

S-TEC CORPORATION  
MINERAL WELLS, TEXAS 76067

FAA/DAS APPROVED  
PILOT'S OPERATING HANDBOOK AND/OR  
AIRPLANE FLIGHT MANUAL SUPPLEMENT  
FOR  
PIPER MODEL PA-28-181

WITH  
S-TEC SYSTEM 55 TWO AXIS  
AUTOMATIC FLIGHT GUIDANCE SYSTEM  
WITH TRIM MONITOR  
(28 VOLT SYSTEM)

REG. NO. N41352

SER. NO. 2843237

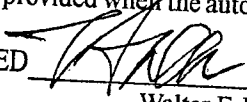
This Supplement must be attached to the applicable FAA Approved Airplane Flight Manual, Pilot's Operating Handbook, or Pilot's Operating Handbook and FAA Approved Airplane Flight Manual modified by the installation of S-TEC System 55 Autopilot Model ST-548 installed in accordance with STC SA8402SW-D. The information contained herein supplements or supersedes the basic manual. For limitations, procedures and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook and/or Airplane Flight Manual.

## SECTION I

### GENERAL

This manual is to acquaint the pilot with the features and functions of the System 55 Two Axis Autopilot and to provide operating instructions for the system when installed in the listed aircraft model(s). The aircraft must be operated within the limitations herein provided when the autopilot is in use.

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Walter F. Davis

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P/N: 891752  
DATE: 6-18-98

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LOG OF REVISION				
Rev. No.	Pages Affected	Description	Approved	Date
1.	Page 5	Added a Note to Normal Operating Procedures regarding altitude hold capture.	<i>WFD</i>	10-05-98

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**SECTION II**

**OPERATING LIMITATIONS**

1. Autopilot operation prohibited above 140 KIAS.
2. Autopilot coupled missed approach or go-around maneuver not authorized.
3. Autopilot must be "OFF" during take off and landing.
4. Flap limitations: Maximum flap deflection is limited to 10° (one notch) with autopilot engaged.
5. Category I operations only.
6. Autopilot use prohibited below 200' AGL during coupled approach operations.

**SECTION III**

**EMERGENCY OPERATING PROCEDURES**

In the event of an autopilot malfunction, or anytime the autopilot is not performing as expected or commanded, do not attempt to identify the system problem. Immediately regain control of the aircraft by overpowering the autopilot as necessary and then immediately disconnect the autopilot. Do not re-engage the autopilot until the problem has been identified and corrected.

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1. The autopilot may be disconnected by:
  - a. Depressing the "AP Disconnect" Switch on the left horn of the pilot's control wheel.
  - b. Placing the "AP Master Switch" in the "OFF" position.
  - c. Momentarily interrupting aircraft electrical power at the battery master switch.
  - d. Pulling the autopilot circuit breaker.
  
2. Trim:
  - a. In the event of a trim failure, manually control aircraft and DEPRESS AND HOLD "Trim Interrupt/AP Disconnect Switch" on control wheel.
  - b. Place trim master switch in "OFF" position, pull circuit breaker, release interrupt switch.
  - c. Retrim aircraft. Leave trim system OFF until corrected.
  
3. Altitude loss during a malfunction and recovery:
  - a. The following altitude losses and bank angles were recorded after a malfunction with a 3 second recovery delay:

<u>Configuration</u>	<u>Bank Angle/Altitude Loss</u>
Climb	50°/-180'
Cruise	55°/-160'
Descent	55°/-320'

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- b. The following altitude losses and bank angles were recorded after a malfunction with a 1 second recovery delay:

<u>Configuration</u>	<u>Bank Angle/Altitude Loss</u>
Maneuvering	18°/-60'
Approach (Coupled or Uncoupled)	20°/-80'

The above values are the worst case for all the models covered by this document.

**SECTION IV**

NORMAL OPERATING PROCEDURES

For detailed normal operating procedures, including system description, pre-flight and in flight procedures refer to S-TEC System 55 Pilot's Operating Handbook, P/N 8747, dated 1-97.

**CAUTION:** When S-TEC Flight Director is installed and operating, the Flight Director Autopilot should be disconnected using the control wheel disconnect switch only. Any other means of disconnect (breaker, ON-OFF switch, etc.) may leave steering bars in view, but inoperable.

**NOTE:** For smoother altitude captures, thus enhancing passenger comfort, engage altitude hold mode at rates of climb of 1,000 FPM or less.

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CONTROL WHEEL SWITCHES

The left grip of the pilot's control wheel will normally contain the following autopilot switches:

- Manual Electric Trim
- Trim Interrupt/A/P Disconnect Switch
- Control Wheel Steering (CWS)

ELECTRIC TRIM SYSTEM

The S-TEC Electric Trim System is designed to accept any single failure, either mechanical or electrical, without uncontrolled operation resulting during operations in the Manual Electric Trim Mode. During autotrim mode the system is designed to limit the effect of any failure causing trim operation. In order to assure proper operation of these safeguards, it is necessary to conduct a simple pre-flight test of the system. Following is a brief description and a preflight test procedure for the trim system.

TRIM SYSTEM WITH TRIM MONITOR

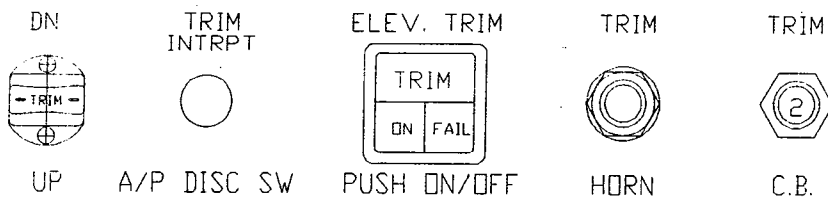


FIGURE 1

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SYSTEM DESCRIPTION

The trim monitor system consists of the components pictured in Figure 1 and is designed to alert the pilot of a trim failure or trim in motion.

The system is activated by pushing the trim master switch on. A green On light, a yellow Trim light and a red Fail light will illuminate in the switch and the trim audio horn will activate for one second, as a test. A trim fault will cause the Trim and Fail lights to illuminate along with continuous horn operation. The pilot should press and hold the red Trim Interrupt button and conduct the emergency procedures listed in Section III of this AFMS.

PREFLIGHT TRIM CHECK (With Trim Monitor)

MANUAL ELECTRIC TRIM - Test Prior To Each Flight

1. Check trim circuit breaker - IN
2. Trim master switch - Push ON - confirm green light ON after completion of test cycle.
3. A/P master switch - ON
4. Operate trim switch (both knob sections) - NOSE DN. Check that trim moves nose down and yellow trim light in trim master switch flashes while trim is in motion. The trim "in motion" indicator in the autopilot programmer should flash "TRIM" also. Conduct the same test in the NOSE UP direction.

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5. With trim operating up or down depress the red control wheel interrupt switch for three seconds minimum. Confirm that trim action stops while switch is pressed. This action should also trigger the trim monitor horn with "Trim" steady and "Fail" flashing in the trim master switch. Recycle the trim master switch to delete the horn.
6. Overpower check - With trim operating electrically, grasp the manual trim wheel and overpower the electric trim to stop trim motion.
7. Operate each half of the trim switch separately - Trim should not operate unless both switch knob segments are moved together.

AUTOTRIM

1. Position elevator control half way aft from full forward.
2. Engage HDG and ALT modes of autopilot.
3. Grasp control and slowly apply forward pressure (nose down). After approximately 3 seconds automatic trim should run NOSE UP. The yellow trim indicator in trim master switch should flash simultaneously with the trim indicator in the A/P programmer.
4. Conduct the same test by slowly applying aft pressure on the elevator control, confirming that autotrim runs NOSE DOWN and trim indicators flash while trim is in motion.
5. Move manual trim switch up or down - Autopilot should disconnect and trim should operate in the commanded direction. (Trim switch will disconnect A/P only when a pitch mode is engaged.)
6. Reengage autopilot HDG and ALT modes - Press trim interrupt/AP disconnect switch - Autopilot should disconnect.
7. Retrim aircraft for take off - Check all controls for freedom of motion and determine that autopilot and trim have disconnected.

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If either the manual electric or autotrim fails any portion of the above check procedure, push the Trim Master Switch "OFF" and do not attempt to use the trim system until the fault is corrected. With the Trim Master Switch "OFF" the autopilot trim indicators will return to operation. If the electric trim system suffers a power failure in flight the system will automatically revert to the trim indicator lights located in the autopilot annunciator panel. If this occurs push the Trim Master Switch "OFF" and trim manually, using the indicators until the fault can be located and corrected.

**GLIDE SLOPE FLIGHT PROCEDURE**

Approach the GS intercept point (usually the OM) with the flaps set to approach deflection of up to 1 notch, as desired (see Limitations section), and with the aircraft stabilized in altitude hold mode. At the glide slope intercept, adjust power for the desired descent speed. For best tracking results make power adjustments in small, smooth increments to maintain desired airspeed. At the missed approach point or the decision height, disconnect the autopilot for landing or for the go-around maneuver (See Limitations Section). If a missed approach is required, the autopilot may be reengaged after the aircraft has been reconfigured for and established in a stabilized climb.

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OPTIONAL EQUIPMENT

ALTITUDE SELECTOR/VERTICAL SPEED SELECTOR P/N 0114 (OPTIONAL)

The altitude selector option operates in conjunction with an altitude encoder and transponder. For pre-flight and normal operating procedures refer to the "Pilot's Operating Handbook for Altitude Selector and Altitude Vertical Speed Selector", P/N 8702, dated 2-91. This option does not affect the limitations or emergency procedures section of this supplement.

ALTITUDE SELECTOR/ALERter/VERTICAL SPEED SELECTOR P/N 0140 (OPTIONAL)

The altitude selector/alerter option is a digital device providing a digital liquid crystal display of the selected altitude, the vertical speed and other functions. The altitude selector function operates in conjunction with an altitude encoder and transponder. For pre-flight and normal operating procedures refer to the "Pilot's Operating Handbook for Altitude Selector/Alerter", P/N 8716, dated 10-93. This option does not affect the limitations or emergency procedures section of this supplement.

**NOTE:** When using either of the above referenced Altitude Selectors with the System 55 Autopilot, the pilot should always program the desired altitude and vertical speed into the altitude selector before simultaneously pressing ALT and VS modes on the System 55 Autopilot programmer. This action will isolate the VS selector knob on the autopilot and the aircraft will respond only to the respective altitude selector commands until capturing the desired altitude.

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**SECTION V**

**PERFORMANCE**

The text of this Section not affected by the installation of this equipment.

**SECTION VI**

**WEIGHT AND BALANCE**

The text of this Section not affected by installation of this equipment.

**SECTION VII**

**SYSTEMS DESCRIPTION AND OPERATION**

The text of this Section not affected by installation of this equipment.

**SECTION VIII**

**HANDLING, SERVICING, AND MAINTENANCE**

The text of this Section not affected by installation of this equipment.

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**SECTION IX**

**SUPPLEMENTS**

See information in this supplement for operation of the S-TEC System 55 Autopilot.

**SECTION X**

**OPERATING TIPS**

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