

FSX Piper PA-28R-201T Turbo Arrow III

User's Notes



FSX Piper Turbo Arrow III package is a development of the original FSX Tubro Arrow III by Rien Cornelissen. The improvements made concern exterior and interior texture, virtual cockpit (new instrument panel with new gauges, VC views), pop-up panels, liveries, aircraft configuration and flight dynamics. The improved plane features demand more accuracy and vigilance during flight operations to prevent the plane systems from damages.

1. New in design and procedures

VC Panel - with GNS-530 and Altimatic IIIC autopilot



- | | |
|--|---|
| 1. Digital Clock | 17. Primer (aux fuel pump momentary button) |
| 2. ASI (with operational TAS correction scale) | 18. COM2/NAV2 Radio |
| 3. Attitude Indicator | 19. ADF Radio |
| 4. Landing Gears Transition Warning Light | 20. Suction Gauge |
| 5. Glideslope Coupler Indicator | 21. Transponder |
| 6. Altimeter | 22. Cluster Gauges (Oil Temp/Pressure, Amp) |
| 7. Annunciator Panel (details at page 3) | 23. Cluster Gauges (Fuel Quantity/CHT) |
| 8. VOR1 Indicator | 24. Electric Panel |
| 9. Audio Panel | 25. Autopilot Control Panel |
| 10. Garmin GNS-530 | 26. Autopilot Mode Switch |
| 11. DME (N1/N2) | 27. Ignition Key |
| 12. ADF Indicator | 28. Manifold Pressure/Fuel Flow Gauge |
| 13. Turn Coordinator | 29. RPM Indicator (with Hobbs Meter) |
| 14. Directional Gyro with Heading Indicator | 30. Landing Gears Handle with Lights |
| 15. VSI | 31. ECU |
| 16. VOR2 Indicator | 32. Alt Air Handle (animation only, INOP) |
| | 33. EGT Indicator |

VC Panel - with GPS-500 and Piper Autocontrol IIIB autopilot



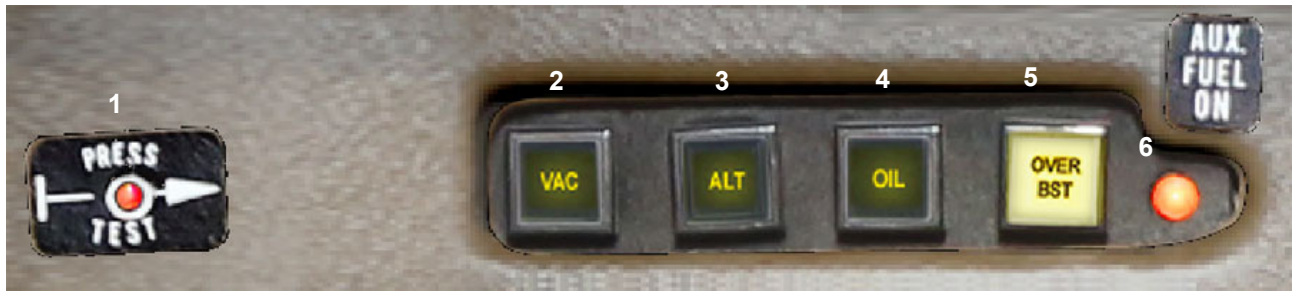
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|--|---|
| 1. Digital Clock | 19. DME (N1/N2) |
| 2. ASI (with operational TAS correction scale) | 20. Transponder |
| 3. Landing Gears Transition Warning Light | 21. ADF Radio |
| 4. Attitude Indicator | 22. Hobbs Meter |
| 5. Altimeter | 23. Cluster Gauges (Oil Temp/Pressure, Amp) |
| 6. Annunciator Panel (details at page 3) | 24. Cluster Gauges (Fuel Quantity/CHT) |
| 7. VOR1 Indicator | 25. Electric Panel |
| 8. Audio Panel | 26. Autopilot Control Panel |
| 9. COM1/NAV1 Radio | 27. Autopilot Mode Switch |
| 10. GPS-500 | 28. NAV/GPS Switch |
| 11. Suction Gauge | 29. Ignition Key |
| 12. ADF Indicator | 30. Manifold Pressure/Fuel Flow Gauge |
| 13. Turn Coordinator | 31. RPM Indicator (with Hobbs Meter) |
| 14. Directional Gyro with Heading Indicator | 32. Landing Gears Handle with Lights |
| 15. VSI | 33. ECU |
| 16. VOR2 Indicator | 34. Alt Air Handle (animation only, INOP) |
| 17. Primer (aux fuel pump momentary button) | 35. EGT Indicator |
| 18. COM2/NAV2 Radio | |

VC Panel - with GNS-430 and Piper Autocontrol IIIB / System 30 ALT autopilots



- | | |
|--|---|
| 1. Digital Clock | 20. Transponder |
| 2. ASI (with operational TAS correction scale) | 21. Altitude Hold Master Switch |
| 3. Landing Gears Transition Warning Light | 22. Altitude Hold Button/Indicator |
| 4. Attitude Indicator | 23. FS-450 Fuel Totalizer |
| 5. Altimeter | 24. Volt-Amp Indicator |
| 6. Annunciator Panel (details at page 3) | 25. Hobbs Meter |
| 7. VOR1 Indicator | 26. Cluster Gauges (Oil Temp/Pressure, Amp) |
| 8. Audio Panel | 27. Cluster Gauges (Fuel Quantity/CHT) |
| 9. Garmin GNS-430 | 28. Electric Panel |
| 10. DME (N1/N2) | 29. Autopilot Control Panel |
| 11. ADF Radio | 30. Autopilot Mode Switch |
| 12. Suction Gauge | 31. Ignition Key |
| 13. ADF Indicator | 32. Manifold Pressure/Fuel Flow Gauge |
| 14. Turn Coordinator | 33. RPM Indicator (with Hobbs Meter) |
| 15. Directional Gyro with Heading Indicator | 34. Landing Gears Handle with Lights |
| 16. VSI | 35. ECU |
| 17. VOR2 Indicator | 36. Alt Air Handle (animation only, INOP) |
| 18. Primer (aux fuel pump momentary button) | 37. EGT Indicator |
| 19. COM2/NAV2 Radio | |

Annunciator Panel

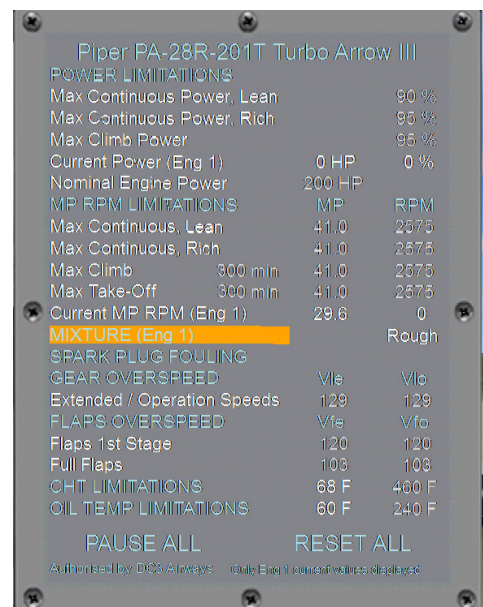


- | | | |
|----|----------------------|---|
| 1. | Press-to test Button | - Annunciator Lights Test Button |
| 2. | VAC light | - Low vacuum system pressure |
| 3. | ALT light | - Alternator not operational |
| 4. | OIL light | - Low oil pressure |
| 5. | OVER BST light | - Manifold pressure is above 41 inches Hg |
| 6. | Amber light | - Aux fuel pump or primer is on (in real plane the light is not on, when the aux fuel pump key is in LO position) |

Pop-Up Panels

- Shieft + 1** GNS/GPS
- Shieft + 2** Mini-panel (1)
- Shieft + 3** RealEngine Panel (2)
The RealEngine panel provides capabilities for more accurate control of the engine and airframe systems limitations.
- Shieft + 4** Lower left panel with Autopilot and ignition key (3)

2



3



1



New liveries



Optional yokes in VC

In addition to the original interior texture with the transparent pilot yoke (Arrow3colors_T.dds) the new package includes the optional file, which gives the opportunity to make the yoke visible (Extras/Yoke_options/ visible Yoke folder).



New VC views



Realism Features

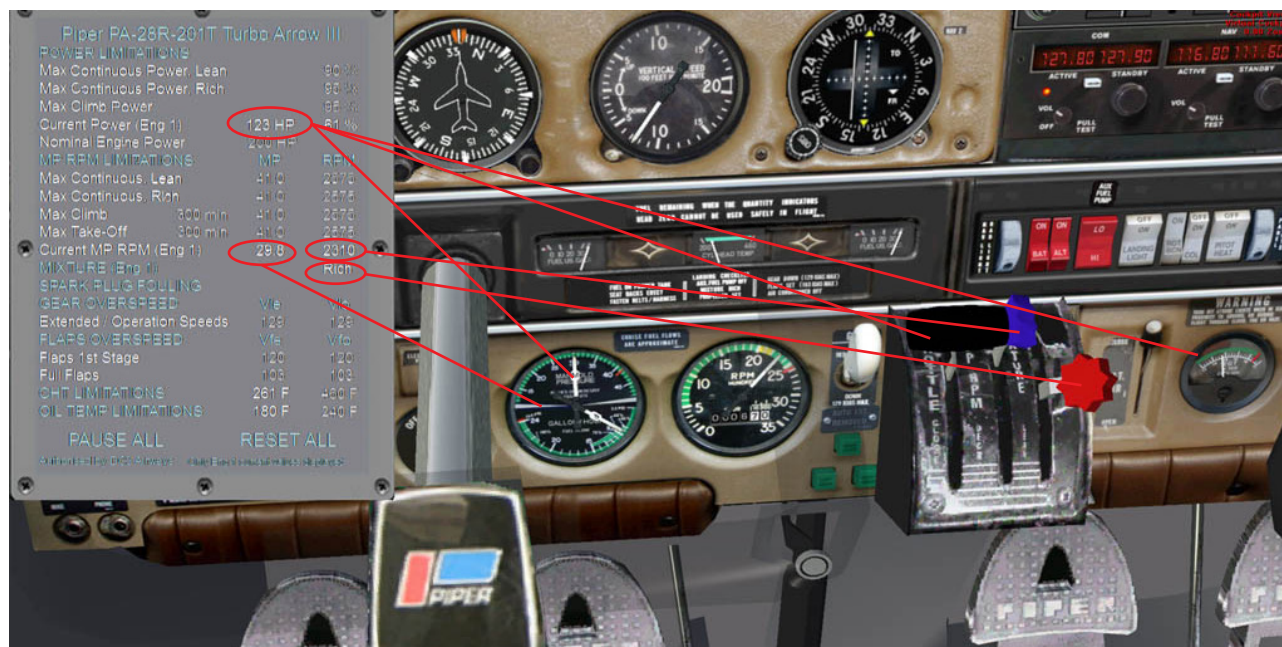
Realistic flight model The improvements in the aircraft configuration and flight dynamics files make the plane spinnable and provide capability for a sideslip maneuver.

Engine and airframe system damage The use of the RealEngine gauge adds more realism to engine operations and airframe system handling. When flying it is necessary to observe the MP, oil and cylinder head temperature and airspeed limits to prevent failures of the engine, flaps and landing gears.

Piper PA-28R-201T Turbo Arrow III		
POWER LIMITATIONS		
Max Continuous Power, Lean	90%	
Max Continuous Power, Rich	100%	
Max Climb Power	100%	
Current Power (Eng 1)	184 HP	92%
Nominal Engine Power	200 HP	
MP RPM LIMITATIONS		
Max Continuous, Lean	410	2675
Max TO/Continuous, Rich	410	2675
Max Climb	0 min	410
Max TO (OVERBUST) 2 min	420	2675
Current MP RPM (Eng 1)	390	2570
MIXTURE (Eng 1)		Full Rich
SPARK PLUG FOULING		
GEAR OVERSPEED	Vfe	Vfe
Extended / Operation Speeds	129	129
FLAPS OVERSPEED	Vfe	Vfe
Flaps 1st Stage	120	120
Full Flaps	103	103
OIL TEMP LIMITATIONS		
	460 F	460 F
	240 F	240 F
PAUSE ALL		
RESET ALL		
Adapted by DCS Airways		



More accurate engine control The use of the RealEngine pop-up panel in addition to regular engine gauges (MP, FF, RPM, EGT) gives an extra capability to control the engine operations for reaching the best power and protect it from the damage.



Engine Limits

For all operations:

max. power, HP	200
max. RPM	2575
max. MP, inHg (below 12,000 ff)	41.0
Max. Allow. Oil Temp.	240° F
Max. Allow. CHT	460° F

Airspeed Limits

Never exceed	183 KIAS
Maximum structural cruising	146 KIAS
Maneuvering	119 KIAS
Flaps Extended	103 KIAS
Maximum Gear Retraction	107 KIAS
Maximum Gear Extension	129 KIAS
Maximum Gear Extended	129 KIAS

When taking off at full throttle and minimum engine oil temperature of 75°F, a 1-2 inches Hg increase in manifold pressure above the rated maximum limit may occur, which is allowed for 2-3 minutes duration. This condition is indicated by the OVERBST light at the annunciator panel. Under normal operating conditions, if maximum rated take-off power is achieved before the throttle reaches full travel, do not advance the throttle lever further. Continued forward movement of the throttle may result in an engine damage.

*The Turbo Arrow III package provides **the overboost simulation** with engine damage effect. For the engine damage purpose the actual manifold pressure meaning at full throttle below 12,000 feet is set as 42.0 inHg. So, when operating with full throttle, observe the OVERBST indicator and keep the throttle lever aft a little (OVERBST light must be extinguished). If not, the engine damage will occur in two minutes.*

Recommended power for climb - 75% at FULL RICH mixture (attention to oil temp., CHT and EGT). At power settings above 75%, do not use the EGT gauge as an aid to adjust mixture. Mixture FULL RICH only.

Max. recommended cruise power - 75% at 2450 RPM. If the EGT gauge is used to monitor cruise fuel flow at 75% power and below, a cruise fuel mixture adjusted to 100-150° F rich of peak will produce the best power setting.

Descent from high altitude should be accomplished at cruise power settings, with the mixture control positioned accordingly. Do not permit cylinder temperature to drop below 300°F for periods exceeding 5 minutes.

The real Continental TSIO-360-F (FB) Engine Starting Procedure is as follows:

- I. Fuel Selector - ON, appropriate tank.
2. Propeller Control - HIGH RPM.
3. Mixture Control - FULL RICH.
4. Battery Switch - ON.
5. Throttle - FULL OPEN.
6. Boost Pumps or Primer - ON, 2 to 3 seconds.
7. Throttle - 1/2 INCH OPEN.
8. Magneto/Start Switch - START position. Release the Magneto / Start Switch to BOTH position as soon as the engine starts.
9. Throttle 1000 to 1500 RPM.
10. Oil Pressure - ABOVE 30 POUNDS WITHIN 30 SECONDS.
- II. Alternator Switch - ON.

CAUTION ... Do not engage the starter when the engine is running as this will damage the starter. Do not crank for longer than thirty seconds at a time, as this may cause the starter motor to overheat. If the engine does not start a/ier thirty seconds of cranking, allow a 3 to 5 minute cooling period before attempting to restart.

CAUTION ... If engine kicks back when starting, DO NOT attempt to start. The ignition starting system is inoperative and must be repaired before damaging starter adapter assembly'.

In abnormal situations, after point 8 and before point 9 proceed as follows:

COLD STARTS:

- a. Throttle - FULL OPEN.
- b. Mixture Control - FULL RICH.
- c. Primer - ON, 2 to 3 seconds.
- d. Throttle - 1/2 INCH OPEN.
- e. Magneto/Start Switch - START position.
- f. Once engine starts, it may be necessary to keep engine running with primer.
- g. Magneto/Start Switch - BOTH position.

FLOODED ENGINE:

- a. Mixture Control - IDLE CUT-OFF.
 - b. Throttle - FULL OPEN.
 - c. Magneto/Start Switch - START.
 - d. Once engine starts, release Magneto/Start Switch to BOTH.
- Retard the throttle to 1000 RPM and slowly advance the mixture control to FULL RICH position.

HOT STARTS:

- a. Throttle - FULL OPEN.
- b. Mixture Control - IDLE CUT-OFF.
- c. Boost Pump - ON, 10-15 seconds or until the fuel pumping pulsations stabilize.
- d. Mixture Control - FULL RICH, momentary priming may be required.
- e. Throttle - Retard to 1/2 INCH.
- f. Magneto/Start Switch - START position.
- g. Once engine starts, release Magneto/Start Switch to BOTH.

WARM-UP

1. Head the aircraft into the wind.
2. During ground operations the propeller should be in the "Full Increase" RPM position.
3. Avoid prolonged idling at low RPM. Fouled spark plugs can result from this practice.
4. Leave mixture in FULL RICH position.
5. Warm-up 900-1000 RPM

2. Autopilot Systems

Altimatec IIIC Autopilot System with Glideslope Coupler



COMMAND CONSOLE

1. Roll (aileron) engagement key
2. Heading mode key
3. Altitude hold mode key
4. Pitch (elevator) engagement key
5. Pitch command wheel
6. Roll command knob
7. Trim Indicator



ROLL (AILERON) ENGAGEMENT

Altimatec IIIC is separated into two distinct systems, the Roll/Heading and Pitch/Altitude. Each is engaged separately by means of a fail safe electronic servo engage mechanism.

Because the roll is first in logical sequence, the roll engage acts as an autopilot master switch. In this capacity the roll must be engaged for all other engage and mode switches to become operative. With this roll switch only engaged, the autopilot is responsive only to the roll axis of the attitude gyro and the commands of the console roll/turn control.



ROLL COMMAND KNOB

The roll command knob controls the roll axis of the aircraft when roll mode switch is engaged. It is useful in maneuvering and will permit steeper bank angles (up to 30°) than those resulting from D.G. heading commands. When the heading mode switch is engaged the roll knob is removed from the autopilot circuit and is ineffective. However, it should be left in the centered position for convenience.



HEADING MODE

The heading mode switch is located directly adjacent and to the right of the roll engage switch. It is the function of the heading mode switch to remove the roll command knob from the autopilot circuit and add the D.G., heading command and coupler functions to the basic roll attitude control. This switch is interlocked with the roll engage so that the roll function will be engaged simultaneously with the heading mode switch. Prior to engagement of the heading mode, the D.G. course selector and coupler modes should be set. (See sections on coupler operation when optional coupler is installed.)



TRIM INDICATOR AND PITCH COMMAND WHEEL

Prior to the engagement of the pitch axis, it is desirable to adjust the autopilot pitch to match the attitude being flown in, this way the pilot can transition from hand flight to autopilot smoothly during the climbout or other pitch maneuvering. The pitch servo effort meter (trim) to the left of the pitch control wheel indicates the position of the pitch command wheel with relation to the attitude being flown.

Thus, if it is pointing upward prior to engagement it indicates that the aircraft can be expected to increase pitch attitude upon engagement, conversely a down meter indicates pitch attitude will be decreased upon engagement. The pitch command wheel is in the autopilot circuit when the pitch mode switch only is engaged. It is removed from the circuit and becomes ineffective upon engagement of the altitude hold. During altitude hold operation it may be set to level or preprogrammed to produce climb or descent upon altitude hold disengagement.

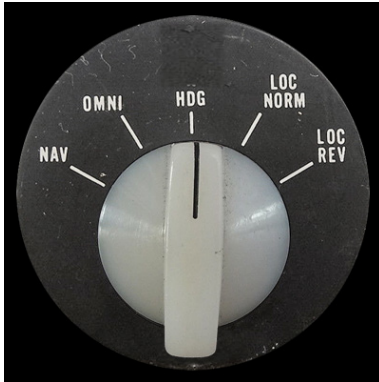
PITCH (ELEVATOR) ENGAGEMENT

The pitch mode switch engages the autopilot pitch servo and makes the autopilot responsive to the pitch attitude of the gyro horizon and the commands of the pitch control wheel. Constant attitudes may be directed by rotating the command wheel in the appropriate direction. The computer system in combination with the automatic trim will maintain this constant attitude through power changes and during gear and flap position transitions. On aircraft not equipped with Century Flight Systems, Inc. automatic trim, it will be necessary to disengage the pitch and manually trim the airplane during attitude, airspeed, or gear flap transitions. (See section on automatic trim.)



ALTITUDE HOLD

The altitude hold is a "command" type which requires no pitch command adjustment prior to engagement. Engagement of the altitude mode switch will remove the pitch command wheel from the circuit and initiate a smooth transition to the pressure altitude at which it was engaged. Barometric sensors provide precise altitude holding with nominal climb and dive limitations for operation in turbulence.



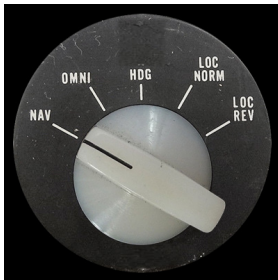
LATERAL GUIDENCE SYSTEM

The system provides automatic beam capture and tracking of OMNI station, VOR, LOC (normal or reverse), or GPS as selected for presentation on the HSI or CDI. In LOC NORM with GS Coupler engaged it also captures and tracks a glidslope on an ILS. When in HDG mode, functions as described above.



OMNI MODE

When in the OMNI MODE position, the system is coupled to the Radio Omni Bearing Indicator. By setting the D.G. Course Indicator to match the Omni Course selection, all headings are then controlled by the Omni radio signals.



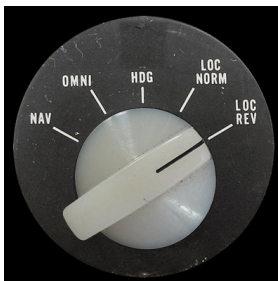
NAV MODE

The NAV Mode is designed to extend the coupler utility by making operation practical under the adverse conditions of unsteady or erratic VOR Signals. Several factors such as terrain, distance, bent courses, etc., produce short term needle deflections which can cause excessive roll motion when in the OMNI Mode.



LOCALIZER (Normal) MODE

In the LOC NORM mode, the system automatically adjusts its sensitivity to accommodate the $2\frac{1}{2}^\circ$ full needle signal instead of the 10° as found in Omni navigation.



LOCALIZER (Reverse) MODE

The features of LOC-NORM except that the aircraft will fly away from the Localizer Indicator needle instead of toward. When using the LOC-REV mode, the Course Selector D.G. is set to the reciprocal of the Front-Course heading.

In FSX environment the NAV, OMNI and LOC modes are actually the same. Due to exact AP option features, when switched to LOC NORM position, the autopilot actually works as in APR mode.

GLIDESLOPE COUPLER SYSTEM



The Glideslope Coupler is an analog computer that directs the Autopilot to intercept and track the approach glidepath. It is used with Lateral Guidance System switched to LOC NORM mode and ALT key depressed at list 20 seconds before the GS Coupler is armed.

INDICATOR LIGHT

The Glideslope Coupler incorporates a panel mounted green indicator light. This light will turn ON at the same time automatic switching takes place to couple the Autopilot to the glide path. This light will stay lit until such time as the unit is decoupled. As this light *only* shows that the Glideslope Coupler is switched into the Autopilot and not actual position relative to glide path. The deviation indicator must be monitored during the approach.

ILS APPROACH PROCEDURES GLIDESLOPE APPROACH (Typical)

1. To intercept ILS
 - a) Dial ILS outbound course on course selector D.G.
 - b) Position Radio Coupler mode switch to LOC REV mode.
 - c) Altitude Hold or Pitch Mode, for Altitude Control.
2. After intercept and at appropriate time, descent to approach altitude.
3. Press ALT Hold switch on console at published approach altitude. Dial procedure turn outbound heading on D.G. and position mode selector to HDG.
4. After one minute, dial the published in bound procedure turn heading moving D.G. course selector in direction of turn. When between 90 and 45 degrees to the inbound heading, dial inbound course on Course Selector D.G. and position mode selector to LOC NORM mode. NOTE: For optimum results, switch to localizer normal at 45°. At this point the airplane will automatically intercept and track the localizer beam, you should be at the proper altitude and on ALT Hold and the glideslope deviation needle should be up. If the above conditions are met for 20 seconds or more, the Glideslope Coupler logic circuit will be armed. Adjust power for the gear down or normal approach speed.
5. Upon interception of glide path (when deviation needle drops to center) the Glideslope Coupler will automatically engage the indicator light will come on, and the aircraft will assure a preset nose-down attitude for descent. Drop gear and re-adjust power as necessary to maintain approach speed. Position flaps not to exceed 15° for approach at this time . Do not change gear or flap setting after initial glideslope intercept for remainder of glideslope coupler operation. Power and airspeed changes must be made carefully to prevent excessive attitude changes.

NOTE: Monitor deviation indicators for actual position on Localizer and glide path. Transmissions may cause deviation needle to fluctuate on some radio installations. On such installations, the coupler will attempt to follow these deviations.

- A) Upon completion of Glideslope Coupler approach, or when VFR, disconnect Autopilot and adjust aircraft for landing configuration.
 - B) For missed approach procedure, set Pitch Command to Climb Attitude. Switch Coupler to HDG mode and apply climb power, gear and flap up, disengage Altitude Hold and set Autopilot to missed approach HDG.
6. To de-couple any one of the following methods may be used:
- A) Switch ALT Hold OFF. this will de-couple Glideslope and revert pitch control to the "Pitch Command Knob," which may be preset to desired climb attitude.
 - B) Switch ALT Hold OFF. then ON. this will de-couple Glideslope and return to altitude hold.
 - C) Switch Radio Coupler OFF, LOC-Norm mode. this will de-couple Glideslope and return pitch control to ALT Hold.
 - D) Disconnect entire autopilot and hand fly aircraft.

Piper Autocontrol IIIB Autipilot System



COMMAND CONSOLE

1. Roll (aileron) engagemen key
2. Roll command knob
3. Heading mode key

The Piper Autocontrol IIIB is a one-axis autopilot, providing basic roll and heading functions. The similar lateral guidance switch (as used with the Altimatic IIIC) provides automatic beam capture and tracking of OMNI station, VOR, LOC (normal or reverse), or GPS as selected for presentation on the HSI or CDI.

S-Tec System 30 ALT



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2

The S-Tec System 30 ALT is a one-axis autopilot, providing altitude hold function.

1. Altitude Hold Master Switch
2. ALT HOLD Switch Display



Master Switch ON



ALT HOLD Mode Engaged



TRIM DN Required



TRIM UP Required

3. Radio Equipment

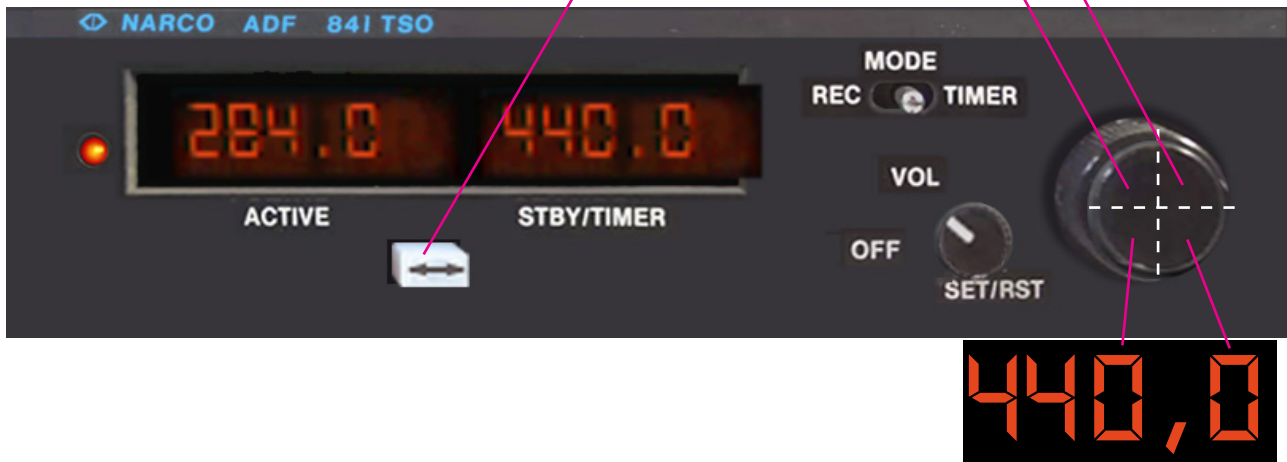
COM/NAV Radios

After switching on the radio click this key to light on NAV display



ADF Reciever

After switching on the receiver click this key to light on frequency display



DME Reciever



Distance/Frequency Display Mode

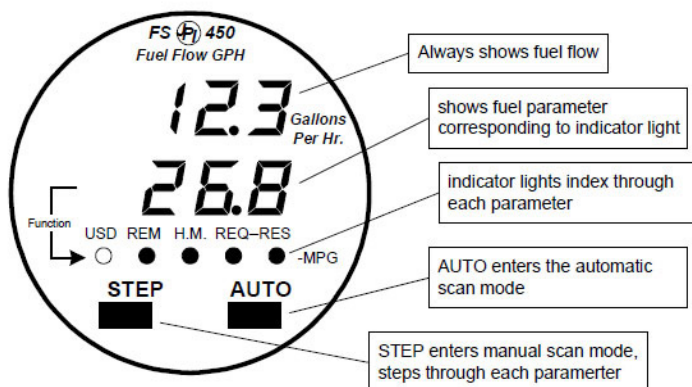
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|-------------------------------|------------------------------------|
| 1. Display Mode Switch | 5. Frequency Display Sector |
| 2. ON/OFF Switch | 6. Nav1/Nav2 Display Sector |
| 3. Nav1/Nav2 Frequency Switch | 7. Ground Speed Display Sector |
| 4. Distance Display Sector | 8. Time-to-Location Display Sector |



Distance/Ground Speed/Time-to-Location Display Mode

4. Auxiliary fuel flow control gauge

FS-450 Fuel Totalizer



Parameter Description	Example	Comments
USD —Total Fuel Used	38 . 2	Since last refueling or trip total.
REM —Fuel Remaining	37 . 2	In gallons, liters or pounds
H.M. —Time to Empty	02 . 45	Hours. Minutes Remaining at current fuel burn
REQ —Fuel required to next GPS WPT or Destination	25 . 8	Present with GPS interface Valid signal and way point
RES —Fuel Reserve at next GPS WPT or Destination	I I . 3	Present with GPS interface Valid signal and way point

Credits

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|---------------------------------|---|
| 1. Rien Cornelissen | - original FSX Piper Turbo Arrow III |
| 2. Gunter Teson1 | - RealEngine gauge |
| 3. Premier Aircraft Design team | - FS9 Garmin gauge |
| 5. Pierre Fasseaux | - Davtron M803 timer and Bendix King VOR gauges |