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SERVICE NO. 1178A

LETTER

Date: April 23, 2014

(S)

Service Letter (SL) 1178A supersedes SL 1178 in its entirety. Aircraft that have previously complied with SL 1178 are in compliance with SL 1178A.

SUBJECT:

GARMIN G1000 SOFTWARE VERSION 720.15

REASON FOR REVISION:

SL 1178A provides information about Garmin warranty coverage for the installation and setup of G1000 Software Version 720.15 in affected airplanes.

MODELS AFFECTED:

PA-46-500TP Meridian

SERIAL NUMBERS AFFECTED:

4697340, 4697399 through 4697537

COMPLIANCE TIME:

Owner/operator discretion

APPROVAL:

The engineering aspects of this service document have been shown to comply with the applicable Federal Aviation Regulations and are FAA approved.

PURPOSE:

Garmin G1000 Software Version 720.15 is a software update which provides system improvements. Included in this update is a resolution to a GIA COM software loading issue that may have caused nuisance advisory messages.

INSTRUCTIONS:

The following procedures detail installation of the G1000 Software Version 720.15 in the PA-46-500TP Meridian. The installation is organized as follows:

NOTE: Perform the procedures in the following order to ensure the expected results.

- a. Creation of Software Download Card
- b. Software Files Transfer to Display
- c. Base System Software and Configuration Load
- d. Optional Equipment Installation
- e. Software Confirmation
- f. Configuration Procedures
- g. Option Features Unlock
- h. Return to Service Checks (Ground)
- i. Return to Service Checks (Flight)

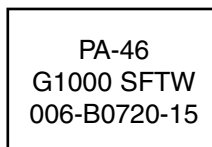
1. Create a Software Download Card

NOTE: A PC, SD card reader and SD card formatted to FAT32 is required to complete this procedure. See “Material Required” section for more details.

- a. Using a PC web browser, go to <http://dealers.garmin.com>.
- b. Enter Username and Password.
- c. On the Dealer Resource Home page, select the Technical Tools link (left hand side of page).
- d. Select the Software Downloads link.
- e. In the “Keywords” field, enter the appropriate software version (720.15) and click the “Go” button.
- f. Save the resulting file to a known location on the PC.
- g. Run the executable file that was downloaded. A window will appear to confirm software installation.
- h. Insert SD card into the SD card reader and click the “Next” button in the pop-up window.
- i. In the pop-up window, select the drive that corresponds to the inserted SD card and then click “Next.”

NOTE: The SD card will be completely erased. Click “Next” to acknowledge any warnings that appear. Another pop-up window will appear to monitor the loader card creation progress. After the card creation is successfully completed, another pop-up window will appear.

- j. Select “Finish.”
- k. Stop the card reader using Windows stop device function.
- l. Eject the SD card from the card reader.
- m. Apply a label to the software loader card, as shown below:



2. Software Files Transfer to Display

- a. Apply power to the aircraft and all avionics.

NOTE: Do not interrupt power to the aircraft at any time during this procedure. Interruption of power could result in damage to the equipment.

NOTE: When removed, as follows, identify each card to ensure they are reinstalled into the same GDU (Garmin Display Unit).

- b. Pull the MFD and both PFD circuit breakers. Remove any SD cards that were previously inserted in either PFD or MFD.
- c. Insert PA-46 G1000 Software Loader Card 006-B0720-15 into the PFD 2 top card slot.
- d. While holding the ENT key on PFD 2, restore power to PFD 2.
- e. When the words “INITIALIZING SYSTEM” appear in the upper left corner of the PFD 2, release the ENT key.
- f. Press the YES soft key at the following prompt (prompt may not appear):
“DO YOU WANT TO CLEAR USER SETTINGS?”
“YES WILL BE ASSUMED IN 10 SECONDS”
- g. Press the YES soft key at the following prompt:
“DO YOU WANT TO UPDATE SYSTEM FILES?”
“NO WILL BE ASSUMED IN 30 SECONDS”
“UPDATING SYSTEM FILES, PLEASE WAIT”
- h. Press the YES soft key at the following prompt (occurs on initial software load only):
“DO YOU WANT TO UPDATE SPLASH SCREEN?”

- i. Press any soft key at the following prompt to confirm load completion:
“PRESS ANY KEY TO CONTINUE.”
“CONTINUING IN 10 SECONDS”
NOTE: New software is loaded to PFD 2. When complete, the PFD 2 starts in configuration mode.
- j. Remove the software loader card from PFD 2 and insert it into the top card slot on the MFD and repeat steps d – i using the MFD. The rightmost soft key is used in place of the ENT key.
- k. Remove the software loader card from the MFD and insert it into the top card slot on PFD 1 and repeat steps d – i using PFD 1.
- l. When PFD 1 update is complete, it starts in the configuration mode. DO NOT remove power from any components until paragraphs 3 and 4 are complete.

3. Base System Software and Configuration Load

NOTE: During this procedure, DO NOT operate the MFD or PFD 2 unless specifically instructed to do so. A failed or cancelled load may result.

NOTE: To Select/Deselect the cursor in fields press the small FMS knob on the PFD. The large FMS knob changes groups and the small FMS knob changes pages within a group.

- a. Go to the “SYSTEM UPLOAD” page on PFD 1 using the small FMS knob.
- b. Activate the cursor, select the “GROUP” field, rotate the small FMS knob to generate a pick list, and select PA-46-500TP.
- c. Press ENT.

NOTE: Ensure that the correct airframe type is selected before proceeding; otherwise, incorrect configuration information will be loaded. Once an airframe type is selected the cursor moves to the “ITEM” field.

- d. Rotate the small FMS knob to generate a pick list and select the appropriate aircraft base configuration file.
- e. Press ENT.
- f. Press the CHK ALL soft key to select all loadable software and configuration files.
- g. Press the LOAD soft key (The load takes approximately 2.0 – 3.0 hours to complete).

NOTE: When load is completed, “Upload Complete” message appears.

- h. Press ENT to accept the software load.

NOTE: If a component fails to load, complete the remainder of the base configuration (software load and configuration), then attempt to repeat software and configuration load by checking only the GIA-63W components and the failed load component. For example, if the GTX fails to load, complete the remainder of the load, then select clear all, followed by selection of all software and configuration for each GIA and each installed GTX.

4. Optional Equipment Installation

NOTE: DO NOT load PA-46 Calibration Option. Loading Calibration Option will reset fuel quantity, flaps and rudder trim calibrations to default values.

Perform these steps for any of the following installed options:

KTA-870 TAS	GDL-69 (XM)
KR-87 ADF	KN-63 DME
WX-500 Stormscope	Dual GTX-33

NOTE: Software version 720.15 also provides for the GTX 33 ES and dual GTX 33 ES transponder options. These are not factory installed options on the affected aircraft.

- a. On PFD 1, select the “SYSTEM UPLOAD” page and activate cursor.
- b. In the “GROUP” field, create a pick list by rotating the small FMS knob and select PA-46-500TP (Meridian).
- c. Press ENT.
- d. In the “ITEM” field, create a pick list by rotating the small FMS knob and select the desired option, press ENT.
- e. Verify all applicable software and configuration boxes are checked.
- f. Press LOAD soft key.
- g. Verify the summary field lists the software load and configuration are complete as required and PASS is displayed next to all associated boxes.
- h. Press ENT to accept.
- i. Select UPDT CFG after each option is entered.
- j. For other installed options repeat steps d – i by rotating the large FMS knob and highlighting the desired option in the File Field.
- k. De-activate the cursor.
- l. Remove the software loader card from PFD 1.

5. Software Confirmation

- a. On PFD 1, select the “SYSTEMS STATUS” page. Activate the cursor and toggle to the LRU window.
- b. Highlight each of the following items in the LRU window and verify that the software part number and software version match the information in Table 1.

NOTE: Not all of the software part numbers and software versions on the “SYSTEMS STATUS” page need to be verified, only those listed in Table 1.

- c. Cycle power on the MFD and both PFDs, power up in Normal mode.
- d. Verify the PA-46 software image is displayed as “Piper PA-46-500TP Meridian System 0720.15” in the upper right corner of the MFD.
- e. Select soft key on MFD to proceed beyond splash screen.
- f. Verify that no manifest (software mismatch) alerts are shown on any of the displays.

NOTE: If any software version and/or part number does not match, or is not successfully loaded, do not continue with Return to Service procedures. Troubleshoot and resolve the issue before continuing.

TABLE 1
SOFTWARE CONFIRMATION

IDENTIFIER	PART NUMBER	VERSION	NOTE
COM1	006-B0081-10	10.00	Only when (-20) GIA installed See NOTE(*) below
COM1	006-B0081-XX	7.00	Only when (-10) GIA installed
COM2	006-B0081-10	10.00	Only when (-20) GIA installed See NOTE (*) below
COM2	006-B0081-XX	7.00	Only when (-10) GIA installed
GCU	006-B0472-20	3.01	
GDC1	006-B0261-18	3.08	
GDC1 FPGA	006-C0055-00	01.05	
GDC2	006-B0261-18	3.08	
GDC2 FPGA	006-C0055-00	01.05	
GDL69	006-B0317-16	3.40.00	Option
GEA1	006-B0193-05	2.07	
GFC CERT GIA1	006-D0907-03	2.03	
GFC CERT GIA2	006-D0907-03	2.03	
GFC CERT P C	006-D0907-03	2.03	
GFC CERT P M	006-D0907-03	2.03	
GFC CERT PT C	006-D0907-03	2.03	
GFC CERT PT M	006-D0907-03	2.03	
GFC CERT R C	006-D0907-03	2.03	
GFC CERT R M	006-D0907-03	2.03	
GFC CERT Y C	006-D0907-03	2.03	
GFC CERT Y M	006-D0907-03	2.03	
GIA1	006-B0544-38	6.40	
GIA1 AUDIO	006-D0425-08	2.13	
GIA2	006-B0544-38	6.40	
GIA2 AUDIO	006-D0425-08	2.13	
GMA1	006-B0203-43	4.03	
GMA2	006-B0203-43	4.03	
GMC	006-B0387-20	3.00	
GMU1	006-B0224-00	2.01	
GMU1 FPGA	006-C0048-00	2.00	
GMU2	006-B0224-00	2.01	
GMU2 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-0A	3.2	
GPS2	006-B0339-0A	3.2	
GRS1	006-B0223-22	3.02	
GRS1 FPGA	006-C0049-00	02.00	
GRS2	006-B0223-22	3.02	
GRS2 FPGA	006-C0049-00	02.00	
GS1	006-B0083-XX	4.00	Only when (-10) GIA installed
GS2	006-B0083-XX	4.00	Only when (-10) GIA installed
GSA PTCH	006-B0398-32	2.30	
GSA PTCH TRM	006-B0398-32	2.30	
GSA ROLL	006-B0398-32	2.30	

TABLE 1 (continued)
SOFTWARE CONFIRMATION

IDENTIFIER	PART NUMBER	VERSION	NOTE
GSA YAW	006-B0398-32	2.30	
GTX1	006-B0172-XX	6.11	
GTX2	006-B0172-XX	6.11	Option
GWX	006-B0266-10	2.11	Option
GWX FPGA	006-C0042-06	3.01	Option
MFD1	006-B0319-A1	12.01	
MFD1 FPGA	006-C0036-04	1.04	
NAV1	006-B0082-11	6.01	Only when (-20) GIA installed See NOTE(*) below
NAV1 FPGA	006-C0124-00	1.00	Only when (-20) GIA installed See NOTE(*) below
NAV1	006-B0082-XX	5.03	Only when (-10) GIA installed
NAV2	006-B0082-11	6.01	Only when (-20) GIA installed See NOTE(*) below
NAV2 FPGA	006-C0124-00	1.00	Only when (-20) GIA installed See NOTE(*) below
NAV2	006-B0082-XX	5.03	Only when (-10) GIA installed
PFD1	006-B0319-A1	12.01	
PFD1 FPGA	006-C0036-04	1.04	
PFD2	006-B0319-A1	12.01	
PFD2 FPGA	006-C0036-04	1.04	
PA-46 CONFIG FILE	006-D0796-15	0720.15	PA-46 CONFIG FILE cannot be verified (Reference Only)

NOTE (*): The COM and NAV software P/N may be displayed as “-XX” rather than the specific dash number. This is normal; the first 8 digits are sufficient to uniquely identify the software.

6. Configuration Procedures

a. Fuel Flow K-Factor

- 1) Start or verify PFD 2, MFD, & PFD 1 are in configuration mode.

NOTE: To run a PFD in configuration mode, hold the ENT key while applying power to the unit. To run the MFD in configuration mode, hold the rightmost soft key while applying power to the unit.

- 2) On PFD 1, select the CAL page group, then select the “FUEL TANK CALIBRATION” page.
- 3) Unlock the page by pressing soft keys 12 (far right soft key), 11, 10, 9 in sequence.
- 4) Activate the cursor.
- 5) Using the large FMS knob highlight “ENG 1 K FACTOR”.
- 6) Using the FMS knob enter a value correspondent to the K factor recorded on the fuel flow sensor identification tag, omitting the decimal. For example, a K factor of “42.5” would be entered as “425”, with no trailing zeros.
- 7) When finished press the ENT key.

b. Mode S Address

NOTE: If Mode S address information is valid, skip to Step 7.

- 1) Start or verify PFD 2, MFD, and PFD 1 are in configuration mode.

NOTE: To run a PFD in configuration mode, hold the ENT key while applying power to the unit. To run the MFD in configuration mode, hold the rightmost soft key while applying power to the unit.

- 2) On PFD 1, select the GTX group, then select the “TRANSPONDER CONFIGURATION” page.
- 3) For aircraft registered in the U.S.A., perform the following:
 - a) In the Address Type field, select “US TAIL”, press the ENT key to configure, then press ENT key at completion prompt.
 - b) In the Mode S Address field, enter the aircraft registration number (tail “N” number) using the FMS knobs, press the ENT key to configure, then press ENT key at completion prompt.
 - c) In the Flight ID Type field, select “Same as Tail”, press the ENT key to configure, then press ENT key at completion prompt.
- 4) For aircraft registered in countries other than the U.S.A., perform the following:
 - a) In the Address Type field, select “HEX ID”, press the ENT key to configure, then press ENT key at completion prompt.
 - b) In the Mode S Address field, enter the 24 bit ICAO aircraft address in hex format, using the FMS knobs.

NOTE: Convert the 24 bit binary code to hexadecimal as shown in the example as follows:

- i 24 bit binary code:
11100100011111101101101
- ii Separate for hex conversion:
1110 / 0100 / 0111 / 1110 / 1110 / 1101
- iii Apply the hexadecimal values per Table 2:
1110 / 0100 / 0111 / 1110 / 1110 / 1101
E 4 7 E E D

**TABLE 2
HEXIDECIMAL CONVERSION**

Binary	Hexadecimal	Decimal	Binary	Hexadecimal	Decimal
/ 0000	0	0	/ 1000	8	8
/ 0001	1	1	/ 1001	9	9
/ 0010	2	2	/ 1010	A	10
/ 0011	3	3	/ 1011	B	11
/ 0100	4	4	/ 1100	C	12
/ 0101	5	5	/ 1101	D	13
/ 0110	6	6	/ 1110	E	14
/ 0111	7	7	/ 1111	F	15

- iv. Example “Hex ID” = E47EED
- c) Press the ENT key to configure, then press ENT key at completion prompt.
- d) In the Flight ID Type field, select “CONFIG ENTRY”, press the ENT key to configure, then press ENT key at completion prompt.
- e) In the Flight ID field, enter the aircraft registration number, using the FMS knobs.
- f) Press the ENT key to configure, then press ENT key at completion prompt.
- 5) Verify that the SET and ACTIVE columns reflect the entries made in step 3) or 4), as applicable.
- 6) Select UPDT CFG after each unlock step.

7. Option Features Unlock

a. CHARTVIEW Unlock

NOTE: Perform this procedure only if the Chartview electronics charts option is installed in the aircraft. The Chartview option requires the Chartview Enable card, Garmin P/N 010-00330-50. Each Chartview Enable card is unique to the aircraft where it was first installed. It cannot be subsequently used on other aircraft.

- 1) Remove power from all displays by opening the associated circuit breakers.
- 2) Insert the Chart Unlock card, P/N 010-00330-50, in the upper slot of PFD 1.
- 3) Power-up each display in configuration mode.
NOTE: To run a PFD in configuration mode, hold the ENT key while applying power to the unit. To run the MFD in configuration mode, hold the rightmost soft key while applying power to the unit.
- 4) On PFD 1, go to the "SYSTEM UPLOAD" page.
- 5) Activate the cursor and use the small FMS knob to create a pick list and select "Configuration Files" in the "GROUP" field. Press ENT.
- 6) Use the small FMS knob to create a pick list and select "Enable Chartview" in the "ITEM" field. Press ENT.
- 7) Verify there is a check mark in the box in the configuration column for Airframe.
- 8) Press the LOAD soft key.
- 9) Monitor the status of the upload. When the upload is finished Complete and Pass is displayed. Press ENT.
- 10) De-activate the cursor.
NOTE: Press UPDT CFG and select "YES".
- 11) Power down the system and remove the Chartview Enable card from the PFD.

b. TAWS Unlock

NOTE: Perform this procedure only if the TAWS option is installed in the aircraft. The TAWS option requires the TAWS Enable card, Garmin P/N 010-00330-51. Each TAWS Enable card is unique to the aircraft where it was first installed. It cannot be subsequently used on other aircraft.

- 1) Remove power from all displays by opening the associated circuit breakers.
- 2) Insert the TAWS Unlock card, P/N 010-00330-51, in the upper slot of the PFD 1.
- 3) Power-up each display in configuration mode.
NOTE: To run a PFD in configuration mode, hold the ENT key while applying power to the unit. To run the MFD in configuration mode, hold the rightmost soft key while applying power to the unit.
- 4) On PFD 1, go to the "SYSTEM UPLOAD" page.
- 5) Activate the cursor and use the small FMS knob to create a pick list and select "Configuration Files" in the "GROUP" field. Press ENT.
- 6) Use the small FMS knob to create a pick list and select "Enable TAWS" in the "ITEM" field. Press ENT.
- 7) Verify there is a check mark in the box in the configuration column for Airframe.
- 8) Press the LOAD soft key.
- 9) Monitor the status of the upload. When the upload is Complete and Pass is displayed. Press ENT.
- 10) De-activate the cursor.
NOTE: Press UPDT CFG and select "YES".
- 11) Power down the system and remove the TAWS Enable card from the PFD.

c. Synthetic Vision Unlock

NOTE: Perform this procedure only if the Synthetic Vision option is installed in the aircraft. The Synthetic Vision option requires the Synthetic Vision Enable card, Garmin P/N 010-00330-55. Each Synthetic Vision Enable card is unique to the aircraft where it was first installed. It cannot be subsequently used on other aircraft.

- 1) Remove power from all displays by opening the associated circuit breakers.
- 2) Insert the Synthetic Vision Enable card, P/N 010-00330-55, in the upper slot of the PFD 1.
- 3) Power-up each display in configuration mode.

NOTE: To run a PFD in configuration mode, hold the ENT key while applying power to the unit. To run the MFD in configuration mode, hold the rightmost soft key while applying power to the unit.

- 4) On PFD 1, go to the "SYSTEM UPLOAD" page.
- 5) Activate the cursor and use the small FMS knob to create a pick list and select "Configuration Files" in the "GROUP" field. Press ENT.
- 6) Use the small FMS knob to create a pick list and select "Enable SVS DUAL PFD" in the "ITEM" field. Press ENT.
- 7) Verify there is a check mark in the box in the configuration column for Airframe.
- 8) Press the LOAD soft key.
- 9) Monitor the status of the upload. When the upload is Complete and Pass is displayed. Press ENT.
- 10) De-activate the cursor.

NOTE: Press UPDT CFG and select YES.

- 11) Power down the system and remove the Synthetic Vision Enable card from the PFD.

8. Return to Service Checks (Ground)

a. Display and Control Panel Checks

- 1) Reinstall 010-00330-43 SVS/TERRAIN/CHART DATA CARDS in both PFDs and the MFD (lower slot).
- 2) Apply electrical power to all avionics equipment. Select the ENT key on MFD to exit initialization page.
- 3) Check for database mismatch.

NOTE: If there is a mismatch, update all the cards to the current database cycle located at <https://fly.garmin.com>, using the AOPA, SAFE TAXI, or OBSTACLES database. (The database patch from Garmin for AOPA can be used to clear the error, however, the database will not be current.)

NOTE: If the airport directory database is flagged as invalid:

1. Connect an SD card reader/writer to a PC with Internet access.
 2. Insert the Garmin Supplemental data card into the SD card reader/writer.
 3. Log in to the Garmin Dealer Website (<http://dealers.garmin.com>).
 4. Download the file "Garmin Integrated Flight Deck AOPA Database Patch" from the Technical Resource section.
 5. Execute the file and follow the prompts. Note that you may need to select the proper drive letter for the SD card reader/writer.
- 4) Select VOR as HSI source on each PFD.
 - 5) Rotate HDG, CRS, ALT, and BARO knobs.
 - 6) Verify HDG, CRS, ALT and BARO selections work on each PFD.
 - 7) Select the display backup button on the pilot's audio panel.
 - 8) Verify PFD 1 displays the engine/aircraft instruments and CAS message window.
 - 9) Select PFD on the GCU-476 keypad.
 - 10) Verify keypad functions work with PFD 1.
 - 11) Select the display backup button on the pilot's audio panel.

- 12) Verify PFD 1 returns to normal state (no engine/aircraft instruments).
 - 13) Select the display backup button on the co-pilot's audio panel.
 - 14) Verify PFD 2 displays the engine/aircraft instruments and CAS message window.
 - 15) Select the display backup button on the co-pilot's audio panel.
 - 16) Verify PFD 2 returns to normal state (no engine/aircraft instruments).
 - 17) Remove power from the MFD by pulling the MFD circuit breaker.
 - 18) Verify the following:
 - a) PFDs switch to reversion mode.
 - b) Engine and aircraft instruments appear on both PFDs.
 - 19) Restore power to MFD. Select MFD button on keyboard.
 - 20) Using the outer and inner FMS knobs on the keyboard, select a Map page and an AUX page from the MFD page selection menus.
 - 21) Verify that MFD page menu selection works with keyboard.
 - 22) Pull the PFD 1 circuit breaker. Select the display back-up button from the pilot's audio panel.
 - 23) Verify the following:
 - a) MFD switches to reversion mode.
 - b) Attitude and heading indications on MFD are valid.
 - c) Airspeed, altitude, vertical speed, OAT on MFD are valid.
 - d) MFD retains engine/ airframe instruments and CAS message window.
NOTE: It is normal for fuel quantity to be failed when PFD 1 is failed.
 - e) GMC 710 Autopilot Controller is functional while XFR is to PFD 2.
 - 24) Restore power to PFD 1. Select the display back-up button from the pilot's audio panel.
 - 25) Verify the MFD returns to a normal format.
 - 26) Pull the PFD 2 circuit breaker. Select the display back-up button from the co-pilot's audio panel.
 - 27) Verify the following Comparator Annunciations are displayed on PFD 1 and the MFD:
 - a) HDG NO COMP
 - b) ROL NO COMP
 - c) PIT NO COMP
 - d) IAS NO COMP
 - e) ALT NO COMP
 - 28) Verify the following:
 - a) MFD switches to reversion mode.
 - b) Attitude and heading indications on MFD are valid.
 - c) Airspeed, altitude, vertical speed, OAT on MFD are valid.
 - d) MFD retains engine/ airframe instruments and CAS message window.
 - e) GMC 710 Autopilot controller is functional while XFR is to PFD 1.
 - 29) Restore power to PFD 2. Select the display back-up button from the co-pilot's audio panel.
 - 30) Verify the MFD returns to a normal format.
- b. AHRS Checks
- NOTE: Allow for the AHRS to align following each power-up.
- 1) Electrical power applied to all avionics equipment.
 - 2) On each PFD, verify that the following indications are displayed as valid:
 - a) Attitude
 - b) Turn and Bank
 - c) Heading

- 3) On each PFD, verify that no AHRS failure messages are displayed.
NOTE: Reception of a valid GPS signal is required to ensure GPS related AHRS failures are not displayed. Allow time for GPS signal acquisition.
 - 4) Engage the autopilot by pressing the AP key on AFCS mode controller.
 - 5) Remove power from the AHRS 1 by pulling the AHRS 1 circuit breaker.
 - 6) Verify the autopilot disconnects automatically.
 - 7) Acknowledge the tone by pressing the AP DISC TRIM INTER switch. (on the pilot's yoke)
 - 8) Verify the following Comparator Annunciations are displayed on the PFDs:
 - a) HDG NO COMP
 - b) ROL NO COMP
 - c) PIT NO COMP
 - 9) Verify Heading, Pitch, and Roll flag invalid on PFD 1.
 - 10) Press the SENSOR key on PFD 1.
 - 11) Press the AHRS 2 key on PFD 1.
 - 12) Verify the following:
 - a) AHRS 2 parameters (attitude, heading) are displayed on PFD 1 without flags.
 - b) BOTH ON AHRS 2 sensor reversion annunciation is displayed on the PFDs.
 - c) White NO COMP Annunciations remain on the PFDs.
 - 13) Restore power to AHRS 1.
 - 14) Select AHRS 1 key on PFD 1.
NOTE: May need to select Sensor Key.
 - 15) Verify normal operation, failure and Comparator Annunciations are removed after AHRS alignment.
 - 16) Repeat steps 4) – 15) for AHRS 2 using PFD 2.
- c. Air Data Checks
- 1) Electrical power applied to all avionics equipment.
 - 2) On each PFD, verify the following indications are displayed as valid:
 - a) Airspeed
 - b) Altitude
 - c) Vertical speed
 - d) Outside Air Temperature (OAT)
 - 3) Engage the autopilot by pressing the AP key on AFCS mode controller.
 - 4) Remove power from ADC 1 by pulling the ADC 1 circuit breaker.
 - 5) Verify the autopilot and yaw damper remain engaged, then disconnect the autopilot.
 - 6) Verify the following Comparator Annunciations are displayed on the PFDs:
 - a) IAS NO COMP
 - b) ALT NO COMP
 - 7) Verify the following are invalid on PFD 1.
 - a) Altitude
 - b) Indicated Airspeed
 - c) Vertical Speed
 - d) Outside Air Temperature (OAT)
 - 8) Verify Cabin Differential Pressure is invalid on the MFD.
 - 9) Press the SENSOR key on PFD 1.
 - 10) Press the ADC 2 key on PFD 1.

- 11) Verify the following:
 - a) ADC 2 parameters (altitude, airspeed, vertical speed, OAT) are displayed on PFD 1 without invalid flags.
 - b) BOTH ON ADC 2 sensor reversion annunciation is displayed on the PFDs.
 - c) White NO COMP Annunciations remain on the PFDs.
 - 12) Restore power to ADC 1.
 - 13) Select ADC 1 key on PFD 1.
NOTE: May need to select Sensor Key.
 - 14) Verify normal operation, invalid flags and Comparator Annunciations are removed.
 - 15) Repeat steps 3) – 7) and 9) – 14) for ADC 2 using PFD 2.
- d. Engine-Airframe Indications Checks
- 1) Electrical power applied to all avionics equipment.
 - 2) Verify the following indications are displayed as valid (no flags):
 - a) Engine torque
 - b) Interstage turbine temperature (ITT)
 - c) Prop speed (Np)
 - d) Generator speed (Ng)
 - e) Oil pressure
 - f) Oil temperature
 - g) Cabin altitude
 - h) Cabin rate
 - i) Cabin differential pressure
 - j) Fuel quantity (left tank, right tank, total)
 - k) Fuel flow
 - l) Fuel temperature
 - m) Alternator current
 - n) Generator current
 - o) Voltage
 - p) Vacuum
 - 3) Cycle rudder trim full left, full right, and then center.
 - 4) Verify that rudder trim indication is displayed as valid and previous calibration was retained.
NOTE: If rudder trim calibration was lost as a result of this software installation, perform the appropriate calibration procedure per PA-46-500TP Meridian Maintenance Manual, Piper P/N 767-072.
 - 5) Cycle flaps through all positions (0, 10, 20, full).
 - 6) Verify that flap position indication is valid and previous calibration was retained.
NOTE: If flap calibration was lost as a result of this software installation, perform the appropriate calibration procedure per PA-46-500TP Meridian Maintenance Manual, Piper P/N 767-072.

e. Audio and COM Checks

- 1) Electrical power applied to all avionics equipment
- 2) Ensure pilot and co-pilot ICS isolation are selected OFF, manual squelch selected OFF, speaker selected ON, volume knobs 2 rotations clockwise from minimum.
- 3) Speak into pilot headset.
- 4) Verify intercom heard using co-pilot headset and using a headset at each passenger station.
- 5) On pilot audio panel, select PA ON.
- 6) On pilot's yoke, press PTT key and speak into pilot headset.
- 7) Verify PA audio is heard over the cockpit speaker.
- 8) Using pilot audio panel, select COM 1 MIC and COM 1 receive.
- 9) Verify COM 1 transmits and receives normally using pilot headset.
- 10) Using co-pilot audio panel, select COM 2 MIC and COM 2 receive.
- 11) Verify COM 2 transmits and receives normally using co-pilot headset.
- 12) Failsafe operation check for COM 1:
 - a) Pull AUDIO MKR 1 circuit breaker.
 - b) Verify COM 1 transmits and receives normally using pilot headset.
 - c) Verify COM 1 audio is controlled by the PFD COM audio control.
 - d) Close the AUDIO MKR 1 circuit breaker.
- 13) Failsafe operation check for COM 2:
 - a) Pull AUDIO MKR 2 circuit breaker.
 - b) Verify COM 2 transmits and receives normally using copilot headset.
 - c) Verify COM 2 audio is controlled by the PFD COM audio control.
 - d) Close the AUDIO MKR 2 circuit breaker.

f. GPS Checks

NOTE: Reception of a valid GPS signal is required to complete these checks. Allow time for acquisition of GPS signal following each power-up.

- 1) Electrical power applied to all avionics equipment.
- 2) Select the "GPS STATUS" page in the AUX page group on the MFD.
- 3) Verify that both GPS receivers acquire navigation capability, as indicated in the GPS status window.
- 4) In areas supported by SBAS capability (WAAS), verify that both GPS receivers acquire 3D differential navigation capability, as indicated in the GPS status window.
- 5) Select GPS as the CDI source on PFD 1 and GPS as the CDI source on PFD 2.
- 6) Remove power from GIA 1 by pulling the INTEG AV 1 circuit breaker.

NOTE: Will also get a FAILED PATH message and XPDR1 FAIL message. (Not relevant to test.)
- 7) Verify the following:
 - a) AHRS 1 GPS – AHRS 1 using back-up GPS source message is displayed.
 - b) AHRS 2 GPS – AHRS 2 not receiving backup GPS information message is displayed.
 - c) BOTH ON GPS2 annunciation displayed on each PFD.
- 8) Restore power to GIA 1 by closing the INTEG AV 1 circuit breaker.
- 9) Verify the failure indications displayed in step 7) are removed.
- 10) Remove power from GIA 2 by pulling the INTEG AV 2 circuit breaker.

NOTE: Will also get a Stormscope Failed and GMA2 FAIL message. (Not relevant to test.)

- 11) Verify the following system messages:
 - a) AHRS 2 GPS – AHRS 2 using back-up GPS source message is displayed.
 - b) AHRS 1 GPS – AHRS 1 not receiving backup GPS information message is displayed.
 - c) BOTH ON GPS 1 annunciation displayed on each PFD.
 - 12) Restore power to GIA 2 by closing the INTEG AV 2 circuit breaker.
 - 13) Verify the failure indications displayed in Step 11) are removed.
- g. GFC-700 Checks
- 1) Pre-Flight Test
 - a) Set the AVIONICS power switch to OFF. After 30 seconds select the AVIONICS power switch to ON.
 - b) Verify that a white “PFT” annunciation is displayed on each PFD. A red “AFCS” annunciation displayed before PFT starts is acceptable.
NOTE: The PFT begins automatically after AHRS and ADC parameters are valid.
 - c) Upon successful completion of the test, an aural alert will sound and the annunciation will clear. If the “PFT” annunciation turns red, the test has failed.
NOTE: For troubleshooting information, refer to the PA-46-500TP Meridian Maintenance Manual, Piper P/N 767-072.
 - d) Repeat Steps a) – c) to test the PFT aural alert. (verifies the other GIA-63W function)
 - 2) Autopilot Operation Checks
NOTE: Throughout this procedure, aft control wheel pressure may be required to overcome pitch control spring force and obtain aft control wheel movement.
 - a) Electrical power applied to all avionics equipment.
 - b) Couple FD to PFD 1 using the XFR button on the AFCS mode controller.
 - c) Verify FD is coupled to PFD 1 as indicated by a left pointing arrow on the AFCS mode controller next to the XFR button and in the AFCS modes field on each PFD.
 - d) Engage the Autopilot by pressing the AP key on the AFCS mode controller.
 - e) Verify green AP engaged annunciation in AFCS modes field on each PFD.
 - f) On PFD 1, push the HDG knob to synchronize the heading bug to the current aircraft heading.
 - g) Select HDG mode by pressing the HDG key on the AFCS mode controller.
 - h) Ensure the command bars are level and the control wheel is stationary. (There may be some roll motion in the yoke if the aircraft is not level.)
 - i) Turn the HDG knob counterclockwise.
 - j) Verify that the flight director indicates a left roll command, and that the control wheel follows the command bars.
 - k) Turn the HDG knob clockwise.
 - l) Verify that the flight director indicates a right roll command, and that the control wheel follows the command bars.
 - m) Press the HDG knob to center the roll command. Wait for control motion to stop.
 - n) Push and hold the CWS button and pull the control wheel to the center of the pitch control range. Release the CWS button.
 - o) Verify the autopilot clutches re-engage and hold the wheel stationary.
 - p) Holding the control wheel lightly, rotate the UP/DN wheel on the AFCS mode controller in the UP direction.
 - q) Verify the flight director displays a pitch up command and the control wheel moves aft.
 - r) Push and hold the CWS button and place the control wheel in the center of the pitch control range. Release the CWS button.

- s) Verify the autopilot clutches re-engage and hold the wheel stationary.
 - t) Rotate the UP/DN wheel on the AFCS mode controller in the DOWN direction.
 - u) Verify the flight director displays a pitch down command and the control wheel moves forward.
 - v) Push and hold the CWS button and move the control wheel to its aft limit. Release the CWS button, then apply continuous forward pressure, slowly moving the control wheel.
 - w) Verify the pitch trim wheel begins moving in a nose up direction.
NOTE: There may be a brief delay before pitch trim is applied by the servo.
 - x) Grip the control wheel, then press and hold the CWS button.
 - y) Verify pitch trim motion stops.
 - z) Move the control wheel to the forward limit then release the CWS button. Apply continuous aft pressure, slowly moving the control wheel.
 - aa) Verify the pitch trim wheel begins moving in a nose down direction.
NOTE: There may be a brief delay before pitch trim is applied by the servo.
 - ab) Relieve pressure on the control wheel.
 - ac) Verify that trim motion stops and that the trim wheel is free to turn.
 - ad) Hold the control wheel and press the A/P DISC TRIM INTER switch.
 - ae) Verify the following:
 - AP is disconnected (control wheel moves freely in pitch and roll)
 - AP annunciation flashes yellow in AFCS modes window on PFD
 - AP disconnect aural alert is sounded
 - af) Press the YD button.
 - ag) Verify green YD engaged annunciation is displayed on each PFD.
 - ah) Press the A/P DISC TRIM INTER switch.
 - ai) Verify the YD annunciation flashes yellow in AFCS modes window on PFD.
- h. GWX-68 Weather Radar

WARNING: BEFORE ENERGIZING THE RADAR, BE SURE MICROWAVE RADIATION SAFETY PRECAUTIONS INCLUDING BOTH FUEL AND PERSONNEL SAFETY CONSIDERATIONS HAVE BEEN OBSERVED. THESE INCLUDE CLEARING ALL PERSONNEL TO AN AREA BEYOND THE MAXIMUM PERMISSIBLE EXPOSURE LEVEL (MPEL) BOUNDARY. THE MPEL FOR THE GWX-68 IS 11 FEET.

- 1) Electrical power applied to all avionics equipment.
- 2) Select the Weather Radar page within the Map Page Group on the MFD.
- 3) Select the MODE soft key on MFD, then select the STANDBY soft key to initiate the warm-up period.
- 4) Verify STANDBY mode is displayed in the mode field after the warm-up is complete.
- 5) Select the MODE soft key, then select the WEATHER soft key.
- 6) Select YES in the caution window when the precautionary steps have been followed.
- 7) Press the BACK soft key.
- 8) Verify the weather radar sweep is displayed as valid (no fail annunciations).
- 9) Select the MODE soft key, then select the STAB ON soft key.
- 10) Verify that STAB ON is shown in the upper right corner of the weather radar page.
NOTE: The AHRS must be aligned prior to use of WXR stabilization mode.
- 11) Select the OFF soft key.

i. WX-500 Stormscope

NOTE: Perform this procedure only if the Stormscope option is installed.

- 1) Electrical power applied to all avionics equipment.
- 2) Select the Stormscope page within the Map Page Group on the MFD.
- 3) Select the MODE soft key, then alternately select CELL and STRIKE modes.
- 4) Verify that the mode field on the Stormscope page displays the same mode as was selected.
- 5) Pull the Stormscope circuit breaker.
- 6) Verify that a Stormscope fail indication is displayed on the Stormscope page.
- 7) Close the Stormscope circuit breaker.

j. GDL-69A XM Satellite Radio and Weather

NOTE: Perform this procedure only if the XM option is installed. This check out procedure assumes the radio and weather products were previously activated for the XM receiver installed in the aircraft. If the XM receiver has not been activated, refer to XM activation procedure in the PA-46-500TP Meridian Maintenance Manual, Piper P/N 767-072. This procedure requires a valid XM satellite signal.

- 1) Electrical power applied to all avionics equipment.
- 2) Pilot and co-pilot ICS isolation selected OFF.
- 3) On the MFD, select the XM Information page in the AUX page group. Select the RADIO soft key.
- 4) Increment and decrement the XM channels using the controls in the cabin.
- 5) Verify the channel increments and decrements as selected.
- 6) Select an active music channel.
- 7) Increase and decrease the volume using the controls in the cabin.
- 8) Using a headset, verify the volume increases and decreases as selected.
- 9) Set the volume in the mid position.
- 10) On the MFD, select the Weather Datalink page from the Map page group.
- 11) Using the soft keys, select a weather image for display.
- 12) Verify that a valid XM weather image can be displayed.

k. KTA-870 Traffic Advisory System

NOTE: Perform this procedure only if the TAS option is installed.

- 1) Electrical power applied to all avionics equipment.
- 2) Select the Traffic Map page in the Map page group on the MFD.
- 3) Ensure the STANDBY soft key is selected.
- 4) Verify STANDBY mode is displayed in the upper left corner of the traffic map (TAS FAIL must not be displayed).
- 5) Press the TEST soft key.
- 6) Verify the following:
 - a) TEST is displayed in the upper left corner of the traffic map.
 - b) A traffic test pattern is displayed.
 - c) "TAS system test Ok" annunciation is heard over the cockpit speaker at the conclusion of the test.
- 7) Open the TAS circuit breaker.
- 8) Verify that a TAS fail indication is displayed on the Traffic map.
- 9) Close the TAS circuit breaker.

I. CHARTVIEW

NOTE: Perform this procedure only if the Chartview option is installed.

- 1) Electrical power applied to all avionics equipment.
- 2) Select the Airport Information page from the WPT page group.
- 3) Enter KVRB in the airport field.
- 4) Select the CHRT soft key.
- 5) Verify the associated electronic terminal charts for the Vero Beach Municipal Airport are viewable.

m. TAWS

NOTE: Perform this procedure only if the TAWS option is installed. A valid GPS signal is required, allow time for signal acquisition following power-up. Matching terrain database cards must be installed in the lower SD card slot on each display.

- 1) Electrical power applied to all avionics equipment.
- 2) Select the TAWS-B page from the Map page group.
- 3) Verify that the title at the top of the page reads "MAP-TAWS-B".

NOTE: If TAWS has not been enabled, the title will read "MAP - TERRAIN PROXIMITY" or "MAP - TERRAIN".

- 4) Press the MENU button, select "Test TAWS", and press ENT.
- 5) Verify that "TAWS system test OK" is annunciated over the audio system following test completion.

n. Synthetic Vision

NOTE: Perform this procedure only if the SVT option is installed in the aircraft. A valid GPS signal is required, allow time for signal acquisition following power-up. Matching terrain database cards must be installed in the lower SD card slot on each display.

- 1) Electrical power applied to all avionics equipment.
- 2) Press the PFD soft key, then the SYN VIS soft key on each PFD.
- 3) Press the SYN TERR soft key on each PFD.
- 4) Verify that the conventional attitude indication (sky/ground) is replaced with the Synthetic Vision image on each PFD.

9. Return to Service Checks (Flight)

a. AFCS Checks

- 1) Electrical power applied to all avionics equipment
- 2) AP and YD engaged
- 3) Perform a heading capture using HDG mode.
- 4) Verify the following:
 - a) The selected heading is captured and tracked, with typical performance.
 - b) Turns are coordinated (slip-skid remains centered)
- 5) Perform an altitude capture using ALT mode.
- 6) Verify that the selected altitude is captured and held, with typical performance.
- 7) Select pitch hold mode and set a pitch command of 5 degrees nose up using the thumbwheel control.
- 8) Apply an increase in thrust.
- 9) Verify that pitch trim is applied to minimize pitch control force applied at the new airspeed.

NOTE: Minimum pitch control force can be verified by selecting CWS and moving the control wheel slightly forward and aft. Resistance should be minimal at the point at which the AP had left the control yoke.

b. COM Checks

Check COM1 and COM2 transmission through Yoke MIC and Hand MIC, receiving out of headphones and speaker.

c. NAV Checks

NOTE: If not practical to perform in flight, this procedure may be accomplished on the ground using approved VHF NAV test equipment, such as IFR model NAV-401L or Aeroflex model IFR-6000.

- 1) Apply electrical power to all avionics equipment.
- 2) Tune the NAV 1 receiver to a valid local VOR station.
- 3) Select NAV 1 as the HSI source on each PFD.
- 4) Using the CRS knob, select a course on each PFD.
- 5) Verify that a valid course deviation indication is displayed on each PFD.
- 6) Select the NAV 1 button on each audio panel.
- 7) Verify NAV 1 audio is audible from the pilot and co-pilot headsets.
- 8) Repeat steps 2)–7) for NAV 2.
- 9) Tune NAV 1 and NAV 2 to a local ILS frequency.
- 10) Select NAV 1 as the HSI source on PFD 1. Select NAV 2 as the HSI source on PFD 2.
- 11) Select Marker Mute button to OFF state on each audio panel.
- 12) With aircraft established on an ILS front course, verify the following:
 - a) Valid course deviation indication displayed on each PFD.
 - b) Valid glideslope deviation indication displayed on each PFD.
- 13) Fly the ILS front course approach and verify the following:
 - a) Marker beacon indications are displayed.
 - b) Marker beacon tones are heard from the pilot and co-pilot headsets.

d. GTX 33 Checks

NOTE: If not practical to perform in flight, this procedure may be accomplished on the ground using approved transponder test equipment, such as Aeroflex model ATC-601 or Aeroflex model IFR-6000.

- 1) Electrical power applied to all avionics equipment.
- 2) Using a coordinated request with air traffic control, verify the following:
 - a) XPDR code reply and ident functioning normally
 - b) XPDR altitude reply functioning normally
 - c) Mode S address reply functioning as configured (refer to paragraph 6b).

NOTE: The following steps apply only to aircraft that have the dual transponder option installed.

- 3) On PFD 1, select the XPDR soft key, then select the XPDR 2 soft key.
- 4) Pull the XPDR 1 circuit breaker.
- 5) Using a coordinated request with air traffic control, verify the following:
 - a) XPDR code reply and ident functioning normally
 - b) XPDR altitude reply functioning normally
 - c) Mode S address reply functioning as configured (refer to paragraph 6b).
- 6) Close the XPDR 1 circuit breaker.

e. Fuel Flow

- 1) Electrical power applied to all avionics equipment.
- 2) During cruise flight, verify fuel flow indication is functioning normally, using cross check of fuel flow data from Pilot Operating Handbook VB-1993 or Pilot Operating Handbook VB-2182, Section 5.

NOTE: Perform this check at any one condition for which a fuel flow is documented. For example, intermediate cruise power (800 ft-lbs), ISA+10, 25,000 feet: 222 knots, ECS normal should result in a fuel flow indication of approximately 189 PPH, as shown in Figure 5-89 in VB-1993; or, for PA-46-500TP (1999 KG), intermediate cruise power (800 ft-lbs), ISA+10, 25,000 feet: 228 knots, ECS normal should result in a fuel flow indication of approximately 86.2 kg/hr, as shown in Figure 5-85 in VB-2182.

f. KR-87 Automatic Direction Finder

NOTE: Perform this procedure only if the ADF option is installed in the aircraft. If not practical to perform in flight, this procedure may be accomplished on the ground using an approved NDB signal generator.

- 1) Electrical power applied to all avionics equipment.
- 2) Tune the ADF receiver to a valid local NDB station (or AM radio station) frequency.
- 3) Select the PFD soft key followed by either BRG soft key on each PFD.

NOTE: Selection of either BRG soft key will cycle through the bearing sources in the following order: NAV, GPS, ADF, OFF.

- 4) Verify that a valid relative bearing indication is displayed on each PFD.
- 5) Select the ADF button on each audio panel.
- 6) Verify ADF audio is audible from the pilot and co-pilot headsets.

g. KN-63 DME

NOTE: Perform this procedure only if the DME option is installed in the aircraft. If not practical to perform in flight, this procedure may be accomplished on the ground using approved DME test equipment, such as Aeroflex model ATC-600 or Aeroflex model IFR-6000.

- 1) Electrical power applied to all avionics equipment.
- 2) Select the PFD soft key followed by the DME soft key on each PFD.
- 3) Verify that the DME information window is displayed on each PFD.
- 4) Select the BACK soft key to access the top level PFD soft key menu.
- 5) Select the DME soft key to display the DME tuning window.
- 6) Using the cursor, ensure NAV 1 is selected as the DME tune mode.
- 7) Tune NAV 1 to a valid local station paired to a DME.
- 8) Verify that a valid distance value is displayed in the DME information window.
- 9) Tune NAV 1 to a frequency that has no paired DME.
- 10) Verify that the indications are removed in the DME information window.
- 11) Using the cursor, select NAV 2 as the DME tune mode in the DME tune window.
- 12) Tune NAV 2 to a DME paired station frequency.
- 13) Verify that a valid distance value is displayed in the DME information window.
- 14) Select the DME button on each audio panel.
- 15) Verify DME audio is audible from the pilot and co-pilot headsets.

10. Make a logbook entry indicating compliance with this Service Letter.

MATERIAL REQUIRED:

One (1) each: personal computer, SD card reader, SD card, and Internet connectivity.

NOTE: Approved card readers include SanDisk SDDR-99 and SDDR-93. The following SD cards are approved, although other SD cards will work:

APPROVED MANUFACTURER	CARD CAPACITY
SANDISK	512 MB
SANDISK	1.0 GB
SANDISK	2.0 GB
SANDISK	4.0 GB

One (1) each, G1000 Meridian Pilot's Guide: Garmin P/N 190-00763-04, per aircraft.

One (1) each, G1000 Meridian Cockpit Reference Guide: Garmin P/N 190-00764-03, per aircraft.

NOTE: These manuals are available for download from the Garmin support website: <http://dealers.garmin.com>.

AVAILABILITY OF PARTS:

Locally procured

EFFECTIVITY DATE:

This service letter is effective upon receipt.

SUMMARY:

Applicable factory participation is limited to new aircraft in warranty at the time of compliance. Factory participation will remain in effect for a period of time not to exceed 180 days from the date of this service letter.

If the service center is an Authorized Garmin Dealer, any warranty claim is to be made directly with Garmin. If the service center is a Factory Authorized Piper Service Facility but not an Authorized Garmin Dealer, any claim is to be made through Piper.

Please contact your Factory Authorized Piper Service Facility to make arrangements for compliance with this service letter in accordance with the compliance time indicated.

NOTE: Please notify the factory of any address/ownership corrections. Changes should include aircraft model, serial number, current owner's name and address.

Corrections and/or changes should be directed to:

PIPER AIRCRAFT, INC.
Attn: Customer Service
2926 Piper Drive
Vero Beach, FL 32960