Approved GPS and Software List
For
Vizion PMA Autopilot
And
Procedure for Approving Additional GPS or Software

Prepared by

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Table of Contents

1. Document Revision History

Rev	Description	Pages	Date
Init	Preliminary manual created	13	7-5-17
A	Added Aera 660, GPS connection and configuration to flight check report, added KLN 89B, and 696.	13	2-14-18
B	Added Garmin 796 and GPS 150XL	13	4-30-18
C	Added Garmin 296, Apollo GX60 and Bendix King KSN770, Avidyne IFD 4XX/5XX, Garmin 300XL, Updated Garmin configurations for GDL 39 usage	17	9-7-18

2. Table of Approved GPS Units

2.1. Vizion Hardware and Software Covered

Vizion Hardware	Vizion Software
Rev A	PV.30

2.2. Approved TSO GPS Units and Software Versions

GPS	GPS Software Version
Apollo GX60	1.22, 3.5
Avidyne IFD 440	10.2.2.0
Avidyne IFD 540	10.2.0.0
Avidyne IFD 550	10.2.0.0
Bendix King KLN 89B	00880-0007
Bendix King KSN770	0106
Garmin GNC 150XL	2.07
Garmin GNC 250XL	2.09
Garmin GNC 300XL	2.09
Garmin GNS 430/430W	5.20
Garmin GTN 650	4.10

2.3. Approved non-TSO (Portable) GPS Units and Software Versions

GPS	GPS Software Version
Garmin 296	6.10
Garmin 496	3.50, 4.80
Garmin Aera 500/510/550/560	5.60
Garmin Aera 660	2.30, 3.20
Garmin 696	6.90, 7.70
Garmin 796	5.20

2.4. GPS Approval Requirements

The Vizion (P/N 8000-174 or 8000-175 or 8000-176) autopilot can be interfaced to multiple different types of GPS units for navigation input. The STC requires that the GPS and GPS software be on the approved list before connection to the Vizion is allowed. If the GPS is listed but the software to be used is not, refer to section 5 of this document for the procedure for approving a new software version.

3. Connection Pinouts
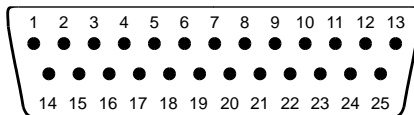
Vizion 25-Pin Connector
viewed from rear of unit

3.1. TSO GPS Pin Connections to Vizion

GPS Connector/Pin	Vizion Pin
Apollo GX-50/60/65	
If GX does NOT have GPSS Nav Interface Connector/5	17
If GX has GPSS Nav Interface Connector/22	17
Avidyne IFD 410/440/510/540/545/550	
P1001/54	17
P1001/46	14
P1001/47	15
Bendix King KLN 89B/94	
P941/2	17
Bendix King KSN770	
J1/62	17
J1/71	14
J1/51	15
Garmin GNS 430/430W	
P4001/56	17
P4001/46	14
P4001/47	15
Garmin GNS 530/530W	
P5001/56	17
P5001/46	14
P5001/47	15
Garmin GTN 650/750	
P1001/8	17
P1001/10	14
P1001/29	15
Garmin GNS 480/Apollo CNX80	
P1/22	17
P5/4	14
P5/24	15
Garmin GNC 155XL/250XL/300XL	
J1/19	17
J1/16	14
J1/15	15

3.2.Non-TSO GPS Connection to Vizion

For connection to the Vizion (P/N 8000-174 or 8000-175 or 8000-176), most non-TSO (portable) GPS units will require a specific cable purchased from either the manufacturer or an authorized dealer. The wire colors in this section assume that specific cable is being used in the installation.

GPS Connector/Pin	Vizion Pin
Garmin 695/696/795/796 without GDL 39	
Blue Wire	17
Garmin 695/696/795/796 with GDL 39	
Orange Wire	17
Garmin Aera 500/510/550/560/660 without GDL 39	
Blue Wire	17
Garmin Aera 500/510/550/560/660 with GDL 39	
Orange Wire	17
Garmin 296/396/496	
Blue Wire	17

4. GPS Configuration

4.1.TSO GPS Configuration Procedures

4.1.1. GNS 430/430W/530/530W

1. Press and hold the ENT button while powering up.
2. Release the ENT button once GARMIN is shown on the display.
3. Cycle through the Instrument Panel Self-Test Page like normal, this will bring up the MAIN ARINC 429 CONFIG page.
4. Cycle the cursor down to OUT, select GAMA 429 as the format.
5. Cycle the cursor down to SPEED, select LOW.
6. Cycle the cursor down to VNAV LABEL (430W/530W only), select ENABLE.
7. Rotate the large knob to access the RS232 SETUP page.
8. Cycle the cursor to the OUTPUT column of the CHNL 1 row.
9. Select Aviation.
10. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.1.2. GTN 650/750

1. Press and hold the HOME button while powering up.

2. Release the HOME button when GARMIN is shown on the display.
3. From the CONFIG MODE screen, touch GTN SETUP.
4. Touch RS232.
5. On channel 1 output, select Aviation, then touch the back arrow.
6. Touch ARINC 429.
7. On channel 1 output, select GAMA 1, Speed LOW, then touch the back arrow.
8. Touch Update Config Module.
9. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.1.3. GNC 155XL/250XL/300XL

1. Press and hold the MSG button.
2. Rotate the outer knob until the I/O Setup page is displayed.
3. Press the CRSR button twice and rotate the inner knob to select Plotting
4. Rotate the outer knob to advance the cursor to the baud rate selection, choose 9600
5. Press CRSR.
6. Power down the GPS.
7. Remove the database card.
8. Power the unit on.
9. Press the ENT button when asked "Select operating mode Normal?".
10. Press the ENT button again when asked "user wpts ok?"
11. After the satellite status page is displayed for five seconds, turn the unit off.
12. Press and hold the ENT button then turn the power on. Release the ENT button when the display activates.
13. Press the CRSR button, then rotate the outer knob to select ARINC 429 CHANNEL.
14. Press the CRSR button, then rotate the inner knob to cycle the cursor to OUTPUT, select w/o GAMA labels.
15. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.1.4. GNS 480/ CNX 80

1. Immediately after power up of GPS, press the 1, 4, and MENU/ENTER buttons together.
2. After the unit reboots, it will be in the SETUP page.
3. Press the button next to SERIAL PORTS.
4. Press the small knob and move the cursor to the TX column for channel 2.
5. Select MAPCOM and 9600. Press the small knob to save.

6. Press BACK to return to the setup page.
7. Press the button next to ARINC PORTS SETUP.
8. Move the cursor to Channel 1 OUT.
9. For DATA, select ARINC 429.
10. For SPEED, select LOW.
11. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.1.5. GX50/60/65 with GPSS

1. Power the GX-50/60/65 up and turn it on while holding down the leftmost and rightmost "smart keys."
2. Rotate the LARGE knob to the Serial Interface Configuration "CH RX TX" page.
3. Press SEL
4. Rotate the large knob to select CH2
5. Rotate the small knob to select GPSS
6. Press ENT
7. Switch power of then back on to restore the GX-50/60/65 to normal operation.
8. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.1.6. GX50/60/65 without GPSS

1. Power the GX-50/60/65 up and turn it on while holding down the leftmost and rightmost "smart keys."
2. Rotate the LARGE knob to the Serial Interface Configuration "CH RX TX" page.
3. Press SEL
4. Rotate the large knob to select CH1
5. Rotate the small knob to select MovMap
6. Press ENT
7. Switch power of then back on to restore the GX-50/60/65 to normal operation.
8. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.1.7. Avidyne IFD 410/440/510/540/545/550

1. Power on the IFD5XX/4XX
2. Acknowledge all start up screens by pressing "Enter"
3. Press Proceed Line Select Key (LSK) followed by the Confirm LSK on the database acknowledgement screen (if shown)
4. Select the "AUX" function key to display the Auxiliary Page. Press on the right side of the "AUX" Function key until the "SYS" tab is shown
5. Select "Status/Software" LSK by pressing associated button until "Update Databases" appears. (If shown)

6. Select "Update Databases" LSK by pressing the associated button. Press the "Confirm" LSK after it appears. The screen will blank for several seconds before coming up in Maintenance Mode
7. On the Main ARINC 429 Config page set output data to Low Speed, data to GAMA 429, and enable VNAV labels
8. Advance to the Main RS232 Config page and set the output of the wired channel to Aviation
9. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.1.8. Bendix King KSN770

Requires the Bendix King ICT available to Bendix King Dealers

1. Insert a USB drive with ICT installed
2. Power up the KSN770
3. Select "CONFIG NAVIGATION" from the the ICT Main Screen
4. Press the "1/2" button to advance to Config Nav Screen 2
5. Set the GAMA Output Type to "EFIS 40/50 (Low Speed)"
6. Select "Save & Return"
7. Press the "Save Config File" button on the ICT if saving the config file to USB is desired.
8. Remove the USB drive and cycle power to return to normal operation.
9. Autopilot baud rate must be 9600, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.2. Non-TSO (Portable) GPS Configuration Procedures

4.2.1. Garmin GPSMAP 296

1. Press the MENU button twice.
2. Scroll down to SETUP.
3. Scroll right to the COM 1 tab.
4. Scroll down to the FORMAT field.
5. Press ENTER, a window will popup.
6. Use the rocker pad to select NMEA IN/NMEA OUT.
7. Press ENTER.
8. Select 4800 for the baud rate.
9. Press MENU to enter the Advanced NMEA Output Setup.
10. Press ENTER
11. Use the rocker pad to select FAST OUTPUT in the Output Rate field.
12. Press ENTER
13. Autopilot baud rate must be 4800, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.2.2. Garmin GPSMAP 395/396/495/496

1. Press the MENU button twice.
2. Scroll down to SETUP.
3. Scroll right to the Interface tab.
4. Scroll down to select the Serial Data Format field.
5. Press ENTER, a window will popup.
6. Scroll to NMEA IN/NMEA OUT
7. Press the MENU button.
8. Select Advanced NMEA Setup and press ENTER.
9. Select FAST OUTPUT, then press ENTER.
10. Autopilot baud rate must be 4800, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.2.3. Garmin Aera 500/510/550/560/660 without GDL 39

1. From the Main Menu, touch Tools->Setup->Interface
2. Touch the Serial Data Format button
3. Select one of the following serial data formats:

> GTX TIS-A In/NMEA &VHF Out (9600 BAUD)
> OR
> Aviation In/NMEA & VHF Out (9600 BAUD)
> OR
> NMEA Out (4800 BAUD)

4. Touch the NMEA Output Mode button to toggle to Fast
5. Autopilot baud rate must be set to match, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.2.4. Garmin Aera 500/510/550/560/660 with GDL 39

1. From the Main Menu, touch Tools->Setup->Interface
2. Touch the Serial Data Format button
3. Touch Garmin Data Transfer
4. Touch the GDL 39 Pass-Through Serial Format button
5. Select one of the following serial data formats:

> GTX TIS-A In/NMEA &VHF Out (9600 BAUD)
> OR
> Aviation In/NMEA & VHF Out (9600 BAUD)
> OR
> NMEA Out (4800 BAUD)

6. Touch the NMEA Output Mode button to toggle to Fast
7. Autopilot baud rate must be set to match, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

8.

4.2.5. Garmin 695/696 without GDL 39

1. Press the MENU button twice.
2. Scroll down and highlight "System Setup"
3. Press the ENT key
4. Scroll down and highlight "Interface"
5. Press the ENT key
6. Rotate the FMS joystick to set the Serial Data Format to one of the following:

<div align="center">

GTX TIS-A In/NMEA &VHF Out (9600 BAUD)

OR

Aviation In/NMEA & VHF Out (9600 BAUD)

OR

NEMA In/NMEA Out (4800 BAUD)

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7. Use the FMS joystick to highlight the NMEA Output Mode field
8. Turn the FMS joystick to select "Fast"
9. Autopilot baud rate must be set to match, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.2.6. Garmin 695/696 with GDL 39

1. Press the MENU button twice.
2. Scroll down and highlight "System Setup"
3. Press the ENT key
4. Scroll down and highlight "Interface"
5. Press the ENT key
6. Rotate the FMS joystick to select "Garmin Data Transfer" for the Serial Data Format
7. Rotate the FMS joystick to set the GDL 39 PASS-THROUGH SERIAL FORMAT to one of the following:

<div align="center">

GTX TIS-A In/NMEA &VHF Out (9600 BAUD)

OR

Aviation In/NMEA & VHF Out (9600 BAUD)

OR

NMEA Out (4800 BAUD)

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8. Use the FMS joystick to highlight the NMEA Output Mode field
9. Turn the FMS joystick to select "Fast"
10. Autopilot baud rate must be set to match, refer to Vizion PMA Installation Guide (166) Appendix corresponding to aircraft type.

4.2.7. Garmin 795/796

1. From the Main Menu, touch Tools->Setup->Interface
2. Touch the Serial Data Format button
3. Select one of the following serial data formats:

    TIS-A In/NMEA & VHF Out (9600 Baud)
    OR
    Aviation In/NMEA &VHF Out (9600 Baud)
    OR
    NMEA Out (4800 Baud)

4. Touch the NMEA Output Mode button to toggle to Fast
5. Autopilot baud rate must be set to match, refer to Vizion PMA
    Installation Guide (166) Appendix corresponding to aircraft type.

5. Procedure for GPS Software Version Approval

All GPS units interfaced to the TruTrak Vizion (P/N 8000-174 or 8000-175 or 8000-176) autopilot require their software to be on the approved list in section 2.2 and 2.3 of this document. This section outlines the procedure to follow to add a software version to the approved list. For GPS units with multiple different softwares, this document refers only to the Main Software of the unit.

5.1. Ground Check Procedure for GPS Units with Self-Test Feature

This section will apply mostly to TSO GPS units that have a self-test page. However, any GPS that has a mode to output signals on the ground can use this procedure. Refer to the manual for the specific GPS unit for instructions on how to access the self-test/demo mode of the GPS.

5.1.1. RS232 Communication Verification

1. Verify that wiring connections are correct for the GPS model interfaced.
2. If GPS unit has a test page, instrument panel self-test, or demo page, leave the GPS at this page for the duration of the ground check.
3. Check upper left corner of autopilot display.
4. GPS OK indicates proper RS232 communication.
5. NO GPS indicates no or improper communication. Refer to Vizion PMA Installation Guide (166) to troubleshoot wiring. Refer to GPS Configuration (section 4 of this document) to verify GPS settings.

5.1.2. ARINC 429 Communication Verification

1. Verify that wiring connections are correct for the GPS model interfaced.
2. If GPS has a test page, instrument panel self-test page, or demo page, leave the GPS at this page for the duration of the ground check.
3. Engage the autopilot by pressing the KNOB on the autopilot controller.
4. Press the MODE button on the autopilot.
5. Check the lower left area of the display.
6. GPSS indicates good ARINC 429 communication.
7. No change or response indicates no or improper communication. Refer to Vizion PMA Installation Guide (166) to troubleshoot wiring. Refer to GPS Configuration (section 4 of this document) to verify GPS settings.

5.2. Taxi Check Procedure for GPS Units without Self-Test Feature

This section will apply mostly to Non-TSO GPS and some older TSO GPS units that do not have a self-test page. This check will require two crew members, a pilot-in-command and an auxiliary crew member to verify proper autopilot interface to the GPS unit.

5.2.1. RS232 Communication Verification

1. Verify that wiring connections are correct for the GPS model interfaced.
2. Power up the GPS and autopilot.
3. Check upper left corner of autopilot display.
4. GPS OK indicates proper RS232 communication.
5. NO GPS indicates no or improper communication. Refer to Vizion PMA Installation Guide (166) to troubleshoot wiring. Refer to GPS Configuration (section 4 of this document) to verify GPS settings.

5.2.2. ARINC 429 Communication Verification

1. Verify that wiring connections are correct for the GPS model interfaced.
2. Program a waypoint into the GPS.
3. Taxi the aircraft at a speed greater than 10 knots.
4. Engage the autopilot by pressing the KNOB on the Vizion controller.
5. Press the MODE button on the autopilot.
6. Check the lower left area of the display.
7. GPSS indicates good ARINC 429 communication.
8. No change or response indicates no or improper communication. Refer to Vizion PMA Installation Guide (166) to troubleshoot wiring. Refer to GPS Configuration (section 4 of this document) to verify GPS settings.

6. Procedure for GPS Model Approval

All GPS units interfaced to the TruTrak Vizion autopilot (P/N 8000-174 or 8000-175 or 8000-176) are required to be on the approved list along with their software. Refer to sections 2.2 and 2.3 of this document for approved GPS units and softwares. Follow the procedure in this section to gain approval for a GPS model that is not on the approved list. New GPS models will require a verified flight check to ensure proper interface to the Vizion autopilot (P/N 8000-174 or 8000-175 or 8000-176).

6.1. Wiring Verification

Using GPS installation manuals and Vizion PMA Installation Guide (166), verify proper connections to autopilot inputs.

6.2. RS232 Communication Verification

1. Verify that wiring connections are correct for the GPS model interfaced.
2. If GPS unit has a test page, instrument panel self-test, or demo page, leave the GPS at this page for the duration of the ground check.
3. Check upper left corner of Vizion display.
4. GPS OK indicates proper RS232 communication.
5. NO GPS indicates no or improper communication. Refer to Vizion PMA Installation Guide (166) to troubleshoot wiring. Refer to GPS Configuration (section 4 of this document) or GPS installation manual to verify GPS settings.

6.3. ARINC 429 Communication Verification (Ground Check)

1. Verify that wiring connections are correct for the GPS model interfaced.
2. If GPS has a test page, instrument panel self-test page, or demo page, leave the GPS at this page for the duration of the ground check.
3. Engage the autopilot by pressing the KNOB on the Vizion controller.
4. Press the MODE button on the autopilot.
5. Check the lower left area of the display.
6. GPSS indicates good ARINC 429 communication.
7. No change or response indicates no or improper communication. Refer to Vizion PMA Installation Guide (166) to troubleshoot wiring. Refer to GPS Configuration (section 4 of this document) or GPS installation manual to verify GPS settings.
8. If wiring and settings are verified with no correct response received, proceed to section 6.4 for the ARINC 429 Communication Verification Taxi Check

6.4. ARINC 429 Communication Verification (Taxi Check)

1. Verify that wiring connections are correct for the GPS model interfaced.
2. Program a waypoint into the GPS.
3. Taxi the aircraft at a speed greater than 10 knots.
4. Engage the autopilot by pressing the KNOB on the Vizion controller.
5. Press the MODE button on the autopilot.
6. Check the lower left area of the display.
7. GPSS indicates good ARINC 429 communication.
8. No change or response indicates no or improper communication. Refer to Vizion PMA Installation Guide (166) to troubleshoot wiring. Refer to GPS Configuration (section 4 of this document) to verify GPS settings.

6.5. GPS Flight Check

After ground check verifications, currently unapproved GPS units must be flown to verify correct interface to the autopilot. A report must be sent to Trutrak verifying a successful check flight. The following points must be covered in the check flight. Fill out the table on page 13 of this document and return

1. Verify autopilot displays TRK and the current ground track in the upper left corner of the display.
2. Verify autopilot follows current track when engaged.
3. Make several left and right turns of greater than 90°, verify autopilot rolls out at correct track.
4. Program a waypoint in the GPS
5. Press the MODE button on the autopilot, verify the autopilot enters GPS NAV mode and tracks to the currently set course and waypoint. (NOTE: If ARINC 429 steering is present, GPS NAV mode will not be accessible.)
6. Verify the autopilot enters GPSS mode on the lower left of the display and tracks to the currently set course (ARINC 429 interface only).
7. Send copy of page 13 flight report to TruTrak.

7. Check Flight Report

Vizion Software Version		
GPS Model		
GPS Software Version		
RS232 Pin Connection	Connector	Pin
RS232 Configuration Setting		
Vizion Baud Rate		
Vizion EFIS Type Setting		
ARINC 429 A Pin Connection	Connector	Pin
ARINC 429 B Connection	Connector	Pin
ARINC 429 Configuration Setting		

Check Flight Parameter	Pass / Fail / N/A
TRK and current ground track displayed in top left	
Autopilot follows current track when engaged	
Autopilot turns and rolls out correctly	
Autopilot enters GPS NAV mode and correctly tracks course	
Autopilot enters GPSS mode and correctly tracks course	
Follows external EFIS bugs	

Authorized Signature   _____

Company Name (if applicable)   _____

Date of flight   _____