AIRPLANE INFORMATION MANUAL
for the
CIRRUS DESIGN SR20

All-Electric SR20
Aircraft Serials 1268 and Subsequent

• NOTE •

AT THE TIME OF ISSUANCE, THIS INFORMATION MANUAL WAS HARMONIZED WITH THE SR20 PILOT'S OPERATING HANDBOOK REV A5 (P/N 11934-003), AND WILL NOT BE KEPT CURRENT. THEREFORE, THIS INFORMATION MANUAL IS FOR REFERENCE ONLY AND CANNOT BE USED AS A SUBSTITUTE FOR THE OFFICIAL PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL.

P/N 13999-003 **October 2005**
Information Manual

Cirrus Design Corporation
4515 Taylor Circle
Duluth, MN 55811

Section 1
General

Table of Contents

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Introduction

This section contains information of general interest to pilots and owners. You will find the information useful in acquainting yourself with the airplane, as well as in loading, fueling, sheltering, and handling the airplane during ground operations. Additionally, this section contains definitions or explanations of symbols, abbreviations, and terminology used throughout this handbook.

• Note •

For specific information regarding the organization of this Handbook, revisions, supplements, and procedures to be used to obtain revision service for this handbook, *refer to the "Foreword" immediately following the title page*

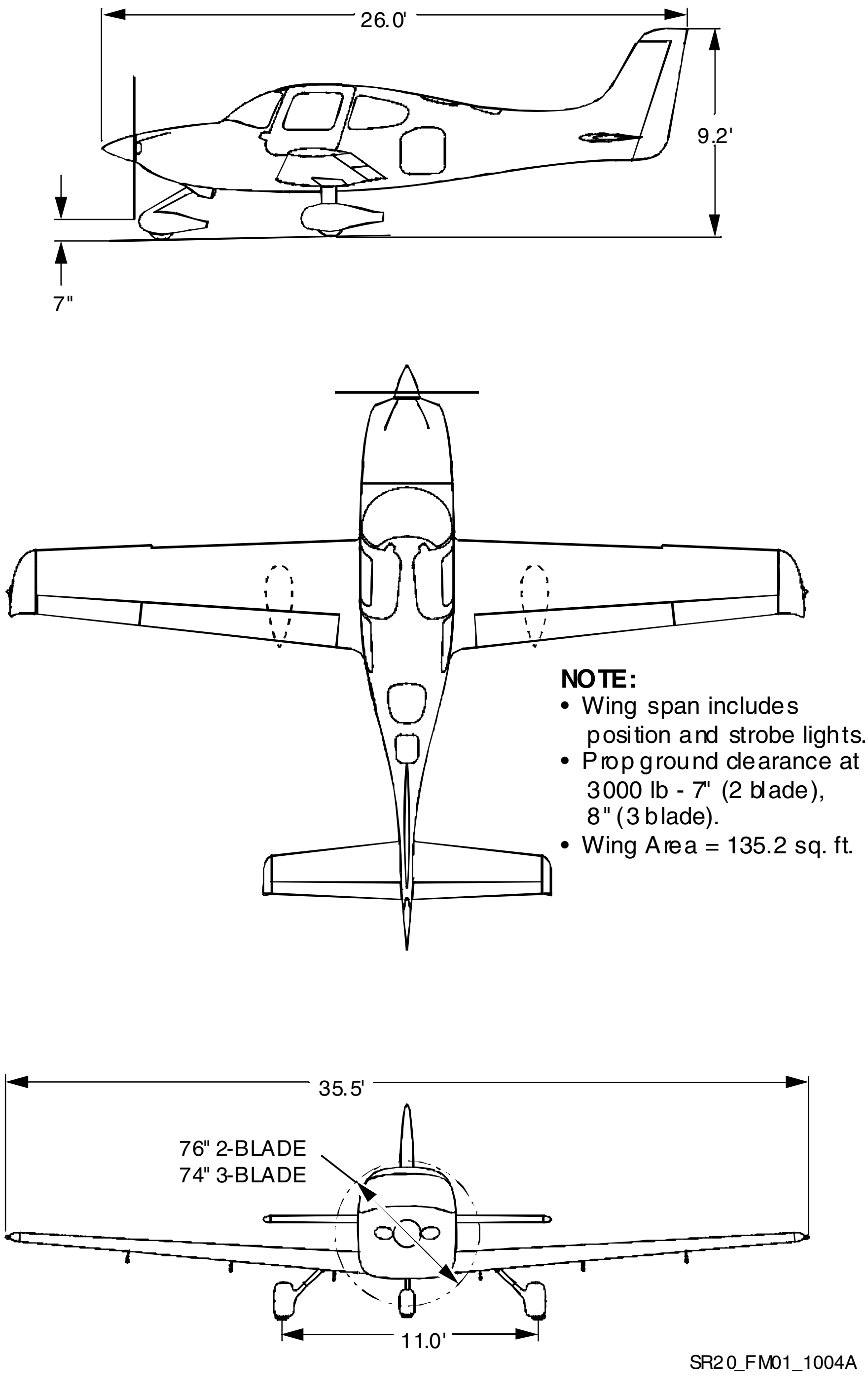
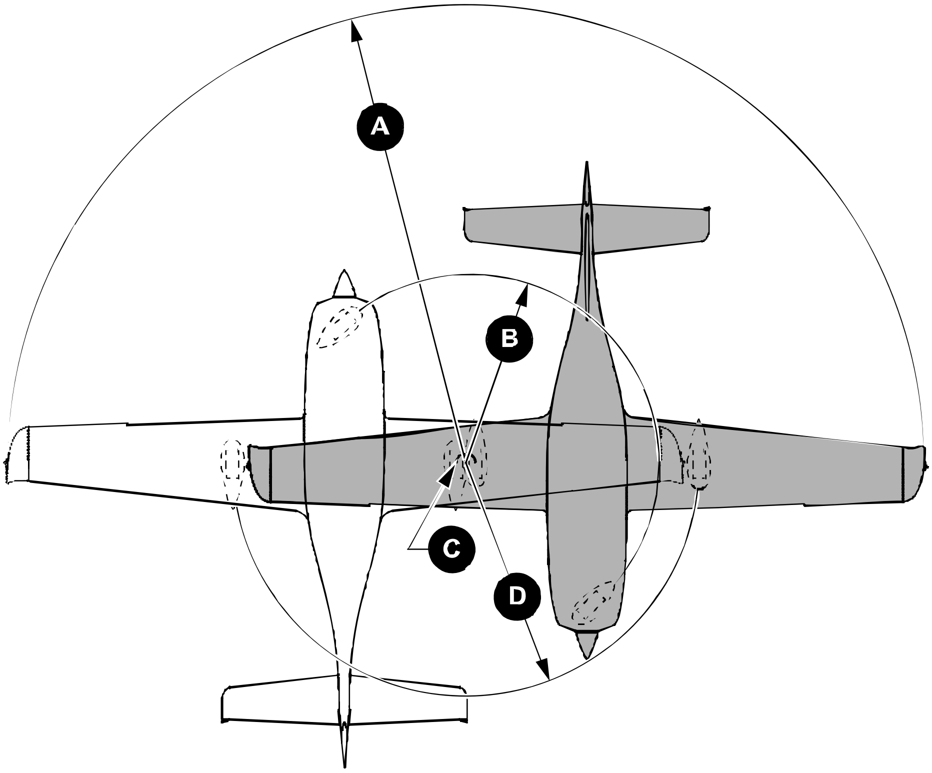


Figure 1-1
Airplane Three View



GROUND TURNING CLEARANCE

A -RADIUS FOR WING TIP .... 23' 11"

B -RADIUS FOR NOSE GEAR ---------------------------- 9' 11"

C -RADIUS FOR INSIDE GEAR ---------------------------- 6"

D -RADIUS FOR OUTSIDE GEAR ---------------------------- 12' 2"

TURNING RADII ARE CALCULATED USING ONE BRAKE AND PARTIAL POWER. ACTUAL TURNING RADIUS MAY VARY A S MUCH AS THREE FEET.

SR20_FM01_1002

Figure 1-2
Turning Radius

The Airplane

Engine

Number of Engines 1

Number of Cylinders... 6

Engine Manufacturer .... Teledyne Continental

Engine Model...IO-360-ES

Fuel Metering.. Fuel Injected

Engine Cooling .... Air Cooled

Engine Type.................................Horizontally Opposed, Direct Drive

Horsepower Rating ....200 hp @ 2700 rpm

Propeller

Hartzell

Propeller Type .... Constant Speed

Two-Blade Propeller:

Model Number BHC-J2YF-1BF/F7694

Diameter ....76.0” (74.5” Minimum)

Three-Blade Propeller:

Model Number PHC-J3YF-1MF/F7392-1

Diameter ....74.0” (72.5” Minimum)

Model Number PHC-J3YF-1RF/F7392-1

Diameter ....74.0” (72.5” Minimum)

Fuel

Total Capacity..60.5 U.S. Gallons (229.0 L)

Total Usable...56 U.S. Gallons (212.0 L)

Approved Fuel Grades:

100 LL Grade Aviation Fuel (Blue)

100 (Formerly 100/130) Grade Aviation Fuel (Green)

Oil

Oil Capacity (Sump) ....8 U.S. Quarts (7.6 L)

Oil Grades:

All Temperatures ....SAE 15W-50 or 20W-50

Below 40 °F (4° C)...SAE 30 or 10W-30

Above 40 °F (4° C) ....SAE 50

Maximum Certificated Weights

Maximum Gross for Takeoff.................................... 3000 lb (1361 Kg)

Maximum Landing Weight...................................... 2900 lb (1315 Kg)

Maximum Baggage Compartment Loading................... 130 lb (59 Kg)

Standard Empty Weight .... 2050 lb (930 Kg)

Maximum Useful Load... 950 lb (431 Kg)

Full Fuel Payload... 622 lb (282 Kg)

Cabin and Entry Dimensions

Dimensions of the cabin interior and entry door openings are illustrated in detail in Section 6.

Baggage Spaces and Entry Dimensions

Dimensions of the baggage area and baggage door opening are illustrated in detail in Section 6.

Specific Loadings

Wing Loading ....22.2 lb per square foot

Power Loading... 15.0 lb per hp

Symbols, Abbreviations and Terminology

General Airspeed Terminology and Symbols

KCAS **Knots Calibrated Airspeed** is the indicated airspeed corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.

KIAS **Knots Indicated Airspeed** is the speed shown on the airspeed indicator. The IAS values published in this handbook assume no instrument error.

KTAS **Knots True Airspeed** is the airspeed expressed in knots relative to undisturbed air which is KCAS corrected for altitude and temperature.

V_G **Best Glide Speed** is the speed at which the greatest flight distance is attained per unit of altitude lost with power off.

V_O **Operating Maneuvering Speed** is the maximum speed at which application of full control movement 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_{NO} **Maximum Structural Cruising Speed** is the speed that should not be exceeded except in smooth air, and then only with caution.

V_{NE} **Never Exceed Speed** is the speed that may not be exceeded at any time.

V_{PD} **Maximum Demonstrated Parachute Deployment Speed** is the maximum speed at which parachute deployment has been demonstrated.

V_S **Stalling Speed** is minimum steady flight speed at which the aircraft is controllable.

$V_{S\ 50\%}$ **Stalling Speed** is minimum steady flight speed at which the aircraft is controllable with 50% flaps.

V_{SO} **Stalling Speed** is the minimum steady flight speed at which the aircraft is controllable in the landing configuration (100% flaps) at the most unfavorable weight and balance.

V_X **Best Angle of Climb Speed** is the speed which results in the greatest gain of altitude in a given horizontal distance.

V_Y **Best Rate of Climb Speed** is the speed which results in the greatest gain of altitude in a given time.

Meteorological Terminology

IMC **Instrument Meteorological Conditions** are meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima for visual flight defined in FAR 91.155.

ISA **International Standard Atmosphere** (standard day) is an atmosphere where (1) the air is a dry perfect gas, (2) the temperature at sea level is 15° C, (3) the pressure at sea level is 29.92 in.Hg (1013.2 millibars), and (4) the temperature gradient from sea level to the altitude at which the temperature is -56.5° C is -0.00198° C per foot and zero above that altitude.

MSL **Mean Sea Level** is the average height of the surface of the sea for all stages of tide. In this Handbook, altitude given as MSL is the altitude above the mean sea level. It is the altitude read from the altimeter when the altimeter's barometric adjustment has been set to the altimeter setting obtained from ground meteorological sources.

OAT **Outside Air Temperature** is the free air static temperature obtained from inflight temperature indications or from ground meteorological sources. It is expressed in either degrees Celsius or degrees Fahrenheit.

- **Pressure Altitude** is the altitude read from the altimeter when the altimeter's barometric adjustment has been set to 29.92 in.Hg (1013 mb) corrected for position and instrument error. In this Handbook, altimeter instrument errors are assumed to be zero.

- **Standard Temperature** is the temperature that would be found at a given pressure altitude in the standard atmosphere. It is 15° C (59° F) at sea level pressure altitude and decreases approximately 2° C (3.6° F) for each 1000 feet of altitude increase. See ISA definition.

Engine Power Terminology

HP **Horsepower** is the power developed by the engine.

MCP **Maximum Continuous Power** is the maximum power that can be used continuously.

MAP **Manifold Pressure** is the pressure measured in the engine's induction system expressed as in. Hg.

RPM **Revolutions Per Minute** is engine rotational speed.

- **Static RPM** is RPM attained during a full-throttle engine runup when the airplane is on the ground and stationary.

Performance and Flight Planning Terminology

g One "**g**" is a quantity of acceleration equal to that of earth's gravity.

- **Demonstrated Crosswind Velocity** is the velocity of the crosswind component for which adequate control of the airplane during taxi, takeoff, and landing was actually demonstrated during certification testing. Demonstrated crosswind is not considered to be limiting.

- **Service Ceiling** is the maximum altitude at which the aircraft at maximum weight has the capability of climbing at a rate of 100 feet per minute.

GPH **Gallons Per Hour** is the amount of fuel (in gallons) consumed by the aircraft per hour.

NMPG **Nautical Miles Per Gallon** is the distance (in nautical miles) which can be expected per gallon of fuel consumed at a specific engine power setting and/or flight configuration.

- **Unusable Fuel** is the quantity of fuel that cannot be safely used in flight.
- **Usable Fuel** is the fuel available for flight planning.

Weight and Balance Terminology

c.g. **Center of Gravity** is the point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.

- **Arm** is the horizontal distance from the reference datum to the center of gravity (c.g.) of an item. The airplane's arm is obtained by adding the airplane's individual moments and dividing the sum by the total weight.
- **Basic Empty Weight** is the actual weight of the airplane including all operating equipment that has a fixed location in the airplane. The basic empty weight includes the weight of unusable fuel and full oil.

MAC **Mean Aerodynamic Chord** is the chord drawn through the centroid of the wing plan area.

LEMAC **Leading Edge of Mean Aerodynamic Chord** is the forward edge of MAC given in inches aft of the reference datum (fuselage station).

- **Maximum Gross Weight** is the maximum permissible weight of the airplane and its contents as listed in the aircraft specifications.
- **Moment** is the product of the weight of an item multiplied by its arm.
- **Useful Load** is the basic empty weight subtracted from the maximum weight of the aircraft. It is the maximum allowable combined weight of pilot, passengers, fuel and baggage.
- **Station** is a location along the airplane fuselage measured in inches from the reference datum and expressed as a number. For example: A point 123 inches aft of the reference datum is Fuselage Station 123.0 (FS 123).

- **Reference Datum** is an imaginary vertical plane from which all horizontal distances are measured for balance purposes.
- **Tare** is the weight of all items used to hold or position the airplane on the scales for weighing. Tare includes blocks, shims, and chocks. Tare weight must be subtracted from the associated scale reading.

Section 2
Limitations

Table of Contents

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Introduction

• Note •

Limitations associated with optional equipment are not described in this section. For optional equipment limitations, *refer to Section 9, Supplements*

The limitations included in this Section of the Pilot's Operating Handbook (POH) are approved by the Federal Aviation Administration.

This section provides operating limitations, instrument markings and basic placards required by regulation and necessary for the safe operation of the SR20 and its standard systems and equipment. *Refer to Section 9* of this handbook for amended operating limitations for airplanes equipped with optional equipment. Compliance with the operating limitations in this section and in Section 9 is required by Federal Aviation Regulations.

Certification Status

The Cirrus SR20 is certificated under the requirements of Federal Aviation Regulations (FAR) Part 23 as documented by FAA Type Certificate TC A00009CH.

Airspeed Limitations

The indicated airspeeds in the following table are based upon Section 5 Airspeed Calibrations using the normal static source. When using the alternate static source, allow for the airspeed calibration variations between the normal and alternate static sources.

Speed	KIAS	KCAS	Remarks
V_{NE}	200	200	**Never Exceed Speed** is the speed limit that may not be exceeded at any time.
V_{NO}	165	165	**Maximum Structural Cruising Speed** is the speed that should not be exceeded except in smooth air, and then only with caution.
V_O 3000 Lb	131	131	**Operating Maneuvering Speed** is the maximum speed at which full control travel may be used. Below this speed the airplane stalls before limit loads are reached. Above this speed, full control movements can damage the airplane.
V_{FE} 50% Flaps 100% Flaps	120 100	120 101	**Maximum Flap Extended Speed** is the highest speed permissible with wing flaps extended.
V_{PD}	135	135	**Maximum Demonstrated Parachute Deployment Speed** is the maximum speed at which parachute deployment has been demonstrated.

Figure 2-1
Airspeed Limits

Airspeed Indicator Markings

The airspeed indicator markings are based upon Section 5 Airspeed Calibrations using the normal static source. When using the alternate static source, allow for the airspeed calibration variations between the normal and alternate static sources.

Marking	Value (KIAS)	Remarks
White Arc	56 - 100	Full Flap Operating Range. Lower limit is the most adverse stall speed in the landing configuration. Upper limit is the maximum speed permissible with flaps extended.
Green Arc	65 - 165	Normal Operating Range. Lower limit is the maximum weight stall at most forward C.G. with flaps retracted. Upper limit is the maximum structural cruising speed.
Yellow Arc	165 - 200	Caution Range. Operations must be conducted with caution and only in smooth air.
Red Line	200	Never exceed speed. Maximum speed for all operations.

Figure 2-2
Airspeed Indicator Markings

Power Plant Limitations

Engine

Teledyne Continental..IO-360-ES

Power Rating .... 200 hp @ 2700 rpm

Maximum RPM ....2700 rpm

Oil:

Oil Temperature................................. 240° F (115° C) maximum

Oil Pressure:

Minimum... 10 psi

Maximum.. 100 psi

Approved Oils:

Engine Break-In: For first 25 hours of operation or until oil consumption stabilizes use straight mineral oil conforming to MIL-L-6082. If engine oil must be added to the factory installed oil, add only MIL-L-6082 straight mineral oil.

After Engine Break-In: Use only oils conforming to Teledyne Continental Specification MHS-24 (Ashless Dispersant Lubrication Oil) or MHS-25 (Synthetic Lubrication Oil). *Refer to Section 8 - Oil Servicing.* Oil viscosity range as follows:

All Temperatures ....15W-50 or 20W-50

Below 40 °F (4° C) ....SAE 30 or 10W-30

Above 40 °F (4° C) ....SAE 50

Fuel Grade................Aviation Grade 100 LL (Blue) or 100 (green)

• Note •

Refer to General Limitations – Fuel Limits in this section for operational limitations regarding fuel and fuel storage.

Propeller

• Note •

Two-blade propellers are not EASA approved for use on this airplane. Airplanes registered in the European Union should ignore all references to the two-blade propeller in this POH.

Hartzell

Propeller Type .... Constant Speed

Two-Blade Propeller:

Model Number...BHC-J2YF-1BF/F7694

Diameter..76.0" (74.5" Minimum)

Three-Blade Propeller:

Model Number.. PHC-J3YF-1MF/F7392-1

Diameter..74.0" (72.5" Minimum)

Model Number.. PHC-J3YF-1RF/F7392-1

Diameter..74.0" (72.5" Minimum)

Weight Limits

Maximum Takeoff Weight .... 3000 lb. (1361 kg)

• Note •

All weights in excess of 2900 pounds (1315 kg) must consist of wing fuel.

Maximum Landing Weight .... 2900 lb. (1315 kg)

Maximum Weight in Baggage Compartment................. 130 lb. (59 kg)

Instrument Markings

Instrument (Range)	Red Line Minimum	Green Arc Normal	Yellow Arc Caution	Red Line Maximum
Power Plant Instrumentation				
Tachometer/ Engine Speed (0 - 3500 RPM)	—	500 - 2700	––	2700
Cylinder Head Temperature (200° F - 500° F)	—	240° - 420° F	420° - 460° F	460° F
Exhaust Gas Temp. (1250° - 1650° F)	—	—	––	—
Manifold Pressure (10 – 35 Inches Hg)	—	15 - 29.5 in. Hg	29.5 – 35 in. Hg	—
Fuel Flow (0 – 18 U.S. Gal./ Hr.)	—	7 – 13 GPH	––	—
Oil Temperature (50° - 240° F)	—	100° - 240° F	—	240° F
Oil Pressure (0 - 100 PSI)	10 psi (Idle)	30 - 60 psi	10 - 30 psi 60 - 100 psi	100 psi (Cold)
Fuel Quantity (0 – 28 U.S. Gallon)	0 gal.	—	0 - 8.2 gal.	—
Miscellaneous Instrumentation				
Voltmeter (16 - 32 Volts)	—	24 - 30 Volts	—	32 Volts

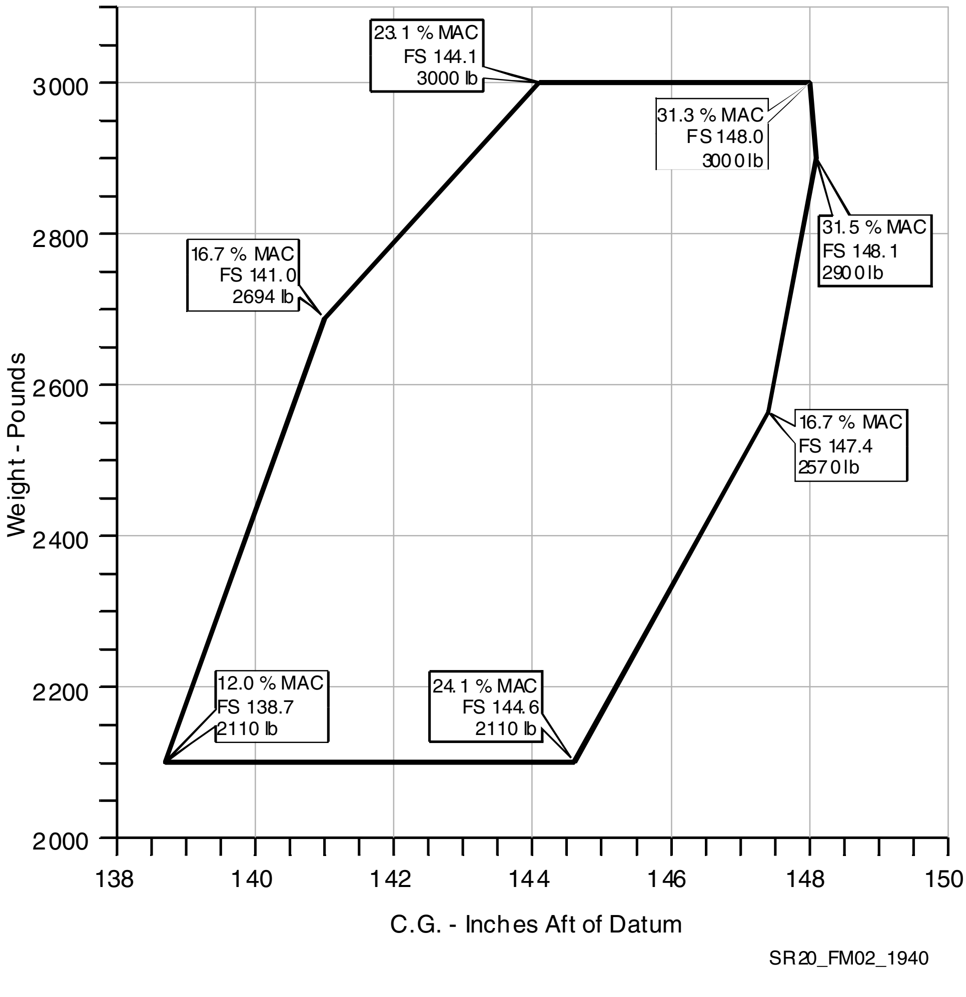
Figure 2-3
Instrumentation Markings

Center of Gravity Limits

Reference Datum ....100 inches forward of firewall

Forward ....*Refer to Figure 2-4*

Aft...*Refer to Figure 2-4*



FORWARD LIMIT - The forward limit is FS 138.7 (12.0% MAC) at 2110 lb., with straight line taper to FS 141.0 (16.7% MAC) at 2694 lb., and to FS 144.1 (23.1% MAC) at 3000 lb.
AFT LIMIT - The aft limit is FS 144.6 (24.1% MAC) at 2110 lb., with straight line taper to FS 147.4 (30.0% MAC) at 2570 lb., to FS 148.1 (31.5% MAC) at 2900 lb., and to FS 148.0 (31.3% MAC at 3000 lb.

Figure 2-4
C.G. Envelope

Maneuver Limits

Aerobatic maneuvers, including spins, are prohibited.

• Note •

Because the SR20 has not been certified for spin recovery, the Cirrus Airframe Parachute System (CAPS) must be deployed if the airplane departs controlled flight. *Refer to Section 3 – Emergency Procedures, Inadvertent Spiral/Spin Entry*.

This airplane is certified in the normal category and is not designed for aerobatic operations. Only those operations incidental to normal flight are approved. These operations include normal stalls, chandelles, lazy eights, and turns in which the angle of bank is limited to 60°.

Flight Load Factor Limits

Flaps UP (0%), 3000 lb...+3.8g, -1.9g

Flaps 50%, 3000 lb...+1.9g, -0g

Flaps 100% (Down), 3000 lb. ....+1.9g, -0g

Minimum Flight Crew

The minimum flight crew is one pilot.

Kinds of Operation

The SR20 is equipped and approved for the following type operations:

- VFR day and night.
- IFR day and night.

Serials 1337 and subsequent with SRV configuration: The airplane is equipped and approved for the following type operations:

- VFR day and night.

Kinds of Operation Equipment List

The following listing summarizes the equipment required under Federal Aviation Regulations (FAR) Part 23 for airworthiness under the listed kind of operation. Those minimum items of equipment necessary under the operating rules are defined in FAR Part 91 and FAR Part 135 as applicable.

• Note •

All references to types of flight operations on the operating limitations placards are based upon equipment installed at the time of Airworthiness Certificate issuance.

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
Communications					
VHF COM	—	—	1	1	
Electrical Power					
Battery 1	1	1	1	1	
Battery 2	—	—	1	1	
Alternator 1	1	1	1	1	
Alternator 2	—	—	1	1	*Serials 1337 & subs w/ SRV standard configuration:* ALT 2 not applicable.

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
Amp Meter/Indication	1	1	1	1	
Low Volts Annunciator	1	1	1	1	
ALT 1 Annunciator	1	1	1	1	
ALT 2 Annunciator	1	1	1	1	*Serials 1337 and subsequent with SRV standard configuration:* ALT 2 Annunciator not applicable.
Circuit Breakers	A/R	A/R	A/R	A/R	As Required.
Equipment & Furnishings					
Emergency Locator Transmitter	1	1	1	1	
Restraint System	A/R	A/R	A/R	A/R	One Seat Belt for each occupant.
Fire Protection					
Fire Extinguisher	1	1	1	1	
Flight Controls					
Flap Position Lights	3	3	3	3	
Flap System	1	1	1	1	
Pitch Trim Indicator	1	1	1	1	
Pitch Trim System	1	1	1	1	
Roll Trim Indicator	1	1	1	1	
Roll Trim System	1	1	1	1	
Stall Warning System	1	1	1	1	
Fuel					

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
Auxiliary Boost Pump	1	1	1	1	
Fuel Quantity Indicator	2	2	2	2	
Fuel Selector Valve	1	1	1	1	
Ice & Rain Protection					
Alternate Engine Air Induction System	1	1	1	1	
Alternate Static Air Source	1	1	1	1	
Pitot Heater	—	—	1	1	
Landing Gear					
Wheel Pants	—	—	—	—	May be removed.
Lights					
Anticollision Lights	2	2	2	2	
Instrument Lights	—	❖	—	❖	❖-Must be operative.
Navigation Lights	—	4	—	4	
Landing Light	—	1	—	1	For hire operations.
Navigation & Pitot Static					
PFD Attitude Indicator	-	-	1	1	*Serials 1337 & subs w/ PFD only.*
Standby Attitude Indicator	-	-	1	1	*Serials 1337 & subs w/ PFD only.*
PFD Airspeed Indicator	-	-	1	1	*Serials 1337 & subs w/ PFD only.*
Standby Airspeed Indicator	1	1	1	1	*Serials 1337 & subs w/ PFD only.*

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
PFD Altimeter	-	-	1	1	*Serials 1337 & subs w/ PFD only.*
Standby Altimeter	1	1	1	1	*Serials 1337 & subs w/ PFD only.*
PFD Heading	-	-	1	1	*Serials 1337 & subs w/ PFD only.*
Altimeter	1	1	1	1	
Airspeed Indicator	1	1	1	1	
Vertical Speed Indicator	—	—	—	—	
Magnetic Compass	1	1	1	1	
Attitude Gyro	—	—	1	1	
HSI	—	—	1	1	
Turn Coordinator (Gyro)	—	—	1	1	
Clock	—	—	1	1	
Nav Radio	—	—	1	1	
Pitot System	1	1	1	1	
Static System, Normal	1	1	1	1	
Multi-Function Display	—	—	—	—	
Engine Indicating					
Cylinder Head Temperature Indication	—	—	—	—	
Exhaust Gas Temperature Indication	—	—	—	—	
Fuel Flow Indication	1	1	1	1	

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
Manifold Pressure Indication	1	1	1	1	
Oil Pressure Indication	1	1	1	1	
Oil Quantity Indicator (Dipstick)	1	1	1	1	
Oil Temperature Indication	1	1	1	1	
Engine Speed	1	1	1	1	
Special Equipment					
Cirrus Airframe Parachute (CAPS)	1	1	1	1	
Airplane Flight Manual	1	1	1	1	Included w/ POH.

Icing

Flight into known icing conditions is prohibited.

Runway Surface

This airplane may be operated on any smooth runway surface.

• Caution •

Operation on unimproved runway surfaces will cause additional wear and may require additional maintenance or inspection. *Refer to the Airplane Maintenance Manual.*

Instrument Procedures

Due to the possibility of CDI needle oscillation, in aircraft configured with a 2 blade propeller, while conducting instrument procedures that use a localizer or Simplified Directional Facility (SDF) navaid, engine speed above 2600 rpm is prohibited.

Fuel Limits

The maximum allowable fuel imbalance is 7.5 U.S. gallons (¼ tank).

Approved Fuel .... Aviation Grade 100 LL (Blue) or 100 (Green)

Total Fuel Capacity .... 60.5 U.S. gallons (229.0 L)

Total Fuel Each Tank .... 30.3 U.S. gallons (114.5 L)

Total Usable Fuel (all flight conditions)....... 56.0 U.S. gallons (212.0 L)

Maximum Operating Altitude

Maximum Operating Altitude .... 17,500 ft. MSL

The operating rules (FAR Part 91 and FAR Part 135) require the use of supplemental oxygen at specified altitudes below the maximum operating altitude. *Refer to Oxygen System Limitations in this Section.*

Environmental Conditions

For operation of the airplane below an outside air temperature of -10°F (-23° C), use of cowl inlet covers approved by Cirrus Design and listed in the Winterization Kit AFM Supplement P/N 11934-S25 is required.

Maximum Occupancy

Occupancy of this airplane is limited to four persons (the pilot and three passengers).

Systems and Equipment Limits

Cirrus Airframe Parachute System (CAPS)

V_{PD} Maximum Demonstrated Deployment Speed..................135 KIAS

• Note •

Refer to Section 10 – Safety Information, for additional CAPS guidance.

Primary Flight Display

1. The PFD integrates with separately approved sensor installations. Adherence to limitations in appropriate installation POH supplements is mandatory.

2. The Avidyne FlightMax Entegra-Series PFD Pilot's Guide, P/N 600-00081-000, Revision 03, or latest revision, must be available to the pilot during all flight operations.
3. Flight under Instrument Flight Rules (IFR) is not permitted with the PFD or any standby indicator (attitude indicator or magnetic compass) inoperative. *Refer to Kinds of Operation Equipment List*.

• Note •

The Avidyne PFD software version is displayed on the PFD during system startup.

4. *Serials 1337 and subsequent before installation of PFD software version 530-00123-XXX-REV05 (where X can be any digit from 0 to 9):* Backcourse approaches are prohibited.

When the PFD is coupled with Autopilot System, the following Limitations apply:

5. Autopilot operation is prohibited above:
    a. 185 KIAS for airplanes equipped with System 55 autopilots.
    b. 180 KIAS for airplanes equipped with System 55SR autopilots.
6. The autopilot must not be engaged for takeoff or landing.
7. The autopilot must be disengaged for missed approach, go-around, and balked landing.
8. Flaps must be set to 50% for autopilot operation in Altitude Hold at airspeeds below 95 KIAS.
9. Flap deflection is limited to 50% during autopilot operations.
10. The autopilot must be disconnected in moderate or severe turbulence.
11. Minimum engage height for the autopilot is 400 ft AGL.

• WARNING •

Autopilot may not be able to maintain all selectable vertical speeds. Selecting a vertical speed that exceeds the aircraft's available performance may cause the aircraft to stall.

12. Minimum speed with the autopilot engaged is $1.2V_S$ for the given configuration.
13. For VOR/GPS and ILS glideslope and localizer intercept, capture, and tracking, the following limitations apply:
    a. The autopilot must be disengaged no later than 100 feet below the Minimum Descent Altitude.
    b. The autopilot must be disconnected during approach if course deviation exceeds 50%. The approach should only be continued by "hand-flying" the airplane.
    c. The autopilot must be disengaged at the Decision Height.
    d. 12 knot maximum crosswind component between the missed approach point and outer marker.
    e. The intercept of the localizer shall occur at least 5 miles outside of the outer marker.
    f. If the crosswind component is greater than 12 knots and less than 17 knots, the intercept shall occur at least 10 miles outside of the outer marker.
    g. The intercept angle shall be no greater than a 45-degree intercept.
    h. The ILS is flown at normal approach speeds, and within any STC or TC speed constraints and as defined in this flight manual.
    i. The flaps should be extended in the approach configuration prior to the Outer Marker. No further changes in the flap configuration should be made throughout the autopilot-coupled approach.
    j. The glideslope is approached in such a manner to allow automatic arming of the glideslope, or if the glideslope is manually armed no more than 15% above the glideslope.

Multi-Function Display

1. The moving map display must not be used as the primary navigation instrument. The moving map display provides visual advisory of the airplane's GPS position against a moving map.

The information supplements CDI course deviation and information provided on the GPS navigator.

2. Use of Map page during IFR flight requires an IFR approved GPS receiver installation operated in accordance with applicable limitations.
3. Under no circumstances should the Map page terrain representations be used as a basis for terrain avoidance.
4. The Avidyne electronic checklists display supplements the Pilot Operating Handbook checklists and is advisory only. The electronic checklists must not be used as the primary set of on-board airplane checklists.
5. The MFD interfaces with separately approved sensor installations. Adherence to limitations in the appropriate sensor installation POH Supplements is mandatory.
6. Traffic information shown on the Map page display is provided to the pilot as an aid to visually acquire traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic. Maneuver should be consistent with ATC instructions. No maneuvers should be made based solely on a traffic advisory.
7. Do not use the optionally installed XM Satellite Weather System for navigation of the aircraft. The XM Satellite Weather System is intended to serve as a situational awareness tool only.
8. Do not use the optionally installed CMax Approach Charts function for navigation of the aircraft. The CMax Approach Charts function is intended to serve as a situational awareness tool only. The electronic approach charts must not be used as the primary set of on-board approach charts.
9. *Serials with EX3000C MFD installed:* The Avidyne FlightMax EX3000C/5000C Pilot's Guide, P/N 600-00072, Revision 00 or later, must be available to the pilot during all flight operations.

   Serials with EX5000C MFD installed: The Avidyne FlightMax EX5000C Pilot's Guide, P/N 600-00108-000, Revision 03 or later, must be available to the pilot during all flight operations.

Oxygen System

Whenever the operating rules require the use of supplemental oxygen, the pilot must:

- Use an oxygen system approved by Cirrus Design and listed in the Oxygen System AFM Supplement Part Number 11934-S09.
- Secure the oxygen bottle in the right front seat as described in the AFM Supplement noted above.

Inflatable Restraint System

Serials 1268 thru 1540 after SB 2X-25-14 and serials 1541 and subsequent; Use of a child safety seat with the inflatable restraint system is prohibited.

Flap Limitations

Approved Takeoff Settings..UP (0%) or 50%

Approved Landing Settings .... Up (0%), 50%, or 100%

Paint

To ensure that the temperature of the composite structure does not exceed 150° F (66° C), the outer surface of the airplane must be painted with an approved white paint, except for areas of registration marks, placards, and minor trim. *Refer to SR20 Airplane Maintenance Manual (AMM), Chapter 51,* for specific paint requirements.

Other Limitations

Smoking

Smoking is prohibited in this airplane.

Placards

Engine compartment, inside oil filler access:

ENGINE OIL GRADE

ABOVE 40° F SAE 50 OR 20W50

BELOW 40° F SAE 30 OR 10W30, 15W50, OR 20W50

REFER TO AFM FOR APPROVED OILS

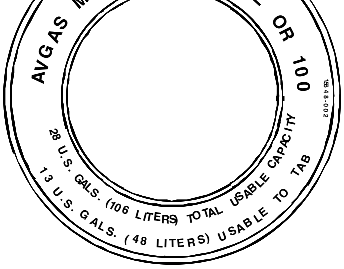
Wing, adjacent to fuel filler caps:

AVGAS MIN GRADE 100LL OR 100
28 U.S. GALS. TOTAL USABLE CAP
13 U.S. GALS. USABLE TO TAB

Serials 1005 thru 1099.

AVGAS MIN GRADE 100LL OR 100
28 U.S. GALS. (106 LITERS) TOTAL USABLE CAP
13 U.S. GALS. (49 LITERS) USABLE TO TAB

Serials 1100 thru 1326.



Serials 1327 & subs.

SR20_FM02_1220C

Figure 2-5
Placards (Sheet 1 of 7)

Upper fuselage, either side of CAPS rocket cover:

WARNING!

ROCKET FOR PARACHUTE DEPLOYMENT INSIDE

STAY CLEAR WHEN AIRPLANE IS OCCUPIED

Left fuselage, on external power supply door:

EXTERNAL

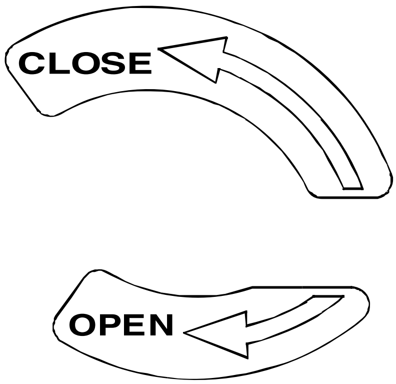
POWER

28 V DC

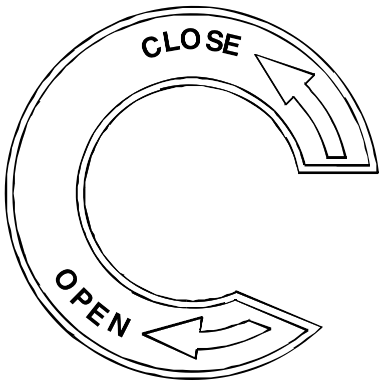
Rudder, and elevator, both sides:

NO PUSH

Doors, above and below latch:



Serials 1005 thru 1316.



Serials 1317 thru 1422.

PUSH

TO

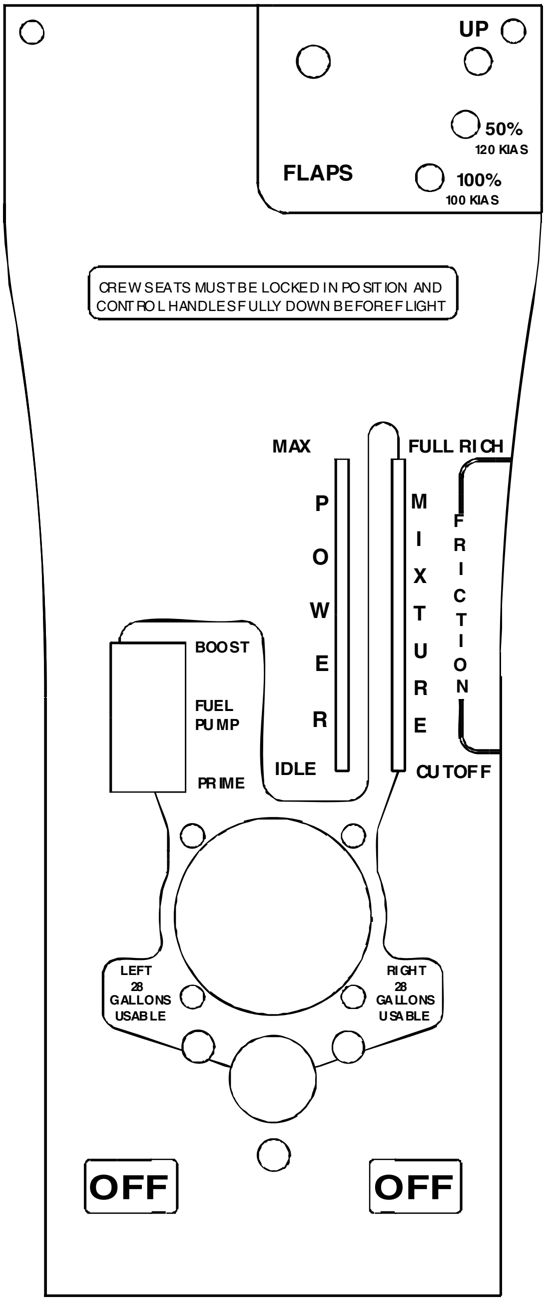
OPEN

Serials 1423 & subs.

SR20_FM02_1221B

Figure 2-5
Placards (Sheet 2 of 7)

Engine control panel:



SR20_FM02_1602A

Figure 2-5
Placards (Sheet 3 of 7)

Wing, flap aft edge:

NO STEP

Cabin Door Window, lower edge, centered, applied upside down:

RESCUE: FRACTURE AND REMOVE WINDOW

Bolster Switch Panel, left edge:

THIS AIRCRAFT IS CERTIFIED FOR THE FOLLOWING FLIGHT OPERATIONS:
DAY - NIGHT - VFR - IFR
(WITH REQUIRED EQUIPMENT)

FLIGHT INTO KNOWN ICING IS PROHIBITED

OPERATE PER AIRPLANE FLIGHT MANUAL

Serials 1005 & subs w/o SRV option.

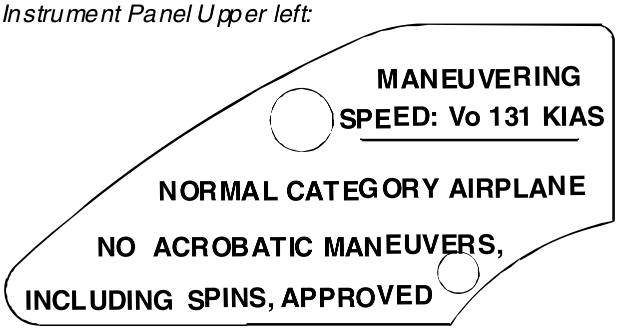
THIS AIRCRAFT IS CERTIFIED FOR THE FOLLOWING FLIGHT OPERATIONS:
DAY - NIGHT - VFR
(WITH REQUIRED EQUIPMENT)

FLIGHT INTO KNOWN ICING IS PROHIBITED

OPERATE PER AIRPLANE FLIGHT MANUAL

Serials 1337 & subs with SRV option.

Instrument Panel Upper left:



SR20_FM02_1223E

Figure 2-5
Placards (Sheet 4 of 7)

Instrument Panel Upper Right:

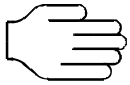
NO SMOKING
FASTEN SEATBELTS
FIRE EXTINGUISHER
UNDER PILOT SEAT FRONT

OR

Above MFD (on one line):

FASTEN SEATBELTS
FIRE EXTINGUISHER UNDER PILOT SEAT FRONT
NO SMOKING

Bolster Panel, both sides:


GRAB HERE

Serials 1351 & subs.

Cabin Window, above door latch:

EMERGENCY EXIT
REMOVE EGRESS HAMMER FROM ARMREST LID
STRIKE CORNER OF WINDOW,
KICK OR PUSH OUT AFTER FRACTURING

Serials 1005 thru 1178.

Cabin Window, above door latch:

EMERGENCY EXIT
REMOVE EGRESS HAMMER FROM WITHIN
CENTER ARMREST LID. STRIKE CORNER OF
WINDOW. KICK OR PUSH OUT AFTER FRACTURING

Serials 1179 & subs.

SR20_FM02_1517C

Figure 2-5
Placards (Sheet 5 of 7)

Baggage Compartment, aft edge:

ELT LOCATED BEHIND BULKHEAD
REMOVE CARPET AND ACCESS PANEL

Baggage Compartment Door, inside:

DISTRIBUTED FLOOR LIMIT 130 LBS

BAGGAGE STRAP CAPACITY IS 35 LBS EACH MAXIMUM

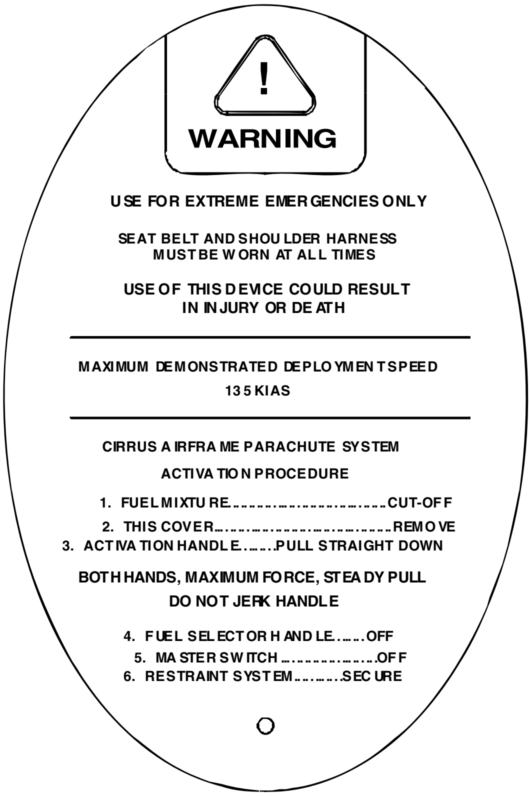
SEE AIRPLANE FLIGHT MANUAL FOR BAGGAGE TIE-DOWN
AND WEIGHT AND BALANCE INFORMATION

12378-001 REV A

SR20_FM02_1224

Figure 2-5
Placards (Sheet 6 of 7)

CAPS Deployment Handle Cover, above pilot's right shoulder :



SR20_FM02_1590

Figure 2-5
Placards (Sheet 7 of 7)

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Section 3
Emergency Procedures

Table of Contents

Introduction

This section provides procedures for handling emergencies and critical flight situations that may occur while operating the SR20. Although emergencies caused by airplane, systems, or engine malfunctions are extremely rare, the guidelines described in this section should be considered and applied as necessary should an emergency arise.

• Note •

Emergency procedures associated with optional systems can be found in Section 9.

Serials 1337 and subsequent with SRV standard configuration: The airplane is equipped with a single alternator, dual battery electrical system. References to Alternator 2 in the following section do not apply.

Airspeeds for Emergency Operations

Maneuvering Speed:

3000 lb ....131 KIAS

2600 lb ....122 KIAS

2200 lb ....111 KIAS

Best Glide:

3000 lb ....96 KIAS

2500 lb ....87 KIAS

Emergency Landing (Engine-out):

Flaps Up..86 KIAS

Flaps 50%..81 KIAS

Flaps 100% ....75 KIAS

Emergency Procedures Guidance

Although this section provides procedures for handling most emergencies and critical flight situations that could arise in the SR20, it is not a substitute for thorough knowledge of the airplane and general aviation techniques. A thorough study of the information in this handbook while on the ground will help you prepare for time-critical situations in the air.

Preflight Planning

Enroute emergencies caused by weather can be minimized or eliminated by careful flight planning and good judgment when unexpected weather is encountered.

Preflight Inspections/Maintenance

In-flight mechanical problems in the SR20 will be extremely rare if proper preflight inspections and maintenance are practiced. Always perform a thorough walk-around preflight inspection before any flight to ensure that no damage occurred during the previous flight or while the airplane was on the ground. Pay special attention to any oil leaks or fuel stains that could indicate engine problems.

Methodology

Aircraft emergencies are very dynamic events. Because of this, it is impossible to address every action a pilot might take to handle a situation. However, four basic actions can be applied to any emergency. They are:

Maintain Aircraft Control — Many minor aircraft emergencies turn into major ones when the pilot fails to maintain aircraft control. Remember, do not panic and do not fixate on a particular problem. Over-attention to a faulty warning light during an instrument approach can lead to a pilot induced unusual attitude and possibly worse. To avoid this, even in an emergency: aviate, navigate, and communicate, in this order. Never let anything interfere with your control of the airplane. Never stop flying.

Analyze the Situation — Once you are able to maintain control of the aircraft, assess the situation. Look at the engine parameters. Listen to the engine. Determine what the airplane is telling you.

Take Appropriate Action — In most situations, the procedures listed in this section will either correct the aircraft problem or allow safe recovery of the aircraft. Follow them and use good pilot judgment.

Land as soon as Conditions Permit — Once you have handled the emergency, assess your next move. Handle any non-critical "clean-up" items in the checklist and put the aircraft on the ground. Remember, even if the airplane appears to be in sound condition, it may not be.

Memory Items

Checklist steps emphasized by underlining such as this:

1. Best Glide Speed .... ESTABLISH

should be memorized for accomplishment without reference to the procedure.

Ground Emergencies

Engine Fire During Start

A fire during engine start may be caused by fuel igniting in the fuel induction system. If this occurs, attempt to draw the fire back into the engine by continuing to crank the engine.

1. Mixture .... CUTOFF
2. Fuel Pump .... OFF
3. Fuel Selector .... OFF
4. Power Lever .... FORWARD
5. Starter .... CRANK
6. If flames persist, perform *Emergency Engine Shutdown on Ground* and *Emergency Ground Egress* checklists.

Emergency Engine Shutdown On Ground

1. Power Lever .... IDLE
2. Fuel Pump (if used) .... OFF
3. Mixture .... CUTOFF
4. Fuel Selector .... OFF
5. Ignition Switch .... OFF
6. Bat-Alt Master Switches .... OFF

Emergency Ground Egress

• WARNING •

While exiting the airplane, make sure evacuation path is clear of other aircraft, spinning propellers, and other hazards.

1. Engine .... SHUTDOWN

• Note •

If the engine is left running, set the Parking Brake prior to evacuating the airplane.

2. Seat belts .... RELEASE
3. Airplane .... EXIT

• Note •

If the doors cannot be opened, break out the windows with egress hammer, located in the console between the front seats, and crawl through the opening.

In-Flight Emergencies

Engine Failure On Takeoff (Low Altitude)

If the engine fails immediately after becoming airborne, abort on the runway if possible. If altitude precludes a runway stop but is not sufficient to restart the engine, lower the nose to maintain airspeed and establish a glide attitude. In most cases, the landing should be made straight ahead, turning only to avoid obstructions. After establishing a glide for landing, perform as many of the checklist items as time permits.

• WARNING •

If a turn back to the runway is elected, be very careful not to stall the airplane.

1. Best Glide or Landing Speed (as appropriate) .... ESTABLISH
2. Mixture .... CUTOFF
3. Fuel Selector .... OFF
4. Ignition Switch.. OFF
5. Flaps .... AS REQUIRED

If time permits:

6. Power Lever .... IDLE
7. Fuel Pump .... OFF
8. Bat-Alt Master Switches.. OFF
9. Seat Belts .... ENSURE SECURED

Maximum Glide

Conditions		Example:	
Power	OFF	Altitude	7,000 ft. AGL
Propeller	Windmilling	Airspeed	Best Glide
Flaps	0% (UP)		
Wind	Zero	Glide Distance	12.5 NM

Best Glide Speed

3000 lb	96 KIAS
2500 lb	87 KIAS

Maximum Glide Ratio ~ 10.9 : 1

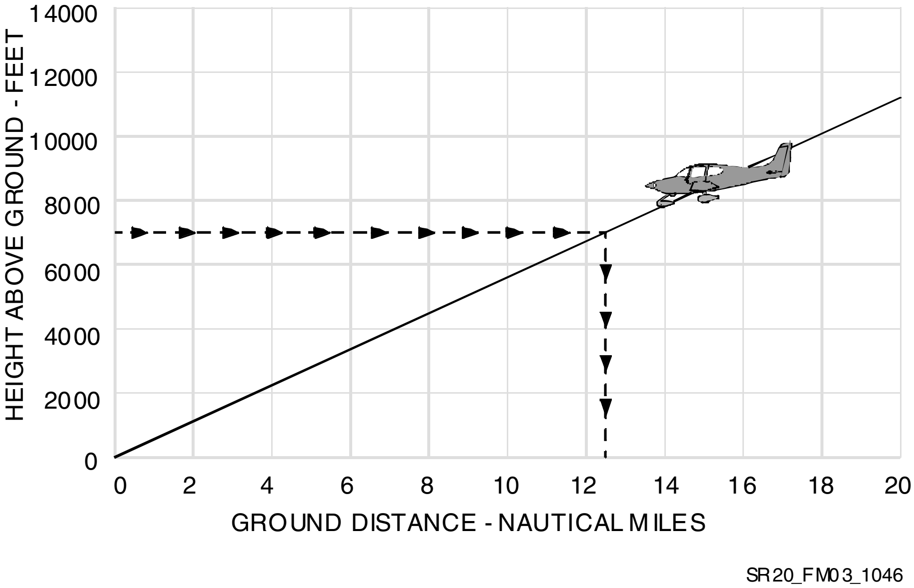

Figure 3-1
Maximum Glide

Engine Failure In Flight

If the engine fails at altitude, pitch as necessary to establish best glide speed. While gliding toward a suitable landing area, attempt to identify the cause of the failure and correct it.

• WARNING •

If engine failure is accompanied by fuel fumes in the cockpit, or if internal engine damage is suspected, move Mixture Control to CUTOFF and do not attempt a restart.

1. Best Glide Speed .... ESTABLISH

• Note •

With a seized or failed engine, the distance that the airplane will glide will be more than the distance it would glide with the engine at idle, such as during training.

If the propeller is windmilling, some additional glide range may be achieved by moving the Power Lever to idle and increasing airspeed by 5 to 10 knots.

2. Mixture .... FULL RICH
3. Fuel Selector .... SWITCH TANKS
4. Fuel Pump .... BOOST
5. Alternate Induction Air .... ON
6. Ignition Switch .... CHECK, BOTH
7. If engine does not start, proceed to *Engine Airstart* or *Forced Landing* checklist, as required.

Engine Airstart

The following procedures address the most common causes for engine loss. Switching tanks and turning the fuel pump on will enhance starting if fuel contamination was the cause of the failure. Leaning the mixture and then slowly enriching mixture may correct faulty mixture control.

• Note •

Engine airstarts may be performed during 1g flight anywhere within the normal operating envelope of the airplane.

1. Bat Master Switches .... ON
2. Power Lever .... ½" OPEN
3. Mixture .... RICH, AS REQ'D
4. Fuel Selector .... SWITCH TANKS
5. Ignition Switch .... BOTH
6. Fuel Pump .... BOOST
7. Alternate Induction Air .... ON
8. Alt Master Switches .... OFF
9. Starter (Propeller not Windmilling) .... ENGAGE
10. Power Lever .... slowly INCREASE
11. Alt Master Switches .... ON
12. If engine will not start, perform *Forced Landing* checklist.

Engine Partial Power Loss

Indications of a partial power loss include fluctuating RPM, reduced or fluctuating manifold pressure, low oil pressure, high oil temperature, and a rough-sounding or rough-running engine. Mild engine roughness in flight may be caused by one or more spark plugs becoming fouled. A sudden engine roughness or misfiring is usually evidence of a magneto malfunction.

• Note •

Low oil pressure may be indicative of an imminent engine failure – *Refer to Low Oil Pressure* procedure in this section for special procedures with low oil pressure.

• Note •

A damaged (out-of-balance) propeller may cause extremely rough operation. If an out-of-balance propeller is suspected, immediately shut down engine and perform Forced Landing checklist.

If a partial engine failure permits level flight, land at a suitable airfield as soon as conditions permit. If conditions do not permit safe level flight, use partial power as necessary to set up a forced landing pattern over a suitable landing field. Always, be prepared for a complete engine failure.

If the power loss is due to a fuel leak in the injector system, fuel sprayed over the engine may be cooled by the slipstream airflow which may prevent a fire at altitude. However, as the Power Lever is reduced during descent and approach to landing the cooling air may not be sufficient to prevent an engine fire.

• WARNING •

If there is a strong smell of fuel in the cockpit, divert to the nearest suitable landing field. Fly a forced landing pattern and shut down the engine fuel supply once a safe landing is assured.

(Continued on following page)

The following procedure provides guidance to isolate and correct some of the conditions contributing to a rough running engine or a partial power loss:

1. Fuel Pump .... BOOST

   Selecting BOOST on may clear the problem if vapor in the injection lines is the problem or if the engine-driven fuel pump has partially failed. The electric fuel pump will not provide sufficient fuel pressure to supply the engine if the engine-driven fuel pump completely fails.

2. Fuel Selector .... SWITCH TANKS

   Selecting the opposite fuel tank may resolve the problem if fuel starvation or contamination in one tank was the problem.

3. Mixture .... CHECK appropriate for flight conditions

4. Power Lever .... SWEEP

   Sweep the Power Lever through range as required to obtain smooth operation and required power.

5. Alternate Induction Air.. ON

   A gradual loss of manifold pressure and eventual engine roughness may result from the formation of intake ice. Opening the alternate engine air will provide air for engine operation if the normal source is blocked or the air filter is iced over.

6. Ignition Switch .... BOTH, L, then R

   Cycling the ignition switch momentarily from BOTH to L and then to R may help identify the problem. An obvious power loss in single ignition operation indicates magneto or spark plug trouble. Lean the mixture to the recommended cruise setting. If engine does not smooth out in several minutes, try a richer mixture setting. Return ignition switch to the BOTH position unless extreme roughness dictates the use of a single magneto.

7. Land as soon as practical.

Low Oil Pressure

If low oil pressure is accompanied by a rise in oil temperature, the engine has probably lost a significant amount of its oil and engine failure may be imminent. Immediately reduce engine power to idle and select a suitable forced landing field.

• WARNING •

Prolonged use of high power settings after loss of oil pressure will lead to engine mechanical damage and total engine failure, which could be catastrophic.

• Note •

Full power should only be used following a loss of oil pressure when operating close to the ground and only for the time necessary to climb to an altitude permitting a safe landing or analysis of the low oil pressure indication to confirm oil pressure has actually been lost.

If low oil pressure is accompanied by normal oil temperature, it is possible that the oil pressure sensor, gage, or relief valve is malfunctioning. In any case, land as soon as practical and determine cause.

1. Power Lever ....MINIMUM REQUIRED
2. Land as soon as possible.

Propeller Governor Failure

If the RPM does not respond to power lever movement or overspeeds, the most likely cause is a faulty governor or an oil system malfunction. If moving the power lever is difficult or rough, suspect a power lever linkage failure and perform the *Power Lever Linkage Failure* checklist.

Propeller RPM will not increase:

1. Oil Pressure .... CHECK
2. Land as soon as practical.

Propeller overspeeds or will not decrease:

1. Power Lever ....ADJUST (to keep RPM in limits)
2. Airspeed ....REDUCE to 80 KIAS
3. Land as soon as practical.

Smoke and Fume Elimination

If smoke and/or fumes are detected in the cabin, check the engine parameters for any sign of malfunction. If a fuel leak has occurred, actuation of electrical components may cause a fire. If there is a strong smell of fuel in the cockpit, divert to the nearest suitable landing field. Perform a *Forced Landing* pattern and shut down the fuel supply to the engine once a safe landing is assured.

1. Heater ....OFF
2. Air Vents..OPEN, FULL COLD
3. Prepare to land as soon as possible.

If airflow is not sufficient to clear smoke or fumes from cabin:

4. Cabin Doors .... UNLATCH

Engine Fire In Flight

If an engine fire occurs during flight, do not attempt to restart the engine.

1. Mixture .... CUTOFF
2. Fuel Pump...OFF
3. Power Lever .... IDLE
4. Fuel Selector..OFF
5. Ignition Switch..OFF
6. Perform *Forced Landing* checklist.

Wing Fire In Flight

1. Pitot Heat Switch..OFF
2. Navigation Light Switch...OFF
3. Strobe Light Switch ....OFF
4. If possible, side slip to keep flames away from fuel tank and cabin.

• Note •

Putting the airplane into a dive may blow out the fire. Do not exceed V_{NE} during the dive.

5. Land as soon as possible.

Cabin Fire In Flight

If the cause of the fire is readily apparent and accessible, use the fire extinguisher to extinguish flames and land as soon as possible. Opening the vents may feed the fire, but to avoid incapacitating the crew from smoke inhalation, it may be necessary to rid cabin of smoke or fire extinguishant. If the cause of fire is not readily apparent, is electrical, or is not readily accessible, proceed as follows:

• WARNING •

Serials 1337 and subsequent: If the airplane is in IMC conditions, turn ALT 1, ALT 2, and BAT 1 switches OFF. Power from battery 2 will keep the Primary Flight Display operational for approximately 30 minutes.

1. Bat-Alt Master Switches .... OFF, AS REQ'D

• Note •

With Bat-Alt Master Switches OFF, engine will continue to run. However, no electrical power will be available.

2. Heater .... OFF
3. Air Vents .... CLOSED
4. Fire Extinguisher .... ACTIVATE

• WARNING •

Halon gas used in the fire extinguisher can be toxic, especially in a closed area. After extinguishing fire, ventilate cabin by opening air vents and unlatching door (if required).

5. When fire extinguished, Air Vents .... OPEN, FULL COLD
6. Avionics Power Switch .... OFF
7. All other switches .... OFF
8. Land as soon as possible.

If setting master switches off eliminated source of fire or fumes and airplane is in night, weather, or IFR conditions:

(Continued on following page)

• WARNING •

If airplane is in day VFR conditions and turning off the master switches eliminated the fire situation, leave the master switches OFF. Do not attempt to isolate the source of the fire by checking each individual electrical component.

9. Bat-Alt Master Switches .... ON
10. Avionics Power Switch .... ON
11. Activate required systems one at a time. Pause several seconds between activating each system to isolate malfunctioning system. Continue flight to earliest possible landing with malfunctioning system off. Activate only the minimum amount of equipment necessary to complete a safe landing.

Emergency Descent

1. Power Lever .... IDLE
2. Mixture .... AS REQUIRED

• Caution •

If significant turbulence is expected do not descend at indicated airspeeds greater than V_{NO} (165 KIAS)

3. Airspeed .... V_{NE} (200 KIAS)

Inadvertent Spiral Dive During IMC Flight

1. Power Lever .... IDLE
2. Stop the spiral dive by using coordinated aileron and rudder control while referring to the attitude indicator and turn coordinator to level the wings.
3. Cautiously apply elevator back pressure to bring airplane to level flight attitude.
4. Trim for level flight.
5. Set power as required.
6. Use autopilot if functional otherwise keep hands off control yoke, use rudder to hold constant heading.
7. Exit IMC conditions as soon as possible.

Spins

The SR20 is not approved for spins, and has not been tested or certified for spin recovery characteristics. The only approved and demonstrated method of spin recovery is activation of the Cirrus Airframe Parachute System (See *CAPS Deployment*, this section). Because of this, if the aircraft "departs controlled flight", the CAPS must be deployed.

While the stall characteristics of the SR20 make accidental entry into a spin extremely unlikely, it is possible. Spin entry can be avoided by using good airmanship: coordinated use of controls in turns, proper airspeed control following the recommendations of this Handbook, and never abusing the flight controls with accelerated inputs when close to the stall (see *Stalls*, Section 4).

If, at the stall, the controls are misapplied and abused accelerated inputs are made to the elevator, rudder and/or ailerons, an abrupt wing drop may be felt and a spiral or spin may be entered. In some cases it may be difficult to determine if the aircraft has entered a spiral or the beginning of a spin.

• WARNING •

> In all cases, if the aircraft enters an unusual attitude from which recovery is not expected before ground impact, ***immediate*** deployment of the CAPS is required.
>
> The minimum demonstrated altitude loss for a CAPS deployment from a one-turn spin is 920 feet. Activation at higher altitudes provides enhanced safety margins for parachute recoveries. Do not waste time and altitude trying to recover from a spiral/spin before activating CAPS.

Inadvertent Spin Entry

1. CAPS .... Activate

CAPS Deployment

The Cirrus Airframe Parachute System (CAPS) should be activated in the event of a life-threatening emergency where CAPS deployment is determined to be safer than continued flight and landing.

• WARNING •

CAPS deployment is expected to result in loss of the airframe and, depending upon adverse external factors such as high deployment speed, low altitude, rough terrain or high wind conditions, may result in severe injury or death to the occupants. Because of this, CAPS should only be activated when any other means of handling the emergency would not protect the occupants from serious injury.

• Caution •

Expected impact in a fully stabilized deployment is equivalent to a drop from approximately 10 feet.

• Note •

Several possible scenarios in which the activation of the CAPS would be appropriate are discussed in Section 10 - Safety Information, of this Handbook. These include:

- Mid-air collision
- Structural failure
- Loss of control
- Landing in inhospitable terrain
- Pilot incapacitation

All pilots should carefully review the information on CAPS activation and deployment in Section 10 before operating the airplane.

Once the decision is made to deploy CAPS, the following actions should be taken:

1. Airspeed .... MINIMUM POSSIBLE

(Continued on following page)

The maximum demonstrated deployment speed is 135 KIAS. Reducing airspeed allows minimum parachute loads and prevents structural overload and possible parachute failure.

2. Mixture (If time and altitude permit) ....CUTOFF

   Generally, a distressed airplane will be safer for its occupants if the engine is not running.

3. Activation Handle Cover..REMOVE

   The cover has a handle located at the forward edge. Pull cover down to expose activation T-handle.

4. Activation Handle (Both Hands)...........PULL STRAIGHT DOWN

   Pull the activation T-handle from its holder. Clasp both hands around the handle and pull straight down in a strong, steady, and continuous motion. Maintain maximum pull force until the rocket activates. Pull forces up to, or exceeding, 45 pounds may be required. Bending of the handle-housing mount is to be expected.

• WARNING •

Jerking or rapidly pulling the activation T-handle will greatly increase the pull forces required to activate the rocket. Use a firm and steady pulling motion – a "chin-up" type pull enhances successful activation.

After Deployment:

5. Mixture ....CHECK, CUTOFF
6. Fuel Selector ....OFF

   Shutting off fuel supply to engine will reduce the chances of fire resulting from impact at touchdown.

7. Bat-Alt Master Switches ....OFF
8. Ignition Switch..OFF
9. Fuel Pump ....OFF
10. ELT...ON
11. Seat Belts and Harnesses .... TIGHTEN

(Continued on following page)

All occupants must have seat belts and shoulder harness securely fastened.

12. Loose Items ....SECURE

If time permits, all loose items should be secured to prevent injury from flying objects in the cabin at touchdown.

13. Assume emergency landing body position.

The emergency landing body position is assumed by placing both hands on the lap, clasping one wrist with the opposite hand, and holding the upper torso erect and against the seat backs.

14. After the airplane comes to a complete stop, evacuate quickly and move upwind.

As occupants exit the airplane, the reduced weight may allow winds to drag the airplane further. As a result of landing impact, the doors may jam. If the doors cannot be opened, break out the windows with the egress hammer, located in the console between the front seats, and crawl through the opening.

Landing Emergencies

Forced Landing (Engine Out)

If all attempts to restart the engine fail and a forced landing is imminent, select a suitable field and prepare for the landing.

A suitable field should be chosen as early as possible so that maximum time will be available to plan and execute the forced landing. For forced landings on unprepared surfaces, use full flaps if possible. Land on the main gear and hold the nose wheel off the ground as long as possible.

If engine power is available, before attempting an "off airport" landing, fly over the landing area at a low but safe altitude to inspect the terrain for obstructions and surface conditions.

• Note •

Use of full (100%) flaps will reduce glide distance. Full flaps should not be selected until landing is assured.

If ditching, avoid a landing flare because of difficulty in judging height over water.

1. Best Glide Speed .... ESTABLISH
2. Radio .... Transmit (121.5 MHz) MAYDAY giving location and intentions
3. Transponder .... SQUAWK 7700
4. If off airport, ELT .... ACTIVATE
5. Power Lever .... IDLE
6. Mixture .... CUTOFF
7. Fuel Selector .... OFF
8. Ignition Switch .... OFF
9. Fuel Pump .... OFF
10. Flaps (when landing is assured) 100%
11. Master Switches .... OFF
12. Seat Belt(s) .... SECURED

Landing Without Elevator Control

The pitch trim spring cartridge is attached directly to the elevator and provides a backup should you lose the primary elevator control system. Set elevator trim for a 80 KIAS approach to landing. Thereafter, do not change the trim setting until in the landing flare. During the flare, the nose-down moment resulting from a power reduction may cause the airplane to hit on the nosewheel. At touchdown, bring the power lever to idle.

1. Flaps ....SET 50%
2. Trim ....SET 80 KIAS
3. Power..................................AS REQUIRED FOR GLIDE ANGLE

System Malfunctions

Primary Flight Display System

In the unlikely event of a PFD failure, the pilot may lose the ability to control the autopilot through the PFD controls. If this malfunction occurs, the PFD circuit breakers may be pulled and the airplane flown using the mechanical standby instruments. With the PFD circuit breakers pulled, autopilot lateral control is available in GPSS steering mode through GPS 1 and autopilot vertical control is available through the Vertical Speed (VS) and Altitude (ALT) modes on the autopilot head. Dim brightness level to black if PFD is found distracting.

PFD - Loss of Air Data

In the event the PFD detects a loss of air data, the affected indicator is removed from the display and replaced with a red “X”. If loss of air data occurs, refer to the mechanical standby instruments (altitude, airspeed) and perform the following procedure:

1. Land as soon as practical.
2. Standby Instruments (altitude, airspeed) .... MONITOR

   If failure occurs while flying in IMC:

Exit IMC.

PFD - Loss of Attitude Data

In the event the PFD detects a loss of attitude data, the affected indicator is removed from the display and replaced with a red “X”. If loss of attitude data occurs, refer to the mechanical standby instruments (attitude, heading) and perform the following procedure:

1. Standby Instruments (attitude, heading) .... MONITOR

   If failure occurs while flying in IMC:

2. Autopilot GPSS Mode .... ACTIVATE
3. Autopilot Altitude Hold .... ACTIVATE

Exit IMC.

(Continued on following page)

• WARNING •

Aircraft equipped with Software Version 530-00123-000 Rev 00 or higher; Any power interruption to the PFD will result in loss of attitude information until the PFD can be restarted on the ground.

Aircraft equipped with Software Version 530-00159-000 Rev 00 or higher; When subjected to a power loss of less than 20 seconds, the PFD is capable of performing a warm start. In this event, a “PLEASE STANDBY” message will be displayed for 2 seconds followed by a “ATTEMPTING QUICK RESTART” message. In the event of a power loss greater than 20 seconds, a warm start is unlikely, and the power interruption will result in loss of attitude information until the PFD can be restarted on the ground.

Power Lever Linkage Failure

If the Power Lever linkage fails in flight, the engine will not respond to power lever control movements. Use power available and flaps as required to safely land the airplane.

If the power lever is stuck at or near the full power position, proceed to a suitable airfield. Fly a forced landing pattern. With landing assured, shut down engine by moving mixture control full aft to CUTOFF. If power is needed again, return mixture control to full RICH and regain safe pattern parameters or go-around. If airspeed cannot be controlled, shut engine down and perform the *Forced Landing* checklist. After landing, bring the airplane to a stop and complete the *Emergency Engine Shutdown on Ground* checklist.

If the power lever is stuck at or near the idle position and straight and level flight cannot be maintained, establish glide to a suitable landing surface. Fly a forced landing pattern.

1. Power Lever Movement..VERIFY
2. Power.. SET if able
3. Flaps...SET if needed
4. Mixture .... AS REQUIRED (full rich to cut-off)
5. Land as soon as possible.
6.

Section 3A
Abnormal Procedures

Table of Contents

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Introduction

This section provides procedures for handling abnormal system and/or flight conditions which, if followed, will maintain an acceptable level of airworthiness or reduce operational risk. The guidelines described in this section are to be used when an abnormal condition exists and should be considered and applied as necessary.

Abnormal Procedures Guidance

Although this section provides procedures for handling most abnormal system and/or flight conditions that could arise in the SR20, it is not a substitute for thorough knowledge of the airplane and general aviation techniques. A thorough study of the information in this handbook while on the ground will help you prepare for time-critical situations in the air.

Sound judgement as well as thorough knowledge of the aircraft, its characteristics, and the flight manual procedures are essential in the handling of any abnormal system and/or flight condition. In addition to the outlined items in the Abnormal Procedures, the following steps are considered part of all abnormal situations:

- Maintain Aircraft Control
- Analyze the Situation
- Take Appropriate Action

Ground Procedures

Brake Failure During Taxi

Ground steering is accomplished by differential braking. However, increasing power may allow some rudder control due to increased groundspeed and airflow over the rudder.

1. Engine Power.. AS REQUIRED
   - To stop airplane - REDUCE
   - If necessary for steering - INCREASE
2. Directional Control ....MAINTAIN WITH RUDDER
3. Brake Pedal(s) ....PUMP

If directional control can not be maintained:

4. Mixture ....CUTOFF

Aborted Takeoff

Use as much of the remaining runway as needed to safely bring the airplane to a stop or to slow the airplane sufficiently to turn off the runway.

1. Power Lever ....IDLE
2. Brakes.. AS REQUIRED

• Caution •

For maximum brake effectiveness, retract flaps, hold control yoke full back, and bring the airplane to a stop by smooth, even application of the brakes to avoid loss of control and/or a blown tire.

In-Flight Procedures

Inadvertent Icing Encounter

Flight into known icing conditions is prohibited. However, If icing is inadvertently encountered:

1. Pitot Heat .... ON
2. Exit icing conditions. Turn back or change altitude.
3. Cabin Heat .... MAXIMUM
4. Windshield Defrost ....FULL OPEN
5. Alternate Induction Air... ON

Inadvertent IMC Encounter

Upon entering IMC, a pilot who is not completely proficient in instrument flying should rely upon the autopilot to execute a 180° turn to exit the conditions. Immediate action should be made to turn back as follows:

1. Airplane Control ....Establish Straight and Level Flight
2. Autopilot .... Engage to hold Heading and Altitude
3. Heading... Reset to initiate 180° turn

Door Open In Flight

The doors on the SR20 will remain 1-3 inches open in flight if not latched. If this is discovered on takeoff roll, abort takeoff if practical. If already airborne:

1. Airspeed..REDUCE TO 80 – 90 KIAS
2. Land as soon as practical.

Landing Procedures

Landing With Failed Brakes

One brake inoperative

1. Land on the side of runway corresponding to the inoperative brake.
2. Maintain directional control using rudder and working brake.

Both brakes inoperative

1. Divert to the longest, widest runway with the most direct headwind.
2. Land on downwind side of the runway.
3. Use the rudder for obstacle avoidance.

• Note •

Rudder effectiveness will decrease with decreasing airspeed.

4. Perform *Emergency Engine Shutdown on Ground* checklist.

Landing With Flat Tire

If a flat tire or tread separation occurs during takeoff and you cannot abort, land as soon as conditions permit.

Main Gear

1. Land on the side of the runway corresponding to the good tire.
2. Maintain directional control with the brakes and rudder.
3. Do not taxi. Stop the airplane and perform a normal engine shutdown.

Nose Gear

1. Land in the center of the runway.
2. Hold the nosewheel off the ground as long as possible.
3. Do not taxi. Stop the airplane and perform a normal engine shutdown.

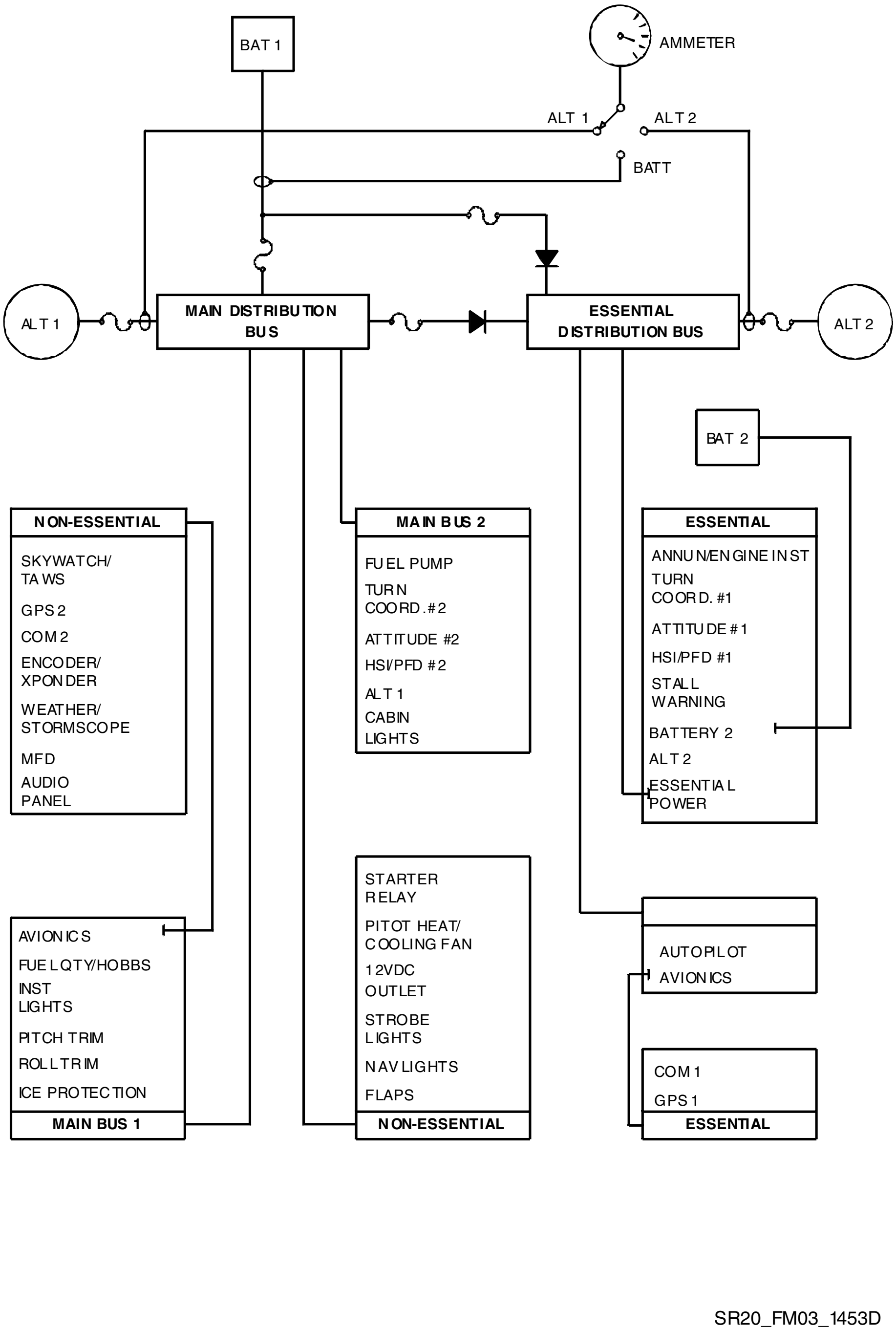

Figure 3A-1
Electrical Power Distribution (Simplified)

System Malfunctions

Alternator Failure

Steady illumination of either ALT caution light in the annunciator panel indicates a failure of the corresponding alternator. The most likely the cause of the alternator failure is a wiring fault, a malfunctioning alternator, or a malfunctioning control unit. Usually, electrical power malfunctions are accompanied by an excessive rate of charge or a discharge rate shown on the ammeter.

• Caution •

Alternators in this airplane are self-exciting. These alternators require battery power for alternator starting; however, once started, the alternators will provide self-generated field power to continue operation in case of a battery failure. To assure alternator restart power is available if the alternators fail, the batteries should not be turned off during flight.

Serials 1005 thru 1581: A flashing ALT 1 light indicates an excessive charging rate. This could occur with a very low BAT 1 and heavy equipment loads. Since the loads on ALT 2 are much lower, it is unlikely that a flashing ALT 2 light could occur, even with a very low BAT 2.

Figure 3-2 shows the electrical system power distribution. Individual loads on each circuit breaker panel bus are shown in the same order as they are on the panel. Note that items on the circuit breaker panel Essential buses are powered from ALT 1, ALT 2, BAT 1, and BAT 2. The circuit breaker panel Main buses and Non-Essential buses are powered from ALT 1 and BAT 1 only.

• Note •

If it is necessary to reduce electrical loads due to an alternator malfunction, switch off electrical components and/or systems that are not essential for the current flight conditions rather than pulling circuit breakers. Load shedding in this manner will prevent accidental circuit breaker disconnection and loss of power to flight-critical systems. See Figure 3-2, Electrical Power Distribution, for details on electrical busses and what components/systems they power.

(Continued on following page)

ALT 1 Light Steady

Steady illumination indicates a failure of ALT 1. Attempt to bring alternator back on line. If alternator cannot be brought back, reduce loads and use Main Bus or Non-Essential loads only as necessary for flight conditions.

1. ALT 1 Master Switch ....OFF
2. Alternator 1 Circuit Breaker.......................... CHECK and RESET
3. ALT 1 Master Switch .... ON

If alternator does not reset:

4. Switch off unnecessary equipment on Main Bus 1, Main Bus 2, and the Non-Essential Buses to reduce loads. Monitor voltage.
5. ALT 1 Master Switch ....OFF
6. Land as soon as practical.

ALT 1 Light Flashing

Serials 1005 thru 1581: The most likely cause is a severely discharged battery along with heavy equipment loads. In this event, reduce loads on Main and Non-Essential buses and monitor amperage until charging rate is within normal limits. Then loads can be added as required.

1. Ammeter Switch... BATT
2. If charging rate is greater than 30 amps, reduce load on Main Bus 1, Main Bus 2, and Non-Essential buses.
3. Monitor ammeter until battery charge rate is less than 15 amps.
4. When battery charge rate is within limits, add loads as necessary for flight conditions.

ALT 2 Light Steady

Except during low RPM operations, steady illumination indicates a failure of ALT 2. If alternator cannot be brought back, Essential bus loads will be powered from ALT 1, BAT 1, and BAT 2.

• Note •

ALT 2 light will illuminate steady and ALT 2 will not come on line until 1700 - 2200 RPM.

1. ALT 2 Master Switch ....OFF

2. Alternator 2 Circuit Breaker .... CHECK and RESET
3. ALT 2 Master Switch ....ON

If alternator does not reset:

4. Switch off unnecessary equipment on Main Bus 1, Main Bus 2, and Non-Essential Buses to reduce loads.
5. ALT 2 Master Switch ....OFF
6. Land as soon as practical.

Engine Indicating System Failure

Serials 1582 and Subsequent: In the event of an Data Acquisition Unit (DAU) failure, the engine indications displayed on the MFD and PFD will be disabled. Numeric readouts will display as three white dashes, the CHT and EGT bar graphs will be removed, and indicator needles displayed on the simulated gages will be removed.

In the event of DAU failure, pull and reset the ANNUN / ENGINE INST circuit breaker. If the engine indicating system fails to resest, land as soon as practical.

1. ANNUN / ENGINE INST Circuit Breaker ....Cycle
2. Land as soon as practical.

LOW VOLTS Warning Light Illuminated

Illumination of the LOW VOLTS light indicates that the voltage measured at the Essential Bus is 24.5 volts or less. Typically, this indicates that the airplane is operating on battery power only and both alternators have failed or are off. If both alternators have failed:

1. Land as soon as practical.

Communications Failure

Communications failure can occur for a variety of reasons. If, after following the checklist procedure, communication is not restored, proceed with FAR/AIM lost communications procedures.

• Note •

In the event of an audio panel power failure the audio panel connects COM 1 to the pilot's headset and speakers. Setting the audio panel 'Off' will also connect COM 1 to the pilot's headsets and speakers.

1. Switches, Controls .... CHECK
2. Frequency .... CHANGE
3. Circuit Breakers.. CHECK
4. Headset.. CHANGE
5. Hand Held Microphone .... CONNECT

Pitot Static Malfunction

Static Source Blocked

If erroneous readings of the static source instruments (airspeed, altimeter and vertical speed) are suspected, the alternate static source valve, on side of console near pilot's right ankle, should be opened to supply static pressure from the cabin to these instruments.

• Note •

If selecting the alternate static source does not work, in an emergency, cabin pressure can be supplied to the static pressure instruments by breaking the glass in the face of the vertical speed indicator. When static pressure is supplied through the vertical speed indicator, the vertical speed UP-DOWN indications will be reversed (i.e., the needle will indicate UP for descent and DOWN for climb).

With the alternate static source on, adjust indicated airspeed slightly during climb or approach according to the Airspeed Calibration (Alternate Static Source) table in Section 5 as appropriate for vent/ heater configuration.

1. Pitot Heat ....ON
2. Alternate Static Source ....OPEN

Pitot Tube Blocked

If only the airspeed indicator is providing erroneous information, and in icing conditions, the most probable cause is pitot ice. If setting Pitot Heat ON does not correct the problem, descend to warmer air. If an approach must be made with a blocked Pitot tube, use known pitch and power settings and the GPS groundspeed indicator, taking surface winds into account.

1. Pitot Heat ....ON

Electric Trim/Autopilot Failure

Any failure or malfunction of the electric trim or autopilot can be overridden by use of the control yoke. If runaway trim is the problem, de-energize the circuit by pulling the circuit breaker (PITCH TRIM, ROLL TRIM, or AUTOPILOT) and land as soon as conditions permit.

1. Airplane Control .... MAINTAIN MANUALLY
2. Autopilot (if engaged) ....Disengage

If Problem Is Not Corrected:

3. Circuit Breakers.. PULL AS Required
   - PITCH TRIM
   - ROLL TRIM
   - AUTOPILOT
4. Power Lever .... AS REQUIRED
5. Control Yoke .... MANUALLY HOLD PRESSURE

Section 4
Normal Procedures

Table of Contents

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Introduction

This section provides amplified procedures for normal operation. Normal procedures associated with optional systems can be found in Section 9.

• Note •

Serials 1337 and subsequent with SRV standard configuration: The airplane is equipped with a single alternator, dual battery electrical system. References to Alternator 2 in the following section do not apply.

Airspeeds for Normal Operation

Unless otherwise noted, the following speeds are based on a maximum weight of 3000 lb. and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff distance, the speed appropriate to the particular weight must be used.

Takeoff Rotation:

- Normal, Flaps 50% ....67 KIAS
- Short Field, Flaps 50% ....65 KIAS
- Obstacle Clearance, Flaps 50% ....75 KIAS

Enroute Climb, Flaps Up:

- Normal, SL ....105 KIAS
- Normal, 10,000’ ....95 KIAS
- Best Rate of Climb, SL ....96 KIAS
- Best Rate of Climb, 10,000’ ....91 KIAS
- Best Angle of Climb, SL ....81 KIAS
- Best Angle of Climb, 10,000’ ....85 KIAS

Landing Approach:

- Normal Approach, Flaps Up ....85 KIAS
- Normal Approach, Flaps 50% ....80 KIAS
- Normal Approach, Flaps 100% ....75 KIAS
- Short Field, Flaps 100% ....75 KIAS

Go-Around, Flaps 50%:

- Full Power ....75 KIAS

Maximum Recommended Turbulent Air Penetration:

- 3000 Lb. ....131 KIAS
- 2600 Lb. ....122 KIAS
- 2200 Lb. ....111 KIAS

Maximum Demonstrated Crosswind Velocity:

- Takeoff or Landing ....21 Knots

Normal Procedures

Preflight Inspection

Before carrying out preflight inspections, ensure that all required maintenance has been accomplished. Review your flight plan and compute weight and balance.

• Note •

Throughout the walk-around: check all hinges, hinge pins, and bolts for security; check skin for damage, condition, and evidence of delamination; check all control surfaces for proper movement and excessive free play; check area around liquid reservoirs and lines for evidence of leaking.

In cold weather, remove all frost, ice, or snow from fuselage, wing, stabilizers and control surfaces. Ensure that control surfaces are free of internal ice or debris. Check that wheel fairings are free of snow and ice accumulation. Check that pitot probe warms within 30 seconds of setting Pitot Heat to ON.

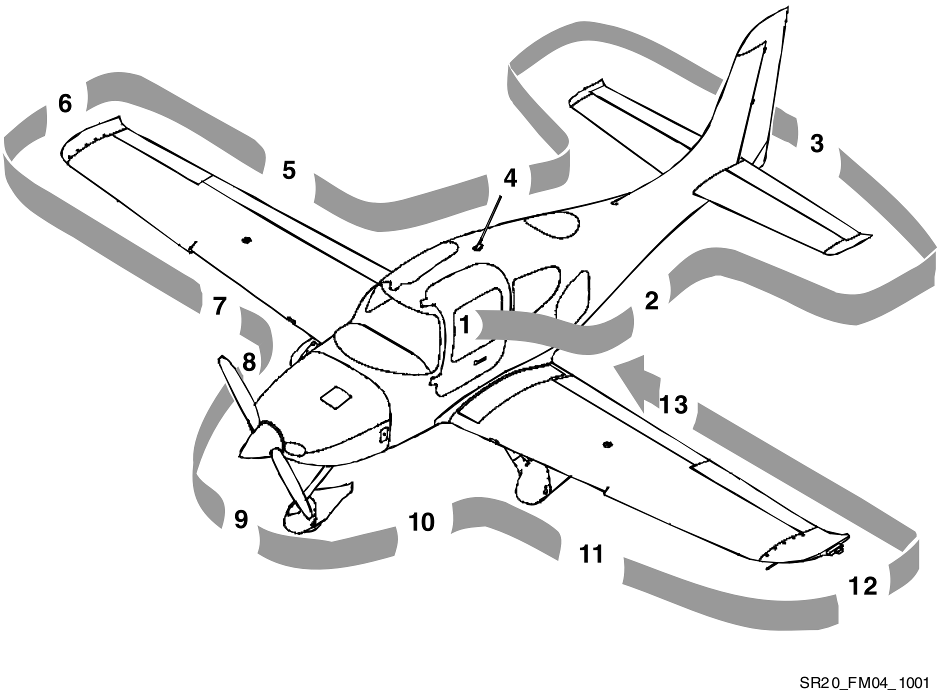

Figure 4-1
Walk-Around

Preflight Walk-Around

1. Cabin
   a. Required Documents.. On Board
   b. Avionics Power Switch..OFF
   c. Bat 2 Master Switch .... ON
   d. PFD - *Serials 0435 and subsequent with PFD*..........Verify On
   e. Avionics Cooling Fan .... Audible
   f. Voltmeter ....23-25 Volts
   g. Flap Position Light .... OUT
   h. Bat 1 Master Switch... ON
   i. Lights .... Check Operation
   j. Stall Warning .... Test

   • Note •

   Test stall warning system by applying suction to the stall warning system inlet and noting the warning horn sounds.

   k. Fuel Quantity ....Check
   l. Fuel Selector ....Select Fullest Tank
   m. Flaps.. 100%, Check Light ON
   n. Oil Annunciator .... On
   o. Bat 1 and 2 Master Switches ....OFF
   p. Alternate Static Source.. NORMAL
   q. Circuit Breakers .... IN
   r. Fire Extinguisher ....Charged and Available
   s. Emergency Egress Hammer ....Available
   t. CAPS Handle .... Pin Removed
2. Left Fuselage
   a. COM 1 Antenna (top) .... Condition and Attachment
   b. Wing/Fuselage Fairing...Check
   c. COM 2 Antenna (underside)........... Condition and Attachment

   d. Baggage Door .... Closed and Secure
   e. Static Button .... Check for Blockage
   f. Parachute Cover .... Sealed and Secure

3. Empennage
   a. Tiedown Rope .... Remove
   b. Horizontal and Vertical Stabilizers .... Condition
   c. Elevator and Tab .... Condition and Movement
   d. Rudder .... Freedom of Movement
   e. Rudder Trim Tab .... Condition and Security
   f. Attachment hinges, bolts and cotter pins .... Secure
4. Right Fuselage
   a. Static Button .... Check for Blockage
   b. Wing/Fuselage Fairings .... Check
5. Right Wing Trailing Edge
   a. Flap and Rub Strips (if installed) .... Condition and Security
   b. Aileron and Tab .... Condition and Movement
   c. Hinges, actuation arm, bolts, and cotter pins .... Secure
6. Right Wing Tip
   a. Tip .... Attachment
   b. Strobe, Nav Light and Lens .... Condition and Security
   c. Fuel Vent (underside) .... Unobstructed
7. Right Wing Forward and Main Gear
   a. Leading Edge and Stall Strips .... Condition
   b. Fuel Cap .... Check Quantity and Secure
   c. Fuel Drains (2 underside) .... Drain and Sample
   d. Wheel Fairings .... Security, Accumulation of Debris
   e. Tire .... Condition, Inflation, and Wear
   f. Wheel and Brakes .... Fluid Leaks, Evidence of Overheating, General Condition, and Security
   g. Chocks and Tiedown Ropes .... Remove

h. Cabin Air Vent.. Unobstructed

8. Nose, Right Side
    a. Cowling... Attachments Secure
    b. Exhaust Pipe ....Condition, Security, and Clearance
    c. Transponder Antenna (underside) .. Condition and Attachment
    d. Gascolator (underside) .... Drain for 3 seconds, Sample

9. Nose gear, Propeller, and Spinner

• WARNING •

Keep clear of propeller rotation plane. Do not allow others to approach propeller.

    a. Tow Bar ....Remove and Stow
    b. Strut ....Condition

• Note •

Serials 1337 and subsequent with SRV standard configuration: The airplane is not equipped with a nose wheel fairing.

    c. Wheel Fairing...................... Security, Accumulation of Debris
    d. Wheel and Tire ....Condition, Inflation, and Wear
    e. Propeller .... Condition (indentations, nicks, etc.)
    f. Spinner ....Condition, Security, and Oil Leaks
    g. Air Inlets.. Unobstructed
    h. Alternator Belt.................................. Condition and Tension

10. Nose, Left Side
    a. Landing Light..Condition
    b. Engine Oil ....Check 6-8 quarts, Leaks, Cap & Door Secure
    c. Cowling... Attachments Secure
    d. External Power ....Door Secure
    e. Exhaust Pipe ....Condition, Security, and Clearance

11. Left Main Gear and Forward Wing
    a. Wheel fairings...................... Security, Accumulation of Debris

b. Tire .... Condition, Inflation, and Wear

c. Wheel and Brakes .... Fluid Leaks, Evidence of Overheating, General Condition, and Security

d. Chocks and Tiedown Ropes.................................... Remove

e. Fuel Drains (2 underside)......................... Drain and Sample

f. Cabin Air Vent.. Unobstructed

g. Fuel Cap.................................... Check Quantity and Secure

h. Leading Edge and Stall Strips.............................. Condition

12. Left Wing Tip

a. Fuel Vent (underside) .... Unobstructed

b. Pitot Mast (underside) .... Cover Removed, Tube Clear

c. Strobe, Nav Light and Lens .... Condition and Security

d. Tip .... Attachment

13. Left Wing Trailing Edge

a. Flap And Rub Strips (If installed).......... Condition and Security

b. Aileron .... Freedom of movement

c. Hinges, actuation arm, bolts, and cotter pins .... Secure

Before Starting Engine

1. Preflight Inspection .... COMPLETED
2. Emergency Equipment... ON BOARD
3. Passengers .... BRIEFED

• Note •

Ensure all the passengers have been fully briefed on smoking, the use of the seat belts, doors, emergency exits, egress hammer, and CAPS.

Verify CAPS handle safety pin is removed.

4. Seats, Seat Belts, and Harnesses ....ADJUST & SECURE

• Caution •

Crew seats must be locked in position and control handles fully down before flight. Ensure seat belt harnesses are not twisted.

Starting Engine

If the engine is warm, no priming is required. For the first start of the day and in cold conditions, prime will be necessary.

Weak intermittent firing followed by puffs of black smoke from the exhaust stack indicates over-priming or flooding. Excess fuel can be cleared from the combustion chambers by the following procedure:

- Turn fuel pump off.
- Allow fuel to drain from intake tubes.
- Set the mixture control full lean and the power lever full open.
- Crank the engine through several revolutions with the starter.
- When engine starts, release ignition switch, retard power lever, and slowly advance the mixture control to FULL RICH position.

If the engine is under-primed, especially with a cold soaked engine, it will not fire, and additional priming will be necessary. As soon as the cylinders begin to fire, open the power lever slightly to keep it running.

Refer to Cold Weather Operation in this section or additional information regarding cold weather operations.

• WARNING •

If airplane will be started using external power, keep all personnel and power unit cables well clear of the propeller rotation plane.

• Caution •

Alternators should be left OFF during engine starting to avoid high electrical loads.

After starting, if the oil gage does not begin to show pressure within 30 seconds in warm weather and about 60 seconds in very cold weather, shut down engine and investigate cause. Lack of oil pressure indicates loss of lubrication, which can cause severe engine damage.

1. External Power (If applicable) .... CONNECT
2. Brakes .... HOLD
3. Bat Master Switches .... ON (Check Volts)

4. Strobe Lights .... ON
5. Mixture .... FULL RICH
6. Power Lever .... FULL FORWARD
7. Fuel Pump.. PRIME, then BOOST

• Note •

On first start of the day, especially under cool ambient conditions, holding Fuel Pump switch to PRIME for 2 seconds will improve starting.

8. Propeller Area .... CLEAR
9. Power Lever .... OPEN ¼ INCH
10. Ignition Switch .... START (Release after engine starts)

• Caution •

Limit cranking to intervals of 20 seconds with a 20 second cooling period between cranks. This will improve battery and contactor life.

11. Power Lever .... RETARD (to maintain 1000 RPM)
12. Oil Pressure .... CHECK
13. Alt Master Switches .... ON
14. Avionics Power Switch .... ON
15. Engine Parameters .... MONITOR
16. External Power (If applicable) .... DISCONNECT
17. Amp Meter/Indication .... CHECK

Before Taxiing

1. Flaps .... UP (0%)
2. Radios/Avionics .... AS REQUIRED
3. Cabin Heat/Defrost .... AS REQUIRED
4. Fuel Selector.. SWITCH TANK

Taxiing

When taxiing, maintain directional control with rudder and differential braking. In crosswind conditions, some brake force may be required, even when taxiing at moderate speeds. Taxi over loose gravel at low engine speed to avoid damage to the propeller tips.

• WARNING •

Recommended maximum engine speed during taxi is 1000 RPM or less.

Taxi with minimum power needed for forward movement. Excessive brake application during taxi can lead to brake overheating which can cause brake damage or failure. Brake damage or failure may result in loss of directional control, possible aircraft damage, and/or personal injury.

1. Brakes .... CHECK
2. Directional Gyro/HSI Orientation .... CHECK
3. Attitude Gyro .... CHECK
4. Turn Coordinator .... CHECK

Before Takeoff

During cold weather operations, the engine should be properly warmed up before takeoff. In most cases this is accomplished when the oil temperature has reached at least 100° F (38° C). In warm or hot weather, precautions should be taken to avoid overheating during prolonged ground engine operation. Additionally, long periods of idling may cause fouled spark plugs.

1. Doors ....LATCHED
2. CAPS Handle .... Verify Pin Removed
3. Seat Belts and Shoulder Harness..................................SECURE
4. Fuel Quantity ....CONFIRM
5. Fuel Selector ....FULLEST TANK
6. Fuel Pump.. ON
7. Flaps ....SET 50% & CHECK
8. Transponder ....SET
9. Autopilot .... CHECK
10. Navigation Radios/GPS ....SET for Takeoff
11. Cabin Heat/Defrost .... AS REQUIRED
12. Brakes...HOLD
13. Power Lever ....1700 RPM
14. Alternator .... CHECK
    a. Pitot Heat.. ON
    b. Navigation Lights .... ON
    c. Landing Light .... ON
    d. Annunciator Lights.. CHECK
    - Verify both ALT 1 and ALT 2 caution lights out and positive amps indication for each alternator. If necessary, increase RPM to extinguish ALT 2 caution light. ALT 2 caution light should go out below 2200 RPM.

(Continued on following page)

15. Voltage .... CHECK
16. Pitot Heat .... AS REQUIRED

• Note •

Pitot heat should be turned ON prior to flight into IMC or flight into visible moisture and OAT of 40° F (4° C) or less.

17. Navigation Lights .... AS REQUIRED
18. Landing Light .... AS REQUIRED
19. Magnetos ....CHECK Left and Right
    a. Ignition Switch ....R, note RPM, then BOTH
    b. Ignition Switch .... L, note RPM, then BOTH

• Note •

RPM drop must not exceed 150 RPM for either magneto. RPM differential must not exceed 75 RPM between magnetos. If there is a doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists.

An absence of RPM drop may indicate faulty grounding of one side of the ignition system or magneto timing set in advance of the specified setting.

20. Engine Parameters .... CHECK
21. Power Lever .... 1000 RPM
22. Flight Instruments, HSI, and Altimeter ....CHECK & SET
23. Flight Controls.. FREE & CORRECT
24. Trim ....SET Takeoff
25. Autopilot .... DISCONNECT

Takeoff

• Note •

The engine is equipped with an altitude compensating fuel pump that automatically provides the proper full rich mixture. Because of this, the mixture should be left full rich for takeoff, even at high altitude airfields.

Power Check: Check full-throttle engine operation early in takeoff run. The engine should run smoothly and turn approximately 2700 RPM. All engine parameters should read in the green. Discontinue takeoff at any sign of rough operation or sluggish acceleration. Make a thorough full-throttle static runup before attempting another takeoff.

For takeoff over a gravel surface, advance Power Lever slowly. This allows the airplane to start rolling before high RPM is developed, and gravel will be blown behind the propeller rather than pulled into it.

Flap Settings: Takeoffs are approved at flaps UP (0%) or flaps 50%. Normal and short field takeoffs are accomplished with flaps set at 50%. Takeoffs using 50% flaps require less ground roll and distance over an obstacle than do takeoffs with no flaps. Takeoff flap settings greater than 50% are not approved.

Soft or rough field takeoffs are performed with 50% flaps by lifting the airplane off the ground as soon as practical in a tail-low attitude. If no obstacles are ahead, the airplane should be leveled off immediately to accelerate to a higher climb speed.

Takeoffs into strong crosswinds normally are performed with the minimum flap setting (0% or 50%) necessary for the field length, to minimize the drift angle immediately after takeoff. With the ailerons partially deflected into the wind, accelerate the airplane to a speed slightly higher than normal, and then with authority, rotate to prevent possibly settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

• Note •

Fuel BOOST should be left ON during takeoff and for climb as required for vapor suppression with hot or warm fuel.

Normal Takeoff

1. Power Lever .... FULL FORWARD
2. Engine Instruments .... CHECK
3. Brakes .... RELEASE (Steer with Rudder Only)
4. Elevator Control .... ROTATE Smoothly at 65-70 KIAS
5. At 85 KIAS, Flaps .... UP

Short Field Takeoff

1. Flaps 50%
2. Brakes .... HOLD
3. Power Lever .... FULL FORWARD
4. Engine Instruments .... CHECK
5. Brakes .... RELEASE (Steer with Rudder Only)
6. Elevator Control .... ROTATE Smoothly at 65 KIAS
7. Airspeed at Obstacle .... 75 KIAS

Climb

Normal climbs are performed flaps UP (0%) and full power at speeds 5 to 10 knots higher than best rate-of-climb speeds. These higher speeds give the best combination of performance, visibility and engine cooling.

For maximum rate of climb, use the best rate-of-climb speeds shown in the rate-of-climb chart in Section 5. If an obstruction dictates the use of a steep climb angle, the best angle-of-climb speed should be used. Climbs at speeds lower than the best rate-of-climb speed should be of short duration to avoid engine-cooling problems.

• Note •

The engine is equipped with an altitude compensating fuel pump that automatically provides the proper full rich mixture for climb. The mixture for climb should be left full rich.

1. Climb Power .... SET
2. Flaps .... Verify UP
3. Mixture .... FULL RICH
4. Engine Parameters .... CHECK
5. Fuel Pump .... OFF

• Note •

Fuel BOOST should be left ON during takeoff and for climb as required for vapor suppression with hot or warm fuel.

Cruise

Normal cruising is performed between 55% and 75% power. The engine power setting and corresponding fuel consumption for various altitudes and temperatures can be determined by using the cruise data in Section 5.

The selection of cruise altitude is made on the basis of the most favorable wind conditions and the use of low power settings. These significant factors should be considered on every trip to reduce fuel consumption.

• Note •

For engine break-in, cruise at a minimum of 75% power until the engine has been operated for at least 25 hours or until oil consumption has stabilized. Operation at this higher power will ensure proper seating of the rings, is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

1. Fuel Pump ....OFF

• Note •

The Fuel Pump may be used for vapor suppression during cruise.

2. Cruise Power.. SET
3. Mixture ....LEAN as required
4. Engine Parameters .... MONITOR

• Note •

Fuel BOOST must be used for switching from one tank to another. Failures to activate the Fuel Pump before transfer could result in delayed restart if the engine should quit due to fuel starvation.

5. Fuel Flow and Balance .... MONITOR

Cruise Leaning

The engine is equipped with an altitude compensating fuel pump that automatically provides the proper full rich mixture. Because of this, the mixture should be set to full rich to allow the aneroid to provide auto leaning for the engine during all flight conditions. If additional cruise leaning beyond that provided by the aneroid is desired, be advised that there may not be a 75° temperature rise from full rich to peak. This is acceptable provided the airplane is at 75% power or less and engine temperatures are within limits.

• Caution •

If moving the mixture control from the full rich position only decreases the EGT from the full rich value, place the mixture control back in the full forward position and have the fuel system serviced.

• Note •

Serials 1337 thru 1581 with SRV standard configuration: The airplane is not equipped with an EGT/CHT gage. To lean the engine for cruise, pull the mixture lever towards CUTOFF until engine runs rough and then push the mixture lever towards FULL RICH until engine operation smooths out.

Exhaust gas temperature (EGT) may be used as an aid for mixture leaning in cruise flight. ***For "Best Power" use 75% power or less. For "Best Economy" use 65% power or less***. To adjust the mixture, lean to establish the peak EGT as a reference point and then adjust the mixture by the desired increment based on the following table:

Mixture Description	Exhaust Gas Temperature
Best Power	75° F Rich Of Peak EGT
Best Economy	50° F Lean Of Peak EGT

Under some conditions, engine roughness may occur while operating at best economy. If this occurs, enrich mixture as required to smooth engine operation. Any change in altitude or Power Lever position will require a recheck of EGT indication.

Descent

1. Altimeter .... SET
2. Cabin Heat/Defrost .... AS REQUIRED
3. Landing Light ....ON
4. Fuel System.. CHECK
5. Mixture .... AS REQUIRED
6. Brake Pressure .... CHECK

Before Landing

1. Seat Belt and Shoulder Harness ....SECURE
2. Fuel Pump .... BOOST
3. Mixture .... FULL RICH
4. Flaps .... AS REQUIRED
5. Autopilot .... AS REQUIRED

Landing

• Caution •

Landings should be made with full flaps. Landings with less than full flaps are recommended only if the flaps fail to deploy or to extend the aircraft's glide distance due to engine malfunction. Landings with flaps at 50% or 0%; power should be used to achieve a normal glidepath and low descent rate. Flare should be minimized.

Normal Landing

Normal landings are made with full flaps with power on or off. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds.

Actual touchdown should be made with power off and on the main wheels first to reduce the landing speed and subsequent need for braking. Gently lower the nose wheel to the runway after airplane speed has diminished. This is especially important for rough or soft field landings.

Short Field Landing

For a short field landing in smooth air conditions, make an approach at 75 KIAS with full flaps using enough power to control the glide path (slightly higher approach speeds should be used under turbulent air conditions). After all approach obstacles are cleared, progressively reduce power and maintain the approach speed by lowering the nose of the airplane. Touchdown should be made power-off and on the main wheels first. Immediately after touchdown, lower the nose wheel and apply braking as required. For maximum brake effectiveness, retract the flaps, hold the control yoke full back, and apply maximum brake pressure without skidding.

Crosswind Landing

Normal crosswind landings are made with full flaps. Avoid prolonged slips. After touchdown, hold a straight course with rudder and brakes as required.

The maximum allowable crosswind velocity is dependent upon pilot capability as well as aircraft limitations. Operation in direct crosswinds of 21 knots has been demonstrated.

Balked Landing/Go-Around

In a balked landing (go-around) climb, disengage autopilot, apply full power, then reduce the flap setting to 50%. If obstacles must be cleared during the go-around, climb at the best angle of climb with 50% flaps. After clearing any obstacles, retract the flaps and accelerate to the normal flaps-up climb speed.

1. Autopilot ....DISENGAGE
2. Power Lever ....FULL FORWARD
3. Flaps 50%
4. Airspeed........................BEST ANGLE OF CLIMB (81 – 83 KIAS)

After clear of obstacles:

5. Flaps ....UP

After Landing

1. Power Lever .... 1000 RPM
2. Fuel Pump .... OFF
3. Flaps .... UP
4. Transponder...STBY
5. Lights .... AS REQUIRED
6. Pitot Heat ....OFF

• Note •

As the airplane slows the rudder becomes less effective and taxiing is accomplished using differential braking.

Shutdown

1. Fuel Pump (if used) .... OFF
2. Throttle...IDLE
3. Ignition Switch...CYCLE

• Caution •

Note that the engine hesitates as the switch cycles through the "OFF" position. If the engine does not hesitate, one or both magnetos are not grounded. Prominently mark the propeller as being "Hot," and contact maintenance personnel immediately

4. Mixture ....CUTOFF
5. All Switches .... OFF
6. Magnetos ....OFF
7. ELT.. TRANSMIT LIGHT OUT

• Note •

After a hard landing, the ELT may activate. If this is suspected, press the RESET button.

8. Chocks, Tie-downs, Pitot Covers .... AS REQUIRED

Stalls

SR20 stall characteristics are conventional. Power-off stalls may be accompanied by a slight nose bobbing if full aft stick is held. Power-on stalls are marked by a high sink rate at full aft stick. Power-off stall speeds at maximum weight for both forward and aft C.G. positions are presented in Section 5 – Performance Data.

When practicing stalls at altitude, as the airspeed is slowly reduced, you will notice a slight airframe buffet and hear the stall speed warning horn sound between 5 and 10 knots before the stall. Normally, the stall is marked by a gentle nose drop and the wings can easily be held level or in the bank with coordinated use of the ailerons and rudder. Upon stall warning in flight, recovery is accomplished by immediately by reducing back pressure to maintain safe airspeed, adding power if necessary and rolling wings level with coordinated use of the controls.

• WARNING •

Extreme care must be taken to avoid uncoordinated, accelerated or abused control inputs when close to the stall, especially when close to the ground.

Environmental Considerations

Cold Weather Operation

Starting

If the engine has been cold soaked, it is recommended that the propeller be pulled through by hand several times to break loose or limber the oil. This procedure will reduce power draw on the battery if a battery start is made.

When the engine has been exposed to temperatures at or below 20° Fahrenheit (-7° C) for a period of two hours or more, the use of an external pre-heater and external power is recommended. Failure to properly preheat a cold-soaked engine may result in oil congealing within the engine, oil hoses, and oil cooler with subsequent loss of oil flow, possible internal damage to the engine, and subsequent engine failure.

If the engine does not start during the first few attempts, or if engine firing diminishes in strength, the spark plugs have probably frosted over. Preheat must be used before another start is attempted.

• WARNING •

If airplane will be started using external power, keep all personnel and power unit cables well clear of the propeller rotation plane.

• Caution •

Inadequate application of preheat to a cold soaked engine may warm the engine enough to permit starting but will not de-congeal oil in the sump, lines, cooler, filter, etc. Congealed oil in these areas will require considerable preheat.

An engine that has been superficially warmed, may start and appear to run satisfactorily, but can be damaged from lack of lubrication due to the congealed oil blocking proper oil flow through the engine. The amount of damage will vary and may not become evident for many hours. However, the engine may be severely damaged and may fail shortly following application of high power. Proper procedures require thorough application of preheat to all parts of the engine. Hot air must be applied directly to the oil sump and external oil lines as well as the cylinders, air intake and oil cooler. Because excessively hot air can damage non-metallic components such as composite parts, seals, hoses, and drives belts, do not attempt to hasten the preheat process.

1. Ignition Switch ....OFF

• WARNING •

Use extreme caution when pulling the propeller through by hand. Make sure ignition switch is OFF, keys are out of ignition, and then act as if the engine will start. A loose or broken ground wire on either magneto could cause the engine to fire.

2. Propeller.. Hand TURN several rotations
3. External Power (If applicable) .... CONNECT
4. Brakes .... HOLD
5. Bat Master Switches .... ON (check voltage)
6. Mixture .... FULL RICH
7. Power lever.. FULL FORWARD
8. Fuel Pump... PRIME, then BOOST

• Note •

In temperatures down to 20°F, hold Fuel (Boost) Pump switch to PRIME for 10 seconds prior to staring.

9. Propeller Area .... CLEAR
10. Power Lever .... OPEN ¼ INCH
11. Ignition Switch .... START (Release after engine starts)

• Caution •

Limit cranking to intervals of 20 seconds with a 20 second cooling period between cranks. This will improve battery and contactor life

12. Power Lever .... RETARD (to maintain 1000 RPM)
13. Oil Pressure .... CHECK
14. Alt Master Switches .... ON

(Continued on following page)

15. Avionics Power Switch ....ON
16. Engine Parameters .... MONITOR
17. External Power (If applicable) .... DISCONNECT
18. Amp Meter/Indication... CHECK
19. Strobe Lights..ON

Hot Weather Operation

Avoid prolonged engine operation on the ground.

• Note •

Fuel BOOST should be left ON during takeoff and for climb as required for vapor suppression with hot or warm fuel.

Noise Characteristics/Abatement

The certificated noise levels for the Cirrus Design SR20 established in accordance with FAR 36 Appendix G are:

Configuration	Actual	Maximum Allowable
Two-blade Propeller	84.79 dB(A)	87.6 dB(A)
Three-blade Propeller	83.42 dB(A)	87.6 dB(A)

No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport. The above noise levels were established at 3000 pounds takeoff weight and 2700 RPM.

Recently, increased emphasis on improving environmental quality requires all pilots to minimize the effect of airplane noise on the general public. The following suggested procedures minimize environmental noise when operating the SR20.

• Note •

Do not follow these noise abatement procedures where they conflict with Air Traffic Control clearances or instructions, weather considerations, or wherever they would reduce safety.

1. When operating VFR over noise-sensitive areas, such as outdoor events, parks, and recreational areas, fly not less than 2000 feet above the surface even though flight at a lower level may be allowed.
2. For departure from or approach to an airport, avoid prolonged flight at low altitude near noise-sensitive areas.

Fuel Conservation

Minimum fuel use at cruise will be achieved using the best economy power setting described under cruise.

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Section 5
Performance Data

Table of Contents

Introduction

Performance data in this section are presented for operational planning so that you will know what performance to expect from the airplane under various ambient and field conditions. Performance data are presented for takeoff, climb, and cruise (including range & endurance).

Associated Conditions Affecting Performance

Computed performance data in this section are based upon data derived from actual flight testing with the airplane and engine in good condition and using average piloting techniques. Unless specifically noted in the “Conditions” notes presented with each table, ambient conditions are for a standard day *(refer to Section 1).* Flap position as well as power setting technique is similarly noted with each table.

The charts in this section provide data for ambient temperatures from –20° C (–4° F) to 40° C (104° F). If ambient temperature is below the chart value, use the lowest temperature shown to compute performance. This will result in more conservative performance calculations. **If ambient temperature is above the chart value, use extreme caution as performance degrades rapidly at higher temperatures.**

All fuel flow data for cruise is based on the recommended lean mixture setting detailed in Section 4 – Normal Procedures.

Serials 1337 and subsequent with SRV standard configuration: Airplane performance is decreased without the nose landing gear fairing installed. Refer to performance tables for specific values.

Flight Planning

The performance tables in this section present sufficient information to predict airplane performance with reasonable accuracy. However, variations in fuel metering, mixture leaning technique, engine & propeller condition, air turbulence, and other variables encountered during a particular flight may account for variations of 10% or more in range and endurance. Therefore, utilize all available information to estimate the fuel required for a particular flight.

• Note •

Whenever possible, select the most conservative values from the following charts to provide an extra margin of safety and to account for events that could occur during a flight.

Sample Problem

The following sample flight problem uses information derived from the airplane performance charts and tables to determine the predicted performance for a typical flight.

The first step in flight planning is to determine the aircraft weight and center of gravity, as well as information about the flight. For this sample problem, the following information is known:

Airplane Configuration:

- Takeoff weight..3000 Pounds
- Usable fuel...56 Gallons

Takeoff Conditions:

- Field pressure altitude .... 1750 Feet
- Temperature ....25° C (ISA + 13° C)
- Wind component along runway ....11 knot headwind
- Runway Condition .... Dry, level, paved
- Field length.. 3000 Feet

Cruise Conditions:

- Total distance.. 560 Nautical Miles
- Pressure altitude... 6500 Feet
- Temperature ....20° C (ISA + 17° C)

- Expected wind enroute ....10 Knot Headwind

Landing Conditions:

- Field pressure altitude ....2000 Feet
- Temperature ....20° C (ISA + 10° C)
- Field length...3000 Feet

Takeoff

The takeoff distance tables, Figure 5-9, show the takeoff ground roll and horizontal distance to reach 50 feet above ground level. The distances shown are based on the short field technique.

Conservative distances can be established by reading the tables at the next higher value of weight, altitude and temperature. For example, in this particular sample problem, the takeoff distance information presented for a weight of 3000 pounds, takeoff field pressure altitude of 2000 feet, and a temperature of 30° C should be used. Using the conservative values results in the following:

- Ground roll ....1940 Feet
- Total distance to clear a 50-foot obstacle ....2734 Feet

Since the takeoff distance tables are based upon a zero wind conditions, a correction for the effect of winds must be made. Use the wind components chart, Figure 5-8 to determine the crosswind and the headwind (or tailwind) component of the reported winds.

Using the 11-knot headwind component, the following corrections can be made:

- Correction for headwind (10% for each 12 knots) 9.2%
- Ground roll, zero wind ....1940 feet
- Decrease in ground roll (1940 feet x 0.092) .... 178 feet
- Corrected ground roll..1762 feet
- Total distance to clear a 50-foot obstacle, zero wind...2734 feet
- Decrease in total distance (2734 feet x 0.092).............. 252 feet
- Corrected total distance to clear 50-foot obstacle.......2482 feet

Corrections for grass runways and sloped runways are also applicable and should be applied. These corrections are calculated in the same manner as the wind correction above. *Refer to Figure 5-9* for correction factors to be applied.

Climb

The takeoff and enroute rate-of-climb and climb gradient tables, Figures 5-10 through 5-13, present maximum rate of climb and climb gradient for various conditions. The time, fuel, and distance to climb table, Figure 5-14, allows determination of the time, fuel, and distance to climb from sea level to a specified pressure altitude. To determine the values to be used for flight planning, the start-of-climb time, fuel, and distance values are subtracted from the end-of-climb (cruise altitude) values. Again, conservative values are obtained by using the next lower altitude value for start of climb or next higher altitude values for end of climb. Using conservative values for the sample data, the following calculations are made:

Start-of-climb values (SL to 1750 feet):

- Time to climb .... 1.3 minutes
- Distance to climb... 2.0 NM
- Fuel to climb .... 0.3 Gal.

End-of-climb values (SL to 6500 feet):

- Time to climb .... 10.3 minutes
- Distance to climb... 17.0 NM
- Fuel to climb .... 2.4 Gal.

Climb values (1750 to 6500 feet):

- Time to climb (end 10.3 – start 1.3)......................... 9.0 minutes
- Distance to climb (end 17.0 – start 2.0)........................ 15.0 NM
- Fuel to climb (end 2.4 – start 0.3)................................ 2.1 Gal.

The above values reflect climb for a standard day and are sufficient for most flight planning. However, further correction for the effect of temperature on climb can be made. The effect of a temperature on climb performance is to increase the time, fuel, and distance to climb by approximately 10% for each 10° C above ISA. In our example, using a temperature of ISA + 13° C, the correction to be applied is 13%.

The fuel estimate for climb is:

- Fuel to climb (standard temperature) .... 2.1 Gal.
- Increase due to non-standard temp. (2.1 x 0.13) .... 0.3 Gal.
- Corrected fuel to climb (2.1 + 0.3)................................ 2.4 Gal.

Procedure for the distance to climb is:

- Distance to climb (standard temperature) .... 15.0 NM
- Increase due to non-standard temp. (9.0 x 0.13) .... 2.0 NM
- Corrected distance to climb (9.0 + 1.2) .... 17.0 NM

Cruise

The selected cruise altitude should be based upon airplane performance, trip length, and winds aloft. A typical cruise altitude and the expected winds aloft are given for this sample problem. Power selection for cruise should be based upon the cruise performance characteristics tabulated in Figure 5-15, and the range/endurance profile presented in Figure 5-16.

The relationship between power and range as well as endurance is shown in the range/endurance profile chart, Figure 5-16. Note that fuel economy and range are substantially improved at lower power settings.

The cruise performance chart, Figure 5-15, is entered at 6000 feet altitude and 30° C above standard temperature. These values are conservative for the planned altitude and expected temperature conditions. The engine speed chosen is 2500 RPM at approximately 55% power, which results in the following:

- Power (MAP = 19.4) 53%
- True airspeed ....131 Knots
- Cruise fuel flow... 9.2 GPH

Fuel Required

The total fuel requirement for the flight may be estimated using the performance information obtained from Figures 5-14 and 5-15. The resultant cruise distance is:

- Total distance (from sample problem) .... 560.0 NM
- Climb distance (corrected value from climb table)........ 17.0 NM
- Cruise distance (total distance – climb distance) .... 543.0 NM

Using the predicted true airspeed from the cruise performance table, Figure 5-15, and applying the expected 10-knot headwind, the ground speed for cruise is expected to be 121 knots. Therefore, the time required for the cruise portion of the trip is:

- 543.0 NM/121 knots = 4.5 hours.

The fuel required for cruise is:

- 4.5 hours x 9.2 GPH = 41.4 gallons.

From the 6000 ft Cruise Table (Figure 5-15), a 45 minute IFR reserve at approximately 70% power requires:

- 45/60 x 11.1 GPH = 8.3 gallons

The total estimated fuel required is as follows:

- Engine start, taxi, and takeoff.................................. 1.0 gallons
- Climb .... 2.4 gallons
- Cruise .... 41.4 gallons
- Reserve... 8.3 gallons
- Total fuel required .... 53.1 gallons

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with ample reserve.

Landing

A procedure similar to takeoff should be used for estimating the landing distance at the destination airport. Figure 5-19 presents landing distance information for the short field technique. The distances corresponding to 2000 feet and 20° C are as follows:

- Ground roll .... 1110 Feet
- Total distance to land over a 50-foot obstacle .... 2166 Feet

A correction for the effect of wind may be made based on the headwind and tailwind corrections presented with the landing chart using the same procedure as outlined for takeoff.

Demonstrated Operating Temperature

Satisfactory engine cooling has been demonstrated for this airplane with an outside air temperature 23° C above standard. The value given is not considered an operating limitation. Reference should be made to Section 2 for engine operating limitations.

Airspeed Calibration

Normal Static Source

Conditions:

- Power for level flight or maximum continuous, whichever is less.
- Weight .... 3000 LB

Example:

Flaps 50%
Indicated Airspeed .... 85 Knots

Calibrated Airspeed .... 86 Knots

• Note •

- Indicated airspeed values assume zero instrument error.
- KIAS = Knots Indicated Airspeed
- KCAS = Knots Calibrated Airspeed

KIAS	KCAS		
	Flaps 0%	Flaps 50%	Flaps 100%
50			49
60		60	60
70	72	71	71
80	81	81	81
90	91	91	91
100	101	101	101
110	111	111	
120	120	120	
130	130		
140	140		
150	150		
160	160		
170	170		
180	180		
190	190		
200	200		

Figure 5-1

Airspeed Calibration

Alternate Static Source

Conditions:

- Power for level flight or maximum continuous, whichever is less.
- Weight ....3000 LB
- Heater, Defroster & Vents ....ON

Example:

Flaps...50%
Indicated Airspeed...............85 Knots

Calibrated Airspeed.............84 Knots

• Note •

- Indicated airspeed values assume zero instrument error.
- KIAS = Knots Indicated Airspeed
- KCAS = Knots Calibrated Airspeed

KIAS	KCAS		
	Flaps 0%	Flaps 50%	Flaps 100%
50			45
60		59	56
70	70	69	67
80	80	79	78
90	90	89	88
100	100	99	98
110	110	109	
120	120	118	
130	130		
140	140		
150	150		
160	161		
170	171		
180	182		
190	192		
200	203		

Figure 5-2

Altitude Correction

Normal Static Source

Conditions:

- Power for level flight or maximum continuous, whichever is less.
- Weight ....3000 LB

Example:

Flaps 50%
Indicated Airspeed ....85 Knots
Desired Altitude.................12,000 FT
Altitude Correction ....-7 FT

Altitude to Fly....................11,993 FT

• Note •

- Indicated airspeed values assume zero instrument error.
- KIAS = Knots Indicated Airspeed
- KCAS = Knots Calibrated Airspeed

Flaps	Press Alt	CORRECTION TO BE ADDED - FEET Normal Static Source - KIAS									
		60	70	80	90	100	120	140	160	180	200
0%	S.L	-12	-11	-10	-9	-8	-5	-3	-3	-5	-10
	5000	-14	-13	-12	-11	-9	-6	-4	-3	-5	-11
	10000	-16	-15	-14	-12	-11	-7	-4	-4	-6	-13
	15000	-19	-18	-16	-14	-12	-8	-5	-4	-7	-16
50%	S.L	-2	-4	-5	-6	-5	+2				
	10000	-2	-4	-6	-7	-6	+2				
	15000	-2	-5	-7	-8	-7	+2				
100%	S.L	-1	-4	-6	-7	-5					
	10000	-1	-5	-7	-8	-6					
	15000	-1	-6	-9	-9	-6					

Figure 5-3

Altitude Correction

Alternate Static Source

Conditions:

- Power for level flight or maximum continuous, whichever is less.
- Weight....................................3000 LB
- Heater, Defroster, & Vents.............ON

Example:

Flaps...0%
Indicated Airspeed..............120 Knots
Desired Altitude................. 12,000 FT
Altitude Correction................... -11 FT

Altitude to Fly..................... 11,989 FT

• Note •

- Indicated airspeed values assume zero instrument error.
- KIAS = Knots Indicated Airspeed
- KCAS = Knots Calibrated Airspeed

Flaps	Press Alt	CORRECTION TO BE ADDED - FEET Normal Static Source - KIAS 60	70	80	90	100	120	140	160	180	200
0%	S.L	-9	-10	-10	-11	-10	-7	-1	11	27	51
	5000	-10	-11	-12	-12	-12	-9	-1	12	32	59
	10000	-12	-13	-14	-14	-14	-10	-1	14	37	69
	15000	-14	-15	-16	-17	-16	-12	-1	17	44	80
50%	S.L	-11	-15	-18	-21	-22	-19				
	10000	-13	-18	-21	-24	-26	-22				
	15000	-15	-20	-25	-28	-30	-26				
100%	S.L	-20	-20	-20	-20	-18					
	10000	-23	-24	-23	-23	-21					
	15000	-27	-27	-27	-26	-25					

Figure 5-4

Temperature Conversion

• Note •

- To convert from Celsius (°C) to Fahrenheit (°F), find, in the shaded columns, the number representing the temperature value (°C) to be converted. The equivalent Fahrenheit temperature is read to the right.
  ➔ **EXAMPLE:** 38° C = 100° F.
- To convert from Fahrenheit (°F) to Celsius (°C), find in the shaded columns area, the number representing the temperature value (°F) to be converted. The equivalent Celsius temperature is read to the left.
  ➔ **EXAMPLE:** 38° F = 3° C.

Temp to Convert °C or °F			Temp to Convert °C or °F			Temp to Convert °C or °F		
°C	←→	°F	°C	←→	°F	°C	←→	°F
-50	**-58**	-72	-17	**2**	36	17	**62**	144
-49	**-56**	-69	-16	**4**	39	18	**64**	147
-48	**-54**	-65	-14	**6**	43	19	**66**	151
-47	**-52**	-62	-13	**8**	46	20	**68**	154
-46	**-50**	-58	-12	**10**	50	21	**70**	158
-44	**-48**	-54	-11	**12**	54	22	**72**	162
-43	**-46**	-51	-10	**14**	57	23	**74**	165
-42	**-44**	-47	-9	**16**	61	24	**76**	169
-41	**-42**	-44	-8	**18**	64	26	**78**	172
-40	**-40**	-40	-7	**20**	68	27	**80**	176
-39	**-38**	-36	-6	**22**	72	28	**82**	180
-38	**-36**	-33	-4	**24**	75	29	**84**	183
-37	**-34**	-29	-3	**26**	79	30	**86**	187
-36	**-32**	-26	-2	**28**	82	31	**88**	190
-34	**-30**	-22	-1	**30**	86	32	**90**	194
-33	**-28**	-18	0	**32**	90	33	**92**	198
-32	**-26**	-15	1	**34**	93	34	**94**	201
-31	**-24**	-11	2	**36**	97	36	**96**	205
-30	**-22**	-8	3	**38**	100	37	**98**	208
-29	**-20**	-4	4	**40**	104	38	**100**	212
-28	**-18**	0	6	**42**	108	39	**102**	216
-27	**-16**	3	7	**44**	111	40	**104**	219
-26	**-14**	7	8	**46**	115	41	**106**	223
-24	**-12**	10	9	**48**	118	42	**108**	226
-23	**-10**	14	10	**50**	122	43	**110**	230
-22	**-8**	18	11	**52**	126	44	**112**	234
-21	**-6**	21	12	**54**	129	46	**114**	237
-20	**-4**	25	13	**56**	133	47	**116**	241
-19	**-2**	28	14	**58**	136	48	**118**	244
-18	**0**	32	16	**60**	140	49	**120**	248

Figure 5-5

Outside Air Temperature for ISA Condition

Example:

Pressure Altitude...................8000 FT
Outside Air Temp....................... 48° F

ISA Condition .... ISA + 10° C

Press Alt Feet	ISA-40°C		ISA-20°C		ISA		ISA+10°C		ISA+20°C	
	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
SL	-25	-13	-5	23	15	59	25	77	35	95
1000	-27	-18	-7	18	13	54	23	72	33	90
2000	-29	-20	-9	16	11	52	21	70	31	88
3000	-31	-24	-11	12	9	48	19	66	29	84
4000	-33	-27	-13	9	7	45	17	63	27	81
5000	-35	-31	-15	5	5	41	15	59	25	77
6000	-37	-34	-17	2	3	38	13	56	23	74
7000	-39	-38	-19	-2	1	34	11	52	21	70
8000	-41	-42	-21	-6	-1	30	10	48	20	66
9000	-43	-45	-23	-9	-3	27	7	45	17	63
10000	-45	-49	-25	-13	-5	23	5	41	15	59
11000	-47	-52	-27	-16	-7	20	3	38	13	56
12000	-49	-56	-29	-20	-9	16	1	34	11	52
13000	-51	-59	-31	-23	-11	13	-1	31	9	49
14000	-53	-63	-33	-27	-13	9	-3	27	7	45

Figure 5-6

Stall Speeds

Conditions:

- Weight ....3000 LB
- C.G. ....Noted
- Power...Idle
- Bank Angle...............................Noted

Example:

Flaps .... Up (0%)
Bank Angle......................................15°

Stall Speed.......... 66 KIAS | 68 KCAS

• Note •

- Altitude loss during wings level stall may be 250 feet or more.
- KIAS values may not be accurate at stall.

Weight	Bank Angle	STALL SPEEDS					
		Flaps 0% Full Up		Flaps 50%		Flaps 100% Full Down	
LB	Deg	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
3000 Most FWD C.G.	0	65	67	61	63	56	59
	15	66	68	62	64	57	60
	30	70	72	65	68	61	63
	45	78	80	72	75	67	70
	60	92	95	86	89	80	83
3000 Most AFT C.G.	0	64	66	59	62	54	57
	15	65	67	60	63	55	58
	30	69	71	64	66	58	61
	45	76	78	71	73	64	68
	60	90	93	84	87	76	81

Figure 5-7

Wind Components

Conditions:

- Runway Heading.........................10°
- Wind Direction..............................60°
- Wind Velocity...................... 15 Knots

Example:

Wind/Flight Path Angle .... 50°
Crosswind Component ....12 Knots
Headwind Component..........10 Knots

• Note •

- The maximum demonstrated crosswind is 21 knots. Value not considered limiting.

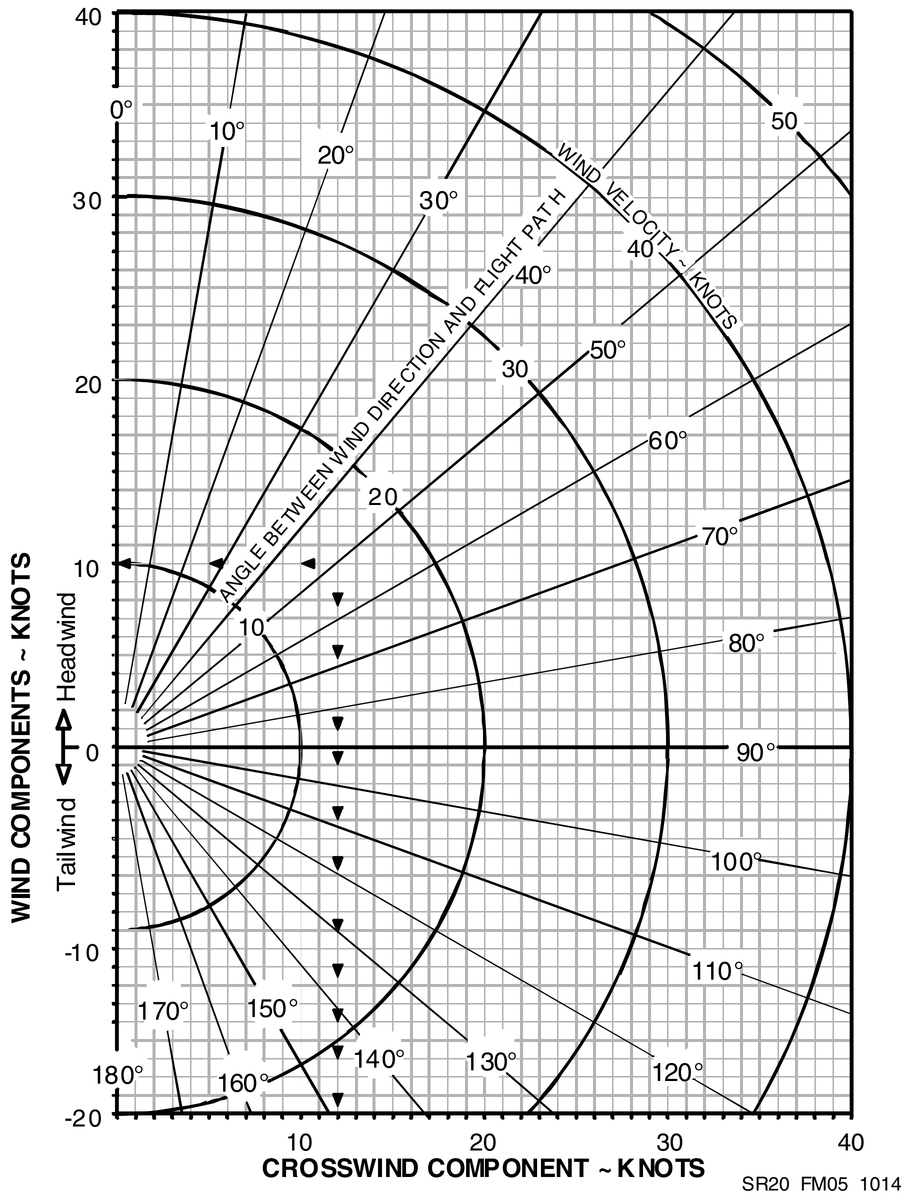

Figure 5-8

Takeoff Distance

Conditions:

- Winds.. Zero
- Runway................... Dry, Level, Paved
- Flaps.. 50%
- Power................................ Maximum set before brake release

Example:

Outside Air Temp .... 25°C
Weight .... 3000 LB
Pressure Altitude.................. 2000 FT
Headwind .... 12 Knots
Runway .... Dry, Paved

Liftoff Speed.......................... 69 KIAS
Obstacle Speed .... 75 KIAS
Takeoff Ground Roll .... 1685 FT
Dist. over 50' Obstacle .... 2380 FT

Factors:

The following factors are to be applied to the computed takeoff distance for the noted condition:

- Headwind - Subtract 10% from computed distance for each 12 knots headwind.
- Tailwind - Add 10% for each 2 knots tailwind up to 10 knots.
- Grass Runway - Add 15% to ground roll distance.
- Sloped Runway - Increase table distances by 22% of the ground roll distance at Sea Level, 30% of the ground roll distance at 5000 ft, 43% of the ground roll distance at 10,000 ft for each 1% of upslope. Decrease table distances by 7% of the ground roll distance at Sea Level, 10% of the ground roll distance at 5000 ft, and 14% of the ground roll distance at 10,000 ft for each 1% of downslope.

• Caution •

The above corrections for runway slope are required to be included herein. These corrections should be used with caution since published runway slope data is usually the net slope from one end of the runway to the other. Many runways will have portions of their length at greater or lesser slopes than the published slope, lengthening (or shortening) takeoff ground roll estimated from the table.

- If brakes are not held while applying power, distances apply from point where full throttle and mixture setting is complete.
- For operation in outside air temperatures colder than this table provides, use coldest data shown.
- For operation in outside air temperatures warmer than this table provides, use extreme caution.

Takeoff Distance

WEIGHT = 3000 LB **Speed at Liftoff = 68 KIAS** **Speed over 50 Ft. Obstacle = 75 KIAS** Flaps - 50% · Takeoff Pwr · Dry Paved	**Headwind:** Subtract 10% for each 12 knots headwind. **Tailwind:** Add 10% for each 2 knots tailwind up to 10 knots. **Runway Slope:** Ref. Factors. **Dry Grass:** Add 15% to Ground Roll

PRESS ALT FT	DISTANCE FT	TEMPERATURE ~ °C 0	10	20	30	40	ISA
SL	Grnd Roll	1287	1390	1497	1608	1724	1446
	50 ft	1848	1988	2132	2282	2437	2064
1000	Grnd Roll	1412	1526	1643	1766	1893	1564
	50 ft	2022	2175	2333	2497	2666	2226
2000	Grnd Roll	1552	1676	1805	1940	2079	1692
	50 ft	2214	2381	2555	2734	2920	2402
3000	Grnd Roll	1706	1842	1985	2132	2286	1831
	50 ft	2426	2609	2799	2996	3200	2593
4000	Grnd Roll	1877	2027	2183	2346		1983
	50 ft	2660	2861	3069	3285		2802
5000	Grnd Roll	2066	2231	2404	2583		2149
	50 ft	2919	3139	3368	3605		3029
6000	Grnd Roll	2276	2458	2648	2845		2329
	50 ft	3205	3447	3698	3959		3276
7000	Grnd Roll	2509	2710	2919			2528
	50 ft	3522	3788	4064			3547
8000	Grnd Roll	2768	2990	3221			2744
	50 ft	3872	4165	4469			3841
9000	Grnd Roll	3056	3301	3555			2980
	50 ft	4261	4583	4917			4160
10000	Grnd Roll	3376	3646				3241
	50 ft	4691	5046				4514

Figure 5-9
Sheet 1 of 2

Takeoff Distance

WEIGHT = 2500 LB Speed at Liftoff = 65 KIAS Speed over 50 Ft Obstacle = 70 KIAS Flaps - 50% · Takeoff Pwr · Dry Paved							**Headwind:** Subtract 10% for each 12 knots headwind. **Tailwind:** Add 10% for each 2 knots tailwind up to 10 knots. **Runway Slope:** Ref. Factors. **Dry Grass:** Add 15% to Ground Roll
PRESS ALT FT	**DISTANCE FT**	**TEMPERATURE ~ °C**					
		0	**10**	**20**	**30**	**40**	**ISA**
SL	**Grnd Roll**	813	878	946	1016	1090	912
	50 ft	1212	1303	1398	1496	1597	1350
1000	**Grnd Roll**	892	964	1038	1116	1196	986
	50 ft	1326	1426	1529	1636	1747	1457
2000	**Grnd Roll**	980	1059	1141	1226	1314	1067
	50 ft	1451	1561	1674	1791	1912	1572
3000	**Grnd Roll**	1078	1164	1254	1348	1445	1156
	50 ft	1590	1709	1834	1962	2095	1697
4000	**Grnd Roll**	1185	1281	1380	1483		1253
	50 ft	1743	1874	2010	2151		1835
5000	**Grnd Roll**	1305	1410	1519	1632		1358
	50 ft	1912	2056	2205	2360		1985
6000	**Grnd Roll**	1438	1553	1673	1798		1473
	50 ft	2098	2256	2421	2590		2140
7000	**Grnd Roll**	1585	1712	1845			1599
	50 ft	2305	2479	2659			2324
8000	**Grnd Roll**	1749	1889	2035			1737
	50 ft	2534	2725	2923			2517
9000	**Grnd Roll**	1931	2085	2247			1887
	50 ft	2787	2997	3216			2727
10000	**Grnd Roll**	2133	2304				2050
	50 ft	3068	3299				2986

Figure 5-9
Sheet 2 of 2

Takeoff Climb Gradient

Conditions:

- Power .... Full Throttle
- Mixture .... Full Rich
- Flaps 50%
- Airspeed.............. Best Rate of Climb

Example:

Outside Air Temp .... 20° C
Weight .... 3000 LB
Pressure Altitude .... 1750 FT

Climb Airspeed..................... 85 Knots
Gradient .... 491 FT/NM

• Note •

- Climb Gradients shown are the gain in altitude for the horizontal distance traversed expressed as Feet per Nautical Mile.
- Cruise climbs or short duration climbs are permissible at best power as long as altitudes and temperatures remain within those specified in the table.
- For operation in air colder than this table provides, use coldest data shown.
- For operation in air warmer than this table provides, use extreme caution.

Weight	Press Alt	Climb Speed	CLIMB GRADIENT ~ Feet per Nautical Mile				
			Temperature ~ °C				
LB	FT	KIAS	-20	0	20	40	ISA
3000	SL	85	678	621	568	518	581
	2000	85	587	532	481	433	504
	4000	84	500	447	398	351	430
	6000	83	416	365	318		358
	8000	82	336	287	241		289
	10000	82	259	212			224
2500	SL	84	957	880	808	741	826
	2000	84	841	767	698	634	729
	4000	83	730	659	593	531	636
	6000	82	624	555	492		545
	8000	81	522	456	396		459
	10000	80	425	362			377

Figure 5-10

Takeoff Rate of Climb

Conditions:

- Power..............................Full Throttle
- Mixture..................................Full Rich
- Flaps.. 50%
- Airspeed ....Best Rate of Climb

Example:

Outside Air Temp .... 20° C
Weight .... 3000 LB
Pressure Altitude.................. 1750 FT

Climb Airspeed.................... 85 Knots
Rate of Climb.......................725 FPM

• Note •

- Rate-of-Climb values shown are change in altitude for unit time expended expressed in Feet per Minute.
- Cruise climbs or short duration climbs are permissible at best power as long as altitudes and temperatures remain within those specified in the table.
- For operation in air colder than this table provides, use coldest data shown.
- For operation in air warmer than this table provides, use extreme caution.

Weight	Press Alt	Climb Speed	RATE OF CLIMB ~ Feet per Minute				
			Temperature ~ °C				
LB	FT	KIAS	-20	0	20	40	ISA
3000	SL	85	905	862	817	771	828
	2000	85	807	761	712	663	734
	4000	84	707	657	606	554	639
	6000	83	607	553	499		545
	8000	82	504	447	390		450
	10000	82	401	341			356
2500	SL	84	1256	1201	1144	1086	1158
	2000	84	1136	1077	1017	955	1044
	4000	83	1014	952	888	824	929
	6000	82	892	825	758		815
	8000	81	768	698	627		701
	10000	80	643	569			587

Figure 5-11

Enroute Climb Gradient

Conditions:

- Power .... Full Throttle
- Mixture .... Full Rich
- Flaps ....0% (UP)
- Airspeed.............. Best Rate of Climb

Example:

Outside Air Temp ....20° C
Weight .... 3000 LB
Pressure Altitude .... 4200 FT

Climb Airspeed....................94 Knots
Gradient .... 359 FT/NM

• Note •

- Climb Gradients shown are the gain in altitude for the horizontal distance traversed expressed as Feet per Nautical Mile.
- Cruise climbs or short duration climbs are permissible at best power as long as altitudes and temperatures remain within those specified in the table.
- For operation in air colder than this table provides, use coldest data shown.
- For operation in air warmer than this table provides, use extreme caution.
- The Maximum Operating Altitude of 17,500 feet MSL may be obtained if the airplane's gross weight does not exceed 2900 lb and the ambient temperature is -20° C or less.

Weight	Press Alt	Climb Speed	CLIMB GRADIENT - Feet per Nautical Mile				
			Temperature ~ °C				
LB	FT	KIAS	-20	0	20	40	ISA
3000	SL	96	650	589	533	481	549
	2000	95	560	502	448	398	474
	4000	94	474	418	367	319	402
	6000	93	392	338	289		332
	8000	92	313	216	214		265
	10000	91	237	188			200
	12000	91	164	118			139
	14000	90	95	51			80
2500	SL	93	846	777	712	652	728
	2000	92	741	674	612	554	640
	4000	92	640	576	516	461	555
	6000	91	543	482	425		473
	8000	90	451	392	337		395
	10000	89	363	306			320
	12000	88	279	224			248
	14000	88	198	147			180

Figure 5-12

Enroute Rate of Climb

Conditions:

- Power..............................Full Throttle
- Mixture..................................Full Rich
- Flaps...................................0% (UP)
- Airspeed ....Best Rate of Climb

Example:

Outside Air Temp .... 10° C
Weight...................................3000 LB
Pressure Altitude..................6500 FT

Climb Airspeed.....................93 Knots
Rate of Climb.......................513 FPM

• Note •

- Rate-of-Climb values shown are change in altitude in feet per unit time expressed in Feet per Minute.
- For operation in air colder than this table provides, use coldest data shown.
- For operation in air warmer than this table provides, use extreme caution.
- Cruise climbs or short duration climbs are permissible at best power as long as altitudes and temperatures remain within those specified in the table.
- The Maximum Operating Altitude of 17,500 feet MSL may be obtained if the airplane's gross weight does not exceed 2900 lb and the ambient temperature is -20° C or less.

Weight	Press Alt	Climb Speed	RATE OF CLIMB ~ Feet per Minute				
			Temperature ~ °C				
LB	FT	KIAS	-20	0	20	40	ISA
3000	SL	96	979	923	866	808	880
	2000	95	868	808	748	688	775
	4000	94	756	693	630	567	671
	6000	93	642	576	510		566
	8000	92	527	458	389		462
	10000	91	411	339			357
	12000	91	294	218			252
	14000	90	175	97			148
2500	SL	93	1231	1175	1117	1058	1132
	2000	92	1109	1050	988	926	1016
	4000	92	987	923	858	793	900
	6000	91	863	796	727		785
	8000	90	738	667	595		670
	10000	89	612	537			555
	12000	88	484	405			440
	14000	88	355	273			325

Figure 5-13

Enroute Rate of Climb Vs Density Altitude

Conditions:

- Power .... Full Throttle
- Mixture .... Full Rich
- Flaps .... 0% (UP)
- Airspeed .... Best Rate of Climb

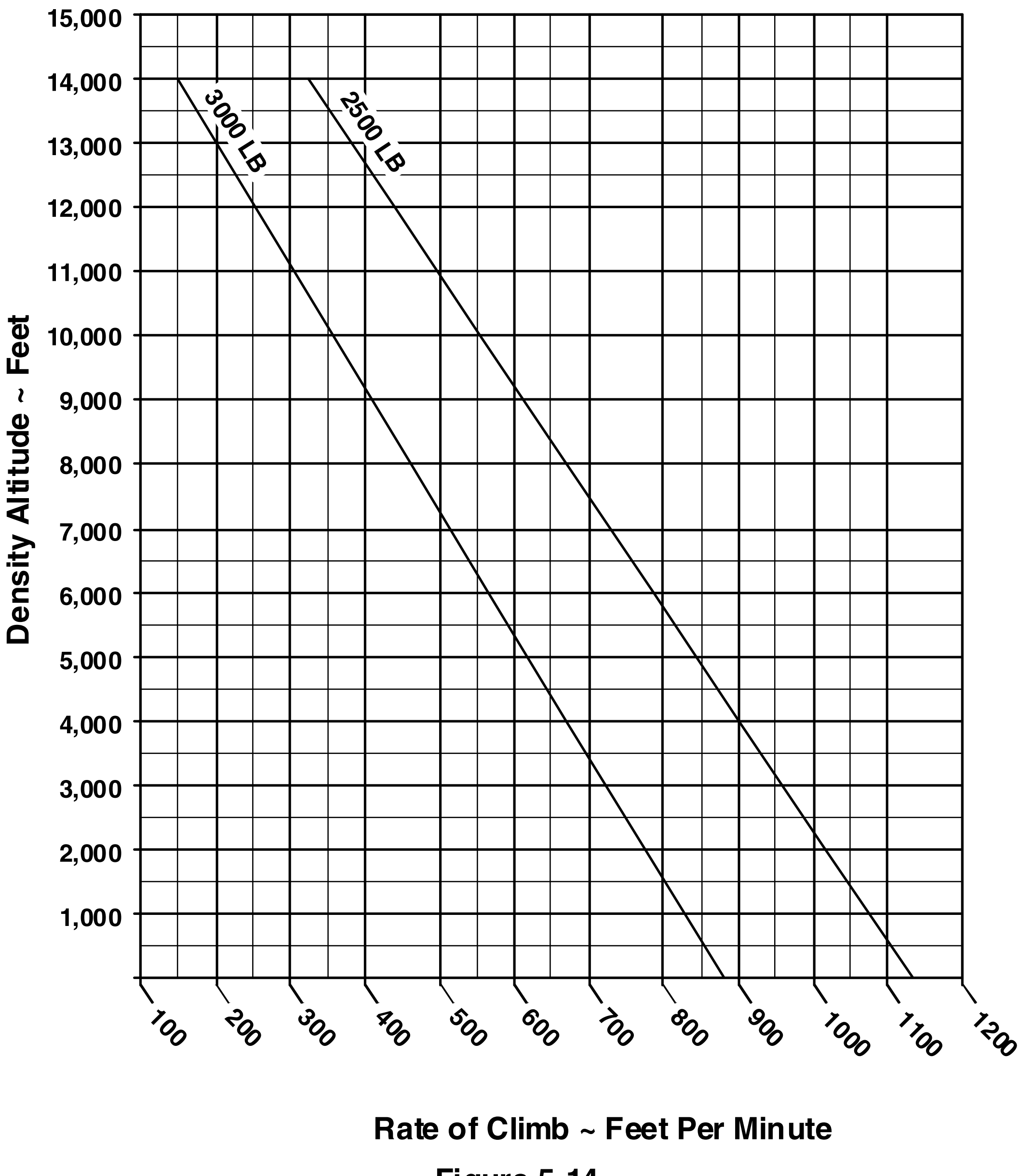

Figure 5-14

Time, Fuel and Distance to Climb

Conditions:

- Power....................................Full Throttle
- Mixture....................................Full Rich
- Fuel Density......................6.0 LB/GAL
- Weight ....3000 LB
- Winds...Zero
- Climb Airspeed..........................Noted

Example:

Outside Air Temp .... ISA
Weight.....................................3000 LB
Airport Press ....1000 FT
Pressure Altitude..................12000 FT

Time to Climb..................22.5 Minutes
Fuel to Climb.......................4.7 Gallon
Distance to Climb.....................39 NM

Factors:

- Taxi Fuel - Add 1 gallon for start, taxi, and takeoff.
- Temperature - Add 10% to computed values for each 10° C above standard.
- Cruise climbs or short duration climbs are permissible at best power as long as altitudes and temperatures remain within those specified in the table.

Press Alt FT	OAT (ISA) °C	Climb Speed KIAS	Rate Of Climb FPM	TIME, FUEL, DISTANCE ~ From Sea Level		
				Time Minutes	Fuel U.S. Gal	Distance NM
SL	**15**	**96**	**880**	0.0	0.0	0
1000	**13**	**96**	**828**	1.3	0.3	2
2000	**11**	**95**	**775**	2.4	0.6	4
3000	**9**	**94**	**723**	3.8	1.0	6
4000	**7**	**94**	**671**	5.2	1.3	8
5000	**5**	**93**	**618**	6.7	1.7	11
6000	**3**	**93**	**566**	8.4	2.0	14
7000	**1**	**92**	**514**	10.3	2.4	17
8000	**-1**	**92**	**462**	12.3	2.9	21
9000	**-3**	**91**	**409**	14.6	3.3	25
10000	**-5**	**91**	**357**	17.2	3.8	29
11000	**-7**	**91**	**305**	20.3	4.4	35
12000	**-9**	**91**	**252**	23.8	5.0	41
13000	**-11**	**91**	**200**	28.3	5.8	49
14000	**-13**	**90**	**148**	34.0	6.8	60

Figure 5-15

Cruise Performance

Conditions:

- Mixture .... Best Power
- Cruise Weight...................... 2600 LB
- Winds .... Zero

  Note:
  Subtract 10 KTS if nose wheel fairings removed.

Cruise Pwr >= 85% not recommended.

Example:

Outside Air Temp .... 29° C
RPM .... 2700 RPM
Cruise Press Alt.................. 8000 FT

% Power (22.2 MAP)................. 73%
True Airspeed .... 154 Knots
Fuel Flow......................... 11.4 GPH

2000 Feet Pressure Altitude		ISA - 30° C (-19° C)			ISA (11° C)			ISA + 30° C (41° C)		
RPM	**MAP**	**PWR**	**KTAS**	**GPH**	**PWR**	**KTAS**	**GPH**	**PWR**	**KTAS**	**GPH**
2700	**27.8**	101%	160	16.0	95%	160	15.0	91%	157	14.2
2500	**27.8**	90%	154	14.1	85%	154	13.4	81%	151	12.9
2500	**26.6**	85%	151	13.4	80%	151	12.8	76%	148	11.7
2500	**25.4**	80%	147	12.7	75%	147	11.6	72%	144	11.3
2500	**24.1**	74%	143	11.5	70%	143	11.1	67%	140	10.7
2500	**22.9**	69%	139	11.0	65%	139	10.6	62%	136	10.2
2500	**22.0**	65%	136	10.5	62%	136	10.2	59%	133	9.9
2500	**19.7**	55%	127	9.5	52%	127	9.20	50%	124	8.9

4000 Feet Pressure Altitude		ISA - 30° C (-23° C)			ISA (7° C)			ISA + 30° C (37° C)		
RPM	**MAP**	**PWR**	**KTAS**	**GPH**	**PWR**	**KTAS**	**GPH**	**PWR**	**KTAS**	**GPH**
2700	**25.8**	94%	159	14.8	89%	159	14.4	84%	157	13.4
2500	**25.8**	84%	153	13.3	79%	153	12.7	75%	150	11.7
2500	**24.8**	80%	150	12.7	75%	150	11.6	72%	147	11.2
2500	**23.6**	75%	146	11.5	70%	146	11.1	67%	143	10.8
2500	**22.3**	69%	141	10.9	65%	141	10.5	62%	138	10.2
2500	**21.0**	63%	136	10.3	60%	136	10.0	57%	133	9.7
2500	**19.8**	58%	131	9.8	55%	131	9.4	52%	129	9.2

6000 Feet Pressure Altitude		ISA - 30° C (-27° C)			ISA (3° C)			ISA + 30° C (33° C)		
RPM	**MAP**	**PWR**	**KTAS**	**GPH**	**PWR**	**KTAS**	**GPH**	**PWR**	**KTAS**	**GPH**
2700	**24.0**	88%	159	13.8	83%	159	13.1	79%	156	12.6
2500	**24.0**	79%	152	12.0	74%	152	11.5	71%	149	11.1
2500	**23.0**	74%	148	11.5	70%	148	11.1	67%	145	10.7
2500	**21.8**	69%	144	11.0	65%	144	10.6	62%	141	10.2
2500	**20.8**	65%	140	10.4	61%	140	10.0	58%	137	9.7
2500	**19.4**	59%	134	9.8	55%	134	9.5	53%	131	9.2

Figure 5-16
Sheet 1 of 2

Cruise Performance

8000 Feet Pressure Altitude										
		ISA - 30° C (-31° C)			ISA (-1° C)			ISA + 30° C (29° C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	**22.2**	82%	157	12.9	77%	157	11.6	73%	154	11.4
2500	**22.2**	73%	150	11.4	69%	150	11.0	65%	147	10.6
2500	**21.2**	69%	146	10.9	65%	146	10.5	62%	143	10.2
2500	**20.1**	64%	142	10.4	60%	142	10.0	57%	139	9.7
2500	**18.9**	59%	136	9.8	55%	136	9.5	52%	134	9.2
2500	**17.7**	53%	131	9.2	50%	131	8.9	48%	128	8.7

10,000 Feet Pressure Altitude										
		ISA - 30° C (-35° C)			ISA (-5° C)			ISA + 30° C (25° C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	**20.6**	76%	155	11.7	72%	155	11.2	68%	152	10.9
2500	**20.6**	68%	148	10.8	64%	148	10.5	61%	145	10.1
2500	**19.6**	64%	144	10.4	60%	144	10.0	57%	141	9.7
2500	**18.5**	59%	139	9.8	55%	139	9.5	53%	136	9.2
2500	**17.3**	54%	134	9.3	50%	134	9.0	48%	131	8.7

12,000 Feet Pressure Altitude										
		ISA - 30° C (-39° C)			ISA (-9° C)			ISA + 30° C (21° C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	**19.0**	70%	153	11.1	66%	153	10.7	63%	150	10.3
2500	**19.0**	63%	146	10.3	59%	146	9.9	56%	143	9.6
2500	**18.0**	59%	141	9.8	55%	141	9.5	52%	138	9.2
2500	**16.8**	53%	136	9.2	50%	136	8.9	47%	133	8.6

14,000 Feet Pressure Altitude										
		ISA - 30° C (-43° C)			ISA (-13° C)			ISA + 30° C (17° C)		
RPM	MAP	PWR	KTAS	GPH	PWR	KTAS	GPH	PWR	KTAS	GPH
2700	**17.6**	66%	151	10.5	62%	151	10.2	58%	148	9.8
2500	**17.6**	59%	144	9.8	55%	144	9.5	52%	141	9.2
2500	**16.5**	54%	142	9.3	50%	142	9.0	48%	139	8.7

Figure 5-16
Sheet 2 of 2

Range / Endurance Profile

Conditions:

- Weight ....3000 LB
- Temperature .... Standard Day
- Winds ....Zero
- Mixture .... See Tables
- Total Fuel........................ 56 Gallons

Example:

Power Setting 65%
Takeoff Press Alt .... 2000 FT
Cruise Press Alt.................... 6000 FT

Fuel to Climb	1.4 Gal.
Cruise Fuel Flow	10.5 GPH
Endurance	4.4 Hr
Range	635 NM
True Airspeed	143 Knots

• Note •

- Fuel Remaining For Cruise accounts for 10.1 gallons for 45 minutes IFR reserve fuel at 75% power and fuel burn for descent.
- Range and endurance shown includes descent to final destination at 160 KIAS and 500 fpm.
- Range is decreased by 1% if nose wheel fairings removed.

75% POWER							**Mixture = Best Power**
Press Alt FT	**Climb Fuel Gal**	**Fuel Remaining For Cruise Gal**	**Airspeed KTAS**	**Fuel Flow GPH**	**Endurance Hours**	**Range NM**	**Specific Range Nm/Gal**
0	0.0	46.3	143	11.6	4.0	576	12.3
2000	0.6	45.7	147	11.6	4.0	594	12.6
4000	1.3	45.0	150	11.6	4.0	606	12.7
6000	2.0	44.3	152	11.6	4.0	617	12.7
8000	2.9	43.4	155	11.6	4.0	627	12.8
10000	3.8	42.5					
12000	5.0	41.3					
14000	6.8	39.5					

Figure 5-17
Sheet 1 of 2

Range / Endurance Profile

65% POWER						Mixture = Best Power	
Press Alt FT	Climb Fuel Gal	Fuel Remaining For Cruise Gal	Airspeed KTAS	Fuel Flow GPH	Endurance Hours	Range NM	Specific Range Nm/Gal
0	0.0	46.3	137	10.5	4.4	608	13.0
2000	0.6	45.7	139	10.5	4.4	620	13.1
4000	1.3	45.0	141	10.5	4.4	628	13.2
6000	2.0	44.3	143	10.5	4.4	635	13.2
8000	2.9	43.4	145	10.5	4.4	645	13.3
10000	3.8	42.5	147	10.5	4.4	654	13.3
12000	5.0	41.3	150	10.5	4.4	666	13.4
14000	6.8	39.5					

55% POWER						Mixture = Best Economy	
Press Alt FT	Climb Fuel Gal	Fuel Remaining For Cruise Gal	Airspeed KTAS	Fuel Flow GPH	Endurance Hours	Range NM	Specific Range Nm/Gal
0	0.0	46.3	127	8.4	5.5	708	15.2
2000	0.6	45.7	130	8.4	5.5	726	15.5
4000	1.3	45.0	131	8.4	5.5	731	15.4
6000	2.0	44.3	134	8.4	5.5	745	15.6
8000	2.9	43.4	136	8.4	5.5	755	15.7
10000	3.8	42.5	139	8.4	5.4	768	15.9
12000	5.0	41.3	141	8.4	5.4	776	15.9
14000	6.8	39.5	144	8.4	5.4	785	16.0

Figure 5-17
Sheet 2 of 2

Balked Landing Climb Gradient

Conditions:

- Power .... Full Throttle
- Mixture .... Full Rich
- Flaps .... 100% (DN)
- Airspeed.............. Best Rate of Climb

Example:

Outside Air Temp ....20° C
Weight .... 2500 LB
Pressure Altitude .... 2000 FT

Climb Airspeed.....................74 Knots
Rate of Climb.................... 679 FT/NM

• Note •

- Balked Landing Climb Gradients shown are the gain in altitude for the horizontal distance traversed expressed as Feet per Nautical Mile.
- Dashed cells in the table represent performance below the minimum balked landing climb requirements.
- For operation in air colder than this table provides, use coldest data shown.
- For operation in air warmer than this table provides, use extreme caution.
- This chart is required data for certification. However, significantly better performance can be achieved by climbing at Best Rate of Climb speeds shown with flaps down or following the Go-Around / Balked Landing procedure in Section 4.

Weight	Press Alt	Climb Speed	CLIMB GRADIENT ~ Feet per Nautical Mile				
			Temperature ~ °C				
LB	FT	KIAS	-20	0	20	40	ISA
2900	SL	75	779	699	626	558	644
	2000	74	664	585	515	449	547
	4000	73	548	475	408	346	451
	6000	72	440	369	305	-	359
	8000	71	335	268	206	-	271
	10000	70	235	170	-	-	186
2500	SL	75	987	894	807	728	829
	2000	74	851	762	679	603	716
	4000	73	721	635	557	484	608
	6000	72	596	514	439	-	502
	8000	71	477	398	327	-	401
	10000	70	362	287	-	-	305

Figure 5-18

Balked Landing Rate of Climb

Conditions:

- Power..............................Full Throttle
- Mixture..................................Full Rich
- Flaps...............................100% (DN)
- Climb Airspeed .... Noted

Example:

Outside Air Temp .... 20° C
Weight.................................2500 LB
Pressure Altitude..................4000 FT

Climb Airspeed....................73 Knots
Rate of Climb.................. 733 FT/NM

• Note •

- Balked Landing Rate of Climb values shown are the full flaps change in altitude for unit time expended expressed in Feet per Minute.
- Dashed cells in the table represent performance below the minimum balked landing climb requirements.
- For operation in air colder than this table provides, use coldest data shown.
- For operation in air warmer than this table provides, use extreme caution.
- This chart is required data for certification. However, significantly better performance can be achieved by climbing at Best Rate of Climb speeds shown with flaps down or following the Go-Around / Balked Landing procedure in Section 4.

Weight	Press Alt	Climb Speed	RATE OF CLIMB - Feet per Minute				
			Temperature ~ °C				
LB	FT	KIAS	-20	0	20	40	ISA
2900	SL	75	905	845	785	724	800
	2000	74	789	726	662	598	691
	4000	73	671	604	538	471	581
	6000	72	552	482	412	-	471
	8000	71	432	359	286	-	362
	10000	70	310	234	-	-	252
2500	SL	75	1142	1076	1009	942	1026
	2000	74	1011	942	872	801	904
	4000	73	880	807	733	660	781
	6000	72	747	670	593	-	658
	8000	71	613	533	453	-	537
	10000	70	478	394	-	-	414

Figure 5-19

Landing Distance

Conditions:

- Technique .... Normal
- Winds ....Zero
- Runway .... Paved
- Flaps. 100%
- Power .... 3° Power Approach to 50 FT obstacle, then Power - IDLE

Example:

Outside Air Temp ....10°C
Weight .... 2900 LB
Pressure Altitude .... 2000 FT
Headwind .... Zero

Landing Ground Roll .... 1072 FT
Dist. over 50' Obstacle......... 2116 FT

Factors:

The following factors are to be applied to the computed landing distance for the noted condition:

- Power for 3° glideslope across obstacle; then reduce to idle.
- Headwind - Subtract 10% from table distances for each 13 knots headwind
- Tailwind - Add 10% to table distances for each 2 knots tailwind up to 10 knots.
- Sloped Runway - Increase table distances by 27% of the ground roll distance for each 1% of downslope. Decrease table distances by 9% of the ground roll distance for each 1% of upslope.

• Caution •

The above corrections for runway slope are required to be included herein. These corrections should be used with caution since published runway slope data is usually the net slope from one end of the runway to the other. Many runways will have portions of their length at greater or lesser slopes than the published slope, lengthening (or shortening) landing ground roll estimated from the table.

- Dry Grass Runway - Add 40% to computed ground roll distance.
- For operation in outside air temperatures colder than this table provides, use coldest data shown.
- For operation in outside air temperatures warmer than this table provides, use extreme caution.

Landing Distance

WEIGHT = 2900 LB
Speed over 50 Ft Obstacle = 75 KIAS
Flaps - 100% · Idle · Dry, Level Paved Surface

Headwind: Subtract 10% per each 13 knots headwind.
Tailwind: Add 10% for each 2 knots tailwind up to 10 knots.
Runway Slope: Ref. Factors.
Dry Grass: Add 40% to Ground Roll

PRESS ALT FT	DISTANCE FT	TEMPERATURE ~ °C 0	10	20	30	40	ISA
SL	Grnd Roll	962	997	1032	1067	1102	1014
	50 ft	1972	2017	2063	2109	2156	2040
1000	Grnd Roll	997	1034	1070	1067	1143	1045
	50 ft	2018	2065	2113	2161	2210	2079
2000	Grnd Roll	1034	1072	1110	1148	1186	1076
	50 ft	2066	2116	2166	2217	2268	2121
3000	Grnd Roll	1073	1112	1151	1191	1230	1108
	50 ft	2117	2169	2222	2275	2329	2164
4000	Grnd Roll	1113	1154	1195	1236		1142
	50 ft	2170	2225	2281	2337		2209
5000	Grnd Roll	1156	1198	1240	1283		1177
	50 ft	2227	2285	2343	2402		2256
6000	Grnd Roll	1200	1244	1288	1332		1214
	50 ft	2287	2348	2409	2471		2306
7000	Grnd Roll	1246	1292	1337			1251
	50 ft	2351	2415	2479			2358
8000	Grnd Roll	1295	1342	1389			1291
	50 ft	2418	2485	2553			2412
9000	Grnd Roll	1345	1394	1444			1331
	50 ft	2490	2560	2631			2470
10000	Grnd Roll	1398	1449				1373
	50 ft	2565	2639				2529

Figure 5-20

Section 6
Weight and Balance

Table of Contents

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Introduction

This section describes the procedure for establishing the basic empty weight and moment of the airplane. Sample forms are provided for reference. Procedures for calculating the weight and moment for various operations are also provided. A comprehensive list of all equipment available for this airplane is included at the back of this section.

It should be noted that specific information regarding the weight, arm, moment, and installed equipment for this airplane as delivered from the factory can only be found in the plastic envelope carried in the back of this handbook.

It is the responsibility of the pilot to ensure that the airplane is loaded properly.

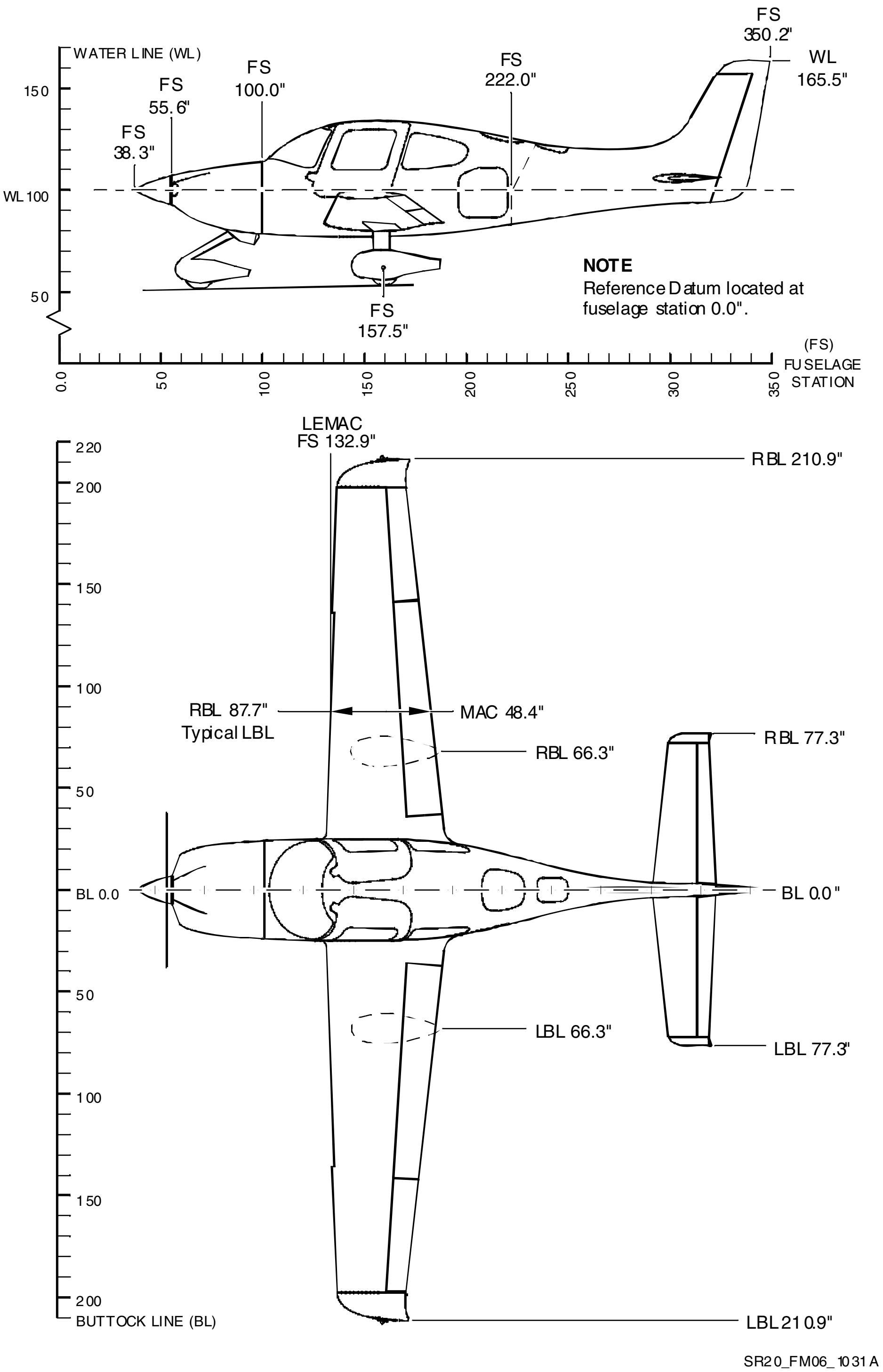


Figure 6-1
Airplane Dimensional Data

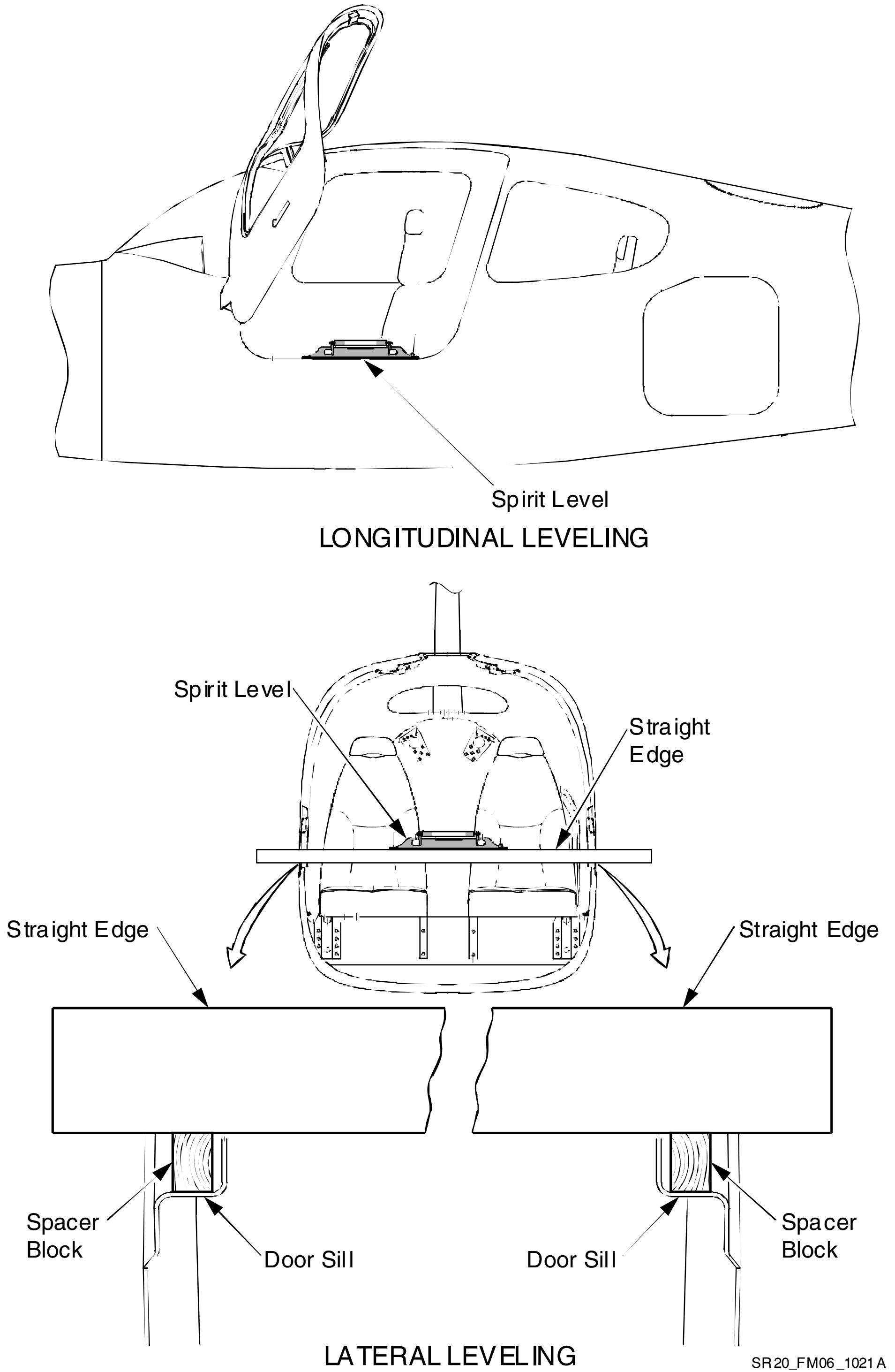
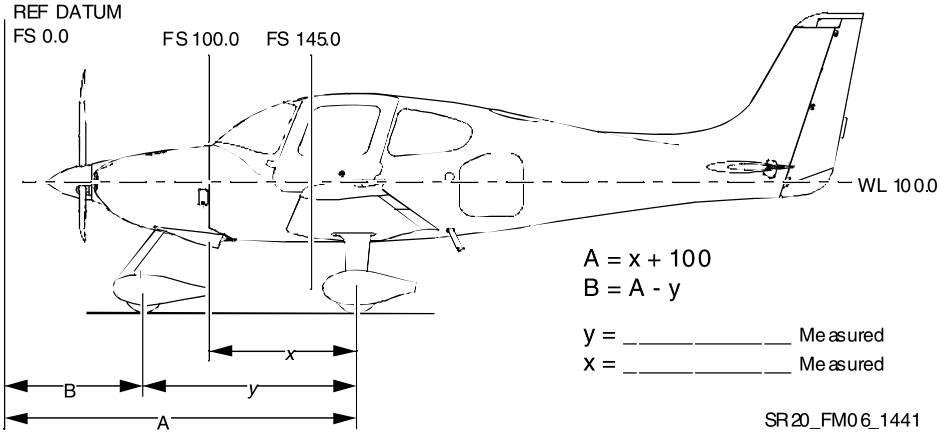


Figure 6-2
Airplane Leveling

Airplane Weighing Form



Weighing Point	Scale Reading	- Tare	= Net Weight	X Arm	= Moment
L Main				A=	
R Main				A=	
Nose				B=	
Total **As Weighed**				CG=	
CG = Total Moment ÷ Total Weight *Space below provided for additions or subtractions to as weighed condition*					
Empty Weight				CG=	
Engine Oil (if oil drained) *15 lb at FS 78.4, moment = 1176*					
Unusable Fuel			26.4	153.95	4064
Basic Empty Weight				CG=	

Figure 6-3
Airplane Weighing Form

Airplane Weighing Procedures

A basic empty weight and center of gravity were established for this airplane when the airplane was weighed just prior to initial delivery. However, major modifications, loss of records, addition or relocation of equipment, accomplishment of service bulletins, and weight gain over time may require re-weighing to keep the basic empty weight and center of gravity current. The frequency of weighing is determined by the operator. All changes to the basic empty weight and center of gravity are the responsibility of the operator. *Refer to Section 8 for specific servicing procedures.*

1. Preparation:
   a. Inflate tires to recommended operating pressures.
   b. Service brake reservoir.
   c. Drain fuel system.
   d. Service engine oil.
   e. Move crew seats to the most forward position.
   f. Raise flaps to the fully retracted position.
   g. Place all control surfaces in neutral position.
   h. Verify equipment installation and location by comparison to equipment list.
2. Leveling (Figure 6-2):
   a. Level longitudinally with a spirit level placed on the pilot door sill and laterally with of a spirit level placed across the door sills. (See Figure 6-2) Alternately, level airplane by sighting the forward and aft tool holes along waterline 95.9.
   b. Place scales under each wheel (minimum scale capacity, 500 pounds nose, 1000 pounds each main).
   c. Deflate the nose tire and/or shim underneath scales as required to properly center the bubble in the level.
3. Weighing (Figure 6-3):
   a. With the airplane level, doors closed, and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.

4. Measuring (Figure 6-3):
   a. Obtain measurement 'x' by measuring horizontally along the airplane center line (BL 0) from a line stretched between the main wheel centers to a plumb bob dropped from the forward side of the firewall (FS 100). Add 100 to this measurement to obtain left and right weighing point arm (dimension 'A'). Typically, dimension 'A' will be in the neighborhood of 157.5.
   b. Obtain measurement 'y' by measuring horizontally and parallel to the airplane centerline (BL 0), from center of nosewheel axle, left side, to a plumb bob dropped from the line stretched between the main wheel centers. Repeat on right side and average the measurements. Subtract this measurement from dimension 'A' to obtain the nosewheel weighing point arm (dimension 'B').
5. Determine and record the moment for each of the main and nose gear weighing points using the following formula:

   Moment = Net Weight x Arm

6. Calculate and record the as-weighed weight and moment by totaling the appropriate columns.
7. Determine and record the as-weighed C.G. in inches aft of datum using the following formula:

   C.G. = Total Moment ÷ Total Weight

8. Add or subtract any items not included in the as-weighed condition to determine the empty condition. Application of the above C.G. formula will determine the C.G for this condition.
9. Add the correction for engine oil (15 lb at FS 78.4), if the airplane was weighed with oil drained. Add the correction for unusable fuel (26.4 lb at FS 153.95) to determine the Basic Empty Weight and Moment. Calculate and record the Basic Empty Weight C.G. by applying the above C.G. formula.
10. Record the new weight and C.G. values on the Weight and Balance Record (Figure 6-4).

The above procedure determines the airplane Basic Empty Weight, moment, and center of gravity in inches aft of datum. C.G. can also be expressed in terms of its location as a percentage of the airplane Mean Aerodynamic Cord (MAC) using the following formula:

$$C.G.\ \%\ MAC = 100 \times (C.G.\ Inches - LEMAC) \div MAC$$

Where:

$$LEMAC = 132.9$$

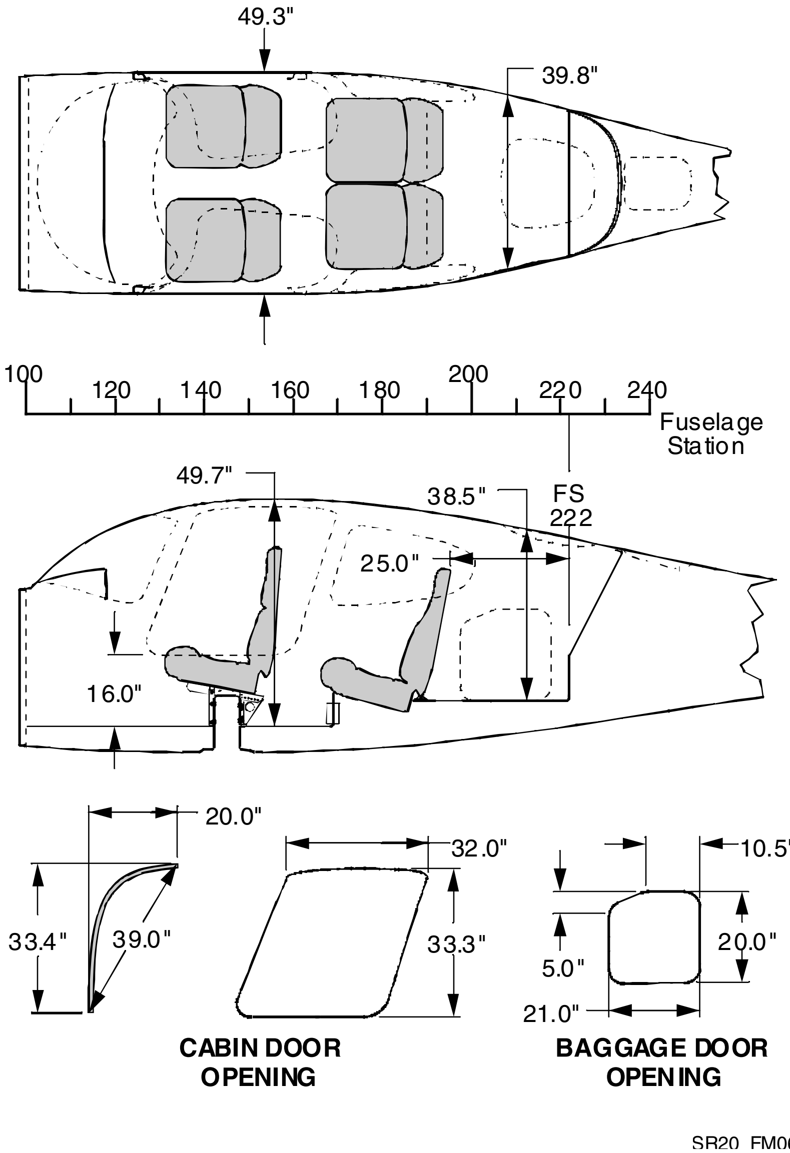
$$MAC = 48.4$$

Weight & Balance Record

Use this form to maintain a continuous history of changes and modifications to airplane structure or equipment affecting weight and balance:

Serial Num:				Reg. Num:				Page of
Date	Item No.		Description of Article or Modification	Weight Change Added (+) or Removed (-)			Running Basic Empty Weight	
	In	Out		WT LB	ARM IN.	MOM/ 1000	WT LB	MOM/ 1000
			As Delivered					

Figure 6-4
Weight and Balance Record



Location	Length	Width	Height	Volume
Cabin	122”	49.3”	49.7	137 cu ft
Baggage Compartment	36”	39.8”	38.5”	32 cu ft

Figure 6-5
Airplane Interior Dimensions

Loading Instructions

It is the responsibility of the pilot to ensure that the airplane is properly loaded and operated within the prescribed weight and center of gravity limits. The following information enables the pilot to calculate the total weight and moment for the loading. The calculated moment is then compared to the Moment Limits chart or table (Figure 6-9) for a determination of proper loading.

Airplane loading determinations are calculated using the Weight & Balance Loading Form (Figure 6-7), the Loading Data chart and table (Figure 6-8), and the Moment Limits chart and table (Figure 6-9).

1. **Basic Empty Weight** – Enter the current Basic Empty Weight and Moment from the Weight & Balance Record (Figure 6-4).
2. **Front Seat Occupants** – Enter the total weight and moment/1000 for the front seat occupants from the Loading Data (Figure 6-8).
3. **Rear Seat Occupants** – Enter the total weight and moment/1000 for the rear seat occupants from the Loading Data (Figure 6-8).
4. **Baggage** – Enter weight and moment for the baggage from the Loading Data (Figure 6-8).
   - If desired, subtotal the weights and moment/1000 from steps 1 through 4. This is the *Zero Fuel Condition*. It includes all useful load items excluding fuel.
5. **Fuel Loading** – Enter the weight and moment of usable fuel loaded on the airplane from the Loading Data (Figure 6-8).
   - Subtotal the weight and moment/1000. This is the *Ramp Condition* or the weight and moment of the aircraft before taxi.
6. **Fuel for start, taxi, and runup** – This value is pre-entered on the form. Normally, fuel used for start, taxi, and runup is approximately 6 pounds at an average moment/1000 of 0.92.
7. **Takeoff Condition** – Subtract the weight and moment/1000 for step 8 (start, taxi, and runup) from the Ramp Condition values (step 7) to determine the Takeoff Condition weight and moment/1000.
   - The total weight at takeoff must not exceed the maximum weight limit of 3000 pounds.

- The total moment/1000 must not be above the maximum or below the minimum moment/1000 for the *Takeoff Condition Weight* as determined from the Moment Limits chart or table (Figure 6-9).

Center of Gravity Limits

The charts below depict the airplane center-of-gravity envelope in terms of inches aft of the reference datum and as a percentage of the Mean Aerodynamic Cord (MAC). The relationship between the two is detailed in the weighing instructions.

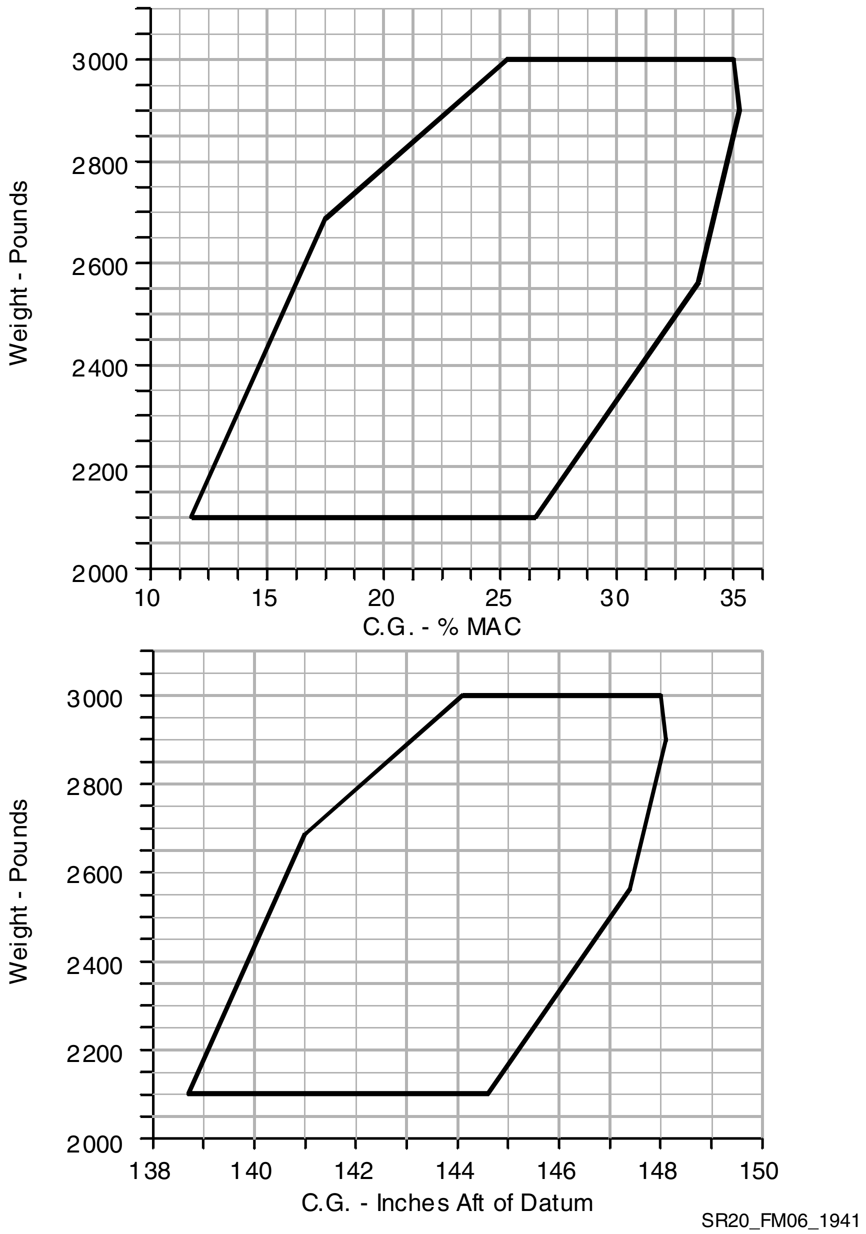


Figure 6-6
Center of Gravity Limits

Weight & Balance Loading Form

Serial Num: _______________ Date:______________________

Reg. Num: ________________ Initials: _____________________

Item	Description	Weight LB	Moment/ 1000
1.	**Basic Empty Weight** *Includes unusable fuel & full oil*		
2.	Front Seat Occupants *Pilot & Passenger (total)*		
3.	Rear Seat Occupants		
4.	Baggage Area *130 lb maximum*		
5.	**Zero Fuel Condition Weight** *Sub total item 1 thru 4*		
6.	Fuel Loading *56 Gallon @ 6.0 lb/gal. Maximum*		
7.	**Ramp Condition Weight** *Sub total item 5 and 6*		
8.	Fuel for start, taxi, and runup *Normally 6 lb at average moment of 922.8*	–	–
9.	**Takeoff Condition Weight** *Subtract item 8 from item 7*		

• Note •

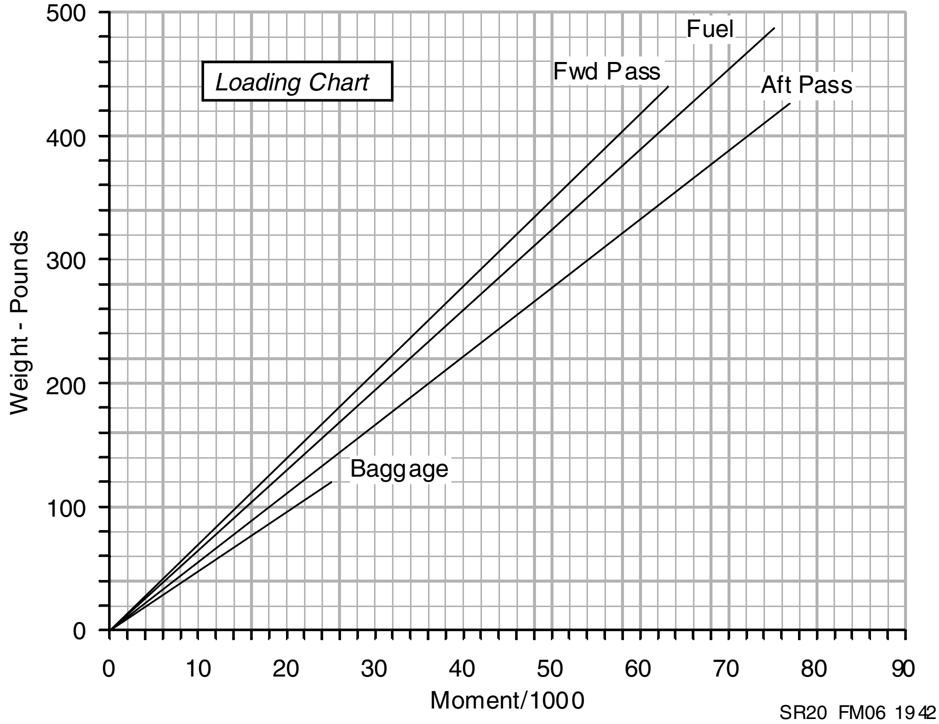
The Takeoff Condition Weight must not exceed 3000 lb. **All weights above 2900 lb must consist of fuel.**

The Takeoff Condition Moment must be within the Minimum Moment to Maximum Moment range at the Takeoff Condition Weight. (Refer to Figure 6-9, Moment Limits).

Figure 6-7
Weight and Balance Loading Form

Loading Data

Use the following chart or table to determine the moment/1000 for fuel and payload items to complete the Loading Form (Figure 6-7).



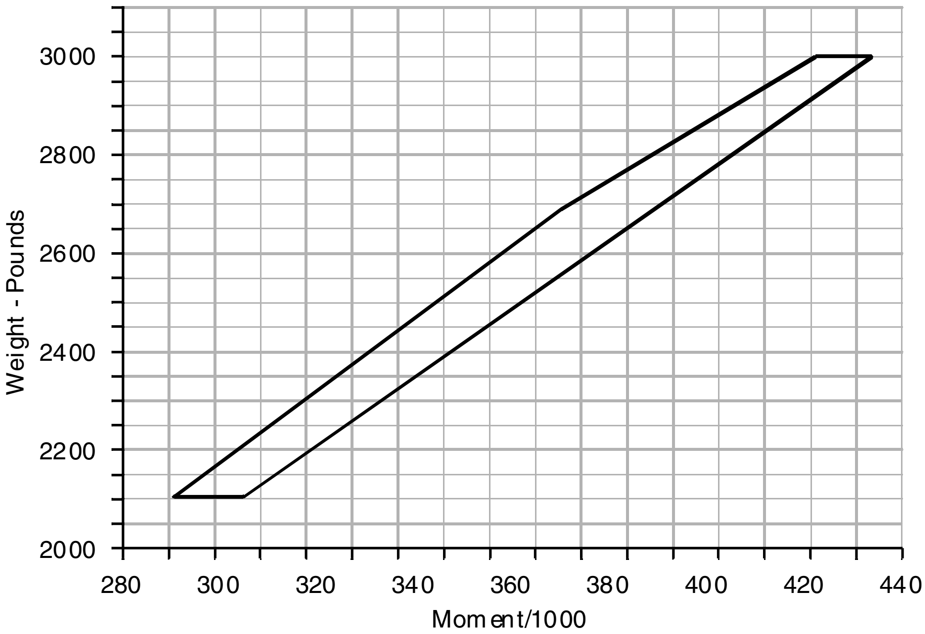
Weight LB	Fwd Pass FS 143.5	Aft Pass FS 180.0	Baggage FS 208.0	Fuel FS 153.8	Weight LB	Fwd Pass FS 143.5	Aft Pass FS 180.0	Fuel FS 153.8
20	2.87	3.60	4.16	3.08	220	31.57	39.60	33.83
40	5.74	7.20	8.32	6.15	240	34.44	43.20	36.90
60	8.61	10.80	12.48	9.23	260	37.31	46.80	39.98
80	11.48	14.40	16.64	12.30	280	40.18	50.40	43.05
100	14.35	18.00	20.80	15.38	300	43.05	54.00	46.13
120	17.22	21.60	24.96	18.45	320	45.92	57.60	49.20
140	20.09	25.20	(27.04)*	21.53	340	48.79	61.20	52.28
160	22.96	28.80		24.60	360	51.66	64.80	55.35
180	25.83	32.40		27.68	380	54.53	68.40	
200	28.70	36.00		30.75	400	57.40	72.00	

*130 lb Maximum

Figure 6-8
Loading Data

Moment Limits

Use the following chart or table to determine if the weight and moment from the completed Weight and Balance Loading Form (Figure 6-7) are within limits.



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Weight LB	Moment/1000 Minimum	Moment/1000 Maximum	Weight LB	Moment/1000 Minimum	Moment/1000 Maximum
2110	293	305	2600	366	383
2150	299	311	2650	374	391
2200	306	320	2700	381	399
2250	314	328	2750	390	406
2300	321	336	2800	398	414
2350	329	344	2850	407	422
2400	336	352	2900	415	429
2450	344	360	2950	424	437
2500	351	368	3000	432	444
2550	359	376			

Figure 6-9
Moment Limits

Equipment List

This list will be determined after the final equipment has been installed in the aircraft.