Welcome to Orange County Flight Center

The POH Summary for the airplane you'll be flying is attached. Please study it and then review areas of concern using the Pilot's Operating Handbook/Airplane Flight Manual and the related avionics pilot guides before you meet with your instructor for the airplane checkout. You can download the avionics pilot guides from the manufacturer's website.

We have taken this reasonable approach to airplane checkouts in order to save you time and to ensure that the material you study includes all of the airplane's nuances—elements that are often missed when one quickly reviews the POH or AFM, particularly for Technically Advanced Aircraft (TAA) that have serial-number based and POH/AFM-Supplement based information.

During the checkout, your instructor will ask you questions about the airplane in order to ensure that you have in fact acquired the proper knowledge. Your checkout will be complete after the instructor signs-off your dispatch record and you sign a statement acknowledging that you have studied this POH Summary and resolved areas of concern using the airplane's POH/AFM and avionics pilot guides.

Fly smart, fly safe,

The OCFC team

Insights from Ralph Butcher, OCFC chief flight instructor:

"Technology simplifies that which is complicated, and complicates that which was simple." You'll quickly realize the validity of that old, familiar quote when you fly a TAA.

The Cirrus, as with all fiber-composite airplanes and most TAA, has new proficiency demands for flying and for cockpit management. The most critical flight element is landing.

During the landing flare, you must stop increasing the pitch attitude as soon as you establish the liftoff attitude that occurs during takeoff—where the nose wheel is slightly higher than the main wheels—and let the airplane settle onto the runway, which will result in a smooth landing. *Do not* continue to increase pitch attitude and hold the airplane off the runway as you have done previously in conventional airplanes. Due to excellent cockpit visibility during landing, students tend to flare excessively and the airplane stops descending. When speed decreases somewhat, the airplane will drop rapidly toward the runway, and the student will quickly apply aft elevator input to stop the descent. That does nothing. The airplane hits hard, the main landing gear flexes outward, and the tail hits the ground, which results in expensive, structural damage.

Another problem will occur if the firewall is damaged due to landing on the nose wheel. The airplane is totaled. It cannot be repaired. Consequently, the nose-wheel strut is designed to break in that situation so that the firewall is not damaged. However, because of sudden engine stoppage, an engine overhaul is required, but that expense is far less than aircraft replacement.

"Compared to conventional airplanes, the Cirrus does not descend very well." You'll frequently hear that statement, which is totally false. All fiber-composite airplanes from the Diamond Katana to the Airbus have minimum drag. Here's the trick: When you're high and need to descend, level off and set minimum power, decelerate, and extend full flaps. Now decrease pitch attitude significantly and fly about 10 knots below V_{FE} in order to avoid an inadvertent flap overspeed. The airplane will descend rapidly. When slightly below your desired glidepath, level off, and decelerate as you return to it.

The parachute does not mean that you can operate contrary to the safety rules used in conventional airplanes (e.g. flight over mountainous terrain, water, etc.) I would use the parachute only if I was in a midair collision and the airplane was unflyable. Would you like to make a parachute landing and drift into power lines—impossible to see when at altitude—and have the chute collapse? When the parachute does the flying, you have absolutely no control over your destiny.

Fixed gear airplanes usually flip over during a forced landing on water, a terrible situation for evacuation. One pilot did use the parachute when over water, but the impact was so hard he broke his back. The landing gear will not help to absorb the impact force of a parachute assisted water landing.

You must know every function of the airplane's avionics systems, and you must use them as tools not crutches. A grave error is committed when a pilot thinks that an autopilot can compensate for poor flying skills. That assumption has caused many fatal accidents.

When hand flying the airplane, use only the PFD, the MFD's moving map, and the frequency selectors for communication and navigation. To expand beyond those items, use the autopilot and keep your eyes outside the cockpit as much as possible.

Do not attempt to master the intricacies of the *glass cockpi*t all at once. That can be frustrating. Master the basic steps for using the OBS and LEG modes, entering a flight plan, navigating from one point to another, and diverting to a nearest airport. Then expand into other areas of interest.

Are you instrument rated? Cirrus recommends (as does OCFC) at least 100 hours in the airplane before you fly IFR in less than marginal VFR conditions—below 3,000/5. They also recommend an Instrument Proficiency Check with a flight instructor every six months and at least three instrument approaches in the airplane every sixty days.

OCFC requires 60 currency in the Cirrus for all rental pilots. For authorization to fly IFR, you must receive an Instrument Proficiency Check in the Cirrus with an OCFC instructor .

CIRRUS SR-20
N325Z, Serial No. 1407
POH SUMMARY

(revised 02/19/2009)

GENERAL, POH Section 1

1. Engine model: Teledyne Continental IO-360-ES
2. Engine horsepower rating: 200 hp @ 2700 rpm
3. Propeller type: Three-blade, constant-speed Hartzell
4. Fuel capacity: 60.5 gallons total, 56.0 gallons useable
5. Fuel type: 100 LL (blue), 100 (green)
6. Oil capacity: 8 quarts (note; min. quantity, 6 qts., is listed in POH section 7)
7. Oil grades: Above 40º F - SAE 50, below 40º F - SAE 30, all temps SAE 15W-50 or SAE 20W-50
8. Maximum gross weight for takeoff: 3,000 lbs.
9. Maximum gross weight for landing: 2,900 lbs.
10. N325Z empty weight (see book at dispatch counter): 2144 lbs.
11. N325Z payload with full fuel (book on dispatch counter): 530 lbs.
12. N325Z useful load: 856 lbs.
13. Wing loading: 22 lbs per square foot. (A 182 is 17 lbs/ft^2)
14. Power loading: 15 lbs. per hp. (A 182 is 13 lbs/hp)

15. V_O: Operating Maneuvering Speed—maximum speed at which application of full control movement will not overstress the airplane.

16. V_{pd}: Maximum parachute deployment speed.

17. $V_{S50\%}$ and V_{SO}: Stall speed with 50% and 100% flaps extended.

LIMITATIONS, POH Section 2

18. V_{NE}, V_{NO}, V_O, V_{FE}, V_{PD}: 200 KIAS, 165, 131, $120_{50\%}/100_{100\%}$, 135

19. Zero fuel weight: 2,900 lbs.

20. Maximum weight in baggage compartment: 130 lbs.

21. Center of gravity reference datum: 100 inches forward of firewall

22. Flap limitations: Takeoff—0% or 50%. Landing—100%, however 0% or 50% can be used if malfunctions or other conditions deem it appropriate.

23. Allowable flight load factors: Flaps up—+3.8g, -1.9g. Flaps extended—+1.9g, -0g.

24. Maximum fuel imbalance limit: 7.5 gallons (1/4 tank)

25. Maximum operating altitude: 17,500 ft. MSL

26. Temperature limit and paint limitations: 150º F (66º C), approved white paint.

27. Runway surface and smoking limitations: Any runway surface, no smoking

28. Maximum demonstrated parachute deployment speed: 135 KIAS

29. Multi-function display limitation: Not approved as a primary navigation instrument. Information may be used for advisory purposes only.

30. Flight into known icing conditions: Prohibited

31. Battery requirements: Battery 1—IFR and VFR. Battery 2—IFR.

32. Alternator requirements: Alternator 1—IFR and VFR. Alternator 2—IFR.

33. List remaining equipment that's required for all operations: Ammeter, low volts, and alternator annunciators; ELT; fire extinguisher; flaps system and flap position lights; pitch and bank trim systems and indicators; fuel boost pump, quantity indicator, and selector valve; alternate engine-air induction system; alternate static source; anti-collision lights; standby altimeter and airspeed indicators; magnetic compass; pitot system, static system (normal); fuel flow, manifold pressure, oil pressure, and oil temperature gages; tachometer; airframe parachute, and airplane flight manual.

34. When is the vertical speed indicator, multi-function display, and cylinder head temperature gage required? Never

EMERGENCY PROCEDURES, POH Section 3

35. Maneuvering speed: 3,000 lbs—131, 2,600 lbs—122, 2,200 lbs—111 KIAS.

36. Best glide speeds: 3,000 lbs—96, 2,200 lbs—87 KIAS.

37. Emergency landing speeds: flaps up—86, flaps 50%—81, flaps 100%—75 KIAS.

38. Engine induction-system fire during start procedure: Mixture cutoff, fuel pump off, fuel selector off, power lever full forward, engage starter.

39. Engine failure in flight procedure: Establish best glide, mixture full rich, switch fuel tanks, fuel pump on boost, alternate induction air on, ignition switch check both.

40. Engine airstart procedure: Battery master switches on, power lever 1/2" open, mixture rich, switch fuel tanks, ignition switch on both, fuel pump on boost, alternate induction air on, alternator master switches off, engage starter if prop not windmilling, slowly increase power lever, alternator master switches on when engine starts.

41. If a partial power loss occurs or the engine starts running rough, what initial action should be performed: Fuel pump on BOOST.

42. If the engine fuel pump fails completely, will the fuel pump's boost position provide enough fuel to keep the engine running? No, but it will keep the engine running if the engine pump has a partial failure.

43. Propeller governor failure procedure: If RPM will not increase, check oil pressure and land as soon as practical. If RPM overspeeds or will not decrease, adjust power lever to keep RPM within limits, reduce to 80 knots, and land as soon as practical.

44. Engine fire in flight procedure: Mixture cutoff, fuel pump off, power lever idle, fuel selector off ignition switch off.

45. Wing fire in flight procedure: Pitot heat, navigation lights, and strobe lights off. Land as soon as possible.

46. Emergency descent procedure: Power lever idle, mixture full rich, and airspeed at V_{NE} (200 kts).

47. Door open in flight procedure: Reduce airspeed to 80 to 90 knots and land as soon as practical. If not latched, door will remain 1 to 3 inches open in flight.

48. CAPS deployment procedure: Airspeed as slow as possible (max demonstrated was 135 kts.) mixture cutoff if possible, cover removed, pull activation handle from its holder and then clasp handle with both hands and pull straight down in a strong,

steady, and continuous motion. Maintain pull force until rocket activates. Bending of the handle-housing mount is to be expected.

49. CAPS after-deployment procedure: Mixture check cutoff, fuel selector off, bat-alt master switches off, ignition switch off, fuel pump off, ELT on (located below CB panel), seat belts and harnesses tightened, loose items secure, and assume emergency landing body position.

50. Describe the emergency landing body position: Cross your arms across your chest, firmly grasping the shoulder harness, and hold your upper torso erect. The landing force is equivalent to a drop from 10 feet above the ground.

51. An alternator malfunctions. What indication would occur? The ALT caution light would illuminate in the annunciator panel, and the ammeter would probably indicate an excessive charge or discharge rate.

52. What does the term “self-exciting” alternator mean? The alternator requires battery voltage only for starting. Once started, it provides self-generated field power to continue operation in case of battery failure.

53. If electrical loads must be reduced due to alternator failure, should you switch off electrical components that are not essential to flight or pull circuit breakers? Why? Switch off electrical components in order to prevent accidental circuit breaker disconnection and loss of power to flight-critical systems.

54. ALT 1 light on steady. The cause and procedure is: Cause: Wiring fault or malfunctioning alternator or control unit. Procedure: ALT 1 master switch off, ALT 1 CB checked and reset, ALT 1 master switch on. If alternator does not reset, reduce loads on main buses 1 and 2 and on the non-essential buses, and monitor voltage, turn the ALT 1 master switch off, and land as soon as practical.

55. ALT 1 light flashing. The cause and procedure is: Cause: A severely discharged battery, which causes an excessive charging rate, along with heavy equipment loads. Procedure: Ammeter switch on BATT. If charging rate is greater than 30 amps, reduce load on main busses 1 and 2 and on the non-essential buses. Monitor ammeter until battery charge rate is less than 15 amps. When charge rate is within limits, add loads as necessary for flight conditions.

56. ALT 2 light steady. The cause and procedure is: Cause: Failure of ALT 2 or rpm below 1,700 to 2,200. Procedure: ALT 2 master switch off, ALT 2 CB checked and reset, ALT 2 master switch on. If alternator does not reset, reduce loads on main buses 1 and 2 and on the non-essential buses, turn the ALT 2 master switch off, and land as soon as practical. (Essential bus loads will now be powered from ALT 1, BAT 1, and BAT 2.)

57. LOW VOLTS warning light illuminated procedure: Cause: Voltage is 24.5 volts or less and you are on battery power only because both alternators have failed or are off. Procedure: If both alternators have failed, land as soon as possible.

58. Communications failure procedure: Check switches and controls, change frequency, check circuit breakers, change headset, and connect the hand-held microphone. (Note: if the audio panel power fails, the audio panel connects COM 1 to the pilot's headset and speakers. The same thing will happen if you turn the audio panel off.)

59. Power lever linkage failure: Use available power and flaps as required to safely land the airplane. If power is stuck at or near full power, use the mixture control to control power for descent. Plan a power-off approach and landing. If power is such that you cannot maintain straight and level flight, plan a forced landing.

60. Electric trim/autopilot failure: Maintain airplane control manually (override the autopilot or trim) and disengage the autopilot if it was engaged. Pull the PITCH TRIM, ROLL TRIM, or AUTOPILOT CB as required. Land as soon as practical.

NORMAL PROCEDURES, POH Section 4

61. Normal, Vy, and Vx climb speeds at sea level: 105, 96, and 81 KIAS

62. Landing approach speeds, flaps up, 50%, and 100%: 85, 80, and 75 KIAS

63. Maximum demonstrated crosswind velocity, takeoff or landing: 21 knots

64. During the cabin inspection before the walk-around, what is the first thing you do after you turn on the BAT 2 master switch? Check the avionics cooling fan.

65. How is the fuel pump used for starting? PRIME for 2 seconds then BOOST

66. What is starter motor's duty time? Intervals of 20 seconds on, 20 seconds off in order to improve battery and contactor life.

67. When should the fuel pump be on BOOST? Engine start, takeoff, and landing; and whenever hot fuel conditions exist, fuel pressure fluctuates, or switching fuel tanks.

68. When are the ALT master switches turned on? After engine start

69. How do you start a flooded engine? Turn fuel pump off, allow fuel to drain from the intake tubes, mixture full lean, power lever full open, crank the engine through several revolutions. When it starts, retard the power lever and slowly advance the mixture to full rich.

70. How do you maintain directional control when taxiing? With rudder and differential braking. In crosswind conditions, some continual brake force may be required.

71. How do you check the autopilot disconnect be checked before takeoff? Even though it's not a Cirrus checklist item, this action should always occur: Press the HDG button to engage the autopilot. Check control forces. Now, press the yoke's autopilot disconnect button (the coolie hat) to ensure autopilot disconnect.

72. How do you check the propeller operation during the runup? Move the power lever up to the detent. Approximately 2,000 rpm should occur, and it should drop about 100 rpm as the power lever is set in the detent.

73. What is the rpm tolerance during the mag check? 150 rpm max drop and both drops must be within 75 rpm of each other.

74. Is an idle check required before takeoff? It's not on Cirrus's checklist, but that's not good. At the conclusion of an engine runup, particularly with a fuel injected engine, an idle check is mandatory.

75. What flap setting is used for short- and soft-field takeoffs? 50%

76. Should the mixture be leaned during climb? No, the fuel pump is altitude compensating so the mixture control must be left at the full rich position.

77. During cruise flight when and how do you lean for best power or best economy? When at 75% power or less, use the MFD's lean assist or manually lean to 75º rich of peak EGT for best power or 50º rich of peak EGT for best economy,

78. When can you land with less than full flaps? Only when the flaps fail to deploy or when it's necessary to extend glide distance due to an engine malfunction.

79. What is the short-field approach speed and the restriction that applies to braking? 75 KIAS. Apply normal brake pressure and announce "simulating max braking."

80. What is the crosswind landing technique? Use full flaps and avoid prolonged slips.

81. If the ELT activates after a hard landing, how do you turn it off? Press the reset button on the ELT control panel that's located below the circuit breaker panel.

PERFORMANCE DATA, POH Section 5

82. When determining airplane performance, what should you do if the ambient temperature is less than or greater than the chart value? Less than: Use the lowest published temperature, which will result in a more conservative performance calculation. More than: Use extreme caution as performance degrades rapidly at higher temperatures.

83. Are performance figures always reliable? No. Range and endurance variations of 10% or more can occur due to variations in fuel metering, mixture leaning technique, engine and propeller condition, and air turbulence.

84. Refer to Flight Planning on page 5-4 of the POH. Using the Sample Problem's configuration and conditions, confirm the answers given for takeoff, climb, cruise, fuel required, and landing by using figures 5-8 through 5-16 and figure 19. (This is a practical exercise to ensure your understanding of the performance charts.)

85. When using the alternate static air system and flying at 80 KIAS, what is the KCAS with 100% flaps? 78 KIAS.

86. When using the alternate static air system and flying at 80 KIAS at sea level, what is the altitude correction with 50% flaps? Subtract 18 feet.

WEIGHT AND BALANCE, POH Section 6

87. Is OCFC's N325Z legal to fly based on the following information? Yes, but the airplane is at its forward CG limit.

    Basic empty weight: 2144.0 lbs.
    Empty moment/1,000: 303.561
    Fuel: 56 gallons useable
    Pilot: 210 lbs.
    Front seat passenger: 170 lbs.
    Rear seat passenger: 140 lbs.

88. Just after takeoff in the previous problem, the pilot realizes that his wallet (pilot certificate and medical) is in his car. Is he legal to immediately return and land? No, the maximum landing weight is 2,900 lbs.

AIRPLANE AND SYSTEMS DESCRIPTION, POH Section 7

89. The airplane is made from composite materials for aerodynamic efficiency. What material is used for the rudder, elevator, ailerons, and wing flaps? Aluminum.

90. What is the rudder-aileron interconnect? It provides a maximum of 8^{o} down aileron with full rudder deflection. Right rudder will cause right roll input and left rudder input will cause left roll input. (This may be why the airplane is roll sensitive. Aileron input coupled with rudder input compounds the aileron input.)

91. The airplane does not have a flight-control gust lock, and you are not required to secure the control yoke with a seat belt when the airplane is tied down. Why not? Because the rudder, aileron, and elevator trim spring cartridges have sufficient power to act as a gust damper.

92. What are the small tabs on the elevator, rudder, and right aileron? Ground adjustable trim tabs that are factory set and do not normally require adjustment.

93. A conical trim button (called a “coolie hat”) activates the aileron and elevator trim motors when moved left or right or up or down. When pushed down, it? Disconnects the autopilot if engaged.

94. How do you position the elevator trim and the aileron trim to the neutral position? Elevator: Align the yoke’s reference mark with the metal tab that’s attached to the instrument panel bolster—the rounded portion that extends across the cockpit beneath the instrument panel. Aileron: Align the fore-and-aft line that’s etched on the control yoke with the centering indication that’s marked on the bolster.

95. If the elevator control system or aileron control system failed due to something other than a jammed elevator or a jammed aileron, how could you control the airplane? Use the elevator or the aileron trim control system.

96. What is the yaw trim system? A spring cartridge attach to the rudder control system that provides a centering force whenever the rudder is deflected. It is ground adjustable only.

97. What backup flight instruments are available if the PFD fails? Altimeter, airspeed, attitude indicator, and magnetic compass.

98. Does the airplane have a traditional turn coordinator? Yes, but it’s out of view behind the right instrument panel bolster and it’s only used by the autopilot.

99. What is the primary heading source for the multifunction display? The PFD.

100. What adjustments can be made for the front seats? Fore and aft and seat-back tilt.

101. Why can’t you kneel or stand on the pilot and passenger seats? Because you’ll crush the seat bottom’s integral aluminum honeycomb core, which is designed to crush under impact and absorb downward loads that would occur during a parachute landing.

102. How can you carry bulky cargo that exceeds the baggage compartment’s length? Unlatch the rear seat backs from within the baggage compartment and fold the seat backs down.

103. When the shoulder harnesses are attached you have complete freedom of movement. How, then, are you protected in the event of a crash? The harnesses are attached to inertial reels which automatically lock during sudden deceleration.

104. How could you evacuate the airplane if the cabin doors were jammed shut? Use the ball-peen type hammer that’s located in the center armrest to break the acrylic windows and form an escape path.

105. You are required to visually inspect the fire extinguisher before each flight. What must you ensure? The nozzle is unobstructed, the pin has not been pulled, and the canister has not been damaged.

106. Are the rudder pedals connected to the nose gear for steering? No.

107. So how do you steer the airplane? Differential braking.

108. Describe the brake system: A master cylinder for each rudder pedal, one hydraulic fluid reservoir, a parking brake valve, and a single disc brake on each main wheel.

109. How do you set the parking brake? Apply the rudder-pedal toe brakes, and while set, pull the PARK BRAKE knob aft. It's located near the pilot's right ankle on the left side of the console.

110. What is the minimum quantity for engine oil? 6 quarts.

111. Describe the fuel injection system: It's a continuous-flow system. The engine driven fuel pump draws fuel from the selected wing tank and sends it to the fuel pump's integral mixture control valve. This 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. Fuel is then sent to the fuel-metering valve on the air-induction system throttle body, which 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.

112. Describe the electric fuel pump operation? It's an oil pressure based system that allows the pump to run at high speed (PRIME) when engine oil pressure is less than 10 psi. Above 10 psi, PRIME has no effect. BOOST energizes the pump in the low-speed mode regardless of oil pressure in order to provide continuous fuel flow for vapor suppression in a hot fuel condition.

113. Where is the friction control wheel located? On the right side of the console.

114. How does the power lever (throttle) function? It adjusts the engine throttle setting in addition to automatically adjusting propeller speed.

115. The power lever system is set to maintain what rpm? Approximately 2,500 rpm throughout the cruise power settings and 2,700 rpm at full power.

116. How does the mixture control lever function? It is mechanically linked to the mixture control valve in the engine driven fuel pump and controls the mixture at that point.

117. Which battery master switch activates the engine's start/ignition switch? BAT 1.

118. Describe the function, location, and operation of the alternate air control knob: It opens the alternate air induction door on the engine induction air manifold in the engine compartment, bypasses the dry induction air filter, and allows warm unfiltered air to enter the engine. It is located near the pilot's right ankle on the console. Depress the center lock button, pull to open, and then release the button.

119. What will activate the engine oil warning light? High temperature or low pressure.

120. How does the propeller system function? The propeller governor senses engine speed by means of flyweights and senses throttle setting through a cable connected to the power control lever (throttle). Moving the power lever forward reduces governor oil pressure and allows centrifugal force to decrease propeller pitch for higher rpm. Moving the power lever aft increases governor oil pressure which increases propeller pitch for lower rpm. During stabilized flight, the governor adjusts propeller pitch in order to maintain a specific rpm.

121. Describe the basic fuel system: A vented fuel tank and a fuel collector tank/sump in each wing, a three-position selector valve, an electric boost pump, and an engine-driven fuel pump. Excess fuel at the engine driven fuel pump is routed back to the selected fuel tank through fuel return lines and the fuel selector valve. (Note; the key for the lockable fuel caps is located in the arm rest storage box.)

122. Describe the fuel venting system: The collector tank is vented into its respective fuel tank, which is vented to a NACA-type vent mounted underneath the wing near each wing tip.

123. What are the locations of the fuel drains? Five total: One under each fuel tank, one under each collector tank/sump, and one under the gascolator, which is below the lower engine cowl just forward of the firewall.

124. How much useable fuel exists if the tanks are filled to the tabs? 26 gallons, 13 in each fuel tank.

125. Left fuel tank is empty; right tank has 10 gal. Will the FUEL caution light be on? No, both tanks must have less than approximately 8.5 gallons for the light to activate.

126. What problem can occur when the fuel tanks are 1/4 full or less? Prolonged uncoordinated flight such as skips or skids for more than 30 seconds can uncover the fuel tank outlets and cause fuel starvation.

127. What is the proper use of the boost pump switch? For engine starting, pressing PRIME (a momentary position) causes the boost pump to operate at high speed until the fuel pressure reaches 2 to 4 psi. When that pressure is attained, the boost pump automatically switches to the low speed BOOST mode (a selectable position) to provide a 4 to 6 psi fuel pressure boost. For vapor suppression with hot fuel, select the BOOST position, which provides a 4 to 6 psi fuel pressure boost. Select the BOOST position for takeoff and landing.

128. Refer to Figure 3-2 on page 3-26 of the POH, and describe the electrical system: There are two batteries and two alternators. BAT 1 and ALT 1 supply the main distribution bus which powers MAIN BUS 1, MAIN BUS 2, NON-ESSENTIAL BUS 1, and NON-ESSENTIAL BUS 2. BAT 2 and ALT 2 supply the essential distribution bus

which powers the ESSENTIAL BUSES. Notice the diode between the two distribution buses. If BAT2 and ALT 2 fail, BAT 1 and ALT 1 will power their normal buses *AND* the essential busses. If BAT 1 and ALT 1 fail, BAT 2 and ALT 2 will power *ONLY* their essential buses. The remaining buses will receive no power.

129. Return to the Electrical System on page 7-43 of the POH. Describe alternator 1: ALT 1 is a belt-driven, internally rectified (converts AC to DC), 75-amp alternator that's mounted on the front of the engine. It is regulated to 28.0 volts.

130. Describe alternator 2: ALT 2 is a gear-driven, internally rectified, 20-amp alternator mounted on the accessory at the rear of the engine. It is regulated to 28.75 volts.

131. Describe both batteries: BAT 1 is a 24-volt, 10-amp-hour battery mounted on the firewall. BAT 2 is composed of two 12-volt, 7-amp-hour batteries connected in series to provide 24 volts and located behind the aft cabin bulkhead.

132. Why do you think that ALT 2 is regulated to a higher voltage than ALT 1 (This is not explained well in the POH)? Voltage is like water pressure. Because ALT 2 has more pressure, it prevents ALT 1 from powering the essential buses during normal operation of the electrical system. ALT 1 can power the essential buses only if ALT 2 fails.

133. Why should the batteries and alternators not be turned off in flight? Because both alternators are self-exciting (not self-starting) and require battery voltage only for field excitation in order to start operating.

134. What equipment is on the essential buses? Annunciator lights, turn coordinator, PFD, stall warning, battery 2, alternator 2, autopilot, and COM 1 and GPS 1 (the upper Garmin 430).

135. How can you prove what the essential buses power? With the engine running on the ground, turn off ALT 1 and BAT 1, but leave ALT 2, BAT 2, and the avionics switch on. Now observe what works and what doesn't work.

136. How can you check to see if the distribution buses isolation diode has failed? Turn on only BAT 2 and the avionics switch and COM 2 or NAV 2. If either one works, the diode has failed.

137. For ALT 1 or ALT 2 to start, battery power must be available. TRUE.

138. When must the avionics switch be off? Prior to activating the MASTER switches, starting the engine, or applying an external power source.

139. What causes the LOW VOLTS warning light to illuminate: Volts less than approximately 24.5 volts.

140. What does the Volt/Amp meter indicate? Essential bus voltage, and by using the ammeter selector switch, BAT 1, ALT 1, and ALT 2 amps.

141. What is indicated when an ALT fail caution light flashes? When it is on steady? Flashes: over-current condition. Steady: alternator failure.

142. Where is the ground service receptacle located and where do you find the procedure? Location: Just aft of the cowl on the left side. Procedure: POH, Section 8, *Ground Handling, Servicing, and Maintenance*.

143. What is the convenience outlet? A 12-volt outlet in the center console that can be used for portable entertainment equipment.

144. List the exterior lights? Navigation, strobe, and landing lights.

145. List the interior lights? Dimmable incandescent instrument bezel lights, dimmable red LED instrument panel flood lights, reading lights that are dimmable for the two front seats, and a dimmable overhead dome light.

146. Three controls exist for heating and ventilation. The cabin HEAT control does what? Controls the amount of hot air that enters the mixing plenum (see POH Figure 7-11).

147. The cabin COLD air control does what? Controls the amount of fresh cooling air that enters the mixing plenum.

148. The cabin air selector does what? Controls the amount of conditioned air (air leaving the mixing plenum) that flows to the cabin and/or the windshield defrost diffuser. (Note: This control is located between the HEAT and COLD selectors and is only marked with a defroster symbol and a human body symbol.)

149. Where are the fresh air intakes and outlets? The intakes are in each wing's inboard leading edge. The right intake flows to the two right side cabin outlets and the mixing plenum. The left intake flows to the two left side cabin outlets.

150. Where are the conditioned air outlets? The adjustable front seat outlets are directly in front of each seat under the instrument panel. The rear seat outlets are at floor level.

151. Where is the sensor for the stall warning horn? Behind the small hole in the right wing's leading edge.

152. Where are the pitot tube and static ports located? Pitot tube: under the left wing. Static ports: one on each side of the aft fuselage.

153. What does the pitot heat caution light indicate? The pitot heat switch is in the on position, but the pitot tube is not receiving electrical current.

154. Describe the standby attitude indicator: Electrically driven gyro with a red GYRO flag that indicates loss of electrical power from the essential bus. It can follow 360º of roll and 360º of pitch, and it has both a traditional knob for aligning the miniature air-

plane with the instrument's horizon and a PULL TO CAGE knob for quick erection of the gyro.

155. Describe the fail-safe mode for the Garmin GMA 340 audio system: It connects the pilot's headphone and microphone to COM 1 if power is removed or if the Mic Selector switch is turned to the OFF position.

156. Where is the ELT located and where is it's control panel located? It is installed directly behind the aft cabin bulkhead, and the control panel is installed immediately below the circuit breaker panel next to the pilot's right leg.

157. How can you tell if the ELT is transmitting? A flashing light on the control panel.

158. Is the ELT portable? Yes. You can access it at the lower aft center of the baggage compartment. Disconnect the leads attached to the unit, remove it, and attach the portable antenna to the antenna jack on the front of the unit. Set main control switch to on.

159. Where is the hour meter located? Inside the armrest storage compartment.

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

161. Describe the parachute activation procedure: Pull the activation T-handle from its receptacle. Now, claps both hands around the activation T-handle and pull straight downward with a strong, steady, and continuous force.

HANDLING, SERVICE, MAINTENANCE, POH Section 8

162. When pushing the airplane backward, must the tow bar be installed? Yes, to keep the nose wheel from turning abruptly.

163. Can you push on the propeller or the horizontal or vertical tail surfaces when moving the airplane? No, push on the wing roots.

164. If the airplane is towed by a vehicle, nose wheel turning is limited to: 90^{o}.

165. What power setting should be used for taxiing? The minimum power needed for forward movement. Excessive braking may result in overheated or damaged brakes.

166. How can you make a minimum radius turn during ground handling? Rotate the airplane around either main landing gear by pressing down on the fuselage just forward of the horizontal stabilizer in order to raise the nose wheel off the ground and pivot the airplane.

167. What are the proper tire pressures? Nose wheel: 40 psi. Main wheels: 53 psi.

168. Installation of the oil dipstick can be difficult. How should you do it? Point the dipstick's finger loop toward the airplane's nose or tail, and allow the dipstick to rotate as you push it into the engine.

169. When cleaning the windshield and windows, what hand motion should you use? Linear—straight back and forth. Circular motion causes spirals in the plexiglas which makes those scratches much more apparent when flying.

170. How should you clean the electronic display screens (PFD and MFD)? Gently wipe the display with a clean, dry cotton cloth. Moisten a clean, cotton cloth with Optiimax LCD Screen Cleaning Solution, wipe screens in one direction moving from top to bottom, and then wipe the display clean with a clean, dry, cotton cloth.

SUPPLEMENTS, POH Section 9

Garmin GMA 340 Audio System

171. Pressing the COM 1/2 button does what? Activates the split com function so that the pilot can transmit/receive on COM 1 and the copilot can simultaneously transmit/receive on COM 2.

172. What does the left inner knob do? On/Off power control and pilot intercom volume.

173. What does the left outer knob do? Pilot mike squelch level.

174. What does the right inner knob do? Copilot's intercom volume when pushed in. Passenger's intercom volume when pulled out.

175. What does the right outer knob do? Copilot and passenger mike squelch level.

176. How do you set the squelch? With the engine running, slowly rotate the control knob clockwise until you no longer hear engine nose in the headset. Place mike close to you lips and verify that normal speech levels open the channel.

177. What is the function of the PILOT and CREW intercom isolation buttons? PILOT: The pilot is isolated from the intercom system. CREW: Pilot and copilot are on one intercom channel, isolated from the passengers who are on a separate channel.

Garmin GTX 327 Transponder

178. Do you turn the transponder to STBY after engine start? No, that occurs automatically when you turn on the avionics power.

179. When do you place the transponder to the ALT position? Never. If the transponder is in STBY, it automatically goes to ALT when airspeed reaches 35 knots, and it automatically returns to STBY when airspeed decreases below 35 knots.

180. What is the function of the 8 and 9 buttons? 8 reduces display contrast; 9 increases display contrast.

181. What bus powers the transponder? Non-essential avionics bus.

182. What does the FUNC key do? Changes the data on the right side of the screen. Displayed data includes pressure altitude, flight time, count up timer, count down timer, contrast, and display brightness.

183. What is displayed when flight time is selected? The time accrued while the airplane was moving faster than 35 knots.

184. How do you start the count up timer? Press the CLR key to zero the display and press the START/STOP key.

185. How do you setup and start the count down timer? Set the time with the CRSR key and the 0 through 9 keys, then press the START/STOP key.

S-Tec System 55X Autopilot

186. Is the S-Tec System 55X POH required to be on the airplane during flight? Yes, and it must be available to the pilot while in flight.

187. How can you disconnect the autopilot? Push in the Coolie Hat on the control yoke or pull the autopilot circuit breaker on the non-essential avionics bus.

188. List and explain the autopilot pre-flight tests:

- When avionics power is turned on, all autopilot annunciators except CWS and TRIM illuminate and then go off after 5 seconds. When the turn coordinator reaches operating rpm, the RDY light will illuminate.
- Heading mode test: Center HDG bug under lubber line on HSI. Momentarily press HDG button on autopilot and note that HDG illuminates. Rotate HDG knob and note that control yoke follows movement to the left and right.
- Vertical speed test: Press VS button and note that VS light illuminates VS+0. Rotate the VS control knob to 500 fpm up and the control yoke should move aft after a short delay. Rotate the VS control knob to 500 fpm down and the control yoke should move forward after a short delay.
- Altitude hold test: Depress the ALT button. Note that ALT annunciator comes on, VS annunciator goes out, and yoke does not move.
- Overpower test: Grasp control yoke and input left and right aileron and nose up and nose down to overpower autopilot. Overpower action should be smooth in each direction with no noise or jerky feel.

- Radio check: Turn on NAV 1 radio with a valid NAV signal and select VLOC for display on the HSI. Engage NAV mode and move OBS so that VOR deviation needle moves left or right. Note that control yoke follows direction of needle movement.
- Autopilot disconnect test: Press the Coolie Hat switch on the control yoke. Note that autopilot disconnects. Move control yoke to confirm that pitch and roll control is free with no control restriction or binding. If a pilot is in the copilot's seat, repeat disconnect test using the copilot's disconnect switch.

189. From where does the autopilot receive its signals? The turn coordinator, the HSI, and the #1 NAV/GPS radio.

190. List and explain the autopilot operating modes:

- RDY (ready): Autopilot is ready for engagement.
- HDG (heading) mode: Autopilot will hold the heading set on the HSI.
- NAV (navigation) mode: Autopilot will provide intercept and tracking of GPS, VOR, and Localizer courses. It automatically sets up a 45º intercept.
- GPSS (GPS Steering) mode: Pressing NAV twice will cause the autopilot to go to GPSS for smoother tracking and transitions. The autopilot is directly coupled to the roll steering command produced by the GPS navigator, eliminating the need for the pilot to make adjustments to the HSI course arrow.
- REV (reverse course) mode: Autopilot will track the localizer back course inbound and the localizer front course outbound.
- APR (Approach) mode:Provides increased sensitivity for VOR or GPS approaches.
- GS (glideslope) mode: Autopilot will capture and track an ILS glideslope. The airplane must be 60% or more below the glideslope centerline during the approach to the intercept point, and with 50% needle deviation of the localizer centerline at the point of intercept—usually the outer marker. When these conditions have existed for 10 seconds, the GS annunciator will illuminate indicating that GS arming has occurred. The ALT light will go out when the glideslope is captured.
- ALT (altitude hold) mode: Autopilot will hold the altitude at the time the mode was selected providing a roll mode is engaged. Altitude correction can be made by rotating the VS knob in the appropriate direction. Altitude will change 20 feet for each click of the knob.
- VS (vertical speed) mode: Autopilot will synchronize to and hold the vertical speed at the time the mode was selected. Vertical speed will change by 100 fpm for each click of the VS knob.

Goodrich SkyWatch SKY497 Traffic Advisory System

191. Must the SkyWatch pilot's guide be available to the pilot in flight? Yes.

192. What avionics unit controls and initiates SkyWatch? GPS 1 (Garmin 430)

193. What sequence occurs before SkyWatch becomes operational? Avionics power on, self-test complete, and STBY mode until 8 seconds after airspeed reaches 35 KIAS.

194. When does SkyWatch return to STBY mode: 24 seconds after airspeed slows to 35 KIAS or below.

195. What are the three operator initiated control functions of SkyWatch? Self-test, switch to normal from the standby screen, switch into standby from the traffic screen (unable when airborne), and change altitude display.

196. List the steps for the AirWatch self-test on the Garmin 430? Rotate the small PUSH CRSR knob to select the Traffic/Weather page. From the traffic screen, press the MENU key to select the Menu page. Rotate the small PUSH CRSR knob to select SELF TEST and then press the ENT key.

197. If you wanted traffic information while on the ground, how would you switch to normal from the standby screen using the Garmin 430? Turn the cursor on and highlight STBY. Use the small PUSH CRSR knob to select OPER? Press the ENT key to place SkyWatch in the OPER (operational) mode. SkyWatch will switch into the 6 nmi display range.

198. How do you change altitude on the traffic display? List the different options: From the traffic screen, turn the cursor on, highlight the current mode, and use the small PUSH CRSR knob to cycle through the options. ABV, look up; NRM, normal; BLW, look down; or UNR, unrestricted.

199. SkyWatch issues TAs. What's that and how are you alerted to a TA? Traffic Advisories. You are alerted to a TA by an aural "Traffic, Traffic" warning over your headset and the cabin speaker. (Note: You'll also here the term RA used by pilots flying larger airplanes. An RA is a resolution advisory that more sophisticated traffic alert systems generate. An RA gives the pilot immediate climb or descend instructions, instructions that have priority over ATC instructions.)

200. What is the SkyWatch range and altitude limits? 6 nmi and ±800 feet relative altitude.

Avidyne EX-Series Multifunction Flight Display (MFD)

201. List and explain the multifunction flight display (MFD) pages:

- MAP page: The primary page that also gives traffic information from SkyWatch.
- TRIP page: Lists the remaining legs of the active flight plan in a tabular format.
- NEAREST page: Provides a list and relative position of navigational items of interest including navaids and airports.
- CHECKLIST pages: Provides an electronic display of checklists—normal and emergency procedures and essential performance data.

- SYSTEM SETUP pages: Allows the pilot to set user preferences for the display and view the on-board database version and validity dates.
- ENGINE MONITORING page: Displays engine instruments, electrical parameters, and leaning information.

202. Can you use the MFD as your primary navigation instrument? No.

203. Which GPS does the MFD use for data input? Whichever one has been selected in the system setup page. Normally GPS 1 is used.

204. If a TA occurs, how do you get the traffic display to appear on the map page? Press the “Message Ack” bezel key.

Avidyne Entegra-Series Primary Flight Display (PFD)

205. What traditional instruments does the PFD replace? Airspeed indicator, attitude indicator, altimeter, turn coordinator, HSI or DG, vertical speed indicator, VOR/LOC indicator, altitude alerter, and OAT/clock.

206. What traditional instruments are still installed as a backup in case the PFD fails? Altimeter, airspeed, attitude indicators, magnetic compass.

207. What traditional instrument is installed just for the autopilot? A turn coordinator.

208. What primary information does the PFD supply to the MFD? Heading. The PFD is the primary heading source for the MFD.

209. Must the Avidyne FlightMax Entegra-Series PFD Pilot’s Guide be available to the pilot during all flight operations? Yes

210. List the limitations that apply when the PFD is coupled with the autopilot system:

- Autopilot operation is prohibited above 185 KIAS.
- Autopilot must not be engaged for takeoff and landing.
- Autopilot must be disengaged for a missed approach and go-around.
- When in altitude hold, flaps 50% cannot be extended above 95 KIAS.
- Flap selection is limited to 50% during autopilot operation.
- Autopilot must be disconnected in moderate or severe turbulence.
- Minimum engage height for the autopilot is 400 feet agl.
- Minimum speed for autopilot engagement is $1.2V_S$ for the configuration.
- The autopilot must be disengaged no later than 100 feet below the MDA, at the DH, and during an approach if course deviation exceeds 50 percent.
- With autopilot engaged for an approach, a 12 knot crosswind limit exists inside the final approach fix.
- A localizer intercept shall occur at least 5 miles outside the FAF, 10 miles if the crosswind component is between 12 and 17 knots.
- The intercept angle shall be no greater than 45 degrees.

- The flaps should be extended to 50% prior to the FAF and no further changes should be made during the autocoupled approach.
- Approach a glideslope in a manner that allows automatic arming of the glideslope, or if glideslope is manually armed, no more than 15% above the glideslope.

211. What will happen to autopilot operation if the PFD fails, and what must you do? You loose the ability to control the autopilot through the PFD controls. If this occurs, pull the PFD circuit breakers and fly the airplane using the backup instruments.

212. Is autopilot lateral control available with the PFD circuit breakers pulled? Only if you use the autopilot's GPSS steering mode (push the NAV button twice) through GPS 1. (Autopilot vertical control is also available through the autopilot's VS and ALT modes.)

213. If you lose attitude information on the PFD, can it be restored? Yes, if the airplane is equipped with software version 530-00159-000 Rev 00 or higher. If that's the case and the power loss was not greater than 20 seconds, you will get a PLEASE STANDBY message for 2 seconds followed by an ATTEMPTING QUICK RESTART message. If that does not occur or if the software has not been upgraded, attitude information is lost until the PFD can be restarted on the ground.

214. Where is the slip/skid indicator? The bottom edge of the bank angle pointer.

215. Where is the rate of turn indicator? The arc with a blue arrow on top of the HSI.

216. The heading, altitude, and vertical speed all have selectable, magenta reference bugs. How can you tell whether or not any of these are coupled to the autopilot? They'll be solid magenta if coupled, but hollow if not coupled.