Installation Guide
For
Vizion PMA Autopilot

Prepared by

TruTrak Flight Systems, Inc.

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Table of Contents

1. Document Revision History

Rev	Description	Pages	Date
Prelim	Preliminary manual created	21	2-7-17
Init	Updated sections for final product and added panel mount GPS information	24	6-14-17
Rev A	Updated voltage to be 12 volts and formatting	23	7-12-17
Rev B	Updated voltage to cover 24 volt servos	23	9-6-17
Rev C	Updated wiring diagram, system diagram , added appendix c	23	1-8-18
Rev D	Added appendix D	23	1-12-18

2. Controller Installation

2.1.Mounting Considerations

The Vizion controller unit is designed to mount in the aircraft instrument panel within view and reach of the pilot. Maximum recommended viewing angle should be no more than 20 deg. The maximum mounting angle the Vizion can accommodate is 10 degrees longitudinal (pitch) axis and 0 degrees lateral (roll or yaw) axis. The location should be such that the controller unit is not blocked by the glare shield on top, or by the throttles, control yoke, etc. on the bottom. Use appropriate aircraft installation standards for mounting and support of the autopilot controller. *After completion of mechanical installation, apply torque seal (Cross Check A498M or equivalent) to all servo and servo linkage fasteners.*

2.2.Wiring Considerations

Use AWG #24 or larger wire for all connections unless otherwise specified. The standard crimp pin contacts supplied in the connector kit are compatible with up to AWG #20 wire. AWG #20 shall be used for all power and ground connections. Do not attach any wires to the outside of the autopilot controller or route high current wires within six (6) inches of the controller. Ensure that routing of the wiring is not exposed to sources of heat, RF or EMI. Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling and routing near aircraft control cables. Do not route the COM antenna coax within twelve (12) inches of any autopilot components.

- Ensure that the autopilot master switch is mounted in a location that is easily accessible to the pilot / crew.
- Ensure that the autopilot circuit breaker is mounted in a location that is easily accessible to the pilot / crew.
- Ensure that the Control Wheel Steering button / emergency autopilot disconnect switch is mounted on the pilot's yoke / stick. This button must be installed, must be red in color, and must be labeled as AP CWS or AP DISCO or AP CUTOFF.
- Ensure that the Emergency Level button is located in a clearly visible and accessible portion of the panel. This button must be accessible to both pilot and copilot.

2.3.Pitot / Static Connection

All TruTrak autopilots require connections to the pitot and static systems. The preferred method of this connection would be tee fittings near the aircraft's altimeter. The static line for the autopilot requires due care in its construction, as excessive lag or insufficient static orifices can cause the autopilot to oscillate (hunt) in pitch. Although there is compensation within the autopilot sufficient to handle moderate amounts of lag, the importance of a good static port and line cannot be overstated.

In some cases problems can be caused by having a large number of devices (including the autopilot) connected to a single, insufficient, static port. In other cases, the static line itself is adequate but there are one or more devices connected to the same line, one of which has a large static reservoir. A simple remedy for this problem if it occurs is a tee-fitting near the static port, and a dedicated line to the autopilot only. Obviously, an insufficiently-large orifice coupled with large static reservoirs can aggravate the problems associated with lag.

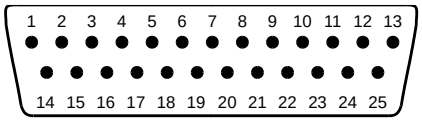
2.4.RFI / EMI Considerations

The autopilot controller is shielded and does not generate any appreciable level of electromagnetic interference. Moreover, the servo lines (except for power and ground) are low-current and cannot contribute to RF interference. The servo power and ground lines do have switching currents through them, but so long as there are no parallel runs of servo power and ground lines with such things as poorly-shielded antenna lines or strobe light power lines, there is no need to shield the servo harnesses.

The autopilot itself has been internally protected from RF interference and has been tested under fairly extreme conditions, such as close proximity to transmitting antennas. However, it is always good practice to ensure that such antennas are properly shielded and not routed directly over or under sensitive panel-mounted electronic equipment. Most problems in this area are the result of improper RF shielding on transmitting antennas, microphone cables, and the like. The most sensitive input to the autopilot is the Control Wheel Steering switch input. This line should not be routed in parallel with transmitting antennas or other sources of known RF interference. If necessary, it can be shielded with the shield connection to pin 13 of the autopilot connector.

2.5.Vizion Electrical Pin Out

The table below provides a brief explanation of each pin function on the main 25-pin connector P101.

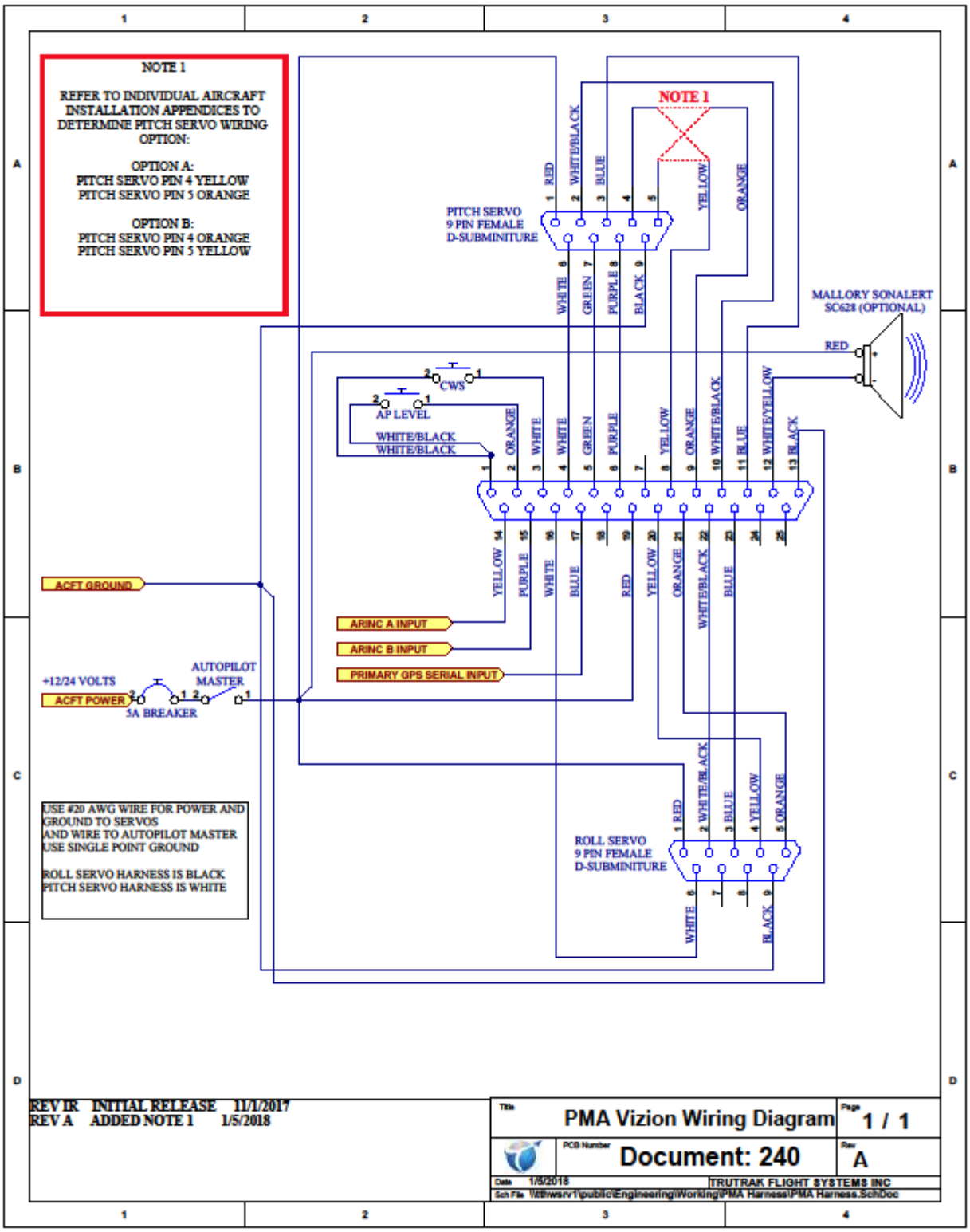


Rear 25-Pin Connector
P101
viewed from rear of unit

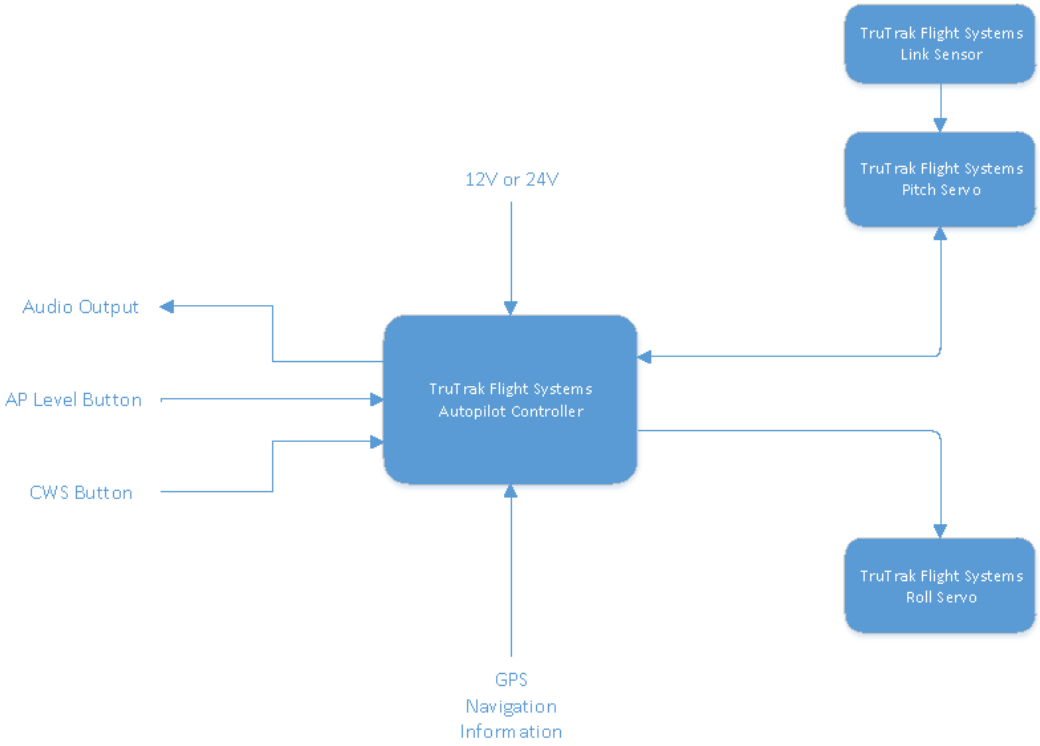
P101 Pin	Function	Notes
1	Used for external Emergency AP Level button connection.	
2	Used for external Emergency AP Level button connection.	
3	**Control Wheel Steering**. Connect as shown in wiring diagram to a RED SPST momentary switch located on the aircraft control yoke or stick to remotely disconnect the autopilot. This is also used for the control wheel steering function.	
4	**Pitch Servo Torque Control**. A signal from the autopilot to the pitch servo, which sets the amount of torque to be delivered by the servo.	
5	**Pitch Servo Trim Sensor**. A signal from the pitch servo to the autopilot, which indicates an out-of-trim condition and its direction.	
6	**Pitch Servo Trim Sensor**. A second signal from the pitch servo to the autopilot, which indicates an out-of-trim condition and its direction.	
7	Unused.	
8	**Pitch Servo control lines**. These lines cause the stepper motor in the pitch servo to run in the appropriate direction at the desired velocity. They are small-signal lines and do not have any substantial current-carrying capability or require any special shielding. Connect to pitch servo as shown on wiring diagram.	
9		
10		
11		
12	**Audio annunciator output** Connect to optional audio annunciator. Designed to drive Mallory Sonalert SC628 type device.	
13	**Ground Connection**. Provide #20 AWG to common grounding point.	
14	**ARINC 429 Input A**	
15	**ARINC 429 Input B**	
16	**Roll Servo Torque Control**. A signal from the autopilot to the roll (aileron) servo, which sets the amount of torque to be delivered by the servo.	

17	**Primary Serial Input**. Baud rate selectable 1200, 2400, 4800 or 9600 baud. Automatically decodes NMEA-0183, Garmin Aviation Format, or Apollo/UPSAT Moving-Map or GPSS format. Provides directional reference to the autopilot.	
18	Unused	
19	**Autopilot Master** (+12 OR +24 V DC). The autopilot itself draws less than 0.5 ampere. Most of the current required by the autopilot system is used by the servos (up to 2A per servo at 12 Volts).	
20 21 22 23	**Roll (aileron) Servo control lines.** These lines cause the stepping motor in the roll servo to run in the appropriate direction at the desired velocity. They are small-signal lines and do not have any substantial current-carrying capability or require any special shielding. Connect to roll servo as shown on wiring diagram.	
24	Unused.	
25	Unused.	

2.6.Vizion Wiring Diagram

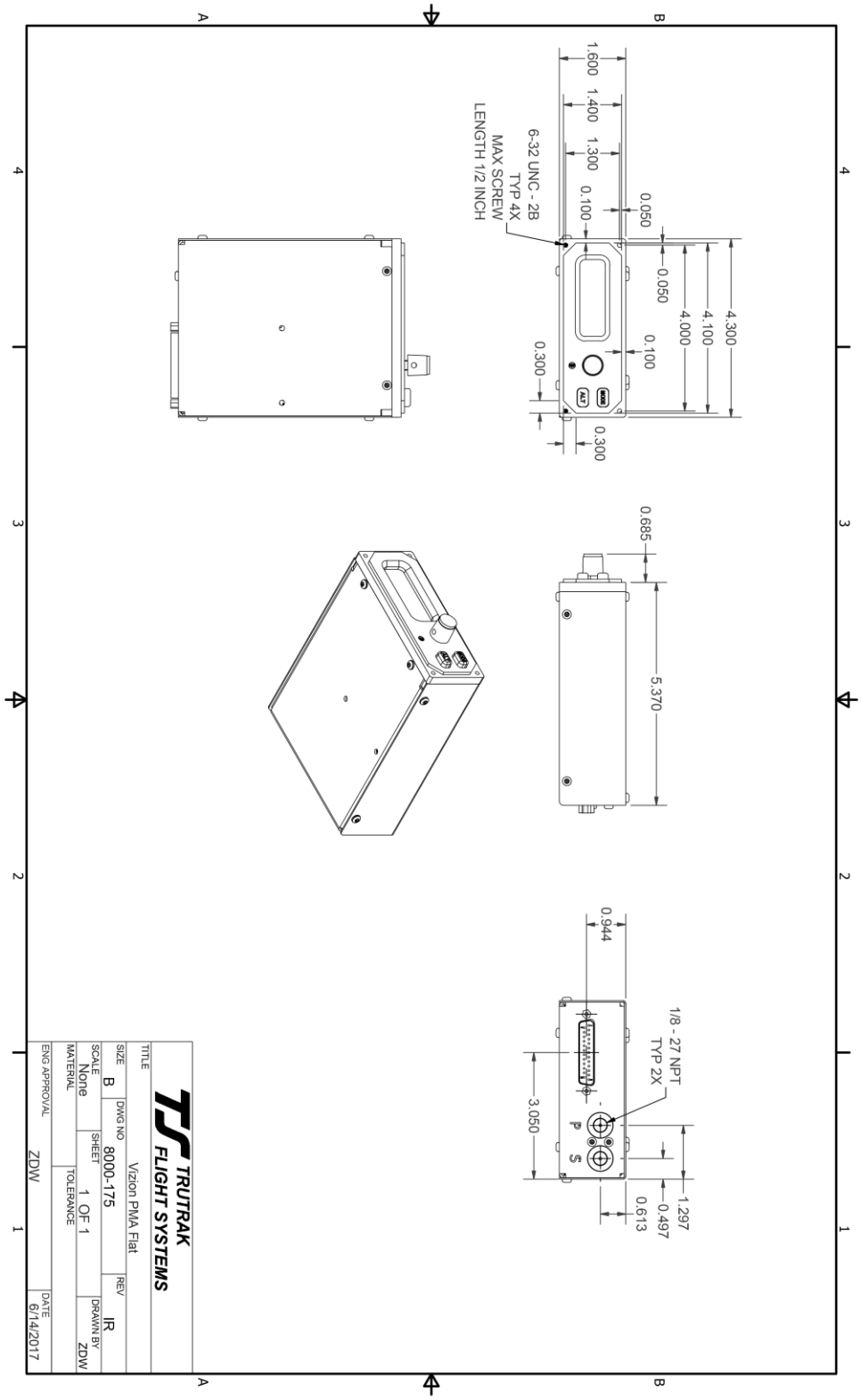


2.7. Vizion Autopilot System Diagram

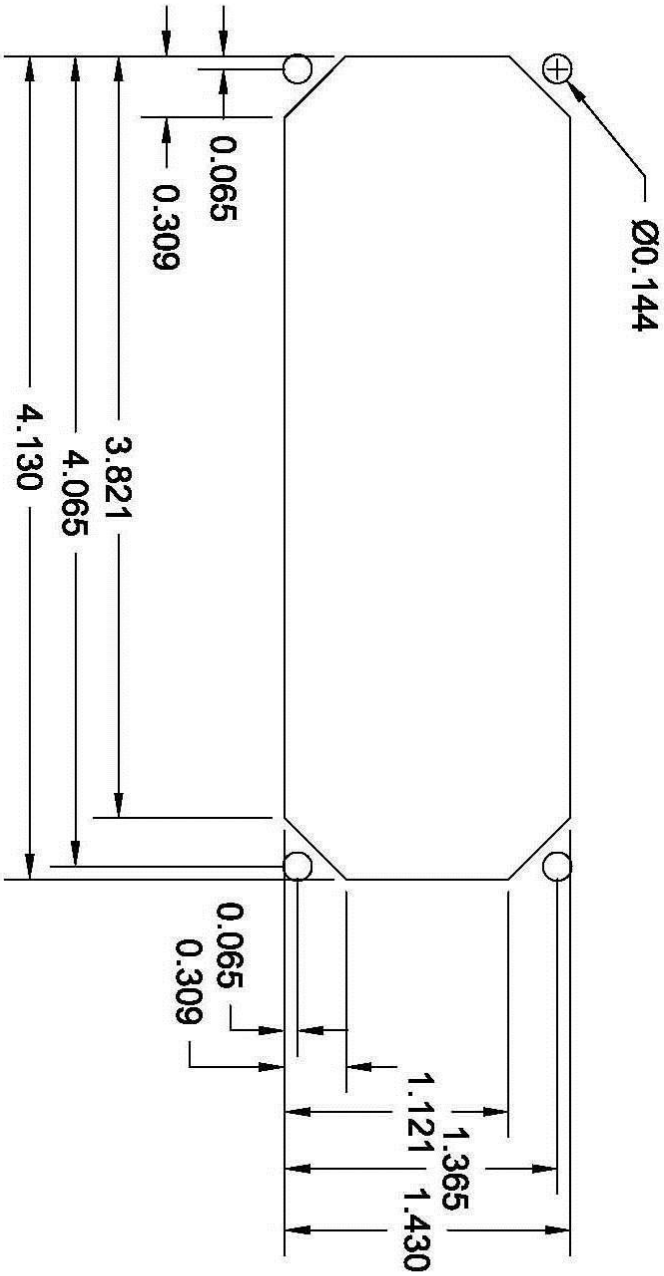


3. Controller Cut-outs and Dimensions

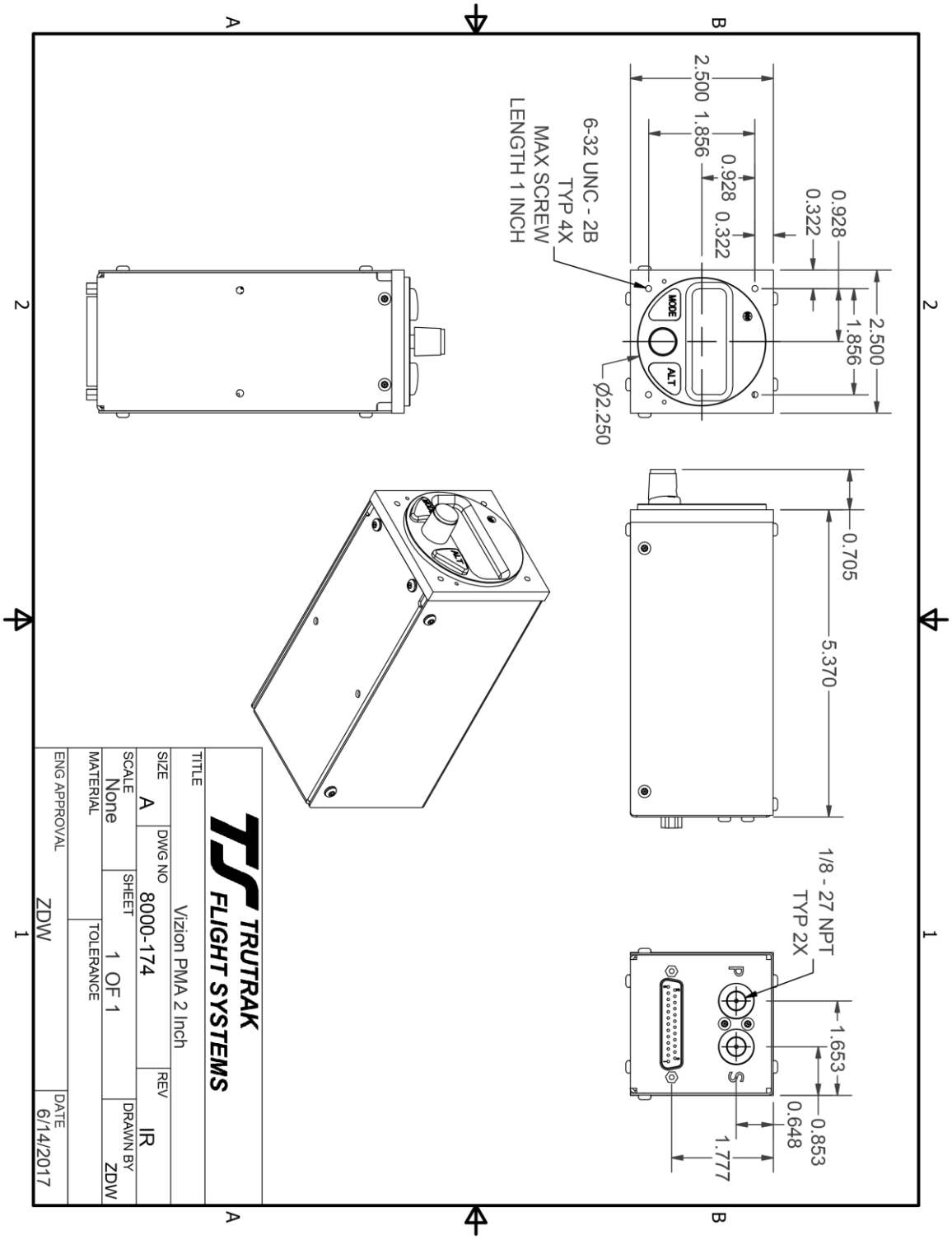
3.1. Flat Pack Dimensions (8000-175)



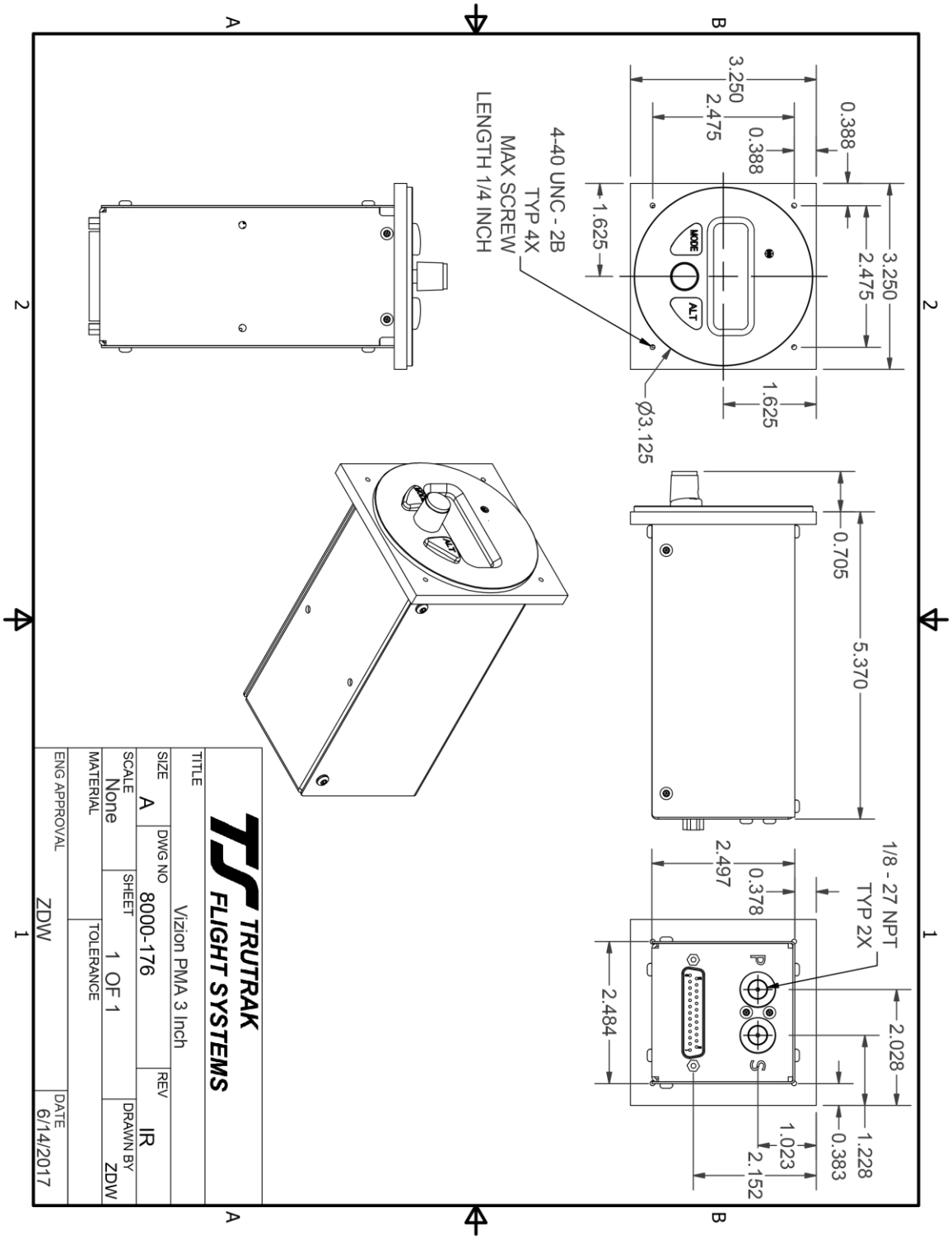
3.2.Flat Pack Panel Cut-out



3.3. 2-1/4" Round Dimensions (8000-174)



3.4. 3-1/8" Round Dimensions (8000-176)



4. GPS Setup Guide

Many new handheld GPS's have adequate output required to fly a TruTrak autopilot. Although most support data output not all handhelds will provide consistent and reliable information required to fly all TruTrak autopilots. Therefore, some handhelds will not fly the airplane well.

We require a data output rate of once per second for best performance. Some handhelds output data at longer intervals than once per second. These handhelds will cause the autopilot not to perform well in turns and it may cause overshooting and hunting. Most handhelds will require a data cable that plugs into the handheld and provides a medium for data output. This is an accessory and is available from your GPS manufacturer. The setup procedures are in your GPS manual. If your GPS is not listed here consult your GPS manual for NMEA output setup. The autopilot must have a direct connection with the handheld GPS to provide the autopilot with RS-232. To allow the handheld GPS to be removed easily you should add a connector in your panel. We recommend that you use a 9 pin D sub-miniature connector in your panel that will mate to the harness from the GPS. This will also allow you to wire power and ground and use the aircraft electrical system to power your handheld GPS.

4.1.Handheld GPS Setup

4.1.1. Garmin GPS 195

The GPS 195 provides data output every two seconds and may be slow in recognizing turns and will overshoot the desired track. This may cause the autopilot to wander and not perform well in turns.

The Garmin 195 requires a Power/data cable (Garmin Part Number 010-10135-00) to provide data output. The Garmin 195 must be configured to provide the correct output to the autopilot.

Press the **MENU** key twice. Select 'Set-Up Menu'. Press **ENTER**. Select 'Input/Output'. Press **ENTER**. The input/output format is 'No In/NMEA Out.' Note that the baud rate is automatically set at 4800 bps.

Note: This is the baud rate that will need to be entered in the setup mode of the autopilot.

4.1.2. Garmin GPS 196

The Garmin 196 requires a Power/data cable (Garmin Part Number 010-10082-00) to provide data output.

The Garmin 196 must be configured to provide the correct output to the autopilot.

Press the **MENU** key twice. Use the arrow keypad to select the 'SETUP' tab.

Within the Setup Menu select the 'INTERFACE' tab. Using the arrow keypad highlight the 'Serial Data Format' field. Use the arrow keypad to select 'NMEA In/NMEA Out' and press **ENTER**.

Set the baud rate to 4800.

Note: This is the baud rate that will need to be entered in the setup mode of the autopilot.

Press **MENU** to enter the Advanced NMEA page. Select 'Advanced NMEA Setup' and press **ENTER**.

Using the arrow keypad and the **ENTER** key to turn OFF 'GPS Status (GSA, GSV)', 'Waypoint/Route (WPL, RTE)', and 'GARMIN Proprietary'.

4.1.3. Garmin GPS 296

The Garmin 296 must be configured to provide the correct output to the autopilot.
Press the **MENU** key twice. Use the rocker keypad to select the SETUP in the vertical tabs. Use the rocker keypad to select the 'COM 1' tab.
Press the down portion of the rocker keypad to select the 'FORMAT' field.
Press **ENTER** and a popup window will show the available settings.
Use the rocker keypad to select 'NMEA IN / NMEA OUT' then press **ENTER**. Select 4800 for the baud rate. Note: This is the baud rate that will need to be entered in the setup mode of the autopilot.
Press **MENU** to enter the Advanced NMEA page. Select 'Advanced NMEA Setup' and press **ENTER**.
Using the arrow keypad and the **ENTER** key to select "FAST OUTPUT" or turn OFF 'GPS Status (GSA, GSV)', 'Waypoint/Route (WPL, RTE)', and 'GARMIN Proprietary'.

4.1.4. Garmin GPS 396/496

The Garmin 496 must be configured to provide the correct output to the autopilot.
Press the **MENU** key twice. Use the rocker keypad to select the SETUP in the vertical tabs. Use the rocker keypad to select the 'Interface' tab.
Press the down portion of the rocker keypad to select the 'Serial Data Format' field.
Press **ENTER** and a popup window will show the available settings.
Use the rocker keypad to select 'NMEA IN / NMEA OUT' then press **ENTER**. Select 4800 for the baud rate. Note: This is the baud rate that will need to be entered in the setup mode of the autopilot.
Press **MENU** to enter the Advanced NMEA page. Select 'Advanced NMEA Setup' and press **ENTER**.
Using the arrow keypad and the **ENTER** key to select "FAST OUTPUT" or turn OFF 'GPS Status (GSA, GSV)', 'Waypoint/Route (WPL, RTE)', and 'GARMIN Proprietary'.

4.1.5. Lowrance Airmap 100

The Lowrance Airmap 100 requires a NMEA/DGPS adapter cable to provide data output. The Lowrance Airmap 100 must be configured to provide the correct output to the autopilot.
Press the **MENU** key then select "NMEA/DGPS CONFIG" from the "System Setup" menu. Highlight the "NMEA OUT" menu then press the right arrow key.
Note: The default baud rate is 4800. This is the baud rate that will entered into the autopilot in the setup mode.

4.1.6. Lowrance Airmap 1000/2000

The Lowrance Airmap 1000/2000 requires a NMEA/DGPS adapter cable to provide data output. The Lowrance Airmap 1000/2000 must be configured to provide the correct output to the autopilot. AirMap has one NMEA 0183 version 2.0 compatible communication port,

Press **MENU|MENU|↓** to **SYSTEM SETUP|ENT**. Press ↓ to **COMMUNICATIONS PORT|ENT**. Select 9600 Baud. This is the baud rate that will entered into the autopilot in the setup mode. Select "NMEA OUT"

4.1.7. Avmap EKP IV

The AvMap EKP IV requires a NMEA/DGPS adapter cable to provide data output. The AvMap EKP IV must be configured to provide the correct output to the autopilot.
MENU' 1 sec. + "COMMUNICATIONS" + 'ENTER' + "NMEA OUTPUT" + 'ENTER'.
The Output NMEA0183 messages are RMC, RMB that need to be selected.
Note: The default baud rate is 4800. This is the baud rate that will entered into the autopilot in the setup mode. The yellow wire is the Data out TX wire.

4.1.8. Garmin 695/696/795/796

Garmin 696 connections to TruTrak autopilot			
Garmin Power/Data Cable	**Signal Name (Garmin)**	**Signal Name (TruTrak)**	**P101 on TruTrak Vizion**
Blue Wire	GPS RS 232 OUT 1	Primary Serial Input	17

Select Tools -> Setup -> Interface

Select the drop down menu under Serial Data Format. Choose one of the formats that outputs NMEA Out. There are three options:

-Aviation In/NMEA & VHF Out is 9600 baud
-GTX TIS-A In/NMEA & VHF Out is 9600 baud
-NMEA Out is 4800 baud

Be sure to match the autopilot baud rate setting to the selected baud rate in the GPS.

4.1.9. Garmin Aera 500/510/550/560/660

Garmin Aera connections to TruTrak autopilot			
Garmin Power/Data Cable	**Signal Name (Garmin)**	**Signal Name (TruTrak)**	**P101 on TruTrak Vizion**
Blue Wire	GPS RS 232 OUT 1	Primary Serial Input	17

Select Tools -> Setup -> Interface

Select the drop down menu under Serial Data Format. Choose one of the formats that outputs NMEA Out. There are three options:

-Aviation In/NMEA & VHF Out is 9600 baud
-GTX TIS-A In/NMEA & VHF Out is 9600 baud
-NMEA Out is 4800 baud

Be sure to match the autopilot baud rate setting to the selected baud rate in the GPS.

4.2.Panel Mount GPS Setup

4.2.1. Garmin 155XL/250XL/300XL

Garmin 155XL/250XL/300XL connections to TruTrak autopilot			
J1 on Garmin unit	**Signal Name (Garmin)**	**Signal Name (TruTrak)**	**P101 on TruTrak Vizion**
19	GPS RS 232 OUT 2	Primary Serial Input	17
16	GPS ARINC 429 OUT A	ARINC-A	14
15	GPS ARINC 429 OUT B	ARINC-B	15

Press & hold **MSG**, rotate outer knob until I/O setup page is displayed. Press **CRSR** twice and rotate inner knob to select "plotting" for output to autopilot. Rotate outer knob to advance cursor to the baud rate field, select 9600. Press **CRSR** to finish.

To set the ARINC output. Remove the data cards turn the unit on. Press "enter" in response to "Select operating mode Normal?" Press "enter" in response to "No Jeppesen database rte / prx limited to user wpts ok?" After the satellite status page is displayed for 5 seconds the unit may be turned off.

With power OFF press and hold the **ENT** key and turn the power on (release the ENT key when the display activates). You should be in the TEST MODE. Press the CRSR key then rotate the outer knob to Select ARINC 429 CHANNEL. Press the CRSR key then rotate the inner knob to advance to OUTPUT and select "w/o GAMA labels"

4.2.2. Garmin 430W and 530W

Garmin 430 and 530 connections to TruTrak autopilot			
P4001 [P5001] on Garmin 430 [530]	**Signal Name (Garmin)**	**Signal Name (TruTrak)**	**P101 on TruTrak Vizion**
56	GPS RS 232 OUT 1	Primary Serial Input	17
46	GPS ARINC 429 OUT A	ARINC-A	14
47	GPS ARINC 429 OUT B	ARINC-B	15

Power 430/530 up and turn it on while holding down the ENT key. Release the ENT key when the display activates. After the data base pages, the first page displayed is the MAIN ARINC 429 CONFIG page. While in Configuration mode, pages can be selected by ensuring the cursor is off and rotating the small right knob. To change data on the displayed Configuration Page, press the small right knob (CRSR) to turn

on the cursor. Turn the large right knob to change between data fields. Turn the large or small right knob to change a field that the cursor is on. Once you have made the desired selection, press the ENT key to accept the entry. The second startup page will test the RS 232 and ARINC inputs on the ground, a good RS 232 connection will display GPS NAV and the asterisk, ARINC will display GPSS and move the stick right and left.

With the MAIN ARINC 429 CONFIG page displayed, on the row labeled OUT, select SPEED ➔ Low
and DATA ➔429 GAMA. In the VNAV row ENABLE LABELS.

Advance to the MAIN RS232 CONFIG page.

On the row labeled CHNL1, select OUTPUT ➔ Aviation.

Note that for the Garmin units, the autopilot will need to be set for 9600 baud.

4.2.3. Garmin GTN-650/GTN-750

Garmin GTN-650/GTN-750 connections to TruTrak autopilot			
P1001	**Signal Name (Garmin)**	**Signal Name (TruTrak)**	**P101 on TruTrak Vizion**
8	GPS RS 232 OUT 1	Primary Serial Input	17
10	GPS ARINC 429 OUT A	ARINC-A	14
29	GPS ARINC 429 OUT B	ARINC-B	15

Press and hold the HOME key when powering up the GTN-650/ GTN-750. Release the key when the display activates. When the config mode screen shows, touch GTN Setup.

Touch RS232. On channel 1 output, select Aviation. Back out to the main config menu.

Touch ARINC-429. On channel 1 output, select GAMA 1, Speed LOW. Back out to the main config menu.

Touch Update Config Module.

Make sure the autopilot baud rate is set to 9600.

5. Vizion Ground Checkout

Once installation and setup of the autopilot are complete, (see appropriate appendix for servo installation, wiring harness routing, and autopilot controller settings) a ground checkout is required before the first flight of the system. This procedure will verify correct servo direction and pitot / static system connection.

The following steps should be used to do a ground checkout prior to powering or engaging autopilot in flight.

1. Apply power to autopilot and servos and GPS (if equipped). If GPS equipped ensure a GPS has a position fix.
2. Verify autopilot display shows either NO FIX or GPS OK in the upper left.
3. Center both aileron and elevator control surfaces.
4. Using a calibrated PITOT / STATIC test box, connected to both PITOT and STATIC ports of the aircraft, apply an airspeed to the system within above MINIMUM AIRSPEED but below MAXIMUM AIRSPEED (These values are given in the appropriate appendix for the aircraft make / model).
5. Engage the autopilot with a PRESS of the KNOB on the face of the autopilot.
6. Verify that both roll and pitch servos have engaged and are holding aircraft controls.
7. Adjust PITOT pressure to lower the airspeed to below MINIMUM AIRSPEED.
8. Verify that autopilot display shows MIN AS within approximately 3 knots of calibrated airspeed indicator on test box.
9. Adjust PITOT pressure to increase the airspeed to above MAXIMUM AIRSPEED.
10. Verify that autopilot display shows MAX AS within approximately 3 knots of calibrated airspeed indicator on test box.
11. Return PITOT pressure to normal range between MINIMUM and MAXIMUM AIRSPEED.
12. Adjust STATIC pressure to lower altitude at a few hundred feet per minute.
13. Verify that stick or yoke moves aft.
14. Adjust STATIC pressure to increase altitude at a few hundred feet per minute.
15. Verify that stick or yoke moves forward.
16. ROTATE KNOB clockwise to command a turn to the right.
17. Verify that stick or yoke moves to roll the aircraft to the right.
18. ROTATE KNOB counter-clockwise to command a turn the left, make sure to rotate far enough to actually command a left turn.
19. Verify that the stick or yoke moves to roll the aircraft to the left.
20. Disengage autopilot with a PRESS of the CWS button.
21. Verify that servos have disconnected, autopilot display shows AP OFF, and controls are again free.

22. Center both aileron and elevator control surfaces.
23. Engage autopilot with a PRESS of the AP LEVEL button.
24. Verify that both roll and pitch servos have engaged and are holding aircraft controls.
25. PRESS KNOB to move cursor to SVS and ROTATE KNOB clockwise to select a 300 fpm VS climb.
26. Verify that stick or yoke moves aft.
27. Apply a force to the stick or yoke to resist the aft movement
28. Verify that the center of the autopilot display shows the letters UP with an arrow pointing up above them. (this is the indication to trim the aircraft for nose up).
29. PRESS KNOB to move cursor to SVS and ROTATE KNOB counter-clockwise to select a -300 fpm VS climb.
30. Verify that stick or yoke moves forward.
31. Apply a force to the stick or yoke to resist the forward movement
32. Verify that the center of the autopilot display shows the letters DN with an arrow pointing down below them (this is the indication to trim the aircraft for nose down).
33. Disengage the autopilot with a PUSH and HOLD of the knob, release when the display shows AP OFF.
34. Verify that both servos have disconnected and controls are again free.

If steps 1-34 are all verified then the autopilot is ready for a confirmation flight.

6. Vizion First Flight Checkout

Prior to performing Vizion first flight, it is strongly recommended that the pilot be familiar with the operation of the Vizion system. Reading though both the Vizion AFMS (TruTrak Doc 176) and the Vizion Operating Manual (TruTrak Doc 167) is recommended. It would also be beneficial to spend some time operating the Vizion autopilot system on the ground to ensure familiarity with modes and controls.

1. Apply power to autopilot and servos and GPS (if equipped). If GPS equipped ensure GPS has a position fix.
2. If GPS equipped, verify autopilot display shows TRK (if aircraft is moving at greater than 15 knots ground speed) and the current track in the upper left.
3. Synchronize autopilot altimeter to aircraft altimeter, CLICK ALT button two times and ROTATE KNOB until displayed altitude matches that of the aircraft altimeter.
4. Engage the autopilot with a CLICK of the KNOB on the face of the autopilot.
5. Verify that both roll and pitch servos have engaged and are holding aircraft controls. The autopilot should synchronize to the current track and vertical speed being flown at the time.

6. ROTATE KNOB clockwise to command a turn of about 60 degrees to the right. (If not GPS equipped, then command a 10-15 degree bank angle)
7. Verify that the aircraft follows the commands and rolls out within a few degrees of the selected track. (If not GPS equipped, the turn must be manually stopped by rotating the KNOB to zero bank)
8. ROTATE KNOB counter-clockwise to command a turn of about 60 degrees the left.
9. Verify that the aircraft follows the commands and rolls out within a few degrees of the selected track. (If not GPS equipped, the turn must be manually stopped by rotating the KNOB to zero bank)
10. If GPS equipped, enter a flight plan or direct to into the GPS.
11. CLICK MODE button to engage either GPS NAV or GPSS.
12. Ensure that autopilot follows GPS flight plan / direct to.
13. Disengage autopilot with a CLICK of the CWS button.
14. Verify that servos have disconnected, autopilot display shows AP OFF, and controls are again free.
15. Engage autopilot with a CLICK of the AP LEVEL button.
16. Verify that both roll and pitch servos have engaged and are holding aircraft controls. (Display will show BANK mode for several seconds and then will transition to TRK mode if GPS equipped)
17. CLICK ALT button to enter altitude select mode.
18. ROTATE KNOB to select an altitude approximately 300 feet lower, CLICK KNOB to move cursor to VS field, ROTATE KNOB to select a climb rate of approximately -300 fpm. CLICK KNOB to enter altitude select mode.
19. Verify that aircraft descends to and levels off within 20 feet of selected altitude (If trim indication appears, trim aircraft accordingly).
20. Disengage the autopilot with a PRESS and HOLD of the knob, release when the display shows AP OFF.
21. Ensure that AEP is in STBY mode. Display should show AEP STBY, if display does not show AEP STBY, CLICK MODE button to toggle AEP mode from AEP OFF to AEP STBY.
22. Manually fly aircraft to bank angle of approximately 45 degrees, verify that AEP engages (Display shows AEP ACTIVE) and roll servo puts force into the control system moving controls in a direction to lower the bank angle.
23. Verify that AEP goes back to STBY when bank angle decreases to approximately 35 degrees.

7. Troubleshooting Guide

Autopilot System Fault	Possible cause	Possible remedy
Autopilot does not power up when circuit breaker / autopilot master is engaged	Circuit breaker malfunction	Inspect and replace circuit breaker if necessary.
	Autopilot not wired to ground	Verify and fix any wiring errors.
Roll servo does not engage when autopilot system is engaged	Roll servo wiring is faulty	Install servo harness tester in place of roll servo, and / or verify correct wiring.
Pitch servo does not engage when autopilot system is engaged	Pitch servo wiring is faulty	Install servo harness tester in place of pitch servo, and / or verify correct wiring.
Roll servo moves in the wrong direction during ground test	Servo wiring incorrect or servo direction not correct in setup.	Verify correct wiring and / or change roll servo direction in autopilot setup.
Pitch servo moves the wrong direction during ground test; trim indicates incorrect direction.	Servo wiring incorrect or servo direction not correct in setup.	Verify correct wiring and / or change pitch servo direction in autopilot setup.
Pitch servo moves the wrong direction during ground test; trim indicates correct direction.	Servo wiring incorrect.	Verify correct wiring
Autopilot controller displays NO GPS	GPS is not configured correctly	Configure RS232 output on GPS.
	Autopilot controller baud rate is set incorrectly	Enter lateral setup menu of autopilot controller, set baud rate to match that of GPS
	GPS wiring is faulty	Check continuity of RS232 transmit wire from GPS to pin 17 of autopilot controller

8. Appendix A – Cessna 172 F-S Installation Information

Contract TruTrak for appropriate installation information.

9. Appendix B – Cessna 177 Installation Information

Contract TruTrak for appropriate installation information.

10. Appendix C – Cessna 175/172 All Models Installation Information

Contract TruTrak for appropriate installation information.

11. Appendix D – PA-28 and PA-32 Installation Information

Contract TruTrak for appropriate installation information.

TruTrak Flight Systems, Inc.