Pilot's Operating Handbook and
FAA Approved Airplane Flight Manual
Supplement
for

S-Tec Fifty Five X Autopilot w/ Optional Flight Director

(Aircraft Serials w/ Perspective Avionics Only)

When the System Fifty Five X Autopilot with Optional Flight Director System is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section (Section 9) of the basic Pilot's Operating Handbook. This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic Pilot's Operating Handbook.

FAA Approved Joseph C Mieos **Date** 18 Dec 2008
for Charles Smalley, Acting Manager
Chicago Aircraft Certification Office, ACE-115C
Federal Aviation Administration

Section 1 - General

This airplane is equipped with an S-TEC System Fifty Five X Autopilot and, if installed, an integrated Flight Director System.

Refer to S-Tec System Fifty Five X Pilot's Operating Handbook for full operational procedures and description of implemented modes.

Refer to the Perspective Integrated Avionics System Pilot's Guide for a detailed description of the avionics system and it's operating modes.

Section 2 - Limitations

1. If aircraft equipped with S-Tec System Fifty Five X, Pilot's Operating Handbook, P/N 87109 4th Edition or later must be immediately available to the pilot during flight.
2. The Cirrus Perspective by Garmin Integrated Avionics System Pilot's Guide for the SR20 and SR22, P/N 190-00820-02 Rev A or later must be immediately available to the pilot during flight. The software status stated in the pilot's guide must match that displayed on the equipment.
3. Autopilot operation is prohibited above 185 KIAS.
4. The autopilot must not be engaged for takeoff or landing.
5. The autopilot must be disengaged for missed approach, go-around, and balked landing.
6. Flaps must be set to 50% for autopilot operation in Altitude Hold at airspeeds below 95 KIAS.
7. Flap deflection is limited to 50% during autopilot operations.
8. The autopilot must be disconnected in moderate or severe turbulence.
9. Minimum engage height for the autopilot is 400 ft AGL.
10. Minimum speed with the autopilot engaged is $1.2V_S$ for the given configuration.
11. For VOR/GPS and ILS glideslope and localizer intercept, capture, and tracking, the following limitations apply:
    a. The autopilot must be disengaged no later than 100 feet below the Minimum Descent Altitude.

b. The autopilot must be disconnect during approach if course deviation exceeds 50%. The approach should only be continued by “hand-flying” the airplane.

c. The autopilot must be disengaged at the Decision Height.

d. 12 knot maximum crosswind component between the missed approach point and outer marker.

e. The intercept of the localizer shall occur at least 5 miles outside of the outer marker.

f. If the crosswind component is greater than 12 knots and less than 17 knots, the intercept shall occur at least 10 miles outside of the outer marker.

g. The intercept angle shall be no greater than a 45-degree intercept.

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

i. The flaps should be extended in the approach configuration prior to the Outer Marker. No further changes in the flap configuration should be made throughout the autopilot-coupled approach.

j. The glideslope is approached in such a manner to allow automatic arming of the glideslope, or if the glideslope is manually armed no more than 15% above the glideslope.

Section 3 - Emergency Procedures

Autopilot Malfunction

Refer to Electric Trim/Autopilot Failure procedure in the basic Pilot's Operating Handbook. Do not reengage the autopilot until the malfunction has been identified and corrected. The autopilot may be disconnected by:

1. Pressing the A/P DISC on the control yoke.

   or

2. Pulling the KEYPADS/AP CTRL circuit breaker on MAIN BUS 1.

Altitude lost during a roll or pitch axis autopilot malfunction and recovery:

Flight Phase	Bank Angle	Altitude Loss
Climb	40°	200 ft
Cruise	45°	300 ft
Descent	40°	350 ft
Maneuvering	10°	60 ft
Approach	10°	80 ft

Section 3A - Abnormal Procedures

Autopilot Display Flashing Caution Annunciations

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

Flashing RDY for 5 seconds with audible tone.

Autopilot disconnect. All annunciations except RDY are cleared.

1. Continue flight without autopilot.

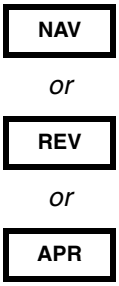
Flashing RDY with audible tone then goes out.

Turn coordinator gyro speed low. Autopilot disengages and cannot be re-engaged.

1. Check power to turn coordinator.

Continued on following page.

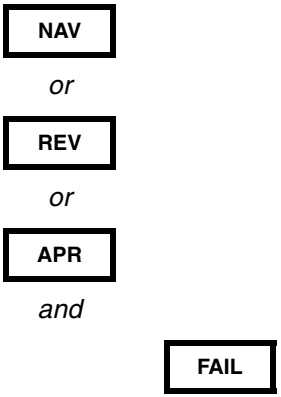
Flashing NAV, REV, or APR



Off navigation course by 50% needle deviation or more.

1. Use HDG mode until problem is identified. Crosscheck raw NAV data, compass heading, and radio operation.

Flashing NAV, REV, or APR with steady FAIL



Invalid radio navigation signal.

1. Check Nav radio for proper reception. Use HDG mode until problem is corrected.

Flashing VS

Excessive vertical speed error over selected vertical speed. Usually occurs in climb.

1. Reduce VS command and/or adjust power as appropriate.

Flashing GS

Off glideslope centerline by 50% needle deviation or more.

1. Check attitude and power. Adjust power as appropriate.

Flashing GS with steady FAIL.

and

Invalid glideslope radio navigation signal.

1. Disconnect autopilot and initiate go-around or missed approach procedure. Inform ATC.

Flashing GS with steady ALT

and

Manual glideslope disabled.

1. Re-enable by pressing NAV mode button.

Section 4 - Normal Procedures

• Note •

Additional normal operating procedures for the System Fifty Five X are described in the S-Tec System Fifty Five X Pilot's Operating Handbook.

PreFlight Inspection

1. Manual Electric Trim.....TEST

   Press the AP DISC button down and hold while commanding trim. Trim should not operate either nose up or nose down.

2. Engage Autopilot Heading Mode .....Press HDG button
3. Engage Autopilot Altitude Hold Mode .....Press ALT button
4. Autopilot Override .....TEST
   Move flight controls fore, aft, left and right to verify that the autopilot can be overpowered.
5. Disengage Autopilot ..... Press AP DISC button
6. Trim ..... SET FOR TAKEOFF
7. Autopilot RDY Light .....CHECK ON
8. Trim airplane for existing flight conditions.

Mode Selection

Heading Mode

1. Set the PFD Heading Bug to the desired heading on the compass card.
2. Press HDG on Programmer/Computer. The HDG annunciation will illuminate and the airplane will turn to the selected heading.
3. Use the PFD Heading Bug to make heading changes as desired.

Navigation Mode

1. Select a reliable VOR or VOR-LOC signal on the NAV receiver.
2. Set the PFD Course Pointer to the desired course on the compass card.
3. Press NAV on Programmer/Computer. The HDG annunciation will illuminate and the airplane will turn to the selected navigational aid.

   If the course needle is at full-scale deflection or if the aircraft's closure rate to the selected course is sufficiently slow, the autopilot will establish the airplane on a heading for a 45° intercept with the selected course. Otherwise, the intercept angle will be less than 45°. As the airplane approaches the course, the autopilot will smoothly shallow the intercept angle.

   To manually select an intercept angle other than 45°:

   a. Set the PFD Heading Bug to the desired course, such that the difference between this heading and the desired course is the intercept angle.

   b. Set the PFD Course Pointer to the desired course.

   c. Press and hold HDG and simultaneously press NAV once on the Programmer/Computer. HDG and NAV annunciations will illuminate and the airplane will turn to the selected heading.

   d. When the on-course intercept turn begins the HDG mode will disengage and the annunciation will go out.

Global Positioning System Steering (GPSS) Mode

1. Select a reliable GPS signal on the NAV receiver.
2. Engage GPSS mode:
   a. If NAV mode is already engaged, press NAV on Programmer/Computer once.
   b. If NAV mode is not engaged, press NAV on Programmer/Computer twice.
3. The NAV annunciation and GPSS will illuminate and the autopilot will steer the aircraft along the predefined course programmed into the NAV receiver.

   During the GPSS mode of operation, the autopilot will not accept any course error input from the PFD Course Pointer.

   If there are no programmed course segments in the Programmer/Computer upon attempted engagement of the GPSS mode, the FAIL annunciation will appear, NAV and GPSS annunciations will flash, and the autopilot will hold the aircraft's wings level.

   To manually select an intercept angle:

   a. Set the PFD Heading Bug to the desired course, such that the difference between this heading and the desired course is the intercept angle.
   b. Press and hold HDG and simultaneously press NAV twice on the Programmer/Computer. HDG, NAV, and GPSS annunciations will illuminate and the airplane will turn to the selected heading.
   c. When the on-course intercept turn begins the HDG mode will disengage and the annunciation will go out.

Altitude Hold Mode

1. Manually fly the airplane to the desired altitude and level off.
2. Press HDG, NAV, GPSS, APR, or REV to engage a roll mode. The associated annunciations will illuminate.
3. Press ALT on the Programmer/Computer. The ALT annunciation will illuminate indicating that the mode is engaged and the autopilot will hold the present altitude.

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

   Altitude can be changed to another altitude by rotating the VS knob on the Programmer/Computer.

   Engagement of the altitude hold mode will reset the PFD Altitude Bug to the captured altitude.

Vertical Speed Mode

1. Press HDG, NAV, GPSS, APR, or REV to engage a roll mode. The associated annunciations will illuminate.
2. Set the PFD Vertical Speed Bug to the desired vertical speed.
3. Press VS on the Programmer/Computer to engage the vertical speed mode. The VS annunciation will illuminate indicating that the mode is engaged and the autopilot will synchronize to and hold the vertical speed at the time the mode was engaged.

   The vertical speed is displayed in 100-foot increments at the far right of the Programmer/Computer window next to the VS annunciation. A plus (+) value indicates climb and a negative or minus (-) value indicates descent.
4. Vertical speed can be adjusted by rotating the VS knob on the Programmer/Computer.

Altitude Pre-Select Function

The altitude selector may be used to set up an altitude and vertical speed for intercept and capture. The altitude can be above or below the current altitude and the vertical speed chosen should be appropriate (climb or descent) for the altitude. Once selected, the altitude and vertical speed can be coupled to the autopilot by pressing and holding the VS button and then pressing the ALT button.

1. Press HDG, NAV, GPSS, APR, or REV to engage a roll mode. The associated annunciations will illuminate.
2. Set the PFD Altitude Bug to the desired altitude.
3. Press and hold VS and simultaneously press ALT to engage the vertical speed mode and arm the altitude hold mode.
4. ALT and VS annunciations will appear and the autopilot will attain and hold the aircraft at the vertical speed at the rate of climb/descent when engaged. Use the VS knob on the Programmer/Computer for vertical speed adjustment.

   As the aircraft approaches the target altitude, a reduction in the vertical speed will automatically occur to ensure that there is no adverse acceleration at the point of capture. Once the target altitude has been captured, the VS annunciation will extinguish to indicate engagement of the altitude hold (ALT) mode.

   Prior to altitude capture, with the VS mode engaged and the ALT mode armed, the PFD Vertical Speed Bug and/or PFD Altitude Bug can be changed at any time, causing the autopilot to respond accordingly.

   During the pre-select sequence, with the VS mode engaged and the ALT mode armed, the following are subject to occur:

   - Pressing the ALT mode selector switch once will disengage the VS mode, and engage the ALT mode. Consequently, the VS annunciation will extinguish, the PFD Vertical Speed Bug will disappear. This may cause some adverse acceleration, as the autopilot works to hold the aircraft at the captured altitude.
   - Pressing the VS mode selector switch once will disarm the ALT mode, but leave the VS mode engaged. Consequently, the ALT annunciation will extinguish.

Flight Director Operation - AP MODE (Optional)

In AP MODE, the Flight Director provides a visual indication of how accurately the Autopilot is tracking the roll and pitch commands.

1. At Flight Director Remote Switches, press AP ON.
2. Press HDG, NAV, GPSS, APR, or REV to engage a roll mode. The associated annunciations will illuminate.
3. Press ALT, VS, or GS to engage a pitch mode. The associated annunciations will illuminate.

   The Flight Director Command Bars turn solid magenta and the autopilot steers the aircraft toward the Command Bars until the Aircraft Reference Symbol is tucked into them.

Flight Director Operation - FD MODE (Optional)

In FD MODE, the Flight Director provides a visual indication of how accurately the Pilot is tracking the roll and pitch commands.

1. At Flight Director Remote Switches, press AP OFF / FD ON.
2. Press HDG, NAV, GPSS, APR, or REV to engage a roll mode. The associated annunciations will illuminate.
3. Press ALT, VS, or GS to engage a pitch mode. The associated annunciations will illuminate.

   The Flight Director Command Bars are displayed hollow and the pilot steers the aircraft toward the Command Bars until the Aircraft Reference Symbol is tucked into them.

Section 5 - Performance

• WARNING •

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

The autopilot will disconnect if the Stall Warning System is activated.

Section 6 - Weight & Balance

Refer to Section 6 - Weight and Balance of the basic POH for current weight and balance data.

Section 7 - System Description

The airplane is equipped with an S-Tec System Fifty Five X two-axis autopilot and, if installed, an integrated Flight Director System. The system consists of the Programmer / Computer, Flight Management System Keyboard, Turn Coordinator, Altitude Transducer, Integrated Avionics Unit #2, Pitch Servo, Roll and Pitch Trim Cartridges, Autopilot Disconnect Switch, Electric Pitch-Trim and Roll-Trim Hat Switch, Optional Flight Director Switches, and Annunciation System.

The autopilot controls the aircraft pitch, and roll attitudes while following commands received from the optional Flight Director. Autopilot operation occurs within the Programmer/Computer installed in the upper section of the center console and provides:

- Autopilot engagement and annunciation
- Autopilot command and control
- Auto-trim operation
- Manual electric trim
- Two axis airplane control (pitch and roll), including approaches

The optional Flight Director provides pitch and roll commands to the autopilot system and displays them on the PFD. With the Flight Director activated, the pilot can hand-fly the aircraft to follow the path shown by the Command Bars. Flight Director operation takes place within the #2 Integrated Avionics Unit and provides:

- Mode annunciation
- Vertical reference control
- Pitch and roll command calculation
- Pitch and roll command display

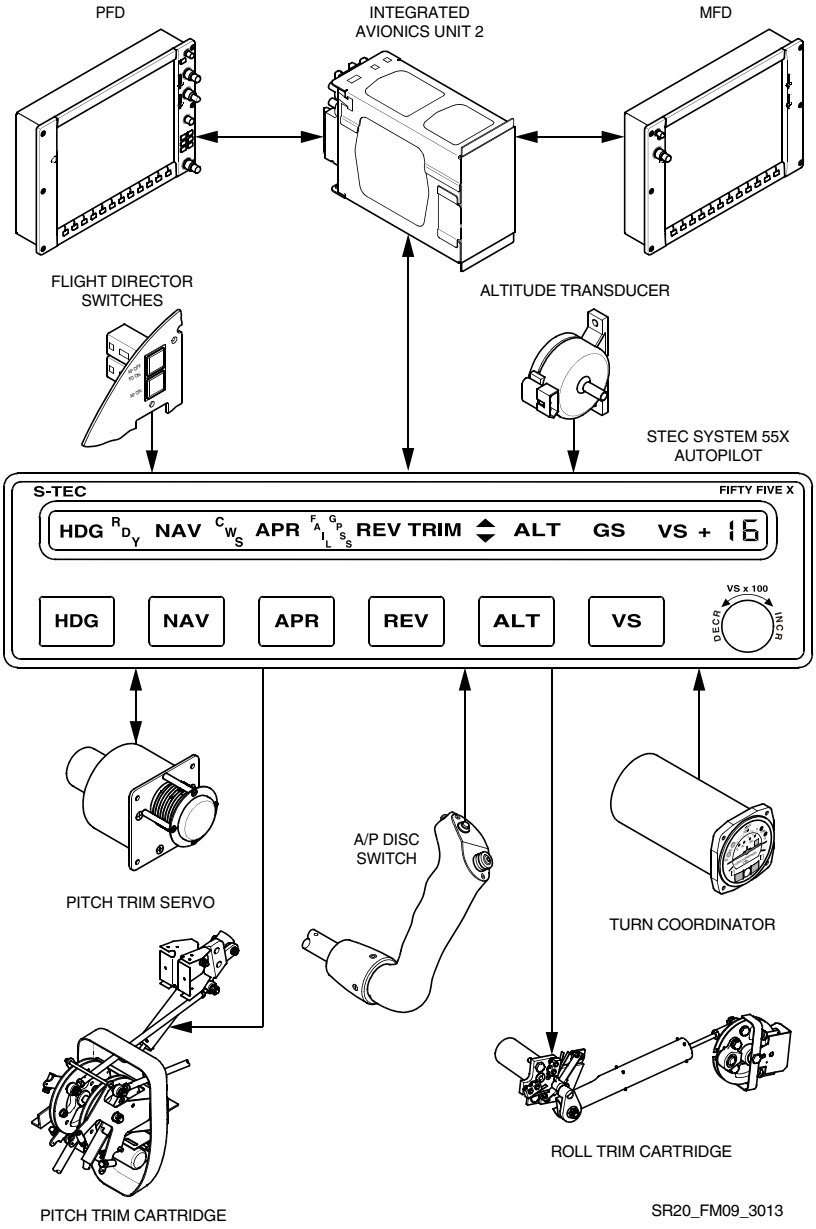


Figure - 1
System Schematic

Programmer / Computer

The Programmer / Computer, located in the upper section of the center console, provides primary control of autopilot modes.

28 VDC for Programmer / Computer operation is supplied through the 5-amp KEYPADS / AP CTRL circuit breaker on MAIN BUS 1.

All Autopilot mode selection is performed by using the mode select buttons and VS modifier knob. Available functions are as follows:

RDY - Ready Mode

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

HDG - Heading Button

When pressed, will engage the Heading mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on the HSI. A new heading may be selected at any time and will result in the airplane turning to the new heading.

NAV - Navigation Button

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

GPSS - GPS Steering Mode

Pressing NAV twice will cause the autopilot to go to GPSS for smoother tracking and transitions. When GPSS is selected, the autopilot can be switched between heading and GPSS modes of operation. In the heading mode, the converter receives a heading error signal from the heading bug on the Horizontal Situation Indicator.

GPSS converts this information and sends this heading error directly to the autopilot.

In the GPSS mode the autopilot can be directly coupled to the roll Commands produced by the GPS Navigator, eliminating the need for the pilot to make any further adjustments to the HSI course arrow.

ALT - Altitude Hold Button

When ALT is selected, the autopilot will hold the altitude at the time the mode was selected. Altitude hold will not engage if an autopilot roll mode is not engaged. Altitude correction for enroute barometric pressure changes may be made by rotation of the VS knob on the Programmer/Computer.

VS - Vertical Speed Button

When VS is selected, the autopilot will synchronize to and hold the vertical speed at the time the mode was selected. Altitude hold will not engage if an autopilot roll mode is not engaged. The vertical speed is displayed in 100-foot increments at the far right of the Programmer/Computer window next to the VS annunciation. A plus (+) value indicates climb and a negative or minus (-) value indicates descent. Vertical speed can be adjusted by rotating the VS knob on the Programmer/Computer.

APR - Approach Button

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

GS - Glideslope Mode

The autopilot GS function will capture and track an ILS glideslope. To arm the GS function, the following conditions must be met:

1. The NAV receiver must be tuned to the appropriate ILS frequency.
2. The glideslope signal must be valid – no flag.
3. The autopilot must be in NAV/APR/ALT modes.
4. The airplane must be 60% or more below the glideslope centerline during the approach to the intercept point, and within 50% needle deviation of the localizer centerline at the point of intercept – usually the outer marker.

When the above conditions have existed for 10 seconds, the GS annunciation will illuminate indicating GS arming has occurred (ALT annunciation will remain on). When the glideslope is intercepted and captured, the ALT annunciation will go out.

REV- Reverse Course Button

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

TRIM - Autotrim Mode

When both a roll mode and a pitch mode are engaged, the autopilot will provide an annunciation whenever it is automatically trimming the aircraft. Should the pitch servo loading exceed a preset threshold for a period of three seconds, the autopilot will annunciate either TRIM ▲ or TRIM ▼ as an advisement that the autopilot is automatically trimming the aircraft. If the autopilot is still in the process of automatically trimming the aircraft after four more seconds, the annunciation will flash. When the aircraft has been sufficiently trimmed, the annunciation will extinguish.

VS Modifier Knob

The VS Knob on the Programmer/Computer is used to change the vertical speed when in vertical speed mode and controls altitude reference when in altitude hold mode. Each ‘click’ of the knob results in a step increase or decrease in the selected mode by the amount shown in the table below.

Mode	Step Value	Range
Altitude Hold (ALT)	20 Feet	+/- 360 Feet*
Vertical speed (VS)	100 Feet per Minute	+/- 1600 Feet per Minute

* Adjustments greater than 360 feet can be made by selecting VS mode and flying the airplane to the new altitude and then re-engaging ALT mode

Flight Management System Keyboard

The Flight Management System Keyboard, found in the center console above the programmer / computer, is the primary means for data entry for the MFD and is used to control NAV/COM Radios, transponder, and flight management system entry. Heading, course and altitude select are also provided.

28 VDC for Flight Management System Keyboard operation is supplied through 5-amp KEYPADS / AP CTRL circuit breaker on MAIN BUS 1.

HDG - Heading Knob.

The HDG knob controls the selected heading bug on the HSI portion of the PFD. It provides the reference for heading select mode. Pushing the HDG knob synchronizes the selected heading to the current heading.

CRS - Course Knob

The CRS knob controls the course pointer on the HSI portion of the PFD. It provides the reference for FD navigation modes when the Flight Director is selected. Pushing the CRS knob re-centers the CDI and returns the course pointer to the bearing of the active waypoint or navigation station.

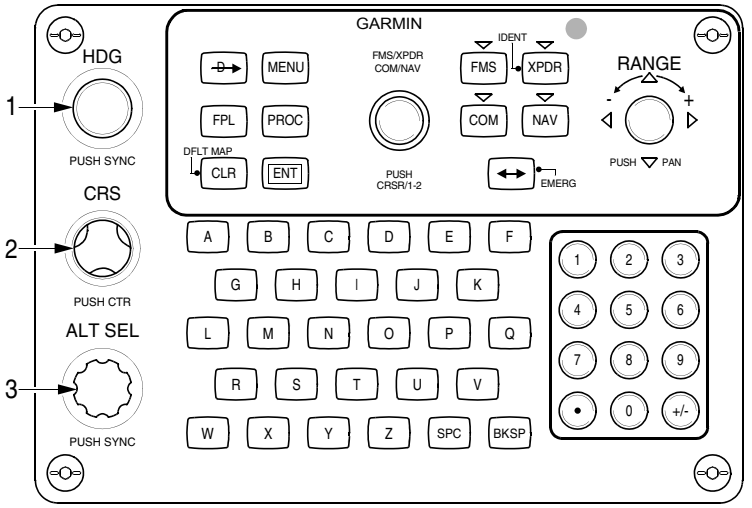
ALT SEL - Altitude Select Knob

The ALT knob controls the Selected Altitude, which is used as the reference for the altitude alerter and the altitude capture function. Pushing the ALT SEL knob synchronizes the selected altitude to the displayed altitude to the nearest 10 ft.

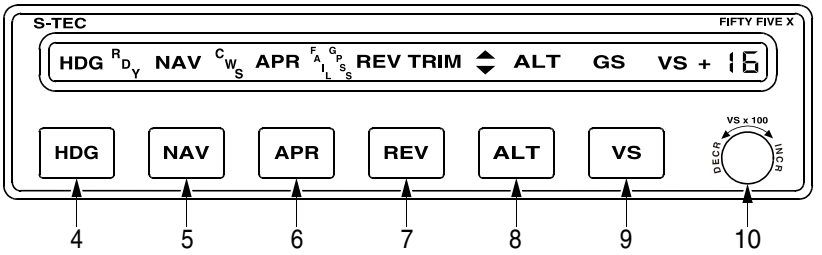
Turn Coordinator

The electric turn coordinator, installed behind the RH bolster panel, provides roll data to the Programmer/Computer. Roll rate is sensed by a single-gimbal, electric-powered gyro.

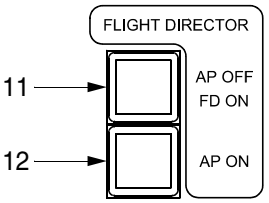
28 VDC for Turn Coordinator operation is supplied through the 5-amp KEYPADS / AP CTRL circuit breaker on MAIN BUS 1.



Flight Management System Keyboard



System 55X Autopilot



Flight Director System
Remote Switches (optional)

Legend

1. Heading Selection
2. Course Selection
3. Altitude Selection
4. Heading Select Mode
5. Navigation Mode
6. Approach Mode
7. Reverse Course Mode
8. Altitude Hold
9. Vertical Speed Mode
10. VS Modifier Knob
11. Flight Director Mode
12. Autopilot Mode

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Figure - 2
System Fifty Five X Autopilot w/ Optional Flight Director

Altitude Transducer

The altitude transducer, installed behind the bolster panel and plumbing directly into the Pitot Static system provides altitude information to the Programmer/Computer.

#2 Integrated Avionics Units

The #2 Integrated Avionics Unit located behind the MFD and instrument panel, functions as the main communication hub to the Avionics System and Programmer / Computer, linking the systems to the PFD and MFD displays. The Integrated Avionics Unit receives air and attitude data parameters from the Air Data Computer and Attitude and Heading Reference System. The Integrated Avionics Unit contains a GPS WAAS receiver, VHF COM/NAV/GS receivers, and system integration microprocessors.

28 VDC for #2 Integrated Avionics Unit operation is supplied through the 7.5-amp COM 2 and 5-amp GPS NAV GIA2 circuit breakers on the MAIN BUS 2.

Pitch Servo

The Pitch Servo, located below the baggage compartment position the aircraft flight controls in response to commands generated by the Programmer/Computer autopilot calculations.

28 VDC for Pitch Servo operation is supplied through the 5-amp KEYPADS/AP CTRL circuit breaker on MAIN BUS 1.

Roll and Pitch Trim Cartridges

Roll and pitch trim is provided by adjusting the neutral position of the compression spring cartridge in the elevator control system by means of an electric motor. For detailed description of the Trim Cartridges refer to the basic POH.

Electric Pitch/Roll-Trim Hat Switch

The yoke mounted Electric Pitch Trim and Roll Trim Hat Switch allows the pilot to manually adjust aircraft trim when the autopilot is not engaged. For detailed description of the Electric Pitch/Roll-Trim Hat Switch refer to the basic POH.

Autopilot Disconnect Switch

The yoke mounted Autopilot Disconnect Switch disengages the autopilot and may also be used to mute the aural alert associated with an AP disconnect.

Flight Director System (Optional)

The Flight Director system enhances situational awareness by reducing cockpit workload through providing a visual cue for the pilot to follow as indicated by the PFD's Flight Director Command Bars. Through turning or pitching the airplane as "directed" by the Command Bars, the pilot will follow the necessary course to arrive at a programmed destination.

The system consists of Flight Director Remote Switches installed on the upper, LH side of the instrument panel and associated relays and wiring between the PFD and autopilot. The remaining portion of the Flight Director system is entirely software dependant

The Flight Director Remote Switches, control system activation and mode. The following describes Remote Switch annunciation, color, and related Autopilot and Flight Director status:

- No Annunciation - Autopilot OFF or Autopilot not active in either roll or pitch control.
- Green AP ON - Autopilot active in roll and/or pitch control. If Autopilot active in roll and pitch control, AP annunciation appears on top edge of PFD, and Flight Director Command Bars magenta.
- Amber AP OFF / FD ON - Autopilot uncoupled. If Autopilot active in roll and pitch control, Flight Director ON and Flight Director Command Bars displayed hollow.

The Flight Director system is powered by 28 VDC through the 5-amp AUTOPILOT circuit breaker on the Essential Bus.

Annunciation System

• Note •

Refer to the Cirrus Perspective Pilot's Guide for a detailed description of the annunciator system and all warnings, cautions and advisories.

Autopilot Status Box and Mode Annunciation

In addition to the Failure and Caution Annunciations displayed on the Programmer / Computer, Autopilot selection and status annunciations are displayed on the PFD above the Airspeed and Attitude indicators.

If installed, Flight Director mode annunciations are displayed on the PFD when the Flight Director is active. Flight Director selection and status is shown in the center of the Autopilot Status Box. Lateral Flight Director modes are displayed on the left and vertical on the right. Armed modes are displayed in white and active in green.

Section 8 – Handling, Service, & Maintenance

No Change.

Section 10 – Safety Information

No Change.

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