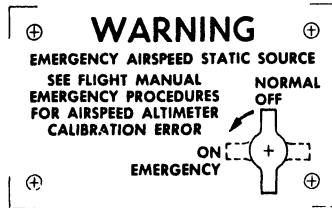
#### PLACARDS:



or;



or;



## EMERGENCY PROCEDURES

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

1. Pilot's Emergency Static Air Source - Switch to ON EMERGENCY (lower sidewall adjacent to pilot)
2. For airspeed calibration and altimeter correction, refer to AIRSPEED CALIBRATION-EMERGENCY SYSTEM and ALTIMETER CORRECTION-EMERGENCY SYSTEM graphs in the PERFORMANCE section.

## CAUTION

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

**NORMAL PROCEDURES** - No change.

**FAA Approved**

**Date: June 2, 1978**

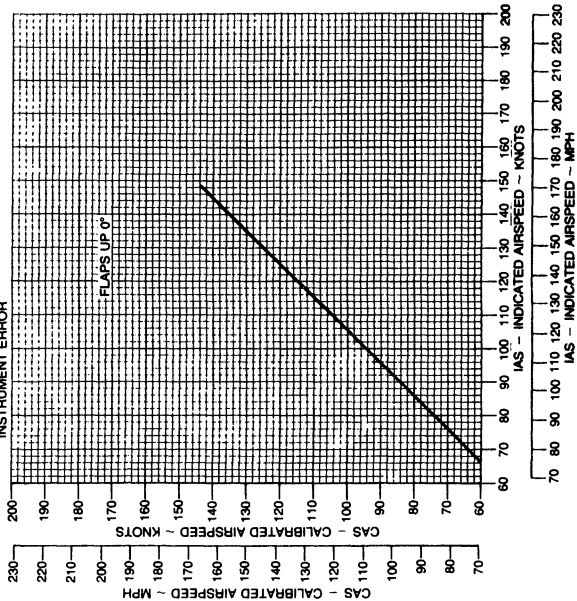
**P/N MCO C32644-11**

# PERFORMANCE

## EMERGENCY STATIC AIR SOURCE

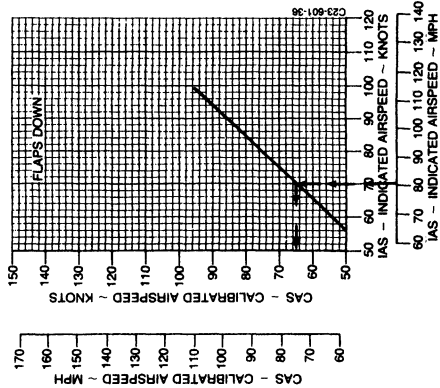
### AIRSPEED CALIBRATION – EMERGENCY SYSTEM

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR



EXAMPLE:

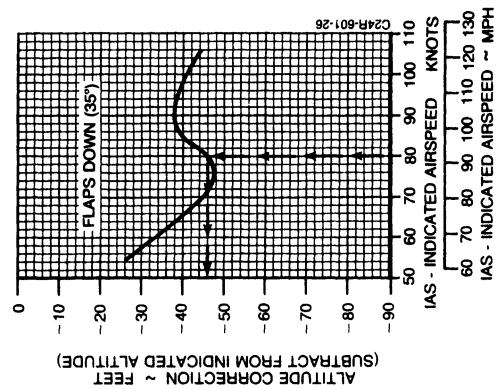
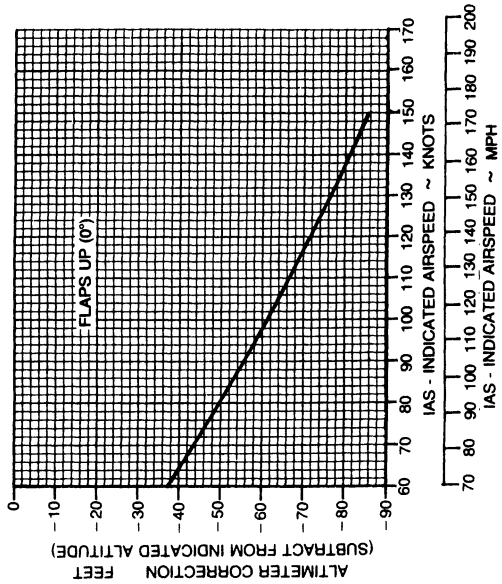
IAS	70 KTS (81 MPH)
FLAPS	DOWN
CAS	65 KTS (75 MPH)



# ALTIMETER CORRECTION - EMERGENCY SYSTEM

EXAMPLE:  
IAS ..... 80 KTS (92 MPH)  
FLAPS ..... DOWN (35°)  
INDICATED ALTITUDE ..... 6256 FT  
ALTIMETER CORRECTION ..... -46 FT  
CORRECTED ALTITUDE ..... 6210 FT

NOTE:  
INDICATED AIRSPEED AND INDICATED  
ALTITUDE ASSUME ZERO INSTRU-  
MENT ERROR



## **SYSTEMS DESCRIPTION**

### **EMERGENCY STATIC AIR SOURCE**

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 (ground obstructions not properly corrected may cause inflight obstruction), the possibility of obstructed static ports should be considered. Partial obstruction will result in the rate-of-climb indication being sluggish during a climb or descent. Verification of suspected obstruction is possible by switching to the emergency system and noting a sudden sustained change in rate of climb. This may be accompanied by abnormal indicated airspeed and altitude changes beyond normal calibration differences.


## **HANDLING, SERVICING, AND MAINTENANCE**

### **EMERGENCY STATIC AIR SOURCE**

The system should be drained every 100 hours.

Remove cover plate from the lower middle fuselage under the spar and unscrew knurled nut to disconnect static air lines and drain moisture. Reconnect static air lines.

Approved:

*for*   
Chester A. Rembleske  
Beech Aircraft Corporation  
DOA CE-2

**FAA Approved**  
**Date: June 2, 1978**  
**P/N MCO C32644-11**





**SECTION X**  
**SAFETY INFORMATION**  
**TABLE OF CONTENTS**

<i>SUBJECT</i>	<i>PAGE</i>
<b>Introduction</b> .....	10-3
<b>General</b> .....	10-5
Do's .....	10-5
Don'ts .....	10-6
<b>Sources of Information</b> .....	10-7
<b>Pilot's Operating Handbook and FAA Approved</b>	
<b>Airplane Flight Manual</b> .....	10-7
<b>BEECHCRAFT Service Publications</b> .....	10-8
<b>Federal Aviation Regulations</b> .....	10-10
Airworthiness Directives .....	10-10
Airman's Information Manual .....	10-10
Advisory Information .....	10-11
FAA Advisory Circulars .....	10-12
FAA General Aviation News .....	10-15
FAA Accident Prevention Program .....	10-15
Additional Information .....	10-16
<b>General Information on Specific Topics</b> .....	10-17
Maintenance .....	10-17
Hazards of Unapproved Modifications .....	10-19
Flight Planning .....	10-20
Passenger Information Cards .....	10-20
Stowage of Articles .....	10-21
Flight Operations .....	10-21
General .....	10-21
Preflight Inspection .....	10-21
Weight and Balance .....	10-22
Autopilots and Electric Trim Systems .....	10-23
Flutter .....	10-26
Turbulent Weather .....	10-27
Wind Shear .....	10-30
Weather Radar .....	10-30
Mountain Flying .....	10-32
VFR - Low Ceilings .....	10-33
VFR at Night .....	10-33
Vertigo - Disorientation .....	10-34
<b>May, 1994</b>	<b>10-1</b>

**SECTION X**  
**SAFETY INFORMATION**  
**TABLE OF CONTENTS (Continued)**

<i>SUBJECT</i>	<i>PAGE</i>
Stalls, Slow Flight and Training .....	10-36
Spins .....	10-36
Descent .....	10-38
Vortices - Wake Turbulence .....	10-39
Takeoff and Landing Conditions .....	10-40
Medical Facts for Pilots .....	10-40
General .....	10-40
Fatigue .....	10-41
Hypoxia .....	10-41
Hyperventilation .....	10-43
Alcohol .....	10-43
Drugs .....	10-45
Scuba Diving .....	10-45
Carbon Monoxide and Night Vision .....	10-45
Decompression Sickness .....	10-46
<b>A Final Word .....</b>	<b>10-47</b>

## **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 recurring training regimen.

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

..... Beech Aircraft Corporation

**WARNING**

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

It is mandatory that you fully understand the contents of this publication and the other operating and maintenance manuals which accompany the airplane; that FAA requirements for ratings, certifications and review be scrupulously complied with; and that you allow only persons who are properly licensed and rated, and thoroughly familiar with the contents of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual to operate the airplane.

**IMPROPER OPERATION OR MAINTENANCE OF AN AIRPLANE, NO MATTER HOW WELL BUILT INITIALLY, CAN RESULT IN CONSIDERABLE DAMAGE OR TOTAL DESTRUCTION OF THE AIRPLANE, ALONG WITH SERIOUS OR FATAL INJURIES TO ALL OCCUPANTS.**

## **GENERAL**

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

The following material in this Safety Information publication covers several subjects in limited detail. Here are some condensed Do's and Don'ts.

### **DO'S**

Be thoroughly familiar with your airplane, know its limitations and your own.

Be current in your airplane, or fly with a qualified instructor until you are current. Practice until you are proficient.

Preplan all aspects of your flight - including a proper weather briefing and adequate fuel reserves.

Use services available - weather briefing, inflight weather and Flight Service Station.

Carefully preflight your airplane.

Use the approved checklist.

Have more than enough fuel for takeoff, plus the trip, and an adequate reserve.

Be sure your weight and C.G. are within limits.

Use seatbelts and shoulder harnesses at all times.

Be sure all loose articles and baggage are secured.

Check freedom and proper direction of operation of all controls during preflight inspection.

Maintain the prescribed airspeeds in takeoff, climb, descent, and landing.

## **Section X**

### **Safety Information**

## **Beechcraft**

### **Single Engine (Piston)**

Avoid wake turbulence (Vortices).

Preplan fuel and fuel tank management before the actual flight. Utilize auxiliary tanks only in level cruise flight. Take off and land on the fullest main tank, NEVER use auxiliary tanks for takeoff or landing.

Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action can be accomplished without reference to the manual.

Keep your airplane in good mechanical condition.

Stay informed and alert; fly in a sensible manner.

### **DON'TS**

Don't take off with frost, ice or snow on the airplane.

Don't take off with less than minimum recommended fuel, plus adequate reserves, and don't run the tank dry before switching.

Don't fly in a reckless, show-off, or careless manner.

Don't fly into thunderstorms or severe weather.

Don't fly in possible icing conditions.

Don't fly close to mountainous terrain.

Don't apply controls abruptly or with high forces that could exceed design loads of the airplane.

Don't fly into weather conditions that are beyond your ratings or current proficiency.

Don't fly when physically or mentally exhausted or below par.

Don't trust to luck.

## **SOURCES OF INFORMATION**

There is a wealth of information available to the pilot created for the sole purpose of making your flying safer, easier and more efficient. Take advantage of this knowledge and be prepared for an emergency in the event that one should occur.

## **PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL**

You must be thoroughly familiar with the contents of your operating manuals, placards, and check lists to ensure safe utilization of your airplane. When the airplane was manufactured, it was equipped with one or more of the following: placards, Owner's Manual, FAA Approved Airplane Flight Manual, FAA Approved Airplane Flight Manual Supplements, Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Beech has revised and reissued many of the early manuals for certain models of airplanes in GAMA Standard Format as Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals. For simplicity and convenience, all official manuals in various models are referred to as the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If the airplane has changed ownership, the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual may have been misplaced or may not be current. Replacement handbooks may be obtained from any BEECHCRAFT Authorized Outlet.



## **BEECHCRAFT SERVICE PUBLICATIONS**

Beech Aircraft Corporation publishes a wide variety of manuals, service letters, service instructions, service bulletins, safety communiques and other publications for the various models of BEECHCRAFT airplanes. Information on how to obtain publications relating to your airplane is contained in BEECHCRAFT Service Bulletin number 2001, entitled "General - BEECHCRAFT Service Publications - What is Available and How to Obtain It."

Beech Aircraft Corporation automatically mails original issues and revisions of BEECHCRAFT Service Bulletins (Mandatory, Recommended and Optional), FAA Approved Airplane Flight Manual Supplements, reissues and revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owners Manuals, Pilot's Operating Manuals and Pilot's Operating Handbooks, and original issues and revisions of BEECHCRAFT Safety Communiques to BEECHCRAFT Owner addresses as listed by the FAA Aircraft Registration Branch List and the BEECHCRAFT International Owner Notification Service List. While this information is distributed by Beech Aircraft Corporation, Beech can not make changes in the name or address furnished by the FAA. The owner must contact the FAA regarding any changes to name or address. Their address is: FAA Aircraft Registration Branch (AAC250) P.O. Box 25082, Oklahoma City, OK 73125, Phone (405) 680-2131.

It is the responsibility of the FAA owner of record to ensure that any mailings from Beech are forwarded to the proper persons. Often the FAA registered owner is a bank or financing company or an individual not in possession of the airplane. Also, when an airplane is sold, there is a lag in processing the change in registration with the FAA. If you are a new owner, contact your BEECHCRAFT Authorized Outlet and ensure your manuals are up to date.

Beech Aircraft Corporation provides a subscription service which provides for direct factory mailing of BEECHCRAFT

publications applicable to a specific serial number airplane. Details concerning the fees and ordering information for this owner subscription service are contained in Service Bulletin number 2001.

For owners who choose not to apply for a Publications Revision Subscription Service, Beech provides a free Owner Notification Service by which owners are notified by post card of BEECHCRAFT manual reissues, revisions and supplements which are being issued applicable to the airplane owned. On receipt of such notification, the owner may obtain the publication through a BEECHCRAFT Authorized Outlet. This notification service is available when requested by the owner. This request may be made by using the owner notification request card furnished with the loose equipment of each airplane at the time of delivery, or by a letter requesting this service, referencing the specific airplane serial number owned. Write to:

Supervisor, Special Services  
Dept. 52  
Beech Aircraft Corporation  
P.O. Box 85  
Wichita, Kansas 67201-0085

From time to time Beech Aircraft Corporation issues BEECHCRAFT Safety Communiques dealing with the safe operation of a specific series of airplanes, or airplanes in general. It is recommended that each owner/operator maintain a current file of these publications. Back issues of BEECHCRAFT Safety Communiques may be obtained without charge by sending a request, including airplane model and serial number, to the Supervisor, Special Services, at the address listed above.

Airworthiness Directives (AD's) are not issued by the manufacturer. They are issued and available from the FAA.

## **FEDERAL AVIATION REGULATIONS**

FAR Part 91, General Operating and Flight Rules, is a document of law governing operation of airplanes and the owner's and pilot's responsibilities. Some of the subjects covered are:

Responsibilities and authority of the pilot-in-command

Certificates required

Liquor and drugs

Flight plans

Preflight action

Fuel requirements

Flight rules

Maintenance, preventive maintenance, alterations, inspection and maintenance records

You, as a pilot, have responsibilities under government regulations. The regulations are designed for your protection and the protection of your passengers and the public. Compliance is mandatory.

## **AIRWORTHINESS DIRECTIVES**

FAR Part 39 specifies that no person may operate a product to which an Airworthiness Directive issued by the FAA applies, except in accordance with the requirements of that Airworthiness Directive.

## **AIRMAN'S INFORMATION MANUAL**

The Airman's Information Manual (AIM) is designed to provide airmen with basic flight information and ATC procedures for use in the national airspace system of the United States. It also contains items of interest to pilots concerning health and medical facts, factors affecting flight safety, a pilot/controller glossary of terms in the Air Traffic Control

system, information on safety, and accident/hazard reporting. It is revised at six-month intervals and can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

This document contains a wealth of pilot information. Among the subjects are:

Controlled Airspace  
Emergency Procedures  
Services Available to Pilots  
Weather and Icing  
Radio Phraseology and Technique  
Mountain Flying  
Airport Operations  
Wake Turbulence - Vortices  
Clearances and Separations  
Medical Facts for Pilots  
Preflight  
Bird Hazards  
Departures - IFR  
Good Operating Practices  
En route - IFR  
Airport Location Directory  
Arrival - IFR

All pilots must be thoroughly familiar with and use the information in the AIM.

## **ADVISORY INFORMATION**

NOTAMS (Notices to Airmen) are documents that have information of a time-critical nature that would affect a pilot's decision to make a flight; for example, an airport closed, terminal radar out of service, or enroute navigational aids out of service.

## **FAA ADVISORY CIRCULARS**

The FAA issues Advisory Circulars to inform the aviation public in a systematic way of nonregulatory material of interest. Advisory Circulars contain a wealth of information with which the prudent pilot should be familiar. A complete list of current FAA Advisory Circulars is published in AC 00-2, which lists Advisory Circulars that are for sale, as well as those distributed free of charge by the FAA, and provides ordering information. Many Advisory Circulars which are for sale can be purchased locally in aviation bookstores or at FBO's. These documents are subject to periodic revision. Be certain the Advisory Circular you are using is the latest revision available. Some of the Advisory Circulars of interest to pilots are:

<b>*00-6</b>	<b>Aviation Weather</b>
<b>00-24</b>	<b>Thunderstorms</b>
<b>00-30</b>	<b>Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence</b>
<b>*00-45</b>	<b>Aviation Weather Services</b>
<b>00-46</b>	<b>Aviation Safety Reporting Program</b>
<b>20-5</b>	<b>Plane Sense</b>
<b>20-32</b>	<b>Carbon Monoxide (CO) Contamination in Aircraft - Detection and Prevention</b>
<b>20-35</b>	<b>Tie-Down Sense</b>
<b>20-43</b>	<b>Aircraft Fuel Control</b>
<b>20-105</b>	<b>Engine Power-Loss Accident Prevention</b>
<b>20-113</b>	<b>Pilot Precautions and Procedures to be Taken in Preventing Aircraft Reciprocating Engine Induction System &amp; Fuel System Icing Problems</b>
<b>20-125</b>	<b>Water in Aviation Fuel</b>

<b>21-4</b>	<b>Special Flight Permits for Operation of Overweight Aircraft</b>
<b>43-9</b>	<b>Maintenance Records: General Aviation Aircraft</b>
<b>43-12</b>	<b>Preventive Maintenance</b>
<b>60-4</b>	<b>Pilot's Spatial Disorientation</b>
<b>60-6</b>	<b>Airplane Flight Manuals (AFM), Approved Manual Materials, Markings and Placards - Airplanes</b>
<b>60-12</b>	<b>Availability of Industry-Developed Guidelines for the Conduct of the Biennial Flight Review</b>
<b>60-13</b>	<b>The Accident Prevention Counselor Program</b>
<b>*61-9</b>	<b>Pilot Transition Courses for Complex Single-Engine and Light Twin-Engine Airplanes</b>
<b>*61-21</b>	<b>Flight Training Handbook</b>
<b>*61-23</b>	<b>Pilot's Handbook of Aeronautical Knowledge</b>
<b>*61-27</b>	<b>Instrument Flying Handbook</b>
<b>61-67</b>	<b>Hazards Associated with Spins in Airplanes Prohibited from Intentional Spinning.</b>
<b>61-84</b>	<b>Role of Preflight Preparation</b>
<b>*67-2</b>	<b>Medical Handbook for Pilots</b>
<b>90-23</b>	<b>Aircraft Wake Turbulence</b>
<b>90-42</b>	<b>Traffic Advisory Practices at Nontower Airports</b>

**Section X**  
**Safety Information**

**Deechcraft**  
**Single Engine (Piston)**

<b>90-48</b>	<b>Pilot's Role in Collision Avoidance</b>
<b>90-66</b>	<b>Recommended Standard Traffic Patterns for Airplane Operations at Uncontrolled Airports</b>
<b>90-85</b>	<b>Severe Weather Avoidance Plan (SWAP)</b>
<b>91-6</b>	<b>Water, Slush and Snow on the Runway</b>
<b>91-13</b>	<b>Cold Weather Operation of Aircraft</b>
<b>*91-23</b>	<b>Pilot's Weight and Balance Handbook</b>
<b>91-26</b>	<b>Maintenance and Handling of Air Driven Gyroscopic Instruments</b>
<b>91-33</b>	<b>Use of Alternate Grades of Aviation Gasoline for Grade 80/87 and Use of Automotive Gasoline</b>
<b>91-35</b>	<b>Noise, Hearing Damage, and Fatigue in General Aviation Pilots</b>
<b>91-43</b>	<b>Unreliable Airspeed Indications</b>
<b>91-44</b>	<b>Operational and Maintenance Practices for Emergency Locator Transmitters and Receivers</b>
<b>91-46</b>	<b>Gyroscopic Instruments - Good Operating Practices</b>
<b>91-50</b>	<b>Importance of Transponder Operations and Altitude Reporting</b>
<b>91-51</b>	<b>Airplane Deice and Anti-ice Systems</b>
<b>91-59</b>	<b>Inspection and Care of General Aviation Aircraft Exhaust Systems</b>
<b>91-65</b>	<b>Use of Shoulder Harness in Passenger Seats</b>

**103-4**                      Hazards Associated with Sublimation of  
Solid Carbon Dioxide (Dry Ice) Aboard Air-  
craft

**210-5A**                    Military Flying Activities

**\* For Sale**

## **FAA GENERAL AVIATION NEWS**

FAA General Aviation News is published by the FAA in the interest of flight safety. The magazine is designed to promote safety in the air by calling the attention of general aviation airmen to current technical, regulatory and procedural matters affecting the safe operation of airplanes. FAA General Aviation News is sold on subscription by the Superintendent of Documents, Government Printing Office, Washington D.C., 20402.

## **FAA ACCIDENT PREVENTION PROGRAM**

The FAA assigns accident prevention specialists to each Flight Standards and General Aviation District Office to organize accident prevention program activities. In addition, there are over 3,000 volunteer airmen serving as accident prevention counselors, sharing their technical expertise and professional knowledge with the general aviation community. The FAA conducts seminars and workshops, and distributes invaluable safety information under this program.

Usually the airport manager, the FAA Flight Service Station (FSS), or Fixed Base Operator (FBO), will have a list of accident prevention counselors and their phone numbers available. All Flight Standards and General Aviation District Offices have a list of the counselors serving the District.

Before flying over unfamiliar territory, such as mountainous terrain or desert areas, it is advisable for transient pilots to consult with local counselors. They will be familiar with the



more desirable routes, the wind and weather conditions, and the service and emergency landing areas that are available along the way. They can also offer advice on the type of emergency equipment you should be carrying.

## **ADDITIONAL INFORMATION**

The National Transportation Safety Board and the Federal Aviation Administration periodically issue, in greater detail, general aviation pamphlets concerning aviation safety. FAA Regional Offices also publish material under the FAA General Aviation Accident Prevention Program. These can be obtained at FAA Offices, Weather Stations, Flight Service Stations or Airport Facilities. Some of these are titled:

12 Golden Rules for Pilots

Weather or Not

Disorientation

Plane Sense

Weather Info Guide for Pilots

Wake Turbulence

Don't Trust to Luck, Trust to Safety

Rain, Fog, Snow

Thunderstorm - TRW

Icing

Pilot's Weather Briefing Guide

Thunderstorms Don't Flirt ... Skirt 'em

IFR-VFR - Either Way Disorientation Can Be Fatal

IFR Pilot Exam-O-Grams

VFR Pilot Exam-O-Grams

Tips on Engine Operation in Small General Aviation Aircraft

Estimating Inflight Visibility

Is the Aircraft Ready for Flight

Tips on Mountain Flying

Tips on Desert Flying

Always Leave Yourself An Out

Safety Guide for Private Aircraft Owners  
Tips on How to Use the Flight Planner  
Tips on the Use of Ailerons and Rudder  
Some Hard Facts About Soft Landings  
Propeller Operation and Care  
Torque "What it Means to the Pilot"  
Weight and Balance. An Important Safety Consideration for Pilots

## **GENERAL INFORMATION ON SPECIFIC TOPICS**

### **MAINTENANCE**

Safety of flight begins with a well maintained airplane. Make it a habit to keep your airplane and all its equipment in air-worthy condition. Keep a "squawk list" on board, and see that all discrepancies, however minor, are noted and promptly corrected.

Schedule your maintenance regularly, and have your airplane serviced by a reputable organization. Be suspicious of bargain prices for maintenance, repair and inspections.

It is the responsibility of the owner and the operator to assure that the airplane is maintained in an airworthy condition and that proper maintenance records are kept.

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

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

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

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

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

Airplanes operated for Air Taxi or other than normal operation, and airplanes operated in humid tropics, or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience.

## **NOTE**

The required periods do not constitute a guarantee that the item will reach the period without malfunction, as the aforementioned factors cannot be controlled by the manufacturer.

Corrosion and its effects must be treated at the earliest possible opportunity. A clean, dry surface is virtually immune to corrosion. Make sure that all drain holes remain unobstructed. Protective films and sealants help to keep corrosive agents from contacting metallic surfaces. Corrosion

inspections should be made most frequently under high-corrosion-risk operating conditions, such as in areas of excessive airborne salt concentrations (e.g., near the sea) and in high-humidity areas (e.g., tropical regions).

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

## **HAZARDS OF UNAPPROVED MODIFICATIONS**

Many airplane modifications are approved under Supplemental Type Certificates (STC's). Before installing an STC on your airplane, check to make sure that the STC does not conflict with other STC's that have already been installed. Because approval of an STC is obtained by the individual STC holder based upon modification of the original type design, it is possible for STC's to interfere with each other when both are installed. Never install an unapproved modification of any type, however innocent the apparent modification may seem. Always obtain proper FAA approval.

Airplane owners and maintenance personnel are particularly cautioned not to make attachments to, or otherwise modify, seats from original certification without approval from the FAA Engineering and Manufacturing District Office having original certification responsibility for that make and model.

Any unapproved attachment or modification to seat structure may increase load factors and metal stress which could cause failure of seat structure at a lesser "G" force than exhibited for original certification.

Examples of unauthorized attachments found are drilling holes in seat tubing to attach fire extinguishers and drilling holes to attach approach plate book bins to seats.

## **FLIGHT PLANNING**

FAR Part 91 requires that each pilot in command, before beginning a flight, familiarize himself with all available information concerning that flight.

Obtain a current and complete preflight briefing. This should consist of local, enroute and destination weather and enroute navaid information. Enroute terrain and obstructions, alternate airports, airport runways active, length of runways, and takeoff and landing distances for the airplane for conditions expected should be known.

The prudent pilot will review his planned enroute track and stations and make a list for quick reference. It is strongly recommended a flight plan be filed with Flight Service Stations, even though the flight may be VFR. Also, advise Flight Service Stations of changes or delays of one hour or more and remember to close the flight plan at destination.

The pilot must be completely familiar with the performance of the airplane and performance data in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. The resultant effect of temperature and pressure altitude must be taken into account in performance if not accounted for on the charts. An applicable FAA Approved Airplane Flight Manual must be aboard the airplane at all times and include the weight and balance forms and equipment list.

## **PASSENGER INFORMATION CARDS**

Beech has available, for most current production airplanes, passenger information cards which contain important information on the proper use of restraint systems, oxygen

masks, emergency exits and emergency bracing procedures. Passenger information cards may be obtained at any BEECHCRAFT Authorized Outlet. A pilot should not only be familiar with the information contained in the cards, but should always, prior to flight, inform the passengers of the information contained in the information cards. The pilot should orally brief the passengers on the proper use of restraint systems, doors and emergency exits, and other emergency procedures, as required by Part 91 of the FAR's.

## **STOWAGE OF ARTICLES**

The space between the seat pan and the floor is utilized to provide space for seat displacement. If hard, solid objects are stored beneath seats, the energy absorbing feature is lost and severe spinal injuries can occur to occupants.

Prior to flight, pilots should insure that articles are not stowed beneath seats that would restrict seat pan energy absorption or penetrate the seat in event of a high vertical velocity accident.

## **FLIGHT OPERATIONS**

### ***GENERAL***

The pilot **MUST** be thoroughly familiar with **ALL INFORMATION** published by the manufacturer concerning the airplane, and is required by law to operate the airplane in accordance with the FAA Approved Airplane Flight Manual and placards installed.

### ***PREFLIGHT INSPECTION***

In addition to maintenance inspections and preflight information required by FAR Part 91, a complete, careful preflight inspection is imperative.

Each airplane has a checklist for the preflight inspection which must be followed. USE THE CHECKLIST.

### ***WEIGHT AND BALANCE***

Maintaining center of gravity within the approved envelope throughout the planned flight is an important safety consideration.

The airplane must be loaded so as not to exceed the weight and center of gravity (C.G.) limitations. Airplanes that are loaded above the maximum takeoff or landing weight limitations will have an overall lower level of performance compared to that shown in the Performance section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If loaded above maximum takeoff weight, takeoff distance and the landing distance will be longer than that shown in the Performance section; the stalling speed will be higher, rate of climb, the cruising speed, and the range of the airplane at any level of fuel will all be lower than shown in the Performance section.

If an airplane is loaded so that the C.G. is forward of the forward limit, it will require additional control movements for maneuvering the airplane with correspondingly higher control forces. The pilot may have difficulty during takeoff and landing because of the elevator control limits.

If an airplane is loaded aft of the aft C.G. limitation, the pilot will experience a lower level of stability. Airplane characteristics that indicate a lower stability level are; lower control forces, difficulty in trimming the airplane, lower control forces for maneuvering with attendant danger of structural overload, decayed stall characteristics, and a lower level of lateral-directional damping.

Ensure that all cargo and baggage is properly secured before takeoff. A sudden shift in balance at rotation can cause controllability problems.

## ***AUTOPILOTS AND ELECTRIC TRIM SYSTEMS***

Because there are several different models of autopilots and electric trim systems installed in Beech airplanes and different installations and switch positions are possible from airplane to airplane, it is essential that every owner/operator review his Airplane Flight Manual (AFM) Supplements and ensure that the supplements properly describe the autopilot and trim installations on his specific airplane. Each pilot, prior to flight, must be fully aware of the proper procedures for operation, and particularly disengagement, for the system as installed.

In addition to ensuring compliance with the autopilot manufacturer's maintenance requirements, all owners/operators should thoroughly familiarize themselves with the operation, function and procedures described in the Airplane Flight Manual Supplements. Ensure a full understanding of the methods of engagement and disengagement of the autopilot and trim systems.

Compare the descriptions and procedures contained in the Supplements to the actual installation in the airplane to ensure that the supplement accurately describes your installation. Test that all buttons, switches and circuit breakers function as described in the Supplements. If they do not function as described, have the system repaired by a qualified service agency. If field service advice or assistance is necessary, contact Beech Aircraft Corporation, Customer Support Department.

As stated in all AFM Supplements for autopilot systems and trim systems installed on Beech airplanes, the preflight check must be conducted before every flight. The preflight check assures not only that the systems and all of their features are operating properly, but also that the pilot, before flight, is familiar with the proper means of engagement and disengagement of the autopilot and trim system.



Autopilot Airplane Flight Manual Supplements caution against trying to override the autopilot system during flight without disengaging the autopilot because the autopilot will continue to trim the airplane and oppose the pilot's actions. This could result in a severely out of trim condition. This is a basic feature of all autopilots with electric trim follow-up.

Do not try to manually override the autopilot during flight.

**IN CASE OF EMERGENCY, YOU CAN OVERPOWER THE AUTOPILOT TO CORRECT THE ATTITUDE, BUT THE AUTOPILOT AND ELECTRIC TRIM MUST THEN IMMEDIATELY BE DISENGAGED.**

It is often difficult to distinguish an autopilot malfunction from an electric trim system malfunction. The safest course is to deactivate both. Do not re-engage either system until after you have safely landed. Then have the systems checked by a qualified service facility prior to further flight.

Depending upon the installation on your airplane, the following additional methods may be available to disengage the autopilot or electric trim in the event that the autopilot or electric trim does not disengage utilizing the disengage methods specified in the Supplements.

**CAUTION**

Transient control forces may occur when the autopilot is disengaged.

1. Turn off the autopilot master switch, if installed.
2. Pull the autopilot and trim circuit breaker(s) or turn off the autopilot switch breaker, if installed.
3. Turn off the RADIO MASTER SWITCH, if installed, and if the autopilot system and the trim system are wired through this switch.

**CAUTION**

Radios, including VHF COMM are also disconnected when the radio master switch is off.

4. Turn off the ELECTRIC MASTER SWITCH.

**WARNING**

Almost all electrically powered systems will be inoperative. Consult the AFM for further information.

5. Push the GA switch on throttle grip, if installed (depending upon the autopilot system).
6. Push TEST EACH FLT switch on the autopilot controller, if installed.

**NOTE**

After the autopilot is positively disengaged, it may be necessary to restore other electrical functions. Be sure when the master switches are turned on that the autopilot does not re-engage.

The above ways may or may not be available on your autopilot. It is essential that you read your airplane's AFM SUPPLEMENT for your autopilot system and check each function and operation on your system.

The engagement of the autopilot must be done in accordance with the instructions and procedures contained in the AFM SUPPLEMENT.

Particular attention must be paid to the autopilot settings prior to engagement. If you attempt to engage the autopilot when the airplane is out of trim, a large attitude change may occur.

**IT IS ESSENTIAL THAT THE PROCEDURES SET FORTH IN THE APPROVED AFM SUPPLEMENTS FOR YOUR SPECIFIC INSTALLATION BE FOLLOWED BEFORE ENGAGING THE AUTOPILOT.**

### ***FLUTTER***

Flutter is a phenomenon that can occur when an aerodynamic surface begins vibrating. The energy to sustain the vibration is derived from airflow over the surface. The amplitude of the vibration can (1) decrease, if airspeed is reduced; (2) remain constant, if airspeed is held constant and no failures occur; or (3) increase to the point of self-destruction, especially if airspeed is high and/or is allowed to increase. Flutter can lead to an in-flight break up of the airplane. Airplanes are designed so that flutter will not occur in the normal operating envelope of the airplane as long as the airplane is properly maintained. In the case of any airplane, decreasing the damping and stiffness of the structure or increasing the trailing edge weight of control surfaces will tend to cause flutter. If a combination of those factors is sufficient, flutter can occur within the normal operating envelope.

Owners and operators of airplanes have the primary responsibility for maintaining their airplanes. To fulfill that responsibility, it is imperative that all airplanes receive a thorough preflight inspection. Improper tension on the control cables or any other loose condition in the flight control system can also cause or contribute to flutter. Pilot's should pay particular attention to control surface attachment hardware including tab pushrod attachment during preflight inspection. Looseness of fixed surfaces or movement of control surfaces other than in the normal direction of travel should be

rectified before flight. Further, owners should take their airplanes to mechanics who have access to current technical publications and prior experience in properly maintaining that make and model of airplane. The owner should make certain that control cable tension inspections are performed as outlined in the applicable Beech Inspection Guide. Worn control surface attachment hardware must be replaced. Any repainting or repair of a moveable control surface will require a verification of the control surface balance before the airplane is returned to service. Control surface drain holes must be open to prevent freezing of accumulated moisture, which could create an increased trailing-edge-heavy control surface and flutter.

If an excessive vibration, particularly in the control column and rudder pedals, is encountered in flight, this may be the onset of flutter and the procedure to follow is:

1. IMMEDIATELY REDUCE AIRSPEED (lower the landing gear if necessary).
2. RESTRAIN THE CONTROLS OF THE AIRPLANE UNTIL THE VIBRATION CEASES.
3. FLY AT THE REDUCED AIRSPEED AND LAND AT THE NEAREST SUITABLE AIRPORT.
4. HAVE THE AIRPLANE INSPECTED FOR AIRFRAME DAMAGE, CONTROL SURFACE ATTACHING HARDWARE CONDITION/SECURITY, TRIM TAB FREE PLAY, PROPER CONTROL CABLE TENSION, AND CONTROL SURFACE BALANCE BY ANOTHER MECHANIC WHO IS FULLY QUALIFIED.

### ***TURBULENT WEATHER***

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

Updating of weather information enroute is also essential. The wise pilot knows that weather conditions can change

## **Section X**

### **Safety Information**

## **Beechcraft**

### **Single Engine (Piston)**

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:

<b>Class of Turbulence</b>	<b>Effect</b>
<b>Extreme</b>	Airplane is violently tossed about and is practically impossible to control. May cause structural damage.
<b>Severe</b>	Airplane may be momentarily out of control. Occupants are thrown violently against the belts and back into the seat. Unsecured objects are tossed about.
<b>Moderate</b>	Occupants require seat belts and occasionally are thrown against the belt. Unsecured objects move about.
<b>Light</b>	Occupants may be required to use seat belts, but objects in the airplane remain at rest.

Thunderstorms, squall lines and violent turbulence should be regarded as extremely dangerous and must be avoided. Hail and tornadic wind velocities can be encountered in thunderstorms that can destroy any airplane, just as tornadoes destroy nearly everything in their path on the ground.

Thunderstorms also pose the possibility of a lightning strike on an airplane. Any structure or equipment which shows evidence of a lightning strike, or of being subjected to a high

current flow due to a strike, or is a suspected part of a lightning strike path through the airplane should be thoroughly inspected and any damage repaired prior to additional flight.

A roll cloud ahead of a squall line or thunderstorm is visible evidence of extreme turbulence; however, the absence of a roll cloud should not be interpreted as denoting that severe turbulence is not present.

Even though flight in severe turbulence must be avoided, flight in turbulent air may be encountered unexpectedly under certain conditions.

The following recommendations should be observed for airplane operation in turbulent air:

Flying through turbulent air presents two basic problems, the answer to both of which is proper airspeed. On one hand, if you maintain an excessive airspeed, you run the risk of structural damage or failure; on the other hand, if your airspeed is too low, you may stall.

If turbulence is encountered, reduce speed to the turbulent air penetration speed, if given, or to the maneuvering speed, which is listed in the Limitations section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. These speeds give the best assurance of avoiding excessive stress loads, and at the same time provide the proper margin against inadvertent stalls due to gusts.

Beware of overcontrolling in an attempt to correct for changes in attitude; applying control pressure abruptly will build up G-forces rapidly and could cause structural damage or even failure. You should watch particularly your angle of bank, making turns as wide and shallow as possible. Be equally cautious in applying forward or back pressure to keep the airplane level. Maintain straight and level attitude in either up or down drafts. Use trim sparingly to avoid being

grossly out of trim as the vertical air columns change velocity and direction. If necessary to avoid excessive airspeeds, lower the landing gear.

### ***WIND SHEAR***

Wind shears are rapid, localized changes in wind direction, which can occur vertically as well as horizontally. Wind shear can be very dangerous to all airplanes, large and small, particularly on approach to landing when airspeeds are slow.

A horizontal wind shear is a sudden change in wind direction or speed that can, for example, transform a headwind into a tailwind, producing a sudden decrease in indicated airspeed because of the inertia of the airplane. A vertical wind shear, is a sudden updraft or downdraft. Microbursts are intense, highly localized severe downdrafts.

The prediction of wind shears is far from an exact science. Monitor your airspeed carefully when flying near storms, particularly on approach. Be mentally prepared to add power and go around at the first indication that a wind shear is being encountered.

### ***WEATHER RADAR***

Airborne weather avoidance radar is, as its name implies, for avoiding severe weather--not for penetrating it. Whether to fly into an area of radar echoes depends on echo intensity, spacing between the echoes, and the capabilities of you and your airplane. Remember that weather radar detects only precipitation drops; it does not detect turbulence. Therefore, the radar scope provides no assurance of avoiding turbulence. The radar scope also does not provide assurance of avoiding instrument weather due to clouds and fog. Your scope may be clear between intense echoes; this clear area does not necessarily mean you can fly between the storms and maintain visual sighting of them.

Thunderstorms build and dissipate rapidly. Therefore, do not attempt to plan a course between echoes using ground based radar. The best use of ground radar information is to isolate general areas and coverage of echoes. You must avoid individual storms from in-flight observations either by visual sighting or by airborne radar. It is better to avoid the whole thunderstorm area than to detour around individual storms unless they are scattered.

Remember that while hail always gives a radar echo, it may fall several miles from the nearest visible cloud and hazardous turbulence may extend to as much as 20 miles from the echo edge. Avoid intense or extreme level echoes by at least 20 miles; that is, such echoes should be separated by at least 40 miles before you fly between them. With weaker echoes you can reduce the distance by which you avoid them.

Above all, remember this: never regard any thunderstorm lightly. Even when radar observers report the echoes are of light intensity, avoiding thunderstorms is the best policy. The following are some do's and don'ts of thunderstorm avoidance:

1. Don't land or take off in the face of an approaching thunderstorm. A sudden gust front of low level turbulence could cause loss of control.
2. Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be disastrous.
3. Don't fly without airborne radar into a cloud mass containing scattered embedded thunderstorms. Embedded thunderstorms usually can not be visually circumnavigated.
4. Don't trust visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.



5. Do avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
6. Do circumnavigate the entire area if the area has 6/10 or greater thunderstorm coverage.
7. Do remember that vivid and frequent lightning indicates the probability of a severe thunderstorm.
8. Do regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher, whether the top is visually sighted or determined by radar.

If you cannot avoid penetrating a thunderstorm, the following are some do's BEFORE entering the storm:

9. Tighten your safety belt, put on your shoulder harness, and secure all loose objects.
10. Plan and hold your course to take you through the storm in minimum time.
11. To avoid the most critical icing, establish a penetration altitude below the freezing level or above the level of -15°C.
12. Verify that pitot heat is on and turn on carburetor heat or engine anti-ice. Icing can be rapid at any altitude and cause almost instantaneous power failure and/or loss of airspeed indication.

### ***MOUNTAIN FLYING***

Pilots flying in mountainous areas should inform themselves of all aspects of mountain flying, including the effects of topographic features on weather conditions. Many good articles have been published, and a synopsis of mountain flying operations is included in the FAA Airman's Information Manual, Part 1.

Avoid flight at low altitudes over mountainous terrain, particularly near the lee slopes. If the wind velocity near the

level of the ridge is in excess of 25 knots and approximately perpendicular to the ridge, mountain wave conditions are likely over and near the lee slopes. If the wind velocity at the level of the ridge exceeds 50 knots, a strong mountain wave is probable with extreme up and down drafts and severe turbulence. The worst turbulence will be encountered in and below the rotor zone, which is usually 8 to 10 miles downwind from the ridge. This zone is sometimes characterized by the presence of "roll clouds" if sufficient moisture is present; altocumulus standing lenticular clouds are also visible signs that a mountain wave exists, but their presence is likewise dependent on moisture. Mountain wave turbulence can, of course, occur in dry air and the absence of such clouds should not be taken as assurance that mountain wave turbulence will not be encountered. A mountain wave downdraft may exceed the climb capability of your airplane. Avoid mountain wave downdrafts.

### ***VFR - LOW CEILINGS***

If you are not instrument rated, do not attempt "VFR on Top" or "Special VFR" flight or clearances. Being caught above a solid cloud layer when an emergency descent is required (or at destination) is an extremely hazardous position for the VFR pilot. Accepting a clearance out of airport control zones with no minimum ceiling and one-mile visibility as permitted with "Special VFR" is a foolish practice for the VFR pilot.

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

### ***VFR AT NIGHT***

When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain a safe minimum altitude as dictated by terrain, obstacles such as

TV towers, or communities in the area flown. This is especially true in mountainous terrain, where there is usually very little ground reference. Minimum clearance is 2,000 feet above the highest obstacle enroute. Do not depend on your ability to see obstacles in time to miss them. Flight on dark nights over sparsely populated country can be the same as IFR, and must be avoided by inexperienced or non-IFR rated pilots.

### ***VERTIGO - DISORIENTATION***

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

Under VFR conditions, the visual sense, using the horizon as a reference, can override the illusions. Under low visibility conditions (night, fog, clouds, haze, etc.) the illusions predominate. Only through awareness of these illusions, and proficiency in instrument flight procedures, can an airplane be operated safely in a low visibility environment.

Flying in fog, dense haze or dust, cloud banks, or very low visibility, with strobe lights or rotating beacons turned on can contribute to vertigo. They should be turned off in these conditions, particularly at night.

All pilots should check the weather and use good judgment in planning flights. The VFR pilot should use extra caution in avoiding low visibility conditions.

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

Disorientation in low visibility conditions is not limited to VFR pilots. Although IFR pilots are trained to look at their instruments to gain an artificial visual reference as a replacement for the loss of a visual horizon, they do not always do so. This can happen when the pilot's physical condition will not permit him to concentrate on his instruments; when the pilot is not proficient in flying instrument conditions in the airplane he is flying; or, when the pilot's work load of flying by reference to his instruments is augmented by such factors as turbulence. Even an instrument rated pilot encountering instrument conditions, intentional or unintentional, should ask himself whether or not he is sufficiently alert and proficient in the airplane he is flying, to fly under low visibility conditions and in the turbulence anticipated or encountered.

If any doubt exists, the flight should not be made or it should be discontinued as soon as possible.

The result of vertigo is loss of control of the airplane. If the loss of control is sustained, it will result in an excessive speed accident. Excessive speed accidents occur in one of two manners, either as an inflight airframe separation or as a high speed ground impact; and they are fatal accidents in either case. All airplanes are subject to this form of accident.

For years, Beech Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals have contained instructions that the landing gear should be extended in any circumstance in which the pilot encounters IFR conditions which approach the limits of his capability or his ratings. Lowering the gear in IFR conditions or flight into heavy or severe turbulence, tends to stabilize the airplane, assists in maintaining proper airspeed, and will substantially reduce the possibility of reaching excessive airspeeds with catastrophic consequences, even where loss of control is experienced.

Excessive speed accidents occur at airspeeds greatly in excess of two operating limitations which are specified in the

manuals: Maximum maneuvering speed and the "red line" or "never exceed" speed. Such speed limits are set to protect the structure of an airplane. For example, flight controls are designed to be used to their fullest extent only below the airplane's maximum maneuvering speed. As a result, the control surfaces should never be suddenly or fully deflected above maximum maneuvering speed. Turbulence penetration should not be performed above that speed. The accidents we are discussing here occur at airspeeds greatly in excess of these limitations. No airplane should ever be flown beyond its FAA approved operating limitations.

### ***STALLS, SLOW FLIGHT AND TRAINING***

The stall warning system must be kept operational at all times and must not be deactivated by interruption of circuits, circuit breakers, or fuses. Compliance with this requirement is especially important in all high performance single engine airplanes during simulated engine-out practice or stall demonstrations, because the stall speed is critical in all low-speed operation of airplanes.

Training should be accomplished under the supervision of a qualified instructor-pilot, with careful reference to the applicable sections of the FAA Practical Test Standards and FAA Pilot Transition Courses for Complex Single Engine and Light Twin Engine Airplanes (AC 61-9). In particular, observe carefully the warnings in the Practical Test Standards.

### ***SPINS***

A major cause of fatal accidents in general aviation airplanes is a spin. Stall demonstrations and practice are a means for a pilot to acquire the skills to recognize when a stall is about to occur and to recover as soon as the first signs of a stall are evident.

**If a stall does not occur - A spin cannot occur.**

It is important to remember, however, that a stall can occur in any flight attitude, at any airspeed, if controls are mis-used.

Unless your airplane has been specifically certificated in the aerobatic category and specifically tested for spin recovery characteristics, it is placarded against intentional spins.

The pilot of an airplane placarded against intentional spins should assume that the airplane may become uncontrollable in a spin, since its performance characteristics beyond certain limits specified in the FAA regulations may not have been tested and are unknown. This is why airplanes are placarded against intentional spins, and this is why stall avoidance is your protection against an inadvertent spin.

Pilots are taught that intentional spins are entered by deliberately inducing a yawing moment with the controls as the airplane is stalled. Inadvertent spins result from the same combination - stall plus yaw. That is why it is important to use coordinated controls and to recover at the first indication of a stall when practicing stalls.

Always remember that extra alertness and pilot techniques are required for slow flight maneuvers, including the practice or demonstration of stalls. In addition to the foregoing mandatory procedure, always:

- Be certain that the center of gravity of the airplane is as far forward as possible. Forward C.G. aids stall recovery, spin avoidance and spin recovery. An aft C.G. can create a tendency for a spin to stabilize, which delays recovery.
- Whenever a student pilot will be required to practice slow flight, be certain that the qualified instructor pilot has a full set of operable controls available. FAA regulations prohibit flight instruction without full dual controls.

## **Section X** **Safety Information**

## **Beechcraft** **Single Engine (Piston)**

- Conduct any maneuvers which could possibly result in a spin at altitudes in excess of five thousand (5,000) feet above ground level in clear air only.
- Remember that an airplane, at or near traffic pattern and approach altitudes, cannot recover from a spin, or perhaps even a stall, before impact with the ground. On final approach maintain at least the airspeed shown in the flight manual.
- Remember that if an airplane flown under instrument conditions is permitted to stall or enter a spin, the pilot, without reference to the horizon, is certain to become disoriented. He may be unable to recognize a stall, spin entry, or the spin condition and he may be unable to determine even the direction of the rotation.
- Finally, never forget that stall avoidance is your best protection against an inadvertent spin. **MAINTAIN YOUR AIRSPEED.**

In airplanes not certificated for aerobatics, spins are prohibited. If a spin is entered inadvertently:

Immediately move the control column full forward and simultaneously apply full rudder opposite to the direction of the spin; continue to hold this position until rotation stops and then neutralize all controls and execute a smooth pullout. Ailerons should be neutral and the throttle in idle position at all times during recovery.

### ***DESCENT***

In single engine piston-powered airplanes, supercharged or normally aspirated, it is necessary to avoid prolonged descents with low power, as this produces two problems: (1) excessively cool cylinder head temperatures which cause premature engine wear, and (2) excessively rich mixtures due to idle enrichment (and altitude) which causes soot and lead deposits on the spark plugs (fouling). The second of these is the more serious consideration; the engine may not

respond to the throttle when it is desired to discontinue the descent. Both problems are amenable to one solution: maintain adequate power to keep cylinder head temperature in the "green" range during descent, and lean to best power mixture (that is, progressively enrich the mixture from cruise only slightly as altitude decreases). This procedure will lengthen the descent, of course, and requires some advance planning. If it is necessary to make a prolonged descent at or near idle, as in practicing forced landings, at least avoid the problem of fouled spark plugs by frequently advancing the throttle until the engine runs smoothly, and maintain an appropriate mixture setting with altitude. (Refer to pre-landing check list.)

### ***VORTICES - WAKE TURBULENCE***

Every airplane generates wakes of turbulence while in flight. Part of this is from the propeller or jet engine, and part from the wing tip vortices. The larger and heavier the airplane, the more pronounced and turbulent the wakes will be. Wing tip vortices from large, heavy airplanes are very severe at close range, degenerating with time, wind and distance. These are rolling in nature, from each wing tip. In tests, vortex velocities of 133 knots have been recorded. Encountering the rolling effect of wing tip vortices within two minutes after passage of large airplanes is most hazardous to light airplanes. This roll effect can exceed the maximum counter-roll obtainable in a light airplane. The turbulent areas may remain for as long as three minutes or more, depending on wind conditions, and may extend several miles behind the airplane. Plan to fly slightly above and to the windward side of other airplanes. Because of the wide variety of conditions that can be encountered, there is no set rule to follow to avoid wake turbulence in all situations. However, the Airman's Information Manual, and to a greater extent Advisory Circular 90-23, Aircraft Wake Turbulence, provide a thorough discussion of the factors you should be aware of when wake turbulence may be encountered.



## ***TAKEOFF AND LANDING CONDITIONS***

When taking off on runways covered with water or freezing slush, the landing gear should remain extended for approximately ten seconds longer than normal, allowing the wheels to spin and dissipate the freezing moisture. The landing gear should then be cycled up, then down, wait approximately five seconds and then retracted again. Caution must be exercised to insure that the entire operation is performed below Maximum Landing Gear Operating Airspeed.

Use caution when landing on runways that are covered by water or slush which cause hydroplaning (aquaplaning), a phenomenon that renders braking and steering ineffective because of the lack of sufficient surface friction. Snow and ice covered runways are also hazardous. The pilot should also be alert to the possibility of the brakes freezing.

Use caution when taking off or landing during gusty wind conditions. Also be aware of the special wind conditions caused by buildings or other obstructions located near the runway.

## **MEDICAL FACTS FOR PILOTS**

### ***GENERAL***

When the pilot enters the airplane, he becomes an integral part of the man-machine system. He is just as essential to a successful flight as the control surfaces. To ignore the pilot in preflight planning would be as senseless as failing to inspect the integrity of the control surfaces or any other vital part of the machine. The pilot has the responsibility for determining his reliability prior to entering the airplane for flight. When piloting an airplane, an individual should be free of conditions which are harmful to alertness, ability to make correct decisions, and rapid reaction time.

## **FATIGUE**

Fatigue generally slows reaction time and causes errors due to inattention. In addition to the most common cause of fatigue; insufficient rest and loss of sleep, the pressures of business, financial worries, and family problems can be important contributing factors. If you are tired, don't fly.

## **HYPOXIA**

Hypoxia, in simple terms, is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. There is a wide individual variation in susceptibility to hypoxia. In addition to progressively insufficient oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (anemias, carbon monoxide, and certain drugs). Also, alcohol and various drugs decrease the brain's tolerance to hypoxia.

Your body has no built-in alarm system to let you know when you are not getting enough oxygen. It is impossible to predict when or where hypoxia will occur during a given flight, or how it will manifest itself. Some of the common symptoms of hypoxia are increased breathing rate, a 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, a hypoxic individual commonly believes things are getting progressively better while he nears total collapse.

The symptoms are slow but progressive, insidious in onset, and are most marked at altitudes starting above ten thousand feet. Night vision, however, can be impaired starting at an altitude of 5,000 feet. Persons who have recently overindulged in alcohol, who are moderate to heavy smokers, or

who take certain drugs, may be more susceptible to hypoxia. Susceptibility may also vary in the same individual from day to day or even morning to evening. Use oxygen on flights above 10,000 feet and at any time when symptoms appear.

Depending upon altitude, a hypoxic individual has a limited time to make decisions and perform useful acts, even though he may remain conscious for a longer period. The time of useful consciousness is approximately 3-5 minutes at 25,000 feet of altitude and diminishes markedly as altitude increases.

Should symptoms occur that cannot definitely be identified as either hypoxia or hyperventilation, try three or four deep breaths of oxygen. The symptoms should improve markedly if the condition was hypoxia (recovery from hypoxia is rapid).

Pilots who fly to altitudes that require or may require the use of supplemental oxygen should be thoroughly familiar with the operation of the airplane oxygen systems. A preflight inspection of the system should be performed, including proper fit of the mask. The passengers should be briefed on the proper use of their oxygen system before flight.

Pilots who wear beards should be careful to ensure that their beard is carefully trimmed so that it will not interfere with proper sealing of the oxygen masks. If you wear a beard or moustache, test the fit of your oxygen mask on the ground for proper sealing. Studies conducted by the military and oxygen equipment manufacturers conclude that oxygen masks do not seal over beards or heavy facial hair.

Federal Aviation Regulations related to the use of supplemental oxygen by flight crew and passengers must be adhered to if flight at higher altitudes is to be accomplished safely. Passengers with significant circulatory or lung disease may need to use supplemental oxygen at lower altitudes than specified by these regulations.

## ***HYPERVENTILATION***

Hyperventilation, or overbreathing, is a disturbance of respiration that may occur in individuals as a result of emotional tension or anxiety. Under conditions of emotional stress, fright, or pain, breathing rate may increase, causing increased lung ventilation, although the carbon dioxide output of the body cells does not increase. As a result, carbon dioxide is "washed out" of the blood. The most common symptoms of hyperventilation are: dizziness, nausea, sleepiness, and finally, unconsciousness. If the symptoms persist, discontinue use of oxygen and consciously slow your breathing rate until symptoms clear, and then resume normal breathing rate. Normal breathing can be aided by talking aloud.

## ***ALCOHOL***

Common sense and scientific evidence dictate that you must not fly as a crew member while under the influence of alcohol. Alcohol, even in small amounts, produces (among other things):

- A dulling of critical judgement.
- A decreased sense of responsibility.
- Diminished skill reactions and coordination.
- Decreased speed and strength of muscular reflexes (even after one ounce of alcohol).
- Decreases in efficiency of eye movements during reading (after one ounce of alcohol).
- Increased frequency of errors (after one ounce of alcohol).
- Constriction of visual fields.
- Decreased ability to see under dim illuminations.
- Loss of efficiency of sense of touch.
- Decrease of memory and reasoning ability.

## **Section X**

### **Safety Information**

## **Beechcraft**

### **Single Engine (Piston)**

- Increased susceptibility to fatigue and decreased attention span.
- Decreased relevance of response.
- Increased self confidence with decreased insight into immediate capabilities.

Tests have shown that pilots commit major errors of judgment and procedure at blood alcohol levels substantially less than the minimum legal levels of intoxication for most states. These tests further show a continuation of impairment from alcohol up to as many as 14 hours after consumption, with no appreciable diminution of impairment. The body metabolizes ingested alcohol at a rate of about one-third of an ounce per hour. Even after the body completely destroys a moderate amount of alcohol, a pilot can still be severely impaired for many hours by hangover. The effects of alcohol on the body are magnified at altitudes, as 2 oz. of alcohol at 18,000 feet produce the same adverse effects as 6 oz. at sea level.

Federal Aviation Regulations have been amended to reflect the FAA's growing concern with the effects of alcohol impairment. FAR 91 states:

#### **"Alcohol or drugs.**

(a) No person may act or attempt to act as a crew-member 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, anti-histamines, cold tablets, cough mixtures, laxatives, tranquilizers, and appetite suppressors, may seriously impair the judgment and coordination needed while flying. The safest rule is to take no medicine before or while flying, except after consultation with your Aviation Medical Examiner.

### ***SCUBA DIVING***

Flying shortly after any prolonged scuba diving could be dangerous. Under the increased pressure of the water, excess nitrogen is absorbed into your system. If sufficient time has not elapsed prior to takeoff for your system to rid itself of this excess gas, you may experience the bends at altitudes even under 10,000 feet, where most light planes fly.

### ***CARBON MONOXIDE AND NIGHT VISION***

The presence of carbon monoxide results in hypoxia which will affect night vision in the same manner and extent as hypoxia from high altitudes. Even small levels of carbon

monoxide have the same effect as an altitude increase of 8,000 to 10,000 feet. Smoking several cigarettes can result in a carbon monoxide saturation sufficient to affect visual sensitivity equal to an increase of 8,000 feet altitude.

### ***DECOMPRESSION SICKNESS***

Pilots flying unpressurized airplanes at altitudes in excess of 10,000 feet should be alert for the symptoms of 'decompression sickness'. This phenomenon, while rare, can impair the pilot's ability to perform and in extreme cases, can result in the victim being rendered unconscious. Decompression sickness, also known as dysbarism and aviators "bends", is caused by nitrogen bubble formation in body tissue as the ambient air pressure is reduced by climbing to higher altitudes. The symptoms are pain in the joints, abdominal cramps, burning sensations in the skin, visual impairment and numbness. Some of these symptoms are similar to hypoxia. The only known remedy for decompression sickness is recompression, which can only be accomplished in an unpressurized airplane by descending. The pilot should immediately descend if it is suspected that this condition exists, since the effects will only worsen with continued exposure to the reduced pressure environment at altitude and could result, if uncorrected, in complete incapacitation. The possibility of decompression sickness can be greatly reduced by pre-breathing oxygen prior to flight and by commencing oxygen breathing well below the altitudes where it is legally mandatory.

## **A FINAL WORD**

Airplanes are truly remarkable machines. They enable us to shrink distance and time, and to expand our business and personal horizons in ways that, not too many years ago, were virtually inconceivable. For many businesses, the general aviation airplane has become the indispensable tool of efficiency.

Advances in the mechanical reliability of the airplanes we fly have been equally impressive, as attested by the steadily declining statistics of accidents attributed to mechanical causes, at a time when the airframe, systems and power plants have grown infinitely more complex. The explosion in capability of avionics systems is even more remarkable. Radar, RNAV, LORAN, sophisticated autopilots and other devices which, just a few years ago, were too large and prohibitively expensive for general aviation size airplanes, are becoming increasingly commonplace in even the smallest airplanes.

It is thus that this Safety Information is directed to the pilot, for it is in the area of the skill and proficiency of you, the pilot, that the greatest gains in safe flying are to be made over the years to come. Intimate knowledge of your airplane, its capabilities and its limitations, and disciplined adherence to the procedures for your airplane's operation, will enable you to transform potential tragedy into an interesting hangar story when - as it inevitably will - the abnormal situation is presented.

Know your airplane's limitations, and your own. Never exceed either.

Safe flying,

**BEECH AIRCRAFT CORPORATION**



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