AIRPLANE INFORMATION MANUAL
for the
CIRRUS DESIGN SR20

Aircraft Serials 1148 thru 1267 and Aircraft Serials 1005 thru 1147 after 3000 Pound Gross Weight Modification

• NOTE •

At the time of issuance, this Information Manual was harmonized with the SR20 Pilot's Operating Handbook Rev A9 (P/N 11934-002), 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 13999-002
Information Manual

March 2010

Cirrus Design Corporation
4515 Taylor Circle
Duluth, MN 55811

Section 1
General

Table of Contents

Intentionally Left Blank

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*

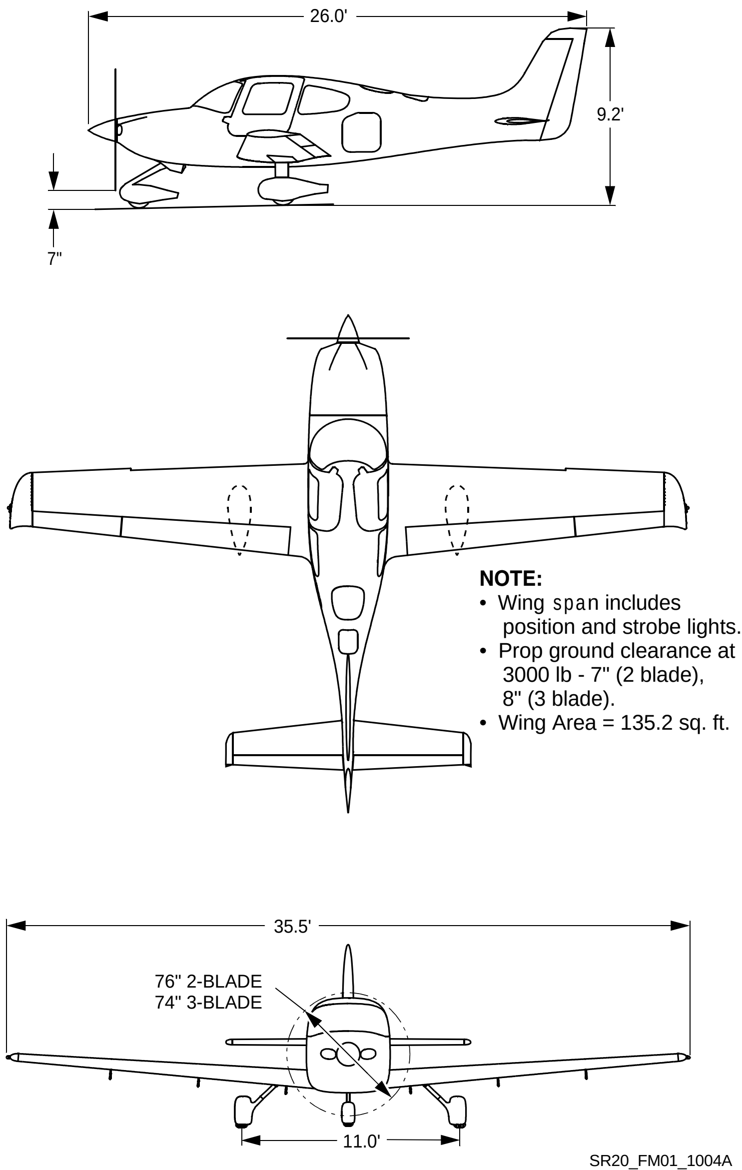
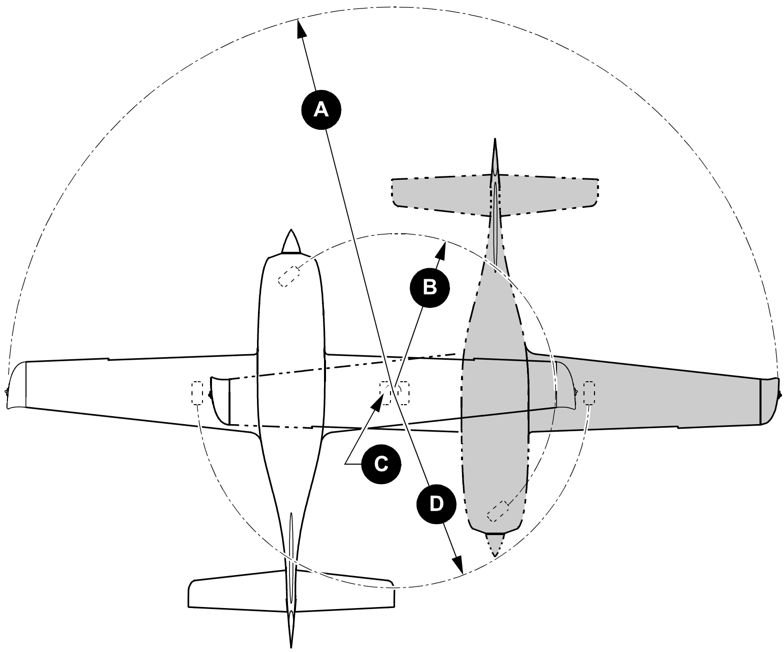


Figure 1-1
Airplane Three View



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 AS 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” (73.0” Minimum)

Three-Blade Propeller:

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

Diameter ....74.0” (72.0” Minimum)

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

Diameter ....74.0” (72.0” 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 at which the airplane will obtain the highest altitude in a given horizontal distance. The best angle-of-climb speed normally increases slightly with altitude.

V_Y **Best Rate of Climb Speed** is the speed at which the airplane will obtain the maximum increase in altitude per unit of time. The best rate-of-climb speed decreases slightly with altitude.

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

Intentionally Left Blank

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 2600 Lb 2300 Lb	 131 122 114	 131 123 115	**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

Above 40°F (4°C)..SAE 50 or 20W50

Below 40°F (4°C) .... SAE 30, 10W-30, 15W50, or 20W50

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” (73.0” Minimum)

Three-Blade Propeller:

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

Diameter..74.0” (72.0” Minimum)

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

Diameter..74.0” (72.0” 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	Green Arc	Yellow Arc	Red Line
	Minimum	Normal	Caution	Maximum
Power Plant Instrumentation				
Tachometer (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

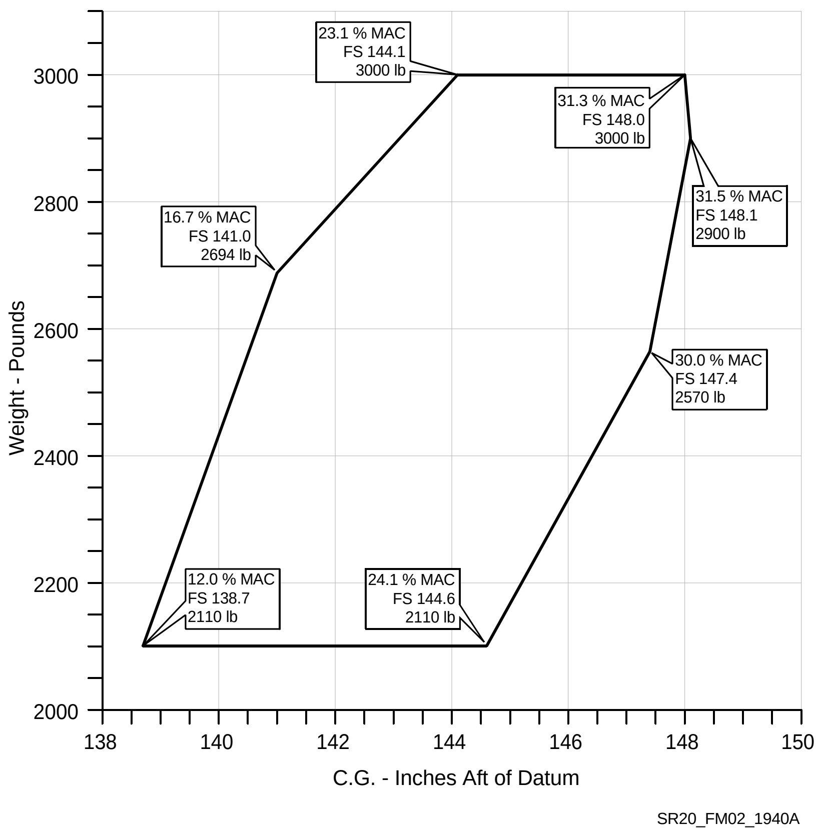
Figure 2-3
Instrument Markings

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.

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 Comm	—	—	1	1	
Electrical Power					
Battery	1	1	1	1	
Batter, Secondary			1	1	Turn Coord Backup.
Alternator	1	1	1	1	
Ammeter	1	1	1	1	
Low Volts Annunciator	1	1	1	1	
Circuit Breakers	A/R	A/R	A/R	A/R	As Required.
Equipment & Furnishings					

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
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					
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					

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
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					
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	—	—	—	—	
Pneumatic					
Suction Gage	—	—	1	1	
Engine Indicating					

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
Cylinder Head Temperature Gage	—	—	—	—	
Exhaust Gas Temperature Gage	—	—	—	—	
Fuel Flow Gage	1	1	1	1	
Manifold Pressure Gage	1	1	1	1	
Oil Pressure Gage	1	1	1	1	
Oil Quantity Indicator (Dipstick)	1	1	1	1	
Oil Temperature Gage	1	1	1	1	
Tachometer	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.*

Taxi Power

Maximum continuous engine speed for taxiing is 1000 RPM on flat, smooth, hard surfaces. Power settings slightly above 1000 RPM are permissible to start motion, for turf, soft surfaces, and on inclines. Use minimum power to maintain taxi speed.

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)

Altitude Limits

Maximum Takeoff Altitude ....10,000 Feet MSL

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.

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 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.

1. *Serials with ARNAV MFD installed*; The ARNAV ICDS 2000 Pilot's Operation Handbook,*Serials with ARNAV MFD installed*; The ARNAV ICDS 2000 Pilot's Operation Handbook, P/N 572-0550

dated May 1998 or later revision, must be available to the pilot during all flight operations

7. *Serials with Avidyne 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 1005 thru 1267 after SB 2X-25-14; Use of a child safety seat with the inflatable restraint system is prohibited.

Flap Limitations

Serials 1005 through 1204 before accomplishment of Service Bulletin SB 20-27-05: Simultaneous Flap operation and COM transmission is prohibited.

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 in accordance with the paint colors and schemes as specified in the Airplane Maintenance Manual*. Refer to 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_1220D

Figure 2-5
Placards (Sheet 1 of 9)

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

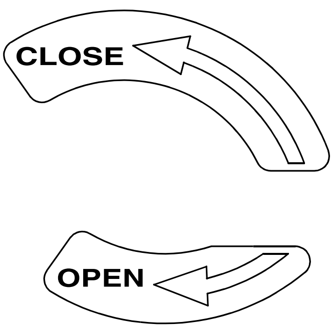
POWER

28 V DC

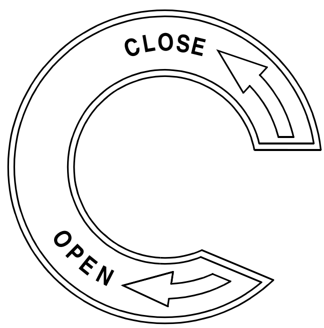
Rudder, and elevator, both sides:

NO PUSH

Doors, above and below latch:



Serials 1005 thru 1316.



Serials 1317 thru 1422.

PUSH

TO

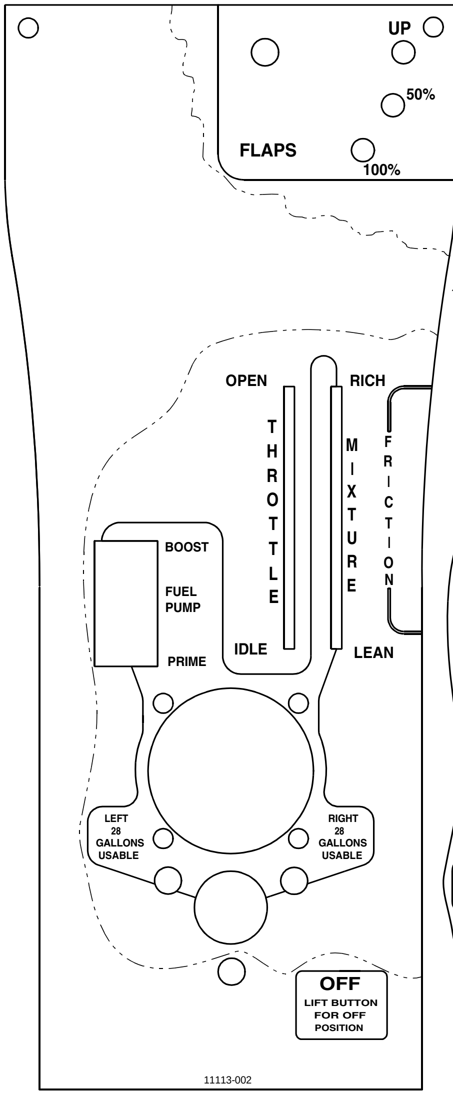
OPEN

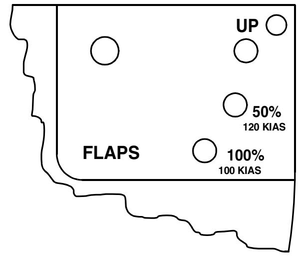
Serials 1423 & subs.

SR20_FM02_1221B

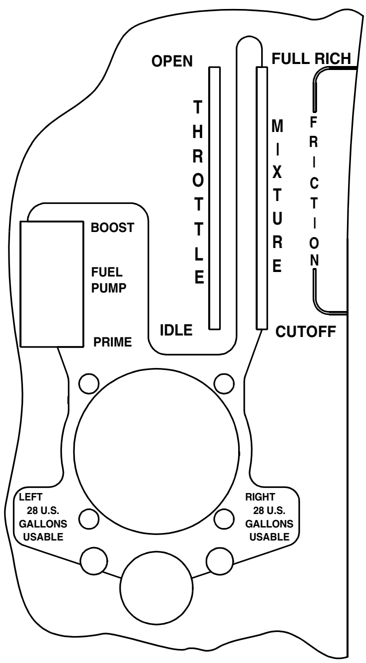
Figure 2-5
Placards (Sheet 2 of 9)

Engine control panel:





Airplane serials 1020 and subsequent and airplane serials 1005 thru 1019 incorporating SB 20-11-01.



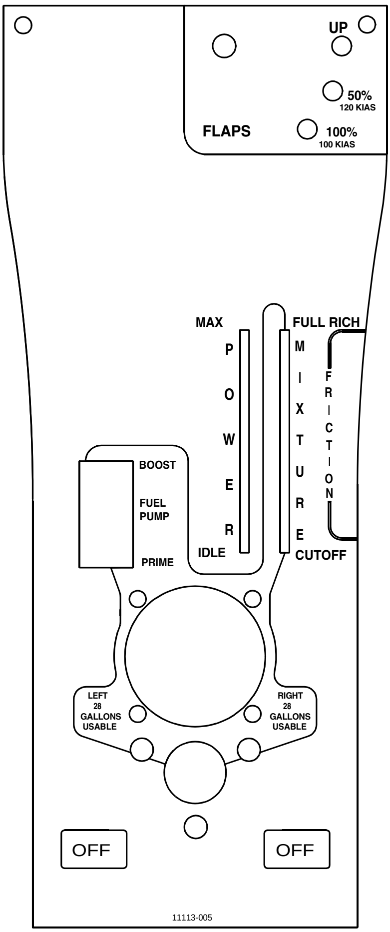
Airplane serials 1005 thru 1019 without SB 20-11-01.

Airplane serials 1100 thru 1183.

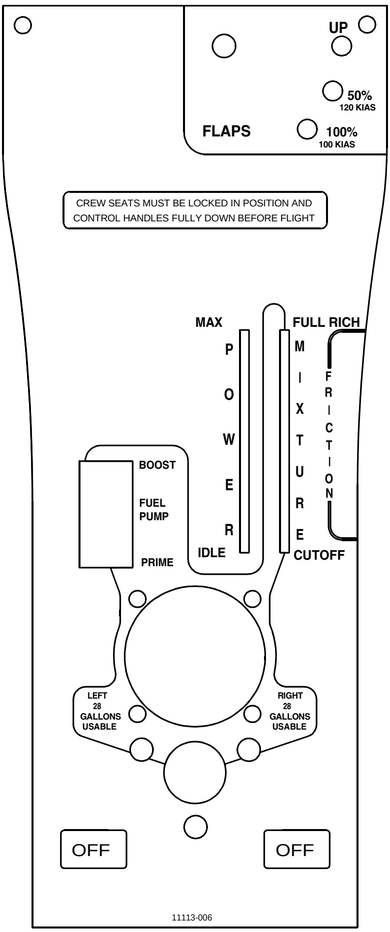
SR20_FM02_1222E

Figure 2-5
Placards (Sheet 3 of 9)

Engine control panel (cont):



Airplane serials 1184 thru 1267.



Airplane serials 1268 and subsequent and airplane serials 1005 thru 1267 incorporating SA 02-13.

SR20_FM02_1520B

Figure 2-5
Placards (Sheet 4 of 9)

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.

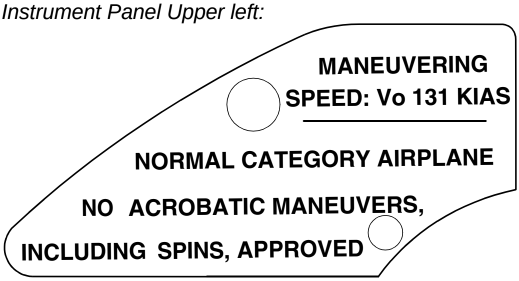
THIS AIRCRAFT IS CERTIFIED FOR THE FOLLOWING FLIGHT OPERATIONS:
DAY - NIGHT - VFR
(WITH REQUIRED EQUIPMENT)

FLIGHT INTO KNOWN ICING IS PROHIBITED

OPERATE PER AIRPLANE FLIGHT MANUAL

Serials 1337 & subs with SRV option.

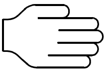
Instrument Panel Upper left:



SR20_FM02_1223E

Figure 2-5
Placards (Sheet 5 of 9)

Bolster Panel, both sides:



GRAB HERE

Serials 1351 & subs.

Instrument Panel:

NO SMOKING

FASTEN SEATBELTS

FIRE EXTINGUISHER
UNDER PILOT SEAT FRONT

Serials 1005 thru 1638.

FASTEN SEAT BELT • NO SMOKING
FIRE EXTINGUISHER FORWARD LEFT OF PILOT SEAT

Serials 1639 & 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.

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_1517E

Figure 2-5
Placards (Sheet 6 of 9)

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

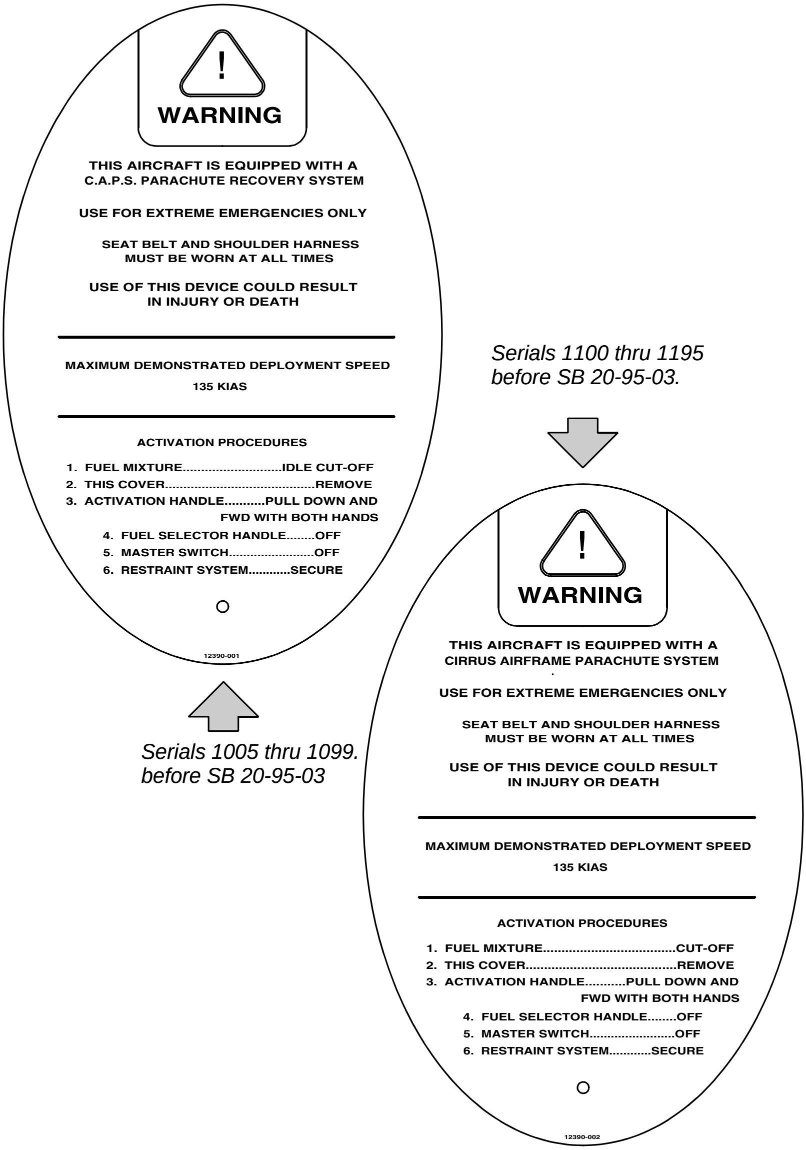
SEE AIRPLANE FLIGHT MANUAL FOR BAGGAGE TIE-DOWN AND WEIGHT AND BALANCE INFORMATION

12378-001 REV A

SR20_FM02_1224

Figure 2-5
Placards (Sheet 7 of 9)

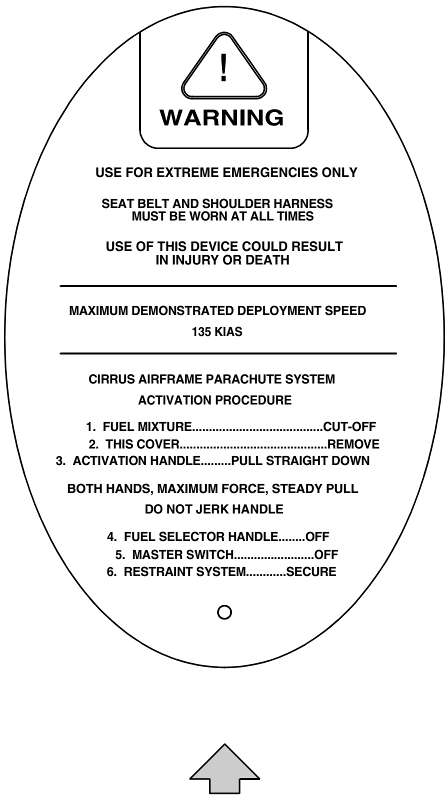
CAPS Deployment Handle Cover, above pilot's right shoulder:



SR20_FM02_1225D

Figure 2-5
Placards (Sheet 8 of 9)

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



Serials 1196 & subs,
Serials 1005 thru 1195 after SB 20-95-03.

SR20_FM02_1522B

Figure 2-5
Placards (Sheet 9 of 9)

Intentionally Left Blank

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.

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.

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. Refer to Section 10, Safety Information, for CAPS deployment information and landing considerations.

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

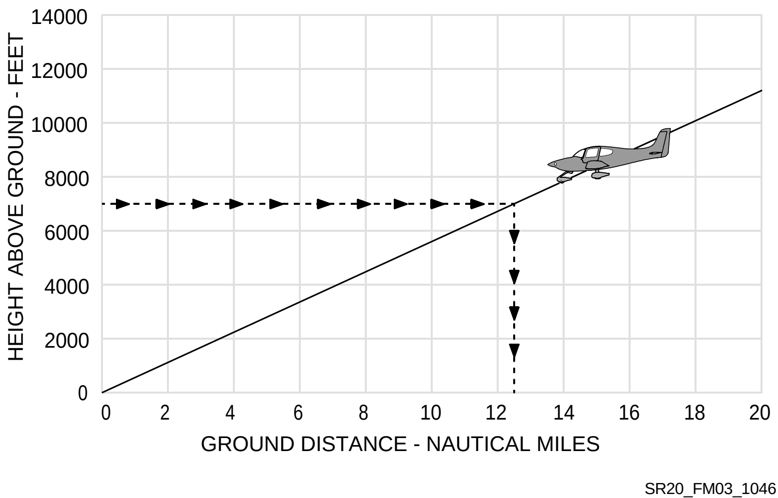


Figure 3-1
Maximum Glide

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. If altitude or terrain does not permit a safe landing, CAPS deployment may be required. *Refer to Section 10, Safety Information*, for CAPS deployment scenarios and landing considerations.

• 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 Switch .... 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 and consider CAPS deployment if a suitable landing site is not available. *Refer to Section 10, Safety Information*, for CAPS deployment scenarios and landing considerations.

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 .... PARTIALLY OPEN

   Airspeed may need to be reduced to partially open door in flight.

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 or doors 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:

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).

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

5. Cabin Doors...PARTIALLY OPEN

   Airspeed may need to be reduced to partially open door in flight.

6. When fire extinguished, Air Vents .... OPEN, FULL COLD
7. Avionics Power Switch .... OFF
8. All other switches .... OFF
9. 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:

• 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.

10. Bat-Alt Master Switches .... ON
11. Avionics Power Switch .... ON
12. 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

In all cases, if the aircraft enters an unusual attitude from which recovery is not assured, immediately deploy CAPS. *Refer to Section 10, Safety Information*, for CAPS deployment information.

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

If all attempts to restart the engine fail and a forced landing is imminent, select a suitable field and prepare for the landing. If flight conditions or terrain does not permit a safe landing, CAPS deployment may be required. *Refer to Section 10, Safety Information*, for CAPS deployment scenarios and landing considerations.

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.

Emergency Landing Without Engine Power

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

Ditching

1. Radio... Transmit (121.5 MHz) MAYDAY giving location and intentions
2. Transponder .... SQUAWK 7700
3. CAPS .... ACTIVATE

   If available, life preservers should be donned and life raft should be prepared for immediate evacuation upon touchdown.

   Consider unlatching a door prior to assuming the emergency landing body position in order to provide a ready escape path.
4. Airplane.. EVACUATE

   It may be necessary to allow some cabin flooding to equalize pressure on the doors. If the doors cannot be opened, break out the windows with the egress hammer and crawl through the opening.
5. Flotation Devices.............INFLATE WHEN CLEAR OF AIRPLANE

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

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.

Vacuum System Failure

Failure of the engine driven vacuum pump is indicated by illumination of the red VACUUM warning light. If the engine driven vacuum pump fails, the electric standby vacuum pump will automatically energize and the amber AUX VAC caution light will illuminate indicating that the electric pump is operating and supplying vacuum for instrument operation.

In the event both vacuum pumps fail in flight, the attitude gyro, directional gyro (if installed) or optional vacuum operated HSI (if installed) will be inoperative. The optional electric powered HSI (if installed) is unaffected by a vacuum system failure. The remaining gyroscopic instrument will be the electric turn coordinator. The autopilot uses the turn coordinator gyro for roll attitude information.

1. Consider using the autopilot roll axis to reduce workload. Engage stabilizer (ST) mode if available. If optional electric HSI is installed, use HDG mode to help maintain wings level - set HDG bug to the current airplane heading before engaging autopilot.

• WARNING •

Do not use HDG mode if airplane is equipped with a vacuum powered directional gyro or vacuum powered HSI.

2. Rely upon “partial panel” techniques while in instrument conditions. Cover inoperative instruments if possible.
3. Endeavor to fly to visual conditions as soon as possible.

Intentionally Left Blank

Section 3A
Abnormal Procedures

Table of Contents

Intentionally Left Blank

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.

After a high-speed aborted takeoff, brake temperatures will be elevated; subsequent aborted takeoffs or other high-energy use of the brakes may cause brake overheat, failure and possibly even fire. A 25-minute cooling time is recommended following high-energy use of the brake system before attempting to conduct operations that may require further high-energy braking. Brake temperature indicator should be inspected prior to flight following a high-energy brake event (refer to Preflight Walk-Around Checklist for detail).

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.

System Malfunctions

Alternator Failure

Abnormal ammeter indications and illumination of the LOW VOLTS warning light may indicate electrical power supply system malfunctions. A broken alternator drive belt, wiring fault or a defective alternator control unit is most likely the cause of the alternator failure. Usually, electrical power malfunctions are indicated by an excessive rate of charge or a discharge rate.

Ammeter Indicates Excessive Rate of Charge

After starting engine and heavy electrical usage at low RPM, the battery will be low enough to accept above normal charging during the initial part of a flight. However, the ammeter should be indicating less than two needle widths of charging current after thirty minutes of cruising flight. If the charging rate remains above this rate, the battery could overheat and evaporate the electrolyte.

Additionally, electronic components in the electrical system can be damaged by an overvoltage. Normally, the alternator control unit over-voltage sensor automatically causes the Alternator circuit breaker to open and shuts down the alternator if the voltage reaches approximately 31.8 volts. If the over-voltage sensor fails, perform the following checklist:

1. Alt Master Switch .... OFF
2. Alternator Circuit Breaker.. PULL
3. Non-essential Electrical Equipment .... OFF
4. Land as soon as practical.

Ammeter Indicates Discharge

If the over-voltage sensor shuts down the alternator, or if the alternator output is low, a discharge rate will be shown on the ammeter and the LOW VOLTS warning light will illuminate. This may be a nuisance trip and an attempt should be made to reactivate the alternator system by following the checklist below through step 4. If the problem no longer exists, normal alternator charging will resume, the LOW VOLTS light will go out, and avionics power may be turned back on. However, If the light comes on again, a malfunction is confirmed and the procedure should be completed. Battery power must be conserved for later operation of the wing flaps, lights, and other essential equipment.

• Note •

Ammeter discharge indications and illumination of the LOW VOLTS warning light can occur during low RPM conditions with a heavy electrical load, such as during taxi. Under these conditions, the master switch need not be cycled as an over-voltage condition has not occurred and the alternator was not de-activated. The LOW VOLTS light should go out at higher RPM.

1. Avionics Switch ....OFF
2. Alternator Circuit Breaker ....CHECK IN
3. Alt Master Switch .... CYCLE Off -On
4. Avionics Switch ....ON

If ammeter still indicates discharge:

1. Alt Master Switch ....OFF
2. Non-essential Electrical Equipment ....OFF
3. If total power failure anticipated, Turn Coordinator Power.....EMER
4. 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
6. Land as soon as practical.

Section 4
Normal Procedures

Table of Contents

Intentionally Left Blank

Introduction

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

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.

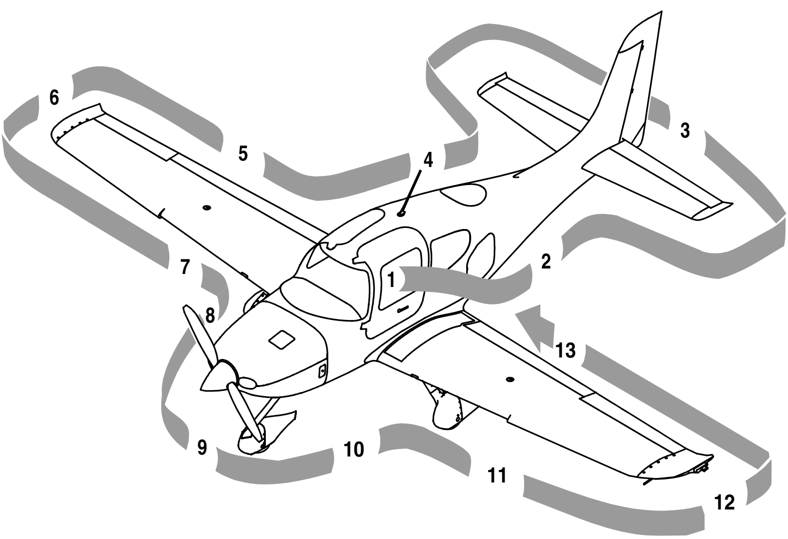


Figure 4-1
Walk-Around

Preflight Walk-Around

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

   • Note •

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

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

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

3. Empennage
    a. Tiedown Rope .... Remove
    b. Horizontal and Vertical Stabilizers .... Condition

• Note •

Verify tape covering the forward and aft inspection holes located on outboard ends of horizontal stabilizer is installed and securely attached.

    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
    c. Door Lock .... Unlock
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

(Continued on following page)

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

d. Wheel Fairings...................... Security, Accumulation of Debris

e. Tire ....Condition, Inflation, and Wear

• Note •

Serials 1005 through 1592 after Service Bulletin SB 2X-32-14 and airplane serials 1593 and subsequent: Clean and inspect temperature indicator installed to piston housing. If indicator center is black, the brake assembly has been overheated. The brake linings must be inspected and O-rings replaced.

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

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

• Note •

Serials 1005 through 1592 after Service Bulletin SB 2X-32-14 and airplane serials 1593 and subsequent: Clean and inspect temperature indicator installed to piston housing. If indicator center is black, the brake assembly has been overheated. The brake linings must be inspected and O-rings replaced.

    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

• WARNING •

Ensure that the airplane is properly loaded and within the AFM's weight and balance limitations prior to takeoff.

2. Weight and Balance ....Verify within limits
3. Emergency Equipment..ON BOARD
4. 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.

5. 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

(Continued on following page)

3. Bat Master Switch .... ON (Check Volts)
4. Strobe Lights .... ON
5. Vacuum System .... CHECK
    a. VACUUM Annunciator .... ON
    b. AUX Vac Annunciator ....ON (Pump Green)
    c. Suction Gage.. GREEN ARC
    d. Attitude Gyro Flag.. OUT OF VIEW
6. Mixture .... FULL RICH
7. Power Lever ....FULL FORWARD
8. Fuel Pump...PRIME, then BOOST

• Note •

Serials 1005 - 1228 before SB 20-73-02: On first start of the day, especially under cool ambient conditions, holding Fuel Pump switch to PRIME for 2-4 seconds will improve starting.

Serials 1005 - 1228 after SB 20-73-02 and serials 1229 and subsequent: On first start of the day, especially under cool ambient conditions, holding Fuel Pump switch to PRIME for 2 seconds will improve starting.

The Fuel Pump should be left ON during takeoff and climb for vapor suppression such as could occur under hot ambient conditions or extended idle.

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. Vacuum System Annunciators .... OUT

15. Alt Master Switches ....ON
16. Avionics Power Switch ....ON
17. Engine Parameters .... MONITOR
18. External Power (If applicable) .... DISCONNECT
19. 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, directional control is accomplished with rudder deflection and intermittent braking (toe taps) as necessary. Use only as much power as is necessary to achieve forward movement. Deceleration or taxi speed control using brakes but without a reduction in power will result in increased brake temperature. Taxi over loose gravel at low engine speed to avoid damage to the propeller tips.

• WARNING •

Maximum continuous engine speed for taxiing is 1000 RPM on flat, smooth, hard surfaces. Power settings slightly above 1000 RPM are permissible to start motion, for turf, soft surfaces, and on inclines. Use minimum power to maintain taxi speed.

If the 1000 RPM taxi power limit and proper braking procedures are not observed, the brake system may overheat and result in brake damage or brake fire.

1. Parking Brake ....DISENGAGE
2. Brakes... CHECK
3. Directional Gyro/HSI Orientation .... CHECK
4. Attitude Gyro .... CHECK
5. 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.

• WARNING •

Do not takeoff with frost, ice, snow, or other contamination on the fuselage, wing, stabilizers, and control surfaces.

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
    e. Note ammeter remains within one needle width.
15. Voltage .... CHECK

16. Pitot Heat .... AS REQUIRED

• Note •

Pitot Heat should be turned ON for flight into IMC, flight into visible moisture, or whenever ambient temperatures are 41° F (5° 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. Vacuum .... CHECK
23. Flight Instruments, HSI, and Altimeter .... CHECK & SET
24. Flight Controls .... FREE & CORRECT
25. Trim ....SET Takeoff
26. 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: Normal and short field takeoffs are accomplished with flaps set at 50%. Takeoffs using 0% are permissible, however, no performance data is available for takeoffs in the flaps up configuration. Takeoffs with 100% flaps 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 are normally performed with the flaps set at 50% to minimize the drift angle immediately after takeoff. With the ailerons fully deflected into the wind, accelerate the airplane to a speed slightly higher than normal while decreasing the aileron deflection as speed increases 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. Brakes.................................... RELEASE (Steer with Rudder Only)
2. Power Lever .... FULL FORWARD
3. Engine Parameters .... CHECK
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 Parameters .... 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 Instruments .... 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.

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.

(Continued on following page)

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.

(Continued on following page)

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 Switch .... ON (check voltage)
6. Vacuum System .... CHECK
   a. VACUUM Annunciator .... ON
   b. AUX Vac Annunciator .... ON (Pump Green)
   c. Suction Gage .... GREEN ARC
   d. Attitude Gyro Flag .... OUT OF VIEW
7. Mixture .... FULL RICH
8. Power lever .... FULL FORWARD
9. Fuel Pump .... PRIME, then BOOST

• Note •

Serials 1005 - 1227 before SB 20-73-02: In temperatures down to 20°F, hold Fuel Pump switch to PRIME for 8-10 seconds prior to starting.

Serials 1005 - 1227 after SB 20-73-02 and serials 1228 and subsequent: In temperatures down to 20°F, hold Fuel Pump switch to PRIME for 10 seconds prior to starting.

10. Propeller Area .... CLEAR

(Continued on following page)

11. Power Lever .... OPEN ¼ INCH
12. 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

13. Power Lever ....RETARD (to maintain 1000 RPM)
14. Oil Pressure .... CHECK
15. Alt Master Switches ....ON
16. Vacuum System Annunciators .... OUT
17. Avionics Power Switch ....ON
18. Engine Parameters .... MONITOR
19. External Power (If applicable) .... DISCONNECT
20. Amp Meter/Indication .... CHECK
21. 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.

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.

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. Additionally, verify that the weather, field length, wind, anticipated turbulence, and other conditions that affect aircraft performance are judged to be satisfactory and conducive to safe operations and compliant with the Federal Aviation Regulations (FARs) or governing regulations, as applicable.

• 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 5-14, present maximum rate of climb and climb gradient for various conditions. The time, fuel, and distance to climb table, Figure 5-15, 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. (15.0 x 0.13) .... 1.9 NM
- Corrected distance to climb (15.0 + 1.9) .... 16.9 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 5-16, and the range/endurance profile presented in Figure 5-17.

The relationship between power and range as well as endurance is shown in the range/endurance profile chart, Figure 5-17. Note that fuel economy and range are substantially improved at lower power settings.

The cruise performance chart, Figure 5-16, 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 5-15 and 5-16. 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 5-16, 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 5-16), 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 5-20 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.

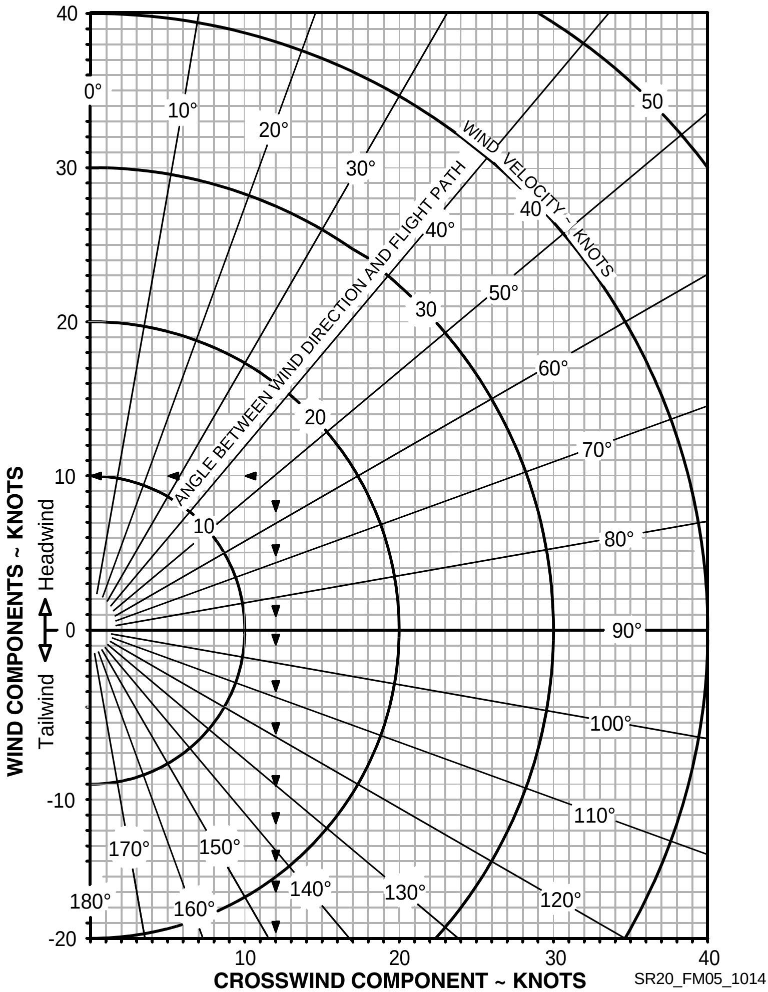


Figure 5-8

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 distance for each 12 knots headwind
- Tailwind - Add 10% for each 2 knots tailwind up to 10 knots.
- Grass Runway, Dry - Add 20% to ground roll distance.
- Grass Runway, Wet - Add 30% 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 20% to Ground Roll. **Wet Grass:** Add 30% 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	2515	1983
	50 ft	2660	2861	3069	3285	3509	2802
5000	**Grnd Roll**	2066	2231	2404	2583	2769	2149
	50 ft	2919	3139	3368	3605	3850	3029
6000	**Grnd Roll**	2276	2458	2648	2845	3050	2329
	50 ft	3205	3447	3698	3959	4228	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 20% to Ground Roll.
Wet Grass: Add 30% 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	1590	1253
	50 ft	1743	1874	2010	2151	2297	1835
5000	Grnd Roll	1305	1410	1519	1632	1750	1358
	50 ft	1912	2056	2205	2360	2520	1985
6000	Grnd Roll	1438	1553	1673	1798	1928	1473
	50 ft	2098	2256	2421	2590	2766	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	274	358
	8000	82	336	287	241	199	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	444	545
	8000	82	504	447	390	333	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	244	332
	8000	92	313	216	214	171	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	445	566
	8000	92	527	458	389	321	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

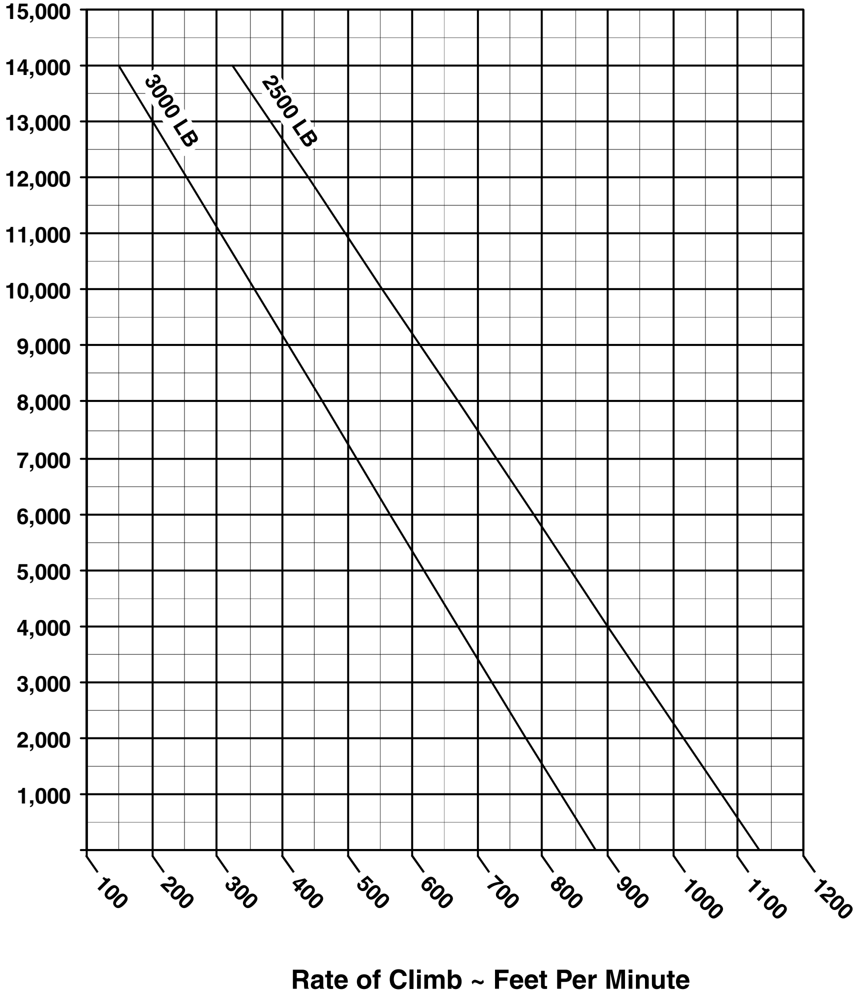


Figure 5-14

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 10º 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 KTAS if nose wheel pant and fairing removed. Lower KTAS by 10% if nose & main wheel pants & fairings removed.

Cruise Pwr above 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 75%
Takeoff Press Alt .... 2000 FT
Cruise Press Alt.................... 6000 FT

Fuel to Climb .... 1.3 Gal.
Cruise Fuel Flow ....11.6 GPH
Endurance ....4.0 Hr
Range.................................... 617 NM
True Airspeed ....152 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 5% if nose wheel pant and fairings removed.
- Range is decreased by 15% if nose and main wheel pants and 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 reduce power passing the estimated 50 foot point and smoothly continue power reduction to reach idle just prior to touchdown.

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:

- 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.
- Grass Runway, Dry - Add 20% to ground roll distance.
- Grass Runway, Wet - Add 60% to ground roll distance.
- 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.

- 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 20% to Ground Roll
Wet Grass: Add 60% 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
	Total	1972	2017	2063	2109	2156	2040
1000	Grnd Roll	997	1034	1070	1067	1143	1045
	Total	2018	2065	2113	2161	2210	2079
2000	Grnd Roll	1034	1072	1110	1148	1186	1076
	Total	2066	2116	2166	2217	2268	2121
3000	Grnd Roll	1073	1112	1151	1191	1230	1108
	Total	2117	2169	2222	2275	2329	2164
4000	Grnd Roll	1113	1154	1195	1236		1142
	Total	2170	2225	2281	2337		2209
5000	Grnd Roll	1156	1198	1240	1283		1177
	Total	2227	2285	2343	2402		2256
6000	Grnd Roll	1200	1244	1288	1332		1214
	Total	2287	2348	2409	2471		2306
7000	Grnd Roll	1246	1292	1337			1251
	Total	2351	2415	2479			2358
8000	Grnd Roll	1295	1342	1389			1291
	Total	2418	2485	2553			2412
9000	Grnd Roll	1345	1394	1444			1331
	Total	2490	2560	2631			2470
10000	Grnd Roll	1398	1449				1373
	Total	2565	2639				2529

Figure 5-20

Section 6
Weight and Balance

Table of Contents

Intentionally Left Blank

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.

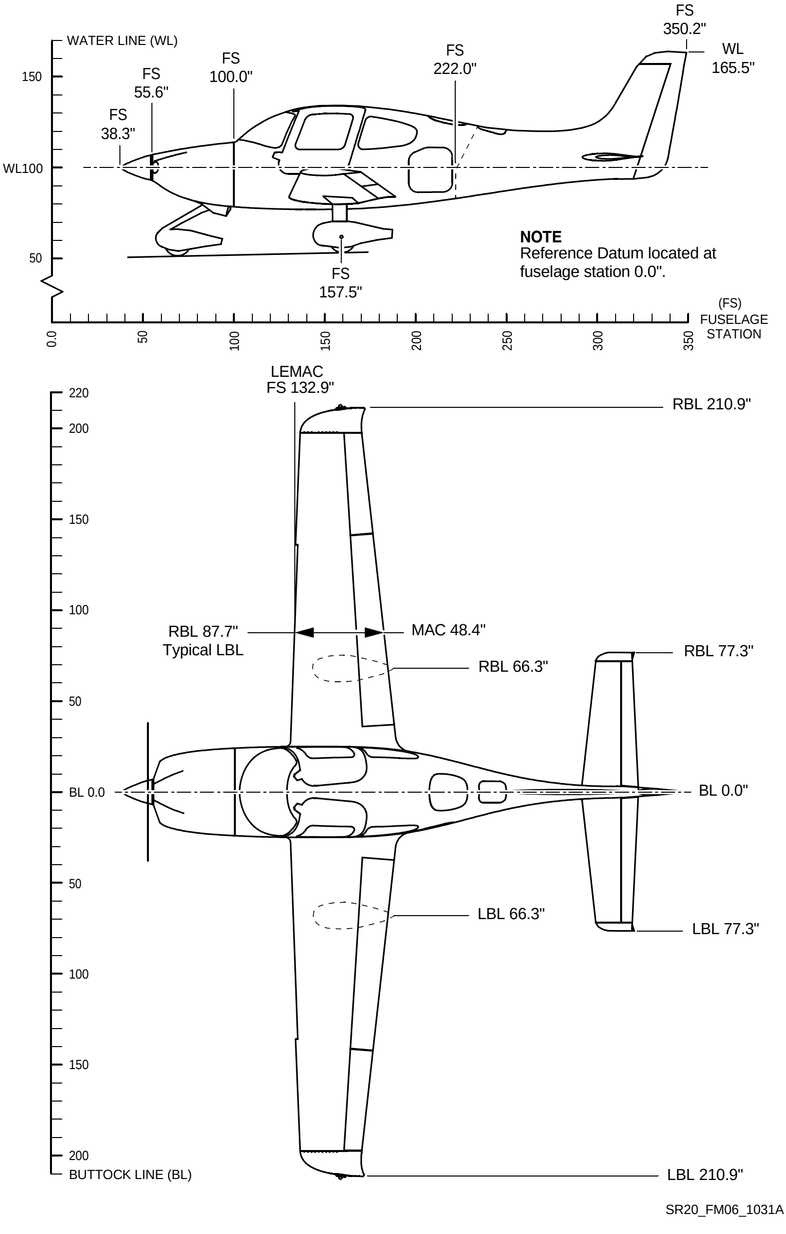


Figure 6-1
Airplane Dimensional Data

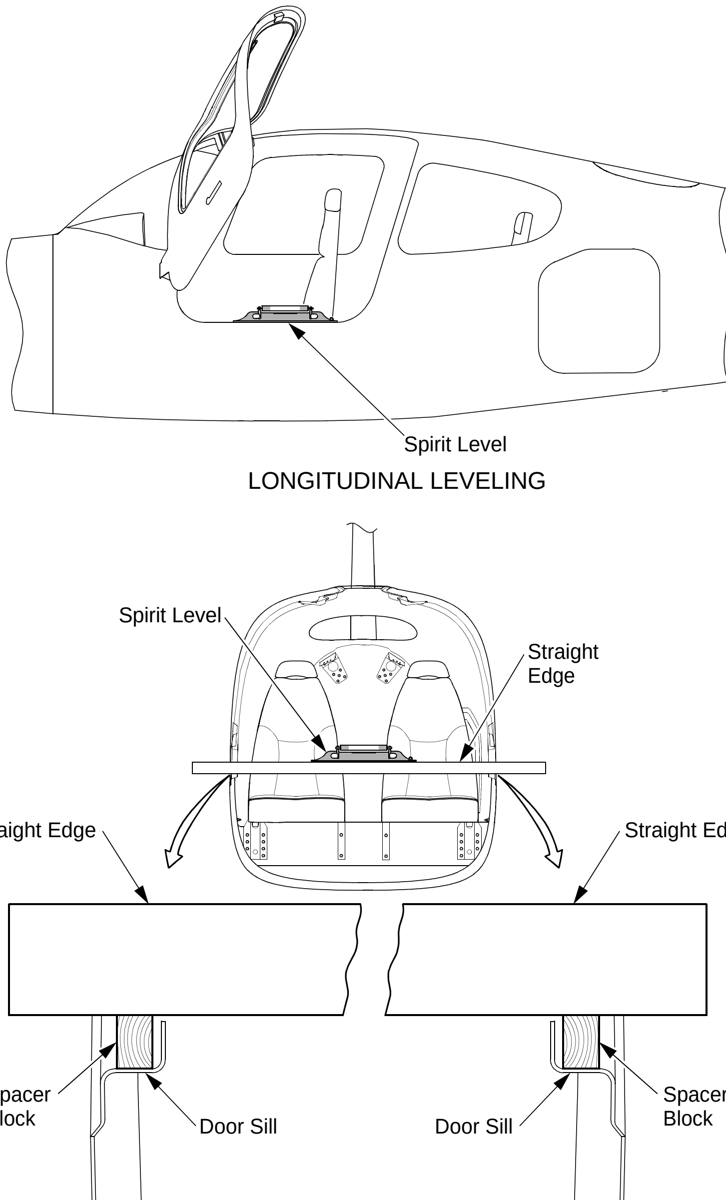
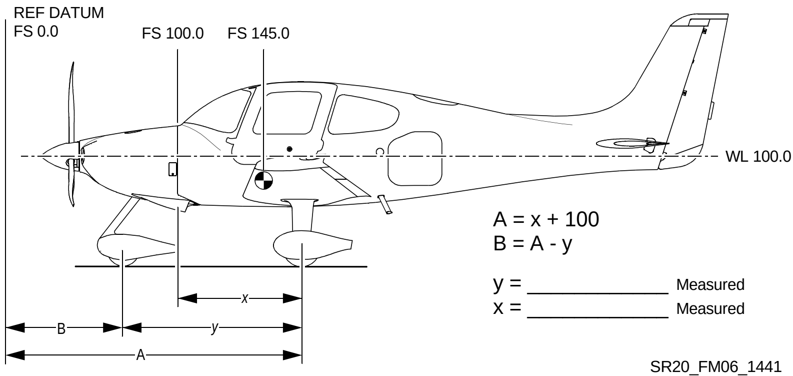


Figure 6-2
Airplane Leveling

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:

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

Where:

$$LEMAC = 132.9$$

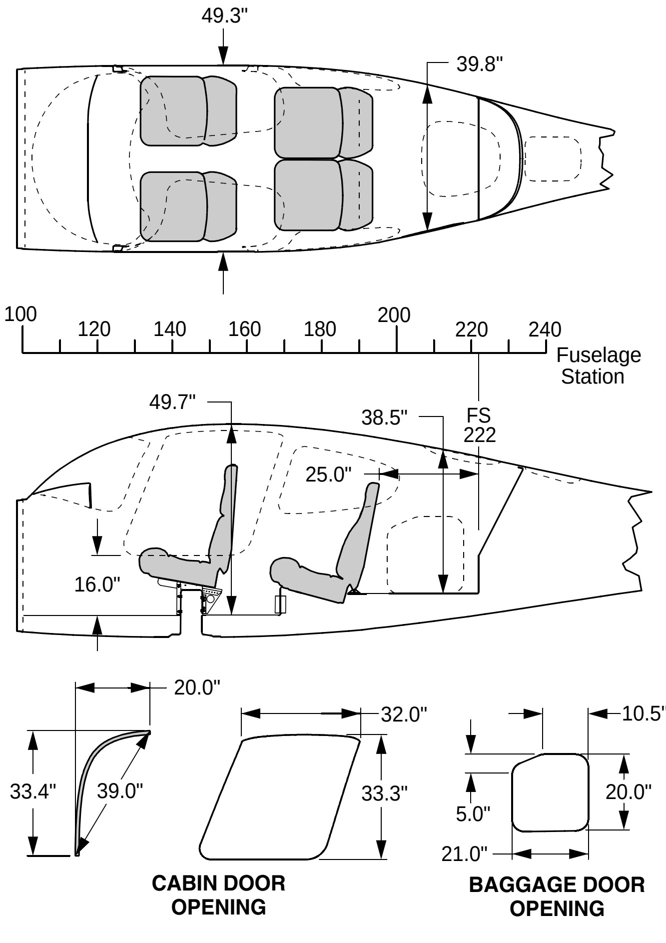
$$MAC = 48.4$$

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.

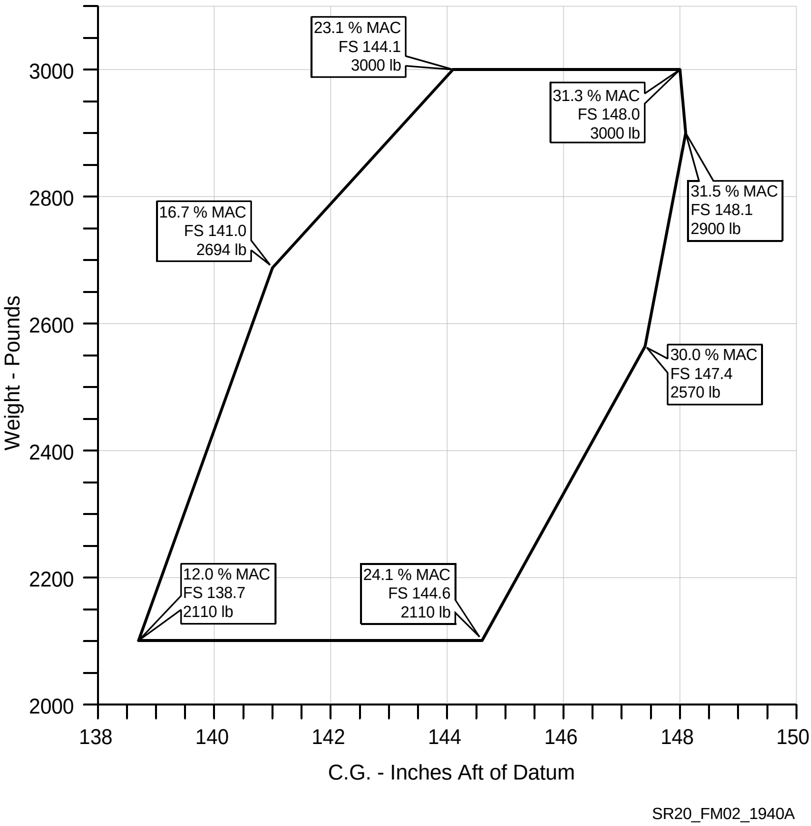
Airplane loading determinations are calculated using the Weight & Balance Loading Form (Figure 6-7), the Loading Data chart and table (Figure 6-8), and the Moment Limits chart and table (Figure 6-9).

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 L oading** – 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 Co ndition** – 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.



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 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 •

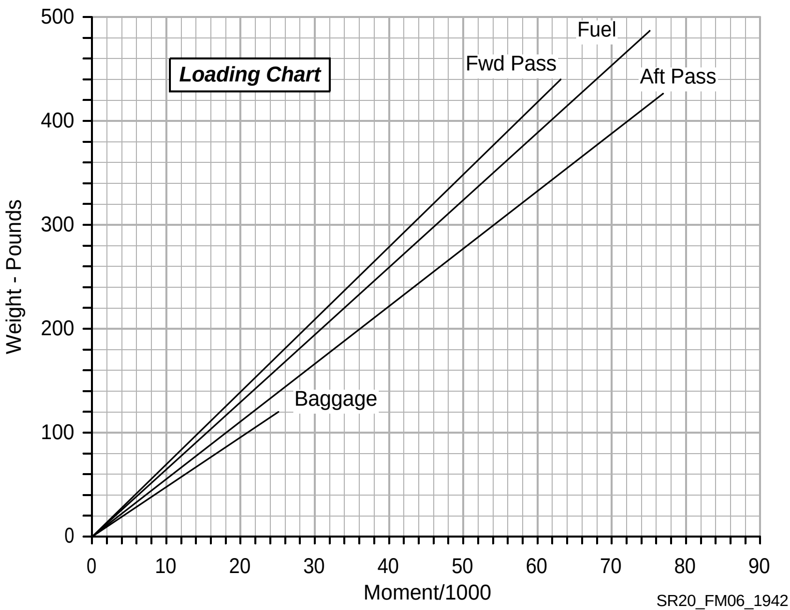
The Takeoff Condition Weight must not exceed 3000 lb. **All weights above 2900 lb must consist of fuel.**

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).



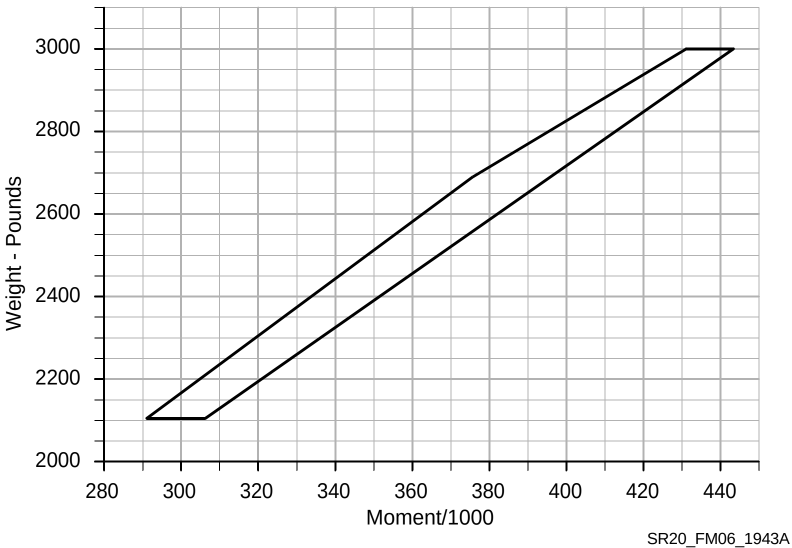
Weight LB	Fwd Pass FS 143.5	Aft Pass FS 180.0	Baggage FS 208.0	Fuel FS 153.8	Weight LB	Fwd Pass FS 143.5	Aft Pass FS 180.0	Fuel FS 153.8
20	2.87	3.60	4.16	3.08	220	31.57	39.60	33.83
40	5.74	7.20	8.32	6.15	240	34.44	43.20	36.90
60	8.61	10.80	12.48	9.23	260	37.31	46.80	39.98
80	11.48	14.40	16.64	12.30	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.



Weight	Moment/1000		Weight	Moment/1000	
LB	Minimum	Maximum	LB	Minimum	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.

Section 7
Airplane and Systems Description

Table of Contents

Intentionally Left Blank

Introduction

This section provides a basic description and operation of the standard airplane and its systems. Optional equipment described within this section is identified as optional.

• Note •

Some optional equipment, primarily avionics, may not be described in this section. For description and operation of optional equipment not described in this section, *refer to Section 9, Supplements*

Airframe

Fuselage

The SR20 monocoque fuselage is constructed primarily of composite materials and is designed to be aerodynamically efficient. The cabin area is bounded on the forward side by the firewall at fuselage station 100, and on the rear by the aft baggage compartment bulkhead at fuselage station 222. Comfortable seating is provided for four adults. A composite roll cage within the fuselage structure provides roll protection for the cabin occupants. The cabin and baggage compartment floors are constructed of a foam core composite with access to under-floor components.

All flight and static loads are transferred to the fuselage structure from the wings and control surfaces through four wing attach points in two locations under the front seats and two locations on the sidewall just aft of the rear seats.

• Note •

Refer to Airplane Cabin description in this section for a complete description of doors, windows, baggage compartment, seats, and safety equipment.

Wings

The wing structure is constructed of composite materials producing wing surfaces that are smooth and seamless. The wing cross section is a blend of several high performance airfoils. A high aspect ratio results in low drag. Each wing provides attach structure for the main landing gear and contains a 30.25-gallon fuel tank.

The wing is constructed in a conventional spar, rib, and shear section arrangement. The upper and lower skins are bonded to the spar, ribs, and shear sections (rear spars) forming a torsion box that carries all of the wing bending and torsion loads. The wing spar is manufactured in one piece and is continuous from wing tip to wing tip. The shear webs (rear spars) are similar in construction but do not carry through the fuselage. The main wing spar passes under the fuselage below the two front seats and is attached to the fuselage in two locations. The rear shear webs are attached to the fuselage sidewalls just aft of the rear seats.

Empennage

The empennage consists of a horizontal stabilizer, a two-piece elevator, a vertical fin and a rudder. All of the empennage components are conventional spar (shear web), rib, and skin construction.

The horizontal stabilizer is a single composite structure from tip to tip. The two-piece elevator, attached to the horizontal stabilizer, is aluminum.

The vertical stabilizer is composite structure integral to the main fuselage shell for smooth transfer of flight loads. The rudder is aluminum and is attached to the vertical stabilizer rear shear web at three hinge points.

Flight Controls

The SR20 uses conventional flight controls for ailerons, elevator and rudder. The control surfaces are pilot controlled through either of two single-handed side control yokes mounted beneath the instrument panel. The location and design of the control yokes allow easy, natural use by the pilot. The control system uses a combination of push rods, cables and bell cranks for control of the surfaces.

Roll trim and pitch trim are available through an electric button on the top of each control yoke.

Elevator System

The two-piece elevator provides airplane pitch control. The elevator is of conventional design with skin, spar and ribs manufactured of aluminum. Each elevator half is attached to the horizontal stabilizer at two hinge points and to the fuselage tailcone at the elevator control sector.

Elevator motion is generated through the pilot’s control yokes by sliding the yoke tubes forward or aft in a bearing carriage. A push-pull linkage is connected to a cable sector mounted on a torque tube. A single cable system runs from the forward elevator sector under the cabin floor to the aft elevator sector pulley. A push-pull tube connected to the aft elevator sector pulley transmits motion to the elevator bellcrank attached to the elevators.

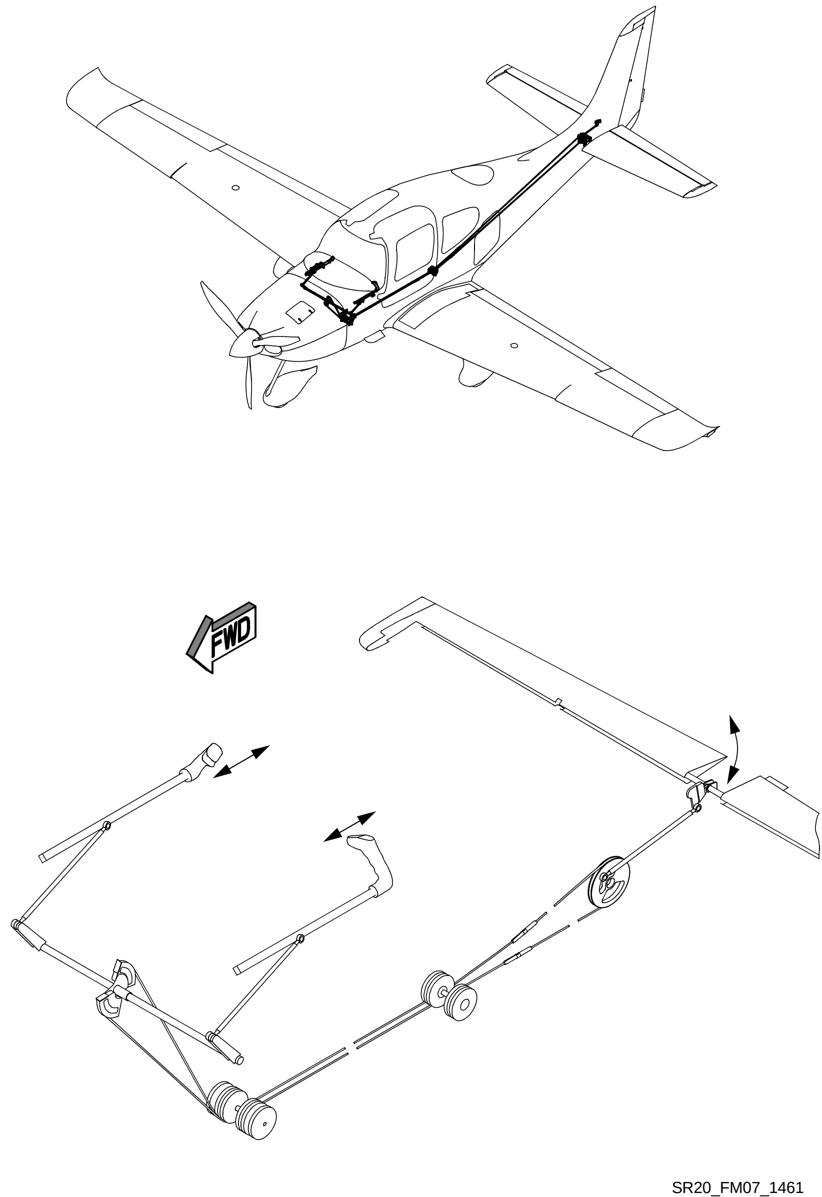
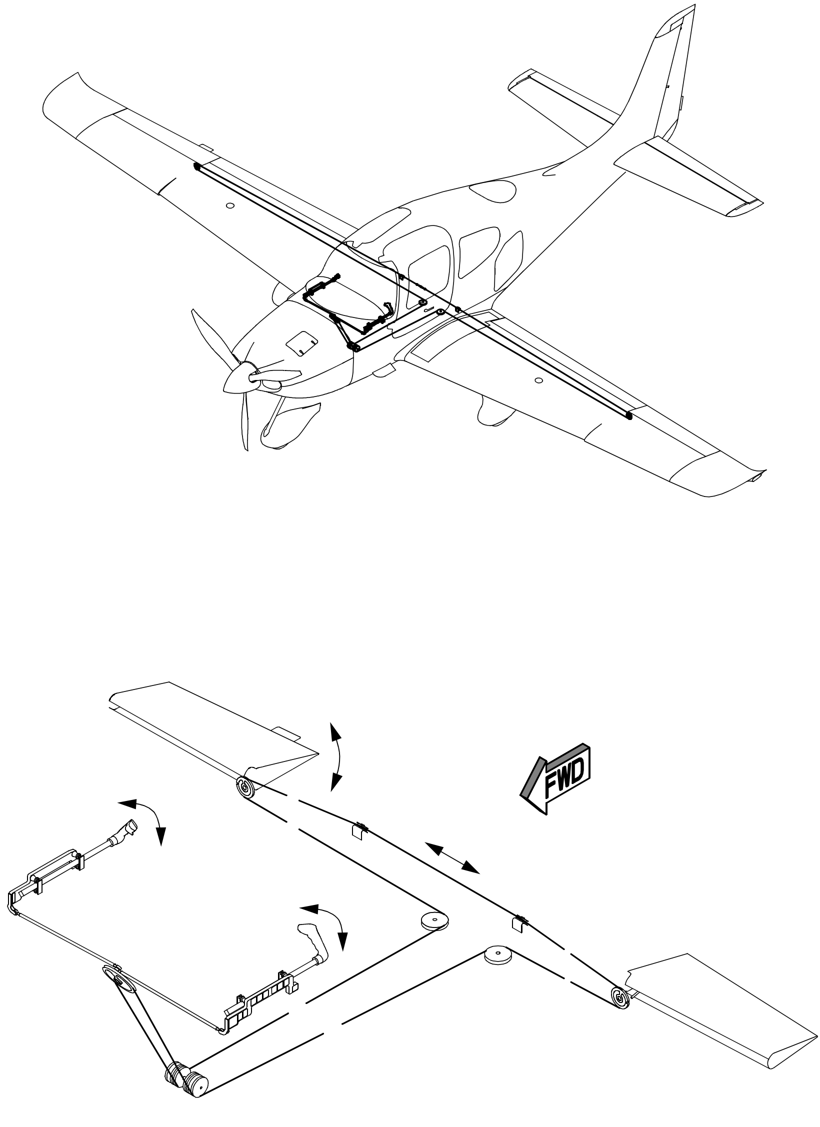


Figure 7-1
Elevator Control System

Aileron System

The ailerons provide airplane roll control. The ailerons are of conventional design with skin, spar and ribs manufactured of aluminum. Each aileron is attached to the wing shear web at two hinge points.

Aileron control motion is generated through the pilot’s control yokes by rotating the yokes in pivoting bearing carriages. Push rods link the pivoting carriages to a centrally located pulley sector. A single cable system runs from the sector to beneath the cabin floor and aft of the rear spar. From there, the cables are routed in each wing to a vertical sector/crank arm that rotates the aileron through a right angle conical drive arm.



SR20_FM07_1462

Figure 7-2
Aileron Control System

Rudder System

The rudder provides airplane directional (yaw) control. The rudder is of conventional design with skin, spar and ribs manufactured of aluminum. The rudder is attached to the aft vertical stabilizer shear web at three hinge points and to the fuselage tailcone at the rudder control bell crank.

Rudder motion is transferred from the rudder pedals to the rudder by a single cable system under the cabin floor to a sector next to the elevator sector pulley in the aft fuselage. A push-pull tube from the sector to the rudder bell crank translates cable motion to the rudder. Springs and a ground adjustable spring cartridge connected to the rudder pedal assembly tension the cables and provide centering force.

A rudder-aileron interconnect is installed to provide a maximum of 8° down aileron with full rudder deflection. Right rudder input will cause right roll input and left rudder input will cause left roll input. With neutral aileron trim, aileron inputs will not cause rudder deflection.

Control Locks

The Cirrus SR20 control system is not equipped with gust locks. The trim spring cartridges have sufficient power to act as a gust damper without rigidly locking the position.

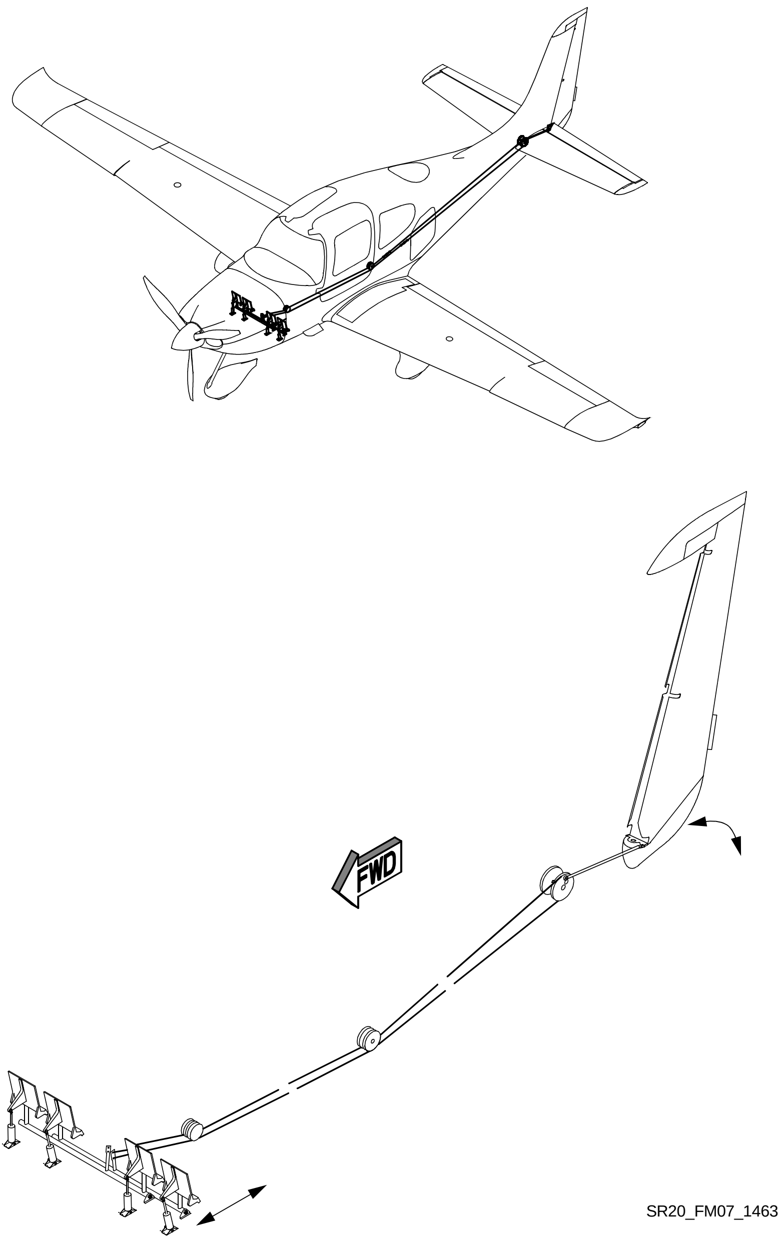


Figure 7-3
Rudder Control System

Trim Systems

Roll and pitch trim are provided by adjusting the neutral position of a compression spring cartridge in each control system by means of an electric motor. The electric roll trim is also used by the autopilot to position the ailerons. It is possible to easily override full trim or autopilot inputs by using normal control inputs.

Ground adjustable trim tabs are installed on the rudder, elevator and right aileron to provide small adjustments in neutral trim. These tabs are factory set and do not normally require adjustment.

Pitch Trim Control System

An electric motor changes the neutral position of the spring cartridge attached to the elevator control horn. A conical trim button located on top of each control yoke controls the motor. Moving the switch forward will initiate nose-down trim and moving the switch aft will initiate nose-up trim. Pressing down on the switch will disconnect the autopilot if the autopilot was engaged. Neutral (takeoff) trim is indicated by the alignment of a reference mark on the yoke tube with a tab attached to the instrument panel bolster. The elevator trim also provides a secondary means of aircraft pitch control in the event of a failure in the primary pitch control system not involving a jammed elevator. Elevator (pitch) trim operates on 28 VDC supplied through the 2-amp PITCH circuit breaker on Main Bus 1.

Roll Trim Control System

An electric motor changes the neutral position of a spring cartridge attached to the left actuation pulley in the wing. A conical trim button located on top of each control yoke controls the motor. Moving the switch left will initiate left-wing-down trim and moving the switch right will initiate right-wing-down trim. Pressing down on the switch will disconnect the autopilot if the autopilot was engaged. Neutral trim is indicated by the alignment of the line etched on the control yoke with the centering indication marked on the instrument panel. The aileron trim also provides a secondary means of aircraft roll control in the event of a failure in the primary roll control system not involving jammed ailerons. Aileron trim operates on 28 VDC supplied through the 2-amp ROLL TRIM circuit breaker on Main Bus 1.

Yaw Trim System

Yaw trim is provided by spring cartridge attached to the rudder pedal torque tube and console structure. The spring cartridge provides a centering force regardless of the direction of rudder deflection. The yaw trim is ground adjustable only.

Flight Deck Arrangement

The following paragraphs are a general description of the flight deck, instruments, and controls. Details relating to the instruments, switches, circuit breakers, and controls on the instrument panel, bolster, and center console are located with the description of the affected system.

Instrument Panel

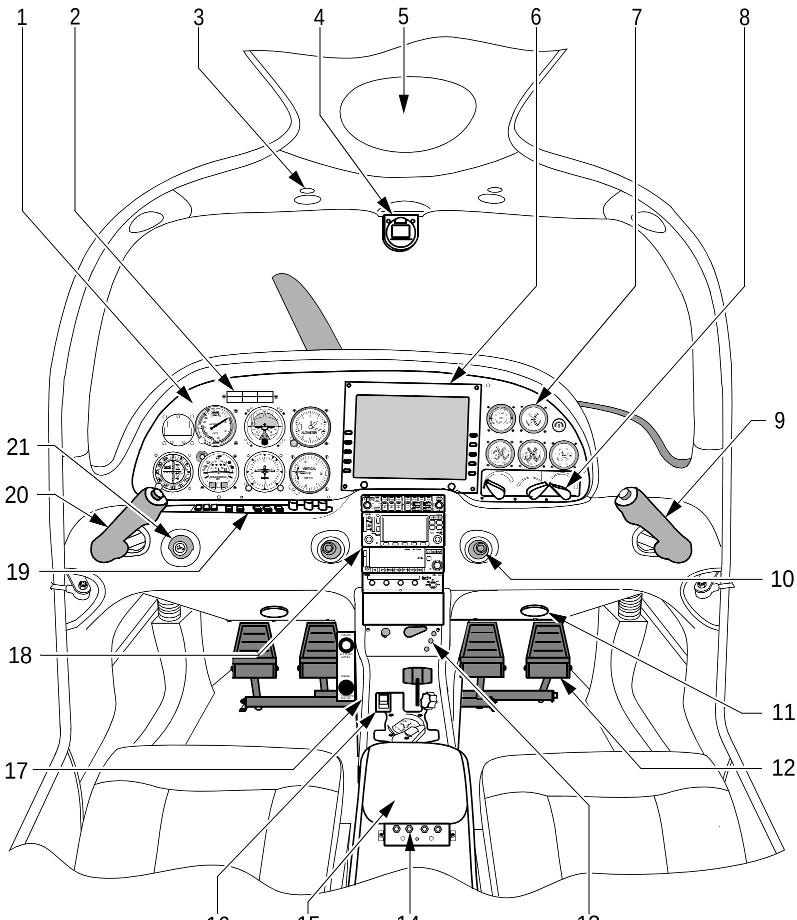
The instrument panel is designed for glare-free use in all flight conditions. The instrument panel is arranged primarily for use by the pilot in the left seat; however, it can be viewed from either seat. Flight instruments and annunciators are located on the left side of the panel and engine instruments are located on the right side of the instrument panel. A large color multifunction display is located between the flight instruments and the engine instruments. Temperature controls are located on the right side below the engine instruments. The SR20 uses standard flight instruments arranged in the 'basic-six' pattern. They include:

Airspeed Indicator	Attitude Gyro	Altimeter
Turn/Bank Coordinator	Directional Gyro	Vertical Speed Indicator

A switch panel located in the "dash board" bolster below the flight instruments contains the master and ignition switches, avionics power switch, Pitot heat switch, and lighting switches. A parking brake knob is mounted below the flight instruments inboard of the pilot at knee level.

Center Console

A center console contains the avionics, flap control and position lights, power lever and mixture controls, fuel system indicator and controls, and audio controls. System circuit breakers, the alternate static source valve, alternate induction air control, and ELT panel switch are located on the left side of the console for easy access by the pilot. A friction knob for adjusting throttle and mixture control feel and position stability is located on the right side of the console. An accessory outlet, map compartment, audio jacks, hour meter, emergency egress hammer, and headset jacks are installed inside the console armrest.



Legend

1. Flight Instrument Panel
2. Annunciator Panel
3. Overhead Light & Switch
4. Magnetic Compass
5. Cirrus Airframe Parachute System (CAPS) Activation T-Handle Cover
6. Multifunction Display
7. Engine Instruments
8. Temperature/Ventilation Controls
9. Control Yoke
10. Fresh Air “Eyeball” Outlet
11. Conditioned Air Outlet
12. Rudder Pedals
13. Flap Control & Position Indicators
14. Passenger Audio Jacks
15. Armrest
16. Engine & Fuel System Controls
17. Left Side Console
    - Circuit Breaker Panel
    - Alternate Engine Air
    - Parking Brake
    - Alternate Static Source
18. Avionics Panel
19. Bolster Switch Panel
20. Control Yoke
21. Start/Ignition Key Switch

SR20_FM07_1059E

Figure 7-4
Instrument Panel and Console

Flight Instruments

• Note •

For additional information on instrument limit markings, *refer to Section 2, Limitations.*

Attitude Indicator

The attitude gyro gives a visual indication of flight attitude. Bank attitude is indicated by a pointer at the top of the indicator relative to the bank scale with index marks at 10°, 20°, 30°, 60°, and 90° either side of the center mark. A fixed miniature airplane superimposed over a movable mask containing a white symbolic horizon bar, which divides the mask into two sections, indicates pitch and roll attitudes. The upper "blue sky" section and the lower "earth" section have pitch reference lines useful for pitch attitude control. This indicator is operable and can follow maneuvers through 360° in roll and 360° in pitch. A knob at the bottom of the instrument is provided for adjustment of the miniature airplane to the horizon bar for a more accurate flight attitude indication. The instrument is vacuum driven and incorporates a red GYRO flag to indicate insufficient vacuum for operation. Upon start, the flag pulls when vacuum passes approximately 4 inches Hg differential. If the vacuum differential approaches 1 inch Hg, the flag drops into view.

Airspeed Indicator

Indicated and true airspeeds are indicated on a dual-scale, internally lit precision airspeed indicator installed in the pilot's instrument panel. The instrument senses difference in static and Pitot pressures and displays the result in knots on a airspeed scale. A single pointer sweeps an indicated airspeed scale calibrated from 40 to 220 knots. The 'zero' index is at the 12 o'clock position. A sub-scale aligns true airspeed with the corresponding indicated airspeed when the altitude/ temperature correction is set in the correction window. A knob in the lower left corner of the instrument is used to rotate the pressure altitude scale in the correction window to align the current pressure altitude with the outside air temperature. Refer to Section 2 (Limitations) for instrument limit markings.

Vertical Speed Indicator

Airplane rate of climb or descent in feet per minute is displayed on the internally lit Vertical Speed indicator installed in the pilot's instrument panel. The instrument senses rate of change in static pressure from a reference pressure and displays the result in climb or descent feet per minute (FPM). Climb is indicated by clockwise rotation of the pointer from zero and descent is indicated by counter clockwise rotation. The '0' (zero) reference point is at the 9 o'clock position. The scale is calibrated from 0 to 2000 FPM in 100-FPM increments in both the 'UP' and 'DOWN' directions.

Altimeter

Airplane altitude is depicted on a conventional, three-pointer, internally lit barometric altimeter installed in the pilot's instrument panel. The instrument senses the local barometric pressure adjusted for altimeter setting and displays the result on the instrument in feet. The altimeter is calibrated for operation between –1000 and 20,000 feet altitude. The scale is marked from 0 to 10 in increments of 2. The long pointer indicates hundreds of feet and sweeps the scale every 1000 feet (each increment equals 20 feet). The short, wide pointer indicates thousands of feet and sweeps the scale every 10,000 feet (each increment equals 200 feet). The short narrow pointer indicates tens of thousands feet and sweeps from 0 to 2 (20,000 feet with each increment equal to 2000 feet). Barometric windows on the instrument's face allow barometric calibrations in either inches of mercury (in.Hg) or millibars (mb). The barometric altimeter settings are input through the barometric adjustment knob at the lower left of the instrument.

Turn Coordinator

The electric turn coordinator, installed in the instrument panel, displays roll information and provides roll data to the autopilot. Additionally, if the airplane is equipped with an S-Tec System 20 or System 30 autopilot, the autopilot engage, disengage, mode select, and mode annunciation are integrated into the turn coordinator display and control knob. Roll rate is sensed by a single-gimbal, electrically powered gyro and displayed on the face of the instrument. The display consists of a symbolic airplane that rotates to indicate turn rate and a standard glass tube and ball inclinometer. Markings on the instrument labeled L & R indicate roll for a standard rate turn in the direction indicated. Power for gyro operation is supplied through the 5-amp TURN COORDINATOR circuit breaker on the Essential Bus. Back-up power for turn coordinator gyro operation is supplied by a 27-volt battery pack.

Turn Coordinator Power Switch

The electrical power source for the turn coordinator is controlled through the ELEC FLT INST PWR switch located immediately below the turn coordinator. The switch has two positions: NORM and EMER. When the switch is set to NORM, electrical power for turn coordinator is supplied through the 5-amp TURN COORDINATOR circuit breaker on the Essential Bus. Should the normal electrical system fail, setting the switch to EMER will power the turn coordinator through a 27-volt battery pack. The switch is left in the NORM position for all normal operations. The batteries must be replaced at specified intervals based upon the date appearing on the battery (refer to SR-20 Airplane Maintenance Manual) and after each use to power the turn coordinator.

Directional Gyro

The airplane is equipped with a directional gyro in the standard configuration. If a directional gyro is not installed the airplane will be equipped with an HSI.

The directional gyro, in the left instrument panel, displays airplane heading by rotating a compass dial in relation to a fixed simulated airplane image and lubber line. The compass dial rotates counter clockwise for right turns. A knob, labeled HDG REF, on the lower right corner of the instrument is used to set the day-glo yellow heading bug. The compass dial should be set in agreement with the magnetic compass just prior to takeoff. As the gyro will precess slightly over a period of time, the directional gyro compass dial should be re adjusted occasionally on extended flights.

To adjust compass card:

1. Push and hold knob at lower left corner of instrument.
2. While holding knob in, rotate knob to adjust gyro compass dial with current magnetic heading.
3. Release knob.

Course Deviation Indicator

The Course Deviation Indicator (CDI) displays course deviation from a VOR, Localizer (LOC) or Glideslope when 'VLOC' is the selected navigation source on the GNS 430 and displays GPS track deviation when 'GPS' is the selected navigation source. Navigation source selection is made using the CDI button on the GNS 430 control.

The instrument is a dual deviation bar VOR/LOC/Glideslope course deviation indicator. The vertical line displays VOR/LOC or GPS track deviation against a 5-dot scale. The horizontal line displays glideslope deviation against a 5-dot scale. The indicator incorporates TO/FROM annunciation, NAV flag, and GS flag. An OBS knob is used to manually rotate the azimuth card to the desired bearing. 28 VDC for instrument lighting is supplied through the 2-amp INSTRUMENT LIGHTS circuit breaker on Main Bus #1.

Horizontal Situation Indicator (Optional)

In optional configurations, the airplane is equipped with either a vacuum powered Century NSD-360 HSI, an electric powered Century NSD-1000 HSI, or a electric powered Sandel 3308 Navigation Display. The displays and operation of the Century NSD-360 and NSD-1000 HSI's are identical with the singular difference being the power source for gyro operation.

Century NSD-360 or NSD-1000 HSI (Optional)

The NSD-360 or NSD-1000 Horizontal Situation Indicator (HSI), in the left instrument panel, provides gyro stabilized, magnetically slaved, heading information, a pictorial VOR/LOC display with a conventional course arrow, and glideslope presentation. The HSI displays airplane heading by rotating a compass dial in relation to a fixed simulated airplane image and lubber line. The HSI directional gyro, which drives the compass dial, is slaved to a flux detector in the right wing through an amplifier under the copilot's floor. A FREE GYRO-SLAVE switch, immediately below the display, allows the pilot to select either Free Gyro mode or Slave mode. In Slave mode, the gyro is slaved to the flux detector. In Free Gyro mode, the gyro must be manually set to the airplane's magnetic compass using the PUSH-SET-CARD knob in the lower right corner of the instrument. The course is set using the Course (Arrow) knob in the lower left corner of the instrument. The HSI course and heading outputs provided to the autopilot to allow NAV/LOC/GPS course tracking or to track a preset heading.

The HSI incorporates conventional warning flags. The HDG (Heading) flag will be out of view whenever the instrument is receiving sufficient electrical power for operation. The NAV (Navigation) flag will be out of view when a VOR or LOC frequency is tuned in the NAV1 receiver and a reliable signal is present. The GS (Glideslope) flag will be out of view when an ILS frequency is tuned on the Nav 1 receiver and a reliable GS signal is present.

The NSD-360 HSI gyro is vacuum powered and a red GYRO flag indicates insufficient vacuum for gyro operation. 28 vdc for HSI operation is supplied through the 2-amp HSI circuit breaker on the Essential bus.

The NSD-1000 HSI is electrically driven and a red GYRO flag indicates loss of electrical power. Redundant circuits paralleled through diodes at the indicator supply DC electrical power for gyro operation. 28 vdc for HSI and gyro operation is supplied through the 2-amp HSI circuit breaker on the Essential bus.

Sandel 3308 Navigation Display (Optional)

The optional Sandel SN3308 Navigation Display combines the functions of an HSI, an RMI, a full color moving map, a Stormscope (if installed) display, GPS annunciator, and 3-light marker beacon indicators. Compass information is derived from a remote directional gyro and a flux detector. 28 VDC for system operation is supplied through the 5-amp HSI circuit breaker on the Essential Bus.

The full-color display uses a rear-projection system driven by an active matrix LCD display. A halogen lamp is the singular primary display projection light source. A separate dimming knob for the display brightness is provided immediately below the display.

The HSI display shows heading and navigation information in a 360° view similar to a conventional mechanical HSI, or in an EFIS 90° ARC view. This includes compass card, heading bug, course pointer, course deviation bar, TO/FROM indicator, glideslope indicator, and flags. Heading bug and course pointer settings include digital readouts that make it easy to set precise headings and courses. Either GPS1 or NAV1 can be selected as primary navigation sources by pressing the NAV switch on the left side of the display. Up to two bearing pointers can be displayed and switched to any NAV receiver including GPS1, GPS2, NAV1, or NAV2. GPS2 and NAV2 can only be displayed as bearing pointers, not as a primary navigation source. The display is color-coded to indicate which navigation source is selected: green for NAV1, yellow for NAV2, and cyan for GPS.

Auto Slew automatically turns the course pointer in response to waypoint sequencing or Direct-To navigation from the GPS receiver eliminating manual course changes at waypoints and reducing pilot workload.

Heading and Course Sync allows the pilot, with one button, to automatically set the heading bug directly to his current heading, or to set the course pointer directly to a VOR station, simultaneously centering course deviation. Course and heading command outputs for autopilot operations are also provided.

The SN3308 detects and warns of abnormal conditions such as flagged navigation receivers and failed directional gyro or flux detector. It also monitors its own internal temperature and provides warnings for over-temperature or loss of cooling conditions.

Magnetic Compass

A conventional, internally lighted, liquid filled, magnetic compass is installed on the cabin headliner immediately above the windshield. A compass correction card is installed with the compass.

Wing Flaps

The electrically controlled, single-slotted flaps provide low-speed lift enhancement. Each flap is manufactured of aluminium and connected to the wing structure at three hinge points. Rub strips are installed on the top leading edge of each flap to prevent contact between the flap and wing flap cove. The flaps are selectively set to three positions: 0%, 50% (16°) and 100% (32°) by operating the FLAP control switch. The FLAP control switch positions the flaps through a motorized linear actuator mechanically connected to both flaps by a torque tube. Proximity switches in the actuator limit flap travel to the selected position and provide position indication. The wing flaps and control circuits are powered by 28 VDC through the 15-amp FLAPS circuit breaker on the Non-Essential Bus.

Flap Control Switch

An airfoil-shaped FLAPS control switch is located at the bottom of the vertical section of the center console. The control switch is marked and has detents at three positions: UP (0%), 50% and 100% (Down). The appropriate V_{FE} speed is marked at the Flap 50% and 100% switch positions. Setting the switch to the desired position will cause the flaps to extend or retract to the appropriate setting. An indicator light at each control switch position illuminates when the flaps reach the selected position. The UP (0%) light is green and the 50% and FULL (100%) lights are yellow.

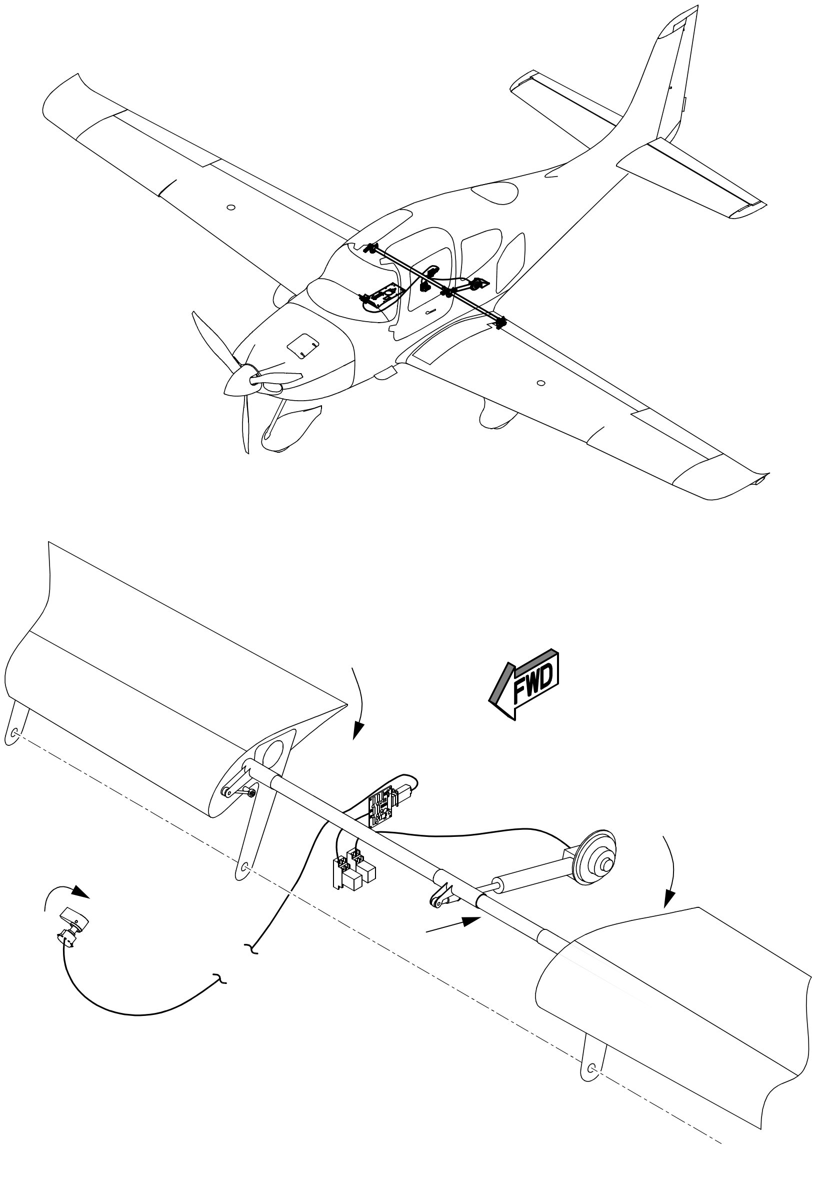


Figure 7-5
Flap Control System

Landing Gear

Main Gear

The main landing gear are bolted to composite wing structure between the wing spar and shear web. The landing gear struts are constructed of composite material for fatigue resistance. The composite construction is both rugged and maintenance free. The main wheels and wheel pants are bolted to the struts. Each main gear wheel has a 15 x 6.00 x 6 tire with inner tube installed. Standard wheel pants are easily removable to provide access to tires and brakes. Access plugs in the wheel pants can be removed to allow tire inflation and pressure checking. Each main gear wheel is equipped with an independent, hydraulically operated, single-disc type brake.

Nose Gear

The nose gear strut is of tubular steel construction and is attached to the steel engine mount structure. The nosewheel is free castering and can turn through an arc of approximately 216 degrees (108 degrees either side of center). Steering is accomplished by differential application of individual main gear brakes. The tube-type nosewheel tire is 5.00 x 5.

Airplane Cabin

Cabin Doors

Two large forward hinged doors allow crew and passengers to enter and exit the cabin. The door handles engage latching pins in the door frame receptacles at the upper aft and lower aft door perimeter. Gas charged struts provide assistance in opening the doors and hold the doors open against gusts. Front seat armrests are integrated with the doors. A key lock in each door provides security. The cabin door keys also fit the baggage compartment door lock. Separate keys are provided for the fuel caps.

Baggage Compartment

The baggage compartment door, located on the left side of the fuselage aft of the wing, allows entry to the baggage compartment. The baggage door is hinged on the forward edge and latched on the rear edge. The door is locked from the outside with a key lock. The baggage compartment key will also open the cabin doors.

The baggage compartment extends from behind the rear passenger seat to the aft cabin bulkhead. The rear seats can be folded forward to provide additional baggage area for long or bulky items.

Four baggage tie-down straps are provided to secure baggage and other items loaded in the baggage compartment. Each strap assembly has a hook at each end and a cam-lock buckle in the middle. The hook ends clip over loop fittings installed in the baggage floor and in the aft bulkhead. The tie-down straps should be stowed attached and tightened to the fittings. If not adequately restrained, baggage compartment items may pose a projectile hazard to cabin occupants in the event of rapid deceleration. Secure all baggage items with tie-down straps.

To install tie-down strap:

1. Position straps over baggage. Thread straps through luggage handles if possible.
2. Clip hook ends of straps over loop fittings.
3. Grasp the buckle and pull the loose strap end of each strap to tighten straps over contents of baggage compartment.

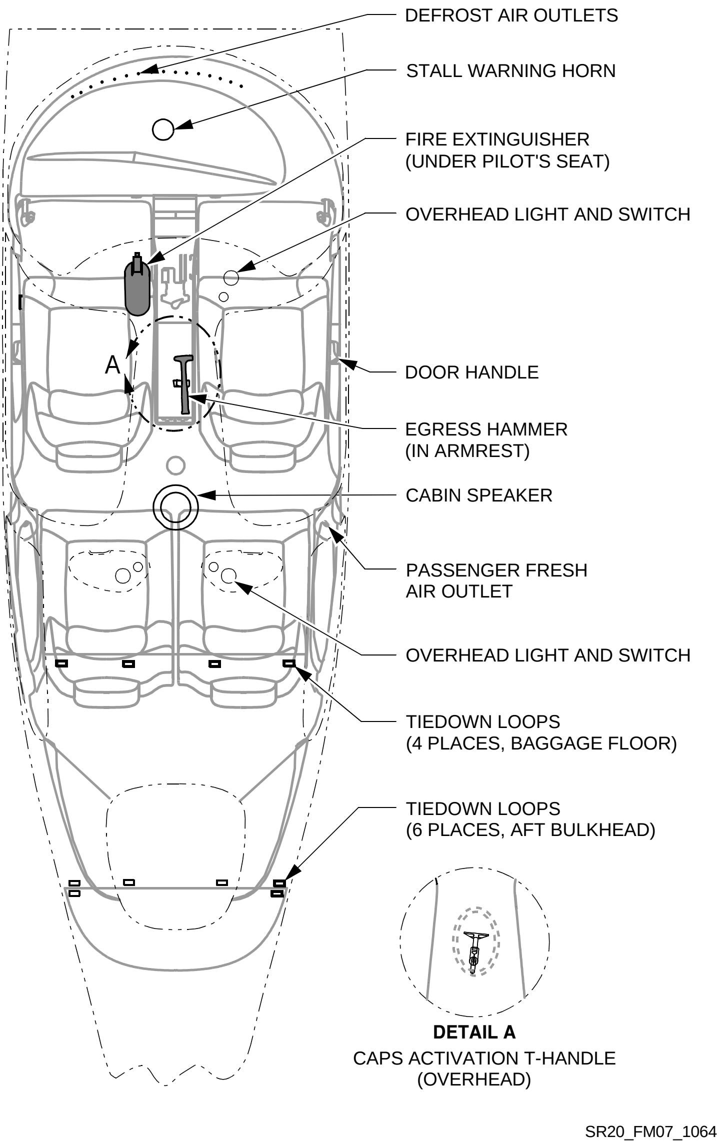


Figure 7-6
Cabin General Arrangement

To loosen tie-down straps:

1. Lift buckle release and pull on buckle to loosen strap.
2. Lift hook ends free of loop fittings.

Seats

The seating arrangement consists of two individually adjustable seats for the pilot and front seat passenger and two individual seats with fold down seat backs for the rear seat passengers.

The front seats are adjustable fore and aft and the seat backs can be reclined for passenger comfort or folded forward for rear seat access. Integral headrests are provided. The fore and aft travel path is adjusted through the seat position control located below the forward edge of the seat cushion. The seat track is angled upward for forward travel so that shorter people will be positioned slightly higher as they adjust the seat forward. Recline position is controlled through levers located on each side of the seat backs. Depressing the recline release control while there is no pressure on the seat back will return the seat back to the full up position.

• Caution •

> The seat bottoms have an integral aluminum honeycomb core designed to crush under impact to absorb downward loads. To avoid crushing this core, do not kneel or stand on the seats.

To position front seat fore and aft:

1. Lift the position control handle.
2. Slide the seat into position.
3. Release the handle and check that the seat is locked in place.

To adjust recline position:

1. Actuate and hold the seat back control lever.
2. Position the seat back to the desired angle.
3. Release the control lever.

Each rear seat consists of a fixed seat bottom, a folding seat back, and a headrest. The seat backs can be unlatched from inside the baggage compartment and folded forward to provide a semi-flat surface for bulky cargo extending forward from the baggage compartment.

To fold seat back forward:

1. From the baggage access, lift the carpet panel at lower aft edge of seat to reveal the seat back locking pins (attached to lanyards).
2. Remove the locking pins and fold seat forward.

Windshield and Windows

The windshield and side windows are manufactured of acrylic. Use only clean soft cloths and mild detergent to clean acrylic surfaces. Refer to Section 8 for detailed cleaning instructions.

Cabin Safety Equipment

Passenger Restraints

Integrated seat belt and shoulder harness assemblies with inertia reels are provided for the pilot and each passenger. The rear seat belts are attached to fittings on the floorboard and the forward seat belts are attached to the seat frame. The shoulder harnesses are attached to inertia reels mounted in the seat back for the front seats and on the baggage compartment rear bulkhead for the rear seats. Each harness is attached to the seat belt. The buckle half of each assembly is on the left-hand side and the link half is on the right-hand side. The inertia reels allow complete freedom of movement of the occupant’s upper torso. In the event of a sudden deceleration, the reels lock automatically to protect the occupants.

Serials 1005 thru 1267 after SB 2X-25-14; An inflatable shoulder harness is integral to each crew seat harness. The electronic module assembly, mounted below the cabin floor, contains a crash sensor, battery, and related circuitry to monitor the deceleration rate of the airplane. In the event of a crash, the sensor evaluates the crash pulse and sends a signal to an inflator assembly mounted to the aft seat frame. This signal releases the gas in the inflator and rapidly inflates the airbag within the shoulder harness cover, After airbag deployment, the airbag deflates to enable the pilot/co-pilot to egress the aircraft without obstruction.

The crash sensor’s predetermined deployment threshold does not allow inadvertent deployment during normal operations, such as hard landings, strikes on the seat, or random vibration.

• Caution •

No slack may exist between the occupant's shoulder and restraint harness shoulder strap.

Stow the seat belts in the latched position when not in use.

To use the restraints:

1. Slip arms behind the harness so that the harness extends over shoulders.
2. Hold the buckle and firmly insert the link.
3. Grasp the seat belt tabs outboard of the link and buckle and pull to tighten. Buckle should be centered over hips for maximum comfort and safety.
4. Restraint harnesses should fit snug against the shoulder with the lap buckle centered and tightened around the hips.

To release the restraints:

1. Grasp the top of the buckle opposite the link and pull outward. The link will slip free of buckle.
2. Slip arms from behind the harness.

Emergency Egress Hammer

An eight-ounce ball-peen type hammer is located in the center armrest accessible to either front seat occupant. In the event of a mishap where the cabin doors are jammed or inoperable, the hammer may be used to break through the acrylic windows to provide an escape path for the cabin occupants.

Fire Extinguisher

A liquefied-gas-type fire extinguisher, containing Halon 1211/1301 extinguishing agent, is mounted on the forward inboard side of the pilot's seat base. The extinguisher is approved for use on class B (liquid, grease) and class C (electrical equipment) fires. The Halon 1211/1301 blend provides the best fire extinguishing capability with low toxicity. A pin is installed through the discharge mechanism to prevent inadvertent discharge of extinguishing agent. The fire extinguisher must be replaced after each use.

To operate the extinguisher:

1. Loosen retaining clamp and remove the extinguisher from its mounting bracket.
2. Hold the extinguisher upright and pull the pin.
3. Get back from the fire and aim nozzle at base of fire at the nearest edge.
4. Press red lever and sweep side to side.

• WARNING •

Halon gas used in the fire extinguisher can be toxic, especially in a closed area. After discharging fire extinguisher, ventilate cabin by opening air vents and unlatching door. Close vents and door after fumes clear.

The extinguisher must be visually inspected before each flight to assure that it is available, charged, and operable. The preflight inspection consists of ensuring that the nozzle is unobstructed, the pin has not been pulled, and the canister has not been damaged. Additionally, the unit should weigh approximately 1.5 lb (0.7 kg). For preflight, charge can be determined by ‘hefting’ the unit.

Engine

The SR20 is powered by a Teledyne Continental IO-360-ES, six-cylinder, normally aspirated, fuel-injected engine de-rated to 200 hp at 2,700 RPM. The engine has a 2000-hour Time Between Overhaul (TBO). Dual, conventional magnetos provide ignition.

The engine is attached to the firewall by a four-point steel mount structure. The firewall attach points are structurally reinforced with gusset-type attachments that transfer thrust and bending loads into the fuselage shell.

Engine Oil System

The engine is provided with a wet-sump, high-pressure oil system for engine lubrication and cooling. Oil for engine lubrication is drawn from an eight-quart capacity sump through an oil suction strainer screen and directed to the engine-mounted oil cooler. The oil cooler is equipped with a pressure relief and temperature control valve set to bypass oil if the temperature is below 170° F or the pressure drop is greater than 18 psi. Bypass or cooled oil is then directed through the one-quart, full-flow oil filter, a pressure relief valve, and then through oil galleries to the engine rotating parts and piston inner domes. Oil is also directed to the propeller governor to regulate propeller pitch. The complete oil system is contained in the engine. An oil filler cap and dipstick are located at the left rear of the engine. The filler cap and dipstick are accessed through a door on the top left side of the engine cowling.

• Caution •

The engine should not be operated with less than six quarts of oil. Seven quarts (dipstick indication) is recommended for extended flights.

Engine Cooling

Engine cooling is accomplished by discharging heat to the oil and then to the air passing through the oil cooler, and by discharging heat directly to the air flowing past the engine. Cooling air enters the engine compartment through the two inlets in the cowling. Aluminum baffles direct the incoming air to the engine and over the engine cylinder cooling fins where the heat transfer takes place. The heated air exits the engine compartment through two vents in the aft portion of the cowling. No movable cowl flaps are used.

Engine Fuel Injection

The multi-nozzle, continuous-flow fuel injection system supplies fuel for engine operation. An engine driven fuel pump draws fuel from the selected wing tank and passes it to the mixture control valve integral to the pump. The mixture control valve proportions fuel in response to the pilot operated mixture control lever position and automatically provides altitude compensation to supply the proper full rich mixture at any altitude. From the mixture control, fuel is routed to the fuel-metering valve on the air-induction system throttle body. The fuel-metering valve adjusts fuel flow in response to the pilot controlled Power Lever position. From the metering valve, fuel is directed to the fuel manifold valve (spider) and then to the individual injector nozzles. The system meters fuel flow in proportion to engine RPM, throttle angle, and ambient altitude pressure. Manual mixture control and idle cut-off are provided. An electric fuel pump provides fuel boost for vapor suppression and for priming.

Engine Air Induction System

Induction air enters the engine compartment through the two inlets in the forward cowling. The air passes through a dry-foam induction filter, through the throttle butterfly, into the six-tube engine manifold, and finally through the cylinder intake ports into the combustion chambers. Should the dry induction filter become clogged, a pilot controlled alternate induction air door can be opened, allowing engine operation to continue. Refer to Engine Controls, Alternate Air Control.

Engine Fuel Ignition

Two engine-driven magnetos and two spark plugs in each cylinder provide fuel ignition. The right magneto fires the lower right and upper left spark plugs, and the left magneto fires the lower left and upper right spark plugs. Normal operation is conducted with both magnetos, as more complete burning of the fuel-air mixture occurs with dual ignition.

Engine Exhaust

Engine exhaust gases are routed through a dual tuned exhaust system. After leaving the cylinders, exhaust gases are routed through the exhaust manifold, through mufflers located on either side of the engine, and then overboard through exhaust pipes exiting through the lower cowling. A muff type heat exchanger, located around the right muffler, provides cabin heat.

Engine Controls

Engine controls are easily accessible to the pilot on a center console. They consist of a single-lever power (throttle) control and a mixture control lever. A friction control wheel, labeled FRICTION, on the right side of the console is used to adjust control lever resistance to rotation for feel and control setting stability. An alternate induction air source control is also provided.

Power (Throttle) Lever

The single-lever throttle control, labeled MAX-POWER-IDLE, on the console adjusts the engine throttle setting in addition to automatically adjusting propeller speed. The lever is mechanically linked by cables to the air throttle body/fuel-metering valve and to the propeller governor. Moving the lever towards MAX opens the air throttle butterfly and meters more fuel to the fuel manifold. A separate cable to the propeller governor adjusts the governor oil pressure to increase propeller pitch to maintain engine RPM. The system is set to maintain approximately 2500 RPM throughout the cruise power settings and 2700 RPM at full power.

Mixture Control

The mixture control lever, labeled RICH-MIXTURE-CUTOFF, on the console adjusts the proportion of fuel to air for combustion. The Mixture Control Lever is mechanically linked to the mixture control valve in the engine-driven fuel pump. Moving the lever forward (towards RICH) repositions the valve allowing greater proportions of fuel and moving the lever aft (towards LEAN) reduces the proportion of fuel. The full aft position (CUTOFF) closes the control valve.

Start/Ignition Switch

A rotary-type key switch, located on the left bolster panel, controls ignition and starter operation. The switch is labeled OFF-R-L- BOTH-START. In the OFF position, the starter is electrically isolated, the magnetos are grounded and will not operate. Normally, the engine is operated on both magnetos (switch in BOTH position) except for magneto checks and emergency operations. The R and L positions are used for individual magneto checks and for single magneto operation when required. When the BAT master switch is ON, rotating the switch to the spring-loaded START position energizes the starter and activates both magnetos. The switch automatically returns to the BOTH position when released.

Alternate Air Control

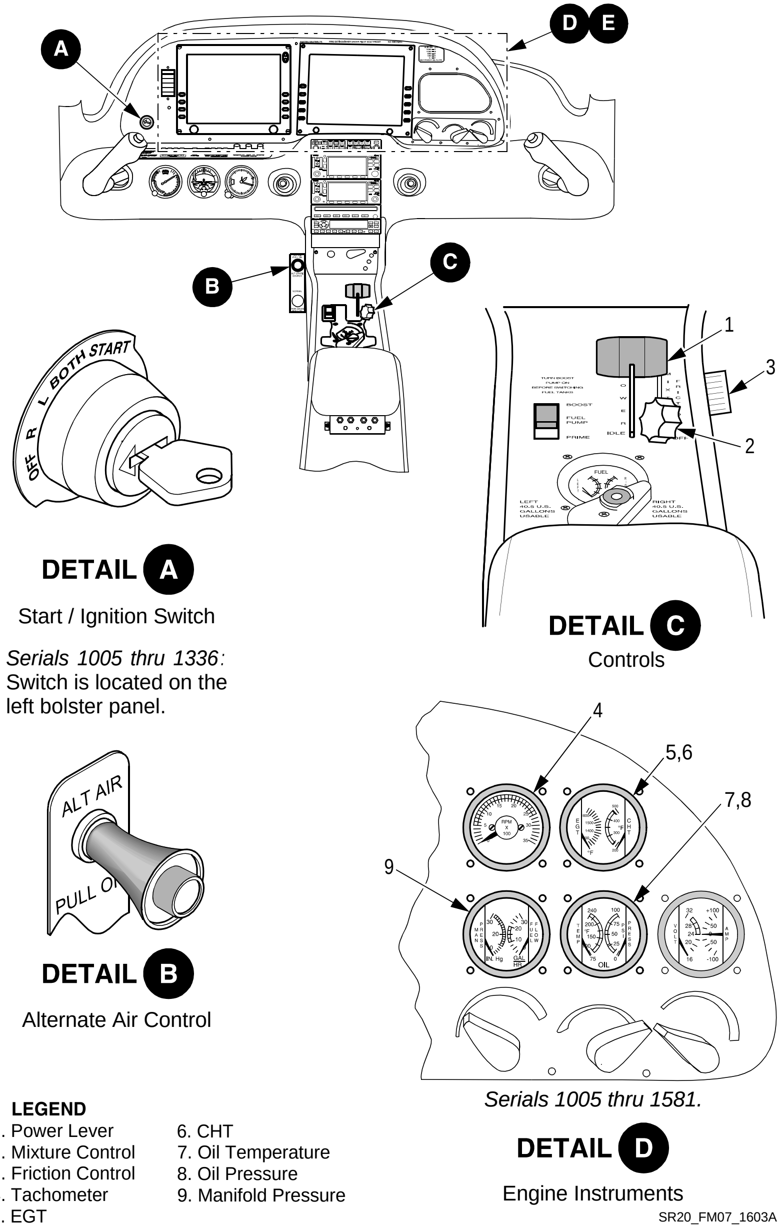
An Alternate Induction Air Control knob, labeled ALT AIR – PULL, is installed on the left console near the pilot's right ankle. To operate the control, depress the center lock button, pull the knob to the open position, and then release the lock button. Pulling the knob opens the alternate air induction door on the engine induction air manifold, bypasses the air filter, and allows warm unfiltered air to enter the engine. Alternate induction air should be used if blocking of the normal air source is suspected. Operation using alternate induction air should be minimized and the cause of filter blocking corrected as soon as practical.

Engine Indicating

The SR20 is equipped with engine instruments and warning lights to monitor the engine performance. The instruments are located on the right side of the instrument panel and the warning lights are located in the annunciator panel immediately in front of the pilot.

• Note •

For additional information on instrument limit markings, *refer to Section 2, Limitations.*



LEGEND

1. Power Lever
2. Mixture Control
3. Friction Control
4. Tachometer
5. EGT
6. CHT
7. Oil Temperature
8. Oil Pressure
9. Manifold Pressure

Figure 7-7
Engine Controls and Indicating

Tachometer

A 2¼" tachometer is mounted on the right instrument panel adjacent to the other engine instruments. The tachometer pointer sweeps a scale marked from 0 to 3500 RPM in 100 RPM increments. Refer to Section 2 (Limitations) for instrument limit markings. The electrically operated tachometer receives a speed signal from a tachometer generator mounted on the aft end of the engine between the magnetos. 28 VDC for instrument operation is supplied through the 5-amp ENGINE INST circuit breaker on the Essential Bus.

Exhaust Gas Temp / Cylinder Head Temp Gage

A 2¼" combination Exhaust Gas Temperature (EGT) and Cylinder Head Temperature (CHT) indicator is mounted in the right instrument panel. 28 VDC for instrument operation is supplied through the 5-amp ENGINE INST circuit breaker on the Essential Bus 1.

The EGT pointer sweeps a scale marked from 1250° F to 1650° F in 25° F increments. The EGT scale has no limit markings. The electrically operated EGT indicator receives a temperature signal from a thermocouple mounted in the left exhaust pipe.

The CHT pointer sweeps a scale marked from 200° F to 500° F. Refer to Section 2 (Limitations) for instrument limit markings. The electrically operated CHT indicator receives a temperature signal from a temperature sensor mounted in the #2 cylinder head on the left side of the engine.

Oil Temperature / Oil Pressure Gage

A 2¼" combination Oil Temperature and Oil Pressure indicator is mounted on the right instrument panel immediately below the EGT/ CHT indicator. The instrument is internally lighted. 28 VDC for instrument operation is supplied through the 5-amp ENGINE INST circuit breaker on the Essential Bus.

The Oil Temperature pointer sweeps a scale marked from 75° F to 250° F in 25° F increments. Refer to Section 2 (Limitations) for instrument limit markings. The Oil Temperature indicator receives a temperature signal from a temperature sending unit mounted on the engine near the left magneto.

The Oil Pressure pointer sweeps a scale marked from 0 psi to 100 psi. Refer to Section 2 (Limitations) for instrument limit markings. The Oil

Pressure indicator receives a pressure signal from an oil pressure sensor on the left side of the engine. Normally, oil pressure may drop to 10 psi at idle but will be in the 30 - 60 psi range at higher RPM.

Fuel Flow / Manifold Pressure Gage

A 2¼” combination Fuel Flow and Manifold Pressure indicator is mounted on the right instrument panel immediately below the tachometer. The indicator is internally lighted. 28 VDC for instrument operation is supplied through the 5-amp ENGINE INST circuit breaker on the Essential Bus.

The Fuel Flow pointer sweeps a scale marked from 0 to 18 Gal/Hr. Refer to Section 2 (Limitations) for instrument limit markings. The electrically operated Fuel Flow indicator receives a fuel-flow rate signal from a fuel-flow transducer installed in the fuel line between the throttle body metering valve and the injector manifold (spider).

The Manifold Pressure pointer sweeps a scale marked from 10 to 35 inches Hg in 5-inch Hg increments. Refer to Section 2 (Limitations) for instrument limit markings. The electrically operated manifold pressure indicator receives a pressure signal from a pressure sensor mounted in the induction airstream on the left side of the induction air manifold.

Oil Warning Light

The red OIL warning light in the annunciator panel comes on to indicate either high oil temperature or low oil pressure. The light is illuminated by a switch in the oil temperature gage if the oil temperature reaches 240° F or by a switch in the oil pressure gage if the oil pressure drops to 10 psi or less. If the OIL warning light comes on in flight, refer to the oil temperature and pressure gages to determine the cause. Typically, low oil pressure will be accompanied by a high oil temperature indication. The light is powered by 28 VDC through the 2-amp ANNUNC circuit breaker on the Essential Bus.

Propeller

The airplane is equipped with a constant-speed, aluminum-alloy propeller with a governor. The airplane is available with the standard two-blade (76” diameter) propeller or an optional three-blade (74” diameter) propeller.

The propeller governor automatically adjusts propeller pitch to regulate propeller and engine RPM. The propeller governor senses engine speed by means of flyweights and senses throttle setting through a cable connected to the power (throttle) control lever in the cockpit. The propeller governor boosts oil pressure in order to regulate propeller pitch position. Moving the throttle lever forward causes the governor to meter less high-pressure oil to the propeller hub allowing centrifugal force acting on the blades to lower the propeller pitch for higher RPM operation. Reducing the power (throttle) lever position causes the governor to meter more high-pressure oil to the propeller hub forcing the blades to a higher pitch, lower RPM, position. During stabilized flight, the governor automatically adjusts propeller pitch in order to maintain an RPM setting (throttle position). Any change in airspeed or load on the propeller results in a change in propeller pitch.

Fuel System

A 56-gallon usable wet-wing fuel storage system provides fuel for engine operation. The system consists of a 30.3-gallon capacity (28-gallon usable) vented integral fuel tank in each wing, a fuel collector/sump in each wing, a three-position selector valve, an electric boost pump, and an engine-driven fuel pump. Fuel is gravity fed from each tank to the associated collector sumps where the engine-driven fuel pump draws fuel through a filter and selector valve to pressure feed the engine fuel injection system. The electric boost pump is provided for engine priming and vapor suppression.

Each integral wing fuel tank has a filler cap in the upper surface of each wing for fuel servicing. An access panel in the lower surface of each wing provides access to the associated wet compartment (tank) for general inspection and maintenance. Float-type fuel quantity sensors in each wing tank provide fuel level information to the fuel quantity indicators. Positive pressure in the tank is maintained through a vent line from each wing tank. Fuel, from each wing tank, gravity feeds through strainers and a check valve to the associated collector tank/sump in each wing. Each collector tank/sump incorporates a flush mounted fuel drain and a vent to the associated fuel tank.

The engine-driven fuel pump pulls filtered fuel from the two collector tanks through a three-position (LEFT-RIGHT-OFF) selector valve. The selector valve allows tank selection. From the fuel pump, the fuel is proportioned to the induction airflow, metered to a flow divider, and delivered to the individual cylinders. Excess fuel is returned to the selected tank.

Fuel quantity indicators for each tank are located in the center console next to the fuel selector in plain view of the pilot. Fuel shutoff and tank selection is positioned nearby for easy access.

Fuel system venting is essential to system operation. Blockage of the system will result in decreasing fuel flow and eventual engine fuel starvation and stoppage. Venting is accomplished independently from each tank by a vent line leading to a NACA-type vent mounted in an access panel underneath the wing near each wing tip.

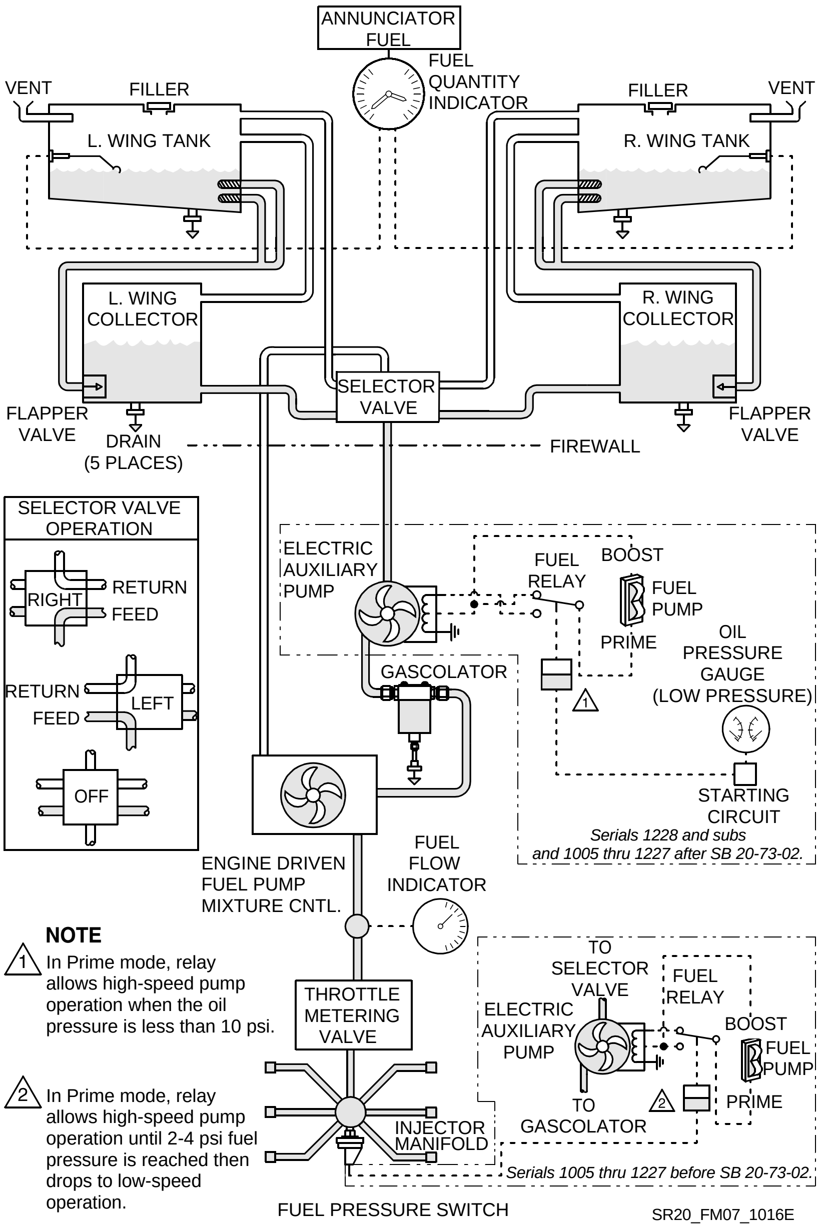


Figure 7-8
Fuel System

The airplane may be serviced to a reduced capacity to permit heavier cabin loadings. This is accomplished by filling each tank to a tab visible below the fuel filler, giving a reduced fuel load of 13 gallons usable in each tank (26 gallons total usable in all flight conditions).

Drain valves at the system low points allow draining the system for maintenance and for examination of fuel in the system for contamination and grade. The fuel must be sampled prior to each flight. A sampler cup is provided to drain a small amount of fuel from the wing tank drains, the collector tank drains, and the gascolator drain. If takeoff weight limitations for the next flight permit, the fuel tanks should be filled after each flight to prevent condensation.

Fuel Selector Valve

A fuel selector valve, located at the rear of the center console, provides the following functions:

- LEFT..................................Allows fuel to flow from the left tank
- RIGHT ....Allows fuel to flow from the right tank
- OFF ....Cuts off fuel flow from both tanks

The valve is arranged so that to feed off a particular tank the valve should be pointed to the fuel indicator for that tank. To select RIGHT or LEFT, rotate the selector to the desired position. To select Off, first raise the fuel selector knob release and then rotate the knob to OFF.

Fuel Quantity Indicator

A dual reading 2¼" fuel quantity indicator is installed on the console immediately forward of the fuel selector valve. The LEFT pointer indicates left tank fuel quantity and sweeps a scale marked from 0 to 28 U.S. gallons in 2½-gallon increments. The RIGHT pointer sweeps an identical scale for the right tank. Each scale is marked with a yellow arc from 0 to 8.2 gallon. The indicators are calibrated to read '0' when no usable fuel remains. Each indicator also provides an output signal to illuminate the FUEL caution light when the fuel quantity goes below approximately 8-9 gallons in each tank. The indicator is internally lighted. 28 VDC for fuel quantity system operation is supplied through the 5-amp ENGINE INST circuit breaker on the Essential Bus.

• Note •

When the fuel tanks are 1/4 full or less, prolonged uncoordinated flight such as slips or skids can uncover the fuel tank outlets. Therefore, if operating with one fuel tank dry or if operating on LEFT or RIGHT tank when 1/4 full or less, do not allow the airplane to remain in uncoordinated flight for periods in excess of 30 seconds.

Fuel Flow Indication

Fuel flow indication is integral to the combination Fuel Flow/Manifold Pressure Gage. Refer to preceding discussion on Fuel Flow and Manifold Pressure Gage for complete description of fuel flow indication.

Fuel Caution Light

The amber FUEL caution light in the annunciator panel comes on to indicate a low fuel condition. The light is illuminated by switches in the fuel quantity gages if the fuel quantity in both tanks drops below approximately 8.5 gallons (17 gallons total with tanks balanced in level flight). Since both tanks must be below 8.5 gallons to illuminate the light, the light could illuminate with as little as 8.5 gallons in one tank during level flight if the other tank is allowed to run dry.

If the FUEL caution light comes on in flight, refer to the Fuel Quantity gages to determine fuel quantity. The light is powered by 28 VDC through the 2-amp ANNUNC circuit breaker on the Essential Bus.

Boost Pump Switch

Boost pump operation and engine prime is controlled through the Fuel Pump BOOST-PRIME switch located adjacent to the fuel selector valve. The PRIME position is momentary and the BOOST position is selectable. A two-speed prime allows the fuel pressure to rapidly achieve proper starting pressure.

Serials 1005 thru 1227 before SB 20-73-02: For engine starting, pressing PRIME causes the boost pump to operate at high speed until the fuel pressure reaches 2-4 psi. When the fuel pressure reaches the 2-4 psi range, a pressure switch in the fuel injection line switches the boost pump to the low-speed mode to provide a 4-6 psi fuel pressure boost. Selecting BOOST energizes the boost pump in low-speed mode to deliver a continuous 4-6 psi boost to the fuel flow for vapor suppression in a hot fuel condition.

Serials 1228 and subs, 1005 thru 1227 after SB 20-73-02: An oil pressure based system is used to control boost pump operation. The oil pressure/oil temperature gauge provides a signal to the starting circuit to generate a ground for the oil annunciator and the fuel system. This system allows the fuel pump to run at high speed (PRIME) when the engine oil pressure is less than 10 PSI. Whenever the engine oil pressure exceeds 10 PSI, pressing PRIME will have no effect. Selecting BOOST energizes the boost pump in low-speed mode regardless of oil pressure to deliver a continuous 4-6 psi boost to the fuel flow for vapor suppression in a hot fuel condition.

The boost pump operates on 28 VDC supplied through the 7.5 amp FUEL PUMP circuit breaker on Main Bus 1.

Brake System

The main wheels have hydraulically operated, single-disc type brakes, individually activated by floor mounted toe pedals at both pilot stations. A parking brake mechanism holds induced hydraulic pressure on the disc brake for parking.

The brake system consists of a master cylinder for each rudder pedal, a hydraulic fluid reservoir, a parking brake valve, a single disc brake assembly on each main landing gear wheel, and associated hydraulic plumbing. Braking pressure is initiated by depressing the top half of a rudder pedal (toe brake). The brakes are plumbed so that depressing either the pilot's or copilot's left or right toe brake will apply the respective (left or right) main wheel brake. The reservoir is serviced with Mil-H-5606 hydraulic fluid.

Brake system malfunction or impending brake failure may be indicated by a gradual decrease in braking action after brake application, noisy or dragging brakes, soft or spongy pedals, excessive travel, and/or weak braking action. Should any of these symptoms occur, immediate maintenance is required. If, during taxi or landing roll, braking action decreases, let up on the pedals and then reapply the brakes with heavy pressure. If the brakes are spongy or pedal travel increases, pumping the pedals may build braking pressure.

Refer to Section 10, Safety Information, for Brake System operational considerations.

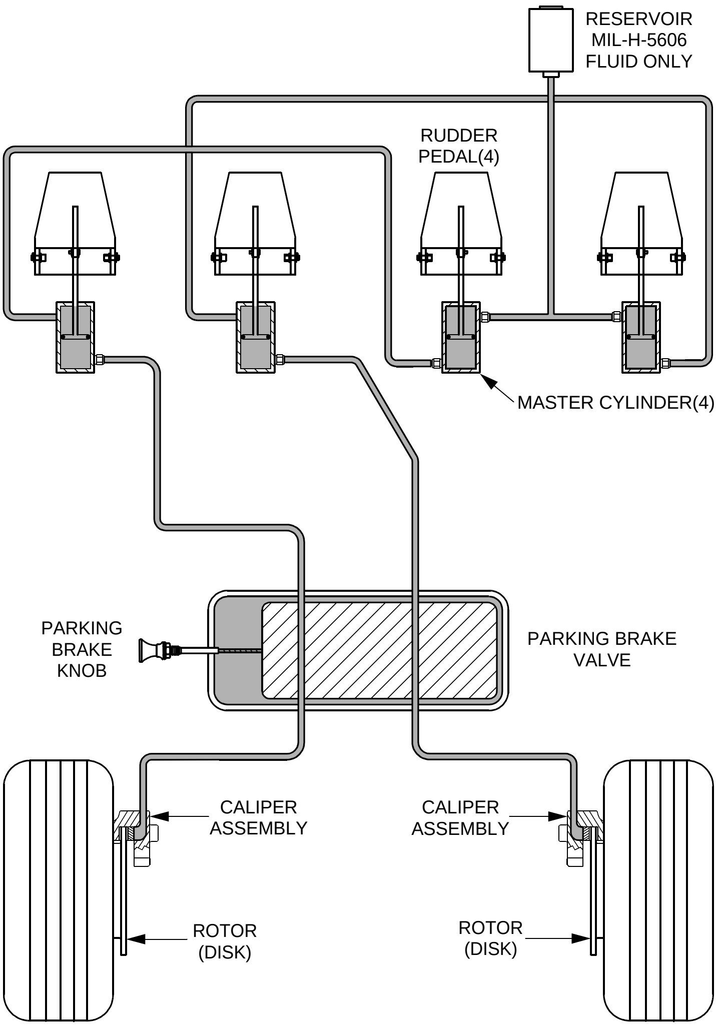


Figure 7-9
Brake System

Parking Brake

• Caution •

> Do not pull the PARK BRAKE knob in flight. If a landing is made with the parking brake valve set, the brakes will maintain any pressure applied after touchdown.

The main wheel brakes are set for parking by using the PARK BRAKE knob on the left side of the console near the pilot’s right ankle. Brake lines from the toe brakes to the main wheel brake calipers are plumbed through a parking brake valve. For normal operation, the knob is pushed in. With the knob pushed in, poppets in the valve are mechanically held open allowing normal brake operation. When the handle is pulled out, the parking brake valve holds applied brake pressure, locking the brakes. To apply the parking brake, set the brakes with the rudder-pedal toe brakes, and then pull the PARK BRAKE knob aft.

Electrical System

The standard airplane is equipped with 28-volt direct current (VDC) single alternator electrical system. The system provides uninterrupted power for avionics, flight instruments, lighting and other electrically operated and controlled systems during normal operation. The system also allows load shedding in the event of an electrical system failure.

• Note •

An optional dual alternator system is installed in some airplanes. For a complete description of the system, refer to 11934-S10, POH Supplement for Dual Alternator System.

Power Generation

Primary power for the SR20 is supplied by a 28-VDC negative-ground electrical system. The electrical power generation system consists of a 24-volt, 10-amp-hour battery, a 75-ampere alternator, a voltage regulator and an over-voltage protection system. The battery is an aviation grade, 12-cell lead-acid type with non-spill vent caps. The battery is used for engine starting and as an emergency power source in the event of alternator failure. The 75-ampere alternator provides constant charging current for the battery and primary power to the aircraft electrical system during normal system operation. The voltage regulator provides transient suppression and constant voltage regulation of the unfiltered alternator power. To protect sensitive instruments, the over-voltage protection system monitors the primary power bus and automatically limits the peak voltage to 28.5 volts. During sustained over-voltage and under-voltage periods, the over-voltage system provides a warning to the pilot.

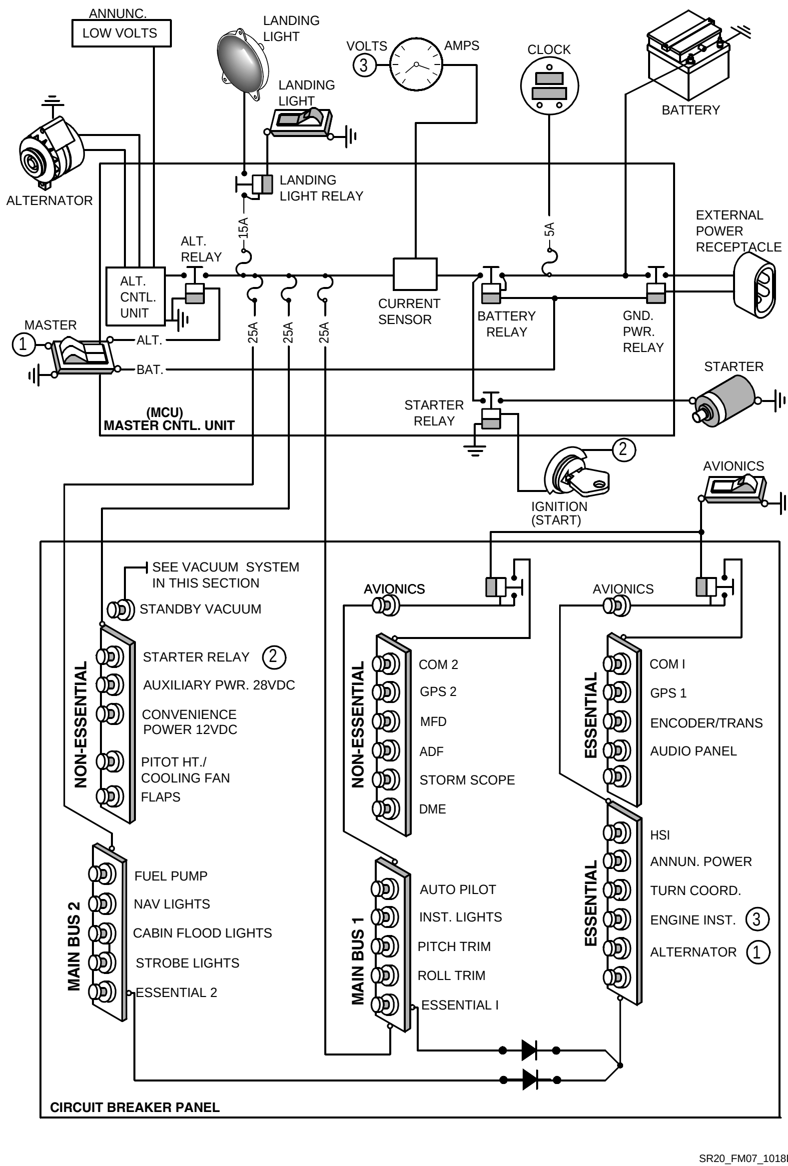


Figure 7-10
Electrical Power & Distribution

Power Distribution

Power distribution for the SR20 consists of the electrical power bus in the Master Control Unit (MCU), Main Buses, Essential and Non-Essential buses in the circuit breaker panel, as well as associated fuses, circuit breakers and switches. The main power buses (Main Bus 1 and Main Bus 2) and the Non-Essential equipment bus receive power from the power generation system through 25-amp feeder bus fuses or circuit breakers located in the Master Control Unit (MCU). The Essential power bus is powered from Main Bus 1 and Main Bus 2 from the Essential 1 and Essential 2 circuit breakers through a network of diodes. The Non-Essential avionics bus and the Essential avionics bus are powered from Main Bus 1 and the Essential power bus respectively through the associated Avionics circuit breakers provided the AVIONICS POWER switch is ON. Avionics loads on the avionics buses can be shed by pulling the associated Avionics circuit breaker.

BAT & ALT Master Switches

The rocker type electrical system MASTER switches are ON in the up position and off in the down position. The right switch, labeled BAT, controls all electrical power to the airplane. The left switch, labeled ALT, controls the alternator.

Normally, both master switches will be ON. However, the BAT switch can be turned on separately to check equipment while on the ground. To check or use avionics equipment or radios while on the ground, the avionics power switch must also be turned on. Positioning the ALT switch to the off position isolates the alternator from the electrical system and the entire electrical load is placed on the battery.

• Note •

Continued operation with the alternator switched off will reduce battery power low enough to open the battery relay, remove power from the alternator field, and prevent alternator restart.

Avionics Power Switch

A rocker switch, labeled AVIONICS POWER, controls electrical power from the airplane primary bus to the avionics bus. The switch is located next to the ALT and BAT Master switches and is ON in the up position and off in the down position. Typically, the switch is used to energize or de-energize all avionics on the Avionics Non-Essential and Avionics Essential buses simultaneously. With the switch in the off position, no electrical power will be applied to the avionics equipment, regardless of the position of the master switch or the individual equipment switches. For normal operations, the AVIONICS POWER switch should be placed in the off position prior to turning the master switch ON or off, starting the engine, or applying an external power source.

Volt / Amp Meter

A 2¼" combination Volts and Ampere meter is mounted on the right instrument panel immediately outboard of the oil temperature and pressure gage. The indicator is internally lighted. 28 VDC for instrument lighting is supplied through the 2-amp Instrument Lights circuit breaker on Main Bus 1.

The VOLT pointer sweeps a scale from 16 to 32 volts. Refer to Section 2 (Limitations) for instrument limit markings. The voltage indication is measured off the essential bus.

The AMP pointer sweeps a scale from -60 to +60 amps with zero at the 9 o'clock position. The amps indication is derived from a current shunt located in the electrical system master control unit (MCU). When the engine is operating and the master switch is turned on, the ammeter indicates the charging rate applied to the battery. In the event the alternator is not functioning or the electrical load exceeds the output of the alternator, the ammeter indicates the battery discharge rate.

Low Volts Warning Light

The airplane is equipped with a red LOW VOLTS warning light in the annunciator panel located on the left side of the instrument panel. The alternator control unit (ACU) located within the master control unit (MCU), which is mounted on the engine side of the firewall, operates the warning light.

In the event an over voltage condition occurs, the alternator control unit (ACU) automatically removes alternator field current to shut down the alternator. With the alternator off line, the battery supplies system current and a discharge rate is indicated on the ammeter. Under these conditions, depending on electrical system load, the LOW VOLTS warning light will illuminate when system voltage drops below 25.5 ± 0.35 volts. Turning the ALT MASTER switch off and back on again may reset the alternator control unit. If the warning light does not illuminate, normal alternator charging has resumed. If the light illuminates again, a malfunction has occurred.

• Note •

Illumination of the LOW VOLTS warning light and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM. The master switch need not be recycled since an over voltage condition has not occurred to de activate the alternator system.

Warning light operation can be tested by turning the landing light on and momentarily turning off the master switch ALT portion while leaving the BAT portion ON.

Circuit Breakers and Fuses

Individual electrical circuits connected to the Main, Essential, and Non-Essential buses in the airplane are protected by re-settable circuit breakers mounted on the left side of the center console. The airplane Essential bus is supplied from the Main Buses through the 20-amp ESSENTIAL 1 and ESSENTIAL 2 circuit breakers. Avionics loads on the Non-Essential Avionics Bus and Essential Avionics Bus are protected by 15-amp AVIONICS circuit breakers connected to the respective bus through relays energized by the AVIONICS switch.

In addition to the individual circuit breakers, 25-amp fuses located on the primary bus in the Master Control Unit (MCU) protect the Main Bus 1, Main Bus 2, and the Non-Essential Bus. Additionally, 15-amp fuses protect the landing light and standby vacuum pump circuits. The clock is continuously powered through a 5-amp fuse connected to the primary bus in the MCU.

Ground Service Receptacle

A ground service receptacle, located just aft of the cowl on the left side of the airplane, is installed to permit the use of an external power source for cold weather starting and maintenance procedures requiring reliable power for an extended period. The external power source must be regulated to 28 VDC. The external power control contactor is wired through the BAT MASTER switch so that the BAT MASTER must be 'on' to apply external power.

Refer to Section 8, Ground Handling, Servicing, and Maintenance, for use of external power and special precautions to be followed.

Convenience Outlet

A 12-volt convenience outlet is installed in the center console. The receptacle accepts a standard cigarette-lighter plug. The outlet may be used to power portable entertainment equipment such as CD players, cassette players, and portable radios. Amperage draw through the outlet must not exceed 3.5 amps. 28 VDC power for the convenience outlet is supplied through the 5-amp CONVENIENCE POWER circuit breaker on the Non-Essential Bus and reduced to 12 volts by a power regulator card in the console.

Exterior Lighting

The airplane is equipped with standard wing tip and tail-mounted navigation lights with integral anti-collision strobe lights. The separately controlled landing light is located in the left cowl inlet.

Navigation Lights

The airplane is equipped with standard wing tip navigation lights. The lights are controlled through the NAV light switch on the instrument panel bolster. 28 VDC for navigation light operation is supplied through the 3-amp NAV LIGHTS circuit breaker on Main Bus 2.

Strobe Light

Anti-collision strobe lights are installed integral with the standard navigation lights. Each strobe is flashed by a separate power supply. The strobe power supplies are controlled through the STROBE light switch on the instrument panel bolster. 28 VDC for strobe light and control circuits is supplied through the 5-amp STROBE LIGHTS circuit breaker on Main Bus 2.

Landing Light

A standard Halogen or optional High Intensity Discharge (HID) landing light is mounted in the lower engine cowl. The landing light is controlled through the LAND light switch on the instrument panel bolster.

In the standard (Halogen) installation, setting the LANDING light switch 'on' energizes the landing light control relay in the Master Control Unit (MCU) completing a 28 VDC circuit from the airplane primary bus to the Halogen lamp. A 15-amp circuit breaker on the primary bus in the MCU protects the circuit.

In the optional (HID) installation, setting the LANDING light switch 'on' energizes the landing light control relay in the Master Control Unit (MCU) completing a 28 VDC circuit from the airplane primary bus to energize the HID ballast, mounted on the forward firewall, which powers the HID lamp in the cowl. A 15-amp circuit breaker on the primary bus in the MCU protects the circuit.

Interior Lighting

Interior lighting for the airplane consists of separately controlled incandescent overhead lights for general cabin lighting, individual lights for the pilots and passengers, and dimmable panel floodlights. The flight instruments and avionics equipment lights are dimmable.

Instrument Lights

Instrument lighting for the airplane consists of dimmable incandescent lights in the instrument bezels. The lights are controlled through the INST lights control on the instrument panel bolster. Rotating the knob clockwise energizes the lights and increases brightness. The instrument light circuits operate on 28 VDC and are protected by the 2-amp INST LIGHTS circuit breaker on Main Bus 1.

Panel Flood Lights

A string of red LEDs mounted under the instrument panel glareshield provide flood lighting for the instrument panel. The lights are controlled through the PANEL lights control on the instrument panel bolster. Rotating the knob clockwise energizes the lights and increases brightness. The panel lights operate on 28 VDC supplied through the 3-amp CABIN LIGHTS circuit breaker on Main Bus 2.

Reading Lights

Individual eyeball-type reading lights are installed in the headliner above each passenger position. Each light is aimed by positioning the lens in the socket and is controlled by a push-button switch located next to the light. The pilot and copilot reading lights are also dimmable through the PANEL lights control on the instrument panel bolster. The lights are powered by 28 VDC supplied through the 3-amp CABIN LIGHTS circuit breaker on Main Bus 2.

Overhead Dome Light

General cabin lighting is provided by a dome light located in the headliner at the approximate center of the cabin. The dome light is controlled through the OVERHEAD light control on the instrument panel bolster. Rotating the knob clockwise from the off position will illuminate the light and control its intensity. The lights are powered by 28 VDC supplied through the 3-amp CABIN LIGHTS circuit breaker on Main Bus 2.

Environmental System

Cabin heating and ventilation is accomplished by supplying conditioned air for heating and windshield defrost and fresh air for ventilation. The conditioned air system consists of a heater muff (heat exchanger) around the right engine exhaust muffler, an air mixing plenum, air ducting for distribution, a windshield diffuser, forward outlet valves, and cable controls for selecting temperature and flow.

Ventilation air is provided by ducting fresh air from air inlets, located in each wing leading edge, to eyeball outlets for each occupant. Each occupant can direct the fresh air flow by positioning the nozzle or control flow rate from 'off' to maximum by rotating the nozzle.

Heating is accomplished by mixing ventilation air from the fresh air inlets with heated air from the heat exchanger and then distributing the 'conditioned' air to the occupants and/or the windshield diffuser. Air for heating is supplied by an inlet in the engine compartment to a muff-type heat exchanger surrounding the right engine exhaust muffler. This heated air is allowed to mix with fresh air from the wing root air inlets in the air mixing plenum behind the instrument panel. The proportion of heated to fresh air is pilot controllable. The mixed (conditioned) air is then directed to the passenger outlets and/or to the windshield diffuser. Conditioned air outlets for the forward occupants are directionally controllable and are located beneath the instrument panel at each position at knee level. Outlets for the rear occupants are at floor level.

The temperature, volume, and flow selection are regulated by manipulation of the cabin temperature and cabin air selector knobs on the lower right side of the instrument panel.

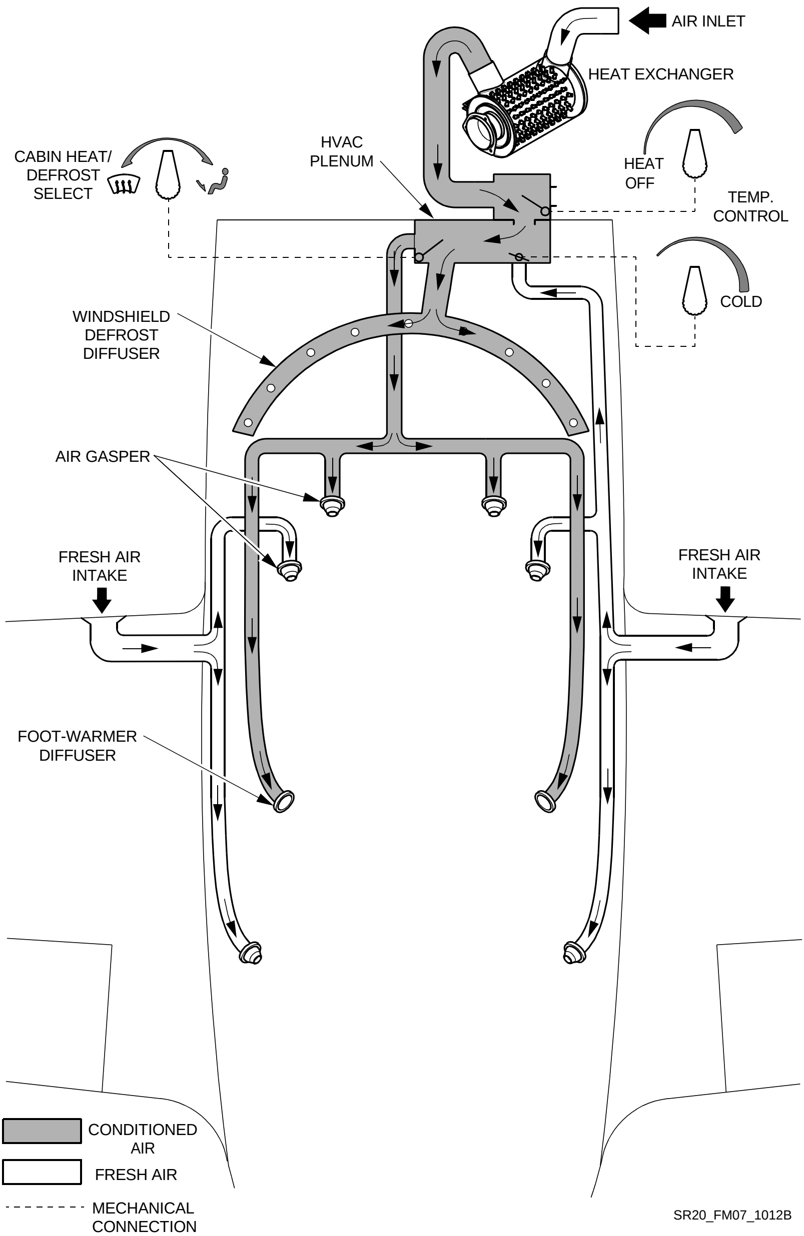


Figure 7-11
Heating and Ventilation

Cabin Heat Control

The amount of heated air allowed into the air mixing plenum is controlled by rotating the Cabin Heat Control, located inboard of the Cabin Air Selector. The control is mechanically linked to a door in a heater box between the heater muff and the mixing plenum. Rotating the control full counterclockwise (HEAT OFF) bypasses heated air from the heater muff into the engine compartment. Rotating the control clockwise opens the door in the heater box allowing heated air to enter the mixing plenum.

Cabin Cooling Control

The amount of cooling air allowed into the air mixing plenum is controlled by rotating the Cabin Cool Control, located outboard of the Cabin Air Selector. The control is mechanically linked to a butterfly valve at the fresh air entrance to the mixing plenum. Rotating the control full counterclockwise shuts down cooling airflow to the mixing plenum from the fresh air inlet in the right wing root. Rotating the control clockwise opens the butterfly allowing fresh cooling air to enter the mixing plenum. Rotating the knob to the full clockwise (COLD) position provides maximum cooling airflow to the mixing plenum.

Cabin Air Selector

Conditioned air from the mixing plenum can be proportioned and directed to the windshield or passengers by manipulating the Cabin Air Selector. The control is linked to a door at the outlet end of the mixing plenum. Rotating the control full counterclockwise to the miniature windshield shuts off airflow to the passenger air distribution system and allows maximum airflow to the windshield diffuser. Rotating the knob full clockwise to the seated person icon shuts off airflow to the windshield diffuser and allows maximum airflow to the passenger air distribution system. The control can be positioned to allow any proportion of windshield and passenger air.

Conditioned air for the forward seats is routed to outlets under the instrument panel at knee level. Conditioned air for the aft seats is ducted to outlets beneath the forward seats near the door posts and exits at floor level.

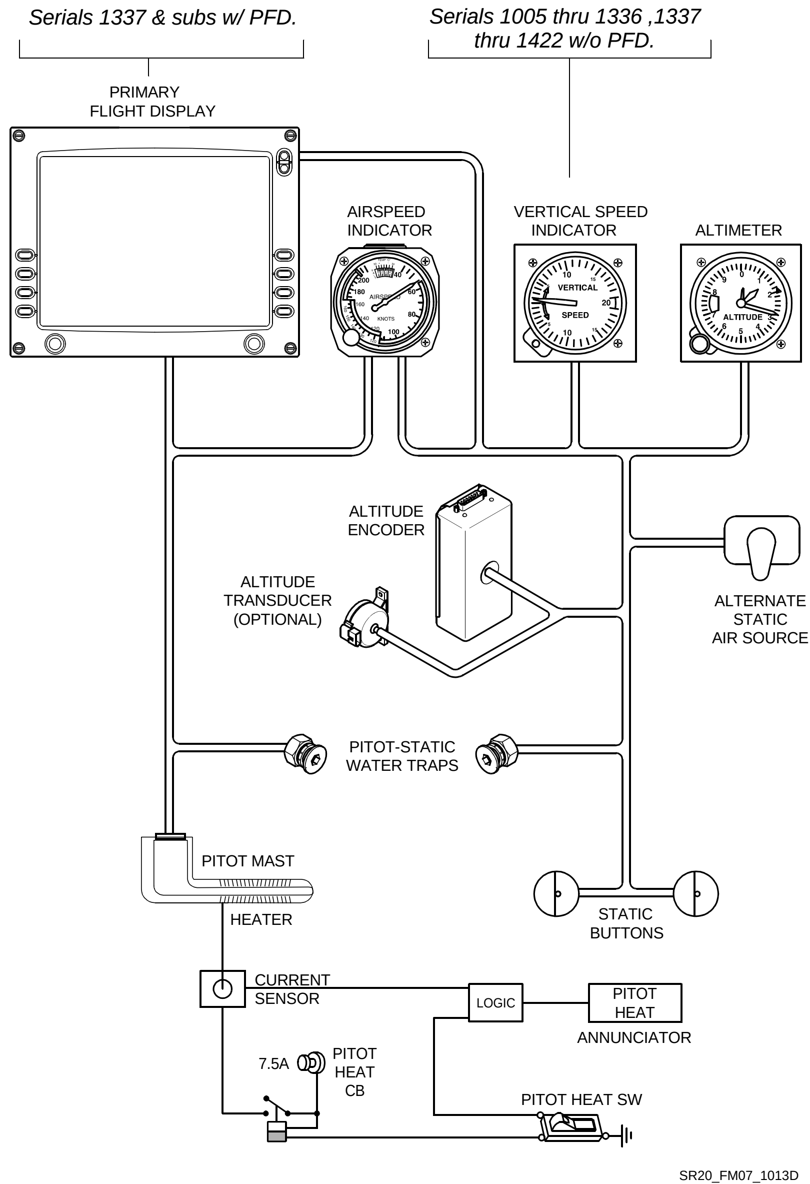


Figure 7-12
Pitot-Static System

Pitot-Static System

The Pitot-Static system consists of a single heated Pitot tube mounted on the left wing and dual static ports mounted in the fuselage. The Pitot heat is pilot controlled through a panel-mounted switch. An internally mounted alternate static pressure source provides backup static pressure should that the primary static source becomes blocked. Water traps with drains, under the floor in the cabin, are installed at each Pitot and static line low point to collect any moisture that enters the system. The traps should be drained at the annual inspection and when water in the system is known or suspected.

Pitot Heat Switch

The heated Pitot system consists of a heating element in the Pitot tube, a rocker switch labeled PITOT HEAT, and associated wiring. The switch and circuit breaker are located on the left side of the switch and control panel. When the Pitot heat switch is turned on, the element in the Pitot tube is heated electrically to maintain proper operation in possible icing conditions. Pitot heat should be used only when required. The Pitot heat system operates on 28 VDC supplied through the 7.5-amp PITOT HEAT/COOLING FAN circuit breaker on the Non-Essential Bus.

Pitot Heat Light

Illumination of the amber PITOT HEAT caution light indicates that the Pitot Heat switch is in the ‘on’ position and the Pitot heater is not receiving electrical current. A current sensor on the Pitot heater power supply wire provides current sensing. The PITOT HEAT warning light operates on 28 VDC supplied through the 2-amp ANNUN circuit breaker on the Essential Bus.

Alternate Static Source

An alternate static pressure source valve is installed on the switch and control panel to the right of the pilot’s leg. This valve supplies static pressure from inside the cabin instead of the external static port. If erroneous instrument readings are suspected due to water or ice in the pressure line going to the standard external static pressure source, the alternate static source valve should be turned on. Pressures within the cabin will vary with open heater/vents. Whenever the alternate static pressure source is selected, refer to Section 5 airspeed calibration and altitude for corrections to be applied.

Vacuum System

The airplane vacuum system provides the vacuum necessary to operate the attitude gyro and directional gyro. The system consists of an engine-driven vacuum pump, an electric vacuum pump for backup, two vacuum switches, two annunciators, a vacuum manifold, a vacuum regulator, vacuum system air filter, and the vacuum-driven instruments (including a suction gauge). The backup portion of the system operates automatically to provide vacuum for the instruments should the engine-driven vacuum pump fail. The back-up function is fully automatic and requires no pilot action. The electric vacuum pump operates on 28 VDC supplied through a 15-amp fuse on the airplanes primary bus in the Master Control Unit (MCU). Electric vacuum pump control circuits are protected by the 2-amp STANDBY VACUUM circuit breaker on the circuit breaker panel.

• Note •

For extended ground maintenance, disable standby vacuum pump by pulling the STANDBY VACUUM circuit breaker.

During the engine starting procedure when the battery master switch is turned ON, the following sequence will occur:

1. The red VACUUM annunciator light will come on. The standby vacuum pump will start and the amber AUX VAC light will come on. After a short delay, the attitude indicator GYRO flag will go out of view.
2. After the engine is started, the red VACUUM annunciator light will go out. The standby pump will stop and the amber AUX VAC light will go out.

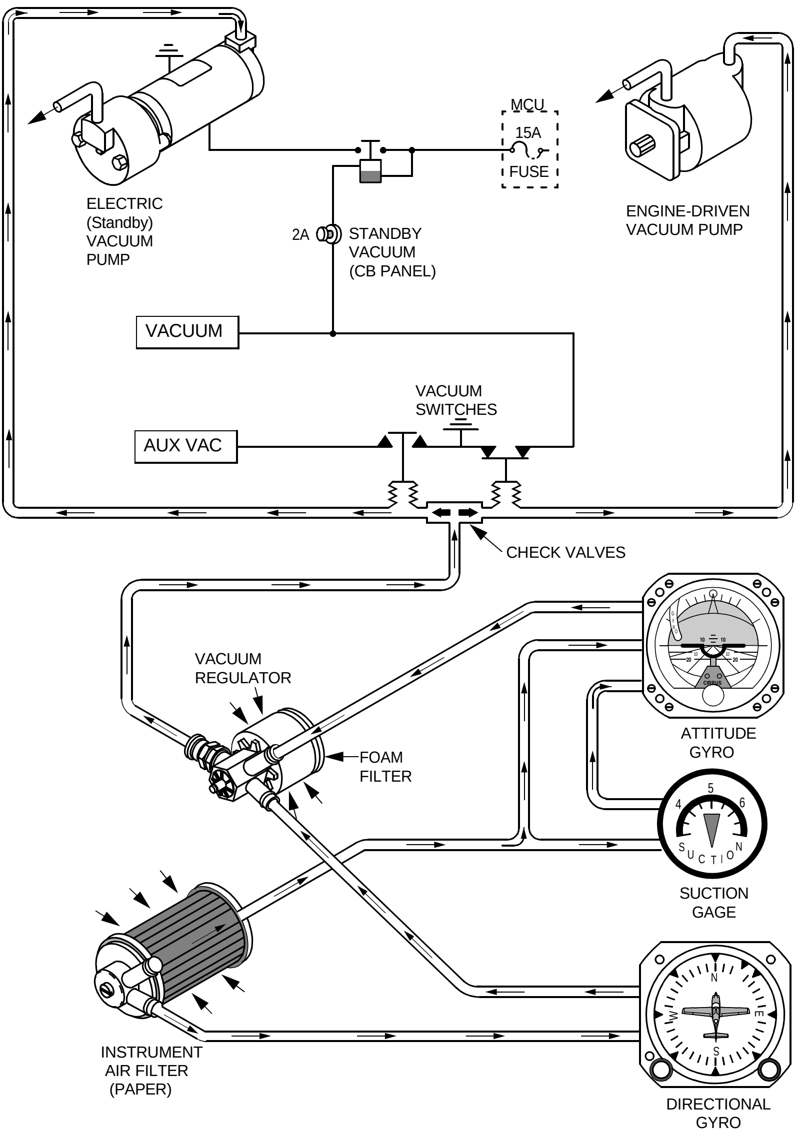


Figure 7-13
Vacuum System

Suction Gauge

The suction gauge, located on the far right side of the instrument panel, is calibrated in inches of Mercury (Hg). The gauge indicates suction available for operation of the attitude and directional gyros. The desired suction range is 4.5 to 5.4 inches of Hg. A suction reading out of this range may indicate a system malfunction or improper adjustment. The attitude and directional indicators should not be considered reliable when the suction gauge indicates out of range.

• Note •

The attitude GYRO flag will drop if the attitude indicator is not receiving adequate vacuum for operation.

Vacuum Warning Light

Illumination of the red VACUUM warning light in the annunciator panel indicates failure of the engine driven vacuum pump or that the airplane's engine is not operating. A vacuum switch in the vacuum line between the engine-driven vacuum pump and the vacuum manifold illuminates the VACUUM warning light on low vacuum in the line. In addition to illuminating the VACUUM warning light, the switch also trips a relay energizing the back-up electric vacuum pump. This condition exists whenever the BAT Master switch is on and the engine is not operating (such as before start) or in the event the engine-driven vacuum pump fails. The VACUUM warning light operates on 28 VDC supplied through the 2-amp ANNUNC PWR circuit breaker on the Essential Bus.

Aux Vac Caution Light

Illumination of the amber AUX VAC caution light in the annunciator panel indicates that the electric (back-up) vacuum pump is supplying vacuum. A vacuum switch in the vacuum line between the electric vacuum pump and the vacuum manifold illuminates the light on rising vacuum in the line. Normally, the light will be illuminated whenever electrical power is on the airplane and the engine-driven vacuum pump is not operating. The AUX VAC caution light operates on 28 VDC supplied through the 2-amp ANNUNC PWR circuit breaker on the Essential Bus.

Stall Warning System

The airplane is equipped with an electro-pneumatic stall warning system to provide audible warning of an approach to aerodynamic stall. The system consists of an inlet in the leading edge of the right wing, a pressure switch and associated plumbing, and a piezo-ceramic horn behind the instrument panel. As the airplane approaches a stall, the low pressure on the upper surface of the wings moves forward around the leading edge of the wings. As the low pressure area passes over the stall warning sense inlet, a slight negative pressure is sensed by the pressure switch. The pressure switch completes a ground circuit causing the warning horn to sound. The warning horn provides a 94dB continuous 2800 Hz tone. The warning sounds at approximately 5 knots above stall with full flaps and power off in wings level flight and at slightly greater margins in turning and accelerated flight. The system operates on 28 VDC supplied though the 2-amp STALL WARNING circuit breaker on the Essential Bus.

With battery power on, the stall warning system preflight check is accomplished as follows:

Stall warning system preflight check:

1. Use small suction cup and apply suction. A sound from the warning horn will confirm that the system is operative.

Standard Avionics

The following paragraphs and equipment descriptions describe all standard avionic installations offered for the SR20. The avionics navigation and communication equipment are mounted in he center console and are easily accessible from either pilot seat.

For detailed descriptions of specific avionic equipment, operating procedures, or data for optional avionic equipment, *refer to the equipment manufacturer's pilot's guide and the FAA Approved Airplane Flight Manual Supplement in Section 9* for specific information regarding the SR20 installation.

Standard avionics suites are available in the following configurations:

Standard Avionics System:

- Integrated Audio System with Intercom (Garmin GMA 340) - The audio panel allows the selection of radio inputs to each pilot's headset, selection of transmitting functions, and intercom.
- Marker Beacon Receiver (Garmin GMA 340) - The marker beacon receiver and annunciation functions are integrated into the airplane audio system.
- IFR approach-certified GPS (Garmin GNS 430) - The standard avionics in the SR20 is based on using Global Positioning System (GPS) as the primary navigation system. The GPS receiver provides position and track error data to the CDI and ARNAV moving map display. The Garmin GNS 430 also includes a VHF communications transceiver (COM 1), a VHF navigation receiver (NAV 1), and a moving map display.
- Two VHF Communications (COM) Transceivers - The COM transceivers provide VHF communications, as well as frequency storage and selection. COM 1 is integrated into the Garmin GNS 430 and COM 2 is integrated into the Garmin GNC 250XL.
- Navigation (NAV) Receiver (VOR/LOC/GS) - A navigation receiver using the standard VHF system is integrated into the Garmin GNS 430. This receiver allows VOR navigation and Instrument Landing System (ILS) approaches including localizer and glideslope tracking.

- Mode C Transponder with altitude encoder (Garmin GTX 320 or GTX 327) - An altitude digitizer provides altitude information to transponder and GPS receiver.
- Multi-Function Display - Either an ARNAV ICDS 2000 or an Avidyne FlightMax EX-Series moving map display is installed. The moving map display shows airplane position in pictorial representation on a moving map. The GPS navigator in the GARMIN GNS 430 automatically provides position information.
- Course Deviation Indicator (CDI) or Optional Horizontal Situation Indicator (HSI) - The CDI or HSI provides course deviation with respect to VOR, Localizer (LOC), and Glideslope (G/S) when VLOC is the selected navigation source and track deviation with respect to a GPS track when GPS is the selected navigation source. Optional vacuum powered or electrical powered conventional HSI's are available and an optional EHSI-type instrument is also available.
- Avionics Master Switch - Provides electrical power to airplane avionics. Powers up the Multi-Function Display.

Multi-Function Display

This airplane is equipped with an Avidyne FlightMax EX5000C 700-00004-XXX-() Multi-Function Flight Display (MFD). The MFD is a 10.4-inch landscape-oriented display mounted in the instrument panel. The MFD provides supplemental display of situational and navigation information to the pilot. This is accomplished by showing an icon representing the airplane against a moving map. The MFD accepts data from a variety of sources, including the GPS sensors, the WX-500 Stormscope, and the SkyWatch Traffic Advisory System. The unit is organized around logical grouping of information presented on "Pages."

The Avidyne FlightMax EX-Series MFD is 10.4-inch diagonal color Active Matrix Liquid Crystal Display (AMLCD) integrated into a Control Display Unit (CDU), which displays the airplane current position and track against a moving map. The EX-Series MFD can perform the following functions:

- Generate and display a moving map based on GPS position data with obstacle and terrain data.
- Display Stormscope® lightning strike bearing and distance.
- Display Skywatch® traffic advisory information. (EX5000C only)
- Display a GPS flight plan based on pilot inputs.
- Display Normal and Emergency checklists as well as performance data.
- Display navigation data, such as groundspeed and track.

The pilot can configure the moving map display. Some of its configuration features are:

- Select Track-up or North-up modes.
- Select map scale.
- Select terrain features, such as airports and special use airspace and select color enhanced terrain.
- Select and view trip data from GPS.

Power for the MCU is 28 VDC supplied through the 5-amp MFD circuit breaker on the Avionics Non-Essential Bus.

• Note •

Serials 1005 through 1472 before MFD software version 530-00162-000 Revision 02; Do not use the Garmin 420 or 430 Navigators to display Stormscope lightning data when the Avidyne MFD's Lightning mode is set to either DATALINK or OFF. For the Garmin 420 or 430 Navigators to accurately display lightning strikes, the Lightning mode selected on the MFD's MAP Page, must be set to either STRIKE or CELL.

Refer to Avidyne FlightMax EX5000C Pilot's Guide, for a more complete description of the MFD, its operating modes, and additional detailed operating procedures.

Autopilot

The airplane may be equipped with the standard S-TEC System Twenty Autopilot, an optional S-TEC System Thirty Autopilot, or an optional S-TEC System 55X autopilot. Refer to the applicable FAA Approved Airplane Flight Manual Supplement and the applicable Pilot's Guide for additional description as well as specific limitations and operating procedures for the SR20.

S-TEC System 20 Autopilot (Standard)

The standard SR20 is equipped with an S-TEC System Twenty Autopilot. This single-axis autopilot system is a rate-based system, deriving roll axis control inputs from its electric turn coordinator. The programmer, computer, annunciators, and servo amplifier are contained entirely within the turn coordinator case. Pilot inputs to the autopilot are made through the multi-function control knob at the upper left corner of the turn coordinator. The control knob provides mode selection, disengage, and turn command functions. The turn coordinator instrument annunciates system modes. The autopilot may be disengaged using either the multi-function control knob or by pressing down on the trim switch on either control yoke handle. The autopilot drives the aileron trim motor and spring cartridge to control airplane roll. 28 VDC for autopilot operation is supplied through the 5-amp AUTOPILOT circuit breaker located on Main Bus 1.

The S-Tec System Twenty Autopilot features:

- Roll Stabilization.
- Turn Command.
- Heading Hold interfaced with DG coupled heading bug.
- NAV/LOC/GPS tracking, HI and LO sensitivity.

S-TEC System 30 Autopilot (Optional)

The optional S-TEC System Thirty Autopilot is a two-axis autopilot system receives roll axis control inputs from an integral electric turn coordinator and altitude information from an altitude transducer plumbed into the static system. The programmer, computer/amplifier, and annunciators are contained entirely within the turn coordinator case. Pilot inputs to the autopilot are made through the Multi-function Control Knob at the upper left of the turn coordinator, through the Altitude Hold switches on the control yoke handles, and the trim control switches on the control yoke handles. The control knob provides mode selection, disengage, and turn command functions. The autopilot makes roll changes through the aileron trim motor and spring cartridge and makes pitch changes for altitude hold through the pitch trim motor and spring cartridge. 28 VDC for autopilot operation is supplied through the 5-amp AUTOPILOT circuit breaker located on Main Bus 1.

The S-Tec System Thirty Autopilot features:

1. Roll Stabilization.
2. Turn Command.
3. Heading Hold interfaced with DG or HSI coupled heading bug.
4. NAV/LOC/GPS tracking, HI and LO sensitivity.
5. Altitude Hold.

S-TEC System 55 / 55X Autopilot (Optional)

The optional S-TEC System 55 or 55X is a two-axis autopilot system. The system consists of a flight guidance programmer/computer, altitude transducer, turn coordinator, and HSI. Mode selection and vertical speed selection is made on the programmer/computer panel. A button on each control yoke handle may be used to disengage the autopilot. The autopilot makes roll changes through the aileron trim motor and spring cartridge and makes pitch changes for vertical speed and altitude hold through the pitch trim motor and spring cartridge. The autopilot operates on 28 vdc supplied through the 5-amp AUTOPILOT circuit breaker on the Main Bus #1.

The SR20 installation S-TEC System 55 and 55X Autopilot features:

1. Heading Hold and Command.
2. NAV/LOC/GPS/GS tracking, high and low sensitivity, and automatic 45° course intercept.
3. Altitude Hold and Command.
4. Vertical Speed Hold and Command.
    - GPS Steering (GPSS) for smoother capture and tracking of enroute or approach course (System 55X only).

GPS Navigation

The airplane is equipped with two GPS navigators. The Garmin GNS 430 navigator is the primary system, is IFR certified, and is coupled to the airplane's CDI and Multi-Function display. The Garmin GNC 250XL provides backup and is approved for VFR use only. GPS1 navigators are capable of providing IFR en route, terminal, and approach navigation with position accuracies better than 15 meters. GPS1 utilizes the Global Positioning System (GPS) satellite network to derive the airplane's position (latitude, longitude, and altitude) and the altitude digitizer to enhance the altitude calculation. The GPS1 antenna is located above the headliner along the airplane centerline. The GPS2 antenna is located below the glareshield and behind the ARNAV MFD. All GPS navigator controls and functions are accessible through the GPS receiver units' front control panels located in the center console. The panels include function keys, power switches, MSG and Nav status annunciators, a color LCD display (GNS 430), a monochromatic display (GNC 250XL), two concentric selector knobs on each panel, and a Jeppesen NavData card slot in each panel. The displays are daylight readable and automatically dimmed for low-light operation. The GNS 430 navigator is powered by 28 VDC through the 5-amp GPS1 and 7.5-amp COM1 circuit breakers on the Avionics Essential Bus. The GNC 250XL navigator is powered by 14 VDC through a 28 to 14 VDC converter mounted under the center console. 28 VDC to power the voltage converter is supplied through the 7.5-amp COM2 circuit breaker on the Avionics Non-Essential Bus.

The Jeppesen Navigation Database provides access to data on Airports, Approaches, Standard Instrument Departures (SIDs), Standard Terminal Arrivals (STARs), VORs, NDBs, Intersections, Minimum Safe Altitudes, Controlled Airspace Advisories and Frequencies. North American and International databases are available. Database information is provided on a card that can be inserted into the card slot on the GPS unit. Subscription information is provided in a subscription packet provided with each system.

Communication (COM) Transceivers

Two VHF communications (COM) transceivers are installed to provide VHF communication. The transceivers and integrated controls are mounted in the Garmin GNS 430 and GNC 250XL units. The transceivers receive all narrow- and wide-band VHF communication transmissions transmitted within range of the selected frequency. The antennas pick up the signals and route the communication signals to the transceivers, which digitize the audible communication signal. The digitized audio is then routed to the audio control unit for distribution to the speakers or headphones.

COM 1 - The Garmin GNS 430 (upper unit) is designated COM 1. The Garmin GNS 430 control panel provides COM 1 transceiver active and standby frequency indication, frequency memory storage, and knob-operated frequency selection. The COM 1 transceiver provides either 720-channel (25 kHz spacing) or 2280-channel (8.33 kHz spacing) operation in a frequency range from 118.000 to 136.975 MHz. The COM 1 antenna is located above the cabin on the airplane centerline. 28 VDC for COM 1 transceiver operation is controlled through the Avionics Master Switch on the bolster switch panel and supplied through the 7.5-amp COM 1 circuit breaker on the Essential Avionics Bus.

COM 2 - The Garmin GNC 250XL (lower unit) is designated COM 2. The Garmin GNC 250XL control panel provides COM 2 transceiver active and standby frequency indication, frequency memory storage, and knob-operated frequency selection. The COM 2 transceiver provides 760-channel (25 kHz spacing) operation in a frequency range from 118.000 to 136.975 MHz. The COM 2 antenna is located on the underside of the cabin on the airplane centerline. 14 VDC for COM 2 transceiver operation is controlled through the Avionics Master Switch on the bolster switch panel and supplied through the 28 to 14 VDC voltage converter from the 7.5-amp COM 2 circuit breaker on the Non-Essential Avionics Bus.

Navigation (Nav) Receiver

The Garmin GNS 430 provides an integrated Navigation (NAV) receiver with VHF Omnirange/Localizer (VOR/LOC) and Glideslope (G/S) capability. The VOR/LOC receiver receives VOR/LOC on a frequency range from 108.000 Mhz to 117.950 Mhz with 50 kHz spacing. Glideslope is received from 329.150 to 335.000 in 150 kHz steps. The Nav receiver controls are integrated into the Garmin GPS 430 control mounted in the center console. The receiver control provides active and standby frequency indication, frequency memory storage, and knob-operated frequency selection. IDENT audio output for VOR and LOC is provided to the audio system. The Nav antenna is mounted on top of the vertical tail. 28 VDC for navigation receiver operation is controlled through the Avionics Master Switch on the bolster switch panel and supplied through the 5-amp GPS1 circuit breaker on the Avionics Non-Essential Bus.

Transponder

The airplane is equipped with a single Garmin GTX 320 or GTX 327 ATC Mode C (identification and altitude) transponder with squawk capability. The transponder system consists of the integrated receiver/transmitter control unit, an antenna, and an altitude digitizer. The receiver/transmitter receives interrogations from a ground-based secondary radar transmitter and then transmits to the interrogating Air Traffic Control Center. Digitized altitude information is provided by a altitude digitizer (encoder) plumbed into the airplane static system. The transponder and integrated controls are mounted in the center console. The transponder control provides active code display, code selection, IDENT button, and test functions. The display is daylight readable and dimming is operator controlled through the INST lights control on the instrument panel bolster. The transponder antenna is mounted on the underside of the fuselage just aft of the firewall. 28 VDC for transponder operation is controlled through the Avionics Master Switch on the bolster switch panel. 28 VDC for receiver, transmitter, and altitude encoder operation is supplied through the 2-amp ENCODER/TRANSPONDER circuit breaker on the Avionics Essential Bus.

Audio System

The Garmin GMA 340 audio control unit, located in the center console, provides audio amplification, audio selection, marker beacon control, and a voice activated intercom system for the cabin speaker, headsets, and microphones. The system allows audio switching for up to three transceivers (COM 1, COM 2, and COM 3) and five receivers (NAV 1, NAV2, ADF, DME, and MKR). In addition, there are two un-switched audio inputs for telephone ringer and altitude warning. Additional inputs are provided for two individual personal entertainment devices. Push buttons select the receiver audio source provided to the headphones. A fail-safe mode connects the pilot headphone and microphone to COM 1 if power is removed or if the Mic Selector switch is turned to the OFF position.

Headset/Microphone Installation

The airplane is equipped with provisions for four noise-canceling headsets with integrated microphones. The forward microphone headsets use remote Push-To-Talk (PTT) switches located on the top of the associated control yoke grip. The rear headsets do not have COM transmit capabilities and do not require PTT switches. The microphone (MIC), headset, and automatic noise reduction (ANR) power jacks for the pilot and front seat passenger are located in the map case and similar jacks for the aft passengers are located on the aft portion of the center console. Audio to all four headsets is controlled by the individual audio selector switches on the audio control panel and adjusted for volume level by using the selected receiver volume controls.

Audio Input Jack

Two audio input jacks are provided on the aft portion of the center console. One jack is located near the convenience outlet for use by the pilot and forward passenger, and another is located further aft by the rear passenger ANR power jacks. These jacks can be used to plug in personal entertainment devices such as portable radios, cassette players, or CD players. Audio volume through these jacks is controlled by connected individual entertainment device.

Emergency Locator Transmitter

The airplane is equipped with a self-contained emergency locator transmitter (ELT). The transmitter and antenna are installed immediately behind the aft cabin bulkhead to the right of the airplane centerline. The main transmitter control switch, labeled ON-OFF-ARMED, on the transmitter is in the armed position for normal operations. A remote switch and indicator panel is installed immediately below the circuit breaker panel. The transmitter unit is mounted longitudinally in the airplane in order to detect deceleration greater than 3.5 ft/sec. If rapid deceleration is detected, the transmitter will repeatedly transmit VHF band audio sweeps at 121.5 Mhz and 243.0 Mhz approximately 0.5 seconds apart. The transmitter and attached portable antenna are accessible through an access at the base of the baggage compartment bulkhead. The ELT can be removed from the airplane and used as a personal locating device if it is necessary to leave the airplane after an accident. Eight dated "D" cell alkaline batteries contained within the transmitter unit power the ELT transmitter. The batteries must be replaced at specified intervals based upon the date appearing on the battery (refer to SR-20 Airplane Maintenance Manual).

ELT Remote Switch and Indicator Panel

The ELT remote switch and indicator panel located immediately below the circuit breaker panel, provides test and monitoring functions for the ELT. The panel contains a button labeled ON, a button labeled RESET, and a red LED (light). The red light flashes when the ELT is transmitting. The ON button is used to test the unit in accordance with the maintenance manual procedures. The RESET button can be used to cancel an inadvertent transmission. A 6-volt Lithium battery mounted in the panel powers the LED. The battery must be replaced at regular intervals (refer to SR20 Airplane Maintenance Manual).

In the event of an accident:

1. Verify ELT operation by noting that the ELT indicator light on the remote panel is flashing.
2. If possible, access the unit as described below and set the ELT main transmitter control switch ON.

Portable use of ELT:

3. Remove access at lower aft center of baggage compartment.
4. Disconnect fixed antenna lead from front of unit.
5. Disconnect lead from remote switch and indicator unit.
6. Loosen attach straps and remove transmitter unit and portable antenna.
7. Attach portable antenna to antenna jack on front of unit.
8. Set main control switch to ON.
    a. Hold antenna upright as much as possible.

Hour Meter

The airplane is equipped with an hour meter to record engine operating time. The hour meter is located inside the armrest storage compartment between the pilot and copilot seats. The hour meter records time when BAT 1 switch is ON and the ALT 1 or ALT 2 switch is set to ON. Power for hour meter operation is 28VDC supplied through the 5-amp ENGINE INST circuit breaker on the Essential Bus.

Digital Clock

The airplane is equipped with a 2¼" Davtron M803 digital clock located on the left instrument panel immediately outboard of the airspeed indicator. The clock provides Universal Time (UT), Local Time (LT), Elapsed Time (ET), Outside Air Temperature (OAT) in °C or °F, and Voltmeter functions. All features and functions are selectable from control buttons on the clock face. The clock receives the OAT signal from a temperature sensor installed immediately forward of the pilots door. The clock operates on 28 VDC supplied through the 5-amp Engine Inst circuit breaker on Main Bus 1. Keep-alive power is supplied through a 5-amp fuse connected to the airplane main distribution bus in the Master Control Unit (MCU). A replaceable AA battery is installed to provide up to three years battery back up.

SEL and CTL Buttons

All time keeping and set functions are addressable using the Select and Control buttons below the time display. Upon power up the clock will display Universal Time (UT). Pressing the Select button 3 times will display Local Time (LT), and Elapsed Time (ET) sequentially. Pressing the button again will return the display to UT.

Set UT or LT:

Use the Select button to select UT or LT as desired. Simultaneously press Select and Control buttons (tens of hours LED will flash). Press Control button repeatedly as required to increment digit to desired value. Press Select button to select the next digit to be set. After all digits have been set, press the Select button again to return to the normal mode.

Flight Time (FT):

The flight time (FT) option is not available in this installation. If FT is selected the display will 'zero.'

Elapsed Time (ET):

The ET mode may be used either in 'count-up' or in 'count-down' modes.

To set the count-up mode:

1. Select ET using the Select button; and

2. Press Control to activate count-up timer. Elapsed time counts up to 59 minutes, 59 seconds, and then switches to hours and minutes. Pressing the Control button again will reset the timer to zero.

To set the count-down mode:

1. Select ET using the Select button;
2. Input a ‘count-down’ time using the same technique as setting UT or LT (a maximum of 59 minutes, 59 seconds may be entered);
3. Press the Select button to exit the set mode; and
4. Press Control to start the count down. At zero, the alarm activates and the display flashes. Pressing either Select or Control deactivates the alarm.

Test Mode:

To enter the self-test mode, hold the Select button for 3 seconds. The display will indicate “88:88” and all four (UT, LT, FT, ET) annunciators will come on.

OAT – VOLTS Button

The red OAT-VOLTS button is used to display Outside Air Temperature and airplane main bus voltage. When the airplane is powered down, the upper display will display the clock’s back-up battery voltage. Upon power up, the display will show the airplane’s main bus voltage. Pressing the button displays OAT in °F. Pressing the button again displays OAT in °C.

Cirrus Airplane Parachute System

The SR20 is equipped with a Cirrus Airplane Parachute System (CAPS) designed to bring the aircraft and its occupants to the ground in the event of a life-threatening emergency. The system is intended to saves the lives of the occupants but will most likely destroy the aircraft and may, in adverse circumstances, cause serious injury or death to the occupants. Because of this it is important to carefully read the CAPS descriptions in this section, section 3 Emergency Procedures and Section 10, Safety and consider when and how you would use the system.

• WARNING •

The parachute system does not require electrical power for activation and can be activated at any time. The solid-propellant rocket flight path is upward from the parachute cover. Stay clear of parachute canister area when aircraft is occupied. Do not allow children in the aircraft unattended.

System Description

The CAPS consists of a parachute, a solid-propellant rocket to deploy the parachute, a rocket activation handle, and a harness imbedded within the fuselage structure.

A composite box containing the parachute and solid-propellant rocket is mounted to the airplane structure immediately aft of the baggage compartment bulkhead. The box is covered and protected from the elements by a thin composite cover.

The parachute is enclosed within a deployment bag that stages the deployment and inflation sequence. The deployment bag creates an orderly deployment process by allowing the canopy to inflate only after the rocket motor has pulled the parachute lines taut.

The parachute itself is a 2400-square-foot round canopy equipped with a slider, an annular-shaped fabric panel with a diameter significantly less than the open diameter of the canopy. The slider has grommets spaced around its perimeter. The canopy suspension lines are routed through these grommets so that the slider is free to move along the suspension lines. Since the slider is positioned at the top of the suspension lines near the canopy, at the beginning of the deployment sequence the slider limits the initial diameter of the parachute and the rate at which the parachute inflates. As the slider moves down the suspension lines the canopy inflates.

A three-point harness connects the airplane fuselage structure to the parachute. The aft harness strap is stowed in the parachute canister and attached to the structure at the aft baggage compartment bulkhead. The forward harness straps are routed from the canister to firewall attach points just under the surface of the fuselage skin. When the parachute deploys, the forward harness straps pull through the fuselage skin covering from the canister to the forward attach points.

Activation Handle

CAPS is initiated by pulling the CAPS Activation T-handle installed in the cabin ceiling on the airplane centerline just above the pilot's right shoulder. A placarded cover, held in place with hook and loop fasteners, covers the T-handle and prevents tampering with the control. The cover is be removed by pulling the black tab at the forward edge of the cover.

Pulling the activation T-handle will activate the rocket and initiate the CAPS deployment sequence. To activate the rocket, two separate events must occur:

1. Pull the activation T-handle from its receptacle. Pulling the T-handle removes it from the o-ring seal that holds it in place and takes out the slack in the cable (approximately two inches (5 cm) of cable will be exposed). Once the slack is removed, the T-handle motion will stop and greater force will be required to activate the rocket.
2. Clasp both hands around activation T-handle and pull straight downward with a strong, steady, and continuous force until the rocket activates. A chin-up type pull works best. Up to 45.0 pounds (20.4 Kg) force, or greater, may be required to activate the rocket. The greater force required occurs as the cable arms and then releases the rocket igniter firing pin. When the firing pin releases, two primers discharge and ignite the rocket fuel.

• Note •

Jerking or rapidly pulling on the activation T-handle greatly increases the pull forces required to activate the rocket.

Attempting to activate the rocket by pushing the activation T-handle forward and down limits the force that can be applied. Pulling the activation T-handle straight down generates the greatest force.

A maintenance safety pin is provided to ensure that the activation handle is not pulled during maintenance. However, there may be some circumstances where an operator may wish to safety the CAPS system; for example, the presence of unattended children in the airplane, the presence of people who are not familiar with the CAPS activation system in the airplane, or during display of the airplane.

The pin is inserted through the handle retainer and barrel locking the handle in the "safe" position. A "Remove Before Flight" streamer is attached to the pin.

• WARNING •

After maintenance has been performed or any other time the system has been safetied, operators must verify that the pin has been removed before further flight.

Deployment Characteristics

When the rocket launches, the parachute assembly is extracted outward due to rocket thrust and rearward due to relative wind. In approximately two seconds the parachute will begin to inflate.

When air begins to fill the canopy, forward motion of the airplane will dramatically be slowed. This deceleration increases with airspeed but in all cases within the parachute envelope should be less than 3 g's. During this deceleration a slight nose-up may be experienced, particularly at high speed; however, the rear riser is intentionally snubbed short to preclude excessive nose-up pitch. Following any nose-up pitching, the nose will gradually drop until the aircraft is hanging nose-low beneath the canopy.

Eight seconds after deployment, the rear riser snub line will be cut and the aircraft tail will drop down into its final approximately level attitude. Once stabilized in this attitude, the aircraft may yaw slowly back and forth or oscillate slightly as it hangs from the parachute. Descent rate is expected to be less than 1500 feet per minute with a lateral speed equal to the velocity of the surface wind. In addition, surface winds may continue to drag the aircraft after ground impact.

• Caution •

Ground impact is expected to be equivalent to touchdown from a height of approximately 10 feet. While the airframe, seats and landing gear are designed to accommodate this stress, occupants must prepare for it in accordance with the CAPS Deployment procedure in Section 3 - Emergency Procedures.

• Note •

The CAPS is designed to work in a variety of aircraft attitudes, including spins. However, deployment in an attitude other than level flight may yield deployment characteristics other than those described above.

Intentionally Left Blank

Section 8
Handling, Servicing, Maintenance

Table of Contents

Introduction

This section provides general guidelines for handling, servicing and maintaining your Cirrus Design SR20. In order to ensure continued safe and efficient operation of your airplane, keep in contact with your Authorized Cirrus Service Center to obtain the latest information pertaining to your aircraft.

Operator’s Publications

The FAA Approved Airplane Flight Manual and Pilot’s Operating Handbook (POH) is provided at delivery. Additional or replacement copies may be obtained from Cirrus Design by contacting the Customer Service Department.

Service Publications

The following service publications are available for purchase from Cirrus Design for the SR20:

- Airplane Maintenance Manual (AMM) – GAMA-type Maintenance Manual divided into chapters as specified by GAMA and ATA covering inspection, servicing, maintenance, troubleshooting, and repair of the airplane structure, systems, and wiring. Revision Service for this manual is also available. A current copy of the AMM is provided at delivery.
- Engine Operators and Maintenance Manual – Cirrus Design provides a Teledyne Continental Engine Operator’s and Maintenance Manual at the time of delivery. Engine and engine accessory overhaul manuals can be obtained from the original equipment manufacturer.
- Avionics Component Operator and Maintenance Manuals -– Cirrus Design provides all available operator’s manuals at the time of delivery. Maintenance manuals, if available, may be obtained from the original equipment manufacturer.

Cirrus Design offers a Subscription Service for the Service Bulletins, Service Letters and Options Letters issued from the factory. This service is offered to interested persons such as owners, pilots and mechanics at a nominal fee. Interested parties may obtain copies and subscription service for these documents by contacting Customer Service at Cirrus Design.

- Service Bulletins – -are of special importance. When you receive a Service Bulletin, comply with it promptly.
- Service Advisory Notices – are used to notify you of optional Service Bulletins, supplier Service Bulletins or Service Letters affecting your airplane, and maintenance data or corrections not requiring a Service Bulletin. Give careful attention to the Service Advisory Notice information.

Ordering Publications

SR20 publications, revision service, and service publication subscription service may be obtained by contacting Customer Service at Cirrus Design as follows:

Cirrus Design Corporation

Customer Service

4515 Taylor Circle

Duluth, MN 55811

Phone: 218 727-2737

FAX: 218 727-2148

Make sure to include airplane serial number and owner's name in all correspondence for accurate processing of your documentation needs.

Airplane Records and Certificates

The Federal Aviation Administration (FAA) requires that certain data, certificates, and licenses be displayed or carried aboard the airplane at all times. Additionally, other documents must be made available upon request. The mnemonic acronym “ARROW” is often used to help remember the required documents.

• Note •

Owners of aircraft not registered in the United States should check with the registering authority for additional requirements.

Required Documents		Note
A	Airworthiness Certificate *FAA Form 8100-2*	Must be displayed at all times
R	Registration Certificate *FAA Form 8050-3*	Must be in the aircraft for all operations.
R	Radio Station License *FCC Form 556*	Required only for flight operations outside the United States
O	Operating Instructions	FAA Approved Flight Manual and Pilot’s Operating Handbook fulfills this requirement
W	Weight & Balance Data	Included in FAA Approved Airplane Flight Manual and Pilot’s Operating Handbook. Data must include current empty weight, CG, and equipment list.

Other Documents	Note
Airplane Logbook	Must be made available upon request
Engine Logbook	Must be made available upon request
Pilot’s Checklist	Available in cockpit at all times.

Airworthiness Directives

The Federal Aviation Administration (FAA) publishes Airworthiness Directives (AD's) that apply to specific aircraft and aircraft appliances or accessories. AD's are mandatory changes and must be complied with within a time limit set forth in the AD. Operators should periodically check with Cirrus Service Centers or A&P mechanic to verify receipt of the latest issued AD for their airplane.

Airplane Inspection Periods

• Note •

FAR 1.1 defines time in service, with respect to maintenance time records, as "the time from the moment an aircraft leaves the surface of the earth until it touches it at the next point of landing."

The inspection items specified in the Annual/100 Inspection have been determined by the average aircraft use rate of the typical owner. Non-commercially operated aircraft that are flown significantly more than 100 hours per year should consider additional inspections commensurate with the hours flown. 100-Hour Inspection or enrollment in a Progressive Inspection Program should be considered in addition to the normally required Annual Inspection. The Annual Inspection interval may also be shortened to accommodate high utilization rate.

Annual Inspection

Unless enrolled in a Progressive Inspection Program, The U.S. Federal Aviation Regulations require all civil aircraft must undergo a thorough Annual Inspection each twelve calendar months. Annual Inspections are due on the last day of the twelfth month following the last Annual Inspection. For example: If an Annual Inspection were performed on 19 November 1998, the next Annual Inspection will be due 30 November 1999. Annual Inspections must be accomplished regardless of the number of hours flown the previous year and can only be performed by a licensed Airframe and Powerplant (A&P) mechanic holding an Inspection Authorization (IA). All Cirrus Authorized Service Centers can perform Annual Inspections. The inspection is listed, in detail, in Chapter 5 of the Aircraft Maintenance Manual.

100-Hour Inspection

If the airplane is used commercially, in addition to the Annual Inspection requirement, the Federal Aviation Regulations requires that the airplane undergo a 100-Hour Inspection each 100 hours of flight operation. The scope of the 100-Hour Inspection is identical to the Annual Inspection except that it can be accomplished by a licensed A&P mechanic. The 100-hour interval may be exceeded by not more than 10 flight hours in order to reach a place where the inspection can be accomplished. Any flight hours used to reach an inspection station must be deducted from the next 100-Hour Inspection interval. The inspection is listed, in detail, in Chapter 5 of the Aircraft Maintenance Manual.

Cirrus Design Progressive Inspection Program

In lieu of the above requirements, an airplane may be inspected using a Progressive Inspection Program in accordance with the Federal Aviation Regulation Part 91.409.

The Cirrus Design Progressive Inspection Program provides for the complete inspection of the airplane utilizing a five-phase cyclic inspection program. A total of eight inspections are accomplished over the course of 400 flight hours, with an inspection occurring every 50 flight hours. The inspection items to be covered in the Progressive Inspection are very similar to the Annual Inspection items. The Progressive Inspection will accomplish a full Inspection of the airplane at 400 flight hours or at 12 calendar months. The inspection is listed, in detail, in Chapter 5 of the Aircraft Maintenance Manual.

Pilot Performed Preventative Maintenance

The holder of a Pilot Certificate issued under FAR Part 61 may perform certain preventive maintenance described in FAR Part 43, Appendix A. This maintenance may be performed only on an aircraft that the pilot owns or operates and which is not used in air carrier service. The regulation also stipulates that the pilot must also complete the appropriate logbook entries. The following is a list of the maintenance that the pilot may perform:

• Note •

The pilot should have the ability and manual procedures for the work to be accomplished.

The pilot may not accomplish any work involving the removal or disassembly of primary structure or operating system, or interfere with an operating system, or affect the primary structure.

1. Remove, install, and repair tires.
2. Clean, grease, or replace wheel bearings
3. Replace defective safety wire or cotter pins.
4. Lubrication not requiring disassembly other than removal of nonstructural items such as access covers, cowlings, or fairings.

• Caution •

Do not use unapproved lubricants. Unapproved lubricants may damage control system components, including but not limited to engine and flight controls. *Refer to the Airplane Maintenance Manual* for approved lubricants.

5. Replenish hydraulic fluid in the hydraulic and brake reservoirs.
6. Refinish the airplane interior or exterior (excluding balanced control surfaces) with protective coatings.
7. Repair interior upholstery and furnishings.
8. Replace side windows.
9. Replace bulbs, reflectors and lenses of position and landing lights.
10. Replace cowling not requiring removal of the propeller.
11. Replace, clean or set spark plug gap clearance.

12. Replace any hose connection, except hydraulic connections, with replacement hoses.
13. Clean or replace fuel and oil strainers, as well as replace or clean filter elements.
14. Replace prefabricated fuel lines.
15. Replace the battery and check fluid level and specific gravity.

Logbook Entry

After any of the above work is accomplished, appropriate logbook entries must be made. Logbook entries should contain:

1. The date the work was accomplished.
2. Description of the work.
3. Number of hours on the aircraft.
4. The certificate number of pilot performing the work.
5. Signature of the individual doing the work.

Logbooks should be complete and up to date. Good records reduce maintenance cost by giving the mechanic information about what has or has not been accomplished.

Ground Handling

Application of External Power

A ground service receptacle, located just aft of the cowl on the left side of the airplane, permits the use of an external power source for cold weather starting and maintenance procedures.

• WARNING •

If external power will be used to start engine, keep yourself, others, and power unit cables well clear of the propeller rotation plane.

To apply external power to the airplane:

• Caution •

Do not use external power to start the airplane with a ‘dead’ battery or to charge a dead or weak battery in the airplane. The battery must be removed from the airplane and battery maintenance performed in accordance with the appropriate Airplane Maintenance Manual procedures.

1. Ensure that external power source is regulated to 28 VDC.
2. Check BAT and AVIONICS power switches are ‘off.’
3. Plug external power source into the receptacle.
4. Set BAT switch to ON. 28 VDC from the external power unit will energize the main distribution and essential distribution buses. The airplane may now be started or electrical equipment operated.
5. If avionics are required, set AVIONICS power switch ON.

• Caution •

If maintenance on avionics systems is to be performed, it is recommended that external power be used. Do not start or crank the engine with the AVIONICS power switch ‘on.’

To remove external power from airplane:

1. If battery power is no longer required, set BAT switch ‘off.’
2. Pull external power source plug.

Towing

The airplane may be moved on the ground by the use of the nose wheel steering bar that is stowed in the rear baggage compartment or by power equipment that will not damage or excessively strain the nose gear assembly. The steering bar is engaged by inserting it into lugs just forward of the nose wheel axle.

• Caution •

While pushing the aircraft backward, the tow bar must be installed to keep the nose wheel from turning abruptly.

Do not use the vertical or horizontal control surfaces or stabilizers to move the airplane. If a tow bar is not available, use the wing roots as push points.

Do not push or pull on control surfaces or propeller to maneuver the airplane.

Do not tow the airplane when the main gear is obstructed with mud or snow.

If the airplane is to be towed by vehicle, do not turn the nose wheel more than 90 degrees either side of center or structural damage to the nose gear could result.

1. *Refer to Airplane Three View (Section 1, Figure 1-1) and Turning Radius (Section 1, Figure 1-2)* or clearances. Be especially cognizant of hangar door clearances.
2. Insert tow bar into the lugs just forward of the nose wheel axle.
3. Release parking brake and remove chocks
4. Move airplane to desired location.
5. Install chocks
6. Remove tow bar.

To obtain a minimum radius turn during ground handling, the airplane may be rotated around either main landing gear by pressing down on a fuselage just forward of the horizontal stabilizer to raise the nosewheel off the ground.

Taxiing

Before attempting to taxi the airplane, ground personnel should be instructed and authorized by the owner to taxi the airplane. Instruction should include engine starting and shutdown procedures in addition to taxi and steering techniques.

• Caution •

Verify that taxi and propeller wash areas are clear before beginning taxi.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel, or any loose material that may cause damage to the propeller blades.

Taxi with minimum power needed for forward movement. Excessive braking may result in overheated or damaged brakes.

1. Remove chocks.
2. Start engine in accordance with Starting Engine procedure (Section 4).
3. Release parking brake.
4. Advance throttle to initiate taxi. Immediately after initiating taxi, apply the brakes to determine their effectiveness. During taxiing, use differential braking to make slight turns to ascertain steering effectiveness.

• Caution •

Observe wing clearance when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.

Avoid holes and ruts when taxiing over uneven ground.

5. Taxi airplane to desired location.
6. Shut down airplane and install chocks and tie-downs in accordance with Shutdown procedure (Section 4).

Parking

The airplane should be parked to protect the airplane from weather and to prevent it from becoming a hazard to other aircraft. The parking brake may release or exert excessive pressure because of heat buildup after heavy braking or during wide temperature swings. Therefore, if the airplane is to be left unattended or is to be left overnight, chock and tie down the airplane.

1. For parking, head airplane into the wind if possible.
2. Retract flaps.
3. Set parking brake by first applying brake pressure using the toe brakes and then pulling the PARK BRAKE knob aft.

• Caution •

Care should be taken when setting overheated brakes or during cold weather when accumulated moisture may freeze a brake.

4. Chock both main gear wheels.
5. Tie down airplane in accordance with tiedown procedure in this section.
6. Install a pitot head cover. Be sure to remove the pitot head cover before flight.
7. Cabin and baggage doors should be locked when the airplane is unattended.

Tiedown

The airplane should be moored for immovability, security and protection. FAA Advisory Circular AC 20-35C, Tiedown Sense, contains additional information regarding preparation for severe weather, tiedown, and related information. The following procedures should be used for the proper mooring of the airplane:

1. Head the airplane into the wind if possible.
2. Retract the flaps.
3. Chock the wheels.
4. Secure tie-down ropes to the wing tie-down rings and to the tail ring at approximately 45-degree angles to the ground. When using rope or non-synthetic material, leave sufficient slack to avoid damage to the airplane should the ropes contract.

• Caution •

Anchor points for wing tiedowns should not be more than 18 feet apart to prevent eyebolt damage in heavy winds.

Use bowline knots, square knots, or locked slipknots. Do not use plain slipknots.

Leveling

The airplane is leveled longitudinally by means of a spirit level placed on the pilot door sill and laterally by means of a spirit level placed across the door sills. Alternately, sight the forward and aft tool holes along waterline 95.9 to level airplane. *Refer to Section 6, Airplane Weighing Procedures and Section 6, Figure 6-2*, for illustration.

Jacking

Two jacking points are provided: one at each wing tiedown. Jack points (pads) are stowed in the baggage compartment. The airplane may be jacked using two standard aircraft hydraulic jacks at the wing jacking points and a weighted tailstand attached to the tail tiedown.

Raise Airplane

• Caution •

Do not jack the aircraft outside or in open hangar with winds in excess of 10 mph.

The empty CG is forward of the wing jacking points. To prevent airplane from tipping forward during maintenance or jacking, use a weighted tailstand (300-lb minimum) attached to the tail tiedown.

1. Position airplane on a hard, flat, level surface.
2. Remove tiedown rings from wings. Stow tie-down rings in baggage compartment.
3. Attach a weighted tailstand to the tail tiedown ring.
4. Position jacks and jack points (pads) for jacking. Insert jack point (pad) into wing tiedown receptacle. Holding the jack point (pad) in place, position the jack under the point and raise the jack to firmly contact the jack point. Repeat for opposite jacking point.
5. Raise the airplane keeping the airplane as level as possible.
6. Secure jack locks.

Lower Airplane

1. Release pressure on all jacks as simultaneously as necessary to keep airplane as level as possible.
2. Remove jacks, jack points (pads), and tailstand. Stow points in baggage compartment. Install tiedown rings in wings.

Servicing

Landing Gear Servicing

The main landing gear wheel assemblies use 15 x 6.00 x 6, six-ply rating tires and tubes. The nose wheel assembly uses a 5.00 x 5 four-ply rating, type III tire and tube. Always keep tires inflated to the rated pressure to obtain optimum performance and maximum service. The landing gear struts do not require servicing. With the exception of replenishing brake fluid, wheel and brake servicing must be accomplished in accordance with Airplane Maintenance Manual (AMM) procedures.

Brake Servicing

Brake Replenishing

The brake system is filled with MIL-H-5606 hydraulic brake fluid. The fluid level should be checked at every oil change and at the annual/ 100-hour inspection, replenishing the system when necessary. The brake reservoir is located on the right side of the battery support frame. If the entire system must be refilled, *refer to the Airplane Maintenance Manual (AMM).*

To replenish brake fluid:

1. Chock tires and release parking brake.
2. Remove top engine cowling to gain access to hydraulic fluid reservoir.
3. Clean reservoir cap and area around cap before opening reservoir cap.
4. Remove cap and add MIL-H-5606 hydraulic fluid as necessary to fill reservoir.
5. Install cap, inspect area for leaks, and then install and secure engine cowling.

Brake Inspection

The brake assemblies and linings should be checked at every oil change (50 hours) for general condition, evidence of overheating, and deterioration. *Serials 1005 thru 2030 before SB 2X-05-01: A*t every annual/100-hour inspection the brakes should be disassembled, the brake linings should be checked and the O-rings replaced.

The aircraft should not be operated with overheated, damaged, or leaking brakes. Conditions include, but are not limited to:

- Leaking brake fluid at the caliper. This can be observed by checking for evidence of fluid on the ground or deposited on the underside of the wheel fairing. Wipe the underside of the fairing with a clean, white cloth and inspect for red colored fluid residue.
- Overheated components, indicated by discoloration or warping of the disk rotor. Excessive heat can cause the caliper components to discolor or cause yellowing of the part identification label.

To inspect the brake assemblies:

1. Remove main gear fairing. (Refer to AMM 32-10)
2. Wipe off any debris from brake caliper assembly that may obstruct inspection.
3. Check brake linings for deterioration and maximum permissible wear. Replace lining when worn to 0.100 inch (2.54 mm).
4. Inspect temperature indicator(s):

   Serials 1005 thru 2030 after Service Bulletin SB 2X-32-14 and before SB 2X-05-01:

   a. Clean and inspect temperature indicator installed to piston housing. If indicator center is black, the brake assembly has been overheated. The brake linings must be inspected and the O-rings replaced.

   Serials 1005 thru 2030 after SB 2X-05-01:

   a. Clean and inspect temperature indicators installed to brake caliper assembly.
   b. Verify temperature indicators are firmly adhered to piston housing.
   c. If top temperature indicator is white or lower temperature indicator is white, the brake assembly has not overheated. O-ring replacement is not necessary. If either temperature indicator is black, the brake assembly has overheated. The brake linings must be inspected and the O-rings replaced.

5. Check brake assemblies for evidence of overheating and/or deterioration.
6. Install main gear fairing. (Refer to AMM 32-10)

Tire Inflation

For maximum service from the tires, keep them inflated to the proper pressure. When checking tire pressure, examine the tires for wear, cuts, nicks, bruises and excessive wear.

To inflate tires:

1. Remove inspection buttons on wheel pants to gain access to valve stems. It may be necessary to move airplane to get valve stem aligned with the access hole.
2. Remove valve stem cap and verify tire pressure with a dial-type tire pressure gage.
3. Inflate nose tire to 40 +2/-0 psi (276 +15/-0 kPa) and main wheel tires to 53 +2/-0 psi (365 +15/-0 kPa).
4. Replace valve stem cap and inspection buttons.

All wheels and tires are balanced before original installation and the relationship of tire, tube, and wheel should be maintained upon reinstallation. In the installation of new components, it may be necessary to rebalance the wheels with the tires mounted. Unbalanced wheels can cause extreme vibration in the landing gear.

Propeller Servicing

The spinner and backing plate should be cleaned and inspected for cracks frequently. Before each flight the propeller should be inspected for nicks, scratches, and corrosion. If found, they should be repaired as soon as possible by a rated mechanic, since a nick or scratch causes an area of increased stress which can lead to serious cracks or the loss of a propeller tip. The back face of the blades should be painted when necessary with flat black paint to retard glare. To prevent corrosion, the surface should be cleaned and waxed periodically.

Oil Servicing

The oil capacity of the Teledyne Continental IO-360-ES engine is 8 quarts. It is recommended that the oil be changed every 50 hours and sooner under unfavorable operating conditions. The following grades are recommended for the specified temperatures at sea level (SL):

Ambient Air Temperature (SL)	Single Viscosity	Multi-Viscosity
All Temperatures	-—	20W-50 15W-50
Below 40° F	SAE 30	10W-30 20W-50 15W-50
Above 40° F	SAE 50	20W-50 15W-50

An oil filler cap and dipstick are located at the left rear of the engine and are accessible through an access door on the top left side of the engine cowling. The engine should not be operated with less than six quarts of oil. Seven quarts (dipstick indication) is recommended for extended flights.

To check and add oil:

1. Open access door on upper left-hand side of cowl. Pull dipstick and verify oil level.
2. If oil level is below 6 quarts (5.7 liters), remove filler cap and add oil through filler as required to reach 6-8 quarts (5.7-7.6 liters).
3. Verify oil level and install dipstick and filler cap.

• Note •

Installation of dipstick can be difficult. To aid in inserting dipstick, point the loop of the dipstick towards the closest spark plug (left rear, #2 cylinder), and use both hands to guide, route, and insert dipstick.

4. Close and secure access panel.

Approved Oils

For the first 25 hours of operation (on a new or rebuilt engine) or until oil consumption stabilizes, use only 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.

• Caution •

> MIL-C-6529, Type II straight mineral oil with corrosion preventive can cause coking with extended use and is not recommended by Cirrus Design for break-in or post break-in use.

After 25 hours of operation and after oil consumption has stabilized, use only aviation lubricating oils conforming to Teledyne Continental Motors (TCM) Specification MHS24, Lubricating Oil, Ashless Dispersant, or TCM Specification MHS25, Synthetic Lubrication Oil. The following products have supplied data to TCM indicating that these oils conform to all the requirements of the above listed TCM specifications:

Product	Supplier
Aeroshell (R) W	Shell Australia
Aeroshell Oil W Aeroshell Oil W 15W-50 Anti-Wear Formulation Aeroshell 15W50	Shell Canada Ltd.
Aeroshell Oil W Aeroshell Oil W 15W-50 Anti-Wear Formulation Aeroshell 15W50	Shell Oil Company
Aviation Oil Type A	Phillips 66 Company
BP Aero Oil	BP Oil Corporation
Castrolaero AD Oil	Castrol Ltd. (Australia)
Chevron Aero Oil	Chevron U.S.A. Inc.
Conoco Aero S	Continental Oil
Delta Avoil	Delta Petroleum Co.
Exxon Aviation Oil EE	Exxon Company, U.S.A.
Mobil Aero Oil	Mobil Oil Company
Pennzoil Aircraft Engine Oil	Pennzoil Company
Quaker State AD Aviation Engine Oil	Quaker State Oil & Refining Co.
Red Ram Aviation Oil 20W-50	Red Ram Ltd. (Canada)
Sinclair Avoil	Sinclair Oil Company
Texaco Aircraft Engine Oil – Premium AD	Texaco Inc.
Total Aero DW 15W50	Total France
Turbonycoil 3570	NYCO S.A.
Union Aircraft Engine Oil HD	Union Oil Company of California

Figure 8-1
Approved Oils

Fuel System Servicing

After the first 25 hours of operation, then every 50-hours or as conditions dictate, the fuel filtration screen in the gascolator must be cleaned. After cleaning, a small amount of grease applied to the gascolator bowl gasket will facilitate reassembly.

Fuel Requirements

Aviation grade 100 LL (blue) or 100 (green) fuel is the minimum octane approved for use in this airplane.

• Caution •

Use of lower grades can cause serious engine damage in a short period. The engine warranty is invalidated by the use of lower octane fuels.

Filling Fuel Tanks

Observe all safety precautions required when handling gasoline. Fuel fillers are located on the forward slope of the wing. Each wing holds a maximum of 30.3 U.S. gallons. When using less than the standard 60.5-gallon capacity, fuel should be distributed equally between each side.

• WARNING •

Have a fire extinguisher available.

Ground fuel nozzle and fuel truck to airplane exhaust pipe and ground fuel truck or cart to suitable earth ground.

Do not fill tank within 100 feet (30.5 meters) of any energized electrical equipment capable of producing a spark.

Permit no smoking or open flame within 100 feet (30.5 meters) of airplane or refuel vehicle.

Do not operate radios or electrical equipment during refuel operations. Do not operate any electrical switches.

To refuel airplane:

1. Place fire extinguisher near fuel tank being filled.

2. Connect ground wire from refuel nozzle to airplane exhaust, from airplane exhaust to fuel truck or cart, and from fuel truck or cart to a suitable earth ground.
3. Place rubber protective cover over wing around fuel filler.

• Note •

Do not permit fuel nozzle to come in contact with bottom of fuel tanks. Keep fuel tanks at least half full at all times to minimize condensation and moisture accumulation in tanks. In extremely humid areas, the fuel supply should be checked frequently and drained of condensation to prevent possible distribution problems.

4. Remove fuel filler cap and fuel airplane to desired level.

• Note •

If fuel is going to be added to only one tank, the tank being serviced should be filled to the same level as the opposite tank. This will aid in keeping fuel loads balanced.

5. Remove nozzle, install filler cap, and remove protective cover.
6. Repeat refuel procedure for opposite wing.
7. Remove ground wires.
8. Remove fire extinguisher.

Fuel Contamination and Sampling

Typically, fuel contamination results from foreign material such as water, dirt, rust, and fungal or bacterial growth. Additionally, chemicals and additives that are incompatible with fuel or fuel system components are also a source of fuel contamination. To assure that the proper grade of fuel is used and that contamination is not present, the ***fuel must be sampled prior to each flight***.

Each fuel system drain must be sampled by draining a cupful of fuel into a clear sample cup. Fuel drains are provided for the fuel gascolator, wing tanks, and collector tank drains. The gascolator drain exits the lower engine cowl just forward of the firewall near the airplane centerline. Fuel tank and collector tank drains are located at the low spot in the respective tank.

If sampling reveals contamination, the gascolator and tank drains must be sampled again repeatedly until all contamination is removed. It is helpful to gently rock the wings and lower the tail slightly to move contaminates to the drain points for sampling. If after repeated samplings (three or more), evidence of significant contamination remains, do not fly the airplane until a mechanic is consulted, the fuel system is drained and purged, and the source of contamination is determined and corrected.

If sampling reveals the airplane has been serviced with an improper fuel grade, do not fly the airplane until the fuel system is drained and refueled with an approved fuel grade.

To help reduce the occurrence of contaminated fuel coming from the supplier or fixed based operator, pilots should assure that the fuel supply has been checked for contamination and that the fuel is properly filtered. Also, between flights, the fuel tanks should be kept as full as operational conditions permit to reduce condensation on the inside of fuel tanks.

Draining Fuel System

The bulk of the fuel may be drained from the wing fuel tanks by the use of a siphon hose placed in the cell or tank through the filler neck. The remainder of the fuel may be drained by opening the drain valves. Use the same precautions as when refueling airplane. *Refer to the SR20 Maintenance Manual* for specific procedures.

Battery Service

Access to the 24 volt battery is gained by removing the upper cowl. It is mounted to the forward right side of the firewall. The battery vent is connected to an acid resistant plastic tube that vents gases and electrolyte overflow overboard.

The battery fluid level must not be brought above the baffle plates. Until experience indicates a longer interval is justified, the battery should be checked every 30 days to determine that the fluid level is proper and the connections are tight and free of corrosion. Do not fill the battery with acid   use distilled water only.

If the battery is not properly charged, recharge it starting with a rate of four amperes and finishing with a rate of two amperes in accordance with Airplane Maintenance Manual (AMM) procedures. The battery should be removed from the airplane for charging, and quick charges are not recommended.

The external power receptacle is located on the left side of the fuselage just aft of the firewall. *Refer to the Airplane Maintenance Manual (AMM)* for battery servicing procedures.

Cleaning and Care

Cleaning Exterior Surfaces

• Note •

Prior to cleaning, place the airplane in a shaded area to allow the surfaces to cool.

The airplane should be washed with a mild soap and water. Harsh abrasives or alkaline soaps or detergents could make scratches on painted or plastic surfaces or could cause corrosion of metal. Cover static ports and other areas where cleaning solution could cause damage. Be sure to remove the static port covers before flight. To wash the airplane, use the following procedure:

1. Flush away loose dirt with water.
2. Apply cleaning solution with a soft cloth, a sponge or a soft bristle brush.
3. To remove exhaust stains, allow the solution to remain on the surface longer.
4. To remove stubborn oil and grease, use a cloth dampened with naphtha.
5. Rinse all surfaces thoroughly.

Any good silicone free automotive wax may be used to preserve painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coating of wax on the leading surfaces will reduce the abrasion problems in these areas.

Cleaning Product	Cleaning Application	Supplier
Mild Dishwasher Soap (abrasive free)	Fuselage Exterior and Landing Gear	Any Source
Pure Carnauba Wax	Fuselage Exterior	Any Source
Mothers California Gold Pure Carnauba Wax	Fuselage Exterior	Wal-Mart Stores
RejeX	Fuselage Exterior	Corrosion Technologies
WX/Block System	Fuselage Exterior	Wings and Wheels
AeroShell Flight Jacket Plexicoat	Fuselage Exterior	ShellStore Online
XL-100 Heavy-Duty Cleaner/Degreaser	Fuselage Exterior and Landing Gear	Buckeye International
Stoddard Solvent PD-680 Type II	Engine Compartment	Any Source
Kerosene	Exterior Windscreen and Windows	Any Source
Klear-To-Land	Exterior Windscreen and Windows	D.W. Davies & Co
Prist	Exterior Windscreen and Windows	Prist Aerospace
LP Aero Plastics Acrylic Polish & Sealant	Exterior Windscreen and Windows	Aircraft Spruce & Specialty

Figure 8-2
Recommended Exterior Cleaning Products

Windscreen and Windows

Before cleaning an acrylic window, rinse away all dirt particles before applying cloth or chamois. Never rub dry acrylic. Dull or scratched window coverings may be polished using a special acrylic polishing paste.

• Caution •

Clean acrylic windows with a solvent free, none abrasive, antistatic acrylic cleaner. Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or glass window cleaning sprays.

Use only a nonabrasive cotton cloth or genuine chamois to clean acrylic windows. Paper towel or newspaper are highly abrasive and will cause hairline scratches.

1. Remove grease or oil using a soft cloth saturated with kerosene then rinse with clean, fresh water.

• Note •

Wiping with a circular motion can cause glare rings. Use an up and down wiping motion to prevent this.

To prevent scratching from dirt that has accumulated on the cloth, fold cloth to expose a clean area after each pass.

2. Using a moist cloth or chamois, gently wipe the windows clean of all contaminates.
3. Apply acrylic cleaner to one area at a time, then wipe away with a soft, cotton cloth.
4. Dry the windows using a dry nonabrasive cotton cloth or chamois.

Engine Compartment

Before cleaning the engine compartment, place a strip of tape on the magneto vents to prevent any solvent from entering these units.

1. Place a large pan under the engine to catch waste.
2. Remove induction air filter and seal off induction system inlet.
3. With the engine cowling removed, spray or brush the engine with solvent or a mixture of solvent and degreaser. In order to remove especially heavy dirt and grease deposits, it may be necessary to brush areas that were sprayed.

   Do not spray solvent into the alternator, vacuum pump, starter, or induction air intakes.

4. Allow the solvent to remain on the engine from 5 to 10 minutes. Then rinse engine clean with additional solvent and allow it to dry.

• Caution •

Do not operate the engine until excess solvent has evaporated or otherwise been removed

5. Remove the protective tape from the magnetos.
6. Open induction system air inlet and install filter.
7. Lubricate the controls, bearing surfaces, etc., in accordance with the Lubrication Chart.

Landing Gear

Before cleaning the landing gear, place a plastic cover or similar material over the wheel and brake assembly.

1. Place a pan under the gear to catch waste.
2. Spray or brush the gear area with solvent or a mixture of solvent and degreaser, as desired. Where heavy grease and dirt deposits have collected, it may be necessary to brush areas that were sprayed, in order to clean them.
3. Allow the solvent to remain on the gear from five to ten minutes. Then rinse the gear with additional solvent and allow to dry.
4. Remove the cover from the wheel and remove the catch pan.
5. Lubricate the gear in accordance with the Lubrication Chart.

Cleaning Interior Surfaces

Seats, carpet, upholstery panels, and headliners should be vacuumed at regular intervals to remove surface dirt and dust. While vacuuming, use a fine bristle nylon brush to help loosen particles.

• Caution •

Remove any sharp objects from pockets or clothing to avoid damaging interior panels or upholstery.

Windshield and Windows

Never rub dry acrylic. Dull or scratched window coverings may be polished using a special acrylic polishing paste.

• Caution •

Clean acrylic windows with a solvent free, none abrasive, antistatic acrylic cleaner. Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or glass window cleaning sprays.

Use only a nonabrasive cotton cloth or genuine chamois to clean acrylic windows. Paper towel or newspaper are highly abrasive and will cause hairline scratches.

• Note •

Wiping with a circular motion can cause glare rings. Use an up and down wiping motion to prevent this.

To prevent scratching from dirt that has accumulated on the cloth, fold cloth to expose a clean area after each pass.

1. Using a moist cloth or chamois, gently wipe the windows clean of all contaminates.
2. Apply acrylic cleaner to one area at a time, then wipe away with a soft, cotton cloth.
3. Dry the windows using a dry nonabrasive cotton cloth or chamois.

Cleaning Product	Cleaning Application	Supplier
Prist	Interior Windscreen and Windows	Prist Aerospace
Optimax	Display Screens	PhotoDon
Mild Dishwasher Soap (abrasive free)	Cabin Interior	Any Source
Leather Care Kit 50689-001	Leather Upholstery	Cirrus Design
Leather Cleaner 50684-001	Leather Upholstery	Cirrus Design
Ink Remover 50685-001	Leather Upholstery	Cirrus Design
Leather Conditioner 50686-001	Leather Upholstery	Cirrus Design
Spot and Stain Remover 50687-001	Leather Upholstery	Cirrus Design
Vinyl Finish Cleaner 50688-001	Vinyl Panels	Cirrus Design
Vinyl & Leather Cleaner 51479-001	Vinyl and Leather Upholstery	Cirrus Design

Figure 8-3
Recommended Exterior Cleaning Products

Instrument Panel and Electronic Display Screens

The instrument panel, control knobs, and plastic trim need only to be wiped clean with a soft damp cloth. The multifunction display, primary flight display, and other electronic display screens should be cleaned with Optimax - LCD Screen Cleaning Solution as follows:

• Caution •

> To avoid solution dripping onto display and possibly migrating into component, apply the cleaning solution to cloth first, not directly to the display screen.
>
> Use only a lens cloth or nonabrasive cotton cloth to clean display screens. Paper towels, tissue, or camera lens paper may scratch the display screen.
>
> Clean display screen with power OFF.

1. Gently wipe the display with a clean, dry, cotton cloth.
2. Moisten clean, cotton cloth with cleaning solution.
3. Wipe the soft cotton cloth across the display in one direction, moving from the top of the display to the bottom. Do not rub harshly.
4. Gently wipe the display with a clean, dry, cotton cloth.

Headliner and Trim Panels

The airplane interior can be cleaned with a mild detergent or soap and water. Harsh abrasives or alkaline soaps or detergents should be avoided. Solvents and alcohols may damage or discolor vinyl or urethane parts. Cover areas where cleaning solution could cause damage. Use the following procedure:

• Caution •

> Solvent cleaners and alcohol should not be used on interior parts. If cleaning solvents are used on cloth, cover areas where cleaning solvents could cause damage.

1. Clean headliner, and side panels, with a stiff bristle brush, and vacuum where necessary.

2. Soiled upholstery, may be cleaned with a good upholstery cleaner suitable for the material. Carefully follow the manufacturer's instructions. Avoid soaking or harsh rubbing.

Leather Upholstery and Seats

For routine maintenance, occasionally wipe leather upholstery with a soft, damp cloth. For deeper cleaning, start with mix of mild detergent and water then, if necessary, work your way up to the products available from Cirrus for more stubborn marks and stains. Do not use soaps as they contain alkaline which will alter the leather’s pH balance and cause the leather to age prematurely. Cover areas where cleaning solution could cause damage. Use the following procedure:

• Caution •

Solvent cleaners and alcohol should not be used on leather upholstry.

1. Clean leather upholstery with a soft bristle brush, and vacuum where necessary.
2. Wipe leather upholstery with a soft, damp cloth.
3. Soiled upholstery, may be cleaned with the approved products available from Cirrus Design. Avoid soaking or harsh rubbing.

Carpets

To clean carpets, first remove loose dirt with a whiskbroom or vacuum. For soiled spots and stubborn stains use a non-flammable, dry cleaning fluid. Floor carpets may be cleaned like any household carpet.

Intentionally Left Blank

Section 9
Supplements

This section of the handbook contains FAA Approved Supplements necessary to safely and to efficiently operate the SR20 when equipped with optional systems or equipment not provided with the standard airplane or for special operations or not included in the handbook. Basically, supplements are mini-handbooks and will contain data corresponding to most sections of the handbook. Data in a supplement adds to, supersedes, or replaces similar data in the basic handbook.

A *Log of Supplements* page immediately follows this page and precedes all Cirrus Design Supplements produced for this airplane. The *Log of Supplements* page can be utilized as a “Table of Contents” for this section. In the event the airplane is modified at a non Cirrus Design facility through an STC or other approval method, it is the owners responsibility to assure that the proper supplement, if applicable, is installed in the handbook and the supplement is properly recorded on the *Log of Supplements* page.

Intentionally Left Blank

Section 9
Log of Supplements

Part Number	Title	Date
___ 11934-S01 R2	Garmin GMA 340 Audio System	07-18-05
___ 11934-S02	Garmin GTX 320 Transponder	03-31-99
___ 11934-S05	Garmin GNC 250XL GPS Navigator w/ VHF COM	03-31-99
___ 11934-S06 R1	S-Tec System Twenty Autopilot	12-07-04
___ 11934-S07 R2	S-Tec System Thirty Autopilot	12-07-04
___ 11934-S08 R3	S-Tec System 55 Autopilot	07-18-05
___ 11934-S09 R1	Approved Oxygen Systems	01-07-03
___ 11934-S10	Dual Alternator System	09-28-99
___ 11934-S11 R1	L-3 Avionics Systems WX500 Stormscope Sensor	07-18-05
___ 11934-S12	Garmin GTX 327 Transponder	12-26-00
___ 11934-S13 R4	S-Tec System 55X Autopilot	07-18-05
___ 11934-S15 R1	L-3 Avionics Systems SkyWatch Traffic Advisory System	10-12-05
___ 11934-S16	Sandel Avionics SN3308 Navigation Display	09-10-01
___ 11934-S17	SR20 Airplanes Registered in Canada	10-10-01
___ 11934-S22 R2	Garmin GNS 430 GPS Navigator	08-15-07
___ 11934-S23 R2	Garmin GNC 420 GPS Navigator	08-15-07
___ 11934-S25 R1	Winterization Kit	12-07-04
___ 11934-S28	Garmin GTX 330 Mode S Transponder	07-03-04
___ 11934-S29	SR20 Airplanes Registered in the European Union	05-27-04
___ 11934-S30 R1	Honeywell KGP 560 Terrain/Awareness Warning System	12-15-07
___ 11934-S31 R1	Avidyne EMax™ Engine Instrumentation	12-15-07
___ 11934-S32 R1	Avidyne CMax™ Electronic Approach Charts	12-15-07
___ 11934-S33 R1	XM Satellite Weather System	12-15-07
___ 11934-S36 R1	Artex ME406 406 MHz ELT System	12-18-08
___ 11934-S38 R1	Garmin 400W-Series GPS Navigator	11-11-07
___ 11934-S44	Part 135: Electrical Loading Shedding Procedure	06-13-09
___ 11934-S45	SR20 Airplanes Registered in Argentina	08-26-09

FAA Approved POH Supplements must be in the airplane for flight operations when the subject optional equipment is installed or the special operations are to be performed.

This Log of Supplements shows all Cirrus Design Supplements available for the aircraft at the cooresponding date of the revision level shown in the lower left corner. A mark (x) in the Part Number column indicates that the supplement is installed in the POH.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

Garmin GMA 340 Audio System

Includes Optional XM Radio System

When the Garmin GMA 340 Audio Panel and the optional XM Radio System are installed in the Cirrus Design SR20, this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook (Handbook). Information in this supplement either adds to, supersedes, or deletes information in the basic Handbook.

• Note •

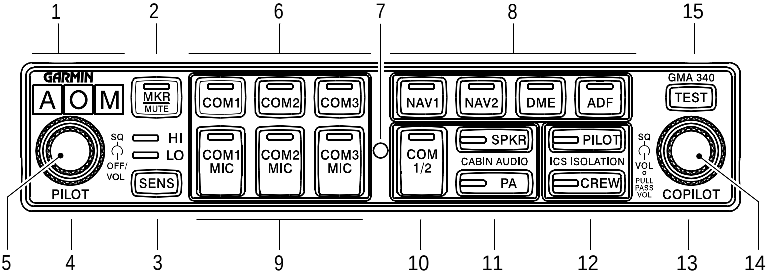
This POH Supplement Revision dated Revision 02: 07-18-05 supersedes and replaces Revision 01 of this supplement dated 07-03-04. This revision adds required data for the optional XM Radio System available for the Garmin GMA 340.

FAA Approved Joseph C Miess Date Jun 03 2009
On Behalf of ANAC of Brazil
for Charles Smalley, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

This supplement provides detailed operating instructions for the Garmin GMA 340 Audio Selector Panel/Intercom System with internal Marker Beacon. This supplement covers the basic operating areas of the Audio Control Panel.

- Power On / Fail-safe Operation
- Audio / Transceiver Selection
- Speaker Output
- Public Address (PA) Function
- Personal Music Inputs
- Intercom (ICS)
- Marker Beacon



SR20_FM09_1108

1. Marker Beacon Annunciators
2. Marker Audio Select Button / LED
3. Marker Sensitivity Select Button
   a. HI Sensitivity LED
   b. LO Sensitivity LED
4. Pilot Intercom Squelch (outer knob)
5. Power / Intercom Volume (inner knob)
6. Transceiver Audio Select Buttons/ LEDs
7. Photocell
8. Receiver Audio Select Buttons / LEDs
9. Transceiver Audio/Transmit Select Buttons / LEDs
10. Split COM Button / LED
11. Cabin Audio Select Buttons / LEDs
    a. SPKR, Cabin Speaker
    b. PA, Public Address
12. Intercom Isolation Buttons / LEDs
    a. PILOT Intercom Mode
    b. CREW Intercom Mode
13. Copilot / Passenger Intercom Squelch (outer knob)
14. Copilot (IN) / Passenger (OUT) Intercom Volume (inner knob)
15. Indicator Test Button

Figure - 1
Audio Control Panel

Section 2 - Limitations

Use of auxiliary AUDIO IN entertainment input and the optionally installed XM Radio System is prohibited during takeoff and landing.

Section 3 - Emergency Procedures

In the event of an audio panel power failure, the audio system will revert to COM 1 for the pilot's mic and headphones and the pilot will have transmit and receive capability.

Section 4 - Normal Procedures

Refer to Section 7 - System Description in this supplement for a complete description and operation of the Audio Control Panel.

Section 5 - Performance

No change from basic Handbook.

Section 6 - Weight & Balance

Garmin GMA 340 Audio System: No change from basic Handbook.

Installation of the optional XM Radio System adds the following optional (Sym = O) equipment at the weight and arm shown in the following table.

ATA / Item	Description	Sym	Qty	Part Number	Unit Wt	Arm
22-01	XM Receiver	O	1	16665-001	1.7	114.0

Section 7 - System Description

Power On and Fail-safe Operation

The Audio Control Panel is powered 'OFF' when the left inner knob (PILOT) is at the full CCW (counter-clockwise) position. Rotating the knob CW (clockwise) activates the unit. CW rotation of knob beyond the 'on' detent increases pilot ICS (intercom system) volume.

A fail-safe circuit connects the pilot's headset directly to the COM1 transceiver in the event of a power failure to the audio control panel or the panel is switched 'OFF.'

Test

Pressing the TEST button illuminates all Panel LEDs and the Marker Beacon Annunciators full bright. During normal operation, a photocell mounted at the approximate center of the control panel senses ambient light to allow automatic LED and annunciator intensity adjustment. Nomenclature dimming is controlled by the INST lights control on the instrument panel bolster.

Audio/Transceiver Selection

Audio selection is performed through the eight selector push buttons in the center of the Audio Control Panel. All audio selector push buttons are push-on, push-off. Selecting an audio source supplies audio to the headphones or cabin speaker. Selected audio sources are indicated by illumination of the push-button switch.

Navigation receiver audio source is selected by depressing NAV1, NAV2 (if installed), MKR, DME (if installed), or ADF (if installed) will select that radio or device as the audio source. Audio level of navigation receivers is controlled through the selected radio volume control.

Transceiver audio is selected by depressing COM1, COM2, or COM3 (if installed). When the audio source is selected using the COM1, COM2, and COM3 buttons, the audio source will remain active regardless of which transceiver is selected as the active MIC source.

Both transceiver audio and MIC (microphone) can be selected by depressing COM1 MIC, COM2 MIC, or COM3 MIC (if installed). Both pilot and copilot are connected to the selected transceiver and both have transmit and receive capabilities. Pilot and copilot must use their respective Push-To-Talk (PTT) switch to transmit. The intercom will function normally. During transmissions the active transmitter's COM MIC button LED blinks at a 1 Hz rate indicating active transmission.

Split COM Function

Pressing the COM 1/2 button activates the split COM function. When split COM is active, COM 1 is the pilot mic/audio source and COM2 is the copilot mic/audio source. The pilot has receive and transmit capabilities on COM1 and the copilot has receive and transmit capabilities on COM2. While split COM is active, simultaneous transmission from COM1 and COM2 is not possible. The pilot and copilot can still listen to COM3, NAV1, NAV2, DME, ADF, and MKR. Pressing the COM 1/2 button a second time will deactivate the split COM function. While split COM is active, the copilot is able to make PA announcements over the cabin speaker allowing the pilot to continue using COM1 independently. This is accomplished by depressing the PA button while split COM is active. Pressing the PA button a second time deactivates this feature and returns the system to normal split COM as described above.

COM Swap Mode

COM swap mode is not available in this installation.

Speaker Output

Pressing the SPKR button will cause the selected airplane radios to be heard over the cabin speaker. Speaker output is muted when a COM microphone is keyed. Speaker level is adjustable through an access hole in the top of the unit (*refer to Garmin installation manual or AMM)*.

Public Address (PA) Function

Pressing the PA button on the audio control panel activates the PA function. When PA is activated and either the pilot's or copilot's microphone is keyed (PTT pressed), the corresponding mic audio is output over the cabin speaker. If the SPKR button is also active, any previously active speaker audio will be muted while the microphone is keyed. Pilot and copilot PA microphone speaker levels are adjustable through an access hole in the top of the unit (*refer to Garmin installation manual or AMM).*

Personal Music Inputs

• Note •

Serials 1005 thru 1532 and serials before SB 2X-34-14; Audio from AUDIO INPUT jacks Music1 and Music2 is muted during intercom activity.

The Audio Control Panel has provisions for up to two separate personal entertainment input (music) devices. These devices are plugged into the AUDIO INPUT jacks in the center console jack panels. Music1 is connected at the AUDIO INPUT jack near the convenience outlet. Music2 is connected to the jack on the aft console. Music1 is soft-muted during all airplane radio activity. Music1 and Music2 have characteristics affected by the active ICS isolation mode.

- Pressing the PILOT ICS Isolation button isolates the pilot from the copilot and passengers. Music1 is available to copilot and passengers.
- Pressing the CREW ICS Isolation button isolates the crew from the passengers and allows the pilot and copilot to listen to Music1 and the passengers to listen to Music2. Radio activity, MKR activity, and pilot or copilot ICS activity will mute Music1. Music2 is not muted.
- When both the PILOT and CREW ICS Isolation mode are **not** selected, Music1 is available to crew and passengers. Radio activity and MKR activity will mute Music1.

Intercom

Intercom controls are located towards the left side of the Audio Control Panel. The controls consist of a Volume control for the pilot and copilot, a Squelch control for all occupants, and an Intercom Mode Selector switch.

Volume & Squelch Control

ICS volume and voice operated relay (VOX) squelch control is controlled through the left (PILOT) and right (COPILOT) control knobs on the Audio Control Panel Control. Knob control is as follows:

- **Left Inner Knob** – On/Off power control and pilot ICS volume. Full CCW is ‘OFF’ position (click).
- **Left Outer Knob** – Pilot ICS mic VOX level. CW rotation increases the amount of mic audio (VOX level) required to break squelch. Full CCW is the ‘hot mic’ position.
- **Right Inner Knob** – When pushed in, rotation controls copilot ICS volume. When out, rotation controls passenger ICS volume.

- **Right Outer Knob** – Copilot and passenger mic VOX level. CW rotation increases the amount of mic audio (VOX level) required to break squelch. Full CCW is the ‘hot mic’ position.

Each microphone input has a dedicated VOX circuit to assure that only the active microphone(s) is/are heard when squelch is broken. After the operator has stopped talking, the intercom channel remains momentarily open to avoid closure between words or normal pauses.

Control

The Audio Control Panel provides an adjustable Voice Operated Relay (VOX) Squelch Control for the pilot, copilot, and passengers. Since the VOX circuits reduce the number of microphones active at any one time, the amount of unwanted background noise in the headphones is diminished. This also allows the use of dissimilar headsets with the same intercom. Because the user can adjust the trip level of the VOX squelch to fit the individual voice and microphone, this helps eliminate the frustration of clipping the first syllables. There is a slight delay after a person stops talking before the channel closes. This prevents closure between words and eliminates choppy communications.

To adjust squelch:

1. With the engine running, set the VOX trip level by slowly rotating the SQL control knob clockwise until you no longer hear the engine noise in the headphones.
2. Position microphone near your lips and speak into microphone. Verify that normal speech levels open the channel.

Intercom Modes

The GMA 340 provides three intercom (ICS) modes to further simplify workload and minimize distractions during all phases of flight: PILOT, CREW, and ALL. The mode selection is accomplished using the PILOT and CREW push-buttons. Pressing a button activates the corresponding ICS mode and pressing the button a second time deactivates the mode. The operator can switch modes (PILOT to CREW or CREW to PILOT) by pressing the desired modes push-button. ALL mode is active when neither PILOT or CREW have been selected.

PILOT The pilot is isolated from the intercom. The pilot can hear radio and sidetone only during radio transmissions. Copilot and passengers can hear the intercom and music but not the airplane radio receptions or pilot transmissions.

CREW Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. They may also listen to Music1. Passengers can continue to communicate with themselves without interrupting the Crew and also may listen to Music2.

ALL All parties will hear the aircraft radio, intercom, and Music1. The music volume increases gradually back to the original level after communications have been completed. Both pilot and copilot have access to the COM transceivers.

The following table shows, in abbreviated form, what each occupant hears in each of the selectable Intercom modes:

Mode	Pilot Hears	Copilot Hears	Passenger Hears
PILOT	A/C Radios Pilot	Passengers Copilot Music1	Passengers Copilot Music1
CREW	A/C Radios Pilot/Copilot Music1	A/C Radios Copilot/Pilot Music1	Passengers Music2
ALL	A/C Radio Pilot/Copilot Passengers Music1	A/C Radio Pilot/ Copilot Passengers Music1	A/C Radio Pilot/Copilot Passengers Music1

Marker Beacon

The Marker Beacon Receiver provides visual and audio indicators to alert the pilot when the airplane passes over a 75 MHz transmitter. Marker beacon controls and lights are located at the extreme left of the Audio Control Panel.

Marker beacon audio is selected by pressing the MKR push-button. If no marker beacon signal is being received, pressing the MKR push-button a second time deselects marker beacon audio. However, if marker beacon is being received, pressing the MKR push-button a second time will mute the audio but the light will continue to flash. Pressing the MKR push-button a third time (while marker beacon audio is muted) deselects marker beacon audio. Marker beacon audio muting automatically disables when the current signal is no longer received.

• Note •

The marker beacon lamps (O, M, A) operate independently of the audio and cannot be disabled.

Marker beacon light and audio keying for ILS approach are summarized below:

O (Blue)	Outer Marker light and associated 400 Hertz tone. The light and tone are keyed at a rate of two tones/flashes per second.
M (Amber)	Middle Marker light and associated 1300 Hertz tone. The light and tone are keyed alternately with short and long bursts.
A (White)	Airway/Inner Marker light and associated 3000 Hertz tone. The light and tone are keyed at a rate of six times per second.

Marker Beacon Sensitivity

The SENS push-button on the left side of the panel is used to set the marker beacon receiver sensitivity. The selected sensitivity level is indicated by illumination of the HIGH or LOW LED. When HIGH sensitivity is selected, the outer marker beacon tone will sound farther out. Selecting LOW sensitivity at this point allows more accurate location of the Outer Marker. Typically, HIGH sensitivity is selected until the outer marker tone is heard, and then LOW sensitivity is selected for more accurate outer marker location.

XM Radio System (Optional Installation)

• Note •

For a detailed operating instructions, *refer to the XM Radio Wireless Controller User Instructions, Document No. XMC050-4, original release or later*. MFD software partnumber 530-00162-000 or later is required for installation of XM Radio System.

Subscription to a XM Radio System Service Package is required for operation. Contact XM Satellite Radio at 800.985.9200 for subscription information.

The optional XM Radio System provides satellite broadcast audio entertainment and information to aircraft occupants via the Garmin GMA 340 Audio System while traveling anywhere within the contiguous United States of America.

The XM receiver, installed in the co-pilot side of the center console, receives audio information via its integral antenna from two geosynchronous XM broadcast satellites. The audio signal is then sent by wire to the Audio Control Panel's Music1 and Music2 AUDIO INPUT jacks. System operation is provided by a hand held, wireless controller.

- When initially powered, the XM radio volume is set to mute and will remain muted until the XM radio establishes communication with the wireless controller.
- System volume for both AUDIO INPUT jacks is controlled simultaneously via the wireless controller.
- In the event of wireless controller failure during flight, cycling the Weather/Stormscope circuit breaker will reset the volume to mute.
- XM radio is the default audio heard on the AUDIO INPUT jacks. If a personal entertainment device such as a CD player is plugged into either AUDIO INPUT jacks, the external source will override the XM audio signal. Refer to the Intercom Modes Table presented above for a description of intercom modes.

The XM Radio System is powered by 28 VDC supplied through the 3-amp Weather/Stormscope breaker on the Non-Essential Bus.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

Dual Alternator System

When the Dual Alternator System is installed in the Cirrus Design SR20, this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement either adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

FAA Approved Joseph C Miess Date 9/28/99
For Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

This airplane is equipped with a Dual Alternator System. Refer to Section 7 in this supplement for a full description of the system.

Section 2 - Limitations

Kinds of Operation Equipment List

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
Electrical Power					
Alternator	1	1	1*	1*	* 2 required if electric HSI installed

Section 3 - Emergency Procedures

Alternator Failure

Abnormal ammeter indications and illumination of the ALT FAIL caution light(s) and/or illumination of the LOW VOLTS warning light may indicate electrical power supply system malfunctions. A broken alternator drive belt, wiring fault or a defective alternator control unit is most likely the cause of the alternator failure. Usually, electrical power malfunctions are accompanied by an excessive battery rate of charge or a battery discharge rate.

• Note •

During low RPM conditions with a heavy electrical load, such as during low-speed taxi, illumination of the LOW VOLTS warning light, illumination of one or both ALT FAIL caution lights, and/or battery discharge ammeter indications can occur. Normally, these indications will return to normal as RPM is increased.

ALT FAIL Light Illuminated

1. Ammeter Select Switch................................SELECT FAILED ALT
2. If Amps = 0, Failed ALT Master Switch .... CYCLE (OFF – ON)
3. If Amps remain = 0, Failed ALT Master Switch ....OFF
4. Failed Alternator Circuit Breaker... PULL

Battery Excessive Rate of Charge

After starting engine and heavy electrical use at low RPM, the battery will be low enough to accept above normal charging. However, the ammeter should be indicating less than two needle widths of charging current after thirty minutes of cruising flight. If the charging rate remains above this rate, the battery could overheat and evaporate the electrolyte.

Additionally, electronic components can be damaged by an overvoltage. Normally, each alternator's ACU over-voltage sensor automatically opens the affected alternator's circuit breaker and shuts down the alternator if the voltage reaches approximately 31.8 volts. If the over-voltage sensor fails, perform the following checklist:

1. Affected ALT Master Switch .... OFF
2. Affected ALT Circuit Breaker .... PULL
3. Nonessential Electrical Equipment .... OFF
4. Land as soon as practical.

Battery Ammeter Indicates Discharge

In the event of a failure of an alternator, the associated ALT FAIL caution light illuminates. If both alternators fail, both ALT FAIL lights will illuminate, the LOW VOLTS warning light will illuminate when the bus voltage drops to approximately 24.5 volts, and a discharge rate will be shown on the battery ammeter. An attempt should be made to reactivate the alternator system by following the checklist below. If the condition clears, normal alternator charging will resume, the warning and caution lights will go out, and avionics power may be turned back on. However, if the lights come on again, a malfunction is confirmed and the procedure should be completed. Battery power must be conserved for later operation of the wing flaps, lights, and other essential equipment.

• Note •

Ammeter discharge indications and illumination of the LOW VOLTS warning light and/or illumination of one or both ALT FAIL caution lights can occur during low RPM conditions with a heavy electrical load, such as during low-speed taxi. Under these conditions, the master switch(es) need not be cycled as an over-voltage condition has not occurred and the alternator was not de-activated. The lights should go out at higher RPM.

1. Alternator Circuit Breakers .... CHECK IN
2. Ammeter Select Switch .... ALT 1
3. If Amps = 0, ALT 1 Master Switch .... CYCLE (OFF – ON)
4. If Amps remain = 0
   a. ALT 1 Master Switch .... OFF
   b. Alternator 1 Circuit Breaker .... PULL
5. Repeat steps 2. thru 4. for ALT 2.
6. Ammeter Select Switch .... BATT
7. Non-essential Electrical Equipment .... OFF

• Note •

Switch equipment ‘Off’ or pull circuit breakers for non-essential equipment until BATT amps reading is zero (0) or positive.

8. If total power failure anticipated, Turn Coordinator Power.....EMER
9. Land as soon as practical.

Section 4 – Normal Procedures

• Note •

All references to “Master Switches” in the basic POH Normal Procedures shall be interpreted as “Master Switches (ALT2-ALT-BAT).”

Before Takeoff

There are no changes to the Before Takeoff procedure, except that the alternator check shall be performed as follows:

1. Alternators .... CHECK
   a. Pitot Heat..ON
   b. Avionics ....ON
   c. Navigation Lights ....ON
   d. Landing Light...ON (3 - 5 seconds)
   e. Verify both ALT FAIL caution lights out and positive amps indication for each alternator.

Section 5 - Performance

There is no change to the airplane performance when the dual alternator system is installed.

Section 6 - Weight & Balance

Weight and balance data for the dual alternator system is provided with the Equipment List for each delivered airplane.

Section 7 - Systems Description

Electrical System

The airplane is equipped with 28-volt direct current (VDC) electrical system. The system provides uninterrupted power for avionics, flight instruments, lighting and other electrically operated and controlled systems during normal operation.

Power Generation

Primary power for the SR20 is supplied by a 28-VDC negative-ground electrical system. The electrical power generation system consists of a 24-volt, 10-amp-hour battery, two alternators, and a master Control Unit (MCU). The MCU contains an Alternator Control Unit (ACU) for each alternator, contactors for starter, battery, and ground power, a landing light relay, circuit protection for the circuit breaker panel buses, and modules for other protection and annunciation functions. The battery is an aviation grade, 12-cell lead-acid type with non-spill vent caps. The battery is used for engine starting and as an emergency power source in the event of alternator failure.

Two rectified alternators provide constant charging current for the battery and primary power to the aircraft electrical system during normal system operation. The forward, belt-driven alternator is designated ALT 1. The aft, engine-driven alternator is designated ALT 2. Although each alternator produces the same amount of power at a given rotational speed, ALT 1 rotates faster and is rated at 75 amperes while ALT 2 is rated at 40 amperes. Paralleling circuits in the function modules balance alternator output so that, under normal operating conditions, ALT 1 provides 60% of the electrical power and ALT 2 provides the remaining 40%.

Each alternator's ACU provides transient suppression and constant voltage regulation of the alternator output. To protect sensitive instruments, over-voltage circuits monitor each alternator's output and automatically limit peak voltage to 28.5 volts. In the event an over-voltage or an overload condition occurs, the associated ACU automatically opens the affected alternator's circuit breaker. With the alternator off line, the associated ALT FAIL light illuminates, and the other alternator will provide 100% of the electrical power requirements.

Should both alternators fail, the battery will supply system current and a discharge rate will be indicated on the ammeter. Under these conditions, depending on electrical system load, the LOW VOLTS warning light will illuminate when system voltage drops below approximately 24.5 volts.

Power Distribution

The power distribution system for the SR20 consists of the primary electrical power bus in the MCU, which distributes electrical power from the alternators, battery, and external power receptacle to the airplane systems through the circuit breaker panel and internal circuit breakers or fuses. The circuit breaker panel main busses (Main Bus 1 and Main Bus 2) and a non-essential bus receives power through 25-amp circuit breakers on the primary power bus in the MCU. The Essential Bus in the circuit breaker panel is dual sourced receiving power from the ESSENTIAL 1 and ESSENTIAL 2 circuit breakers on the respective Main Bus. Nonessential avionics are powered from Main Bus 1 through the associated AVIONICS circuit breaker. Essential avionics is powered from the Essential Bus through the associated AVIONICS circuit breaker. During normal operation the essential and non-essential busses operate in parallel, but during power system failures, the non-essential bus can be disconnected to provide load shedding of non-essential equipment loads. This load shedding system is designed to increase emergency operating power capacity and to decrease pilot workload during emergency situations by providing the capability to remove all non-essential loads in a single action.

BAT & ALT Master Switches

Rocker type electrical system MASTER switches for the battery (BAT) and both alternators (ALT2 and ALT) are installed on the bolster switch panel. The right switch, labeled BAT, controls the battery contactor. When the BAT switch is set ‘on,’ battery power is available to the airplane electrical circuits. The ALT2 master switch controls the aft, gear-driven alternator. The ALT master switch controls the forward, belt-driven alternator.

Normally, all master switches will be ON. However, the BAT switch can be turned on separately to check equipment while on the ground. To check or use avionics equipment or radios while on the ground, the avionics power switch must also be turned on. Positioning either ALT switch to the off position isolates the associated alternator from the electrical system and the entire electrical load is placed on the operative alternator. If both ALT switches are in the off position the entire electrical load is placed on the battery.

• Note •

Continued operation with both alternator switches off will reduce battery power low enough to open the battery relay, remove power from the alternator field, and prevent alternator restart.

Low-Volts Warning Light

The airplane is equipped with a red LOW VOLTS warning light in the annunciator panel located on the left side of the instrument panel. An MCU function module operates the light. The LOW VOLTS warning annunciator will illuminate whenever bus voltage drops below approximately 24.5 VDC.

• Note •

Illumination of the LOW VOLTS warning light and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM.

LOW VOLTS warning light operation can be tested by turning the landing light on and momentarily turning off both ALT master switches while leaving the BAT master switch ‘on.’

ALT FAIL Lights

The airplane is equipped with an amber ALT FAIL light for each alternator. The lights are located on the left side of the instrument panel next to the annunciator panel. Illumination of the ALT 1 FAIL or ALT 2 FAIL caution light indicates that the associated alternator is not providing proportional power. The lights will also illuminate when the BAT master switch is ‘on’ and the associated ALT master switch is OFF or the associated alternator’s circuit breaker is open.

• Note •

Illumination of ALT FAIL caution light may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM.

Volt / Amp Meter

A 2¼" combination Volts and Ampere meter is mounted on the right instrument panel immediately outboard of the oil temperature and pressure gage. The indicator is internally lighted. 28 VDC for instrument lighting is supplied through the 2-amp INSTRUMENT LIGHTS circuit breaker on Main Bus 1.

The VOLT pointer sweeps a scale from 16 to 32 volts. Refer to Section 2 (Limitations) in basic POH for instrument limit markings. The voltage indication is measured off the essential bus.

The AMP pointer sweeps a scale from –60 to +60 amps with zero at the 9 o'clock position. The amps indication is derived from current transducers located in the MCU function modules. Output from each alternator and the battery is measured. The panel mounted AMMETER SELECT switch is used to select the desired indication. When the engine is operating and the master switch is turned on, the ammeter indicates the charging rate applied to the battery. In the event the alternators are not functioning or the electrical load exceeds the output of the alternators, the ammeter indicates the battery discharge rate. Alternator ammeter indications are positive only.

Ammeter Select Switch

The AMMETER SELECT switch on the instrument panel is used to select the desired source of electrical current flow to be indicated on the ammeter. The switch has three positions: ALT 1, BATT, and ALT 2. Selecting one of the switch positions will cause the amperage output from that device to be displayed on the ammeter.

Circuit Breakers and Fuses

Individual electrical circuits connected to the Main, Essential, and Non-essential buses in the airplane are protected by re-settable circuit breakers mounted on the left side of the center console. The airplane Essential bus is supplied from the Main Buses through the 20-amp

ESSENTIAL 1 and ESSENTIAL 2 circuit breakers. Avionics loads on the Non-essential Avionics Bus and Essential Avionics Bus are protected by 15-amp AVIONICS circuit breakers connected to the respective bus through relays energized by the AVIONICS switch.

In addition to the individual circuit breakers, 25-amp circuit breakers located on the primary bus in the Master Control Unit (MCU) protect the Main Bus 1, Main Bus 2, and the Non-Essential Bus. Additionally, 15-amp circuit breakers protect the landing light and standby vacuum pump circuits. The clock is continuously powered through a 5-amp fuse connected to the primary bus in the MCU.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

L-3 Avionics Systems WX500 Stormscope Sensor

When the L-3 Avionics Systems WX500 Stormscope Sensor is installed in the Cirrus Design SR20, this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 01: 07-18-05 supersedes and replaces the original release of this supplement dated 04-12-00.

FAA Approved Joseph C Miess Date 18 JUL 2005

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 General

This airplane is equipped with a L-3 Avionics Systems WX500 Stormscope Sensor. The stormscope sensor output is displayed on the Multi-Function Display (MFD).

Refer to L-3 Avionics Systems WX500 Stormscope Series II Weather Mapping Sensor User's Guide, P/N 009-11501-001 revision C or later for a detailed description of the system.

• WARNING •

Do not attempt to penetrate a thunderstorm using the Stormscope system. FAA Advisory material recommends that pilots "avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo."

Section 2 - Limitations

1. Stormscope information displayed on the Multi-Function Display is FOR REFERENCE ONLY and must not be used for navigation.

Section 3 - Emergency Procedures

There is no change to the basic POH Emergency Procedures when the WX500 stormscope is installed.

Section 4 – Normal Procedures

Refer to the Multi-Function Display Pilot's Guide installed with the airplane for detailed operating procedures and specific display information.

Stormscope Status Box

When the Stormscope is on, system status will be displayed in the Stormscope status box in the upper left corner of the map page.

HDG or TRK – HDG will be displayed if an external heading input is available. If HDG (heading) is displayed bearing to the strike will be referenced to the airplane heading (direction nose is pointing). If TRK (track) is displayed the bearing to the strike will be referenced to the airplane track (direction airplane is traveling). Normally, the system will plot strikes with reference to heading.

STRK or CELL – STRK will be displayed if the Strike mode is selected. In this mode, individual strikes are plotted using the ‘X’ symbol. CELL will be displayed if the CELL mode is selected. In the Cell mode a ‘+’ symbol is plotted for associated strikes.

RATE – The number of strikes per minute for the selected mode and scale is indicated in a small window below the status line.

Section 5 - Performance

There is no change to the airplane performance when the WX500 stormscope is installed.

Section 6 - Weight & Balance

Weight and balance data for the WX500 stormscope is provided with the Equipment List for each delivered airplane.

Section 7 - Systems Description

• Note •

Refer to the Multi-Function Display Pilot’s Guide installed with the airplane for detailed operating procedures and specific display information.

The L-3 Avionics Systems WX-500 Weather Mapping Sensor (Stormscope) detects electrical discharges associated with thunderstorms and displays the activity on the Multi-Function Display. The system consists of an antenna located on top of the fuselage just forward of the rear window and a processor unit mounted under the aft baggage floor. The antenna detects the electrical and magnetic fields generated by intra-cloud, inter-cloud, or cloud to ground electrical discharges occurring within 200 nm of the airplane and sends the “discharge” data to the processor. The processor digitizes, analyzes, and converts the “discharge” signals into range and bearing data and communicates the data to the MFD every two seconds. The Stormscope processor is powered 28 VDC through the 3-amp STORMSCOPE circuit breaker on the Avionics Non-essential Bus.

Intentionally Left Blank

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

Garmin GTX 327 Transponder

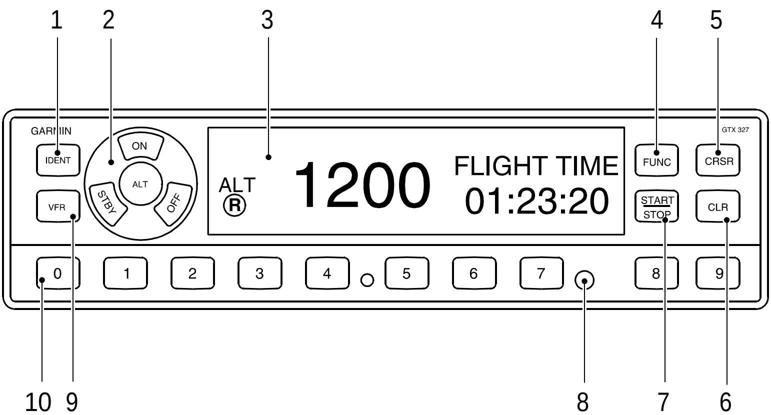
When a Garmin GTX 327 Transponder is installed in the Cirrus Design SR20, this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

FAA Approved Joseph C Miess Date 26 Dec 2000

Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

The airplane is equipped with a single Garmin GTX 327 ATC Mode A/C (identification and altitude) transponder with squawk capability. This supplement provides complete operating instructions for the GTX 327 and does not require any additional data be carried in the airplane.



1. Identification Key
2. Mode Selector Keys
   a. OFF
   b. STBY (Standby)
   c. ON
   d. ALT
3. Display Window
4. FUNC (Function) Key
5. CRSR (Cursor)
6. CLR (Clear) Key
7. START/STOP Key
8. Photocell
9. VFR Key
10. Selector Keys
    a. 0-7 - Code Selection
    b. 8-9 - Display Brightness/Contrast

SR20_FM09_1501

Section 2 - Limitations

No Change

Section 3 - Emergency Procedures

No Change

Section 4 - Normal Procedures

• Note •

Expected coverage from the GTX 327 is limited to "line of sight." Low altitude or aircraft antenna shielding by the airplane itself may result in reduced range. Range can be improved by climbing to a higher altitude.

After Engine Start

1. Avionics Power Switch ....ON

   The transponder will turn on in the STBY mode. The transponder is "on" but will not respond to interrogations from ATC secondary surveillance radar.

Before Takeoff

1. Transponder Mode Selector Keys ....ALT

   If the transponder is in the STBY mode, it will automatically switch to ALT during takeoff when the groundspeed increases through approximately 35 knots. The transponder will respond to ATC Mode C (altitude and identification) interrogations.

   • Note •

   Selecting ON puts the transponder in Mode A (identification) only. The transponder will respond to Mode C (altitude) interrogations with signals that contain no altitude information.

After Landing

1. Transponder Mode Selector Keys .... STBY or OFF

   If the transponder is in the ALT mode for landing, it will automatically switch to STBY during landing rollout when the groundspeed decreases through approximately 35 knots.

Section 5 - Performance

No Change

Section 6 - Weight & Balance

No Change

Section 7 - Systems Description

• Note •

This supplement provides specific procedures for use of the GTX 327 Transponder in the SR20 and a general description of the unit. For a detailed description of the GTX 327, *refer to GARMIN GTX 327 Mode A/C Transponder Pilots Guide*, p/n 190-00187-00 Revision A (Feb 2000) or later revision.

The Garmin GTX 327 transponder system consists of the integrated receiver/transmitter control unit, an antenna, and an altitude digitizer. The receiver/transmitter receives interrogations from a ground-based secondary surveillance radar transmitter and then transmits to the interrogating Air Traffic Control Center. Digitized altitude information is provided by the altitude digitizer (encoder) plumbed into the airplane static system. The transponder and integrated controls are mounted in the center console. The transponder control provides active code display, code selection, IDENT button, and test functions. The display is daylight readable and is automatically dimmed through a photocell. The controller buttons are dimmed through the INST lights control on the instrument panel bolster. The transponder antenna is mounted on the underside of the fuselage just aft of the firewall. 28 vdc for transponder operation is controlled through the Avionics Master Switch on the bolster switch panel. 28 VDC for receiver, transmitter, and altitude encoder operation is supplied through the 2-amp ENCODER/XPONDER circuit breaker on the Avionics Essential Bus.

Mode Selector Keys

The mode selector keys are located in a circular arrangement immediately to the left of the display window. The selected mode is annunciated at the left side of the display immediately adjacent to the selector keys. The five positions are:

OFF - Turns off all power to the GTX 327 transponder. The transponder should be off until the engine is started. Normally, the transponder can be left in the STBY position and allow the Avionics Power Switch to control system power.

STBY - Powers the transponder in standby mode. The last active identification code will be selected. In STBY, the transponder will not reply to any interrogations from an ATC secondary ground surveillance radar system. This is the normal position for ground operations in the SR20.

• Note •

STBY mode is automatically entered from ALT mode during landing ground roll as the groundspeed decreases through 35 knots.

ON - Powers on the GTX 327 in Mode A (identification mode.). The last active identification code will be selected. In addition to the airplane's identification code, the transponder will also reply to altitude (Mode C) interrogations with signals that do not contain altitude information.

ALT - Places the transponder in Mode A and Mode C, identification and altitude respectively. The transponder will respond to interrogations with the airplane's identification code and standard pressure altitude (29.92 inches Hg).

• Note •

ALT mode is automatically entered from STBY mode during takeoff ground roll as the groundspeed increases through 35 knots.

Code Selector Keys

Code selection is accomplished by depressing the eight selector keys (numbered 0 - 7) located immediately below the display. Any of 4096 active identification codes can be selected. The selected code must be in accordance with instructions for IFR flight or rules applicable to transponder utilization for VFR flight.

The airplane's transponder code is used to enhance tracking capability by ATC. Therefore, do not switch the transponder to STBY when making routine code changes.

Input a New Code

1. Use CLR key to remove the current code.
2. Use "0 - 7" keys to input the new code. The new code will not be activated until the last (fourth) digit is entered. Pressing the CLR key will move the cursor back to the previous digit. Pressing the CRSR key during code entry will remove the cursor and cancel the entry.

• Note •

When making routine code changes, avoid inadvertent selection of code 7500 and all codes within the 7600 series (7600 – 7677) and 7700 series (7700 – 7777). These codes trigger special indicators in automated facilities. 7500 will be decoded as the hijack code.

Important Codes

- 1200 – VFR code for any altitude in U.S.
- 7000 – VFR code commonly used in Europe
- 7500 – Hijacking
- 7600 – Loss of communications
- 7700 – Emergency
- 7777 – Military interceptor operations (Never squawk this code)
- 0000 – Military use only (not enterable)

Reply Light

The reply light is the small reverse video “R” immediately below the mode annunciation in the display window. The reply light will blink each time the transponder replies to ground interrogations. The light will remain on during the 18-second IDENT time interval.

IDENT Key

Pressing the IDENT button activates the Special Position Identification (SPI) pulse for approximately 18 seconds allowing ATC to identify your transponder return from other returns on the controller’s scope. The Reply annunciator in the display will illuminate during the SPI pulse. Momentarily press the IDENT key when the controller requests, “SQUAWK IDENT.”

VFR Key

Pressing the VFR key sets the transponder to the pre-programmed VFR code selected in the configuration mode (factory set to 1200). Pressing the VFR key a second time will restore the previous identification code.

FUNC Key

Pressing the FUNC key changes the data shown on the right side of the display. Pressing the FUNC key a second time will cycle the display to the next data. Displayed data includes Pressure Altitude, Flight Time, Count Up Timer, Count Down Timer, Contrast, and Display Brightness.

PRESSURE ALT - Displays pressure altitude in feet. An arrow to the right of the altitude indicates that the airplane is climbing or descending.

FLIGHT TIME - Displays the flight time. The timer receives groundspeed from GPS1. Flight time starts when the groundspeed reaches 35 knots on takeoff and pauses when the groundspeed descends below 35 knots on landing.

COUNT UP TIMER - The count up timer is controlled by the START / STOP key. Pressing the CLR key zeros the display.

COUNT DOWN TIMER - The count down timer is controlled by the START / STOP key. The CRSR and “0 - 9” keys are used to set the initial time. Pressing the CLR key resets the timer to the initial value.

CONTRAST - Allows adjustment of display contrast. When CONTRAST is selected, pressing the “8” key reduces contrast and pressing “9” increases contrast.

DISPLAY - The display function is not available in this installation. Display brightness is automatically controlled through a photocell in the front panel.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

S-Tec System 55X Autopilot

When the S-Tec System Fifty Five X (55X) Autopilot is installed in the Cirrus Design SR20, this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 04: 08-15-07, supersedes and replaces Revision 03 of this supplement dated 07-18-05..

FAA Approved Joseph C Miess Date Aug 15 2007

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

This airplane is equipped with an S-TEC System 55X Autopilot. The System 55X autopilot is a two-axis autopilot system. The system consists of a flight guidance programmer/computer, altitude encoder, altitude selector / alerter, turn coordinator, and HSI. Mode selection and vertical speed selection is made on the programmer/computer panel. A button on each control yoke handle may be used to disengage the autopilot. The autopilot makes roll changes through the aileron trim motor and spring cartridge and makes pitch changes for altitude hold through the elevator trim motor. The SR20 installation of the S-Tec System 55X Autopilot features:

- Heading Hold and Command;
- NAV/LOC/GS tracking, high and low sensitivity, GPSS roll steering, and automatic 45° course intercept;
- Altitude Hold and Command; and
- Vertical Speed Hold and Command.

Refer to S-Tec System Fifty-Five X Autopilot Pilot's Operating Handbook (POH): *Serials 1005 thru 1336;* P/N 87109 dated 8 November 2000 or later OR *Serials 1337 and subsequent;* P/N 87247 original release or later for full operational procedures and description of implemented modes. The System 55X POH also contains detailed procedures for accomplishing GPS & VOR course tracking, front course and back course localizer approaches, and glideslope tracking.

• Note •

The SR20 implementation of the System 55X Autopilot does not utilize the optional remote annunciator, roll servo, and optional trim servo. Therefore, all references to these items in the S-Tec System 55X POH shall be disregarded. Additionally, this installation does not utilize a CWS (Control Wheel Steering) switch or an AUTOPILOT MASTER switch.

This installation utilizes the airplane's pitch and roll trim actuators to affect steering changes. Therefore, the automatic trim function of the System 55X is not implemented. Disregard all references in the S-Tec System 55X POH to this feature.

Roll and pitch information are displayed on attitude indicator. Autopilot Flight Director is not implemented in this installation.

Section 2 - Limitations

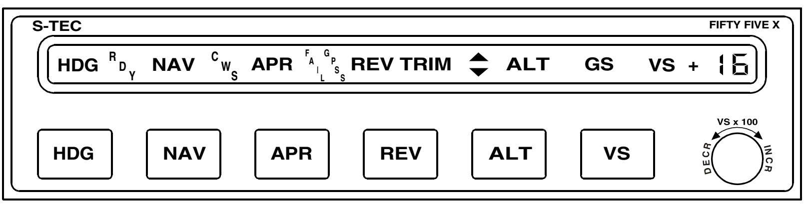
1. Autopilot operation is prohibited above 185 KIAS.
2. The autopilot must not be engaged for takeoff or landing.
3. The autopilot must be disengaged for missed approach, go-around, and balked landing.
4. Flaps must be set to 50% for autopilot operation in Altitude Hold at airspeeds below 95 KIAS.
5. Flap deflection is limited to 50% during autopilot operations.
6. The autopilot must be disconnected in moderate or severe turbulence.
7. Minimum engage height for the autopilot is 400 ft AGL.
8. Minimum speed with the autopilot engaged is $1.2V_S$ for the given configuration.
9. 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 disconnect during approach if course deviation exceeds 50%. The approach should only be continued by “hand-flying” the airplane.
   c. 12 knot maximum crosswind component between the missed approach point and outer marker.
   d. The intercept of the localizer shall occur at least 5 miles outside of the outer marker.
   e. 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.
   f. The intercept angle shall be no greater than a 45-degree intercept.

g. The ILS is flown at normal approach speeds, and within any STC or TC speed constraints and as defined in this flight manual.

h. 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.

i. 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.

10. The S-TEC System Fifty Five X Pilot's Operating Handbook: *Serials 1005 thru 1336;* P/N 87109 dated 8 November 2000 or later OR *Serials 1337 and subsequent;* P/N 87247 original release or later, must be carried in the airplane at all times and must be available to the pilot while in flight.



SR20_FM09_1509

Figure - 1
System 55X Autopilot Programmer/Computer

Section 3 - Emergency Procedures

Autopilot Malfunction

Refer to Electric Trim/Autopilot Failure procedure in the SR20 POH. Do not reengage the autopilot until the malfunction has been identified and corrected. The autopilot may be disconnected by:

1. Pressing the A/P DISC/Trim switch on the control yoke handle.
2. Pulling the AUTOPILOT circuit breaker on Essential Bus.

Altitude lost during a roll axis autopilot malfunction and recovery:

Flight Phase	Bank Angle	Altitude Loss
Climb	30°	None
Cruise	55°	100 ft
Descent	55°	120 ft
Maneuvering	10°	None
Approach	0°	20 ft

Altitude lost during a pitch axis autopilot malfunction and recovery:

Flight Phase	Altitude Loss
Cruise	200 ft
ILS	25 ft

System Failure and Caution Annunciations

If any of the following failure annunciations occur at low altitude or during an actual instrument approach, disengage the autopilot, execute a go-around or missed approach as appropriate. Inform ATC of problem. Do not try to troubleshoot until a safe altitude and maneuvering area are reached or a safe landing is completed.

Annunciation	Condition	Action
Flashing RDY for 5 seconds with audible tone.	Autopilot disconnect. All annunciations except RDY are cleared.	None.
Flashing RDY with audible tone then goes out.	Turn coordinator gyro speed low. Autopilot disengages and cannot be re-engaged.	Check power to turn coordinator.
Flashing NAV, REV, or APR.	Off navigation course by 50% needle deviation or more.	Use HDG mode until problem is identified. Crosscheck raw NAV data, compass heading, and radio operation.
Flashing NAV, REV, or APR with steady FAIL	Invalid radio navigation signal.	Check Nav radio for proper reception. Use HDG mode until problem is corrected.
Flashing VS	Excessive vertical speed error over selected vertical speed. Usually occurs in climb.	Reduce VS command and/or adjust power as appropriate.
Flashing GS	Off glideslope centerline by 50% needle deviation or more.	Check attitude and power. Adjust power as appropriate.
Flashing GS with steady FAIL	Invalid glideslope radio navigation signal.	Disconnect autopilot and initiate go-around or missed approach procedure. Inform ATC.
Flashing GS plus ALT.	Manual glideslope disabled.	Re-enable by pressing NAV mode button.

Section 4 - Normal Procedures

Refer to Section 7 – Systems Description for a description of the autopilot and altitude selector and their respective modes.

• WARNING •

The pilot must properly monitor and control the engine power to avoid stalling the airplane in autopilot altitude hold or vertical speed modes.

Autopilot Pre-Flight Tests

1. Battery Master Switch .... ON
2. Avionics Power Switch .... ON

   Note that all autopilot annunciators, except CWS, and TRIM illuminate. After about 5 seconds, all lights will go out. When the turn coordinator gyro has reached operational RPM, the RDY annunciator will come on.
3. Heading Mode..TEST
   a. Center the HDG bug under the lubber line on the HSI.
   b. Momentarily press HDG button on autopilot Mode Selector. Note that HDG light illuminates.
   c. Then rotate HDG knob on the HSI to the left then right. Note that control yokes follow movement of knob. Then return HDG bug to lubber line.
4. Vertical Speed..TEST
   a. Press VS button on autopilot programmer/computer. Note that VS light illuminates VS+0.
   b. Rotate the VS control knob to 500 FPM up (+5). After a short delay, the control yoke will move aft.
   c. Rotate the VS control knob to 500 FPM down (-5). After a short delay, the control yoke will move forward.
5. Altitude Hold..TEST
   a. Depress ALT button on autopilot programmer/computer. Note that ALT annunciator comes on, VS annunciator goes out, and yoke does not move.

6. Overpower Test:

    a. Grasp control yoke and input left aileron, right aileron, nose up, and nose down to overpower autopilot. Overpower action should be smooth in each direction with no noise or jerky feel.

7. Radio Check:

    a. Turn on NAV1 radio, with a valid NAV signal, and select VLOC for display on the HSI.

    b. Use autopilot programmer/computer to engage NAV mode and move OBS so that VOR deviation needle moves left or right. Note that control yokes follow direction of needle movement.

8. Autopilot Disconnect Tests:

    a. Press Pilot A/P DISC/Trim Switch (control yoke). Note that the autopilot disengages. Move control yoke to confirm that pitch and roll control is free with no control restriction or binding.

    b. Repeat step using Copilot A/P DISC/Trim Switch.

In-Flight Procedures

1. Autopilot RDY Light .... CHECK ON
2. Trim airplane for existing flight conditions.
3. Engage desired mode by pressing mode selector button on autopilot programmer/computer.

Heading Mode

1. Begin by selecting a heading on HSI within 10° of the current airplane heading.
2. Press HDG button on autopilot programmer/computer. The HDG annunciator will illuminate and the airplane will turn to the selected heading.
3. Use HSI HDG bug to make heading changes as desired.

Altitude Hold Mode

1. Manually fly the airplane to the desired altitude and level off.

• Note •

For smoothest transition to altitude hold, the airplane rate of climb or descent should be less than 100 FPM when Altitude Hold is selected.

2. Press HDG or NAV to engage a roll mode. The associated annunciator will illuminate.

• Note •

A roll mode must be engaged prior to engaging a pitch mode.

3. Press the ALT button on the autopilot programmer/computer. The ALT annunciator will illuminate indicating that the mode is engaged and the autopilot will hold the present altitude.

• Note •

Manually flying the airplane off the selected altitude will not disengage altitude hold and the autopilot will command a pitch change to recapture the altitude when the control input is released.

4. Altitude can be synchronized to another altitude by rotating the VS knob on the programmer/computer. Clockwise rotation will increase and counterclockwise rotation will decrease altitude 20 feet for each ‘click.’ The maximum adjustment is ±360 feet. Adjustments greater than 360 feet can be made by selecting VS mode and flying the airplane to the new altitude and then re-engaging ALT mode.

Vertical Speed Mode

1. Begin by manually establishing the desired vertical speed.
2. Press HDG or NAV to engage a roll mode. The associated annunciator will illuminate.

• Note •

A roll mode must be engaged prior to engaging a pitch mode.

3. Press the VS button on the autopilot programmer/computer to engage the vertical speed mode. When the mode is engaged, the

autopilot will synchronize to and hold the vertical speed at the time the mode was engaged.

• Note •

The vertical speed is displayed in 100-foot increments on the programmer/computer window or on the vertical speed indicator on the PFD. A plus (+) value indicates climb and a negative or minus (-) value indicates descent.

4. Vertical speed can be adjusted by rotating the VS knob on the programmer/computer or the right knob on the PFD when the VSI bug has been selected.

• Note •

A flashing VS mode annunciator indicates excessive error between actual vertical speed and the selected vertical speed (usually in climb). The pilot should adjust power or reduce the commanded vertical speed as appropriate to remove the error.

GPS tracking and GPS Approach

1. Begin with a reliable GPS signal selected on the NAV receiver.
2. Select desired course on HSI and establish a desired intercept heading.
3. Press the NAV button on the autopilot programmer/computer twice. The NAV and GPSS mode annunciators will illuminate.

• Note •

If the course needle is at full-scale deviation, the autopilot will establish the airplane on a heading for a 45° intercept with the selected course. As the airplane approaches the course, the autopilot will smoothly shallow the intercept angle. The pilot may select an intercept angle less than the standard 45° by setting the desired intercept heading with the HSI HDG bug, pressing and holding HDG, and then pressing NAV once to intercept course in NAV mode or twice to intercept course in GPSS mode on the autopilot programmer/computer. When the on-course intercept turn begins the HDG mode will disengage and the annunciator will go out.

Turns while in GPSS mode can exceed the standard rate by 20% to 30%.

In NAV mode while tracking a GPS or VOR/LOC signal, during the intercept sequence the autopilot operates at maximum gain and sensitivity (90% of standard rate turn). When the selected course is intercepted, course deviation needle centered, the course-tracking program is activated. The system will remain at maximum sensitivity for approximately 15 seconds while the wind correction angle is established. The maximum turn rate is then reduced to 45% standard rate. Approximately 60 seconds later, the maximum turn rate is reduced to 15% standard rate.

4. For increased sensitivity during GPS approach or if desired for enroute tracking, press the APR button on the autopilot programmer/computer. The NAV, GPSS, and APR annunciators will be illuminated. Use HDG to accomplish a procedure turn. Engage GPSS again to complete the approach.

VOR Tracking and VOR-LOC Approach

1. Begin with a reliable VOR or VOR-LOC signal selected on the NAV receiver.
2. Select desired course on HSI and establish a desired intercept heading.
3. Press the NAV button on the autopilot programmer/computer. The NAV mode will illuminate. Course interception and tracking will be as described under GPS Tracking and GPS Approach above.
4. For station passage, set HDG bug to within 5° of selected course.

• Note •

If the HDG bug is within 5° of center and the course deviation is less than 10%, the autopilot will immediately establish the lowest level of sensitivity and limit the turn rate to a maximum of 15% of a standard rate turn.

5. For increased sensitivity during approach or if desired for enroute tracking, press the APR button on the autopilot programmer/computer. Both NAV and APR annunciators will be illuminated.

Glideslope Intercept and Tracking

1. Begin with a reliable ILS signal selected on the NAV receiver.
2. Select autopilot NAV and APR. Airplane must be within 50% needle deviation of localizer centerline.
3. Select ALT mode. Airplane must be 60% or more below the glideslope centerline during the approach to the intercept point. If the above conditions have existed for 10 seconds, GS mode will arm, the GS annunciator will come on and the ALT annunciator will remain illuminated. When glideslope intercept occurs, the ALT annunciator will go out and the system will track the glideslope.

• Note •

If approach vectoring locates the airplane too near the glideslope at the intercept point (usually the outer marker), the GS mode can be manually armed by pressing the ALT button once. Once capture is achieved, GS annunciator will come on and ALT annunciator will go out.

Section 5 - Performance

There is no change to the airplane performance when the S-Tec System 55X autopilot is installed.

Section 6 - Weight & Balance

There is no change to the airplane weight & balance when the S-Tec System 55X autopilot is installed.

Section 7 - Systems Description

Autopilot

The airplane is equipped with an S-Tec System 55X two-axis Automatic Flight Control System (Autopilot). The autopilot programmer/computer is installed in the center console radio stack.

The autopilot roll axis uses an inclined gyro in the turn coordinator case as the primary turn and roll rate sensor. In addition to the turn coordinator instrument, the roll axis computer receives signals from the HSI and the #1 NAV/GPS radio. The roll computer computes roll steering commands for turns, radio intercepts, and tracking. Roll axis steering is accomplished by autopilot steering commands to the aileron trim motor and spring cartridge.

The pitch computer receives altitude data from the altitude encoder pressure transducer plumbed into the static system, an accelerometer, and glideslope information from the HSI and #1 NAV radio. Pitch axis command for altitude hold, vertical speed hold, and glideslope tracking is accomplished by pitch computer commands to the elevator trim motor and trim cartridge.

28 VDC for autopilot and altitude selector/alerter is supplied through the 5-amp AUTOPILOT circuit breaker on the MAIN BUS #1.

All Autopilot mode selection is performed by using the mode select buttons and VS knob on the autopilot programmer/computer in the center console. Annunciators in the programmer/computer display window annunciate modes. *Refer to Figure 1* for an illustration of the programmer/computer.

RDY (Ready)– Illuminates when autopilot is ready for engagement. When the airplane's Battery Master switch is turned on and the rate gyro RPM is correct, the RDY annunciator will come on indicating the autopilot is ready for the functional check and operation. The autopilot cannot be engaged unless the RDY light is illuminated.

HDG (Heading) Mode – When HDG is selected, the autopilot will engage the HDG mode, fly the airplane to, and hold the heading set on the HSI. Subsequent heading changes are made using the HDG knob on the HSI. For smoothest transition to HDG mode, it is recommended that the airplane be aligned to within 10° of the selected heading before engaging HDG. The HDG mode is also used in combination with the NAV mode to set up a pilot selected intercept angle to a course.

NAV (Navigation) Mode - When NAV is selected, the autopilot will provide intercept and tracking of GPS, VOR, and Localizer courses. For course intercept with full-scale deviation, the autopilot automatically sets up a 45° intercept angle at maximum gain and sensitivity (turn is limited to 90% of standard rate). The point at which the turn to capture the course begins is dependent upon closure rate and airplane position. When the course is intercepted and the HSI course deviation needle centered (indicating course capture), the autopilot automatically initiates a tracking gain program to reduce turn rate to 45% standard rate, and then 15% standard rate.

REV (Reverse Course) – When REV is selected, the autopilot will automatically execute high sensitivity gain for an approach where tracking the front course outbound or tracking the back course inbound is required. The APR and REV annunciators will illuminate when REV is selected.

APR (Approach) – When APR is selected, the autopilot provides increased sensitivity for VOR or GPS approaches. APR may also be used to provide increased sensitivity for enroute course tracking.

GS (Glideslope) - The autopilot GS function will capture and track an ILS glideslope. To arm the GS function, the following conditions must be met: (1) the NAV receiver must be tuned to the appropriate ILS frequency; (2) The glideslope signal must be valid - no flag; (3) the autopilot must be in NAV/APR/ALT modes; and (4) the airplane must be 60% or more below the glideslope centerline during the approach to the intercept point, and within 50% needle deviation of the localizer centerline at the point of intercept - usually the outer marker. When the above conditions have existed for 10 seconds, the GS annunciator will illuminate indicating GS arming has occurred (ALT annunciator will remain on). When the glideslope is intercepted and captured, the ALT annunciator will go out.

ALT (Altitude Hold), Mode - When ALT is selected, the autopilot will hold the altitude at the time the mode was selected. Altitude hold will not engage if an autopilot roll mode is not engaged. Altitude correction for enroute barometric pressure changes may be made by rotation of the VS knob on the autopilot programmer/computer. Clockwise rotation will increase and counterclockwise rotation will decrease altitude 20 feet for each 'click.' The maximum adjustment is ±360 feet. Adjustments greater than 360 feet can be made by selecting VS mode and flying the airplane to the new altitude and then re-engaging ALT mode.

VS (Vertical Speed) Mode - When VS is selected, the autopilot will synchronize to and hold the vertical speed at the time the mode was selected. Altitude hold will not engage if an autopilot roll mode is not engaged. The vertical speed is displayed in 100-foot increments at the far right of the programmer/computer window next to the VS annunciation. A plus (+) value indicates climb and a negative or minus

(-) value indicates descent. Vertical speed can be adjusted by rotating the VS knob on the programmer/computer. Clockwise rotation increases and counterclockwise rotation decreases rate of climb (or descent) 100 FPM for each 'click.' The maximum adjustment is ±1600 FPM.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

L-3 Avionics Systems SkyWatch Traffic Advisory System

When the L-3 Avionics Systems SkyWatch 497 is installed in the Cirrus Design SR20, this POH Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the appropriate Cirrus Design Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated 10-12-05 supersedes and replaces the original release of this supplement dated 08-20-01.

FAA Approved Joseph C Miess Date Oct 12 2005

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

This airplane is equipped with a L-3 Avionics Systems SkyWatch SKY497 Traffic Advisory System to advise the pilot of transponder-equipped aircraft that may pose a collision threat. SkyWatch advisory information is displayed on the GARMIN 430 display. The display indicates relative range, bearing, and altitude of intruder aircraft. Aural warnings are integrated into the airplane's audio system.

Section 2 - Limitations

• WARNING •

SkyWatch can only detect aircraft that are equipped with operating transponders.

1. Traffic information shown on the GARMIN 430 displays is provided as an aid in visually acquiring traffic. Pilots must maneuver the aircraft based only upon ATC guidance or positive visual acquisition of conflicting traffic.
2. If the pilot is advised by ATC to disable transponder altitude reporting, the SkyWatch must be turned OFF.
3. The L-3 Avionics Systems SkyWatch Traffic Advisory System Model SKY497 Pilot's Guide P/N 009-10801-001 Rev B (6/6/00) or later must be available to the pilot during flight with the SkyWatch operating.
4. The GARMIN 400 Series Pilot's Guide Addendum for "Display Interface for Traffic and Weather Data" P/N 190-001140-10 Rev B or later revision must be available to the pilot during flight with the SkyWatch operating.

Section 3 - Emergency Procedures

No Change

Section 4 - Normal Procedures

After Engine Start

1. Avionics Power Switch ....ON
2. SkyWatch will turn on, complete a self-test, and then enter the STBY mode.

• Note •

During the takeoff run, SkyWatch will automatically switch to operational mode approximately 8 seconds after 35 KIAS is achieved.

During the landing roll out, SkyWatch will automatically switch back to STBY approximately 24 seconds after the airplane slows to 35 KIAS or below.

Serials 1582 and subsequent: To minimize pilot distraction, Skywatch system sensitivity will automatically be set to level B (reduced) and aural warnings will be inhibited when flaps are set to 50% and 100%.

3. *Refer to the GARMIN 400 Series Pilot's Guide Addendum* for "Display Interface for Traffic and Weather Data" P/N 190-001140-10 Rev B for additional SkyWatch operational data not included in this supplement.

Operator Initiated Control of SkyWatch

Self-Test

In addition to the power-up self-test, an automatic self-test is performed several times each minute. If the SkyWatch is in STBY or FAILED modes, an operator initiated self-test may be performed using the GNS 430 controls as described below:

1. Rotate the small PUSH CRSR knob to select the Traffic / Weather page.
2. From the Traffic Screen, press the MENU key to select the Menu page.
3. Rotate the small PUSH CRSR knob to select SELF TEST and then press the ENT key.

Switch to Normal from the Standby Screen

SkyWatch must be switched out of STBY to display traffic information. The ability to switch out of STBY on the ground is useful for scanning the airspace around the airfield prior to takeoff. Using the GNS 430 controls:

1. Turn the cursor on and highlight STBY.
2. Use the small PUSH CRSR knob to select OPER?
3. Press the ENT key to place SkyWatch in the OPER (operational) mode. SkyWatch will switch into the 6 nmi display range.

Switch into Standby from the Traffic Screen

SkyWatch cannot be switched to Standby while airborne. With the airplane on the ground, use the GNS 430 controls as described below:

1. Turn the cursor on and highlight OPER.
2. Use the small PUSH CRSR knob to select STBY?
3. Press the ENT key to place SkyWatch in the STBY (standby) mode.

Change Altitude Display

1. From the Traffic Screen, turn the cursor on, highlight the current mode, and use the small PUSH CRSR knob to cycle through the options.
2. With each turn, the display changes to display the traffic in the selected display range (ABV, look up; NRM, normal: BLW, look down; or UNR, unrestricted). *Refer to the L-3 Avionics Systems SkyWatch Traffic Advisory System Model SKY497 Pilot's Guide* P/N 009-10801-001 Rev B (6/6/00) or later for information regarding the display ranges.

Respond to Traffic Advisories

1. When the SkyWatch issues a TA (Traffic Advisory), visually scan outside for the intruder aircraft. Call ATC for Guidance. If you visually acquire the intruder aircraft, use normal right-of-way procedures to maintain separation.

• Note •

Do not maneuver solely on traffic information shown on the display. Information shown on the display is provided as an aid in visually acquiring traffic - It is not a replacement for ATC and See & Avoid techniques.

Section 5 - Performance

No Change

Section 6 - Weight & Balance

SkyWatch adds the following optional (Sym = O) equipment at the weight and arm shown in the following table.

ATA/ Item	Description	Sym	Qty	Part Number	Unit Wt	Arm
34-01	SkyWatch Inverter	O	1	14484-001	0.5	118.0
34-02	SkyWatch Antenna Instl.	O	1	14477-001	2.3	150.5
34-03	SkyWatch Track Box	O	1	14477-050	10.0	140.0
34-04	SkyWatch Wiring Instl	O	1	14479-001	2.0	145.0

Section 7 - Systems Description

The SkyWatch model SKY497 is an airborne Traffic Advisory System (TAS). SkyWatch monitors a radius of approximately 6 nautical miles around the aircraft by interrogating transponders in the monitored area and determining if a collision threat exists. To determine if a collision threat exists, SkyWatch calculates the range, altitude, bearing, and closure rate of all transponder equipped aircraft with the 6 nautical mile range. When SkyWatch detects an intruder aircraft within 0.55 nautical mile horizontal distance and a ±800 ft relative altitude or detects an intruder aircraft is on a course that will intercept the SkyWatch airplane's course within 20 seconds (non-altitude reporting intruder aircraft) or 30 seconds (altitude reporting intruder aircraft), SkyWatch will issue a Traffic Advisory (TA). Traffic Advisories are indicated on the GNS 430 displays and aural “Traffic, Traffic” warnings are announced in the headphones and cabin speaker.

SkyWatch may be pilot controlled through the GNS 430 controller. STBY (standby), OPER (operational), and SELF TEST modes as well as altitude display (ABV, look up; NRM, normal: BLW, look down; or UNR, unrestricted) can be selected.

The SkyWatch System consists of a Transmitter Receiver Computer (TRC) installed under the copilot's seat just forward of the spar tunnel and a directional antenna installed on the airplane exterior above the cabin. The system also utilizes inputs from the altitude encoder, the aircraft heading system (gyro slaving amplifier), and a speed switch plumbed into the pitot system. Electrical power for system operation is 28 vdc supplied through the 5-amp SKYWATCH Circuit Breaker on the Avionics Non-Essential bus.

• Note •

Refer to the L-3 Avionics Systems SkyWatch Pilot's Guide (P/N 009-10801-001) for a description of the SkyWatch System.

Refer to the GARMIN Addendum for "Display Interface for Traffic and Weather Data" P/N 190-001140-10 for additional operational information and a display description.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement
For

Garmin GNS 430 GPS Navigator

When a Garmin GNS 430 GPS Navigator with NAV, ILS, and COM is installed in the Cirrus Design SR20 this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement either adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 02: 08-15-07 supersedes and replaces the Revision 01 of this supplement dated 05-25-05.

Serials 1005 thru 1267; This supplement replaces GNS 430 GPS Navigator supplement. P/N 11934-S03 original release or later.

FAA Approved *Joseph C Miess* Date Aug 15 2007

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

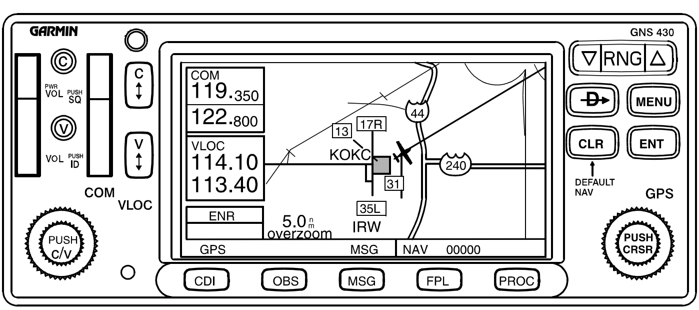
The airplane is equipped with a Garmin GNS 430 GPS Navigator with VHF Nav, ILS, and VHF Com herein referred to as the “Navigator.” The GNS 430 is capable of providing IFR enroute, terminal, and approach navigation with position accuracies better than 15 meters. The system utilizes the Global Positioning System (GPS) satellite network to derive the airplane’s position (latitude, longitude, and altitude) and the altitude digitizer to enhance the altitude calculation.

The GARMIN GNS 430 GPS Navigator may be installed in single or dual installations. If one GNS 430 is installed, it will be designated ‘GPS 1,’ and either a GARMIN GNC 250XLGPS Navigator or a GARMIN GNC 420 GPS Navigator will be installed as GPS 2. Refer to applicable supplements for descriptions of these units.

If two GARMIN GNS 430 Navigators are installed, the upper unit will be designated ‘GPS 1’ and the lower unit will be designated ‘GPS 2.’ In these installations, the MFD and the HSI will display GPS 1 information and the CDI (VOR/LOC/ILS/GS Indicator) will display GPS 2 information.

• Note •

Refer to GPS 430 INTEGRATION in the NORMAL Procedures Section of this supplement for a more detailed description of GPS 430 integration in the various configurations.



SR20_FM09_1109

Figure - 1
Garmin GNS 430 Front Panel

Section 2 – Limitations

Provided the GPS Navigator is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications of:

1. VFR/IFR, enroute, terminal, and instrument approach (GPS, VOR) operations, that is, enroute, terminal, and instrument approach within the U.S. National Airspace System, North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace using the WGS-84 (or NAD 83) coordinate reference datum in accordance with the criteria of AC 20-138, AC 91-49, and AC 120-33. Navigation data is based upon use of only the global positioning system (GPS) operated by the United States.
2. The Garmin GNS 430 Pilot's Guide and Reference, P/N 190-00140-00, Revision F dated July 2000 (or later appropriate revision) must be immediately available to the flight crew whenever navigation is predicated on the use of the GPS Navigator. The software status stated in the pilot's guide must match that displayed on the equipment.
3. The Navigator must utilize software version 2.XX (where X is a digit, 0-9) or later.
4. IFR enroute and terminal navigation is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.
5. GPS instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the Navigator’s NavData database. The database must incorporate the current update cycle.
    a. Instrument approaches must be conducted in the approach mode and RAIM must be available at the Final Approach Fix.
    b. Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, and MLS approaches are not authorized in GPS mode.
    c. When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS navigation, the aircraft must have operational equipment capable of using that navigation aid, and the required navigation aid must be operational.

6. The aircraft must have other approved navigation equipment installed and operating appropriate to the route of flight.
7. The Garmin GNS 430 meets RNP5 (BRNAV) requirements of AC 90-96 and is in accordance with AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 01, provided it is receiving usable navigation information from the GPS receiver.
8. Do not use the Terrain Display for navigation of the aircraft. The Terrain Display does not provide TAWS capability and is intended to serve as a situational awareness tool only and does not provide the accuracy fidelity on which to solely base terrain or obstacle avoidance maneuvering decisions.

Section 3 - Emergency Procedures

1. If GPS Navigator information is not available or is invalid, utilize remaining operational navigation equipment as required.
2. If “RAIM NOT AVAILABLE…” or “RAIM POSITION WARNING” message is displayed, continue to navigate using the GPS equipment or revert to an alternate means of navigation appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using another IFR approved navigation system.

Section 4 - Normal Procedures

The GARMIN GNS 430 Navigator is available in single or dual installations. Operating procedures for each unit of a dual installation are identical. *Refer to the GNS 430 Integration* paragraphs in this supplement for integration differences when single and dual units are installed. Normal operating procedures are outlined in the GARMIN GNS 430 Pilot's Guide and Reference, P/N 190-00140-00, Revision F dated July 2000 (or later appropriate revision).

Activate GPS

1. Battery Master Switch .... ON
2. Avionics Power Switch .... ON
3. Navigator Com/ Power Switch..................................... Rotate ‘ON’

The Navigator will display a welcome page while the self-test is in progress. When the self test is successfully completed, the Navigator asks for NavData database confirmation, acquires position, and then displays the acquired position on the Navigator's display and on the MFD.

• Note •

The Navigator is not coupled to an air and fuel data computer. Manual fuel-on-board and fuel flow entries must be made in order to use the fuel planning function of the AUX pages.

The GPS Navigator utilizes altitude information from the altitude encoder's altitude digitizer to enhance altitude information.

GNS 430 Integration

The GNS 430 Navigator is integrated into the SR20 Avionics installation in three configurations:

1. Single GARMIN GNS 430 (GPS 1) interfaced with the CDI and MFD and a single GARMIN GNC 250XL (GPS 2) not integrated with a remote indicator.
    a. In this configuration, pressing the alternate-action CDI push-button on the GARMIN GNS 430 (GPS 1) alternately selects GPS or NAV for display on the CDI each time the button is pressed. The CDI source is indicated by illumination of the “GPS” or “VLOC” annunciation in the lower left corner of the GNS 430 display.

    • Note •

    The CDI displays course deviation from a VOR, Localizer (LOC) or Glideslope (G/S) when VLOC is selected for display and displays GPS track deviation when GPS is the selected navigation source.

    b. GPS 2 in this configuration is a GARMIN GNC 250XL GPS Navigator with VHF Com. This unit displays GPS data on the unit's display panel only and is not integrated with any remote indicator. *Refer to the SR20 POH Supplement* for GARMIN GNC 250XL GPS Navigator, P/N 11934-S05.

2. Single GARMIN GNS 430 (GPS 1) interfaced with the HSI and MFD and a single GARMIN GNC 420 (GPS 2) interfaced with the CDI (VOR/LOC) indicator.

   a. In this configuration, pressing the alternate-action CDI push-button on the GARMIN GNS 430 (GPS 1) alternately selects GPS or NAV for display on the HSI and MFD each time the button is pressed. The HSI source is indicated by illumination of the “GPS” or “VLOC” annunciation in the lower left corner of the GNS 430 display.

      • Note •

      The HSI displays course deviation from a VOR, Localizer (LOC), or Glideslope (G/S) when VLOC is the navigation source and displays GPS track deviation when GPS is the selected navigation source.

   b. GPS 2 in this configuration is a GARMIN GNC 420 GPS Navigator interfaced with the CDI (VOR/LOC Indicator). This unit displays GPS data on the unit’s display panel and on the remote CDI (VOR/LOC Indicator). *Refer to the SR20 POH Supplement for GARMIN GNC 420 GPS Navigator*, P/N 11934-S23.

3. Dual GARMIN GNS 430 units are installed. GPS 1 in this configuration is the uppermost GNS 430 unit in the console and GPS 2 is the lower GNS 430 unit.

   a. GPS 1 in this configuration is a GARMIN GNS 430 GPS Navigator with VHF Com interfaced with the HSI and MFD. Pressing the alternate-action CDI push-button on GPS 1 alternately selects GPS or NAV for display in the HSI and MFD each time the button is depressed. The HSI source is indicated by illumination of the “GPS” or “VLOC” annunciation in the lower left corner of the GNS 430 display.

      • Note •

      The HSI displays course deviation from a VOR, Localizer (LOC) or Glideslope (G/S) when VLOC is the navigation source and displays GPS track deviation when GPS is the selected navigation source.

b. GPS 2 in this configuration is a GARMIN GNS 430 GPS Navigator with VHF Com interfaced with the CDI (VOR/LOC/ILS/GS Indicator). Pressing the alternate-action CDI push-button on GPS 2 alternately selects GPS or NAV for display in the CDI each time the button is depressed. The HSI source is indicated by illumination of the “GPS” or “VLOC” annunciation in the lower left corner of the GNS 430 display.

• Note •

The CDI displays course deviation from a VOR, Localizer (LOC) or Glideslope (G/S) when VLOC is the navigation source and displays GPS track deviation when GPS is the selected navigation source.

Deactivate GPS

1. Navigator Com/ Power Switch .... Rotate CCW ‘OFF’

Section 5 - Performance

No change from basic Handbook.

Section 6 - Weight & Balance

No change from basic Handbook.

Section 7 - Systems Description

• Note •

This supplement provides a general description of the Garmin GNS 430, its operation, and SR20 interface. For a detailed description of the GNS 430 and full operation instructions *refer to the Garmin GNS 430 Pilot's Guide and Reference*, P/N 190-00140-00, Revision F dated July 2000 (or later appropriate revision).

The following paragraphs describe a single GARMIN GNS 430 unit and its functions. In the event a second GNS 430 is installed, the second unit will function as described below except that the GPS navigator is designated GPS 2, the NAV receiver is designated NAV 2, and the VHF communications receiver is designated COM 2. The GPS 2 GPS navigator and

VHF NAV is powered by 28 VDC through the Avionics Master Switch and the 5-amp GPS2 circuit breaker on the Avionics Non-essential Bus. 28 VDC for transceiver operation is supplied through the Avionics master Switch and the 7.5-amp COM2 circuit breaker on the Avionics Non-Essential Bus.

GNS 430 Integrated GPS/NAV/COM System

This airplane is equipped with a GNS 430 integrated GPS navigator, NAV receiver, and COM transceiver. The GPS navigator consists of a GPS receiver, a navigation computer, and a Jeppeson NavData database all contained in the GNS 430 control unit mounted in the center console. The GPS is designated 'GPS 1.' A VHF NAV receiver and tuner for receiving VHF Omnirange (VOR), Localizer (LOC), and Glideslope (G/S) is also integrated into the control unit. The NAV receiver is designated 'NAV 1.' Additionally, a VHF communications receiver, designated 'COM 1,' is also integrated into the unit. All tuning and display controls for the GPS, NAV, and COM are located in the GNS 430 control/display in the center console. The following paragraphs describe the GPS, NAV, and COM functions of this unit. For a complete description, as well as full operating instructions, *refer to the Garmin GNS 430 Pilot's Guide and Reference*.

GPS Navigator

The Garmin GNS 430 GPS navigator is the primary system (GPS 1), is IFR certified, and is coupled to the airplane's HSI (or HSI) and MFD. Normally, the second GPS Navigator provides backup and is approved for VFR use only. If the second GPS is also a Garmin 430, it will be coupled to the CDI and is also approved for IFR use. The Garmin GPS 430 is capable of providing IFR enroute, terminal, and approach navigation with position accuracies better than 15 meters. The system utilizes the Global Positioning System (GPS) satellite network to derive the airplane's position (latitude, longitude, and altitude) and the altitude digitizer to enhance the altitude calculation. The GPS 1 antenna is located beneath the cabin roof along the airplane centerline and the GPS 2 antenna is located under the glareshield. All GPS navigator controls and functions are accessible through the GNS 430 front control panel located in the center console. The panel includes function keys, power switches, MSG and Nav status annunciators, color LCD display, two concentric selector knobs on each panel, and a

Jeppesen NavData card slot in each panel. The GNS 430 navigator is powered by 28 VDC through the 5-amp GPS1 circuit breaker on the Avionics Essential Bus.

The Jeppesen Navigation Database provides access to data on Airports, Approaches, Standard Instrument Departures (SIDs), Standard Terminal Arrivals (STARs), VORs, NDBs, Intersections, Minimum Safe Altitudes, Controlled Airspace Advisories and Frequencies. North American and International databases are available. Database information is provided on a card that can be inserted into the card slot on the GPS unit. Subscription information is provided in a subscription packet provided with each system.

Navigation (Nav) Receiver

The Garmin GNS 430 provides an integrated Navigation (NAV) receiver with VHF Omnirange/Localizer (VOR/LOC) and Glideslope (G/S) capability. The VOR/LOC receiver receives on a frequency range from 108.000 Mhz to 117.950 Mhz with 50 kHz spacing. Glideslope is received from 329.150 to 335.00 in 150 kHz steps. The Nav receiver controls are integrated into the Garmin GNS 430 control mounted in the center console. The receiver control provides active and standby frequency indication, frequency memory storage, and knob-operated frequency selection. IDENT audio output for VOR and LOC is provided to the audio system. The Nav antenna is mounted on top of the vertical tail. 28 VDC for navigation receiver operation is controlled through the Avionics Master Switch on the bolster switch panel and supplied through the 5-amp GPS 1 circuit breaker on the Avionics Essential Bus. The airplane is equipped with a Garmin GNS 430 integrated GPS Navigator, Navigation (NAV) receiver with VHF Omnirange/Localizer (VOR/LOC) and Glideslope receiver.

Communication (COM) Transceiver

The GNS 430 includes a digitally-tuned integrated VHF communications (COM) transceiver. The transceiver and integrated controls are mounted in the Garmin GNS 430 unit. The transceiver receives all narrow- and wide-band VHF communication transmissions transmitted within a frequency range of 118.000 MHz to 136.975 MHz in 25.0 kHz steps (720 channels). For European operations, the COM can be operator configured for 8.33 kHz channel spacing (2280 channels). The tuning controls are collocated with the NAV at the left side of the GNS 430 front panel. Frequency tuning is accomplished by rotating the large and small concentric knobs to select a standby frequency and then transferring the frequency to the active window. The COM frequency display window is at the upper left corner of the GNS 430 display. Auto-tuning can be accomplished by entering a frequency from a menu. The COM 1 antenna is located above the cabin on the airplane centerline. 28 VDC for transceiver operating is controlled through the Avionics Master Switch and supplied through the 7.5-amp COM1 circuit breaker on the Avionics Essential Bus.

TERRAIN Interface*

• Note •

*TERRAIN functionality is a standard feature found in GNS 430 units with main software version 5.01 or above and valid terrain and obstacle databases installed.

Garmin TERRAIN is a terrain awareness system incorporated into GNS 430 units to increase situational awareness and aid in reducing controlled flight into terrain. The TERRAIN function displays altitudes of terrain and obstructions relative to the aircraft's altitude and are advisory in nature only. Individual obstructions may be shown if available in the database, however, not all obstructions may be available in the database and data may be inaccurate. TERRAIN information should be used as an aid to visual acquisition and not use to navigate or maneuver to avoid terrain.

For for a more detailed description of the TERRAIN function, *refer to the Garmin GNS 430 Pilot's Guide and Reference, P/N 190-00140-00, Revision H dated May 2006 or later revision*.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement
For

Garmin GNC 420 GPS Navigator

• Note •

When a GARMIN GNC 420 GPS Navigator with VHF COM is installed in the Cirrus Design SR20 this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement either adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 02: 08-15-07 supersedes and replaces Revision 01 of this supplement dated 05-25-05.

Serials 1005 thru 1267; This supplement supersedes GNC 420 GPS Navigator supplement, P/N 11934-S04 original release or later.

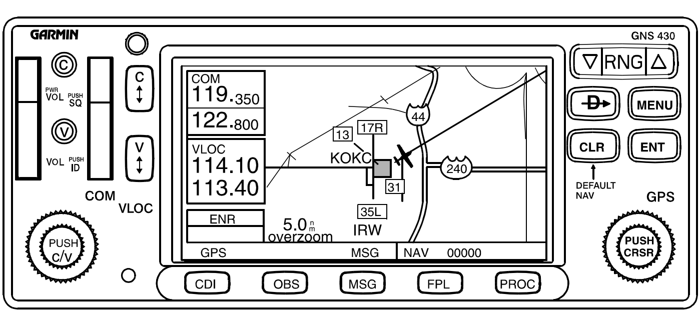
FAA Approved Joseph C Miess Date Aug 15 2007
for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

The airplane is equipped with a GARMIN GNC 420 GPS Navigator with VHF Com herein referred to as the “Navigator.” The GNC 420 is capable of providing IFR enroute, terminal, and approach navigation with position accuracies better than 15 meters. The system utilizes the Global Positioning System (GPS) satellite network to derive the airplane’s position (latitude, longitude, and altitude) and the altitude digitizer to enhance the altitude calculation.

Provided the GPS Navigator is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications of:

> VFR/IFR, enroute, terminal, and instrument approach (GPS) operations, that is, enroute, terminal, and instrument approach within the U.S. National Airspace System, North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace using the WGS-84 (or NAD 83) coordinate reference datum in accordance with the criteria of AC 20-138, AC 91-49, and AC 120-33. Navigation data is based upon use of only the global positioning system (GPS) operated by the United States.



SR20_FM09_1109

Figure - 1
GARMIN GNC 420 Front Panel

Section 2 - Limitations

1. The GARMIN GNC 420 Pilot's Guide and Reference, P/N 190-00140-20, Revision B dated August 2002 (or later appropriate revision) must be immediately available to the flight crew whenever navigation is predicated on the use of the GPS Navigator. The software status stated in the pilot's guide must match that displayed on the equipment.
2. The Navigator must utilize software version 2.XX (where X is a digit, 0-9) or later.
3. IFR enroute and terminal navigation is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.
4. GPS instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the Navigator's NavData database. The database must incorporate the current update cycle.
   a. Instrument approaches must be conducted in the approach mode and RAIM must be available at the Final Approach Fix.
   b. Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, and MLS approaches are not authorized in GPS mode.
   c. When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS navigation, the aircraft must have operational equipment capable of using that navigation aid, and the required navigation aid must be operational.
5. The aircraft must have other approved navigation equipment installed and operating appropriate to the route or flight.
6. The Garmin GNC 420 meets RNP5 (BRNAV) requirements of AC 90-96 and is in accordance with AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 01, provided it is receiving usable navigation information from the GPS receiver.
7. Do not use the TERRAIN Interface for navigation of the aircraft. The Terrain Display does not provide TAWS capability and is intended to serve as a situational awareness tool only and does not provide the accuracy fidelity on which to solely base terrain or obstacle avoidance maneuvering decisions.

Section 3 - Emergency Procedures

1. If GPS Navigator information is not available or is invalid, utilize remaining operational navigation equipment as required.
2. If "RAIM NOT AVAILABLE..." or "RAIM POSITION WARNING" message is displayed, continue to navigate using the GPS equipment or revert to an alternate means of navigation appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using another IFR approved navigation system.

Section 4 - Normal Procedures

Normal operating procedures are outlined in the GARMIN GNC 420 Pilot's Guide and Reference, P/N 190-00140-20, Revision B dated August 2002 (or later appropriate revision).

Activate GPS

1. Battery Master Switch .... ON
2. Avionics Power Switch .... ON
3. Navigator Com/ Power Switch..................................... Rotate 'ON'

   The Navigator will display a welcome page while the self-test is in progress. When the self test is successfully completed, the Navigator asks for NavData database confirmation, acquires position, and then displays the acquired position on the Navigator's display.

• Note •

The Navigator is not coupled to an air and fuel data computer. Manual fuel-on-board and fuel flow entries must be made in order to use the fuel planning function of the AUX pages.

The GPS Navigator utilizes altitude information from the altitude encoder's altitude digitizer to enhance altitude information.

GPS Course Remote Display

GNC 420 GPS course information is displayed on the airplane CDI.

• Note •

Since the GNC 420 does not provide ILS outputs, the CDI utilized in this installation does not provide glideslope display.

Deactivate GPS

1. Navigator Com/ Power Switch .... Rotate CCW 'OFF'

Section 5 - Performance

No change from basic Handbook.

Section 6 - Weight & Balance

No change from basic Handbook.

Section 7 - Systems Description

• Note •

This supplement provides a general description of the GARMIN GNC 420, its operation, and SR20 interface. For a detailed description of the GNC 420 and full operation instructions *refer to the GARMIN GNC 420 Pilot's Guide and Reference*, P/N 190-00140-20, Revision B dated August 2002 (or later appropriate revision).

GNC 420 Integrated GPS/COM System

This airplane is equipped with a GNC 420 integrated GPS navigator and COM transceiver. The GPS navigator consists of a GPS receiver, a navigation computer, and a Jeppeson NavData database all contained in the GNC 420 control unit mounted in the center console. The GPS is designated 'GPS 2.' Additionally, a VHF communications receiver, designated COM 2, is also integrated into the unit. All tuning and display controls for the GPS and COM are located in the GNC 420 control/display in the center console. The following paragraphs describe the GPS and COM functions of this unit. For a complete description, as well as full operating instructions, *refer to the GARMIN GNC 420 Pilot's Guide and Reference*.

GPS Navigator

The GARMIN GNC 420 GPS navigator is the secondary system (GPS 2), is IFR certified, and is coupled to the airplane's CDI. The GARMIN GNC 420 GPS navigator is capable of providing IFR enroute, terminal, and approach navigation with position accuracies better than 15 meters. The system utilizes the Global Positioning System (GPS) satellite network to derive the airplane's position (latitude, longitude, and altitude) and the altitude digitizer to enhance the altitude calculation. The GPS 2 antenna is located under the glareshield along the airplane centerline. All GPS navigator controls and functions are accessible through the GNC 420 front control panel located in the center console. The panel includes function keys, power switches, MSG and Nav status annunciators, color LCD display, two concentric selector knobs on each panel, and a Jeppesen NavData card slot in each panel.

Serials 1005 thru 1267; The GNC 420 navigator is powered by 28 VDC through the 5-amp GPS2 circuit breaker on the Avionics Essential Bus

Serials 1268 and subsequent; The GNC 420 navigator is powered by 28 VDC through the 5-amp GPS2 and 7.5-amp COM 2 circuit breakers on the Avionics Non-Essential Bus.

The Jeppesen Navigation Database provides access to data on Airports, Approaches, Standard Instrument Departures (SIDs), Standard Terminal Arrivals (STARs), VORs, NDBs, Intersections, Minimum Safe Altitudes, Controlled Airspace Advisories and Frequencies. North American and International databases are available. Database information is provided on a card that can be inserted into the card slot on the GPS unit. Subscription information is provided in a subscription packet provided with each system.

Communication (COM) Transceiver

The GNC 420 includes a digitally-tuned integrated VHF communications (COM) transceiver. The transceiver and integrated controls are mounted in the GARMIN GNC 420 unit. The transceiver receives all narrow- and wide-band VHF communication transmissions transmitted within a frequency range of 118.000 MHz to 136.975 MHz in 25.0 kHz steps (720 channels). For European operations, the COM can be operator configured for 8.33 kHz channel spacing (2280 channels). The tuning controls are located at the left side of the GNC 420 front panel. Frequency tuning is accomplished by rotating the large and small concentric knobs to select a standby frequency and then transferring the frequency to the active window. The COM frequency display window is at the upper left corner of the GNC 420 display. Auto-tuning can be accomplished by entering a frequency from a menu. The COM 2 antenna is located below the cabin on the airplane centerline. 28 VDC for transceiver operating is controlled through the Avionics Master Switch and supplied through the 7.5-amp COM2 circuit breaker on the Avionics Non-Essential Bus.

TERRAIN Interface*

• Note •

*TERRAIN functionality is a standard feature found in GNC 420 units with main software version 5.01 or above and valid terrain and obstacle databases installed.

Garmin TERRAIN is a terrain awareness system incorporated into GNC 420 units to increase situational awareness and aid in reducing controlled flight into terrain. The TERRAIN function displays altitudes of terrain and obstructions relative to the aircraft's altitude and are advisory in nature only. Individual obstructions may be shown if available in the database, however, not all obstructions may be available in the database and data may be inaccurate. TERRAIN information should be used as an aid to visual acquisition and not use to navigate or maneuver to avoid terrain.

For for a more detailed description of the TERRAIN function, *refer to the Garmin GNC 420 Pilot's Guide and Reference, P/N 190-00140-20, Revision H dated May 2006 or later revision*.

Intentionally Left Blank

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

Honeywell KGP 560 Terrain/ Awareness Warning System

When the Honeywell KGP 560 Terrain Awareness and Warning System is installed in the Cirrus Design SR20, this Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 01: 12-15-07 supersedes and replaces the original release of this supplement dated Original: 07-03-04.

FAA Approved Joseph C Miess Date 15 Dec 2007

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

The airplane is equipped with an Honeywell KGP 560 Terrain Awareness and Warning System that performs the functions of a Class C Terrain Awareness and Warning System (TAWS) in accordance with TSO C151b.

Incorporating much of the technology found in TAWS for air transport aircraft, the KPG 560 supports:

- Alerting for premature descent.
- Alerting for excessive rate of climb/descent.
- Altitude callout (500 ft) and alerting within 5 nm of 2000 ft public runways.
- Look-ahead algorithms and integrated terrain/obstacle database.

The system consists of the 560 GA-EGPWS Processor mounted on the underside of the pilot-side kickplate, a Terrain/Obstacle Database integral to the processor, the Configuration Module integral to the system's wire harness, and the TAWS annunciator panel mounted on the lower LH portion of the instrument panel.

The KGP 560 receives data from the GPS sensor, Transponder, Primary Flight Display, and the Multifunction Display (MFD). Aural alerts are communicated to the pilot via the GMA 340 Audio Panel. To enhance the situational awareness to the pilot, color-coded terrain display is interfaced on the MFD.

For specific MFD operational details *refer to the Avidyne FlightMax EX5000C Pilot's Guide*.

For specific KGP 560 operational details, *refer to the KGP 560 & 860 EGPWS Pilot's Guide, P/N 006-18254-001, Revision 04 or later.*

Section 2 - Limitations

1. Do not use the Terrain Awareness Display for navigation of the aircraft. The KGP 560 Terrain Awareness and Warning System is intended to serve as a situational awareness tool only and may not provide the accuracy fidelity on which to solely base terrain or obstacle avoidance maneuvering decisions.

Section 3 - Emergency Procedures

Off-Airport Landings

1. For ditching or other off-airport landings, inhibit the Terrain Awareness System functions by selecting the TERR INHIBIT switch on the annunciator panel to prevent unwanted aural alerting.

Section 4 - Normal Procedures

• Note •

Only vertical maneuvers are recommended responses to warnings and alerts unless operating in VMC or the pilot determines, using all available information and instruments, that a turn, in addition to the vertical escape maneuver, is the safest course of action.

During certain operations, warning thresholds may be exceeded due to specific terrain or operating procedures. During day VFR flight, these warnings may be considered as a cautionary.

If the TAWS issues an alert when the Terrain Awareness Display Page is not selected, a pop up message will appear on the active display page of the MFD. To clear the alert, the pilot must acknowledge the pop up message by pressing the Soft Key next to the displayed “OK”.

Pilots are authorized to deviate from their current air traffic control (ATC) clearance to the extent necessary to comply with a TAWS warning.

Activate TAWS

• Note •

If the aircraft horizontal position derived from the Garmin Navigator (GPS 1) is invalid, TAWS will be inoperative and the TERR INOP annunciator will illuminate.

1. SKYWATCH/TAWS Circuit Breaker .... IN
2. MFD Circuit Breaker .... IN
3. Battery Master Switch .... ON
4. Avionics Power Switch .... ON
5. Verify TERR INOP Annunciator ....OFF
6. At MFD prompt, any Key ....PRESS
7. MFD Soft Keys .... SET to TAWS

Response To Ground Proximity Warnings

Aural “PULL UP” Warning
Red TERR WARN Annunciation

1. Level the wings, simultaneously adding full power.
2. Increase pitch attitude to 15 degrees nose up.
3. Adjust pitch attitude to ensure terrain clearance while respecting stall warning. If flaps are extended, retract flaps to the UP position.
4. Continue climb at best angle of climb speed (V_X) until terrain clearance is assured.

Aural “SINK RATE” Warning
Aural “DON’T SINK” Warning
Amber TERR CAUT Annunciation

1. Initiate appropriate corrective action to remove the cause of the warning.

Response To Awareness Alerts

Aural "TERRAIN AHEAD" Alert
Aural "OBSTACLE AHEAD" Alert
Amber TERR CAUT Annunciation

1. Take positive corrective action until the alert ceases. Stop descending, or initiate a climb turn as necessary, based on analysis of all available instruments and information.

Aural "TERRAIN AHEAD; PULL UP" Alert
Aural "OBSTACLE AHEAD; PULL UP" Alert
Red TERR WARN Annunciation

1. Level the wings, simultaneously adding full power.
2. Increase pitch attitude to 15 degrees nose up.
3. Adjust pitch attitude to ensure terrain clearance while respecting stall warning. If flaps are extended, retract flaps to the UP position.
4. Continue climb at best angle of climb speed (V_X) until terrain clearance is assured.

Deactivate TAWS

1. SKYWATCH/TAWS Circuit Breaker..PULL

   or

2. Avionics Power Switch..OFF

Section 5 - Performance

No Change.

Section 6 - Weight & Balance

Installation of the Honeywell KGP 560 Terrain Awareness and Warning System adds the following optional (Sym = O) equipment at the weight and arm shown in the following table.

ATA / Item	Description	Sym	Qty	Part Number	Unit Wt	Arm
34-01	KGP 560 Processor	O	1	15963-001	1.25	117.0

Section 7 - Systems Description

The Honeywell KGP 560 Terrain Awareness and Warning System compares GPS information from the Garmin Navigator (GPS 1) to the integrated Terrain/Obstacle Database to produce a real-time model of the surrounding terrain. This “virtual” picture is then sent to the MFD to provide enhanced situational awareness to the pilot.

The system consists of the 560 GA-EGPWS Processor mounted on the underside of the pilot-side kickplate, a Terrain/Obstacle Database integral to the processor, the Configuration Module integral to the system’s wire harness, and the TAWS annunciator panel mounted on the lower LH portion of the instrument panel.

The 560 GA-EGPWS Processor is powered by 28 VDC through the 5-amp SKYWATCH/TAWS circuit breaker on the Avionics Nonessential Bus.

For a additional system information, *refer to the KGP 560 & 860 EGPWS Pilot’s Guide, P/N 006-18254-001, Revision 04 or later*.

System Constraints

- If there is no terrain data in the database for a particular area, then TAWS alerting is not available for that area. The affected area on the Terrain Awareness Display Page will be colored a MAGENTA dot pattern.
- If the TAWS has been inhibited (e.g. the pilot selected TERR INHIBIT) the system will not give aural alerts. The MFD will display a purple message block with cyan text reading, “TAWS Inhibited”.
- The TAWS will not be available and the TERR INOP annunciator will illuminate if any of the following components are inoperative: MFD, PFD, GPS 1, Transponder, or Attitude Encoder.

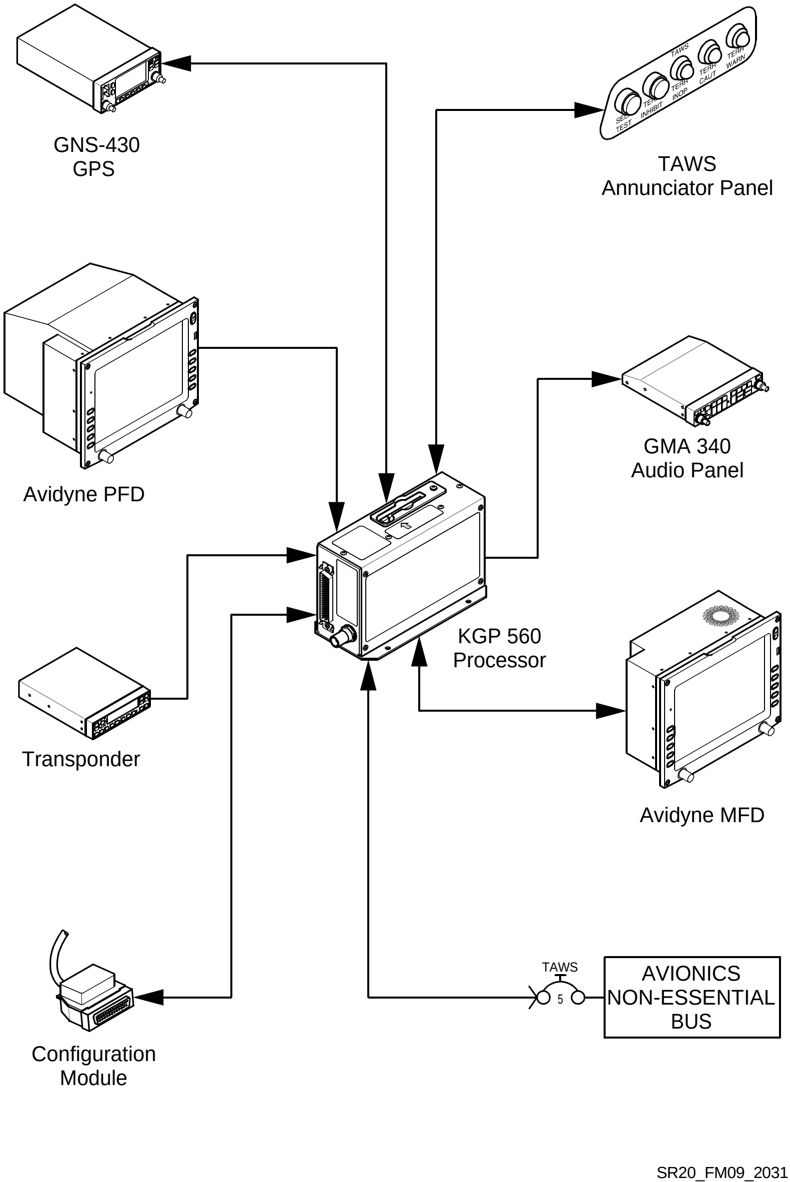


Figure - 1
Honeywell KGP 560 TAWS Simplified Schematic

TAWS Annunciator Panel

TAWS terrain annunciations and control functions are incorporated into the Annunciator Panel. The panel consists of a momentary pushbutton switch (SELF TEST), an illuminated pushbutton switch (TERR INHIBIT), and three LEDS for Terrain Warning (TERR WARN), Terrain Caution (TERR CAUT), Terrain Inoperative (TERR INOP).

- SELF TEST - Provides test function for the TAWS.
- TERR INHIBIT - To inhibit nuisance or unwanted warnings at airports that are not in the system database, the pilot may select the TERR INHIBIT switch. Although selection will inhibit all TAWS visual and aural alerts, the Terrain Awareness Display will remain functional with the message “Warnings Inhibited” displayed on the MFD. When activated the switch will illuminate amber.
- TERR INOP - Indicates the TAWS inoperative. When activated the LED will illuminate amber.
- TERR CAUT - Indicates a possible terrain or obstacle conflict within 40-60 seconds. When activated the LED will illuminate amber.
- TERR WARN - Indicates a possible terrain or obstacle conflict within 30 seconds. When activated the LED will illuminate red.

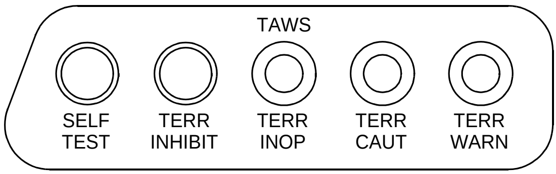
The annunciators are dimmed via the instrument panel lighting dimmer switch. The TAWS annunciator panel is powered by 28 VDC through the 2-amp ANNUN circuit breaker on the Essential Bus

Alert Priority

When any of the TAWS aural alerts are in progress, all aural TRAFFIC alerts are inhibited.

Advisory Callout

The advisory callout “*FIVE HUNDRED*”, occurs at approximately 500 feet AGL.



SR20_FM09_2033

Annunciator	Color	Function
SELF TEST	N/A	Provides test function for TAWS
TERR INHIBIT	AMBER	All TAWS alerting functions inhibited
TERR INOP	AMBER	Indicates TAWS inoperative
TERR CAUT	AMBER	Possible terrain or obstacle conflict within 40-60 seconds
TERR WARN	RED	Possible terrain or obstacle conflict within 30 seconds

Figure - 2
TAWS Annunciator Panel

MFD Terrain Awareness Display

• WARNING •

Do not use the Terrain Awareness Display for navigation of the aircraft. The TAWS is intended to serve as a situational awareness tool only and may not provide the accuracy fidelity on which to solely base terrain or obstacle avoidance maneuvering decisions.

To select the Terrain Awareness Display Page on the MFD, rotate the page knob to TAWS.

Terrain and obstacle alerts are the most critical situations displayed by TAWS. There are two levels of alerts:

- **Caution Alert** - Possible terrain or obstacle conflict within 40-60 seconds. When triggered, the terrain or obstacle that caused the alert is displayed in bright yellow. In addition, a message describing the nature of the alert is presented in the MFD message bar.
- **Warning Alert** - Possible terrain or obstacle conflict within 30 seconds. When triggered, the terrain or obstacle that caused the alert is displayed in bright red. In addition, a message describing the nature of the alert is presented in the message bar

When a caution or warning alert is active, the display image surrounding the target is enlarged somewhat to allow the terrain or obstacle to be better seen on the display.

If a terrain or obstacle alert occurs while a page other than Terrain Awareness Display Page is being displayed, a terrain or obstacle alert message is displayed in the Message Bar. When the pilot acknowledges this message, the MFD will automatically switch to the Terrain Awareness Display Page.

The message bar will be removed from the display when the TAWS is no longer in alert status, or if the pilot acknowledges the message from the Terrain Awareness Display Page.

Geometric Altitude versus Measured Sea Level

An indication of MSL-G or Geometric Altitude may appear on the left side of the MFD indicating the height above Measured Sea Level (MSL) calculated from the GPS.

This data serves as the reference for color-coding for the Terrain Awareness Display Page and as an input to the TAWS Look-Ahead algorithm. Because it is derived from GPS, Geometric Altitude may differ from corrected barometric altitude. Therefore, Geometric Altitude may be in error by as much as 100 ft and should not be used for navigation. MSL-G is presented solely to provide the pilot additional situational awareness regarding the true MSL height upon which the TAWS Terrain Display and Alerting is based.

Self Test

Proper operation of the TAWS can be verified when the aircraft is on the ground as follows:

1. Select the TAWS page on the MFD
2. Clear all caution messages in the lower right corner
3. Ensure that the TERR INHIBIT switch is not engaged, and momentarily push the SELF TEST switch:
    a. The amber TERR INOP light should be illuminated.
    b. The amber TERR INOP light should extinguish.
    c. The red TERR WARN light should be illuminated.
    d. An aural “EGPWS SYSTEM OK” is enunciated over cockpit speaker.
    e. The red TERR WARN light should extinguish.
    f. The amber TERR CAUT light should be illuminated.
    g. The amber TERR CAUT light should extinguish.
    h. A terrain self-test pattern should appear on the MFD.
    i. The terrain self-test should disappear after several sweeps of the terrain display.
    j. A TAWS Sensor Self Test Caution message should appear in the lower right comer of the MFD.
4. Acknowledge and clear this caution.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

Avidyne EMax™ Engine Instrumentation

When the Avidyne EMax™ Engine Instrumentation system is installed in the Cirrus Design SR20, this POH Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 01: 12-15-07 supersedes and replaces the original release of this supplement dated Original: 10-12-05.

FAA Approved Joseph C Miess Date 15 Dec 2007

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

EMax™ Engine Instrumentation provides the pilot with engine parameters depicted on simulated gauges and electrical system parameters located in a dedicated region within in the EX5000C MFD display.

Figure - 1
Avidyne EMax™ Engine Instrumentation

Section 2 - Limitations

No Change.

Section 3 - Emergency Procedures

No Change.

Section 4 - Normal Procedures

No Change.

Section 5 - Performance

No Change.

Section 6 - Weight & Balance

Installation of the Avidyne Engine Instruments adds the following optional (Sym = O) equipment at the weight and arm shown in the following table.

ATA / Item	Description	Sym	Qty	Part Number	Unit Wt	Arm
34-03	Engine Sensors	O	11	-	1.0	75.0
34-04	Engine Sensor Unit	O	1	14843-001	1.1	118.0
34-05	Engine Sensor Harness	O	1	15030-001	0.9	92.0
34-06	Engine Sensor Cabin Harness	O	1	15032-001	2.1	108.0

Section 7 - System Description

An Engine Sensor Unit interfaces (SIU) with engine-mounted sensors, some of which are shared with the standard airplane gauges, and provide data to the MFD for display.

Airplanes equipped with EMax™ Engine Instrumentation display all engine settings and parameters on a dedicated MFD engine monitor page. The MFD also displays engine and fuel data in data blocks on the full-screen moving map display. In the event of an exceedence, each out-of-limit parameter is highlighted on the screen for immediate attention. The engine monitor also includes data capture capability, providing full-time recording of critical engine performance parameters.

The Engine Instruments system is powered by 28 VDC supplied through the 5-amp Engine Instruments breaker on the Main Bus 1.

Refer to Avidyne FlightMax EX5000C Pilot's Guide for a more complete description of EMax Engine Instruments, its operating modes, and additional detailed operating procedures.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

Avidyne CMax™ Electronic Approach Charts

When the Avidyne CMax™ Electronic Approach Charts system is installed in the Cirrus Design SR20, this POH Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 01: 12-15-07 supersedes and replaces the original release of this supplement dated Original: 10-12-05.

FAA Approved Joseph C Miess Date 15 Dec 2007

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

Avidyne CMax™ Electronic Approach Charts allows the pilot to view terminal procedure chart data on the EX5000C MFD. If the chart is geo-referenced, an ownship symbol and flight plan legs can be overlaid on the chart to further enhance the pilot's situational awareness. Most approach charts and airport diagrams are geo-referenced; most arrival, departure, and miscellaneous charts are not.

Figure - 1
Avidyne CMax™ Electronic Approach Charts

Section 2 - Limitations

1. Do not use the CMax Approach Charts function for navigation of the aircraft. The CMax Approach Charts function is intended to serve as a situational awareness tool only.
2. 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.

Section 3 - Emergency Procedures

Loss of CMax™ Electronic Approach Charts

- In the event CMax Approach Charts cannot be displayed on the MFD, refer to back-up approach data such as paper copies or a laptop containing the JeppView software and data.
- If no back-up data is available contact Air Traffic Control for approach information.

Section 4 - Normal Procedures

• Note •

Back-up approach charts for CMax are not required. However, back-up approach data for departure, destination, and alternate field is recommended. Reference CMax Description in this supplement.

Section 7 - System Description

The CMax installation is entirely software dependant. No additional hardware is required.

• Note •

Back-up approach charts for CMax are not required. However, back-up approach data for departure, destination, and alternate field is recommended. Back-up approach data could be printed copies of published approach charts, a laptop containing the JeppView software and data, or notes providing the approach vertical data (the Garmin 430 can display lateral approach information).

Refer to Avidyne FlightMax EX5000C Pilot's Guide, for a more complete description of CMax Approach Charts, its operating modes, and additional detailed operating procedures.

Pilot's Operating Handbook and

FAA Approved Airplane Flight Manual

Supplement

for

XM Satellite Weather System

When the XM Satellite Weather System system is installed in the Cirrus Design SR20, this POH Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the Cirrus Design SR20 Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic SR20 Pilot's Operating Handbook.

• Note •

This POH Supplement Revision dated Revision 01: 12-15-07 supersedes and replaces the original release of this supplement dated Original: 10-12-05.

FAA Approved *Joseph C Miess* Date 15 Dec 2007

for Royace H. Prather, Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

The XM Satellite Weather System enhances situational awareness by providing the pilot with real time, graphical weather information depicted on the MAP page of the EX5000C MFD display.

Figure - 1
XM Satellite Weather Overlay

Section 2 - Limitations

1. Do not use the XM Satellite Weather System for navigation of the aircraft. The XM Satellite Weather System is intended to serve as a situational awareness tool only.

Section 3 - Emergency Procedures

No Change.

Section 4 - Normal Procedures

No Change.

Section 5 - Performance

No Change.

Section 6 - Weight & Balance

Installation of the XM Satellite Weather System adds the following optional (Sym = O) equipment at the weight and arm shown in the following table.

ATA / Item	Description	Sym	Qty	Part Number	Unit Wt	Arm
34-07	XM Receiver	O	1	16665-001	1.7	114.0

Section 7 - System Description

The XM Satellite Weather System enhances situational awareness by providing the pilot with real time, graphical weather information. The XM antenna, integrated with the COM1 antenna, receives weather information from dual-redundancy satellites. This signal is sent to the XM receiver, installed in the co-pilot side of the instrument console, which interprets and overlays the weather data on the MAP page of the EX5000C MFD.

Once activated, the XM Satellite Weather System will overlay the following weather data on the EX5000C MFD:

- NEXRAD Radar

- METARs
- SIGMETs
- AIRMETs
- TFRs
- Lightning Strikes

The XM Satellite Weather System is powered by 28 VDC supplied through the 3-amp Weather/Stormscope breaker on the Non-Essential Bus.

Refer to Avidyne FlightMax EX5000C Pilot's Guide for a more complete description of XM Satellite Weather System, its operating modes, and additional detailed operating procedures.

Section 10
Safety Information

Table of Contents

Intentionally Left Blank

Introduction

The Cirrus Design SR20 is a modern, advanced technology airplane designed to operate safely and efficiently in a flight environment. However, like any other aircraft, pilots must maintain proficiency to achieve maximum safety, utility, and economy.

As the pilot you must be thoroughly familiar with the contents of this Handbook, the Handbook Supplements, the SR20 Flight Checklist, and operational guides and data provided by manufacturers of equipment installed in this airplane. You must operate the airplane in accordance with the applicable FAA operating rules and within the Limitations specified in Section 2 of this Handbook.

The Normal Procedures section of this handbook was designed to provide guidance for day-to-day operation of this airplane. The procedures given are the result of flight testing, FAA certification requirements, and input from pilots with a variety of operational experience. Become fully familiar with the procedures, perform all the required checks, and operate the airplane within the limitations and as outlined in the procedures.

Cirrus Airframe P   arachute System (CAPS) Deployment

The Cirrus Airframe Parachute System (CAPS) is designed to lower the aircraft and its passengers to the ground in the event of a life-threatening emergency. However, because CAPS deployment is expected to result in damage to 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 aircraft occupants, its use should not be taken lightly. Instead, possible CAPS activation scenarios should be well thought out and mentally practiced by every SR20 pilot.

The following discussion is meant to guide your thinking about CAPS activation. It is intended to be informative, not directive. It is the responsibility of you, the pilot, to determine when and how the CAPS will be used.

Deployment Scenarios

This section describes possible scenarios in which the activation of the CAPS might be appropriate. This list is not intended to be exclusive, but merely illustrative of the type of circumstances when CAPS deployment could be the only means of saving the occupants of the aircraft.

Mid-air Collision

A mid-air collision may render the airplane unflyable by damaging the control system or primary structure. If a mid-air collision occurs, immediately determine if the airplane is controllable and structurally capable of continued safe flight and landing. If it is not, CAPS activation should be considered.

Structural Failure

Structural failure may result from many situations, such as: encountering severe gusts at speeds above the airplane's structural cruising speed, inadvertent full control movements above the airplane's maneuvering speed, or exceeding the design load factor while maneuvering. If a structural failure occurs, immediately determine if the airplane is controllable and structurally capable of continued safe flight and landing. If it is not, CAPS activation should be considered.

Loss of Control

Loss of control may result from many situations, such as: a control system failure (disconnected or jammed controls); severe wake turbulence, severe turbulence causing upset, severe airframe icing, or sustained pilot disorientation caused by vertigo or panic; or a spiral/ spin. If loss of control occurs, determine if the airplane can be recovered. If control cannot be regained, the CAPS should be activated. This decision should be made prior to your pre-determined decision altitude (2,000’ AGL, as discussed below).

Landing Required in Terrain not Permitting a Safe Landing

If a forced landing is required because of engine failure, fuel exhaustion, excessive structural icing, or any other condition CAPS activation is only warranted if a landing cannot be made that ensures little or no risk to the aircraft occupants. However, if the condition occurs over terrain thought not to permit such a landing, such as: over extremely rough or mountainous terrain, over water out of gliding distance to land, over widespread ground fog or at night, CAPS activation should be considered.

Pilot Incapacitation

Pilot incapacitation may be the result of anything from a pilot’s medical condition to a bird strike that injures the pilot. If this occurs and the passengers cannot reasonably accomplish a safe landing, CAPS activation by the passengers should be considered. This possibility should be explained to the passengers prior to the flight and all appropriate passengers should be briefed on CAPS operation so they could effectively deploy CAPS if required.

General Deployment Information

Deployment Speed

The maximum speed at which deployment has been demonstrated is 135 KIAS. Deployment at higher speeds could subject the parachute and aircraft to excessive loads that could result in structural failure. Once a decision has been made to deploy the CAPS, make all reasonable efforts to slow to the minimum possible airspeed. However, if time and altitude are critical, and/or ground impact is imminent, the CAPS should be activated regardless of airspeed.

Deployment Altitude

No minimum altitude for deployment has been set. This is because the actual altitude loss during a particular deployment depends upon the airplane's airspeed, altitude and attitude at deployment as well as other environmental factors. In all cases, however, the chances of a successful deployment increase with altitude. As a guideline, the demonstrated altitude loss from entry into a one-turn spin until under a stabilized parachute is 920 feet. Altitude loss from level flight deployments has been demonstrated at less than 400 feet. With these numbers in mind it might be useful to keep 2,000 feet AGL in mind as a cut-off decision altitude. Above 2,000 feet, there would normally be time to systematically assess and address the aircraft emergency. Below 2,000 feet, the decision to activate the CAPS has to come almost immediately in order to maximize the possibility of successful deployment. At any altitude, once the CAPS is determined to be the only alternative available for saving the aircraft occupants, deploy the system without delay.

Deployment Attitude

The CAPS has been tested in all flap configurations at speeds ranging from V_{so} to V_a. Most CAPS testing was accomplished from a level attitude. Deployment from a spin was also tested. From these tests it was found that as long as the parachute was introduced to the free air by the rocket, it would successfully recover the aircraft into its level descent attitude under parachute. However, it can be assumed that to minimize the chances of parachute entanglement and reduce aircraft oscillations under the parachute, the CAPS should be activated from a wings-level, upright attitude if at all possible.

Landing Considerations

After a CAPS deployment, the airplane will descend at less than 1500 feet per minute with a lateral speed equal to the velocity of the surface wind. The CAPS landing touchdown is equivalent to ground impact from a height of approximately 10 feet. While the airframe, seats, and landing gear are designed to accommodate the stress, occupants must be prepared for the landing. The overriding consideration in all CAPS deployed landings is to prepare the occupants for the touchdown in order to protect them from injury as much as possible.

Emergency Landing Body Position

The most important consideration for a touchdown with CAPS deployed is to protect the occupants from injury, especially back injury. Contacting the ground with the back offset attempting to open a door or secure items increases the likelihood of back injury. All occupants must be in the emergency landing body position well before touchdown. After touchdown, all occupants should maintain the emergency landing body position until the airplane comes to a complete stop.

The emergency landing body position is assumed with tightened seat belt and shoulder harness 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. The seat cushions contain an aluminum honeycomb core designed to crush under impact to absorb downward loads and help protect the spine from compression injury.

Door Position

For most situations, it is best to leave the doors latched and use the time available to transmit emergency calls, shut down systems, and get into the Emergency Landing Body Position well before impact. The discussion below gives some specific recommendations, however, the pilot's decision will depend upon all factors, including time to impact, altitude, terrain, winds, condition of airplane, etc.

There is the possibility that one or both doors could jam at impact. If this occurs, to exit the airplane, the occupants will have to force open a partially jammed door or break through a door window using the Emergency Exit Hammer located in the lid of the center armrest. This can significantly delay the occupants from exiting the airplane.

If the pilot elects to touchdown with a door opened, there are several additional factors the pilot must consider: loss of door, possibility of head injury, or injury from an object coming through the open door.

- If a door is open prior to touchdown in a CAPS landing, the door will most likely break away from the airplane at impact.
- If the door is open and the airplane contacts the ground in a rolled condition, an occupant could be thrown forward and strike their head on the exposed door pillar. Contacting the ground in a rolled condition could be caused by terrain that is not level, contacting an obstacle such as a tree, or by transient aircraft attitude.
- With a door open, it is possible for an object such as a tree limb or flying debris to come through the opening and strike an occupant.

• WARNING •

If it is decided to unlatch a door, unlatch one door only. Opening only one door will provide for emergency egress as well as reduce risks associated with ground contact. Typically, this would be the copilot's door as this allows the other occupants to exit first after the airplane comes to rest.

CAPS Landing Scenario	Door Position
Empty Copilot Seat	Unlatch Copilot Door
Very Little Time Before Impact	Keep Doors Closed
Fire	Unlatch Copilot Door
Water Landing	Unlatch Copilot Door
Condition Unknown	Keep Doors Closed

Water Landings

The ability of the airplane to float after a water landing has not been tested and is unknown. However, since there is the possibility that one or both doors could jam and use of the emergency egress hammer to break out a window could take some time, the pilot may wish to consider unlatching a door prior to assuming the emergency landing body position in order to provide a ready escape path should the airplane begin to sink.

Post Impact Fire

If there is no fire prior to touchdown and the pilot is able to shut down the engine, fuel, and electrical systems, there is less chance of a post impact fire. If the pilot suspects a fire could result from impact, unlatching a door immediately prior to assuming the emergency landing body position should be considered to assure rapid egress.

Ground Gusts

If it is known or suspected that ground gusts are present in the landing zone, there is a possibility that the parachute could drag the airplane after touchdown, especially if the terrain is flat and without obstacles. In order to assure that the occupants can escape the airplane in the timeliest manner after the airplane comes to rest, the pilot may elect to unlatch the copilot's door for the CAPS landing. Occupants must be in the Emergency Landing Body Position for touchdown. Occupants must not loosen seat belts until the airplane comes to rest. When the airplane comes to rest, the occupants should exit the airplane and immediately move upwind to prevent a sudden gust from dragging the airplane in their direction.

Taxiing, Steering, and Braking Practices

Cirrus aircraft use a castering nose wheel and rely on aerodynamic forces and differential braking for directional control while taxiing. Proper braking practices are therefore critical to avoid potential damage to the brakes.

The most common cause of brake damage and/or failure is the creation of excessive heat through improper braking practices. Pilots unaccustomed to free castering nose wheel steering may be inclined to “ride” the brakes to maintain constant taxi speeds and use the brakes excessively for steering.

Proper Operating Practices

When taxiing, directional control is accomplished with rudder deflection and intermittent braking (toe taps) as necessary. Use only as much power as is necessary to achieve forward movement. Deceleration or taxi speed control using brakes but without a reduction in power will result in increased brake temperature.

On flat, smooth, hard surfaces, do not exceed 1000 RPM maximum continuous engine speed for taxi. Power settings slightly above 1000 RPM are permissible to start motion, for turf, soft surfaces, and on inclines. Use minimum power to maintain constant taxi speed.

“Riding the brakes” while taxiing is similar to driving a car with one foot on the brake and one foot on the gas. This causes a continuous build up of energy that would otherwise be moving the airplane.

Observe the following operating practices:

- Verify that the parking brake is completely disengaged before taxi.
- The rudder is effective for steering on the ground and should be used.
- Use only as much power (throttle) as is necessary to achieve forward movement. Keep in mind, any additional power added with the throttle will be absorbed in the brakes to maintain constant speed.
- Use rudder deflection and the minimum necessary inputs of differential braking to achieve directional control.

- Do not “ride the brakes”. Pilots should consciously remove pressure from the brakes while taxiing. Failure to do so results in excessive heat buildup, premature brake wear, and increased possibility of brake failure or fire.
- Avoid unnecessary high-speed taxiing. High-speed taxiing may result in excessive demands on the brakes, increased brake wear, and the possibility of brake failure or fire.
- Brakes have a large energy absorbing capacity; therefore, cooling time should be considered. Energy absorbed during a few seconds of deceleration can take up to an hour to dissipate. Always allow adequate cooling time after brake use.
- Allow a cooling period following a high-energy braking event. High-energy braking can include an aborted takeoff or the equivalent energy required for a Maximum Gross Weight full-stop from 70 knots in less than 1000 feet.

Brake Maintenance

The brake assemblies and linings should be checked at every oil change (50 hours) for general condition, evidence of overheating, and deterioration. *Serials 1005 thru 2030 before SB 2X-05-01: A*t every annual/100-hour inspection the brakes should be disassembled, the brake linings should be checked and the O-rings must be replaced. Refer to Section 8, Handling, Servicing, and Maintenance for specific servicing information on the Brake System.

Intentionally Left Blank