



Fifty Five X

Cirrus SR20/22 Aircraft
SR20: SN 1337 and Above
SR22: SN 0435 and Above

Pilot's Operating Handbook



S-TEC

1.4 Modes of Operation

1.4.1 Roll Axis Control

Heading (HDG) Mode

Used to Turn onto a Selected Heading and Hold it

Navigation (NAV) Mode

Used to Intercept and Track a VOR/GPS Course

Approach (APR) Mode

Used to Intercept and Track a LOC/GPS Front Course Inbound

Reverse (REV) Mode

Used to Intercept and Track a LOC Back Course Inbound

Global Positioning System Steering (GPSS) Mode

Used to Laterally Steer along a Course defined by GPS

1.4.2 Pitch Axis Control

Altitude Hold (ALT) Mode

Used to Hold Altitude

Vertical Speed (VS) Mode

Used to Hold Vertical Speed

Glideslope (GS) Mode

Used to Intercept and Track Glideslope

Note:

Glidepath can herein this document be used interchangeably with Glideslope.

1.5 Block Diagram

The System Fifty Five X Block Diagram is shown in Fig. 1-1.

Table 2-2. Pre-Flight Test (continued from page 2-7)

ACTION	RESPONSE
9. Attempt movement of A/C Control Sidestick forward and aft (A/C with Pitch Servo Only).	A/C Control Sidestick's reduced freedom of movement indicates that Pitch Servo is engaged. Pitch Servo can be overridden. If not, disconnect autopilot and do not use.
10. Set PFD VSI Bug to 0 FPM.	-----
11. Press VS mode selector switch to engage vertical speed mode.	VS annunciation appears with HDG on AP display, as shown in Fig. 2-12. VS annunciation appears with HDG on PFD display, and VSI bug is magenta as shown in Fig. 2-13.
12. Set PFD VSI Bug to 500 FPM climbing.	A/C Control Sidestick moves in aft direction.
13. Set PFD VSI Bug to 500 FPM descending.	A/C Control Sidestick moves in forward direction.
14. Set PFD VSI Bug to 0 FPM.	A/C Control Sidestick stops.
15. Move A/C Control Sidestick as far aft as possible (A/C with Pitch Servo Only).	After 3 seconds, TRIM ∇ annunciation appears on AP display. After 7 seconds, TRIM ∇ annunciation flashes.
16. Move A/C Control Sidestick as far forward as possible (A/C with Pitch Servo Only).	After 3 seconds, TRIM $\wedge$ annunciation appears on AP display. After 7 seconds, TRIM $\wedge$ annunciation flashes.
17. Move A/C Control Sidestick aft until TRIM $\wedge$ annunciation is extinguished (A/C with Pitch Servo Only).	-----

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3.1.2 Navigation (NAV) Mode

Select a VOR frequency on the Navigation Receiver. Set the PFD CRS Pointer to the desired course on the compass card, and press the NAV mode selector switch to engage the navigation mode. The NAV annunciation will appear as shown in Fig. 3-3.

If the Left/Right Needle is at full scale (100%) deflection from center, the autopilot will establish the aircraft on a 45° intercept angle relative to the selected course. If the Left/Right Needle is less than 100% deflection from center, the autopilot may still establish an intercept angle of 45°, provided the aircraft's closure rate to the selected course is sufficiently slow. Otherwise, the intercept angle will be less than 45°. A typical view of the PFD during this stage of the intercept sequence is shown in Fig. 3-4.



Fig. 3-3. AP Display, NAV Mode Engaged



Fig. 3-4. PFD Display, NAV Mode Engaged, A/C on 45° Intercept Angle

As the aircraft approaches the selected course, the autopilot will sense the corresponding rate at which the Left/Right Needle approaches center (closure rate), and gradually shallow the intercept angle as the autopilot turns the aircraft onto the course. A typical view of the PFD during this stage of the intercept sequence is shown in Fig. 3-5. The point at which this turn begins is variable, depending upon the closure rate. Although closure rate is principally a function of airspeed, the distance of the aircraft from the ground station also has an effect. However, the turn will always begin between 100% and 20% of Left/Right Needle deflection from center, or Course Deviation Indication (CDI).

During this stage of the intercept sequence, the autopilot operates at maximum gain and sensitivity to closure rate. In addition, the autopilot will limit the aircraft's turn rate to 90% of a standard rate turn.

When the aircraft arrives at 15% CDI needle deflection, the course is captured. At course capture, a step reduction in autopilot gain occurs; however, the PFD CRS Pointer has sufficient authority to complete the intercept. In addition, the sensitivity to closure rate is reduced. The overall authority of the autopilot during this stage of the intercept sequence is called the HIGH GAIN condition.

Fifteen seconds after course capture, a second step reduction in autopilot gain occurs, and will limit the aircraft's turn rate to 45% of a standard rate turn. In addition, the sensitivity to closure rate is reduced again. The overall authority of the autopilot during this stage of the intercept sequence is called the INTERMEDIATE GAIN condition.



Fig. 3-5. PFD Display, NAV Mode Engaged, A/C Turning onto Course

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Thirty seconds after course capture, the autopilot will establish the required crosswind correction angle.

Seventy five seconds after course capture, a third step reduction in autopilot gain occurs to limit the aircraft's turn rate to 15% of a standard rate turn. In addition, the sensitivity to closure rate is reduced once more. The overall authority of the autopilot during this final stage of the intercept sequence is called the LOW GAIN condition. This marks the end of the intercept sequence, and the beginning of tracking. A typical view of the PFD during tracking is shown in Fig. 3-6.

The pilot should make speed, distance, and time considerations during the 75 second period from course capture to the beginning of tracking, to account for the aircraft's position. For example at 115 kts, a distance of 2.4 nautical miles will be traveled in 75 seconds.

If PFD CRS Pointer is within 5° of the selected course, and the CDI needle deflection is less than 10%, the autopilot will immediately establish the LOW GAIN condition upon engagement of the NAV mode.

While tracking in the LOW GAIN condition, the autopilot ignores short term CDI needle excursions, to thereby inhibit aircraft scalloping during VOR station passage. Should the CDI needle deflection exceed 50% for a period of 60 seconds, the autopilot will revert to the INTERMEDIATE GAIN condition, as a means to re-establish the aircraft on course.



The NAV annunciation will flash whenever the CDI needle deflection exceeds 50%, or the NAV Flag is in view. In the latter event, the FAIL annunciation will also appear.

While tracking in the LOW GAIN condition and within 50% CDI needle deflection, to track in the higher authority INTERMEDIATE GAIN condition, press the APR mode selector switch to engage the approach mode. This is acknowledged as shown in Fig. 3-7.

While tracking in either the LOW GAIN or INTERMEDIATE GAIN condition, if a new course is selected that is different from the original course by 10° or more, the autopilot will revert to the HIGH GAIN condition.



Fig. 3-7. AP Display, APR Mode Engaged

3.1.2.1 Pilot Selectable Intercept Angle

To select an intercept angle other than 45°, set the PFD Hdg Bug to the desired intercept heading on the compass card, such that the difference between this heading and the desired course is the intercept angle. Set the PFD CRS Pointer to the desired course. Press and hold the HDG mode selector switch, and press the NAV mode selector switch to engage the heading mode and arm the navigation mode. HDG and NAV annunciations will appear as shown in Fig. 3-8.



Fig. 3-8. AP Display, HDG Mode Engaged, NAV Mode Armed

The autopilot will establish the aircraft on the selected intercept angle (heading). A typical view of the PFD during this stage of the intercept sequence is shown in Fig. 3-9. The autopilot will hold this heading until the autopilot must turn the aircraft onto the selected course, to prevent overshoot. At this point in the intercept sequence, the HDG annunciation will extinguish to indicate engagement of the navigation mode.

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3.1.7 Autotrim (A/C with Pitch Servo Only)

When the Remote AP ON Switch has been selected (reference section 3.4.1), and both a roll mode (HDG, NAV, APR, REV, GPSS) and a pitch mode (ALT, VS, GS) are engaged, the autopilot will provide an annunciation whenever it is automatically trimming the aircraft. A pitch mode can only be engaged after a roll mode has been engaged.

Should the pitch servo loading exceed a preset threshold for a period of three seconds, the autopilot will annunciate either Trim $\wedge$ or Trim $\vee$ as an advisement that the autopilot is automatically trimming the aircraft in the indicated direction. This is shown in Fig. 3-22. 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, such that the pitch servo loading is below the preset threshold, the annunciation will extinguish.



Fig. 3-22. AP Display, HDG and ALT HOLD Modes Engaged, Autotrim in Progress

3.1.8 Manual Electric Trim

A Remote Manual Electric Trim Switch is located on each Control Sidestick. It can only be used to trim the aircraft from the RDY, or when the Remote AP OFF / FD ON Switch has been selected. To trim the aircraft nose up, press aft and maintain pressure on the Remote Manual Electric Trim Switch. To trim the aircraft nose down, press forward and maintain pressure on the Remote Manual Electric Trim Switch.

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3.2 Precision Approach Procedures

3.2.1 Straight-In ILS Approach

Execute a straight-in intercept and track of the FRONT INBOUND LOC course (reference section 3.3.3), while holding the approach altitude. The NAV, APR, and ALT annunciations will appear as shown in Fig. 3-23. A typical view of the PFD during this stage of the ILS approach sequence is shown in Fig. 3-24.

The GS mode must be armed prior to engagement. Once the following conditions have existed simultaneously for a period of one second, the GS annunciation will appear to acknowledge that the GS mode has automatically armed, as shown in Fig. 3-25:

1. APR mode engaged
2. ALT mode engaged
3. NAV Flag out of view
4. GS Flag out of view
5. LOC frequency channeled
6. A/C within 50% needle deflection of LOC centerline
7. A/C more than 10% needle deflection below GS centerline

A typical view of the PFD during this stage of the ILS approach sequence is shown in Fig. 3-26.

The armed GS mode can be subsequently disabled by pressing the APR mode selector switch. The GS annunciation will flash to acknowledge this. To then re-arm the GS mode, press the APR mode selector switch again. The GS annunciation will immediately extinguish, but re-appear after 1 second.

With the GS mode armed, once the aircraft arrives at 5% below the GS centerline, the ALT annunciation will extinguish to indicate engagement of the GS mode, as shown in Fig. 3-27. This marks the end of the intercept sequence, and the beginning of tracking. A typical view of the PFD during this stage of the ILS approach sequence is shown in Fig. 3-28.

Note:

If the approach positions the aircraft slightly above the GS centerline, press the ALT mode selector switch to immediately engage the GS mode.

Caution:

Manual engagement of the glideslope mode above the glideslope will result in the aircraft aggressively moving toward the glideslope. DO NOT manually engage the glideslope mode if the aircraft is more than 20% above the glideslope.

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The GS annunciation will flash whenever the Glideslope Deviation Indication (GDI) needle deflection exceeds 50%, or the GS Flag is in view. In the latter event, the FAIL annunciation will also appear.

At the Decision Height (DH) or Missed Approach Point (MAP), disconnect the autopilot to execute either a manual landing or go-around, respectively.

A pictorial of this procedure is shown in Fig. 3-29.



Fig. 3-23. AP Display, NAV, APR, and ALT HOLD Modes Engaged



Fig. 3-24. PFD Display, NAV, APR, and ALT HOLD Modes Engaged

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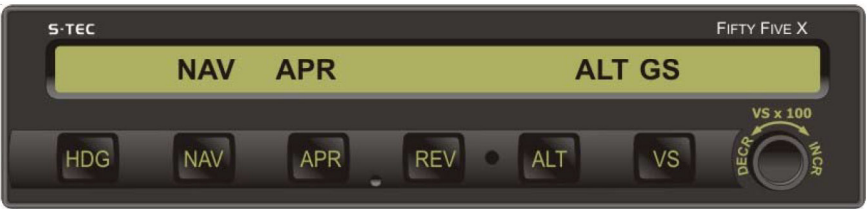


Fig. 3-25. AP Display, NAV, APR and ALT HOLD Modes Engaged, GS Mode Armed



Fig. 3-26. PFD Display, NAV, APR, and ALT HOLD Modes Engaged, GS Mode Armed

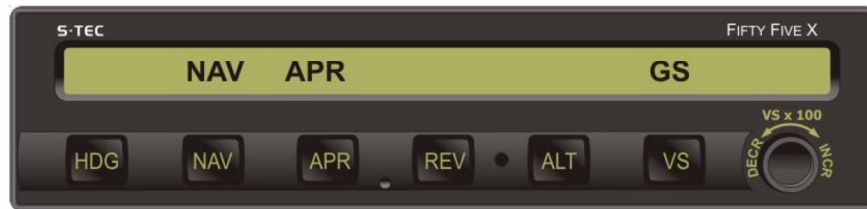


Fig. 3-27. AP Display, NAV, APR, and GS Modes Engaged



Fig. 3-28. PFD Display, NAV, APR, and GS Modes Engaged

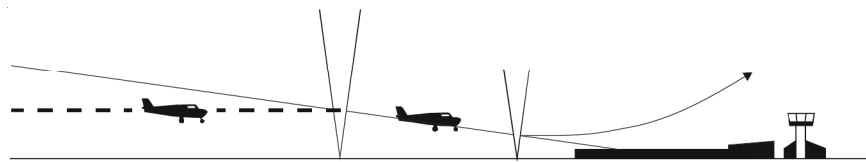


Fig. 3-29. Straight-In ILS Approach