

# System Fifty Five X Autopilot



## Pilot's Operating Handbook



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# **SECTION 1 INTRODUCTION**



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## 1.0 Introduction

The primary purpose of the System Fifty Five X **Pilot Operating Handbook (POH)** is to provide pilots with step-by-step functional Preflight and In-Flight Operating Procedures for the installed system.

This System Fifty Five X Pilot's Operating Handbook, part number 87109, dated 31 May 2002 or later, must be carried in the aircraft and be made available to the pilot while in flight.

### NOTICE

The information in this manual must be used in conjunction with the FAA approved Airplane Flight Manual Supplement (**AFMS**), Pilot Operating Handbook Supplement (**POHS**), or Supplemental Flight Manual (**SFM**). Refer to the specific **AFMS**, **POHS**, or **SFM** for your aircraft's specific information and emergency operating procedures.

If the autopilot is to be used during Instrument Flight Rules (**IFR**) operations, we recommend that you develop a thorough understanding of the autopilot system, its functions and characteristics in Visual Meteorological Conditions (**VMC**). Accomplish this before undertaking an **IFR** flight.

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## **SECTION 2 BLOCK DIAGRAM**

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2.0 Block Diagram

SYSTEM FIFTY FIVE X BLOCK DIAGRAM

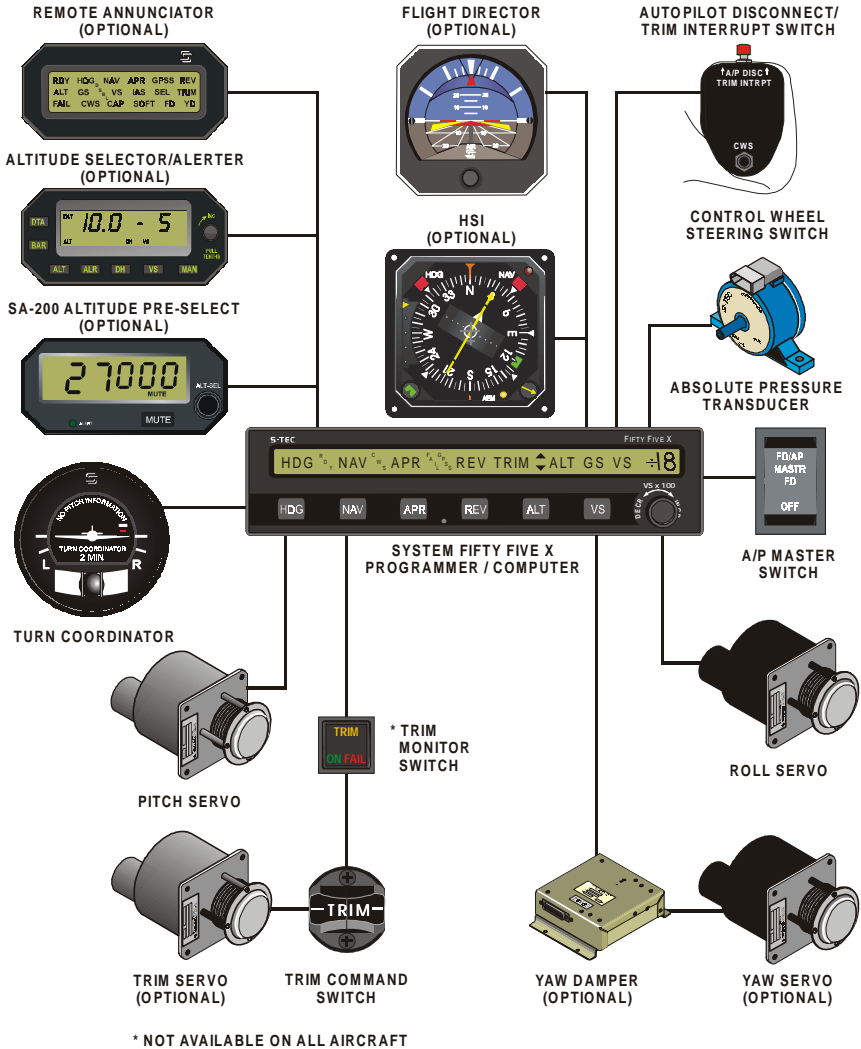


Fig. 2-1. System Fifty Five X Block Diagram

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# **SECTION 3 AUTOPILOT OVERVIEW**



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### 3.0 Autopilot Overview

#### 3.1 System Fifty Five X Autopilot Overview

The System Fifty Five X is a rate autopilot that controls the roll and pitch axes of the aircraft. The autopilot's main function is to convert pilot commands to logic signals for the roll and pitch computers. As the pilot enters the desired mode by pressing the appropriate mode selector switch, the computer acknowledges the mode, causing the appropriate annunciator to illuminate.



The Roll Computer receives select input signals from the Directional Gyro (**DG**) or Horizontal Situation Indicator (**HSI**), Very High Frequency Omni-directional Radio (**VOR**), Localizer (**LOC**) or Global Positioning System (**GPS**), Deviation Indicators, and the Turn Coordinator. It then computes roll servo commands for stabilization, turns, navigation intercepts, and tracking.

Sensing for trim annunciation or automatic elevator trim is provided by the pitch servo. Drive for the elevator trim servo is provided by the pitch computer.

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# **SECTION 4 PROCEDURES**

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4.0 Procedures

4.1 Pre-Flight Procedures

4.1.1 Autopilot Self-Test

**NOTE:** The System Fifty Five X incorporates a **SELF-TEST** that requires a 100% pass rate before the autopilot can be engaged. To perform the test, aircraft **DC** electrical power must be supplied to the autopilot.

1. Autopilot Master switch.....**Set to FD / AP**

—Observe that all segments of the Programmer / Computer display and annunciators illuminate for 5 seconds during test.



—Satisfactory completion of the **SELF-TEST** is indicated when the Ready (**RDY**) annunciator remains on at the end of the 5-second self-test.



—Should a fault be detected, the **FAIL** annunciator will remain on at the conclusion of the self-test and the autopilot will not operate.



**NOTE:** If the autopilot detects the Turn Coordinator rotor speed as low or not turning, the display will remain blank and the autopilot will remain inoperable. In cold weather, the Turn Coordinator may take longer to attain proper operating speed due to temperature sensitivity. If either condition occurs, consult your dealer before use of the autopilot is attempted.

**4.1.2 Pre-flight Test**

1. Trim Master (**ON/OFF**) Switch.....**ON**
2. **HDG** and **VS** switches.....**PRESS/RELEASE**  
—Ensure that **HDG** and **VS** illuminates on the Fifty Five X annunciator.
3. Control Wheel Steering (**CWS**) switch.....**PRESS/RELEASE**  
—Verify that **CWS** and **VS** are highlighted on the annunciator.



4. **CWS** switch.....**PRESS/HOLD**  
—Verify that the autopilot servos have dis-engaged and the controls are free.
5. **CWS** switch..... **RELEASE**  
—Servos should re-engage.
6. **VS** Knob.....**ROTATE CW**  
—Pitch control should move slowly out (pilot may have to assist a heavy yoke).
7. **VS** Knob.....**ROTATE CCW**  
—Pitch control should move slowly in.
8. **A/P DISC** Trim Interrupt Switch (on control yoke).....**PRESS**  
—Verify the autopilot disconnects.
9. **HDG** Mode.....**ENGAGE**
10. **DG** or **HSI HDG** bug.....**MOVE LT/RT**  
—Roll control should follow the **HDG** bug.
11. Altitude Hold (**ALT**) button.....**PUSH**  
—**Slowly pull** out (nose up) on the pitch control. Autotrim should run nose down with **TRIM** flashing on the remote annunciator and the autopilot computer / programmer after approximately 3 seconds.  
—**Slowly move** pitch control forward (nose down). After 3 seconds, autotrim should move nose up with **TRIM** flashing on the remote annunciator and the autopilot computer / programmer after approximately 3 seconds.

12. Trim Master (ON/OFF) Switch.....**OFF**

**NOTE:** If HSI equipped, center the course arrow under the lubber line and push the **NAV** button. Move the course arrow on the HSI left then right. Roll control should follow the course arrow. Channel a valid **VOR** signal and move course arrow just enough to deflect the left / right needle 1 or 2 dots. Roll control should follow the Course Deviation Indicator (**CDI**) left / right needle during the test. *(This test is only valid if the left / right needle is centered with the course arrow under the lubber line).*

**NOTE:** If DG equipped, center the **HDG** bug under the lubber line. Channel a valid **VOR** signal. Move the **OBS** to cause left / right **CDI** needle deflection. The roll control should follow the left / right needle movement.

13. REV Mode button.....**PUSH**  
 —Roll control should respond opposite to the course arrow and **CDI** left / right needle inputs.

14. Autopilot Master Switch (If FD Equipped).....**SELECT FD**  
 —Note the roll, pitch and trim servos are disengaged. The steering bar should be in view on the attitude indicator.

15. HDG Mode.....**ENGAGE**  
 —**MOVE HDG** bug **45 degrees** left. The roll steering bar should slowly indicate a left steering command. Repeat the same test for the right side.

16. VS Mode.....**ENGAGE**  
 —**SELECT 1500 FPM** rate of climb. Note the pitch steering bar moves slowly up. Repeat the same test for the down direction.

17. Autopilot Master Switch.....**SELECT FD / AP**  
 —The servos should re-engage.

18. Trim Master (ON/OFF) Switch.....**ON**

19. Manual Electric Trim Command Switch.....**MOVE FWD or AFT**  
 —The autopilot should disconnect.

**NOTE:** The Manual Electric Trim Command Switch will disconnect the autopilot only if there is a Pitch Mode engaged.



### 4.1.3 Manual Electric Trim Test

1. Trim Master (**ON/OFF**) switch.....**ON**
  - Move** each segment of the Manual Electric Trim Command Switch **FWD** and **AFT**. Trim should not run.
  - Move** both segments of the Trim Command switch **FWD**. Trim should run nose down.
  - Move** both segments of the Trim Command switch **AFT**. Trim should run nose up.
  - Re-trim** aircraft for takeoff and check controls for freedom of movement. Be sure the autopilot and trim servos are dis-engaged.

**NOTE:** If the aircraft is equipped with Optional Yaw Damper, reference the Yaw Damper Section of this **POH** for the Pre-flight check.

**NOTE:** If either the Manual Electric Trim or Auto-trim fails any portion of the Pre-flight Test, move the Trim Master Switch to **OFF**.

***DO NOT USE THE ELECTRIC TRIM UNTIL THE FAULT IS CORRECTED.***

With the Trim Master switch **OFF**, the Autopilot Trim Indicators and Audio Warning are activated. If the electric trim fails, or has an in-flight power failure, the system automatically reverts to an out-of-trim annunciation and audio warning.

***SHOULD THIS OCCUR, MOVE THE TRIM MASTER SWITCH TO OFF, AND REVERT TO MANUAL AIRCRAFT TRIM UNTIL THE FAULT IS CORRECTED.***

## 4.2 Normal Operating Procedures

### 4.2.1 Heading Mode

Set the heading bug on the **DG** or **HSI** to the desired heading, and press the **HDG** button. The **HDG** annunciator will illuminate. New headings can be selected simply by repositioning the heading bug.



**NOTE:** When operating in the **HDG** Mode, the system is not coupled to any navigation aid. It merely flies the heading bug. It will be necessary to monitor navigation instruments for course deviation due to wind drift and wind correction angles.

### 4.2.2 NAV Intercept and Tracking

If your aircraft is equipped with an **HSI**, your **S-TEC** autopilot will receive both left / right deviation and course information. With an **HSI**, the heading bug is not used during tracking. To intercept and track a **VOR** or **GPS** course, select the desired course with the **HSI** Course Pointer and engage the **NAV** Mode.

If your aircraft is equipped with a **DG**, the **HDG** bug must be set to the desired course before engaging **NAV** Mode. The **HDG** bug provides course information when using the **NAV** Modes.



If the course needle is at full-scale deviation, the autopilot will establish a 45° intercept angle. As the aircraft approaches the selected course, the autopilot senses the closure rate and gradually shallows the intercept angle. The point at which this turn begins is variable, depending on the aircraft position and closure rate to the course. However, the turn will always begin between 100% (full-scale) needle deflection and 20% of full-scale.

During the intercept sequence, the system operates in maximum gain and sensitivity to needle position and motion and can command the aircraft at 90% of the standard rate turn. When the selected course is intercepted, and the needle is centered, indicating course capture, initiation of the tracking gain program is automatic.



If the aircraft is equipped with an optional remote annunciator, the gain level will be indicated. **NAV** and **CAP** (Capture) Modes will be annunciated.

The high sensitivity level (**CAP**) is maintained for about 15 seconds while the wind correction angle is established. After 15 seconds, the maximum turn rate is then reduced to 45% of the standard rate turn (**CAP, SOFT**).



The optional remote annunciator will indicate **NAV**, **CAP**, and **SOFT**.

Approximately 60 seconds later, the turn rate maximum is reduced to 15% standard rate and the lowest level of sensitivity is achieved (**SOFT**).



At this point, the optional remote annunciator will indicate **NAV** and **SOFT**. The **CAP** annunciator will extinguish.

If the course pointer, on an **HSI** or **HDG** bug on a **DG**, is within 5° of center and needle deflection is less than 10%, the computer will immediately establish this lowest sensitivity when **NAV** is selected.

This condition provides low activity levels during station passage when **VOR** signals are erratic. In other words, it ignores short-term needle excursions.

The system includes a course deviation monitor. If the aircraft strays off course or **LOC** centerline by 50% needle deflection, the **NAV** annunciator flashes a warning. It flashes at station passage because of short-term needle excursion, and because the **NAV** signal is inadequate. It also flashes when the **NAV** flag is displayed. When this occurs, the **FAIL** annunciator will illuminate.

When operating in the **NAV / SOFT** Mode and a needle deflection of 50% or more is experienced for 1.5 minutes, the gain program will switch to **NAV/CAP/SOFT**, increasing sensitivity and authority to reestablish the aircraft on course.

When a course change of 10° or more is required at an enroute **VOR**, select the new course using the course pointer (if HSI equipped or **HDG** bug if **DG** equipped). The autopilot will acknowledge the changes and automatically adjust for intercept.

#### 4.2.2.1 Pilot Selectable Intercept Angles (DG or HSI)

The pilot may select an angle of intercept less than the standard 45°. Simply place the heading bug to the desired heading to be used for the course intercept and push both **HDG** and **NAV** switches simultaneously. Both **HDG** and **NAV** will be annunciated.



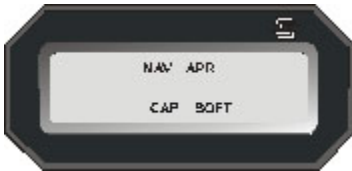
The selected heading will now be flown until the autopilot computes that an on course turn must be made to minimize overshoot at the point of intercept. At the time the on course turn begins, the **HDG** annunciator will extinguish. If using a **DG**, it is imperative that the pilot set the **HDG** bug to the selected course at this time.



**NOTE:** Intercept angles greater than 45° usually result in some course overshoot depending on the distance of the aircraft from the station and aircraft speed. Therefore, angles greater than 45° are not recommended.

### 4.2.3 Approach (APR) Mode Switch

The **APR** Mode provides increased sensitivity for **VOR** or **GPS** approaches. The pilot may also select this mode if increased sensitivity is desired for enroute **NAV** tracking. To engage this mode press the **APR** switch on the Programmer / Computer. **NAV** and **APR** will be displayed on the annunciator.



If the aircraft is equipped with a remote annunciator **NAV**, **APR**, **CAP**, and **SOFT** will be displayed.

### 4.2.4 GPS Steering (GPSS) Mode

**NOTE:** The Autopilot is equipped with a **GPS** Steering (**GPSS**) Mode that can be used for normal **GPS** course tracking or for **GPS** approach. In **GPSS** Mode, the heading bug and / or course arrow position has no effect on the autopilot and may be preset for the missed approach heading, etc..., as desired.

**NOTE:** When operating in the **GPSS** Mode and properly coupled to the **GPS** receiver, the autopilot will automatically steer the aircraft around the **GPS** approach without further heading or course inputs required by the pilot.

**NOTE:** The autopilot will track only those segments of the approach contained in the **GPS** Navigator database. Procedure turns and holding patterns are not usually contained in the data base.

#### 4.2.5 GPSS Operating Procedures

1. To enter the **GPSS** Mode, push the **NAV** button twice.
2. The autopilot will accept steering commands from the **GPS** unit and will fly the lateral segments of the approach without any further input from the pilot.
3. When in the **GPSS** Mode, **NAV** and **GPSS** will be annunciated.
4. To delete the **GPSS** function, push the **NAV** button again or select **HDG** or **CWS** Mode.

**NOTE:** Turns while in **GPSS** Mode can exceed the standard rate by 20 to 30%.



##### 4.2.5.1 Pilot Selectable Intercept Angles (GPSS Mode)

The autopilot may also be programmed for Pilot Selectable Intercept Angles while using the **GPSS** Mode. Simply, push and hold the **HDG** button, then push the **NAV** button twice. **HDG**, **NAV**, and **GPSS** will be displayed on the annunciator.



As the aircraft nears the on-course turn point, the **HDG** annunciator will extinguish.



**NOTE:** Some Fifty Five X Autopilot installations inhibit the use of the **GPSS** mode when the **NAV** source selector switch on the **GPS** navigator is in the **VOR / LOC** position or the external **NAV** selector switch (as appropriate) is in **NAV** position. To determine how your system operates conduct the following pre-flight test:

1. Provide power to the autopilot.
2. Observe a ready (**RDY**) indication on the annunciator.
3. Select **VOR / LOC** on the **GPS** navigator or select the **NAV** Mode on the external **NAV** selector switch (as appropriate). Channel an invalid **VOR** frequency.
4. Press the autopilot **NAV** button twice. If flashing **NAV** and steady **FAIL** is annunciated, the system is inhibited from entering the **GPSS** Mode with the **NAV** source selector switch in the **VOR / LOC** or **NAV** position. If flashing **NAV**, **GPSS**, and steady **FAIL** is annunciated, the system is not inhibited from entering the **GPSS** Mode anytime the **NAV** button is pressed twice. The following **CAUTION** will apply to those systems.

### **CAUTION**

**With the autopilot in the GPSS Mode, NAV and GPSS will be annunciated. In this mode, guidance is received directly from the GPS Navigator regardless of what is displayed on the NAV indicators (HSI, CDI...). If the GPS Navigator has a valid flight plan active and the autopilot is in the GPSS Mode, the autopilot will follow that flight plan. If no flight plan is active, the autopilot will annunciate a flashing GPSS and FAIL will be steady. The aircraft will continue straight, wings level .**

**NOTE:** For all autopilot navigation operations not utilizing **GPSS**, ensure that **GPSS** is **NOT** annunciated.

#### **4.2.6 Standard GPS Approach**

**NOTE:** The autopilot is capable of conducting non-precision **GPS** approaches when coupled to a valid **GPS** signal. These are conducted in the same manner as a **VOR** Approach.

1. When the autopilot is interfaced with an **HSI** or **DG** it is capable of intercepting and tracking a valid **GPS** course.
2. Place the Course Pointer on the **HSI** or **HDG** bug on the **DG** on the indicated bearing to the waypoint.

3. Select the **APR** Mode. The autopilot will intercept and track the **GPS** signal.
4. If desired, the pilot can use the pilot selectable intercept angle procedure as described on preceding pages. (Ref. 4.2.5.1 Pilot Selectable Intercept Angles).
5. For procedure turns, the pilot must select the **HDG** Mode and fly the aircraft through the procedure turn with the heading bug.
6. Once established on the **INBOUND** course to the Final Approach Fix (**FAF**), select the **APR** Mode.

#### 4.2.7. GPS Steering (GPSS) Approach

**NOTE:** When operating in the **GPSS** Mode, the autopilot requires no further inputs from the **HSI** or **DG** (i.e. heading or course changes) as the approach progresses.

1. Program the desired approach into the **GPS** Navigator.
2. Press the autopilot **NAV** button twice to access the **GPSS** Mode. Verify that **GPSS** is displayed on the autopilot annunciator panel.
3. Verify the aircraft begins a turn toward the Initial Approach Fix (**IAF**) or that segment of the approach that transitions to the selected approach.
4. Monitor the autopilot as it moves around the approach using vertical speed and altitude hold to fly the vertical elements of the approach.
5. Select **HDG** to accomplish a procedure turn.
6. Engage the **GPSS** again to complete the approach.

#### 4.2.8 Reverse (REV) Mode

The Reverse Mode provides roll commands for intercept and tracking the localizer back course inbound or localizer front course outbound.

#### 4.2.9 Vertical Speed (VS)

To engage vertical speed, the autopilot roll axis must be engaged. Selecting **HDG** Mode or any roll mode will satisfy this requirement. With any roll mode engaged, the pilot may select **VS** Mode by pressing the **VS** Mode select switch. The autopilot will synchronize with the aircraft's vertical speed at the time the mode is selected and the corresponding vertical speed will be indicated in the Programmer / Computer display. Vertical speed may now be modified in 100 ft. increments by rotating the **VS** knob clockwise or counter-clockwise.





The + (positive) symbol annunciation indicates a vertical speed climb selection. Clockwise rotation of the **VS** knob increases the rate of climb and counter-clockwise rotation decreases the rate of climb to 0. The - (negative) symbol annunciation indicates a vertical speed descent selection. Counter-clockwise rotation of the **VS** knob increases the rate of descent and clockwise rotation decreases the rate of descent to 0. Maximum selectable **VS** limits are  $\pm 1600$  feet-per-minute (**FPM**) in most aircraft (see the **AFMS** for your installation).

**NOTE:** If the **VS** Mode annunciator flashes while in the **VS** Mode, this is an indication of excessive error between actual vertical speed compared to selected vertical speed (usually in a climb) and the pilot should adjust aircraft power or reduce the vertical speed command as appropriate.

#### 4.2.10 Altitude (ALT)

The Altitude Mode, **ALT**, may be engaged with any roll mode displayed by pressing the **ALT** Mode switch. The aircraft will maintain the pressure altitude present at the time of the **ALT** Mode selection.

Altitude Correction for enroute barometric pressure changes may be made while in **ALT** Mode by rotation of the **VS** knob. Each "click" will change the altitude by 20 ft. The maximum altitude correction is  $\pm 360$  ft. Corrections in excess of  $\pm 360$  ft. will require selecting the **VS** Mode and climbing or descending to the new altitude and re-engaging **ALT** Mode.



#### 4.2.11 Control Wheel Steering

The System Fifty Five X Autopilot is equipped with a Control Wheel steering (**CWS**) Mode of operation that is entered by use of the **CWS** switch located on the control wheel. In order to use the mode, both a roll and pitch axis mode must be engaged.

Use of the **CWS** Mode allows the pilot to manually maneuver the aircraft without disconnecting the autopilot. Examples of its use include maneuvering to avoid traffic, placing the aircraft in a specific bank or climbing or descending without having to disconnect the autopilot.

Depress and hold the Control Wheel Steering Switch located on the aircraft's control wheel. The **CWS** and **VS** Modes will annunciate. Maneuver the aircraft as desired.



**NOTE:** Aircraft vertical speed (times 100) will be displayed in the Programmer / Computer Annunciator window directly above the **VS** selector knob.

**Example:** + 6 equals 600 Feet Per Minute (**FPM**) rate of climb.

If desiring a specific attitude, press **CWS** switch. Allow the aircraft to stabilize in the desired attitude for 2 to 3 seconds, release the Control Wheel Steering switch and the autopilot roll and pitch servos will engage and synchronize with the aircraft's turn rate and vertical speed.

**NOTE:** If the aircraft roll angle is greater than a standard rate turn when the **CWS** switch is released, the bank angle will be reduced to produce 90% of a standard rate turn as a maximum.

From the **CWS** Mode, the pilot may select other modes such as **HDG**, **NAV**, **ALT**, or may modify the present vertical speed using the **VS** knob.

The pilot may re-enter the **CWS** Mode at any time by simply depressing the **CWS** switch on the control wheel, positioning the aircraft in the desired roll and pitch attitude and releasing the **CWS** switch.

**NOTE:** When in the **CWS** Mode, the autopilot is not referencing any specific heading or attitude but is simply maintaining the approximate aircraft attitude that existed upon release of the **CWS** switch.

#### 4.2.12 Pitch Trim Indicator

If automatic trim has failed or is turned off, a sensor in the System Fifty Five X Autopilot pitch servo detects out-of-trim elevator loads. When such forces exceed a preset level and time delay, **TRIM** will annunciate on the Programmer / Computer with either the up or down symbol annunciated to indicate the direction elevator trim is required. In addition, an audible warning tone will sound 5 for seconds (this is same audible beeping tone emitted when the autopilot is disconnected but at a slower rate). The annunciation will be steady for about 5 seconds, then flash until proper trim conditions have been met. The pilot will be required to manually trim the aircraft until the trim indicator is extinguished.

**NOTE:** If trim is annunciated and the pilot disengages the autopilot, there will be residual out of trim force at the control wheel. Be alert if the autopilot is disengaged while **TRIM** is annunciated.

#### 4.2.13 Autotrim

With the autotrim functioning normally, the aircraft elevator trim will be maintained automatically when the Trim Master switch is on and a pitch mode is activated.

When the elevator trim is in motion, **TRIM** and the **up** or **down** symbol will annunciate indicating trim in motion and the direction of travel. Should the trim continue to run in excess of 7 seconds, these annunciations will flash.



If the trim master switch is **OFF** or a failure has occurred in the Autotrim, the system will automatically revert to "Pitch Trim Indicator" mode of operation.

**NOTE:** Using the trim switch on the control wheel while the pitch axis of the autopilot is engaged, disconnects the autopilot.

The pilot is also provided with **Manual Electric Trim** when the autopilot is disengaged or if only a roll axis mode has been engaged.

To use **Manual Electric Trim**, simply move the trim switch located on the aircraft's control wheel in the desired direction of trim. **FWD** for nose down or **AFT** for nose up. **TRIM** will be annunciated and will flash while the trim is in motion.

**NOTE:** The **S-TEC** trim system is designed to accept any type of single failure (mechanical or electrical) without uncontrolled operation resulting. To ensure that no hidden failures have occurred, conduct a trim pre-flight check prior to every flight.

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### 4.3 Approach Procedures

#### 4.3.1 Procedure Turn Localizer Approach (Standard DG)

Select the appropriate localizer frequency. Set the heading bug to the **OUTBOUND** localizer course and engage the **REV** Mode to track the localizer front course outbound or back course inbound.

When a localizer is channeled and **REV** Mode is selected, the System Fifty Five X will automatically execute high sensitivity gain for the approach and **APR** and **REV** will be annunciated.



If the course needle is at full-scale deviation, the autopilot will establish a 45° intercept angle. As the aircraft approaches the localizer course, the autopilot senses the closure rate and gradually shallows the intercept angle. The point that this turn begins is variable depending on the aircraft position and closure rate to the course. However, the turn will always begin between 100% (full-scale) needle deflection and 20% of full-scale.

During the intercept sequence, the system operates in maximum gain and sensitivity to needle position and motion and can command the aircraft at 90% of the standard rate turn. When the localizer course is intercepted and the needle is centered (indicating course capture), initiation of the tracking gain program is automatic.



If the aircraft is equipped with the optional remote annunciator, the **APR**, **REV**, and **CAP** Modes will be annunciated.

The high sensitivity level is maintained for about 15 seconds while wind correction angle is established. Turn rate maximum is then reduced to 45% of standard rate.

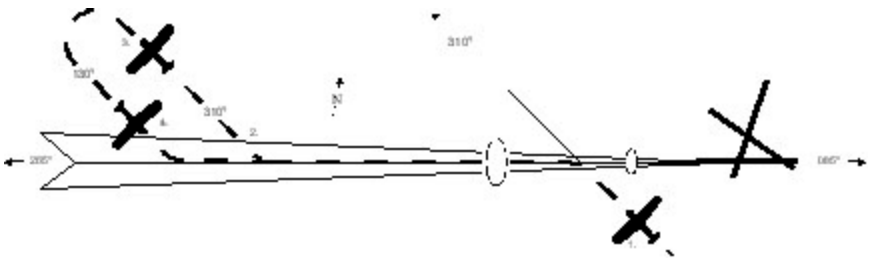


The optional remote annunciator will indicate **APR**, **REV**, **CAP**, and **SOFT**.

If the heading bug is within 5° of center and needle deflection is less than 10%, the computer will immediately establish this sensitivity level when **REV** is selected.

Set the heading bug to the outbound procedure turn heading and select heading mode. At the appropriate time, in 90° increments, set the heading bug to the **INBOUND** procedure turn heading. Once established on the **INBOUND** procedure turn heading, follow the localizer intercept and tracking procedures for standard **DG** noted below.

**4.3.3.1 Procedure Turn Localizer Approach and Tracking with Standard D.G.**



1. a. Tune navigation radio to **LOC** frequency.  
 b. Set heading bug to published outbound **LOC** heading.  
 c. Push **REV** Mode switch.
2. a. Set heading bug to outbound procedure turn heading.  
 b. Press **HDG** Mode switch.
3. a. In 90° increments, set heading bug to inbound procedure turn heading.
4. a. Set heading bug to inbound **LOC** heading.  
 b. Press **NAV** Mode switch. Autopilot will intercept and capture localizer course and track inbound to the airport.

### 4.3.2 Straight-In Localizer Intercept and Tracking (Standard DG)

With the appropriate localizer frequency selected, set the heading bug to the **INBOUND** localizer course and engage the **NAV** mode to track the localizer front course inbound or back course outbound.

When a localizer is channeled and **NAV** Mode is selected, the System Fifty Five X will automatically execute high sensitivity gain for the approach and activate the **APR** Mode. **NAV** and **APR** will be annunciated.



If the course needle is at full-scale deviation, the autopilot will establish a 45° intercept angle. As the aircraft approaches the localizer course, the autopilot senses the closure rate, and gradually shallows the intercept angle. The point at which this turn begins is variable, depending on the aircraft position and closure rate to the course. However, the turn will always begin between 100% (full-scale) needle deflection and 20% of full-scale.

During the intercept sequence, the system operates in maximum gain and sensitivity to needle position and motion and can command the aircraft at 90% of the standard rate turn. When the localizer course is intercepted, and the needle is centered (indicating course capture), initiation of the tracking gain program is automatic.



If the aircraft is equipped with the optional remote annunciator, the **NAV**, **APR**, and **CAP** modes will be annunciated.

The high sensitivity level is maintained for about 15 seconds while wind correction angle is established. Turn rate maximum is then reduced to 45% of standard rate.

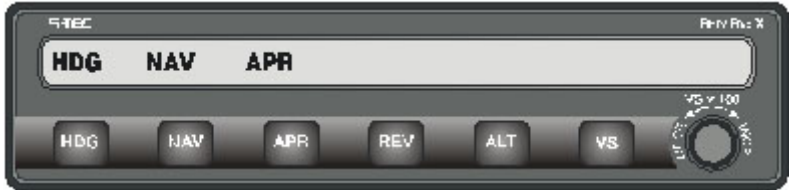
If the heading bug is within 5° of center and needle deflection is less than 10%, the computer will immediately establish this sensitivity level when **NAV** is selected.

The system also includes a course deviation monitor. If the aircraft strays off **LOC** centerline by 50% needle deflection, the **NAV** annunciator flashes a warning. It also flashes when the **OBS NAV** flag is displayed. When that occurs, the **FAIL** annunciation will illuminate.



### 4.3.3 Pilot Selectable Intercept Angles (Standard DG)

The pilot may select an angle of intercept less than the standard 45°. Place the heading bug on the **DG** to the desired heading used for the course intercept and simultaneously push both **HDG** and **NAV** switches. **HDG**, **NAV**, and **APR** will be displayed on the autopilot annunciator.



The selected heading will now be flown until the autopilot computes that an on course turn must be made to minimize overshoot at the point of intercept. At the time the on-course turn begins, the **HDG** Mode will extinguish and **you must move the heading bug to match the localizer course**.

**NOTE:** Intercept angles greater than 45° usually result in some course overshoot, depending on the distance from the station and aircraft speed. Therefore, angles greater than 45° are not recommended.

### 4.3.4 Procedure Turn Localizer Approach (Optional HSI)

Select the appropriate localizer frequency. Set the course pointer to the **INBOUND** localizer course and engage the Reverse (**REV**) Mode to track the localizer front course outbound or back course inbound.

When a localizer is channeled and **REV** Mode is selected, the system will automatically execute high sensitivity gain for the approach and **APR** and **REV** will be displayed on the autopilot annunciator.



If the course needle is at full-scale deviation, the autopilot will establish a 45° intercept angle. As the localizer course is approached, the autopilot senses the closure rate and gradually shallows the intercept angle. The inbound turning point is variable, depending on aircraft position and closure rate to the course. However, the turn will always begin between 100% (full-scale) needle deflection and 20% of full-scale.

During the intercept sequence, the system operates at maximum gain and sensitivity to needle position and motion and can command the aircraft at 90% of the standard rate turn. When the localizer course is intercepted and the needle is centered (indicating course capture), initiation of the tracking gain program is automatic.



If the aircraft is equipped with an optional remote annunciator, the **APR**, **REV**, and **CAP** modes will be annunciated.

The high sensitivity level is maintained for about 15 seconds while wind correction angle is established. Turn rate maximum is then reduced to 45% of standard rate.

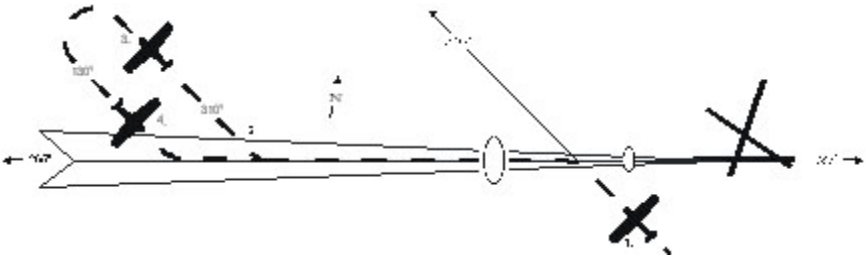


The optional remote annunciator will indicate **APR**, **REV**, **CAP** and **SOFT**.

If the course selector is within 5° of center and needle deflection is less than 10%, the computer will immediately establish this sensitivity level when **REV** is selected.

Set the heading bug to the outbound procedure turn heading and select heading mode. At the appropriate time, in 90° increments, set the heading bug to the inbound procedure turn heading. Once established on the inbound procedure turn heading, follow the straight-in localizer approach and tracking procedures for the optional **HSI**.

4.3.4.1 Procedure Turn Localizer Approach and Tracking with Optional HSI



1. a. Tune navigation radio to **LOC** frequency.  
 b. Set published inbound **LOC** course heading with course pointer.  
 c. Push **REV** Mode switch.
2. a. Set heading bug to published outbound procedure turn heading.  
 b. Press **HDG** Mode switch.
3. a. In 90° increments, set heading bug to inbound procedure turn heading.  
 b. When established on inbound procedure turn heading, press **NAV** Mode switch.
4. a. Once established in **NAV** Mode, set heading bug to the published missed approach heading. (If a missed approach is declared, at the Middle Marker (**MM**), disconnect the autopilot and stabilize the aircraft for the missed approach before engaging **HDG** and **VS** Modes).

### 4.3.5 Straight-In Localizer Intercept and Tracking (Optional HSI)

With the appropriate localizer frequency selected, set the course selector to the **INBOUND** localizer course and engage the **NAV** Mode to track the localizer front course inbound or back course outbound.

When a localizer is channeled and **NAV** Mode is selected, the system will automatically execute high sensitivity gain for the approach and activate the **APR** Mode with **NAV** and **APR** being annunciated.



If the course needle is at full-scale deviation, the autopilot will establish a  $45^\circ$  intercept angle. As the aircraft approaches the localizer course, the autopilot senses the closure rate, and gradually shallows the intercept angle. The point that this turn begins is variable depending on the aircraft position and closure rate to the course. However, the turn will always begin between 100% (full-scale) needle deflection and 20% of full-scale.

During the intercept sequence, the system operates in maximum gain and sensitivity to needle position and motion and can command the aircraft at 90% of the standard rate turn. When the localizer is intercepted and the needle is centered (indicating course capture), initiation of the tracking gain program is automatic.



If the aircraft is equipped with the optional remote annunciator the **NAV**, **APR**, and **CAP** modes will be annunciated.

The high sensitivity level is maintained for about 15 seconds while wind correction angle is established. Turn rate maximum is then reduced to 45% of standard rate.



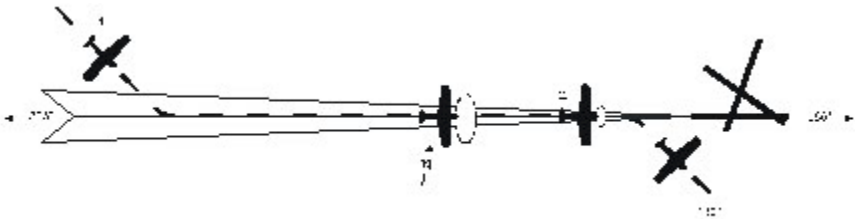
The optional remote annunciator will indicate **NAV**, **APR**, **CAP**, and **SOFT**.

If the course selector is within 5 ° of center and needle deflection is less than 10%, the computer will immediately establish this sensitivity level when **NAV** is selected.

Since the heading bug is not used for the final approach segment, the pilot may elect to move the heading bug to the published missed approach heading for reference and use in the heading mode should a missed approach be necessary.

The system also includes a course deviation monitor. If the aircraft strays off **LOC** centerline by 50% needle deflection, the **NAV** annunciator flashes a warning. It also flashes when the **HSI NAV** flag is displayed. When this occurs, the **FAIL** annunciation will illuminate.

**4.3.5.1 Straight-In Localizer Intercept and Tracking (Optional HSI)**



- b. Set course pointer to published inbound **LOC** course heading.
  - c. Press **NAV** Mode switch.
2. a. Once **NAV** Mode is established, heading bug can be set to published missed approach heading.
- b. At the Middle Marker, if a missed approach is declared, disconnect the autopilot and stabilize the aircraft for the missed approach before engaging **HDG** and **VS** Modes.

**4.3.6 Pilot Selectable Intercept Angles (Optional HSI)**

The pilot may select an angle of intercept less than the standard 45°. Place the heading bug on the desired heading to be used for the course intercept and simultaneously push the **HDG** and **NAV** switches. **HDG**, **NAV**, and **APR** will be displayed on the autopilot annunciator.



The selected heading will now be flown until the autopilot computes that an on course turn must be made to minimize overshoot at the point of intercept. At the time the on course turn begins, the **HDG** Mode will extinguish.

**NOTE:** Intercept angles greater than  $45^\circ$  usually result in some course overshoot, depending on the distance from the station and aircraft speed. Therefore, angles greater than  $45^\circ$  are not recommend.

#### 4.3.7 Glide-slope Intercept and Tracking (Software Version 4 and below)

To arm the automatic glide-slope (**GS**) capture function, the following conditions must be met:

- NAV** receiver must be tuned to the appropriate frequency.
- Glide-slope signal must be valid - no flag.
- Autopilot must be in **NAV / APR / ALT** Modes.
- Aircraft must be 60% or more below **GS** 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.



Glide-slope arming will occur when the above conditions have existed for 10 seconds. Illumination of the **GS** annunciator will occur, indicating arming has been accomplished. The **ALT** annunciator remains on.



Glide-slope capture is indicated by extinguishing of the **ALT** annunciation.



**NOTE:** If vectored to intercept the localizer too close to the glide-slope intercept point (resulting in less than 60% GS needle deviation when on course), the system will not automatically arm the glide-slope. Manual arming must be followed. (See page 4-30).

**NOTE:** If the 55X computer is of software version 5 and above (as evidenced by the number 5 in the right side of the display, when first powered up) the glideslope will arm when the CDI is from 20% to 100% up deflection for 1 second. The glideslope will capture immediately if the CDI is within a window of 20% up needle to 10% down needle when the altitude hold button is pressed and all the other required conditions are met.

**4.3.7.1 Glide-slope Intercept and Track**



**Flying the Glide-slope**

When making an **ILS** approach, be sure to follow the published procedure for the approach you have been cleared to make. (Ref. **4.3.2** Localizer Intercept and Tracking.)

Approach the glide-slope intercept point with the aircraft stabilized in the Altitude Hold (**ALT**) Mode. If the aircraft requires approach flaps, lower the flaps to the proper position. (Refer to **FAA / AFM** supplement for flap use limitations.)

At glide-slope intercept, lower the landing gear (if applicable) and adjust power for the desired descent speed and published rate of descent. For best tracking results, make power adjustments in small, smooth increments to maintain the desired rate of descent and airspeed.

At the Missed Approach Point (**MAP**), Decision Height (**DH**), or the autopilot's minimum operating altitude (whichever is higher), disengage the autopilot to execute a manual landing or a Go-Around maneuver. If a Missed Approach is declared, the autopilot can be re-engaged after a stabilized climb has been established.

#### 4.3.7.2 Procedure Turn for Glide-slope Approach



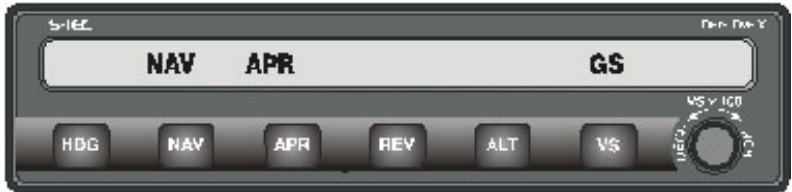
1. a. Tune navigation radio to **ILS** frequency.
  - b. Follow the procedure(s) for **LOC** Approach Intercept and Tracking in this manual.
2. a. If a procedure turn is required, enter the procedure turn above the published altitude.
  - b. Upon entering the inbound procedure turn sequence, press the **VS** Mode switch.
  - c. Rotate the **VS SELECTOR** knob to establish the desired rate of descent to reach approach altitude at completion of the procedure turn.
  - d. Upon reaching approach altitude, press the **ALT** Mode switch.
  - e. When the **NAV** Mode switch is pressed, and if the aircraft is below the glide-slope, the **APR** and **GS** annunciations will illuminate along with the **ALT** annunciation.
  - f. Upon capture of the glide-slope, the **ALT** annunciation will extinguish. (Ref. 4.3.7 Glide-slope Intercept and Track).
3. a. If a circling or straight-in approach to the **ILS** course is established, descend to approach altitude well in advance of reaching the Outer Marker.
  - b. Upon reaching approach altitude, press the **ALT** Mode switch.
  - c. Upon capture of **LOC** course, **NAV**, **APR**, **ALT**, and **GS** will illuminate if all conditions for glide-slope operation are met (Ref. Glide-slope Operation). This signifies automatic arming of the glide-slope function.
  - d. Upon glide-slope capture, the **ALT** annunciation will extinguish, signifying **GS** capture.

**NOTE:** If the final approach flown locates the aircraft above the glide-slope prior to reaching the Outer Marker, follow the procedure outlined in the text on Manual Arming of the glide-slope.



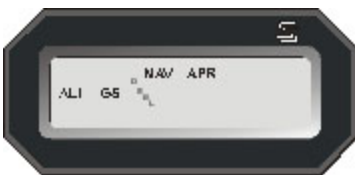
### 4.3.8 Manual Arm / Automatic Capture

If approach vectoring locates the aircraft above or too near the glideslope centerline at the intercept point (usually the outer marker), it becomes necessary to execute manual arming of the glideslope. This is done by pressing the **ALT** switch once (if operating in the altitude hold mode) pressing the **ALT** switch twice (if operating in the **VS** Mode). Once capture is achieved, the **GS** annunciation will illuminate and the **ALT** annunciation will extinguish.



The system includes a glide-slope deviation monitor. If the aircraft strays off glide-slope centerline by 50% needle deflection, the **GS** annunciator flashes a warning. It also flashes when the **GS** flag is displayed. When this occurs, the **FAIL** annunciation will illuminate.

**NOTE:** If it becomes necessary to establish a holding pattern at the Outer Marker, automatic glide-slope arming can be disabled by pressing the **APR** switch a second time while in the **NAV / APR** Mode. The **GS** annunciator will flash and **ALT** will annunciate.



The **GS** annunciator will flash, and the **ALT** and **DSBL** annunciators will illuminate on the optional remote annunciator to indicate the **GS** Mode is disabled.

To re-establish **GS** arming, press the **APR** Mode switch again. The disable (**DSBL**) annunciator will extinguish, the **GS** annunciator will cease to flash and remain steady. Re-arming will occur when all other required conditions stated have been met.

## **CAUTION**

**If the aircraft is not equipped with the optional remote annunciator, the only indication that the glide-slope function has been disabled is the flashing GS annunciator on the autopilot programmer.**

To fly the holding pattern, if inbound to the Outer Marker, press the **APR** switch twice to disable the glide-slope arming. When the Outer Marker or holding fix is reached, press the **HDG** switch and rotate the heading bug in the direction of the turn. It is best to select the reciprocal course in increments of  $90^\circ$ , rather than the full  $180^\circ$ .

When the outbound leg is completed, again rotate the **HDG** bug in the direction of the turn, in  $90^\circ$  increments, to re-establish the inbound course, and press the **APR** switch twice when localizer needle deflection is near 50% of full scale. If on this inbound leg you wish to rearm the glide-slope, press the **APR** switch once.

### **4.3.9 Procedure Turn Localizer Back-Course Approach (Optional HSI)**

Select the appropriate localizer frequency. Set the course selector to the **INBOUND** Localizer **FRONT** Course and engage the **NAV** Mode to track the localizer back course outbound or front course inbound. When a localizer is channeled and **NAV** Mode is selected, the System Fifty Five X will automatically execute high sensitivity gain for the approach and **NAV** and **APR** will be annunciated.



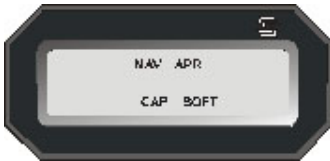
If the course needle is at full-scale deviation, the autopilot will establish a  $45^\circ$  intercept angle. As the aircraft approaches the localizer course, the autopilot senses the closure rate and gradually shallows the intercept angle. The point at which this turn begins is variable depending on the aircraft position and closure rate to the course. However, the turn will always begin between 100% (full-scale) needle deflection and 20% of full-scale.

During the intercept sequence, the system operates in maximum gain and sensitivity to needle position and motion and can command the aircraft at 90% of the standard rate turn. When the localizer course is intercepted and the needle is centered (indicating course capture), initiation of the tracking gain program is automatic.



If the aircraft is equipped with the optional remote annunciator, the **NAV**, **APR**, and **CAP** modes will be displayed.

The high sensitivity level is maintained for about 15 seconds while the wind correction angle is established. Turn rate maximum is then reduced to 45% of standard rate.

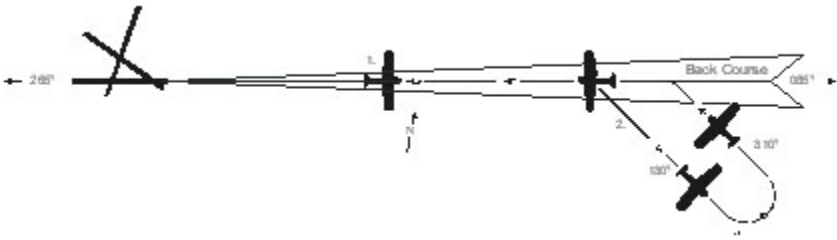


The optional remote annunciator will indicate **NAV**, **APR**, **CAP**, and **SOFT**.

If the course selector is within 5° of center and needle deflection is less than 10%, the computer will immediately establish this sensitivity level when **NAV** is selected.

Set the heading bug to the outbound procedure turn heading and select Heading Mode (**HDG**). At the appropriate time, in 90° increments, set the heading bug to the inbound procedure turn heading. Once established on the inbound procedure turn heading, follow the localizer back-course intercept and tracking procedures for optional **HSI** (as noted in para. 4.3.9.1).

#### 4.3.9.1 Back-Course Procedure Turn (HSI)



**REVERSE** Mode is used to track the front course outbound or the back course inbound to the airport.

The **HSI** Course Pointer **MUST** be set to the front course inbound heading.

1. a. Tune the navigation receiver to **LOC** frequency.  
 b. Set course pointer to published inbound **LOC** front course heading.  
 c. Press **NAV** Mode switch. The autopilot will capture and track back course outbound.
2. a. Set heading bug to the published outbound procedure turn heading.  
 b. Press the **HDG** Mode switch.
3. a. In  $90^\circ$  increments, set heading bug to the inbound procedure turn heading.  
 b. Press **REV** Mode switch. Autopilot will intercept, capture, and track back course inbound to the airport.

**4.3.10 Localizer Back-Course Intercept and Tracking (Optional HSI)**

With the appropriate localizer frequency selected, set the course pointer to the **INBOUND** Localizer **FRONT Course** and engage the **REV** Mode to track the localizer back course inbound or front course outbound.

When a localizer is channeled and **REV** Mode is selected, the System Fifty Five X will automatically execute high sensitivity gain for the approach and automatically activate the **APR** Mode. **APR** and **REV** will be annunciated.



If the course needle is at full-scale deviation, the autopilot will establish a 45 ° intercept angle. As the aircraft approaches the localizer course, the autopilot senses the closure rate and gradually shallows the intercept angle. The point at which this turn begins is variable depending on the aircraft position and closure rate to the course. However, the turn will always begin between 100% (full-scale) needle deflection and 20% of full-scale.

During the intercept sequence, the system operates in maximum gain and sensitivity to needle position and motion and can command the aircraft to 90% of the standard rate turn. When the localizer course is intercepted and the needle is centered (indicating course capture), initiation of the tracking gain program is automatic.



If equipped with the optional remote annunciator, the **APR**, **REV**, and **CAP** modes will be annunciated.

The high sensitivity level is maintained for about 15 seconds while wind correction angle is established. Turn rate maximum is then reduced to 45% of standard rate.



The optional remote annunciator will indicate **APR**, **REV**, **CAP**, and **SOFT**.

If the course pointer is within  $5^\circ$  of center and needle deflection is less than 10%, the computer will immediately establish this sensitivity level when **REV** is selected.

Since the heading bug is not used for the final approach segment, the pilot may elect to move the heading bug to the published Missed Approach Heading for reference and use in the Heading Mode, should a Missed Approach be necessary.

The system also includes a course deviation monitor. If the aircraft strays off **LOC** centerline by 50% needle deflection, the **NAV** annunciator flashes a warning. It also flashes when the **HSI NAV** flag is displayed. When this occurs, the **FAIL** annunciator will illuminate.

#### 4.3.11 Pilot Selectable Intercept Angles (Optional HSI)

The pilot may select an angle of intercept less than the standard  $45^\circ$ . This is done by placing the heading bug on the desired heading to be used for the course intercept while simultaneously pushing the **HDG** and **REV** switches. **HDG**, **APR**, and **REV** is annunciated.

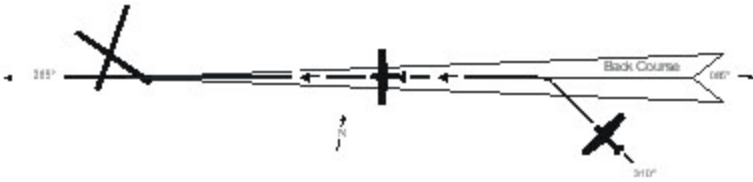


The selected heading is flown until the autopilot computes that an on-course turn must be made to minimize overshoot at the point of intercept. When the on-course turn begins, **HDG** Mode will extinguish.



**NOTE:** Intercept angles greater than  $45^\circ$  usually result in some course overshoot, depending on the distance from the station and aircraft speed. Therefore, angles greater than  $45^\circ$  are not recommended.

#### 4.3.9.2 Back Course Straight-In Approach (Optional HSI)



1. a. Tune navigation radio to **LOC** frequency.  
b. Set Course Pointer to published inbound front course heading.  
c. Press **REV** Mode switch.  
d. Heading bug can be set to missed approach heading after course capture.

**NOTE:** To establish a selected angle of intercept (dual mode intercept), on the back course, set the course pointer to the published inbound front course heading, and the heading bug to the desired heading to establish the selected angle intercept.

Press the **HDG** and **REV** Mode switches simultaneously. Upon capture of the back course, the autopilot automatically cancels **HDG** Mode and tracks the final approach course.

#### 4.4 System Failure and Caution Annunciations

The System Fifty Five X contains a number of automatic failure and caution annunciations to advise the pilot of operational problems. They are the following:

<u>ANNUNCIATION</u>	<u>CONDITION</u>	<u>ACTION</u>
Flashing <b>RDY</b> for 5 seconds with audible tone	Indicates autopilot disconnect. All annunciations except <b>RDY</b> are cleared.	<b>N/A</b>
Flashing <b>RDY</b> with audible tone then extinguished	Turn Coordinator Gyro Rotor Speed low. Autopilot disconnects and cannot be re-engaged	Check Power to Turn Coordinator. Conduct other system checks as necessary.
Flashing <b>NAV</b> , <b>REV</b> , or <b>APR</b>	Indicates off navigation course by 50% needle deviation or more.	Use <b>HDG</b> Mode until problem is identified. Cross-check raw <b>NAV</b> data, compass <b>HDG</b> , radio operation.
Flashing <b>NAV</b> , <b>REV</b> , or <b>APR</b> Steady <b>FAIL</b>	Indicates invalid Radio Navigational Signal.	Check <b>NAV</b> Radio for proper reception, Use <b>HDG</b> Mode until problem is corrected.
Flashing <b>VS</b>	Indicates excessive Vertical Speed Error over selected <b>VS</b> (usually climb).	Reduce <b>VS</b> command and / or adjust power as appropriate.
Flashing <b>GS</b>	Indicates Off glideslope centerline by 50% needle deviation or more.	Check altitude, power. Add or reduce power as appropriate.
Flashing <b>GS</b> , steady <b>FAIL</b>	Indicates invalid glide-slope radio navigation signal.	Disconnect autopilot and initiate go-around or missed approach as appropriate. Inform Air Traffic Control.
Flashing <b>VS</b> and number (with 01282 only)	Indicates incorrect <b>VS</b> polarity for target altitude.	Enter the appropriate <b>VS</b> value
Flashing <b>GS</b> plus <b>ALT</b>	Indicates Manual glide-slope disable.	Re-enable by pushing <b>APR</b> Mode Switch.



**NOTE:** If any of the aforementioned failure annunciations occur at low altitude or during an actual instrument approach disengage the autopilot and execute a go-around or missed approach as appropriate. Inform **ATC** of the problem. Do not attempt to troubleshoot or otherwise identify the nature of the failure until a safe altitude and maneuvering area are reached or safe landing is executed.

#### 4.5 Autopilot Disconnect

The autopilot can be disconnected by any of the following actions:

1. Turn the Autopilot Master switch **OFF**.
2. Press the Autopilot Disconnect / Trim Interrupt switch on the aircraft's control wheel.
3. Pull the aircraft's **AUTOPILOT** Circuit Breaker.
4. If the pitch axis of the autopilot is engaged, activate the Trim Command switch on the aircraft control wheel **FWD** or **AFT**.

#### 4.6 Yaw Damper (Optional)



(Configuration may vary with installation)

##### 4.6.1 Yaw Damper Controls

The Yaw Damper Master switch is a three-position (center **OFF**) switch. In the **AUTO** position, the Yaw Damper will engage any time an autopilot Roll Mode (**HDG, NAV, ect**) is engaged. The Yaw Damper can also be used by itself when the autopilot is disengaged by moving the switch to the **YAW ON** position. The Yaw Damper Trim Control is used to make small corrections after the Yaw Damper is engaged to keep the slip / skid ball centered.

#### 4.6.2 Yaw Damper Pre-flight Procedures

1. Place the Yaw Damper Master switch in the **YAW AUTO** position and engage the autopilot **HDG** Mode. Note that the Yaw Damper engages and causes increased pedal force.
2. Rotate the Yaw Damper Trim Control clockwise and note that the right rudder pedal moves slowly forward. Rotate the Yaw Damper Trim Control counter-clockwise and note that the left rudder pedal moves forward. Re-center the trim control.
3. Press the Autopilot Disconnect Trim Interrupt switch on the control wheel and note that both the Autopilot and Yaw Damper disconnect. Assure freedom of controls.
4. Yaw Damper must be **OFF** for takeoff and landing.

#### 4.6.3 Yaw Damper In-flight Procedures

1. Trim the aircraft for the phase of flight being conducted (climb, cruise, descent) with the rudder trim.
2. Adjust the Yaw Damper Trim Control to center.
3. With the Yaw Damper Master switch in the **AUTO** position, engage the Autopilot and note that Yaw Damper engages.
4. Make small Yaw Damper Trim adjustments as necessary to keep the slip / skid ball centered.
5. For Yaw Damper use with the Autopilot disengaged, move the Yaw Damper Master switch to **ON**.
6. **DISCONNECT** the Yaw Damper for landing.

**NOTE:** After making large power, configuration, or flight profile changes, it is advisable to disconnect the Yaw Damper to verify that the rudder is in trim then re-engage the Yaw Damper. The Yaw Damper will not trim the rudder automatically.

#### 4.7 Single-Cue Flight Director Operation (Optional)

This system, which integrates both the roll axis and pitch axis, offers synchronized display of the flight profile. It is automatically activated when the autopilot is engaged. A Flight Director provides a visual indication of how accurately the pilot or autopilot is tracking the commands of the active mode of operation.



Activation is indicated by the FD annunciator on the remote annunciator.

A remote **Parallax Adjustment** is provided to change the height of the horizontal display to compensate for different seat heights and a remote switch allows flight director operation when the autopilot is not in use.



For proper flight technique, the system presentation requires the pilot to roll and pitch the aircraft toward the steering command bars until the delta-shaped reference is tucked into the steering command bars, indicating that commands have been satisfied. For example, if the display is up and left, the pilot would be required to establish a left turn, pitch-up attitude.



As bank angle and vertical speed approach the required amounts, bank angle and pitch-up attitude are shallowed. When the delta reference and the steering bars are matched the commands have been met. Thereafter, it is necessary to maneuver the aircraft to keep the display elements matched in order to accurately fly the programmed modes.

Accurate flight director operation requires alertness by the pilot and monitoring of the movement of the display. Keeping it matched is quite simple. However, control inputs must be timely for accurate flight director following of the desired command.



For manually controlled flight by the flight director, place the **FD/AP** master switch in the "FD" position. This disables the autopilot servos, allowing the pilot to control the aircraft to the flight director commands.



To engage the autopilot without interruption, simply place the **FD/AP** master switch in the "FD/AP" position.

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# **SECTION 5 SPECIFICATIONS**

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## Appendix A: Specifications

### System Requirements

#### Programmer/Computer

Power required	14/28 VDC
Weight	3.0 lbs.
Dimensions	6.25 X 1.50 X 10.60 in.
TSO	C9c

**NOTE:** Unit will operate with either 14 or 28 VDC input; however internal circuit board assemblies must be set up for a specific voltage.

#### Turn Coordinator

Power required:	14/28 VDC
Flag voltage detector operating limits:	9.0 VDC (approx.)
Flag RPM detector operating limits:	Nominal RPM less 20%
Current Requirements	0.8 Amp (max)
Weight:	1.8 lbs.
Dimensions:	3.28 X 3.28 X 5.62 in.

#### Roll Servo

Power required:	14/28 VDC
Current requirements:	Included in system current requirements
Weight:	2.9 lbs.
Dimensions:	3.75 X 3.75 X 7.25 in.

#### Pitch Servo

Power required:	14/28 VDC
Current requirements:	Included in system current requirements
Weight:	2.9 lbs.
Dimensions:	3.75 X 3.75 X 7.25 in.



**SPECIFICATIONS (Cont'd)**

**Altitude Pressure Transducer**

Power required: 10 VDC (supplied by autopilot)  
 Pressure range: 0-15 PSI absolute  
 Overpressure: 150% of operating maximum  
 Weight: 0.2 lbs.

**Remote Annunciator (OPTIONAL)**

Power required: 0.2 Amp (max)  
 Weight: 0.75 lbs.  
 Dimensions: 1.60 X 3.42 X 3.80 in.

**Trim Servo (OPTIONAL)**

Power required: 14/28 VDC  
 Current requirements: 0.5 Amp (avg.), 2.0 Amp (max)  
 Weight: 2.9 lbs  
 Dimensions: 3.75 X 3.75 X 7.25 in.

**Yaw Damper (OPTIONAL)**

Power required: 14/28 VDC  
 Current requirements: 1.5 Amp (max continuous)  
 Weight: 0.9 lbs  
 Dimensions: 4.5 X 1.75 X 5.25 in.

**System Current Requirements**

(Approximate)	<u>@14 VDC</u>	<u>@28 VDC</u>
Average operating current:	1.0 Amp	0.5 Amp
Maximum current:	5.0 Amp	3.0 Amp

# **SECTION 6 GLOSSARY**

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# GLOSSARY

<u>Term</u>	<u>Meaning</u>
AFMS	Airplane Flight Manual Supplement
ALT	Altitude
APR	Approach
ATC	Air Traffic Control
CAP	Capture
CDI	Course Deviation Indicator
CON'T	Continued
CWS	Control Wheel Steering
DG	Directional Gyro
DSBL	Disable
FAA	Federal Aviation Administration
FD	Flight Director
FPM	Feet Per Minute
GPS	Global Positioning System
GPSS	Global Positioning System Steering
GS	Glideslope
HDG	Heading
HSI	Horizontal Situation Indicator
IFR	Instrument Flight Rules
LOC	Localizer
N/A	Not Applicable
NAV	Navigation
POH	Pilot Operating Handbook
POHS	Pilot Operating Handbook Supplement
PSI	Pounds Per Square Inch
RDY	Ready
REV	Reverse
RPM	Revolutions Per Minute
SFM	Supplemental Flight Manual
TSO	Technical Standard Order
VDC	Volts Direct Current
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omnidirectional Radio Range
VS	Vertical Speed

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