Section 7
Airplane and Systems Description

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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.

Serials 1423 and subsequent: The lower firewall employs a 20° bevel to improve crashworthiness. In addition, an avionics bay is located aft of bulkhead 222 and accessible through an access panel installed on the RH side of the aft fuselage.

• 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.
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. 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. 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, instrumentation, and controls. 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. For details relating to the instrumentation, switches, circuit breakers, and controls on the instrument panel, bolster, and center console, refer to the related topics in this section.

Instrument Panel

Serials 1268 through 1336: 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:

<table>
<thead>
<tr>
<th>Airspeed Indicator</th>
<th>Attitude Gyro</th>
<th>Altimeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn Coordinator</td>
<td>HSI</td>
<td>Vertical Speed Indicator</td>
</tr>
</tbody>
</table>

Serials 1268 through 1337, an electronic clock is located immediately to the left of the flight instruments on the instrument panel.

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.
Serials 1337 and subsequent: The airplane is equipped with an Avidyne FlightMax Entegra-Series Primary Flight Display (PFD). The PFD is a 10.4” landscape-oriented display intended to be the primary display of primary flight parameter information (attitude, airspeed, heading, and altitude) to the pilot. The PFD accepts data from a variety of sources, including the GPS sensors, the System 55X Autopilot, and is the primary heading source for the Multifunction Display.

Standby altimeter, airspeed, and attitude indicators are mounted on the bolster panel in case of total or partial PFD failure. To provide roll data to the autopilot system, a Turn Coordinator is mounted behind the RH bolster panel.

Annunciators and the ignition switch are located on the left side of the panel and a large color multifunction display is located adjacent to the primary flight display. Temperature controls are located on the right side below the glove compartment.

A switch panel located in the “dash board” bolster below the flight instruments contains the master switch, avionics power switch, pitot heat switch, and lighting switches.

**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.
Figure 7-4
Instrument Panel and Console (Sheet 1 of 3)
SR20 Airplane Description

9. Temperature/Ventilation Controls
10. Control Yoke
11. Fresh Air “Eyeball” Outlet
12. Conditioned Air Outlet
13. Rudder Pedals
14. Flap Control & Position Indicators
15. Passenger Audio Jacks
16. Armrest
17. Engine & Fuel System Controls
18. Left Side Console
   - Circuit Breaker Panel
   - Alternate Engine Air
   - Parking Brake
   - Alternate Static Source
19. Avionics Panel
20. Bolster Switch Panel
21. Control Yoke
22. Flight Instrument Panel

Figure 7-4
Instrument Panel and Console (Sheet 2 of 3)
Figure 7-4
Instrument Panel and Console (Sheet 3 of 3)

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

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September 2011
Flight Instruments

• Note •

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

Primary Flight Display - Serials 1337 and Subsequent

The Primary Flight Display (PFD) provides the functions of the attitude indicator, heading indicator, airspeed indicator, altimeter, vertical speed indicator, directional gyro, course deviation indicator, and altitude pre-select controller onto a single electronic display. In addition, the PFD communicates with GPS1, GPS2, NAV1, NAV2, the Multifunction Display, and Autopilot System.

An integral air data/attitude and heading reference system (ADAHRS) uses a 3-axis solid state gyro and accelerometer system combined with a magnetometer to replace the vertical and directional gyros. ADAHRS also provides roll, pitch, heading data and continually updates the winds aloft and true airspeed (TAS) indications on the PFD. The magnetometer assembly mounted in the wing also provides outside air temperature (OAT) data.

The airplane’s Pitot-Static system is connected to the PFD to provide airspeed, altitude, and vertical speed.

Standby instruments for airspeed, attitude and altitude are mounted on the LH bolster panel and are on separate power sources than the PFD.

Redundant power sources provide 28 VDC for system operation. Power is supplied through the 10-amp PFD1 circuit breaker on the Essential Bus and the 10-amp PFD2 circuit breaker on Main Bus 2. Either circuit is capable of powering the PFD. System start-up is automatic once power is applied. The display presents the Initialization Display immediately after power is applied. Power-on default is 75% brightness. Typical alignment times are 3 minutes from battery turn on.
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Airplane Description

Cirrus Design
SR20

Figure 7-5
PFD System - Simplified Schematic

SR20_FM07_1607B
The airspeed tape to the left of the main ADI begins indicating at 20 Knots Indicated Airspeed (KIAS) and is color-coded to correspond with airspeeds for $V_{SO}$, $V_{FE}$, $V_{S}$, $V_{NO}$, and $V_{NE}$. An altitude tape is provided to the right of the main ADI and also displays a symbol for the Altitude preselect (Altitude bug). The Vertical Speed Indicator (VSI) is displayed to the right of the altitude tape. The displayed scale of the VSI is +/- 2000 FPM and for rates above 2000 FPM, the needle will peg just outside the scale and a digital readout of actual VSI up to 4000 FPM is then displayed. An additional data block is provided for display of outside air temperature (OAT), true airspeed (TAS), and groundspeed (GS). Controls for selecting bug and barometric correction values are along the right side of the PFD. A wind indicator is also provided beneath the altitude tape.

Attitude Data

Attitude is depicted on the main ADI using an aircraft reference symbol against a background of labeled pitch ladders and an arced scale along the top of the ADI to indicate bank angle. A skid/slip indicator is attached to the bottom edge of the bank angle pointer.
Figure 7-6
Primary Flight Display
**Horizontal Situation Indicator (HSI)**

**Heading Data**

Magnetic heading is represented in boxed numeric form at the top of the compass rose. Heading rate (Rate of Turn Indicator) takes the form of a blue arcing arrow that begins behind the magnetic heading indicator and moves left or right accordingly. Graduations are provided on the rate-of-turn indicator scale to indicate half and full standard-rate turns. A heading bug is also provided on the compass rose.

**Navigation Data**

Navigation data on the PFD takes several forms. A course deviation indicator (CDI) is always provided on the HSI and a bearing pointer can be optionally selected for display on the HSI by the pilot. Controls for selecting the source of navigation data, selecting the display format of the navigation data, and for selecting the type of compass rose and moving map to be displayed are along the left side of the PFD. The active flight plan contained in the GPS Nav/Com unit selected as the primary navigation source (Nav) can be optionally selected for display on the HSI as well as the desired range of the optionally selectable moving map display. If a localizer or ILS frequency is tuned and captured in the GPS Nav/Com selected as the Nav source, a vertical deviation indicator (VDI) and horizontal deviation indicator (HDI) are automatically displayed on the ADI.

- **Note** -

In the event glide slope or localizer signals are lost, the HDI and/or VDI will be displayed as red-“X”s to indicate loss of signal. The red-“X”ed indicator will only be removed if the signal is regained, the Nav Source is changed on the PFD, or if the GPS Nav/Com is retuned to another frequency. Appropriate action must be taken by the pilot if on an approach.

Attitude Indicator

• Note •

Serials 1337 and subsequent with SRV standard configuration: The airplane is not equipped with a standby attitude indicator.

Serials 1337 and subsequent without SRV configuration: The standby attitude indicator is mounted on the LH bolster panel.

The attitude indicator 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” sections have pitch reference lines useful for pitch attitude control. The indicator can follow maneuvers through 360° in roll and 360° in pitch. A knob at the bottom of the instrument allows adjustment of the miniature airplane to the horizon bar for a more accurate flight attitude indication.

A PULL TO CAGE knob on the indicator is used for quick erection of the gyro. When the caging knob is pulled, the pitch and roll indications will align to within 2° of their respective fixed references.

The instrument 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 attitude gyro operation is supplied through the 3-amp Attitude #1 circuit breaker on the Essential Bus and the 3-amp Attitude #2 circuit breaker on the Main Bus 2.
Airspeed Indicator

• Note •

*Serials 1337 and subsequent:* The standby airspeed indicator is mounted on the LH bolster panel and shows only indicated airspeed.

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 an 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.

Vertical Speed Indicator

• Note •

*Serials 1337 and subsequent:* The Vertical Speed Indicator is integrated into the PFD.

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

- Note -

Serials 1337 and subsequent: The standby altimeter is mounted on the LH bolster panel.

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 (zero) 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

- Note -

Serials 1337 and subsequent: Turn Coordinator function and roll data display is integrated into the PFD.

Avionics Configuration 2.0 and 2.1:

The electric turn coordinator displays roll information and provides roll data to the integral autopilot system (System 20 or System 30) Roll rate is sensed by a single-gimbal, electric-powered gyro and displayed on the face of the instrument. The display consists of a symbolic airplane rotates to indicate turn rate and a standard glass tube and ball inclinometer. Markings, labeled L & R, indicate roll for a standard rate turn in the direction indicated. Redundant circuits paralleled through diodes at the indicator supply DC electrical power. 28 VDC for roll rate gyro operation is supplied through the 2-amp TURN COORD 1 circuit breaker on the Essential Bus and the 2-amp TURN COORD 2 circuit breaker on the Main Bus 2.
**Avionics Configuration 2.2:**

The electric turn coordinator, installed in the instrument panel, displays roll information and provides roll data to the System 55X autopilot. The instrument and power supplies are as described above.

**Directional Gyro**

**Avionics Configuration 2.0:**

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. 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 readjusted occasionally on extended flights. 28 VDC for lighting is supplied through the 2-amp INST LIGHTS circuit breaker on Main Bus 1.

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.
Course Deviation Indicator

• Note •

*Serials 1337 and subsequent:* The Course Deviation Indicator is integrated into the PFD.

**Avionics Configuration 2.0 and 2.1:**

The Course Deviation Indicator (CDI) displays navigation information from the GPS navigator. The CDI displays GPS track deviation on a single deviation bar instrument. A vertical line displays GPS track deviation against a 5-dot scale. The indicator incorporates TO/FROM annunciation and NAV flag. An OBS knob is used to manually rotate the azimuth card to the desired bearing. 28 VDC for lighting is supplied through the 2-amp INST LIGHTS circuit breaker on Main Bus 1.

**Avionics Configuration 2.2:**

The Course Deviation Indicator (CDI) displays navigation information from GPS 2 (Garmin GNS 430). Navigation source selection is made using the CDI button on the GPS 2 control. The CDI displays course deviation from a VOR or Localizer (LOC) and Glideslope when ‘VLOC’ is the selected navigation source and displays GPS track deviation when ‘GPS’ is the selected navigation source. The instrument has two deviation bars. 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 INST LIGHTS circuit breaker on Main Bus 1.
Horizontal Situation Indicator

• Note •

Serials 1337 and subsequent: The Horizontal Situation Indicator is integrated into the PFD.

Avionics Configuration 2.1:

The Century NSD-1000 is a conventional HSI that provides gyro stabilized, magnetically slaved, heading information, a pictorial VOR/LOC display with a conventional course arrow, and glideslope presentation. The instrument 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, 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-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 the redundant power circuits is supplied through the 5-amp HSI/PFD 1 circuit breaker on the Essential Bus and 5-amp HSI/PFD 2 circuit breaker on Main Bus 2.
Avionics Configuration 2.2:

The Sandel SN3308 combines the functions of an HSI, an RMI, a full color moving map, a Stormscope display, GPS annunciator, and 3-light marker beacon indicators. Compass information is derived from a remote directional gyro and a flux detector. Redundant power sources provide 28 VDC for system operation. Power is supplied through the 5-amp HSI/PFD 1 circuit breaker on the Essential Bus and the 5-amp HSI/PFD 2 circuit breaker on Main Bus 2. Either circuit is capable of powering the Navigation Display.

The full-color display uses a rear-projection system driven by an active matrix LCD display. The unit uses a halogen lamp as 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. One button operation allows primary navigation to be selected from up to four different sources: two VOR/ILS receivers and two GPS receivers. Either GPS1 or NAV1 may be selected as primary navigation sources. 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 red 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.

Redundant circuits paralleled through diodes at the indicator supply DC electrical power for gyro operation. 28 VDC for the redundant power circuits is supplied through the 5-amp HSI/PFD 1 circuit breaker on the Essential Bus and 5-amp HSI/PFD 2 circuit breaker on Main Bus 2.

**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 7-7
Wing Flaps
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 nose wheel is free castering and can turn through an arc of approximately, Serials 1005 thru 1885, 216 degrees (108 degrees either side of center) or, Serials 1886 thru 2064, 170 degrees (85 degrees either side of center). Nose gear shock absorption is provided by polymer shock absorbing pucks. Steering is accomplished by differential application of individual main gear brakes. The tube-type nosewheel tire measures 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.

Serials 1423 and subsequent: The seat back must be in the fully upright or the fully reclined position before closing the cabin door. Seat backs in the forward or break-over position can cause damage to the door handle or interior panel.
Cabin Speaker
Egress Hammer (in armrest)
Overhead Light and Switch
Fire Extinguisher (under pilot's seat)
Tiedown Loops (6 places, aft bulkhead)
Tiedown Loops (4 places, baggage floor)
Stall Warning Horn
Defrost Air Outlets
Door Handle
Passenger Fresh Air Outlet
Figure 7-8
Cabin Arrangement
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.

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. It is recommended that the seat belts be stowed in the latched position when not in use.

Serials 1268 through 1540 after SB 2X-25-14 and serials 1541 and subsequent; 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.

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**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 FRICITION, 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 CUTOFF) reduces the proportion of fuel. The full aft position (CUTOFF) closes the control valve.
**Start/Ignition Switch**

- **Note** -

  *Serials 1337 and subsequent: The Start/Ignition Switch is located on the instrument panel.*

A rotary-type key switch, located on the left bolster, 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 1 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 instrumentation and warning lights to monitor the engine performance.

- **Note** -

  For additional information on instrument limit markings, *refer to Section 2, Limitations.*
Serials 1268 through 1581: The engine instruments are located on the right side of the instrument panel and the oil temperature/pressure warning light is located in the annunciator panel immediately in front of the pilot.

Serials 1582 and subsequent: The engine instrumentation is displayed on the MFD’s Engine Page. A separate Data Acquisition Unit (DAU), mounted above the right hand kickplate, converts analog signals from the CHT, EGT, MAP, oil pressure, oil temperature, and tachometer sensors to digital format, which are then transmitted to the MFD and/or PFD for display. 28 VDC for Data Acquisition Unit operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus.

The PFD presents percent power in the upper left area of the display in vertical tape format and as text immediately above. Engine RPM, manifold pressure, fuel flow and oil pressure are continuously displayed in the engine data block located in the lower right corner of the PFD.

System health, caution, and warning messages are displayed in color-coded advisory boxes in the lower right corner of the MFD. In addition, the text of the engine parameters displayed on the PFD change to the corresponding color of advisory box during an annunciation event.

The oil temperature/pressure warning light is located in the annunciator panel immediately in front of the pilot.

- Note -

Serials 1268 and subsequent with optional EMax Engine Monitoring after factory installation or after Service Bulletin SB 22-77-01: The following engine instrument component descriptions are the same as those listed for airplane serials 1582 and subsequent except:

- EGT and CHT probes are installed to each exhaust pipe and cylinder head respectively. MFD functionality is enhanced by displaying six channels of EGT and CHT data.

Refer to Avidyne FlightMax EX5000C Pilot’s Guide, for a more complete description of the MFD, its operating modes, and additional detailed operating procedures for the EMax option.
Figure 7-9
Engine Controls and Indicating (Sheet 1 of 2)

Serials 1005 thru 1581.

DETAIL A
Start / Ignition Switch

Serials 1005 thru 1336:
Switch is located on the left bolster panel.

DETAIL B
Alternate Air Control

DETAIL C
Controls

Serials 1005 thru 1581.

DETAIL D
Engine Instruments

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

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Figure 7-9

Engine Controls and Indicating (Sheet 2 of 2)

LEGEND
4. Tachometer
5. EGT (shown with EMax)
6. CHT (shown with EMax)
7. Oil Temperature
8. Oil Pressure
9. Manifold Pressure
10. Percent Power
11. Oil Warning Light

DETAILED

Engine Instruments
Serials 1582 & subs.

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Tachometer

Serials 1268 through 1581: 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.

The electrically operated tachometer receives a speed signal from a magnetic pickup on the right hand magneto. 28 VDC for instrument operation is supplied through the 5-amp ENGINE INST circuit breaker on Main Bus 1.

Serials 1582 and subsequent: Engine RPM is shown in the upper left-most corner of the MFD as both a simulated tachometer and as text. The simulated tachometer receives a speed signal from a magnetic pickup on the right hand magneto via the DAU and sweeps a scale marked from 0 to 3000 RPM in 50 RPM increments.

Engine RPM is also continuously displayed in the engine data block located in the lower right corner of the PFD.

In the event engine speed exceeds 2710 RPM for five seconds, the MFD will display “Check RPM” in a red advisory box in the lower right corner of the MFD.

28 VDC for the digital instrument operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus.

Exhaust Gas Temp / Cylinder Head Temp Gage/Bar Graphs

Serials 0002 through 1601, 1603 through 1643 and 1645 through 1662 without EMaX Engine Monitoring: 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 Main 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 exhaust stream of the #4 cylinder exhaust pipe. The CHT pointer sweeps a scale marked from 200°F to 500°F. The electrically operated CHT indicator receives a temperature
signal from a temperature sensor mounted in the #6 cylinder head on the left side of the engine.

**Serials 1582 and subsequent:** Exhaust Gas Temperature (EGT) and Cylinder Head Temperature (CHT) readings are displayed on the MFD as vertical bars that ascend and descend respective to increasing and decreasing temperatures.

The EGT indicator receives a temperature signal via the DAU from a sensor mounted in the exhaust stream of the #4 cylinder exhaust pipe. The EGT bar and graph is marked from 1000°F to 1600°F in 100°F increments. The EGT of the cylinder is displayed above the bar in text and an up or down trend arrow appears below the temperature to indicate whether EGT is rising or falling.

The CHT indicator receives a temperature signal via the DAU from a sensor mounted in the #6 cylinder head. The CHT bar and graph is marked from 100°F to 500°F in 100°F increments. The CHT of the cylinder is displayed above the bar in text and an up or down trend arrow appears below the temperature to indicate whether CHT is rising or falling.

In the event CHT exceeds 420°F, the MFD will display “Check CHT” in a yellow advisory box in the lower right corner of the MFD. In the event CHT exceeds 460°F, the MFD will display “Check CHT” in a red advisory box in the lower right corner of the MFD.

28 VDC for the digital instrument operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus.

**Oil Temperature / Oil Pressure Gage(s)**

**Serials 1268 through 1581:** A 2¼” combination Oil Temperature and Oil Pressure indicator is mounted on the right instrument panel 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 Main Bus 1.

The Oil Temperature pointer sweeps a scale marked from 50°F to 250°F in 25°F increments. The Oil Temperature indicator receives a temperature signal from a temperature sending unit mounted at the lower left side of the engine below the oil cooler.
The Oil Pressure pointer sweeps a scale marked from 0 psi to 100 psi. The Oil Pressure indicator receives a pressure signal from an oil pressure sensor mounted at the aft end of the engine below the oil cooler. Normally, oil pressure may drop to 10 psi at idle but will be in the 30 - 60 psi range at higher RPM.

**Serials 1582 and subsequent:** Oil temperature is shown in the upper right corner of the MFD as both a simulated temperature gage and as text. The simulated gage receives a temperature signal from a sensor mounted below the oil cooler via the DAU and sweeps a scale marked from 75°F to 250°F in 10°F increments.

In the event oil temperature reaches 235°F, the MFD will display “Monitor Oil Temperature” in a red advisory box in the lower right corner of the MFD.

In the event oil temperature exceeds 240°F, the MFD will display “Check Oil Temp” in a red advisory box in the lower right corner of the MFD.

Oil pressure is shown in the upper right-most corner of the MFD as both a simulated pressure gage and as text. The simulated gage receives a pressure signal from a sensor mounted below the oil cooler via the DAU and sweeps a scale marked from 0 psi to 100 psi in 5 psi increments.

Oil pressure is also continuously displayed in the engine data block located in the lower right corner of the PFD.

In the event oil pressure falls below 10 psi or exceeds 99 psi, the MFD will display “Check Oil Press” in a red advisory box in the lower right corner of the MFD.

In the event oil pressure falls below 30 psi or exceeds 75 psi, the MFD will display “Check Oil Press” in a yellow advisory box in the lower right corner of the MFD.

28 VDC for the digital instrument operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus

**Fuel Flow and/or Manifold Pressure Gage**

**Serials 1268 through 1581:** 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 Main Bus #1.

The Fuel Flow pointer sweeps a scale marked from 0 to 30 Gal/Hr. The electrically operated Fuel Flow indicator receives a fuel-flow rate signal from a fuel-flow transducer on the right side of the engine in the fuel line between the engine driven fuel pump and throttle body metering valve.

The Manifold Pressure pointer sweeps a scale marked from 10 to 30 inches Hg in one-inch Hg increments. 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 near the throttle body.

**Serials 1582 and subsequent:** Manifold pressure is shown in the upper left corner of the MFD as both a simulated temperature gage and as text.

The simulated gage receives a pressure signal from a pressure sensor mounted in the induction air manifold near the throttle body via the DAU and sweeps a scale marked from 10 to 30 inches Hg in one-inch Hg increments.

Manifold pressure is also continuously displayed in the engine data block located in the lower right corner of the PFD.

28 VDC for the digital instrument operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus.

**Percent Power Gage**

**Serials 1582 and subsequent:** Percent power is shown in the upper middle section of the MFD as both a simulated gage and as text.

The simulated gage displays calculated percent of maximum engine power produced by the engine based on an algorithm employing manifold pressure, indicated air speed, outside air temperature, pressure altitude, engine speed and fuel flow. The percent power gage sweeps a scale marked from 0 to 100 percent in 5 percent increments.

Percent power is also continuously displayed in the upper left area of the PFD in vertical tape format and as text immediately above.
28 VDC for the digital instrument operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus.

**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/DAU if the oil temperature reaches 240°F or 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 ANNUN / ENGINE INST 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.
In Prime mode, relay allows high-speed pump operation when the oil pressure is less than 10 psi.
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.

• Note •

Serials 1268 and subsequent with optional EMax Engine Monitoring after factory installation or after Service Bulletin SB 22-77-01: The following fuel system component descriptions are the same as those listed for airplane serials 1582 and subsequent except:

• MFD functionality is enhanced by displaying fuel used, fuel remaining, time remaining, fuel economy, and the addition of Initial Usable Fuel page.

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

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. Serials 1268 through 1581: 28 VDC for fuel quantity system operation is supplied through the 5-amp ENGINE INST circuit breaker on Main Bus 1. Serials 1582 and subsequent: 28 VDC for fuel quantity system operation is supplied through the 5-amp FUEL QTY / HOBBS circuit breaker on Main Bus 1.

• 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.
Figure 7-11
Fuel System Controls and Indicating (Sheet 1 of 2)

LEGEND
1. Fuel Pump Switch
2. Fuel Quantity Gage
3. Fuel Selector Valve
4. Fuel Flow

Serials 1005 thru 1581.
Cirrus Design
SR20

Section 7
Airplane Description

P/N 13999-003 Info Manual 7-61

Cirrus Design Section 7
SR20 Airplane Description

FUEL
OIL
LOW VOLTS
PITOT HEAT
ALT 1
ALT 2

LEGEND
4. Fuel Flow
5. Fuel Used (EMax only)
6. Fuel Remaining (EMax only)
7. Time Remaining (EMax only)
8. Fuel Economy (EMax only)
9. Fuel Caution Light

淑ful Function Display

DETAIL C

Serials 1582 & subs.

Figure 7-11
Fuel System Controls and Indicating (Sheet 2 of 2)

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SR20_FM07_2227
Fuel Flow Indication

Serials 1268 through 1581: 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.

Serials 1582 and subsequent: Fuel flow is shown as text in the fuel data block located in the lower right section of the MFD and is also continuously displayed in The MFD and PFD receives a fuel-flow rate signal via the DAU from a fuel-flow transducer on the right side of the engine in the fuel line between the engine driven fuel pump and throttle body metering valve.

In the event fuel flow exceeds 18.0 gallons per hour, the MFD will display “Check Fuel Flow” in a red advisory box in the lower right corner of the MFD.

28 VDC for the digital instrument operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus.

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 indicator 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 ANNUN / ENGINE INST 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.

An oil pressure based system is used to control boost pump operation. The oil pressure/oil temperature sensor provides a signal to the starting circuit/DAU 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 2.
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.
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.
Figure 7-12
Brake System
Electrical System

The airplane is equipped with a two-alternator, two-battery, 28-volt direct current (VDC) electrical system designed to reduce the risk of electrical system faults. The system provides uninterrupted power for avionics, flight instruments, lighting, and other electrically operated and controlled systems during normal operation.

- Note -

*Serials 1337 and subsequent with SRV standard configuration:* The airplane is equipped with a single alternator, dual battery electrical system. This configuration is identical to the dual alternator system described below except components used in conjunction with the secondary alternator are removed.

Power Generation

Primary power for the SR20 is supplied by a 28-VDC, negative-ground electrical system. The electrical power generation system consists of two alternators controlled by a Master Control Unit (MCU) mounted on the left side of the firewall and two batteries for starting and electrical power storage.

Alternator 1 (ALT 1) is a belt-driven, internally rectified, 75-amp alternator mounted on the right front of the engine. Alternator 2 (ALT 2) is a gear-driven, internally rectified, 20-amp alternator mounted on the accessory drive at the rear of the engine. ALT 1 is regulated to 28 volts and ALT 2 is regulated to 28.75 volts. The output from ALT 1 is connected to the Main Distribution Bus in the MCU through an 80-amp fuse. The output from ALT 2 is connected to the Essential Distribution Bus in the MCU through a 40-amp fuse. Both alternators are self-exciting (not self-starting) and require battery voltage for field excitation in order to start up - for this reason, the batteries and alternators should not be turned off in flight.

Battery 1 (BAT 1) is an aviation grade 12-cell, lead-acid, 24-volt, 10-amp-hour battery mounted on the right firewall. BAT 1 is charged from the Main Distribution Bus in the MCU. Battery 2 (BAT 2) is composed of two 12-volt, 7-amp-hour, sealed, lead-acid batteries connected in series to provide 24 volts. Both BAT 2 units are located in a vented, acid-resistant container mounted behind the aft cabin bulkhead (FS
222) below the parachute canister. BAT 2 is charged from the circuit breaker panel Essential Bus.

The Master Control Unit (MCU) is located on the left firewall. The MCU controls ALT 1, ALT 2, starter, landing light, external power, and power generation functions. In addition to ALT 1 and ALT 2 voltage regulation, the MCU also provides external power reverse polarity protection, alternator overvoltage protection, as well as alternator fail and overcurrent annunciations. Power is distributed to the airplane circuit panel buses through Main and Essential Buses in the MCU. During normal operation, the alternators feed their respective Distribution Bus independently (ALT 1 feeds Main Distribution Bus and ALT 2 feeds the Essential Distribution Bus). The distribution buses are interconnected by two 50-amp fuses and a diode. The diode prevents ALT 2 from feeding the Main Distribution Bus. Additionally, since ALT 2 / Essential Distribution Bus voltage is slightly higher than ALT 1 / Main Distribution Bus voltage, ALT 1 will not feed the Essential Distribution Bus unless ALT 2 fails.

**Power Distribution**

The power distribution system for the SR20 consists of the Main Distribution Bus and the Essential Distribution Bus in the MCU and associated buses in the Circuit Breaker panel. The circuit breaker panel is located on the left side of the console next to the pilots right knee.

For normal operation, the Essential Buses in the circuit breaker panel are powered from the Essential Distribution Bus in the MCU through 25-amp circuit breakers. BAT 2 is connected directly to the Essential Bus in the circuit breaker panel and will power the bus should the voltage coming from the MCU distribution buses drop below the battery voltage. Additionally, in the event of an ALT 2 failure, the circuit breaker panel Essential Bus will be powered from ALT 1 through the Main distribution and Essential distribution buses in the MCU. Main Bus 1, Main Bus 2, and the equipment Non-Essential Bus in the circuit breaker panel are powered from ALT 1 through the Main Distribution Bus in the MCU. The Avionics Non-Essential Bus in the circuit breaker panel is powered from Main Bus 1.
Serials 1359 and subsequent with SRV option: The airplane is equipped with a single alternator, dual battery electrical system. This configuration is identical to the dual alternator system except components used in conjunction with the secondary alternator are removed.

Serials 1005 thru 1581: 80A fuse.

Serials 1005 thru 1581: 100A fuse.

Serials 1633, 1639 & subs with optional Blower Fan installed.

Figure 7-13
Electrical System Schematic
**BAT & ALT Master Switches**

The rocker type electrical system MASTER switches are ON in the up position and OFF in the down position. The switches, labeled BAT 2, BAT 1, ALT 1, ALT 2 are located in the bolster switch panel immediately below the instrument panel. These switches, along with the AVIONICS power switch, control all electrical power to the airplane.

**Battery Switches**

The BAT 1 and BAT 2 switches control the respective battery. Setting the BAT 1 switch ‘on’ energizes a relay connecting BAT 1 to the MCU Distribution Buses (also energizing the circuit breaker panel buses) and the open contacts of the starter relay. Setting the BAT 2 switch ‘on’ energizes a relay connecting BAT 2 to the circuit breaker panel Essential Buses. Normally, for flight operations, all master switches will be ‘on.’ However, the BAT 1 and BAT 2 switches can be turned ‘on’ separately to check equipment while on the ground. Setting only the BAT 2 switch ‘on’ will energize those systems connected to the circuit breaker panel Essential Bus. If any system on the other buses is energized, a failure of the Distribution Bus interconnect isolation diode is indicated. When the BAT 1 switch is set to ‘on,’ the remaining systems will be energized. To check or use avionics equipment or radios while on the ground, the AVIONICS power switch must also be turned on.
Alternator Switches

The ALT 1 and ALT 2 switches control field power to the respective alternator. For ALT 1 to start, the BAT 1 switch must be ‘on.’ Setting the ALT 1 switch ‘on’ energizes a relay allowing 28 VDC from the ALT 1 circuit breaker (Main Bus 2) to be applied to voltage regulator for ALT 1. For ALT 2 to start, either the BAT 1 switch or the BAT 2 switch must be ‘on.’ Setting the ALT 2 switch ‘on’ energizes a relay allowing 28 VDC from the ALT 2 circuit breaker (Essential Bus) to be applied to voltage regulator for ALT 2. Positioning either ALT switch to the OFF position removes the affected alternator from the electrical system.

- Note -

Continued operation with the alternators 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, controls electrical power from the circuit breaker panel bus to the Avionics Bus. The switch is located next to the ALT and BAT Master switches. Typically, the switch is used to energize or de-energize all avionics on the Avionics Non-Essential and 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 switch should be placed in the OFF position prior to activating the MASTER switches, starting the engine, or applying an external power source.

Volts and Ampere Meter/Indication

Serials 1268 through 1581: A 2¼” combination Volts and Ampere meter is mounted on the right instrument panel outboard of the oil temperature and pressure indicator. The indicator is internally lighted. 28 VDC for instrument lighting is supplied through the 2-amp INST 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 -100 to +100 amps with zero at the 9 o'clock position. The amp indication is derived from current transducers located in the MCU. Output from each alternator and BAT 1 is measured. The panel mounted AMMETER SELECT switch is used to select the desired indication. When the engine is operating and the ALT 1 and ALT 2 Master switches are 'on,' the ammeter indicates the charging rate applied to the batteries. In the event the alternators are not functioning or the electrical load exceeds the output of the alternators, the ammeter indicates BAT 1 discharge rate. Alternator ammeter indications are positive only.

**Serials 1582 and subsequent:** Main and Essential Bus voltages are shown as text in the electrical data block located in the mid-right section of the MFD and are also displayed in the voltage parameters block located in the upper left corner of the PFD when voltages fall outside typical operating parameters. The MFD and PFD receive the voltage signals via the DAU as measured directly off the Main and Essential Buses.

In the event Main Bus voltage is less than 24.5v or exceeds 32.0v the MFD will display “Check Main Bus” in a yellow advisory box in the lower right corner of the MFD.

In the event Essential Bus voltage is less than 24.5v or exceeds 32.0v the MFD will display “Check Main Bus” in a red advisory box in the lower right corner of the MFD.

Alternator 1 and Alternator 2 ampere output are shown as text in the electrical data block located in the mid-right section of the MFD. The MFD and PFD receive the amp signals via the DAU as derived from current transducers located in the MCU.

In the event Alternator 1 or Alternator 2 ampere output is less than 2 amps for 20 seconds or more, the MFD will display “Check ALT 1” or “Check ALT 2” respectively, in a yellow advisory box in the lower right corner of the MFD.

28 VDC for the digital instrument operation is supplied through the 2-amp ANNUN / ENGINE INST circuit breaker on the Essential Bus.
Ammeter Select Switch

*Serials 1268 through 1581:* 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. The BATT position indicates BAT 1 current flow only. Selecting one of the switch positions will cause the amperage output from that device to be displayed on the ammeter.

*Serials 1582 and subsequent:* Main and Essential Bus voltages are displayed on the MFD and PFD, therefore, no ammeter select switch is necessary.

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. A voltage sensor in the (MCU) monitors voltage on the Essential Bus and illuminates the warning light when the voltage is less than approximately 24.5 volts.

- **Note** -

  The LOW VOLTS warning light may come on during extended low RPM operation with heavy electrical loads. Under these conditions, the light will go out at higher RPM.

ALT Fail Caution Lights

Two ALT Fail caution lights are installed in the annunciator panel. The ALT 1 and ALT 2 caution lights in the annunciator panel provide annunciation of alternator failure or overcurrent conditions at the respective alternator. The lights are operated by circuits in the MCU and current sensors on the ALT 1 and ALT 2 output lines. Steady illumination of either light indicates an alternator failure. *Serials 1268 through 1581:* A flashing ALT light indicates an overcurrent condition.
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 in the circuit breaker panel on the left side of the center console.

Essential Buses

The circuit breaker panel Essential Bus is powered by ALT 2 from the MCU Essential Distribution Bus through the 25-amp ESSENTIAL POWER circuit breaker and from BAT 2 through the 30-amp BATTERY 2 circuit breaker. The Essential Bus is also powered by ALT 1 and BAT-1 through an isolation diode connecting the Main and Essential Distribution Buses in the MCU. The autopilot and Essential avionics equipment are powered directly from the Essential Distribution Bus in the MCU through a 25-amp circuit breaker on the Distribution Bus. Power from the 15-amp AVIONICS circuit breaker is also controlled through the AVIONICS master switch on the bolster switch panel.

Main Buses

The circuit breaker panel Main Bus 1 and Main Bus 2 are powered by ALT 1 and BAT 1 from the MCU Main Distribution Bus through 25-amp circuit breakers on the Distribution Bus. ALT 2 and BAT 2 are prevented from powering the Main Buses by the isolation diode interconnecting the MCU distribution buses. Loads on circuit breaker panel Main Buses are shed by pulling the individual circuit breakers. The 15-amp AVIONICS circuit breaker on Main Bus 1 powers all loads on the Non-Essential Avionics Bus. Power from the 15-amp AVIONICS circuit breaker is also controlled through the AVIONICS master switch on the bolster switch panel.

Non-Essential Buses

The circuit breaker panel contains two Non-Essential Buses, the Non-Essential Equipment Bus and the Avionics Non-Essential Bus. The Avionics Non-Essential Bus is powered through the 15-amp AVIONICS circuit breaker on Main Bus 1 and is discussed above. The Non-Essential Equipment Bus is powered by ALT 1 and BAT 1 from the MCU Main Distribution Bus through a 25-amp circuit breaker. ALT 2 and BAT 2 are prevented from powering the Non-Essential Equipment Bus by the isolation diode interconnecting the MCU.
distribution buses. Loads on the Non-Essential Equipment Bus are shed by pulling the individual circuit breakers.

**Ground Service Receptacle**

A ground service receptacle is located just aft of the cowl on the left side of the airplane. This receptacle 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 1 MASTER switch so that the BAT 1 switch 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. 28 VDC power for the convenience outlet is supplied through the 3-amp 12VDC OUTLET circuit breaker on the Non-Essential Bus.

**Exterior Lighting**

The airplane is equipped with standard wing tip navigation lights with integral anti-collision strobe lights and Serials 1886 & subs; recognition lights (optional). The separately controlled landing light is located in the lower cowl.

**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 5-amp NAV LIGHTS circuit breaker on Non-Essential Bus.

**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 Non-Essential Bus.

**Landing Light**

*Serials 1337 and subsequent with SRV standard configuration:* The airplane is equipped with a Halogen landing light.

A 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. Setting the LAND light switch ‘on’ energizes the landing light control relay in the Master Control Unit (MCU) completing a 28 VDC circuit from the airplane Main Distribution Bus to the light’s ballast located on the firewall. The ballast provides boosted voltage to illuminate the HID lamp. A 15-amp breaker on the Main Distribution Bus in the MCU protects the circuit.

**Recognition Lights (Optional) - Serials 1886 & subs**

The airplane is equipped with recognition lights on the leading edge of the wing tips. The lights are controlled through the landing light switch on the instrument panel bolster. 28 VDC for recognition light operation is supplied through the 5-amp RECOG LIGHTS circuit breaker on the NON ESS BUS.

**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 instrumentation 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 supplied through 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

* Note *

*Serials 1337 and subsequent with SRV standard configuration:* Reading lights are not installed on this airplane.

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. Ventilation air is provided by ducting ram air from air inlets 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 ram 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.

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.

Serials 1639 and subsequent: An optional 3-speed blower fan is available to supplement airflow when ram air may be inadequate such as during ground operation. The optional blower fan is powered by 28 VDC supplied through 15-amp Fan breaker on Main A/C Bus 2.

**Description and Operation - Serials 1005 thru 1638**

The environmental system consists of an air inlet in the upper RH cowl, a heat exchanger around the RH engine exhaust muffler, two fresh air inlets, located in each wing root leading edge, a hot air valve located on the firewall, an air mixing plenum located behind the instrument panel, a windshield diffuser, air ducting for distribution, crew and passenger air vents, and required actuators for selecting temperature and flow

**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 shuts off airflow to the passenger air distribution system and allows maximum airflow to the windshield diffuser. Rotating the knob full clockwise 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 routed to outlets beneath the forward seats near the door posts and exits at floor level.
Cabin Heat Control

The amount of heated air allowed into the air mixing plenum is controlled by rotating the Cabin Heat Control. 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.

Description and Operation - Serials 1639 and Subs

Serials 1639 thru 1885: The environmental system consists of a fresh air inlet in the RH upper cowl, a heat exchanger around the RH engine exhaust muffler, one fresh air inlet located in the RH wing root leading edge, a hot air valve located on the firewall, an air mixing chamber located under the RH crew seat, a distribution manifold behind the instrument panel, a windshield diffuser, air ducting for distribution, crew and passenger air vents, and required actuators for selecting temperature and flow.

Serials 1886 and subs: The environmental system consists of a fresh air inlet in the RH upper cowl, a heat exchanger around the RH engine exhaust muffler, a fresh air inlet in the RH lower cowl, an air mixing chamber located on the firewall, a distribution manifold behind the instrument panel, a windshield diffuser, air ducting for distribution, crew and passenger air vents, and required actuators for selecting temperature and flow.
**Airflow Selection**

*Serials 1639 thru 1885:* The airflow selector regulates the volume of airflow allowed into the cabin distribution system through mechanical linkage to a butterfly valve in the distribution manifold. If option installed, the blower fan is turned on when the selector dial exceeds the full open position. *Serials 1886 and subs:* The airflow selector on the system control panel regulates the volume of airflow allowed into the cabin distribution system. When the airflow selector is moved past the OFF position an electro-mechanical linkage actuates a valve in the mixing chamber on the forward firewall to the full open position. The air is then distributed by either ram air or by an optional blower fan to the distribution manifold mounted to the center, aft side of the firewall. The optional blower fan system includes 0 (ram air), 1 (low fan), 2 (med fan), and 3 (high fan) airflow settings.

**Vent Selection**

“Conditioned” air from the distribution manifold can be proportioned and directed to passengers and/or the windshield by manipulating the cabin vent selector. The selector is mechanically linked to butterfly valves at the entrances to the windshield diffuser and the cabin floor ducting. There is continuous airflow to the panel and armrest eyeball outlets. Each occupant can control the flow rate from 'off' to maximum by rotating the nozzle. When the selector is in the far left position, both butterfly valves are closed providing maximum airflow to the panel and armrest eyeball outlets. Rotating the selector a quarter-turn clockwise opens the cabin floor butterfly valve allowing airflow to the rear seat foot warmer diffusers and the front seat outlets mounted to the underside of each kickplate. Rotating the selector another quarter-turn clockwise opens the windshield diffuser butterfly valve which permits shared airflow to the defrosting mechanism and cabin floor outlets.

When the selector is in the far right position, the cabin floor butterfly valve is closed providing maximum airflow to the windshield diffuser.

**Temperature Selection**

The temperature selector is mechanically linked to the hot air valve and fresh air intake valve. Rotating the selector simultaneously opens and closes the two valves, permitting hot and cold air to mix and enter the distribution system. Rotating the selector clockwise, permits warmer air to enter the system - counterclockwise, cooler air.
Figure 7-14
Environmental System - Serials 1005 through 1638

Cabin Heat/Defrost Select

Foot-Warmer Diffuser

Air Gasper

Fresh Air Intake

Windshield Defrost Diffuser

HVAC Plenum

Heat Exchanger

Temp. Control

Cold

Heat Off

Heat On

Air Inlet

Conditioned Air

Fresh Air

Mechanical Connection
NOTE: Illustration depicts maximum cabin cooling airflows and selector settings.

Figure 7-14
Environmental System - Serials 1639 thru 1885

Section 7
Airplane Description
Cirrus Design
SR20

Figure 7-14
Environmental System - Serials 1639 thru 1885
NOTE: Illustration depicts maximum cabin cooling airflows and selector settings.

Figure 7-14
Environmental System - Serials 1886 and Subs

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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 / ENGINE INST circuit breaker on the Essential Bus.
Figure 7-16
Pitot-Static System Schematic
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.

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, and Serials 1706 and subsequent; the autopilot system to disconnect. 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 the 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:

**Avionics Configuration 2.0 - Serials 1268 through 1336:**
- Single-Axis Autopilot (S-Tec System 20)
- Integrated Audio System with Intercom (Garmin GMA 340)
- Marker Beacon Receiver (Garmin GMA 340)
- One IFR Approach-Certified GPS (Garmin GNS 430) and One VFR GPS (Garmin GNC 250XL)
- Two VHF Communications (Garmin GNS 430 and Garmin GNC 250XL)
- Single Navigation (VOR/LOC/GS) Receiver (GNS 430)
- Mode C Transponder with Altitude Encoder (Garmin GTX 327)
- Directional Gyro
- Course Deviation Indicator

**Avionics Configuration 2.1 - Serials 1268 through 1336:**
- Moving Map Display (Avidyne MFD)
- Two-Axis Autopilot (S-Tec System 30)
- Integrated Audio System with Intercom (Garmin GMA 340)
- Marker Beacon Receiver (Garmin GMA 340)
- Two IFR Approach-Certified GPS (Garmin GNS 430 and Garmin GNS 420)
- Two VHF Communications Transceivers (Garmin GNS 430 and Garmin GNS 420)
• Single Navigation (VOR/LOC/GS) Receiver (GNS 430)
• Mode C Transponder with Altitude Encoder (Garmin GTX 327)
• Horizontal Situation Indicator
• Course Deviation Indicator

Avionics Configuration 2.2 - Serials 1268 through 1336:
• Moving Map Display (Avidyne MFD)
• Two-Axis Autopilot (S-Tec System 55X)
• Integrated Audio System with Intercom (Garmin GMA 340)
• Marker Beacon Receiver (Garmin GMA 340)
• Two IFR Approach-Certified GPS (Garmin GNS 430)
• Two VHF Communications Transceivers (Garmin GNS 430)
• Two Navigation (VOR/LOC/GS) Receiver (GNS 430)
• Mode C Transponder with Altitude Encoder (Garmin GTX 327)
• Electronic Navigation Display (Sandel SN3308)
• Course Deviation Indicator

Avionics Configuration PFD - Serials 1337 and subsequent:
• Moving Map Display (Avidyne MFD)
• Primary Flight Display (Avidyne PFD)
• Two-Axis Autopilot (S-Tec System 55SR)
• Integrated Audio System with Intercom (Garmin GMA 340)
• Marker Beacon Receiver (Garmin GMA 340)
• One IFR Approach-Certified GPS (Garmin GNS 430) and One VFR GPS (Garmin GNC 250XL)
• Two VHF Communications (Garmin GNS 430 and Garmin GNC 250XL)
• Single Navigation (VOR/LOC/GS) Receiver (GNS 430)
• Mode C Transponder with Altitude Encoder (Garmin GTX 327)

Avionics Configuration SRV - Serials 1337 and subsequent:
• Primary Flight Display (Avidyne PFD)
• Moving Map Display (Avidyne MFD)
• Integrated Audio System with Intercom (Garmin GMA 340)
• Marker Beacon Receiver (Garmin GMA 340)
• One IFR Certified GPS (Garmin GNC 420)
• One VHF Communications (Garmin GNC 420)
• Mode C Transponder with Altitude Encoder (Garmin GTX 327)

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**

**Avionics Configuration 2.0:**

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. A button on each control yoke handle may be used to disengage the autopilot. The turn coordinator instrument annunciates system modes. The autopilot drives the aileron trim motor and spring cartridge to control airplane roll. The autopilot operates on 28 VDC supplied through the 5-amp AUTOPILOT circuit breaker on the Essential Bus.
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.

**Avionics Configuration 2.1:**

These airplanes are equipped with an S-TEC System Thirty Autopilot. This 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 Pitot-Static system. The programmer, roll computer/amplifier, and annunciators are contained entirely within the turn coordinator case. The Multi-function Control Knob at the upper left of the turn coordinator provides mode selection, disengage, and turn command functions. A button on each control yoke handle may be used to disengage the autopilot. A separate pitch computer provides the ALT hold function. Roll axis steering is accomplished by autopilot steering commands to the aileron trim motor and spring cartridge. Pitch axis command for altitude hold is accomplished by pitch computer commands to the elevator servo. The autopilot operates on 28 VDC supplied through the 5-amp AUTOPILOT circuit breaker on the Essential Bus. The S-Tec System Thirty Autopilot features:

- Roll Stabilization;
- Turn Command;
- NAV/LOC/GPS tracking; HI and LO sensitivity;
- Altitude Hold; and
- GPS Steering (GPSS) for smoother turns onto a course or during course tracking.

A separate GPSS converter provides GPS roll steering to the autopilot. A GPSS/HDG button allows the operator to switch between HDG and Roll Steering modes. In the HDG mode the autopilot responds to the HDG bug on the HSI. In the GPSS mode, the autopilot responds to roll steering inputs from the GPS navigator.

Refer to *S-TEC System Thirty Autopilot Pilot's Operating Handbook* (P/N 8777) dated Feb 1999 or later and the applicable POH.
supplement for a more complete description of the autopilot, its operating modes, and additional detailed operating procedures.

Refer to S-TEC-Meggit Global Positioning System Steering (GPSS) Converter Pilot's Operating Handbook (P/N 8799) dated 8 Feb 2001 or later and applicable POH supplement for a more complete description of the GPSS converter, its modes, and additional operating procedures.

**Avionics Configuration 2.2:**

These airplanes are equipped with an S-TEC System 55X Autopilot with Altitude Selector / Alerter. The System 55X autopilot is a two-axis autopilot system. The system consists of a flight guidance programmer/computer, altitude selector/alerter, altitude transducer, turn coordinator, and HSI. Mode selection and vertical speed selection are made on the programmer/computer panel. The altitude selector/alerter allows the pilot to pre-select altitudes and rates of climb or descent to be used by the autopilot. 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 preselect and hold through the elevator trim motor. The autopilot operates on 28 VDC supplied through the 5-amp AUTOPILOT circuit breaker on the Essential Bus. The S-Tec System 55X Autopilot features:

- Heading Hold and Command;
- NAV/LOC/GPS/GS tracking, high and low sensitivity, and automatic 45° -course intercept;
- Altitude and Climb/Descent Rate Preselect
- Altitude Hold and Command;
- Vertical Speed Hold and Command; and
- GPS Steering (GPSS) for smoother turns onto a course or during course tracking.

Refer to S-Tec System Fifty-Five X Autopilot Pilot’s Operating Handbook (POH), P/N 87109 dated 8 November 2000 or later revision 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.
Refer to S-Tec Altitude Selector / Alerter Pilot’s Operating Handbook (POH) P/N 8716 or P/N 87110 (no revision or later) for full operational procedures and detailed description of operational modes of the Altitude Selector / Alerter.

### Avionics Configuration PFD:

This airplane is equipped with an S-TEC System 55SR Autopilot. The System 55SR autopilot is a two-axis autopilot system. The system consists of a flight guidance programmer/computer, altitude transducer, turn coordinator, and primary flight display (PFD). Mode 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 autopilot operates on 28 VDC supplied through the 5-amp AUTOPILOT circuit breaker on the Essential Bus. The S-Tec System 55SR Autopilot features:

- Heading Hold and Command;
- NAV/LOC/GPS tracking;
- Altitude Hold and Command;
- GPS Steering (GPSS) for smoother turns onto a course or during course tracking.

### GPS Navigation

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.

### Avionics Configuration 2.0 and PFD:

The airplane is equipped with two GPS navigators. The Garmin GNS 430 navigator is designated GPS 1, IFR certified, and is coupled to the airplane’s CDI and Multi-Function display. The Garmin GNC 250XL provides backup, is approved for VFR use only, and is not coupled to the Multi-Function or Primary Flight Displays. The primary GPS
navigator is powered by 28 VDC through the 5-amp GPS 1 and 7.5-amp COM 1 circuit breakers on the Avionics Essential Bus. The secondary GPS navigator is powered by 28 VDC through the 7.5-amp COM 2 circuit breaker on the Avionics Non-Essential Bus.

**Avionics Configuration 2.1 and 2.2:**

The airplane is equipped with two GPS navigators. The Garmin GNS 430 is designated GPS 1 and the Garmin GNS 420 (Configuration 2.1) or an additional GNS 430 (Configuration 2.2) is designated GPS 2. Both Garmin GPS navigators are IFR certified. The primary unit, designated GPS 1, is coupled to the airplane’s HSI, Autopilot, and multifunction display. The secondary unit, designated GPS 2, is coupled to the airplane’s CDI.

The GPS navigators are capable of providing IFR enroute, terminal, and approach navigation with position accuracies better than 15 meters. Each GPS navigator utilizes the Global Positioning System (GPS) satellite network to derive the airplane’s position (latitude, longitude, and altitude) and the altitude encoder to enhance the altitude calculation.

The GPS1 antenna is located above the headliner along the airplane centerline. The GPS2 antenna is located below the gareshield and behind the 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), 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 primary GPS navigator is powered by 28 VDC through the 5-amp GPS 1 and 7.5-amp COM 1 circuit breakers on the Avionics Essential Bus. The secondary GPS navigator is powered by 28 VDC through the 5-amp GPS 2 and the 7.5-amp COM 2 circuit breaker on the Avionics Non-Essential Bus.

**Avionics Configuration SRV:**

*Optional SRV configuration:* An optional Garmin GNS 430 GPS transceiver is available as an upgrade to the Garmin GNS 420. The system description is identical to the Garmin GNS 420 described below.
Standard SRV configuration: The airplane is equipped with one GPS navigator. The Garmin GNS 420 navigator is designated GPS 1, and is coupled to the airplane’s Multi-Function display. The GPS navigator is powered by 28 VDC through the 5-amp GPS 1 and 7.5-amp COM 1 circuit breakers on the Avionics Essential Bus.

Communication (COM) Transceivers

Avionics Configuration 2.0, 2.1, 2.2, and PFD:

Two VHF communications (COM) transceivers are installed to provide VHF communication. The transceivers and integrated controls are mounted in the Garmin GNS 430, GNS 420 or GNC 250 XL 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 upper Garmin GNS 430 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 lower Garmin GNS 420 or GNC 250 XL is designated COM 2. The Garmin GNS control panel provides COM 2 transceiver active and standby frequency indication, frequency memory storage, and knob-operated frequency selection. The COM 2 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 2 antenna is located on the underside of the cabin on the airplane centerline. 28 VDC for COM 2 transceiver operation is controlled through the Avionics Master Switch on the bolster switch.
panel and supplied through the 7.5-amp COM 2 circuit breaker on the Non-Essential Avionics Bus.

**Avionics Configuration SRV:**

*Optional SRV configuration: An optional Garmin GNS 430 GPS transceiver is available as an upgrade to the Garmin GNS 420. The system description is identical to the Garmin GNS 420 described below.*

One VHF communications (COM) transceiver is installed to provide VHF communication. The transceiver and integrated controls are mounted in the Garmin GNS 420 unit. The transceiver receives all narrow- and wide-band VHF communication transmissions transmitted within range of the selected frequency. The antenna picks up the signals and routes the communication signals to the transceiver, 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 420 is designated COM 1. The Garmin GNS 420 control panel provides COM 1 transceiver active and standby frequency indication, frequency memory storage, and knob-operated frequency selection. The 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.

**Navigation (Nav) Receiver**

**Avionics Configuration 2.0, 2.1, 2.2, and PFD:**

The airplane is equipped with one NAV receiver integrated into the Garmin GNS 430 GPS Navigators (the GNS 420 or GNC 250XL do not incorporate a NAV receiver). Mounted in the upper radio rack slot, this unit is designated NAV 1. The GNS 430 has VHF Omnimrange/Localizer (VOR/LOC) capability. The VOR/LOC receiver receives VOR/LOC on a frequency range from 108.000 Mhz to 117.950 Mhz with 50 kHz spacing. The GNS 430 has glideslope capability. Glideslope is received from 329.150 to 335.000 in 150 kHz steps. The
receivers and integrated controls are mounted in the Garmin GNS 430 control display. The receiver controls provide 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, mounted on top of the vertical tail, provides VOR/LOC input for both Nav receivers.

NAV 1 – The upper GARMIN GNS 430 is designated NAV 1. 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 Essential Bus row.

**Avionics Configuration 2.2:**

The airplane is equipped with two NAV receivers integrated into the Garmin GNS 430 GPS Navigators. The upper unit is designated NAV 1 and the lower unit is designated NAV 2. The Nav receiver controls are integrated into the Garmin GNS control mounted in the center console. Each unit has VHF Omirange/Localizer (VOR/LOC) capability. The VOR/LOC receiver receives VOR/LOC on a frequency range from 108.000 Mhz to 117.950 Mhz with 50 kHz spacing. The GNS 430 has glideslope capability. Glideslope is received from 329.150 to 335.000 in 150 kHz steps. 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, mounted on top of the vertical tail, provides VOR/LOC input for both Nav receivers.

NAV 1 – The upper GARMIN GNS 430 is designated NAV 1. 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 Essential Bus row.

NAV 2 – The lower GARMIN GNS 430 is designated NAV 2. 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 2 circuit breaker on the Avionics Non-Essential Bus row.
Transponder

The airplane is equipped with a single Garmin 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 encoder. 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, provided by the altitude encoder, is 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. A FUNC (function) key allows for selection of pressure altitude, flight time, count-up timer and countdown timer modes. 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/XPONDER circuit breaker on the Avionics Non-Essential Bus.

Audio System

The airplane is equipped with a Garmin GMA 340 Audio Panel. Refer to the Garmin GMA 340 Audio Panel Pilot's Operating Handbook, P/N 190-00149-10 Rev C or later, and the applicable POH supplement for a more complete description of the autopilot, its operating modes, and additional detailed operating procedures.

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 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 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 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:
   a. Remove access at lower aft center of baggage compartment.
   b. Disconnect fixed antenna lead from front of unit.
   c. Disconnect lead from remote switch and indicator unit.
   d. Loosen attach straps and remove transmitter unit and portable antenna.
   e. Attach portable antenna to antenna jack on front of unit.
   f. Set main control switch to ON.
   g. Hold antenna upright as much as possible.

**Hour Meter(s)**

*Serials 1268 through 1632 and 1634 through 1638:* The airplane is equipped with an hour meter located inside the armrest storage compartment between the pilot and copilot seats. Recording begins when the BAT 1 switch is ON and either the ALT 1 or ALT 2 switch is ON.

*Serials 1268 through 1581:* 28 VDC for hour meter operation is supplied through the 5-amp ENGINE INST circuit breaker.

*Serials 1582 through 1632 and 1634 through 1638:* 28 VDC for hour meter operation is supplied through the 5-amp FUEL QTY / HOBBS circuit breaker on Main Bus 1.

*Serials 1633, 1639 and subsequent:* The airplane is equipped with two hour meters located inside the armrest storage compartment between the pilot and copilot seats. The #1 hour meter, labeled HOBBS begins recording when the BAT 1 switch is ON and either the ALT 1 or ALT 2 switch is ON. The #2 hour meter records flight time and is labeled...
FLIGHT. Recording begins when the airplane reaches a speed of approximately 35 KIAS and is controlled by a differential pressure switch connected to the Pitot-static system. 28 VDC for hour meter operation is supplied through the 5-amp FUEL QTY / HOBBS circuit breaker on Main Bus 1.

Digital Clock

Serials 1268 through 1337; 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
Serials 1268 through 1337; 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.

Serials 1337 and subsequent with Avionics Configuration PFD; Outside Air Temperature annunciation is integrated into the MFD or PFD.
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 save 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.