S-Tec 55X Autopilot

Cirrus Transition Course

02/11/04

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The system information, procedures and guidelines found in this presentation are for Reference Only.

The information & procedures in this presentation have been taken from the FAA Approved Airplane Flight Manual and Pilot's Operating Handbook (POH). The Information & Procedures in this presentation DO NOT SUPERSEDE the Information & Procedures in the POH. In the event of conflict, the POH shall take precedence.

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General

- Rate autopilot
- Two axis control system
  - Roll axis controlled by aileron trim motor and spring cartridge
  - Pitch axis controlled by pitch trim motor
- Powered by Essential Bus

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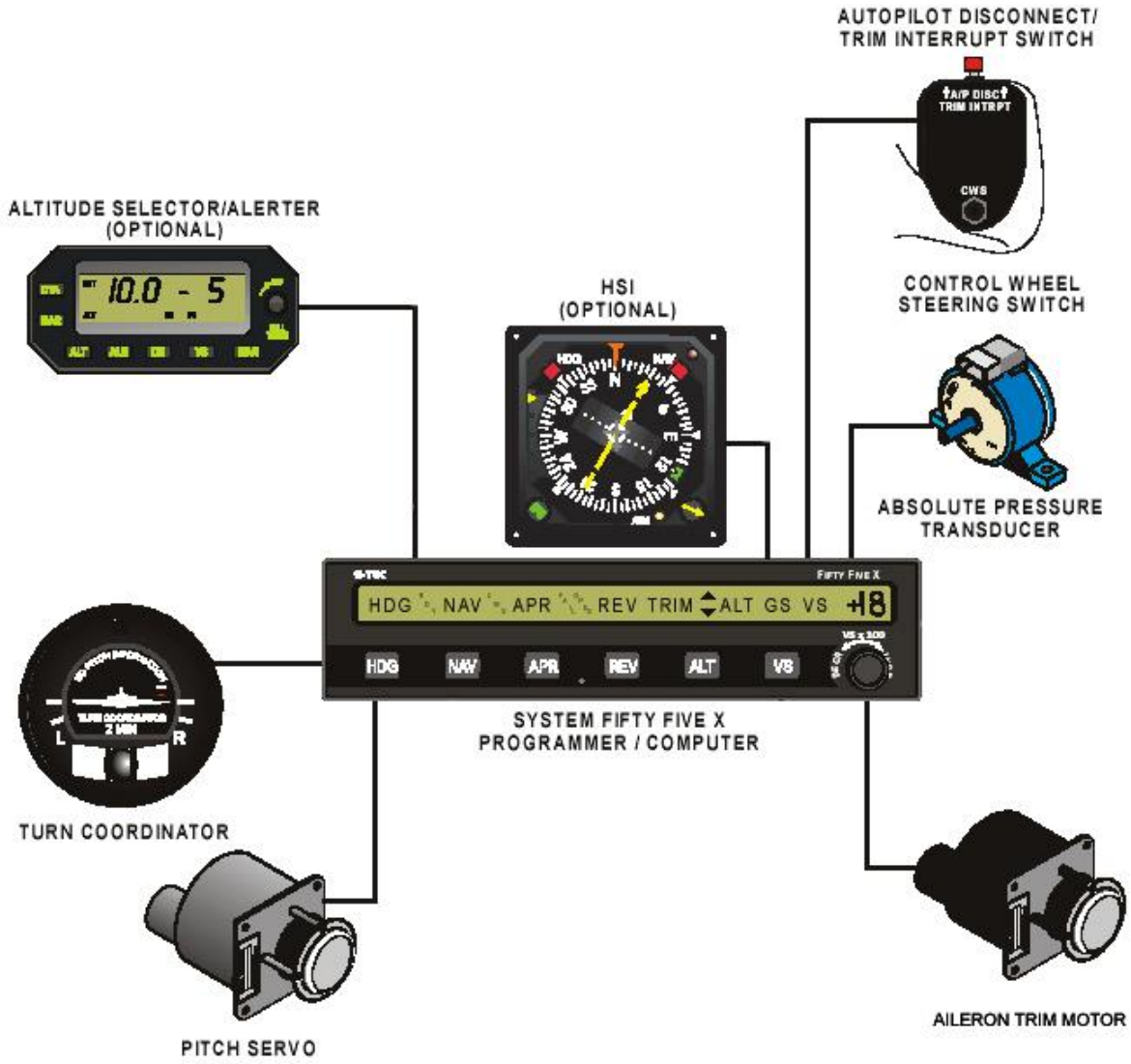
System Components



Manufacturers Notes

- **SR-22 installation utilizes aircrafts roll trim actuator. The automatic trim feature is not utilized.**
- **No flight director**

Limitations

- Operation prohibited at speeds in excess of 185 KIAS
- Autopilot must be disengaged for takeoff and landing
- Autopilot must be disengaged for the missed approach, go around, or balked landing
- Flaps must be set to 50% for autopilot operation in Altitude Hold at speeds below 95 KIAS

Limitations

- Flap deflection is limited to 50% during autopilot operations
- The S-Tec System 55X POH must be carried in the airplane and available to the pilot while in flight
- For ILS glideslope and localizer intercept, capture, and tracking, the following limitations apply:
  - 12 knot maximum crosswind component
  - The intercept of the localizer shall occur at least 5 miles outside of the outer marker
  - The intercept angle shall be no greater than 45°
  - The glideslope is approached in such a manner to allow automatic arming of the glideslope, or manually armed no more than 15% above GS.

Initialization

- At power up verify illumination of all autopilot mode annunciators
  - CWS and TRIM annunciators will not illuminate
- RDY will illuminate when Turn Coordinator gyro has reached an operational speed

Preflight Test

- Heading Mode
  - Center HDG Bug on lubber line
  - Select HDG Mode on autopilot mode controller
  - Rotate HDG knob left and right of lubber line
  - Verify proper roll control inputs
- Vertical Speed
  - Select VS mode on autopilot mode controller
  - Rotate VS control knob to + 500 feet and – 500 feet
  - Verify proper pitch control inputs

Preflight Test

- **Altitude Hold**
  - **Select ALT mode on autopilot mode controller**
  - **Verify ALT annunciation, VS annunciation extinguishes, and stationary yoke**
- **Overpower**
  - **Grasp control yoke and move in all directions. Action should be smooth in all directions with no noise or jerky feel**

Preflight Test

- Radio Check
  - Tune to a valid NAV station
  - Select VLOC on HSI display
  - Select NAV mode on autopilot mode controller
  - Turn CDI left and right of course verifying roll inputs in direction of needle adjustment
- Autopilot Disconnect Check
  - Press Pilot A/P DISC switch, verify disconnect
  - Select HDG and ALT mode
  - Engage pitch trim, verify disconnect

In-Flight Procedures

- **Heading Mode**
  - **Position HDG Bug within 10° of current heading**
  - **Select HDG Mode on autopilot mode controller**
  - **Position HDG Bug as desired**

In-Flight Procedures

- **Navigation Mode**
  - **Ensure a reliable VOR or Localizer signal exists**
  - **Select the desired course using the CDI**
  - **Select NAV mode on the autopilot mode controller**

NOTE

  - **If the CDI is at full scale deflection the autopilot will command a default 45° intercept angle**
  - **To intercept the course at an angle other than 45°**
    - **Position the HDG Bug to the desired intercept angle**
    - **Hold the HDG button while selecting NAV mode on autopilot mode controller**
    - **Autopilot will fly selected heading until course intercept**

In-Flight Procedures

- **GPS Steering Mode**
  - **Ensure a reliable GPS signal and flight plan exist**
  - **Select the desired course using the CDI**
  - **Press the NAV button twice on the autopilot mode controller**
  - **Verify illumination of NAV and GPSS annunciators**

In-Flight Procedures

- **GPS Steering Mode**

NOTE

- **If the CDI is at full scale deflection the autopilot will command a default 45° intercept angle**
- **To intercept the course at an angle other than 45°**
  - **Position the HDG Bug to the desired intercept angle**
  - **Hold the HDG button while pressing the NAV button twice mode on autopilot mode controller**
  - **Autopilot will fly selected heading until course intercept**

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In-Flight Procedures

- **Difference between NAV mode and GPSS mode**

While the AP is in NAV mode it will determine what guidance corrections are needed by reference to what is happening on the HSI.

While the AP is in GPSS mode it will determine what guidance corrections are needed by reference to what is happening on the GPS unit. (Selected GPS unit if using PFD)

NOTE

The AP flies a much more accurate course because the difference between your desired course (DTK) and your current track (TRK) can be determined by the GPS unit. GPSS also allows turn anticipation. A HSI does not know your groundspeed, distance to waypoint or degree of course change to determine an early turn.

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In-Flight Procedures

- **Altitude Hold Mode**
  - **Manually fly the airplane to the desired altitude and level off**

NOTE

- **A roll mode must be selected prior to engaging a pitch mode**

- **Select ALT mode on autopilot mode controller**
- **Altitude may be fine tuned using the VS knob**
  - **20 foot increments**
  - **Maximum authority +/- 360 feet**

In-Flight Procedures

- **Vertical Speed Mode**
  - **Select VS mode on autopilot mode controller**

NOTE

- **A roll mode must be selected prior to engaging a pitch mode**

NOTE

- **The aircraft's vertical speed at time of mode selection will be engaged by default**
- **Select the desired vertical speed using the VS knob on the autopilot mode controller**
  - **100 foot increments**
  - **Maximum authority +/- 1600 foot**

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In-Flight Procedures

- **Vertical Speed Mode**

CAUTION

- **A flashing VS annunciator indicates excessive error between selected vertical speed and actual vertical speed.**
- **The pilot should adjust power or vertical speed rate selected to correct error**

Approach Procedures

- **VOR / Localizer Approach**
  - **Ensure a reliable VOR or Localizer signal exists**
  - **Select the desired course using the CDI**
  - **Select APR mode on the autopilot mode controller**
  - **Verify illumination of NAV and APR annunciators**

NOTE

- **Course intercept is identical to the In-Flight Procedures**
- **For station passage, select HDG mode with the HDG bug set within 5° of the selected course**
- **Procedure turns must be flown using HDG mode**

Approach Procedures

- **Localizer Back Course Approach**
  - **Ensure a reliable Localizer signal exists**
  - **Select the desired course using the CDI**
  - **Select APR and REV modes on the autopilot mode controller**
  - **Verify illumination of NAV, APR, and REV annunciators**

NOTE

  - **Course intercept is identical to the In-Flight Procedures**
  - **The front course should always be selected course when executing a LOC BC approach**
  - **Procedure turns must be flown using HDG mode**

Approach Procedures

- **GPS Approach**
  - **Ensure the GPS approach has been properly loaded and activated**
  - **Select the desired course using the CDI**
  - **Select GPSS mode on the autopilot mode controller**
  - **Select APR mode on the autopilot mode controller, if desired**

NOTE

- **Course intercept is identical to the In-Flight Procedures**

Approach Procedures

- **GPS Approach**

NOTE

- **Procedure turns must be flown using HDG mode.**
  - **Although displayed on the GPS, the autopilot is not capable of flying the depicted turn without pilot action**

Approach Procedures

- **ILS Approach**
  - **Ensure a reliable Localizer signal exists**
  - **Select the desired course using the CDI**
  - **Select APR mode on the autopilot mode controller**
  - **Verify illumination of NAV and APR annunciators**

NOTE

- **Course intercept is identical to the In-Flight Procedures**
- **Procedure turns must be flown using HDG mode**
- **If it is necessary to track outbound on the front course, REV mode must be selected**

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Approach Procedures

- ILS Approach
  - Glideslope Coupling
    - APR and ALT modes must be selected
    - Aircraft must be within ½ scale deflection of localizer
    - Aircraft must be 60% or more below the glideslope
      - Condition must exist for 10 seconds for GS mode to arm
      - Arm indicated by illumination of ALT and GS annunciators
    - ALT annunciator extinguishes at glideslope intercept

NOTE

- GS mode may be manually engaged by pressing ALT once when in ALT mode and a glideslope signal exists

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Abnormal Procedures

WARNING

- **Do not attempt to correct autopilot malfunctions unless you are in a safe maneuvering phase of flight and at a safe altitude**

Abnormal Procedures

- **Autopilot Disconnect**

Annunciation	Condition	Action
Flashing RDY for 5 seconds with audible tone	Autopilot disconnect. All annunciations except RDY are cleared.	None.

Abnormal Procedures

- **Low Gyro Speed**

Annunciation	Condition	Action
Flashing RDY with audible tone then goes out	Turn coordinator gyro speed low. Autopilot disengages and cannot be re-engaged.	Check power to turn coordinator. If starting aircraft in cold weather, allow additional time for gyro to come to speed.

Abnormal Procedures

- **Off Course**

Annunciation	Condition	Action
Flashing NAV, REV, or APR	Off navigation course by 50% needle deviation or more.	Use HDG mode until problem is identified. Crosscheck raw NAV data, compass heading, and radio operation.

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Abnormal Procedures

- **Invalid radio navigation signal**

Annunciation	Condition	Action
Flashing NAV, REV, or APR with steady FAIL	Invalid radio navigation signal	Check Nav radio for proper reception. Use HDG mode until problem is corrected.

Abnormal Procedures

- **Excessive Vertical Speed Error**

Annunciation	Condition	Action
Flashing VS	Excessive vertical speed error over selected vertical speed. Usually occurs in climb.	Reduce VS command and/or adjust power as appropriate.

Abnormal Procedures

- **Glideslope deviation**

Annunciation	Condition	Action
Flashing GS	Off glideslope centerline by 50% needle deviation or more.	Check altitude and power. Adjust power as appropriate.

Abnormal Procedures

- **Invalid Glideslope signal**

Annunciation	Condition	Action
Flashing GS with steady FAIL	Invalid glideslope radio navigation signal.	Disconnect autopilot and initiate go-around or missed approach procedure. Inform ATC.

Abnormal Procedures

- **Manual Glideslope Disabled**

Annunciation	Condition	Action
Flashing GS plus ALT	Manual glideslope disabled.	Re-enable by pressing NAV mode button.

Emergency Procedures

- **Autopilot Malfunction**
  - **The autopilot may be disconnected by:**
    - **Pressing A/P DISC on the control yoke**
    - **Using manual pitch trim with a vertical mode selected**
    - **Pulling the Autopilot Circuit Breaker**

WARNING

- **Due to the positioning on the circuit breaker panel, the pilot should be able to identify the following circuit breakers without visual reference**
  - **Autopilot**
  - **Pitch Trim Servo**
  - **Roll Trim Servo**

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Emergency Procedures

- **Recovery – Loss of Altitude**

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

WARNING

- **Use of these figures assumes an immediate response to an autopilot malfunction**

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