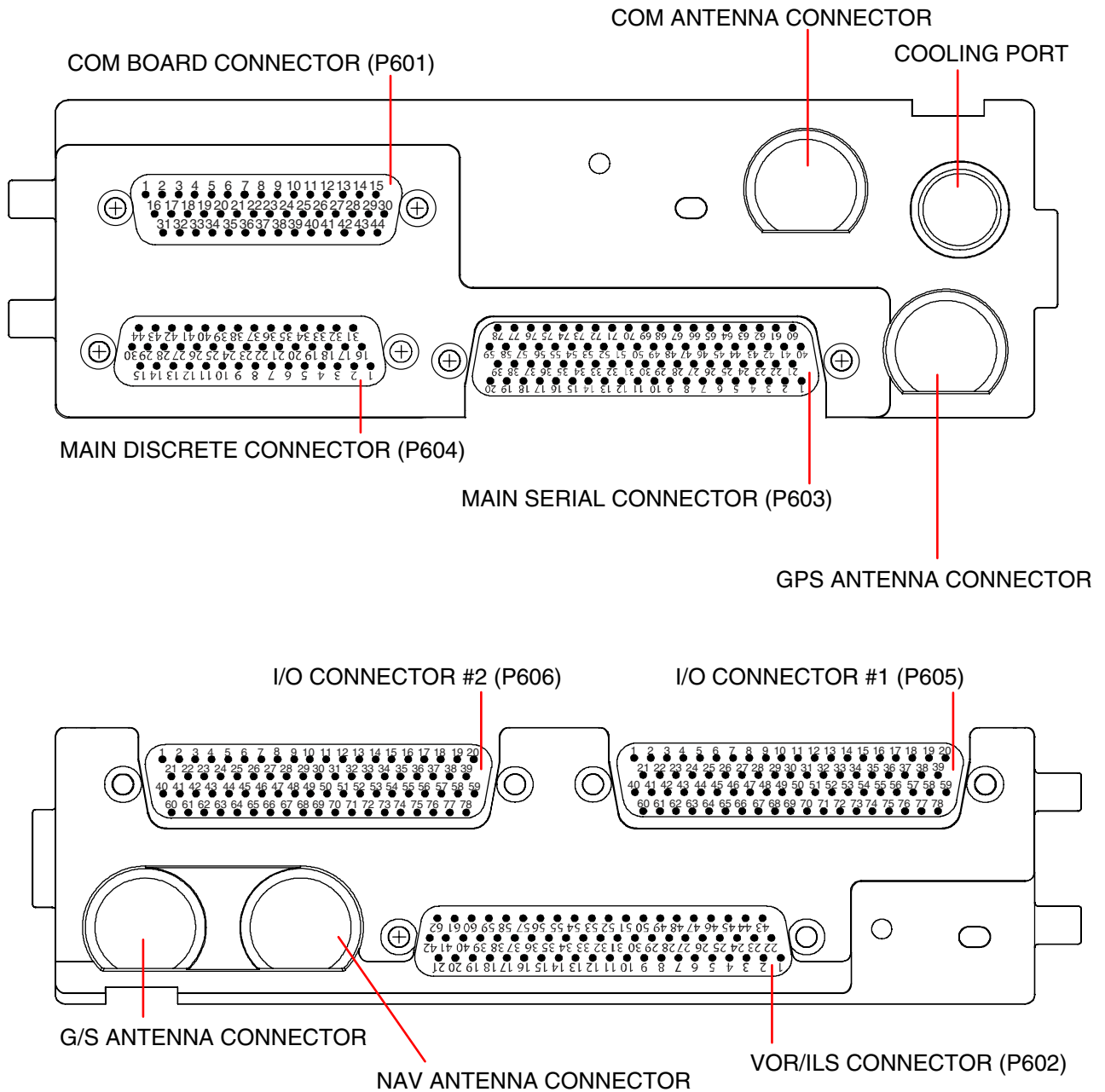


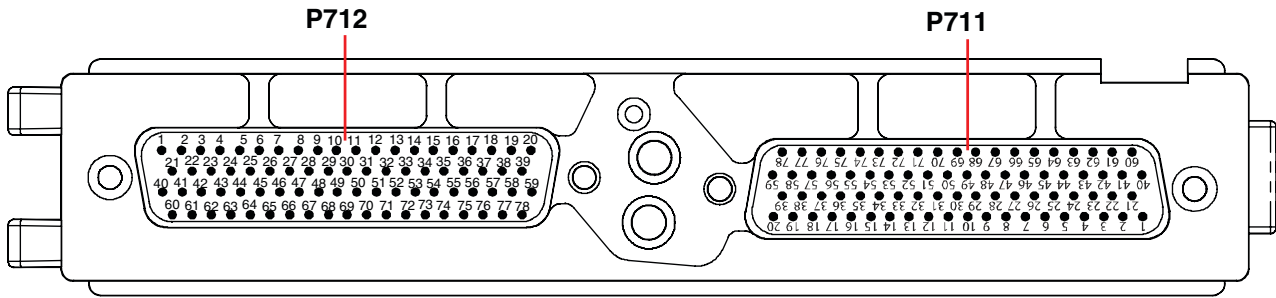
GIA 63W BACKSHELL CONNECTORS



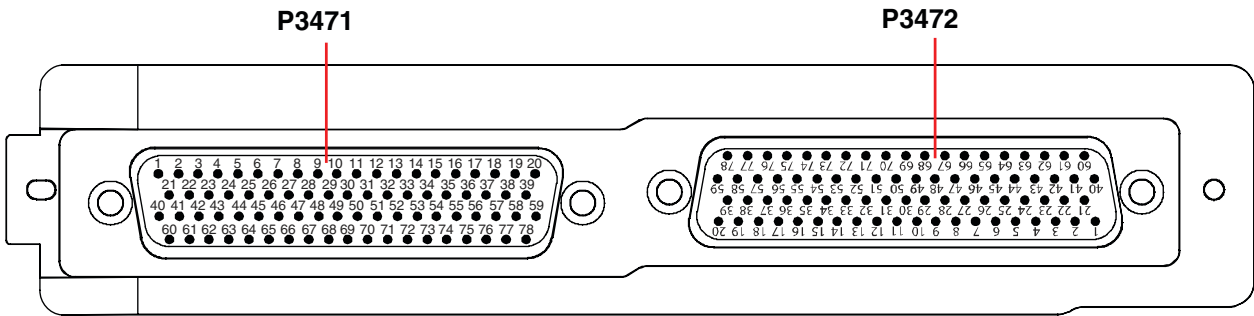
Viewed with the LRU removed.

Backshell Connectors
Figure 24 (Sheet 1 of 4)

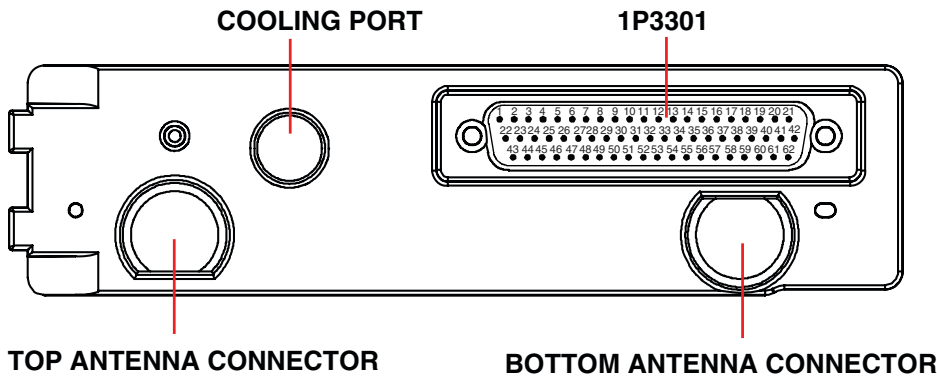
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GEA 71 Backshell Connectors



GMA 1347 Backshell Connectors

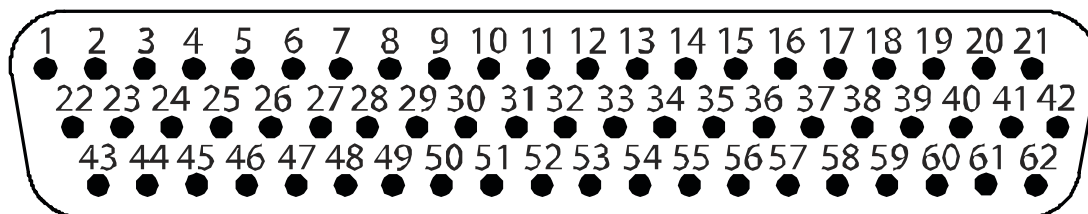


GTX 33 Backshell Connectors

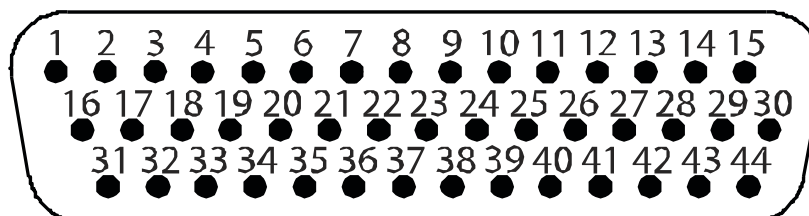
Backshell connectors as viewed with the LRU removed.

Backshell Connectors
Figure 24 (Sheet 2 of 4)

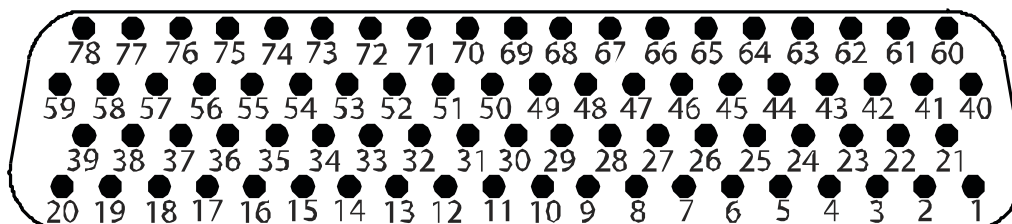
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



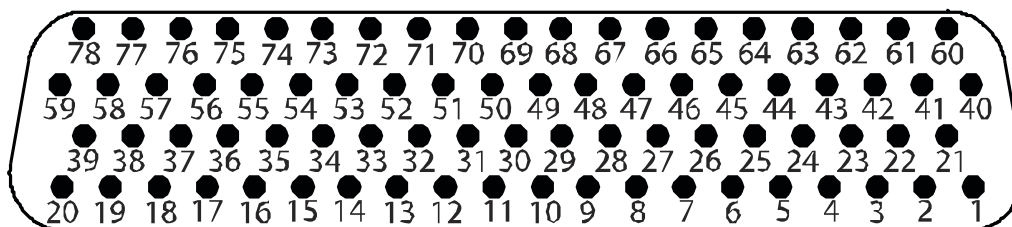
GDU 1040 Backshell Connector (1P10001, 2P10001, and 3P10001)



GRS 77 Backshell Connector (1P771, 2P771)



GDC 74A Backshell Connector (1P741, 2P741)

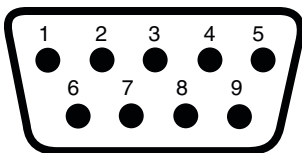


GDL 69A (Optional) Backshell Connector (P691)

Backshell connectors as viewed with the LRU removed.

Backshell Connectors
Figure 24 (Sheet 3 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GRT 10 (Optional) Backshell Connector (P771)

Backshell connectors as viewed with the LRU removed.

Backshell Connectors
Figure 24 (Sheet 4 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 9 (Sheet 1 of 2)
G1000 - TROUBLESHOOTING - GDU**

GDU 1040 Troubleshooting / Common Problems	
Symptom	Recommended Action
Display is blank	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle power. ✓ If GDU recovers, observe display for yellow text containing error information at the top of the screen. If message indicates software needs to be re-loaded, then re-load software. Otherwise, replace the GDU.
Display resets	• Use a bright light to verify LCD is active. ✓ Adjust avionics dimmer control full clockwise. ✓ Manually turn up backlight on the PFD and load configuration files to the GDU. • Ensure slide lock is fully engaged with the locking tabs on the back of the unit. ✓ If slide lock is not fully engaged, remove connector and verify the locking tabs on the GDU are perpendicular to the connector. If necessary, straighten them before reseating connector.
Display flickers	• Ensure GDU is receiving power. If a circuit breaker is tripped, determine source of short before resetting breaker. • Ensure circuit breakers have not failed and power wire connections are secure. • Swap PFD and MFD. ✓ If problem follows unit, replace the display. (Note the position it failed in.) ✓ If problem does not follow unit, troubleshoot aircraft wiring for fault.
SD card is stuck in GDU	• DO NOT insert a screwdriver of any length into the card slot. • DO NOT pry against the overlay. • DO NOT force the SD Card out. • Use a small screwdriver in the groove on the side of the exposed end of the card to help pull out the card. • Push the card in further to release the card locking mechanism. • Check SD Card for having more than one label. Two or more labels on the card will cause sticking. ✓ Remove all but one label. • Ensure the SD card is from Toshiba or SanDisk. Use of other SD Cards is not recommended. • If card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair.
A button/knob/joystick does not appear to function	• Go to the GDU TEST page in configuration mode and verify button, knob, or joystick operates correctly by observing a change in color from red to green in the button/knob/joystick icon when the button/knob/joystick is pressed. If a button is stuck, the button icon will be green without pressing the button as soon as you turn to the GDU TEST page. ✓ If problem is verified, replace GDU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 9 (Sheet 2 of 2)
G1000 - TROUBLESHOOTING - GDU**

GDU 1040 Troubleshooting / Common Problems (cont.)	
Symptom	Recommended Action
Terrain/Obstacle/Safetaxi does not display	• Ensure supplemental data cards are inserted correctly in the lower slots of all three GDU's. • Allow the system to verify the data on the cards for approximately five minutes after power-up. • If a database does not activate, reload the problem database onto the SD Card or replace the card.
Display will not track dimmer bus	• Reload GDU configuration files. • Swap PFD and MFD to see if problem remains with display. ✓ Replace display if condition remains with the same display. ✓ If condition remains in original position after swapping displays, check GDU dimmer input to verify voltage is present.
Keyboard will not track dimmer bus	
Display will not track photocell	• Reload GDU configuration files. • Swap PFD and MFD to see if problem remains with display. ✓ Replace display if condition remains with the same unit. ✓ If condition remains in original position after swapping displays, check GDU dimmer input to verify voltage is present. • Go to the GDU TEST page in configuration mode. ✓ Cover and uncover photocells and verify that PHOTOCELL A or PHOTOCELL B value changes. ✓ If values do not change, replace the display.
Keyboard will not track photocell	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 1 of 6)
G1000 - MESSAGE ADVISORIES - GDU**

GDU 1040 Messages / Software / Configuration Messages		
Failure Message	Cause	Solution
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The system has found the PFD and/or MFD software versions do not match.	• Load correct software version. See Software Loading procedure.
MANIFEST – PFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in the specified PFD.	
MANIFEST – MFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in MFD.	
CNFG MODULE – PFD configuration module is inoperative.	The PFD master configuration module has failed.	• Check master configuration module connector and wiring for damage inside the GDU connector backshell. ✓ Replace master configuration module wiring and pins. ✓ If problem persists, replace master configuration module. NOTE New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 2 of 6)
G1000 - MESSAGE ADVISORIES - GDU**

GDU 1040 Messages / Software / Configuration Messages (cont.)		
Failure Message	Cause	Solution
MFD CONFIG – MFD configuration error. Config service required.	A configuration mismatch has occurred between the display and the Master Configuration Module.	• Reload the display configuration files from SD Loader Card. • Reload system configuration files by pressing the UPDT CFG softkey on the Configuration Upload Page in the PFD System Page Group to load configuration files into the configuration module. ✓ If message persists, check PFD1 config module wiring for faults and replace if necessary. ✓ If issue continues, replace PFD1 master configuration module. ✓ If problem persists, replace the display. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
PFD CONFIG – PFD configuration error. Config service required.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 3 of 6)
G1000 - MESSAGE ADVISORIES - GDU**

Database Message Advisories		
Failure Message	Cause	Solution
MFD DB ERR – MFD aviation database error exists.	The MFD or PFD has encountered an error in the Jeppesen aviation database.	• Reload aviation database into the display. • Contact Garmin Technical Support for assistance.
PFD DB ERR – PFD aviation database error exists.		
MFD DB ERR – MFD terrain database error exists.	The MFD has encountered an error in the terrain database.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard. • Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD terrain database error exists.	The specified PFD has encountered an error in the terrain database.	
MFD DB ERR – MFD obstacle database error exists.	The MFD has encountered an error in the obstacle database.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard. • Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD obstacle database error exists.	The specified PFD has encountered an error in the obstacle database.	
MFD DB ERR – MFD airport terrain database error exists.	The MFD has encountered an error in the airport terrain database.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard. • Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD airport terrain database error exists.	The PFD has encountered an error in the airport terrain database.	
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The system has found the Jeppesen aviation database cycles in the PFD and/or MFD do not match.	• Load current aviation database versions to all displays.
DB MISMATCH – Aviation database type mismatch. Xtalk is off.	The system has found the Jeppesen aviation database types in the PFD and/or MFD do not match (i.e., different regions: Americas, International, Atlantic, etc.)	• Load same type aviation database to all displays.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 4 of 6)
G1000 - MESSAGE ADVISORIES - GDU**

Database Message Advisories (cont.)		
Failure Message	Cause	Solution
DB MISMATCH – Airport Terrain database version mismatch. Xtalk is off.	The PFD and/or MFD have different Airport Terrain database versions installed.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard.
DB MISMATCH – Terrain database version mismatch.	The PFD and/or MFD have different terrain database versions installed.	
DB MISMATCH – Obstacle database version mismatch.	The PFD and/or MFD have different obstacle database versions installed.	
DB MISMATCH – Terrain database type mismatch.	The PFD and/or MFD have different terrain database types installed (i.e., different regions: Americas, International, Atlantic, etc).	

Cooling Message Advisories		
Failure Message	Cause	Solution
MFD COOLING – has poor cooling. Reducing power usage.	MFD has exceeded its operating temperature range.	• Check cooling fan and wiring for proper operation (if applicable). ✓ Replace the cooling fan if unable to determine if it is correctly operating. ✓ If problem persists, replace the MFD. • If problem continues contact Garmin Aviation Product Support.
PFD COOLING – has poor cooling. Reducing power usage.	PFD has exceeded its operating temperature range.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 5 of 6)
G1000 - MESSAGE ADVISORIES - GDU**

Key Message Advisories		
Failure Message	Cause	Solution
MFD "key" KEYSTK – key is stuck.	The SYSTEM has determined a key is stuck on MFD.	- Go to the GDU TEST page in configuration mode and verify if key is stuck (if key is stuck its indicator will be green). - Exercise suspected stuck key and reset GDU TEST page to see if indicator remains green without pressing the key. ✓ If problem persists replace the display.
PFD "key" KEYSTK – key is stuck.	The system has determined a key is stuck on the PFD.	

Miscellaneous Message Advisories		
Failure Message	Cause	Solution
XTALK ERROR – A flight display cross talk error has occurred.	A communication error has occurred between the MFD and/or PFD.	- Ensure a database error has not occurred (identified in the ALERTS window on the PFD). ✓ If a database error has occurred, correct error before proceeding. - Check display Ethernet interconnect wiring. - Replace PFD with a known good unit, to verify location of problem: ✓ If problem persists, reinstall PFD and replace MFD.
DATA LOST – Pilot stored data lost. Recheck settings.	Pilot stored data has been lost.	- If the CLR key was held during a power cycle, disregard message. - Cycle power to PFD: ✓ Ensure CLR key is not stuck on the GDU TEST page. ✓ If problem persists, replace PFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 6 of 6)
G1000 - MESSAGE ADVISORIES - GDU**

Miscellaneous Message Advisories		
Failure Message	Cause	Solution
MFD SERVICE – needs service. Return unit for repair.	The G1000 has determined MFD needs service.	• Ensure the MFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. ✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. ✓ If the CCFT level rises, disregard the message. ✓ If the CCFT level does not rise, replace the MFD • Replace the MFD
PFD SERVICE – needs service. Return unit for repair.	The G1000 has determined the specified PFD needs service.	• Ensure the PFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to the GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. ✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. ✓ If the CCFT level rises, disregard the message. ✓ If the CCFT level does not rise, replace the PFD • Replace the PFD.
PFD VOLTAGE – PFD has low voltage. Reducing power usage.	The specified PFD supply voltage is low.	• Check input voltage to PFD. • If input voltage is ok, replace PFD.
MFD VOLTAGE – MFD has low voltage. Reducing power usage.	The MFD supply voltage is low.	• Check input voltage to MFD. • If input voltage is ok, replace MFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 11
G1000 - TROUBLESHOOTING - GMA**

GMA Common Problems / Message Advisories	
Symptom/ Failure Message	Recommended Action
Noise in Audio	Most often the cause of the noise is external to the GMA. Try the following to locate the source of the noise before replacing the GMA: • Try a different pair of headsets. Noise cancelling headsets may pick up and/or generate more noise than standard headsets from their own circuitry. • Check for noise with the engine turned off. ✓ If the noise is present only when the engine is running, check the generator and/or ignition system as possible sources of noise (see applicable airframe specific maintenance manual). • Check for noise as all electrical equipment is turned on and off (strobes, other radios, etc.). ✓ If the noise is identified from one electrical system or component refer to the applicable airframe specific maintenance manual. • Ensure the NAV/COM squelch is not open. • Ensure the ADF and DME audio is not active. • Ensure the marker beacon audio is not active. • Ensure the ICS squelch is not open. ✓ Master squelch level can be adjusted on the GMA CONFIGURATION page for higher noise environments. • Replace unit only after all possible external sources of noise are eliminated.
Buttons Do Not Work	• Some buttons are disabled in the GMA CONFIGURATION page by default. This is to remove potential sources of audio noise for inputs that are not used. If in doubt as to which buttons should be disabled, reload GMA config files and other config files for optional equipment installed in the aircraft (i.e. ADF, HF, etc.) from the loader card.
COM Bleedover	• Verify on the GMA CONFIGURATION page that "Disable Split COM" has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, Split COM operation is not approved. If the box is black (indicating COM 1/2 button is active), highlight "Disable Split COM" with the cursor and press the ENT key to turn the box green which will deactivate Split COM mode.
Speaker Cuts Out	• Reduce volume level of the item that caused the speaker to cut out when turned up. A speaker protection circuit disables the speaker output if the volume is too high. If the volume is not sufficient, replace aircraft cabin speaker, reference the Airframe Maintenance Manual.
Mic Audio Heard in Speaker	• Reduce ICS Volume.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12
G1000 - MESSAGE ADVISORIES - GMA**

GMA Common Problems / Message Advisories (cont.)		
Failure Message	Cause	Solution
GMA SERVICE – GMA needs service. Return unit for repair.	The system has determined that the GMA 1347 needs service.	• Replace GMA.
GMA FAIL – GMA is inoperative.	The system has detected a failure in the GMA 1347.	• Ensure GMA is receiving power. • Ensure both GIAs are receiving power. • Ensure all GDUs are receiving power. • Ensure the GMA/GIA RS-232 data lines are working properly. • Ensure the GIA/GDU Ethernet data lines are working properly. • Replace GMA.
MANIFEST – GMA software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GMA 1347.	Load the correct unit software. See Software/Configuration (above) for the Software Loading procedure.
GMA CONFIG – GMA configuration error. Config service req'd.	The system has detected a GMA 1347 configuration mismatch for the unit.	• Load GMA configuration files. See Software/Configuration (above). ✓ Replace GMA. ✓ If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 13 (Sheet 1 of 2)
G1000 - TROUBLESHOOTING - GIA 63W**

GIA 63W Troubleshooting COM	
Symptom	Recommended Action
Weak COM transmit power	- Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check COM antenna and cabling for faults.
Weak COM receiver	- Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check COM antenna and cabling for faults.
No COM sidetone	- Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem persists, replace GMA1 with a known good unit.

GIA 63W Troubleshooting NAV	
Symptom	Recommended Action
Weak NAV receiver	- Set up a NAV/COM Ramp Test Set to radiate a test signal. - Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

GIA 63W Troubleshooting G/S	
Symptom	Recommended Action
Weak G/S receiver	- Set up a NAV/COM Ramp Test Set to radiate a test signal. - Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 13 (Sheet 2 of 2)
G1000 - TROUBLESHOOTING - GIA 63W**

GIA 63W Troubleshooting GPS	
Symptom	Recommended Action
Will Not Acquire Satellites	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Using the MFD AUX – GPS Status page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e. cell phones, FBO datalink antennas, etc.). • Check date and time on Date/Time Setup Page. ✓ If date and time are incorrect, enter the correct date and time. • Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, clear the GPS almanac by performing the following steps – - o Using the PFD in config mode, go to the GIA RS-232/ARNIC 429 Config Page. - o At the top of the screen, select the GIA that can not acquire satellites (GIA1 or GIA2) and press the ENT key. - o Press the “CLR NV” softkey at the bottom of the screen. - o Select “OK” in the “Clear GIA nonvolatile memory?” pop-up window. - o Next reload GIA Audio and Config files from a loader card, see G1000 Software/Configuration Procedure, for instructions. Be sure to reload the config files for any optional equipment installed on the aircraft that require the GIA configuration to be updated. • Cycle power on the system and allow it to restart in normal mode. Place the aircraft outside and allow 15-30 minutes for the GPS to acquire a position and download a new almanac. ✓ If clearing nonvolatile memory is unsuccessful and the GPS still can not acquire a position, replace the GIA. ✓ If problem does not follow unit, check GPS antenna and cabling.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 1 of 6)
G1000 - MESSAGE ADVISORIES - GIA 63W**

GIA 63W Message Advisories COM Messages		
Failure Message	Cause	Solution
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has determined COM1 needs service.	Replace GIA1 according to instructions in Removal/Installation.
COM2 SERVICE – COM2 needs service. Return unit for repair.	The system has determined COM2 needs service.	Replace GIA2 according to instructions in Removal/Installation.
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	- Press the push-to-talk switch(es) again to cycle its operation. - Check push-to-talk switch(es) and wiring. - Check GIA1/GMA 1347 interconnect. - Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Software/Configuration above): ✓ If problem follows the unit, replace GIA1. ✓ If problem persists replace defective GMA 1347.
COM2 PTT – COM2 push-to-talk key is stuck.	The COM2 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	- Press the push-to-talk switch(es) again to cycle its operation. - Check push-to-talk switch(es) and wiring. - Check GIA2/GMA 1347 interconnect. - Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Software/Configuration above): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists replace defective GMA 1347.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 2 of 6)
G1000 - MESSAGE ADVISORIES - GIA 63W**

GIA 63W Message Advisories COM Messages		
Failure Message	Cause	Solution
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM1 external remote transfer switch again to cycle its operation. Check COM1 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows the unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
COM2 RMT XFR – COM2 remote transfer key is stuck.	The COM2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM2 external remote transfer switch again to cycle its operation. Check COM2 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The specified COM transceiver is reporting a high temperature condition and is reducing transmit power to prevent damage.	• Check fan, wiring and air tubing for proper operation (if applicable). • Replace cooling fan if unable to determine if operating correctly. • Replace GIA. • If problem persists contact Garmin Aviation Product Support for assistance.
COM2 TEMP – COM2 over temp. Reducing transmitter power.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 3 of 6)
G1000 - MESSAGE ADVISORIES - GIA 63W**

GIA Message Advisories NAV Messages		
Failure Message	Cause	Solution
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	The system has detected a failure in NAV1 receiver.	Replace GIA1.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	The system has detected a failure in NAV2 receiver.	Replace GIA2.
NAV1 RMT XFR – NAV1 remote transfer key is stuck.	The NAV1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the NAV1 external remote transfer switch again to cycle its operation. Check NAV1 remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
NAV2 RMT XFR – NAV2 remote transfer key is stuck.	The NAV2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the NAV2 external remote transfer switch again to cycle its operation. Check NAV2 remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 4 of 6)
G1000 - MESSAGE ADVISORIES - GIA 63W**

GIA Message Advisories Glideslope Messages		
Failure Message	Cause	Solution
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	The system has detected a failure in G/S1 receiver.	Replace GIA1.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	The system has detected a failure in G/S2 receiver.	Replace GIA2.
G/S1 FAIL – G/S1 is inoperative.	The system has detected a failure in G/S1 receiver.	- Switch GIA1 and GIA2 to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow unit, check G/S1 antenna and cabling.
G/S2 FAIL – G/S2 is inoperative.	The system has detected a failure in G/S2 receiver.	- Switch GIA1 and GIA2 to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow unit, check G/S2 antenna and cabling.

GIA Message Advisories GPS Messages		
Failure Message	Cause	Solution
MANIFEST – GPS1 software mismatch. Communication halted.	The system has detected an incorrect software version loaded in GIA1.	• Load the correct GPS software. See Software/Configuration above): for the Software Loading procedure.
MANIFEST – GPS2 software mismatch. Communication halted.	The system has detected an incorrect software version loaded in GIA2.	
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	The system has detected a failure in GPS1 receiver.	• Replace GIA.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	The system has detected a failure in GPS2 receiver.	
GPS1 FAIL – GPS1 is inoperative.	The system has detected a failure in GPS1 receiver.	• Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow the unit, check GPS antenna and cabling.
GPS2 FAIL – GPS2 is inoperative.	The system has detected a failure in GPS2 receiver.	
NOTE Before troubleshooting, ensure that no cell phones or devices using cell phone technology are turned on, even in a monitoring state, in the cabin.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 5 of 6)
G1000 - MESSAGE ADVISORIES - GIA 63W**

GIA Message Advisories GPS Messages (cont.)		
Failure Message	Cause	Solution
LOI – GPS integrity lost. Crosscheck with other NAVS.	If the primary receiver is a WAAS sensor, the alert indicates that GPS position data has timed out.	- Verify the area the aircraft was traveling through did not have loss of GPS coverage. FAA NOTAMs may be issued for periods of outages, or the US Coast Guard website http://www.navcen.uscg.gov/gps/gps_notices/default.htm will have notices posted. - Using the MFD AUX – GPS Status page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e., cell phones, FBO datalink antennas, etc.). - If GPS receivers can not acquire a position lock, troubleshoot per the “Will not acquire satellites” section.
GPS NAV LOST – Loss of GPS navigation. Insufficient satellites.	There is no GPS position fix available or the system is in dead reckoning mode.	
GPS NAV LOST – Loss of GPS navigation. Position error.	The G1000 has detected an internal position warning has occurred.	
GPS NAV LOST – Loss of GPS navigation. GPS fail.	The G1000 has detected a GPS engine failure.	

GIA Message Advisories GIA Cooling Messages		
Failure Message	Cause	Solution
GIA1 COOLING – GIA1 temperature too low.	GIA1 operating temperature is too low.	Allow unit to warm up.
GIA2 COOLING – GIA2 temperature too low.	GIA2 operating temperature is too low.	Allow unit to warm up.
GIA1 COOLING – GIA1 over temperature.	GIA1 has exceeded its operating temperature range.	- Check fan, wiring and air tubing for proper operation (if applicable). - Replace cooling fan if unable to determine if operating correctly. - Replace GIA1. - If problem persists contact Garmin Aviation Product Support for assistance.
GIA2 COOLING – GIA2 over temperature.	GIA2 has exceeded its operating temperature range.	- Check fan, wiring and air tubing for proper operation (if applicable). - Replace cooling fan if unable to determine if operating correctly. - Replace GIA2. - If problem persists contact Garmin Aviation Product Support for assistance.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 6 of 6)
G1000 - MESSAGE ADVISORIES - GIA 63W**

GIA Message Advisories GIA Configuration Messages		
Failure Message	Cause	Solution
MANIFEST – GIA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA1.	Load the correct software. See Software/Configuration (above) for the Software Loading procedure.
MANIFEST – GIA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA2.	
GIA1 CONFIG – GIA1 audio config error. Config service req'd.	The GIA's audio configuration files are incorrect or missing.	Reload audio configuration files.
GIA2 CONFIG – GIA2 audio config error. Config service req'd.		
GIA1 CONFIG – GIA1 configuration error. Config service req'd.	The system has detected a GIA configuration mismatch. If GIAs are not properly configured after being swapped/replaced, this message appears.	- Load the configuration files for that GIA. See Software/Configuration (above) for GIA 63W Configuration Loading procedure. - If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
GIA2 CONFIG – GIA2 configuration error. Config service req'd.		
HW MISMATCH – GIA hardware mismatch, GIA1 communication halted.	The G1000 has detected a non-WAAS GIA 63W.	Replace GIA with a WAAS unit.
HW MISMATCH – GIA hardware mismatch, GIA2 communication halted.		
GIA1 SERVICE – GIA1 needs service. Return unit for repair.	The G1000 has detected a failure in the specified GIA.	Replace suspect GIA.
GIA2 SERVICE – GIA2 needs service. Return unit for repair.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 15
G1000 - TROUBLESHOOTING / MESSAGE ADVISORIES - GEA**

GEA Troubleshooting / GEA Message Advisories		
Failure Message	Cause	Solution
MANIFEST – GEA software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GEA 71.	Load the correct software version. See GEA 71 Software Load Procedure.
GEA CONFIG – GEA configuration error. Config service required.	The system has detected a configuration mismatch in the GEA 71.	• Load GEA configuration files. See GEA 71 Configuration Procedure. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 16
G1000 - TROUBLESHOOTING / MESSAGE ADVISORIES - GTX**

GTX 33 Troubleshooting / Message Advisories		
Failure Message	Cause	Solution
MANIFEST – GTX software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GTX 33.	Reload software. See Software Load / Configuration Procedure.
XPDR CONFIG – XPDR configuration error. Config service required.	The system has detected a configuration mismatch for the specified GTX 33.	- Perform a SET>ACTV configuration reset on the GTX Config page and verify the aircraft registration is present. - If error is still present, reload config files from a loader card. ✓ If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
XPDR SRVC – XPDR needs service. Return unit for repair.	The G1000 has detected a failure in the specified GTX 33.	Replace GTX.
XPDR FAIL – XPDR is inoperative.	The specified GTX 33 is not responding.	- Check wiring between GIAs and GTX. - Replace GTX 33.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 17
G1000 - TROUBLESHOOTING - GRS / GMU**

GRS 77 (AHRS) / GMU 44 Troubleshooting / Message Advisories	
Symptom	Recommended Action
AHRS does not complete initialization	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important if this issue appears during ground operation only. • Calibrate the GRS 77. • Check GRS 77 configuration module wiring for damage. • Check GRS 77 connector for bent pins. ✓ If no damage can be found, replace GRS 77 configuration module. ✓ If problem persists, replace the GRS 77.
Attitude appears unstable	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure the four GRS 77 mounting screws are tight. Finger tight is not sufficient, a screwdriver must be used to verify. • Ensure mounting rack and airframe shelf are secure and all hardware and brackets are present (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). • Ensure GRS 77 connector is securely fastened and proper strain relief is provided. • Remove GRS 77 connector and verify there are no bent pins. • Replace the GRS 77. • Contact Garmin for further troubleshooting if required.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 18 (Sheet 1 of 2)
G1000 - MESSAGE ADVISORIES -- GRS / GMU**

GRS Troubleshooting / Message Advisories		
Failure Message	Cause	Solution
MANIFEST – GRS software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GRS 77.	Load correct software version. See Software Configuration Procedures.
AHRS SERVICE – AHRS magnetic-field model needs update.	The AHRS magnetic field model should be updated for the specified unit. Appears on ground only.	Load updated AHRS magnetic field file. See GRS 77 / Components for AHRS magnetic field update information.
GEO LIMITS – AHRS too far north/south, no magnetic compass.	No magnetic compass information available due to being too far north or south.	Operate the aircraft only within the limits as specified in the PA28-181 w/ G1000 POH.
AHRS TAS – AHRS not receiving airspeed.	The specified GRS 77 is not receiving airspeed from the GDC 74A.	- Check GRS/GDC interconnect for faults. - Replace the GDC 74A. - If problem persists, replace the GRS 77A.
AHRS GPS – AHRS not receiving backup GPS information.	The GRS 77 is not receiving backup GPS information from either GIA 63.	- Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. - Check GPS status for GIA 1 and 2 on MFD - AUX GPS STATUS page. If one or both GPS receivers cannot acquire a position lock, see GPS troubleshooting section. - Troubleshoot GIA 1 and 2 – GRS wiring for faults (ref. Failed Path troubleshooting section). - Replace the GRS 77.
AHRS GPS – AHRS operating exclusively in no-GPS mode.	The GRS 77 is operating in the absence of GPS.	
AHRS GPS – AHRS not receiving any GPS information.	The GRS 77 is not receiving GPS data from the GPS receivers.	
AHRS GPS – AHRS using backup GPS source.	The GRS 77 is using the backup GPS data path.	
AHRS MAG DB – AHRS magnetic model database version mismatch.	The G1000 has detected a magnetic model database version mismatch.	Load AHRS magnetic model field in both GRS units.
MAG VAR WARN – Large magnetic variance. Verify all course angles.	Magnetic variance value from GMU 44 is not accurate.	- If flying near large radio towers or other sources of possible electromagnetic interference, the condition should correct itself as the aircraft leaves the area. - If problem persists, run magnetic interference check in LRU Test Procedures (below) to check for magnetic interference in the aircraft.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 18 (Sheet 2 of 2)
G1000 - MESSAGE ADVISORIES -- GRS / GMU

GMU Troubleshooting / Message Advisories		
Failure Message	Cause	Solution
MANIFEST – GMU software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GMU 44.	Load the correct software version. See G1000 Software/Configuration Procedure, for the Software Load Procedure.
HDG FAULT – AHRS magnetometer fault has occurred	A fault has occurred in the specified magnetometer; heading will be flagged invalid.	• Check GMU 44/GRS 77 interconnect for faults. ✓ Replace GMU 44. ✓ If problem persists, replace GRS 77.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 19
G1000 - TROUBLESHOOTING / MESSAGE ADVISORIES - GDC 74A**

GDC 74A Troubleshooting / Message Advisories		
Symptom	Recommended Action	
Altitude is different than standby altimeter	- Perform a pitot/static check per 34-10 Pitot Static Systems in this manual. Allow the GDC to warm up for fifteen minutes before checking accuracy, per Garmin Service Advisory 0606. - Determine which instrument is outside limits and replace. The GDC may be field adjusted per Garmin Service Advisory 0720. Note: Both units may individually be in spec but show a difference in altitude. Do not return the GDC to Garmin for service if not outside limits.	
GDC Config file does not load.	- Replace GDC config module. ✓ If problem persists, replace GDC config module wire harness.	
Failure Message	Cause	Solution
MANIFEST – GDC1 software mismatch Communication halted.	The system has detected an incorrect software version loaded in the specified GDC 74A.	Load correct software version. See Software Configuration Procedures.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 20
G1000 - TROUBLESHOOTING - GDL 69A**

GDL 69A (Optional) Troubleshooting / Message Advisories	
Symptom	Recommended Action
No XM audio is heard	• Ensure the following items are not preventing the audio panel from distributing XM audio (reference applicable G1000 Pilot's Guide): ✓ Verify the XM volume is not muted on the AUX – XM RADIO page on the MFD. ✓ Verify the COM squelch is not open. ✓ Verify the ICS squelch is not open. ✓ Verify the marker beacon tones are not being received. ✓ Verify the headphone (if equipped) volume is turned up. • Go to the AUX – SYSTEM STATUS page on the MFD and ensure unit is online. ✓ If a red X is present, verify the unit is receiving power at the rack connector.
No XM weather information is displayed	• Ensure there are no GDL alerts in the alert window. If there is an Alert for software or configuration error or mismatch, reload the file noted in the Alert. • Restart the PFD's and MFD in configuration mode and go to the GDL page. ✓ Verify unit is active. ✓ Verify the Signal number is "2" or "3". If it is "0" or "1" check the GDL 69A antenna and cabling for faults. ✓ Reseat the GDL 69A to verify the coax connector is fully seated. ✓ If unit is not active, contact XM Customer service at 1-800-985-9200 to have a refresh signal sent to your unit. You will need to provide them the Audio Radio ID (and Data Radio ID number for XM weather) numbers. Also verify with XM that the correct Weather package (Aviator Lite or Aviator) is on the account, and that no traffic service has been activated against that Radio ID. The unit must be on for approximately one hour after the request for the refresh has been sent to receive the signal. ✓ Alternatively, you may also go to XM's website at http://www.xmradio.com/refresh/ and enter the radio IDs to have a refresh signal sent. ✓ If there is still problems receiving weather products after performing the above step, call XM and have the account deactivated, and a new account activated to clear out any corrupt account information. ✓ Verify there is a good ground connection through the aircraft between the MFD and the GDL 69A unit. Reference the Aircraft Maintenance Manual for instructions on how to check bonding and ground points. ✓ If problem persists, replace the GDL 69A.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 21
G1000 - MESSAGE ADVISORIES - GDL 69A**

GDL 69A (Optional) Troubleshooting / Message Advisories		
Failure Message	Cause	Solution
GDL 69 FAIL – GDL 69A has failed.	The G1000 has detected a failure in the GDL 69A.	• Replace GDL 69A. • Check GDL 69A antenna and cabling. • Check the GDL 69A and MFD interconnect.
GDL69 CONFIG – GDL 69A configuration error. Config service req'd.	The G1000 has detected a GDL 69A configuration mismatch.	• Reload configuration file. See Software Load / Configuration Procedure. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
MANIFEST – GDL software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GDL 69A.	• Load correct software version. See Software Load / Configuration Procedure.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 22
G1000 - MESSAGE ADVISORIES - GTS 800

Failure Message	Cause	Solution
MANIFEST – GTS software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GTS 800.	Load the correct software version. See G1000 Software/Configuration Procedure, for the Software Load Procedure.
GTS CONFIG – GTS configuration error. Config service req'd.	The system has detected a configuration mismatch for the specified GTS 800.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 23
G1000 - TROUBLESHOOTING - SOFTWARE CONFIGURATION**

Software/Configuration Troubleshooting / Message Advisories	
Problem	Solutions
MFD or PFD displays do not power up:	• Ensure power is present at display backshell connector. • Troubleshoot per the “Blank Display” GDU section.
Software file load fails: 	• Ensure that LRU is reporting data on System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Retry software file load or try using a different card. Ensure that the MFD is not touched during the loading process. • Ensure that LRU part number is compatible with software version and Card Loader. • Replace LRU.
Configuration file load fails: 	• Ensure that LRU is reporting data on System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Retry configuration file load or try using a different card. Ensure that the MFD is not touched during the loading process. • Ensure that LRU part number is compatible with Card Loader. • Replace LRU.
GIA1 and/or GIA2 to 'LRU' data path not working	• Ensure GIA1 and GIA2 are configured correctly. • Check wiring, connectors & pins as needed.
Software File Mismatch Alert appears in lower right corner of PFD when started in normal mode: 	• Ensure that proper software file part number and version were loaded to LRU. To attain the current software P/N and version for your aircraft contact: Piper Aircraft Inc. Customer Service. • Check and ensure that correct Card Loader was used during load process. Refer to the General Arrangement Drawing. • Reload software to LRU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 24
G1000 - SYSTEMS COMMUNICATIONS HIERARCHY**

System Communication Hierarchy	
The following criteria must be satisfied to be able to perform the desired operation:	
Desired Operation	Criteria for Success
Load Software to MFD or PFD	- G1000 Loader Card must be inserted in top slot for each display to be loaded. - CLR & ENT keys must be held during power up of display. - Power on only one display at a time during software loading.
Load AIRFRAME, SYSTEM, MFD, PFD and MANIFEST configuration files to MFD and PFD	- G1000 Loader Card must be inserted in top slot of PFD. - PFD and MFD must be powered on. - PFD and MFD must have correct software.
Load Software/Configuration files to GIA 63Ws	- G1000 Loader Card must be inserted in top slot of PFD. - G1000 system must be powered on. - PFD and MFD must have correct software. - PFD and MFD must be successfully configured with AIRFRAME, SYSTEM, MANIFEST, MFD and PFD configuration files.
Load Software/Configuration files to: - GMA 1347 - GDC 74A - GEA 71 - GRS 77 (software only) - GMU 44 (software only) - GTX 33	- G1000 Loader Card must be inserted into PFD top slot. - G1000 must be powered on. - PFD and MFD must have correct software and configuration settings. - GIA 63Ws must have correct software. - GIA 63Ws must be successfully configured with GIA1 and GIA2 configuration files. - Data path from GIA1 to each LRU must be operational.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

I. Configuration Mode Overview

CAUTION: THE CONFIGURATION MODE CONTAINS CERTAIN PAGES AND SETTINGS THAT ARE CRITICAL TO AIRCRAFT OPERATION AND SAFETY. THESE PAGES ARE PROTECTED AND CANNOT BE MODIFIED, UNLESS THE TECHNICIAN IS PROPERLY AUTHORIZED AND EQUIPPED. HOWEVER, MOST PROTECTED PAGES ARE VIEWABLE TO ALLOW SYSTEM AWARENESS FOR TROUBLESHOOTING.

The Configuration Mode exists to provide the avionics technician with a means of configuring, checking, and calibrating various G1000 sub-systems. Troubleshooting and diagnostics information can also be viewed in this mode.

(1) Start the system in Configuration Mode:

- (a) Press and hold the ENT key on the PFD while applying power using the PFD circuit breaker.
- (b) Release the ENT key after 'INITIALIZING SYSTEM' appears in the upper left corner of the PFD.
- (c) If prompted, press the ENT key or the YES softkey to update system files.
- (d) Repeat steps (a) through (c) on the MFD, using the MFD circuit breaker to apply power.

NOTE: For a complete description and breakdown of each Configuration Mode page, refer to the G1000 Line Maintenance & Configuration Manual, Garmin P/N 190-00303-04.

(2) SET>ACTV Configuration

Throughout the Configuration Mode pages, there are SET and ACTIVE columns for input/output settings and other parameters.

"SET": Refers to a setting or group of settings that reside in PFD Internal Memory and/or the Master Configuration Module.

ACTIVE: Refers to an 'active' setting or parameter currently being used by the LRU. LRUs store the 'active' settings within internal memory.

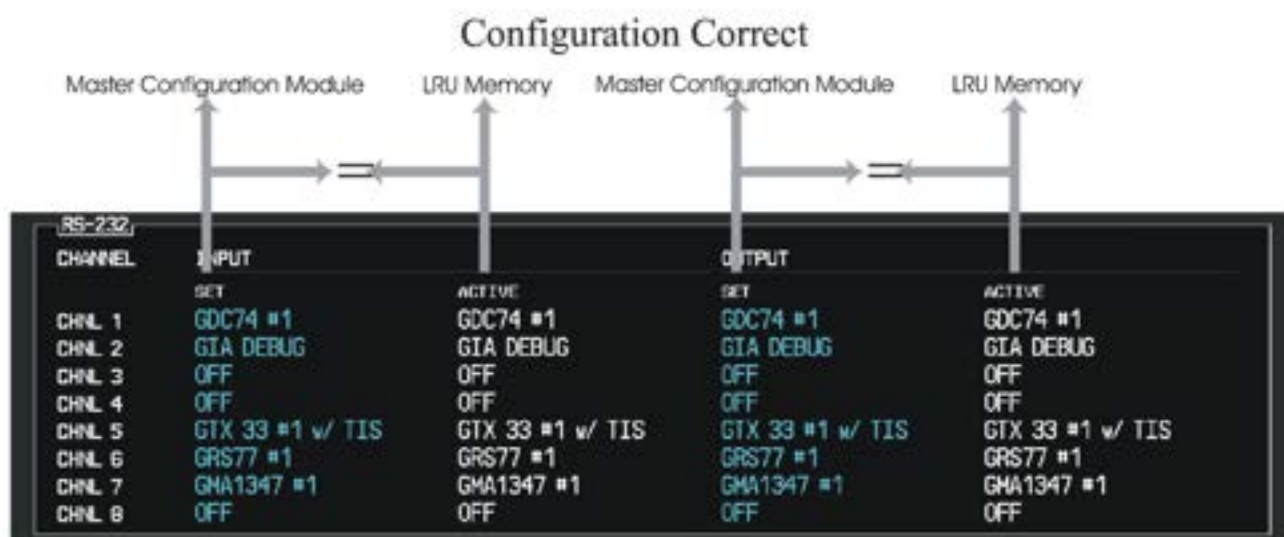
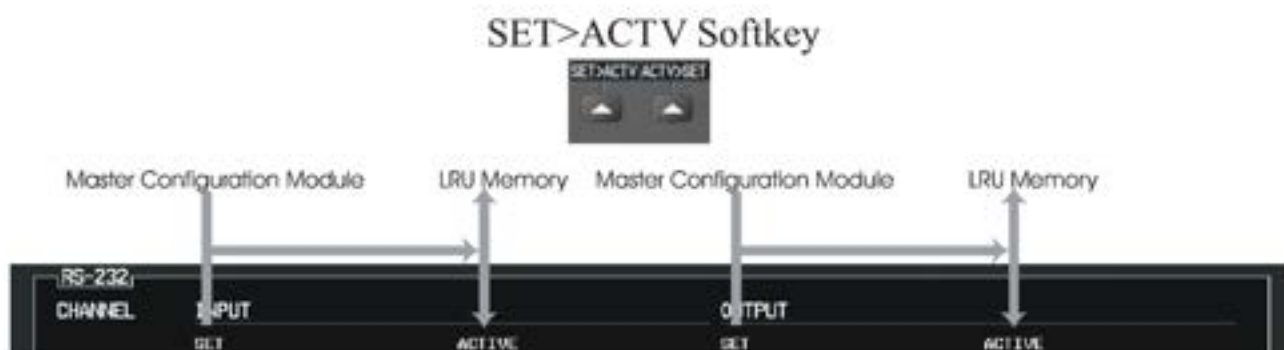
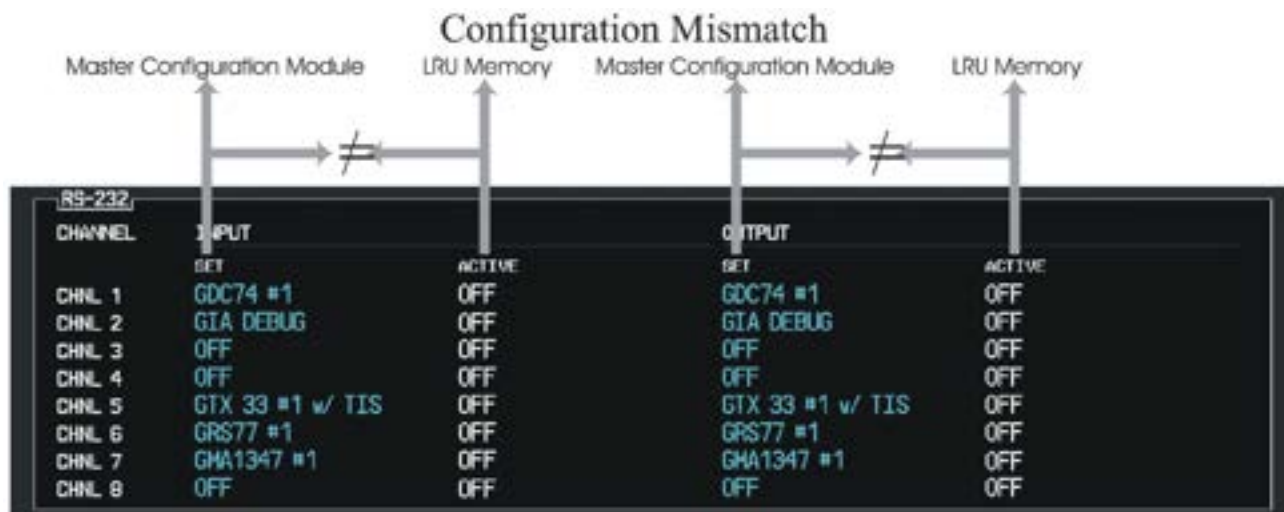
Data can be manually copied from one column to the other (and from the PFD memory to the LRU memory and vice-versa) by using the following two softkeys, when available:

- **SET>ACTV** (read 'Set to Active') softkey: Allows the installer to send the information in the SET column (data stored in the master config module) to the ACTV column (data used by LRU).
- **ACTV>SET** (read 'Active to Set') softkey: Causes the LRUs current settings to be copied to the master configuration module as SET items.

CAUTION: THE ACTV>SET SOFTKEY MUST BE USED WITH CAUTION! IF AN IMPROPERLY CONFIGURED UNIT IS INSTALLED, THIS SOFTKEY CAUSES THE WRONG CONFIGURATION TO REPLACE THE CORRECT AIRCRAFT CONFIGURATION.

In the first example shown in "Figure 25", the SET columns do not match the ACTIVE columns. The inequality between SET and ACTIVE indicates a configuration mismatch. By pressing the SET>ACTV softkey, this copies the SET column to the LRU unit's configuration memory. The settings then become the ACTIVE settings for the LRU being configured.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



SET>ACTV Configuration
Figure 25

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

When troubleshooting the system, technicians can look for inequalities between SET and ACTIVE columns. Certain problems can be resolved simply by pressing the SET>ACTV softkey, which reloads settings to the specific LRU from the PFD (Note that this can also be accomplished by reloading the configuration files for the LRU, using the software loader card.).

A blank active column, as shown in "Figure 26", represents loss of communication between the display and the particular unit. See troubleshooting for more details.

RS-232

CHANNEL	INPUT		OUTPUT	
	SET	ACTIVE	SET	ACTIVE
CHNL 1	GDC74 #1		GDC74 #1	
CHNL 2	GIA DEBUG		GIA DEBUG	
CHNL 3	OFF		OFF	
CHNL 4	OFF		OFF	
CHNL 5	GTX 33 #1 w/ TIS		GTX 33 #1 w/ TIS	
CHNL 6	GRS77 #1		GRS77 #1	
CHNL 7	GMA1347 #1		GMA1347 #1	
CHNL 8	OFF		OFF	

Set > Active - Loss of Communications
Figure 26

(3) Configuration Prompts

When configuration settings are changed, the technician receives on-screen prompts and/or confirmations such as those shown in "Figure 27". Other prompts may be encountered during the configuration process.



Configuration Prompts
Figure 27

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(4) Data Transmission Indicators

See "Figure 28".

Several configuration pages utilize an indicator light system to show discrete (ON/OFF) data and/or hardware component status. Unless otherwise noted, the following applies to all such status indicators:

- (a) Green Light: Expected data is successfully received and is ON. A green light could also indicate that the parameter/component is working correctly.
- (b) Red Light: Expected data is not received. A red light could also indicate that a parameter/component is invalid.
- (c) No Light (Black): Expected data is successfully received and is OFF, or no data is expected. A black light could also indicate that the parameter/component is not responding.

(5) Configuration Mode Navigation

Using the FMS knob, a user can navigate through different pages and page groups in the Configuration Mode. See "Chart 25" on page 34250192. For complete description and breakdown of each page, refer to the G1000 Line Maintenance and Configuration Manual, see Vendor Publications in the Introduction.



Data Transmission Indicators
Figure 28

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 25
CONFIGURATION MODE NAVIGATION

System Page Group

1. System Status	5. System Upload	9. System Configuration
2. Date/Time Setup	6. Diagnostics Terminal	10. System Setup
3. Main Lighting	7. Maintenance Log	11. Manifest Configuration
4. Audio Alert Configuration	8. OEM Diagnostics	

GDU Page Group

1. RS-232 / ARINC 429 Config	4. Diagnostics	7. Airframe Configuration
2. GDU Status	5. Serial/Ethernet I/O	
3. GDU Test	6. Alert Configuration	

GIA Page Group

1. RS-232 / ARINC 429 Config	3. GIA I/O Configuration	5. GIA Status
2. CAN / RS-485 Config	4. COM Setup	

GEA Page Group

1. Engine Data	2. GEA Status	3. GEA Configuration

GTX Page Group

1. RS-232 / ARINC 429 Config	2. Transponder Configuration

GRS Page Group

1. AHRS / Air Data Input	2. GRS / GMU Calibration

GDC Page Group

- | |
|----------------------|
| 1. GDC Configuration |
|----------------------|

GFC Page Group

1. GFC Configuration	2. GFC Status

GMA Page Group

- | |
|----------------------|
| 1. GMA Configuration |
|----------------------|

CAL Page Group

- | |
|--------------------------|
| 1. Fuel Tank Calibration |
|--------------------------|

GDL Page Group (Optional)

- | |
|-------------------|
| 1. GDL 69A Config |
|-------------------|

Other (Optional)

1. Stormscope	2. S-TEC

GTS (Optional)

- | |
|----------------------|
| 1. GTS Configuration |
|----------------------|

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

J. G1000 Software Information

NOTE: The following sections provide a detailed description of loading all G1000 software and configuration files, which may be excessive for individual LRU removal and replacement. If removing and replacing individual LRUs, refer to Components, above, for the necessary steps.

(1) G1000 Software Image

CAUTION: IT IS CRITICAL THAT THE TECHNICIAN INSTALLS THE CORRECT SOFTWARE IMAGE PART NUMBER WHEN SERVICING THE G1000 SYSTEM. APPROVED SOFTWARE DEFINITIONS FOR EACH CONFIGURATION ARE DEFINED IN THE REQUIRED EQUIPMENT LIST (REL), "CHART 29" ON PAGE 342501137.

All software and configuration files were certified by Garmin as part of the FAA-approved Type Design data. Approved software definitions for each configuration are defined in the Required Equipment List (REL), "Chart 29" on page 342501137.

G1000 software and configuration files are controlled via the approved software image part number listed in the REL. This software image is loaded into the G1000 using a software loader card. The installer shall create this software loader card by downloading the approved software image in accordance with the procedure provided immediately following.

CAUTION: BE CAUTIOUS WHEN USING SOFTWARE LOADER CARDS DURING MAINTENANCE. THE G1000 SYSTEM IMMEDIATELY INITIALIZES THE CARD UPON POWER-UP. ON-SCREEN PROMPTS MUST BE GIVEN CAREFUL ATTENTION IN ORDER TO AVOID POTENTIAL LOSS OF DATA. ALWAYS READ THROUGH PROCEDURES GIVEN IN THIS SECTION, BEFORE ATTEMPTING TO USE THE SOFTWARE LOADER CARDS.

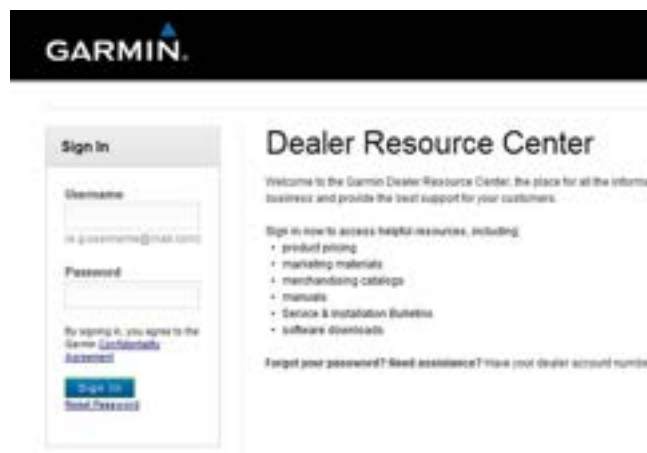
(2) Software Loader Card Creation

The following procedure requires a PC with an SD card reader. Piper recommends SanDisk® SDDR-99 and SDDR-93 card readers. Additionally, only SanDisk brand 16GB SD cards are recommended.

The software image is an executable self-extracting file which builds the correct file structure onto an SD card for use loading software to the G1000. To obtain the current file follow the procedures outlined below.

NOTE: In order to create a loader card, the installer completing these procedures must be an authorized Piper service center to gain access to the necessary data via the Garmin website.

- (a) Go to <http://www.garmin.com> and click on the 'Dealer Resource Center' link in the lower right hand portion of the home page. Enter username and password. See "Figure 29".
- (b) Select Support and then Software Downloads.



Dealer Login Screen
Figure 29

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (c) Search for the appropriate image version (i.e., 1618.xx from the appropriate Required Equipment List (REL), "Chart 29" on page 342501137 in the "Search by Keyword" field.
- (d) Save the file to a known location on the PC.
- (e) Run the executable file that was downloaded. A window will appear to confirm software installation.
- (f) Insert the SD card into the SD card reader and select the Next button in the pop-up window.
- (g) In the pop-up window, select the drive that corresponds to the inserted SD card and then click the Next button.

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

- (h) Select the Finish button.
- (i) Stop the card reader using Windows stop device function.
- (j) Eject the SD card from the card reader.
- (k) Apply a label to the software loader card identifying the aircraft, G1000 NXi SFTW and the appropriate software image part number as shown below:

NOTE: See appropriate Required Equipment List (REL), "Chart 29" on page 342501137 for software image part number.

PA-28-181 G1000 NXi SFTW 006-x1618-xx

(3) Handling a Software Download Card

The SD memory cards used for the Software Download Card are manufactured to the specifications of the SD Card Association for use in portable devices. As such they are reasonably robust devices that do not require special handling instructions. However, the memory cards are not unbreakable and reasonable precautions regarding their use and handling should be used including the following guidelines:

- (a) Do not bend an SD memory card or subject it to violent impact.
- (b) Do not leave SD cards in locations where they may be exposed to moisture or high temperatures.
- (c) Avoid exposing the card to static electricity or electro-magnetic interference.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

K. Software Files

Software files are defined by part number and version number. Each G1000 LRU reports the software version it currently contains to the user in two places.

- (1) Normal System Mode: The AUX – SYSTEM STATUS page lists each LRU and the reported software version.
- (2) Configuration Mode: The SYSTEM STATUS page (SYSTEM page group) reports more detailed LRU information, including software version, part number, and LRU status. Software files are loaded to LRUs from the SYSTEM UPLOAD page in Configuration Mode.
- (3) Configuration File Descriptions
 - (a) Configuration Files are divided into groups, and are only displayed at the System Upload page during the software/configuration loading process.
 - (b) Configuration files contain preset selections for input/output channels, aircraft-specific settings, and LRU-specific settings. The following list describes each of the configuration files:

AIRFRAME This file contains data such as airspeed parameters, engine/airframe sensor limitations, fuel tank parameters and alerting system settings that tailor a G1000 PFD or MFD to the PA-28-181.

AIRFRAME Alerts specific to the PA-28-181 are set when this file is loaded.

ALERTS

SYSTEM This file configures the G1000 high-speed data bus (HSDB) to expect one PFD, one MFD, two GIAs, and (optional) one GDL 69A.

MANIFEST This file loads a manifest checklist of all software part numbers and versions associated with an approved system configuration. The G1000 performs a software check between each LRU's reported version and the version contained on the manifest. If an inequality is detected for an LRU, this LRU is then excluded from the G1000 and a manifest alert is triggered to the operator.

MFD1 This file configures MFD serial/discrete communication and alert system settings.

PFD1 This file configures PFD serial/discrete communication and alert system settings.

GIA1/GIA2 These files configure GIA1/GIA2 serial/discrete communication settings.

GMA1 This file configures GMA 1347 audio and serial communication settings

GTX1 These files configure GTX 33 transponder and serial communications settings.

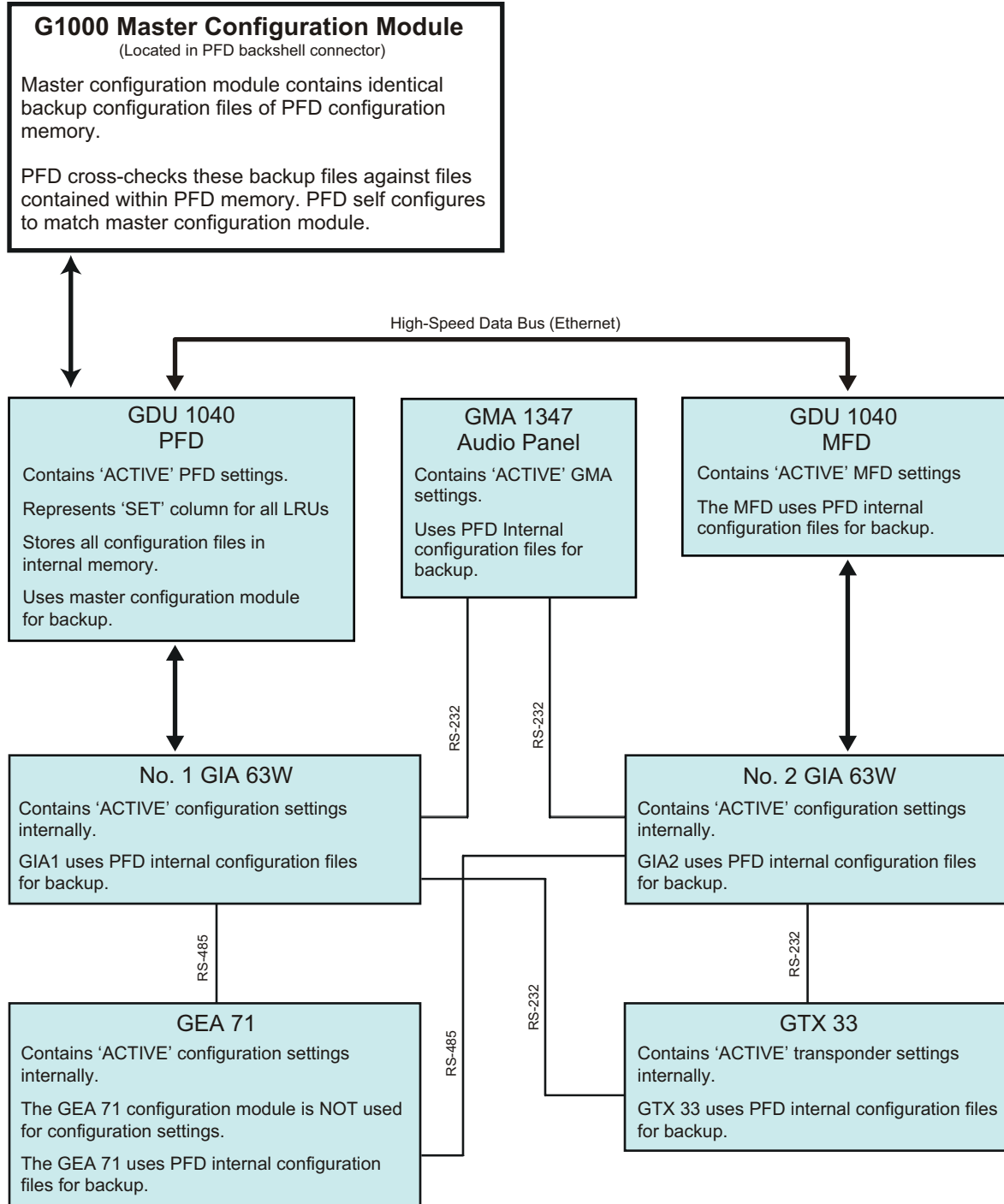
GEA1 These files configure GEA engine/airframe parameters.

GDC1 This file configures GDC 74A air data values for the PA-28-181.

GDL_69 This file configures gains and cable loss for the PA-28-181 installation if the optional GDL 69A is installed.

AUDIO This file configures audio alerts for the PA28-181.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



LRU Configuration File Storage
Figure 30

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(4) Configuration File Storage

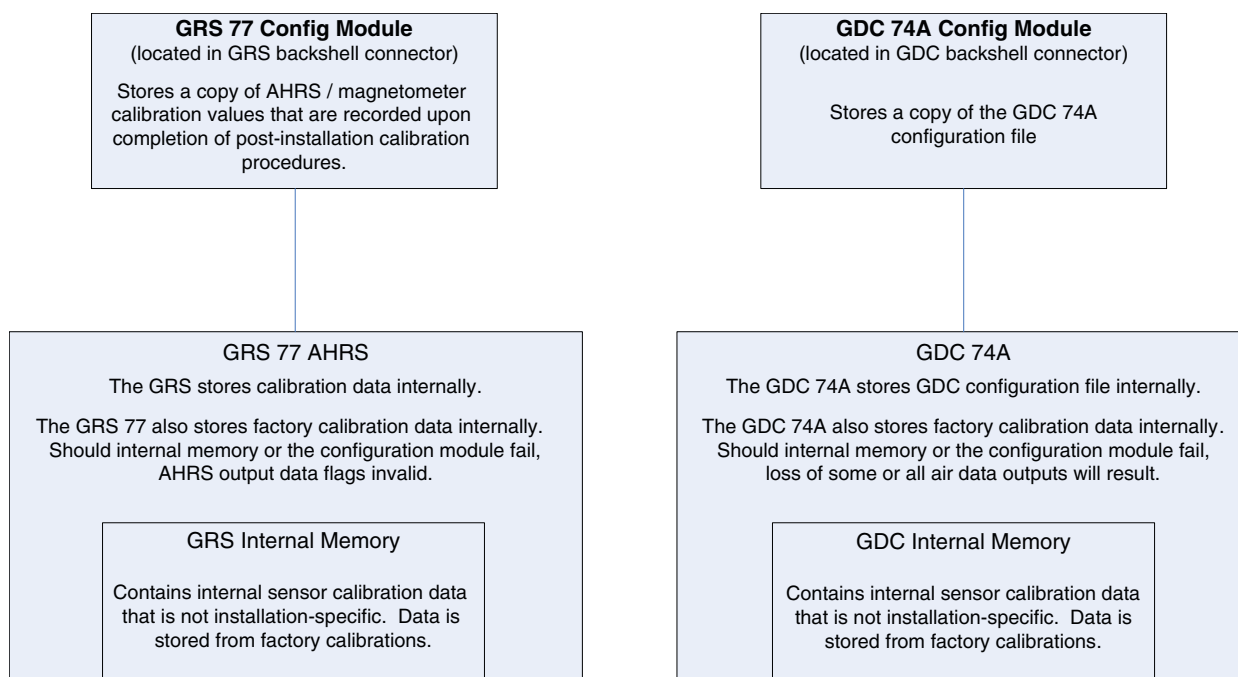
The G1000 system stores all configuration settings in multiple places so that the settings are retained in the aircraft during the maintenance of any LRUs.

During system configuration, as shown in "Figure 30", each file is sent directly to the applicable LRU where it is stored in local LRU memory (except GRS 77 and GDC 74A). Each file is also stored in the PFD internal memory. The applicable PFD also sends a copy of all configuration files to the Master Configuration module, located in the connector backshell (see "Figure 22" on page 34250149). If the PFD is replaced, the configuration module retains all configuration files in the aircraft.

NOTE: The GRS 77 AHRS and GMU 44 Magnetometer do not have a configuration file. However, these LRUs do store calibration data acquired during the post installation checkout, which are characteristic to the specific installation. While performing maintenance on these units, re-calibration may be required. See GRS 77 AHRS / GMU 44 Magnetometer, under LRU Test Procedures, for more information on re-calibration criteria.

The GRS 77 and GDC 74A configuration modules, as shown in "Figure 31", function differently than the rest of the system. The GDC 74A configuration file is loaded directly to GDC internal memory. A copy of the file is stored in the GDC configuration module.

The GRS 77 configuration module does not store any configuration settings. Instead, it stores calibration data recorded during installation calibration procedures.



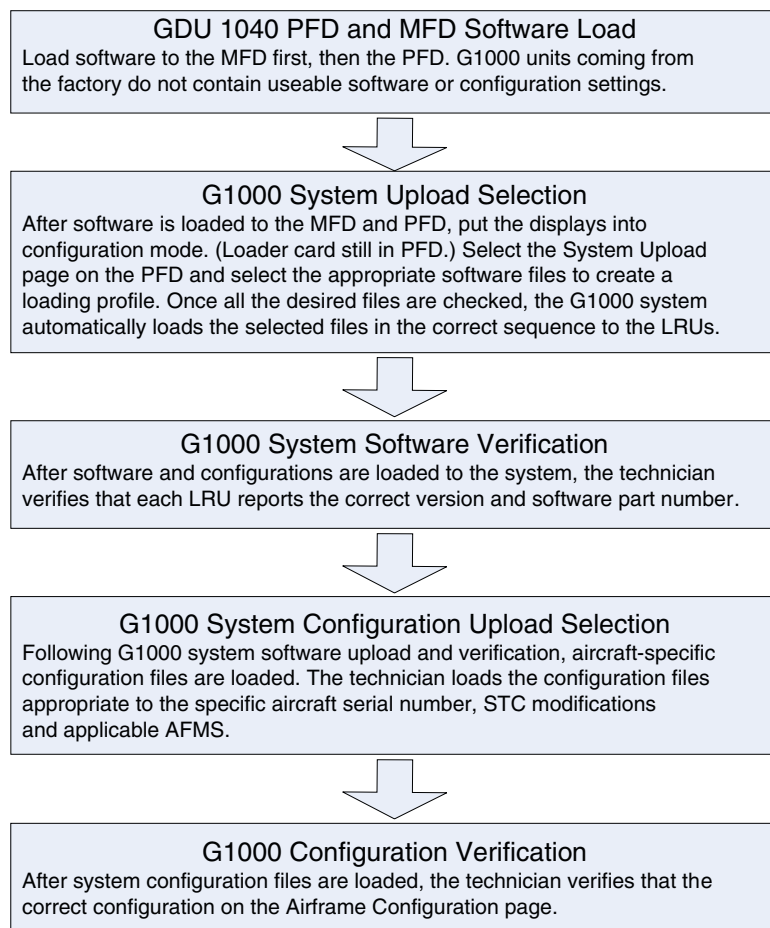
GRS/GDC Configuration Settings Storage
Figure 31

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(5) G1000 Software/Configuration Procedure

This section summarizes the procedures required to load software and configuration files to the G1000. It is intended to work as a central guide for technicians to use while performing maintenance on the aircraft. This section is referenced by other sections of this manual when G1000 software reload is required. The technician should use proper judgment regarding the context of maintenance required while following this section.

The diagram in "Figure 32" depicts an overview of the software/configuration sequence for the G1000 system. This applies mostly to a new G1000 system which has not previously been powered up and is for informative purposes only.



Software/Configuration Overview
Figure 32

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

L. Software Load

(PIR-PPS55034, Rev. D.)

(1) MFD & PFD Software Load

CAUTION: DO NOT INTERRUPT POWER TO THE AIRCRAFT AT ANY TIME DURING THESE PROCEDURES. INTERRUPTION OF POWER COULD RESULT IN DAMAGE TO THE EQUIPMENT.

- (a) Apply power to the aircraft and all avionics.
- (b) Pull the MFD and PFD circuit breakers. Remove any SD cards in the PFD or MFD.
- (c) Insert G1000/PA-28 Loader Card into the MFD top card slot.
- (d) While holding the ENT and CLR keys on the MFD, restore power to it by pushing in the MFD circuit breaker.
- (e) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the MFD, release the ENT and CLR keys.
- (f) Press the YES softkey 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 softkey 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 softkey at the following prompt (prompt may not appear):
 - "DO YOU WANT TO UPDATE THE CUSTOM GRAPHIC FILES (EG, SPLASH SCREEN)?"**
 - "NO WILL BE ASSUMED IN 30 SECONDS"**
- (i) Press any softkey at the following prompt to confirm load completion:
 - "PRESS ANY KEY TO CONTINUE."**
 - "CONTINUING IN 10 SECONDS."**
- (j) New software is loaded to the MFD. When complete, the MFD starts in Configuration Mode.
- (k) Remove power to the MFD by pulling the MFD circuit breaker.
- (l) Remove the G1000/PA-28 Config/Loader Card from the MFD and insert it into the top card slot on the PFD. Repeat Steps (d) through (i) for the PFD.
- (m) When PFD update is complete, it starts in the Configuration Mode. DO NOT remove power.
- (n) While holding the ENT key on the MFD, restore power to the MFD by pushing in its circuit breaker.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CAUTION: FOR THE REST OF THE SOFTWARE/CONFIGURATION PROCEDURE, DO NOT OPERATE THE MFD WHILE LOADING SOFTWARE OR CONFIGURATION FILES UNLESS SPECIFICALLY INSTRUCTED TO DO SO. A FAILED OR CANCELLED LOAD MAY RESULT.

(2) System Upload

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 the PFD using the small FMS knob.
- (b) Activate the cursor and select GROUP. Rotate the small FMS knob to generate a pick list. Rotate the small FMS knob to select Baseline.
- (c) Press ENT.
- (d) In the ITEM field, create a pick list by rotating the small FMS knob and select PA-28-181 Archer III.
- (e) Press ENT.
- (f) Press the CHK ALL softkey to select all loadable software and configuration files.
- (g) Press the LOAD softkey. (The load takes 90 minutes to two (2) hours to complete.)
- (h) Review list and verify that all items state "PASS".
- (i) Press ENT to accept the software load.
- (j) Deselect the cursor.

(3) Optional Equipment Configuration

Perform the following steps if any of the following options are installed:

KR-87 ADF	Air Conditioning
KN-63 DME	GDL 69A XM
GTS 800 TAS	S-TEC 55X Autopilot
(No GTX 33 ES (Extended Squitter) Transponder)	
GTS 800 TAS and GTX 33 ES Transponder	
GTX 33 ES Transponder (No GTS 800)	
Hobbs Meter - Configuration A, B, or C	
Tachometer - Configuration A, B, or C	

- (a) On PFD, 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 Options.
- (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 both Software and Configuration boxes are checked for Garmin options.
- (f) Verify Configuration boxes checked for all other options.
- (g) Press LOAD softkey.
- (h) Verify the summary field lists the software and configuration are complete as required and PASS is displayed next to both appropriate boxes.
- (i) Press ENT to accept.
- (j) For other installed options, repeat steps (d) thru (i) by rotating the large FMS knob and highlighting the File Field.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (k) De-activate the cursor.
- (l) Upon completion of all required baseline config, option config, and calibration loading procedures, remove the Loader card from top slot of PFD.

(4) Calibration Option Load

NOTE: Only load configuration option once. Re-loading of configuration option could result in a loss of system calibrations.

- (a) Go to the SYSTEM UPLOAD page and activate cursor. In the GROUP field, create a pick list by rotating the small FMS knob and select Options.
- (b) Press ENT.
- (c) In the ITEM field, create a pick list by rotating the small FMS knob and select Fuel Calibration Initialization.
- (d) Press LOAD softkey.
- (e) Verify the Summary field lists the software and configuration are complete as required and PASS is displayed next to both appropriate boxes.
- (f) Press UPDT CFG softkey.
- (g) Press ENT to select YES when prompted "Update Config Module?"
- (h) Press ENT to confirm completion.
- (i) Upon completion of all required baseline config, option config, and calibration loading procedures, remove the Loader card from top slot of PFD.

(5) Splash Screen Update

- (a) Remove power from the PFD and MFD.
- (b) Insert G1000/PA-28 Loader Card into the MFD top card slot.
- (c) Apply power to MFD.
- (d) Press the NO softkey at the following prompt:

"DO YOU WANT TO UPDATE SYSTEM FILES?"

- (e) Press the YES softkey at the following prompt:

**"DO YOU WANT TO UPDATE CUSTOM GRAPHIC FILES
(EG, SPLASH SCREEN)?"**

- (f) At the prompt, press any key to continue.
- (g) Remove G1000/PA-28 Loader Card from the MFD top card slot.
- (h) Repeat steps (b) thru (g) for the PFD.
- (i) Upon completion of splash screen update, remove the Loader card from top slot of PFD.

(6) Software Load Confirmation

- (a) Start the PFD and MFD in Configuration Mode by applying power while holding ENT.
- (b) On the PFD, select the Systems Status page. Activate the cursor and toggle to the LRU window.
- (c) Highlight each of the listed items in the LRU window and check the software part number and software version against the current numbers and versions shown in the appropriate Required Equipment List (REL). Some items may be in the expandable list of the corresponding item (denote by "+" next to the LRU). Press ENT with the desired LRU highlighted to expand these lists.

NOTE: Not all of the software P/Ns and versions on the Systems Status page need to be verified, only those recorded in the appropriate REL.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (d) De-activate the cursor.

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

- (e) Re-start the PFD and MFD.
- (f) On MFD splash screen, verify appropriate version ("Piper PA-28 System XXXX.XX" where XXXX.XX is the system version number from the appropriate Required Equipment List, "Chart 29" on page 342501137.) is displayed in the upper right corner of the MFD.
- (g) Select softkey on MFD to proceed beyond splash screen.
- (h) Verify that no manifest (software mismatch) alerts are shown on any of the displays.

(7) GRC 10 XM Pairing (If installed)

NOTE: To pair the GRC 10 XM Handheld Remote Control to the GRT 10 Remote Transceiver, you will need to have the GRT 10 serial number and to install two AA batteries in the GRC 10.

- (a) Press and Release any key on the GRC 10 to power on the unit.
- (b) The GRC 10 will display: "GRT 10 not found"
- (c) Press the following buttons in sequential order:
- 1) UP
 - 2) DOWN
 - 3) LEFT
 - 4) RIGHT
 - 5) MINUS (-)
 - 6) PLUS (+)
 - 7) PSET
- (d) Using the arrow buttons on the GRC 10, enter the GRT 10 serial number.
- (e) Verify that the correct serial number was entered.
- (f) Store the GRT 10 serial number by pressing the XM button.

(8) Aircraft Registration Number Entry

NOTE: The large FMS knob changes Groups and the small FMS knob changes Pages within a Group.

- (a) Start the PFD and MFD in configuration mode by applying power while holding ENT key.
- (b) Select the GTX group, then select the TRANSPONDER CONFIGURATION page on PFD.
- (c) Ensure that the ADDRESS TYPE is US TAIL under the SET and ACTIVE columns.
- (d) Ensure that the FLIGHT ID TYPE is SAME AS TAIL under the SET and ACTIVE columns.
- (e) Select the SYSTEM Group and then select the AIRCRAFT CONFIGURATION page.
- (f) Activate the cursor and highlight the AIRCRAFT REGISTRATION field. Use the small/large FMS knob to enter the aircraft registration number.
- (g) Once the correct registration number is entered, press the ENT key. Then press SET GTX1 softkey to configure the transponder. Press ENT to select OK at the dialog that pops up. Then press ENT again after configuration is completed.
- (h) Press SET GTS softkey to configure traffic system (if installed). Press ENT to select OK at the dialog that pops up. Then press ENT again after configuration is completed.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(9) Chartview, Synthetic Vision, and TAWS Unlock Procedures (If installed)

Prior to attempting to unlock any of the options, verify software is properly loaded per "Software Load Confirmation" on page 342501101.

(a) CHARTVIEW Unlock (Optional)

- 1) Remove power from the PFD and MFD by pulling (opening) the PFD and MFD circuit breakers.

NOTE: The Chartview Unlock card can only enable Charts on one system (one aircraft). A new Chartview Unlock card must be used for each aircraft.

- 2) Insert the Chart Unlock card, in the upper slot of the PFD.
- 3) While holding the ENT key on the PFD and MFD, restore power by pushing in (closing) the circuit breakers.
- 4) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the MFD and PFD, release the ENT key.
- 5) On the PFD, go to the System Upload page.
- 6) Activate the cursor and use the small FMS knob to create a pick list and select Configuration Files in the GROUP field. Press ENT.
- 7) Use the small FMS knob to create a pick list and select Enable Chartview in the ITEM field. Press ENT.
- 8) Verify there is a check mark in the box in the configuration column for Airframe.
- 9) Press the LOAD softkey.
- 10) Monitor the status of the upload. When the upload is finished, Complete and Pass is displayed. Press ENT.
- 11) De-activate the cursor.
- 12) Power down the system and remove the Chartview Unlock card from the PFD.
- 13) After the Chart function is unlocked, the card should be stored with the aircraft records.

(b) Synthetic Vision Unlock (Optional)

- 1) Remove power from the PFD and MFD by pulling (opening) the PFD and MFD circuit breakers.

NOTE: The Synthetic Vision Unlock card can only enable Synthetic Vision on one system (one aircraft). A new Synthetic Vision Unlock card must be used for each aircraft.

- 2) Insert the Synthetic Vision Unlock card, in the upper slot of the PFD.
- 3) While holding the ENT key on the PFD and MFD, restore power by pushing in (closing) the PFD and MFD circuit breakers.
- 4) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the PFD and MFD, release the ENT key.
- 5) On the PFD, go to the System Upload page.
- 6) Activate the cursor and use the small FMS knob to create a pick list and select Configuration Files in the GROUP field. Press ENT.
- 7) Use the small FMS knob to create a pick list and select Enable SVS Single PFD in the ITEM field. Press ENT.
- 8) Verify there is a check mark in the box in the configuration column for Airframe.
- 9) Press the LOAD softkey.
- 10) Monitor the status of the upload. When the upload is finished, Complete and Pass is displayed. Press ENT.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 11) De-activate the cursor.
 - 12) Power down the system and remove the Synthetic Vision Unlock card from the PFD.
 - 13) After the Synthetic Vision function is unlocked, the card should be stored with the aircraft records.
- (c) TAWS Unlock (Optional)
- 1) Remove power from the PFD and MFD by opening the PFD and MFD circuit breakers.
NOTE: The TAWS Unlock card can only enable TAWS on one system (one aircraft). A new TAWS Unlock card must be used for each aircraft.
 - 2) Insert the TAWS Unlock card in the upper slot of the PFD.
 - 3) While holding the ENT key on the the PFD and MFD, restore power by pushing in (closing) the PFD and MFD circuit breakers.
 - 4) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the PFD and MFD release the ENT key.
 - 5) On the PFD, go to the System Upload page.
 - 6) Activate the cursor and use the small FMS knob to create a pick list and select Configuration Files in the GROUP field. Press ENT.
 - 7) Use the small FMS knob to create a pick list and select Enable TAWS in the ITEM field. Press ENT.
 - 8) Verify there is a check mark in the box in the configuration column for Airframe.
 - 9) Press the LOAD softkey.
 - 10) Monitor the status of the upload. When the upload is finished, Complete and Pass is displayed. Press ENT.
 - 11) De-activate the cursor.
 - 12) Power down the system and remove the TAWS Unlock card from the PFD.
 - 13) After the TAWS function is unlocked, the card should be stored with the aircraft records.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(10) Aviation Database Loading Procedures

(a) GARMIN GDU 1040 Terrain Data Card Loading Procedure

NOTE: Garmin Field Service Engineering, resident at Piper, will be responsible for supplying updates for the GDU 1040 Terrain Data Base Card.

- 1) Remove power from the PFD and MFD by pulling the PFD and MFD circuit breakers.
- 2) Identify each Terrain Data Base Card respective to the display in which it is to be installed (PFD and MFD).
- 3) Install a Terrain Database Card in the bottom slot of the PFD and MFD.
- 4) This completes the installation of the Terrain Database Card.

(b) JEPPS NAV Database Aircraft Loading Procedure

- 1) Remove power from the PFD and MFD by pulling circuit breakers for the displays.
- 2) Install the JEPPS NAV Database card in the top slot of the PFD.
- 3) Restore power to the appropriate display (PFD and MFD) by pushing in (closing) the appropriate circuit breaker.

This prompt is displayed in the upper left corner of the display.

**“DO YOU WANT TO UPDATE THE STANDBY NAVIGATION
DATABASE ON THE BOTTOM CARD?”**

**“THE STANDBY DATABASE WILL BE ACTIVATED UPON THE
FIRST ON-GROUND POWER CYCLE ON OR AFTER 00:00
SYSTEM TIME ON THE EFFECTIVE DATE.”**

“NO WILL BE ASSUMED IN 30 SECONDS.”

- 4) Press the ENT key to confirm the database update. This prompt is displayed:

**“DO YOU WANT TO UPDATE THE NAVIGATION
DATABASE?”**

**“SELECTING YES WILL OVERWRITE THE ACTIVE NAVIGATION
DATABASE?”**

“NO WILL BE ASSUMED IN 30 SECONDS.”

- 5) After the update completes, the PFD starts in Normal Mode. The PFD aviation database is now updated.
- 6) Remove the JEPPS NAV Database card from the top slot of the PFD and place it in the top slot of the MFD. Repeat steps 3 and 4 for the MFD. After the update completes, the MFD starts in Normal Mode. The MFD aviation database is now updated.
- 7) After the JEPPS NAV Database loading procedure is completed, the card should be stored with the aircraft records.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(c) JEPPS CHARTS Aircraft Loading Procedure

- 1) Remove power from the MFD by pulling the MFD circuit breaker.
- 2) Install Jepps Charts Card in the bottom slot of the MFD.
- 3) Restore power to the MFD by closing the MFD circuit breaker.
- 4) Press the ENT key to confirm the database update.
- 5) After the update completes, the MFD starts in Normal Mode.
- 6) The Jepps Charts are now loaded in the MFD and do not need to be loaded in the PFD.
- 7) The Jepps Charts Card remains in the bottom slot of the MFD.

(11) Optional Equipment Checks

(a) Chartview Check (Optional)

- 1) Select the Airport Information page (first page in the WPT group).
- 2) Verify that the title at the top of the page reads "WPT- Airport Information".
- 3) Enter KVRB as the waypoint and verify that the CHRT softkey is available.
- 4) Press the CHRT softkey and verify the electronic chart is viewable.

(b) Synthetic Vision Check (Optional)

- 1) Ensure that matching terrain data base cards are installed in the bottom card slots in the PFD and MFD, and the aircraft has a GPS position.
- 2) Press the PFD softkey on PFD.
- 3) Press the SYN VIS softkey on PFD.
- 4) Press the SYN TERR softkey on PFD.

NOTE: You will need a valid GPS signal.

- 5) Verify the traditional blue/brown attitude depiction is replaced with the Synthetic Vision rendering within 2 - 3 minutes.

(c) TAWS Check (Optional)

- 1) Ensure that matching terrain data base cards are installed in the bottom card slots in the PFD and MFD, and the aircraft has a GPS position.
- 2) Select the TAWS-B page (last page in the MAP group).
- 3) Verify that the title at the top of the page reads "MAP - "TAWS-B". If TAWS has not been enabled, the title will read "MAP - TERRAIN PROXIMITY" or "MAP - TERRAIN".
- 4) Press the MENU button and select "Test TAWS System" from the pop-up menu and press ENT.
- 5) After the TAWS test has completed, verify that "TAWS System Test Okay" is annunciated over the audio system.

(d) Terrain Proximity Check (if TAWS is not installed)

- 1) Ensure that matching terrain data base cards are installed in the bottom card slots in the PFD and MFD, and the aircraft has a GPS position.
- 2) Select the TERRAIN PROXIMITY page (last page in the MAP group).
- 3) Verify that the title at the top of the page reads "MAP - TERRAIN PROXIMITY".
- 4) Verify that the map is colored to show terrain and no failures are annunciated on the page.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) GDL 69A Datalink Check (Optional)

NOTE: This section verifies the correct installation of the GDL 69A.

- 1) On the MFD, select "AUX - XM RADIO".
- 2) Run up and down the XM channels using the cabin controls. Select an active music channel when finished.
- 3) Increase and decrease the volume using the cabin controls, then set the volume at the mid-point.
- 4) Verify XM audio operation at pilot, copilot and all passenger stations. Verify stereo operation.
- 5) Plug an external source into the AUX audio jack in the cabin and verify that it can be heard in all passenger stations. Verify that it is not audible via the pilot and copilot phone jacks.
- 6) Activate the Stall Warning horn and verify that the XM audio is muted.

(f) KR 87 ADF Check (Optional)

- 1) Tune the ADF to a known local NDB and verify the bearing is correct within +/- 15° and the Morse Code Identifier is clear and accurate.
- 2) Verify the ADF audio is available on the GMA 1347 audio panel.

(g) KN 63 DME Check (Optional)

- 1) Perform systems check with the ATC 600 and verify the DME is tuned by NAV 1 and NAV 2.
- 2) Verify the distance is accurate.
- 3) Verify the DME audio is available on the GMA 1347 audio panel.

(h) GTX 33 ES (Extended Squitter) Check (Optional)

- 1) Press the XPDR softkey on the PFD.
- 2) Verify that the ADS-B TX softkey is available and can be toggled (softkey 10).

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

M. Post-Installation Procedures

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

NOTE: This entire procedure must be successfully accomplished in order for the G1000 system to be airworthy in your airplane.

NOTE: The following checks **MUST** be performed prior to electrical power-up with the associated wiring connected to the electronic equipment. Failure to perform these checks prior to powering up may result in damage to the equipment.

(1) Bus Power Check

- (a) Do not apply external power to the aircraft.
- (b) Verify that all circuit breakers are set.
- (c) Turn ON Battery Master switch with Avionics Bus Master switch and the Emergency switch in the "OFF" position. Then:
 - 1) Verify Avionics Bus and Emergency Bus are not powered.
 - 2) Pull Lighting Bus and Non-Essential Bus circuit breakers.
 - 3) Verify Lighting Bus and Non-Essential Bus are not powered.
 - 4) Reset Non-Essential Bus circuit breaker.
 - 5) Verify Non-Essential Bus is powered, and Light Bus is NOT powered.
 - 6) Reset Lighting Bus circuit breaker.
 - 7) Verify the Lighting Bus and Non-Essential Bus are powered
- (d) Turn ON the Avionics Bus Master switch, then:
 - 1) Pull Avionics Bus, Non-Essential Bus and Lighting Bus circuit breakers.
 - 2) Verify Essential Bus is powered
 - 3) Verify Avionics Bus, Non-Essential Bus, Lighting Bus and Emergency Bus are not powered.
 - 4) Reset Avionics Bus circuit breaker.
 - 5) Verify Avionics Bus is powered.
 - 6) Verify Non-Essential Bus, Lighting Bus and Emergency Bus are not powered.
 - 7) Reset Non-Essential Bus and Lighting Bus circuit breakers.
- (e) Turn the Emergency Switch to ARM, then turn OFF the Battery Master switch and Avionics Master Switch, then:
 - 1) Verify that the Essential Bus, Avionics Bus, Non-Essential Bus and Lighting Bus are not powered.
 - 2) Verify that the Emergency Bus is powered.
- (f) Turn OFF the Emergency switch, Battery Master switch and Avionics Bus Master Switch. Verify that the Battery Bus is powered.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Wiring Harness Checkout

The following is required only when a harness has been repaired, modified, or replaced, but is recommended when troubleshooting.

Prior to installing any LRUs, the wiring harness should be checked for proper connections to the aircraft systems and other avionics systems. Point to point continuity should be checked to expose any faults such as shorting to ground. Any faults or discrepancies found should be corrected before proceeding. Refer to wiring schematics in Chapter 91.

(3) Initial Display Testing

(a) General

Verify the following:

- 1) COM/NAV fields are valid in the top corner of the PFD.
- 2) Altitude, airspeed, vertical speed, heading and OAT fields are valid on the PFD.
- 3) Ensure FD/AP switch is set to "FD" (if installed). Verify no BACKUP PATHs alerts on the PFD. If an LRU is not communicating over its primary path, the BACKUP PATH alert will identify which LRU is having the problem.
- 4) Select Reversionary Mode by pressing the "Display Backup" button on the GMA 1347 Audio Panel. Verify that the PFD and MFD accurately display attitude, altitude, airspeed, vertical speed, and engine instruments. Deactivate the Reversionary Mode.

(b) STALL Annunciation Test

- 1) Activate stall sensor on left wing.
- 2) Verify "stall" aural alert.

(c) Pitot Heat Annunciation Test

- 1) Verify "PITOT HT OFF" annunciation appears on display.
- 2) Pull PITOT HEAT circuit breaker. Turn the Pitot Heat switch to the ON position.
- 3) Verify "PITOT HT FAIL" annunciation appears on display.
- 4) Turn Pitot Heat switch to the OFF position.
- 5) Reset PITOT HEAT circuit breaker.

(d) PFD Fan Fail CAS Test

- 1) Pull BATT circuit breaker to remove power from aircraft.
- 2) Remove PFD and disconnect connector 1P3281 from PFD Fan.
- 3) Reinstall PFD and then reset BATT circuit breaker..
- 4) Verify "PFD FAN FAIL" CAS Advisory annunciates.
- 5) Pull BATT circuit breaker to remove power from aircraft.
- 6) Remove PFD and reconnect connector 1P3281 to PFD Fan. Reinstall PFD.
- 7) Remove MFD and disconnect 2P3281 from MFD Fan.
- 8) Reinstall MFD and reset BATT circuit breaker.
- 9) Verify that "PFD FAN FAIL" CAS Advisory does not annunciate. Verify that "MFD FAN FAIL" CAS Advisory does annunciate.
- 10) Pull BATT circuit breaker to remove power from aircraft.
- 11) Remove MFD and reconnect 2P3281 to MFD Fan. Reinstall MFD.
- 12) Disconnect 3P3281 from Avionics Fan. Reset BATT circuit breaker.
- 13) Verify that "MFD FAN FAIL" CAS Advisory does not annunciate. Verify that "AV FAN FAIL" CAS Advisory does annunciate.
- 14) Pull BATT circuit breaker to remove power from aircraft.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 15) Reconnect connector 3P3281 to Avionics Fan.
- 16) Reset BATT circuit breaker. Verify that "AV FAN FAIL" CAS Advisory is not annunciated.
- (e) Hour (Hobbs) Meter Operation Test
 - 1) For aircraft with Hobbs Meter Configuration A, see "Engine Run Checks" on page 342501134.
 - 2) For aircraft with Hobbs Meter Configuration B, use appropriate test equipment to simulate airspeed greater than 50 knots. Hobbs shall run while TAS > 50 kts.
 - 3) For aircraft with Hobbs Meter Configuration C, Hobbs shall run whenever GIA 1 is powered and reports OK status.
- (f) Bus Voltage Indication Test
 - 1) With external power removed and Battery Master switch set to ON.
 - 2) Verify Main bus voltage indication.
 - 3) With external power removed, Battery Master Switch set to OFF, and Emergency Switch set to ARM.
 - 4) Verify Emergency bus voltage indication.
- (4) Emergency Bus Operation Verification Test

Verify all of the following functions are operational when Emergency Power Switch is on "ARM," Battery Master Switch is "OFF," the engine is off, external power is disconnected, and Reversionary Mode is activated (press "Display Backup" switch on the GMA 1347).

 - (a) PFD
 - (b) COM1
 - (c) NAV1 (Integrated Avionics GIA 63W #1)
 - (d) AHRS (GRS 77)
 - (e) GMA 1347 (Audio Panel)
 - (f) ADC (GDC 74A)
 - (g) GEA 71 (Engine Instruments)
 - (h) Standby Instrument (EBD)
 - (i) Avionics Dimmer

NOTE: When under Emergency Power, the MFD, XPDR and optional avionics equipment (for autopilot, ADF, DME, XM, TAS, etc.) are unavailable. Also note that NAV2, GPS2 and COM2 are not available.
- (5) G1000 Connection Check

Perform the following steps to verify the following:

NOTE: Do not have External Power on the aircraft while conducting the following tests.

 - (a) PFD and MFD Ethernet connection check

Perform "Display Failure Test" on page 342501132.
 - (b) Engine and GPS data availability check

Check for engine data availability to the displays and GPS data availability to the AHRS when either or both GIAs are inoperative:

Perform "GIA Failure Test" on page 342501131.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

N. LRU Test Procedures

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

(1) GDU 1040 PFD and MFD Test Procedure

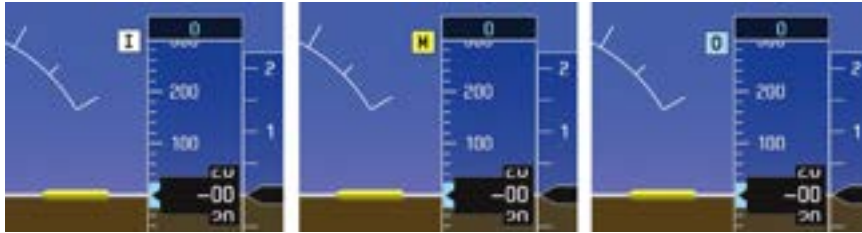
- (a) Allow displays to initialize.
- (b) Check that all COM/NAV display fields are valid in the top corners of the displays.
- (c) On the PFD, check that the attitude, heading, altitude, airspeed, vertical speed, and OAT fields are valid within two (2) minutes of power up. On the MFD, check that all of the engine instrument fields are valid.
- (d) Push the red display reversion button on the GMA 1347. Verify that the PFD and MFD enter reversionary mode. Both displays should have valid attitude, heading, altitude, airspeed, vertical speed, and engine instruments.
- (e) De-activate reversionary mode by pushing the red reversion button again.
- (f) Verify that any options, if equipped (i.e. ADF, DME, TAWS, ChartView, etc.), are operational.
- (g) On the PFD, press the ALERTS softkey. Correct any PFD/MFD Alert messages that appear.
- (h) If no other service is to be performed, perform Return to Service Procedure, below.

(2) GMA 1347 Audio and Communications Test

Except for marker beacon operation, an in-aircraft checkout may be performed in the aircraft with known good microphone, headset, and speaker.

- (a) Check that the pilot and copilot Intercom System (ICS) mics and phone jacks are functioning.
- (b) Press SPKR on the Audio Panel for two (2) seconds (for Passenger Address mode), press the MIC key and verify that audio is heard from the cockpit speaker. (SPKR key flashes while in PA mode.)
- (c) Verify operation of COM1 and COM2. Conduct VSWR Check, under GIA 63W Test, below.
- (d) Failsafe Operation Check – GMA 1347 to COM1
 - 1) Turn off the GMA 1347 by pulling the AUDIO MKR circuit breaker.
 - 2) Verify COM1 transmits and receives normally over pilot and copilot headphones.
 - 3) Verify COM1 audio is controlled by the PFD COM audio control.
 - 4) Verify COM2 transmits and receives normally over pilot and copilot headphones.
 - 5) Verify COM2 audio is controlled by the PFD COM audio control.
 - 6) Close (push in) the AUDIO MKR circuit breaker.
- (e) Marker Beacon Test
 - 1) Verify that the outer, middle and inner markers appear on the PFD (See "Figure 33").
 - 2) Verify Marker Beacon Audio and tones.
 - 3) Verify the MKR MUTE key mutes the Marker Beacon Audio.
 - 4) Verify Marker HI/LO Sensitivity operation.
- (f) Verify operation of Passenger ICS at all stations.
- (g) If no other service is to be performed, continue to Return to Service Procedure, below.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Marker Beacon Symbolry
Figure 33

(3) GIA 63W Tests

(a) GPS Signal Acquisition

See "Figure 34".

The GIA 63W units normally acquire a GPS navigation solution in 2 minutes after startup if the aircraft is outside (or indoors with a GPS repeater).

- 1) Select the GPS STATUS page on the MFD (fourth page in AUX group).
- 2) Two softkeys on the bottom of the display will toggle between GPS1 and GPS2.
- 3) Verify that both receivers show 3D DIFF NAV on the MFD.

NOTE: It may be necessary to temporarily disable or move away from GPS repeaters while testing, as repeaters may adversely affect GPS receiver performance.



GPS STATUS Page (MFD)
Figure 34

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(b) VSWR Check of COM Antennas

Check the insertion loss and VSWR (Voltage Standing Wave Ratio) of COM1 and COM2.

To check VSWR, insert an in-line wattmeter into the coaxial transmission line between the transceiver and antenna. The wattmeter should be inserted as closely as possible to the transceiver. Any problem with the antenna installation is most likely seen as high reflected power.

A VSWR of 3:1 may result in a loss of up to 50 percent of transmit power. The VSWR should be 2.5:1 or less.

VSWR Test

1) VSWR (Voltage Standing Wave Ratio)

The standing wave ratio is a measure of the amount of power transmitted to the antenna, compared to the amount reflected back to the transmitter. S.W.R.'s are a function of the transmission line, the antenna and their installation.

2) Material Required

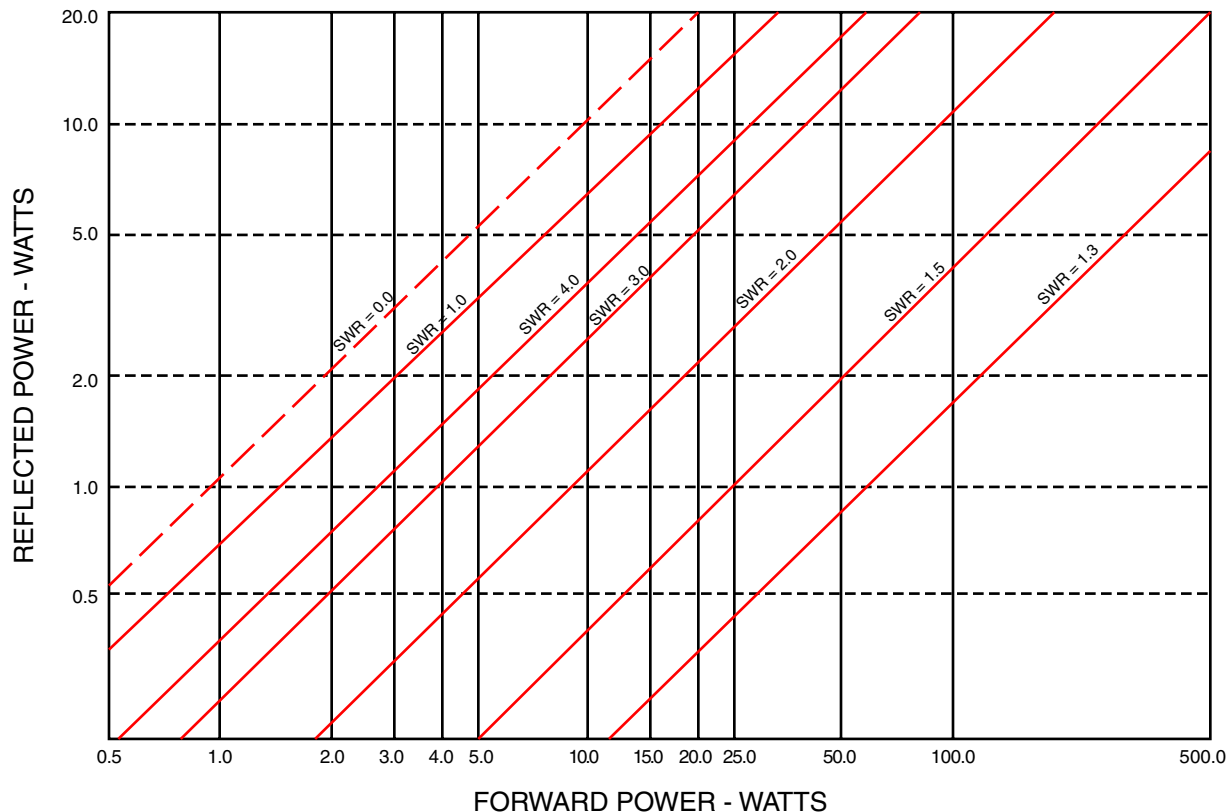
Thruline Wattmeter (Model 43 Bird Electronics, Cleveland, Ohio) or equivalent.

3) S.W.R. Test:

Test the antenna installation with the Thruline wattmeter. Check VSWR's at 118.0, 123.0, 128.0, 132.0, and 135.95 MHZ. Determine the VSWR value with the conversion chart below.

4) VSWR's in excess of 2.5:1 are not acceptable.

VSWR CONVERSION CHART



**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(c) VHF COM Interference Test

This test must be conducted outside. Use of a GPS repeater inside a hangar may result in a failed test.

This procedure assumes that the system is currently set to 25 kHz COM channel spacing. Once the signal acquisition test has been completed successfully, perform the following steps:

- 1) On the MFD, monitor GPS signal strength bars on the AUX – GPS STATUS page.
- 2) On the PFD, ensure that the CDI is set to GPS. If it is not, press the 'CDI' softkey until GPS ENR is displayed.
- 3) Verify that the GPS "INTEG" flag is out of view.
- 4) Select 121.150 MHz on the COM1 transceiver.
- 5) Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
- 6) During the transmit period, verify that the GPS "INTEG" flag does not come into view on the PFD and verify that GPS1 does not lose a 3-D navigation solution on the MFD.
- 7) Repeat steps 5) and 6) and re-transmit while monitoring GPS2 signal levels on the MFD.
- 8) Repeat steps 4) through 7) for each of the following frequencies:
 - 121.175 MHz
 - 121.200 MHz
 - 131.250 MHz
 - 131.275 MHz
 - 131.300 MHz
- 9) Repeat steps 4) through 8) for the COM2 transceiver (GIA2).
- 10) On the MFD, select the AUX – SYSTEM SETUP page.
- 11) Under the COM CONFIG field, change the COM channel spacing from 25 kHz to 8.33 kHz.
- 12) Go back to the AUX – GPS STATUS page.
- 13) Select 121.185 MHz on the COM1 transceiver.
- 14) Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
- 15) During the transmit period, verify that the GPS "INTEG" flag does not come into view on the PFD and verify that GPS1 does not lose a 3-D navigation solution on the MFD.
- 16) Repeat steps 14) and 15) and re-transmit while monitoring GPS2 signal levels on the MFD.
- 17) Repeat steps 14) through 16) for each of the following frequencies:
 - 121.190 MHz
 - 130.285 MHz
 - 131.290 Mhz
- 18) Repeat steps 14) through 17) for the COM2 transceiver (GIA2).
- 19) On the MFD, select the AUX – SYSTEM SETUP page and change the COM channel spacing back to 25 kHz.
- 20) Continue to the VOR/LOC/GS Test.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (d) VOR/LOC/GS Test
 - 1) Perform NAV 1 and NAV 2 accuracy tests: Full scale, Half scale, OBS operation.
 - 2) Check NAV 1 and NAV 2 audio and Ident.
 - 3) Check NAV 1 and NAV 2 Sensitivity.
 - 4) Perform LOC 1 and LOC 2 accuracy tests: Full scale, Half scale.
 - 5) Check LOC 1 and LOC 2 Sensitivity.
 - 6) Perform GS 1 and GS 2 accuracy tests: Full scale, Half scale.
 - 7) Check GS 1 and GS 2 Sensitivity.

(4) GEA 71 Test

- (a) On the MFD (Normal Mode), check the indication for each of the sensor or monitor inputs with the aircraft engines off. In general, verify all engine and system instruments show valid static normal values and markings, with no red Xs or erratic indications. Refer to "Figure 35" (baseline configuration instruments shown) for normal engine instrument markings.
- (b) If no other service is to be performed, continue to the Return to Service Procedure, below.

(5) Transponder Configuration

Select the GTX page group, and then select the Transponder Configuration page on the PFD:

- (a) Select the appropriate transponder.
- (b) Ensure that the 'ADDRESS TYPE' is 'US TAIL' under the 'SET' and 'ACTIVE' columns.
- (c) Activate the cursor and highlight the 'ADDRESS' field. Use the small/large FMS knobs to enter the aircraft registration number.
- (d) Once the correct registration number is entered, press the ENTER key. The transponder is configured.
- (e) The transponder then alerts the technician of complete configuration.
- (f) Press the ENTER key on the PFD and deactivate the cursor.
- (g) Continue to the GTX 33/33D Test procedure.

(6) GTX 33 Test

Operation of the GTX 33 Mode-S transponder is accomplished using the PFD or the MFD. Refer to G1000 Cockpit Reference Guide, for basic operation.

The integrated transponder/altitude reporting system must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) §§ 91.411 and 91.413, every 24 calendar months, or any time the transponder is removed. This test requires the use of a Mode S ramp generator. Specific instructions for operating the ramp tester are contained in the applicable operator's manual. Refer to Title 14 CFR Part 43.

If no other service is to be performed, continue to the Return to Service Procedure, below.



Normal Engine Instruments
Figure 35

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(7) GDC 74A Tests

NOTE: If any connections in the pitot / static system are opened for maintenance, the entire system must be rechecked per Pitot and Static Systems, Test, in 34-10-00.

NOTE: Allow the unit to warm up for 15 minutes before performing the following tests.

Verification of the altimeter and airspeed must be performed using an air data test set (ADTS). The static port and altimeter must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) § 91.411 and Part 43 Appendix E. The PFD must be in Configuration Mode and the MFD must be in Reversionary mode for performing the tests as outlined in Part 43 Appendix E.

(a) Part 43 Appendix E Testing

1) Preparation:

CAUTION: CONFIGURATION MODE CONTAINS CERTAIN PAGES AND SETTINGS THAT ARE CRITICAL TO AIRCRAFT OPERATION AND SAFETY. THESE PAGES ARE PROTECTED AND CANNOT BE MODIFIED, UNLESS THE TECHNICIAN IS PROPERLY AUTHORIZED AND EQUIPPED. HOWEVER, MOST PROTECTED PAGES ARE VIEWABLE TO ALLOW SYSTEM AWARENESS FOR TROUBLESHOOTING.

- a) Start the G1000 system in Normal Mode.
- b) Remove power to PFD.
- c) Turn on PFD in Configuration Mode: press and hold the ENT key on the PFD while applying power.
- d) Release the ENT key after "INITIALIZING SYSTEM" appears in the upper left corner of the PFD.

2) Testing:

- a) Using the FMS knob on the PFD turn to the GRS page group. Use the B ALT field for all CFR Part 43 Appendix E tests for G1000 altitude.
- b) Place the MFD in Reversionary Mode. The baro setting can then be read from the MFD for CFR Part 43 Appendix E tests.

NOTE: The baro setting on the MFD is controlled by PFD.

- 3) After completing the tests specified by § 91.411 and Part 43 Appendix E, return the MFD and PFD to Normal Mode.

NOTE: The following tests are above and beyond the requirements set forth in Appendix E, and are required only when appendix E tests are required.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4) Pitot/Static Airspeed Test

- a) Command air data test set (ADTS) to simulate air speeds shown in the table below.

<u>Calibrated Air Speed (Knots)</u>	<u>Allowed tolerance (± Knots)</u>
50	5.0
80	3.5
100	2.0
120	2.0
150	2.0

- b) Wait for ADTS to report that target values have been achieved.
c) Verify that computed air speeds shown on the PFD are within the tolerances specified in the OEM maintenance documentation.

5) Static Port Vertical Speed (Rate of Climb) Test

- a) Command ADTS to change the altitude at the rates shown in the table below.
b) Wait for ADTS to report that target rates have been achieved.
c) Verify that the Rate of Climb reported by the Vertical Speed field on the PFD is within the tolerances specified in the table below:

<u>Vertical Speed (feet/minute)</u>	<u>Allowed tolerance, (± feet/minute)</u>
2000	100
0	45
-2000	100

(8) OAT Probe Check

Check that the outside air temperature (OAT) probe measurement given on the PFD is accurate by comparing it to a calibrated thermometer which is stabilized at ambient temperature. OAT reading should be within 2° C of calibrated thermometer.

If no other service is to be performed, continue to the Return to Service Procedure, below.

(9) GRS/GMU Calibration Procedures

GRS/GMU Recalibration Criteria – see "Chart 26".

The following calibration procedures are provided for the GRS 77 and GMU 44:

- Pitch/Roll Offset Calibration:
- Magnetometer Calibration:
- Engine Run-Up Vibration Test:
- Magnetometer Interference Test:

When ready to perform the procedures, shut off the displays by pulling the PFD and MFD circuit breakers. Restart the PFD and MFD in Configuration Mode. Follow the steps given for each procedure on-screen at the GRS/GMU CALIBRATION page. Note that the CALIBRATE command cannot be selected and activated until the installer acknowledges all required steps have been carried out by pressing the ENT key on each step.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 26
G1000 - GRS 77 AHRS/GMU 44 MAGNETOMETER CALIBRATIONS**

Required GRS/GMU Calibrations			
Condition	Calibrations Required		
	Procedure A: GRS 77 Pitch/Roll Offset	Procedure B: GRS/GMU Magnetic Calibration	Procedure C: Engine Run-up Vibration Test
GMU 44 was removed and reinstalled (no change in serial number).	None Required. Continue to GRS/GMU Test section.		
GMU 44 was replaced with new unit (new serial number).		X	
GRS 77 AHRS was removed and/or replaced. The mounting tray was NOT removed and the mounting tray bolts were NOT loosened.	None Required. Continue to GRS/GMU Test section.		
GRS 77 AHRS was removed and/or replaced. The mounting tray WAS removed and/or mounting tray bolts WERE loosened.	X	X	X
GRS 77 AHRS Configuration Module was replaced.	X	X	X

(10) GRS 77 Pitch/Roll Offset Calibration (Procedure A)

This procedure must be performed with the engine OFF.

- (a) Level the aircraft to within $\pm 0.25^\circ$ of zero pitch and zero roll using a digital level. (Refer to 8-20-00.)
- (b) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (c) Go to the GRS Page Group on the PFD by rotating the large FMS knob.
- (d) Select the GRS/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (e) Activate the cursor by pressing the small FMS knob and highlight the SELECT GRS UNIT window. Select GRS1 on the PFD
- (f) Highlight the SELECT PROCEDURE window and select **PITCH/ROLL OFFSET**.
- (g) Press the ENT key.
- (h) Follow the checklist items displayed and press the ENT key as each step is completed or confirmed.
- (i) When the CALIBRATE field is blinking on the PFD, press the ENT key to begin the procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (j) After several seconds, a new checklist appears in the lower half of the PFD. Press the ENT key as each step is confirmed. When the CONFIRM AIRCRAFT IS LEVEL field is blinking on the PFD, press the ENT key to continue.
- (k) The result of the pitch/roll offset compensation is displayed on the PFD. If successful, the PFD reports the successful calibration and returns to normal operation.
- (l) Press the ENT key on the PFD to conclude this procedure.
- (m) Restart the displays in Normal Mode.

NOTE: The following Magnetometer Calibration procedure must be carried out at a site that is determined to be free of magnetic disturbances. If unsure whether a site is “clean” or not, the technician should verify that the site is clean by following the guidance provided. The technician may skip the Compass Rose Evaluation Procedure if the site condition is acceptable.

(11) Compass Rose Evaluation of Magnetic Disturbances for Magnetometer Calibration Procedure (Optional)

NOTE: Typically, a compass rose is an acceptable location to perform the magnetometer calibration procedure. However, because not all compass roses are well maintained, even an existing compass rose should be regularly evaluated using the method described here to determine if it is free of magnetic disturbances. If evaluation of an existing compass rose indicates that magnetic disturbances are present, then an alternative location must be found to perform the Magnetometer Calibration procedure.

A G1000-equipped airplane that has completed the pitch/roll offset compensation procedure can be used to evaluate a candidate site for magnetic disturbances and determine whether it is a suitable location to perform the magnetometer calibration procedure. The magnetometer calibration procedure itself contains the logic to simultaneously survey the location for magnetic cleanliness while it is computing the magnetometer calibration parameters. In order to evaluate a candidate site, the Magnetometer Calibration procedure must be performed twice: once turning clockwise around the site and once turning counterclockwise. Both times, the procedure should be conducted as described in GRS 77/GMU 44 Magnetometer Calibration, below, with the exception of the direction of turns around the site.

NOTE: Although (Procedure B) GRS 77/GMU 44 Magnetometer Calibration indicates that the Magnetometer Calibration procedure should be performed by making a series of clockwise turns around the site, the procedure can also be performed by making counterclockwise turns for the purpose of evaluating the site for magnetic disturbances.

If, upon completion of the Magnetometer Calibration procedure in both directions, the PFD displays the “CALIBRATION SUCCESSFUL / SITE IS CLEAN” message, then the candidate site is sufficiently free of magnetic disturbances and acceptable for magnetometer calibration. It is important that successful results are obtained in both directions to ensure that the magnetometer sweeps over a large enough area at the candidate site.

If, upon completion of the Magnetometer Calibration procedure in either direction, the PFD displays either the “MAG FIELD AT SITE NOT UNIFORM,” or “MAG FIELD AT SITE DIFFERS FROM IGRF MODEL” message, then the site contains magnetic disturbances that are too significant to use the site for calibration.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(12) GRS 77/GMU 44 Magnetometer Calibration (Procedure B)

NOTE: Procedure A must first be successfully accomplished before performing Procedure B, only for situations where the GRS 77 was replaced with a new unit.

Calibration Procedure B must be carried out on a compass rose in order to guarantee measurements free of environmental magnetic disturbances. Attempting to carry out this maneuver on a typical ramp area may not yield a successful calibration. The accuracy of the AHRS cannot be guaranteed if this calibration is not performed on a magnetically clean compass rose. If the compass rose condition is not known, it is recommended that the technician follow the guidance in Compass Rose Evaluation of Magnetic Disturbances, above.

- (a) Start the aircraft engine following the procedures referenced in the POH.
- (b) After aircraft engine startup, taxi the aircraft to a properly calibrated compass rose.
- (c) At the compass rose, align the aircraft to a heading of magnetic north ($\pm 5^\circ$).

CAUTION: CALIBRATION PROCEDURE B MUST BE CARRIED OUT ON A COMPASS ROSE IN ORDER TO GUARANTEE MEASUREMENTS FREE OF ENVIRONMENTAL MAGNETIC DISTURBANCES. ATTEMPTING TO CARRY OUT THIS MANEUVER ON A TYPICAL RAMP AREA MAY NOT YIELD A SUCCESSFUL CALIBRATION. THE ACCURACY OF THE AHRS CANNOT BE GUARANTEED IF THIS CALIBRATION IS NOT PERFORMED ON A MAGNETICALLY CLEAN COMPASS ROSE OR EQUIVALENT.

- (d) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (e) Go to the GRS Page Group on the PFD by rotating the large FMS knob.
- (f) Select the GRS/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence on the PFD:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (g) Activate the cursor by pressing the small FMS knob and highlight the GRS UNIT window. Select GRS1 on the PFD.
- (h) Highlight the SELECT PROCEDURE window and select MAGNETOMETER.
- (i) Press the ENT key.
- (j) Use the cursor to highlight the BEFORE CALIBRATION window on the PFD.
- (k) Follow the checklist items displayed and press the ENT key as each step is completed or confirmed.
- (l) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
- (m) The PFD display advises the operator when to turn the aircraft, when to stop, and when to turn again.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (n) Upon instruction to turn, taxi the aircraft in a right turn. After approximately 25° to 30° of turn from the last heading, the PFD display advises the operator to stop the aircraft.

NOTE: Due to the difficulties in executing smooth, accurate turns, the PFD may incorrectly interpret a station and instruct to “HOLD POSITION” prior to full completion of a 30° turn. If this scenario is encountered, it is best for the operator to ignore the “HOLD POSITION” command and instead use outside references to complete the approximate 30° turn. Instead of using the PFD instructions to turn as a real-time indication of when to turn, simply judge the 30° (±5°) turn increments of the aircraft by using the compass rose radials. Dwelling at these 30° increments for the time recommended by the PFD should result in successful calibration.

- (o) The PFD guides the operator to dwell at multiple headings around a complete circle.

NOTE: Due to high winds or excessive airframe vibration, the operator may encounter a condition where a PFD restarts the 18-second countdown without full completion of the previous countdown. If this is encountered more than once for a given station, the operator should begin turning to the next station (approximately 30°). A minimum of 2 successful stations per quadrant (and for each GRS 77) is required, where a successful station is a full 18-second countdown followed by instruction to move. Ensure that at least 2 stations per quadrant are completed. Thus, it may sometimes be required to dwell at a station after a countdown restart. A maximum of 20 stations is allowed for the entire calibration procedure. If too many countdown restarts are encountered, the calibration will fail with the message, “TOO MANY STATIONS.”

- (p) Repeat the turn-and-stop process until the PFD advises that a successful calibration is complete. The GRS 77 AHRS then enter the normal operational mode. Press the ENT to conclude this procedure.

(13) Engine Run-Up Vibration Test (Procedure C)

NOTE: Calibration Procedure C is performed in order to guarantee that the AHRS mounting is sufficiently rigid and insensitive to vibration. Calibration Procedures A and B are not required prior to this procedure.

- (a) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (b) Go to the GRS Page Group on the PFD by rotating the large FMS knob.
- (c) Select the GRS/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
- 9
 - 10
 - 11
 - 12 (far right softkey)
- (d) Activate the cursor by pressing the small FMS knob and highlight the SELECT GRS UNIT window.
- (e) Highlight the SELECT PROCEDURE window and select ENGINE RUN-UP TEST on the PFD.
- (f) Again, press the ENT key on the PFD to select the first checklist item displayed.
- (g) Follow the checklist items displayed and press the ENT key as each one is completed or confirmed. When the CALIBRATE field is blinking on the PFD, press the ENT key to begin the procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (h) The PFD will instruct the operator to gradually increase power from idle to full throttle and back to idle over a period of 2 - 4 minutes.
- (i) When the engine run-up is completed and the engine is back to an idle setting, press the ENT key on the PFD to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking.
- (j) PFD will state if the installation has passed or failed the vibration test. If the test fails, the specific measurements causing the failure are identified and associated numeric values are displayed on the PFD.

NOTE: Should a failure occur, the technician may perform the Engine Run-up test a maximum of three (3) times successively before corrective action must be taken. If the test does not pass after three attempts, then the installation should not be considered reliable until the source of the vibration problem is identified and remedied. In the event of repeated failure of the engine run-up test, record the values that are reported to be out of range for future reference.

The following are potential causes for failure of the engine run-up test:

- 1) Vibration motion of GRS 77 and/or GMU 44 caused by neighboring equipment and/or supports.
 - 2) Mounting screws and other hardware for GRS 77 and/or GMU 44 not firmly attached.
 - 3) GRS 77 connector not firmly attached to unit.
 - 4) Cabling leading to GRS 77 or GMU 44 not firmly secured to supporting structure.
 - 5) An engine and/or propeller that is significantly out of balance.
- (k) Press the ENT key to conclude this procedure.

(14) Magnetometer Interference Test

The Magnetometer Interference Test validates that no electronic device is interfering with the operation of the GMU 44 magnetometer. It verifies that the aircraft has a magnetically "clean" GMU 44 installation. The test exercises various devices on the aircraft that could affect the magnetic field measured by the GMU (examples include navigation lights, control servos, etc).

NOTE: It is highly recommended that this test be performed after the installation or maintenance of any electrical components on the aircraft and/or for troubleshooting the GMU 44.

NOTE: External power cart and other aircraft need to be as far away from the aircraft as possible. Turn Battery Master ON, AV BUS Master ON, and push in (close) all circuit breakers.

- (a) Start the PFD and MFD in Configuration Mode by holding ENT on each display while closing the circuit breaker.
- (b) Go to the GRS Page Group on the PFD by rotating the large FMS knob.
- (c) Select the GRS/GMU Calibration Page, as shown in "Figure 36". This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (d) Press the ENT key.
- (e) Select MAG INTERFERENCE TEST and press the ENT key.
- (f) Follow the checklist items displayed on the PFD, and press the ENT key as each one is completed or confirmed.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Magnetometer Interference Test
Figure 36

- (g) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.

NOTE: The list of relevant electronic devices are given in "Chart 27". Use a stopwatch to accurately time the tests. All actions are to be carried out in the order and at the precise elapsed time as specified in the prepared test sequence.

NOTE: It is important that the "time equals zero" moment corresponds with the moment the PFD first displays the blinking TEST COMPLETE? message.

- (h) When the test is complete, press the ENT key to indicate the process is complete. When this is done, the TEST COMPLETE field stops blinking.
- (i) The PFD will display if the corresponding GRS 77 installation has passed or failed the magnetometer interference test. If the test passes, no further action is required for this test. If the test fails, the installation should be considered unreliable until the source of magnetic interference is identified and remedied. When the magnetometer interference test fails, record the three magnetometer maximum deviation values and their corresponding timestamps. Any maximum deviation value greater than 2.5 milliGauss indicates a problem that must be resolved. Compare the corresponding timestamps with the prepared test sequence to identify which action produced the problem. Contact Garmin for assistance in resolving the problem.

NOTE: Two common reasons for a failed magnetometer interference test are:

- 1) New equipment is installed in close proximity to GMU 44 magnetometer, and,
- 2) an existing or new electronic device has become grounded through the aircraft structure instead of via the proper ground wire in a twisted shielded pair.

- (j) Press the ENT key to conclude this procedure.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 27
G1000 - MAGNETOMETER INTERFERENCE TEST

MAGNETOMETER INTERFERENCE TEST	
ELAPSED TIME Since start of test (Minutes:Seconds)	ACTION
0:00	Test Begins
0:10	Turn on strobe light
0:20	Turn off strobe light
0:30	Turn on fin strobe
0:40	Turn off fin strobe
0:50	Turn on nav lights (if optional tail light installed)
1:00	Turn off nav lights (if optional tail light installed)
1:10	Blower Motor on Low
1:20	Blower Motor off
1:30	Blower Motor on High
1:40	Blower Motor off

(15) Automatic Flight Control System (AFCS) Tests (If installed)

See "Garmin G1000 Equipped Airplanes" in 22-10-00 under S-TEC System 55/55X, "Ground Checks".

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Normal Mode AHRS Check
Figure 37

(16) GRS/GMU Test

The aircraft may now be taxied back and the engine can be shut down for final testing. Restart the displays in Normal Mode to conduct final system checks. When the PFD powers up in Normal Mode, the AHRS attitude and heading information displayed should become valid within one (1) minute of power-up, as shown in "Figure 37" (provided both GPS receivers have a valid position; if GPS is unavailable, AHRS initialization may take as long as two (2) minutes).

If no other service is to be performed, continue to the Return to Service Procedure, below.

(17) GDL 69A (Optional) Test

- (a) If an XM Satellite Radio subscription has already been activated, then power up the G1000 and go to the AUX – XM RADIO page on the MFD. There, verify that the GDL 69A is working properly by moving back and forth through the channels.
- (b) If the GDL 69A is replaced (new unit), the owner must re-activate the subscription, using the new GDL 69A's Radio ID number.
- (c) As a final operations check, make sure there are no MANIFEST errors shown on the PFD for the GDL 69A.

If no other service is to be performed, continue to the Return to Service Procedure, below.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(18) TAWS Functional Check

- (a) Ensure that matching terrain database cards are installed in the bottom slots of the PFD and MFD and that the aircraft has a GPS position.
- (b) Select the TAWS-B page in the MAP Group.
- (c) 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."

- (d) Press the MENU button and select "Test TAWS System" from the pop-up menu and press ENT key.
- (e) After the TAWS test has completed, verify that "TAWS System Test Okay" is heard over the audio system.
- (f) If no other service is to be performed, continue to the Return to Service Procedure, below.

(19) ChartView (Optional) Check

ChartView, if installed, must be enabled using a ChartView Enable Card and a current ChartView database. Ensure that a Chartview Jeppesen Nav Data U.S. database card is installed in the top card slot of the MFD. Refer to Chartview Unlock, above.

NOTE: The required ChartView databases are subscription-based and are to be procured by the aircraft owner directly from Jeppesen.

- (a) Select the Airport Information page in the WPT Group.
- (b) Verify that the title at the top of the page reads "WPT- Airport Information".
- (c) Enter KVRB as the waypoint and verify that the CHRT softkey is available.
- (d) Press the CHRT softkey and verify the electronic chart is viewable.
- (e) If no other service is to be performed, continue to the Return to Service Procedure, below.

(20) DME (Optional) Check

This check verifies that the DME-to-G1000 interface operates correctly.

- (a) Perform systems check with the appropriate test equipment and verify the DME is tuned by NAV1 and NAV2.
- (b) Verify the distance is accurate.
- (c) Verify the DME audio is available on the GMA 1347 audio panel.
- (d) If no other service is to be performed, continue to the Return to Service Procedure, below.

(21) ADF (Optional) Check

This check verifies that the ADF / G1000 interface operates correctly.

- (a) Tune the ADF to a known local NDB and verify the bearing is correct within +/- 15° and the Morse Code Identifier is clear and accurate.
- (b) Verify the ADF audio is available on the GMA 1347 audio panel.
- (c) If no other service is to be performed, continue to the Return to Service Procedure, below.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(22) Display System Checkout

(a) NAV Source Selection Tests

NOTE: The CDI will not be depicted if the VOR antenna is not receiving a valid signal.

NOTE: For GPS, the word that is displayed with the GPS (i.e., GPS TERM) depends on the phase of flight of the airplane. Display of either 'GPS TERM' or 'GPS ENR' is acceptable.

- 1) Start these tests with all avionics powered.
- 2) Press the Direct-To-Key (-D->).
- 3) Enter a Direct-To waypoint. Press ENT.
- 4) Enter 117.3 MHz (TRV VOR) or an appropriate VOR frequency simulated with test equipment into the active NAV 1 frequency box on the PFD.
- 5) Enter 110.0 MHz (MLB VOR) or an appropriate VOR frequency simulated with test equipment into the active NAV 2 frequency box on the PFD.
- 6) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from GPS TERM to VOR1.
- 7) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from VOR1 TO VOR2.
- 8) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from VOR2 TO GPS TERM.

(b) Bearing Pointers and Information Windows Tests

NOTE: The bearing pointer will not be depicted if it is not receiving a valid signal.

- 1) Start these tests with all avionics powered.
- 2) Press the Direct-To-Key (-D->).
- 3) Enter a Direct-To waypoint. Press ENT.
- 4) Enter 117.3 MHz (TRV VOR) or an appropriate VOR frequency simulated with test equipment into the NAV1 frequency box on the PFD. Enter 110.0 MHz (MLB VOR) or an appropriate VOR frequency simulated with test equipment into the NAV2 frequency box on the PFD.
- 5) Enter 257 kHz (SQT NDB) into the ADF receiver (if installed).
- 6) Press the PFD softkey on the PFD to make the BRG1 and BRG2 softkey selections visible.
- 7) Verify that the BRG1 softkey can be pressed to sequentially cycle through NAV1, NAV2, GPS, and ADF (if installed).
- 8) Verify that the BRG2 softkey can be pressed to sequentially cycle through NAV1, NAV2, GPS, and ADF (if installed).

(c) BARO Selection Tests

- 1) Rotate the BARO knob on the PFD and verify that the PFD BARO values change.
- 2) Set the current altimeter setting and verify that the PFD altimeter indicates within $\pm 30'$ of field elevation.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

O. Return to Service Procedure

WARNING: IT IS ESSENTIAL THAT THE SOFTWARE VERSIONS BE CHECKED AND MATCHED AGAINST THE LISTED VERSIONS IN THE REQUIRED EQUIPMENT LIST (REL). SEE "CHART 29". SOFTWARE CONFIGURATION IS A CRITICAL PART OF THE G1000 OPERATION AND MUST BE VERIFIED BEFORE RETURNING AN AIRCRAFT TO SERVICE.

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

(1) Software Verification

After reinstalling any G1000 LRU, use the checkoff list in "Chart 28" to verify correct LRU software part numbers and versions against the current numbers and versions shown in the Required Equipment List (REL). See "Chart 29" on page 342501137.

- (a) The PFD System Status page (see "Figure 38") displays a list of LRUs in the LRU window.
- (b) Enter Configuration Mode on the PFD and MFD by applying power while holding ENT.
- (c) Verify on the System Configuration Page that the following are valid (indicated by green annunciations): MFD1, PFD, GIA1, GIA2, and GDL 69A (optional).
- (d) Verify on the System Status Page that the following are valid (green annunciations indicate that the system is healthy): MFD1, PFD, GIA1, GIA2, and GDL 69A (optional).

(2) LRU Failure Tests

Various secondary comms paths are tested to ensure that desired backup paths are in place.

(a) GPS Failure Test

- 1) Start these tests with all avionics powered.
- 2) Valid GPS reception.
- 3) Place a shroud over the GPS1 antenna to prevent signal reception. Verify loss of GPS1 signal on MFD 'Aux' group page 4 (GPS Status page). The following should remain valid on the PFD throughout the procedure:
 - a) Attitude
 - b) Heading
 - c) Airspeed
 - d) Altitude
 - e) Vertical Speed
 - f) OAT
 - g) GPS CDI.
- 4) Remove shroud from the GPS1 antenna.
- 5) Place a shroud over the GPS2 antenna to prevent signal reception. Verify loss of GPS2 signal on MFD 'Aux' group page 4 (GPS Status page). The following should remain valid on the PFD throughout the procedure:
 - a) Attitude
 - b) Heading
 - c) Airspeed
 - d) Altitude
 - e) Vertical Speed
 - f) OAT
 - g) GPS CDI.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



System Status Page (Configuration Mode)

Figure 38

- 6) Leave the shroud over the GPS2 antenna and replace the shroud over the GPS1 antenna. Verify loss of GPS 1 and 2 signals on 'Aux' group page 4 (GPS Status page). The following should remain valid on the PFD throughout the procedure.
 - a) Attitude
 - b) Heading
 - c) Airspeed
 - d) Altitude
 - e) Vertical Speed
 - f) OAT
 - g) and GPS LOI (loss of integrity) annunciated on the PFD.
- (b) GIA Failure Test
 - 1) Start these tests with all avionics powered.
 - 2) Valid GPS reception. Valid NAV signal.
 - 3) Remove power from GIA1 by pulling the INTEG AV 1 and COM 1 circuit breakers.
 - 4) Verify the following system messages:
 - a) AHRS1 GPS – AHRS1 USING BACKUP GPS SOURCE
 - b) FAILED PATH – A data path has failed.
 - c) AV FAN FAIL – The cooling fan for remote avionics is failed.
 - 5) Verify the following flag invalid:
 - a) COM/NAV 1 field
 - b) NAV 1 CDI loses deviation bar.
 - 6) Restore power to GIA1 by resetting the INTEG AV 1 and COM 1 circuit breakers.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 7) Verify the following:
All invalid flags, system messages, and annunciations are removed. (#1 GPS will take time to reinitialize).
 - 8) Remove power from GIA 2 by pulling the INTEG AV 2 and COM 2 circuit breakers.
 - 9) Verify the following system messages:
 - a) AHRS1 GPS – AHRS1 not receiving backup GPS information.
 - b) FAILED PATH – A data path has failed.
 - 10) Verify the following flag invalid:
 - a) COM/NAV 2 field
 - b) NAV 2 CDI loses deviation bar.
 - 11) Restore power to GIA2 by resetting the INTEG AV 2 and COM 2 circuit breakers.
 - 12) Verify the following:
 - 13) All invalid flags, system messages, and annunciations are removed. (#2 GPS will take time to reinitialize).
 - 14) Remove power from GIA 1 and GIA 2 by pulling the INTEG AV 1, INTEG AV 2, COM 1 and COM 2 circuit breakers.
 - 15) Verify the following system messages:
 - a) XPDR1 FAIL
 - b) GMA1 FAIL
 - c) FAILED PATH
 - d) GPS NAV LOST
 - e) AHRS1 GPS
 - f) TRAFFIC FAIL (If GTS 800 is not installed)
 - 16) Verify the following flag invalid:
 - a) COM/NAV 1 field
 - b) COM/NAV 2 field
 - c) XPDR field
 - d) Engine Instruments
 - 17) Verify the following:
 - a) All AHRS and ADC fields remain valid.
 - b) NAV 1 & NAV 2 CDI loses deviation bar.
- (c) Display Failure Test
- 1) Start these tests with all avionics powered.
 - 2) Remove power from the MFD by pulling the MFD circuit breaker.
 - 3) Verify the following system messages on the PFD:
 - a) XTALK ERROR system message
 - b) MFD VOLTAGE (This may or may not appear depending on power failure rate vs. MFD update rate)
 - c) FAILED PATH
 - d) GDL 69 FAIL (If Installed)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 4) Verify the following:
 - a) PFD switches to reversion mode.
 - b) Attitude and Heading remain valid from AHRS.
 - c) Airspeed, Altitude, Vertical Speed and OAT remain valid.
 - d) Engine Instrumentation appears on PFD.
 - e) COM/NAV 2 fields flag invalid.
 - 5) Restore power to the MFD. The display should return to Normal operation.
 - 6) Select reversionary mode on GMA 1347 Audio Panel.
 - 7) Remove power from the PFD by pulling the PFD circuit breaker.
 - 8) Verify the following system messages are displayed on the MFD:
 - a) XTALK ERROR
 - b) TRAFFIC FAIL (If Installed)
 - c) FAILED PATH
 - 9) Verify the following:
 - a) Attitude and Heading remain valid from AHRS.
 - b) Airspeed, Altitude, Vertical Speed and OAT remain valid.
 - c) MFD retains engine instrumentation.
 - d) COM/NAV 1 fields flag invalid.
 - 10) Restore power to the PFD and deselect reversionary mode on GMA 1347 Audio Panel. The displays should return to normal operation
- (d) AHRS Failure Test
- Allow AHRS to realign between tests.
- 1) Start these tests with all avionics powered.
 - 2) Remove power from the AHRS by pulling the AHRS circuit breaker.
 - 3) Verify the following flag invalid on the PFD:
 - a) Heading
 - b) Attitude
 - c) Altitude
 - d) Indicated Airspeed
 - e) Vertical Speed
 - f) Static Air Temperature (OAT) and ISA
 - 4) Restore power to the AHRS.
 - 5) Verify normal operation and invalid flags are removed.
- (e) ADC Failure Test
- 1) Start these tests with all avionics powered.
 - 2) Remove power from ADC by pulling ADC circuit breaker.
 - 3) Verify the following flag invalid on PFD:
 - a) Altitude
 - b) Airspeed
 - c) Vertical Speed
 - d) OAT and ISA
 - 4) Restore power to the ADC and verify system returns to normal operation.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(3) Flight Test

A flight test is recommended after the installation is complete to ensure satisfactory performance of the G1000.

(4) VHF Comm Tests

Verify the communications capability on both the high and low ends of the VHF COM spectrum.

(5) VOR/ILS Tests

Select a VOR channel within a 40-nautical-mile range. Listen to the VOR audio and verify that no electrical interference such as magneto noise is present. Check the tone identifier filter operation. Fly inbound or outbound on a selected VOR radial and check for proper LEFT / RIGHT, TO / FROM flag indications on the CDI. Check the VOR accuracy.

(6) Engine Run Checks

The following checks verify certain annunciations, displays, and systems operation.

WARNING: DO NOT WORK IN THE ENGINE AREA WHILE THE ENGINE IS RUNNING.

CAUTION: AFTER RUNNING THE ENGINE, THE EXHAUST STACKS WILL BE HOT.

(a) With engine OFF and PFD in reversionary mode:

Verify the difference between indicated left and right fuel quantity is less than 5 gallons.

(b) Start Engine.

(c) Turn on Alternator.

(d) Set engine RPM to greater than 1100.

(e) Verify Alternator Operation:

1) Verify alternator operation by checking that ALTR AMPS is in the normal range.

2) Pull Alt Field circuit breaker.

3) Verify "ALT FAIL" Warning CAS annunciates.

4) Reset Alt Field circuit breaker.

5) Verify "ALT FAIL" Warning CAS extinguishes.

6) Verify alternator operation by checking that ALTR AMPS is in the normal range.

(f) For aircraft with Hobbs Meter Configuration A, verify Hour Meter operation:

Hobbs meter shall run while engine is running.

(g) Verify RPM, Fuel Flow, EGT, Oil Pressure, and Oil Temp are operating in normal range.

(h) Verify alternator and battery current indications.

1) With the Battery Master Switch ON and alternator on line. Note alternator current and battery current.

2) Turn the Battery Master switch OFF.

3) Note alternator current. Verify that alternator current with battery on equals the alternator current with battery off plus battery current (within +/- 5 amps).

(i) Turn off Alternator. Shutdown engine.

(7) Maintenance Records

After conducting the function check flight, the airplane may be returned to service. Record the following information in the appropriate airplane maintenance logs:

(a) Part number of the loader card used to perform software loading or software updates.

(b) Any other applicable information related to the maintenance work performed on the airplane.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
G1000 - RETURN TO SERVICE CHECK LIST**

Group System	SW Ver. OK	System	SW Ver. OK	System	SW Ver. OK
Control & Display:					
MFD1	_____	PFD	_____		
MFD1 FPGA	_____	PFD FPGA	_____		
CNS:					
COM1	_____	GDL69	_____	NAV1	_____
COM2	_____	GMA1	_____	NAV1 FPGA	_____
GIA1	_____	GPS1	_____	NAV2	_____
GIA1 AUDIO	_____	GPS2	_____	NAV2 FPGA	_____
GIA2	_____	GTS	_____		
GIA2 AUDIO	_____	GTX1	_____		
Sensors:					
GDC1	_____	GMU1	_____	GRS1 FPGA	_____
GDC1 FPGA	_____	GMU1 FPGA	_____		
GEA1	_____	GRS1	_____		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 29
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 - VER. 1618.02 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-XX	11.00	
COM2	006-B0081-XX	11.00	
GDC1	006-B0261-19	3.09	
GDC1 FPGA	006-C0055-00	01.05	
GDL69	006-B0317-22	4.02.00 (Optional, Verify If Installed)	
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-52	7.08	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-52	7.08	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-20	5.0	
GPS2	006-B0339-20	5.0	
GRS1	006-B0223-23	3.03	
GRS1 FPGA	006-C0049-00	02.00	
GRS1 MV DB	006-D0159-02	2010.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-10	3.00 (Optional, Verify If Installed)	
GTS AUDIO	006-D0726-00	2.00 (Optional, Verify If Installed)	
GTS FPGA	006-C0081-20	2.0 (Optional, Verify If Installed)	
GTS MAGNET V	006-D0159-02	2010.00 (Optional, Verify If Installed)	
GTX1	006-B0172-XX	7.02	
MFD1	006-B0319-B1	13.01	
MFD1 FPGA	006-C0036-04	1.04	
NAV1	006-B0082-12	6.02	
NAV1 BB	006-B0082-BC	2.01	
NAV1 FPGA	006-C0124-00	1.00	

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 29
REQUIRED EQUIPMENT LISTS (RELS)

G1000 - VER. 1618.02 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)

LRU Identifier	Part Number	Version	Remarks
NAV2	006-B0082-12	6.02	
NAV1 BB	006-B0082-BC	2.01	
NAV2 FPGA	006-C0124-00	1.00	
PFD1	006-B0319-B1	13.01	
PFD1 FPGA	006-C0036-04	1.04	
PA-28 IMAGE	006-B1618-02	1618.02 ⁽¹⁻²⁾	
(5) PIR-107599 C.			
(6) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 29
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 - VER. 1618.03 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-XX	11.00	
COM2	006-B0081-XX	11.00	
GDC1	006-B0261-19	3.09	
GDC1 FPGA	006-C0055-00	01.05	
GDL69	006-B0317-22	4.02.00 (Optional, Verify If Installed)	
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-4C	7.09	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-4C	7.09	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-20	5.0	
GPS2	006-B0339-20	5.0	
GRS1	006-B0223-23	3.03	
GRS1 FPGA	006-C0049-00	02.00	
GRS1 MV DB	006-D0159-02	2010.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-10	3.00 (Optional, Verify If Installed)	
GTS AUDIO	006-D0726-00	2.00 (Optional, Verify If Installed)	
GTS FPGA	006-C0081-20	2.0 (Optional, Verify If Installed)	
GTS MAGNET V	006-D0159-02	2010.00 (Optional, Verify If Installed)	
GTX1	006-B0172-XX	7.02	
MFD1	006-B0319-B4	13.04	
MFD1 FPGA	006-C0036-04	1.04	
NAV1	006-B0082-12	6.02	
NAV1 BB	006-B0082-BC	2.01	
NAV1 FPGA	006-C0124-00	1.00	

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 29
REQUIRED EQUIPMENT LISTS (RELS)

G1000 - VER. 1618.03 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)

LRU Identifier	Part Number	Version	Remarks
NAV2	006-B0082-12	6.02	
NAV1 BB	006-B0082-BC	2.01	
NAV2 FPGA	006-C0124-00	1.00	
PFD1	006-B0319-B4	13.04	
PFD1 FPGA	006-C0036-04	1.04	
PA-28 IMAGE	006-B1618-03	1618.03 ⁽¹⁻²⁾	
(1) PIR-107599 C. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 29
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 - VER. 1618.04 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-XX	11.10	
COM2	006-B0081-XX	11.10	
GDC1	006-B0261-19	3.09	
GDC1 FPGA	006-C0055-00	01.05	
GDL69	006-B0317-22	4.02.00 (Optional, Verify If Installed)	
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-4N	7.14	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-4N	7.14	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-20	5.0	
GPS2	006-B0339-20	5.0	
GRS1	006-B0223-23	3.03	
GRS1 FPGA	006-C0049-00	02.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-11	3.01 (Optional, Verify If Installed)	
GTS AUDIO	006-D0726-00	2.00 (Optional, Verify If Installed)	
GTS FPGA	006-C0081-20	2.0 (Optional, Verify If Installed)	
GTX1	006-B0172-XX	7.04	
MFD1	006-B0319-B9	13.08	
MFD1 FPGA	006-C0036-04	1.04	
NAV1	006-B0082-12	6.02	
NAV1 FPGA	006-C0124-00	1.00	

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 29
REQUIRED EQUIPMENT LISTS (RELS)

G1000 - VER. 1618.04 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)

LRU Identifier	Part Number	Version	Remarks
NAV2	006-B0082-12	6.02	
NAV2 FPGA	006-C0124-00	1.00	
PFD1	006-B0319-B9	13.08	
PFD1 FPGA	006-C0036-04	1.04	
PA-28 IMAGE	006-B1618-04	1618.04 ⁽¹⁻²⁾	
(1) PIR-107599 F. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 29
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 - VER. 1618.05 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-XX	11.10	
COM2	006-B0081-XX	11.10	
GDC1	006-B0261-19	3.09	
GDC1 FPGA	006-C0055-00	01.05	
GDL69	006-B0317-22	4.02.00	(Optional , Verify If Installed)
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-4N	7.14	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-4N	7.14	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-20	5.0	
GPS2	006-B0339-20	5.0	
GRS1	006-B0223-23	3.03	
GRS1 FPGA	006-C0049-00	02.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-11	3.01	(Optional , Verify If Installed)
GTS AUDIO	006-d0726-00	2.00	(Optional , Verify If Installed)
GTS FPGA	006-c0081-20	2.0	(Optional , Verify If Installed)
GTX1	006-B0172-XX	7.04	
MFD1	006-B0319-B9	13.08	
MFD1 FPGA	006-C0036-04	1.04	
NAV1	006-B0082-12	6.02	
NAV1 FPGA	006-C0124-00	1.0	

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 29
REQUIRED EQUIPMENT LISTS (RELS)

G1000 - VER. 1618.05 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)

LRU Identifier	Part Number	Version	Remarks
NAV2	006-B0082-12	6.02	
NAV2 FPGA	006-C0124-00	1.0	
PFD1	006-B0319-B9	13.08	
PFD1 FPGA	006-C0036-04	1.04	
PA-28 IMAGE	006-B1618-05	1618.05 ⁽¹⁻²⁾	
(1) PIR-107599 G. Installed per Piper Service Letter 1215. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 29
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 - VER. 1618.06 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-XX	11.10	
COM2	006-B0081-XX	11.10	
GDC1	006-B0261-19	3.09	
GDC1 FPGA	006-C0055-00	01.05	
GDL69	006-B0317-22	4.02.00	(Optional , Verify If Installed)
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-4N	7.14	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-4N	7.14	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-20	5.0	
GPS2	006-B0339-20	5.0	
GRS1	006-B0223-27	3.07	
GRS1 FPGA	006-C0049-00	02.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-11	3.01	(Optional , Verify If Installed)
GTS AUDIO	006-d0726-00	2.00	(Optional , Verify If Installed)
GTS FPGA	006-c0081-20	2.0	(Optional , Verify If Installed)
GTX1	006-B0172-XX	7.04	
MFD1	006-B0319-B9	13.08	
MFD1 FPGA	006-C0036-04	1.04	
NAV1	006-B0082-12	6.02	
NAV1 FPGA	006-C0124-00	1.0	

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 29
REQUIRED EQUIPMENT LISTS (RELS)

G1000 - VER. 1618.06 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)

LRU Identifier	Part Number	Version	Remarks
NAV2	006-B0082-12	6.02	
NAV2 FPGA	006-C0124-00	1.0	
PFD1	006-B0319-B9	13.08	
PFD1 FPGA	006-C0036-04	1.04	
PA-28 IMAGE	006-B1618-06	1618.06 ⁽¹⁻²⁾	
(1) PIR-107599 H. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

INTEGRATED AVIONICS SYSTEM - GARMIN G1000 NXi

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

Integrated Avionics System - Garmin G1000 NXi - S/N's 2843852, 2843854–2843999

(PIR-190-00907-00, Rev B.)

Optional in S/N's 2843852, 2843854–2843999.

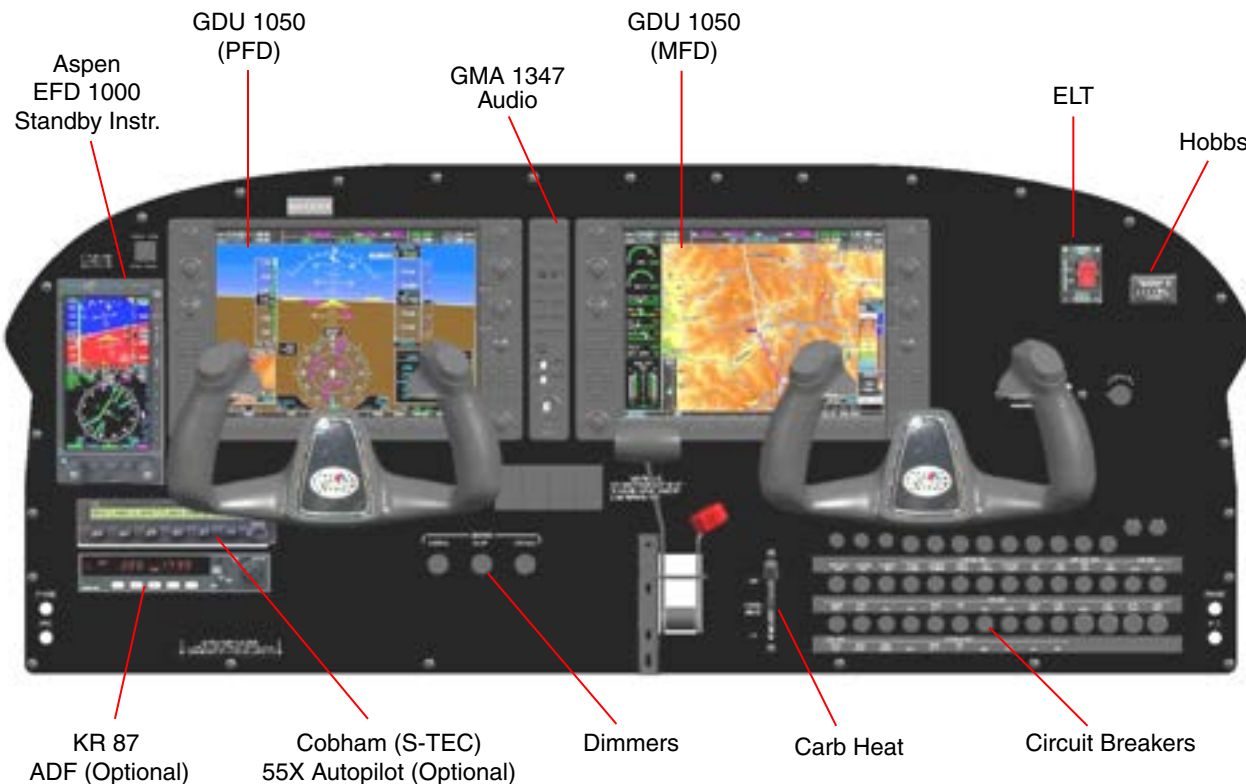
A. Description

See "Figure 1".

The Garmin G1000 NXi Integrated Avionics System consists of two (2) GDU 105X displays that serve as the primary flight display (PFD) and multi-function display (MFD). Functions provided by the system include display of attitude, heading, navigation, engine and airframe status, and a moving map display with position derived by GPS. In addition to display functions, GPS navigation, VHF Com, and transponder functions are provided by the G1000 NXi system (via knobs and buttons on the display bezel).

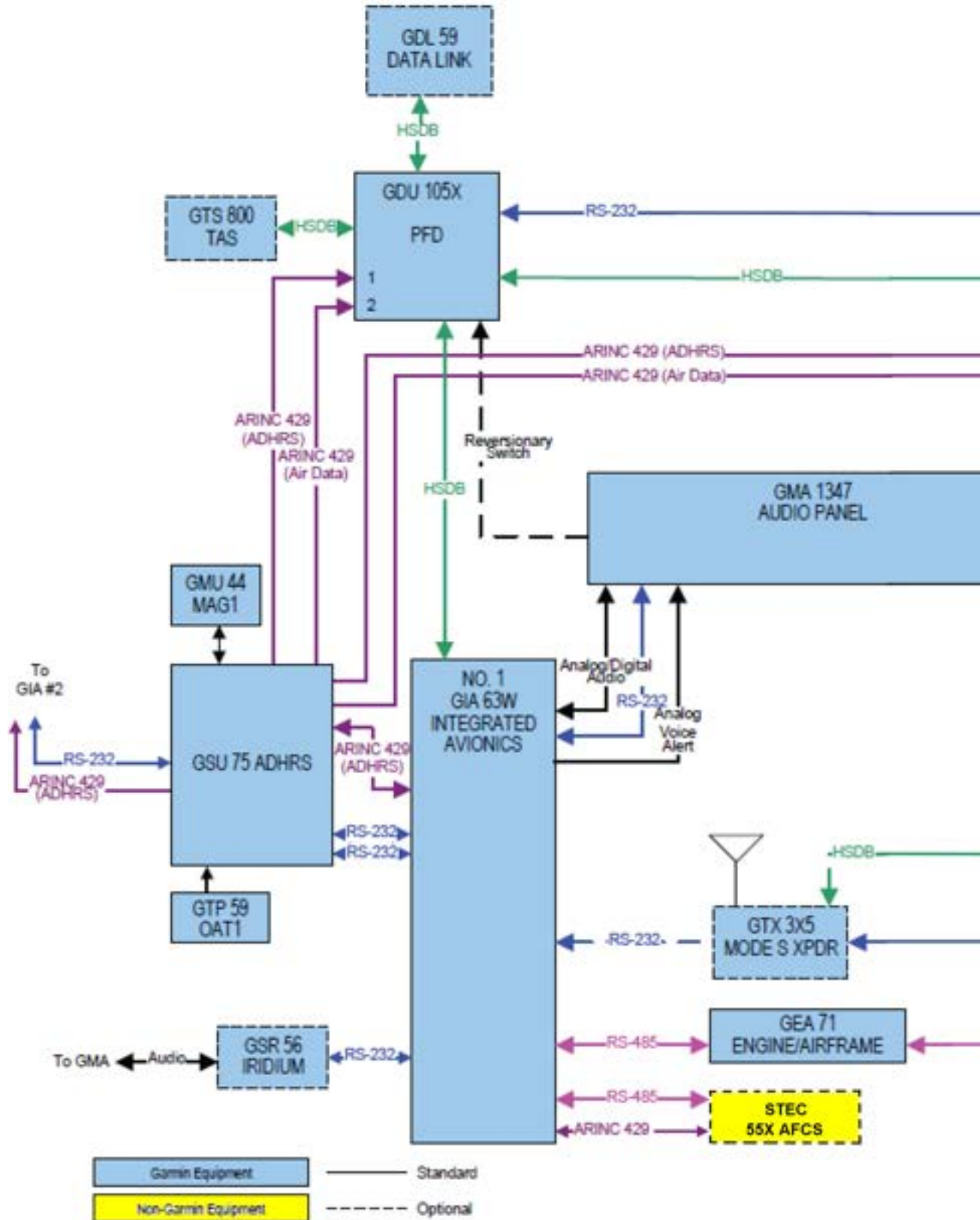
A single ADAHRS computer is standard. Several options that may be incorporated into the G1000 NXi system include S-TEC 55X Autopilot, GTS 800 traffic advisory system (TAS), and TAWS-B capabilities.

See the latest revision of the appropriate Garmin G1000 Pilots Guide for control and operation information. See Vendor Publications under Supplementary Publications in the Introduction.



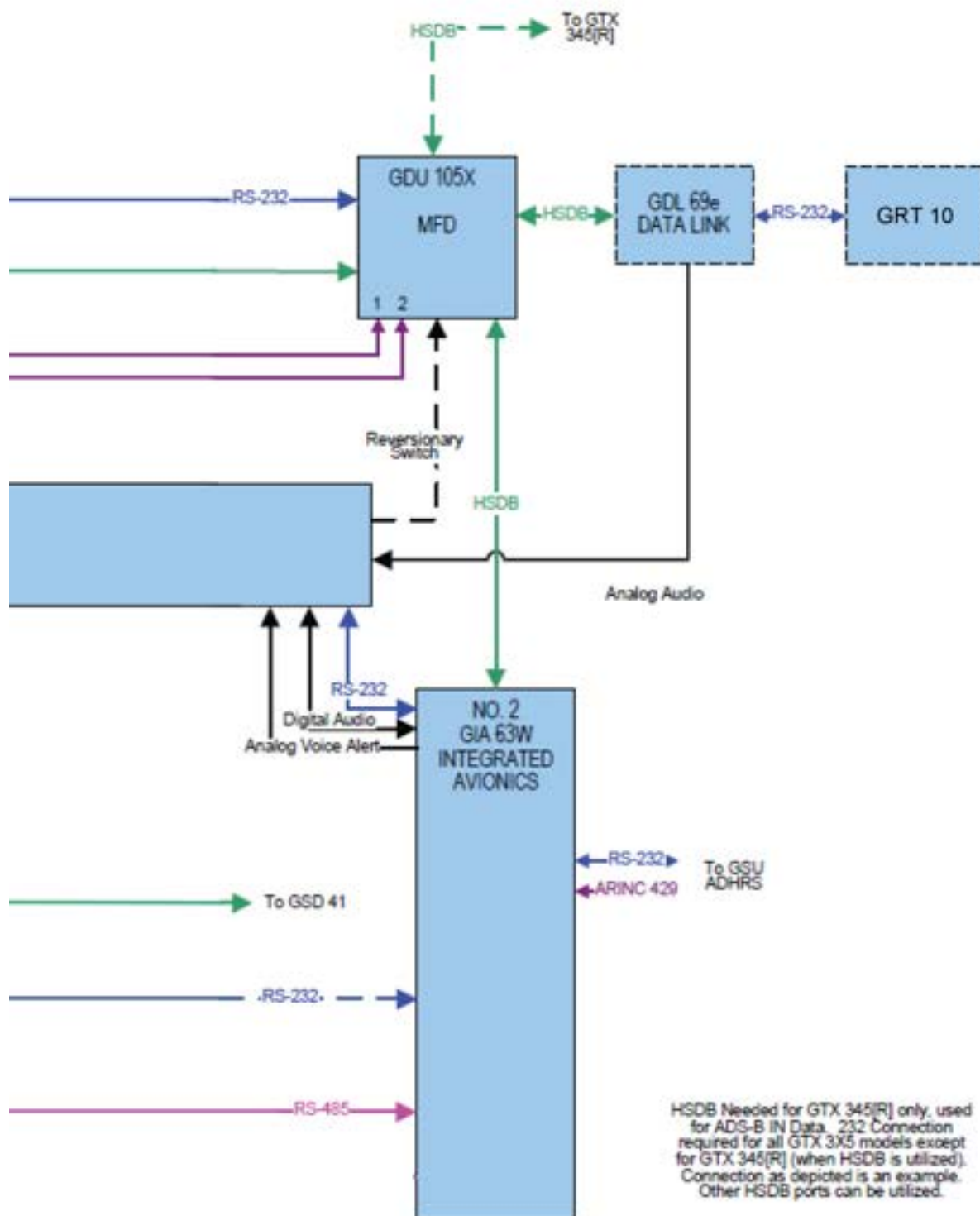
**Garmin G1000 NXi Instrument Panel
Figure 1**

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Electrical/Avionics Component Block Diagram
Figure 2 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Electrical/Avionics Component Block Diagram
Figure 2 (Sheet 2 of 2)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(1) Flight Instrumentation

GSU 75 ADAHRS, GTP 59 OAT Probe, and GMU 44 Magnetometer units are responsible for providing the G1000 NXi system with aircraft attitude, heading, altitude, airspeed, vertical speed, and outside air temperature information, all displayed on the PFD.

Primary data outputs from the GSU are sent directly to the PFD via ARINC 429. Secondary data paths connect the GSU to the MFD in the standard installation. Additional cables connect the GSU to both GIA 63W units.

The GSU 75 receives GPS data from the GIAs, and magnetic heading from the GMU. Using these external sources, combined with internal sensor data, the GSU accurately calculates aircraft attitude and heading.

(2) Engine Indicator System

The GEA 71 provides engine and airframe data to the G1000 NXi system. The unit interfaces to transducers. Analog data is received from the transducers and is converted to a digital signal by the GEA 71. Digital information is then sent through the primary RS-485 serial path to the #1 GIA 63W. From the GIA, data is sent through the HSDB connection to the PFD, then on to the MFD for display. A backup data path exists, from the GEA to the #2 GIA 63W and on to the MFD for display, in the event the primary path fails.

(3) Communications/Navigation Systems

The GIA 63W IAUs contain VHF COM, VHF NAV, and GPS receivers. COM and NAV audio is sent via analog or digital audio to the GMA 1347 Audio Panel.

GPS information is sent to the GSU 75 ADAHRS and to both displays for processing.

A single GTX 3X5R Mode S/ES Transponder communicates with both GIAs. Transponder data is sent from the GIAs to the PFD where control and operation occurs.

(4) Components Details

Detailed descriptions of the individual G1000 NXi system components/Line Replaceable Units (LRU's) are found below.

B. Power Distribution

See "Figure 3".

The electrical system has a tie point to connect the external power source, primary battery, starter motor, alternator and essential bus feed. Distribution of power for the G1000 NXi system occurs on three aircraft electrical busses.

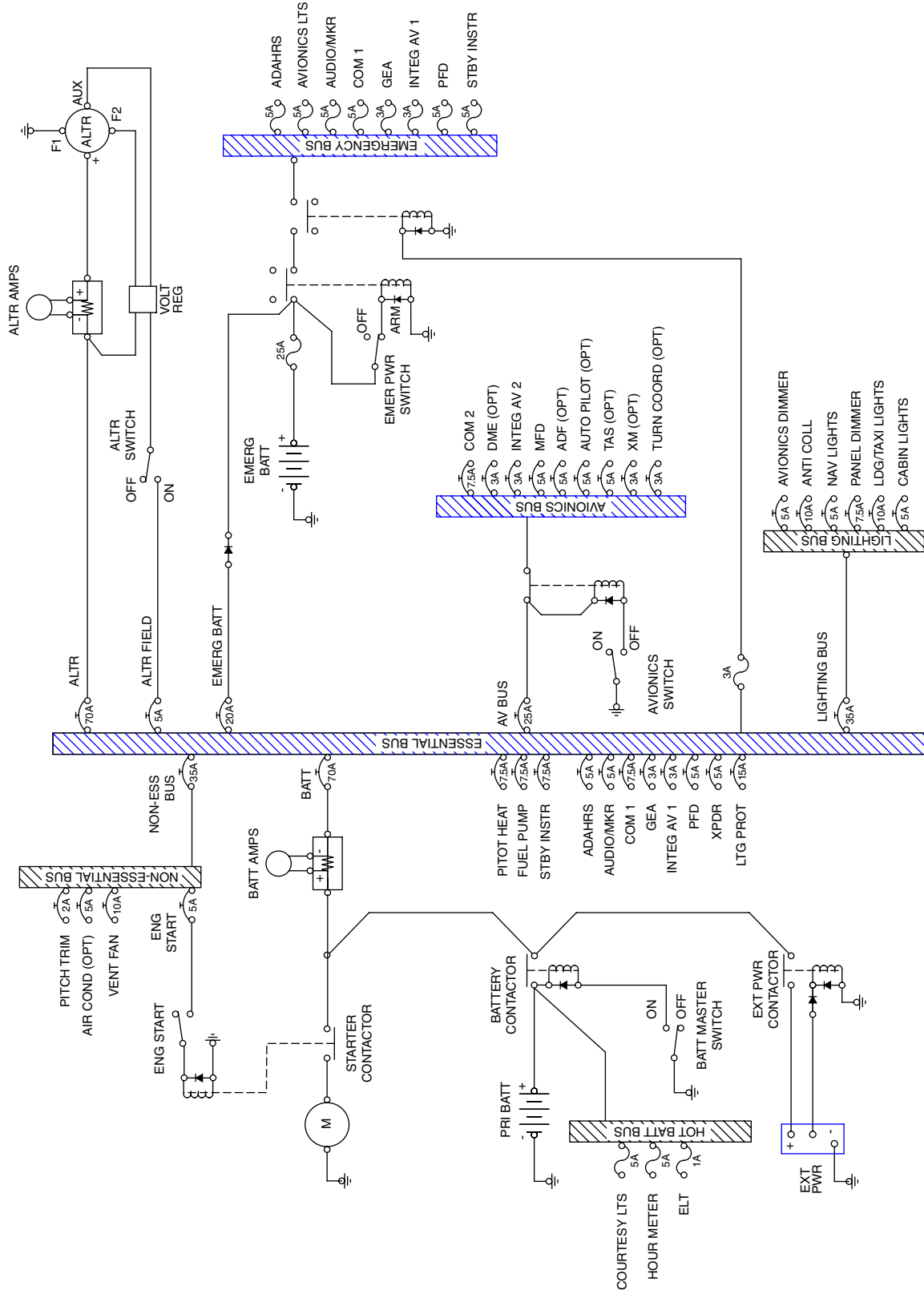
Essential Bus: Electrical current is fed to the essential bus from the alternator, isolated by one 70-amp circuit breaker. It is also 70-amp circuit breaker isolated from the battery. Essential bus loads are isolated from non-essential loads.

Emergency Bus: The emergency bus serves as a backup for the G1000 NXi system and is isolated from all other busses. When the EMER switch is turned on, the battery master switch must be turned "OFF" to remove power from the essential bus. This closes the relay connecting the emergency bus to the emergency battery, providing emergency power to the connected equipment.

Avionics Bus: There is a single avionics bus that is isolated from its essential bus feed by a relay. It is controlled by the avionics switch in the cockpit. The avionics bus is fed through independent contactor that is protected by a 25-amp circuit breaker.

The electrical system also includes one non-essential bus and one lighting bus which are isolated by circuit breakers from the essential bus feed.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Bus Feeds and Component Power Sources
Figure 3

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. G1000 NXi System Controls and Operation

(1) System Controls

The G1000 NXi system controls are located on the PFD and MFD bezels. Indicators above the PFD, MFD, NAV, and COM keys are illuminated when their respective control mode(s) are selected. See the appropriate Garmin G1000 Pilots Guide for detailed controls descriptions. The unit is in MFD control mode by default on system power-up. NAV/COM radio tuning can be accomplished in either PFD or MFD control mode. The appropriate frequency box on the selected display is outlined by a light blue selection box, which flashes for a few seconds to indicate Control Unit activity. Selection of a different display control or radio tuning mode results in cancelation of the previous radio tuning mode.

(2) System Operation

The displays are connected together via multiple data busses, thus allowing for high-speed communication. The PFD and MFD are directly connected to the GIA 63W unit on the respective side, as shown in "Figure 2" on page 3425022. This section discusses the normal and reversionary modes of operation as well as the various ADAHRS modes of the G1000 NXi system.

(a) Normal Operation

1) PFD

In normal mode, the PFD presents graphical flight instrumentation (attitude, heading, airspeed, altitude and vertical speed), thereby replacing the traditional flight instrument cluster. The PFD also offers control for COM and NAV frequency selection.

2) MFD

In normal mode, the right portion of the MFD displays a full-color moving map with navigation information, while the left portion of the MFD is dedicated to the Engine Indication System (EIS). "Figure 4" gives an example of the G1000 NXi displays in normal mode.

(b) Reversionary Mode

NOTE: The G1000 NXi system alerts the pilot when backup paths are utilized by the LRUs. Refer to the Appendices in the appropriate Garmin Pilot's Guide for further information regarding system-specific alerts.

Reversionary mode is a mode of operation in which all important flight information is presented on at least one functioning displays (see "Figure 5"). Transition to reversionary mode should be straight-forward for the pilot, for flight parameters are presented in the same format as in normal mode. In the event of a PFD failure, the G1000 NXi system automatically switches to reversionary (backup) mode. In reversionary mode, all important flight information is presented on the remaining display, whether the MFD or PFD.

- PFD failure – Press the DISPLAY BACKUP button on the GMU 1347 (see "Figure 6") to put MFD into reversionary mode.
- MFD failure – The PFD automatically goes into reversionary mode.

Both displays may be set to reversionary mode at any time by pressing DISPLAY BACKUP on the GMU 1347 (see "Figure 6").

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Normal Mode
Figure 4



Reversionary Mode (PFD or MFD Failure)
Figure 5

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Audio Control and Display Backup (GMA 1347)
Figure 6

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

D. Maintenance Mode

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXi SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC.

The "Hobbs" Meter is activated by the GIA 63W Integrated Avionics Units and will run when one of the following is true, depending on how it was configured:

- (1) the engine is running (Option A); or
- (2) the airplane is inflight (Option B); or
- (3) the GIA 63W No. 1 is ON (Option C).

To prevent needless accumulation of "hours" (i.e., to disable the "Hobbs" Meter) on the ground a Maintenance Mode has been implemented in the Garmin G1000 NXi software.

Enter "Maintenance Mode" before exiting the splash screen at system startup by pressing SoftKeys 1, 2, 3, 1 in that order. The "MAINT MODE ON" advisory will then be displayed while the system remains in maintenance mode.

E. Troubleshooting

Troubleshoot the Garmin G1000 NXi system by first identifying, then isolating the specific failure to the responsible LRU. There are several indications that the G1000 NXi presents to the pilot or technician, showing overall system condition. A course of action should be determined based on the information presented on the display.

The fifth AUX group page on the MFD (see "Figure 7" on page 34250210) provides LRU health status by means of a green check or a red 'X'. Also, LRU software versions are shown along with other database versions and dates. If a red 'X' is shown for an LRU, see the appropriate LRU troubleshooting chart for guidance.

Typically, the G1000 NXi Alerting System provides alerts/annunciations in conjunction with the information presented at the fifth AUX page.

CAUTION: POST INSTALLATION SET-UP, BELOW, PROVIDES DETAILED INSTRUCTIONS ON EQUIPMENT CONFIGURATION AND RETURN-TO-SERVICE TESTING. ANYTIME A G1000 NXi COMPONENT OR LRU IS REMOVED, SWAPPED, OR REPLACED, THE TECHNICIAN MUST FOLLOW THE PROCEDURES GIVEN IN "POST INSTALLATION SET-UP" TO ENSURE PROPER OPERATION OF THE SYSTEM.

Troubleshooting information is provided as follows:

- (1) Line Replaceable Unit (LRU) Failures
See "Chart 1" on page 34250213 as the first step in troubleshooting any LRU.
- (2) Engine / Airframe Sensor Failures - see "Chart 2" on page 34250218.
- (3) TAWS (Optional) - "Chart 3" on page 34250220.
- (4) GDU 105X - see "Chart 9" on page 34250260 and "Chart 10" on page 34250262.
- (5) GMA 1347 - see "Chart 11" on page 34250268 and "Chart 12" on page 34250269.
- (6) GIA 63W - see "Chart 13" on page 34250270 and "Chart 14" on page 34250272.
- (7) GEA 71 - see "Chart 15" on page 34250278.
- (8) GTX 3X5R - see "Chart 16" on page 34250279.
- (9) GSU 75 - see "Chart 17" on page 34250280 and "Chart 18" on page 34250281.
- (10) GMU 44 - see "Chart 17" on page 34250280 and "Chart 18" on page 34250281.
- (11) GDL 59 - see "Chart 19" on page 34250283.
- (12) GDL 69A / 69eA (Optional) - see "Chart 20" on page 34250284.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



System Status Page (AUX Group) - Example
Figure 7

- (13) FS 510 - see "Chart 22" on page 34250286.
- (14) GTS 800 - see "Chart 22" on page 34250286.
- (15) Software Configuration and Status Verification

(PIR-107992, Rev. D.)

- (a) Enter the configuration mode on the PFD and the MFD by applying power while holding ENT on each display until "Initializing Display" is on the screen.
- (b) Verify on the System Status page that the following are valid. (Indicated by green annunciations): MFD1, PFD1, GIA1, GIA2, and GDL 69A (optional).
- (c) Rotate the small FMS knob to navigate to the System Configuration page and verify that the following are valid. (Indicated by green annunciations): MFD1, PFD1, GIA1, GIA2, and GDL 69A (optional).

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



1. GIA 63W Integrated Avionics Units
2. GSU 75 ADAHRS
3. GSU 75 ADAHRS
4. GMU 44 Magnetometer
5. GTX 3X5R Transponder
6. GEA 71 Engine Airframe Units

System Fail
Figure 8

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 1 of 5)
LRU TROUBLESHOOTING**

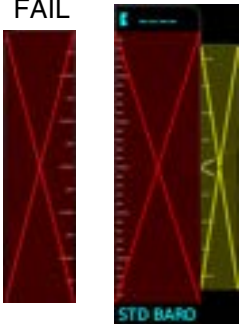
System Failure Troubleshooting

The following table provides basic troubleshooting guidance for LRU failures.

Invalid Data Field	Associated LRU(s)	Solution
Low Speed Awareness Band permanently displayed 	GDU	- With aircraft weight on wheels and the G1000 NXi in Configuration Mode, check that the RH GEAR ON GROUND discrete in indication on GIA I/O CONFIGURATION page is illuminated. - If indication is illuminated Green, switch GIA1 and GIA2, to verify location of problem: ✓ If problem is resolved, replace defective unit. ✓ If indication is not illuminated, check for wiring faults between the GIAs and aircraft squat switch system.
Low Speed Awareness Band permanently inhibited 	GDU	- With aircraft weight off wheels and the G1000 NXi in Configuration Mode, check that the RH GEAR ON GROUND discrete in indication on GIA I/O CONFIGURATION page is not illuminated. - If indication is not illuminated Green, switch GIA1 and GIA2, to verify location of problem: ✓ If problem is resolved, replace unit. ✓ If indication is illuminated, check for wiring faults between the GIAs and aircraft squat switch system.
NAV1 & COM1 = GIA1 	GIA1	- Check configuration settings for GIA1 and PFD. - Swap GIA1 and GIA2, to verify location of problem: ✓ If problem follows GIA1, replace GIA1. - Check Ethernet interconnect from GIA1 to PFD. ✓ If problem persists, replace PFD.
NAV2 & COM2 = GIA2 	GIA2	- Check configuration settings for GIA2 and MFD. - Swap GIA1 and GIA2, to verify location of problem: ✓ If problem follows GIA2, replace GIA2. - Check Ethernet interconnect from GIA2 to MFD. ✓ If problem persists, replace MFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 2 of 5)
LRU TROUBLESHOOTING**

Invalid Data Field	Associated LRU(s)	Solution
GPS DR 	GIA1 or GIA2	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Check GPS1 and GPS2 signal strength on AUX page 4. Refer to GIA GPS section if GPS can not acquire a position lock for troubleshooting. • Check corresponding GPS antenna and cable for faults. • Check Ethernet interconnect between the PFD to GIA1 or MFD to GIA2 for faults. • Swap GIA1 and GIA2, to verify location of problem: ✓ If problem follows the GIA, replace the GIA. ✓ If problem persists, replace the PFD or MFD.
XPDR FAIL 	GTX 3X5R	• Check GTX 3X5R configuration settings for GIA1 and GIA2. • Check GTX 3X5R/GIA1 interconnect. • Check GTX 3X5R/GIA2 interconnect. • Perform a SET>ACTV configuration reset on the GTX Config page for each GTX, and verify the aircraft registration is present. • Replace GTX 3X5R. ✓ If problem persists, replace GIA.
ALTITUDE VERT SPEED FAIL AIRSPEED FAIL 	GSU 75	• Inspect GSU 75 pitot/static plumbing integrity. • Inspect pitot/static ports and associated equipment for faults. • For TAS failure, also check GTP 59 OAT probe. • Check GSU 75 configuration settings for the PFD, MFD, GIA1, and GIA2. ✓ If PFDs, MFD, and GIA configuration settings are correct, replace the GSU configuration module. ✓ If problem persists, replace the GSU 75.
OAT 	GTP 59	• Check OAT probe wiring and connectors for faults. • Check GSU config module wiring for damage, replace if any is found. • Replace GSU config module • Replace GSU 75 with a known good unit: ✓ If problem persists, replace the GTP 59

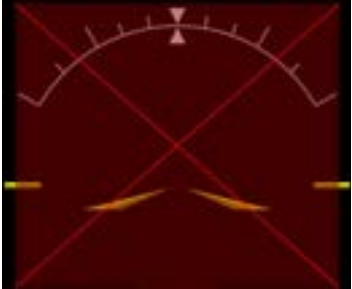
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 3 of 5)
LRU TROUBLESHOOTING**

Invalid Data Field	Associated LRU(s)	Solution
HDG FAIL 	GSU 75 & GMU 44	• Ensure metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer and aircraft is not in hangar, near other buildings, parked over metal drainage culverts or on hard surfaces that may contain steel reinforcements. • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle power after moving aircraft away from metal objects to determine if metal objects were the source of the interference. Allow up to five minutes for the heading to reinitialize. • Perform a Magnetometer Interference Test to check for interference from onboard electrical system components (e.g. NAV lights). Pay particular attention to any new electrical devices that have been installed since the aircraft was new. Correct any discrepancies that do not allow this test to pass before continuing. • Ensure GSU 75 and GMU 44 connectors are secure. • Check the wiring and any inline connectors between the GSU and GMU for faults. • Recalibrate the GMU 44. • Load configuration files to the PFD, MFD, GIA1, and GIA2. ✓ If problem persists replace the GMU 44. ✓ If problem persists, replace the GSU 75.
	GSU 75 & GMU 44	• If this message persists longer than five minutes, perform ADAHRS calibration procedures as described later in this chapter.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 4 of 5)
LRU TROUBLESHOOTING**

Invalid Data Field	Associated LRU(s)	Solution
ATTITUDE FAIL 	GSU 75	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle GSU 75 power to restart initialization. • Ensure GSU 75 connector is secure and proper wire harness strain relief is provided. • Ensure the GSU 75 is fastened down tightly in it's mounting rack and that the mounting rack is not loose (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). • Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important for an ATTITUDE FAIL that appears during ground operation only. • Perform an Engine Run-Up Test to check if engine vibration is causing the GSU 75 to go offline. • Load configuration files to the PFD, MFD, GIA1, and GIA2. • Calibrate the GSU 75 (Pitch/Roll Offset and Magnetometer Calibration). • Replace GSU 75. ✓ If problem persists replace GSU 75 configuration module. ✓ Contact Garmin Aviation Product Support if condition continues after replacing the GSU 75 and config module for additional assistance.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

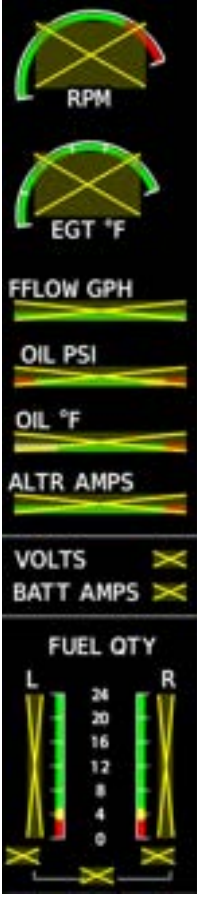
**CHART 1 (Sheet 5 of 5)
LRU TROUBLESHOOTING**

A DME or ADF failure is represented by the following red X's. The PFD displays function as a control head for the remote-mounted Honeywell KR 87 ADF and KN 63 DME.

Invalid Field	Sensor	Solutions
ADF FAIL OR NO ADF SIGNAL  GIA2 FAIL 	Honeywell ADF (Optional)	• Ensure that GIA 63W #2 is properly functioning. • Reload the ADF option configurations. • Check for proper operation of the ADF receiver. Ensure that the receiver is receiving power. • Check ADF – GIA2 interconnect.
 	Honeywell DME (Optional)	• Ensure that GIA 63W #2 is properly functioning. • Reload the DME option configurations. • Check for proper operation of the DME receiver. Ensure that the receiver is receiving power. • Check DME – GIA2 interconnect.

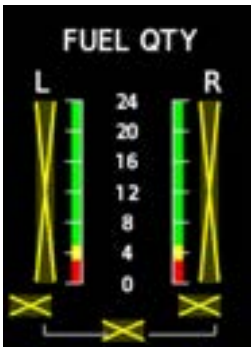
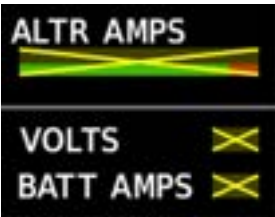
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 1 of 2)
TROUBLESHOOTING ENGINE / AIRFRAME SENSOR FAILURES**

Invalid Data Field	Associated LRUs	Solution
Engine/Airframe Sensors (All Invalid) 	GEA 71 & GIA 63W	• If software was loaded to a new GDU display, be sure that the user settings for the replaced display were cleared. Clear user settings by pressing the CLR key on the replaced display while applying power to it. Acknowledge the on-screen prompt by pressing the ENT key or the right-most softkey. • Check for GEA related Alert messages on the PFD. Correct any Alerts concerning software or configuration errors by reloading software or configuration as noted. • Verify GEA internal power supply, configuration, and calibration status in configuration mode. ✓ The internal power supply, configuration and calibration boxes should be green. If they are red, replace the GEA 71. • Verify internal, external, and reference voltages listed in the Main Analog and I/O A Analog boxes are not dashed out (does not include Aircraft Power 1 and 2). ✓ If any voltages are dashed out, replace the GEA. • Ensure the GEA is online (green checkmark on the AUX – SYSTEM STATUS page). ✓ If GEA is not online verify unit is receiving power at the rack connector. ✓ Check the GIA/GEA interconnects for faults. ✓ Reload configuration files to both GIA's and the GEA. • If problem persists, replace the GEA 71.
Invalid Field	Sensor	Possible Solutions (for applicable engine/system)
	Propeller RPM	• Check engine tachometer sensor wiring. • Replace engine tachometer sensor. • Replace GEA 71.
	Exhaust Gas Temp (EGT)	• Check EGT sensor wiring. • Replace EGT sensor . • Replace GEA 71.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 2 of 2)
TROUBLESHOOTING ENGINE / AIRFRAME SENSOR FAILURES**

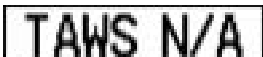
Invalid Field	Sensor	Possible Solutions (for applicable engine/system)
	Fuel Flow	• Check fuel flow transmitter wiring. • Check fuel flow transmitter - GEA wiring. • Check power input to fuel flow transmitter. • Replace fuel flow transmitter. • Replace GEA 71.
	Oil Pressure	• Check oil pressure sensor – GEA wiring. • Replace oil pressure sensor. • Replace GEA 71.
	Oil Temperature	• Check oil temperature sensor – GEA wiring. • Replace oil temperature sensor. • Replace GEA 71.
	Fuel Quantity	• Check Fuel Senders - #1 GIA 63W wiring. • Check #1 GIA 63W - #1PFD wiring. • Check MFD - #1 PFD connections. • Replace Fuel Senders left or right • Replace #1 GIA 63W • Replace #1 PFD • For more details see 28-00-00.
	Amp/Volts	• Check Alt amp sensor - GEA 71 wiring. • Replace Alt amp sensor. • Replace GEA 71. • Check main bus - GEA 71 wiring. • Check emergency bus - GEA 71 wiring. • Replace GEA 71

Engine/Airframe Instrument Failures

The above table provides guidance for troubleshooting individual engine/airframe sensor failures. Be sure to also follow previous guidance given for the GEA 71. The technician should troubleshoot to isolate the fault by checking sensor-to-GEA wiring, replacing the suspect sensor, and finally by replacing the GEA 71. Replace one part at a time. Check for correct operation of the sensors and GEA 71 after any part has been replaced. See also Wiring Diagrams in Chapter 91.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 3
TAWS (OPTIONAL) TROUBLESHOOTING**

Annunciation	Cause	Solution
	A TAWS system failure has occurred.	• If message occurred on the first power up after unlocking TAWS, cycle power to initialize TAWS. • Ensure each GDU contains the correct database data card. • Ensure the G1000 NXi is configured for TAWS: ✓ If the system is not configured for TAWS, reconfigure per TAWS Unlock Procedure, herein. • Verify GIAs are online. • Ensure a database or GDU SW mismatch has not occurred. ✓ If a mismatch has occurred, load correct database/software files or replace the terrain card.
	TAWS system is currently being tested.	N/A – Test will be conducted up to two minutes.
	TAWS system alerting is disabled	Enable TAWS system alerting by pressing the INHIBIT softkey on the MAP – TAWS page.
	GPS system integrity not high enough to enable TAWS	• Ensure valid GPS position is received from the AUX – GPS STATUS page. • Check GPS antenna & associated coaxial cabling. • Troubleshoot GIAs.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(16) Backup Communications Path Checks

The G1000 NXi system architecture is designed with redundant communication ports for several LRUs so that critical information can continue to be displayed in the event of an equipment or wiring failure. Of most importance is flight attitude, heading, and air data information. The GSU 75 and each have four separate ARINC 429 data lines which are all capable of sending data to the displays. The GEA 71, GTX 335R/345R, and GMA 1347 each have two redundant serial communication paths for the same purpose. See "Figure 2" on page 3425022" for a basic G1000 NXi block diagram depicting this architecture. When troubleshooting, refer to the Wiring Diagrams in Chapter 91.

(17) Failed Path Messages

The following message indicates there is a data path connected to the GDU (PFD or MFD) or the GIA 63W (1 or 2) that has failed.

FAILED PATH – A data path has failed.

The FAILED PATH message is triggered by a timeout of any one digital channel. The channels that are checked are listed on these pages in Configuration Mode:

- (a) GDU RS-232 / ARINC 429 CONFIG (PFD and MFD).
- (b) GIA RS-232 / ARINC 429 CONFIG (GIA1 and GIA2).
- (c) GIA CAN / RS-485 CONFIGURATION (GIA1 and GIA2).

The box next to each channel indicates the current status of the channel per the below:

Red = data path is known to be failed.

Black = data path status is unknown.

Green = data path is known to be good.

The applicable data paths can be verified by viewing the Configuration Mode pages listed below.

NOTE: Check the PFD Alert Window for configuration or software error messages regarding the displays or LRUs. Correct any errors before proceeding.

**CHART 4
G1000 NXI - MESSAGE ADVISORIES / TROUBLESHOOTING**

Data Path Failures		
Failure Message	Cause	Solutions
FAILED PATH – A data path has failed.	A communications data path status is not being received by the G1000 NXi.	Determine which data path has failed: See the following charts and ADAHRS backup path test under Return to Service. Check wiring continuity for the failed path. Swap or replace the affected LRU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 5
FAILED PATH MESSAGES, CONFIG PAGE (PFD, MFD, AND GIA) - PROCESS**

SELECT UNITS = PFD / MFD / GIA1 / GIA2 – RS-232 / ARINC-429 / RS-485 Serial Config Pages

Indicator	Status
 GREEN	SELECT UNIT/LRU data path is functioning correctly.
 RED	SELECT UNIT/LRU data path is not functioning correctly. • Check avionics status page for SELECT UNIT or LRU configuration or software error messages. Correct any errors before proceeding. • If applicable, check the SELECT UNIT/LRU interconnect wiring and unit connector pins for faults. • Replace LRU. • Reload SELECT UNIT config file. • If problem remains, replace SELECT UNIT. • Remove SELECT UNIT and verify power and ground are present at the appropriate connector. → If power or ground is not present, troubleshoot aircraft wiring for faults. → If power and ground are present, check SELECT UNIT unit and LRU connector for damaged or pushback pins. • Swap PFD to confirm if the problem is in the original PFD. • Replace original PFD if box displays green check after swapping displays. • Ensure LRU connector is secure and proper wire harness strain relief is provided. • Swap LRU #1 and LRU #2 to confirm if the problem is in the original LRU #1. • Replace original LRU #1 if box displays green check after swapping units.
 BLACK	SELECT UNIT/LRU data path functionally is unknown. • Reload SELECT UNIT configuration file.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 6 (Sheet 1 of 2)
FAILED PATH MESSAGES, CONFIG PAGE (PFD AND MFD)**

PFD ARINC 429

Channel	LRU	Indicator	Status
IN 1	GSU 75	 GREEN	PFD/GSU data path is functioning correctly.
		 RED	PFD/GSU data path is not functioning correctly. - Verify GSU status is "OK" using the System Status page on the MFD. If it is not, correct condition before proceeding, referencing troubleshooting sections. - Swap GSU with a known working GSU unit to confirm if the problem is in the original GSU. - Replace original GSU if box turns green after swapping units. - Load PFD configuration file. - Swap PFD with MFD to confirm if the problem is in the PFD. - Replace original PFD if box turns green after swapping displays. - Swap GSU with a known working GSU unit to confirm if the problem is in the original GSU. - Replace original GSU if box turns green after swapping units. Check the PFD/GSU interconnect wiring for faults.
		 BLACK	PFD/GSU data path functionally is unknown. Reload PFD configuration file.
IN 2	GSU 75	 GREEN	PFD/GSU data path is functioning correctly.
		 RED	PFD/GSU data path is not functioning correctly. - Verify GSU status is "OK" using the System Status page on the MFD. If it is not, correct condition before proceeding, referencing troubleshooting sections. - Load PFD and GSU configuration files. - Swap PFD with MFD to confirm if the problem is in the PFD. - Replace original PFD if box turns green after swapping displays. - Check the PFD/GSU interconnect wiring for faults. Replace GSU 75 if problem remains.
		 BLACK	PFD/GSU data path functionality is unknown. Reload PFD configuration file.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 6 (Sheet 2 of 2)
FAILED PATH MESSAGES, CONFIG PAGE (PFD AND MFD)**

MFD ARINC 429

Channel	LRU	Indicator	Status
IN 1	GSU 75	 GREEN	MFD/GSU data path is functioning correctly.
		 RED	MFD/GSU data path is not functioning correctly. - Verify GSU status is “OK” using the System Status page on the MFD. If it is not, correct condition before proceeding, referencing troubleshooting sections. - Swap GSU with a known working GSU unit to confirm if the problem is in the original GSU. - Replace original GSU if box turns green after swapping units. - Load MFD configuration file. - Swap MFD with PFD to confirm if the problem is in the MFD . - Replace original MFD if box turns green after swapping displays. - Swap GSU with a known working GSU unit to confirm if the problem is in the original GSU. - Replace original GSU if box turns green after swapping units. Check the MFD/GSU interconnect wiring for faults.
		 BLACK	MFD/GSU data path functionally is unknown. Reload MFD configuration file.
IN 2	GSU 75	 GREEN	MFD/GSU data path is functioning correctly.
		 RED	MFD/GSU data path is not functioning correctly. - Verify GSU status is “OK” using the System Status page on the MFD. If it is not, correct condition before proceeding, referencing troubleshooting sections. - Load MFD and GSU configuration files. - Swap MFD with PFD to confirm if the problem is in the MFD. - Replace original MFD if box turns green after swapping displays. - Check the MFD/GSU interconnect wiring for faults. Replace GSU 75 if problem remains.
		 BLACK	MFD/GSU data path functionality is unknown. Reload MFD configuration file.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7 (Sheet 1 of 5)
FAILED PATH MESSAGES, GIA RS-232 / ARINC 429 CONFIG PAGE (GIA1 AND GIA2)**

GIA1 RS-232

Channel	LRU	Indicator	Status
CHNL 1	GSU 75	 GREEN	GIA1/GSU data path is functioning correctly.
		 RED	GIA1/GSU data path is not functioning correctly. - Verify GSU status is OK on the System Status page on the MFD. If it has a red "X", troubleshoot why the GSU is offline before proceeding. - Swap GIA1 and GIA2, reconfigure both GIAs to their new locations to confirm if the problem is in the original GIA1. - Replace original GIA1 if box turns green after swapping units. - Check the GIA1/GSU interconnect wiring and connector pins for faults. Replace GSU 75 if problem remains.
		 BLACK	GIA1/GSU data path functionality is unknown. Reload GIA1 configuration files.
CHNL 5	GTX 3X5R w/TIS	 GREEN	GIA1/GTX data path is functioning correctly.
		 RED	GIA1/GTX data path is not functioning correctly. - Load GIA1 and GTX configuration files. - Swap GIA1 and GIA2, reconfigure both GIAs to their new locations to confirm if the problem is in the original GIA1. - Replace original GIA1 if box turns green after swapping units. - Check the GIA1/GTX interconnect wiring for faults. Replace GTX 3X5R if problem remains.
		 BLACK	GIA1/GTX data path functionality is unknown. Reload GIA1 configuration files.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7 (Sheet 2 of 5)
FAILED PATH MESSAGES, GIA RS-232 / ARINC 429 CONFIG PAGE (GIA1 AND GIA2)**

GIA1 RS-232

Channel	LRU	Indicator	Status
CHNL 6	GSU 75	 GREEN	GIA1/GSU data path is functioning correctly.
		 RED	GIA1/GSU data path is not functioning correctly. • Verify GSU status is OK on the System Status page on the MFD. If it has a red "X", troubleshoot why the GSU is offline before proceeding. • Load GIA1 configuration files. • Swap GIA1 and GIA2, reconfigure both GIAs to their new locations to confirm if the problem is in the original GIA1. - o Replace original GIA1 if box turns green after swapping units. • Swap GSU out with a known good spare (reconfigure as required) to confirm if the problem is in original GSU. - o Replace original GSU if box turns green after swapping units. Check the GIA1/GSU interconnect wiring for faults.
		 BLACK	GIA1/GSU data path functionality is unknown. Reload GIA1 configuration files.
CHNL 7	GMA 1347	 GREEN	GIA1/GMA 1347 data path is functioning correctly.
		 RED	GIA1/GMA 1347 data path is not functioning correctly. • Verify GMA 1347 status is OK on the System Status page on the MFD. If it has a red "X", troubleshoot why the GMA is offline before proceeding. • Load GIA1 and GMA 1347 configuration files. • Swap GIA1 and GIA2, reconfigure both GIAs to their new locations to confirm if the problem is in the original GIA1. - o Replace original GIA1 if box turns green after swapping units. Check the GIA1/GMA 1347 interconnect wiring for faults.
		 BLACK	GIA1/GMA 1347 data path functionality is unknown. Reload GIA1 configuration files.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7 (Sheet 3 of 5)
FAILED PATH MESSAGES, GIA RS-232 / ARINC 429 CONFIG PAGE (GIA1 AND GIA2)**

GIA1 ARINC 429

Channel	LRU	Indicator	Status
IN 5	GSU 75	 GREEN	GIA1/GSU data path is functioning correctly.
		 RED	GIA1/GSU data path is not functioning correctly. • Verify GSU status is OK on the System Status page on the MFD. If it has a red "X", troubleshoot why GSU is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIAs to their new locations to confirm if the problem is in the original GIA1. ◦ Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GSU interconnect wiring and unit connector pins for faults. • Replace GSU 75.
		 BLACK	GIA1/GSU data path functionality is unknown. Reload GIA1 configuration files.
IN 6	GSU 75	 GREEN	GIA1/GSU data path is functioning correctly.
		 RED	GIA1/GSU data path is not functioning correctly. • Verify GSU status is OK on the System Status page on the MFD. If it has a red "X", troubleshoot why GSU is offline before proceeding. • Ensure GSU connector is secure and proper wire harness strain relief is provided. • Swap GIA1 and GIA2, reconfigure both GIAs to their new locations to confirm if the problem is in the original GIA1. ◦ Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GSU interconnect wiring and unit connector pins for faults. • Replace GSU 75.
		 BLACK	GIA1/GSU data path functionality is unknown. Reload GIA1 configuration files.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7 (Sheet 4 of 5)
FAILED PATH MESSAGES, GIA RS-232 / ARINC 429 CONFIG PAGE (GIA1 AND GIA2)**

GIA2 RS-232

Channel	LRU	Indicator	Status
CHNL 5	GTX 3X5R with TIS	 GREEN	GIA2/GTX data path is functioning correctly.
		 RED	GIA2/GTX data path is not functioning correctly. • Check PFD alert window for GIA or GTX configuration or software error messages. Correct any errors before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA2. ➔ Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GTX interconnect wiring and connector pins for faults. Replace GTX if problem remains.
		 BLACK	GIA2/GTX data path functionally is unknown. Reload GIA2 configuration file.
CHNL 7	GMA 1347	 GREEN	GIA2/GMA data path is functioning correctly.
		 RED	GIA2/GMA data path is not functioning correctly. • Check PFD alert window for GIA or GMA configuration or software error messages. Correct any errors before proceeding. • Verify GMA 1347 status is OK using AUX - SYSTEM STATUS page on MFD. If there is a Red-X, troubleshooting why the GMA is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA2. ➔ Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GMA interconnect wiring and connector pins for faults. Replace GMA 1347 if problem remains.
		 BLACK	GIA2/GMA data path functionally is unknown. Reload GIA2 configuration file.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7 (Sheet 5 of 5)
FAILED PATH MESSAGES, GIA RS-232 / ARINC 429 CONFIG PAGE (GIA1 AND GIA2)**

GIA2 ARINC 429

Channel	LRU	Indicator	Status
IN 6	GSU 75	 GREEN	GIA2/GSU data path is functioning correctly.
		 RED	GIA2/GSU data path is not functioning correctly. • Check PFD alert window for GIA or GSU configuration or software error messages. Correct any errors before proceeding. • Verify GSU 75 status is OK using AUX - SYSTEM STATUS page on MFD. If there is a Red-X, troubleshooting why the GSU is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA2. → Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GSU interconnect wiring and connector pins for faults. Replace GSU 75 if problem remains.
		 BLACK	GIA2/GSU data path functionally is unknown. Reload GIA2 configuration file.
CHNL 7	GMA 1347	 GREEN	GIA2/GMA data path is functioning correctly.
		 RED	GIA2/GMA data path is not functioning correctly. • Check PFD alert window for GIA or GMA configuration or software error messages. Correct any errors before proceeding. • Verify GMA 1347 status is OK using AUX - SYSTEM STATUS page on MFD. If there is a Red-X, troubleshooting why the GMA is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA2. → Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GMA interconnect wiring and connector pins for faults. Replace GMA 1347 if problem remains.
		 BLACK	GIA2/GMA data path functionally is unknown. Reload GIA2 configuration file.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 8
FAILED PATH MESSAGES, RS-485 CONFIG PAGE (GIA1 & GIA2)**

GIA1 RS-485

Channel	LRU	Indicator	Status
CHNL 1	GEA 71	 GREEN	GIA1/GEA data path is functioning correctly.
		 RED	GIA1/GEA data path is not functioning correctly. • Check PFD alert window for GIA or GEA configuration or software error messages. Correct any errors before proceeding. • Verify GEA status is "OK" using the AUX-SYSTEM STATUS page on the MFD. If it has a Red-x, troubleshoot why the GEA is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. → Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GEA interconnect wiring and connector pins for faults. Replace GEA if problem remains.
		 BLACK	GIA1/GEA data path functionally is unknown. Reload GIA1 configuration file.

GIA2 RS-485

Channel	LRU	Indicator	Status
CHNL 1	GEA 71	 GREEN	GIA2/GEA data path is functioning correctly.
		 RED	GIA2/GEA data path is not functioning correctly. • Check PFD alert window for GIA or GEA configuration or software error messages. Correct any errors before proceeding. • Verify GEA status is "OK" using the AUX-SYSTEM STATUS page on the MFD. If it has a Red-x, troubleshoot why the GEA is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA2. → Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GEA interconnect wiring and connector pins for faults. Replace GEA if problem remains.
		 BLACK	GIA2/GEA data path functionally is unknown. Reload GIA2 configuration file.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

F. Recommended Tools

The following tools (or equivalent) are recommended to perform various maintenance tasks on the G1000 NXi system.

- (1) Calibrated voltmeter capable of measuring 0-32 Volts DC.
- (2) #2 Phillips Screwdriver.
- (3) 3/32-inch Hex Tool.
- (4) Calibrated digital Level with 0.25 degrees of accuracy capability.
- (5) Calibrated VHF NAV/COM/ILS ramp tester.
- (6) Calibrated transponder ramp tester including Mode S capability for Mode S transponder equipped aircraft.
- (7) Air Data Test Set (ADTS) capable of simulating altitude up to the aircraft's service ceiling.
- (8) Headset/Microphone.
- (9) Outdoor line-of-site to GPS satellite signals or GPS indoor repeater.
- (10) Ground Power Unit (Capable of supplying 28 Vdc).
- (11) Calibrated Flight Control Cable Tension Meter or equivalent.
- (12) Calibrated digital thermometer suitable for measuring ambient temperature.
- (13) Laptop with RS232 emulation software.
- (14) M22885/108T8234 extraction tool.
- (15) An 0.060" 6-Spline wrench.
- (16) WX-PA portable analyzer kit (If Stormscope is installed).
- (17) Calibrated torque wrench capable of measuring 0–70 in-lbs.
- (18) Standard sockets & wrenches (3/8", 9/16", and 13/16").

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

G. Inspections

(1) Annual / 100 Hour Inspection

Each 12 months or 100 hours time-in-service, whichever comes first:

(a) Under Post-Installation Procedures, below:

Perform the "G1000 NXi Connection Check" on page 342502114.

(b) Under LRU Test Procedures, Initial Display Testing, below, perform the "PFD Fan Fail CAS Test" on page 342502113.

(2) 500 Hour Inspection

Perform the following function tests of the Avionics, PFD, and MFD cooling fans:

(a) Avionics Cooling Fan

- 1) Turn OFF all electrical components and avionics systems.
- 2) Pull the INTEG AV1 circuit breaker.
- 3) Turn the master switch ON.
- 4) Push IN the INTEG AV1 circuit breaker. Verify airflow from the Avionics Cooling Blower by motor sound and, if required, by sight (i.e., use a flashlight to observe the fan turning in the intake opening).
- 5) After checking blower, turn OFF master switch.

(b) PFD and MFD Cooling Fans

The PFD and MFD cooling fans are wired into the PFD and MFD circuit breakers, respectively. Accordingly, function test them as follows:

- 1) Turn OFF all electrical components and avionics systems.
- 2) Pull the PFD and MFD circuit breakers.
- 3) Turn the master switch ON.
- 4) Push IN the PFD circuit breaker. Verify operation of the PFD cooling fan by motor sound. Pull the PFD circuit breaker.
- 5) Push IN the MFD circuit breaker. Verify operation of the MFD cooling fan by motor sound. Pull the MFD circuit breaker.
- 6) After checking cooling fans, turn OFF master switch and push IN PFD and MFD circuit breakers.

(3) 1000 Hour Inspection

Each 1000 hours time-in-service visually inspect each unit listed below for corrosion, damage, or other defects. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors.

(a) GDU 105X PFD and MFD

Remove the PFD and MFD. Inspect the mounting surface and connector for corrosion, heavy oxidation or other damage.

(b) GMA 1347 Audio Panel

Inspect the GMA 1347 unit(s), rack and connectors for corrosion or other defects.

(c) GIA 63W Integrated Avionics Units

Inspect the GIA 63W #1 and #2 unit, rack and connectors for corrosion or other defects.

(d) GEA 71 Engine/Airframe Unit

Inspect the GEA 71 unit, rack, and connectors for corrosion or other defects.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (e) GTX 3X5R Mode S Transponder.
Inspect the GTX 3X5R unit, rack and connectors for corrosion or other defects.
- (f) GDL 69eA - Datalink (if installed)
Inspect the GDL 69A unit, rack and connectors for corrosion or other defects.
- (g) PFD and MFD Cooling Fans
Inspect the PFD and MFD cooling fans for accumulation of dust or other damage. Remove excess dust as required.
- (h) Avionics Cooling Fan
Inspect the avionics cooling fan for accumulation of dust or other damage. Remove excess dust as required.
- (i) GSU 75 ADAHRS
Inspect the GSU 75 unit, rack and connector for corrosion or other defects.
- (j) GMU 44 Magnetometer
Remove the GMU 44 and inspect the mounting hardware and GMU 44 for corrosion or other damage.
- (k) Perform electrical bond tests on all G1000 NXi equipment. See 51-80-00.
- (l) Perform visual checks on the shield terminations for any degradation.

H. Components

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXi SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

(1) General

Maintenance of the G1000 NXi system components is "On Condition" only. The following provides basic information regarding unit removal, installation, and troubleshooting. Basic guidance on loading and configuring software is provided under Post Installation Set-up, below. When removing and/or replacing any G1000 NXi component, always ensure that aircraft power is off. Unplug any auxiliary power supplies.

Before removing any G1000 NXi LRU, it is required that the technician verify the LRU software part numbers.

To check an LRU software part number and/or version:

- (a) Start the G1000 NXi system in Configuration Mode as described in Configuration Mode Overview under Post Installation Set-up, below.
- (b) The System Status page shows a list of LRUs in the LRU window. Activate the cursor and highlight the LRU window.
- (c) Use the FMS knob to scroll through the list in the window and select the desired LRU.
- (d) The software part number and version is displayed in the DATA window. Compare this to the latest configuration shown in the Required Equipment List (REL), "Chart 30" on page 342502143.

NOTE: If a faulty LRU is not reporting its software version and part number, check aircraft maintenance logs for last software version loaded and verify against the latest configuration.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) GDU 105X PFD and MFD

See "Figure 9".

CAUTION: THE GDU 105XS USE A LENS COATED WITH A SPECIAL ANTI-REFLECTIVE COATING THAT IS VERY SENSITIVE TO SKIN OILS, WAXES AND ABRASIVE CLEANERS. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING. IT IS VERY IMPORTANT TO CLEAN THE LENS USING A CLEAN, LINT-FREE CLOTH AND AN EYEGLASS LENS CLEANER THAT IS SPECIFIED AS SAFE FOR ANTI-REFLECTIVE COATINGS.

(a) Description

Two Garmin GDU 105X displays are installed in the instrument panel. The GDU 105X units, 10.4-inch LCD displays with 1024x768 resolution, and either may serve as a PFD or MFD. The stand-by instruments are located to the left of the pilot's display. A GMA 1347 Audio Panel is located between the two GDU 105X displays.

The GDU 105X units communicate with each other and the GIA 63W units through high-speed data bus (HSDB) Ethernet connections.



(b) Troubleshooting

See "Chart 1" on page 34250213, "Chart 9" on page 34250260, and "Chart 10" on page 34250262.

GDU 1050 - PFD and MFD Displays
Figure 9

(c) Removal

NOTE: Retain the database SD card(s) from the original display to install in the new display after loading software.

- 1) Disconnect the negative (ground) battery cable.
- 2) Using a 3/32-inch hex tool, rotate all four quarter-turn fasteners counterclockwise until they reach their stops.
- 3) Carefully remove the display from the panel.
- 4) While supporting the display, disconnect the connector.

(d) Installation

NOTE: If replacing the PFD with a new, repaired, or exchanged GDU, the new GDU must be placed in the MFD location to load the GDU system to prevent the deletion of configuration files residing in the PFD configuration module. It is not necessary to install a display in the PFD position to load GDU software into a display installed in the MFD position. After loading GDU software into the display in the MFD position, turn off the system and move the GDU to the PFD position. Then, continue the GDU installation by loading the PFD configuration files.

- 1) Visually inspect the connector and pins for signs of damage. Repair any damage. While supporting the display, connect the connector to the rear of the unit.
- 2) Carefully insert the display into the panel cutout, ensuring that all 4 quarter-turn fasteners align with the corresponding holes.
- 3) Seat the display in the panel cutout. Do not use excessive force while inserting the display.
- 4) Once seated, rotate all four quarter-turn fasteners clockwise to lock the display to the panel.
- 5) Connect the negative (ground) battery cable.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original Displays Reinstalled.

If the removed display(s) are re-installed in their original positions, no software or configuration loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the "GDU 105X PFD and MFD Test Procedure" on page 342502116 under LRU Test Procedures.

2) New, Repaired or Exchanged Display(s) Installed.

If a new, repaired or exchanged GDU 105X is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 342502101.

NOTE: If performing a manual Complete Software Load, and ChartView or TAWS were previously installed, these must be reactivated. See Chartview and TAWS Unlock Procedure respectively. If any other options were previously installed, these must also be reactivated per Optional Equipment Configuration.

Then continue to the "GDU 105X PFD and MFD Test Procedure" on page 342502116 under LRU Test Procedures.

(3) GMA 1347 Audio Panel

See "Figure 10".

(a) Description

The Garmin GMA 1347 Audio Panel integrates NAV/COM digital audio, intercom system and marker beacon controls. The GMA 1347 panel provides control of all cockpit intercom/mic systems as well as NAV/COM/ILS audio. The unit also provides display reversion mode control through a large red Display button. Power to the audio panel is provided by the battery switch or by applying external power. The GMA 1347 unit interfaces with the existing marker beacon antenna as well as existing mic and phone jacks.

(b) Troubleshooting

See "Chart 1" on page 34250213, "Chart 11" on page 34250268, and "Chart 12" on page 34250269.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Using a 3/32-in hex tool, turn the hex nut counter-clockwise until the GMA 1347 is unlocked from its location.
- 3) Carefully remove the GMA 1347 from its rack.

(d) Installation

- 1) Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GMA 1347 into the rack until the locking tab engages the rack.
- 3) Turn the hex nut clockwise to draw unit into rack until seated. Do not overtighten nut.
- 4) Connect the negative (ground) battery cable.



GMA 1347 Audio Panel
Figure 10

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original GMA 1347 Reinstalled.

No software or configuration loading or testing is required if the original panel is reinstalled. This does not include units that were returned for repair: their software and configuration files are deleted during the repair testing process. Continue to the Return to Service Procedure, below.

2) New, Repaired or Exchanged GMA 1347 Installed.

If a new, repaired, or exchange GMA 1347 is installed, see "LRU Replacement" on page 342502101. Before beginning the software load, remove the Supplemental Database cards from the bottom slots of each display. Identify which card is removed from the MFD so it can be reinserted into the MFD when software and configuration loading is complete. If performing a manual Complete Software Load, ensure the following files are loaded:

- a) GMA Software
- b) GMA Configuration
- c) GMA Files for optional equipment installed on the aircraft (i.e. ADF, HF radio, etc.).

Reinstall all the cards after the software and configuration file loads are complete. Then, continue to GMA 1347 Test Procedure under LRU Test Procedures.

(4) GIA 63W Integrated Avionics Unit

See "Figure 11".

(a) Description

Two Garmin GIA 63W Integrated Avionics Units (IAUs) contain the VHF COM/NAV receivers, WAAS GPS receiver, Flight Director, and system integration microprocessors. The GIAs also serve as a communication interface to all other G1000 NXi LRUs in the system. Each GIA 63W communicates directly with the on-side GDU 105X display using a HSDB Ethernet connection. Both GIAs are located directly behind the PFD and MFD, installed into their respective LRU racks. Power is provided to GIA1 by the essential bus or the emergency bus. GIA2 is powered by the avionics bus.



GIA 63W Integrated Avionics Unit
Figure 11

1) Both GIA 63s interface to the following equipment:

- VOR/LOC/Glideslope Antenna System
- VHF COM #1 & #2 Antennas
- GA 36 and GA 37 GPS/WAAS Antennas
- GMA 1347
- GEA 71
- GDU 105X, #1 & #2
- GTX 3X5R
- GSU 75
- Fuel Quantity Sensors (left and right)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 2) The GIA 63 #2 interfaces to the following additional equipment:
- S-TEC 55X AFCS (if installed)
 - KR 87 ADF (if installed)
 - KN 63 DME (if Installed)
 - WX 500 Stormscope (if installed)

NOTE: The GIA 63W is compatible only with the antennas listed in the GIA 63W Installation Manual, Garmin P/N 190-00303-05.

- (b) Troubleshooting
See "Chart 1" on page 34250213, "Chart 2" on page 34250218, "Chart 13" on page 34250270, and "Chart 14" on page 34250272.
- (c) Removal
- 1) Remove the MFD as described above, under "GDU 105X PFD and MFD."
 - 2) Unlock the GIA 63W handle by loosening the Phillips screw on the handle.
 - 3) Pull the handle upward to unlock the GIA 63W. Gently remove the unit from the rack.
- (d) Installation
- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
 - 2) Gently insert the GIA 63W into its rack. The handle should engage the dogleg track.
 - 3) Press down on the GIA 63W handle to lock the unit into the rack.
 - 4) Lock the handle to the GIA 63W body using the Phillips screw.
 - 5) Reinstall the MFD as described above.
- (e) Return to Service
- 1) Original GIA 63W(s) Reinstalled
No software or configuration loading is required if the removed GIA is reinstalled in its original position (GIA1 and GIA2 in their original racks). This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to "Return to Service Procedure" on page 342502136.
 - 2) Original GIA 63W(s) Swapped for Troubleshooting
No software loading is required if the original GIA units are reinstalled in opposite positions (GIA1 and GIA2 in opposite unit racks). However, configuration loading is required. See "LRU Replacement" on page 342502101. Then continue to "GIA 63W Tests" on page 342502117 under LRU Test Procedures.
 - 3) New, Repaired or Exchanged GIA 63W(s) Installed
If a new, repaired or exchanged GIA 63 is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 342502101. Then continue to "GIA 63W Tests" on page 342502117 under LRU Test Procedures.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(5) GEA 71 Engine/Airframe Unit

See "Figure 12".

(a) Description

The Garmin GEA 71 Engine/Airframe Unit provides engine/airframe data to the G1000 NXi system. Data received from transducers/sensors is generally processed and sent to GIA 63Ws via RS-485 digital interface. Engine parameters are normally displayed on the MFD. In the event of a MFD failure, all engine instruments can be displayed on the PFD. The GEA is located behind the MFD and is mounted in a vertical orientation. Power is received from the essential bus or the emergency bus.

The GEA interfaces to the following:

- Exhaust Gas Temperature Sensors
- Amp/Volts Sensor
- Oil Pressure Sensor
- Oil Temperature Sensor
- Fuel Flow Sensor
- Fuel Quantity Sensors
- Propeller Speed Sensor (Tachometer)
- Flap Position Sensor (Optional)

(b) Troubleshooting

See "Chart 1" on page 34250213, "Chart 2" on page 34250218, and "Chart 15" on page 34250278.

(c) Removal

- 1) Remove the MFD as described above.
- 2) Unlock the GEA 71 handle by unscrewing the Phillips screw.
- 3) Pull the handle upward to unlock the GEA 71.
- 4) Gently remove the GEA 71 from its rack.

(d) Installation

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GEA 71 into the rack. The handle should engage the dogleg track.
- 3) Press down on the handle to lock the unit into place.
- 4) Lock the handle to the GEA 71 body using the Phillips screw.
- 5) Reinstall the MFD as described above.



GEA 71 Engine/Airframe Unit
Figure 12

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original GEA 71 Reinstalled

No software or configuration loading is required if the removed GEA 71 is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the "Return to Service Procedure" on page 342502136.

2) New, Repaired or Exchanged GEA 71 Installed

If a new, repaired or exchanged GEA 71 is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 342502101. Then continue to the "GEA 71 Test" on page 342502120 under LRU Test Procedures.

(6) GEA 71 Backshell Thermocouple

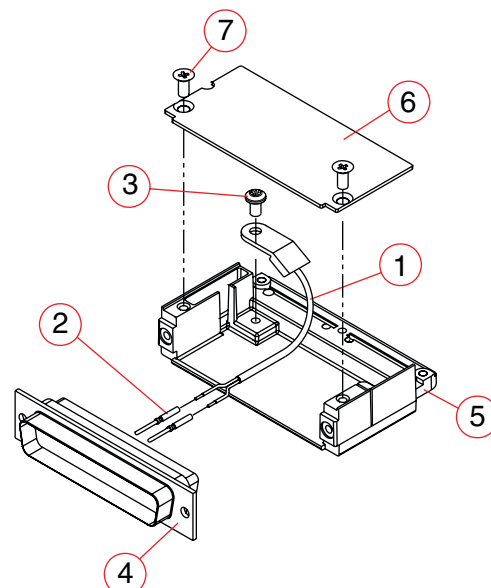
See "Figure 13".

(a) Removal

- 1) Remove GEA 71 as described above.
- 2) Remove GEA connector backplate.
- 3) Remove connector J701 (5) from the backplate.
- 4) Remove cover (6) from the backshell.
- 5) Unscrew thermocouple from boss on backshell. Extract the thermocouple pins from the connector.

(b) Installation

- 1) Crimp pins (2) onto each of the thermocouple wires (1). Ensure that pre-stripped wire length is 1/8" prior to crimping.
- 2) Insert newly crimped pins and wires into the appropriate connector housing location (4) as specified in the electrical schematic.
- 3) Place thermocouple body (1) onto the backshell boss (5). Place the thermocouple as shown in "Figure 13" so that the wires exit towards the bottom of the backshell.
- 4) Fasten thermocouple tightly to backshell using the provided screw (3).
- 5) Fasten cover (6) to backshell using the provided screws (7).



GEA 71 Backshell Thermocouple
Figure 13

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(7) GTX 3X5R Mode S/ES Transponder

See "Figure 14".

(a) Description

The unit is mounted directly behind the MFD in the center of that avionics shelf. Power is received from the essential bus. Similarly to the GEA 71, the GTX 3X5R unit sends data via RS-232 directly to each GIA 63W. Information is then sent to the PFD, where the pilot can control the transponder. The GTX 3X5R unit interfaces with the transponder antenna.

The Garmin GTX 335R is standard, a GTX 345R is optional. Each provides Mode A, C, and S altitude and position reporting information for the G1000 NXi system as well as TIS-A and ADS-B OUT (1090 ES). Using precise GPS-referenced positioning information, the extended squitter technology enables transponders to automatically transmit traffic surveillance data – including aircraft flight ID, position, altitude, velocity, climb/descent, and heading information.

When the optional GTX 345R is installed, ADS-B IN (UAT, TIS-B, and FIS-B) capability is added. The unit receives and displays ADS-B transmissions from other ADS-B OUT equipped aircraft, ADS-R, and TIS-B information from ground stations. In addition, FIS-B information from UAT ground stations in the United States is received and available for display. This includes: NOTAM (includes TFRs), AIRMET, SIGMET, SUA, METAR, TAFs, PIREP, Winds/Temps Aloft, Regional NEXRAD, CONUS NEXRAD.

(b) Troubleshooting

See "Chart 1" on page 34250213 and "Chart 16" on page 34250279.

(c) Each Twenty-four (24) Calendar Months

The integrated transponder/altitude reporting system must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) §§ 91.411 and 91.413, every 24 calendar months, or any time the transponder is removed. This test requires the use of a Mode S ramp generator. Specific instructions for operating the ramp tester are contained in the applicable operator's manual. Refer to Title 14 CFR Part 43.

(d) Removal

- 1) Remove the MFD as described above.
- 2) Insert a 3/32 inch hex driver into the hole along the left edge of the lower half of the unit.
- 3) Rotate the screw counter-clockwise until it stops. This rotates a tab out of a cut-out in the rack.
- 4) Lift pull-tab on front of unit and pull GTX 3X5R from the rack.

(e) Installation

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GTX 3X5R into its rack, pressing it back until the front of the unit is flush with the aft edge of the rack.
- 3) Insert a 3/32 inch hex driver into the hole along the left edge of the lower half of the unit.



GTX 3X5R Mode S/ES Transponder
Figure 14

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 4) Rotate the screw clockwise until the rotating tab engages the retention cut-out in the rack.
- 5) Reinstall the MFD as described above.
- (f) Return to Service
 - 1) Original GTX 3X5R is Reinstalled

No software or configuration loading is required if the removed GTX 3X5R is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to "GTX 3X5R Test" on page 342502120 under LRU Test Procedures.
 - 2) New, Repaired or Exchanged GTX 3X5R is Installed

If a new, repaired or exchanged GTX 3X5R is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 342502101.

NOTE: If performing a manual Complete Software Load, after loading software and configuration files continue to "Aircraft Registration Number Entry" on page 342502109.

Continue to "GTX 3X5R Test" on page 342502120 under LRU Test Procedures.

- (8) GSU 75 Air Data and Attitude and Heading Reference System (ADAHRS)
See "Figure 15".

(a) Description

The GSU 75 is mounted on top of a bracket at the left side of the airplane just forward of F.S. 191.00. Power is provided to the unit from the essential bus or the emergency bus. The GSU 75 provides power to the GMU 44 and GTP 59.

The Garmin GSU 75 ADAHRS provides flight altitude, airspeed, attitude and heading data for flight instrumentation to the G1000 NXi system. It contains advanced tilt sensors, accelerometers, and rate sensors. The unit interfaces with the GMU44 Magnetometer and GTP 59 OAT Probe. It receives GPS signals from the GIA 63Ws. Actual attitude and heading information is sent using ARINC 429 digital interface to both GDU 105Xs (PFD and MFD) and the GIA 63Ws.



GSU 75 ADAHRS
Figure 15

(b) Troubleshooting

See "Chart 1" on page 34250213, "Chart 17" on page 34250280, and "Chart 18" on page 34250281.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the baggage compartment rear closeout panel.
- 3) Disconnect the ADAHRS harness connector.
- 4) Disconnect and cap the pitot and static lines.
- 5) Loosen the two retentions screws counter-clockwise until they disconnect from the mounting rack.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 6) Gently lift the forward end of the GSU 75 from the mounting rack and pull the unit forward until its feet disengage the mounting rack.

NOTE: If the mounting rack is removed or even if the mounting rack screws are loosened, the GSU 75 must be re-calibrated. See Post-Installation Setup, below.

(d) Installation

- 1) Place the GSU 75 on the mounting rack and slide the unit back until the feet fully engage the rack.
- 2) Push down and simultaneously turn each retention screw clockwise. Torque each retention screw to 15–20 in-lbs.
- 3) Uncap and connect the pitot and static lines.
- 4) Visually inspect the harness connectors to ensure there are no bent or damaged pins. Repair any damage. Connect the harness connector to the GSU 75.
- 5) Reinstall the baggage compartment rear closeout panel.
- 6) Connect the negative (ground) battery cable.

(e) Return to Service

1) Original GSU 75 is Reinstalled

If the original GSU 75 was reinstalled, then no software loading is required. This does not include a unit that were returned for repair as their software is deleted during the repair testing process.

- a) If the GSU mounting rack was not removed or loosened, continue to "GSU 75 Tests" on page 342502121 under LRU Test Procedures.
- b) If the GSU mounting rack was removed or loosened, continue to "GSU/GMU Calibration Procedures" on page 342502122 under LRU Test Procedures. .

2) New, Repaired or Exchanged GSU 75 is Installed

If a new, repaired or exchanged GSU 75 is installed, then software must be loaded and the unit must be calibrated. See "LRU Replacement" on page 342502101. Then, proceed as follows:

- a) If the GSU mounting rack was not removed or loosened, continue to "GSU 75 Tests" on page 342502121 under LRU Test Procedures.
- b) If the GSU mounting rack was removed or loosened, continue to "GSU/GMU Calibration Procedures" on page 342502122 under LRU Test Procedures.

3) New GSU 75 Configuration Module is Installed

If the GSU 75 configuration module was replaced, no software loading is required. Continue to the "GSU/GMU Calibration Procedures" on page 342502122 under LRU Test Procedures.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(9) GTP 59 OAT Probe

See "Figure 16".

(a) Description

The Garmin GTP 59 OAT Probe provides the GSU 75 with air temperature data. The OAT probe is mounted on an access cover in the underside of the left wing.

(b) Troubleshooting

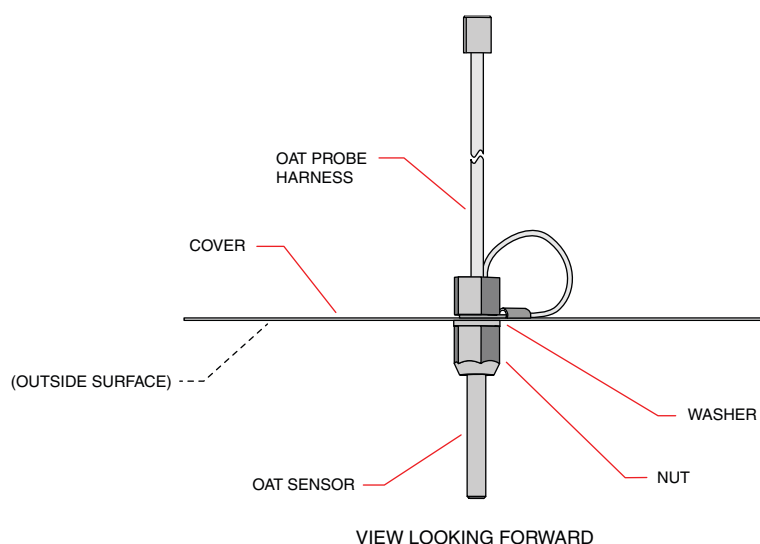
See "Chart 1" on page 34250213.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the access cover.
- 3) Disconnect the connector.
- 4) Use an open-end wrench to hold the probe in place on the inside of the access cover. On the outside of the access cover, loosen the GTP 59 nut and remove the GTP 59, nut and washer.

(d) Installation

- 1) Place the GTP 59 grounding strap O-ring connector over the OAT probe end and insert the probe through the access cover from the inside side. Secure with nut and washer and washer on the outside of the access cover. Use an open-end wrench to hold the GTP 59 on the inside and torque the nut on the outside to 100 ± 20 in. lbs.
- 2) Reconnect the connector to the airplanes wiring harness.
- 3) Install the access cover.
- 4) Connect the negative (ground) battery cable.



GTP 59 OAT Probe
Figure 16

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(10) GMU 44 Magnetometer

See "Figure 17".

(a) Description

The GMU 44 provides horizontal and vertical magnetic field information to the GSU 75 ARHS. This LRU is powered via the GSU 75. It communicates with the GSU 75 using a RS-485 digital interface. The GMU 44 bracket is mounted on a wing access cover assembly at the bottom of the left wing between WS 148.60 and 131.60.



GMU 44 Magnetometer
Figure 17

(b) Troubleshooting

See "Chart 1" on page 34250213, "Chart 17" on page 34250280, and "Chart 18" on page 34250281.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the eight non-ferrous screws securing the magnetometer cover assembly to the underside of the left wing.
- 3) Disconnect the wiring harness connection and remove the magnetometer and cover assembly.
- 4) Remove the three non-ferrous screws securing the magnetometer to its mounting bracket. Disconnect the grounding strap and remove the magnetometer.

(d) Installation

CAUTION: THE MAGNETOMETERS ARE SECURED TO THE MOUNTING BRACKET WITH BRASS SCREWS. ENSURE ONLY BRASS SCREWS ARE USED WHEN REINSTALLING.

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Place the GMU 44 into its mounting bracket, make sure the arrow on the GMU44 aligns with the arrow on the mounting bracket, and secure three non-ferrous screws. Torque 12-15 in-lbs. Connect the grounding strap.
- 3) Reconnect the GMU 44 pigtail to the wing wiring harness.
- 4) Reinstall the magnetometer cover assembly, make sure the arrow on the GMU44 is pointing forward, and secure the assembly with eight (8) non-ferrous screws.
- 5) Connect the negative (ground) battery cable.

(e) Return to Service

- 1) Original GMU 44 is Reinstalled

If the original GMU 44 was reinstalled, then no software loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to "GSU 75 Tests" on page 342502121 under LRU Test Procedures.

- 2) New Repaired or Exchange GMU 44 is Installed

If the repaired or exchange GMU 44 was replaced with a new unit then software must be loaded. See "LRU Replacement" on page 342502101. Then continue to "GSU/GMU Calibration Procedures" on page 342502122 under LRU Test Procedures.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(11) GDL 59 Flight Parameter Recorder (Optional.)

See "Figure 18".

(a) Description

The GDL 59 is located just forward of F.S. 191.00. It's mounted in an equipment rack attached to the inboard side of a bracket at the left side of the airplane. The associated Wi-Fi antenna is mounted atop the tailcone under the dorsal fairing (see Figure 1 in 23-00-00).

The GDL 59 is a flight parameter recorder with a high-speed Wi-Fi transceiver for transmitting collected data from the airplane to a Wi-Fi hotspot for trend monitoring and maintenance planning. In flight, the unit records specified data from the G1000 NXi system. Such data can include engine trend and exceedance data, system maintenance data, crew advisory system (CAS) messages and more. Up to two gigabytes of memory is available to support hours of flight time logging. On the ground, logged data / reports can be sent through the integrated 802.11g Wi-Fi transceiver. Simply park the airplane within range of a Wi-Fi hotspot and use the MFD to select data to upload.



GDL 59 Data Link Unit
Figure 18

(b) Troubleshooting

See "Chart 20" on page 34250284.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the baggage compartment rear closeout panel.
- 3) Unscrew and remove the Phillips head screw securing the installation lever.
- 4) Lift the installation lever to release the unit from the rack and pull the GDL 59 forward out of the rack.

(d) Installation

- 1) Visually inspect the connector to ensure there are no bent or damaged pins. Repair any damage.
- 2) Position the unit in the rack with the installation lever raised and slide aft until the installation lever engages its slot in the rack.
- 3) Press the installation lever down to fully seat the unit. Secure with Phillips head screw, torquing 10–14 in-lbs.
- 4) Install the baggage compartment rear closeout panel.
- 5) Connect the negative (ground) battery cable.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original GDL 59 is Reinstalled

No software or configuration loading is required if the original GDL 59 is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the GDL 59 Test Procedures under LRU Test Procedure.

2) New, Repaired or Exchanged GDL 59 is Installed

If a new, repaired or exchanged GDL 59 is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 342502101. Then, continue to GDL 59 Test Procedure under LRU Test Procedures.

(12) GDL 69A / 69eA Data Link Unit (Optional.)

See "Figure 19".

(a) Description

The GDL 69A/69eA is mounted in a rack on a bracket on the upper left side of the fuselage forward of F.S. 191.00. The GDL 69eA provides XM Radio weather and music entertainment through means of a dedicated satellite data link. Power to the GDL 69eA is received from the avionics bus. The GDL 69eA sends weather data via HSDB connection to the MFD, where the data link interface is controlled. It is linked directly to the GMA 1347 Audio Panel for distribution of the audio signal.

(b) Troubleshooting

See "Chart 20" on page 34250284 and "Chart 21" on page 34250285.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the baggage compartment rear closeout panel.
- 3) Unlock the GDL 69eA handle by unscrewing the Phillips screw.
- 4) Pull the handle upward to unlock the GDL 69eA.
- 5) Gently remove the GDL 69eA from its rack.

(d) Installation

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GDL 69eA into the rack. The handle should engage the dogleg track.
- 3) Press down on the handle to lock the unit into place.
- 4) Lock the handle to the GDL 69eA body using the Phillips screw.
- 5) Reinstall the baggage compartment rear closeout panel.
- 6) Connect the negative (ground) battery cable.

(e) Return to Service

1) Original GDL 69eA is Reinstalled

No software or configuration loading is required if the original GDL 69eA is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the "GDL 69A (69eA) Test" on page 342502130 under LRU Test Procedures.



GDL 69A/69eA Data Link Unit
Figure 19

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2) New, Repaired or Exchanged GDL 69eA is Installed

If a new, repaired or exchanged GDL 69eA is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 342502101. Be sure the XM Satellite Radio subscription is reactivated. Then, continue to "GDL 69A (69eA) Test" on page 342502130 under LRU Test Procedures.

NOTE: The radio IDs required for activation may be obtained as follows: start MFD in normal mode and navigate to the XM page in the AUX group.. XM weather services has an eight (8) digit "data radio ID" and XM radio services has an eight (8) digit "audio radio ID" displayed on that page.

(13) GRT 10/GRC 10 Wireless Remote System (Optional.)

See "Figure 20".

(a) Description

The optional GRT 10 wireless transceiver and GRC 10 wireless remote control are for passenger use to control the audio functions (volume adjustment and channel changing) of the Garmin GDL 69A Datalink Receiver. The system consists of two components:

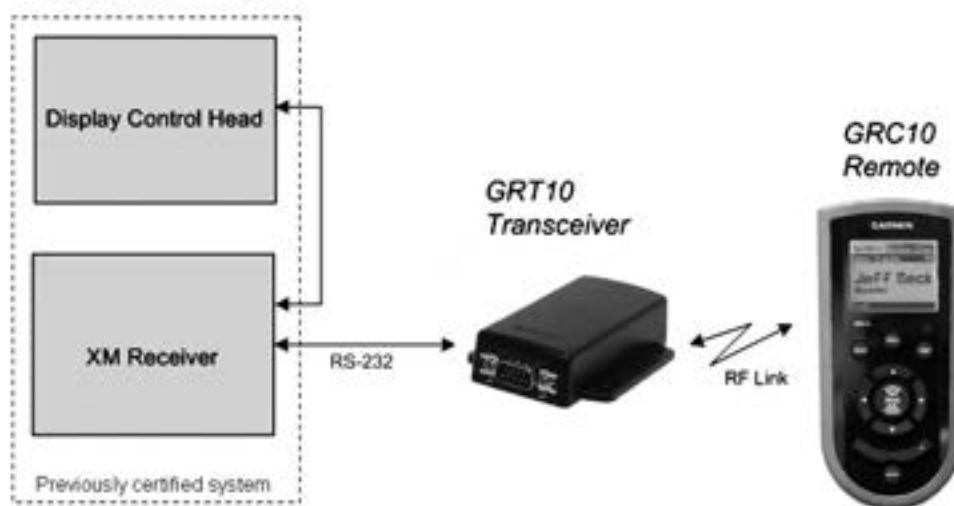
- 1) The GRT 10 Wireless Transceiver installed in the aircraft adjacent to the GDL 69A and connected to the GDL 69A serial port, and
- 2) the GRC 10 Wireless Remote with an LCD display.

(b) Removal

- 1) Disconnect backshell assembly from unit.
- 2) Use a 3/16" hex drive tool to remove each of the four mounting screws.

(c) Installation

- 1) Inspect connector for damaged pins.
- 2) Hold unit flush with the mounting plate.
- 3) Use a 3/16" hex drive tool to tighten each of the four mounting screws.
- 4) Connect backshell assembly to unit.



GRT 10 (Optional)
Figure 20

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(14) FS 510 Bluetooth and Wi-Fi Connectivity (Optional.)

See "Figure 21".

(a) Description

The FlightStream 510 is an SD card-sized unit which is inserted into the lower SD card slot on the face of the MFD. It provides a secure (password protected) Bluetooth and Wi-Fi interface to the G1000 NXi to provide wireless database updating via the Garmin Pilot app, situational data available to mobile apps, GPS and attitude information, ADS-B (Traffic and FIS-B), Flight Plans, PVT, AHRS, TIS-B, FIS-B, Data logging, and SXM Weather.

(b) Troubleshooting

See "Chart 22" on page 34250286.

(c) Removal

- 1) Press and release unit.
- 2) Remove unit from card slot.

(d) Installation

- 1) Place unit in card slot.
- 2) Press unit into card slot until you feel unit engage slot.



FS 510 (Optional)
Figure 21

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(15) GTS 800 Traffic Advisory System

See "Figure 22".

(a) Description

The optional GTS 800 Traffic Advisory System provides real-time traffic information to the PFD (and, indirectly, to the MFD). The Garmin GTS 800 connects with the #1 GDU 105X and communicates with the MFD through an HSDB connection. Power is received from the Avionics Bus.

(b) Troubleshooting

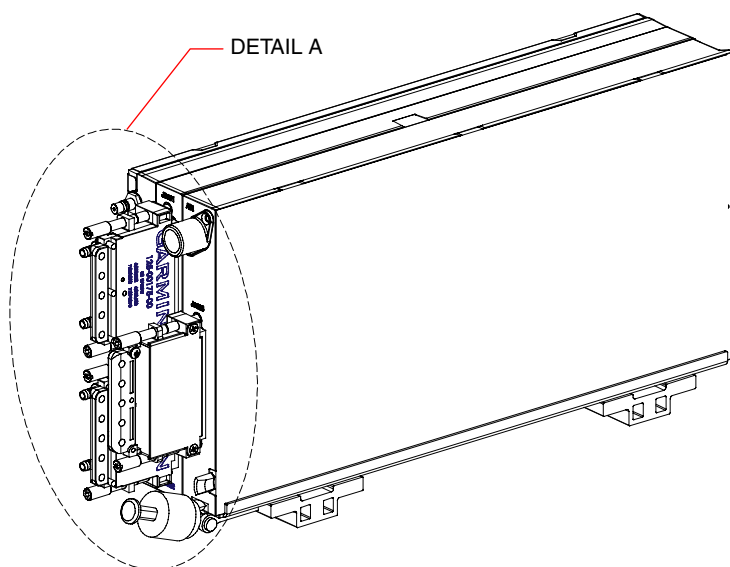
See "Chart 23" on page 34250286.

(c) Removal

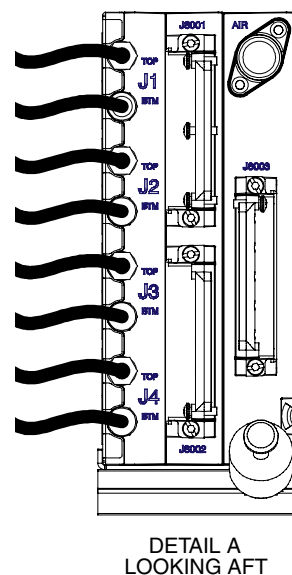
- 1) Remove the aft cabin hatshelf assembly to gain access to the aft avionics shelf.
- 2) Disconnect the GTS 800 connectors.
- 3) Loosen the GTS 800 unit by unscrewing the knurled retainer.
- 4) Move the retainer arms downward. Gently remove the GTS 800 from its rack.

(d) Installation

- 1) Insert the GTS 800 into the rack and lift each retainer arm to engage lip.
- 2) Gently screw retainer to secure the GTS 800 unit into place.
- 3) Visually inspect the connectors and pins for damage. Repair any damage. Connect the connectors to the unit.
- 4) Reinstall the aft cabin hatshelf assembly.



GTS 800 TAS
Figure 22



PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(16) Configuration Module

See "Figure 23".

The configuration module is located in the backshell of the connector it is terminated to.

(a) Removal

- 1) Disconnect connector from LRU.
- 2) Remove 2 screws (8) from cover (7) and remove cover.
- 3) Unplug connector from configuration module (1).
- 4) Remove configuration module.

(b) Installation

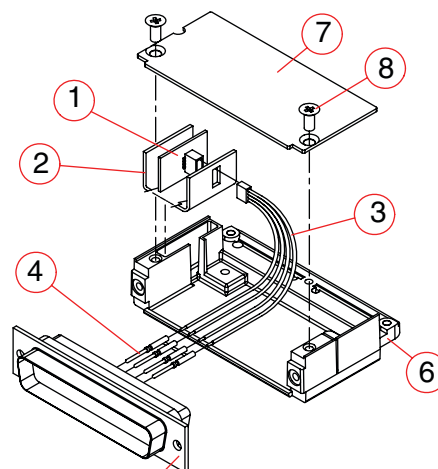
- 1) Inspect connector for damaged pins (4).
- 2) Place configuration module (1) in position.
- 3) Insert connector into configuration module (1).
- 4) Assembly of the connector is the reverse of disassembly.

(c) Return to Service

- 1) GEA 71 Configuration Module is replaced:
No software loading is required. Continue to GEA 71 Test described later in this chapter.
- 2) GSU 75 ADAHRS Configuration Module is replaced:
No software loading is required. Continue to "GSU 75 Tests" on page 342502121.
- 3) GRS 79 AHRS Configuration Module is replaced:
No software loading is required; however, all three GRS/GMU calibration procedures must be performed. See "Chart 30" on page 342502143.
- 4) The Master Configuration Module (i.e., GDU 105X PFD) is replaced:
 - a) Start the G1000 NXi system in configuration mode.
 - b) Go to the Configuration Upload Page on the PFD.
 - c) Press the UPDT CFG softkey and press ENT.

NOTE: If the master configuration module is replaced, the system ID number will change. This will require the replacement of all enable (i.e., unlock) cards. Optional system enable (i.e., unlock) cards are locked to the system ID number when first used. If the system ID number changes, the enable (i.e., unlock) cards must be replaced with new/unused cards. Contact Garmin Aviation Support for assistance.

- 5) If both the GDU 105X PFD and the Master Configuration Module are replaced: The entire G1000 NXi system must be reconfigured. Proceed to "Complete Software Load" on page 342502105.



Configuration Module
Figure 23

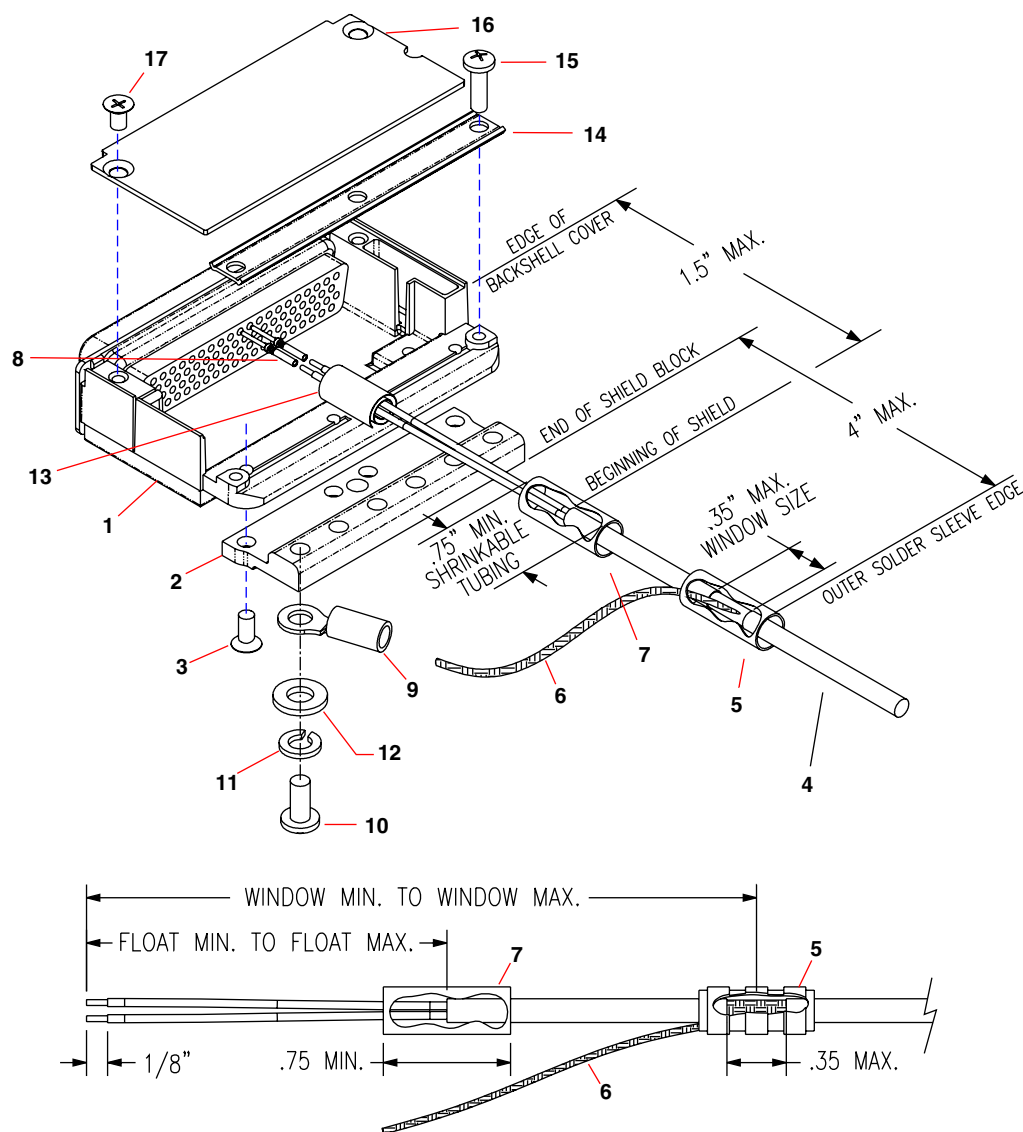
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(17) Shield Block Installation

See "Figure 24".

Most G1000 NXi connectors employ a shield block grounding system to provide necessary ground reference to shielding and/or transducers.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



1. CAST HOUSING	10. SCREW
2. SHIELD BLOCK(S)	11. SPLIT WASHER
3. SCREW	12. FLAT WASHER
4. MULTIPLE CONDUCTOR SHIELDED CABLE (2-CONDUCTOR DEMONSTRATED HERE)	13. SILICON FUSION TAPE
5. DRAIN WIRE SHIELD TERMINATION (METHOD OPTIONAL)	14. STRAIN RELIEF
6. BRAID, FLAT	15. SCREW
7. FLOATING SHIELD TERMINATION (METHOD OPTIONAL)	16. LID
8. PINS	17. SCREW
9. RING TERMINAL, #8, INSULATED	

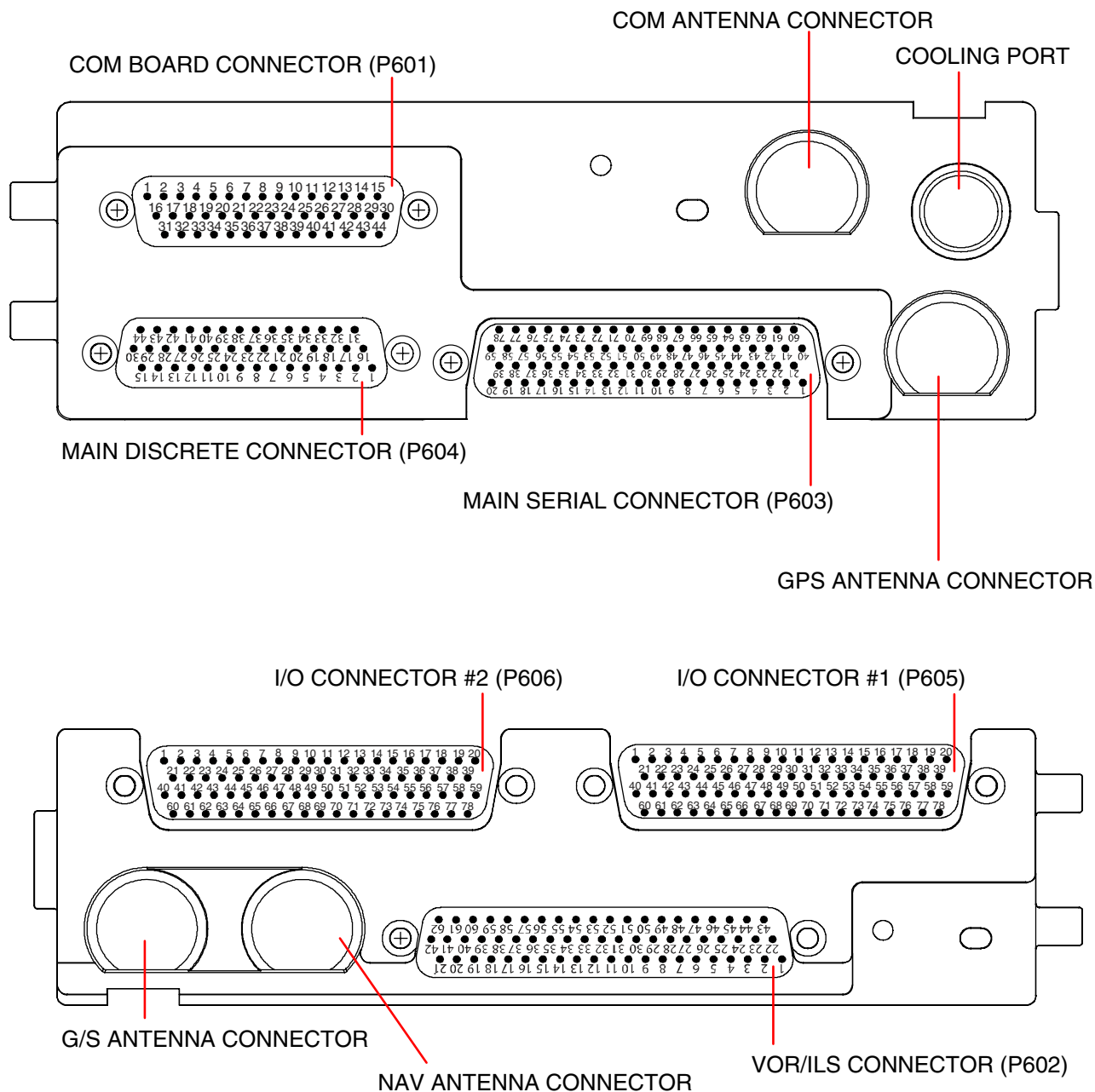
Shield Block Installation to Backshell
Figure 24

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

(18) Backshell Connectors

See "Figure 25" on page 34250255.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

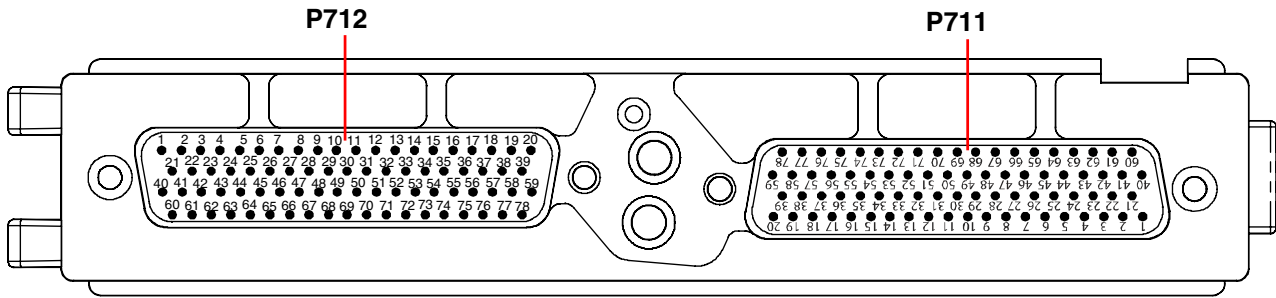


GIA 63W

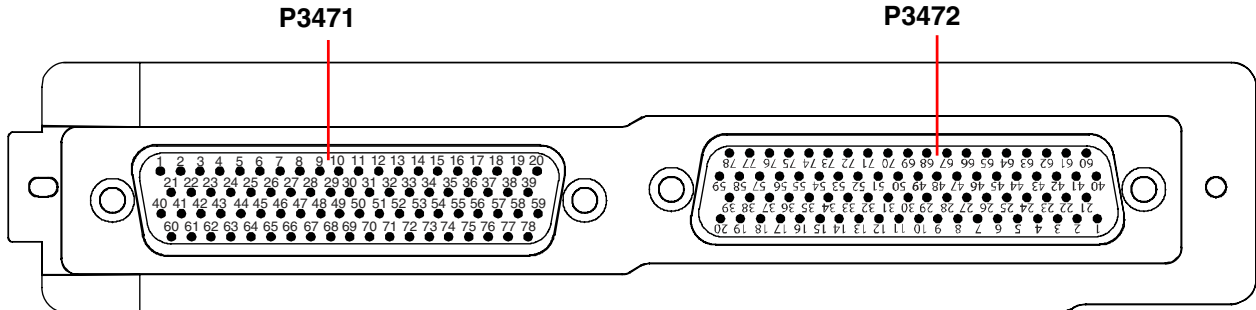
Viewed with the LRU removed.

Backshell Connectors
Figure 25 (Sheet 1 of 5)

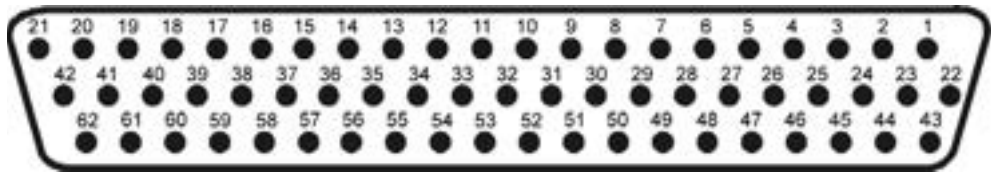
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GEA 71



GMA 1347



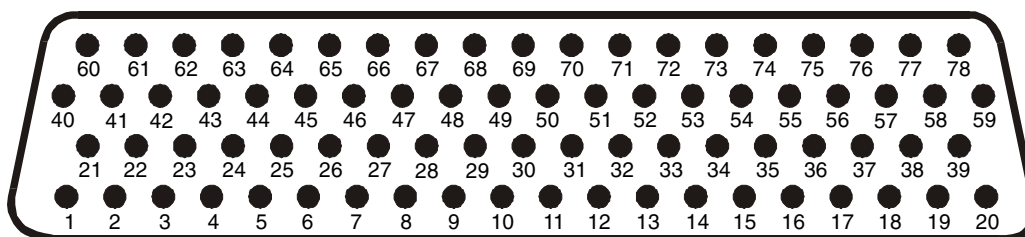
J10001 Connector

GDU 105X

Viewed with the LRU removed.

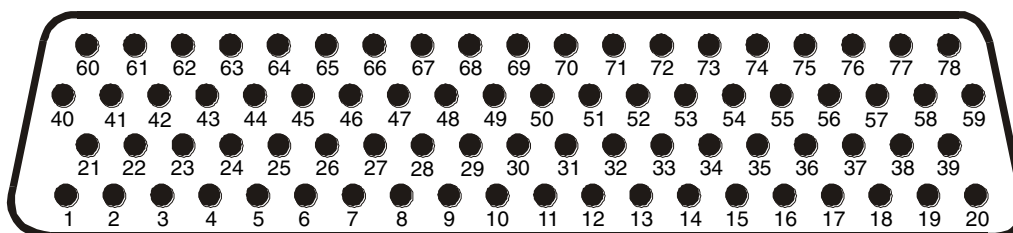
Backshell Connectors
Figure 25 (Sheet 2 of 5)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



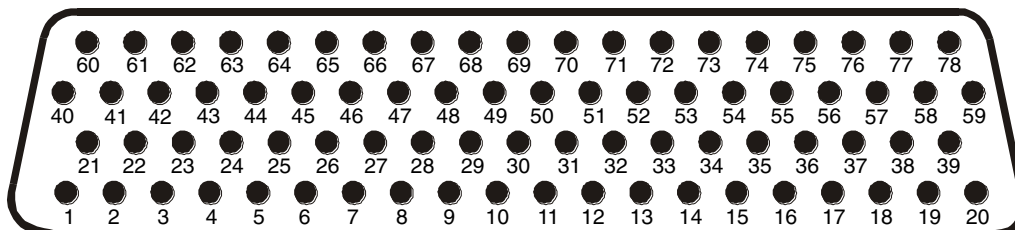
J751 Connector

GSU 75



P591Connector

GDL 59 (Optional)



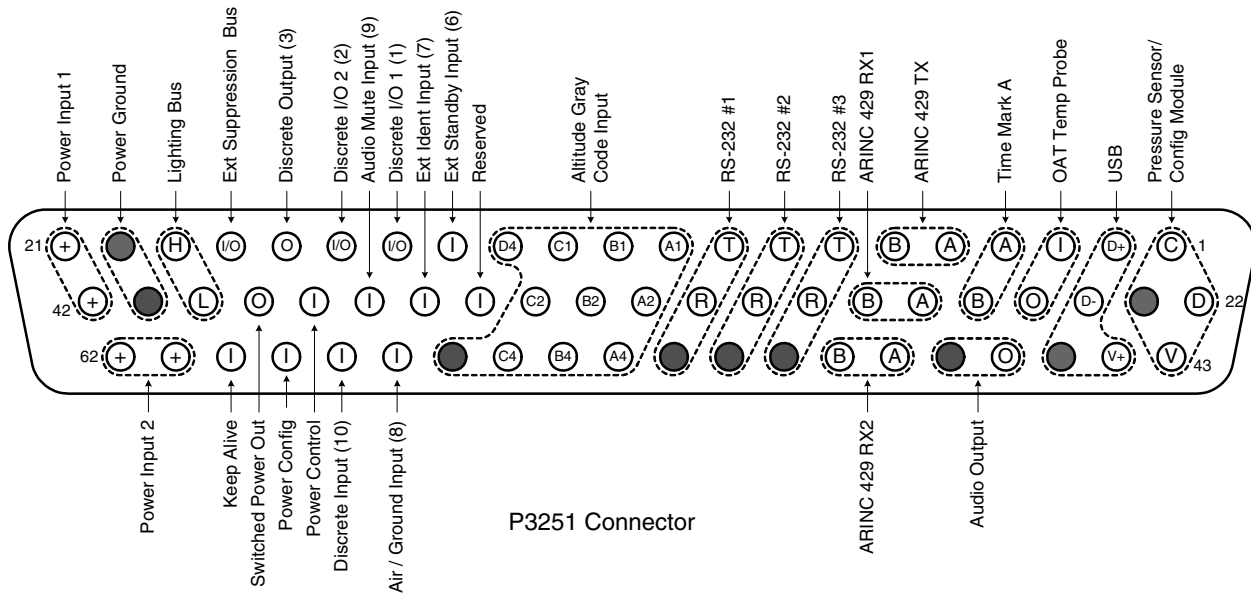
P691Connector

GDL 69A (Optional)

Viewed with the LRU removed.

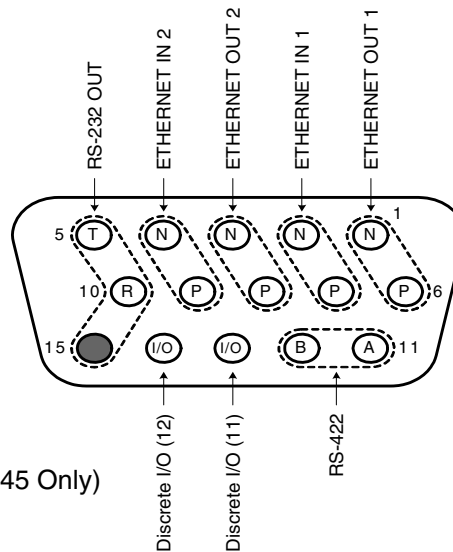
Backshell Connectors
Figure 25 (Sheet 3 of 5)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



● Ground

Numbers in () are the discrete I/O numbers.

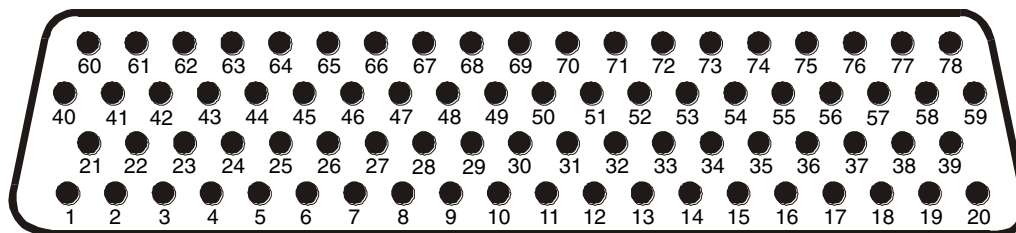


GTX 3X5

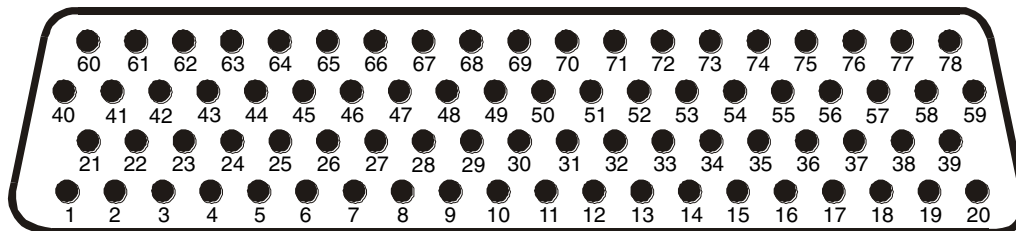
LOOKING AT THE BACK OF THE UNIT

Backshell Connectors
Figure 25 (Sheet 4 of 5)

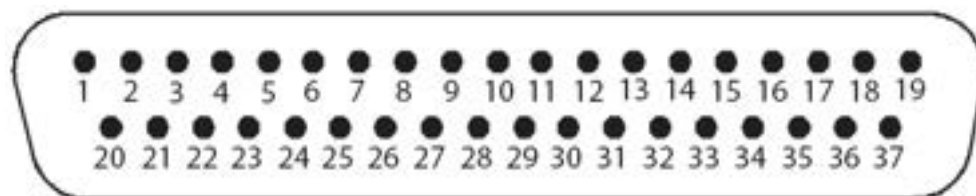
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



P8001 Connector



P8002 Connector



P8003 Connector

GTS 800 (Optional)

Viewed with the LRU removed.

Backshell Connectors
Figure 25 (Sheet 5 of 5)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 9 (Sheet 1 of 2)
G1000 NXi - TROUBLESHOOTING - GDU**

Symptom	Recommended Action
Display is blank	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle power. ✓ If GDU recovers, observe display for yellow text containing error information at the top of the screen. If message indicates software needs to be re-loaded, then re-load software. Otherwise, replace the GDU.
Display resets	• Use a bright light to verify LCD is active. ✓ Adjust avionics dimmer control full clockwise. ✓ Manually turn up backlight on the PFD and load configuration files to the GDU. • Ensure slide lock is fully engaged with the locking tabs on the back of the unit. ✓ If slide lock is not fully engaged, remove connector and verify the locking tabs on the GDU are perpendicular to the connector. If necessary, straighten them before reseating connector.
Display flickers	• Ensure GDU is receiving power. If a circuit breaker is tripped, determine source of short before resetting breaker. • Ensure circuit breakers have not failed and power wire connections are secure. • Swap PFD and MFD. ✓ If problem follows unit, replace the display. (Note the position it failed in.) ✓ If problem does not follow unit, troubleshoot aircraft wiring for fault.
SD card is stuck in GDU	• DO NOT insert a screwdriver of any length into the card slot. • DO NOT pry against the overlay. • DO NOT force the SD Card out. • Use a small screwdriver in the groove on the side of the exposed end of the card to help pull out the card. • Push the card in further to release the card locking mechanism. • Check SD Card for having more than one label. Two or more labels on the card will cause sticking. ✓ Remove all but one label. • Ensure the SD card is from Toshiba or SanDisk. Use of other SD Cards is not recommended. • If card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair.
A button/knob/joystick does not appear to function	• Go to the GDU TEST page in configuration mode and verify button, knob, or joystick operates correctly by observing a change in color from red to green in the button/knob/joystick icon when the button/knob/joystick is pressed. If a button is stuck, the button icon will be green without pressing the button as soon as you turn to the GDU TEST page. ✓ If problem is verified, replace GDU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 9 (Sheet 2 of 2)
G1000 NXi - TROUBLESHOOTING - GDU**

Symptom	Recommended Action
Terrain/Obstacle/Safetaxi does not display	• Ensure supplemental data cards are inserted correctly in the lower slots of each GDU. • Allow the system to verify the data on the cards for approximately five minutes after power-up. • If a database does not activate, reload the problem database onto the SD Card or replace the card.
Display will not track dimmer bus	• Reload GDU configuration files. • Swap PFD and MFD to see if problem remains with display. ✓ Replace display if condition remains with the same display. ✓ If condition remains in original position after swapping displays, check GDU dimmer input to verify voltage is present.
Keyboard will not track dimmer bus	
Display will not track photocell	• Reload GDU configuration files. • Swap PFD and MFD to see if problem remains with display. ✓ Replace display if condition remains with the same unit. ✓ If condition remains in original position after swapping displays, check GDU dimmer input to verify voltage is present. • Go to the GDU TEST page in configuration mode. ✓ Cover and uncover photocells and verify that PHOTOCELL A or PHOTOCELL B value changes. ✓ If values do not change, replace the display.
Keyboard will not track photocell	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 1 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Software / Configuration		
Failure Message	Cause	Solution
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The system has found the PFD and/or MFD software versions do not match.	• Load correct software version. See Software Loading procedure.
MANIFEST – PFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in the specified PFD.	
MANIFEST – MFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in MFD.	
CNFG MODULE – PFD configuration module is inoperative.	The PFD master configuration module has failed.	• Check master configuration module connector and wiring for damage inside the GDU connector backshell. ✓ Replace master configuration module wiring and pins. ✓ If problem persists, replace master configuration module. NOTE New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 2 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Software / Configuration (cont.)		
Failure Message	Cause	Solution
MFD CONFIG – MFD configuration error. Config service required.	A configuration mismatch has occurred between the display and the Master Configuration Module.	• Reload the display configuration files from SD Loader Card. • Reload system configuration files by pressing the UPDT CFG softkey on the Configuration Upload Page in the PFD System Page Group to load configuration files into the configuration module. ✓ If message persists, check PFD1 config module wiring for faults and replace if necessary. ✓ If issue continues, replace PFD1 master configuration module. ✓ If problem persists, replace the display. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
PFD CONFIG – PFD configuration error. Config service required.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 3 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Database Message Advisories		
Failure Message	Cause	Solution
MFD DB ERR – MFD aviation database error exists.	The MFD or PFD has encountered an error in the Jeppesen aviation database.	• Reload aviation database into the display. • Contact Garmin Technical Support for assistance.
PFD DB ERR – PFD aviation database error exists.		
MFD DB ERR – MFD terrain database error exists.	The MFD has encountered an error in the terrain database.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard. • Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD terrain database error exists.	The specified PFD has encountered an error in the terrain database.	
MFD DB ERR – MFD obstacle database error exists.	The MFD has encountered an error in the obstacle database.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard. • Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD obstacle database error exists.	The specified PFD has encountered an error in the obstacle database.	
MFD DB ERR – MFD airport terrain database error exists.	The MFD has encountered an error in the airport terrain database.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard. • Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD airport terrain database error exists.	The PFD has encountered an error in the airport terrain database.	
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The system has found the Jeppesen aviation database cycles in the PFD and/or MFD do not match.	• Load current aviation database versions to all displays.
DB MISMATCH – Aviation database type mismatch. Xtalk is off.	The system has found the Jeppesen aviation database types in the PFD and/or MFD do not match (i.e., different regions: Americas, International, Atlantic, etc.)	• Load same type aviation database to all displays.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 4 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Database Message Advisories (cont.)		
Failure Message	Cause	Solution
DB MISMATCH – Airport Terrain database version mismatch. Xtalk is off.	The PFD and/or MFD have different Airport Terrain database versions installed.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard.
DB MISMATCH – Terrain database version mismatch.	The PFD and/or MFD have different terrain database versions installed.	
DB MISMATCH – Obstacle database version mismatch.	The PFD and/or MFD have different obstacle database versions installed.	
DB MISMATCH – Terrain database type mismatch.	The PFD and/or MFD have different terrain database types installed (i.e., different regions: Americas, International, Atlantic, etc).	

Cooling Message Advisories		
Failure Message	Cause	Solution
MFD COOLING – has poor cooling. Reducing power usage.	MFD has exceeded its operating temperature range.	• Check cooling fan and wiring for proper operation (if applicable). ✓ Replace the cooling fan if unable to determine if it is correctly operating. ✓ If problem persists, replace the MFD. • If problem continues contact Garmin Aviation Product Support.
PFD COOLING – has poor cooling. Reducing power usage.	PFD has exceeded its operating temperature range.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 5 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Key Message Advisories		
Failure Message	Cause	Solution
MFD "key" KEYSTK – key is stuck.	The SYSTEM has determined a key is stuck on MFD.	- Go to the GDU TEST page in configuration mode and verify if key is stuck (if key is stuck its indicator will be green). - Exercise suspected stuck key and reset GDU TEST page to see if indicator remains green without pressing the key. ✓ If problem persists replace the display.
PFD "key" KEYSTK – key is stuck.	The system has determined a key is stuck on the PFD.	

Miscellaneous Message Advisories		
Failure Message	Cause	Solution
XTALK ERROR – A flight display cross talk error has occurred.	A communication error has occurred between the MFD and/or PFD.	- Ensure a database error has not occurred (identified in the ALERTS window on the PFD). ✓ If a database error has occurred, correct error before proceeding. - Check display Ethernet interconnect wiring. - Replace PFD with a known good unit, to verify location of problem: ✓ If problem persists, reinstall PFD and replace MFD.
DATA LOST – Pilot stored data lost. Recheck settings.	Pilot stored data has been lost.	- If the CLR key was held during a power cycle, disregard message. - Cycle power to PFD: ✓ Ensure CLR key is not stuck on the GDU TEST page. ✓ If problem persists, replace PFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 6 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Miscellaneous Message Advisories (cont.)		
Failure Message	Cause	Solution
MFD SERVICE – needs service. Return unit for repair.	The G1000 NXi has determined MFD needs service.	• Ensure the MFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. ✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. ✓ If the CCFT level rises, disregard the message. ✓ If the CCFT level does not rise, replace the MFD • Replace the MFD
PFD SERVICE – needs service. Return unit for repair.	The G1000 NXi has determined the specified PFD needs service.	• Ensure the PFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to the GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. ✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. ✓ If the CCFT level rises, disregard the message. ✓ If the CCFT level does not rise, replace the PFD • Replace the PFD.
PFD VOLTAGE – PFD has low voltage. Reducing power usage.	The specified PFD supply voltage is low.	• Check input voltage to PFD. • If input voltage is OK, replace PFD.
MFD VOLTAGE – MFD has low voltage. Reducing power usage.	The MFD supply voltage is low.	• Check input voltage to MFD. • If input voltage is ok, replace MFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 11
G1000 NXi - TROUBLESHOOTING - GMA**

Symptom/ Failure Message	Recommended Action
Noise in Audio	Most often the cause of the noise is external to the GMA. Try the following to locate the source of the noise before replacing the GMA: • Try a different pair of headsets. Noise cancelling headsets may pick up and/or generate more noise than standard headsets from their own circuitry. • Check for noise with the engine turned off. ✓ If the noise is present only when the engine is running, check the generator and/or ignition system as possible sources of noise (see applicable airframe specific maintenance manual). • Check for noise as all electrical equipment is turned on and off (strobes, other radios, etc.). ✓ If the noise is identified from one electrical system or component refer to the applicable airframe specific maintenance manual. • Ensure the NAV/COM squelch is not open. • Ensure the ADF and DME audio is not active. • Ensure the marker beacon audio is not active. • Ensure the ICS squelch is not open. ✓ Master squelch level can be adjusted on the GMA CONFIGURATION page for higher noise environments. • Replace unit only after all possible external sources of noise are eliminated.
Buttons Do Not Work	• Some buttons are disabled in the GMA CONFIGURATION page by default. This is to remove potential sources of audio noise for inputs that are not used. If in doubt as to which buttons should be disabled, reload GMA config files and other config files for optional equipment installed in the aircraft (i.e. ADF, HF, etc.) from the loader card.
COM Bleedover	• Verify on the GMA CONFIGURATION page that "Disable Split COM" has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, Split COM operation is not approved. If the box is black (indicating COM 1/2 button is active), highlight "Disable Split COM" with the cursor and press the ENT key to turn the box green which will deactivate Split COM mode.
Speaker Cuts Out	• Reduce volume level of the item that caused the speaker to cut out when turned up. A speaker protection circuit disables the speaker output if the volume is too high. If the volume is not sufficient, replace aircraft cabin speaker, reference the Airframe Maintenance Manual.
Mic Audio Heard in Speaker	• Reduce ICS Volume.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12
G1000 NXi - MESSAGE ADVISORIES - GMA**

Failure Message	Cause	Solution
GMA SERVICE – GMA needs service. Return unit for repair.	The system has determined that the GMA 1347 needs service.	• Replace GMA.
GMA FAIL – GMA is inoperative.	The system has detected a failure in the GMA 1347.	• Ensure GMA is receiving power. • Ensure both GIAs are receiving power. • Ensure all GDUs are receiving power. • Ensure the GMA/GIA RS-232 data lines are working properly. • Ensure the GIA/GDU Ethernet data lines are working properly. • Replace GMA.
MANIFEST – GMA software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GMA 1347.	Load the correct unit software. See Software/Configuration (above) for the Software Loading procedure.
GMA CONFIG – GMA configuration error. Config service req'd.	The system has detected a GMA 1347 configuration mismatch for the unit.	• Load GMA configuration files. See Software/Configuration (above). ✓ Replace GMA. ✓ If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 13 (Sheet 1 of 2)
G1000 NXi - TROUBLESHOOTING - GIA 63W**

COM	
Symptom	Recommended Action
Weak COM transmit power	• Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check COM antenna and cabling for faults.
Weak COM receiver	• Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check COM antenna and cabling for faults.
No COM sidetone	• Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem persists, replace GMA1 with a known good unit.

NAV	
Symptom	Recommended Action
Weak NAV receiver	• Set up a NAV/COM Ramp Test Set to radiate a test signal. • Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

Glide/Slope	
Symptom	Recommended Action
Weak G/S receiver	• Set up a NAV/COM Ramp Test Set to radiate a test signal. • Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 13 (Sheet 2 of 2)
G1000 NXi - TROUBLESHOOTING - GIA 63W**

GPS	
Symptom	Recommended Action
Will Not Acquire Satellites	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Using the MFD AUX – GPS Status page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e. cell phones, FBO datalink antennas, etc.). • Check date and time on Date/Time Setup Page. ✓ If date and time are incorrect, enter the correct date and time. • Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, clear the GPS almanac by performing the following steps – - o Using the PFD in config mode, go to the GIA RS-232/ARNIC 429 Config Page. - o At the top of the screen, select the GIA that can not acquire satellites (GIA1 or GIA2) and press the ENT key. - o Press the “CLR NV” softkey at the bottom of the screen. - o Select “OK” in the “Clear GIA nonvolatile memory?” pop-up window. - o Next reload GIA Audio and Config files from a loader card, see G1000 NXi Software/Configuration Procedure, for instructions. Be sure to reload the config files for any optional equipment installed on aircraft that require GIA configuration to be updated. • Cycle power on the system and allow it to restart in normal mode. Place the aircraft outside and allow 15-30 minutes for the GPS to acquire a position and download a new almanac. ✓ If clearing nonvolatile memory is unsuccessful and the GPS still can not acquire a position, replace the GIA. ✓ If problem does not follow unit, check GPS antenna and cabling.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 1 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 63W**

COM Messages		
Failure Message	Cause	Solution
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has determined COM1 needs service.	Replace GIA1 according to instructions in Removal/Installation.
COM2 SERVICE – COM2 needs service. Return unit for repair.	The system has determined COM2 needs service.	Replace GIA2 according to instructions in Removal/Installation.
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	- Press the push-to-talk switch(es) again to cycle its operation. - Check push-to-talk switch(es) and wiring. - Check GIA1/GMA 1347 interconnect. - Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Software/Configuration above): ✓ If problem follows the unit, replace GIA1. ✓ If problem persists replace defective GMA 1347.
COM2 PTT – COM2 push-to-talk key is stuck.	The COM2 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	- Press the push-to-talk switch(es) again to cycle its operation. - Check push-to-talk switch(es) and wiring. - Check GIA2/GMA 1347 interconnect. - Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Software/Configuration above): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists replace defective GMA 1347.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 2 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 63W**

COM Messages (cont.)		
Failure Message	Cause	Solution
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM1 external remote transfer switch again to cycle its operation. Check COM1 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows the unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
COM2 RMT XFR – COM2 remote transfer key is stuck.	The COM2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM2 external remote transfer switch again to cycle its operation. Check COM2 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The specified COM transceiver is reporting a high temperature condition and is reducing transmit power to prevent damage.	• Check fan, wiring and air tubing for proper operation (if applicable). • Replace cooling fan if unable to determine if operating correctly. • Replace GIA. • If problem persists contact Garmin Aviation Product Support for assistance.
COM2 TEMP – COM2 over temp. Reducing transmitter power.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 3 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 63W**

NAV Messages		
Failure Message	Cause	Solution
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	The system has detected a failure in NAV1 receiver.	Replace GIA1.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	The system has detected a failure in NAV2 receiver.	Replace GIA2.
NAV1 RMT XFR – NAV1 remote transfer key is stuck.	The NAV1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the NAV1 external remote transfer switch again to cycle its operation. Check NAV1 remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
NAV2 RMT XFR – NAV2 remote transfer key is stuck.	The NAV2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the NAV2 external remote transfer switch again to cycle its operation. Check NAV2 remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 4 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 63W**

Glideslope Messages		
Failure Message	Cause	Solution
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	The system has detected a failure in G/S1 receiver.	Replace GIA1.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	The system has detected a failure in G/S2 receiver.	Replace GIA2.
G/S1 FAIL – G/S1 is inoperative.	The system has detected a failure in G/S1 receiver.	- Switch GIA1 and GIA2 to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow unit, check G/S1 antenna and cabling.
G/S2 FAIL – G/S2 is inoperative.	The system has detected a failure in G/S2 receiver.	- Switch GIA1 and GIA2 to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow unit, check G/S2 antenna and cabling.

GPS Messages		
Failure Message	Cause	Solution
MANIFEST – GPS1 software mismatch. Communication halted.	The system has detected an incorrect software version loaded in GIA1.	• Load the correct GPS software. See Software/Configuration above): for the Software Loading procedure.
MANIFEST – GPS2 software mismatch. Communication halted.	The system has detected an incorrect software version loaded in GIA2.	
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	The system has detected a failure in GPS1 receiver.	• Replace GIA.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	The system has detected a failure in GPS2 receiver.	
GPS1 FAIL – GPS1 is inoperative.	The system has detected a failure in GPS1 receiver.	• Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow the unit, check GPS antenna and cabling.
GPS2 FAIL – GPS2 is inoperative.	The system has detected a failure in GPS2 receiver.	
NOTE Before troubleshooting, ensure that no cell phones or devices using cell phone technology are turned on, even in a monitoring state, in the cabin.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 5 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 63W**

GPS Messages (cont.)		
Failure Message	Cause	Solution
LOI – GPS integrity lost. Crosscheck with other NAVS.	If the primary receiver is a WAAS sensor, the alert indicates that GPS position data has timed out.	- Verify the area the aircraft was traveling through did not have loss of GPS coverage. FAA NOTAMs may be issued for periods of outages, or the US Coast Guard website http://www.navcen.uscg.gov/gps/gps_notices/default.htm will have notices posted. - Using the MFD AUX – GPS Status page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e., cell phones, FBO datalink antennas, etc.). - If GPS receivers can not acquire a position lock, troubleshoot per the “Will not acquire satellites” section.
GPS NAV LOST – Loss of GPS navigation. Insufficient satellites.	There is no GPS position fix available or the system is in dead reckoning mode.	
GPS NAV LOST – Loss of GPS navigation. Position error.	The G1000 NXi has detected an internal position warning has occurred.	
GPS NAV LOST – Loss of GPS navigation. GPS fail.	The G1000 NXi has detected a GPS engine failure.	

Cooling Messages		
Failure Message	Cause	Solution
GIA1 COOLING – GIA1 temperature too low.	GIA1 operating temperature is too low.	Allow unit to warm up.
GIA2 COOLING – GIA2 temperature too low.	GIA2 operating temperature is too low.	Allow unit to warm up.
GIA1 COOLING – GIA1 over temperature.	GIA1 has exceeded its operating temperature range.	- Check fan, wiring and air tubing for proper operation (if applicable). - Replace cooling fan if unable to determine if operating correctly. - Replace GIA1. - If problem persists contact Garmin Aviation Product Support for assistance.
GIA2 COOLING – GIA2 over temperature.	GIA2 has exceeded its operating temperature range.	- Check fan, wiring and air tubing for proper operation (if applicable). - Replace cooling fan if unable to determine if operating correctly. - Replace GIA2. - If problem persists contact Garmin Aviation Product Support for assistance.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 6 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 63W**

Configuration Messages		
Failure Message	Cause	Solution
MANIFEST – GIA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA1.	Load the correct software. See Software/Configuration (above) for the Software Loading procedure.
MANIFEST – GIA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA2.	
GIA1 CONFIG – GIA1 audio config error. Config service req'd.	The GIA's audio configuration files are incorrect or missing.	Reload audio configuration files.
GIA2 CONFIG – GIA2 audio config error. Config service req'd.		
GIA1 CONFIG – GIA1 configuration error. Config service req'd.	The system has detected a GIA configuration mismatch. If GIAs are not properly configured after being swapped/replaced, this message appears.	- Load the configuration files for that GIA. See Software/Configuration (above) for GIA 63W Configuration Loading procedure. - If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
GIA2 CONFIG – GIA2 configuration error. Config service req'd.		
HW MISMATCH – GIA hardware mismatch, GIA1 communication halted.	The G1000 NXi has detected a non-WAAS GIA 63W.	Replace GIA with a WAAS unit.
HW MISMATCH – GIA hardware mismatch, GIA2 communication halted.		
GIA1 SERVICE – GIA1 needs service. Return unit for repair.	The G1000 NXi has detected a failure in the specified GIA.	Replace suspect GIA.
GIA2 SERVICE – GIA2 needs service. Return unit for repair.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 15
G1000 NXi - TROUBLESHOOTING / MESSAGE ADVISORIES - GEA**

Failure Message	Cause	Solution
MANIFEST – GEA software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GEA 71B.	Load the correct software version. See GEA 71B Software Load Procedure.
GEA CONFIG – GEA configuration error. Config service required.	The system has detected a configuration mismatch in the GEA 71B.	• Load GEA configuration files. See GEA 71B Configuration Procedure. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 16
G1000 NXi - TROUBLESHOOTING / MESSAGE ADVISORIES - GTX**

Failure Message	Cause	Solution
MANIFEST – GTX software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GTX.	Reload software. See Software Load / Configuration Procedure.
XPDR CONFIG – XPDR configuration error. Config service required.	The system has detected a configuration mismatch for the specified GTX.	- Perform a SET>ACTV configuration reset on the GTX Config page and verify the aircraft registration is present. - If error is still present, reload config files from a loader card. ✓ If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
XPDR SRVC – XPDR needs service. Return unit for repair.	The G1000 NXi has detected a failure in the specified GTX.	Replace GTX.
XPDR FAIL – XPDR is inoperative.	The specified GTX is not responding.	- Check wiring between GIAs and GTX. - Replace GTX.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 17
G1000 NXi - TROUBLESHOOTING - GSU / GMU**

Symptom	Recommended Action
ADAHRS does not complete initialization	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important if this issue appears during ground operation only. • Calibrate the GSU 75. • Check GSU 75 configuration module wiring for damage. • Check GSU 75 connector for bent pins. ✓ If no damage can be found, replace GSU 75 configuration module. ✓ If problem persists, replace the GSU 75.
Attitude appears unstable	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure the GSU 75 mounting screws are tight. Finger tight is not sufficient, a screwdriver must be used to verify. • Ensure mounting rack and airframe shelf are secure and all hardware and brackets are present (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). • Ensure GSU 75 connector is securely fastened and proper strain relief is provided. • Remove GSU 75 connector and verify there are no bent pins. • Replace the GSU 75. • Contact Garmin for further troubleshooting if required.
Altitude is different than standby instrument.	• Perform a pitot/static check per Pitot Static Systems Test, in 34-10-00. Allow the GSU to warm up for fifteen minutes before checking accuracy. • Determine which instrument is outside limits and replace. Return the GSU to Garmin, if outside limits. Note: Both units may individually be in spec but show a difference in altitude. Do not return the GSU to Garmin for service if not outside limits.
GSU Config file does not load.	• Replace GSU config module. ✓ If problem persists, replace GSU config module wire harness.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 18 (Sheet 1 of 2)
G1000 NXi - MESSAGE ADVISORIES -- GSU / GMU**

GSU		
Failure Message	Cause	Solution
MANIFEST – GSU software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GSU 75.	Load correct software version. See Software Configuration Procedures.
ADAHRS SERVICE – ADAHRS magnetic-field model needs update.	The AHRS magnetic field model should be updated for the specified unit. Appears on ground only.	Load updated AHRS magnetic field file. See GSU 75 / Components for AHRS magnetic field update information.
GEO LIMITS – ADAHRS too far north/south, no magnetic compass.	No magnetic compass information available due to being too far north or south.	Operate the aircraft only within the limits as specified in the POH.
ADAHRS TAS – ADAHRS not providing airspeed.	The GSU 75 is not providing airspeed data.	- Perform pitot/static check per 34-10-00 in this manual. Allow GSU to warm up fifteen minutes before checking accuracy. - If pitot/static system checks out and connections to GSU are good, replace the GSU 75.
ADAHRS GPS – ADAHRS not receiving backup GPS information.	The GSU 75 is not receiving backup GPS information from either GIA 63.	- Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. - Check GPS status for GIA 1 and 2 on MFD - AUX GPS STATUS page. If one or both GPS receivers cannot acquire a position lock, see GPS troubleshooting section. - Troubleshoot GIA 1 & 2 to GSU 75 wiring for faults (ref. Failed Path troubleshooting section). - Replace the GSU 75.
ADAHRS GPS – ADAHRS operating exclusively in no-GPS mode.	The GSU 75 is operating in the absence of GPS.	
ADAHRS GPS – ADAHRS not receiving any GPS information.	The GSU 75 is not receiving GPS data from the GPS receivers.	
ADAHRS GPS – ADAHRS using backup GPS source.	The GSU 75 is using the backup GPS data path.	
MAG VAR WARN – Large magnetic variance. Verify all course angles.	Magnetic variance value from GMU 44 is not accurate.	- If flying near large radio towers or other sources of possible electromagnetic interference, the condition should correct itself as the aircraft leaves the area. - If problem persists, run magnetic interference check in LRU Test Procedures (below) to check for magnetic interference in the aircraft.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 18 (Sheet 2 of 2)
G1000 NXi - MESSAGE ADVISORIES -- GSU / GMU

GMU		
Failure Message	Cause	Solution
MANIFEST – GMU software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GMU 44.	Load the correct software version. See G1000 NXi Software/Configuration Procedure, for the Software Load Procedure.
HDG FAULT – ADAHRS magnetometer fault has occurred.	A fault has occurred in the specified magnetometer; heading will be flagged invalid.	Check GMU 44/GSU 75 interconnect for faults. • Replace GMU 44. • If problem persists, replace GSU 75.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 19
G1000 NXi - TROUBLESHOOTING - GDL 59

Symptom	Recommended Actions
No communication with GDL 59.	Check power wiring and pin out of GDL 59 unit. Ensure GDL 59 configuration option has been loaded.
No or low-quality Wi-Fi signal.	Verify that a Wi-Fi network is configured and available. Ensure the Wi-Fi antenna is within range of a Wi-Fi network. Remove any obstacles between the aircraft Wi-Fi antenna and the Wi-Fi network hub that may be blocking the signal. Check the Wi-Fi antenna cable and connectors. Verify antenna ground plane is adequate.
Connects to Wi-Fi but cannot send report data.	Activate Garmin Connex. Note that a replacement GDL 59 unit must be registered again, even if the MFD already shows REGISTERED.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 20
G1000 NXi - TROUBLESHOOTING - GDL 69A**

Symptom	Recommended Action
No XM audio is heard	• Ensure the following items are not preventing the audio panel from distributing XM audio (reference applicable G1000 Pilot's Guide): ✓ Verify the XM volume is not muted on the AUX – XM RADIO page on the MFD. ✓ Verify the COM squelch is not open. ✓ Verify the ICS squelch is not open. ✓ Verify the marker beacon tones are not being received. ✓ Verify the headphone (if equipped) volume is turned up. • Go to the AUX – SYSTEM STATUS page on the MFD and ensure unit is online. ✓ If a red X is present, verify the unit is receiving power at the rack connector.
No XM weather information is displayed	• Ensure there are no GDL alerts in the alert window. If there is an Alert for software or configuration error or mismatch, reload the file noted in the Alert. • Restart the PFD and MFD in configuration mode and go to the GDL page. ✓ Verify unit is active. ✓ Verify the Signal number is "2" or "3". If it is "0" or "1" check the GDL 69eA antenna and cabling for faults. ✓ Reseat the GDL 69eA to verify the coax connector is fully seated. ✓ If unit is not active, contact XM Customer service at 1-800-985-9200 to have a refresh signal sent to your unit. You will need to provide them the Audio Radio ID (and Data Radio ID number for XM weather) numbers. Also verify with XM that the correct Weather package (Aviator Lite or Aviator) is on the account, and that no traffic service has been activated against that Radio ID. The unit must be on for approximately one hour after the request for the refresh has been sent to receive the signal. ✓ Alternatively, you may also go to XM's website at http://www.xmradio.com/refresh/ and enter the radio IDs to have a refresh signal sent. ✓ If there is still problems receiving weather products after performing the above step, call XM and have the account deactivated, and a new account activated to clear out any corrupt account information. ✓ Verify there is a good ground connection through the aircraft between the MFD and the GDL 69eA unit. Reference the Aircraft Maintenance Manual for instructions on how to check bonding and ground points. ✓ If problem persists, replace the GDL 69eA.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 21
G1000 NXi - MESSAGE ADVISORIES - GDL 69A**

Failure Message	Cause	Solution
GDL 69 FAIL – GDL 69A has failed.	The G1000 NXi has detected a failure in the GDL 69A.	• Replace GDL 69A. • Check GDL 69A antenna and cabling. • Check the GDL 69A and MFD interconnect.
GDL 69 CONFIG – GDL 69A configuration error. Config service req'd.	The G1000 NXi has detected a GDL 69A configuration mismatch.	• Reload configuration file. See Software Load / Configuration Procedure. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
MANIFEST – GDL software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GDL 69A.	• Load correct software version. See Software Load / Configuration Procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 22
G1000 NXi - TROUBLESHOOTING - FS 510**

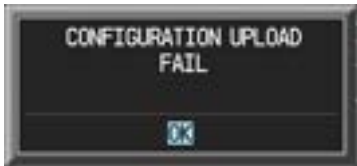
Problem	Action
Flight Stream Not Found	Check that Flight Stream is not obstructed by RF blocking material. Check that the control/display is in RF range of the Flight Stream. Check that pairing mode is enabled.
Flight Stream Connection Lost	Check that the control/display is in RF range of the Flight Stream. Check that Flight Stream is not obstructed by RF blocking material. Remove the Bluetooth pairing from the portable electronic device and the Flight Stream, and then attempt to pair the device again.

**CHART 23
G1000 NXi - MESSAGE ADVISORIES - GTS 800**

Failure Message	Cause	Solution
MANIFEST – GTS software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GTS 800.	Load the correct software version. See G1000 NXi Software/Configuration Procedure, for the Software Load Procedure.
GTS CONFIG – GTS configuration error. Config service req'd.	The system has detected a configuration mismatch for the specified GTS 800.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 24
G1000 NXi - TROUBLESHOOTING - SOFTWARE CONFIGURATION**

Problem	Solutions
MFD or PFD displays do not power up:	• Ensure power is present at display backshell connector. • Troubleshoot per the “Blank Display” GDU section.
Software file load fails: 	• Ensure that LRU is reporting data on System Status page (LRU is ‘ONLINE’). Check data path wiring as needed. • Retry software file load or try using a different card. Ensure that the MFD is not touched during the loading process. • Ensure that LRU part number is compatible with software version and Card Loader. • Replace LRU.
Configuration file load fails: 	• Ensure that LRU is reporting data on System Status page (LRU is ‘ONLINE’). Check data path wiring as needed. • Retry configuration file load or try using a different card. Ensure that the MFD is not touched during the loading process. • Ensure that LRU part number is compatible with Card Loader. • Replace LRU.
GIA1 and/or GIA2 to ‘LRU’ data path not working	• Ensure GIA1 and GIA2 are configured correctly. • Check wiring, connectors & pins as needed.
Software File Mismatch Alert appears in lower right corner of PFD when started in normal mode: 	• Ensure that proper software file part number and version were loaded to LRU. To attain the current software P/N and version for your aircraft contact: Piper Aircraft Inc. Customer Service. • Check and ensure that correct Card Loader was used during load process. Refer to the General Arrangement Drawing. • Reload software to LRU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 25
G1000 NXi - SYSTEMS COMMUNICATIONS HIERARCHY**

The following criteria must be satisfied to be able to perform the desired operation:	
Desired Operation	Criteria for Success
Load Software to MFD or PFD	• G1000 NXi Loader Card must be inserted in top slot for each display to be loaded. • ENT key must be held during power up of display. • Power on only one display at a time during software loading.
Load AIRFRAME, SYSTEM, MFD, PFD and MANIFEST configuration files to MFD and PFD	• G1000 NXi Loader Card must be inserted in top slot of PFD. • PFD and MFD must be powered on. • PFD and MFD must have correct software.
Load Software/Configuration files to GIA 63Ws	• G1000 NXi Loader Card must be inserted in top slot of PFD. • G1000 NXi system must be powered on. • PFD and MFD must have correct software. • PFD and MFD must be successfully configured with AIRFRAME, SYSTEM, MANIFEST, MFD and PFD configuration files.
Load Software/Configuration files to: - GMA 1347 - GSU 75 - GEA 71 - GMU 44 (software only) - GTX 3X5R	• G1000 NXi Loader Card must be inserted into PFD top slot. • G1000 NXi must be powered on. • PFD and MFD must have correct software and configuration settings. • GIA 63Ws must have correct software. • GIA 63Ws must be successfully configured with GIA1 and GIA2 configuration files. • Data path from GIA1 to each LRU must be operational.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

I. Configuration Mode Overview

CAUTION: THE CONFIGURATION MODE CONTAINS CERTAIN PAGES AND SETTINGS THAT ARE CRITICAL TO AIRCRAFT OPERATION AND SAFETY. THESE PAGES ARE PROTECTED AND CANNOT BE MODIFIED, UNLESS THE TECHNICIAN IS PROPERLY AUTHORIZED AND EQUIPPED. HOWEVER, MOST PROTECTED PAGES ARE VIEWABLE TO ALLOW SYSTEM AWARENESS FOR TROUBLESHOOTING.

The Configuration Mode exists to provide the avionics technician with a means of configuring, checking, and calibrating various G1000 NXi sub-systems. Troubleshooting and diagnostics information can also be viewed in this mode.

(1) Start the system in Configuration Mode:

- (a) Press and hold the ENT key on the PFD while applying power using the PFD circuit breaker.
- (b) Release the ENT key after 'INITIALIZING SYSTEM' appears in the upper left corner of the PFD.
- (c) Repeat steps (a) and (b) on the MFD, using the MFD circuit breaker to apply power.

NOTE: For a complete description and breakdown of each Configuration Mode page, refer to the appropriate Garmin G1000 Line Maintenance & Configuration Manual.

(2) SET>ACTV Configuration

Throughout the Configuration Mode pages, there are SET and ACTIVE columns for input/output settings and other parameters.

"SET": Refers to a setting or group of settings that reside in PFD Internal Memory and/or the Master Configuration Module.

ACTIVE: Refers to an 'active' setting or parameter currently being used by the LRU. LRUs store the 'active' settings within internal memory.

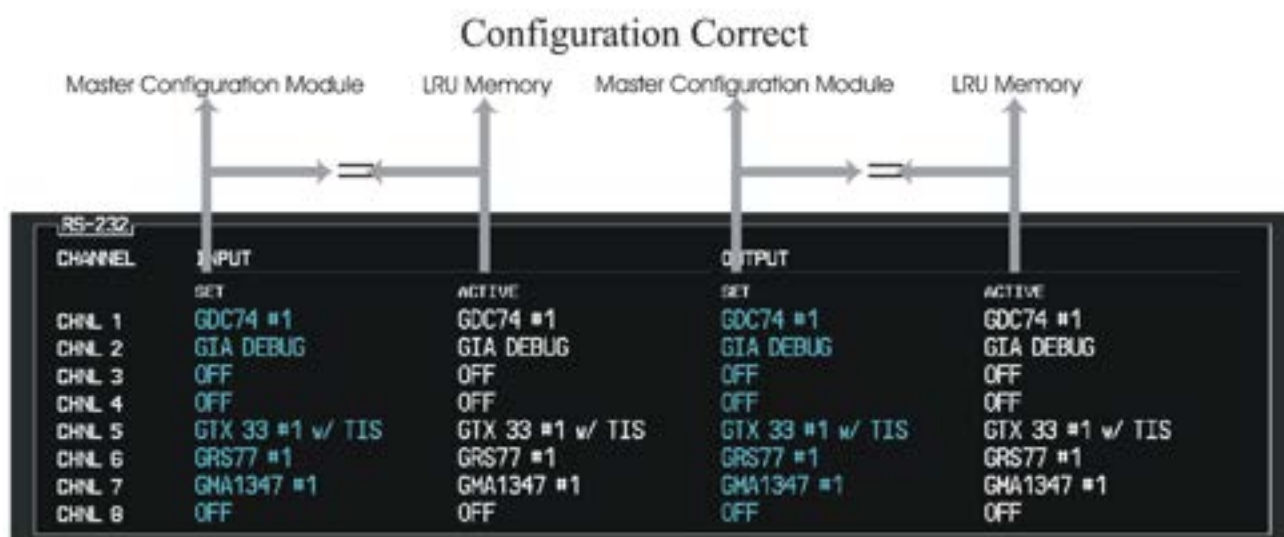
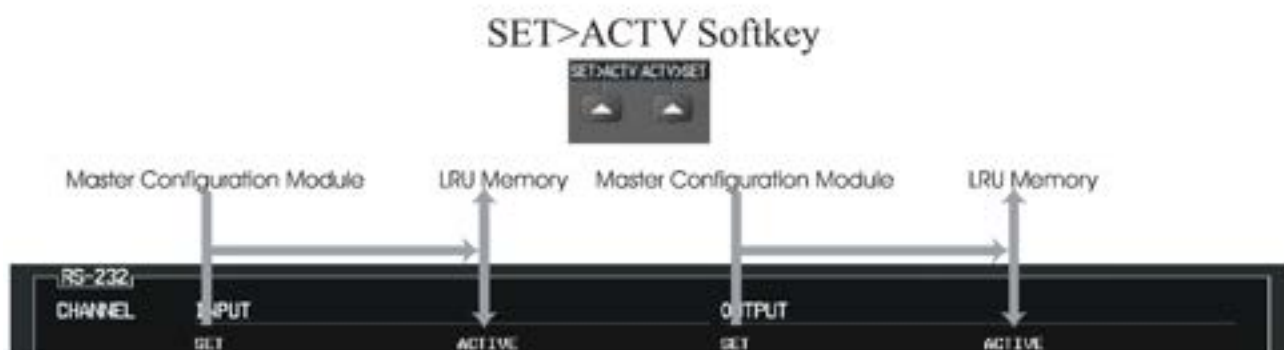
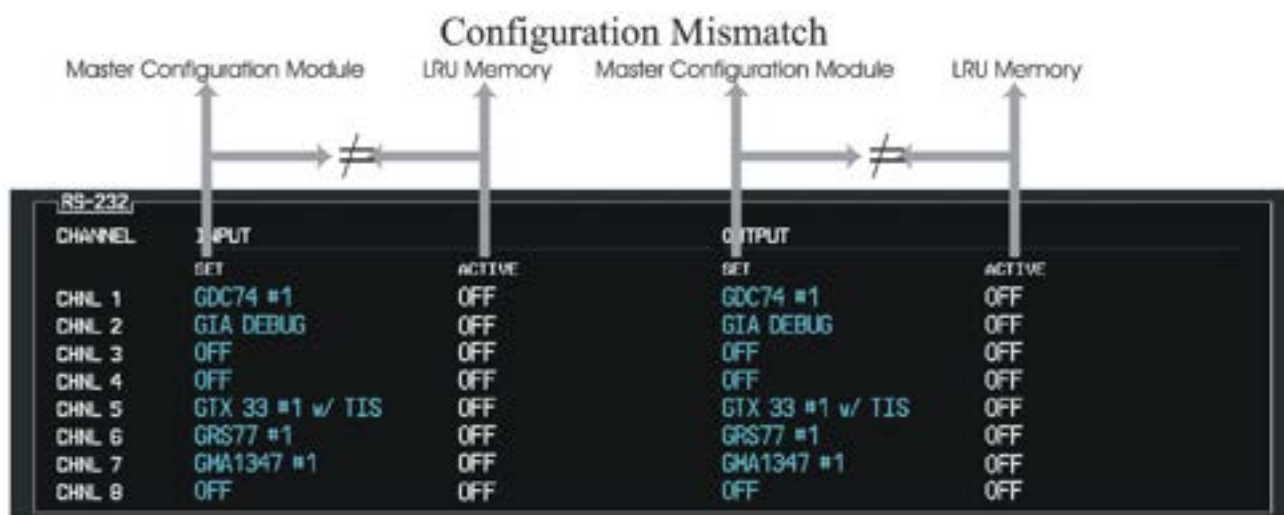
Data can be manually copied from one column to the other (and from the PFD memory to the LRU memory and vice-versa) by using the following two softkeys, when available:

- **SET>ACTV** (read 'Set to Active') softkey: Allows the installer to send the information in the SET column (data stored in the master config module) to the ACTV column (data used by LRU).
- **ACTV>SET** (read 'Active to Set') softkey: Causes the LRUs current settings to be copied to the master configuration module as SET items.

CAUTION: THE ACTV>SET SOFTKEY MUST BE USED WITH CAUTION! IF AN IMPROPERLY CONFIGURED UNIT IS INSTALLED, THIS SOFTKEY CAUSES THE WRONG CONFIGURATION TO REPLACE THE CORRECT AIRCRAFT CONFIGURATION.

In the first example shown in "Figure 26", the SET columns do not match the ACTIVE columns. The inequality between SET and ACTIVE indicates a configuration mismatch. By pressing the SET>ACTV softkey, this copies the SET column to the LRU unit's configuration memory. The settings then become the ACTIVE settings for the LRU being configured.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



SET>ACTV Configuration
Figure 26

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

When troubleshooting the system, technicians can look for inequalities between SET and ACTIVE columns. Certain problems can be resolved simply by pressing the SET>ACTV softkey, which reloads settings to the specific LRU from the PFD (Note that this can also be accomplished by reloading the configuration files for the LRU, using the software loader card.).

A blank active column, as shown in "Figure 27", represents loss of communication between the display and the particular unit. See troubleshooting for more details.

RS-232

CHANNEL	INPUT	ACTIVE	OUTPUT	ACTIVE
CHNL 1	GDC74 #1		GDC74 #1	
CHNL 2	GIA DEBUG		GIA DEBUG	
CHNL 3	OFF		OFF	
CHNL 4	OFF		OFF	
CHNL 5	GTX 33 #1 w/ TIS		GTX 33 #1 w/ TIS	
CHNL 6	GRS77 #1		GRS77 #1	
CHNL 7	GMA1347 #1		GMA1347 #1	
CHNL 8	OFF		OFF	

Set > Active - Loss of Communications
Figure 27

(3) Configuration Prompts

When configuration settings are changed, the technician receives on-screen prompts and/or confirmations such as those shown in "Figure 28". Other prompts may be encountered during the configuration process.



Configuration Prompts
Figure 28

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(4) Data Transmission Indicators

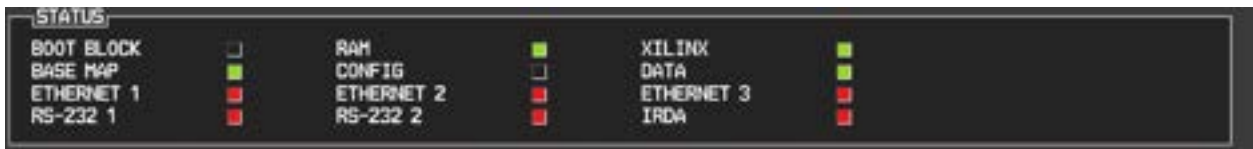
See "Figure 29".

Several configuration pages utilize an indicator light system to show discrete (ON/OFF) data and/or hardware component status. Unless otherwise noted, the following applies to all such status indicators:

- (a) Green Light: Expected data is successfully received and is ON. A green light could also indicate that the parameter/component is working correctly.
- (b) Red Light: Expected data is not received. A red light could also indicate that a parameter/component is invalid.
- (c) No Light (Black): Expected data is successfully received and is OFF, or no data is expected. A black light could also indicate that the parameter/component is not responding.

(5) Configuration Mode Navigation

Using the FMS knob, a user can navigate through different pages and page groups in the Configuration Mode. See "Chart 26" on page 34250294. For complete description and breakdown of each page, refer to the appropriate Garmin G1000 Line Maintenance & Configuration Manual.



Data Transmission Indicators
Figure 29

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 26
CONFIGURATION MODE NAVIGATION

System Page Group

1. System Status	5. System Upload	9. System Configuration
2. Date/Time Setup	6. Diagnostics Terminal	10. System Setup
3. Main Lighting	7. Maintenance Log	11. Manifest Configuration
4. Audio Alert Configuration	8. OEM Diagnostics	

GDU Page Group

1. RS-232 / ARINC 429 Config	4. Diagnostics	7. Airframe Configuration
2. GDU Status	5. Serial/Ethernet I/O	
3. GDU Test	6. Alert Configuration	

GIA Page Group

1. RS-232 / ARINC 429 Config	3. GIA I/O Configuration	5. GIA Status
2. CAN / RS-485 Config	4. COM Setup	

GEA Page Group

1. Engine Data	2. GEA Status	3. GEA Configuration

GTX Page Group

1. RS-232 / ARINC 429 Config	2. Transponder Configuration

GSU Page Group

1. GSU Configuration	3. GSU / GMU Calibration
2. ADAHRS Data Input	

GFC Page Group

1. GFC Configuration	2. GFC Status

GMA Page Group

- | |
|----------------------|
| 1. GMA Configuration |
|----------------------|

CAL Page Group

- | |
|--------------------------|
| 1. Fuel Tank Calibration |
|--------------------------|

GDL Page Group (Optional)

- | |
|--------------------|
| 1. GDL 69eA Config |
|--------------------|

Other (Optional)

1. Stormscope	2. S-TEC

GTS (Optional)

- | |
|----------------------|
| 1. GTS Configuration |
|----------------------|

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

J. G1000 NXi Software Information

NOTE: The following sections provide a detailed description of loading all G1000 NXi software and configuration files, which may be excessive for individual LRU removal and replacement. If removing and replacing individual LRUs, refer to Components, above, for the necessary steps.

(1) G1000 NXi Software Image

CAUTION: IT IS CRITICAL THAT THE TECHNICIAN INSTALLS THE CORRECT SOFTWARE IMAGE PART NUMBER WHEN SERVICING THE G1000 NXi SYSTEM. APPROVED SOFTWARE DEFINITIONS FOR EACH CONFIGURATION ARE DEFINED IN THE REQUIRED EQUIPMENT LIST (REL), "CHART 30" ON PAGE 342502143.

All software and configuration files were certified by Garmin as part of the FAA-approved Type Design data. Approved software definitions for each configuration are defined in the Required Equipment List (REL), "Chart 30" on page 342502143.

G1000 NXi software and configuration files are controlled via the approved software image part number listed in the REL. This software image is loaded into the G1000 NXi using a software loader card. The installer shall create this software loader card by downloading the approved software image in accordance with the procedure provided immediately following.

CAUTION: BE CAUTIOUS WHEN USING SOFTWARE LOADER CARDS DURING MAINTENANCE. THE G1000 NXi SYSTEM IMMEDIATELY INITIALIZES THE CARD UPON POWER-UP. ON-SCREEN PROMPTS MUST BE GIVEN CAREFUL ATTENTION IN ORDER TO AVOID POTENTIAL LOSS OF DATA. ALWAYS READ THROUGH PROCEDURES GIVEN IN THIS SECTION, BEFORE ATTEMPTING TO USE THE SOFTWARE LOADER CARDS.

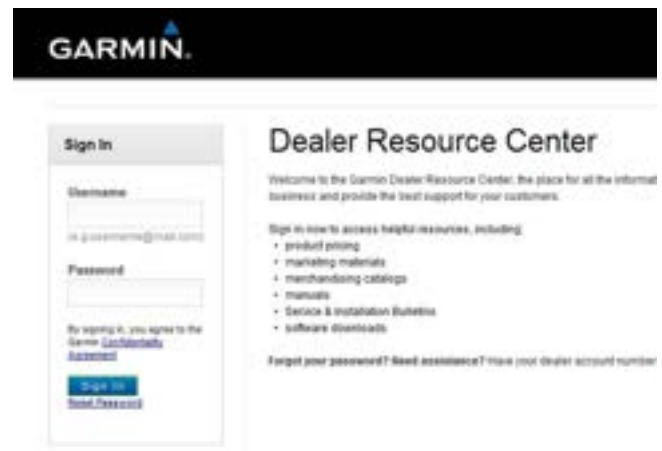
(2) Software Loader Card Creation

The following procedure requires a PC with an SD card reader. Piper recommends SanDisk® SDDR-99 and SDDR-93 card readers. Additionally, only SanDisk brand 16GB SD cards are recommended.

The software image is an executable self-extracting file which builds the correct file structure onto an SD card for use loading software to the G1000 NXi. To obtain the current file follow the procedures outlined below.

NOTE: In order to create a loader card, the installer completing these procedures must be an authorized Piper service center to gain access to the necessary data via the Garmin website.

- (a) Go to <http://www.garmin.com> and click on the 'Dealer Resource Center' link in the lower right hand portion of the home page. Enter username and password. See "Figure 30".
- (b) Select Support and then Software Downloads.



Dealer Login Screen
Figure 30

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (c) Search for the appropriate image version (i.e., 2698.xx from the appropriate Required Equipment List (REL), "Chart 30" on page 342502143 in the "Search by Keyword" field.
- (d) Save the file to a known location on the PC.
- (e) Run the executable file that was downloaded. A window will appear to confirm software installation.
- (f) Insert the SD card into the SD card reader and select the Next button in the pop-up window.
- (g) In the pop-up window, select the drive that corresponds to the inserted SD card and then click the Next button.

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

- (h) Select the Finish button.
- (i) Stop the card reader using Windows stop device function.
- (j) Eject the SD card from the card reader.
- (k) Apply a label to the software loader card identifying the aircraft, G1000 NXi SFTW and the appropriate software image part number as shown below:

NOTE: See appropriate Required Equipment List (REL), "Chart 30" on page 342502143 for software image part number.

PA-28-181 G1000 NXi SFTW 006-x2698-xx

(3) Handling a Software Download Card

The SD memory cards used for the Software Download Card are manufactured to the specifications of the SD Card Association for use in portable devices. As such they are reasonably robust devices that do not require special handling instructions. However, the memory cards are not unbreakable and reasonable precautions regarding their use and handling should be used including the following guidelines:

- (a) Do not bend an SD memory card or subject it to violent impact.
- (b) Do not leave SD cards in locations where they may be exposed to moisture or high temperatures.
- (c) Avoid exposing the card to static electricity or electro-magnetic interference.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

K. Software Files

Software files are defined by part number and version number. Each G1000 NXi LRU reports the software version it currently contains to the user in two places.

- (1) Normal System Mode: The AUX – SYSTEM STATUS page lists each LRU and the reported software version.
- (2) Configuration Mode: The SYSTEM STATUS page (SYSTEM page group) reports more detailed LRU information, including software version, part number, and LRU status. Software files are loaded to LRUs from the SYSTEM UPLOAD page in Configuration Mode.
- (3) Configuration File Descriptions
 - (a) Configuration Files are divided into groups, and are only displayed at the System Upload page during the software/configuration loading process.
 - (b) Configuration files contain preset selections for input/output channels, aircraft-specific settings, and LRU-specific settings. The following list describes each of the configuration files:

AIRFRAME This file contains data such as airspeed parameters, engine/airframe sensor limitations, fuel tank parameters and alerting system settings that tailor a G1000 NXi PFD or MFD to the PA-28-181.

AIRFRAME Alerts specific to the PA-28-181 are set when this file is loaded.

ALERTS

SYSTEM This file configures the G1000 NXi high-speed data bus (HSDB) to expect one PFD, one MFD, two GIAs, and (optional) one GDL 69eA.

MANIFEST This file loads a manifest checklist of all software part numbers and versions associated with an approved system configuration. The G1000 NXi performs a software check between each LRU's reported version and the version contained on the manifest. If an inequality is detected for an LRU, this LRU is then excluded from the G1000 NXi and a manifest alert is triggered to the operator.

MFD1 This file configures MFD serial/discrete communication and alert system settings.

PFD1 This file configures PFD serial/discrete communication and alert system settings.

GIA1/GIA2 These files configure GIA1/GIA2 serial/discrete communication settings.

GMA1 This file configures GMA 1347 audio and serial communication settings

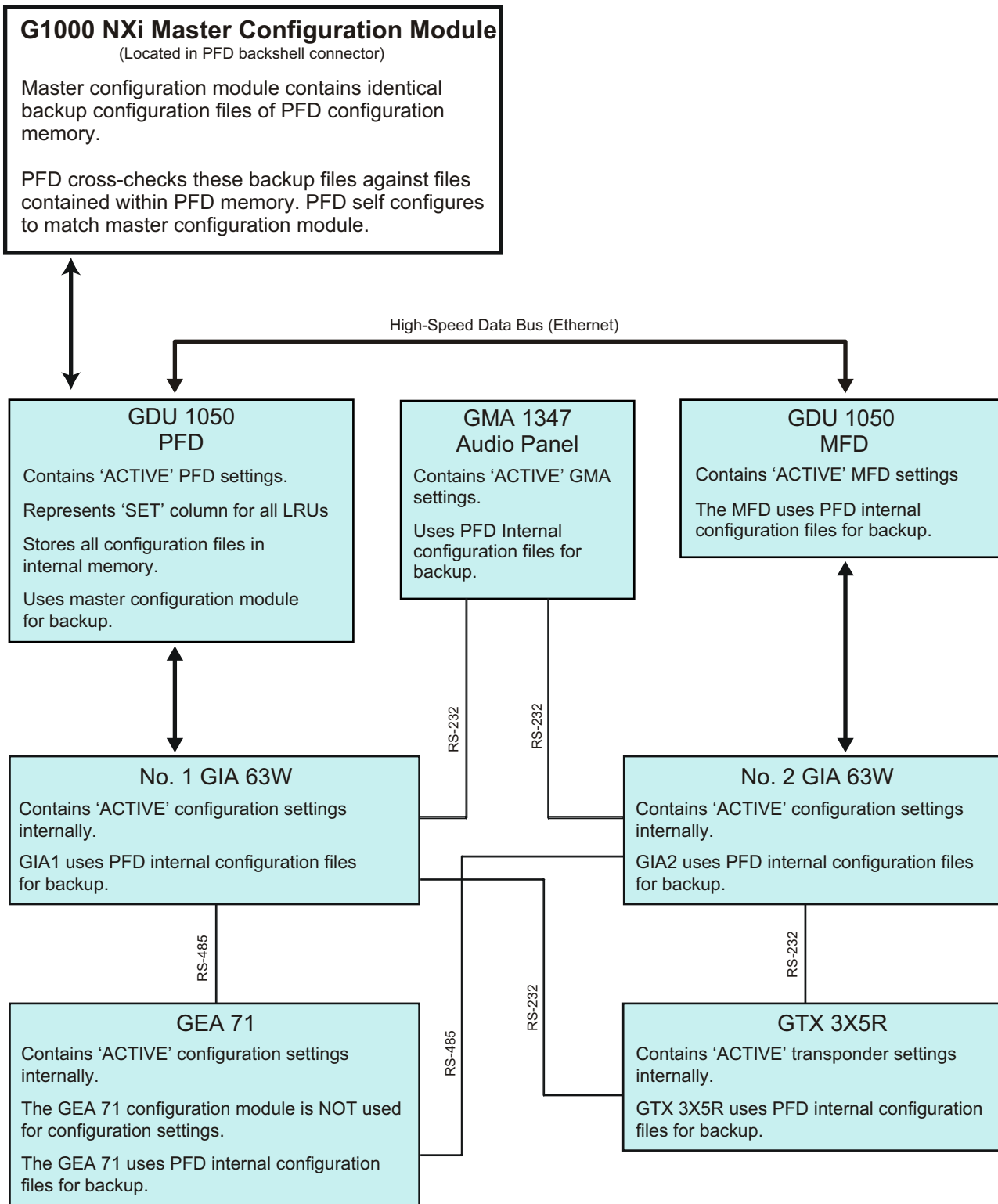
GTX1 These files configure GTX 3X5R transponder and serial communications settings.

GEA1 These files configure GEA engine/airframe parameters.

GDL_69 This file configures gains and cable loss for the PA-28-181 installation if the optional GDL 69eA is installed.

AUDIO This file configures audio alerts for the PA28-181.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



LRU Configuration File Storage
Figure 31

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

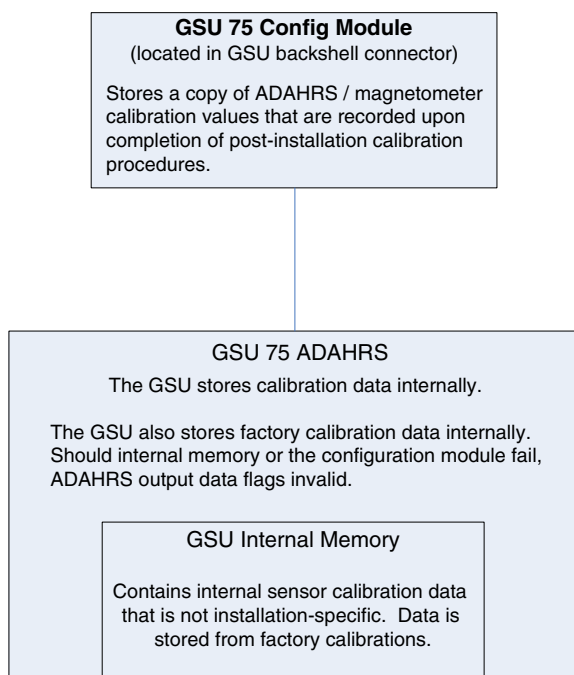
(4) Configuration File Storage

The G1000 NXi system stores all configuration settings in multiple places so that the settings are retained in the aircraft during the maintenance of any LRUs.

During system configuration, as shown in "Figure 31", each file is sent directly to the applicable LRU where it is stored in local LRU memory (except GSU 75). Each file is also stored in the PFD internal memory. The applicable PFD also sends a copy of all configuration files to the Master Configuration module, located in the connector backshell (see "Figure 23"). If the PFD is replaced, the configuration module retains all configuration files in the aircraft.

NOTE: The GSU 75 ADAHRS and GMU 44 Magnetometer do not have a configuration file. However, these LRUs do store calibration data acquired during the post installation checkout, which are characteristic to the specific installation. While performing maintenance on these units, recalibration may be required. See GSU 75 ADAHRS / GMU 44 Magnetometer, under LRU Test Procedures, for more information on recalibration criteria.

The GSU 75 configuration module, as shown in "Figure 32", functions differently than the rest of the system. The GSU 75 configuration module does not store any configuration settings. Instead, it stores calibration data recorded during installation calibration procedures.



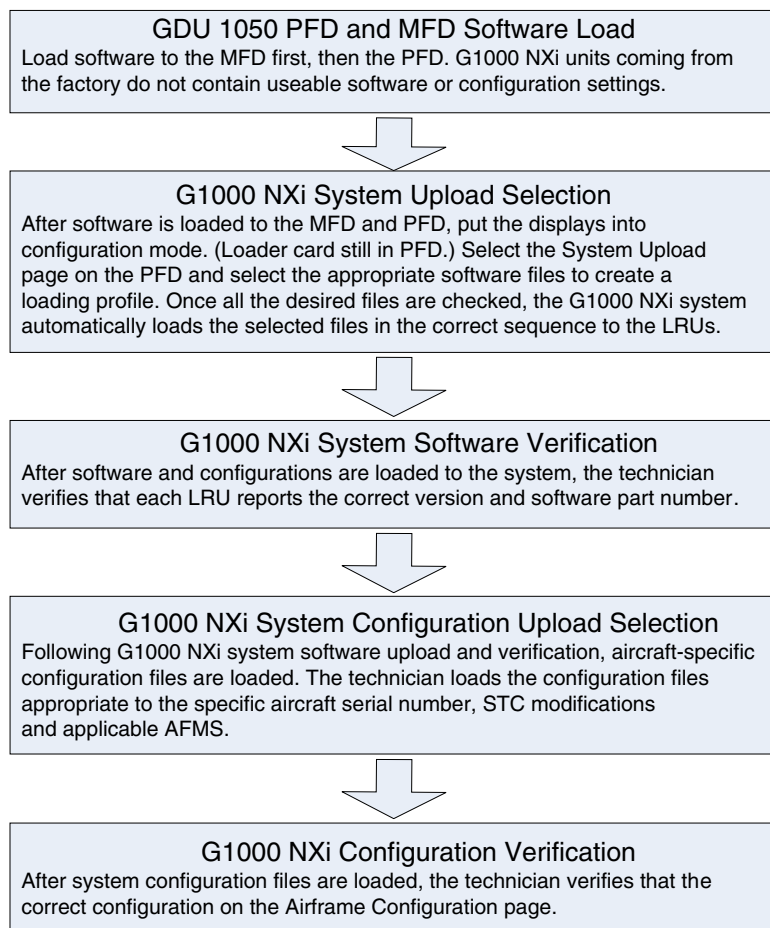
GSU Configuration Settings Storage
Figure 32

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(5) G1000 NXi Software/Configuration Procedure

This section summarizes the procedures required to load software and configuration files to the G1000 NXi. It is intended to work as a central guide for technicians to use while performing maintenance on the aircraft. This section is referenced by other sections of this manual when G1000 NXi software reload is required. The technician should use proper judgment regarding the context of maintenance required while following this section.

The diagram in "Figure 33" depicts an overview of the software/configuration sequence for the G1000 NXi system. This applies mostly to a new G1000 NXi system which has not previously been powered up and is for informative purposes only.



Software/Configuration Overview
Figure 33

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

L. LRU Replacement

Whenever a Garmin LRU has been replaced and the system is then booted into configuration mode, the Configuration Manager page appears and shows the synchronization status for the system and will note LRUs needing updates to software and/or configuration.

If the technician skips synchronization of the physically replaced LRUs then a "LRU replacement detected" message will be shown on the GDU in normal mode. This message will persist until the "Intelligent LRU Replacement Procedure" on page 342502102 or the manual "Complete Software Load" on page 342502105 is performed. The "LRU replacement detected" message may not be displayed if there are existing Manifest error or Configuration error messages.

Intelligent LRU Software Replacement or manual Complete Software Load is the required action to repair messages related to Manifest error, Configuration error or LRU replacement detection that show up after physical replacement of an LRU.

(1) Applicability and Restrictions

- (a) The Intelligent/Manual LRU Replacement procedure is not required if GDUs within the system are swapped in position. E.g., PFD display swapped with MFD display. The configuration information is stored by all GDUs in their internal memory. The information inside PFD harness configuration module such as fuel, cal and other data is retained during PFD replacement. However, the "LRU replacement detected" message will also be displayed until the "Intelligent LRU Replacement Procedure" on page 342502102 or the manual "Complete Software Load" on page 342502105 is performed.
- (b) The system keeps track of features that have been activated using enablement cards. If an LRU is replaced, Intelligent LRU Replacement will ensure that associated feature set remains available.
- (c) Currently Intelligent LRU Replacement only supports replacement of one LRU at a time.
- (d) Intelligent replacement only supports replacement of LRUs with the same hardware model number E.g., GIA 63W-20 should only be replaced with GIA 63W-20 model in order to utilize intelligent replacement. The manual "Complete Software Load" on page 342502105 can be used if the LRU hardware model is different. Intelligent LRU Replacement cannot be used if a software update is also being carried out for the system. Such an update will require a new loader card and must be carried out via the manual Complete Software Load using the System Upload page.
- (e) Intelligent LRU Replacement can be used to reload any item that has been setup via a loader or enablement card. This includes LRU software, LRU configuration, equipment options and feature unlock settings.

(2) Transaction Log

In order for the G1000 NXi system to accurately replace an LRU's software and configuration, it must first know what was originally loaded to that LRU. To facilitate this, the system records all updates performed through a loader card. Once this record is stored; the system will have the ability to replace those updates back to the LRU at any time. This stored record of all software and configuration updates is known as the "Transaction Log".

The Transaction Log is viewable on the GDU in configuration mode via the Configuration Log page. The history can also be exported to the Top Slot SD card in a textual format by pressing the "DNLD TRANS" button on that page.

On the Configuration Log page the most recent update is at the top of the list. Grayed-out text represents configuration items that were loaded prior to the last "Clear Command". These configurations are no longer applicable to the current state of the aircraft; but are listed in the log for informational and historical purposes.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Garmin's calibration and configuration features use specific files known as GREG files to upload calibration and configuration features. Each file is populated with various product data that is specific to a fleet of aircraft or may be specific to a single aircraft. As part of the transaction functionality, files that are used to load configuration and calibration data will be put through CRC generating software to generate a unique value for each transaction. Calibration and configuration data that is manually changed by maintenance technicians will not be recorded by the transactions logs. This includes calibration data changed via configuration pages, rigging, etc., however, transactions for the clear command softkeys that are part of the Systems Upload page will be recorded.

(3) Card Copy Feature

The system provides an option to copy loader cards to GDU internal memory. The internally saved loader cards are used by Intelligent LRU Replacement procedure. The configuration mode Card Copy option uploads the loader card into PFD internal memory. This process requires approximately four (4) minutes. A newly uploaded loader card is automatically synchronized with the MFD by transferring it in the background during normal mode. This transfer takes a similar amount of time.

The GDUs can hold copies of 32 cards. An interface is provided to delete cards that are no longer applicable. This can be accessed by using the "MANAGE" key on LRU Replacement page.

(4) Intelligent LRU Replacement Procedure

The intelligent LRU replacement procedure is performed on the LRU Replacement page available in configuration mode. Proceed as follows:

(a) Summary

- 1) Check the synchronization status of LRUs on the Configuration Manager page in configuration mode. This page lists those LRUs requiring synchronization.
- 2) Navigate to the LRU Replacement page, for the replaced LRU (shown in yellow text). Load the LRU configuration from the menu. No loader card or selection of options are required.
- 3) Verify the status of synchronization via the Configuration Manager page. A fully synchronized system will show "Synchronized" for all LRUs.

(b) Details

- 1) Selection of the replaced LRU.

The page will highlight LRUs that the G1000 NXi system recognizes as being "new" to the system. The system will provide a "LRU Replacement Detected" message by comparing [serial numbers](#) of the units. Serial number comparison is carried out for software version and region configuration version. Other configuration items are checked by comparing CRCs.

Some replaced LRUs may not get this message if they do not report a serial number. This behavior is common for GIA COM and GIA NAV items because they do not report a serial number. However, if these components have a different software or configuration version, it will be indicated by error messages for Manifest or Configuration. That will be an indication that a Manual/Intelligent Replacement procedure for software/configuration is required.

On the LRU replacement page, LRUs are highlighted (in yellow) if the software, configuration, or serial number of the new unit is different than the unit it is replacing.

- 2) Summary and control of what software/configuration will be loaded to the newly replaced LRU.

The control and display of this information is similar to the System Upload page.

- 3) Initiate the upload of software and configuration to the replaced LRU.

The page will report status and progress similar to the System Upload page.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4) Verification

Once an LRU Replacement procedure has been performed, installers can confirm that the system has been successfully returned to its previously approved state by using the Configuration Manager page available in configuration mode. This page supports to two functions:

- a) Display of expected and actual G1000 NXi fleet and aircraft identification numbers.
- b) Display of the synchronization status between each LRU and the GDU currently being used. This status compares the GDU's expected configuration to what each LRU is reporting as its actual configuration. If they match, the page will report "Synchronized". If they do not match, the page will report "Not Synchronized".

During the time between when the LRU hardware has been replaced, and prior to the LRU Replacement procedure being performed technicians should expect to see a "Not Synchronized" status. Once the LRU Replacement procedure is performed the status will return to "Synchronized", confirming that the replacement was successful

Display of "Invalid"/"Not Synchronized" messages after a replacement procedure indicate that a system restart is required. The restart will resolve items responsible for these error messages.

(c) Step-by-Step Procedure

The following assumes a new LRU has not yet been installed. Please make sure power is OFF before beginning.

NOTE: Only one LRU can be replaced at a time using this loading method.

NOTE: If replacing a GMU 44, perform "(11) GSU 75/GMU 44 Magnetometer Calibration (Procedure B)" on page 342502125.

- 1) Replace faulty LRU with new unit in accordance with that specific LRU's installation instructions. Ensure that Power is OFF before you begin.
- 2) Power up the PFD and MFD in config mode by holding down the ENT key until "INITIALIZING SYSTEM" appears on each GDU.
- 3) On the PFD, use the FMS knob to navigate to the "LRU REPLACEMENT" page.
- 4) The system should automatically detect the new LRU (displayed in gold letters). Use the FMS knob to select the desired LRU.
- 5) Ensure all SOFTWARE and CONFIGURATION boxes are checked.
- 6) Press the LOAD softkey.
- 7) Review the LRU replacement page to ensure that all SOFTWARE and CONFIGURATION items are marked as "PASS".
- 8) Remove power from the PFD and MFD.
- 9) Restart the PFD and MFD in config mode.
- 10) Use the FMS knob on the PFD to navigate to the "CONFIGURATION MANAGER" page.
- 11) Ensure that all CONFIGURATION ITEMS are marked as "Synchronized".
- 12) Use the FMS knob on the PFD to navigate to the "SYSTEM STATUS" page.
- 13) Use the FMS knob to scroll down to the recently installed LRU and confirm that the status is OK.
- 14) Remove power from the PFD and MFD.
- 15) Restart the PFD and MFD in normal mode.
- 16) Confirm that no MANIFEST, CONFIG ERROR, or LRU REPLACEMENT messages exist.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

M. Complete Software Load

(PIR-107992 D.)

(1) MFD & PFD Software Load

CAUTION: DO NOT INTERRUPT POWER TO THE AIRCRAFT AT ANY TIME DURING THESE PROCEDURES. INTERRUPTION OF POWER COULD RESULT IN DAMAGE TO THE EQUIPMENT.

- (a) Apply power to the aircraft and all avionics.
- (b) Pull the MFD and PFD circuit breakers. Remove any SD cards in the PFD or MFD.
- (c) Insert G1000 NXi/PA-28 Loader Card into the PFD top card slot.

NOTE: See "Software Loader Card Creation" on page 34250295, if required.

- (d) While holding the ENT and CLR keys on the PFD, restore power to it by pushing in the PFD circuit breaker.
- (e) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the PFD, release the ENT key.
- (f) Press the YES softkey at the following prompt:

"DO YOU WANT TO UPDATE SYSTEM FILES?"

"NO WILL BE ASSUMED IN 30 SECONDS"

"UPDATING SYSTEM FILES, PLEASE WAIT."

- (g) Press the YES softkey at the following prompt (prompt may not appear):

**"DO YOU WANT TO UPDATE THE CUSTOM GRAPHIC FILES
(EG, SPLASH SCREEN)?"**

"NO WILL BE ASSUMED IN 30 SECONDS"

- (h) Press any softkey at the following prompt to confirm load completion:

"PRESS ANY KEY TO CONTINUE."

"CONTINUING IN 10 SECONDS."

- (i) When PFD update is complete, it starts in the Configuration Mode. DO NOT remove power.
- (j) While holding the ENT key on the MFD, restore power to the MFD by pushing in its circuit breaker.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CAUTION: FOR THE REST OF THE SOFTWARE/CONFIGURATION PROCEDURE, DO NOT OPERATE THE MFD WHILE LOADING SOFTWARE OR CONFIGURATION FILES UNLESS SPECIFICALLY INSTRUCTED TO DO SO. A FAILED OR CANCELLED LOAD MAY RESULT.

(2) System Upload

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) Activate the cursor and select GROUP. Rotate the small FMS knob to generate a pick list. Rotate the small FMS knob to select Baseline.
- (b) Press ENT.
- (c) In the ITEM field, create a pick list by rotating the small FMS knob and select PA-28-181 Archer III.
- (d) Press ENT.
- (e) Press the LOAD softkey. (The load takes 90 minutes to two (2) hours to complete.)
- (f) Review list and verify that all items state "PASS".
- (g) Press ENT to accept the software load.
- (h) Deselect the cursor.

(3) Optional Equipment Configuration

Perform the following steps if any of the following options are installed:

KR-87 ADF	Air Conditioning
KN-63 DME	Flight Stream 510
GDL 59	GDL 69 SXM
GTS 800	GTX 345
S-TEC 55X Autopilot	GTX 345 with GTS
Tachometer - Configuration A, B, or C	CO Detector
Hobbs Meter - Configuration A, B, or C	Kulite OP Transducer

NOTE: Do not attempt to install both GTX 345 and GTX 345 with GTS options. Pick the one applicable to your airplane.

NOTE: At least one of the Hobbs configurations and one of the Tachometer configurations must be installed. If not, the Hobbs or Tach timer will not function.

NOTE: Kulite OP Transducer option must be installed in all airplanes S/N's 2843881 and up. Failure to do so will result in improper operation of the oil pressure gauge.

- (a) On PFD, 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 Options.
- (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) Press LOAD softkey.
- (f) Verify the summary field lists the software and configuration are complete as required and PASS is displayed next to both appropriate boxes.
- (g) Press ENT to accept.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (h) For other installed options, repeat steps (d) thru (i) by rotating the large FMS knob and highlighting the File Field.
- (i) De-activate the cursor.
- (j) Upon completion of all required baseline config, option config, and calibration loading procedures, remove the Loader card from top slot of PFD.

(4) Calibration Option Load

NOTE: Only load configuration option once. Re-loading of configuration option could result in a loss of system calibrations.

- (a) Go to the SYSTEM UPLOAD page and activate cursor. In the GROUP field, create a pick list by rotating the small FMS knob and select Options.
- (b) Press ENT.
- (c) In the ITEM field, create a pick list by rotating the small FMS knob and select Fuel Calibration Initialization.
- (d) Press LOAD softkey.
- (e) Verify the Summary field lists the software and configuration are complete as required and PASS is displayed next to both appropriate boxes.
- (f) Press UPDT CFG softkey.
- (g) Press ENT to select YES when prompted "Update Config Module?"
- (h) Press ENT to confirm completion.
- (i) Upon completion of all required baseline config, option config, and calibration loading procedures, remove the Loader card from top slot of PFD.

(5) Splash Screen Update

- (a) Remove power from the PFD and MFD.
- (b) Insert G1000 NXi/PA-28 Loader Card into the MFD top card slot.
- (c) Apply power to MFD.
- (d) Press the NO softkey at the following prompt:

"DO YOU WANT TO UPDATE SYSTEM FILES?"

- (e) Press the YES softkey at the following prompt:

**"DO YOU WANT TO UPDATE CUSTOM GRAPHIC FILES
(EG, SPLASH SCREEN)?"**

- (f) At the prompt, press any key to continue.
- (g) Remove G1000 NXi/PA-28 Loader Card from the MFD top card slot.
- (h) Repeat steps (b) thru (g) for the PFD.
- (i) Upon completion of splash screen update, remove the Loader card from top slot of PFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(6) Software Load Confirmation

- (a) Start the PFD and MFD in Configuration Mode by applying power while holding ENT.
- (b) On the PFD, select the Systems Status page. Activate the cursor and toggle to the LRU window.
- (c) Highlight each of the listed items in the LRU window and check the software part number and software version against the current numbers and versions shown in the appropriate Required Equipment List (REL). Some items may be in the expandable list of the corresponding item (denote by "+" next to the LRU). Press ENT with the desired LRU highlighted to expand these lists.

NOTE: Not all of the software P/Ns and versions on the Systems Status page need to be verified, only those recorded in the appropriate REL.

- (d) De-activate the cursor.

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

- (e) Re-start the PFD and MFD.
- (f) On MFD splash screen, verify appropriate version ("Piper PA-28 System XXXX.XX" where XXXX.XX is the system version number from the appropriate Required Equipment List, "Chart 30".) is displayed in the upper right corner of the MFD.
- (g) Select softkey on MFD to proceed beyond splash screen.
- (h) Verify that no manifest (software mismatch) alerts are shown on any of the displays.

N. Configuration and Setup

(1) XM Radio (GDL 69A/69eA) Activation

See "Chart 21" on page 34250285 for activation procedures.

NOTE: The radio IDs required for activation may be obtained as follows: start MFD in normal mode and navigate to the XM page in the AUX group. Press the info softkey.

(2) GRC 10 Pairing (If Installed)

NOTE: To pair the GRC 10 to the GRT 10 you will need the GRT 10 Serial Number, and the GRC 10 will need to have two AA batteries installed.

- (a) Press and Release any key on the GRC 10 to power on the unit.
- (b) The GRC 10 will display:
"GRT 10 not found"
- (c) Press the following buttons in sequential order: UP, DOWN, LEFT, RIGHT, MINUS (-), PLUS (+), PSET
- (d) Using the arrow buttons on the GRC 10, enter the GRT 10 Serial Number.
- (e) Verify that the correct Serial Number was entered.
- (f) Store the GRT 10 Serial Number by pressing the XM button.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(3) Aircraft Registration Number Entry (Transponder Configuration)

NOTE: The large FMS knob changes Groups and the small FMS knob changes Pages within a Group.

- (a) Place the PA-28 loader card into the top slot of the PFD.
- (b) Start PFD and MFD in configuration mode by applying power while holding ENT key.
- (c) Select GTX group by rotating the large FMS knob, and then select the TRANSPONDER CONFIGURATION page by rotating the small FMS knob on PFD.
- (d) Ensure that Allow Flight ID Entry is "Config Entry" in the Set and Active columns.
- (e) Select the SYSTEM Group and then select the AIRCRAFT CONFIGURATION page.
- (f) Activate the cursor and highlight the AIRCRAFT REGISTRATION field. Use the small/large FMS knob to enter the aircraft registration number.
- (g) Ensure that an ICAO ADDRESS is automatically populated.
- (h) Press the SET GTS softkey to configure traffic system (if installed). Press ENT to select OK at the dialog that pops up. Then press ENT again after configuration is completed.
- (i) Upon completion, remove loader card from top slot of PFD and store with the aircraft records.

(4) Option Unlock Procedures

Prior to attempting to unlock any of the options, verify software is properly loaded per "Software Load Confirmation" on page 342502108.

(a) CHARTVIEW Unlock (If installed)

- 1) Remove power from the PFD and MFD by pulling (opening) the PFD and MFD circuit breakers.

NOTE: The Chartview Unlock card can only enable Charts on one system (one aircraft). A new Chartview Unlock card must be used for each aircraft.

- 2) Insert the Chart Unlock card, in the upper slot of the PFD.
- 3) While holding the ENT key on the PFD and MFD, restore power by pushing in (closing) the circuit breakers.
- 4) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the MFD and PFD, release the ENT key.
- 5) On the PFD, go to the System Upload page.
- 6) Activate the cursor and use the small FMS knob to create a pick list and select Configuration Files in the GROUP field. Press ENT.
- 7) Use the small FMS knob to create a pick list and select Enable Chartview in the ITEM field. Press ENT.
- 8) Verify there is a check mark in the box in the configuration column for Airframe.
- 9) Press the LOAD softkey.
- 10) Monitor the status of the upload. When the upload is finished, Complete and Pass is displayed. Press ENT.
- 11) De-activate the cursor.
- 12) Power down the system and remove the Chartview Unlock card from the PFD.
- 13) After the Chart function is unlocked, the card should be stored with the aircraft records.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(b) Synthetic Vision Unlock (If installed)

- 1) Remove power from the PFD and MFD by pulling (opening) the PFD and MFD circuit breakers.

NOTE: The Synthetic Vision Unlock card can only enable Synthetic Vision on one system (one aircraft). A new Synthetic Vision Unlock card must be used for each aircraft.

- 2) Insert the Synthetic Vision Unlock card, in the upper slot of the PFD.
- 3) While holding the ENT key on the PFD and MFD, restore power by pushing in (closing) the PFD and MFD circuit breakers.
- 4) On the PFD, 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 Single 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 softkey.
- 9) When the upload is finished, Complete and Pass is displayed. Press ENT.
- 10) De-activate the cursor.
- 11) Power down the system and remove the Synthetic Vision Unlock card from the PFD.
- 12) After the Synthetic Vision function is unlocked, the card should be stored with the aircraft records.

(c) TAWS Unlock (If installed)

- 1) Remove power from the PFD by opening the PFD circuit breaker.

NOTE: The TAWS Unlock card can only enable TAWS on one system (one aircraft). A new TAWS Unlock card must be used for each aircraft.

- 2) Insert the TAWS Unlock card in the upper slot of the PFD.
- 3) While holding the ENT key on the the PFD and MFD, restore power by pushing in (closing) the PFD and MFD circuit breakers.
- 4) On the PFD, go to the System Upload page with the small FMS knob.
- 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 softkey.
- 9) Monitor the status of the upload. When the upload is finished, Complete and Pass is displayed. Press ENT.
- 10) De-activate the cursor.
- 11) Power down the system and remove the TAWS Unlock card from the PFD.
- 12) After the TAWS function is unlocked, the card should be stored with the aircraft records.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(d) CMC Unlock (If installed)

- 1) Remove power from the PFD by opening the PFD circuit breaker.

NOTE: The CMC Enablement card can only enable CMC on one system (one aircraft).
A new CMC Enablement card must be used for each aircraft.

- 2) Insert the CMC Enablement card, PS50207-28 in the upper slot of the PFD.
- 3) Start the PFD and MFD in configuration mode by applying power to each display while holding the ENT key.
- 4) On the PFD, go to the System Upload page with the small FMS knob.
- 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 CMC Enablement 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 softkey.
- 9) Monitor status of the upload. When upload is complete and Pass is displayed, press ENT.
- 10) De-activate the cursor.
- 11) Power down the system and remove the CMC Enablement card from the PFD.
- 12) After the CMC function is unlocked, the card should be stored with the aircraft records.

(5) Aviation Database Loading Procedures

(a) GARMIN GDU Database Card Loading Procedure

NOTE: Garmin Field Service Engineering, resident at Piper, will be responsible for supplying updates for the GDU Database Card.

- 1) Remove power from the PFD and MFD by pulling the PFD and MFD circuit breakers.
- 2) Install databases (SafeTaxi, Terrain 4.9 Arc Second, Airport Directory, Basemap, Obstacle DB2, FliteCharts, NAV Database) on a datacard utilizing TimerTW.
- 3) Install Database Card in the bottom slot of the MFD.
- 4) Restore power to the PFD and MFD.
- 5) The MFD will load the databases and automatically sync them to the PFD. Status can be monitored on the Databases page of the Aux group on the MFD.
- 6) After database sync is completed, remove power from the PFD and MFD and remove the card from the bottom slot of the MFD and store with the aircraft records.
- 7) Restore power to the PFD and MFD.

(b) JEPPE CHARTS Aircraft Loading Procedure

- 1) Remove power from the MFD by pulling the MFD circuit breaker.
- 2) Install Jepps Charts Card in the bottom slot of the MFD.
- 3) Restore power to the MFD by closing the MFD circuit breaker.
- 4) After the update completes, the MFD starts in normal mode.
- 5) Navigate to the Databases page of the Aux group on the MFD. Remove power from aircraft when instructed to cycle power.
- 6) Remove Jepps Charts Card from bottom slot of the MFD and store with the aircraft records.
- 7) Reapply aircraft power and verify charts are updated on the MFD splash screen.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

O. Post-Installation Procedures

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXI SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

NOTE: This entire procedure must be successfully accomplished in order for the G1000 NXi system to be airworthy in your airplane.

NOTE: The following checks **MUST** be performed prior to electrical power-up with the associated wiring connected to the electronic equipment. Failure to perform these checks prior to powering up may result in damage to the equipment.

(1) Bus Power Check

- (a) Do not apply external power to the aircraft.
- (b) Verify that all circuit breakers are set.
- (c) Turn ON Battery Master switch with Avionics Bus Master switch and the Emergency switch in the "OFF" position. Then:
 - 1) Verify Avionics Bus and Emergency Bus are not powered.
 - 2) Pull Lighting Bus and Non-Essential Bus circuit breakers.
 - 3) Verify Lighting Bus and Non-Essential Bus are not powered.
 - 4) Reset Non-Essential Bus circuit breaker.
 - 5) Verify Non-Essential Bus is powered, and Light Bus is NOT powered.
 - 6) Reset Lighting Bus circuit breaker.
 - 7) Verify the Lighting Bus and Non-Essential Bus are powered
- (d) Turn ON the Avionics Bus Master switch, then:
 - 1) Pull Avionics Bus, Non-Essential Bus and Lighting Bus circuit breakers.
 - 2) Verify Essential Bus is powered
 - 3) Verify Avionics Bus, Non-Essential Bus, Lighting Bus and Emergency Bus are not powered.
 - 4) Reset Avionics Bus circuit breaker.
 - 5) Verify Avionics Bus is powered.
 - 6) Verify Non-Essential Bus, Lighting Bus and Emergency Bus are not powered.
 - 7) Reset Non-Essential Bus and Lighting Bus circuit breakers.
- (e) Turn the Emergency Switch to ARM, then turn OFF the Battery Master switch and Avionics Master switch, then:
 - 1) Verify that the Essential Bus, Avionics Bus, Non-Essential Bus and Lighting Bus are not powered.
 - 2) Verify that the Emergency Bus is powered.
- (f) Turn OFF the Emergency switch, Battery Master switch and Avionics Master switch. Verify that the Battery Bus is powered.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

(2) Wiring Harness Checkout

The following is required only when a harness has been repaired, modified, or replaced, but is recommended when troubleshooting.

Prior to installing any LRUs, the wiring harness should be checked for proper connections to the aircraft systems and other avionics systems. Point to point continuity should be checked to expose any faults such as shorting to ground. Any faults or discrepancies found should be corrected before proceeding. Refer to wiring schematics in Chapter 91.

(3) Initial Display Testing

(a) General

Verify the following:

- 1) COM/NAV fields are valid in the top corner of the PFD.
- 2) Altitude, airspeed, vertical speed, heading and OAT fields are valid on the PFD.
- 3) Ensure FD/AP switch is set to "FD" (if installed). Verify no FAILED PATH alerts on the PFD. Set FD/AP switch back to OFF.
- 4) Select Reversionary Mode by pressing the "Display Backup" button on the GMA 1347 Audio Panel. Verify that the PFD and MFD accurately display attitude, altitude, airspeed, vertical speed, and engine instruments. Deactivate the Reversionary Mode.

(b) STALL Annunciation Test

- 1) Activate stall sensor on left wing.
- 2) Verify "stal" aural alert.

(c) Pitot Heat Annunciation Test

- 1) Verify "PITOT HT OFF" annunciation appears on display.
- 2) Pull PITOT HEAT circuit breaker. Turn the Pitot Heat switch to the ON position.
- 3) Verify "PITOT HT FAIL" annunciation appears on display.
- 4) Turn Pitot Heat switch to the OFF position.
- 5) Reset PITOT HEAT circuit breaker.

(d) PFD Fan Fail CAS Test

- 1) Pull BATT circuit breaker to remove power from aircraft.
- 2) Remove PFD and disconnect connector 1P3281 from PFD Fan.
- 3) Reinstall PFD and then reset BATT circuit breaker..
- 4) Verify "PFD FAN FAIL" CAS Advisory annunciates.
- 5) Pull BATT circuit breaker to remove power from aircraft.
- 6) Remove PFD and reconnect connector 1P3281 to PFD Fan. Reinstall PFD.
- 7) Remove MFD and disconnect 2P3281 from MFD Fan.
- 8) Reinstall MFD and reset BATT circuit breaker.
- 9) Verify that "PFD FAN FAIL" CAS Advisory does not annunciate. Verify that "MFD FAN FAIL" CAS Advisory does annunciate.
- 10) Pull BATT circuit breaker to remove power from aircraft.
- 11) Remove MFD and reconnect 2P3281 to MFD Fan. Reinstall MFD.
- 12) Disconnect 3P3281 from Avionics Fan. Reset BATT circuit breaker.
- 13) Verify that "MFD FAN FAIL" CAS Advisory does not annunciate. Verify that "AV FAN FAIL" CAS Advisory does annunciate.
- 14) Pull BATT circuit breaker to remove power from aircraft.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 15) Reconnect connector 3P3281 to Avionics Fan.
- 16) Reset BATT circuit breaker. Verify that "AV FAN FAIL" CAS Advisory is not annunciated.
- (e) Hour (Hobbs) Meter Operation Test
 - 1) For aircraft with Hobbs Meter Configuration A, see "Engine Run Checks" on page 342502140.
 - 2) For aircraft with Hobbs Meter Configuration B, use appropriate test equipment to simulate airspeed greater than 50 knots. Hobbs shall run while TAS > 50 kts.
 - 3) For aircraft with Hobbs Meter Configuration C, Hobbs shall run whenever GIA 1 is powered and reports OK status.
- (f) Bus Voltage Indication Test
 - 1) With external power removed and Battery Master switch set to ON.
 - 2) Verify Main bus voltage indication.
 - 3) With external power removed, Battery Master Switch set to OFF, and Emergency Switch set to ARM.
 - 4) Verify Emergency bus voltage indication.
- (4) Emergency Bus Operation Verification Test

Verify all of the following functions are operational when Emergency Power Switch is set to "ARM," Battery Master Switch is set to "OFF," the engine is off, and external power is disconnected.

 - (a) PFD
 - (b) COM1
 - (c) NAV1 (Integrated Avionics GIA 63W #1)
 - (d) AHRS (GSU 75)
 - (e) GMA 1347 (Audio Panel)
 - (f) Air Data Computer (GSU 75)
 - (g) GEA 71 (Engine Instruments)
 - (h) Standby Instrument (EBD)
 - (i) Avionics Dimmer

NOTE: When under Emergency Power, the MFD, GDL 69, Autopilot Controller, XPDR, ADF, DME, and Traffic are not available. Also note that NAV2, GPS2 and COM2 are not available.
- (5) G1000 NXi Connection Check

Perform the following steps to verify the following:

NOTE: Do not have External Power on the aircraft while conducting the following tests.

 - (a) PFD and MFD Ethernet connection check

Perform "Display Failure Test" on page 342502138.
 - (b) Engine and GPS data availability check.

Check for engine data availability to the displays and GPS data availability to the ADAHRS when either or both GIAs are inoperative:

Perform "GIA Failure Test" on page 342502137.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

P. LRU Test Procedures

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXI SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

(1) GDU 105X PFD and MFD Test Procedure

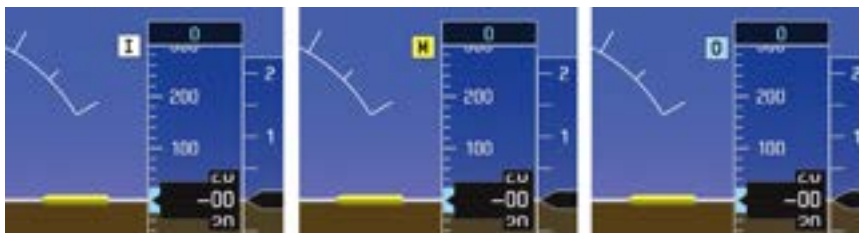
- (a) Allow displays to initialize.
- (b) Check that all COM/NAV display fields are valid in the top corners of the displays.
- (c) On the PFD, check that the attitude, heading, altitude, airspeed, vertical speed, and OAT fields are valid within two (2) minutes of power up. On the MFD, check that all of the engine instrument fields are valid.
- (d) Push the red display reversion button on the GMA 1347. Verify that the PFD and MFD enter reversionary mode. Both displays should have valid attitude, heading, altitude, airspeed, vertical speed, and engine instruments.
- (e) De-activate reversionary mode by pushing the red reversion button again.
- (f) Verify that any options, if equipped (i.e. ADF, DME, TAWS, ChartView, etc.), are operational.
- (g) On the PFD, press the ALERTS softkey. Correct any PFD/MFD Alert messages that appear.
- (h) If no other service is to be performed, perform "Return to Service Procedure" on page 342502136.

(2) GMA 1347 Audio and Communications Test

Except for marker beacon operation, an in-aircraft checkout may be performed in the aircraft with known good microphone, headset, and speaker.

- (a) Apply external power. Supply power to the Avionics Bus.
- (b) Verify that the pilot and copilot Intercom System (ICS) mics and phone jacks are functioning.
- (c) Press PA key on the Audio Panel for two (2) seconds (for Passenger Address mode), press the pilot's MIC key and verify that audio is heard from the cockpit speaker.
- (d) Verify operation of COM1. Conduct VSWR Check, under GIA 63W Test, below.
- (e) Failsafe Operation Check – GMA 1347 to COM1
 - 1) Turn off the GMA 1347 by pulling the AUDIO MKR circuit breaker.
 - 2) Verify COM1 transmits and receives normally over pilot headphones.
 - 3) Verify COM1 audio is controlled by the PFD COM audio control.
 - 4) Close (push in) the AUDIO MKR circuit breaker.
- (f) Verify operation of COM2. Conduct VSWR Check, under GIA 63W Test, below.
- (g) Marker Beacon Test
 - 1) Verify that the outer, middle and inner markers appear on the PFD (see "Figure 34").
 - 2) Verify Marker Beacon Audio and tones.
 - 3) Verify the MKR MUTE key mutes the Marker Beacon Audio.
 - 4) Verify Marker HI/LO Sensitivity operation.
- (h) Verify operation of Passenger ICS at all stations.
- (i) If no other service is to be performed, continue to "Return to Service Procedure" on page 342502136.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Marker Beacon Symbology
Figure 34

(3) GIA 63W Tests

(a) GPS Signal Acquisition (see "Figure 35")

The GIA 63W units normally acquire a GPS navigation solution in 2 minutes after startup if the aircraft is outside (or indoors with a GPS repeater).

- 1) Select the GPS STATUS page on the MFD (fourth page in AUX group).
- 2) Two softkeys on the bottom of the display will toggle between GPS1 and GPS2.
- 3) Verify that both receivers show 3D DIFF NAV on the MFD.

NOTE: It may be necessary to temporarily disable or move away from GPS repeaters while testing, as repeaters may adversely affect GPS receiver performance.



GPS STATUS Page (MFD)
Figure 35

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(b) VSWR Check of COM Antennas

Check the insertion loss and VSWR (Voltage Standing Wave Ratio) of COM1 and COM2.

To check VSWR, insert an in-line wattmeter into the coaxial transmission line between the transceiver and antenna. The wattmeter should be inserted as closely as possible to the transceiver. Any problem with the antenna installation is most likely seen as high reflected power.

A VSWR of 3:1 may result in a loss of up to 50 percent of transmit power. The VSWR should be 2.5:1 or less.

VSWR Test

1) VSWR (Voltage Standing Wave Ratio)

The standing wave ratio is a measure of the amount of power transmitted to the antenna, compared to the amount reflected back to the transmitter. S.W.R.'s are a function of the transmission line, the antenna and their installation.

2) Material Required

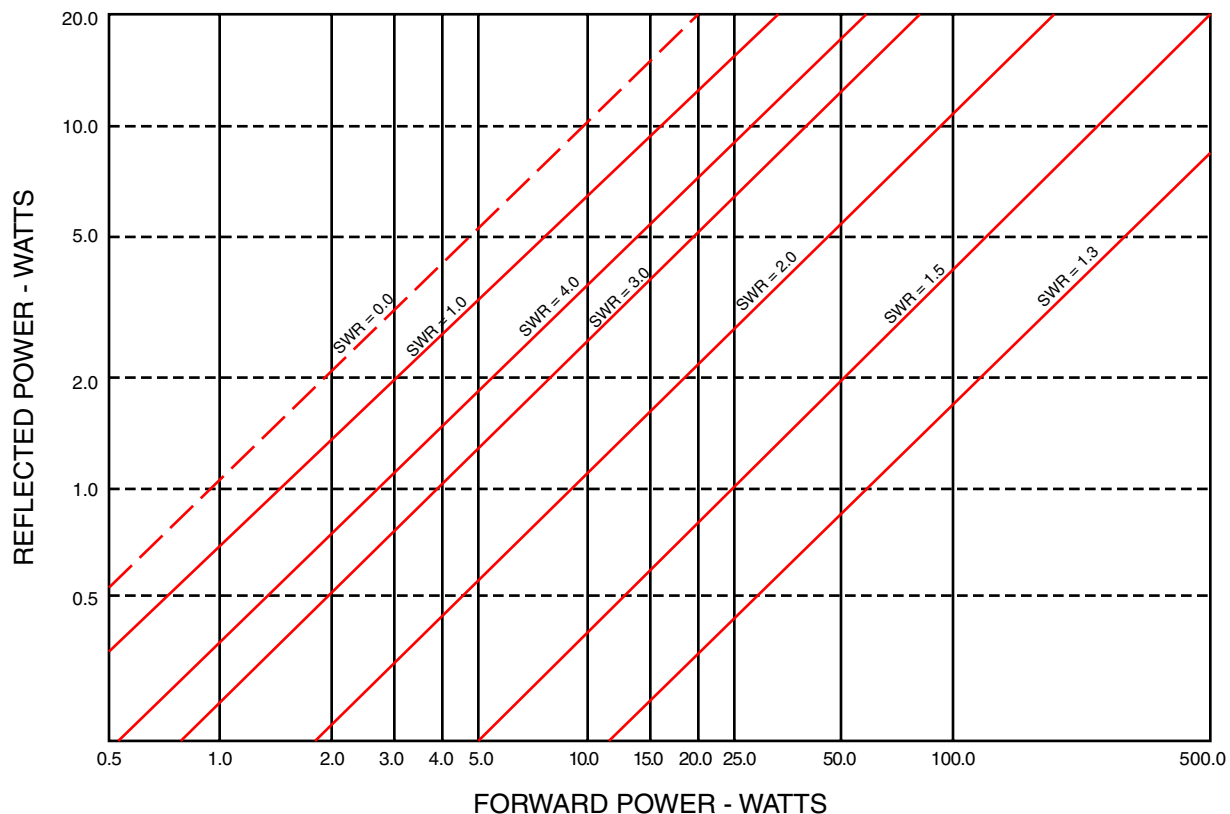
Thruline Wattmeter (Model 43 Bird Electronics, Cleveland, Ohio) or equivalent.

3) S.W.R. Test:

Test the antenna installation with the Thruline wattmeter. Check VSWR's at 118.0, 123.0, 128.0, 132.0, and 135.95 MHZ. Determine the VSWR value with the conversion chart below.

4) VSWR's in excess of 2.5:1 are not acceptable.

VSWR CONVERSION CHART



**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(c) VHF COM Interference Test

This test must be conducted outside. Use of a GPS repeater inside a hangar may result in a failed test.

This procedure assumes that the system is currently set to 25 kHz COM channel spacing. Once the signal acquisition test has been completed successfully, perform the following steps:

- 1) On the MFD, monitor GPS signal strength bars on the AUX – GPS STATUS page.
- 2) On the PFD, ensure that the CDI is set to GPS. If it is not, press the 'CDI' softkey until GPS ENR is displayed.
- 3) Verify that the GPS "INTEG" flag is out of view.
- 4) Select 121.150 MHz on the COM1 transceiver.
- 5) Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
- 6) During the transmit period, verify that the GPS "INTEG" flag does not come into view on the PFD and verify that GPS1 does not lose a 3-D navigation solution on the MFD.
- 7) Repeat steps 5) and 6) and re-transmit while monitoring GPS2 signal levels on the MFD.
- 8) Repeat steps 4) through 7) for each of the following frequencies:
 - 121.175 MHz
 - 121.200 MHz
 - 131.250 MHz
 - 131.275 MHz
 - 131.300 MHz
- 9) Repeat steps 4) through 8) for the COM2 transceiver (GIA2).
- 10) On the MFD, select the AUX – SYSTEM SETUP page.
- 11) Under the COM CONFIG field, change the COM channel spacing from 25 kHz to 8.33 kHz.
- 12) Go back to the AUX – GPS STATUS page.
- 13) Select 121.185 MHz on the COM1 transceiver.
- 14) Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
- 15) During the transmit period, verify that the GPS "INTEG" flag does not come into view on the PFD and verify that GPS1 does not lose a 3-D navigation solution on the MFD.
- 16) Repeat steps 14) and 15) and re-transmit while monitoring GPS2 signal levels on the MFD.
- 17) Repeat steps 14) through 16) for each of the following frequencies:
 - 121.190 MHz
 - 130.285 MHz
 - 131.290 Mhz
- 18) Repeat steps 14) through 17) for the COM2 transceiver (GIA2).
- 19) On the MFD, select the AUX – SYSTEM SETUP page and change the COM channel spacing back to 25 kHz.
- 20) Continue to the VOR/LOC/GS Test.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(d) VOR/LOC/GS Test

- 1) Perform NAV 1 and NAV 2 accuracy tests: Full scale, Half scale, OBS operation.
- 2) Check NAV 1 and NAV 2 audio and Ident.
- 3) Check NAV 1 and NAV 2 Sensitivity.
- 4) Perform LOC 1 and LOC 2 accuracy tests: Full scale, Half scale.
- 5) Check LOC 1 and LOC 2 Sensitivity.
- 6) Perform GS 1 and GS 2 accuracy tests: Full scale, Half scale.
- 7) Check GS 1 and GS 2 Sensitivity.

(4) GEA 71 Test

- (a) On the MFD (Normal Mode), check the indication for each of the sensor or monitor inputs with the aircraft engines off. In general, verify all engine and system instruments show valid static normal values and markings, with no red Xs or erratic indications. Refer to "Figure 36" (baseline configuration instruments shown) for normal engine instrument markings.
- (b) If no other service is to be performed, continue to the Return to Service Procedure, below.

(5) GTX 3X5R Test

Operation of the GTX 3X5R Mode-S transponder is accomplished using the PFD or the MFD. Refer to the appropriate Garmin G1000 Cockpit Reference Guide, for basic operation.

(a) Functional Check

- 1) Press the XPDR softkey on the PFD.
- 2) Verify that the ADS-B TX softkey is available and can be toggled (softkey 10).

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.



Normal Engine Instruments
Figure 36

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(6) GSU 75 Tests

NOTE: If any connections in the pitot / static system are opened for maintenance, the entire system must be rechecked per Pitot and Static Systems, "Test" on page 34101.

NOTE: Allow the unit to warm up for 15 minutes before performing the following tests.

Verification of the altimeter and airspeed must be performed using an air data test set (ADTS). The static port and altimeter must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) § 91.411 and Part 43 Appendix E. The PFD must be in Configuration Mode and the MFD must be in Reversionary mode for performing the tests as outlined in Part 43 Appendix E.

(a) Part 43 Appendix E Testing

1) Preparation

CAUTION: CONFIGURATION MODE CONTAINS CERTAIN PAGES AND SETTINGS THAT ARE CRITICAL TO AIRCRAFT OPERATION AND SAFETY. THESE PAGES ARE PROTECTED AND CANNOT BE MODIFIED, UNLESS THE TECHNICIAN IS PROPERLY AUTHORIZED AND EQUIPPED. HOWEVER, MOST PROTECTED PAGES ARE VIEWABLE TO ALLOW SYSTEM AWARENESS FOR TROUBLESHOOTING.

- a) Start the G1000 NXi system in Normal Mode.
- b) Remove power to PFD.
- c) Turn on PFD in Configuration Mode: press and hold the ENT key on the PFD while applying power.
- d) Release the ENT key after "INITIALIZING SYSTEM" appears in the upper left corner of the PFD.

2) Testing

NOTE: Per Part 43 Appendix E, paragraph (b)(2), Garmin specifies a test procedure equivalent to Part 43 Appendix E, paragraph (b)(1) with two exceptions. The tests of sub-paragraphs (iv) (Friction) and (vi) (Barometric Scale Error) are not applicable because the digital outputs of the GSU 75 are not susceptible to these types of errors.

- a) Using the FMS knob on the PFD turn to the GSU page group. Use the B ALT field for all CFR Part 43 Appendix E tests for G1000 NXi altitude.
- b) Place the MFD in Reversionary Mode. The baro setting can then be read from the MFD for CFR Part 43 Appendix E tests.

NOTE: The baro setting on the MFD is controlled by PFD.

- 3) After completing the tests specified by § 91.411 and Part 43 Appendix E, return the MFD and PFD to Normal Mode.

NOTE: The following tests are above and beyond the requirements set forth in Appendix E, and are required only when appendix E tests are required.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4) Pitot/Static Airspeed Test

- a) Command air data test set (ADTS) to simulate air speeds shown in the table below.

<u>Calibrated Air Speed (Knots)</u>	<u>Allowed tolerance (± Knots)</u>
50	5.0
80	3.5
100	2.0
120	2.0
150	2.0

- b) Wait for ADTS to report that target values have been achieved.
c) Verify that computed air speeds shown on the PFD are within the tolerances specified in the OEM maintenance documentation.

5) Static Port Vertical Speed (Rate of Climb) Test

- a) Command ADTS to change the altitude at the rates shown in the table below.
b) Wait for ADTS to report that target rates have been achieved.
c) Verify that the Rate of Climb reported by the Vertical Speed field on the PFD is within the tolerances specified in the table below:

<u>Vertical Speed (feet/minute)</u>	<u>Allowed tolerance, (± feet/minute)</u>
2000	100
0	45
-2000	100

(7) OAT Probe Check

Check that the outside air temperature (OAT) probe measurement given on the PFD is accurate by comparing it to a calibrated thermometer which is stabilized at ambient temperature. OAT reading should be within 2° C of calibrated thermometer.

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.

(8) GSU/GMU Calibration Procedures

GSU/GMU Recalibration Criteria – see "Chart 27".

The following calibration procedures are provided for the GSU 75 and GMU 44:

- Pitch/Roll Offset Calibration:
- Magnetometer Calibration:
- Engine Run-Up Vibration Test:
- Magnetometer Interference Test:

When ready to perform the procedures, shut off the displays by pulling the PFD and MFD circuit breakers. Restart the PFD and MFD in Configuration Mode. Follow the steps given for each procedure on-screen at the GSU/GMU CALIBRATION page. Note that the CALIBRATE command cannot be selected and activated until the installer acknowledges all required steps have been carried out by pressing the ENT key on each step.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 27
GSU 75 ADAHRS / GMU 44 MAGNETOMETER CALIBRATIONS**

Required GSU/GMU Calibrations			
Condition	Calibrations Required		
	Procedure A: GSU 75 Pitch/Roll Offset	Procedure B: GSU/GMU Magnetic Calibration	Procedure C: Engine Run-up Vibration Test
GMU 44 was removed and/or replaced.		X	
GSU 75 ADAHRS was removed and/or replaced. The mounting tray was NOT removed and the mounting tray bolts were NOT loosened.	None Required. Continue to GRS/GMU Test section.		
GSU 75 ADAHRS was removed and/or replaced. The mounting tray WAS removed and/or mounting tray bolts WERE loosened.	X	X	X
GSU 75 ADAHRS Configuration Module was replaced.	X	X	X

(9) GSU 75 Pitch/Roll Offset Calibration (Procedure A)

This procedure must be performed with the engine OFF.

- (a) Level the aircraft to within $\pm 0.25^\circ$ of zero pitch and zero roll using a digital level. (Refer to 8-20-00.)
- (b) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (c) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (d) Select the GSU/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (e) Activate the cursor by pressing the small FMS knob and highlight the SELECT GSU UNIT window. Select GSU1 on the PFD
- (f) Highlight the SELECT PROCEDURE window and select **PITCH/ROLL OFFSET**.
- (g) Press the ENT key.
- (h) Follow the checklist items displayed and press the ENT key as each step is completed or confirmed.
- (i) When the CALIBRATE field is blinking on the PFD, press the ENT key to begin the procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (j) After several seconds, a new checklist appears in the lower half of the PFD. Press the ENT key as each step is confirmed. When the CONFIRM AIRCRAFT IS LEVEL field is blinking on the PFD, press the ENT key to continue.
- (k) The result of the pitch/roll offset compensation is displayed on the PFD. If successful, the PFD reports the successful calibration and returns to normal operation.
- (l) Press the ENT key on the PFD to conclude this procedure.
- (m) Restart all displays in Normal Mode.

NOTE: The following Magnetometer Calibration procedure must be carried out at a site that is determined to be free of magnetic disturbances. If unsure whether a site is “clean” or not, the technician should verify that the site is clean by following the guidance provided. The technician may skip the Compass Rose Evaluation Procedure if the site condition is acceptable.

(10) Compass Rose Evaluation of Magnetic Disturbances for Magnetometer Calibration Procedure (Optional)

NOTE: Typically, a compass rose is an acceptable location to perform the magnetometer calibration procedure. However, because not all compass roses are well maintained, even an existing compass rose should be regularly evaluated using the method described here to determine if it is free of magnetic disturbances. If evaluation of an existing compass rose indicates that magnetic disturbances are present, then an alternative location must be found to perform the Magnetometer Calibration procedure.

A G1000 NXi-equipped airplane that has completed the pitch/roll offset compensation procedure can be used to evaluate a candidate site for magnetic disturbances and determine whether it is a suitable location to perform the magnetometer calibration procedure. The magnetometer calibration procedure itself contains the logic to simultaneously survey the location for magnetic cleanliness while it is computing the magnetometer calibration parameters. In order to evaluate a candidate site, the Magnetometer Calibration procedure must be performed twice: once turning clockwise around the site and once turning counterclockwise. Both times, the procedure should be conducted as described in GSU 75/GMU 44 Magnetometer Calibration, below, with the exception of the direction of turns around the site.

NOTE: Although (Procedure B) GSU 75/GMU 44 Magnetometer Calibration indicates that the Magnetometer Calibration procedure should be performed by making a series of clockwise turns around the site, the procedure can also be performed by making counterclockwise turns for the purpose of evaluating the site for magnetic disturbances.

If, upon completion of the Magnetometer Calibration procedure in both directions, the PFD displays the “CALIBRATION SUCCESSFUL / SITE IS CLEAN” message, then the candidate site is sufficiently free of magnetic disturbances and acceptable for magnetometer calibration. It is important that successful results are obtained in both directions to ensure that the magnetometer sweeps over a large enough area at the candidate site.

If, upon completion of the Magnetometer Calibration procedure in either direction, the PFD displays either the “MAG FIELD AT SITE NOT UNIFORM,” or “MAG FIELD AT SITE DIFFERS FROM IGRF MODEL” message, then the site contains magnetic disturbances that are too significant to use the site for calibration.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(11) GSU 75/GMU 44 Magnetometer Calibration (Procedure B)

NOTE: Procedure A must first be successfully accomplished before performing Procedure B, only for situations where the GSU 75 was replaced with a new unit.

Calibration Procedure B must be carried out on a compass rose in order to guarantee measurements free of environmental magnetic disturbances. Attempting to carry out this maneuver on a typical ramp area may not yield a successful calibration. The accuracy of the ADAHRS cannot be guaranteed if this calibration is not performed on a magnetically clean compass rose. If the compass rose condition is not known, it is recommended that the technician follow the guidance in Compass Rose Evaluation of Magnetic Disturbances, above.

- (a) Start the aircraft engine following the procedures referenced in the POH.
- (b) After aircraft engine startup, taxi the aircraft to a properly calibrated compass rose.
- (c) At the compass rose, align the aircraft to a heading of magnetic north ($\pm 5^\circ$).

CAUTION: CALIBRATION PROCEDURE B MUST BE CARRIED OUT ON A COMPASS ROSE IN ORDER TO GUARANTEE MEASUREMENTS FREE OF ENVIRONMENTAL MAGNETIC DISTURBANCES. ATTEMPTING TO CARRY OUT THIS MANEUVER ON A TYPICAL RAMP AREA MAY NOT YIELD A SUCCESSFUL CALIBRATION. THE ACCURACY OF THE ADAHRS CANNOT BE GUARANTEED IF THIS CALIBRATION IS NOT PERFORMED ON A MAGNETICALLY CLEAN COMPASS ROSE OR EQUIVALENT.

- (d) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (e) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (f) Select the GSU/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence on the PFD:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (g) Activate the cursor by pressing the small FMS knob and highlight the GSU UNIT window. Select GSU1 on the PFD.
- (h) Highlight the SELECT PROCEDURE window and select MAGNETOMETER.
- (i) Press the ENT key.
- (j) Use the cursor to highlight the BEFORE CALIBRATION window on the PFD.
- (k) Follow the checklist items displayed and press the ENT key as each step is completed or confirmed.
- (l) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
- (m) The PFD display advises the operator when to turn the aircraft, when to stop, and when to turn again.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (n) Upon instruction to turn, taxi the aircraft in a right turn. After approximately 25° to 30° of turn from the last heading, the PFD display advises the operator to stop the aircraft.

NOTE: Due to the difficulties in executing smooth, accurate turns, the PFD may incorrectly interpret a station and instruct to “HOLD POSITION” prior to full completion of a 30° turn. If this scenario is encountered, it is best for the operator to ignore the “HOLD POSITION” command and instead use outside references to complete the approximate 30° turn. Instead of using the PFD instructions to turn as a real-time indication of when to turn, simply judge the 30° (±5°) turn increments of the aircraft by using the compass rose radials. Dwelling at these 30° increments for the time recommended by the PFD should result in successful calibration.

- (o) The PFD guides the operator to dwell at multiple headings around a complete circle.

NOTE: Due to high winds or excessive airframe vibration, the operator may encounter a condition where a PFD restarts the 18-second countdown without full completion of the previous countdown. If this is encountered more than once for a given station, the operator should begin turning to the next station (approximately 30°). A minimum of 2 successful stations per quadrant (and for each GSU 75) is required, where a successful station is a full 18-second countdown followed by instruction to move. Ensure that at least 2 stations per quadrant are completed. Thus, it may sometimes be required to dwell at a station after a countdown restart. A maximum of 20 stations is allowed for the entire calibration procedure. If too many countdown restarts are encountered, the calibration will fail with the message, “TOO MANY STATIONS.”

- (p) Repeat the turn-and-stop process until the PFD advises that a successful calibration is complete. The GSU 75 ADAHRS then enter the normal operational mode. Press the ENT to conclude this procedure.

(12) Engine Run-Up Vibration Test (Procedure C)

NOTE: Calibration Procedure C is performed in order to guarantee that the ADAHRS mounting is sufficiently rigid and insensitive to vibration. Calibration Procedures A and B are not required prior to this procedure.

- (a) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (b) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (c) Select the GSU/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
- 9
 - 10
 - 11
 - 12 (far right softkey)
- (d) Activate the cursor by pressing the small FMS knob and highlight the SELECT GSU UNIT window.
- (e) Highlight the SELECT PROCEDURE window and select ENGINE RUN-UP TEST on the PFD.
- (f) Again, press the ENT key on the PFD to select the first checklist item displayed.
- (g) Follow the checklist items displayed and press the ENT key as each one is completed or confirmed. When the CALIBRATE field is blinking on the PFD, press the ENT key to begin the procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (h) The PFD will instruct the operator to gradually increase power from idle to full throttle and back to idle over a period of 2–4 minutes.
- (i) When the engine run-up is completed and the engine is back to an idle setting, press the ENT key on the PFD to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking.
- (j) PFD will state if the installation has passed or failed the vibration test. If the test fails, the specific measurements causing the failure are identified and associated numeric values are displayed on the PFD.

NOTE: Should a failure occur, the technician may perform the Engine Run-up test a maximum of three (3) times successively before corrective action must be taken. If the test does not pass after three attempts, then the installation should not be considered reliable until the source of the vibration problem is identified and remedied. In the event of repeated failure of the engine run-up test, record the values that are reported to be out of range for future reference.

The following are potential causes for failure of the engine run-up test:

- 1) Vibration motion of GSU 75 and/or GMU 44 caused by neighboring equipment and/or supports.
- 2) Mounting screws and other hardware for GSU 75 and/or GMU 44 not firmly attached.
- 3) GSU 75 connector not firmly attached to unit.
- 4) Cabling leading to GSU 75 or GMU 44 not firmly secured to supporting structure.
- 5) An engine and/or propeller that is significantly out of balance.

- (k) Press the ENT key to conclude this procedure.

(13) Magnetometer Interference Test

The Magnetometer Interference Test validates that no electronic device is interfering with the operation of the GMU 44 magnetometer. It verifies that the aircraft has a magnetically “clean” GMU 44 installation. The test exercises various devices on the aircraft that could affect the magnetic field measured by the GMU (examples include navigation lights, control servos, etc).

NOTE: It is highly recommended that this test be performed after the installation or maintenance of any electrical components on the aircraft and/or for troubleshooting the GMU 44.

NOTE: External power cart and other aircraft need to be as far away from the aircraft as possible. Turn Battery Master ON, AV BUS Master ON, and push in (close) all circuit breakers.

- (a) Start the PFD and MFD in Configuration Mode by holding ENT on each display while closing the circuit breaker.
- (b) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (c) Select the GSU/GMU Calibration Page, as shown in "Figure 37" on page 342502128. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (d) Press the ENT key.
- (e) Select MAG INTERFERENCE TEST and press the ENT key.
- (f) Follow the checklist items displayed on the PFD, and press the ENT key as each one is completed or confirmed.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Magnetometer Interference Test
Figure 37

- (g) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.

NOTE: The list of relevant electronic devices are given in "Chart 28" on page 342502129. Use a stopwatch to accurately time the tests. All actions are to be carried out in the order and at the precise elapsed time as specified in the prepared test sequence.

NOTE: It is important that the "time equals zero" moment corresponds with the moment the PFD first displays the blinking TEST COMPLETE? message.

- (h) When the test is complete, press the ENT key to indicate the process is complete. When this is done, the TEST COMPLETE field stops blinking.
- (i) The PFD will display if the corresponding GSU 75 installation has passed or failed the magnetometer interference test. If the test passes, no further action is required for this test. If the test fails, the installation should be considered unreliable until the source of magnetic interference is identified and remedied. When the magnetometer interference test fails, record the three magnetometer maximum deviation values and their corresponding timestamps. Any maximum deviation value greater than 2.5 milliGauss indicates a problem that must be resolved. Compare the corresponding timestamps with the prepared test sequence to identify which action produced the problem. Contact Garmin for assistance in resolving the problem.

NOTE: Two common reasons for a failed magnetometer interference test are:

- 1) New equipment is installed in close proximity to GMU 44 magnetometer, and,
- 2) an existing or new electronic device has become grounded through the aircraft structure instead of via the proper ground wire in a twisted shielded pair.

- (j) Press the ENT key to conclude this procedure.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 28
G1000 NXi - MAGNETOMETER INTERFERENCE TEST

MAGNETOMETER INTERFERENCE TEST	
ELAPSED TIME Since start of test (Minutes:Seconds)	ACTION
0:00	Test Begins
0:10	Turn on strobe light
0:20	Turn off strobe light
0:30	Turn on fin strobe
0:40	Turn off fin strobe
0:50	Turn on nav lights (if optional tail light installed)
1:00	Turn off nav lights (if optional tail light installed)
1:10	Blower Motor on Low
1:20	Blower Motor off
1:30	Blower Motor on High
1:40	Blower Motor off

(14) Automatic Flight Control System (AFCS) Tests (If installed)

See 'Garmin G1000 / G1000 NXi Equipped Airplanes' under S-TEC System 55 / 55X, Ground Checks in 22-10-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



ADAHRS Normal Mode Check
Figure 38

(15) ADAHRS Normal Mode Check

The aircraft may now be taxied back and the engine can be shut down for final testing. Restart the displays in Normal Mode to conduct final system checks. When the PFD powers up in Normal Mode, the ADAHRS attitude and heading information displayed should become valid within one (1) minute of power-up, as shown in "Figure 38" (provided both GPS receivers have a valid position; if GPS is unavailable, ADAHRS initialization may take as long as two (2) minutes).

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.

(16) GDL 69A (69eA) Test

NOTE: This section verifies the correct installation of the GDL 69A, but is not the activation sequence. See "Chart 20" on page 34250284 for XM activation.

- Connect a headset to the audio jack on the pilot or copilot side of the airplane.
- On the MFD select AUX - XM RADIO.
- Change the XM channel using the MFD controls.
- Increase and Decrease the volume using the MFD controls.
- Change the XM channel using a Bluetooth device with Garmin Pilot connected to the FS 510 (if installed). Increase and Decrease the volume using the Bluetooth device.
- Change the XM channel using the GRC 10 (if installed). Increase and Decrease the volume using the GRC 10.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (g) Verify XM audio operation at Pilot, Copilot and all passenger stations. Verify stereo operation.
- (h) Activate the Stall Warning horn and verify that the XM audio is muted.
- (i) As a final operations check, make sure there are no MANIFEST errors shown on the PFD for the GDL 69eA.

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.

(17) GTS 8xx Checkout (If Installed)

- (a) Start the G1000 NXi system in normal mode and select the Traffic Map page in the map group on the MFD.
- (b) Turn ADS-B off by pressing the ADS-B softkey if the softkey indicator is green.
- (c) Verify that the STANDBY, OPERATE, TEST (in Standby mode), and ALT MODE softkeys are available on the bottom of the display. Verify that a TAS Status (not TAS FAIL) is displayed in the upper right corner of the traffic map. Verify that a yellow NO DATA message is not displayed in the center of the map. If TIS is displayed instead of TAS, refer to "Optional Equipment Configuration" on page 342502106 to install the GTS 800 option.
- (d) Press the OPERATE softkey and verify that OPERATING is displayed in the upper right corner of the traffic map.
- (e) Press the STANDBY softkey and verify that STANDBY is displayed in the upper right corner of the traffic map.
- (f) Set range to 6NM or greater.
- (g) Press the TEST softkey and verify that TEST is displayed in the upper right corner of the traffic map and that a traffic test pattern is displayed. Verify that "TAS System Test" aural is heard over the cockpit speaker at the conclusion of the test.
- (h) Verify that the FAIL indicator is not present in the top right corner of the MFD.
- (i) Open the TAS circuit breaker and verify that TRFC FAIL system message is annunciated.
- (j) Close the TAS circuit breaker and verify that TRFC FAIL system message is cleared.

(18) ChartView Check (If installed)

ChartView, if installed, must be enabled using a ChartView Enable Card and a current ChartView database. Ensure that a Chartview Jeppesen Nav Data U.S. database card is installed in the top card slot of the MFD. Refer to Chartview Unlock, above.

NOTE: The required ChartView databases are subscription-based and are to be procured by the aircraft owner directly from Jeppesen.

- (a) Select the Airport Information page in the WPT Group.
- (b) Verify that the title at the top of the page reads "WPT- Airport Information".
- (c) Enter KVRB as the waypoint and verify that the CHRT softkey is available.
- (d) Press the CHRT softkey and verify the electronic chart is viewable.
- (e) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.

(19) Synthetic Vision Check (If installed)

- (a) Ensure that the aircraft has a valid GPS position.
- (b) Press the PFD Opt softkey on PFD.
- (c) Press the SVT softkey on PFD.
- (d) Press the Terrain softkey on PFD.
- (e) Verify the traditional blue/brown attitude depiction is replaced with the Synthetic Vision rendering within 2–3 minutes.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(20) TAWS Functional Check

- (a) Ensure that the aircraft has a valid GPS position.
- (b) Select the TAWS-B page in the MAP Group.
- (c) 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."

- (d) Press the MENU button and select "Test TAWS System" from the pop-up menu and press ENT key.
- (e) After the TAWS test has completed, verify that "TAWS System Test Okay" is heard over the audio system.
- (f) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.

(21) Terrain Proximity Check (if TAWS is not installed)

- (a) Ensure that the aircraft has a valid GPS position.
- (b) Select the TERRAIN PROXIMITY page (last page in the MAP group).
- (c) Verify that the title at the top of the page reads "MAP - TERRAIN PROXIMITY".
- (d) Verify that the map is colored to show terrain and no failures are annunciated on the page.

(22) KR 87 ADF Functional Check and Adjustment (If installed)

(a) Functional Check

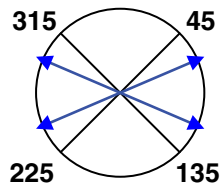
This check verifies that the ADF / G1000 NXi interface operates correctly.

- 1) Tune the ADF to a known local NDB and verify the bearing is correct within +/- 15° and the Morse Code Identifier is clear and accurate.
- 2) Verify the ADF audio is available on the GMA 1347 audio panel.

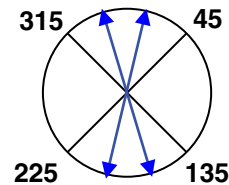
(b) Quadrantal Error Adjustment

- 1) Position aircraft on ramp in an area that is clear of surrounding buildings and other obstructions that may block or reflect radio signals.
- 2) Select ADF as the bearing source on the PFD.
- 3) Select ADF mode on ADF receiver.
- 4) Tune the ADF to a known local NDB.
- 5) Orient aircraft such that the bearing indicator points to 0 degrees (aircraft is heading directly to station). Note the heading.
- 6) Using the heading indicator, rotate the aircraft 45 degrees to the left (counterclockwise). Note the indicated relative bearing and the amount of error.
- 7) Continue to turn the aircraft in 45 degree increments, noting the relative bearing error at the increment.
- 8) Verify that the relative bearing error at the cardinal points (90, 180, 270, 360) is within ±5 degrees.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Turn the QE adjustment
pot clockwise



Turn the QE adjustment
pot counter-clockwise

Quadrantal Error Adjustment
Figure 39

NOTE: The following steps are not required if the quadrantal error is within tolerance.

- 9) Average the errors at the quadrantal points (45, 135, 225, 315) to determine the amount of QE adjustment required.

NOTE: The QE adjustment potentiometer is located to the side of the antenna connector. The adjustment hole is protected by a threaded cap which must first be removed. If the antenna is inaccessible from the inside of the aircraft, the antenna will have to be unfastened and pulled away from the aircraft far enough to insert a jeweler's screwdriver into the adjustment hole. Take care of the O-ring seal beneath the adjustment screw cap. Following adjustment, the cap must be reinstalled to ensure that the electronics compartment is environmentally sealed.

- 10) Perform quadrantal error adjustment per the following figures. The QE adjustment potentiometer has a sensitivity of approximately 1 degree per turn.
 - 11) Recheck the relative bearings and readjust the QE compensation pot as necessary to split the errors at the quadrantal points and obtain the lowest possible average error.
 - 12) When QE adjustments are complete, reinstall the o-ring seal and the threaded cap in the adjustment hole to seal the antenna.
- (c) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.
- (23) KN 63 DME Check (If installed)
- This check verifies that the DME-to-G1000 NXi interface operates correctly.
- (a) Perform systems check with the appropriate test equipment and verify the DME is tuned by NAV1 and NAV2.
 - (b) Verify the distance is accurate.
 - (c) Verify the DME audio is available on the GMA 1347 audio panel.
 - (d) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342502136.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(24) GDL 59 Checkout (If installed)

- (a) Using the MFD, navigate to the “Maintenance Wifi Setup” page under the “Aux” tab.
- (b) Press the “Avail” softkey to search available networks.
- (c) Press the FMS knob in to activate the cursor, then use the FMS knob to select a known network that you have access to and press the “Connect” softkey.
- (d) Enter password, if required, and press ENT. Press ENT again to confirm.
- (e) Press ENT to put a check next to Save Connection.
- (f) Enter the four letter airport identifier and press ENT. Press ENT again to confirm.
- (g) Verify that the connection status is listed as “Connected” (this may take several minutes).

(25) FS 510 Checkout (If installed)

This procedure requires the use of a Bluetooth enabled device, such as a smart phone or tablet with the Garmin Pilot app installed.

- (a) Ensure the airplane has a valid GPS position.
- (b) Turn on Bluetooth on the mobile device.
- (c) Navigate to the Aux group, Connex Setup page on the MFD. Note the Bluetooth unique identifier at the end of the Bluetooth name field on this page.
- (d) Pair to “Flight Stream 510-XXXX” on the mobile device, where XXXX is the unique identifier for this particular Flight Stream 510.
- (e) Follow prompts on the device as well as on the MFD to confirm the confirmation code.
- (f) Open the Garmin Pilot application on the mobile device.
- (g) Tap the button in the top left corner of the mobile device.
- (h) Select Connex from the list on the left of the mobile device screen, then select Flight Stream 510 from the devices list.
- (i) Select Flight Stream 510-XXXX from the dropdown menu on the mobile device and then press Connect.
- (j) After the device has connected, press Activate on the mobile device to receive the flight plan update.
- (k) Tap the button in the top left corner of the mobile device twice and then select Flight Plan.
- (l) Ensure that KVRB appears as the first airport listed.
- (m) Tap “Add Waypoint” and type in KFPR and press done.
- (n) Tap the blue connex icon located to the right of Flight Plan on the top row on the mobile device.
- (o) Tap “Send to Navigator”.
- (p) Press ENT on the MFD when prompted with “pending flight plan.”
- (q) Press ENT on the MFD when prompted to activate flight plan.
- (r) Press ENT on the MFD again to click ok.
- (s) Go to the Navigation Map on the MFD and verify flight path is correct.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(26) Display System Checkout

(a) NAV Source Selection Tests

NOTE: The CDI will not be depicted if the VOR antenna is not receiving a valid signal.

NOTE: For FMS, the word that is displayed with the FMS (i.e., FMS TERM) depends on the phase of flight of the airplane. Display of either 'FMS TERM' or 'FMS ENR' is acceptable.

- 1) Start these tests with all avionics powered.
- 2) Press the Direct-To-Key (-D->).
- 3) Enter a Direct-To waypoint. Press ENT twice to activate.
- 4) Enter 117.3 MHz (TRV VOR) or an appropriate VOR frequency simulated with test equipment into the active NAV 1 frequency box on the PFD.
- 5) Enter 110.0 MHz (MLB VOR) or an appropriate VOR frequency simulated with test equipment into the active NAV 2 frequency box on the PFD.
- 6) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from FMS TERM to VOR1.
- 7) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from VOR1 TO VOR2.
- 8) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from VOR2 TO FMS TERM.

(b) Bearing Pointers and Information Windows Tests

NOTE: The bearing pointer will not be depicted if it is not receiving a valid signal.

- 1) Start these tests with all avionics powered.
- 2) Press the Direct-To-Key (-D->).
- 3) Enter a Direct-To waypoint. Press ENT.
- 4) Enter 117.3 MHz (TRV VOR) or an appropriate VOR frequency simulated with test equipment into the NAV1 frequency box on the PFD. Enter 110.0 MHz (MLB VOR) or an appropriate VOR frequency simulated with test equipment into the NAV2 frequency box on the PFD.
- 5) Enter 257 kHz (SQT NDB) into the ADF receiver (if installed).
- 6) Press the PFD softkey on the PFD to make the Bearing 1 and Bearing 2 softkey selections visible.
- 7) Verify that the Bearing 1 softkey can be pressed to sequentially cycle through NAV1, NAV2, FMS, and ADF (if installed).
- 8) Verify that the BRG2 softkey can be pressed to sequentially cycle through NAV1, NAV2, FMS, and ADF (if installed).

(c) BARO Selection Tests

- 1) Rotate the BARO knob on the PFD and verify that the PFD BARO values change.
- 2) Set the current altimeter setting and verify that the PFD altimeter indicates within $\pm 30'$ of field elevation.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Q. Return to Service Procedure

WARNING: INSPECT AND MATCH SOFTWARE VERSIONS INSTALLED AGAINST VERSIONS LISTED IN THE REQUIRED EQUIPMENT LIST (REL). SEE "CHART 30" ON PAGE 342502143. CORRECT SOFTWARE CONFIGURATION IS CRITICAL TO PROPER G1000 NXI OPERATION AND MUST BE VERIFIED BEFORE RETURNING AN AIRCRAFT TO SERVICE.

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXI SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

(1) Software Verification

After reinstalling any G1000 NXi LRU, use the checkoff list in "Chart 29" on page 342502142 to verify correct LRU software part numbers and versions against the current numbers and versions shown in the Required Equipment List (REL). See "Chart 30" on page 342502143.

- (a) The PFD System Status page (see "Figure 40" on page 342502137) displays a list of LRUs in the LRU window.
- (b) Enter Configuration Mode on the PFD and MFD by applying power while holding ENT.
- (c) Verify on the System Configuration Page that the following are valid (indicated by green annunciations): MFD, PFD, GIA1, GIA2, and GDL 69eA (optional).
- (d) Verify on the System Status Page that the following are valid (green annunciations indicate that the system is healthy): MFD, PFD, GIA1, GIA2, and GDL 69eA (optional).

(2) LRU Failure Tests

Various secondary comms paths are tested to ensure that desired backup paths are in place.

(a) GPS Failure Test

- 1) Start these tests with all avionics powered.
- 2) Valid GPS reception. Press Direct-To-Key (-D->). Enter a Direct-To waypoint.
- 3) Place a shroud over the GPS1 (i.e., left) antenna to prevent signal reception. Verify loss of GPS1 signal on MFD 'Aux' group, 'GPS Status' page. The following should remain valid on the PFD throughout the procedure:
 - a) Attitude
 - b) Heading
 - c) Airspeed
 - d) Altitude
 - e) Vertical Speed
 - f) OAT
 - g) GPS CDI
- 4) Remove shroud from the GPS1 antenna.
- 5) Place a shroud over the GPS2 (i.e., right) antenna to prevent signal reception. Verify loss of GPS2 signal on MFD 'Aux' group, 'GPS Status' page. To view GPS2 status, press the GPS2 softkey. The following should remain valid on the PFD throughout the procedure:
 - a) Attitude and Heading
 - b) Airspeed and Altitude
 - c) Vertical Speed
 - d) OAT
 - e) GPS CDI

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



System Status Page (Configuration Mode)
Figure 40

- 6) Leave the shroud over the GPS2 antenna and replace the shroud over the GPS1 antenna. Verify loss of GPS 1 and 2 signals on 'Aux' group, 'GPS Status' page. The following should remain valid on the PFD throughout the procedure.
 - a) Attitude
 - b) Heading
 - c) Airspeed
 - d) Altitude
 - e) Vertical Speed
 - f) OAT
 - g) and GPS LOI (loss of integrity) annunciated on the PFD.
- (b) GIA Failure Test
 - 1) Start these tests with all avionics powered.
 - 2) Valid GPS reception. Valid NAV signal.
 - 3) Remove power from GIA1 by pulling the INTEG AV 1 and COM 1 circuit breakers.
 - 4) Verify the following system messages:
 - a) AHRS1 GPS – AHRS1 USING BACKUP GPS SOURCE
 - b) FAILED PATH – A data path has failed.
 - c) AV FAN FAIL – The cooling fan for remote avionics is failed.
 - 5) Verify the following flag invalid:
 - a) COM/NAV 1 field
 - b) NAV 1 CDI loses deviation bar.
 - 6) Restore power to GIA1 by resetting the INTEG AV 1 and COM 1 circuit breakers.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 7) Verify the following:
All invalid flags, system messages, and annunciations are removed. (#1 GPS will take time to reinitialize).
 - 8) Remove power from GIA 2 by pulling the INTEG AV 2 and COM 2 circuit breakers.
 - 9) Verify the following system messages:
 - a) AHRS1 GPS – AHRS1 not receiving backup GPS information.
 - b) FAILED PATH – A data path has failed.
 - 10) Verify the following flag invalid:
 - a) COM/NAV 2 field
 - b) NAV 2 CDI loses deviation bar.
 - c) COM 2 Frequency Decoding Box
 - 11) Restore power to GIA2 by resetting the INTEG AV 2 and COM 2 circuit breakers.
 - 12) Verify the following:
 - 13) All invalid flags, system messages, and annunciations are removed. (#2 GPS will take time to reinitialize).
 - 14) Remove power from GIA 1 and GIA 2 by pulling the INTEG AV 1, INTEG AV 2, COM 1 and COM 2 circuit breakers.
 - 15) Verify the following system messages:
 - a) XPDR1 FAIL
 - b) GMA1 FAIL
 - c) FAILED PATH
 - d) GPS NAV LOST
 - e) AHRS1 GPS
 - f) TRAFFIC FAIL (If GTS 800 is not installed)
 - 16) Verify the following flag invalid:
 - a) COM/NAV 1 field
 - b) COM/NAV 2 field
 - c) XPDR field (will not flag invalid if GTX 345 installed)
 - d) Engine Instruments
 - e) CO level (if CO Detector installed)
 - 17) Verify the following:
 - a) All AHRS and ADC fields remain valid.
 - b) NAV 1 & NAV 2 CDI loses deviation bar.
 - 18) Close all circuit breakers.
- (c) Display Failure Test
- 1) Start these tests with all avionics powered.
 - 2) Remove power from the MFD by pulling the MFD circuit breaker.
 - 3) Verify the following system messages on the PFD:
 - a) MFD VOLTAGE (This may or may not appear depending on power failure rate vs. MFD update rate)
 - b) FAILED PATH
 - c) GDL 69 FAIL (If Installed)
 - d) ADS-B INVALID

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 4) Verify the following:
 - a) PFD switches to reversion mode.
 - b) Attitude and Heading remain valid from AHRS.
 - c) Airspeed, Altitude, Vertical Speed and OAT remain valid.
 - d) Engine Instrumentation appears on PFD.
 - e) COM/NAV 2 fields flag invalid.
 - 5) Restore power to the MFD. The display should return to Normal operation.
 - 6) Select reversionary mode on GMA 1347 Audio Panel. Verify MFD switches to reversionary mode.
 - 7) Remove power from the PFD by pulling the PFD circuit breaker.
 - 8) Verify the following system messages are displayed on the MFD:
 - a) TRAFFIC FAIL (If Installed)
 - b) FAILED PATH
 - 9) Verify the following:
 - a) Attitude and Heading remain valid from AHRS.
 - b) Airspeed, Altitude, Vertical Speed and OAT remain valid.
 - c) MFD retains engine instrumentation.
 - d) COM/NAV 1 fields flag invalid.
 - 10) Restore power to the PFD and deselect reversionary mode on GMA 1347 Audio Panel. The displays should return to normal operation
- (d) GSU 75 Failure Test
- 1) Start these tests with all avionics powered.
 - 2) Remove power from the GSU 75 by pulling the ADAHRS circuit breaker.
 - 3) Verify the following flag invalid on the PFD:
 - a) Altitude
 - b) Indicated Airspeed
 - c) Vertical Speed
 - d) Static Air Temperature (OAT) and ISA
 - e) Heading
 - f) Attitude
 - 4) Restore power to the GSU.
 - 5) Verify normal operation and invalid flags are removed.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(3) Flight Test

A flight test is recommended after the installation is complete to ensure satisfactory performance of the G1000 NXi.

(4) VHF Comm Tests

Verify the communications capability on both the high and low ends of the VHF COM spectrum.

(5) VOR/ILS Tests

Select a VOR channel within a 40-nautical-mile range. Listen to the VOR audio and verify that no electrical interference such as magneto noise is present. Check the tone identifier filter operation. Fly inbound or outbound on a selected VOR radial and check for proper LEFT / RIGHT, TO / FROM flag indications on the CDI. Check the VOR accuracy.

(6) Engine Run Checks

The following checks verify certain annunciations, displays, and systems operation.

WARNING: DO NOT WORK IN THE ENGINE AREA WHILE THE ENGINE IS RUNNING.

CAUTION: AFTER RUNNING THE ENGINE, THE EXHAUST STACKS WILL BE HOT.

(a) Start Engine.

- 1) Turn on Alternator.
- 2) Set engine RPM to greater than 1100.

(b) Verify Alternator Operation and Annunciation.

- 1) Verify alternator operation by checking that ALTR AMPS is in the normal range.
- 2) Pull Alt Field circuit breaker.
- 3) Verify "ALT FAIL" Warning CAS annunciates.
- 4) Reset Alt Field circuit breaker.
- 5) Verify "ALT FAIL" Warning CAS extinguishes.
- 6) Verify alternator operation by checking that ALTR AMPS is in the normal range.

(c) For aircraft with Hobbs Meter Configuration A, verify Hour Meter operation:

Hobbs meter shall run while engine is running.

(d) Verify RPM, Fuel Flow, EGT, Oil Pressure, and Oil Temp are operating in normal range.

(e) Verify alternator and battery current indications.

- 1) With the Battery Master Switch ON and alternator on line. Note alternator current and battery current.
- 2) Turn the Battery Master switch OFF.
- 3) Note alternator current. Verify that alternator current with battery on equals the alternator current with battery off plus battery current (within +/- 5 amps).

(f) Turn off Alternator. Shutdown engine.

(7) Maintenance Records

After conducting the function check flight, the airplane may be returned to service. Record the following information in the appropriate airplane maintenance logs:

- (a) Part number of the loader card used to perform software loading or software updates.
- (b) Any other applicable information related to the maintenance work performed on the airplane.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 29
G1000 NXi - RETURN TO SERVICE CHECK LIST**

Group System	SW Ver. OK	System	SW Ver. OK	System	SW Ver. OK
Control & Display:					
MFD1	_____	PFD	_____		
MFD1 FPGA	_____	PFD FPGA	_____		
CNS:					
COM1	_____	GDL69	_____	NAV1	_____
COM2	_____	GMA1	_____	NAV1 FPGA	_____
GIA1	_____	GPS1	_____	NAV2	_____
GIA1 AUDIO	_____	GPS2	_____	NAV2 FPGA	_____
GIA2	_____	GTS	_____		
GIA2 AUDIO	_____	GTX1	_____		
Sensors:					
		GSU1	_____		
GEA1	_____	GSU1 FPGA	_____		
GMU1	_____				
GMU1 FPGA	_____				

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 30
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 NXi - VER. 2698.00 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-42	11.30	
COM2	006-B0081-42	11.30	
GDC1	006-B1838-50	2.00	
GDC1 RGN LIST	006-D5080-50	2.00	
GDL59	006-B0735-15	2.50	Optional, Verify If Installed
GDL59 RTR	006-B0736-16	2.40	Optional, Verify If Installed
GDL59 RTR FS	006-D1112-10	2.00	Optional, Verify If Installed
GDL69	006-B1902-04	5.10	Optional, Verify If Installed
GDL69 APP PACKAGE	006-D5402-02	1.10	Optional, Verify If Installed
GDL69 XM FIRMWARE	006-B2181-03	1.20	Optional, Verify If Installed
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-63	8.05	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-63	8.05	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-21	5.1	
GPS2	006-B0339-21	5.1	
GRS1	006-B1838-00	2.00	
GRS1 REGION LIST	006-D5080-00	2.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-12	3.10	Optional, Verify If Installed
GTS FPGA	006-C0081-20	2.0	Optional, Verify If Installed
GTS RGN LIST	006-D0725-01	2.00	Optional, Verify If Installed

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 30
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 NXi - VER. 2698.00 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
GTX1	006-B1607-02	2.03	
GTX1 ADS-B FPGA	006-C0157-21	2.10	Optional, Verify If Installed
GTX1 ADS-B SYSTEM	006-B1797-01	2.01	Optional, Verify If Installed
GTX1 FPGA	006-C0153-22	2.20	
MFD1	006-B1177-51	20.01	
NAV1	006-B0082-12	6.02	
NAV1 FPGA	006-C0124-00	1.0	
NAV2	006-B0082-12	6.02	
NAV2 FPGA	006-C0124-00	1.0	
PFD1	006-B1177-51	20.01	
PA-28 IMAGE	006-B2698-00	2698.01 ⁽¹⁻²⁾	
(1) PIR-107999 New. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 30
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 NXi - VER. 2698.01 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-42	11.30	
COM2	006-B0081-42	11.30	
GDC1	006-B1838-52	2.02	
GDC1 RGN LIST	006-D5080-50	2.00	
GDL59	006-B0735-15	2.50	Optional, Verify If Installed
GDL59 RTR	006-B0736-16	2.40	Optional, Verify If Installed
GDL59 RTR FS	006-D1112-10	2.00	Optional, Verify If Installed
GDL69	006-B1902-04	5.10	Optional, Verify If Installed
GDL69 APP PACKAGE	006-D5402-02	1.10	Optional, Verify If Installed
GDL69 XM FIRMWARE	006-B2181-03	1.20	Optional, Verify If Installed
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-67	8.05.2	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-67	8.05.2	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-21	5.1	
GPS2	006-B0339-21	5.1	
GRS1	006-B1838-02	2.02	
GRS1 REGION LIST	006-D5080-00	2.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-12	3.10	Optional, Verify If Installed
GTS FPGA	006-C0081-20	2.0	Optional, Verify If Installed
GTS RGN LIST	006-D0725-01	2.00	Optional, Verify If Installed

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 30
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 NXi - VER. 2698.01 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
GTX1	006-B1607-02	2.03	
GTX1 ADS-B FPGA	006-C0157-21	2.10	Optional, Verify If Installed
GTX1 ADS-B SYSTEM	006-B1797-01	2.01	Optional, Verify If Installed
GTX1 FPGA	006-C0153-22	2.20	
MFD1	006-B1177-53	20.02	
NAV1	006-B0082-12	6.02	
NAV1 FPGA	006-C0124-00	1.0	
NAV2	006-B0082-12	6.02	
NAV2 FPGA	006-C0124-00	1.0	
PFD1	006-B1177-53	20.02	
PA-28 IMAGE	006-B2698-01	2698.00 ⁽¹⁻²⁾	
(1) PIR-107999 A. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 30
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXi - VER. 2698.04 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-42	11.30	
COM2	006-B0081-42	11.30	
GDC1	006-B1838-52	2.02	
GDC1 RGN LIST	006-D5080-50	2.00	
GDL59	006-B0735-15	2.50	Optional, Verify If Installed
GDL59 RTR	006-B0736-17	2.41	
GDL59 RTR FS	006-D1112-10	2.00	Optional, Verify If Installed
GDL69	006-B1902-04	5.10	Optional, Verify If Installed
GDL69 APP PACKAGE	006-D5402-02	1.10	Optional, Verify If Installed
GDL69 XM FIRMWARE	006-B2181-03	1.20	Optional, Verify If Installed
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-67	8.05.2	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-67	8.05.2	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-21	5.1	
GPS2	006-B0339-21	5.1	
GRS1	006-B1838-02	2.02	
GRS1 REGION LIST	006-D5080-00	2.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-12	3.10	Optional, Verify If Installed
GTS FPGA	006-C0081-20	2.0	Optional, Verify If Installed
GTS RGN LIST	006-D0725-01	2.00	Optional, Verify If Installed
GTX1	006-B1607-02	2.03	
GTX1 ADS-B FPGA	006-C0157-21	2.10	Optional, Verify If Installed
GTX1 ADS-B SYSTEM	006-B1797-01	2.01	Optional, Verify If Installed

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 30
REQUIRED EQUIPMENT LISTS (RELS)

G1000 NXi - VER. 2698.04 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)

LRU Identifier	Part Number	Version	Remarks
GTX1 FPGA	006-C0153-22	2.20	
MFD1	006-B1177-52	20.10	
NAV1	006-B0082-12	6.02	
NAV1 FPGA	006-C0124-00	1.0	
NAV2	006-B0082-12	6.02	
NAV2 FPGA	006-C0124-00	1.0	
PFD1	006-B1177-52	20.10	
PA-28 IMAGE	006-B2698-04	2698.04 ⁽¹⁻²⁾	
(1) PIR-107999 B. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 30
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXi - VER. 2698.06 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B0081-42	11.30	
COM2	006-B0081-42	11.30	
GDC1	006-B1838-52	2.02	
GDC1 RGN LIST	006-D5080-50	2.00	
GDL59	006-B0735-15	2.50	Optional, Verify If Installed
GDL59 RTR	006-B0736-17	2.41	
GDL59 RTR FS	006-D1112-10	2.00	Optional, Verify If Installed
GDL69	006-B1902-04	5.10	Optional, Verify If Installed
GDL69 APP PACKAGE	006-D5402-02	1.10	Optional, Verify If Installed
GDL69 XM FIRMWARE	006-B2181-03	1.20	Optional, Verify If Installed
GEA1	006-B0193-05	2.07	
GIA1	006-B0544-67	8.05.2	
GIA1 AUDIO	006-D4432-00	2.00	
GIA2	006-B0544-67	8.05.2	
GIA2 AUDIO	006-D4432-00	2.00	
GMA1	006-B0203-44	4.04	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B0339-21	5.1	
GPS2	006-B0339-21	5.1	
GRS1	006-B1838-07	2.02	
GRS1 REGION LIST	006-D5080-00	2.00	
GS1	006-B0082-XX	6.02	
GS2	006-B0082-XX	6.02	
GTS	006-B0551-12	3.10	Optional, Verify If Installed
GTS FPGA	006-C0081-20	2.0	Optional, Verify If Installed
GTS RGN LIST	006-D0725-01	2.00	Optional, Verify If Installed

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 30
REQUIRED EQUIPMENT LISTS (RELS)

G1000 NXi - VER. 2698.06 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)

LRU Identifier	Part Number	Version	Remarks
GTX1	006-B1607-02	2.03	
GTX1 ADS-B FPGA	006-C0157-21	2.10	Optional, Verify If Installed
GTX1 ADS-B SYSTEM	006-B1797-01	2.01	Optional, Verify If Installed
GTX1 FPGA	006-C0153-22	2.20	
MFD1	006-B1177-52	20.10	
NAV1	006-B0082-12	6.02	
NAV1 FPGA	006-C0124-00	1.0	
NAV2	006-B0082-12	6.02	
NAV2 FPGA	006-C0124-00	1.0	
PFD1	006-B1177-52	20.10	
PA-28 IMAGE	006-B2698-04	2698.06 ⁽¹⁻²⁾	
(1) PIR-107999 R. (2) Verify On MFD Splash Screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

INTEGRATED AVIONICS SYSTEM - GARMIN G1000 NXi

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

Integrated Avionics System - Garmin G1000 NXi - 2843823, 2881001 and up

(PIR-190-00907-00, Rev B.)

Optional in [S/N's](#) 2843823, 2881001 and up.

A. Description

See "Figure 1" on page 3425032.

The Garmin G1000 NXi Integrated Avionics System consists of two (2) GDU 105x displays that serve as the primary flight display (PFD) and multi-function display (MFD). Functions provided by the system include display of attitude, heading, navigation, engine and airframe status, and a moving map display with position derived by GPS. In addition to display functions, GPS navigation, VHF Com, and transponder functions are provided by the G1000 NXi system (via knobs and buttons on the display bezel).

A single ADAHRS computer is standard. Several options that may be incorporated into the G1000 NXi system include GFC 700 AFCS Autopilot, GTS 800 traffic advisory system (TAS), and TAWS-B capabilities.

See the latest revision of the Garmin G1000 Pilots Guide for control and operation information. See Vendor Publications under Supplementary Publications in the Introduction.

(1) Flight Instrumentation

GSU 75 ADAHRS, GTP 59 OAT Probe, and GMU Magnetometer units are responsible for providing the G1000 Nxi system with aircraft attitude, heading, altitude, airspeed, vertical speed, and outside air temperature information, all displayed on the PFD.

Primary data outputs from the GSU are sent directly to the PFD via ARINC 429. Secondary data paths connect the GSU to the MFD in the standard installation. Additional cables connect the GSU to both GIA 64/64W Integrated Avionics Units.

The GSU 75 receives GPS data from the GIAs, and magnetic heading from the GMU. Using these external sources, combined with internal sensor data, the GSU accurately calculates aircraft attitude and heading.

(2) Engine Indicator System

The GEA 71B provides engine and airframe data to the G1000 NXi system. The unit interfaces to transducers. Analog data is received from the transducers and is converted to a digital signal by the GEA 71B. Digital information is then sent through the primary RS-485 serial path to the #1 GIA 64/64W. From the GIA, data is sent through the HSDB connection to the PFD, then on to the MFD for display. A backup data path exists, from the GEA to the #2 GIA 64/64W and on to the MFD for display, in the event the primary path fails.

(3) Communications/Navigation Systems

The GIA 64/64W IAUs contain VHF COM, VHF NAV, and GPS receivers. COM and NAV audio is sent via analog or digital audio to the GMA 1360 Audio Panel.

GPS information is sent to the GSU 75 ADAHRS and to both displays for processing.

A single GTX 3X5R Mode S/ES Transponder communicates with both GIAs. Transponder data is sent from the GIAs to the PFD where control and operation occurs.

(4) Components Details

Detailed descriptions of the individual G1000 NXi system components/Line Replaceable Units (LRU's) are found below.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



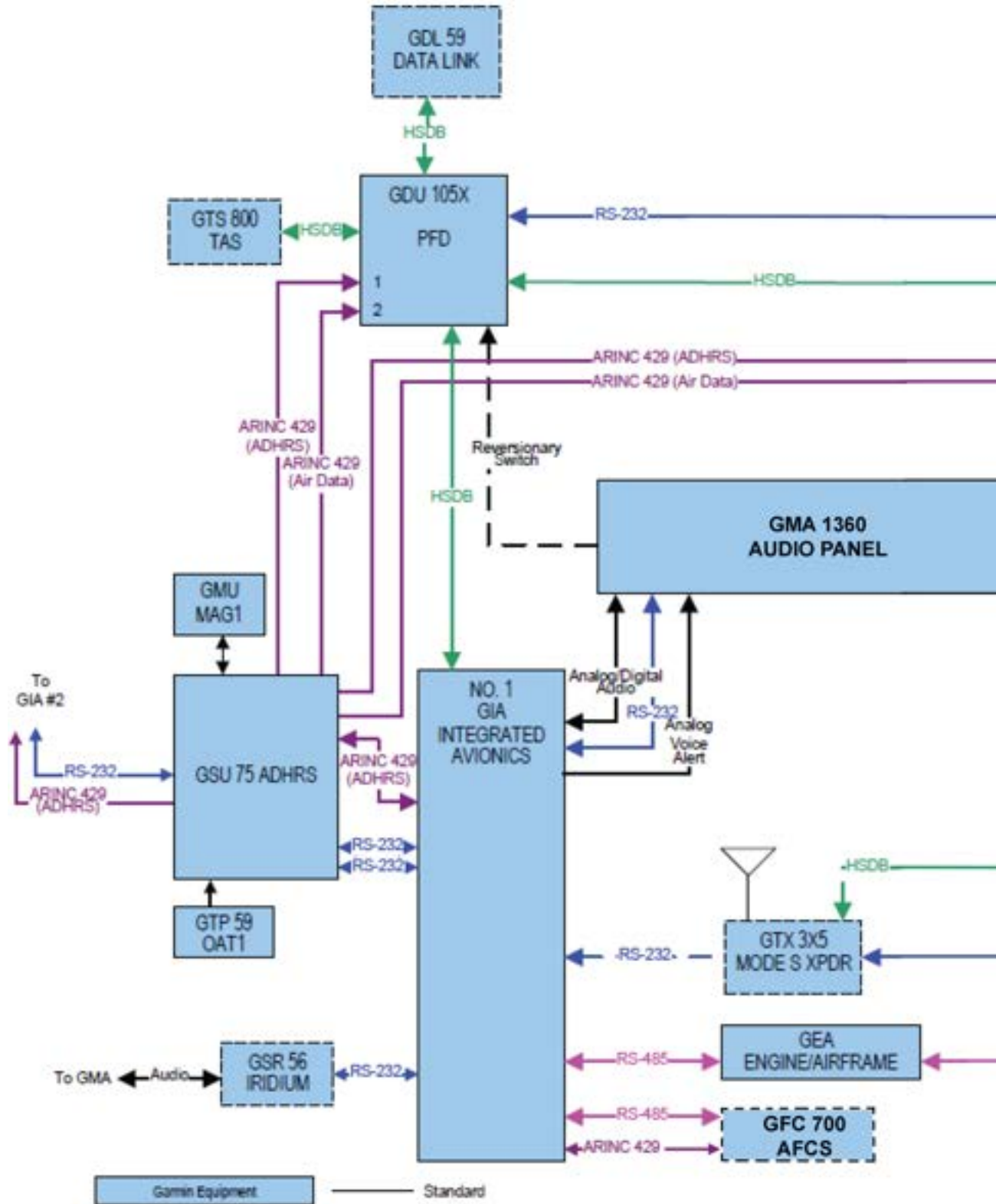
Garmin G1000 NXi Instrument Panel
Figure 1 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

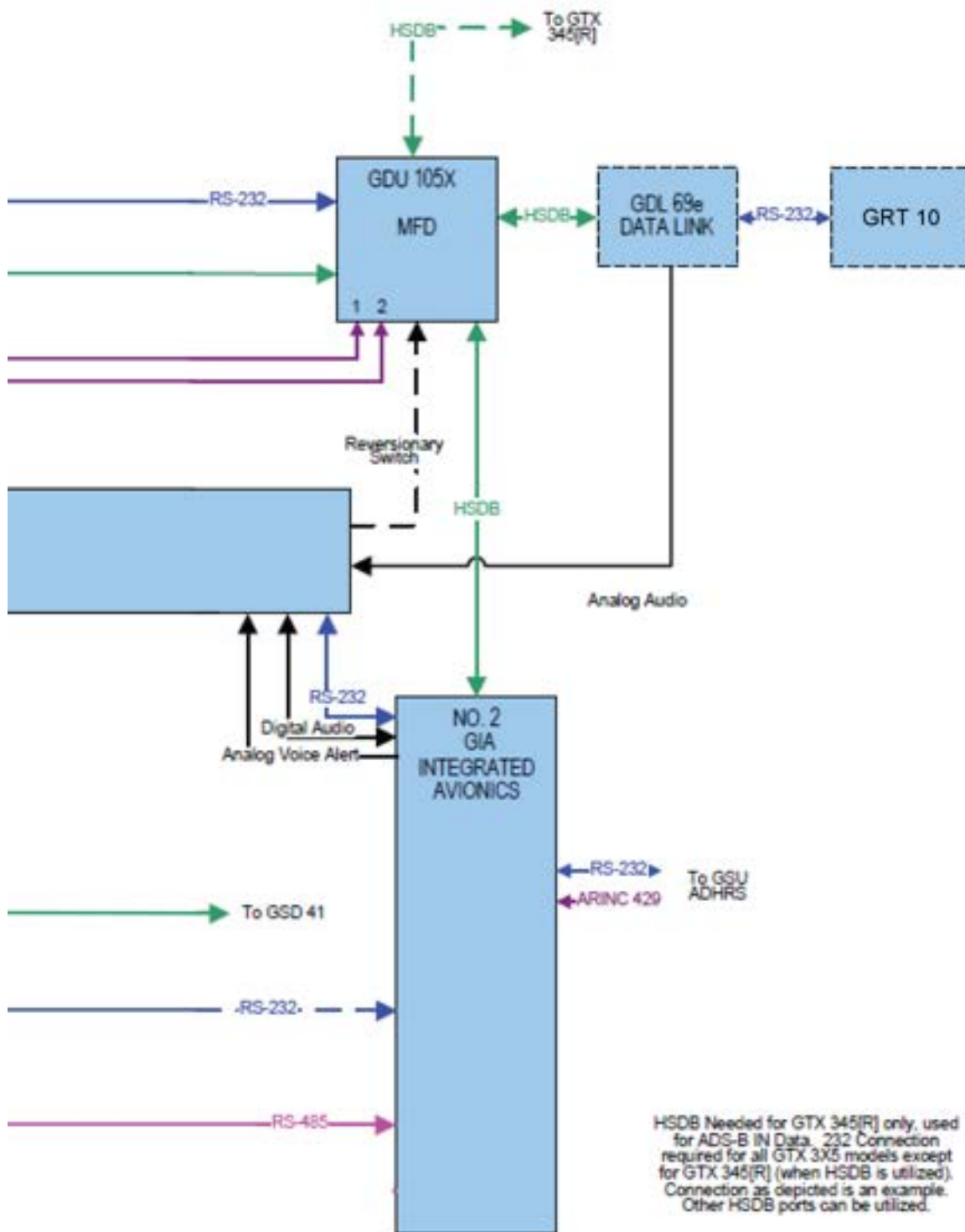


Garmin G1000 NXi Instrument Panel
Figure 1 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Electrical/Avionics Component Block Diagram
Figure 2 (Sheet 1 of 2)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Electrical/Avionics Component Block Diagram
Figure 2 (Sheet 2 of 2)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Power Distribution

See "Figure 3".

The electrical system has a tie point to connect the external power source, primary battery, starter motor, alternator and essential bus feed. Distribution of power for the G1000 NXi system occurs on three aircraft electrical busses.

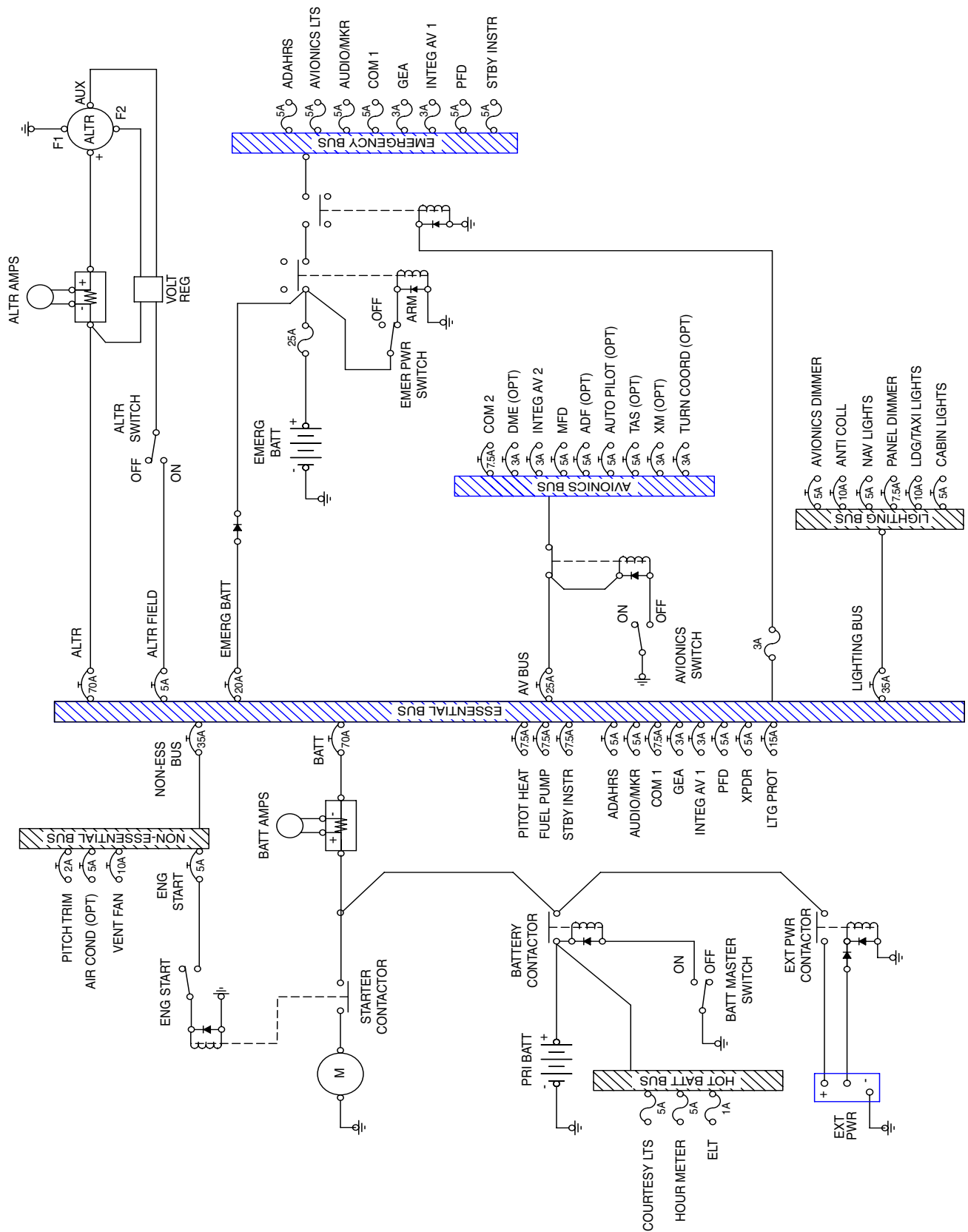
Essential Bus: Electrical current is fed to the essential bus from the alternator, isolated by one 70-amp circuit breaker. It is also 70-amp circuit breaker isolated from the battery. Essential bus loads are isolated from non-essential loads.

Emergency Bus: The emergency bus serves as a backup for the G1000 NXi system and is isolated from all other busses. When the EMER switch is turned on, the battery master switch must be turned "OFF" to remove power from the essential bus. This closes the relay connecting the emergency bus to the emergency battery, providing emergency power to the connected equipment.

Avionics Bus: There is a single avionics bus that is isolated from its essential bus feed by a relay. It is controlled by the avionics switch in the cockpit. The avionics bus is fed through independent contactor that is protected by a 25-amp circuit breaker.

The electrical system also includes one non-essential bus and one lighting bus which are isolated by circuit breakers from the essential bus feed.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Bus Feeds and Component Power Sources
Figure 3

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. G1000 NXi System Controls and Operation

(1) System Controls

The G1000 NXi system controls are located on the PFD and MFD bezels. Indicators above the PFD, MFD, NAV, and COM keys are illuminated when their respective control mode(s) are selected. See the appropriate Garmin G1000 Pilots Guide for detailed controls descriptions. The unit is in MFD control mode by default on system power-up. NAV/COM radio tuning can be accomplished in either PFD or MFD control mode. The appropriate frequency box on the selected display is outlined by a light blue selection box, which flashes for a few seconds to indicate Control Unit activity. Selection of a different display control or radio tuning mode results in cancelation of the previous radio tuning mode.

(2) System Operation

The displays are connected together via multiple data busses, thus allowing for high-speed communication. The PFD and MFD are directly connected to the GIA 64/64W unit on the respective side, as shown in "Figure 2" on page 3425034. This section discusses the normal and reversionary modes of operation as well as the various ADAHRS modes of the G1000 NXi system.

(a) Normal Operation

1) PFD

In normal mode, the PFD presents graphical flight instrumentation (attitude, heading, airspeed, altitude and vertical speed), thereby replacing the traditional flight instrument cluster. The PFD also offers control for COM and NAV frequency selection.

2) MFD

In normal mode, the right portion of the MFD displays a full-color moving map with navigation information, while the left portion of the MFD is dedicated to the Engine Indication System (EIS). "Figure 4" on page 3425039 gives an example of the G1000 NXi displays in normal mode.

(b) Reversionary Mode

NOTE: The G1000 NXi system alerts the pilot when backup paths are utilized by the LRUs. Refer to the Appendices in the appropriate Garmin Pilot's Guide for further information regarding system-specific alerts.

Reversionary mode is a mode of operation in which all important flight information is presented on at least one functioning displays (see "Figure 5" on page 3425039). Transition to reversionary mode should be straight-forward for the pilot, for flight parameters are presented in the same format as in normal mode. In the event of a PFD failure, the G1000 NXi system automatically switches to reversionary (backup) mode. In reversionary mode, all important flight information is presented on the remaining display, whether the MFD or PFD.

- PFD failure – Press the DISPLAY BACKUP button on the GMU 1360 (see "Figure 6" on page 34250310) to put MFD into reversionary mode.
- MFD failure – The PFD automatically goes into reversionary mode.

Both displays may be set to reversionary mode at any time by pressing DISPLAY BACKUP on the GMU 1360 (see "Figure 6" on page 34250310).

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Normal Mode
Figure 4



Reversionary Mode (PFD or MFD Failure)
Figure 5

Effectivity
with Garmin G1000 NXi
2843823, 2881001 and up

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Audio Control and Display Backup (GMA 1360)
Figure 6

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

D. Maintenance Mode

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXi SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC.

The "Hobbs" Meter is activated by the GIA 64/64W Integrated Avionics Units and will run when one of the following is true, depending on how it was configured:

- (1) the engine is running (Option A); or
- (2) the airplane is inflight (Option B); or
- (3) the GIA 64/64W No. 1 is ON (Option C).

To prevent needless accumulation of "hours" (i.e., to disable the "Hobbs" Meter) on the ground a Maintenance Mode has been implemented in the Garmin G1000 NXi software.

Enter "Maintenance Mode" before exiting the splash screen at system startup by pressing SoftKeys 1, 2, 3, 1 in that order. The "MAINT MODE ON" advisory will then be displayed while the system remains in maintenance mode.

E. Troubleshooting

Troubleshoot the Garmin G1000 NXi system by first identifying, then isolating the specific failure to the responsible LRU. There are several indications that the G1000 NXi presents to the pilot or technician, showing overall system condition. A course of action should be determined based on the information presented on the display.

The fifth AUX group page on the MFD (see "Figure 7" on page 34250312) provides LRU health status by means of a green check or a red 'X'. Also, LRU software versions are shown along with other database versions and dates. If a red 'X' is shown for an LRU, see the appropriate LRU troubleshooting chart for guidance.

Typically, the G1000 NXi Alerting System provides alerts/annunciations in conjunction with the information presented at the fifth AUX page.

CAUTION: POST INSTALLATION SET-UP, BELOW, PROVIDES DETAILED INSTRUCTIONS ON EQUIPMENT CONFIGURATION AND RETURN-TO-SERVICE TESTING. ANYTIME A G1000 NXi COMPONENT OR LRU IS REMOVED, SWAPPED, OR REPLACED, THE TECHNICIAN MUST FOLLOW THE PROCEDURES GIVEN IN "POST INSTALLATION SET-UP" TO ENSURE PROPER OPERATION OF THE SYSTEM.

Troubleshooting information is provided as follows:

- (1) Line Replaceable Unit (LRU) Failures
See "Chart 1" on page 34250315 as the first step in troubleshooting any LRU.
- (2) Engine / Airframe Sensor Failures - see "Chart 2" on page 34250320.
- (3) TAWS (Optional) - "Chart 3" on page 34250322.
- (4) GDU 105x - see "Chart 7" on page 34250354 and "Chart 8" on page 34250356.
- (5) GMA 1360 - see "Chart 9" on page 34250362 and "Chart 10" on page 34250363.
- (6) GIA 64/64W - see "Chart 11" on page 34250364 and "Chart 12" on page 34250366.
- (7) GEA 71B - see "Chart 13" on page 34250372.
- (8) GTX 3X5R - see "Chart 14" on page 34250373.
- (9) GSU 75 - see "Chart 15" on page 34250374 and "Chart 16" on page 34250375.
- (10) GMU 44 - see "Chart 15" on page 34250374 and "Chart 16" on page 34250375.
- (11) GDL 59 - see "Chart 17" on page 34250377.
- (12) GDL 69A / 69eA (Optional) - see "Chart 18" on page 34250378.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



System Status Page (AUX Group) - Example
Figure 7

- (13) FS 510 - see "Chart 20" on page 34250380.
- (14) GTS 800 - see "Chart 20" on page 34250380
- (15) Software Configuration and Status Verification

(PIR-108059, Rev. D.)

- (a) Enter the configuration mode on the PFD and the MFD by applying power while holding ENT on each display until "Initializing Display" is on the screen.
- (b) Verify on the System Status page that the following are valid. (Indicated by green annunciations): MFD1, PFD1, GIA1, GIA2, and GDL 69A (optional).
- (c) Rotate the small FMS knob to navigate to the System Configuration page and verify that the following are valid. (Indicated by green annunciations): MFD1, PFD1, GIA1, GIA2, and GDL 69A (optional).

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



1. GIA 64/64W Integrated Avionics Units
2. GSU 75 ADAHRS
3. GSU 75 ADAHRS
4. GMU 44/44B Magnetometer
5. GTX 3X5R Transponder
6. GEA 71B Engine Airframe Interface

System Fail
Figure 8

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 1 of 5)
LRU TROUBLESHOOTING**

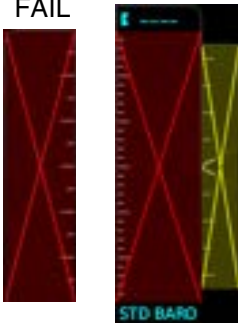
System Failure Troubleshooting

The following table provides basic troubleshooting guidance for LRU failures.

Invalid Data Field	Associated LRU(s)	Solution
Low Speed Awareness Band permanently displayed 	GDU	- With aircraft weight on wheels and the G1000 NXi in Configuration Mode, check that the RH GEAR ON GROUND discrete in indication on GIA I/O CONFIGURATION page is illuminated. - If indication is illuminated Green, switch GIA1 and GIA2, to verify location of problem: ✓ If problem is resolved, replace defective unit. ✓ If indication is not illuminated, check for wiring faults between the GIAs and aircraft squat switch system.
Low Speed Awareness Band permanently inhibited 	GDU	- With aircraft weight off wheels and the G1000 NXi in Configuration Mode, check that the RH GEAR ON GROUND discrete in indication on GIA I/O CONFIGURATION page is not illuminated. - If indication is not illuminated Green, switch GIA1 and GIA2, to verify location of problem: ✓ If problem is resolved, replace unit. ✓ If indication is illuminated, check for wiring faults between the GIAs and aircraft squat switch system.
NAV1 & COM1 = GIA1 	GIA1	- Check configuration settings for GIA1 and PFD. - Swap GIA1 and GIA2, to verify location of problem: ✓ If problem follows GIA1, replace GIA1. - Check Ethernet interconnect from GIA1 to PFD. ✓ If problem persists, replace PFD.
NAV2 & COM2 = GIA2 	GIA2	- Check configuration settings for GIA2 and MFD. - Swap GIA1 and GIA2, to verify location of problem: ✓ If problem follows GIA2, replace GIA2. - Check Ethernet interconnect from GIA2 to MFD. ✓ If problem persists, replace MFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 2 of 5)
LRU TROUBLESHOOTING**

Invalid Data Field	Associated LRU(s)	Solution
GPS DR 	GIA1 or GIA2	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Check GPS1 and GPS2 signal strength on AUX page 4. Refer to GIA GPS section if GPS can not acquire a position lock for troubleshooting. • Check corresponding GPS antenna and cable for faults. • Check Ethernet interconnect between the PFD to GIA1 or MFD to GIA2 for faults. • Swap GIA1 and GIA2, to verify location of problem: ✓ If problem follows the GIA, replace the GIA. ✓ If problem persists, replace the PFD or MFD.
XPDR FAIL 	GTX 3X5R	• Check GTX 3X5R configuration settings for GIA1 and GIA2. • Check GTX 3X5R/GIA1 interconnect. • Check GTX 3X5R/GIA2 interconnect. • Perform a SET>ACTV configuration reset on the GTX Config page for each GTX, and verify the aircraft registration is present. • Replace GTX 3X5R. ✓ If problem persists, replace GIA.
ALTITUDE VERT SPEED FAIL AIRSPEED FAIL 	GSU 75	• Inspect GSU 75 pitot/static plumbing integrity. • Inspect pitot/static ports and associated equipment for faults. • For TAS failure, also check GTP 59 OAT probe. • Check GSU 75 configuration settings for the PFD, MFD, GIA1, and GIA2. ✓ If PFDs, MFD, and GIA configuration settings are correct, replace the GSU configuration module. ✓ If problem persists, replace the GSU 75.
OAT 	GTP 59	• Check OAT probe wiring and connectors for faults. • Check GSU config module wiring for damage, replace if any is found. • Replace GSU config module • Replace GSU 75 with a known good unit: ✓ If problem persists, replace the GTP 59

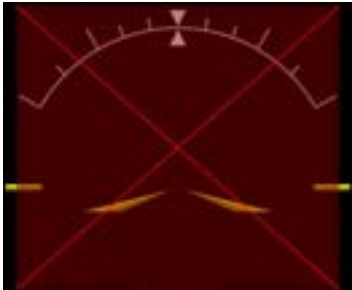
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 3 of 5)
LRU TROUBLESHOOTING**

Invalid Data Field	Associated LRU(s)	Solution
HDG FAIL 	GSU 75 & GMU	• Ensure metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer and aircraft is not in hangar, near other buildings, parked over metal drainage culverts or on hard surfaces that may contain steel reinforcements. • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle power after moving aircraft away from metal objects to determine if metal objects were the source of the interference. Allow up to five minutes for the heading to reinitialize. • Perform a Magnetometer Interference Test to check for interference from onboard electrical system components (e.g. NAV lights). Pay particular attention to any new electrical devices that have been installed since the aircraft was new. Correct any discrepancies that do not allow this test to pass before continuing. • Ensure GSU 75 and GMU connectors are secure. • Check the wiring and any inline connectors between the GSU and GMU for faults. • Recalibrate the GMU . • Load configuration files to the PFD, MFD, GIA1, and GIA2. ✓ If problem persists replace the GMU . ✓ If problem persists, replace the GSU 75.
	GSU 75 & GMU	• If this message persists longer than five minutes, perform ADAHRS calibration procedures as described later in this chapter.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 4 of 5)
LRU TROUBLESHOOTING**

Invalid Data Field	Associated LRU(s)	Solution
ATTITUDE FAIL 	GSU 75	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle GSU 75 power to restart initialization. • Ensure GSU 75 connector is secure and proper wire harness strain relief is provided. • Ensure the GSU 75 is fastened down tightly in it's mounting rack and that the mounting rack is not loose (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). • Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important for an ATTITUDE FAIL that appears during ground operation only. • Perform an Engine Run-Up Test to check if engine vibration is causing the GSU 75 to go offline. • Load configuration files to the PFD, MFD, GIA1, and GIA2. • Calibrate the GSU 75 (Pitch/Roll Offset and Magnetometer Calibration). • Replace GSU 75. ✓ If problem persists replace GSU 75 configuration module. ✓ Contact Garmin Aviation Product Support if condition continues after replacing the GSU 75 and config module for additional assistance.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

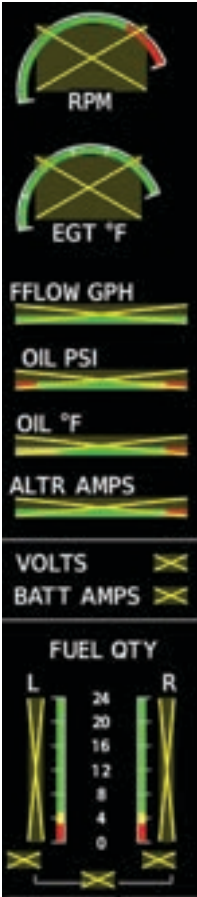
**CHART 1 (Sheet 5 of 5)
LRU TROUBLESHOOTING**

A DME or ADF failure is represented by the following red X's. The PFD displays function as a control head for the remote-mounted Honeywell KR 87 ADF and KN 63 DME.

Invalid Field	Sensor	Solutions
ADF FAIL OR NO ADF SIGNAL  GIA2 FAIL 	Honeywell ADF (Optional)	• Ensure that GIA 64/64W #2 is properly functioning. • Reload the ADF option configurations. • Check for proper operation of the ADF receiver. Ensure that the receiver is receiving power. • Check ADF – GIA2 interconnect.
 	Honeywell DME (Optional)	• Ensure that GIA 64/64W #2 is properly functioning. • Reload the DME option configurations. • Check for proper operation of the DME receiver. Ensure that the receiver is receiving power. • Check DME – GIA2 interconnect.

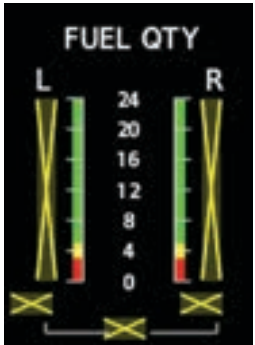
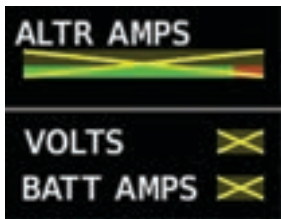
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 1 of 2)
TROUBLESHOOTING ENGINE / AIRFRAME SENSOR FAILURES**

Invalid Data Field	Associated LRUs	Solution
Engine/Airframe Sensors (All Invalid) 	GEA 71B & GIA 64/64W	- If software was loaded to a new GDU display, be sure that the user settings for the replaced display were cleared. Clear user settings by pressing the CLR key on the replaced display while applying power to it. Acknowledge the on-screen prompt by pressing the ENT key or the right-most softkey. - Check for GEA related Alert messages on the PFD. Correct any Alerts concerning software or configuration errors by reloading software or configuration as noted. - Verify GEA internal power supply, configuration, and calibration status in configuration mode. ✓ The internal power supply, configuration and calibration boxes should be green. If they are red, replace the GEA 71B. - Verify internal, external, and reference voltages listed in the Main Analog and I/O A Analog boxes are not dashed out (does not include Aircraft Power 1 and 2). ✓ If any voltages are dashed out, replace the GEA. - Ensure the GEA is online (green checkmark on the AUX – SYSTEM STATUS page). ✓ If GEA is not online verify unit is receiving power at the rack connector. ✓ Check the GIA/GEA interconnects for faults. ✓ Reload configuration files to both GIA's and the GEA. - If problem persists, replace the GEA 71B.
Invalid Field	Sensor	Possible Solutions (for applicable engine/system)
	Propeller RPM	- Check engine tachometer sensor wiring. - Replace engine tachometer sensor. - Replace GEA 71B.
	Exhaust Gas Temp (EGT)	- Check EGT sensor wiring. - Replace EGT sensor . - Replace GEA 71B.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 2 of 2)
TROUBLESHOOTING ENGINE / AIRFRAME SENSOR FAILURES**

Invalid Field	Sensor	Possible Solutions (for applicable engine/system)
	Fuel Flow	• Check fuel flow transmitter wiring. • Check fuel flow transmitter - GEA wiring. • Check power input to fuel flow transmitter. • Replace fuel flow transmitter. • Replace GEA 71B.
	Oil Pressure	• Check oil pressure sensor – GEA wiring. • Replace oil pressure sensor. • Replace GEA 71B.
	Oil Temperature	• Check oil temperature sensor – GEA wiring. • Replace oil temperature sensor. • Replace GEA 71B.
	Fuel Quantity	• Check Fuel Senders - #1 GIA 64/64W wiring. • Check #1 GIA 64/64W - #1PFD wiring. • Check MFD - #1 PFD connections. • Replace Fuel Senders left or right • Replace #1 GIA 64/64W • Replace #1 PFD • For more details see 28-00-00.
	Amp/Volts	• Check Alt amp sensor - GEA 71B wiring. • Replace Alt amp sensor. • Replace GEA 71B. • Check main bus - GEA 71B wiring. • Check emergency bus - GEA 71B wiring. • Replace GEA 71B

Engine/Airframe Instrument Failures

The above table provides guidance for troubleshooting individual engine/airframe sensor failures. Be sure to also follow previous guidance given for the GEA 71B. The technician should troubleshoot to isolate the fault by checking sensor-to-GEA wiring, replacing the suspect sensor, and finally by replacing the GEA 71B. Replace one part at a time. Check for correct operation of the sensors and GEA 71B after any part has been replaced. See also the Wiring Diagrams in Chapter 91.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 3
TAWS (OPTIONAL) TROUBLESHOOTING**

Annunciation	Cause	Solution
TAWS FAIL	A TAWS system failure has occurred.	• If message occurred on the first power up after unlocking TAWS, cycle power to initialize TAWS. • Ensure each GDU contains the correct database data card. • Ensure the G1000 NXi is configured for TAWS: ✓ If the system is not configured for TAWS, reconfigure per TAWS Unlock Procedure, herein. • Verify GIAs are online. • Ensure a database or GDU SW mismatch has not occurred. ✓ If a mismatch has occurred, load correct database/software files or replace the terrain card.
TAWS TEST	TAWS system is currently being tested.	N/A – Test will be conducted up to two minutes.
TAWS INHB	TAWS system alerting is disabled	Enable TAWS system alerting by pressing the INHIBIT softkey on the MAP – TAWS page.
TAWS N/A	GPS system integrity not high enough to enable TAWS	• Ensure valid GPS position is received from the AUX – GPS STATUS page. • Check GPS antenna & associated coaxial cabling. • Troubleshoot GIAs.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(16) Backup Communications Path Checks

The G1000 NXi system architecture is designed with redundant communication ports for several LRUs so that critical information can continue to be displayed in the event of an equipment or wiring failure. Of most importance is flight attitude, heading, and air data information. The GSU 75 and each have four separate ARINC 429 data lines which are all capable of sending data to the displays. The GEA 71B, GTX 335R/345R, and GMA 1360 each have two redundant serial communication paths for the same purpose. See "Figure 2" on page 3425034 for a basic G1000 NXi block diagram depicting this architecture. When troubleshooting, refer to the G1000 NXi Wiring Diagrams in Chapter 91.

(17) Failed Path Messages

The following message indicates there is a data path connected to the GDU (PFD or MFD) or the GIA 64/64W (1 or 2) that has failed.

FAILED PATH – A data path has failed.

The FAILED PATH message is triggered by a timeout of any one digital channel. The channels that are checked are listed on these pages in Configuration Mode:

- (a) GDU RS-232 / ARINC 429 CONFIG (PFD and MFD).
- (b) GIA RS-232 / ARINC 429 CONFIG (GIA1 and GIA2).
- (c) GIA CAN / RS-485 CONFIGURATION (GIA1 and GIA2).

The box next to each channel indicates the current status of the channel per the below:

Red = data path is known to be failed.

Black = data path status is unknown.

Green = data path is known to be good.

The applicable data paths can be verified by viewing the Configuration Mode pages listed in "Chart 6" on page 34250324.

NOTE: Check the PFD Alert Window for configuration or software error messages regarding the displays or LRUs. Correct any errors before proceeding.

**CHART 4
G1000 NXi - MESSAGE ADVISORIES / TROUBLESHOOTING**

Data Path Failures		
Failure Message	Cause	Solutions
FAILED PATH – A data path has failed.	A communications data path status is not being received by the G1000 NXi.	Determine which data path has failed: See the following charts and ADAHRS backup path test under Return to Service. Check wiring continuity for the failed path. Swap or replace the affected LRU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 5
FAILED PATH MESSAGES, CONFIG PAGE (PFD, MFD, AND GIA) - PROCESS**

SELECT UNITS = PFD / MFD / GIA1 / GIA2 – RS-232 / ARINC-429 / RS-485 Serial Config Pages

Indicator	Status
 GREEN	SELECT UNIT/LRU data path is functioning correctly.
 RED	SELECT UNIT/LRU data path is not functioning correctly. • Check avionics status page for SELECT UNIT or LRU configuration or software error messages. Correct any errors before proceeding. • If applicable, check the SELECT UNIT/LRU interconnect wiring and unit connector pins for faults. • Replace LRU. • Reload SELECT UNIT config file. • If problem remains, replace SELECT UNIT. • Remove SELECT UNIT and verify power and ground are present at the appropriate connector. → If power or ground is not present, troubleshoot aircraft wiring for faults. → If power and ground are present, check SELECT UNIT unit and LRU connector for damaged or pushback pins. • Swap PFD to confirm if the problem is in the original PFD. • Replace original PFD if box displays green check after swapping displays. • Ensure LRU connector is secure and proper wire harness strain relief is provided. • Swap LRU #1 and LRU #2 to confirm if the problem is in the original LRU #1. • Replace original LRU #1 if box displays green check after swapping units.
 BLACK	SELECT UNIT/LRU data path functionally is unknown. • Reload SELECT UNIT configuration file.

**CHART 6
DATABUS ACTIVITY AND INTERFACE CHECKS**

UNIT	BUS ACTIVITY	INTERFACE
PFD1	ARINC 429 CH 2 IN GSU75	1P10001-16/17 to P751-28/29
MFD	ARINC 429 CH 2 IN GSU75	2P10001-16/17 to P751-8/9
GIA 1	RS 232 CH 1 IN/OUT ADC	1P603-41/43/42 to P751-69/70/68
GIA 1	RS 232 CH 5 IN/OUT GTX 3X5	1P603-53/55/54 to P3251-9/31/52
GIA 1	RS 232 CH 6 IN/OUT AHRS	1P603-56/58/57 to P751-51/52/32
GIA 1	RS 232 CH 7 IN/OUT GMA 1360	1P603-59/62 to P3472-6/7
GIA 1	ARINC 429 CH 6 IN AHRS	1P603-14/15 to P751-27/7
GIA 1	RS-485 CH 1 GEA	1P603-23/24 to 1P701-5/6
GIA 2	RS 232 CH 5 IN/OUT GTX 3X5	2P603-53/55/54 to P3251-9/31/52
GIA 2	RS 232 CH 7 GMA 1360	2P603-59/62 to P3472-38/39
GIA 2	ARINC 429 CH 2 IN AHRS	2P603-33/35 to P751-49/50
GIA 2	RS-485 CH 1 GEA	2P603-23/24 to 1P701-7/8

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

F. Recommended Tools

The following tools (or equivalent) are recommended to perform various maintenance tasks on the G1000 NXi system.

- (1) Calibrated voltmeter capable of measuring 0-32 Volts DC.
- (2) #2 Phillips Screwdriver.
- (3) 3/32-inch Hex Tool.
- (4) Calibrated digital Level with 0.25 degrees of accuracy capability.
- (5) Calibrated VHF NAV/COM/ILS ramp tester.
- (6) Calibrated transponder ramp tester including Mode S capability for Mode S transponder equipped aircraft.
- (7) Air Data Test Set (ADTS) capable of simulating altitude up to the aircraft's service ceiling.
- (8) Headset/Microphone.
- (9) Outdoor line-of-site to GPS satellite signals or GPS indoor repeater.
- (10) Ground Power Unit (Capable of supplying 28 Vdc).
- (11) Calibrated Flight Control Cable Tension Meter or equivalent.
- (12) Calibrated digital thermometer suitable for measuring ambient temperature.
- (13) Laptop with RS232 emulation software.
- (14) M22885/108T8234 extraction tool.
- (15) An 0.060" 6-Spline wrench.
- (16) WX-PA portable analyzer kit (If Stormscope is installed).
- (17) Calibrated torque wrench capable of measuring 0–70 in-lbs.
- (18) Standard sockets & wrenches (3/8", 9/16", and 13/16").

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

G. Inspections

(1) Annual / 100 Hour Inspection

Each 12 months or 100 hours time-in-service, whichever comes first:

(a) Under Post-Installation Procedures, below:

Perform the "G1000 NXi Connection Check" on page 342503111.

(b) Under LRU Test Procedures, Initial Display Testing, below, perform the "PFD Fan Fail CAS Test" on page 342503110.

(2) 500 Hour Inspection

Perform the following function tests of the Avionics, PFD, and MFD cooling fans:

(a) Avionics Cooling Fan

- 1) Turn OFF all electrical components and avionics systems.
- 2) Pull the INTEG AV1 circuit breaker.
- 3) Turn the master switch ON.
- 4) Push IN the INTEG AV1 circuit breaker. Verify airflow from the Avionics Cooling Blower by motor sound and, if required, by sight (i.e., use a flashlight to observe the fan turning in the intake opening).
- 5) After checking blower, turn OFF master switch.

(b) PFD and MFD Cooling Fans

The PFD and MFD cooling fans are wired into the PFD and MFD circuit breakers, respectively. Accordingly, function test them as follows:

- 1) Turn OFF all electrical components and avionics systems.
- 2) Pull the PFD and MFD circuit breakers.
- 3) Turn the master switch ON.
- 4) Push IN the PFD circuit breaker. Verify operation of the PFD cooling fan by motor sound. Pull the PFD circuit breaker.
- 5) Push IN the MFD circuit breaker. Verify operation of the MFD cooling fan by motor sound. Pull the MFD circuit breaker.
- 6) After checking cooling fans, turn OFF master switch and push IN PFD and MFD circuit breakers.

(3) 1000 Hour Inspection

Each 1000 hours time-in-service visually inspect each unit listed below for corrosion, damage, or other defects. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors.

(a) GDU 105x PFD and MFD

Remove the PFD and MFD. Inspect the mounting surface and connector for corrosion, heavy oxidation or other damage.

(b) GMA 1360 Audio Panel

Inspect the GMA 1360 unit(s), rack and connectors for corrosion or other defects.

(c) GIA 64/64W Integrated Avionics Units

Inspect the GIA 64/64W #1 and #2 unit, rack and connectors for corrosion or other defects.

(d) GEA 71B Engine/Airframe Unit

Inspect the GEA 71B unit, rack, and connectors for corrosion or other defects.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (e) GTX 3X5R Mode S Transponder.
Inspect the GTX 3X5R unit, rack and connectors for corrosion or other defects.
- (f) GDL 69A / 69eA - Datalink (if installed)
Inspect the GDL 69A / 69eA unit, rack and connectors for corrosion or other defects.
- (g) PFD and MFD Cooling Fans
Inspect the PFD and MFD cooling fans for accumulation of dust or other damage. Remove excess dust as required.
- (h) Avionics Cooling Fan
Inspect the avionics cooling fan for accumulation of dust or other damage. Remove excess dust as required.
- (i) GSU 75 ADAHRS
Inspect the GSU 75 unit, rack and connector for corrosion or other defects.
- (j) GMU 44/44B Magnetometer
Remove the GMU and inspect the mounting hardware and GMU for corrosion or other damage.
- (k) Perform electrical bond tests on all G1000 NXi equipment. See 51-80-00.
- (l) Perform visual checks on the shield terminations for any degradation.

H. Components

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXi SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE "D. MAINTENANCE MODE" ON PAGE 34250311.

(1) General

Maintenance of the G1000 NXi system components is "On Condition" only. The following provides basic information regarding unit removal, installation, and troubleshooting. Basic guidance on loading and configuring software is provided under "Complete Software Load" on page 34250398. When removing and/or replacing any G1000 NXi component, always ensure that aircraft power is off. Unplug any auxiliary power supplies.

Before removing any G1000 NXi LRU, it is required that the technician verify the LRU software part numbers.

To check an LRU software part number and/or version:

- (a) Start the G1000 NXi system in Configuration Mode as described in Configuration Mode Overview under Post Installation Set-up, below.
- (b) The System Status page shows a list of LRUs in the LRU window. Activate the cursor and highlight the LRU window.
- (c) Use the FMS knob to scroll through the list in the window and select the desired LRU.
- (d) The software part number and version is displayed in the DATA window. Compare this to the latest configuration shown in the Required Equipment List (REL), "Chart 28" on page 342503143.

NOTE: If a faulty LRU is not reporting its software version and part number, check aircraft maintenance logs for last software version loaded and verify against the latest configuration.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) GDU 105x PFD and MFD

See "Figure 9".

CAUTION: THE GDU 105X USE A LENS COATED WITH A SPECIAL ANTI-REFLECTIVE COATING THAT IS VERY SENSITIVE TO SKIN OILS, WAXES AND ABRASIVE CLEANERS. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING. IT IS VERY IMPORTANT TO CLEAN THE LENS USING A CLEAN, LINT-FREE CLOTH AND AN EYEGLASS LENS CLEANER THAT IS SPECIFIED AS SAFE FOR ANTI-REFLECTIVE COATINGS.

(a) Description

Two Garmin GDU 105x displays are installed in the instrument panel. The GDU 105x units, 10.4-inch LCD displays with 1024x768 resolution, and either may serve as a PFD or MFD. The stand-by instruments are located to the left of the pilot's display. A GMA 1360 Audio Panel is located between the two GDU 105x displays.

The GDU 105x units communicate with each other and the GIA 64/64W units through high-speed data bus (HSDB) Ethernet connections.



(b) Troubleshooting

See "Chart 1" on page 34250315, "Chart 7" on page 34250354, and "Chart 8" on page 34250356.

GDU 105x - PFD and MFD Displays
Figure 9

(c) Removal

NOTE: Retain the database SD card(s) from the original display to install in the new display after loading software.

- 1) Disconnect the negative (ground) battery cable.
- 2) Using a 3/32-inch hex tool, rotate all four quarter-turn fasteners counterclockwise until they reach their stops.
- 3) Carefully remove the display from the panel.
- 4) While supporting the display, disconnect the connector.

(d) Installation

NOTE: If replacing the PFD with a new, repaired, or exchanged GDU, the new GDU must be placed in the MFD location to load the GDU system to prevent the deletion of configuration files residing in the PFD configuration module. It is not necessary to install a display in the PFD position to load GDU software into a display installed in the MFD position. After loading GDU software into the display in the MFD position, turn off the system and move the GDU to the PFD position. Then, continue the GDU installation by loading the PFD configuration files.

- 1) Visually inspect the connector and pins for signs of damage. Repair any damage. While supporting the display, connect the connector to the rear of the unit.
- 2) Carefully insert the display into the panel cutout, ensuring that all 4 quarter-turn fasteners align with the corresponding holes.
- 3) Seat the display in the panel cutout. Do not use excessive force while inserting the display.
- 4) Once seated, rotate all four quarter-turn fasteners clockwise to lock the display to the panel.
- 5) Connect the negative (ground) battery cable.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original Displays Reinstalled.

If the removed display(s) are re-installed in their original positions, no software or configuration loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the "GDU 105x PFD and MFD Test Procedure" on page 342503113 under LRU Test Procedures.

2) New, Repaired or Exchanged Display(s) Installed.

If a new, repaired or exchanged GDU 105x is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 34250395.

NOTE: If performing a manual Complete Software Load, and ChartView or TAWS were previously installed, these must be reactivated. See Chartview and TAWS Unlock Procedure respectively. If any other options were previously installed, these must also be reactivated per Optional Equipment Configuration.

Then continue to the "GDU 105x PFD and MFD Test Procedure" on page 342503113 under LRU Test Procedures.

(3) GMA 1360 Audio Panel

See "Figure 10".

(a) Description

The Garmin GMA 1360 Audio Panel integrates NAV/COM digital audio, intercom system and marker beacon controls. The GMA 1360 panel provides control of all cockpit intercom/mic systems as well as NAV/COM/ILS audio. The unit also provides display reversion mode control through a large red Display button. Power to the audio panel is provided by the battery switch or by applying external power. The GMA 1360 unit interfaces with the existing marker beacon antenna as well as existing mic and phone jacks.

(b) Troubleshooting

See "Chart 1" on page 34250315, "Chart 9" on page 34250362, and "Chart 10" on page 34250363.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Using a 3/32-in hex tool, turn the hex nut counter-clockwise until the GMA 1360 is unlocked from its location.
- 3) Carefully remove the GMA 1360 from its rack.

(d) Installation

- 1) Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GMA 1360 into the rack until the locking tab engages the rack.
- 3) Turn the hex nut clockwise to draw unit into rack until seated. Do not overtighten nut.
- 4) Connect the negative (ground) battery cable.



GMA 1360 Audio Panel
Figure 10

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original GMA 1360 Reinstalled.

No software or configuration loading or testing is required if the original panel is reinstalled. This does not include units that were returned for repair: their software and configuration files are deleted during the repair testing process. Continue to the Return to Service Procedure, below.

2) New, Repaired or Exchanged GMA 1360 Installed.

If a new, repaired, or exchange GMA 1347 is installed, see "LRU Replacement" on page 34250395. Before beginning the software load, remove the Supplemental Database cards from the bottom slots of each display. Identify which card is removed from the MFD so it can be reinserted into the MFD when software and configuration loading is complete. If performing a manual Complete Software Load, ensure the following files are loaded:

- a) GMA Software
- b) GMA Configuration
- c) GMA Files for optional equipment installed on the aircraft (i.e. ADF, HF radio, etc.).

Reinstall all the cards after the software and configuration file loads are complete. Then, continue to GMA 1360 Test Procedure under LRU Test Procedures.

(4) GIA 64/64W Integrated Avionics Unit

See "Figure 11".

(a) Description

Two Garmin GIA 64/64W Integrated Avionics Units (IAUs) contain the VHF COM/NAV receivers, WAAS GPS receiver, Flight Director, and system integration microprocessors. The GIAs also serve as a communication interface to all other G1000 NXi LRUs in the system. Each GIA 64/64W communicates directly with the on-side GDU 105x display +using a HSDB Ethernet connection. Both GIAs are located directly behind the PFD and MFD, installed into their respective LRU racks. Power is provided to GIA1 by the essential bus or the emergency bus. GIA2 is powered by the avionics bus.



GIA 64 Integrated Avionics Unit
Figure 11

1) Both GIA 64/64Ws interface to the following equipment:

- VOR/LOC/Glideslope Antenna System
- VHF COM #1 & #2 Antennas
- GA 36 and GA 37 GPS/WAAS Antennas
- GMA 1360
- GEA 71B
- GDU 105x, #1 & #2
- GTX 3X5R
- GSU 75
- Fuel Quantity Sensors (left and right)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 2) The GIA 64/64W #2 interfaces to the following additional equipment:
 - GFC 700 AFCS (if installed)
 - KR 87 ADF (if installed)
 - KN 63 DME (if Installed)
 - WX 500 Stormscope (if installed)

NOTE: The GIA 64/64W is compatible only with the antennas listed in the GIA 64/64W Installation Manual, Garmin P/N 190-00303-05.

(b) Troubleshooting

See "Chart 1" on page 34250315, "Chart 2" on page 34250320, "Chart 11" on page 34250364, and "Chart 12" on page 34250366.

(c) Removal

- 1) Remove the MFD as described above, under "GDU 105x PFD and MFD."
- 2) Unlock the GIA 64/64W handle by loosening the Phillips screw on the handle.
- 3) Pull the handle upward to unlock the GIA 64/64W. Gently remove the unit from the rack.

(d) Installation

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GIA 64/64W into its rack. The handle should engage the dogleg track.
- 3) Press down on the GIA 64/64W hand to lock the unit into the rack.
- 4) Lock the handle to the GIA 64/64W body using the Phillips screw.
- 5) Reinstall the MFD as described above.

(e) Return to Service

1) Original GIA 64/64W(s) Reinstalled

No software or configuration loading is required if the removed GIA is reinstalled in its original position (GIA1 and GIA2 in their original racks). This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to "Return to Service Procedure" on page 342503136.

2) Original GIA 64/64W(s) Swapped for Troubleshooting

No software loading is required if the original GIA units are reinstalled in opposite positions (GIA1 and GIA2 in opposite unit racks). However, configuration loading is required. See "LRU Replacement" on page 34250395. Then continue to "GIA 64/64W Tests" on page 342503115 under LRU Test Procedures.

3) New, Repaired or Exchanged GIA 64/64W(s) Installed

If a new, repaired or exchanged GIA 64/64W is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 34250395. Then continue to "GIA 64/64W Tests" on page 342503115 under LRU Test Procedures.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(5) GEA 71B Engine/Airframe Unit

See "Figure 12".

(a) Description

The Garmin GEA 71B Engine/Airframe Unit provides engine/airframe data to the G1000 NXi system. Data received from transducers/sensors is generally processed and sent to GIA 64/64Ws via RS-485 digital interface. Engine parameters are normally displayed on the MFD. In the event of a MFD failure, all engine instruments can be displayed on the PFD. The GEA is located behind the MFD and is mounted in a vertical orientation. Power is received from the essential bus or the emergency bus.

The GEA interfaces to the following:

- Exhaust Gas Temperature Sensors
- Amp/Volts Sensor
- Oil Pressure Sensor
- Oil Temperature Sensor
- Fuel Flow Sensor
- Fuel Quantity Sensors
- Propeller Speed Sensor (Tachometer)
- Flap Position Sensor (Optional)

(b) Troubleshooting

See "Chart 1" on page 34250315, "Chart 2" on page 34250320, and "Chart 13" on page 34250372.

(c) Removal

- 1) Remove the MFD as described above.
- 2) Unlock the GEA 71B handle by unscrewing the Phillips screw.
- 3) Pull the handle upward to unlock the GEA 71B.
- 4) Gently remove the GEA 71B from its rack.

(d) Installation

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GEA 71B into the rack. The handle should engage the dogleg track.
- 3) Press down on the handle to lock the unit into place.
- 4) Lock the handle to the GEA 71B body using the Phillips screw.
- 5) Reinstall the MFD as described above.



GEA 71B Engine/Airframe Unit
Figure 12

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original GEA 71B Reinstalled

No software or configuration loading is required if the removed GEA 71B is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the "Return to Service Procedure" on page 342503136.

2) New, Repaired or Exchanged GEA 71B Installed

If a new, repaired or exchanged GEA 71B is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 34250395. Then continue to the "GEA 71B Test" on page 342503118 under LRU Test Procedures.

(6) GEA 71B Backshell Thermocouple

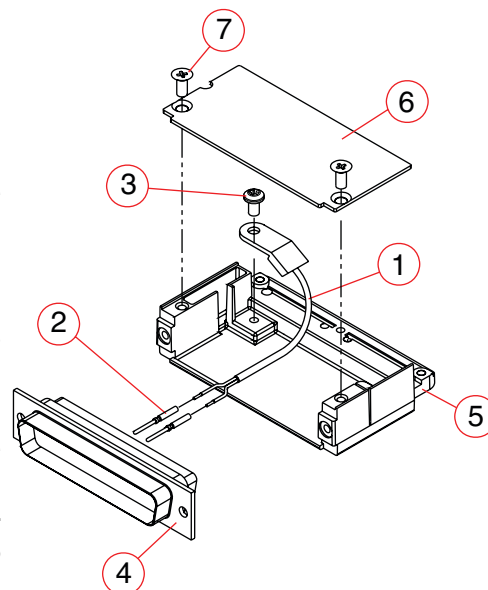
See "Figure 13".

(a) Removal

- 1) Remove GEA 71B as described above.
- 2) Remove GEA connector backplate.
- 3) Remove connector J701 (5) from the backplate.
- 4) Remove cover (6) from the backshell.
- 5) Unscrew thermocouple from boss on backshell. Extract the thermocouple pins from the connector.

(b) Installation

- 1) Crimp pins (2) onto each of the thermocouple wires (1). Ensure that pre-stripped wire length is 1/8" prior to crimping.
- 2) Insert newly crimped pins and wires into the appropriate connector housing location (4) as specified in the electrical schematic.
- 3) Place thermocouple body (1) onto the backshell boss (5). Place the thermocouple as shown in "Figure 13" so that the wires exit towards the bottom of the backshell.
- 4) Fasten thermocouple tightly to backshell using the provided screw (3).
- 5) Fasten cover (6) to backshell using the provided screws (7).



GEA 71B Backshell Thermocouple
Figure 13

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(7) GTX 3X5R Mode S/ES Transponder

See "Figure 14".

(a) Description

The unit is mounted directly behind the MFD in the center of that avionics shelf. Power is received from the essential bus. Similarly to the GEA 71B, the GTX 3X5R unit sends data via RS-232 directly to each GIA 64/64W. Information is then sent to the PFD, where the pilot can control the transponder. The GTX 3X5R unit interfaces with the transponder antenna.

The Garmin GTX 335R is standard, a GTX 345R is optional. Each provides Mode A, C, and S altitude and position reporting information for the G1000 NXi system as well as TIS-A and ADS-B OUT (1090 ES). Using precise GPS-referenced positioning information, the extended squitter technology enables transponders to automatically transmit traffic surveillance data – including aircraft flight ID, position, altitude, velocity, climb/descent, and heading information.

When the optional GTX 345R is installed, ADS-B IN (UAT, TIS-B, and FIS-B) capability is added. The unit receives and displays ADS-B transmissions from other ADS-B OUT equipped aircraft, ADS-R, and TIS-B information from ground stations. In addition, FIS-B information from UAT ground stations in the United States is received and available for display. This includes: NOTAM (includes TFRs), AIRMET, SIGMET, SUA, METAR, TAFs, PIREP, Winds/Temps Aloft, Regional NEXRAD, CONUS NEXRAD.

(b) Troubleshooting

See "Chart 1" on page 34250315 and "Chart 14" on page 34250373.

(c) Each Twenty-four (24) Calendar Months

The integrated transponder/altitude reporting system must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) §§ 91.411 and 91.413, every 24 calendar months, or any time the transponder is removed. This test requires the use of a Mode S ramp generator. Specific instructions for operating the ramp tester are contained in the applicable operator's manual. Refer to Title 14 CFR Part 43.

(d) Removal

- 1) Remove the MFD as described above.
- 2) Insert a 3/32 inch hex driver into the hole along the left edge of the lower half of the unit.
- 3) Rotate the screw counter-clockwise until it stops. This rotates a tab out of a cut-out in the rack.
- 4) Lift pull-tab on front of unit and pull GTX 3X5R from the rack.

(e) Installation

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GTX 3X5R into its rack, pressing it back until the front of the unit is flush with the aft edge of the rack.
- 3) Insert a 3/32 inch hex driver into the hole along the left edge of the lower half of the unit.



GTX 3X5R Mode S/ES Transponder
Figure 14

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 4) Rotate the screw clockwise until the rotating tab engages the retention cut-out in the rack.
- 5) Reinstall the MFD as described above.
- (f) Return to Service
 - 1) Original GTX 3X5R is Reinstalled

No software or configuration loading is required if the removed GTX 3X5R is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to "GTX 3X5R Test" on page 342503118 under LRU Test Procedures.
 - 2) New, Repaired or Exchanged GTX 3X5R is Installed

If a new, repaired or exchanged GTX 3X5R is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 34250395.

NOTE: If performing a manual Complete Software Load, after loading software and configuration files continue to "Aircraft Registration Number Entry" on page 342503103.

Continue to "GTX 3X5R Test" on page 342503118 under LRU Test Procedures.

- (8) GSU 75 Air Data and Attitude and Heading Reference System (ADAHRS)
See "Figure 15".

(a) Description

The GSU 75 is mounted on top of a bracket at the left side of the airplane just forward of F.S. 191.00. Power is provided to the unit from the essential bus or the emergency bus. The GSU 75 provides power to the GMU 44/44B and GTP 59.

The Garmin GSU 75 ADAHRS provides flight altitude, airspeed, attitude and heading data for flight instrumentation to the G1000 NXi system. It contains advanced tilt sensors, accelerometers, and rate sensors. The unit interfaces with the GMU44/44B Magnetometer and GTP 59 OAT Probe. It receives GPS signals from the GIA 63Ws. Actual attitude and heading information is sent using ARINC 429 digital interface to both GDU 105xs (PFD and MFD) and the GIA 64/64Ws.



GSU 75 ADAHRS
Figure 15

(b) Troubleshooting

See "Chart 1" on page 34250315, "Chart 15" on page 34250374, and "Chart 16" on page 34250375.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the baggage compartment rear closeout panel.
- 3) Disconnect the ADAHRS harness connector.
- 4) Disconnect and cap the pitot and static lines.
- 5) Loosen the two retentions screws counter-clockwise until they disconnect from the mounting rack.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 6) Gently lift the forward end of the GSU 75 from the mounting rack and pull the unit forward until its feet disengage the mounting rack.

NOTE: If the mounting rack is removed or even if the mounting rack screws are loosened, the GSU 75 must be re-calibrated. See Post-Installation Setup, below.

(d) Installation

- 1) Place the GSU 75 on the mounting rack and slide the unit back until the feet fully engage the rack.
- 2) Push down and simultaneously turn each retention screw clockwise. Torque each retention screw to 15–20 in-lbs.
- 3) Uncap and connect the pitot and static lines.
- 4) Visually inspect the harness connectors to ensure there are no bent or damaged pins. Repair any damage. Connect the harness connector to the GSU 75.
- 5) Reinstall the baggage compartment rear closeout panel.
- 6) Connect the negative (ground) battery cable.

(e) Return to Service

1) Original GSU 75 is Reinstalled

If the original GSU 75 was reinstalled, then no software loading is required. This does not include a unit that were returned for repair as their software is deleted during the repair testing process.

- a) If the GSU mounting rack was not removed or loosened, continue to "GSU 75 Tests" on page 342503119 under LRU Test Procedures.
- b) If the GSU mounting rack was removed or loosened, continue to "GSU/GMU Calibration Procedures" on page 342503121 under LRU Test Procedures. .

2) New, Repaired or Exchanged GSU 75 is Installed

If a new, repaired or exchanged GSU 75 is installed, then software must be loaded and the unit must be calibrated. See "LRU Replacement" on page 34250395. Then, proceed as follows:

- a) If the GSU mounting rack was not removed or loosened, continue to "GSU 75 Tests" on page 342503119 under LRU Test Procedures.
- b) If the GSU mounting rack was removed or loosened, continue to "GSU/GMU Calibration Procedures" on page 342503121 under LRU Test Procedures.

3) New GSU 75 Configuration Module is Installed

If the GSU 75 configuration module was replaced, no software loading is required. Continue to the "GSU/GMU Calibration Procedures" on page 342503121 under LRU Test Procedures.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(9) GTP 59 OAT Probe

See "Figure 16".

(a) Description

The Garmin GTP 59 OAT Probe provides the GSU 75 with air temperature data. The OAT probe is mounted on an access cover in the underside of the left wing.

(b) Troubleshooting

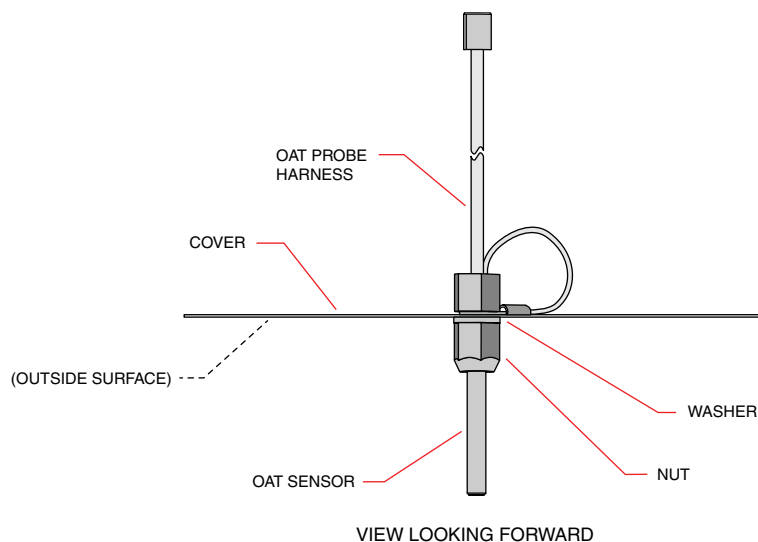
See "Chart 1" on page 34250315.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the access cover.
- 3) Disconnect the connector.
- 4) Use an open-end wrench to hold the probe in place on the inside of the access cover. On the outside of the access cover, loosen the GTP 59 nut and remove the GTP 59, nut and washer.

(d) Installation

- 1) Place the GTP-59 grounding strap O-ring connector over the OAT probe end and insert the probe through the access cover from the inside side. Secure with nut and washer and washer on the outside of the access cover. Use an open-end wrench to hold the GTP-59 on the inside and torque the nut on the outside to 100 ± 20 in. lbs.
- 2) Reconnect the connector to the airplanes wiring harness.
- 3) Install the access cover.
- 4) Connect the negative (ground) battery cable.



GTP 59 OAT Probe
Figure 16

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

(10) GMU 44/44B Magnetometer

See "Figure 17".

(a) Description

The GMU provides horizontal and vertical magnetic field information to the GSU 75 ARHS. This LRU is powered via the GSU 75. It communicates with the GSU 75 using a RS-485 digital interface. The GMU bracket is mounted on a wing access cover assembly at the bottom of the left wing between WS 148.60 and 131.60.

(b) Troubleshooting

See "Chart 1" on page 34250315, "Chart 15" on page 34250374, and "Chart 16" on page 34250375.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the eight non-ferrous screws securing the magnetometer cover assembly to the underside of the left wing.
- 3) Disconnect the wiring harness connection and remove the magnetometer and cover assembly.
- 4) Remove the three non-ferrous screws securing the magnetometer to its mounting bracket. Disconnect the grounding strap. Remove the magnetometer.

(d) Installation

CAUTION: THE MAGNETOMETERS ARE SECURED TO THE MOUNTING BRACKET WITH BRASS SCREWS. ENSURE ONLY BRASS SCREWS ARE USED WHEN REINSTALLING.

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Place the GMU into its mounting bracket, make sure the arrow on the GMU aligns with the arrow on the mounting bracket, and secure three non-ferrous screws. Torque 12–15 in-lbs. Connect the grounding strap
- 3) Reconnect the GMU pigtail to the wing wiring harness.
- 4) Reinstall the magnetometer cover assembly, make sure the arrow on the GMU is pointing forward, and secure the assembly with eight (8) non-ferrous screws.
- 5) Connect the negative (ground) battery cable.

(e) Return to Service

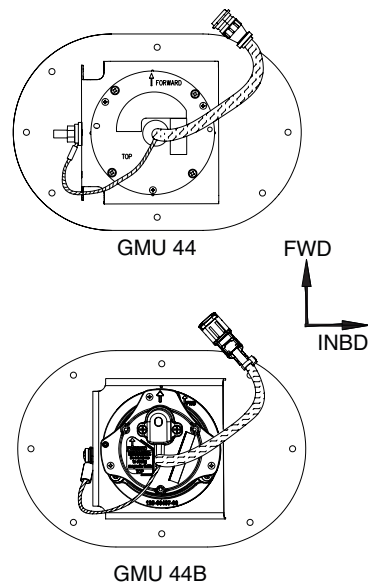
- 1) Original GMU is Reinstalled

If the original GMU was reinstalled, then no software loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to "GSU 75 Tests" on page 342503119 under LRU Test Procedures.

- 2) New Repaired or Exchange GMU is Installed

If the repaired or exchange GMU was replaced with a new unit then software must be loaded. See "LRU Replacement" on page 34250395. Then continue to "GSU/GMU Calibration Procedures" on page 342503121 under LRU Test Procedures.

107814_1



GMU 44/44B Magnetometers
Figure 17

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(11) GDL 59 Flight Parameter Recorder (Optional.)

See "Figure 18".

(a) Description

The GDL 59 is located just forward of F.S. 191.00. It's mounted in an equipment rack attached to the inboard side of a bracket at the left side of the airplane. The associated Wi-Fi antenna is mounted atop the tailcone under the dorsal fairing (see Figure 1 in 23-00-00).

The GDL 59 is a flight parameter recorder with a high-speed Wi-Fi transceiver for transmitting collected data from the airplane to a Wi-Fi hotspot for trend monitoring and maintenance planning. In flight, the unit records specified data from the G1000 NXi system. Such data can include engine trend and exceedance data, system maintenance data, crew advisory system (CAS) messages and more. Up to two gigabytes of memory is available to support hours of flight time logging. On the ground, logged data / reports can be sent through the integrated 802.11g Wi-Fi transceiver. Simply park the airplane within range of a Wi-Fi hotspot and use the MFD to select data to upload.



GDL 59 Data Link Unit
Figure 18

(b) Troubleshooting

See "Chart 18" on page 34250378.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the baggage compartment rear closeout panel.
- 3) Unscrew and remove the Phillips head screw securing the installation lever.
- 4) Lift the installation lever to release the unit from the rack and pull the GDL 59 forward out of the rack.

(d) Installation

- 1) Visually inspect the connector to ensure there are no bent or damaged pins. Repair any damage.
- 2) Position the unit in the rack with the installation lever raised and slide aft until the installation lever engages its slot in the rack.
- 3) Press the installation lever down to fully seat the unit. Secure with Phillips head screw, torquing 10–14 in-lbs.
- 4) Install the baggage compartment rear closeout panel.
- 5) Connect the negative (ground) battery cable.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Return to Service

1) Original GDL 59 is Reinstalled

No software or configuration loading is required if the original GDL 59 is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the GDL 59 Test Procedures under LRU Test Procedure.

2) New, Repaired or Exchanged GDL 59 is Installed

If a new, repaired or exchanged GDL 59 is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 34250395. Then, continue to GDL 59 Test Procedure under LRU Test Procedures.

(12) GDL 69A / 69eA Data Link Unit (Optional.)

See "Figure 19".

(a) Description

The GDL 69A/69eA is mounted in a rack on a bracket on the upper left side of the fuselage forward of F.S. 191.00. The GDL 69 provides XM Radio weather and music entertainment through means of a dedicated satellite data link. Power to the GDL 69 is received from the avionics bus. The GDL 69 sends weather data via HSDB connection to the MFD, where the data link interface is controlled. It is linked directly to the GMA 1347 Audio Panel for distribution of the audio signal.

(b) Troubleshooting

See "Chart 18" on page 34250378 and "Chart 19" on page 34250379.

(c) Removal

- 1) Disconnect the negative (ground) battery cable.
- 2) Remove the baggage compartment rear closeout panel.
- 3) Unlock the GDL 69 handle by unscrewing the Phillips screw.
- 4) Pull the handle upward to unlock the GDL 69.
- 5) Gently remove the GDL 69 from its rack.

(d) Installation

- 1) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
- 2) Gently insert the GDL 69 into the rack. The handle should engage the dogleg track.
- 3) Press down on the handle to lock the unit into place.
- 4) Lock the handle to the GDL 69 body using the Phillips screw.
- 5) Reinstall the baggage compartment rear closeout panel.
- 6) Connect the negative (ground) battery cable.

(e) Return to Service

1) Original GDL 69 is Reinstalled

No software or configuration loading is required if the original GDL 69 is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the "GDL 69 SXM Test" on page 342503130 under LRU Test Procedures.



GDL 69A/69eA Data Link Unit
Figure 19

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2) New, Repaired or Exchanged GDL 69 is Installed

If a new, repaired or exchanged GDL 69 is installed, the correct software and configuration files must be loaded to the unit. See "LRU Replacement" on page 34250395. Be sure the XM Satellite Radio subscription is reactivated. Then, continue to "GDL 69 SXM Test" on page 342503130 under LRU Test Procedures.

NOTE: The radio IDs required for activation may be obtained as follows: start MFD in normal mode and navigate to the XM page in the AUX group.. XM weather services has an eight (8) digit "data radio ID" and XM radio services has an eight (8) digit "audio radio ID" displayed on that page.

(13) GRT 10/GRC 10 Wireless Remote System (Optional.)

See "Figure 20".

(a) Description

The optional GRT 10 wireless transceiver and GRC 10 wireless remote control are for passenger use to control the audio functions (volume adjustment and channel changing) of the Garmin GDL 69A / 69eA Datalink Receiver. The system consists of two components:

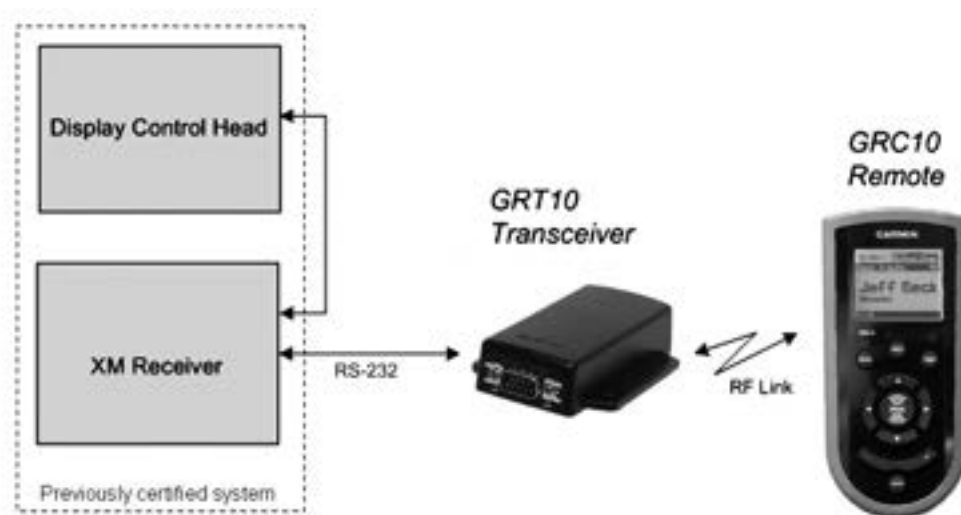
- 1) The GRT 10 Wireless Transceiver installed in the aircraft adjacent to the GDL 69A / 69eA and connected to the GDL 69A / 69eA serial port, and
- 2) the GRC 10 Wireless Remote with an LCD display.

(b) Removal

- 1) Disconnect backshell assembly from unit.
- 2) Use a 3/16" hex drive tool to remove each of the four mounting screws.

(c) Installation

- 1) Inspect connector for damaged pins.
- 2) Hold unit flush with the mounting plate.
- 3) Use a 3/16" hex drive tool to tighten each of the four mounting screws.
- 4) Connect backshell assembly to unit.



GRT 10 (Optional)
Figure 20

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(14) FS 510 Bluetooth and Wi-Fi Connectivity (Optional.)

See "Figure 21".

(a) Description

The FlightStream 510 is an SD card-sized unit which is inserted into the lower SD card slot on the face of the MFD. It provides a secure (password protected) Bluetooth and Wi-Fi interface to the G1000 NXi to provide wireless database updating via the Garmin Pilot app, situational data available to mobile apps, GPS and attitude information, ADS-B (Traffic and FIS-B), Flight Plans, PVT, AHRS, TIS-B, FIS-B, Data logging, and SXM Weather.

(b) Troubleshooting

See "Chart 20" on page 34250380.

(c) Removal

- 1) Press and release unit.
- 2) Remove unit from card slot.

(d) Installation

- 1) Place unit in card slot.
- 2) Press unit into card slot until you feel unit engage slot.



FS 510 (Optional)
Figure 21

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(15) GTS 800 Traffic Advisory System

See "Figure 22".

(a) Description

The optional GTS 800 Traffic Advisory System provides real-time traffic information to the PFD (and, indirectly, to the MFD). The Garmin GTS 800 connects with the #1 GDU 105x and communicates with the MFD through an HSDB connection. Power is received from the Avionics Bus.

(b) Troubleshooting

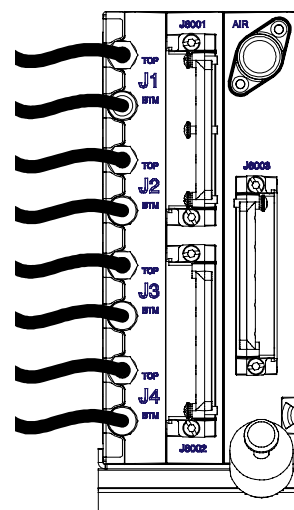
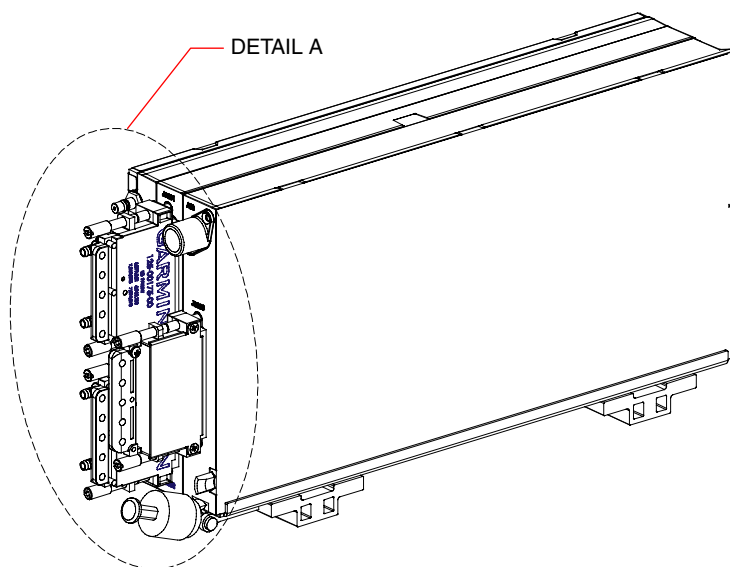
See "Chart 21" on page 34250380.

(c) Removal

- 1) Remove the aft cabin hatshelf assembly to gain access to the aft avionics shelf.
- 2) Disconnect the GTS 800 connectors.
- 3) Loosen the GTS 800 unit by unscrewing the knurled retainer.
- 4) Move the retainer arms downward. Gently remove the GTS 800 from its rack.

(d) Installation

- 1) Insert the GTS 800 into the rack and lift each retainer arm to engage lip.
- 2) Gently screw retainer to secure the GTS 800 unit into place.
- 3) Visually inspect the connectors and pins for damage. Repair any damage. Connect the connectors to the unit.
- 4) Reinstall the aft cabin hatshelf assembly.



DETAIL A
LOOKING AFT

GTS 800 TAS
Figure 22

Effectivity
with Garmin G1000 NXi
2843823, 2881001 and up

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

(16) Configuration Module

See "Figure 23".

The configuration module is located in the backshell of the connector it is terminated to.

(a) Removal

- 1) Disconnect connector from LRU.
- 2) Remove 2 screws (8) from cover (7) and remove cover.
- 3) Unplug connector from configuration module (1).
- 4) Remove configuration module.

(b) Installation

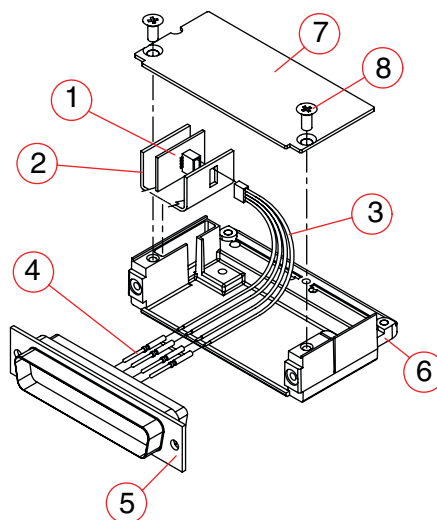
- 1) Inspect connector for damaged pins (4).
- 2) Place configuration module (1) in position.
- 3) Insert connector into configuration module (1).
- 4) Assembly of the connector is the reverse of disassembly.

(c) Return to Service

- 1) GEA 71B Configuration Module is replaced:
No software loading is required. Continue to GEA 71B Test described later in this chapter.
- 2) GSU 75 ADAHRS Configuration Module is replaced:
No software loading is required. Continue to "GSU 75 Tests" on page 342503119.
- 3) GRS 79 AHRS Configuration Module is replaced:
No software loading is required; however, all three GRS/GMU calibration procedures must be performed. See "Chart 28" on page 342503143.
- 4) The Master Configuration Module (i.e., GDU 105x PFD) is replaced:
 - a) Start the G1000 NXi system in configuration mode.
 - b) Go to the Configuration Upload Page on the PFD.
 - c) Press the UPDT CFG softkey and press ENT.

NOTE: If the master configuration module is replaced, the system ID number will change. This will require the replacement of all enable (i.e., unlock) cards. Optional system enable (i.e., unlock) cards are locked to the system ID number when first used. If the system ID number changes, the enable (i.e., unlock) cards must be replaced with new/unused cards. Contact Garmin Aviation Support for assistance.

- 5) If both the GDU 105x PFD and the Master Configuration Module are replaced: The entire G1000 NXi system must be reconfigured. Proceed to "Complete Software Load" on page 34250398.



Configuration Module
Figure 23

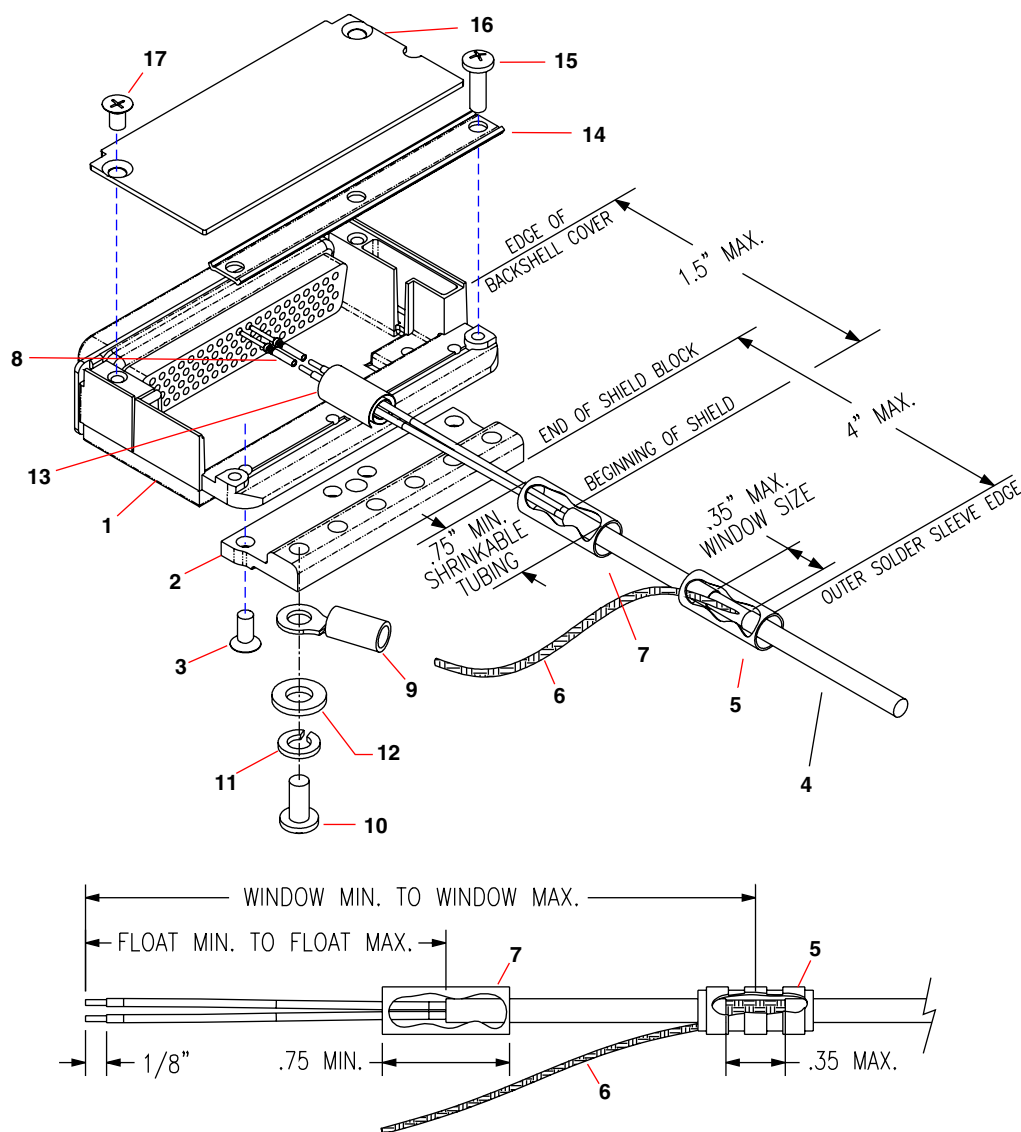
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(17) Shield Block Installation

See "Figure 24".

Most G1000 NXi connectors employ a shield block grounding system to provide necessary ground reference to shielding and/or transducers.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



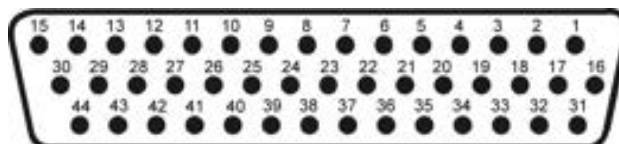
1. CAST HOUSING	10. SCREW
2. SHIELD BLOCK(S)	11. SPLIT WASHER
3. SCREW	12. FLAT WASHER
4. MULTIPLE CONDUCTOR SHIELDED CABLE (2-CONDUCTOR DEMONSTRATED HERE)	13. SILICON FUSION TAPE
5. DRAIN WIRE SHIELD TERMINATION (METHOD OPTIONAL)	14. STRAIN RELIEF
6. BRAID, FLAT	15. SCREW
7. FLOATING SHIELD TERMINATION (METHOD OPTIONAL)	16. LID
8. PINS	17. SCREW
9. RING TERMINAL, #8, INSULATED	

Shield Block Installation to Backshell
Figure 24

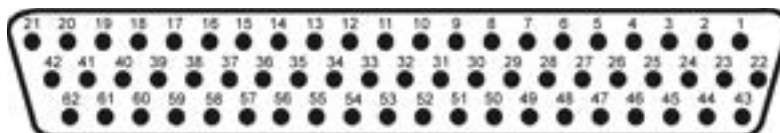
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

- (18) Backshell Connectors
See "Figure 25".

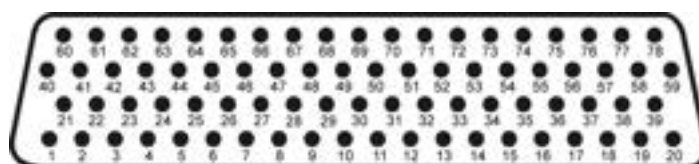
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



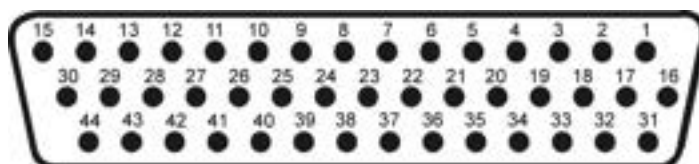
View of J601 connector from back of unit



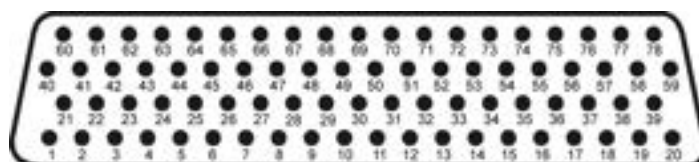
View of J602 connector from back of unit



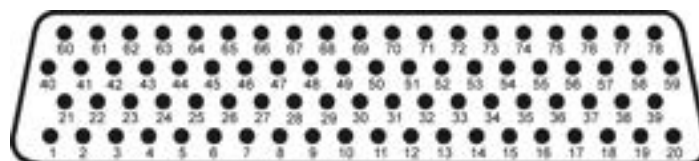
View of J603 connector from back of unit



View of J604 connector from back of unit



View of J605 connector from back of unit



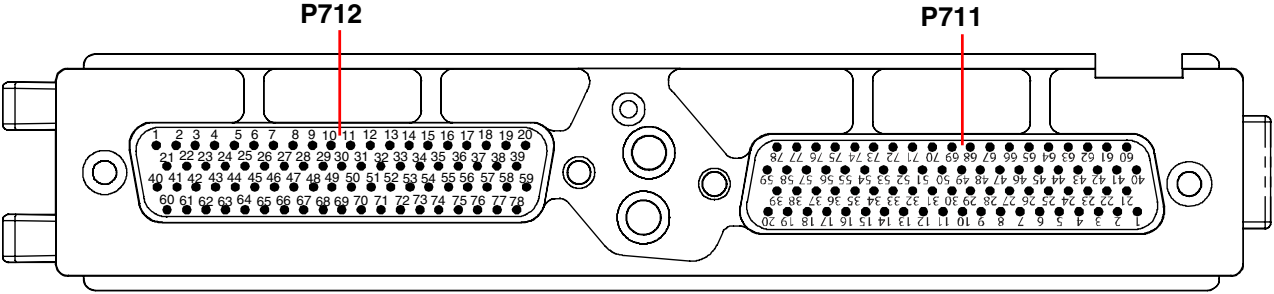
View of J606 connector from back of unit

GIA 64 Viewed with the LRU reomoved.

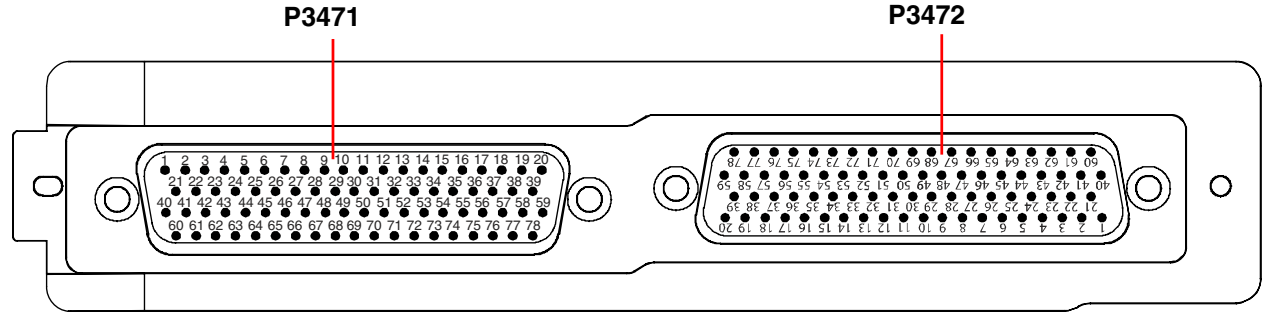
Backshell Connectors
Figure 25 (Sheet 1 of 5)

[Effectivity](#)
with Garmin G1000 NXi
2843823, 2881001 and up

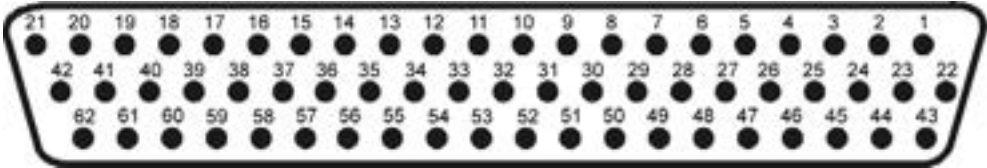
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GE A 71B



GMA 1360



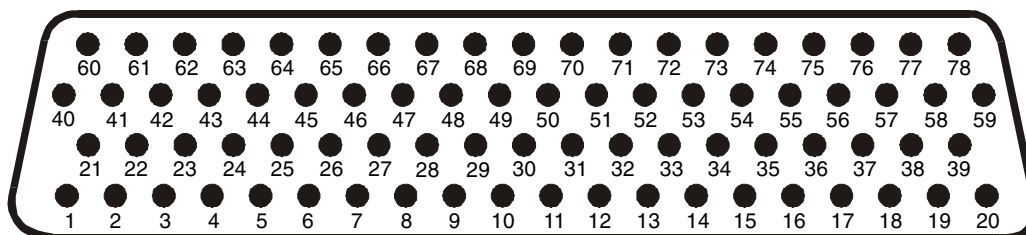
J10001 Connector

GDU 105X

Viewed with the LRU removed.

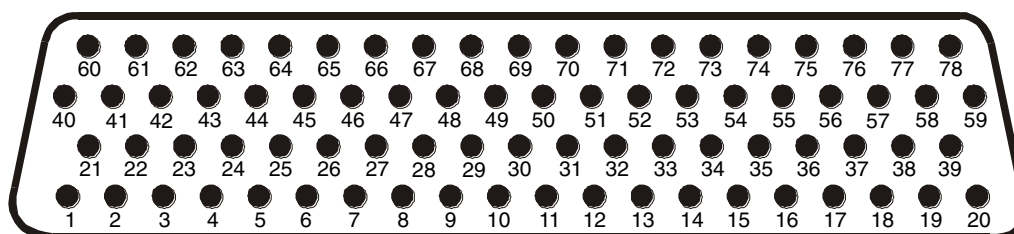
Backshell Connectors
Figure 25 (Sheet 2 of 5)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



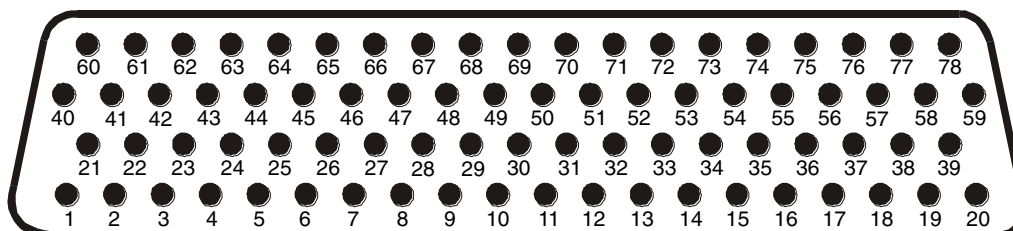
J751 Connector

GSU 75



P591Connector

GDL 59 (Optional)



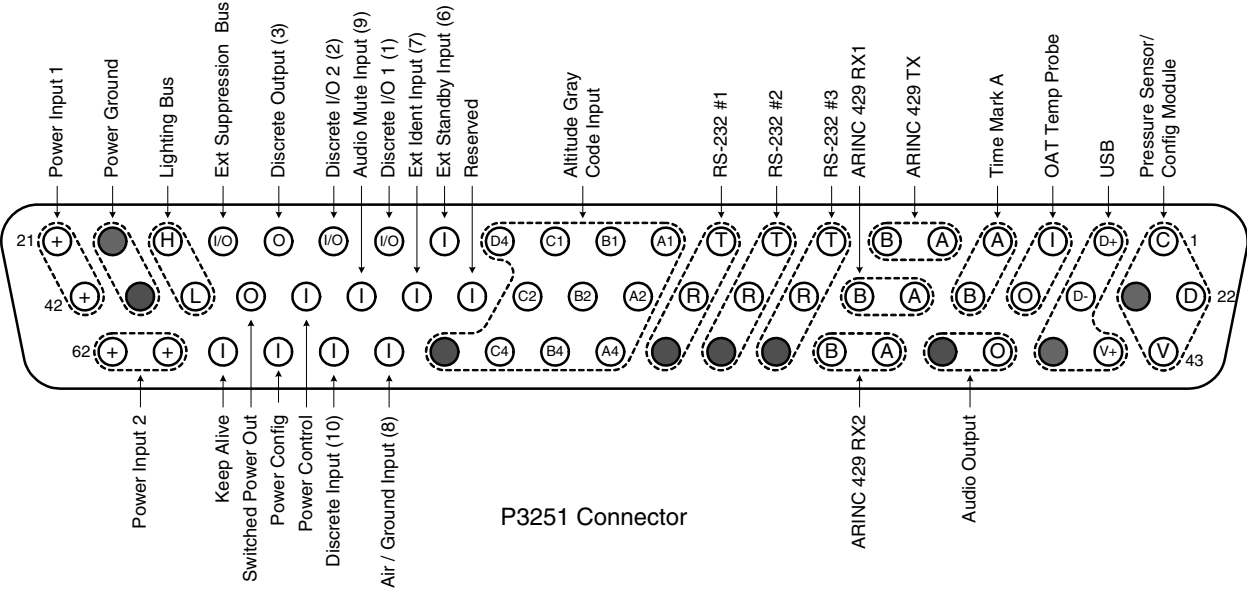
P691Connector

GDL 69A (Optional)

Viewed with the LRU removed.

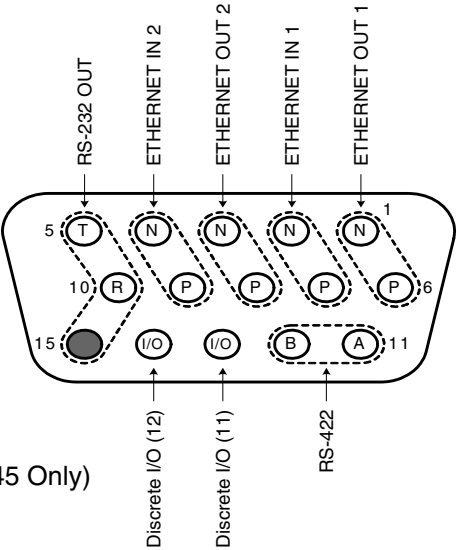
Backshell Connectors
Figure 25 (Sheet 3 of 5)

PIPER AIRCRAFT, INC. PA-28-181, ARCHER III MAINTENANCE MANUAL



● Ground

Numbers in () are the discrete I/O numbers.

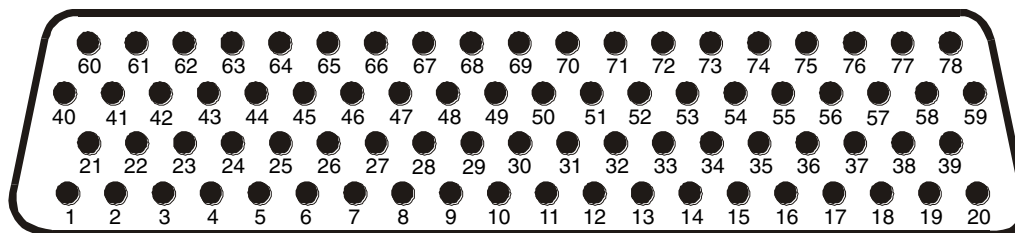


GTX 3X5

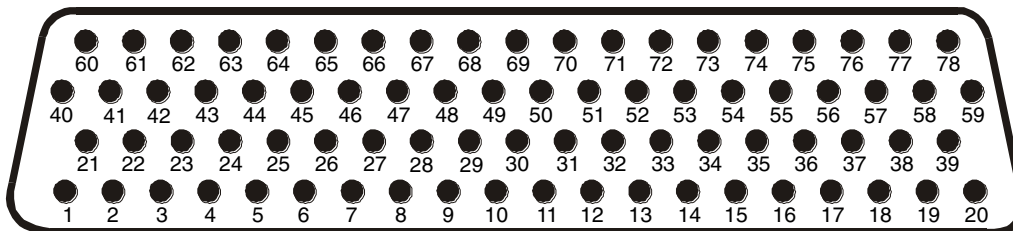
LOOKING AT THE BACK OF THE UNIT

Backshell Connectors
Figure 25 (Sheet 4 of 5)

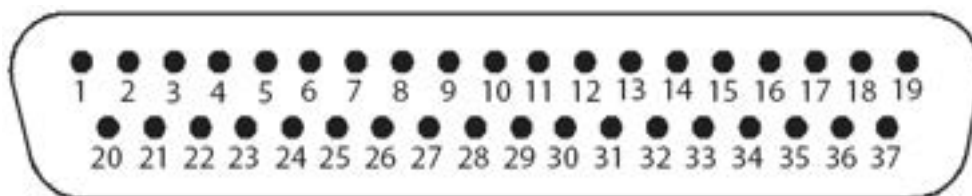
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



P8001 Connector



P8002 Connector



P8003 Connector

GTS 800 (Optional)

Viewed with the LRU removed.

Backshell Connectors
Figure 25 (Sheet 5 of 5)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7 (Sheet 1 of 2)
G1000 NXi - TROUBLESHOOTING - GDU**

Symptom	Recommended Action
Display is blank	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle power. ✓ If GDU recovers, observe display for yellow text containing error information at the top of the screen. If message indicates software needs to be re-loaded, then re-load software. Otherwise, replace the GDU.
Display resets	• Use a bright light to verify LCD is active. ✓ Adjust avionics dimmer control full clockwise. ✓ Manually turn up backlight on the PFD and load configuration files to the GDU. • Ensure slide lock is fully engaged with the locking tabs on the back of the unit. ✓ If slide lock is not fully engaged, remove connector and verify the locking tabs on the GDU are perpendicular to the connector. If necessary, straighten them before reseating connector.
Display flickers	• Ensure GDU is receiving power. If a circuit breaker is tripped, determine source of short before resetting breaker. • Ensure circuit breakers have not failed and power wire connections are secure. • Swap PFD and MFD. ✓ If problem follows unit, replace the display. (Note the position it failed in.) ✓ If problem does not follow unit, troubleshoot aircraft wiring for fault.
SD card is stuck in GDU	• DO NOT insert a screwdriver of any length into the card slot. • DO NOT pry against the overlay. • DO NOT force the SD Card out. • Use a small screwdriver in the groove on the side of the exposed end of the card to help pull out the card. • Push the card in further to release the card locking mechanism. • Check SD Card for having more than one label. Two or more labels on the card will cause sticking. ✓ Remove all but one label. • Ensure the SD card is from Toshiba or SanDisk. Use of other SD Cards is not recommended. • If card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair.
A button/knob/joystick does not appear to function	• Go to the GDU TEST page in configuration mode and verify button, knob, or joystick operates correctly by observing a change in color from red to green in the button/knob/joystick icon when the button/knob/joystick is pressed. If a button is stuck, the button icon will be green without pressing the button as soon as you turn to the GDU TEST page. ✓ If problem is verified, replace GDU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7 (Sheet 2 of 2)
G1000 NXi - TROUBLESHOOTING - GDU**

Symptom	Recommended Action
Terrain/Obstacle/Safetaxi does not display	• Ensure supplemental data cards are inserted correctly in the lower slots of each GDU. • Allow the system to verify the data on the cards for approximately five minutes after power-up. • If a database does not activate, reload the problem database onto the SD Card or replace the card.
Display will not track dimmer bus	• Reload GDU configuration files. • Swap PFD and MFD to see if problem remains with display. ✓ Replace display if condition remains with the same display. ✓ If condition remains in original position after swapping displays, check GDU dimmer input to verify voltage is present.
Keyboard will not track dimmer bus	
Display will not track photocell	• Reload GDU configuration files. • Swap PFD and MFD to see if problem remains with display. ✓ Replace display if condition remains with the same unit. ✓ If condition remains in original position after swapping displays, check GDU dimmer input to verify voltage is present. • Go to the GDU TEST page in configuration mode. ✓ Cover and uncover photocells and verify that PHOTOCELL A or PHOTOCELL B value changes. ✓ If values do not change, replace the display.
Keyboard will not track photocell	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 8 (Sheet 1 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Software / Configuration		
Failure Message	Cause	Solution
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The system has found the PFD and/or MFD software versions do not match.	• Load correct software version. See Software Loading procedure.
MANIFEST – PFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in the specified PFD.	
MANIFEST – MFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in MFD.	
CNFG MODULE – PFD configuration module is inoperative.	The PFD master configuration module has failed.	• Check master configuration module connector and wiring for damage inside the GDU connector backshell. ✓ Replace master configuration module wiring and pins. ✓ If problem persists, replace master configuration module. NOTE New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 8 (Sheet 2 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU

Software / Configuration (cont.)		
Failure Message	Cause	Solution
MFD CONFIG – MFD configuration error. Config service required.	A configuration mismatch has occurred between the display and the Master Configuration Module.	- Reload the display configuration files from SD Loader Card. - Reload system configuration files by pressing the UPDT CFG softkey on the Configuration Upload Page in the PFD System Page Group to load configuration files into the configuration module. ✓ If message persists, check PFD1 config module wiring for faults and replace if necessary. ✓ If issue continues, replace PFD1 master configuration module. ✓ If problem persists, replace the display. NOTE New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
PFD CONFIG – PFD configuration error. Config service required.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 8 (Sheet 3 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Database Message Advisories		
Failure Message	Cause	Solution
MFD DB ERR – MFD aviation database error exists.	The MFD or PFD has encountered an error in the Jeppesen aviation database.	- Reload aviation database into the display. - Contact Garmin Technical Support for assistance.
PFD DB ERR – PFD aviation database error exists.		
MFD DB ERR – MFD terrain database error exists.	The MFD has encountered an error in the terrain database.	- Confirm supplemental data card is inserted fully. - Reload the database or replace the supplemental datacard. - Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD terrain database error exists.	The specified PFD has encountered an error in the terrain database.	
MFD DB ERR – MFD obstacle database error exists.	The MFD has encountered an error in the obstacle database.	- Confirm supplemental data card is inserted fully. - Reload the database or replace the supplemental datacard. - Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD obstacle database error exists.	The specified PFD has encountered an error in the obstacle database.	
MFD DB ERR – MFD airport terrain database error exists.	The MFD has encountered an error in the airport terrain database.	- Confirm supplemental data card is inserted fully. - Reload the database or replace the supplemental datacard. - Contact Garmin product Support for further assistance if needed.
PFD DB ERR – PFD airport terrain database error exists.	The PFD has encountered an error in the airport terrain database.	
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The system has found the Jeppesen aviation database cycles in the PFD and/or MFD do not match.	Load current aviation database versions to all displays.
DB MISMATCH – Aviation database type mismatch. Xtalk is off.	The system has found the Jeppesen aviation database types in the PFD and/or MFD do not match (i.e., different regions: Americas, International, Atlantic, etc.)	Load same type aviation database to all displays.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 8 (Sheet 4 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Database Message Advisories (cont.)		
Failure Message	Cause	Solution
DB MISMATCH – Airport Terrain database version mismatch. Xtalk is off.	The PFD and/or MFD have different Airport Terrain database versions installed.	• Confirm supplemental data card is inserted fully. • Reload the database or replace the supplemental datacard.
DB MISMATCH – Terrain database version mismatch.	The PFD and/or MFD have different terrain database versions installed.	
DB MISMATCH – Obstacle database version mismatch.	The PFD and/or MFD have different obstacle database versions installed.	
DB MISMATCH – Terrain database type mismatch.	The PFD and/or MFD have different terrain database types installed (i.e., different regions: Americas, International, Atlantic, etc).	

Cooling Message Advisories		
Failure Message	Cause	Solution
MFD COOLING – has poor cooling. Reducing power usage.	MFD has exceeded its operating temperature range.	• Check cooling fan and wiring for proper operation (if applicable). ✓ Replace the cooling fan if unable to determine if it is correctly operating. ✓ If problem persists, replace the MFD. • If problem continues contact Garmin Aviation Product Support.
PFD COOLING – has poor cooling. Reducing power usage.	PFD has exceeded its operating temperature range.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 8 (Sheet 5 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Key Message Advisories		
Failure Message	Cause	Solution
MFD "key" KEYSTK – key is stuck.	The SYSTEM has determined a key is stuck on MFD.	- Go to the GDU TEST page in configuration mode and verify if key is stuck (if key is stuck its indicator will be green). - Exercise suspected stuck key and reset GDU TEST page to see if indicator remains green without pressing the key. ✓ If problem persists replace the display.
PFD "key" KEYSTK – key is stuck.	The system has determined a key is stuck on the PFD.	

Miscellaneous Message Advisories		
Failure Message	Cause	Solution
XTALK ERROR – A flight display cross talk error has occurred.	A communication error has occurred between the MFD and/or PFD.	- Ensure a database error has not occurred (identified in the ALERTS window on the PFD). ✓ If a database error has occurred, correct error before proceeding. - Check display Ethernet interconnect wiring. - Replace PFD with a known good unit, to verify location of problem: ✓ If problem persists, reinstall PFD and replace MFD.
DATA LOST – Pilot stored data lost. Recheck settings.	Pilot stored data has been lost.	- If the CLR key was held during a power cycle, disregard message. - Cycle power to PFD: ✓ Ensure CLR key is not stuck on the GDU TEST page. ✓ If problem persists, replace PFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 8 (Sheet 6 of 6)
G1000 NXi - MESSAGE ADVISORIES - GDU**

Miscellaneous Message Advisories (cont.)		
Failure Message	Cause	Solution
MFD SERVICE – needs service. Return unit for repair.	The G1000 NXi has determined MFD needs service.	• Ensure the MFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. ✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. ✓ If the CCFT level rises, disregard the message. ✓ If the CCFT level does not rise, replace the MFD • Replace the MFD
PFD SERVICE – needs service. Return unit for repair.	The G1000 NXi has determined the specified PFD needs service.	• Ensure the PFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to the GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. ✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. ✓ If the CCFT level rises, disregard the message. ✓ If the CCFT level does not rise, replace the PFD • Replace the PFD.
PFD VOLTAGE – PFD has low voltage. Reducing power usage.	The specified PFD supply voltage is low.	• Check input voltage to PFD. • If input voltage is OK, replace PFD.
MFD VOLTAGE – MFD has low voltage. Reducing power usage.	The MFD supply voltage is low.	• Check input voltage to MFD. • If input voltage is ok, replace MFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 9
G1000 NXi - TROUBLESHOOTING - GMA**

Symptom/ Failure Message	Recommended Action
Noise in Audio	Most often the cause of the noise is external to the GMA. Try the following to locate the source of the noise before replacing the GMA: • Try a different pair of headsets. Noise cancelling headsets may pick up and/or generate more noise than standard headsets from their own circuitry. • Check for noise with the engine turned off. ✓ If the noise is present only when the engine is running, check the generator and/or ignition system as possible sources of noise (see applicable airframe specific maintenance manual). • Check for noise as all electrical equipment is turned on and off (strobes, other radios, etc.). ✓ If the noise is identified from one electrical system or component refer to the applicable airframe specific maintenance manual. • Ensure the NAV/COM squelch is not open. • Ensure the ADF and DME audio is not active. • Ensure the marker beacon audio is not active. • Ensure the ICS squelch is not open. ✓ Master squelch level can be adjusted on the GMA CONFIGURATION page for higher noise environments. • Replace unit only after all possible external sources of noise are eliminated.
Buttons Do Not Work	• Some buttons are disabled in the GMA CONFIGURATION page by default. This is to remove potential sources of audio noise for inputs that are not used. If in doubt as to which buttons should be disabled, reload GMA config files and other config files for optional equipment installed in the aircraft (i.e. ADF, HF, etc.) from the loader card.
COM Bleedover	• Verify on the GMA CONFIGURATION page that "Disable Split COM" has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, Split COM operation is not approved. If the box is black (indicating COM 1/2 button is active), highlight "Disable Split COM" with the cursor and press the ENT key to turn the box green which will deactivate Split COM mode.
Speaker Cuts Out	• Reduce volume level of the item that caused the speaker to cut out when turned up. A speaker protection circuit disables the speaker output if the volume is too high. If the volume is not sufficient, replace aircraft cabin speaker, reference the Airframe Maintenance Manual.
Mic Audio Heard in Speaker	• Reduce ICS Volume.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10
G1000 NXi - MESSAGE ADVISORIES - GMA**

Failure Message	Cause	Solution
GMA SERVICE – GMA needs service. Return unit for repair.	The system has determined that the GMA 1360 needs service.	• Replace GMA.
GMA FAIL – GMA is inoperative.	The system has detected a failure in the GMA 1360.	• Ensure GMA is receiving power. • Ensure both GIAs are receiving power. • Ensure all GDUs are receiving power. • Ensure the GMA/GIA RS-232 data lines are working properly. • Ensure the GIA/GDU Ethernet data lines are working properly. • Replace GMA.
MANIFEST – GMA software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GMA 1360.	Load the correct unit software. See Software/Configuration (above) for the Software Loading procedure.
GMA CONFIG – GMA configuration error. Config service req'd.	The system has detected a GMA 1360 configuration mismatch for the unit.	• Load GMA configuration files. See Software/Configuration (above). ✓ Replace GMA. ✓ If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. NOTE New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 11 (Sheet 1 of 2)
G1000 NXi - TROUBLESHOOTING - GIA 64**

COM	
Symptom	Recommended Action
Weak COM transmit power	- Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check COM antenna and cabling for faults.
Weak COM receiver	- Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check COM antenna and cabling for faults.
No COM sidetone	- Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem persists, replace GMA1 with a known good unit.

NAV	
Symptom	Recommended Action
Weak NAV receiver	- Set up a NAV/COM Ramp Test Set to radiate a test signal. - Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

Glide/Slope	
Symptom	Recommended Action
Weak G/S receiver	- Set up a NAV/COM Ramp Test Set to radiate a test signal. - Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace GIA. ✓ If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 11 (Sheet 2 of 2)
G1000 NXi - TROUBLESHOOTING - GIA 64**

GPS	
Symptom	Recommended Action
Will Not Acquire Satellites	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Using the MFD AUX – GPS Status page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e. cell phones, FBO datalink antennas, etc.). • Check date and time on Date/Time Setup Page. ✓ If date and time are incorrect, enter the correct date and time. • Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, clear the GPS almanac by performing the following steps – - o Using the PFD in config mode, go to the GIA RS-232/ARNIC 429 Config Page. - o At the top of the screen, select the GIA that can not acquire satellites (GIA1 or GIA2) and press the ENT key. - o Press the “CLR NV” softkey at the bottom of the screen. - o Select “OK” in the “Clear GIA nonvolatile memory?” pop-up window. - o Next reload GIA Audio and Config files from a loader card, see G1000 NXi Software/Configuration Procedure, for instructions. Be sure to reload the config files for any optional equipment installed on aircraft that require GIA configuration to be updated. • Cycle power on the system and allow it to restart in normal mode. Place the aircraft outside and allow 15-30 minutes for the GPS to acquire a position and download a new almanac. ✓ If clearing nonvolatile memory is unsuccessful and the GPS still can not acquire a position, replace the GIA. ✓ If problem does not follow unit, check GPS antenna and cabling.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12 (Sheet 1 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 64**

COM Messages		
Failure Message	Cause	Solution
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has determined COM1 needs service.	Replace GIA1 according to instructions in Removal/Installation.
COM2 SERVICE – COM2 needs service. Return unit for repair.	The system has determined COM2 needs service.	Replace GIA2 according to instructions in Removal/Installation.
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	- Press the push-to-talk switch(es) again to cycle its operation. - Check push-to-talk switch(es) and wiring. - Check GIA1/GMA 1360 interconnect. - Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Software/Configuration above): ✓ If problem follows the unit, replace GIA1. ✓ If problem persists replace defective GMA 1360.
COM2 PTT – COM2 push-to-talk key is stuck.	The COM2 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	- Press the push-to-talk switch(es) again to cycle its operation. - Check push-to-talk switch(es) and wiring. - Check GIA2/GMA 1360 interconnect. - Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists replace defective GMA 1360.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12 (Sheet 2 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 64**

COM Messages (cont.)		
Failure Message	Cause	Solution
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM1 external remote transfer switch again to cycle its operation. Check COM1 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/ Configuration above): ✓ If problem follows the unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
COM2 RMT XFR – COM2 remote transfer key is stuck.	The COM2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM2 external remote transfer switch again to cycle its operation. Check COM2 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/ Configuration above): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The specified COM transceiver is reporting a high temperature condition and is reducing transmit power to prevent damage.	• Check fan, wiring and air tubing for proper operation (if applicable). • Replace cooling fan if unable to determine if operating correctly. • Replace GIA. • If problem persists contact Garmin Aviation Product Support for assistance.
COM2 TEMP – COM2 over temp. Reducing transmitter power.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12 (Sheet 3 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 64**

NAV Messages		
Failure Message	Cause	Solution
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	The system has detected a failure in NAV1 receiver.	Replace GIA1.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	The system has detected a failure in NAV2 receiver.	Replace GIA2.
NAV1 RMT XFR – NAV1 remote transfer key is stuck.	The NAV1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the NAV1 external remote transfer switch again to cycle its operation. Check NAV1 remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
NAV2 RMT XFR – NAV2 remote transfer key is stuck.	The NAV2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the NAV2 external remote transfer switch again to cycle its operation. Check NAV2 remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Software/Configuration above): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12 (Sheet 4 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 64**

Glideslope Messages		
Failure Message	Cause	Solution
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	The system has detected a failure in G/S1 receiver.	Replace GIA1.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	The system has detected a failure in G/S2 receiver.	Replace GIA2.
G/S1 FAIL – G/S1 is inoperative.	The system has detected a failure in G/S1 receiver.	- Switch GIA1 and GIA2 to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow unit, check G/S1 antenna and cabling.
G/S2 FAIL – G/S2 is inoperative.	The system has detected a failure in G/S2 receiver.	- Switch GIA1 and GIA2 to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow unit, check G/S2 antenna and cabling.

GPS Messages		
Failure Message	Cause	Solution
MANIFEST – GPS1 software mismatch. Communication halted.	The system has detected an incorrect software version loaded in GIA1.	• Load the correct GPS software. See Software/Configuration above): for the Software Loading procedure.
MANIFEST – GPS2 software mismatch. Communication halted.	The system has detected an incorrect software version loaded in GIA2.	
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	The system has detected a failure in GPS1 receiver.	• Replace GIA.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	The system has detected a failure in GPS2 receiver.	
GPS1 FAIL – GPS1 is inoperative.	The system has detected a failure in GPS1 receiver.	• Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows the unit, replace GIA. ✓ If problem does not follow the unit, check GPS antenna and cabling.
GPS2 FAIL – GPS2 is inoperative.	The system has detected a failure in GPS2 receiver.	
NOTE Before troubleshooting, ensure that no cell phones or devices using cell phone technology are turned on, even in a monitoring state, in the cabin.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12 (Sheet 5 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 64**

GPS Messages (cont.)		
Failure Message	Cause	Solution
LOI – GPS integrity lost. Crosscheck with other NAVS.	If the primary receiver is a WAAS sensor, the alert indicates that GPS position data has timed out.	- Verify the area the aircraft was traveling through did not have loss of GPS coverage. FAA NOTAMs may be issued for periods of outages, or the US Coast Guard website http://www.navcen.uscg.gov will have notices posted. - Using the MFD AUX – GPS Status page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e., cell phones, FBO datalink antennas, etc.). - If GPS receivers can not acquire a position lock, troubleshoot per the “Will not acquire satellites” section.
GPS NAV LOST – Loss of GPS navigation. Insufficient satellites.	There is no GPS position fix available or the system is in dead reckoning mode.	
GPS NAV LOST – Loss of GPS navigation. Position error.	The G1000 NXi has detected an internal position warning has occurred.	
GPS NAV LOST – Loss of GPS navigation. GPS fail.	The G1000 NXi has detected a GPS engine failure.	

Cooling Messages		
Failure Message	Cause	Solution
GIA1 COOLING – GIA1 temperature too low.	GIA1 operating temperature is too low.	Allow unit to warm up.
GIA2 COOLING – GIA2 temperature too low.	GIA2 operating temperature is too low.	Allow unit to warm up.
GIA1 COOLING – GIA1 over temperature.	GIA1 has exceeded its operating temperature range.	- Check fan, wiring and air tubing for proper operation (if applicable). - Replace cooling fan if unable to determine if operating correctly. - Replace GIA1. - If problem persists contact Garmin Aviation Product Support for assistance.
GIA2 COOLING – GIA2 over temperature.	GIA2 has exceeded its operating temperature range.	- Check fan, wiring and air tubing for proper operation (if applicable). - Replace cooling fan if unable to determine if operating correctly. - Replace GIA2. - If problem persists contact Garmin Aviation Product Support for assistance.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12 (Sheet 6 of 6)
G1000 NXi - MESSAGE ADVISORIES - GIA 64**

Configuration Messages		
Failure Message	Cause	Solution
MANIFEST – GIA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA1.	Load the correct software. See Software/Configuration (above) for the Software Loading procedure.
MANIFEST – GIA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA2.	
GIA1 CONFIG – GIA1 audio config error. Config service req'd.	The GIA's audio configuration files are incorrect or missing.	Reload audio configuration files.
GIA2 CONFIG – GIA2 audio config error. Config service req'd.		
GIA1 CONFIG – GIA1 configuration error. Config service req'd.	The system has detected a GIA configuration mismatch. If GIAs are not properly configured after being swapped/replaced, this message appears.	- Load the configuration files for that GIA. See Software/Configuration (above) for GIA 64 Configuration Loading procedure. - If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
GIA2 CONFIG – GIA2 configuration error. Config service req'd.		
HW MISMATCH – GIA hardware mismatch, GIA1 communication halted.	The G1000 NXi has detected a non-WAAS GIA 64.	Replace GIA with a WAAS unit.
HW MISMATCH – GIA hardware mismatch, GIA2 communication halted.		
GIA1 SERVICE – GIA1 needs service. Return unit for repair.	The G1000 NXi has detected a failure in the specified GIA.	Replace suspect GIA.
GIA2 SERVICE – GIA2 needs service. Return unit for repair.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 13
G1000 NXi - TROUBLESHOOTING / MESSAGE ADVISORIES - GEA**

Failure Message	Cause	Solution
MANIFEST – GEA software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GEA 71B.	Load the correct software version. See GEA 71B Software Load Procedure.
GEA CONFIG – GEA configuration error. Config service required.	The system has detected a configuration mismatch in the GEA 71B.	• Load GEA configuration files. See GEA 71B Configuration Procedure. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14
G1000 NXi - TROUBLESHOOTING / MESSAGE ADVISORIES - GTX**

Failure Message	Cause	Solution
MANIFEST – GTX software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GTX.	Reload software. See Software Load / Configuration Procedure.
XPDR CONFIG – XPDR configuration error. Config service required.	The system has detected a configuration mismatch for the specified GTX.	- Perform a SET>ACTV configuration reset on the GTX Config page and verify the aircraft registration is present. - If error is still present, reload config files from a loader card. ✓ If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
XPDR SRVC – XPDR needs service. Return unit for repair.	The G1000 NXi has detected a failure in the specified GTX.	Replace GTX.
XPDR FAIL – XPDR is inoperative.	The specified GTX is not responding.	- Check wiring between GIAs and GTX. - Replace GTX.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 15
G1000 NXi - TROUBLESHOOTING - GSU / GMU**

GRS 77 (AHRS) / GMU 44 Troubleshooting / Message Advisories	
Symptom	Recommended Action
AHRS does not complete initialization	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important if this issue appears during ground operation only. • Calibrate the GRS 77. • Check GRS 77 configuration module wiring for damage. • Check GRS 77 connector for bent pins. ✓ If no damage can be found, replace GRS 77 configuration module. ✓ If problem persists, replace the GRS 77.
Attitude appears unstable	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure the four GRS 77 mounting screws are tight. Finger tight is not sufficient, a screwdriver must be used to verify. • Ensure mounting rack and airframe shelf are secure and all hardware and brackets are present (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). • Ensure GRS 77 connector is securely fastened and proper strain relief is provided. • Remove GRS 77 connector and verify there are no bent pins. • Replace the GRS 77. • Contact Garmin for further troubleshooting if required.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 16 (Sheet 1 of 2)
G1000 NXi - MESSAGE ADVISORIES -- GSU / GMU**

GSU		
Failure Message	Cause	Solution
MANIFEST – GSU software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GSU 75.	Load correct software version. See Software Configuration Procedures.
ADAHRS SERVICE – ADAHRS magnetic-field model needs update.	The AHRS magnetic field model should be updated for the specified unit. Appears on ground only.	Load updated AHRS magnetic field file. See GSU 75 / Components for AHRS magnetic field update information.
GEO LIMITS – ADAHRS too far north/south, no magnetic compass.	No magnetic compass information available due to being too far north or south.	Operate the aircraft only within the limits as specified in the POH.
ADAHRS TAS – ADAHRS not providing airspeed.	The GSU 75 is not providing airspeed data.	- Perform pitot/static check per 34-10-00 in this manual. Allow GSU to warm up fifteen minutes before checking accuracy. - If pitot/static system checks out and connections to GSU are good, replace the GSU 75.
ADAHRS GPS – ADAHRS not receiving backup GPS information.	The GSU 75 is not receiving backup GPS information from either GIA 63.	- Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. - Check GPS status for GIA 1 and 2 on MFD - AUX GPS STATUS page. If one or both GPS receivers cannot acquire a position lock, see GPS troubleshooting section. - Troubleshoot GIA 1 & 2 to GSU 75 wiring for faults (ref. Failed Path troubleshooting section). - Replace the GSU 75.
ADAHRS GPS – ADAHRS operating exclusively in no-GPS mode.	The GSU 75 is operating in the absence of GPS.	
ADAHRS GPS – ADAHRS not receiving any GPS information.	The GSU 75 is not receiving GPS data from the GPS receivers.	
ADAHRS GPS – ADAHRS using backup GPS source.	The GSU 75 is using the backup GPS data path.	
MAG VAR WARN – Large magnetic variance. Verify all course angles.	Magnetic variance value from GMU 44 is not accurate.	- If flying near large radio towers or other sources of possible electromagnetic interference, the condition should correct itself as the aircraft leaves the area. - If problem persists, run magnetic interference check in LRU Test Procedures (below) to check for magnetic interference in the aircraft.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 16 (Sheet 2 of 2)
G1000 NXi - MESSAGE ADVISORIES -- GSU / GMU

GMU		
Failure Message	Cause	Solution
MANIFEST – GMU software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GMU.	Load the correct software version. See G1000 NXi Software/Configuration Procedure, for the Software Load Procedure.
HDG FAULT – ADAHRS magnetometer fault has occurred	A fault has occurred in the specified magnetometer; heading will be flagged invalid.	• Check GMU /GSU 75 interconnect for faults. ✓ Replace GMU . ✓ If problem persists, replace GSU 75.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 17
G1000 NXi - TROUBLESHOOTING - GDL 59

Symptom	Recommended Actions
No communication with GDL 59.	Check power wiring and pin out of GDL 59 unit. Ensure GDL 59 configuration option has been loaded.
No or low-quality Wi-Fi signal.	Verify that a Wi-Fi network is configured and available. Ensure the Wi-Fi antenna is within range of a Wi-Fi network. Remove any obstacles between the aircraft Wi-Fi antenna and the Wi-Fi network hub that may be blocking the signal. Check the Wi-Fi antenna cable and connectors. Verify antenna ground plane is adequate.
Connects to Wi-Fi but cannot send report data.	Activate Garmin Connex. Note that a replacement GDL 59 unit must be registered again, even if the MFD already shows REGISTERED.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 18
G1000 NXi - TROUBLESHOOTING - GDL 69A**

Symptom	Recommended Action
No XM audio is heard	• Ensure the following items are not preventing the audio panel from distributing XM audio (reference applicable G1000 NXi Pilot's Guide): ✓ Verify the XM volume is not muted on the AUX – XM RADIO page on the MFD. ✓ Verify the COM squelch is not open. ✓ Verify the ICS squelch is not open. ✓ Verify the marker beacon tones are not being received. ✓ Verify the headphone (if equipped) volume is turned up. • Go to the AUX – SYSTEM STATUS page on the MFD and ensure unit is online. ✓ If a red X is present, verify the unit is receiving power at the rack connector.
No XM weather information is displayed	• Ensure there are no GDL alerts in the alert window. If there is an Alert for software or configuration error or mismatch, reload the file noted in the Alert. • Restart the PFD and MFD in configuration mode and go to the GDL page. ✓ Verify unit is active. ✓ Verify the Signal number is "2" or "3". If it is "0" or "1" check the GDL 69A antenna and cabling for faults. ✓ Reseat the GDL 69A to verify the coax connector is fully seated. ✓ If unit is not active, contact XM Customer service at 1-800-985-9200 to have a refresh signal sent to your unit. You will need to provide them the Audio Radio ID (and Data Radio ID number for XM weather) numbers. Also verify with XM that the correct Weather package (Aviator Lite or Aviator) is on the account, and that no traffic service has been activated against that Radio ID. The unit must be on for approximately one hour after the request for the refresh has been sent to receive the signal. ✓ Alternatively, you may also go to XM's website at http://www.xmradio.com/refresh and enter the radio IDs to have a refresh signal sent. ✓ If there is still problems receiving weather products after performing the above step, call XM and have the account deactivated, and a new account activated to clear out any corrupt account information. ✓ Verify there is a good ground connection through the aircraft between the MFD and the GDL 69A unit. Reference the Aircraft Maintenance Manual for instructions on how to check bonding and ground points. ✓ If problem persists, replace the GDL 69A.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 19
G1000 NXi - MESSAGE ADVISORIES - GDL 69A**

Failure Message	Cause	Solution
GDL 69 FAIL – GDL 69A has failed.	The G1000 NXi has detected a failure in the GDL 69A.	• Replace GDL 69A. • Check GDL 69A antenna and cabling. • Check the GDL 69A and MFD interconnect.
GDL69 CONFIG – GDL 69A configuration error. Config service req'd.	The G1000 NXi has detected a GDL 69A configuration mismatch.	• Reload configuration file. See Software Load / Configuration Procedure. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <u>NOTE</u> New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 NXi Syst. ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.
MANIFEST – GDL software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GDL 69A.	• Load correct software version. See Software Load / Configuration Procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 20
G1000 NXi - TROUBLESHOOTING - FS 510**

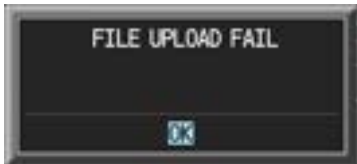
Problem	Action
Flight Stream Not Found	Check that Flight Stream is not obstructed by RF blocking material. Check that the control/display is in RF range of the Flight Stream. Check that pairing mode is enabled.
Flight Stream Connection Lost	Check that the control/display is in RF range of the Flight Stream. Check that Flight Stream is not obstructed by RF blocking material. Remove the Bluetooth pairing from the portable electronic device and the Flight Stream, and then attempt to pair the device again.

**CHART 21
G1000 NXi - MESSAGE ADVISORIES - GTS 800**

Failure Message	Cause	Solution
MANIFEST – GTS software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the specified GTS 800.	Load the correct software version. See G1000 NXi Software/Configuration Procedure, for the Software Load Procedure.
GTS CONFIG – GTS configuration error. Config service req'd.	The system has detected a configuration mismatch for the specified GTS 800.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 22
G1000 NXi - TROUBLESHOOTING - SOFTWARE CONFIGURATION**

Problem	Solutions
MFD or PFD displays do not power up:	• Ensure power is present at display backshell connector. • Troubleshoot per the "Blank Display" GDU section.
Software file load fails: 	• Ensure that LRU is reporting data on System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Retry software file load or try using a different card. Ensure that the MFD is not touched during the loading process. • Ensure that LRU part number is compatible with software version and Card Loader. • Replace LRU.
Configuration file load fails: 	• Ensure that LRU is reporting data on System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Retry configuration file load or try using a different card. Ensure that the MFD is not touched during the loading process. • Ensure that LRU part number is compatible with Card Loader. • Replace LRU.
GIA1 and/or GIA2 to 'LRU' data path not working	• Ensure GIA1 and GIA2 are configured correctly. • Check wiring, connectors & pins as needed.
Software File Mismatch Alert appears in lower right corner of PFD when started in normal mode: 	• Ensure that proper software file part number and version were loaded to LRU. To attain the current software P/N and version for your aircraft contact: Piper Aircraft Inc. Customer Service. • Check and ensure that correct Card Loader was used during load process. Refer to the General Arrangement Drawing. • Reload software to LRU.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 23
G1000 NXi - SYSTEMS COMMUNICATIONS HIERARCHY**

The following criteria must be satisfied to be able to perform the desired operation:	
Desired Operation	Criteria for Success
Load Software to MFD or PFD	• G1000 NXi Loader Card must be inserted in top slot for each display to be loaded. • ENT key must be held during power up of display. • Power on only one display at a time during software loading.
Load AIRFRAME, SYSTEM, MFD, PFD and MANIFEST configuration files to MFD and PFD	• G1000 NXi Loader Card must be inserted in top slot of PFD. • PFD and MFD must be powered on. • PFD and MFD must have correct software.
Load Software/Configuration files to GIA 64s	• G1000 NXi Loader Card must be inserted in top slot of PFD. • G1000 NXi system must be powered on. • PFD and MFD must have correct software. • PFD and MFD must be successfully configured with AIRFRAME, SYSTEM, MANIFEST, MFD and PFD configuration files.
Load Software/Configuration files to: - GMA 1360 - GSU 75 - GEA 71B - GMU 44/44B (software only) - GTX 3X5R	• G1000 NXi Loader Card must be inserted into PFD top slot. • G1000 NXi must be powered on. • PFD and MFD must have correct software and configuration settings. • GIA 64s must have correct software. • GIA 64s must be successfully configured with GIA1 and GIA2 configuration files. • Data path from GIA1 to each LRU must be operational.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

I. Configuration Mode Overview

CAUTION: THE CONFIGURATION MODE CONTAINS CERTAIN PAGES AND SETTINGS THAT ARE CRITICAL TO AIRCRAFT OPERATION AND SAFETY. THESE PAGES ARE PROTECTED AND CANNOT BE MODIFIED, UNLESS THE TECHNICIAN IS PROPERLY AUTHORIZED AND EQUIPPED. HOWEVER, MOST PROTECTED PAGES ARE VIEWABLE TO ALLOW SYSTEM AWARENESS FOR TROUBLESHOOTING.

The Configuration Mode exists to provide the avionics technician with a means of configuring, checking, and calibrating various G1000 NXi sub-systems. Troubleshooting and diagnostics information can also be viewed in this mode.

(1) Start the system in Configuration Mode:

- (a) Press and hold the ENT key on the PFD while applying power using the PFD circuit breaker.
- (b) Release the ENT key after 'INITIALIZING SYSTEM' appears in the upper left corner of the PFD.
- (c) Repeat steps (a) and (b) on the MFD, using the MFD circuit breaker to apply power.

NOTE: For a complete description and breakdown of each Configuration Mode page, refer to the appropriate Garmin G1000 Line Maintenance & Configuration Manual.

(2) SET>ACTV Configuration

Throughout the Configuration Mode pages, there are SET and ACTIVE columns for input/output settings and other parameters.

"SET": Refers to a setting or group of settings that reside in PFD Internal Memory and/or the Master Configuration Module.

ACTIVE: Refers to an 'active' setting or parameter currently being used by the LRU. LRUs store the 'active' settings within internal memory.

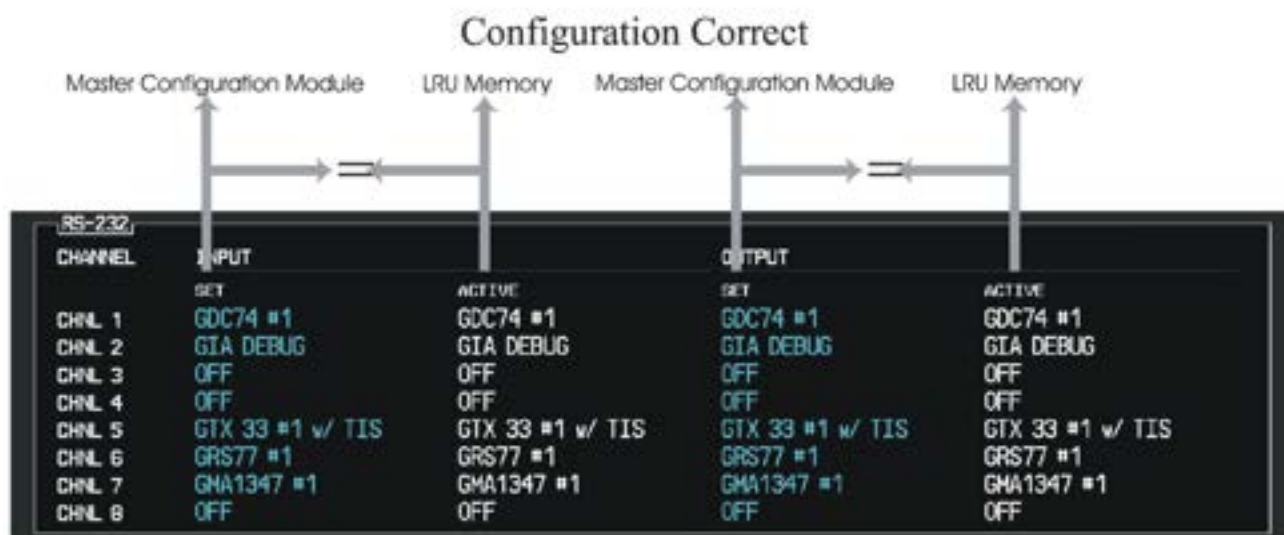
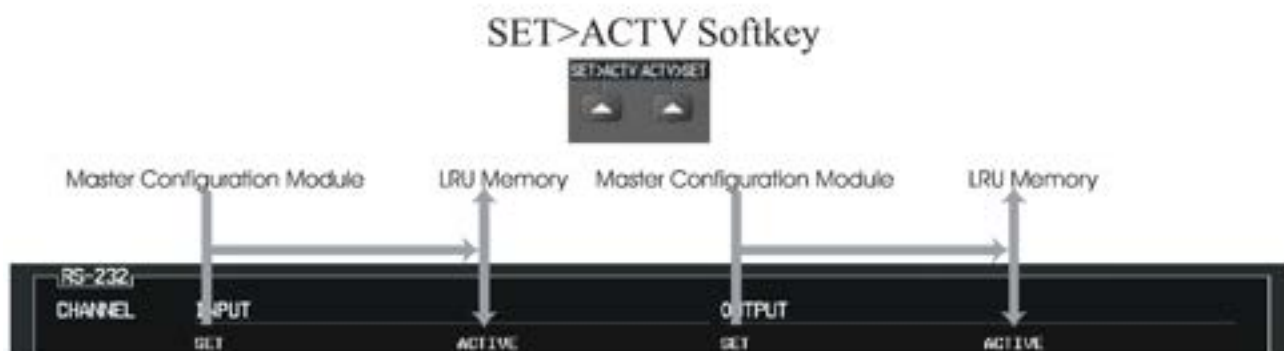
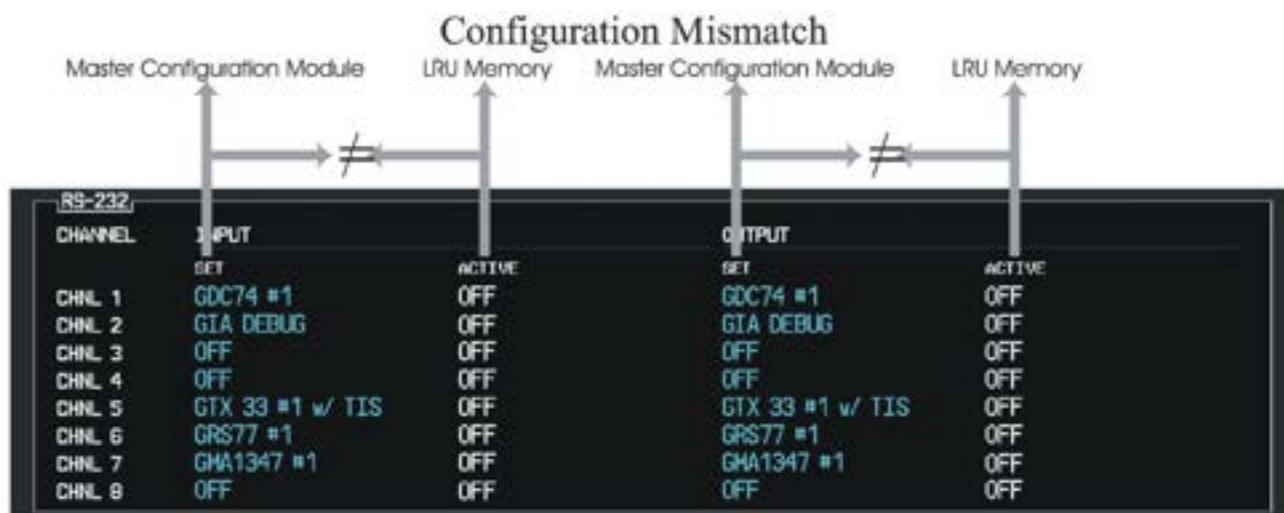
Data can be manually copied from one column to the other (and from the PFD memory to the LRU memory and vice-versa) by using the following two softkeys, when available:

- **SET>ACTV** (read 'Set to Active') softkey: Allows the installer to send the information in the SET column (data stored in the master config module) to the ACTV column (data used by LRU).
- **ACTV>SET** (read 'Active to Set') softkey: Causes the LRUs current settings to be copied to the master configuration module as SET items.

CAUTION: THE ACTV>SET SOFTKEY MUST BE USED WITH CAUTION! IF AN IMPROPERLY CONFIGURED UNIT IS INSTALLED, THIS SOFTKEY CAUSES THE WRONG CONFIGURATION TO REPLACE THE CORRECT AIRCRAFT CONFIGURATION.

In the first example shown in "Figure 26" on page 34250385, the SET columns do not match the ACTIVE columns. The inequality between SET and ACTIVE indicates a configuration mismatch. By pressing the SET>ACTV softkey, this copies the SET column to the LRU unit's configuration memory. The settings then become the ACTIVE settings for the LRU being configured.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



SET>ACTV Configuration
Figure 26

[Effectivity](#)
with Garmin G1000 NXi
2843823, 2881001 and up

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

When troubleshooting the system, technicians can look for inequalities between SET and ACTIVE columns. Certain problems can be resolved simply by pressing the SET>ACTV softkey, which reloads settings to the specific LRU from the PFD (Note that this can also be accomplished by reloading the configuration files for the LRU, using the software loader card.).

A blank active column, as shown in "Figure 27", represents loss of communication between the display and the particular unit. See troubleshooting for more details.



RS-232				
CHANNEL	INPUT		OUTPUT	
	SET	ACTIVE	SET	ACTIVE
CHNL 1	GDC74 #1		GDC74 #1	
CHNL 2	GIA DEBUG		GIA DEBUG	
CHNL 3	OFF		OFF	
CHNL 4	OFF		OFF	
CHNL 5	GTX 33 #1 w/ TIS		GTX 33 #1 w/ TIS	
CHNL 6	GRS77 #1		GRS77 #1	
CHNL 7	GMA1347 #1		GMA1347 #1	
CHNL 8	OFF		OFF	

Set > Active - Loss of Communications
Figure 27

(3) Configuration Prompts

When configuration settings are changed, the technician receives on-screen prompts and/or confirmations such as those shown in "Figure 28". Other prompts may be encountered during the configuration process.



Configuration Prompts
Figure 28

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(4) Data Transmission Indicators

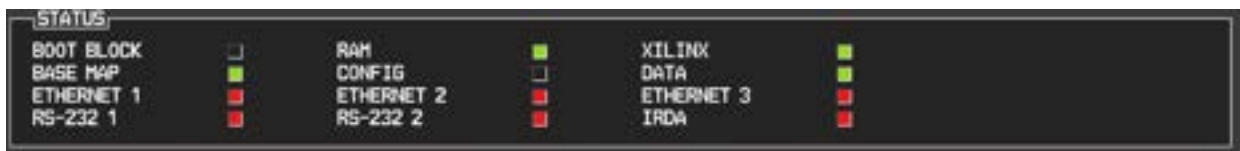
See "Figure 29".

Several configuration pages utilize an indicator light system to show discrete (ON/OFF) data and/or hardware component status. Unless otherwise noted, the following applies to all such status indicators:

- (a) Green Light: Expected data is successfully received and is ON. A green light could also indicate that the parameter/component is working correctly.
- (b) Red Light: Expected data is not received. A red light could also indicate that a parameter/component is invalid.
- (c) No Light (Black): Expected data is successfully received and is OFF, or no data is expected. A black light could also indicate that the parameter/component is not responding.

(5) Configuration Mode Navigation

Using the FMS knob, a user can navigate through different pages and page groups in the Configuration Mode. See "Chart 24" on page 34250388. For a complete description and breakdown of each page, refer to the appropriate Garmin G1000 Line Maintenance & Configuration Manual.



Data Transmission Indicators
Figure 29

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 24
CONFIGURATION MODE NAVIGATION

System Page Group

1. System Status	5. System Upload	9. System Configuration
2. Date/Time Setup	6. Diagnostics Terminal	10. System Setup
3. Main Lighting	7. Maintenance Log	11. Manifest Configuration
4. Audio Alert Configuration	8. OEM Diagnostics	

GDU Page Group

1. RS-232 / ARINC 429 Config	4. Diagnostics	7. Airframe Configuration
2. GDU Status	5. Serial/Ethernet I/O	
3. GDU Test	6. Alert Configuration	

GIA Page Group

1. RS-232 / ARINC 429 Config	3. GIA I/O Configuration	5. GIA Status
2. CAN / RS-485 Config	4. COM Setup	

GEA Page Group

1. Engine Data	2. GEA Status	3. GEA Configuration

GTX Page Group

1. RS-232 / ARINC 429 Config	2. Transponder Configuration

GSU Page Group

1. GSU Configuration	3. GSU / GMU Calibration
2. ADAHRS Data Input	

GFC Page Group

1. GFC Configuration	2. GFC Status

GMA Page Group

- | |
|----------------------|
| 1. GMA Configuration |
|----------------------|

CAL Page Group

- | |
|--------------------------|
| 1. Fuel Tank Calibration |
|--------------------------|

GDL Page Group (Optional)

- | |
|--------------------|
| 1. GDL 69eA Config |
|--------------------|

Other (Optional)

1. Stormscope	2. GFC 700 AFCS

GTS (Optional)

- | |
|----------------------|
| 1. GTS Configuration |
|----------------------|

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

J. G1000 NXi Software Information

NOTE: The following sections provide a detailed description of loading all G1000 NXi software and configuration files, which may be excessive for individual LRU removal and replacement. If removing and replacing individual LRUs, refer to Components, above, for the necessary steps.

(1) G1000 NXi Software Image

CAUTION: IT IS CRITICAL THAT THE TECHNICIAN INSTALLS THE CORRECT SOFTWARE IMAGE PART NUMBER WHEN SERVICING THE G1000 NXi SYSTEM. APPROVED SOFTWARE DEFINITIONS FOR EACH CONFIGURATION ARE DEFINED IN THE REQUIRED EQUIPMENT LIST (REL), "CHART 28" ON PAGE 342503143.

All software and configuration files were certified by Garmin as part of the FAA-approved Type Design data. Approved software definitions for each configuration are defined in the Required Equipment List (REL), "Chart 28" on page 342503143.

G1000 NXi software and configuration files are controlled via the approved software image part number listed in the REL. This software image is loaded into the G1000 NXi using a software loader card. The installer shall create this software loader card by downloading the approved software image in accordance with the procedure provided immediately following.

CAUTION: BE CAUTIOUS WHEN USING SOFTWARE LOADER CARDS DURING MAINTENANCE. THE G1000 NXi SYSTEM IMMEDIATELY INITIALIZES THE CARD UPON POWER-UP. ON-SCREEN PROMPTS MUST BE GIVEN CAREFUL ATTENTION IN ORDER TO AVOID POTENTIAL LOSS OF DATA. ALWAYS READ THROUGH PROCEDURES GIVEN IN THIS SECTION, BEFORE ATTEMPTING TO USE THE SOFTWARE LOADER CARDS.

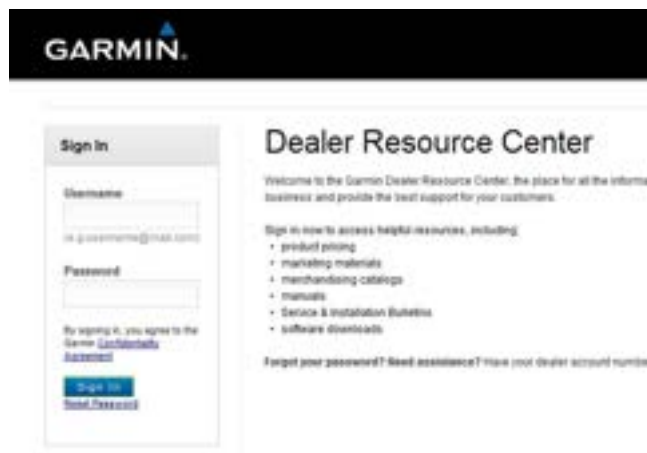
(2) Software Loader Card Creation

The following procedure requires a PC with an SD card reader. Piper recommends SanDisk® SDDR-99 and SDDR-93 card readers. Additionally, only SanDisk brand 16GB SD cards are recommended.

The software image is an executable self-extracting file which builds the correct file structure onto an SD card for use loading software to the G1000 NXi and GFC 700. To obtain the current file follow the procedures outlined below.

NOTE: In order to create a loader card, the installer completing these procedures must be an authorized Piper service center to gain access to the necessary data via the Garmin website.

- (a) Go to <http://www.garmin.com> and click on the 'Dealer Resource Center' link in the lower right hand portion of the home page. Enter username and password. See "Figure 30".
- (b) Select Support and then Software Downloads.



Dealer Login Screen
Figure 30

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (c) Search for the appropriate image version (i.e., 3080.xx from the appropriate Required Equipment List (REL), "Chart 28" on page 342503143 in the "Search by Keyword" field.
- (d) Save the file to a known location on the PC.
- (e) Run the executable file that was downloaded. A window will appear to confirm software installation.
- (f) Insert the SD card into the SD card reader and select the Next button in the pop-up window.
- (g) In the pop-up window, select the drive that corresponds to the inserted SD card and then click the Next button.

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

- (h) Select the Finish button.
- (i) Stop the card reader using Windows stop device function.
- (j) Eject the SD card from the card reader.
- (k) Apply a label to the software loader card identifying the aircraft, G1000 NXi SFTW and the appropriate software image part number as shown below:

NOTE: See appropriate Required Equipment List (REL), "Chart 28" on page 342503143 for software image part number.

PA-28-181 G1000 NXi SFTW 006-x3080-xx

(3) Handling a Software Download Card

The SD memory cards used for the Software Download Card are manufactured to the specifications of the SD Card Association for use in portable devices. As such they are reasonably robust devices that do not require special handling instructions. However, the memory cards are not unbreakable and reasonable precautions regarding their use and handling should be used including the following guidelines:

- (a) Do not bend an SD memory card or subject it to violent impact.
- (b) Do not leave SD cards in locations where they may be exposed to moisture or high temperatures.
- (c) Avoid exposing the card to static electricity or electro-magnetic interference.
- (d)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

K. Software Files

Software files are defined by part number and version number. Each G1000 NXi LRU reports the software version it currently contains to the user in two places.

- (1) Normal System Mode: The AUX – SYSTEM STATUS page lists each LRU and the reported software version.
- (2) Configuration Mode: The SYSTEM STATUS page (SYSTEM page group) reports more detailed LRU information, including software version, part number, and LRU status. Software files are loaded to LRUs from the SYSTEM UPLOAD page in Configuration Mode.
- (3) Configuration File Descriptions
 - (a) Configuration Files are divided into groups, and are only displayed at the System Upload page during the software/configuration loading process.
 - (b) Configuration files contain preset selections for input/output channels, aircraft-specific settings, and LRU-specific settings. The following list describes each of the configuration files:

AIRFRAME This file contains data such as airspeed parameters, engine/airframe sensor limitations, fuel tank parameters and alerting system settings that tailor a G1000 NXi PFD or MFD to the PA-28-181.

AIRFRAME Alerts specific to the PA-28-181 are set when this file is loaded.

ALERTS

SYSTEM This file configures the G1000 NXi high-speed data bus (HSDB) to expect one PFD, one MFD, two GIAs, and (optional) one GDL 69A / 69eA.

MANIFEST This file loads a manifest checklist of all software part numbers and versions associated with an approved system configuration. The G1000 NXi performs a software check between each LRU's reported version and the version contained on the manifest. If an inequality is detected for an LRU, this LRU is then excluded from the system and a manifest alert is triggered to the operator.

MFD1 This file configures MFD serial/discrete communication and alert system settings.

PFD1 This file configures PFD serial/discrete communication and alert system settings.

GIA1/GIA2 These files configure GIA1/GIA2 serial/discrete communication settings.

GMA1 This file configures GMA 1360 audio and serial communication settings

GTX1 These files configure GTX 3X5R transponder and serial communications settings.

GEA1 These files configure GEA engine/airframe parameters.

GDL_69 This file configures gains and cable loss for the PA-28-181 installation if the optional GDL 69A / 69eA is installed.

AUDIO This file configures audio alerts for the PA28-181.

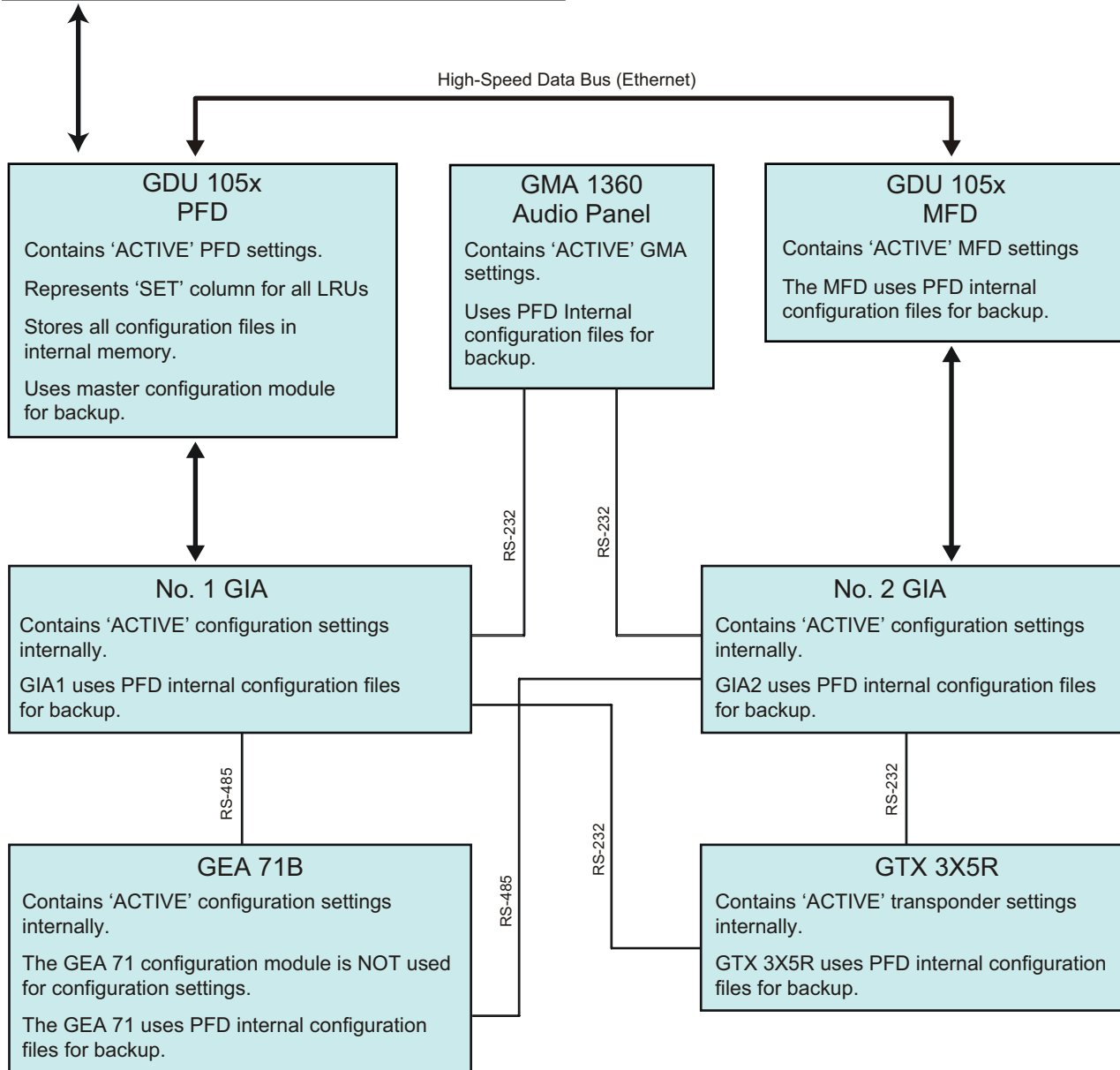
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

G1000 NXi Master Configuration Module

(Located in PFD backshell connector)

Master configuration module contains identical backup configuration files of PFD configuration memory.

PFD cross-checks these backup files against files contained within PFD memory. PFD self configures to match master configuration module.



LRU Configuration File Storage
Figure 31

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

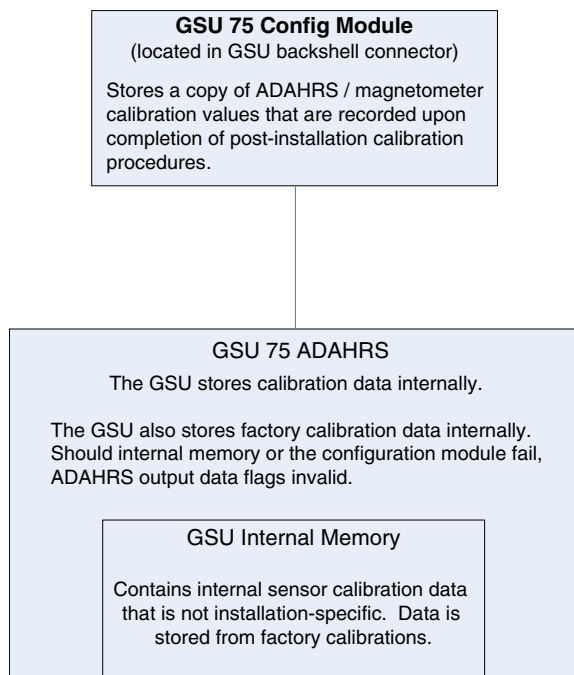
(4) Configuration File Storage

The G1000 NXi system stores all configuration settings in multiple places so that the settings are retained in the aircraft during the maintenance of any LRUs.

During system configuration, as shown in "Figure 31", each file is sent directly to the applicable LRU where it is stored in local LRU memory (except GSU 75). Each file is also stored in the PFD internal memory. The applicable PFD also sends a copy of all configuration files to the Master Configuration module, located in the connector backshell (see "Figure 23"). If the PFD is replaced, the configuration module retains all configuration files in the aircraft.

NOTE: The GSU 75 ADAHRS and GMU 44 Magnetometer do not have a configuration file. However, these LRUs do store calibration data acquired during the post installation checkout, which are characteristic to the specific installation. While performing maintenance on these units, recalibration may be required. See GSU 75 ADAHRS / GMU 44 Magnetometer, under LRU Test Procedures, for more information on recalibration criteria.

The GSU 75 configuration module, as shown in "Figure 32", functions differently than the rest of the system. The GSU 75 configuration module does not store any configuration settings. Instead, it stores calibration data recorded during installation calibration procedures.



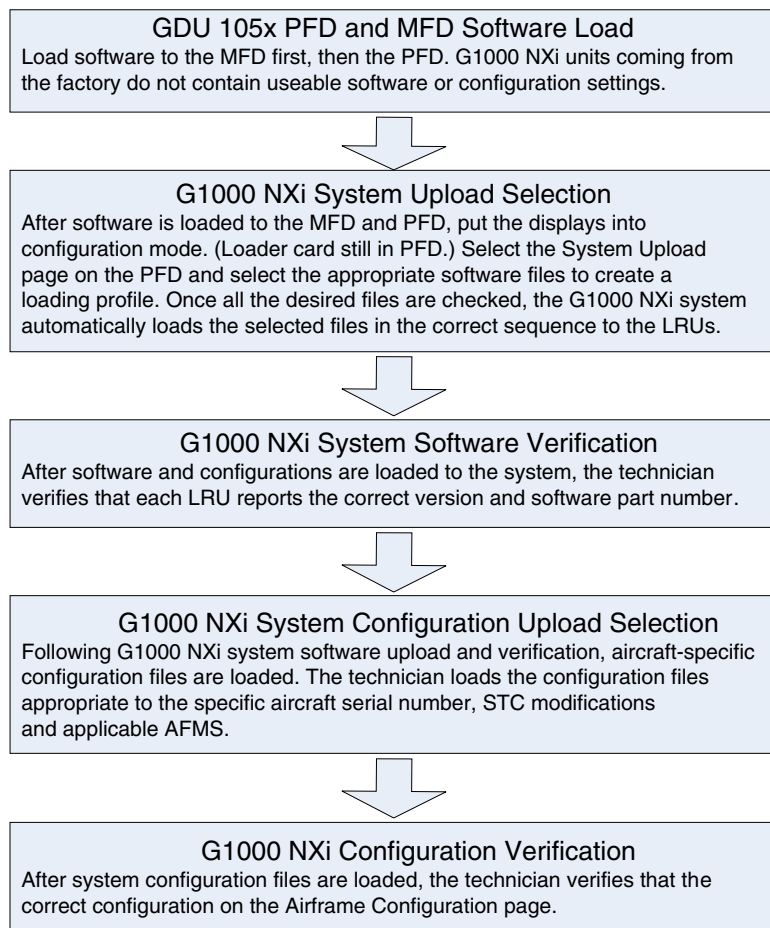
GSU Configuration Settings Storage
Figure 32

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(5) G1000 NXi Software/Configuration Procedure

This section summarizes the procedures required to load software and configuration files to the G1000 NXi. It is intended to work as a central guide for technicians to use while performing maintenance on the aircraft. This section is referenced by other sections of this manual when G1000 NXi software reload is required. The technician should use proper judgment regarding the context of maintenance required while following this section.

The diagram in "Figure 33" depicts an overview of the software/configuration sequence for the G1000 NXi system. This applies mostly to a new G1000 NXi system which has not previously been powered up and is for informative purposes only.



Software/Configuration Overview
Figure 33

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

L. LRU Replacement

Whenever a Garmin LRU has been replaced and the system is then booted into configuration mode, the Configuration Manager page appears and shows the synchronization status for the system and will note LRUs needing updates to software and/or configuration.

If the technician skips synchronization of the physically replaced LRUs then a "LRU replacement detected" message will be shown on the GDU in normal mode. This message will persist until the "Intelligent LRU Replacement Procedure" on page 34250396 or the manual "Complete Software Load" on page 34250398 is performed. The "LRU replacement detected" message may not be displayed if there are existing Manifest error or Configuration error messages.

Intelligent LRU Software Replacement or manual Complete Software Load is the required action to repair messages related to Manifest error, Configuration error or LRU replacement detection that show up after physical replacement of an LRU.

(1) Applicability and Restrictions

- (a) The Intelligent/Manual LRU Replacement procedure is not required if GDUs within the system are swapped in position. E.g., PFD display swapped with MFD display. The configuration information is stored by all GDUs in their internal memory. The information inside PFD harness configuration module such as fuel, cal and other data is retained during PFD replacement. However, the "LRU replacement detected" message will also be displayed until the "Intelligent LRU Replacement Procedure" on page 34250396 or the manual "Complete Software Load" on page 34250398 is performed.
- (b) The system keeps track of features that have been activated using enablement cards. If an LRU is replaced, Intelligent LRU Replacement will ensure that associated feature set remains available.
- (c) Currently Intelligent LRU Replacement only supports replacement of one LRU at a time.
- (d) Intelligent replacement only supports replacement of LRUs with the same hardware model number E.g., GIA 64-20 should only be replaced with GIA 64-20 model in order to utilize intelligent replacement. The manual "Complete Software Load" on page 34250398 can be used if the LRU hardware model is different. Intelligent LRU Replacement cannot be used if a software update is also being carried out for the system. Such an update will require a new loader card and must be carried out via the manual Complete Software Load using the System Upload page.
- (e) Intelligent LRU Replacement can be used to reload any item that has been setup via a loader or enablement card. This includes LRU software, LRU configuration, equipment options and feature unlock settings.

(2) Transaction Log

In order for the G1000 NXi system to accurately replace an LRU's software and configuration, it must first know what was originally loaded to that LRU. To facilitate this, the system records all updates performed through a loader card. Once this record is stored; the system will have the ability to replace those updates back to the LRU at any time. This stored record of all software and configuration updates is known as the "Transaction Log".

The Transaction Log is viewable on the GDU in configuration mode via the Configuration Log page. The history can also be exported to the Top Slot SD card in a textual format by pressing the "DNLD TRANS" button on that page.

On the Configuration Log page the most recent update is at the top of the list. Grayed-out text represents configuration items that were loaded prior to the last "Clear Command". These configurations are no longer applicable to the current state of the aircraft; but are listed in the log for informational and historical purposes.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Garmin's calibration and configuration features use specific files known as GREG files to upload calibration and configuration features. Each file is populated with various product data that is specific to a fleet of aircraft or may be specific to a single aircraft. As part of the transaction functionality, files that are used to load configuration and calibration data will be put through CRC generating software to generate a unique value for each transaction. Calibration and configuration data that is manually changed by maintenance technicians will not be recorded by the transactions logs. This includes calibration data changed via configuration pages, rigging, etc., however, transactions for the clear command softkeys that are part of the Systems Upload page will be recorded.

(3) Card Copy Feature

The system provides an option to copy loader cards to GDU internal memory. The internally saved loader cards are used by Intelligent LRU Replacement procedure. The configuration mode Card Copy option uploads the loader card into PFD internal memory. This process requires approximately four (4) minutes. A newly uploaded loader card is automatically synchronized with the MFD by transferring it in the background during normal mode. This transfer takes a similar amount of time.

The GDUs can hold copies of 32 cards. An interface is provided to delete cards that are no longer applicable. This can be accessed by using the "MANAGE" key on LRU Replacement page.

(4) Intelligent LRU Replacement Procedure

The intelligent LRU replacement procedure is performed on the LRU Replacement page available in configuration mode. Proceed as follows:

(a) Summary

- 1) Check the synchronization status of LRUs on the Configuration Manager page in configuration mode. This page lists those LRUs requiring synchronization.
- 2) Navigate to the LRU Replacement page, for the replaced LRU (shown in yellow text). Load the LRU configuration from the menu. No loader card or selection of options are required.
- 3) Verify the status of synchronization via the Configuration Manager page. A fully synchronized system will show "Synchronized" for all LRUs.

(b) Details

- 1) Selection of the replaced LRU.

The page will highlight LRUs that the G1000 NXi system recognizes as being "new" to the system. The system will provide a "LRU Replacement Detected" message by comparing [serial numbers](#) of the units. Serial number comparison is carried out for software version and region configuration version. Other configuration items are checked by comparing CRCs.

Some replaced LRUs may not get this message if they do not report a serial number. This behavior is common for GIA COM and GIA NAV items because they do not report a serial number. However, if these components have a different software or configuration version, it will be indicated by error messages for Manifest or Configuration. That will be an indication that a Manual/Intelligent Replacement procedure for software/configuration is required.

On the LRU replacement page, LRUs are highlighted (in yellow) if the software, configuration, or serial number of the new unit is different than the unit it is replacing.

- 2) Summary and control of what software/configuration will be loaded to the newly replaced LRU.

The control and display of this information is similar to the System Upload page.

- 3) Initiate the upload of software and configuration to the replaced LRU.

The page will report status and progress similar to the System Upload page.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4) Verification

Once an LRU Replacement procedure has been performed, installers can confirm that the system has been successfully returned to its previously approved state by using the Configuration Manager page available in configuration mode. This page supports to two functions:

- a) Display of expected and actual G1000 NXi fleet and aircraft identification numbers.
- b) Display of the synchronization status between each LRU and the GDU currently being used. This status compares the GDU's expected configuration to what each LRU is reporting as its actual configuration. If they match, the page will report "Synchronized". If they do not match, the page will report "Not Synchronized".

During the time between when the LRU hardware has been replaced, and prior to the LRU Replacement procedure being performed technicians should expect to see a "Not Synchronized" status. Once the LRU Replacement procedure is performed the status will return to "Synchronized", confirming that the replacement was successful

Display of "Invalid"/"Not Synchronized" messages after a replacement procedure indicate that a system restart is required. The restart will resolve items responsible for these error messages.

(c) Step-by-Step Procedure

The following assumes a new LRU has not yet been installed. Please make sure power is OFF before beginning.

NOTE: Only one LRU can be replaced at a time using this loading method.

NOTE: If replacing a GMU 44, perform "GSU 75/GMU Magnetometer Calibration" on page 342503124.

- 1) Replace faulty LRU with new unit in accordance with that specific LRU's installation instructions. Ensure that Power is OFF before you begin.
- 2) Power up the PFD and MFD in config mode by holding down the ENT key until "INITIALIZING SYSTEM" appears on each GDU.
- 3) On the PFD, use the FMS knob to navigate to the "LRU REPLACEMENT" page.
- 4) The system should automatically detect the new LRU (displayed in gold letters). Use the FMS knob to select the desired LRU.
- 5) Ensure all SOFTWARE and CONFIGURATION boxes are checked.
- 6) Press the LOAD softkey.
- 7) Review the LRU replacement page to ensure that all SOFTWARE and CONFIGURATION items are marked as "PASS".
- 8) Remove power from the PFD and MFD.
- 9) Restart the PFD and MFD in config mode.
- 10) Use the FMS knob on the PFD to navigate to the "CONFIGURATION MANAGER" page.
- 11) Ensure that all CONFIGURATION ITEMS are marked as "VALID".
- 12) Use the FMS knob on the PFD to navigate to the "SYSTEM STATUS" page.
- 13) Use the FMS knob to scroll down to the recently installed LRU and confirm that the status is OK.
- 14) Remove power from the PFD and MFD.
- 15) Restart the PFD and MFD in normal mode.
- 16) Confirm that no MANIFEST, CONFIG ERROR, or LRU REPLACEMENT messages exist.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

M. Complete Software Load

(PIR-108059 K.)

(1) MFD & PFD Software Load

CAUTION: DO NOT INTERRUPT POWER TO THE AIRCRAFT AT ANY TIME DURING THESE PROCEDURES. INTERRUPTION OF POWER COULD RESULT IN DAMAGE TO THE EQUIPMENT.

- (a) Apply power to the aircraft and all avionics.
- (b) Pull the MFD and PFD circuit breakers. Remove any SD cards in the PFD or MFD.
- (c) Insert G1000 NXi/PA-28 Loader Card into the PFD top card slot.

NOTE: See "Software Loader Card Creation" on page 34250389, if required.

NOTE: If installing software version 006-B3080-09 after having replaced the GEA 71B with a new unit fresh from the Garmin factory, see the "Special Procedure" on page 34250399.

- (d) While holding the ENT and CLR keys on the PFD, restore power to it by pushing in the PFD circuit breaker.
- (e) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the PFD, release the ENT key.
- (f) Press the YES softkey at the following prompt:

"DO YOU WANT TO UPDATE SYSTEM FILES?"

"NO WILL BE ASSUMED IN 30 SECONDS"

"UPDATING SYSTEM FILES, PLEASE WAIT."

- (g) Press the YES softkey at the following prompt (prompt may not appear):

**"DO YOU WANT TO UPDATE THE CUSTOM GRAPHIC FILES
(EG, SPLASH SCREEN)?"**

"NO WILL BE ASSUMED IN 30 SECONDS"

- (h) Press any softkey at the following prompt to confirm load completion:

"PRESS ANY KEY TO CONTINUE."

"CONTINUING IN 10 SECONDS."

- (i) When PFD update is complete, it starts in the Configuration Mode. DO NOT remove power.
- (j) While holding the ENT key on the MFD, restore power to the MFD by pushing in its circuit breaker.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Special Procedure

If installing software version 006-B3080-09 after having replaced the GEA 71B with a new unit fresh from the Garmin factory, proceed as follows:

(a) Required Equipment

- 1) 006-B3080-05 loader card
- 2) 006-B3080-09 loader card

(b) Procedure

- 1) Insert the 006-B3080-05 loader card into the top slot of the PFD.
- 2) Press and hold the ENT key on the MFD and power on into the configuration mode.
- 3) Press and hold the ENT key on the PFD and power on into the configuration mode.
- 4) When 'Do you want to update system files?' is displayed, select the YES softkey.
- 5) When 'Do you want to update graphics file?' is displayed, select the NO softkey.
- 6) On the Software Upload page select Baseline in the Group box and press ENT.
- 7) On the Software Upload page select Piper PA-28-181 Archer III in the Item Box and press ENT.
- 8) Press the CRL All softkey to uncheck all software and configuration boxes.
- 9) Using the FMS knob, place a check mark in the software and configuration boxes from lines "Initialize System" through "GEA 71B 1".
- 10) Ensure software configuration boxes are checked.
- 11) Press the Load softkey.
- 12) Ensure PASS is displayed once software and configuration files have been loaded.
- 13) Press the UPDT CFG softkey.
- 14) Power down the system and remove the loader card from the top slot of PFD.
- 15) Update the system to software version 006-B3080-09 using the normal procedure beginning with "MFD & PFD Software Load" on page 34250398.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CAUTION: FOR THE REST OF THE SOFTWARE/CONFIGURATION PROCEDURE, DO NOT OPERATE THE MFD WHILE LOADING SOFTWARE OR CONFIGURATION FILES UNLESS SPECIFICALLY INSTRUCTED TO DO SO. A FAILED OR CANCELLED LOAD MAY RESULT.

(3) System Upload

NOTE: If LRUs have been replaced and need to be programmed and/or configured, see "LRU Replacement" on page 34250395.

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) Activate the cursor and select GROUP. Rotate the small FMS knob to generate a pick list. Rotate the small FMS knob to select Baseline.
- (b) Press ENT.
- (c) In the ITEM field, create a pick list by rotating the small FMS knob and select PA-28-181 Archer III.
- (d) Press ENT.
- (e) Press the LOAD softkey. (The load takes 90 minutes to two (2) hours to complete.)
- (f) Review list and verify that all items state "PASS".
- (g) Press ENT to accept the software load.
- (h) Deselect the cursor.

(4) Optional Equipment Configuration

NOTE: Only the options listed below are approved for installation.

Perform the following steps if any of the following options are installed:

ADF KR-87 Installation	Air Conditioning Installation
KN-63 DME Installation	Flight Stream 510 Installation
GDL 59	GDL 69 SXM
GTS 800 Installation	GMU 44B
Tach Configuration - A, B, or C	Split Com
Hobbs Installation - Configuration A, B, or C	CO Detector
GTX 345 Only Installation	
(No GTS800 and No Flightstream)	GTX 335
GTX 345 with GTS and without Flightstream Installation	CHT Installation
GTX 345 with GTS and Flightstream Installation	
GTX 345 without GTS and with Flightstream Installation	

NOTE: One of the Hobbs configurations and one of the Tach configurations must be installed. If not installed, the Hobbs or Tach timer will not function.

NOTE: If aircraft is equipped with both a GTX 345 and GTS, install one of the GTX 345 with GTS Installation options. Do not install the GTS 800 Installation option.

NOTE: GMU 44B option must be installed if aircraft is equipped with GMU 44B.

- (a) On PFD, 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 Options.
- (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) Press LOAD softkey.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (f) Verify the summary field lists the software and configuration are complete as required and PASS is displayed next to both appropriate boxes.
- (g) Press ENT to accept.
- (h) For other installed options, repeat steps (d) thru (i) by rotating the large FMS knob and highlighting the File Field.
- (i) De-activate the cursor.
- (j) Upon completion of all required baseline config, option config, and calibration loading procedures, remove the Loader card from top slot of PFD.

(5) AFCS Installation (Optional)

NOTE: The following options shall only be installed if the aircraft is equipped with GFC 700 autopilot.

Perform the following steps if any of the following options are installed, per APO:

GFC 700 Installation Option

Enhanced AFCS Support

NOTE: Enhanced AFCS Support must be loaded to any aircraft with the Enhanced AFCS option. This is required in addition to the Enhanced AFCS Unlock card to fully install the Enhanced AFCS option.

- (a) On PFD, rotate the FMS knob to 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 GFC 700.
- (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) Press the CHK ALL softkey.
- (f) Press LOAD softkey. Verify the summary field lists the software and configuration are complete as required and PASS is displayed next to both appropriate boxes.
- (g) Press ENT to accept.
- (h) For other installed options repeat steps 4 thru 9 by rotating the large FMS knob and highlighting the desired option in the ITEM Field.
- (i) De-activate the cursor.

(6) Calibration Option Load

NOTE: Only load configuration option once. Re-loading of configuration option could result in a loss of system calibrations.

- (a) Go to the SYSTEM UPLOAD page and activate cursor. In the GROUP field, create a pick list by rotating the small FMS knob and select Options.
- (b) Press ENT.
- (c) In the ITEM field, create a pick list by rotating the small FMS knob and select Fuel Calibration Initialization.
- (d) Press LOAD softkey.
- (e) Verify the Summary field lists the software and configuration are complete as required and PASS is displayed next to both appropriate boxes.
- (f) Press UPDT CFG softkey.
- (g) Press ENT to select YES when prompted "Update Config Module?"
- (h) Press ENT to confirm completion.
- (i) Upon completion of all required baseline config, option config, and calibration loading procedures, remove the Loader card from top slot of PFD.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(7) Splash Screen Update

- (a) Remove power from the PFD and MFD.
- (b) Insert G1000 NXi/PA-28 Loader Card into the MFD top card slot.
- (c) Apply power to MFD.
- (d) Press the NO softkey at the following prompt:

“DO YOU WANT TO UPDATE SYSTEM FILES?”

- (e) Press the YES softkey at the following prompt:

**“DO YOU WANT TO UPDATE CUSTOM GRAPHIC FILES
(EG, SPLASH SCREEN)?”**

- (f) At the prompt, press any key to continue.
- (g) Remove G1000 NXi/PA-28 Loader Card from the MFD top card slot.
- (h) Repeat steps (b) thru (g) for the PFD.
- (i) Upon completion of splash screen update, remove the Loader card from top slot of PFD.

(8) Software Load Confirmation

- (a) Start the PFD and MFD in Configuration Mode by applying power while holding ENT.
- (b) On the PFD, select the Systems Status page. Activate the cursor and toggle to the LRU window.
- (c) Highlight each of the listed items in the LRU window and check the software part number and software version against the current numbers and versions shown in the appropriate Required Equipment List (REL). Some items may be in the expandable list of the corresponding item (denote by “+” next to the LRU). Press ENT with the desired LRU highlighted to expand these lists.

NOTE: Not all of the software P/Ns and versions on the Systems Status page need to be verified, only those recorded in the appropriate REL.

- (d) De-activate the cursor.

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

- (e) Re-start the PFD and MFD.
- (f) On MFD splash screen, verify appropriate version (“Piper PA-28 System XXXX.XX” where XXXX.XX is the system version number from the appropriate Required Equipment List, “Chart 28”) is displayed in the upper right corner of the MFD.
- (g) Select softkey on MFD to proceed beyond splash screen.
- (h) Verify that no manifest (software mismatch) alerts are shown on any of the displays.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

N. Configuration and Setup

(1) XM Radio (GDL 69A/69eA) Activation

See "Chart 19" on page 34250379 for activation procedures.

NOTE: The radio IDs required for activation may be obtained as follows: start MFD in normal mode and navigate to the XM page in the AUX group. Press the info softkey.

(2) Aircraft Registration Number Entry (Transponder Configuration)

NOTE: The large FMS knob changes Groups and the small FMS knob changes Pages within a Group.

- (a) Place the PA-28 loader card into the top slot of the PFD.
- (b) Start PFD and MFD in configuration mode by applying power while holding ENT key.
- (c) Select GTX group by rotating the large FMS knob, and then select the TRANSPONDER CONFIGURATION page by rotating the small FMS knob on PFD.
- (d) Ensure that Allow Flight ID Entry is "Same As Tail" in the Set and Active columns.
- (e) Select the SYSTEM Group and then select the AIRCRAFT CONFIGURATION page.
- (f) Activate the cursor and highlight the AIRCRAFT REGISTRATION field. Use the small/large FMS knob to enter the aircraft registration number.
- (g) Ensure that an ICAO ADDRESS is automatically populated.
- (h) Press the SET GTS softkey to configure traffic system (if installed). Press ENT to select OK at the dialog that pops up. Then press ENT again after configuration is completed.
- (i) Upon completion, remove loader card from top slot of PFD and store with the aircraft records.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(3) Option Unlock Procedures

Prior to attempting to unlock any of the options, verify software is properly loaded per "Software Load Confirmation" on page 342503102.

(a) CHARTVIEW Unlock (If installed)

- 1) Remove power from the PFD and MFD by pulling (opening) the PFD and MFD circuit breakers.

NOTE: The Chartview Unlock card can only enable Charts on one system (one aircraft). A new Chartview Unlock card must be used for each aircraft.

- 2) Insert the Chart Unlock card, in the upper slot of the PFD.
- 3) While holding the ENT key on the PFD and MFD, restore power by pushing in (closing) the circuit breakers.
- 4) When the words "INITIALIZING SYSTEM" appear in the upper left corner of the MFD and PFD, release the ENT key.
- 5) On the PFD, go to the System Upload page.
- 6) Activate the cursor and use the small FMS knob to create a pick list and select Configuration Files in the GROUP field. Press ENT.
- 7) Use the small FMS knob to create a pick list and select Enable Chartview in the ITEM field. Press ENT.
- 8) Verify there is a check mark in the box in the configuration column for Airframe.
- 9) Press the LOAD softkey.
- 10) Monitor the status of the upload. When the upload is finished, Complete and Pass is displayed. Press ENT.
- 11) De-activate the cursor.
- 12) Power down the system and remove the Chartview Unlock card from the PFD.
- 13) After the Chart function is unlocked, the card should be stored with the aircraft records.

(b) Synthetic Vision Unlock (If installed)

- 1) Remove power from the PFD and MFD by pulling (opening) the PFD and MFD circuit breakers.

NOTE: The Synthetic Vision Unlock card can only enable Synthetic Vision on one system (one aircraft). A new Synthetic Vision Unlock card must be used for each aircraft.

- 2) Insert the Synthetic Vision Unlock card, in the upper slot of the PFD.
- 3) While holding the ENT key on the PFD and MFD, restore power by pushing in (closing) the PFD and MFD circuit breakers.
- 4) On the PFD, 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 Single 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 softkey.
- 9) When the upload is finished, Complete and Pass is displayed. Press ENT.
- 10) De-activate the cursor.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 11) Power down the system and remove the Synthetic Vision Unlock card from the PFD.
 - 12) After the Synthetic Vision function is unlocked, the card should be stored with the aircraft records.
- (c) TAWS Unlock (If installed)
- 1) Remove power from the PFD by opening the PFD circuit breaker.

NOTE: The TAWS Unlock card can only enable TAWS on one system (one aircraft). A new TAWS Unlock card must be used for each aircraft.
 - 2) Insert the TAWS Unlock card in the upper slot of the PFD.
 - 3) While holding the ENT key on the the PFD and MFD, restore power by pushing in (closing) the PFD and MFD circuit breakers.
 - 4) On the PFD, go to the System Upload page with the small FMS knob.
 - 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 softkey.
 - 9) Monitor the status of the upload. When the upload is finished, Complete and Pass is displayed. Press ENT.
 - 10) De-activate the cursor.
 - 11) Power down the system and remove the TAWS Unlock card from the PFD.
 - 12) After the TAWS function is unlocked, the card should be stored with the aircraft records.
- (d) CMC Unlock (Optional)
- 1) Remove power from the PFD by opening the PFD circuit breaker.

NOTE: The CMC Enablement card can only enable CMC on one system (one aircraft). A new CMC Enablement card must be used for each aircraft.
 - 2) Insert the CMC Enablement card in the upper slot of the PFD.
 - 3) Start the PFD and MFD in configuration mode by applying power to each display while holding the ENT key.
 - 4) On the PFD, go to the System Upload page with the small FMS knob.
 - 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 CMC Enablement 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 softkey.
 - 9) Monitor status of the upload. When upload is complete and Pass is displayed, press ENT.
 - 10) De-activate the cursor.
 - 11) Power down the system and remove the CMC Enablement card from the PFD.
 - 12) After the CMC function is unlocked, the card should be stored with the aircraft records.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(e) Enhanced AFCS Unlock (Optional)

NOTE: The Enhanced AFCS Support option must be loaded as described in "AFCS Installation (Optional)" on page 342503101 before the Enhanced AFCS Unlock card is used for the system to properly operate.

1) Remove power from the PFD by opening the PFD circuit breaker.

NOTE: The Enhanced AFCS Unlock card can only enable Enhanced AFCS on one system (one aircraft). A new TAWS Enable card must be used for each aircraft.

- a) Insert the Enhanced AFCS Unlock card in the upper slot of the PFD.
- b) Start the PFD and MFD in configuration mode by applying power to each display while holding the ENT key.
- c) On the PFD, go to the SYSTEM UPLOAD page with the small FMS knob.
- d) Activate the cursor and use the small FMS knob to create a pick list and select Configuration Files in the GROUP field. Press ENT.
- e) Use the small FMS knob to create a pick list and select Enhanced AFCS in the ITEM field. Press ENT.
- f) Verify there is a check mark in the box in the configuration column for Airframe.
- g) Press the LOAD softkey.
- h) Monitor the status of the upload. When the upload is Complete and Pass is displayed. Press ENT.
- i) De-activate the cursor.
- j) Power down the system and remove the Enhanced AFCS card from the PFD.
- k) After the TAWS function is unlocked the unlock card is to be returned to aircraft records.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(4) Aviation Database Loading Procedures

(a) GARMIN GDU Database Card Loading Procedure

NOTE: Garmin Field Service Engineering, resident at Piper, will be responsible for supplying updates for the GDU Database Card.

- 1) Remove power from the PFD and MFD by pulling the PFD and MFD circuit breakers.
- 2) Install databases (SafeTaxi, Terrain 4.9 Arc Second, Airport Directory, Basemap, Obstacle DB2, FliteCharts, NAV Database) on a datacard utilizing TimerTW.
- 3) Install Database Card in the bottom slot of the MFD.
- 4) Restore power to the PFD and MFD.
- 5) The MFD will load the databases and automatically sync them to the PFD. Status can be monitored on the Databases page of the Aux group on the MFD.
- 6) After database sync is completed, remove power from the PFD and MFD and remove the card from the bottom slot of the MFD and store with the aircraft records.
- 7) Restore power to the PFD and MFD.

(b) JEPPS CHARTS Aircraft Loading Procedure

- 1) Remove power from the MFD by pulling the MFD circuit breaker.
- 2) Install Jepps Charts Card in the bottom slot of the MFD.
- 3) Restore power to the MFD by closing the MFD circuit breaker.
- 4) After the update completes, the MFD starts in normal mode.
- 5) Navigate to the Databases page of the Aux group on the MFD. Remove power from aircraft when instructed to cycle power.
- 6) Remove Jepps Charts Card from bottom slot of the MFD and store with the aircraft records.
- 7) Reapply aircraft power and verify charts are updated on the MFD splash screen.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

O. Post-Installation Procedures

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXI SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

NOTE: This entire procedure must be successfully accomplished in order for the G1000 NXi system to be airworthy in your airplane.

NOTE: The following checks **MUST** be performed prior to electrical power-up with the associated wiring connected to the electronic equipment. Failure to perform these checks prior to powering up may result in damage to the equipment.

(1) Bus Power Check

- (a) Do not apply external power to the aircraft.
- (b) Verify that all circuit breakers are set.
- (c) Turn ON Battery Master switch with Avionics Bus Master switch and the Emergency switch in the "OFF" position. Then:
 - 1) Verify Avionics Bus and Emergency Bus are not powered.
 - 2) Pull Lighting Bus and Non-Essential Bus circuit breakers.
 - 3) Verify Lighting Bus and Non-Essential Bus are not powered.
 - 4) Reset Non-Essential Bus circuit breaker.
 - 5) Verify Non-Essential Bus is powered, and Light Bus is NOT powered.
 - 6) Reset Lighting Bus circuit breaker.
 - 7) Verify the Lighting Bus and Non-Essential Bus are powered
- (d) Turn ON the Avionics Bus Master switch, then:
 - 1) Pull Avionics Bus, Non-Essential Bus and Lighting Bus circuit breakers.
 - 2) Verify Essential Bus is powered
 - 3) Verify Avionics Bus, Non-Essential Bus, Lighting Bus and Emergency Bus are not powered.
 - 4) Reset Avionics Bus circuit breaker.
 - 5) Verify Avionics Bus is powered.
 - 6) Verify Non-Essential Bus, Lighting Bus and Emergency Bus are not powered.
 - 7) Reset Non-Essential Bus and Lighting Bus circuit breakers.
- (e) Turn the Emergency Switch to ARM, then turn OFF the Battery Master switch and Avionics Master switch, then:
 - 1) Verify that the Essential Bus, Avionics Bus, Non-Essential Bus and Lighting Bus are not powered.
 - 2) Verify that the Emergency Bus is powered.
- (f) Turn OFF the Emergency switch, Battery Master switch and Avionics Master switch. Verify that the Battery Bus is powered.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Wiring Harness Checkout

The following is required only when a harness has been repaired, modified, or replaced, but is recommended when troubleshooting.

Prior to installing any LRUs, the wiring harness should be checked for proper connections to the aircraft systems and other avionics systems. Point to point continuity should be checked to expose any faults such as shorting to ground. Any faults or discrepancies found should be corrected before proceeding. Refer to wiring schematics in Chapter 91.

(3) Initial Display Testing

(a) General

Verify the following:

- 1) COM/NAV fields are valid in the top corner of the PFD.
- 2) Altitude, airspeed, vertical speed, heading and OAT fields are valid on the PFD.
- 3) Ensure FD/AP switch is set to "FD" (if installed). Verify no FAILED PATH alerts on the PFD. Set FD/AP switch back to OFF.
- 4) Select Reversionary Mode by pressing the "Display Backup" button on the GMA 1360 Audio Panel. Verify that the PFD and MFD accurately display attitude, altitude, airspeed, vertical speed, and engine instruments. Deactivate the Reversionary Mode.

(b) STALL Annunciation Test

- 1) Activate stall sensor on left wing.
- 2) Verify "stall" aural alert.

(c) Pitot Heat Annunciation Test

- 1) Verify "PITOT HT OFF" annunciation appears on display.
- 2) Pull PITOT HEAT circuit breaker. Turn the Pitot Heat switch to the ON position.
- 3) Verify "PITOT HT FAIL" annunciation appears on display.
- 4) Turn Pitot Heat switch to the OFF position.
- 5) Reset PITOT HEAT circuit breaker.

(d) PFD Fan Fail CAS Test

- 1) Pull BATT circuit breaker to remove power from aircraft.
- 2) Remove PFD and disconnect connector 1P3281 from PFD Fan.
- 3) Reinstall PFD and then reset BATT circuit breaker..
- 4) Verify "PFD FAN FAIL" CAS Advisory annunciates.
- 5) Pull BATT circuit breaker to remove power from aircraft.
- 6) Remove PFD and reconnect connector 1P3281 to PFD Fan. Reinstall PFD.
- 7) Remove MFD and disconnect 2P3281 from MFD Fan.
- 8) Reinstall MFD and reset BATT circuit breaker.
- 9) Verify that "PFD FAN FAIL" CAS Advisory does not annunciate. Verify that "MFD FAN FAIL" CAS Advisory does annunciate.
- 10) Pull BATT circuit breaker to remove power from aircraft.
- 11) Remove MFD and reconnect 2P3281 to MFD Fan. Reinstall MFD.
- 12) Disconnect 3P3281 from Avionics Fan. Reset BATT circuit breaker.
- 13) Verify that "MFD FAN FAIL" CAS Advisory does not annunciate. Verify that "AV FAN FAIL" CAS Advisory does annunciate.
- 14) Pull BATT circuit breaker to remove power from aircraft.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 15) Reconnect connector 3P3281 to Avionics Fan.
- 16) Reset BATT circuit breaker. Verify that "AV FAN FAIL" CAS Advisory is not annunciated.
- (e) Hour (Hobbs) Meter Operation Test
 - 1) For aircraft with Hobbs Meter Configuration A, see "Engine Run Checks" on page 342503141.
 - 2) For aircraft with Hobbs Meter Configuration B, use appropriate test equipment to simulate airspeed greater than 50 knots. Hobbs shall run while TAS > 50 kts.
 - 3) For aircraft with Hobbs Meter Configuration C, Hobbs shall run whenever GIA 1 is powered and reports OK status.
- (f) Bus Voltage Indication Test
 - 1) With external power removed and Battery Master switch set to ON.
 - 2) Verify Main bus voltage indication.
 - 3) With external power removed, Battery Master Switch set to OFF, and Emergency Switch set to ARM.
 - 4) Verify Emergency bus voltage indication.

(4) Emergency Bus Operation Verification Test

Verify all of the following functions are operational when Emergency Power Switch is set to "ARM," Battery Master Switch is set to "OFF," the engine is off, and external power is disconnected.

- (a) PFD
- (b) COM1
- (c) NAV1 (Integrated Avionics GIA 64/64W #1)
- (d) AHRS (GSU 75)
- (e) GMA 1360 (Audio Panel)
- (f) Air Data Computer (GSU 75)
- (g) GEA 71B (Engine Instruments)
- (h) Standby Instrument (EBD)
- (i) Avionics Dimmer

NOTE: When under Emergency Power, the MFD, GDL 69A / 69eA, Autopilot Controller, XPDR, ADF, DME, Oil Pressure, and Traffic are not available. Also note that NAV #2, GPS #2 and COM #2 are not available.

(5) G1000 NXi Connection Check

Perform the following steps to verify the following:

NOTE: Do not have External Power on the aircraft while conducting the following tests.

- (a) PFD and MFD Ethernet connection check.
Perform "Display Failure Test" on page 342503139.
- (b) Engine and GPS data availability check.
Check for engine data availability to the displays and GPS data availability to the ADAHRS when either or both GIAs are inoperative:
Perform "GIA Failure Test" on page 342503137.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

P. LRU Test Procedures

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXi SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE "MAINTENANCE MODE" ON PAGE 34250311.

(1) GDU 105x PFD and MFD Test Procedure

- (a) Allow displays to initialize.
- (b) Check that all COM/NAV display fields are valid in the top corners of the displays.
- (c) On the PFD, check that the attitude, heading, altitude, airspeed, vertical speed, and OAT fields are valid within two (2) minutes of power up. On the MFD, check that all of the engine instrument fields are valid.
- (d) Push the red display reversion button on the GMA 1360. Verify that the PFD and MFD enter reversionary mode. Both displays should have valid attitude, heading, altitude, airspeed, vertical speed, and engine instruments.
- (e) De-activate reversionary mode by pushing the red reversion button again.
- (f) Verify that any options, if equipped (i.e. ADF, DME, TAWS, ChartView, etc.), are operational.
- (g) On the PFD, press the ALERTS softkey. Correct any PFD/MFD Alert messages that appear.
- (h) If no other service is to be performed, perform "Return to Service Procedure" on page 342503136.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) GMA 1360 Audio and Communications Test

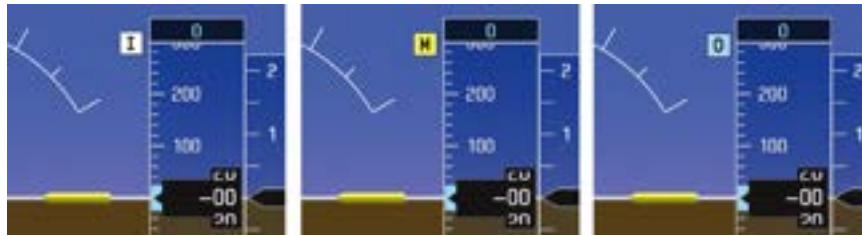
Except for marker beacon operation, an in-aircraft checkout may be performed in the aircraft with known good microphone, headset, and speaker.

- (a) Apply external power. Supply power to the Avionics Bus.
- (b) Verify that the pilot and copilot Intercom System (ICS) mics and phone jacks are functioning.
- (c) Verify operation of COM1. Conduct VSWR Check, under GIA 64/64W Test, below.
- (d) Failsafe Operation Check – GMA 1360 to COM1
 - 1) Turn off the GMA 1360 by pulling the AUDIO MKR circuit breaker.
 - 2) Verify COM1 transmits and receives normally over pilot headphones.
 - 3) Verify COM1 audio is controlled by the PFD COM audio control.
 - 4) Close (push in) the AUDIO MKR circuit breaker.
- (e) Verify operation of COM2. Conduct VSWR Check, under GIA 63W Test, below.
- (f) Marker Beacon Test
 - 1) Verify that the outer, middle and inner markers appear on the PFD (see "Figure 34" on page 342503115).
 - 2) Verify Marker Beacon Audio and tones.
 - 3) Verify the MKR MUTE key mutes the Marker Beacon Audio.
 - 4) Verify Marker HI/LO Sensitivity operation.
- (g) Verify operation of Passenger ICS at all stations.
- (h) If no other service is to be performed, continue to "Return to Service Procedure" on page 342503136.

(3) Split Com Checkout (optional)

- (a) Set COM1 and COM2 to different receiving frequencies.
- (b) Press COM1 mic and COM2 mic key on the audio panel simultaneously.
- (c) Verify COM1 mic and COM2 mic buttons are illuminated on the Audio panel.
- (d) Verify COM1 transmits and receives on pilot side and COM2 transmits and receives on copilot side. Both transmissions may be done on the same frequency, but COM1 and COM2 shall be tuned to different frequencies during transmission. For example, transmit on 123.55 on COM1 while COM2 is tuned to 120.75, then transmit on 123.55 on COM2 while COM1 is tuned to 120.75.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Marker Beacon Symbology
Figure 34

(4) GIA 64/64W Tests

(a) GPS Signal Acquisition (see "Figure 35")

The GIA 64/64W units normally acquire a GPS navigation solution in 2 minutes after startup if the aircraft is outside (or indoors with a GPS repeater).

- 1) Select the GPS STATUS page on the MFD (fourth page in AUX group).
- 2) Two softkeys on the bottom of the display will toggle between GPS1 and GPS2.
- 3) Verify that both receivers show 3D DIFF NAV on the MFD.

NOTE: It may be necessary to temporarily disable or move away from GPS repeaters while testing, as repeaters may adversely affect GPS receiver performance.



GPS STATUS Page (MFD)
Figure 35

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(b) VSWR Check of COM Antennas

Check the insertion loss and VSWR (Voltage Standing Wave Ratio) of COM1 and COM2.

To check VSWR, insert an in-line wattmeter into the coaxial transmission line between the transceiver and antenna. The wattmeter should be inserted as closely as possible to the transceiver. Any problem with the antenna installation is most likely seen as high reflected power.

A VSWR of 3:1 may result in a loss of up to 50 percent of transmit power. The VSWR should be 2.5:1 or less.

VSWR Test

1) VSWR (Voltage Standing Wave Ratio)

The standing wave ratio is a measure of the amount of power transmitted to the antenna, compared to the amount reflected back to the transmitter. S.W.R.'s are a function of the transmission line, the antenna and their installation.

2) Material Required

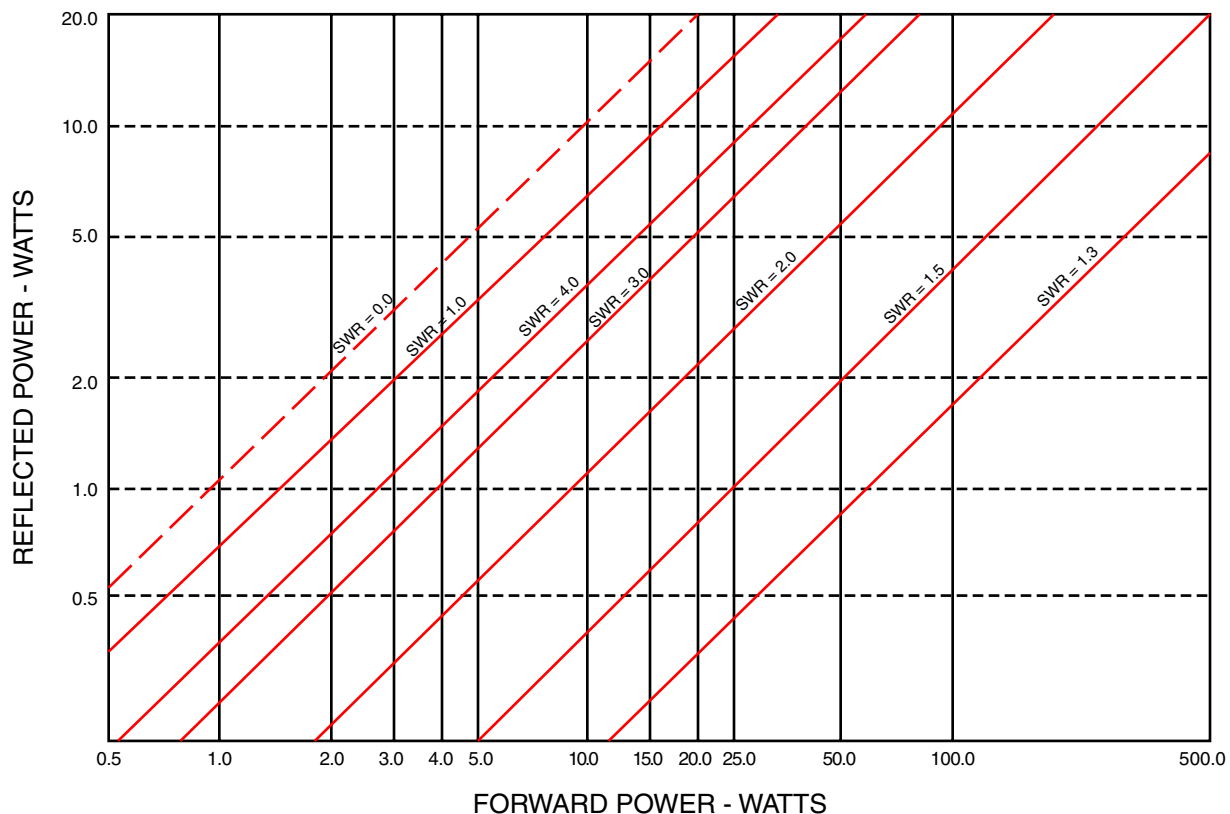
Thruline Wattmeter (Model 43 Bird Electronics, Cleveland, Ohio) or equivalent.

3) S.W.R. Test:

Test the antenna installation with the Thruline wattmeter. Check VSWR's at 118.0, 123.0, 128.0, 132.0, and 135.95 MHZ. Determine the VSWR value with the conversion chart below.

4) VSWR's in excess of 2.5:1 are not acceptable.

VSWR CONVERSION CHART



**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(c) VHF COM Interference Test

This test must be conducted outside. Use of a GPS repeater inside a hangar may result in a failed test.

This procedure assumes that the system is currently set to 25 kHz COM channel spacing. Once the signal acquisition test has been completed successfully, perform the following steps:

- 1) On the MFD, monitor GPS signal strength bars on the AUX – GPS STATUS page.
- 2) On the PFD, ensure that the CDI is set to GPS. If it is not, press the 'CDI' softkey until GPS ENR is displayed.
- 3) Verify that the GPS "INTEG" flag is out of view.
- 4) Select 121.150 MHz on the COM1 transceiver.
- 5) Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
- 6) During the transmit period, verify that the GPS "INTEG" flag does not come into view on the PFD and verify that GPS1 does not lose a 3-D navigation solution on the MFD.
- 7) Repeat steps 5) and 6) and re-transmit while monitoring GPS2 signal levels on the MFD.
- 8) Repeat steps 4) through 7) for each of the following frequencies:
 - 121.175 MHz
 - 121.200 MHz
 - 131.250 MHz
 - 131.275 MHz
 - 131.300 MHz
- 9) Repeat steps 4) through 8) for the COM2 transceiver (GIA2).
- 10) On the MFD, select the AUX – SYSTEM SETUP page.
- 11) Under the COM CONFIG field, change the COM channel spacing from 25 kHz to 8.33 kHz.
- 12) Go back to the AUX – GPS STATUS page.
- 13) Select 121.185 MHz on the COM1 transceiver.
- 14) Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
- 15) During the transmit period, verify that the GPS "INTEG" flag does not come into view on the PFD and verify that GPS1 does not lose a 3-D navigation solution on the MFD.
- 16) Repeat steps 14) and 15) and re-transmit while monitoring GPS2 signal levels on the MFD.
- 17) Repeat steps 14) through 16) for each of the following frequencies:
 - 121.190 MHz
 - 130.285 MHz
 - 131.290 Mhz
- 18) Repeat steps 14) through 17) for the COM2 transceiver (GIA2).
- 19) On the MFD, select the AUX – SYSTEM SETUP page and change the COM channel spacing back to 25 kHz.
- 20) Continue to the VOR/LOC/GS Test.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (d) VOR/LOC/GS Test
 - 1) Perform NAV 1 and NAV 2 accuracy tests: Full scale, Half scale, OBS operation.
 - 2) Check NAV 1 and NAV 2 audio and Ident.
 - 3) Check NAV 1 and NAV 2 Sensitivity.
 - 4) Perform LOC 1 and LOC 2 accuracy tests: Full scale, Half scale.
 - 5) Check LOC 1 and LOC 2 Sensitivity.
 - 6) Perform GS 1 and GS 2 accuracy tests: Full scale, Half scale.
 - 7) Check GS 1 and GS 2 Sensitivity.
- (5) GEA 71B Test
 - (a) On the MFD (Normal Mode), check the indication for each of the sensor or monitor inputs with the aircraft engines off. In general, verify all engine and system instruments show valid static normal values and markings, with no red Xs or erratic indications. Refer to "Figure 36" (baseline configuration instruments shown) for normal engine instrument markings.
 - (b) If no other service is to be performed, continue to the Return to Service Procedure, below.
- (6) GTX 3X5R Test

Operation of the GTX 3X5R Mode-S transponder is accomplished using the PFD or the MFD. Refer to the appropriate Garmin G1000 Cockpit Reference Guide, for basic operation.

 - (a) Functional Check
 - 1) Press the XPDR softkey on the PFD.
 - 2) Verify that the ADS-B TX softkey is available and can be toggled (softkey 10).

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.



Normal Engine Instruments
Figure 36

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(7) GSU 75 Tests

NOTE: If any connections in the pitot / static system are opened for maintenance, the entire system must be rechecked per Pitot and Static Systems, "Test" on page 34101.

NOTE: Allow the unit to warm up for 15 minutes before performing the following tests.

Verification of the altimeter and airspeed must be performed using an air data test set (ADTS). The static port and altimeter must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) § 91.411 and Part 43 Appendix E. The PFD must be in Configuration Mode and the MFD must be in Reversionary mode for performing the tests as outlined in Part 43 Appendix E.

Part 43 Appendix E Testing

1) Preparation

CAUTION: CONFIGURATION MODE CONTAINS CERTAIN PAGES AND SETTINGS THAT ARE CRITICAL TO AIRCRAFT OPERATION AND SAFETY. THESE PAGES ARE PROTECTED AND CANNOT BE MODIFIED, UNLESS THE TECHNICIAN IS PROPERLY AUTHORIZED AND EQUIPPED. HOWEVER, MOST PROTECTED PAGES ARE VIEWABLE TO ALLOW SYSTEM AWARENESS FOR TROUBLESHOOTING.

- a) Start the G1000 NXi system in Normal Mode.
- b) Remove power to PFD.
- c) Turn on PFD in Configuration Mode: press and hold the ENT key on the PFD while applying power.
- d) Release the ENT key after "INITIALIZING SYSTEM" appears in the upper left corner of the PFD.

2) Testing

NOTE: Per Part 43 Appendix E, paragraph (b)(2), Garmin specifies a test procedure equivalent to Part 43 Appendix E, paragraph (b)(1) with two exceptions. The tests of sub-paragraphs (iv) (Friction) and (vi) (Barometric Scale Error) are not applicable because the digital outputs of the GSU 75 are not susceptible to these types of errors.

- a) Using the FMS knob on the PFD turn to the GSU page group. Use the B ALT field for all CFR Part 43 Appendix E tests for G1000 NXi altitude.
- b) Place the MFD in Reversionary Mode. The baro setting can then be read from the MFD for CFR Part 43 Appendix E tests.

NOTE: The baro setting on the MFD is controlled by PFD.

- 3) After completing the tests specified by § 91.411 and Part 43 Appendix E, return the MFD and PFD to Normal Mode.

NOTE: The following tests are above and beyond the requirements set forth in Appendix E, and are required only when appendix E tests are required.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4) Pitot/Static Airspeed Test

- a) Command air data test set (ADTS) to simulate air speeds shown in the table below.

<u>Calibrated Air Speed (Knots)</u>	<u>Allowed tolerance (± Knots)</u>
50	5.0
80	3.5
100	2.0
120	2.0
150	2.0

- b) Wait for ADTS to report that target values have been achieved.
c) Verify that computed air speeds shown on the PFD are within the tolerances specified in the OEM maintenance documentation.

5) Static Port Vertical Speed (Rate of Climb) Test

- a) Command ADTS to change the altitude at the rates shown in the table below.
b) Wait for ADTS to report that target rates have been achieved.
c) Verify that the Rate of Climb reported by the Vertical Speed field on the PFD is within the tolerances specified in the table below:

<u>Vertical Speed (feet/minute)</u>	<u>Allowed tolerance, (± feet/minute)</u>
2000	100
0	45
-2000	100

(8) OAT Probe Check

Check that the outside air temperature (OAT) probe measurement given on the PFD is accurate by comparing it to a calibrated thermometer which is stabilized at ambient temperature. OAT reading should be within 2° C of calibrated thermometer.

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(9) GSU/GMU Calibration Procedures

GSU/GMU Recalibration Criteria – see "Chart 25".

The following calibration procedures are provided for the GSU 75 and GMU 44:

- Pitch/Roll Offset Calibration:
- Magnetometer Calibration:
- Engine Run-Up Vibration Test:
- Magnetometer Interference Test:

When ready to perform the procedures, shut off the displays by pulling the PFD and MFD circuit breakers. Restart the PFD and MFD in Configuration Mode. Follow the steps given for each procedure on-screen at the GSU/GMU CALIBRATION page. Note that the CALIBRATE command cannot be selected and activated until the installer acknowledges all required steps have been carried out by pressing the ENT key on each step.

**CHART 25
GSU 75 ADAHRS / GMU MAGNETOMETER CALIBRATIONS**

Required GSU/GMU Calibrations			
Condition	Calibrations Required		
	Procedure A: GSU 75 Pitch/Roll Offset	Procedure B: GSU/GMU Magnetic Calibration	Procedure C: Engine Run-up Vibration Test
GMU 44 was removed and/or replaced.		X	
GSU 75 ADAHRS was removed and/or replaced. The mounting tray was NOT removed and the mounting tray bolts were NOT loosened.	None Required. Continue to GRS/GMU Test section.		
GSU 75 ADAHRS was removed and/or replaced. The mounting tray WAS removed and/or mounting tray bolts WERE loosened.	X	X	X
GSU 75 ADAHRS Configuration Module was replaced.	X	X	X

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(10) GSU 75 Pitch/Roll Offset Calibration (Procedure A)

This procedure must be performed with the engine OFF.

- (a) Level the aircraft to within $\pm 0.25^\circ$ of zero pitch and zero roll using a digital level. (Refer to 8-20-00.)
- (b) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (c) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (d) Select the GSU/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (e) Activate the cursor by pressing the small FMS knob and highlight the SELECT GSU UNIT window. Select GSU1 on the PFD
- (f) Highlight the SELECT PROCEDURE window and select **PITCH/ROLL OFFSET**.
- (g) Press the ENT key.
- (h) Follow the checklist items displayed and press the ENT key as each step is completed or confirmed.
- (i) When the CALIBRATE field is blinking on the PFD, press the ENT key to begin the procedure.
- (j) After several seconds, a new checklist appears in the lower half of the PFD. Press the ENT key as each step is confirmed. When the CONFIRM AIRCRAFT IS LEVEL field is blinking on the PFD, press the ENT key to continue.
- (k) The result of the pitch/roll offset compensation is displayed on the PFD. If successful, the PFD reports the successful calibration and returns to normal operation.
- (l) Press the ENT key on the PFD to conclude this procedure.
- (m) Restart all displays in Normal Mode.

NOTE: The following Magnetometer Calibration procedure must be carried out at a site that is determined to be free of magnetic disturbances. If unsure whether a site is “clean” or not, the technician should verify that the site is clean by following the guidance provided. The technician may skip the Compass Rose Evaluation Procedure if the site condition is acceptable.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(11) Compass Rose Evaluation of Magnetic Disturbances for Magnetometer Calibration Procedure (Optional)

NOTE: Typically, a compass rose is an acceptable location to perform the magnetometer calibration procedure. However, because not all compass roses are well maintained, even an existing compass rose should be regularly evaluated using the method described here to determine if it is free of magnetic disturbances. If evaluation of an existing compass rose indicates that magnetic disturbances are present, then an alternative location must be found to perform the Magnetometer Calibration procedure.

A G1000 NXI-equipped airplane that has completed the pitch/roll offset compensation procedure can be used to evaluate a candidate site for magnetic disturbances and determine whether it is a suitable location to perform the magnetometer calibration procedure. The magnetometer calibration procedure itself contains the logic to simultaneously survey the location for magnetic cleanliness while it is computing the magnetometer calibration parameters. In order to evaluate a candidate site, the Magnetometer Calibration procedure must be performed twice: once turning clockwise around the site and once turning counterclockwise. Both times, the procedure should be conducted as described in GSU 75/GMU Magnetometer Calibration, below, with the exception of the direction of turns around the site.

NOTE: Although (Procedure B) GSU 75/GMU Magnetometer Calibration indicates that the Magnetometer Calibration procedure should be performed by making a series of clockwise turns around the site, the procedure can also be performed by making counterclockwise turns for the purpose of evaluating the site for magnetic disturbances.

If, upon completion of the Magnetometer Calibration procedure in both directions, the PFD displays the "CALIBRATION SUCCESSFUL / SITE IS CLEAN" message, then the candidate site is sufficiently free of magnetic disturbances and acceptable for magnetometer calibration. It is important that successful results are obtained in both directions to ensure that the magnetometer sweeps over a large enough area at the candidate site.

If, upon completion of the Magnetometer Calibration procedure in either direction, the PFD displays either the "MAG FIELD AT SITE NOT UNIFORM," or "MAG FIELD AT SITE DIFFERS FROM IGRF MODEL" message, then the site contains magnetic disturbances that are too significant to use the site for calibration.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(12) GSU 75/GMU Magnetometer Calibration (Procedure B)

NOTE: Procedure A must first be successfully accomplished before performing Procedure B, only for situations where the GSU 75 was replaced with a new unit.

Calibration Procedure B must be carried out on a compass rose in order to guarantee measurements free of environmental magnetic disturbances. Attempting to carry out this maneuver on a typical ramp area may not yield a successful calibration. The accuracy of the ADAHRS cannot be guaranteed if this calibration is not performed on a magnetically clean compass rose. If the compass rose condition is not known, it is recommended that the technician follow the guidance in Compass Rose Evaluation of Magnetic Disturbances, above.

- (a) Start the aircraft engine following the procedures referenced in the POH.
- (b) After aircraft engine startup, taxi the aircraft to a properly calibrated compass rose.
- (c) At the compass rose, align the aircraft to a heading of magnetic north ($\pm 5^\circ$).

CAUTION: CALIBRATION PROCEDURE B MUST BE CARRIED OUT ON A COMPASS ROSE IN ORDER TO GUARANTEE MEASUREMENTS FREE OF ENVIRONMENTAL MAGNETIC DISTURBANCES. ATTEMPTING TO CARRY OUT THIS MANEUVER ON A TYPICAL RAMP AREA MAY NOT YIELD A SUCCESSFUL CALIBRATION. THE ACCURACY OF THE ADAHRS CANNOT BE GUARANTEED IF THIS CALIBRATION IS NOT PERFORMED ON A MAGNETICALLY CLEAN COMPASS ROSE OR EQUIVALENT.

- (d) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (e) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (f) Select the GSU/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence on the PFD:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (g) Activate the cursor by pressing the small FMS knob and highlight the GSU UNIT window. Select GSU1 on the PFD.
- (h) Highlight the SELECT PROCEDURE window and select MAGNETOMETER.
- (i) Press the ENT key.
- (j) Use the cursor to highlight the BEFORE CALIBRATION window on the PFD.
- (k) Follow the checklist items displayed and press the ENT key as each step is completed or confirmed.
- (l) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
- (m) The PFD display advises the operator when to turn the aircraft, when to stop, and when to turn again.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (n) Upon instruction to turn, taxi the aircraft in a right turn. After approximately 25° to 30° of turn from the last heading, the PFD display advises the operator to stop the aircraft.

NOTE: Due to the difficulties in executing smooth, accurate turns, the PFD may incorrectly interpret a station and instruct to “HOLD POSITION” prior to full completion of a 30° turn. If this scenario is encountered, it is best for the operator to ignore the “HOLD POSITION” command and instead use outside references to complete the approximate 30° turn. Instead of using the PFD instructions to turn as a real-time indication of when to turn, simply judge the 30° (±5°) turn increments of the aircraft by using the compass rose radials. Dwelling at these 30° increments for the time recommended by the PFD should result in successful calibration.

- (o) The PFD guides the operator to dwell at multiple headings around a complete circle.

NOTE: Due to high winds or excessive airframe vibration, the operator may encounter a condition where a PFD restarts the 18-second countdown without full completion of the previous countdown. If this is encountered more than once for a given station, the operator should begin turning to the next station (approximately 30°). A minimum of 2 successful stations per quadrant (and for each GSU 75) is required, where a successful station is a full 18-second countdown followed by instruction to move. Ensure that at least 2 stations per quadrant are completed. Thus, it may sometimes be required to dwell at a station after a countdown restart. A maximum of 20 stations is allowed for the entire calibration procedure. If too many countdown restarts are encountered, the calibration will fail with the message, “TOO MANY STATIONS.”

- (p) Repeat the turn-and-stop process until the PFD advises that a successful calibration is complete. The GSU 75 ADAHRS then enter the normal operational mode. Press the ENT to conclude this procedure.

(13) Engine Run-Up Vibration Test (Procedure C)

NOTE: Calibration Procedure C is performed in order to guarantee that the ADAHRS mounting is sufficiently rigid and insensitive to vibration. Calibration Procedures A and B are not required prior to this procedure.

- (a) Start the PFD and MFD in Configuration Mode by holding the ENT key on each display while closing the circuit breaker.
- (b) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (c) Select the GSU/GMU Calibration page by rotating the small FMS knob. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
- 9
 - 10
 - 11
 - 12 (far right softkey)
- (d) Activate the cursor by pressing the small FMS knob and highlight the SELECT GSU UNIT window.
- (e) Highlight the SELECT PROCEDURE window and select ENGINE RUN-UP TEST on the PFD.
- (f) Again, press the ENT key on the PFD to select the first checklist item displayed.
- (g) Follow the checklist items displayed and press the ENT key as each one is completed or confirmed. When the CALIBRATE field is blinking on the PFD, press the ENT key to begin the procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (h) The PFD will instruct the operator to gradually increase power from idle to full throttle and back to idle over a period of 2–4 minutes.
- (i) When the engine run-up is completed and the engine is back to an idle setting, press the ENT key on the PFD to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking.
- (j) PFD will state if the installation has passed or failed the vibration test. If the test fails, the specific measurements causing the failure are identified and associated numeric values are displayed on the PFD.

NOTE: Should a failure occur, the technician may perform the Engine Run-up test a maximum of three (3) times successively before corrective action must be taken. If the test does not pass after three attempts, then the installation should not be considered reliable until the source of the vibration problem is identified and remedied. In the event of repeated failure of the engine run-up test, record the values that are reported to be out of range for future reference.

The following are potential causes for failure of the engine run-up test:

- 1) Vibration motion of GSU 75 and/or GMU 44 caused by neighboring equipment and/or supports.
 - 2) Mounting screws and other hardware for GSU 75 and/or GMU 44 not firmly attached.
 - 3) GSU 75 connector not firmly attached to unit.
 - 4) Cabling leading to GSU 75 or GMU 44 not firmly secured to supporting structure.
 - 5) An engine and/or propeller that is significantly out of balance.
- (k) Press the ENT key to conclude this procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(14) Magnetometer Interference Test

The Magnetometer Interference Test validates that no electronic device is interfering with the operation of the GMU magnetometer. It verifies that the aircraft has a magnetically "clean" GMU installation. The test exercises various devices on the aircraft that could affect the magnetic field measured by the GMU (examples include navigation lights, control servos, etc).

NOTE: It is highly recommended that this test be performed after the installation or maintenance of any electrical components on the aircraft and/or for troubleshooting the GMU.

NOTE: External power cart and other aircraft need to be as far away from the aircraft as possible. Turn Battery Master ON, AV BUS Master ON, and push in (close) all circuit breakers.

- (a) Start the PFD and MFD in Configuration Mode by holding ENT on each display while closing the circuit breaker.
- (b) Go to the GSU Page Group on the PFD by rotating the large FMS knob.
- (c) Select the GSU/GMU Calibration Page, as shown in "Figure 37" on page 342503128. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
 - 9
 - 10
 - 11
 - 12 (far right softkey)
- (d) Press the ENT key.
- (e) Select MAG INTERFERENCE TEST and press the ENT key.
- (f) Follow the checklist items displayed on the PFD, and press the ENT key as each one is completed or confirmed.
- (g) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.

NOTE: The list of relevant electronic devices are given in "Chart 26" on page 342503128. Use a stopwatch to accurately time the tests. All actions are to be carried out in the order and at the precise elapsed time as specified in the prepared test sequence.

NOTE: It is important that the "time equals zero" moment corresponds with the moment the PFD first displays the blinking TEST COMPLETE? message.

- (h) When the test is complete, press the ENT key to indicate the process is complete. When this is done, the TEST COMPLETE field stops blinking.
- (i) The PFD will display if the corresponding GSU 75 installation has passed or failed the magnetometer interference test. If the test passes, no further action is required for this test. If the test fails, the installation should be considered unreliable until the source of magnetic interference is identified and remedied. When the magnetometer interference test fails, record the three magnetometer maximum deviation values and their corresponding timestamps. Any maximum deviation value greater than 2.5 milliGauss indicates a problem that must be resolved. Compare the corresponding timestamps with the prepared test sequence to identify which action produced the problem. Contact Garmin for assistance in resolving the problem.

NOTE: Two common reasons for a failed magnetometer interference test are:

- 1) New equipment is installed in close proximity to GMU 44 magnetometer, and,
- 2) an existing or new electronic device has become grounded through the aircraft structure instead of via the proper ground wire in a twisted shielded pair.

- (j) Press the ENT key to conclude this procedure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Magnetometer Interference Test
Figure 37

**CHART 26
G1000 NXi - MAGNETOMETER INTERFERENCE TEST**

MAGNETOMETER INTERFERENCE TEST	
ELAPSED TIME Since start of test (Minutes:Seconds)	ACTION
0:00	Test Begins
0:10	Turn on strobe light
0:20	Turn off strobe light
0:30	Turn on fin strobe
0:40	Turn off fin strobe
0:50	Turn on nav lights (if optional tail light installed)
1:00	Turn off nav lights (if optional tail light installed)
1:10	Blower Motor on Low
1:20	Blower Motor off
1:30	Blower Motor on High
1:40	Blower Motor off

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(15) Automatic Flight Control System (AFCS) Tests (If installed)

See Ground Checks under Garmin GFC 700 Automatic Flight Control System (AFCS) (Optional) in 22-10-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



ADAHRS Normal Mode Check
Figure 38

(16) ADAHRS Normal Mode Check

The aircraft may now be taxied back and the engine can be shut down for final testing. Restart the displays in Normal Mode to conduct final system checks. When the PFD powers up in Normal Mode, the ADAHRS attitude and heading information displayed should become valid within one (1) minute of power-up, as shown in "Figure 38" (provided both GPS receivers have a valid position; if GPS is unavailable, ADAHRS initialization may take as long as two (2) minutes).

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.

(17) GDL 69 SXM Test

NOTE: This section verifies the correct installation of the GDL 69, but is not the activation sequence. See "Chart 12" on page 34250366 for XM activation.

- Connect a headset to the audio jack on the pilot or copilot side of the airplane.
- On the MFD select AUX - XM RADIO.
- Change the XM channel using the MFD controls.
- Increase and Decrease the volume using the MFD controls.
- Change the XM channel using a Bluetooth device with Garmin Pilot connected to the FS 510 (if installed). Increase and Decrease the volume using the Bluetooth device.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (f) Verify XM audio operation at Pilot, Copilot and all passenger stations. Verify stereo operation.
- (g) Activate the Stall Warning and verify that the XM audio is muted.
- (h) As a final operations check, make sure there are no MANIFEST errors shown on the PFD for the GDL 69.

If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.

(18) GTS 8xx Checkout (If Installed)

- (a) Start the G1000 NXi system in normal mode and select the Traffic Map page in the map group on the MFD.
- (b) Turn ADS-B off by pressing the ADS-B softkey if the softkey indicator is green.
- (c) Verify that the STANDBY, OPERATE, TEST (in Standby mode), and ALT MODE softkeys are available on the bottom of the display. Verify that a TAS Status (not TAS FAIL) is displayed in the upper right corner of the traffic map. Verify that a yellow NO DATA message is not displayed in the center of the map. If TIS is displayed instead of TAS, refer to "Optional Equipment Configuration" on page 342503100 to install the GTS 800 option.
- (d) Press the OPERATE softkey and verify that OPERATING is displayed in the upper right corner of the traffic map.
- (e) Press the STANDBY softkey and verify that STANDBY is displayed in the upper right corner of the traffic map.
- (f) Set range to 6NM or greater.
- (g) Press the TEST softkey and verify that TEST is displayed in the upper right corner of the traffic map and that a traffic test pattern is displayed. Verify that "TAS System Test" aural is heard over the cockpit speaker at the conclusion of the test.
- (h) Verify that the FAIL indicator is not present in the top right corner of the MFD.
- (i) Open the TAS circuit breaker and verify that TRFC FAIL system message is annunciated.
- (j) Close the TAS circuit breaker and verify that TRFC FAIL system message is cleared.

(19) ChartView Check (If installed)

ChartView, if installed, must be enabled using a ChartView Enable Card and a current ChartView database. Ensure that a Chartview Jeppesen Nav Data U.S. database card is installed in the top card slot of the MFD. Refer to Chartview Unlock, above.

NOTE: The required ChartView databases are subscription-based and are to be procured by the aircraft owner directly from Jeppesen.

- (a) Select the Airport Information page in the WPT Group.
- (b) Verify that the title at the top of the page reads "WPT- Airport Information".
- (c) Enter KVRB as the waypoint and verify that the CHRT softkey is available.
- (d) Press the CHRT softkey and verify the electronic chart is viewable.
- (e) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(20) TAWS Functional Check

- (a) Ensure that the aircraft has a valid GPS position.
- (b) Select the TAWS-B page in the MAP Group.
- (c) 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."

- (d) Press the MENU button and select "Test TAWS System" from the pop-up menu and press ENT key.
- (e) After the TAWS test has completed, verify that "TAWS System Test Okay" is heard over the audio system.
- (f) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.

(21) Terrain Proximity Check (if TAWS is not installed)

- (a) Ensure that the aircraft has a valid GPS position.
- (b) Select the TERRAIN PROXIMITY page (last page in the MAP group).
- (c) Verify that the title at the top of the page reads "MAP - TERRAIN PROXIMITY".
- (d) Verify that the map is colored to show terrain and no failures are annunciated on the page.

(22) KR 87 ADF Functional Check and Adjustment (If installed)

(a) Functional Check

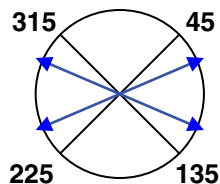
This check verifies that the ADF / G1000 NXi interface operates correctly.

- 1) Tune the ADF to a known local NDB and verify the bearing is correct within +/- 15° and the Morse Code Identifier is clear and accurate.
- 2) Verify the ADF audio is available on the GMA 1360 audio panel.

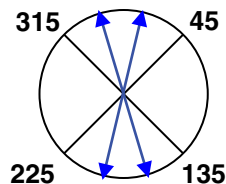
(b) Quadrantal Error Adjustment

- 1) Position aircraft on ramp in an area that is clear of surrounding buildings and other obstructions that may block or reflect radio signals.
- 2) Select ADF as the bearing source on the PFD.
- 3) Select ADF mode on ADF receiver.
- 4) Tune the ADF to a nearby non-directional transmitter (see "Figure 39" on page 342503133).
- 5) Orient aircraft such that the bearing indicator points to 0 degrees (aircraft is heading directly to station). Note the heading.
- 6) Using the heading indicator, rotate the aircraft 45 degrees to the left (counterclockwise). Note the indicated relative bearing and the amount of error.
- 7) Continue to turn the aircraft in 45 degree increments, noting the relative bearing error at the increment.
- 8) Verify that the relative bearing error at the cardinal points (90, 180, 270, 360) is within ±5 degrees.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Turn the QE adjustment
pot clockwise



Turn the QE adjustment
pot counter-clockwise

Quadrantal Error Adjustment
Figure 39

NOTE: The following steps are not required if the quadrantal error is within tolerance.

- 9) Average the errors at the quadrantal points (45, 135, 225, 315) to determine the amount of QE adjustment required.

NOTE: The QE adjustment potentiometer is located to the side of the antenna connector. The adjustment hole is protected by a threaded cap which must first be removed. If the antenna is inaccessible from the inside of the aircraft, the antenna will have to be unfastened and pulled away from the aircraft far enough to insert a jeweler's screwdriver into the adjustment hole. Take care of the O-ring seal beneath the adjustment screw cap. Following adjustment, the cap must be reinstalled to ensure that the electronics compartment is environmentally sealed.

- 10) Perform quadrantal error adjustment per the following figures. The QE adjustment potentiometer has a sensitivity of approximately 1 degree per turn.
 - 11) Recheck the relative bearings and readjust the QE compensation pot as necessary to split the errors at the quadrantal points and obtain the lowest possible average error.
 - 12) When QE adjustments are complete, reinstall the O-ring seal and the threaded cap in the adjustment hole to seal the antenna.
- (c) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.
- (23) KN 63 DME Check (If installed)
- This check verifies that the DME-to-G1000 NXi interface operates correctly.
- (a) Perform systems check with the appropriate test equipment and verify the DME is tuned by NAV1 and NAV2.
 - (b) Verify the distance is accurate.
 - (c) Verify the DME audio is available on the GMA 1360 audio panel.
 - (d) If no other service is to be performed, continue to the "Return to Service Procedure" on page 342503136.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(24) GDL 59 Checkout (If installed)

NOTE: This section requires a strong Wi-Fi signal in order to verify the proper operation of the GDL 59.

- (a) Using the MFD, navigate to the “Maintenance Wifi Setup” page under the “Aux” tab.
- (b) Press the “Avail” softkey to search available networks.
- (c) Press the FMS knob in to activate the cursor, then use the FMS knob to select a known network that you have access to and press the “Connect” softkey.
- (d) If required, enter password and press ENT. Press ENT again to confirm.
- (e) Press ENT to put a check next to Save Connection.
- (f) Enter the four letter airport identifier and press ENT. Press ENT again to confirm.
- (g) Verify that the connection status is listed as “Connected” (this may take several minutes).

(25) FS 510 Checkout (If installed)

This procedure requires the use of a Bluetooth enabled device, such as a smart phone or tablet with the Garmin Pilot app installed.

NOTE: This section requires the use of a Bluetooth enabled device, such as a smart phone or tablet with the Garmin Pilot app installed.

- (a) Ensure the airplane has a valid GPS position.
- (b) Turn on Bluetooth on the mobile device.
- (c) Navigate to the Aux group, Connex Setup page on the MFD. Note the Bluetooth unique identifier at the end of the Bluetooth name field on this page.
- (d) Pair to “Flight Stream 510-XXXX” on the mobile device, where XXXX is the unique identifier for this particular Flight Stream 510.
- (e) Follow prompts on the device as well as on the MFD to confirm the confirmation code.
- (f) Open the Garmin Pilot application on the mobile device.
- (g) Tap the button in the top left corner of the mobile device.
- (h) Select Connex from the list on the left of the mobile device screen, then select Flight Stream 510 from the devices list.
- (i) Select Flight Stream 510-XXXX from the dropdown menu on the mobile device and then press Connect.
- (j) After the device has connected, press Activate on the mobile device to receive the flight plan update.
- (k) Tap the button in the top left corner of the mobile device twice and then select Flight Plan.
- (l) Ensure that KVRB appears as the first airport listed.
- (m) Tap “Add Waypoint” and type in KFPR and press done.
- (n) Tap the blue connex icon located to the right of Flight Plan on the top row on the mobile device.
- (o) Tap “Send to Navigator”.
- (p) Press ENT on the MFD when prompted with “pending flight plan.”
- (q) Press ENT on the MFD when prompted to activate flight plan.
- (r) Press ENT on the MFD again to click ok.
- (s) Go to the Navigation Map on the MFD and verify flight path is correct.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(26) Display System Checkout

(a) NAV Source Selection Tests

NOTE: The CDI will not be depicted if the VOR antenna is not receiving a valid signal.

NOTE: For FMS, the word that is displayed with the FMS (i.e., FMS TERM) depends on the phase of flight of the airplane. Display of either 'FMS TERM' or 'FMS ENR' is acceptable.

- 1) Start these tests with all avionics powered.
- 2) Press the Direct-To-Key (-D->).
- 3) Enter a Direct-To waypoint. Press ENT twice to activate.
- 4) Enter an appropriate local VOR frequency or an appropriate VOR frequency simulated with test equipment into the active NAV 1 frequency box on the PFD.
- 5) Enter a different appropriate local VOR frequency or an appropriate VOR frequency simulated with test equipment into the active NAV 2 frequency box on the PFD.
- 6) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from FMS TERM to VOR1.
- 7) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from VOR1 TO VOR2.
- 8) Press the CDI softkey on the PFD. Verify the NAV source on the PFD changes from VOR2 TO FMS TERM.

(b) Bearing Pointers and Information Windows Tests

NOTE: The bearing pointer will not be depicted if it is not receiving a valid signal.

- 1) Start these tests with all avionics powered.
- 2) Press the Direct-To-Key (-D->).
- 3) Enter a Direct-To waypoint. Press ENT.
- 4) Enter an appropriate local VOR frequency or an appropriate VOR frequency simulated with test equipment into the NAV1 frequency box on the PFD. Enter a different appropriate local VOR frequency or an appropriate VOR frequency simulated with test equipment into the NAV2 frequency box on the PFD.
- 5) Enter a known local NDB frequency into the ADF receiver (if installed).
- 6) Press the PFD softkey on the PFD to make the Bearing 1 and Bearing 2 softkey selections visible.
- 7) Verify that the Bearing 1 softkey can be pressed to sequentially cycle through NAV1, NAV2, FMS, and ADF (if installed).
- 8) Verify that the BRG2 softkey can be pressed to sequentially cycle through NAV1, NAV2, FMS, and ADF (if installed).

(c) BARO Selection Tests

- 1) Rotate the BARO knob on the PFD and verify that the PFD BARO values change.
- 2) Set the current altimeter setting and verify that the PFD altimeter indicates within $\pm 30'$ of field elevation.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Q. Return to Service Procedure

WARNING: INSPECT AND MATCH SOFTWARE VERSIONS INSTALLED AGAINST VERSIONS LISTED IN THE REQUIRED EQUIPMENT LIST (REL). SEE "CHART 28" ON PAGE 342503143. CORRECT SOFTWARE CONFIGURATION IS CRITICAL TO PROPER SYSTEM OPERATION AND MUST BE VERIFIED BEFORE RETURNING AN AIRCRAFT TO SERVICE.

CAUTION: ENTER "MAINTENANCE MODE" WHEN ACTIVATING THE GARMIN G1000 NXI SYSTEM ON THE GROUND TO CONDUCT TESTS, INSPECTIONS, ETC. SEE MAINTENANCE MODE UNDER TROUBLESHOOTING, ABOVE.

(1) Software Verification

After reinstalling any G1000 NXi LRU, use the checkoff list in "Chart 27" on page 342503142 to verify correct LRU software part numbers and versions against the current numbers and versions shown in the Required Equipment List (REL). See "Chart 28" on page 342503143.

- (a) The PFD System Status page (see "Figure 40" on page 342503137) displays a list of LRUs in the LRU window.
- (b) Enter Configuration Mode on the PFD and MFD by applying power while holding ENT.
- (c) Verify on the System Configuration Page that the following are valid (indicated by green annunciations): MFD, PFD, GIA1, GIA2, and GDL 69A / 69eA (optional).
- (d) Verify on the System Status Page that the following are valid (green annunciations indicate that the system is healthy): MFD, PFD, GIA1, GIA2, and GDL 69A / 69eA (optional).

(2) LRU Failure Tests

Various secondary comms paths are tested to ensure that desired backup paths are in place.

(a) GPS Failure Test

- 1) Start these tests with all avionics powered.
- 2) Valid GPS reception. Press Direct-To-Key (-D->). Enter a Direct-To waypoint.
- 3) Place a shroud over the GPS1 (i.e., left) antenna to prevent signal reception. Verify loss of GPS1 signal on MFD 'Aux' group, 'GPS Status' page. The following should remain valid on the PFD throughout the procedure:
 - a) Attitude
 - b) Heading
 - c) Airspeed
 - d) Altitude
 - e) Vertical Speed
 - f) OAT
 - g) GPS CDI
- 4) Remove shroud from the GPS1 antenna.
- 5) Place a shroud over the GPS2 (i.e., right) antenna to prevent signal reception. Verify loss of GPS2 signal on MFD 'Aux' group, 'GPS Status' page. To view GPS2 status, press the GPS2 softkey. The following should remain valid on the PFD throughout the procedure:
 - a) Attitude and Heading
 - b) Airspeed and Altitude
 - c) Vertical Speed
 - d) OAT
 - e) GPS CDI

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



System Status Page (Configuration Mode)
Figure 40

- 6) Leave the shroud over the GPS2 antenna and replace the shroud over the GPS1 antenna. Verify loss of GPS 1 and 2 signals on 'Aux' group, 'GPS Status' page. The following should remain valid on the PFD throughout the procedure.
 - a) Attitude
 - b) Heading
 - c) Airspeed
 - d) Altitude
 - e) Vertical Speed
 - f) OAT
 - g) and GPS LOI (loss of integrity) annunciated on the PFD.
- (b) GIA Failure Test
 - 1) Start these tests with all avionics powered.
 - 2) Valid GPS reception. Valid NAV signal.
 - 3) Remove power from GIA1 by pulling the INTEG AV 1 and COM 1 circuit breakers.
 - 4) Verify the following system messages:
 - a) AHRS1 GPS – AHRS1 USING BACKUP GPS SOURCE
 - b) FAILED PATH – A data path has failed.
 - c) AV FAN FAIL – The cooling fan for remote avionics is failed.
 - 5) Verify the following flag invalid:
 - a) COM/NAV 1 field
 - b) NAV 1 CDI loses deviation bar.
 - 6) Restore power to GIA1 by resetting the INTEG AV 1 and COM 1 circuit breakers.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 7) Verify the following:
All invalid flags, system messages, and annunciations are removed. (#1 GPS will take time to reinitialize).
- 8) Remove power from GIA 2 by pulling the INTEG AV 2 and COM 2 circuit breakers.
- 9) Verify the following system messages:
 - a) AHRS1 GPS – AHRS1 not receiving backup GPS information.
 - b) FAILED PATH – A data path has failed.
- 10) Verify the following flag invalid:
 - a) COM/NAV 2 field
 - b) NAV 2 CDI loses deviation bar.
 - c) COM 2 Frequency Decoding Box
- 11) Restore power to GIA2 by resetting the INTEG AV 2 and COM 2 circuit breakers.
- 12) Verify the following:
- 13) All invalid flags, system messages, and annunciations are removed. (#2 GPS will take time to reinitialize).
- 14) Remove power from GIA 1 and GIA 2 by pulling the INTEG AV 1, INTEG AV 2, COM 1 and COM 2 circuit breakers.
- 15) Verify the following system messages:
 - a) XPDR1 FAIL (if GTX 345 is not installed)
 - b) GMA1 FAIL
 - c) FAILED PATH
 - d) GPS NAV LOST
 - e) AHRS1 GPS
 - f) TRAFFIC FAIL (If GTS 800 is not installed)
 - g) CO DET FAIL (If Installed)
 - h) TRN AUD FAIL (If Installed)
- 16) Verify the following flag invalid:
 - a) COM/NAV 1 field
 - b) COM/NAV 2 field
 - c) XPDR field (will not flag invalid if GTX 345 installed)
 - d) Engine Instruments
- 17) Verify the following:
 - a) All AHRS and ADC fields remain valid.
 - b) NAV 1 & NAV 2 CDI loses deviation bar.
- 18) Close all circuit breakers.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (c) Display Failure Test
- 1) Start these tests with all avionics powered.
 - 2) Remove power from the MFD by pulling the MFD circuit breaker.
 - 3) Verify the following system messages on the PFD:
 - a) MFD VOLTAGE (This may or may not appear depending on power failure rate vs. MFD update rate)
 - b) FAILED PATH
 - c) GDL 69 FAIL (If Installed)
 - d) XPDR1 ADS-B TRFC (if GTX 345 installed)
 - e) XPDR1 CSA FAIL (if GTX 345 installed)
 - f) XPDR1 ADS-B NO POS (if GTX 345 installed)
 - 4) Verify the following:
 - a) PFD switches to reversion mode.
 - b) Attitude and Heading remain valid from AHRS.
 - c) Airspeed, Altitude, Vertical Speed and OAT remain valid.
 - d) Engine Instrumentation appears on PFD.
 - 5) Restore power to the MFD. The display should return to Normal operation.
 - 6) Select reversionary mode on GMA 1360 Audio Panel. Verify MFD switches to reversionary mode.
 - 7) Remove power from the PFD by pulling the PFD circuit breaker.
 - 8) Verify the following system messages are displayed on the MFD:
 - a) TCAS FAIL (If Installed)
 - b) FAILED PATH
 - c) GDL 59 FAIL (If Installed)
 - 9) Verify the following:
 - a) Attitude and Heading remain valid from AHRS.
 - b) Airspeed, Altitude, Vertical Speed and OAT remain valid.
 - c) MFD retains engine instrumentation.
 - 10) Restore power to the PFD and deselect reversionary mode on GMA 1360 Audio Panel. The displays should return to normal operation

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(d) GSU 75 Failure Test

- 1) Start these tests with all avionics powered.
- 2) Remove power from the GSU 75 by pulling the ADAHRS circuit breaker.
- 3) Verify the following flag invalid on the PFD:
 - a) Altitude
 - b) Indicated Airspeed
 - c) Vertical Speed
 - d) Static Air Temperature (OAT) and ISA
 - e) Heading
 - f) Attitude
- 4) Restore power to the GSU.
- 5) Verify normal operation and invalid flags are removed.

(3) Flight Test

A flight test is recommended after the installation is complete to ensure satisfactory performance of the G1000 NXi.

(4) VHF Comm Tests

Verify the communications capability on both the high and low ends of the VHF COM spectrum.

(5) VOR/ILS Tests

Select a VOR channel within a 40-nautical-mile range. Listen to the VOR audio and verify that no electrical interference such as magneto noise is present. Check the tone identifier filter operation. Fly inbound or outbound on a selected VOR radial and check for proper LEFT / RIGHT, TO / FROM flag indications on the CDI. Check the VOR accuracy.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(6) Engine Run Checks

The following checks verify certain annunciations, displays, and systems operation.

WARNING: DO NOT WORK IN THE ENGINE AREA WHILE THE ENGINE IS RUNNING.

CAUTION: AFTER RUNNING THE ENGINE, THE EXHAUST STACKS WILL BE HOT.

(a) Start Engine.

- 1) Turn on Alternator.
- 2) Set engine RPM to greater than 1100.

(b) Verify Alternator Operation and Annunciation.

- 1) Verify alternator operation by checking that ALTR AMPS is in the normal range.
- 2) Pull Alt Field circuit breaker.
- 3) Verify "ALT FAIL" Warning CAS annunciates.
- 4) Reset Alt Field circuit breaker.
- 5) Verify "ALT FAIL" Warning CAS extinguishes.
- 6) Verify alternator operation by checking that ALTR AMPS is in the normal range.

(c) For aircraft with Hobbs Meter Configuration A, verify Hour Meter operation:

Hobbs meter shall run while engine is running.

(d) On MFD Engine page, verify RPM, Fuel Flow, EGT, Oil Pressure, and Oil Temp, and CHT (optional) are operating in normal range.

(e) Verify alternator and battery current indications.

- 1) With the Battery Master Switch ON and alternator on line. Note alternator current and battery current.
- 2) Turn the Battery Master switch OFF.
- 3) Note alternator current. Verify that alternator current with battery on equals the alternator current with battery off plus battery current (within +/- 5 amps).

(f) Turn off Alternator. Shutdown engine.

(7) Maintenance Records

After conducting the function check flight, the airplane may be returned to service. Record the following information in the appropriate airplane maintenance logs:

- (a) Part number of the loader card used to perform software loading or software updates.
- (b) Any other applicable information related to the maintenance work performed on the airplane.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 27
G1000 NXI - RETURN TO SERVICE CHECK LIST**

Group System	SW Ver. OK	System	SW Ver. OK	System	SW Ver. OK
Control & Display:					
MFD1	_____	PFD	_____		
MFD1 FPGA	_____	PFD FPGA	_____		
CNS:					
COM1	_____	GDL69	_____	NAV1	_____
COM2	_____	GMA1	_____	NAV1 FPGA	_____
GIA1	_____	GPS1	_____	NAV2	_____
GIA1 AUDIO	_____	GPS2	_____	NAV2 FPGA	_____
GIA2	_____	GTS	_____		
GIA2 AUDIO	_____	GTX1	_____		
Sensors:					
		GSU1	_____		
GEA1	_____	GSU1 FPGA	_____		
GMU1	_____				
GMU1 FPGA	_____				

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.02 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-82371-02	2.02	
COM2	006-82371-02	2.02	
GDC1	006-81838-54	2.04	
GDC1 RGN LIST	006-D5080-50	2.00	
GDC1 AIRCRAFT CONFIG	006-D6037-07	2.00	
GDL59	006-80735-15	2.50	OPTIONAL, VERIFY IF INSTALLED
GDL59 ROUTER	006-80736-17	2.41	OPTIONAL, VERIFY IF INSTALLED
GDL59 RTR FS	006-D1112-10	2.00	OPTIONAL, VERIFY IF INSTALLED
GDL69	006-81902-05	5.20	OPTIONAL, VERIFY IF INSTALLED
GEA1	006-82139-02	2.10	
GEA1 PUBLIC KEY	006-D6358-K1	3.00	
GEA1 RGN LIST	006-D6358-00	2.00	
GEA1 XHTML	006-D6358-H4	2.03	
GIA1	006-82548-05	2.02	
GIA1 AUDIO	006-D0425-23	4.03	
GIA2	006-82548-05	2.02	
GIA2 AUDIO	006-D0425-23	4.03	
GMA1	006-82212-03	5.11D	
GMU1	006-80224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-81827-10	7.00	
GPS2	006-81827-10	7.00	
GRS1	006-81838-04	2.04	
GRS RGN LIST	006-D5080-00	2.00	
GSA PTCH CTL	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-02	2.02	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH MON	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-02	2.02	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM C	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELS)**

**G1000 NXI - VER. 3080.02 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
GSA PTCH TRIM M	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL CTL	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-02	2.02	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL MON	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-02	2.02	OPTIONAL, VERIFY IF INSTALLED
GTS	006-80551-31	4.01	OPTIONAL, VERIFY IF INSTALLED
GTS AUDIO	006-D0726-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GTS FPGA	006-C0081-20	2.0	OPTIONAL, VERIFY IF INSTALLED
GTX1	006-81607-08	2.11	OPTIONAL, VERIFY IF INSTALLED
MFD1	006-81177-64	20.80	
NAV1	006-82253-00	2.00	
NAV1 RGN LIST	006-D5761-00	2.00	
NAV2	006-82253-00	2.00	
NAV2 RGN LIST	006-D5761-00	2.00	
PFD1	006-81177-64	20.80	
PA-28 IMAGE	006-83080-02	3080.02 ⁽¹⁻²⁾	
(1) 107999 E. (2) Verify on MFD splash screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.03 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-82371-02	2.02	
COM2	006-82371-02	2.02	
GDC1	006-81838-54	2.04	
GDC1 RGN LIST	006-D5080-50	2.00	
GDC1 AIRCRAFT CONFIG	006-D6037-07	2.00	
GDL59	006-80735-15	2.50	OPTIONAL, VERIFY IF INSTALLED
GDL59 ROUTIER	006-80736-17	2.41	OPTIONAL, VERIFY IF INSTALLED
GDL59 RTR FS	006-D1112-10	2.00	OPTIONAL, VERIFY IF INSTALLED
GDL69	006-81902-05	5.20	OPTIONAL, VERIFY IF INSTALLED
GEA1	006-82139-03	2.11	
GEA1 PUBLIC KEY	006-D6358-K1	3.00	
GEA1 RGN LIST	006-D6358-00	2.00	
GEA1 XHTML	006-D6358-H4	2.03	
GIA1	006-82548-07	2.02.1	
GIA1 AUDIO	006-D0425-23	4.03	
GIA2	006-82548-07	2.02.1	
GIA2 AUDIO	006-D0425-23	4.03	
GMA1	006-82212-03	5.11D	
GMU1	006-80224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-81827-10	7.00	
GPS2	006-81827-10	7.00	
GRS1	006-81838-04	2.04	
GRS RGN LIST	006-D5080-00	2.00	
GSA PTCH CTL	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH MON	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM C	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.03 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
GSA PTCH TRIM M	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL CTL	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL MON	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GTS	006-80551-31	4.01	OPTIONAL, VERIFY IF INSTALLED
GTS AUDIO	006-D0726-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GTS FPGA	006-C0081-20	2.0	OPTIONAL, VERIFY IF INSTALLED
GTX1	006-81607-09	2.12	
MFD1	006-81177-64	20.80	
NAV1	006-82253-00	2.00	
NAV1 RGN LIST	006-D5761-00	2.00	
NAV2	006-82253-00	2.00	
NAV2 RGN LIST	006-D5761-00	2.00	
PFD1	006-81177-64	20.80	
PA-28 IMAGE	006-83080-03	3080.03 ⁽¹⁻²⁾	
(1) 107999 E. Factory Installed in S/N's 2881037 and up. (2) Verify on MFD splash screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.04 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-82371-02	2.02	
COM2	006-82371-02	2.02	
GDC1	006-81838-54	2.04	
GDC1 RGN LIST	006-D5080-50	2.00	
GDC1 AIRCRAFT CONFIG	006-D6037-07	2.00	
GDL59	006-80735-15	2.50	OPTIONAL, VERIFY IF INSTALLED
GDL59 ROUTIER	006-80736-17	2.41	OPTIONAL, VERIFY IF INSTALLED
GDL59 RTR FS	006-D1112-10	2.00	OPTIONAL, VERIFY IF INSTALLED
GDL69	006-81902-05	5.20	OPTIONAL, VERIFY IF INSTALLED
GEA1	006-82139-03	2.11	
GEA1 PUBLIC KEY	006-D6358-K1	3.00	
GEA1 RGN LIST	006-D6358-00	2.00	
GEA1 XHTML	006-D6358-H4	2.03	
GIA1	006-82548-07	2.02.1	
GIA1 AUDIO	006-D0425-23	4.03	
GIA2	006-82548-07	2.02.1	
GIA2 AUDIO	006-D0425-23	4.03	
GMA1	006-82212-03	5.11D	
GMA1 AUDIO CONFIG	006-D3035-CQ	5.12D	
GMU1	006-80224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-81827-10	7.00	
GPS2	006-81827-10	7.00	
GRS1	006-81838-04	2.04	
GRS RGN LIST	006-D5080-00	2.00	
GSA PTCH CTL	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH MON	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM C	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.04 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM M	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL CTL	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL MON	006-80398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GTS	006-80551-31	4.01	OPTIONAL, VERIFY IF INSTALLED
GTS AUDIO	006-D0726-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GTS FPGA	006-C0081-20	2.0	OPTIONAL, VERIFY IF INSTALLED
GTX1	006-81607-09	2.12	
MFD1	006-81177-64	20.80	
NAV1	006-82253-00	2.00	
NAV1 RGN LIST	006-D5761-00	2.00	
NAV2	006-82253-00	2.00	
NAV2 RGN LIST	006-D5761-00	2.00	
PFD1	006-81177-64	20.80	
PA-28 IMAGE	006-83080-04	3080.04 ⁽¹⁻²⁾	
(1) 107999 H. Factory Installed in S/N's 2881045 and up. (2) Verify on MFD splash screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.05 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B2371-02	2.02	
COM2	006-B2371-02	2.02	
GDC1	006-B1838-54	2.04	
GDC1 RGN LIST	006-D5080-50	2.00	
GDC1 AIRCRAFT CONFIG	006-D6037-07	2.00	
GDL59	006-B0735-15	2.50	OPTIONAL, VERIFY IF INSTALLED
GDL59 ROUTER	006-B0736-17	2.41	OPTIONAL, VERIFY IF INSTALLED
GDL59 RTR FS	006-01112-10	2.00	OPTIONAL, VERIFY IF INSTALLED
GDL69	006-B1902-05	5.20	OPTIONAL, VERIFY IF INSTALLED
GEA1	006-B2139-03	2.11	
GEA1 PUBLIC KEY	006-D6358-K1	3.00	
GEA1 RGN LIST	006-D6358-00	2.00	
GEA1 XHTML	006-D6358-H4	2.03	
GIA1	006-B2548-07	2.02.1	
GIA1 AUDIO	006-D0425-2	4.03	
GIA2	006-B2548-07	2.02.1	
GIA2 AUDIO	006-D0425-23	4.03	
GMA1	006-B2212-06	5.18D	
GMA1 AUDIO CONFIG	006-D3035-FD	5.18D	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	
GPS1	006-B1827-10	7.00	
GPS2	006-B1827-10	7.00	
GRS1	006-B1838-07	2.07	
GRS RGN LIST	006-D5080-00	2.00	
GSA PTCH CTL	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH MON	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.05 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL CTL	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL MON	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GTS	006-B0551-31	4.01	OPTIONAL, VERIFY IF INSTALLED
GTS AUDIO	006-D0726-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GTS FPGA	006-C0081-20	2.0	OPTIONAL, VERIFY IF INSTALLED
GTX1	006-B1607-09	2.12	
MFD1	006-B1177-64	20.80	
NAV1	006-B2253-00	2.00	
NAV1 RGN LIST	006-D5761-00	2.00	
NAV2	006-B2253-00	2.00	
NAV2 RGN LIST	006-D5761-00	2.00	
PFD1	006-B1177-64	20.80	
PA-28 IMAGE	006-B3080-05	3080.05 ⁽¹⁻²⁾	
(1) 107999 J. Factory Installed in S/N's 2881151 and up. (2) Verify on MFD splash screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.09 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B2371-02	2.02	
COM2	006-B2371-02	2.02	
GDC1	006-B1838-56	2.06	
GDC1 RGN LIST	006-D5080-50	2.00	
GDC1 AIRCRAFT CONFIG	006-D6037-07	2.00	
GDL59	006-B0735-17	2.51	OPTIONAL, VERIFY IF INSTALLED
GDL59 ROUTER	006-B0736-17	2.41	OPTIONAL, VERIFY IF INSTALLED
GDL59 RTR FS	006-01112-10	2.00	OPTIONAL, VERIFY IF INSTALLED
GDL69	006-B1902-06	5.21	OPTIONAL, VERIFY IF INSTALLED
GEA1	006-B2139-05	2.21	
GEA1 PUBLIC KEY	006-D6358-K1	3.00	
GEA1 RGN LIST	006-D6358-00	2.00	
GEA1 XHTML	006-D6358-H8	2.07	
GIA1	006-B2548-0H	2.06	
GIA1 AUDIO	006-D0425-26	4.06	
GIA2	006-B2548-0H	2.06	
GIA2 AUDIO	006-D0425-26	4.06	
GMA1	006-B2212-0A	5.27D	
GMA1 AUDIO CONFIG	006-D3035-EF	5.27D	
GMU1	006-B0224-01	2.05	
GMU1 FPGA	006-C0048-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GPS1	006-B1827-10	7.00	
GPS2	006-B1827-10	7.00	
GRS1	006-B1838-07	2.07	
GRS RGN LIST	006-D5080-00	2.00	
GSA PTCH CTL	008-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH MON	006-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.09 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL CTL	006-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL MON	006-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GTS	006-B0551-35	4.13	OPTIONAL, VERIFY IF INSTALLED
GTS AUDIO	006-D0726-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GTS FPGA	006-C0081-20	2.0	OPTIONAL, VERIFY IF INSTALLED
GTX1	006-B1607-0F	2.52	
MFD1	006-B1177-6D	20.89	
NAV1	006-B2253-00	2.00	
NAV1 RGN LIST	006-D5761-00	2.00	
NAV2	006-B2253-00	2.00	
NAV2 RGN LIST	006-D5761-00	2.00	
PFD1	006-B1177-6D	20.89	
PA-28 IMAGE	006-B3080-09	3080.09 ⁽¹⁻²⁾	
(1) 107999 L/M/P. Factory Installed in S/N's 2881106, 2881189, 2881202 and up. (2) Verify on MFD splash screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.10 (Sheet 1 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
COM1	006-B2371-02	2.02	
COM2	006-B2371-02	2.02	
GDC1	006-B1838-56	2.06	
GDC1 RGN LIST	006-D5080-50	2.00	
GDC1 AIRCRAFT CONFIG	006-D6037-07	2.00	
GDL59	006-B0735-17	2.51	OPTIONAL, VERIFY IF INSTALLED
GDL59 ROUTER	006-B0736-17	2.41	OPTIONAL, VERIFY IF INSTALLED
GDL59 RTR FS	006-01112-10	2.00	OPTIONAL, VERIFY IF INSTALLED
GDL69	006-B1902-06	5.21	OPTIONAL, VERIFY IF INSTALLED
GEA1	006-B2139-05	2.21	
GEA1 PUBLIC KEY	006-D6358-K1	3.00	
GEA1 RGN LIST	006-D6358-00	2.00	
GEA1 XHTML	006-D6358-H8	2.07	
GIA1	006-B2548-0H	2.06	
GIA1 AUDIO	006-D0425-26	4.06	
GIA2	006-B2548-0H	2.06	
GIA2 AUDIO	006-D0425-26	4.06	
GMA1	006-B2212-0A	5.27D	
GMA1 AUDIO CONFIG	006-D3035-EF	5.27D	
GMU1	006-B0224-01	2.05	OPTIONAL, VERIFY IF GMU 44 INSTALLED
GMU 1	006-B2679-00	2.00	OPTIONAL, VERIFY IF GMU 44B INSTALLED
GMU1 FPGA	006-C0048-00	2.00	OPTIONAL, VERIFY IF GMU 44 INSTALLED
GPS1	006-B1827-10	7.00	
GPS2	006-B1827-10	7.00	
GRS1	006-B1838-07	2.07	
GRS RGN LIST	006-D5080-00	2.00	
GSA PTCH CTL	008-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 28
REQUIRED EQUIPMENT LISTS (RELs)**

**G1000 NXI - VER. 3080.10 (Sheet 2 of 2)
REQUIRED EQUIPMENT LIST (REL)**

LRU Identifier	Part Number	Version	Remarks
GSA PTCH MON	006-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA PTCH TRIM	006-B0398-38	3.40	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7315-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL CTL	006-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GSA ROLL MON	006-B0398-41	3.51	OPTIONAL, VERIFY IF INSTALLED
AFCS GAINS	006-D7066-01	2.01	OPTIONAL, VERIFY IF INSTALLED
GTS	006-B0551-35	4.13	OPTIONAL, VERIFY IF INSTALLED
GTS AUDIO	006-D0726-00	2.00	OPTIONAL, VERIFY IF INSTALLED
GTS FPGA	006-C0081-20	2.0	OPTIONAL, VERIFY IF INSTALLED
GTX1	006-B1607-0F	2.52	
MFD1	006-B1177-6D	20.89	
NAV1	006-B2253-00	2.00	
NAV1 RGN LIST	006-D5761-00	2.00	
NAV2	006-B2253-00	2.00	
NAV2 RGN LIST	006-D5761-00	2.00	
PFD1	006-B1177-6D	20.89	
PA-28 IMAGE	006-B3080-10	3080.10 ⁽¹⁻²⁾	
(1) 107999 N. Factory Installed in S/N's 2881348 and up. (2) Verify on MFD splash screen.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

DEPENDENT POSITION DETERMINING

1. COM/NAV/GPS

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

S/N's 2843203 and up; Standard, Avidyne Entegra, or Garmin G500 equipped airplanes.

A. Maintenance

Single or dual Garmin GNS 430 (or, in later airplanes, GNS 430W) COM/NAV/GPS systems are installed as standard equipment. Each installation consists of the GNS 430 (GNS 430W) transceiver/display unit, associated wiring, and antennas.

Maintenance of the GNS 430 series is "on condition" only and, with the exception of swapping complete units, should be performed only by a qualified avionics shop in accordance with the appropriate GARMIN maintenance manual.

Information provided in this manual is intended solely to aid the removal and installation of the GNS 430 (GNS-430W) transceiver/display units, their associated wiring and antennas.

B. Removal and Installation

See 39-10-00.

C. Post Installation Setup Procedure

(PIR-PPS60199-2 Rev. K / PPS60199-5 Rev. New.)

(1) Aircraft Preparation and Configuration

Setup and preliminary checks may be made using the aircraft battery or external power supplied by an external power source. Final checks (CDI/HSI accuracy) should be made with the engine running and the aircraft configured in Chart 1.

(2) Configuration Setup Procedure

Access the Configuration Mode of the unit by depressing and holding the ENT key while applying power to the unit. Release the ENT key when the display activates. After the data base pages, press the ENT key twice to display the MAIN ARINC 429 CONFIG page. Pages may be selected by ensuring the cursor is off and rotating the inner concentric knob on the right side of the unit.

To change data on the displayed Configuration Page, the cursor must be selected. Press the inner concentric knob on the right side of the unit to activate the cursor. Rotating the outer concentric knob on the right side of the unit changes the selected data field. Rotating the inner concentric knob changes the data within the selected field. To accept entry of the desired selection, press the ENT key.

**CHART 1
FINAL CHECK CONFIGURATION**

Engine running, alternators	On	Avionics	On
Instrument Panel Lights	Full Bright	Day/Night Switch	Day
Navigation Lights	On	Strobe Lights	On
Pitot Heat	Off	Air Conditioning	Off
Cabin Blower Fan	Low	Vent Blower	Off

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(a) Main ARINC 429 Page

- 1) In [S/N's 2843203 and up](#), configure the MAIN ARINC 429 Page as follows: (for single GNS installation use settings for GNS Unit #1)

BUS	GNS UNIT #1		GNS UNIT #2	
	SPEED	DATA	SPEED	DATA
IN 1	HIGH	GARMIN GTX 330	HIGH	GARMIN GTX 330
	HIGH *	"AIRDATA" W/SKYWATCH *	HIGH *	"AIRDATA" W/SKYWATCH *
IN 2	HIGH	OFF	HIGH	OFF
	HIGH *	"TRAFFIC ADVISORY" * W/SKYWATCH	HIGH *	"TRAFFIC ADVISORY" * W/SKYWATCH
OUT	HIGH	GAMA 429 GRAPHICS W/INT	HIGH	OFF
SDI	LNAV 1		LNAV 2	
VNAV **	ENABLE LABELS		ENABLE LABELS	

(* - not with GNS-430W / ** - only with GNS-430W)

- 2) In [S/N's 2843598 thru 2843682, with Avidyne Entegra](#), configure the MAIN ARINC 429 Page as follows:

BUS	GNS UNIT #1		GNS UNIT #2	
	SPEED	DATA	SPEED	DATA
IN 1	LOW	SANDEL EHSI	LOW	SANDEL EHSI
IN 2	HIGH	"AIR DATA"	HIGH	"AIR DATA"
OUT	LOW	GAMA 429 GRAPHICS W/INT	LOW	GAMA 429 GRAPHICS W/INT
SDI	LNAV 1		LNAV 2	
VNAV *	ENABLE LABELS		ENABLE LABELS	

(* - only with GNS-430W)

(b) Main RS-232 CONFIG Page

- 1) In [S/N's 2843203 and up](#), deselect the cursor and rotate the inner concentric knob on the right side of the unit to display the MAIN RS232 CONFIG page. Configure as follows:

a) Single installation:

BUS	GNS UNIT #1		
	INPUT	OUTPUT	
CHNL 1	OFF	OFF	
CHNL 2	OFF	OFF	
CHNL 3	OFF *	OFF *	(* - CROSSFILL with GNS-430W)
CHNL 4	OFF	OFF	
	"WX-500" **	"WX-500" ***	(** - with STORMSCOPE & GNS-430)
CHNL 5 ****	OFF	OFF	(*** - with STORMSCOPE)
CHNL 6 ****	OFF	OFF	(**** - not with GNS-430W)

b) Dual installation:

BUS	GNS UNIT #1		GNS UNIT #2	
	INPUT	OUTPUT	INPUT	OUTPUT
CHNL 1	OFF	AVIATION NO ALT *	OFF	OFF
CHNL 2	OFF	OFF	OFF	OFF
CHNL 3	CROSSFILL	CROSSFILL	CROSSFILL	CROSSFILL
CHNL 4	OFF	OFF	OFF	OFF
	"WX-500" **	"WX-500" **	"WX-500" **	
CHNL 5 ***	OFF	OFF	OFF	OFF
CHNL 6 ***	OFF	OFF	OFF	OFF

(* - OFF with GNS-430W / ** - with STORMSCOPE & GNS-430 / *** - not with GNS-430W)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 2) In [S/N's 2843598 thru 2843682, with Avidyne Entegra](#), deselect the cursor and rotate the inner concentric knob on the right side of the unit to display the MAIN RS232 CONFIG page. Configure as follows:

BUS	GNS UNIT #1		GNS UNIT #2	
	INPUT	OUTPUT	INPUT	OUTPUT
CHNL 1	OFF	OFF	OFF	OFF
CHNL 2	OFF	OFF	OFF	OFF
CHNL 3	CROSSFILL	CROSSFILL	CROSSFILL	CROSSFILL
CHNL 4	OFF	OFF	OFF	OFF
CHNL 5 *	OFF	OFF	OFF	OFF
CHNL 6 *	OFF	OFF	OFF	OFF

(* - not with GNS-430W)

- (c) Deselect the cursor and rotate the inner concentric knob on the right side of the unit to display the MAIN System Config page. Configure as follows:

	GNS UNIT #1	GNS UNIT #2 (If installed)
CONFIGURE	FUEL	FUEL
FUEL TYPE	AV GAS	AV GAS
TERRAIN		
CONFIGURE	TERRAIN	TERRAIN
TERRAIN TYPE	TERRAIN	TERRAIN
TEST CARD?	PASS	PASS
HW CONFIGURE	TERRAIN	TERRAIN

- (d) Deselect the cursor and rotate the inner concentric knob on the right side of the unit to display the MAIN LIGHTING page. Configure both the GNS #1 and #2 as follows:

	DISPLAY		KEY	
LIGHTING	NO SETTING		NO SETTING	
SOURCE	PHOTO		PHOTO	
RESP TIME/MIN	4	80	4	40
SLOPE/OFFSET	50	50	50	50

- (e) Deselect the cursor and rotate the inner concentric knob on the right side of the unit to display the MAIN CDI/OBS CONFIG page. Setup is only required for selected course calibration. (GNS #1 only in GNS-430W installations.)

Adjust the OBS or HSI course needle to indicate a selected course of 150 degrees. The SELECTED COURSE field on the GNS unit should indicate very close to 150 degrees. Select the "Calibrate to 150?" field and press ENT. Verify the OBS (or HSI course) operation by checking that the course displayed on the GNS unit is within 2° of the selected course. Verify the accuracy at 30° cardinal headings around the OBS card.

- (f) Deselect the cursor and rotate the inner concentric knob on the right side of the unit to display the COM SETUP page. Change only the "SPACING" setting to display "Select 25.0 KHz."
- (g) Deselect the cursor and rotate the inner concentric knob on the right side of the unit to display the VOR/LOC/GS/CDI page. Change only the "DME CHNL MODE" setting to display "Parallel 2x5."

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(h) VOR/LOC/GS ARINC 429 CONFIG Page. Configure both the GNS #1 and #2 as follows:

1) without Avidyne Entegra:

GNS UNIT #1	RX	TX
SPEED	HIGH	HIGH
SDI	VOR/ILS 1	
DME MODE	DIRECTED FREQ 1	
GNS UNIT #2	RX	TX
SPEED	HIGH	HIGH
SDI	VOR/ILS 2	
DME MODE	DIRECTED FREQ 2	

2) with Avidyne Entegra:

GNS UNIT #1	RX	TX
SPEED	LOW	LOW
SDI	VOR/ILS 1	
DME MODE	DIRECTED FREQ 1	
GNS UNIT #2	RX	TX
SPEED	LOW	LOW
SDI	VOR/ILS 2	
DME MODE	DIRECTED FREQ 2	

(i) GPS antenna height is 6.0 feet.

D. VOR / LOC / GS Ramp Checks

Once the GNS units have been configured, proper navigation receiver and indicator operation (VOR / LOC / GS) should be verified using the IFR NAV-401L ramp test set or equivalent. This procedure assumes familiarity with proper operation of the test equipment and is not intended to be a tutorial on test set use. Refer to the appropriate test set operating instructions for proper operation of the ramp test equipment.

(1) OBS / CDI Checks:

- (a) Check that the proper OBS indicator is connected to the appropriate VOR receiver; the #1 OBS is connected to GNS #1; and, the #2 OBS is connected to GNS #2.
- (b) Check the lateral and vertical deviation needles and/or lateral and vertical flags for deflection while keying the communication transmitter on a representative sampling of frequencies (118.00 MHz to 136.975 MHz).
- (c) Tune the navigation receiver and the adjust test set to 108.0 MHz. Using the ramp test set, check the accuracy of the OBS or Course Selector needle (HSI) at 30° increments (30°, 60°, ..., 330°, 360°).

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Localizer Indicators Checks

- (a) Tune the navigator receiver and adjust the test set to 108.1 MHz. Using the ramp test set, check that the course deviation needle (CDI) centers within 1/2 dot with 0 DDM applied at the test set.

- (b) Check GNS #1 and #2 left and right deviation of the CDI as follows:

CDI (LOC)	DDM	DEFLECTION
Centered	0	0% F.S.
Standard Deviation	.093	60% F.S.
Full Scale Deflection	.155	100% F.S.
More than F.S.	.200	100% + F.S.
Full Tone (single mod)	.400	FLAG

(3) Glide Slope Indicator Checks

- (a) Set navigation receiver and the test set to 108.1 MHz. Glide Slope generator defaults to proper G/S frequency (334.7 MHz.). Using the ramp test set, check that the needle (G/S) centers within 1/2 dot with 0 DDM applied at the test set.

- (b) Check GNS #1 and #2 up and down deviation of the glide slope indicator as follows:

G / S	DDM	DEFLECTION
Centered	0	0% F.S.
Standard Deviation	.091	52% F.S.
Full Scale Deflection	.175	100% F.S.
More than F.S.	.400	100% + F.S.
Full Tone (single mod)	.800	FLAG

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Transponder

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

A. S/N's 2843203 thru 2843414

A Garmin GTX 320 Transponder is installed as standard equipment. Maintenance of the GTX 320 is "on condition" only and, with the exception of swapping complete units, should be performed only by a qualified avionics shop in accordance with the Garmin GTX 320 Maintenance Manual (Garmin P/N - 190-00133-02).

Information provided in this manual is intended solely to aid the removal and installation of the GTX 320 transceiver/display unit, its associated wiring and antenna.

Removal and Installation

See 39-10-00.

B. S/N's 2843415 and up; Standard, Avidyne Entegra, or Garmin G500 equipped airplanes

A Garmin GTX 330 Transponder is installed as standard equipment. Maintenance of the GTX 330 is "on condition" only and, with the exception of swapping complete units, should be performed only by a qualified avionics shop in accordance with the GARMIN GTX 330 Maintenance Manual (Garmin P/N - 190-00207-02).

Information provided in this manual is intended solely to aid the removal and installation of the GTX 330 transceiver/display unit, its associated wiring and antenna.

(1) Removal and Installation

See 39-10-00.

(2) Post Installation Setup Procedure

(PIR-PPS60206 Rev. O.)

Access the Configuration Mode of the unit by depressing and holding the FUNC key while applying power to the unit. Release the FUNC key when the display activates. The FUNC key sequences forward through the configuration pages. The START/STOP key reverses through the pages, stopping at the Menu page. The CRSR key highlights selectable fields on each page. When a field is highlighted, the 0-9 keys enter numeric data and the 8 or 9 keys move through list selections. Press the CRSR key to accept changes. When a field is highlighted, pressing the FUNC key moves to the next configuration page without saving the changes. To exit the configuration pages, turn the power off and then turn the unit on again without holding the FUNC key for normal operation.

NOTE: When the unit is turned on for the first time, or an invalid address is recognized, the unit will prompt the user to enter a valid aircraft address. See Mode S Address paragraph, below.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(a) Configuration Menu

The JUMP TO menu page provides the capability to select a Configuration Mode starting page without having to step through all of the pages. Press the CRSR key and sequence through to the desired section with the 8 and 9 keys. Jump to the selection by pressing the CRSR key again with the desired selection highlighted. The FUNC key steps to the next configuration page, after which the START/STOP key reverses until stopping at the JUMP TO menu page. Following is a list of selections and their descriptions

SELECTION	DESCRIPTION
DIAGNOSTICS	Jumps to Gray Code Input Page
DISPLAY/AUDIO	Jumps to Audio Volume Page
I/O CONFIG	Jumps to ARINC INPUT #1 Page
ACFT CONFIG	Jumps to Operation Configuration #1 Page

(b) Refer to Charts 2-6 for required settings on the configuration pages.

(c) On the TEMPERATURE Page, select "NO" for SENSOR INSTALLED.

(d) MODE S Address (ICAO Aircraft Address Code) and FLIGHT ID Entry Page

When the unit is turned on for the first time, or an invalid address is recognized, the unit will prompt the user to enter a valid aircraft address.

NOTE: U.S. registered aircraft ICAO Aircraft Address Code (ADDRESS HEX) is the "N number" and is displayed as such on the ATC-601. On Non-U.S. registered aircraft, verify only that the hexadecimal code displayed on ATC-601 matches the "ADDRESS HEX" code programmed on the GTX-330.

1) U.S. Registered Aircraft

- a) To highlight the "U.S. Tail #" address field, press the CRSR key one time.
- b) Enter the registration number using the number keys. Press the CRSR key to select the numeric entry field. Press a key repeatedly to scroll through the digit/alpha characters for that entry field.
- c) Repeat step b until the complete number is entered.
- d) When finished, press the CRSR key to accept the number entry.
- e) For entering the Flight ID number (highlights the "Config Entry" field), press the CRSR key one time.
- f) Repeat step b.
- g) When finished, press the CRSR key to accept the number entry.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2
VOICE AND VOLUME (TIS Installations Only - No other traffic system installed.)**

Function	Selection	Description
VOLUME	MAX	
VOICE	MALE	
MESSAGE (0-5)		Selected Audio Tones and Messages 0 = Toggle a continuous tone on and off 1 = Attention Tone, precedes voice messages to attract the pilot's attention. 2 = "Leaving Altitude," when altitude monitor is active and the altitude deviation is exceeded. 3 = "Traffic," when a TIS traffic alert is received. 4 = "Time Expired," when the countdown expires. 5 = "Traffic Not Available," when TIS service is not available or out of range of an operating TIS MODE S site. 6-9 are not used.
ALTITUDE MONITOR	OFF	When Altitude Pre-Select is installed.
	-tone	When Altitude Pre-Select is not installed.
PAGE CHANGE	ENABLE	
COUNTDOWN TIMER	tone	

**CHART 3
DISPLAY MODE AND KEY LIGHTING**

DISPLAY MODE	AUTO	KEY	AUTO
LEVEL	75	LVL	Not Selectable
BKLT	AUTO	RSP TIME	4
LVL	Not Selectable	MIN	5
RSP TIME	4	KEY SRCE	28V
MIN	8	SLOPE	20
BKLT SRCE	PHOTO	OFFSET	30
SLOPE	50	CONTRAST MODE	AUTO
OFFSET	50	VFR KEY	ENABLE

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 4
ARINC 429 CONFIGURATION PAGE**

GTX 330		
429 INPUT	SPEED	DATA
CHANNEL 1	HIGH	GPS/FMS
CHANNEL 2	HIGH	OFF
CHANNEL 3	LOW	OFF
CHANNEL 4		OFF
429 OUTPUT		DATA
CHANNEL 1		OFF
CHANNEL 2		GARMIN W/TIS GARMIN W/SKYWATCH

**CHART 5
RS-232 INPUT AND OUTPUT**

RS-232 CONFIG	GTX	
232 INPUT	INPUT	OUTPUT
CHANNEL 1	OFF	OFF
CHANNEL 2	OFF	OFF

**CHART 6
OPERATION CONFIGURATION**

VS RATE	500
FORMAT	FEET
VFR ID	1200
ALTITUDE ALERT DEVIATION	200
SQUAT SWITCH	"NO"
"SENSE"	"_"
DELAY TIME	24
AUTO FLIGHT TIMER	MANUAL

**CHART 7
HEXADECIMAL 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

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- 2) Non-US Registered Aircraft
- a) For entering Non-U.S. Aircraft Registration, press the CRSR key one time, then 8 or 9 to select ADDRESS HEX.
 - b) Non-U.S. Aircraft Registry normally supplies a 24 bit binary code, known as the ICAO Aircraft Code for the Mode S address in lieu of directly entering the N# for U.S. registered aircraft.
 - c) The GTX 330 only accepts a hexadecimal format for the Non-U.S. Registered Aircraft, so the 24 bit binary code must be converted to a hexadecimal format.
 - d) Convert the 24 bit binary code to hexadecimal as follows:
 - 1 24 bit binary code: 11100100011111101101101
 - 2 Separate for hex conversion: 1110/0100/0111/1110/1110/1101
 - 3 Apply the hexadecimal values found in Chart 7.

E	4	7	E	E	D
1110/	0100/	0111/	1110/	1110/	1101
 - e) Enter the hexadecimal address using the number keys. Press the CRSR key to select the numeric entry field. Press a key repeatedly to scroll through the digit/alpha characters for that entry field.
 - f) Repeat step 5 until the complete number is entered.
 - g) For FLIGHT ID select "CONFIG ENTRY" and enter the Hex code or select "POWER UP ENTRY".
 - h) When finished, press the CRSR key to accept the number entry.
- 3) On the "MODE S Aircraft Type" Page:
- a) Select "<15.5k Lb" for AC TYPE, "<=150 kt" for MAX AIRSPEED, and "1E-5" for GPS INTEGRITY.
 - b) Select "<15 MT" for AC LENGTH TYPE LENGTH, and "<=11.5 MT" for AC WIDTH TYPE WIDTH.
 - c) Select "ENABLE" for EHS.
- NOTE:** Advance through remaining display screens that cannot be changed.
- d) When entries are complete, cycle unit power and check for entries.

C. Garmin G1000 equipped airplanes

A GTX 33 Transponder is installed as standard equipment. A GTX 33 (ES) is optional. Maintenance of the GTX 33 is "on condition" only and, with the exception of swapping complete units, should be performed only by a qualified avionics shop in accordance with the GARMIN appropriate GTX 33 Maintenance Manual.

The GTX 33 is an integral part of the Garmin G1000 Integrated Avionics System. Any configuration, set-up, removal and installation information is provided in 34-25-01.

D. Garmin G1000 NXi equipped airplanes

A GTX 335R Transponder is installed as standard equipment. A GTX 345R is optional. Maintenance of the GTX 335R is "on condition" only and, with the exception of swapping complete units, should be performed only by a qualified avionics shop in accordance with the GARMIN appropriate GTX 335R Maintenance Manual.

The GTX 335R is an integral part of the Garmin G1000 NXi Integrated Avionics System. Any configuration, set-up, removal and installation information is provided in 34-25-02 or 34-25-03, as appropriate.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

E. Mode S Transponder Ground Tests

(PIR-PPS60207, Rev. E.)

These tests enable compliance with FAR 91.413 and FAR Part 43 Appendixes E and F. Perform these tests in conjunction with Post Installation Set-up, above.

(1) Requirements

- (a) Tests to be accomplished by using a Transponder Ramp Tester capable of testing to requirements stated in FAR Part 43 Appendix F.
- (b) Transponder must be properly configured per aircraft setup specification prior to starting this process.
- (c) Controllable vacuum source.
- (d) During all tests specified herein, the aircraft altimeter shall be set a 29.92 inches of mercury (1013.2 Millibars).
- (e) Altitude encoders shall be tested up to and including the maximum operating altitude for that aircraft.

(2) Auto Test Requirements

- (a) Perform the AUTO TEST function and verify that MODES A, C, and S PASS.
- (b) Record the following results:
 - 1) **FREQ:** 1090 +/-1 MHz (1089.0 MHz to 1091.0 MHz)
 - 2) **ERP:** 125 Watts minimum to 500 Watts maximum
 - 3) **MTL:** -73 dBm +/- 4 (-69 dBm to -77 dBm)
 - 4) **d. DIVERSITY ISOLATION:** Greater than 20db (Only on aircraft equipped with diversity transponder.)

(3) Individual Test Requirements

U.S. Registered Aircraft ICAO aircraft address code (address hex) is actually the "N number". On foreign registered aircraft verify only that the hexadecimal code displayed matches the "address hex" code programmed on the transponder.

(a) SLS Level

NOTE: This can be verified via ATC 601 TEST 4 or IFR 6000 A/C DECDR/SLS.

- (b) Test Set interrogates UUT with ATCRBS Modes A and C. It verifies a reply is received when P2 pulse is 9dB less than P1 pulse and no reply is received when P2 pulse amplitude is equal to P1 pulse. Transponder response to Mode 3/A interrogations not to exceed 1% when amplitude of the P2 pulse = P1 pulse and the transponder is interrogated at a pulse repetition rate of 235 per second.

(c) ATCRBS Only All-Call

NOTE: This can be verified via ATC 601 TEST 5 or IFR 6000 A/C F1/F2 SPACE/WIDTH.

Test Set interrogates UUT with ATCRBS Only ALL-CALL (0.8 microsecond P4 pulse) and verifies that Mode S transponders do not reply.

(d) MODE S All-Call Interrogations

NOTE: This can be verified via ATC 601 TEST 6 or IFR 6000 S. ALL-CALL.

Test Set interrogates UUT with Mode A/S All-Call (1.6 microsecond P4 pulse). Address received from Mode S reply is sent in UF4 interrogation and verified with DF4 address.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (e) Invalid Address: Mode S Address

NOTE: This can be verified via ATC 601 TEST 7 or IFR 6000 S REPLY.

Test Set interrogates UUT with MODE S interrogations using correct address and two incorrect addresses (Nominal rate of 50 interrogations per second). These addresses are different from the address determined from Mode S All-Call. The Test Set verifies that no reply is received.

- (f) Mode S UF0:

NOTE: This can be verified via ATC 601 TEST 9 or IFR 6000 UF0.

Test Set interrogates UUT with Mode S UF0 and verifies that reply has correct altitude (Compared to ATCRBS Mode C), correct address (Compared to DF11) and correct format. UFO AQ bit is "1" for requesting airspeed information in DFO RI field.

- (g) Mode S UF4:

NOTE: This can be verified via ATC 601 TEST 10 or IFR 6000 UF4.

Test Set interrogates UUT with Mode S UF4 and verifies reply has correct altitude (Compared to ATCRBS Mode C), correct address (Compared to DF11) and correct format.

- (h) Mode S UF5:

NOTE: This can be verified via ATC 601 TEST 11 or IFR 6000 UF5.

Test Set interrogates UUT with Mode S UF5 and verifies that reply has correct ID Code (Compared to ATCRBS mode A), correct address (Compared to DF11) and correct format.

- (i) Mode S UF11:

NOTE: This can be verified via ATC 601 TEST 12 or IFR 6000 UF11.

Test Set interrogates UUT with Mode S UF16 and verifies that reply has correct address and format.

- (j) Mode S UF16:

NOTE: This can be verified via ATC 601 TEST 13 or IFR 6000 UF16.

Test set interrogates UUT with UF16 and verifies that reply has correct altitude (Compared to ATCRBS Mode C), correct address (Compared to DF11) and correct format. UF16 AQ bit is "0" for requesting TCAS capability information in DF16 RI field.

- (k) Mode S UF20:

NOTE: This can be verified via ATC 601 TEST 14 or IFR 6000 UF20.

Test Set interrogates UUT with Mode S UF20 and verifies that reply (if received) has correct ID code (Compared to ATCRBS Mode A), correct address (Compared to DF11) and correct format.

- (l) Mode S UF21:

NOTE: This can be verified via ATC 601 TEST 15 or IFR 6000 UF21.

Test Set interrogates UUT with Mode S UF21 and verifies that reply (if received) has correct ID code (Compared to ATCRBS Mode A), correct address (Compared to DF11) and correct format.

- (m) Squitter:

NOTE: This can be verified via ATC 601 TEST 15 or IFR 6000 S REPLY.

Test Set verifies that squitters are received from UUT every 0.8 to 2.4 seconds.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(n) Radio Reply Frequency

NOTE: This can be verified via ATC 601 TEST 17 or IFR 6000 POWER/FREQ.

Test Set verifies that UUT transmit frequency is 1090 MHz (+/- 1 MHz).

(o) Mode S Diversity Transmission Channel Isolation:

NOTE: This can be verified via ATC 601 TEST 18 or IFR 6000 S REPLY. (Test only applicable to aircraft equipped with Diversity Transponder)

Test set verifies that power level difference is 20dB between "on" antenna squitters and "off" antenna squitters.

NOTE: To insure ≥ 20 dB dynamic range, Diversity Test must be run within 50 ft of UUT Antenna being tested.

(p) MTL Difference (Receiver Sensitivity)

NOTE: This can be verified via ATC 601 TEST 19 or IFR 6000 POWER/FREQ.

Test Set verifies that receiver sensitivity difference between Mode A and Mode C is ≤ 1.0 dB.

(q) Power and MTL:

NOTE: This can be verified by ATC 601 Power Test or IFR 6000 POWER/FREQ.

(r) Test Set verifies that UUT power output is between the following parameters:

- 48.5 dBm < UUT ERP < 57.0 dBm
- UUT MTL = -73.0 dBm (+/- 4.0 dB)

NOTE: Power Test must be run at a distance established in Setup procedure. The minimum RF peak output power (ERP on Test Set) is at least 125 watts and maximum RF peak output power does not exceed 500 watts.

(4) Accuracy Test

(a) Set-up

- 1) Apply power to the Altitude Reporter and the Transponder Test Set.
- 2) Set primary flight altimeter to 29.92 in hg.
- 3) Allow a minimum of 15 minutes warm up time.
- 4) The Transponder Test Set reading should match with flight altimeter reading, not with the static pressure system tester.

(b) Testing

Select ten or more evenly spaced altitude test points between sea level and the altitude designated in 3.6. Increase the vacuum, causing the aircraft altimeter indicated altitude to increase. Approach each test point slowly. Tap the altimeter lightly before each reading to minimize friction effects. If a check point is missed, do not go back, go on to the next test point. For each test point check the aircraft altimeter dial reading at the encoding altimeter/digitizer transition point. (The transition point is the point at which the altitude encoder readout displayed on the ATC-600A or equivalent test set, changes to the proper code for the test point).

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(c) Accuracy Requirements

Accuracy requirements shall be as follows: The altitude encoder shall transition to the selected test point within ± 125 ft. at each test point, and within ± 87 ft. at no less than 70 percent of the test points.

EXAMPLE: Approaching the 6,000 foot transition point, the aircraft altimeter dial shall read $6,000 \pm 125$ ft. (5,875 to 6,125 ft.) when the transition to the ± 87 ft. (5,913 to 6,087 ft.) if the 6,000 foot transition point is one of 70% noted above).

(d) Out of Limits

If either the aircraft altimeter or the aircraft encoder fails the accuracy tests, replace the out-of-limits device and repeat the test.

(e) Post Test Cleanup

After testing is completed, the aircraft transponder switch and battery switch shall be placed in the off position, the test set shall be disconnected. The static system shall be reconnected, and the static system then tested for leaks.

(f) ADS-B Out Functionality Tests

Perform Advisory Circular 20-165 test and verify the following:

- 1) $NACp \geq 8$
- 2) $NIC \geq 7$
- 3) $NACv \geq 1$
- 4) Verify ADS-B barometer altitude matches transponder barometer altitude (Alt. Air= 0).

(5) Test Complete.

Restore airplane to operational configuration and secure.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

WIRING

Airplanes equipped with Garmin GFC 700 Automatic Flight Control Systems have additional EMI shielding on some harness assemblies. If repair is required, see EMI Shielding in 20-97-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

37

VACUUM

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 37

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
37-List of Effective Pages	1	Nov 15/17			
	2	Mar 6/14			
37-Table of Contents	1	Nov 15/17			
	2	Mar 6/14			
37-00-00	1	Nov 15/17			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
37-10-00	1	Mar 6/14			
	2	Sep 1/16			
	3	Mar 6/14			
	4	Mar 6/14			
	5	Mar 6/14			
	6	Mar 6/14			
	7	Mar 6/14			
	8	Mar 6/14			
37-20-00	1	Mar 6/14			
	2	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 37 - VACUUM

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	37-00-00	1
Description and Operation		1
Troubleshooting		1
<u>DISTRIBUTION</u>	37-10-00	1
Hoses and Clamps		1
Gyro Filters		1
Vacuum Pump		2
Inspection		2
Removal		3
Installation		3
Replacing Pump Fittings		3
Vacuum Regulator		4
Service Tips		4
Adjustment		4
Removal and Replacement		4
Auxiliary Vacuum Pump		5
Operational Check		5
Removal		5
Installation		7
Replacing Pump Fittings		7
<u>INDICATING</u>	37-20-00	1
Vacuum Gauge		1
Service Tips		1
Removal		1
Installation		1
Vacuum Sensor		1
Removal		1
Installation		1

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

GENERAL

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

The air driven gyro instrumentation in Archer III models gives quick and actual indications of airplane attitude, performance, and condition. Maintenance, other than described, must be done by the instrument manufacturer or an authorized repair station.

NOTE: In airplanes equipped with the Avidyne Entegra or Garmin G1000/G1000 NXi Integrated Avionics System, no vacuum system is installed.

1. Description and Operation

The vacuum system operates the gyro instruments and consists of an engine driven dry vacuum pump, a vacuum regulator and filter, and necessary tubing to connect components. The auxiliary vacuum system operates on 28 Vdc. A vacuum gauge is used to constantly monitor the system. Any time vacuum pressure falls below 3.5 in. Hg, a VACUUM INOP annunciator will illuminate.

2. Troubleshooting

See Chart 1.

**CHART 1 (Sheet 1 of 3)
TROUBLESHOOTING VACUUM SYSTEM**

Trouble	Cause	Remedy
No vacuum gauge indication at instrument.	Open vacuum line.	Locate and repair.
	Faulty instrument.	Replace.
No vacuum gauge indication at instrument or source.	Faulty gauge or malfunctioning pump.	Replace gauge or replace pump.
Low vacuum system indication.	Filter dirty.	Clean and replace filter.
	Vacuum regulator valve not adjusted properly.	Adjust regulator valve per Adjustments in this section.
	Gyros to filter line restricted.	Repair or replace line.
	Pump to gyros line leaking.	Check all lines and fittings.
Abnormal gyro precession - vacuum gauge reading correct or at maximum pressure.	Dirty filter.	Replace filter first and, if necessary, adjust regulator.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 2 of 3)
TROUBLESHOOTING VACUUM SYSTEM**

Trouble	Cause	Remedy
Normal vacuum reading, but sluggish operation of instruments.	Faulty instrument.	Replace instrument.
	Dirty or clogged filter or vacuum line kinked.	Replace filter. Repair lines.
High system vacuum.	Vacuum regulator incorrectly adjusted.	Adjust regulator.
	Dirty or clogged filter.	Replace filter.
	Vacuum lines bent or restricted.	Repair lines.
	Vacuum regulator sticking or dirty screen.	Clean and check operation of regulator. Clean screen.
Regulator cannot be adjusted for correct pressure.	Line leaking.	Check lines and fittings.
	Vacuum pump malfunctioning.	Replace pump.
Vacuum correct on ground, but not normal at altitude.	Vacuum pump malfunctioning.	Replace pump.
	Regulator sticky.	Clean regulator.
Vacuum correct but pilot reports erratic or shows complete loss in flight.	Regulator sticky.	Clean regulator.
	Oil in pump due to leaky engine seal or cleaning fluid blown into pump while cleaning engine.	Replace pump.
Vacuum can only be maintained at full throttle on ground.	Leak in system.	Repair or replace lines.
	Worn pump.	Replace pump.
	Stuck regulator.	Clean or replace regulator.
AUX ON selected on ground check and auxiliary vacuum pump will not run.	Circuit breaker open.	Push in circuit breaker(s).
	Faulty electrical motor.	Isolate and check operation. Replace pump/motor assembly if required.
	Faulty contactor.	Check operation. Replace if required.
	Loose or broken wire connections.	Tighten all wire connections and terminals. Check all wires for open breaks; repair as needed.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 3 of 3)
TROUBLESHOOTING VACUUM SYSTEM**

Trouble	Cause	Remedy
AUX ON selected on ground check and little or no vacuum is indicated; AUX ON annunciator will not light.	Leak in vacuum system.	Tighten clamps and check hoses. Replace if necessary.
	Restriction in hose lines.	Inspect and repair hose lines. Replace if necessary.
	Dirty filter.	Replace filter.
	Faulty bulb.	Replace bulb.
	Regulator not adjusted properly.	Adjust properly.
VAC OFF AUX ON annunciator switch will not engage auxiliary vacuum pump system.	Open circuit breaker.	Push in circuit breaker(s).
	Faulty switch.	Test switch for operation. Replace if necessary
Auxiliary vacuum pump maintains correct pressure on the ground but not at altitude.	Auxiliary vacuum pump is worn.	Replace auxiliary vacuum pump assembly.
	Regulator is sticky.	Clean or replace regulator.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

DISTRIBUTION

The following information is intended to aid in diagnosing vacuum system service symptoms on those components which are serviced by removal and replacement – i.e., hoses, clamps, gyro filters, vacuum pumps, and vacuum regulators.

1. Hoses and Clamps

- A. These items should be examined periodically and inspected carefully whenever maintenance activities cause hose disconnections to be made at the pumps, manifold, regulators, tube assemblies, gyros and/or vacuum gauge.
- B. Ends of hoses should be examined for rubber separation and slivers of rubber on inside diameter of hoses. These slivers can and do become detached. If this happens, the vacuum pump(s) will suck in the loose particles and eventually ingest them. This can cause pump failure.
- C. Replace old, hard, cracked or brittle hose. Sections of the inner layers may separate, causing pump failure.
- D. Ensure hoses are clear and clean by blowing them out with shop air. Remove from aircraft as required.

CAUTION: DO NOT WIGGLE HOSE FROM SIDE TO SIDE DURING INSTALLATION, AS THIS COULD CAUSE PARTICLES TO BE CUT FROM INNER WALL OF HOSE WHICH WOULD DAMAGE THE PUMP.

- E. Where hose clearance is tight, making it difficult to reinstall it onto a fitting or barb, spray the fitting or barb with silicone. Let dry, then install hose by pushing it straight on.

CAUTION: WHEN REPLACING ANY OF THE THREADED FITTINGS, DO NOT USE PIPE DOPE, THREADLUBE, OR TAPE. PIPE DOPE / TAPE PARTICLES INGESTED BY THE VACUUM PUMP COULD CAUSE THE PUMP TO FAIL. USE ONLY SILICONE SPRAY, LETTING IT DRY BEFORE ASSEMBLY.

- F. Hose clamps and fittings should be replaced when broken, damaged or corroded.

2. Gyro Filters

- A. Gyro filter must be serviced on a scheduled basis, not to exceed 100 hours, and on condition.
- B. The system installation employs a large central filter (mounted on the upper left rear of the forward bulkhead (behind instrument panel)) and differential vacuum gauge that continuously monitors filter condition while indicating vacuum readings.

NOTE: A decline in panel gauge reading indicates the filter is becoming clogged. Filters should be replaced when gauge reading declines; DO NOT adjust regulator(s).

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

3. Vacuum Pump

The vacuum pump is the rotary vane, positive displacement type. The unit consists of an aluminum housing containing a tempered sleeve in which an offset rotor is incorporated. The assembly is driven by a coupling mated to the engine driven gear assembly. The pump is mounted on the accessory section of engine.

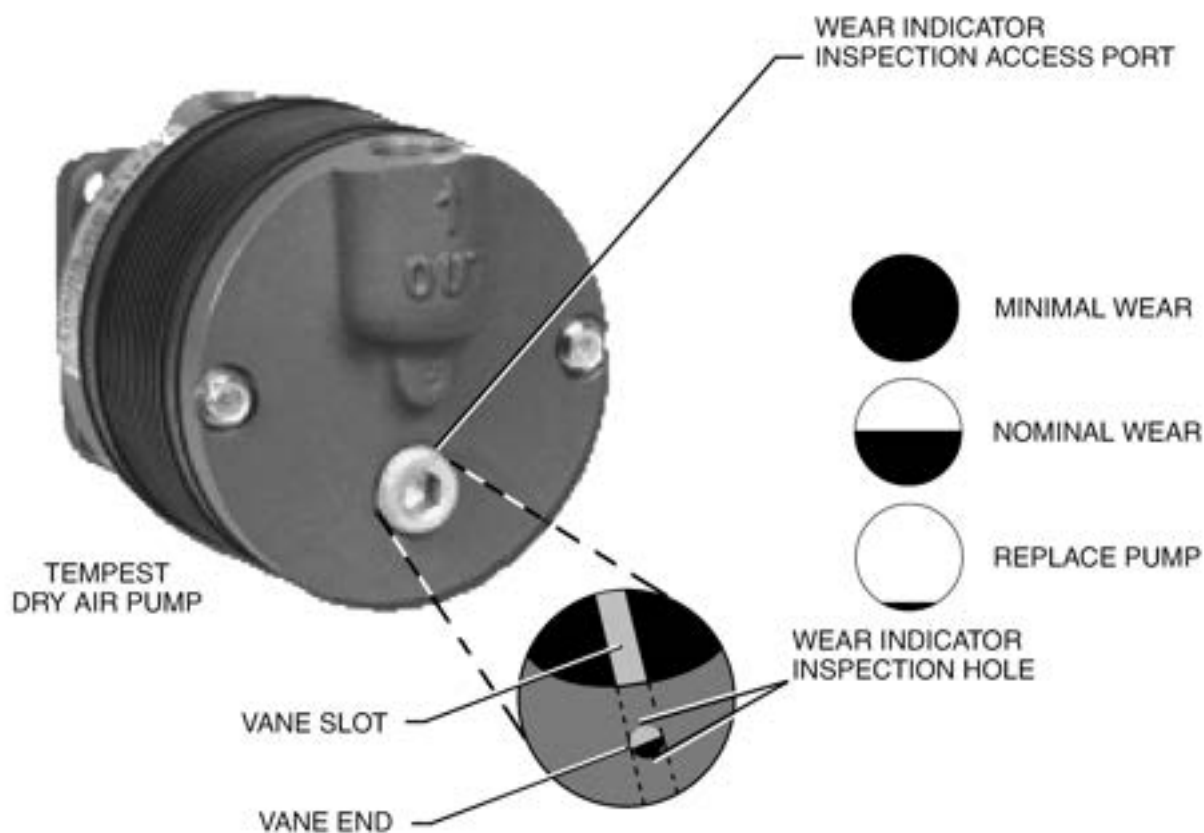
Parker-Hannifin Airborne pumps were original equipment in S/N's 2843001 thru 2843529. Beginning with S/N's 2843530 & later, and for all service replacement requirements, Aero Accessories Tempest pumps are installed.

A. Inspection Aero Accessories Tempest Pumps Only. See "Figure 1".

The vacuum pump(s) feature a wear indicator inspection port on the back cover which allows direct observation of pump vane wear. Beginning at 600 hours time-in-service, and each 100 hours thereafter, remove the inspection port plug and observe vane wear as shown in Figure 1.

NOTE: Inspection criteria in Aero Accessories Tempest Service Letter SL-004 may be used between 600–1,000 hours time-in-service in lieu of the 100 hour inspection specified above.

- (1) As the vanes wear, they slide outboard in the vane slots in the rotor.
- (2) When the portion of the vane that can be observed in the inspection hole covers approximately 1/8 of the inspection hole, replace the pump.



Vacuum Pump Vane Wear Inspection
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Removal

- (1) Remove top engine cowling. (Refer to Chapter 71-10-00.)
- (2) Loosen hose clamp and remove hose from pump fitting.
- (3) Remove the four retaining nuts, lock washers, and plain washers that secure pump to engine.
- (4) Remove pump.

C. Installation

CAUTION: NEVER INSTALL A PUMP THAT HAS BEEN DAMAGED OR DROPPED.

NOTE: Change the vacuum system filter when installing a new pump.

- (1) If required, install fittings on pump per Replacing Pump Fittings, below.

CAUTION: THE ONLY PUMP MOUNTING GASKET AUTHORIZED AND APPROVED FOR USE ON THE AIRBORNE VACUUM PUMP IS AIRBORNE GASKET B3-1-2, PIPER PART NUMBER 751-859. ANY OTHER GASKET COULD RESULT IN OIL SEEPAGE OR LEAKAGE AT THE MOUNTING SURFACE.

- (2) Place pump gasket in its proper place and align spline on pump drive with spline on engine drive assembly.
- (3) Secure pump to engine with four plain washers, lock washers, and retaining nuts. Tighten nuts to a torque of 50 to 70 inch-pounds. Install lock nuts.
- (4) Connect hoses to pump; secure with hose clamps.
- (5) Install engine cowling.

D. Replacing Pump Fittings

CAUTION: WHEN REPLACING ANY OF THE THREADED FITTINGS, DO NOT USE PIPE DOPE, THREADLUBE, OR TAPE. PIPE DOPE / TAPE PARTICLES INGESTED BY THE VACUUM PUMP COULD CAUSE THE PUMP TO FAIL. USE ONLY SILICONE SPRAY, LETTING IT DRY BEFORE ASSEMBLY.

CAUTION: A PUMP THAT HAS BEEN DAMAGED OR DROPPED SHOULD NOT BE INSTALLED.

- (1) Before installing any fittings on pump, check for any external damage.

CAUTION: DO NOT APPLY VISE PRESSURE TO OUTSIDE DIAMETER OR OVERALL LENGTH OF PUMP.

- (2) When a vise is used to hold pump while installing fittings, suitable caution must be exercised to avoid pump damage. Square mounting flange must be held between soft wood blocks and only at right angles to vise jaws. Use only enough vise pressure to hold pump firmly.
- (3) The ports of AIRBORNE pumps have been treated with a dry film lubricant and AIRBORNE fittings are cadmium plated thus eliminating any need for thread lubricants. If thread lubricant is required, use only a silicone spray. Apply sparingly to external threads of fittings only and let dry before assembly.
- (4) Firmly hand tighten fittings into pump ports. Then, using a wrench, tighten each fitting 1/2 to 2 turns only. Do not over tighten.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4. Vacuum Regulator

One vacuum regulator valve is incorporated in the system to control vacuum pressure to gyro instruments. Regulator valve is under instrument panel. Gain access to the valve for maintenance and adjustment from below instrument panel.

A. Service Tips

- (1) Vacuum regulators seldom need replacement. Symptoms that suggest replacement are:
 - (a) Chatter as indicated by rapid fluctuation of vacuum gauge needle or an audible sound.
 - (b) Non-repeatability of vacuum gauge reading when panel gauge is not suspect or has been checked against a known test gauge (cruise RPM only).
- (2) All modes of regulator malfunction tend to increase vacuum power applied to gyros. Thus, although excess vacuum is applied, a loss of vacuum does not occur.
- (3) Gyros themselves act as a limiting device to keep vacuum power applied from exceeding safe levels.

NOTE: If panel gauge has been checked and found OK and vacuum gauge reading does not repeat within the normal operating range as marked on the gauge, then the vacuum regulator(s) should be changed. Observe usual precautions for maintaining system cleanliness to avoid pump failure from ingested debris.

B. Adjustment

WARNING: DO NOT ATTEMPT ADJUSTMENT OF THIS VALVE WITH ENGINE IN OPERATION, WITHOUT A QUALIFIED PILOT OR OTHER RESPONSIBLE PERSON AT THE CONTROLS.

CAUTION: VERIFY CENTRAL AIR FILTER AND VACUUM LINES ARE CLEAN BEFORE ADJUSTING VACUUM REGULATOR.

- (1) Loosen locking nut or remove protective cap from valve, per type installed.
- (2) Start engine. Allow time for warm-up, and run engine at medium rpm.
- (3) With engine running at medium rpm, suction gauge should read 5.0 ± 0.2 inches mercury. If reading is not within this range, shut down engine and adjust regulator valve (move valve adjustment screw clockwise to increase pressure, and counterclockwise to decrease pressure). Start engine and repeat check. With engine running at medium rpm, suction gauge should indicate 5.0 ± 0.2 inches mercury. If airplane is not equipped with suction gauge, connect a gauge by removing the plug from back of the artificial horizon, and attaching a temporary gauge.
- (4) Restart the engine and repeat the check.
- (5) After system pressure is adjusted to 5.0 ± 0.2 inches mercury, remove gauge and install plug, replace protective cap, or tighten locknut, per type valve installed.

C. Removal and Replacement

- (1) Disconnect the three lines and remove mounting nut. Remove valve from airplane.
- (2) Install regulator in reverse order of removal.
- (3) Check complete vacuum system for proper operation.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

5. Auxiliary Vacuum Pump

Refer to "Figure 2".

CAUTION: REPLACE AUXILIARY VACUUM PUMP/MOTOR ASSEMBLY WITH A NEW, WORKING UNIT, OR SEND UNIT TO VENDOR FOR REPAIR. IT IS IMPORTANT PUMP/MOTOR ASSEMBLY BE REPAIRED BY TRAINED PERSONNEL FOR PROPER OPERATION.

The auxiliary vacuum pump mounted on the firewall is a backup source to operate the gyro flight instruments if the engine driven pump fails. It consists of a 24 Vdc pump motor assembly and relay with a 20 amp circuit breaker in the system to protect the pump motor circuit, and a 5 amp circuit breaker to protect the annunciator light switch. A VAC OFF AUX ON switch is on the extreme left instrument panel.

NOTE: See Figure 1, 91-37-10, for Auxiliary Vacuum Pump electrical schematic(s).

A. Operational Check, Engine Off

CAUTION: VERIFY ALL ELECTRICAL EQUIPMENT IS OFF BEFORE BEGINNING ENGINE OFF OPERATIONAL CHECK.

CAUTION: RUN AUXILIARY PUMP FOR ONLY A SHORT PERIOD OF TIME. EXCESSIVE TIME OF OPERATION WEAKENS BATTERY TO AN UNRELIABLE CHARGE LEVEL.

- (1) Press battery master switch on. Check that VAC OFF annunciator lights.
- (2) Press VAC OFF/AUX ON annunciator switch. Check that AUX ON annunciator lights, and VAC OFF annunciator goes out. Check that vacuum gauge reads between 4.8 and 5.2 in. hg.
- (3) Press VAC OFF/AUX ON annunciator switch to cycle it to the off position. Check that AUX ON annunciator goes out, and VAC OFF annunciator lights.
- (4) Press battery master switch off.

B. Removal

WARNING: VERIFY BATTERY MASTER SWITCH IS OFF.

WARNING: COVER AUXILIARY VACUUM PUMP SWITCH ON THE INSTRUMENT PANEL WITH AN INOP PLACARD, IF A REPLACEMENT AUXILIARY PUMP/MOTOR ASSEMBLY IS NOT INSTALLED BEFORE NEXT FLIGHT.

CAUTION: THE AUXILIARY VACUUM PUMP AND MOTOR COMPRISE A SEALED ASSEMBLY AND MUST BE REMOVED AS ONE ASSEMBLY.

CAUTION: THE ELAPSED TIME INDICATOR IS MATCHED TO THE PUMP/MOTOR ASSEMBLY AND MUST BE REMOVED AND REPLACED WITH THE PUMP/MOTOR ASSEMBLY.

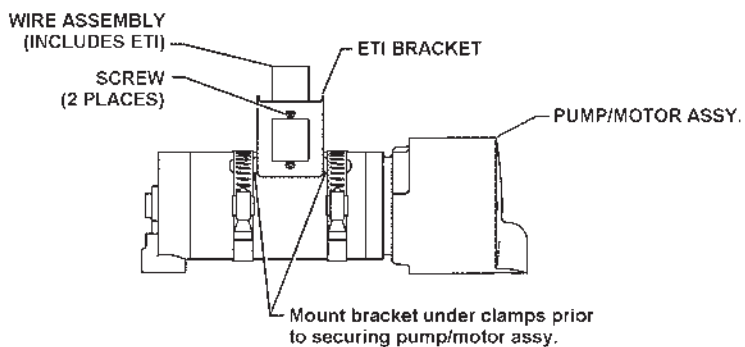
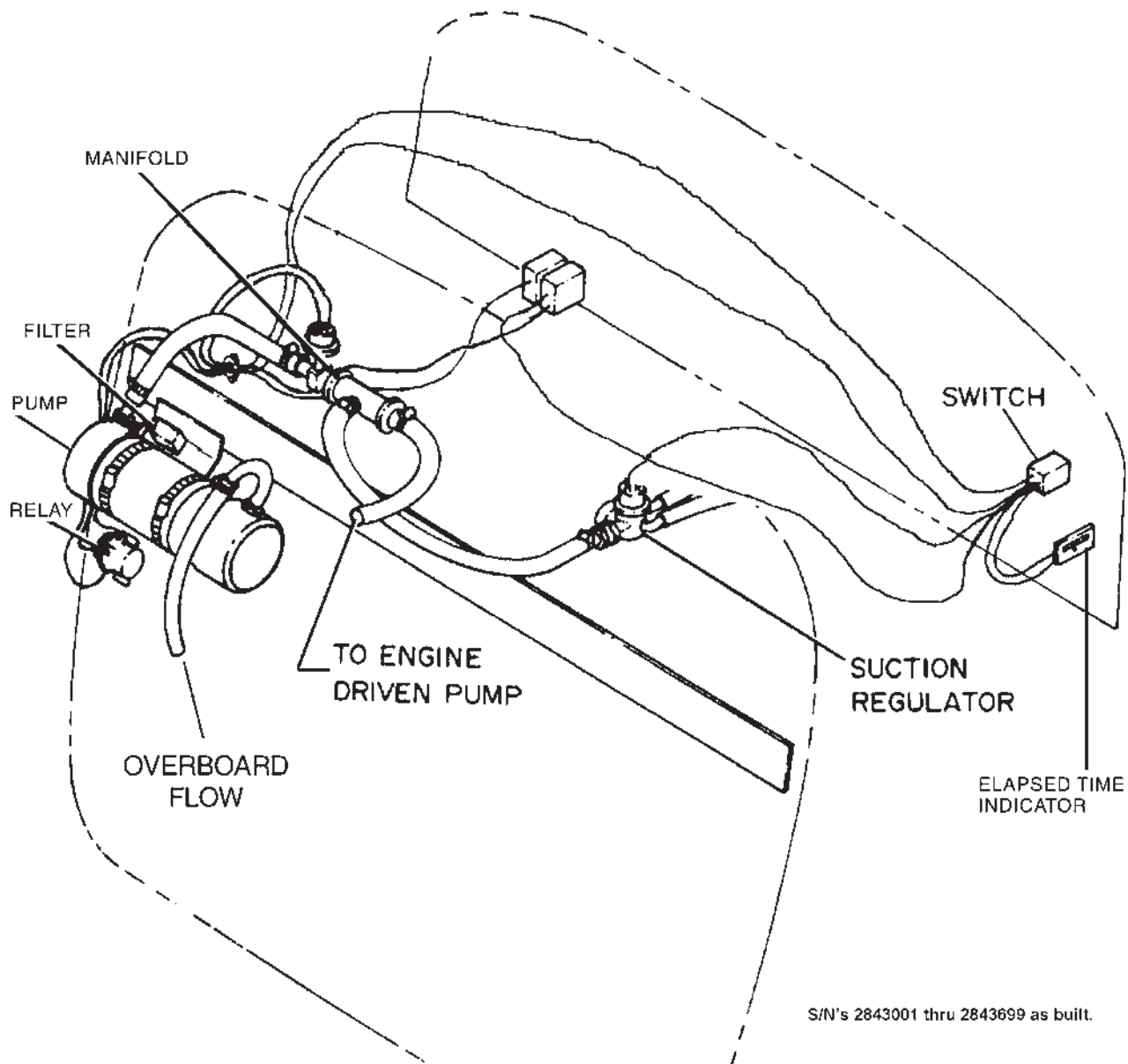
- (1) Remove top engine cowling.
- (2) Disconnect hoses from pump/motor assembly.
- (3) In [S/N's 2843001 thru 2843699 without Piper Kit No. 88509-002 installed](#):
 - (a) Disconnect electrical leads at terminals on pump/motor assembly.
 - (b) Loosen band clamps and remove pump/motor assembly from airplane.
 - (c) Locate elapsed time indicator under instrument panel; disconnect electrical leads.

CAUTION: INSULATE AND SECURE LEADS REMAINING IN AIRPLANE IF A REPLACEMENT ELAPSED TIME INDICATOR IS NOT INSTALLED IMMEDIATELY.

- (d) Remove elapsed time indicator.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85387 G
101292 C



S/N's 2843700 and 2843702; and
2843001 thru 2843699 with Piper Kit No. 88509-002.

Auxiliary Vacuum Pump Installation
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (4) In S/N's 2843700 and 2843702; and 2843001 thru 2843699 with Piper Kit No. 88509-002 installed:

- (a) Disconnect electrical leads at terminals on pump/motor assembly.
- (b) Disconnect electrical leads from elapsed time indicator (ETI) at pump/motor assembly.

CAUTION: INSULATE AND SECURE LEADS REMAINING IN AIRPLANE IF A REPLACEMENT ELAPSED TIME INDICATOR IS NOT TO BE INSTALLED IMMEDIATELY.

- (c) Loosen band clamps and remove pump/motor assembly, ETI, and ETI mounting bracket from airplane.
 - (d) Remove two screws and remove ETI from it's mounting bracket.
- (5) If auxiliary vacuum pump will not be installed now, place protective covers over open end of vacuum lines, insulate all electrical leads relative to the auxiliary vacuum system, and install top engine cowl.

C. Installation

WARNING: BE SURE BATTERY MASTER SWITCH IS OFF.

CAUTION: NEVER INSTALL A PUMP THAT HAS BEEN DAMAGED OR DROPPED.

CAUTION: THE ELAPSED TIME INDICATOR (ETI) IS MATCHED TO THE PUMP/MOTOR ASSEMBLY AND MUST BE REMOVED AND REPLACED WITH THE PUMP/MOTOR ASSEMBLY.

NOTE: In S/N's 2843001 thru 2843699, the original equipment ETI is no longer available. Upon first time replacement in or after 2012, install Piper Kit No. 88509-002 to accommodate the replacement ETI.

- (1) Remove top engine cowl.
- (2) Mount ETI to it's mounting bracket with screws (2 ea.).
- (3) Mount pump/motor assembly, ETI and ETI mounting bracket to pump/motor assembly mounting bracket with band clamps. Do not tighten clamps.

NOTE: Rotate pump/motor assembly within clamps for easier installation. Position the ETI and it's bracket to avoid interfering with airplane structure or other systems.

- (4) Connect elapsed time indicator electrical connector.
- (5) Check elapsed time indicator can be easily inspected.
- (6) Attach and secure electrical leads to terminals on pump motor assembly.
- (7) Measure hoses to obtain proper length. Cut hoses if necessary.
- (8) Attach and secure hoses to ports on pump/motor assembly.
- (9) Position pump/motor assembly per Figure 2.
- (10) Tighten clamps.
- (11) Install top engine cowl.

D. Replacing Pump Fittings

See Replacing Pump Fittings under Vacuum Pump, above.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

INDICATING

1. Vacuum Gauge

The vacuum gauge is mounted on the left side of the instrument panel. The gauge is calibrated in inches of mercury and reads the amount of vacuum (negative pressure) in the system. The vacuum gauge has a direct vacuum (negative pressure) line and vent line, and reads the differential pressure or actual negative pressure being applied to the gyro instruments.

A. Service Tips

NOTE: Vacuum gauges are replaced when malfunctions occur.

- (1) Check vacuum gauge accuracy by comparing reading on suspect gauge with a gauge of known accuracy.
- (2) Visually examine gauge performance as follows:
 - (a) With engine stopped and no vacuum applied to gauge, pointer should rest against internal stop in the 9 o'clock position. Replace gauge if there is any displacement from this position.
 - (b) A slight overshoot during engine start, not to exceed one half of an inch mercury, is normal and not cause to replace gauge.
 - (c) With engine operating at normal cruise rpm, gauge should read from 4.8 to 5.2 inches of mercury.
 - (d) At 1200 rpm, vacuum gauge reading should be more than four inches of mercury.

B. Removal

- (1) Gain access to gauge from under instrument panel.
- (2) Loosen hose clamps on back side of gauge.
- (3) Remove hoses.
- (4) Remove and retain the 4 screws securing gauge in panel. Remove gauge.

C. Installation

- (1) Position gauge in instrument panel. Secure with the 4 screws retain during removal.
- (2) Attach hoses and tighten clamps.
- (3) Check gauge is operating properly by engaging the BATT MSTR and LOW VAC AUX ON switches. Gauge should read 5.0 ± 0.2 inches of Hg.

2. Vacuum Sensor

A. Removal

Gain access to the sensor unit by reaching up under the instrument panel to the vacuum regulator. Remove as follows:

- (1) Disconnect the two electrical leads.
- (2) Unscrew sensor unit from vacuum regulator.
- (3) Cover hole to prevent foreign matter from entering regulator.

B. Installation

- (1) Screw sensor unit into vacuum regulator.
- (2) Connect the two electrical leads.
- (3) Perform operational check.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

39

ELECTRICAL / ELECTRONIC PANELS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 39

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
39-List of Effective Pages	1	Nov 15/17			
	2	Mar 6/14			
39-Table of Contents	1	Nov 15/17			
	2	Mar 6/14			
39-10-00	1	Mar 6/14			
	2	Sep 1/16			
	3	Sep 1/16			
	4	Sep 1/16			
	5	Mar 6/14			
	6	Mar 6/14			
39-20-00	1	Sep 1/16			
	2	Sep 1/16			
	3	Sep 1/16			
	4	Sep 1/16			
	5	Nov 15/17			
	6	Sep 1/16			
	7	Sep 1/16			
	8	Sep 1/16			
	9	Sep 1/16			
	10	Nov 15/17			
	11	Nov 15/17			
	12	Sep 1/16			
	13	Nov 15/17			
	14	Sep 1/16			
	15	Sep 1/16			
	16	Sep 1/16			
	17	Sep 1/16			
	18	Sep 1/16			
	19	Sep 1/16			
	20	Nov 15/17			
	21	Nov 15/17			
	22	Nov 15/17			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 39 - ELECTRICAL / ELECTRONIC PANELS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>INSTRUMENT AND CONTROL PANELS</u>	39-10-00	1
General		1
Face-Mounted Instruments		1
Removal		1
Installation		1
Rack-Mounted Avionics		1
Removal		1
Installation		2
Circuit Breaker Panel		2
Removal		2
Installation		2
Switches		3
Overhead Panel Switches		3
Removal		3
Installation		3
Instrument Panel Switches		3
Removal		3
Installation		4
Linear Modular Connectors (LMD/LMS)		4
EMI and RFI Check		4
<u>ELECTRICAL & ELECTRONIC EQUIPMENT</u>	39-20-00	1
Index		1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

INSTRUMENT AND CONTROL PANELS

1. General

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

A. Face-Mounted Instruments

Most instruments are face-mounted and secured to the instrument panel by screws from the front of the panel. Most instruments are removed out the back of the panel, but a few are removed through the front of the panel. Take special care when any operation pertaining to the instruments is performed.

(1) Removal

- (a) Disconnect the plumbing and/or electrical connectors from the back of the instrument. Where two or more lines connect to an instrument, identify and tag each line to facilitate installation. Attach a dust cap to each fitting.

NOTE: For those instruments which remove through the front of the panel, disconnecting and tagging plumbing and/or electrical connectors can be done after the instrument retaining screws are removed and the instrument is slid gently forward to expose the connections at the rear.

- (b) Remove the screws that secure the instrument in the panel cutout.
- (c) Remove the instrument from the panel.

(2) Installation

- (a) Place the instrument in its proper panel cutout and secure with screws.

NOTE: For those instruments which install through the front of the panel, connecting plumbing and/or electrical connectors can be done from the front of the panel before the instrument retaining screws are installed. After the connections are secure, slide the instrument into place and install the retaining screws.

- (b) Connect the plumbing and/or electrical connectors to back of instrument.
- (c) Check instrument operation.

B. Rack-Mounted Avionics

(PIR-PPS60237, Rev. New.)

Most avionics are rack-mounted front-removable units generally secured to the instrument panel tray/rack by a single jackscrew located in the center of their faceplate.

(1) Removal

- (a) Insert an appropriate size (generally 3/32 inch) allen wrench into the jackscrew access hole in the faceplate.
- (b) Unscrew the jackscrew in a counterclockwise direction.
- (c) Slide the avionics unit aft and out of the instrument panel tray/rack.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Installation

NOTE: Inspect the front of the panel-mounted avionics tray/rack to verify it is not significantly inset from the panel. If so, correct the tray/rack installation before proceeding.

NOTE: The high insertion forces required to seat a unit with “high density” connectors tend to limit the effectiveness of the first seating attempt. Accordingly, the following procedure requires sequential applications of force, and subsequent tightening of the jackscrew, to ensure all connectors seat properly.

- (a) Slide the avionics unit into the instrument panel rack and forward applying a moderate insertion force.
- (b) Insert an appropriate size (generally 3/32 inch) allen wrench into the jackscrew access hole in the faceplate and tighten to remove any slack, but do not try to “pull” unit into place with the jackscrew.
- (c) Apply additional insertion force to front of unit.
- (d) Tighten jackscrew again.
- (e) Apply additional insertion force to front of unit.
- (f) Finish tightening jackscrew.
- (g) Ensure that unit bezel is “tight” against panel.

2. Circuit Breaker Panel

Circuit breakers are installed in the lower right instrument panel and are of the single hole mounting, push-button type, with manual reset.

Should a circuit breaker be replaced or added, exercise extreme caution ensuring the breakers are in proper mechanical alignment, any insulators that are called out are installed correctly, and all electrical wiring and connections meet aviation standards. Do not deviate from the parts manual requirements when replacing circuit breakers.

NOTE: This type of circuit breaker can be used as a method of turning a system on and off.

A. Removal

- (1) Disconnect negative (ground) battery cable.
- (2) Remove knurled nut from circuit breaker face plate on front of instrument panel.
- (3) From behind instrument panel, disconnect electric bus bar from circuit breaker.
- (4) From behind instrument panel, remove circuit protector from instrument panel.

NOTE: Record placement of electrical leads to aid installation.

- (5) Disconnect electrical connections fastened with screws to circuit breaker.

B. Installation

- (1) Check circuit breaker amperage is correct.
- (2) Connect electrical leads to their proper screws on new breaker and secure.
- (3) From behind instrument panel, insert circuit protector into its proper hole on instrument panel.
- (4) From behind instrument panel, install electric bus bar to circuit breakers.
- (5) Reconnect negative (ground) battery cable.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Switches

The main electrical switches are back lit rocker type, which are mounted in an overhead panel. Avionics and pitot heat rocker type switches are mounted in the lower center instrument panel. The switches in both location are snap-in type.

CAUTION: ALTHOUGH SMALL SWITCH ASSEMBLIES ARE EASIER TO REMOVE IF WIRING IS FIRST DISCONNECTED, THE LIMITED WORK SPACE BEHIND THE PANEL CAN RESULT IN BURNED WIRE INSULATION. DO NOT ATTEMPT TO UNSOLDER THESE SMALL ELECTRICAL CONNECTIONS BEHIND THE INSTRUMENT PANEL UNDER ANY CONDITIONS. IF NECESSARY, CUT WIRES AT POINT OF CONNECTION. IN ANY CASE, IT'S BETTER TO DAMAGE THE SWITCH AND REPLACE IT, RATHER THAN DAMAGE THE WIRING HARNESS LEADS.

A. Overhead Panel Switches

(1) Removal

- (a) Disconnect negative (ground) battery cable.
- (b) Remove switch panel by:
 - 1) Removing and retain the 6 panel attaching screws.
 - 2) Disconnecting the two electrical connectors.
- (c) Remove desired switch(es) by:
 - 1) Squeezing on upper and lower retaining clips and pushing switch through front of panel.

NOTE: Note placement of electrical leads to aid installation.

- 2) Disconnecting electrical leads on back of switch.

(2) Installation

- (a) With electrical leads extending through switch hole in panel, attach electrical leads with mounting screws to their proper place on back of switch.
- (b) Position switch in proper location and, while squeezing on lower and upper retaining clip, push in on switch until it "snaps" into place.
- (c) Position panel in proper overhead location and connect the two electric connectors.
- (d) Secure with the 6 screw previously removed.
- (e) Connect negative (ground) battery cable.

B. Instrument Panel Switches

(1) Removal

- (a) Disconnect negative (ground) battery cable.
- (b) Reach behind instrument panel and, while squeezing on the upper and lower clips, push switch out through front of panel.

NOTE: Note placement of electrical leads to aid installation.

- (c) Disconnect electrical connections on back of switch(es).

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Installation

- (a) With electrical leads extending through switch hole in panel, attach electrical leads with mounting screws to their proper place on back of switch.
- (b) Position switch in proper location and, while squeezing on lower and upper retaining clip, push in on switch until it “snaps” into place.
- (c) Connect negative (ground) battery cable.

4. Linear Modular Connectors (LMD/LMS)

Linear Modular Connectors (LMD/LMS) are used in some instrumentation and avionics installations to simplify assembly and reduce production cost. Special tools are needed to remove some modules in some installations. See Amphenol / Pyle publication LM-300 (LM-300-1) available from:

[http://www.amphenol-aerospace.com.service Instructions.asp](http://www.amphenol-aerospace.com.service%20Instructions.asp)

5. EMI and RFI Check

(PIR-PPS65119, Rev A.)

A. Background

ElectroMagnetic Interference (EMI) and Radio Frequency Interference (RFI) are a growing concern with the installation of advanced digital avionics. The following test procedure is recommended before return-to-service each time any electrical / avionics work is performed.

B. Procedure

- (1) Position the aircraft at least 50 yards from buildings or any other large structures.
- (2) Ensure all aircraft closeout panels (excluding interior trim panels) and engine cowling are installed on the aircraft being tested.
- (3) With the aircraft running and all avionics, exterior lights and equipment ON, verify that:
 - (a) There are no unusual needle or display fluctuations on any display or gauge;
 - (b) There is no objectionable background noise in the headsets.
 - (c) For troubleshooting purposes, if either is present, systematically turn OFF equipment until the offending system is identified.
- (4) RFI interference is typically generated by energy from the aircraft communication radios bouncing around the airframe. Verify that transmitting on the communication system does not cause RFI interference by performing the following test on each communication system.
 - (a) On each of the following frequencies key the microphone for 3 to 5 seconds:

121.150 MHZ	127.000 MHZ
131.250 MHZ	121.175 MHZ
121.200 MHZ	131.275 MHZ
123.000 MHZ	131.300 MHZ
 - (b) Verify that this does not cause any unusual needle or display fluctuations on any display or gauge.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

ELECTRICAL AND ELECTRONIC EQUIPMENT

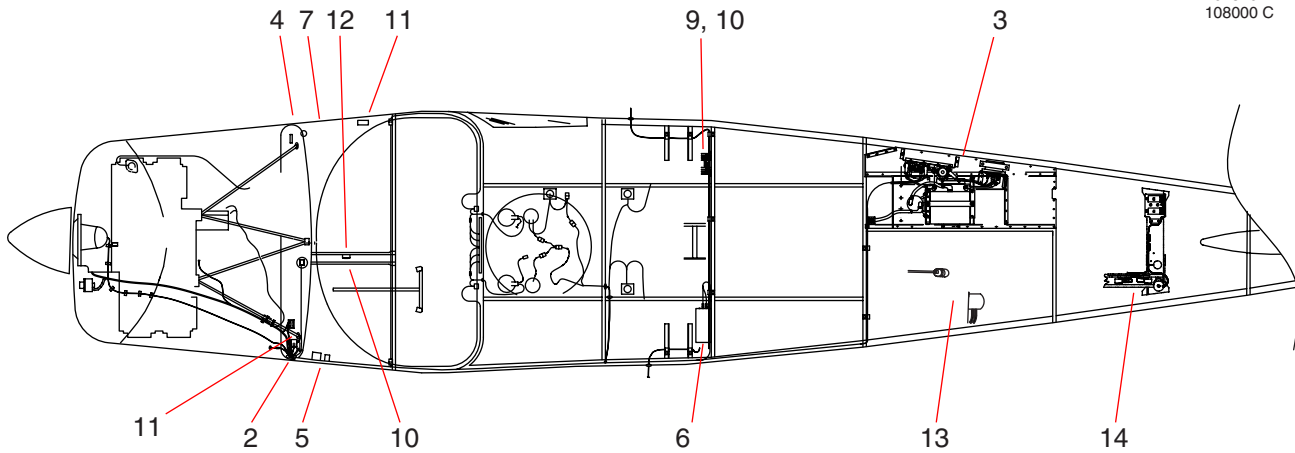
This section is intended to aid the user in locating electrical/electronic components that are not otherwise defined in their respective subject chapter/section. "Figure 1" on page 39202 is an orientation view showing the airframe locations detailed in Figures 2 and up.

Index

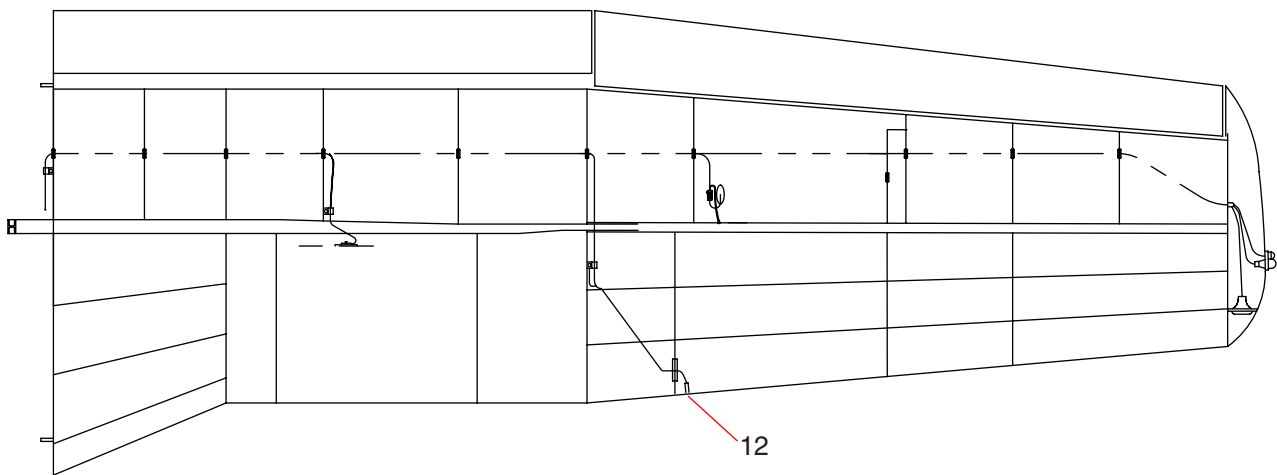
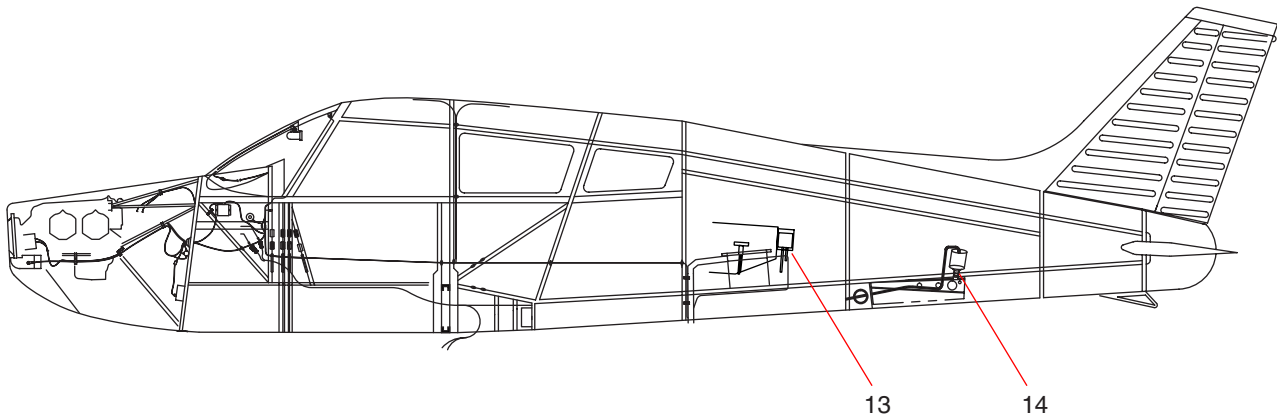
<u>Component</u>	<u>Illustration</u>
Air Conditioning	
Fan Motor	Figure 13
Condensor Door Motor	Figure 14
Open Limit Switch	Figure 14
Pressure Switch S5	Figure 13
Alternator Out Switch	Figure 5
Annunciator Box Assembly	Figure 9
Annunciator Dimmer Assembly	Figure 9
Avionics Cooling Blower	Figure 7
Battery Contactor	Figure 3
CO Detector	Figure 5
Control Assembly	Figure 7
Current Limiter, Standby Alternator	Figure 11
Current Sensor, Standby Alternator	Figure 11
DAU	Figure 10
Dimmer Control	Figure 4
EGT Probe	See 77-20-00
Exceedance Horn	Figure 10
Fuel Pump, Fuel Filter	See 28-20-00
Fuse Assembly	Figure 8
Ground Blocks	Figure 5
	Figure 7
Inverter Assembly	Figure 15
K1 Relay	Figure 14
K2 Relay	Figure 14
K303 Relay	Figure 7
Lift Detector	Figure 12
Low Voltage Sensor	Figure 7
Oil Pressure Sender & Switch	See 79-20-00
Pitot Heat Sensor Assembly	Figure 7
Primer Switch Relay	Figure 5
Shunt Assembly	Figure 15
Stall Horn	Figure 12
Standby Alternator	See 24-30-00
Standby Alternator Regulator	Figure 11
Starter Contactor	Figure 2
Trim Monitor	Figure 5
Voltage Regulator	Figure 5
Terminal Strip	Figure 6

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370 AZ
99575 AC
101910 Y
107570 F
108000 C



ITEM NUMBERS KEYED TO FIGURE NUMBER



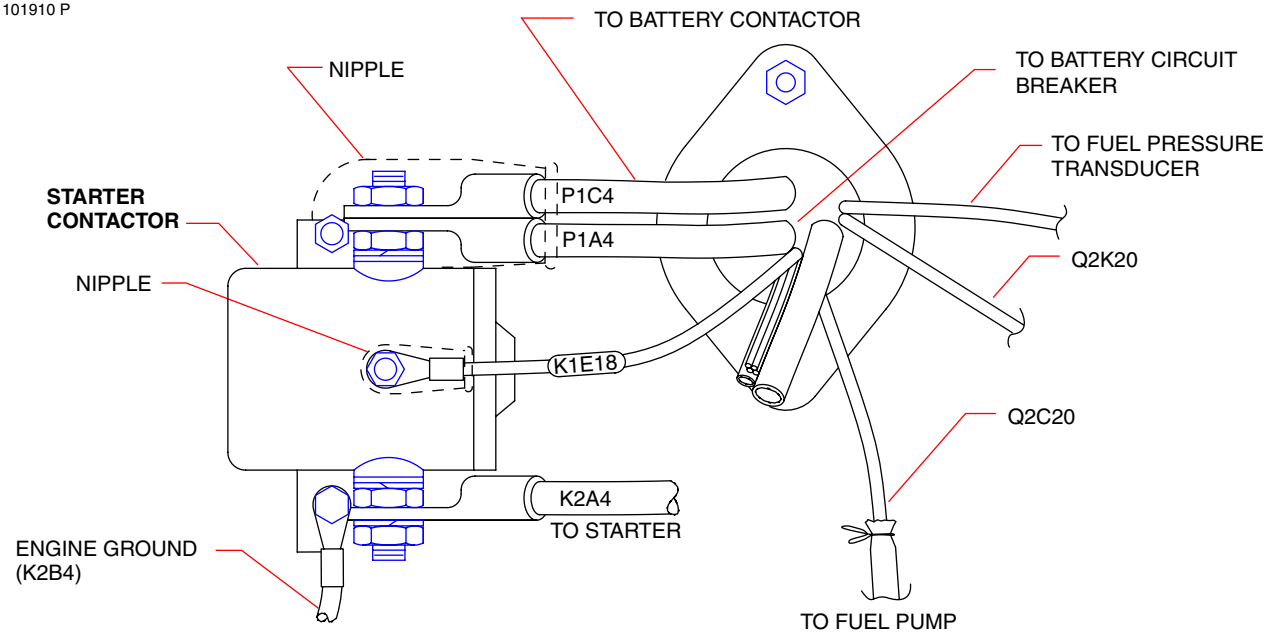
Electrical/Electronic Component Locator
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

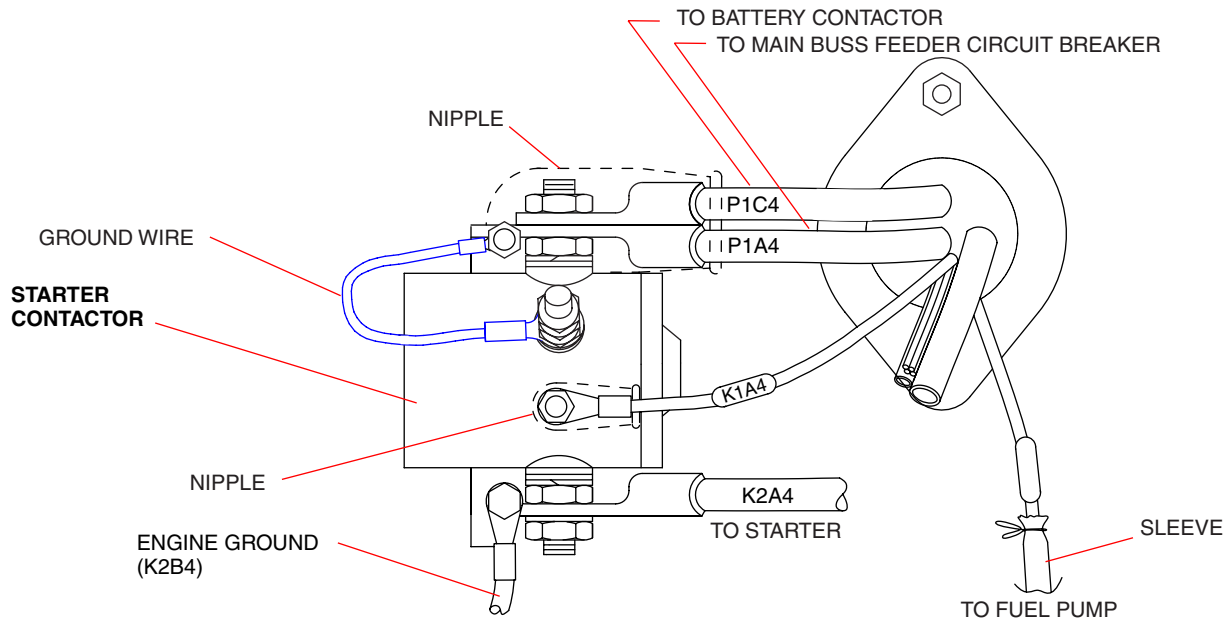
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370 AI
101910 P



S/N'S 2843001 THRU 2843597
Original Equipment

LOOKING AFT AT LEFT SIDE LOWER FIREWALL



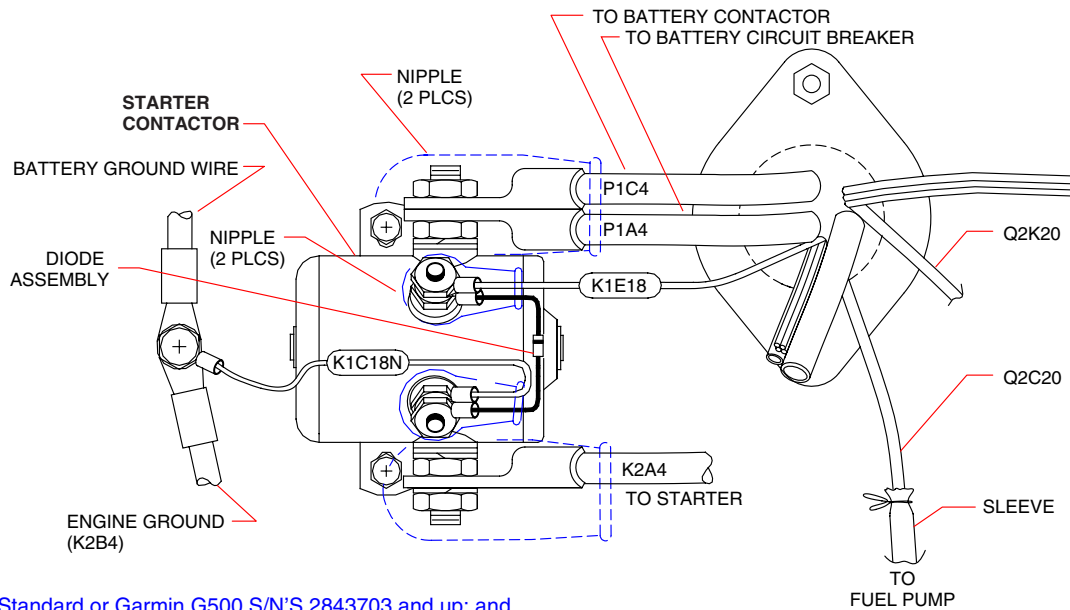
S/N'S 2843598 THRU 2843702
Original Equipment

LOOKING AFT AT LEFT SIDE LOWER FIREWALL

Electrical/Electrical Component Locator
Figure 2 (Sheet 1 of 2)

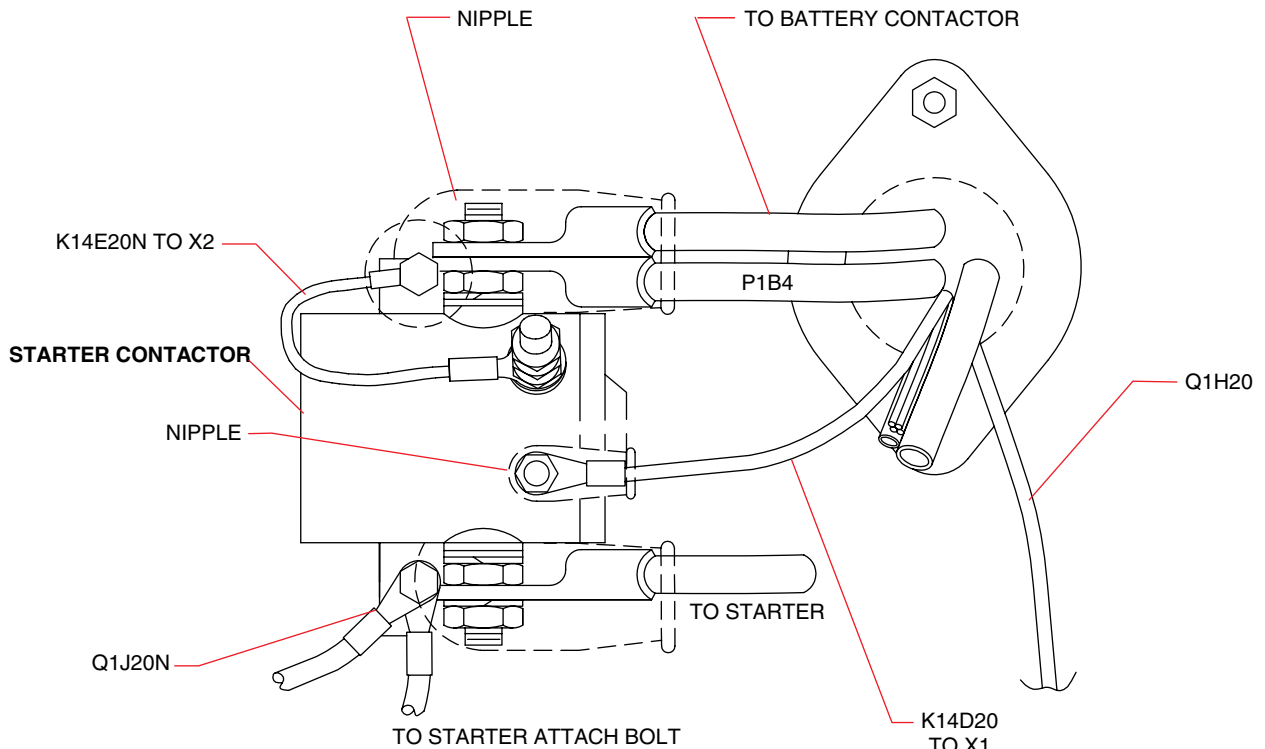
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

85370 AQ



Standard or Garmin G500 S/N'S 2843703 and up; and
Standard, Garmin G500, or Avidyne Entegra
S/N'S 2843001-2843700, and 2843702,
with Kit No. 767-391

LOOKING AFT AT LEFT SIDE LOWER FIREWALL



With Garmin G1000 or G1000 NXi

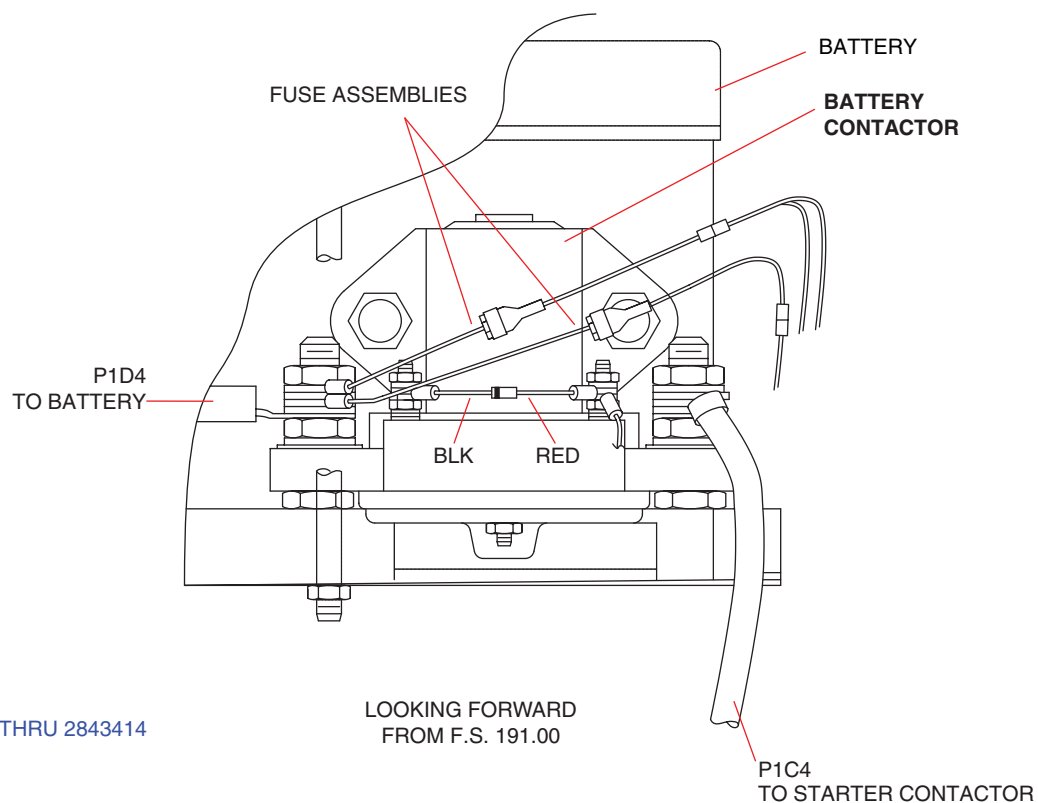
LOOKING AFT AT LEFT SIDE LOWER FIREWALL

Electrical/Electronic Component Locator
Figure 2 (Sheet 2 of 2)

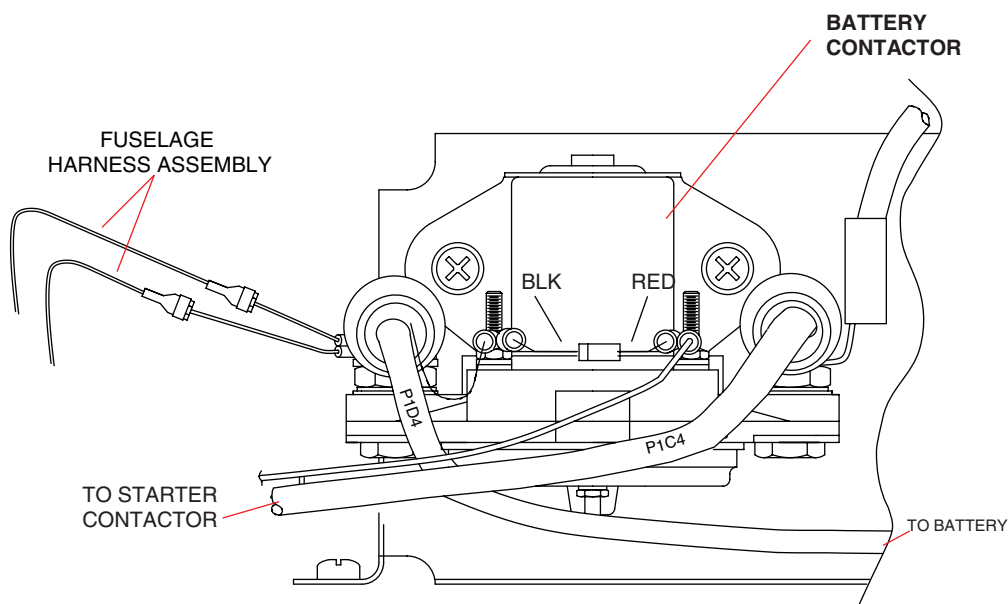
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



S/N's 2843001 THRU 2843414



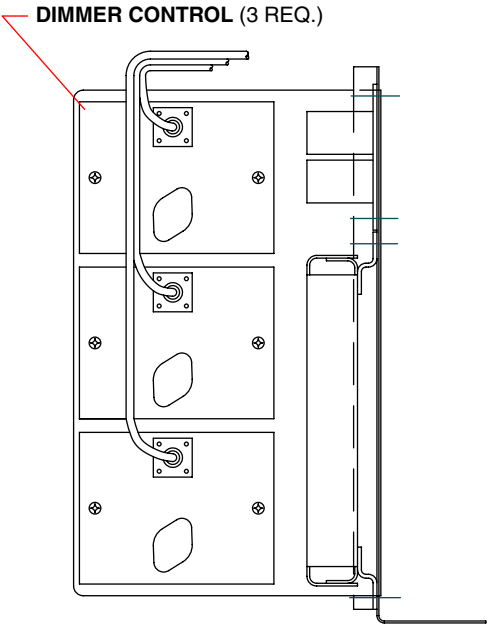
S/N's 2843415 AND UP

Electrical/Electrical Component Locator
Figure 3

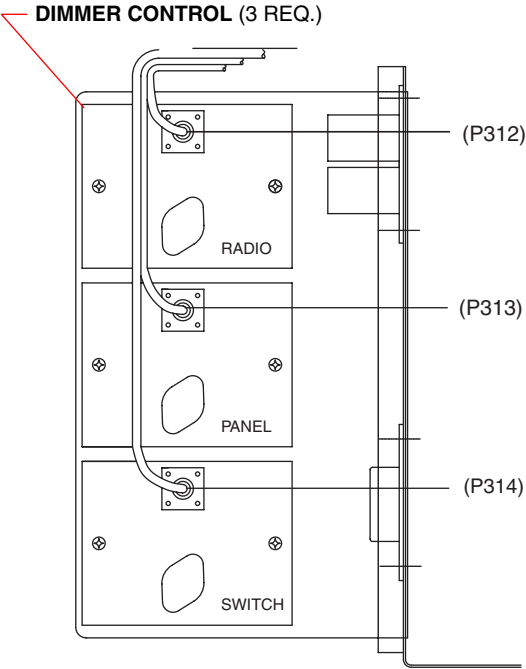
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370

STANDARD AND GARMIN G500



WITH AVIDYNE INTEGRA

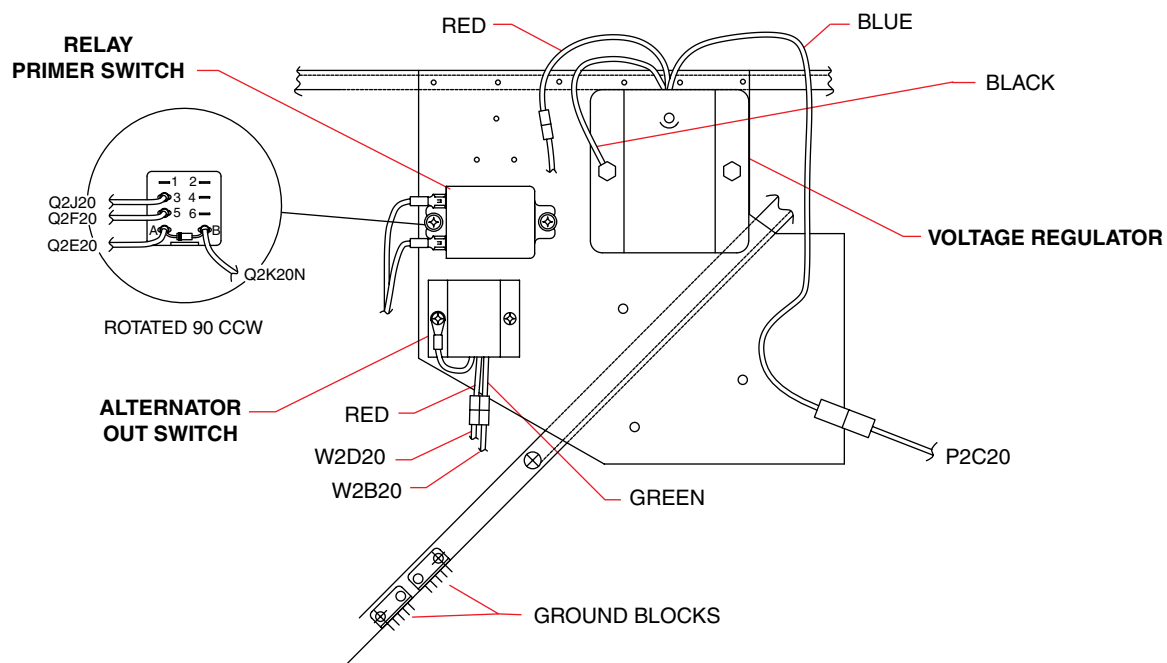
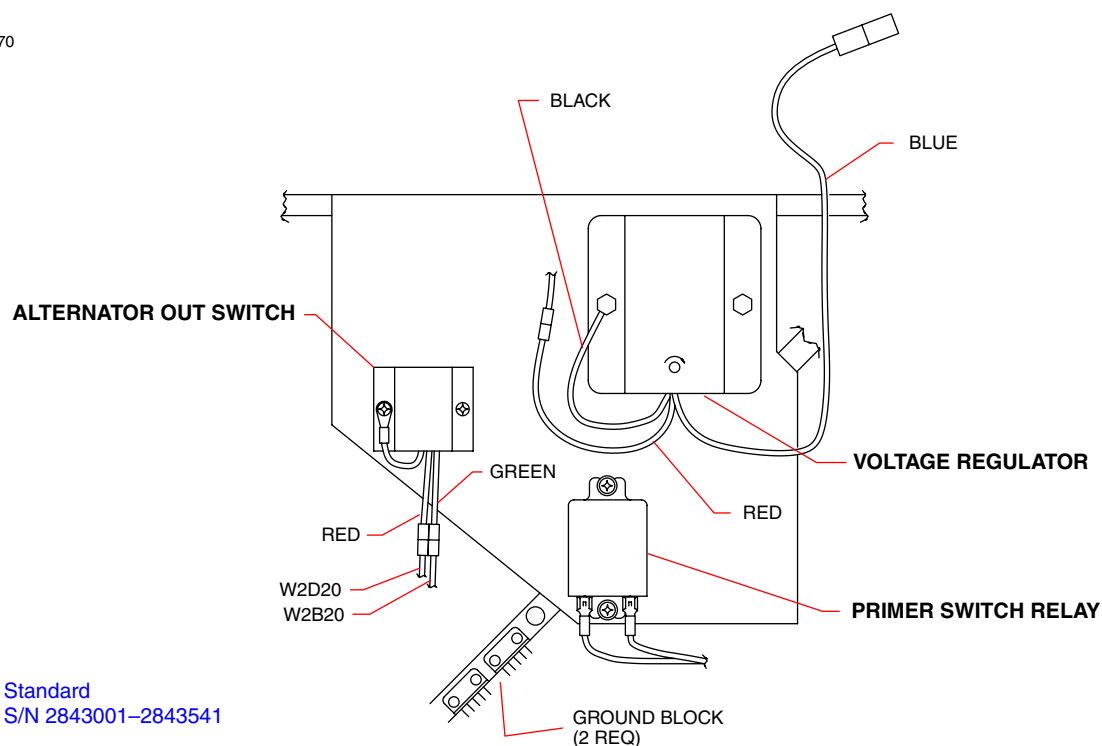


UNDER INSTRUMENT PANEL
RIGHT SIDE, LOOKING FORWARD

Electrical/Electrical Component Locator
Figure 4

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370



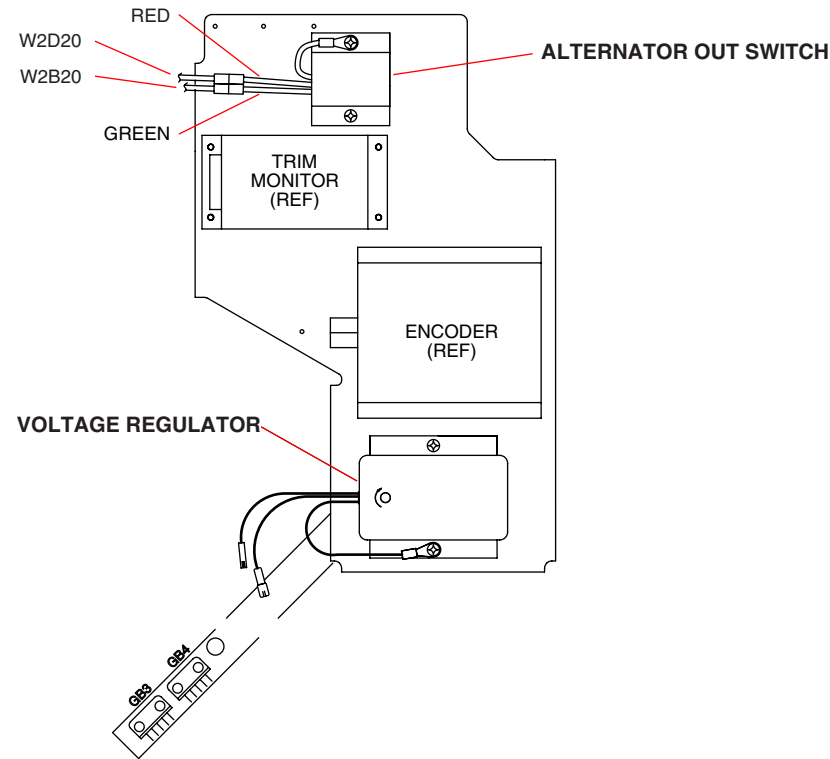
Standard or Garmin G500
in S/N's 2843542 and up

UNDER INSTRUMENT PANEL
LEFT SIDE, LOOKING OUTBOARD

Electrical/Electrical Component Locator
Figure 5 (Sheet 1 of 3)

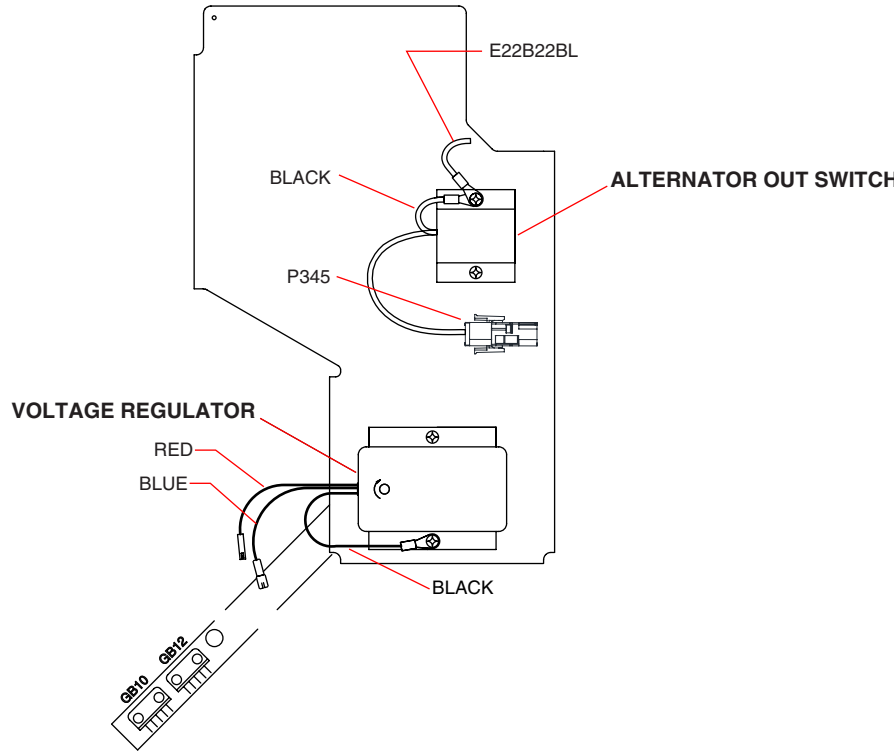
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

101910 P



WITH AVIDYNE INTEGRA

107570



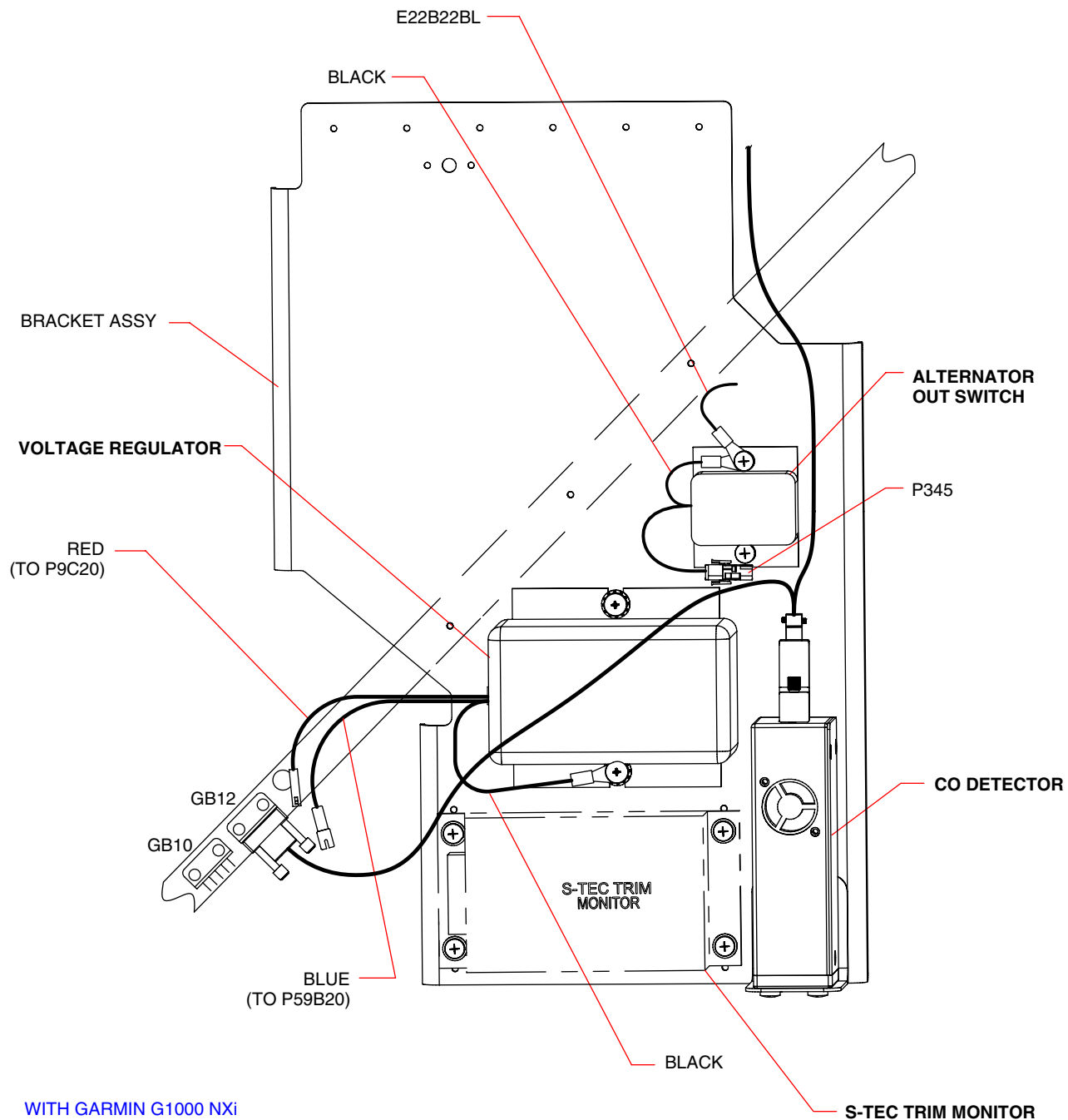
WITH GARMIN G1000

**UNDER INSTRUMENT PANEL
LEFT SIDE, LOOKING OUTBOARD**

Electrical/Electrical Component Locator
Figure 5 (Sheet 2 of 3)

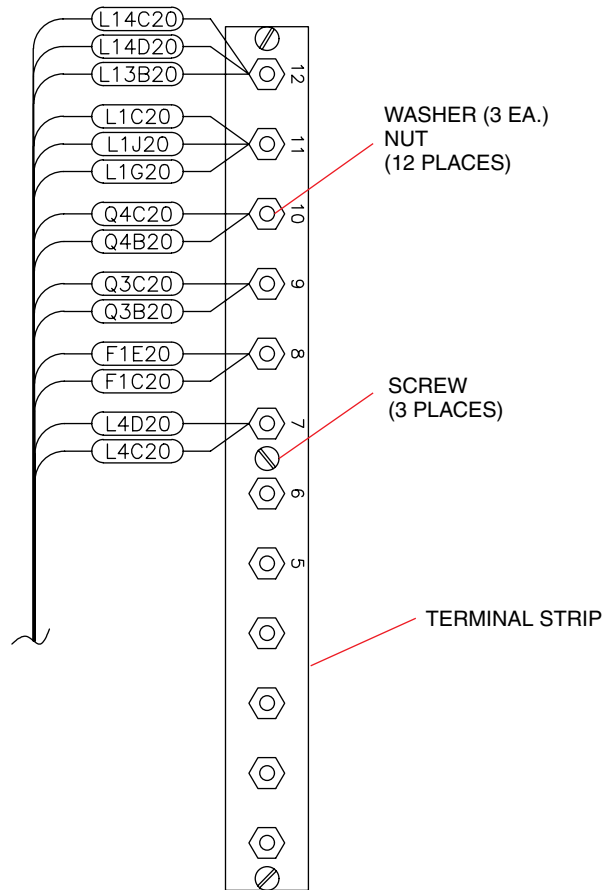
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108000 C



UNDER INSTRUMENT PANEL
LEFT SIDE, LOOKING OUTBOARD
Electrical/Electrical Component Locator
Figure 5 (Sheet 3 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

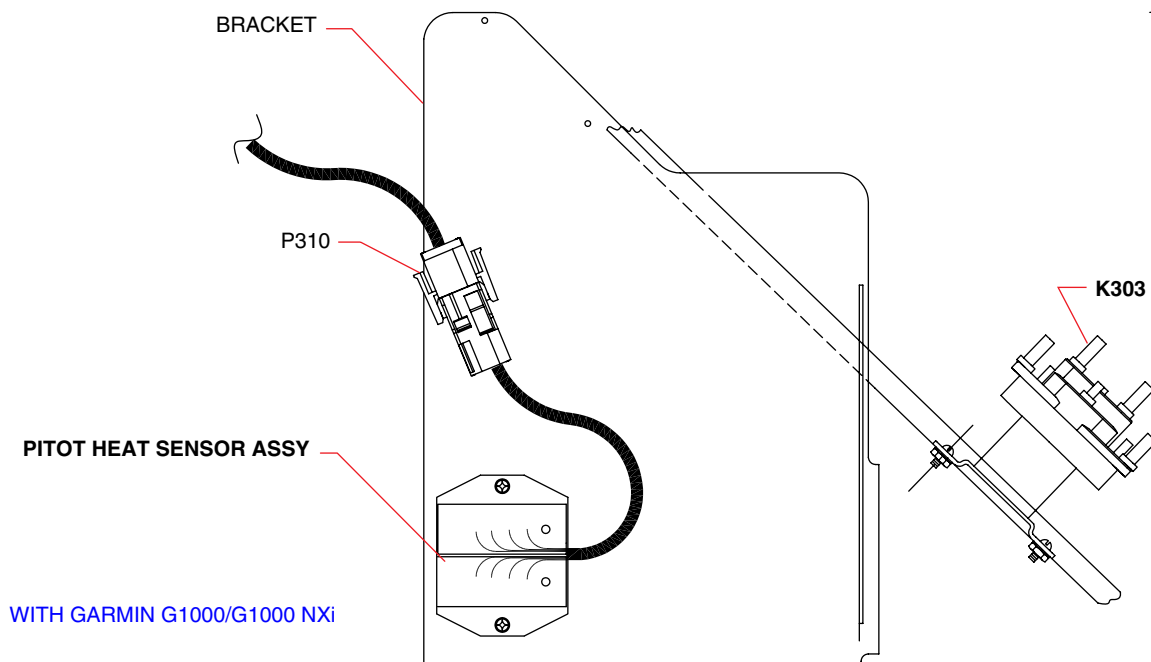
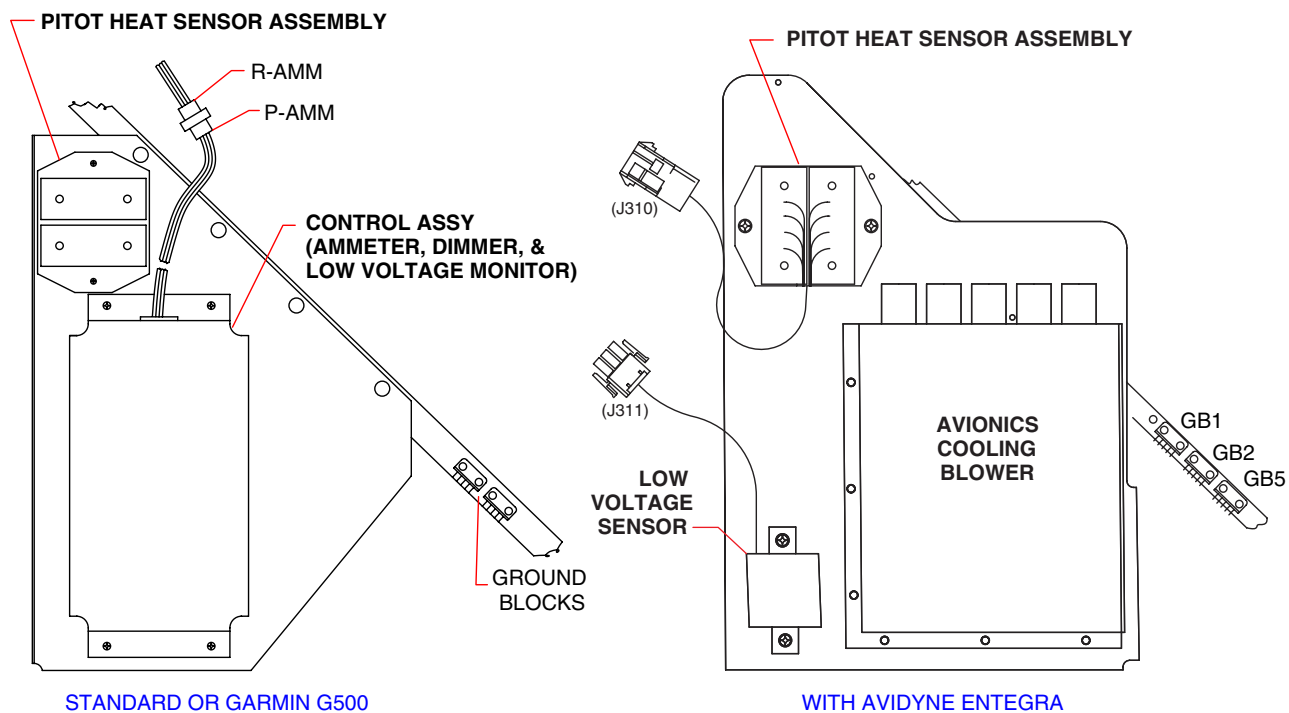


LOOKING AFT
(COVER REMOVED, ROTATED 90° CLOCKWISE)

Effectivity
Standard Or With
Garmin G500

Electrical/Electrical Component Locator
Figure 6

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

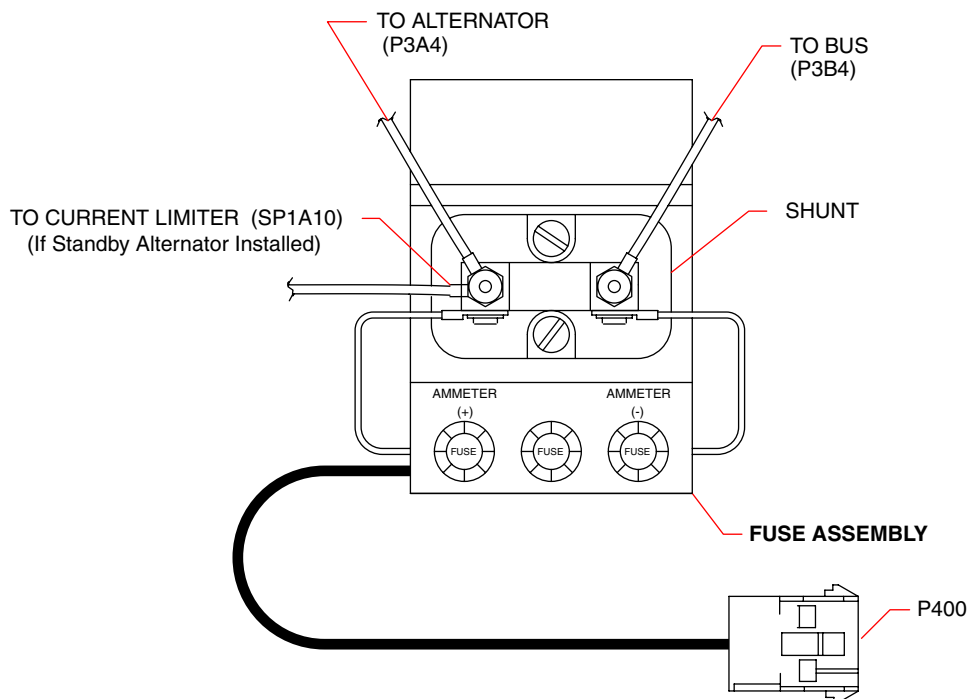
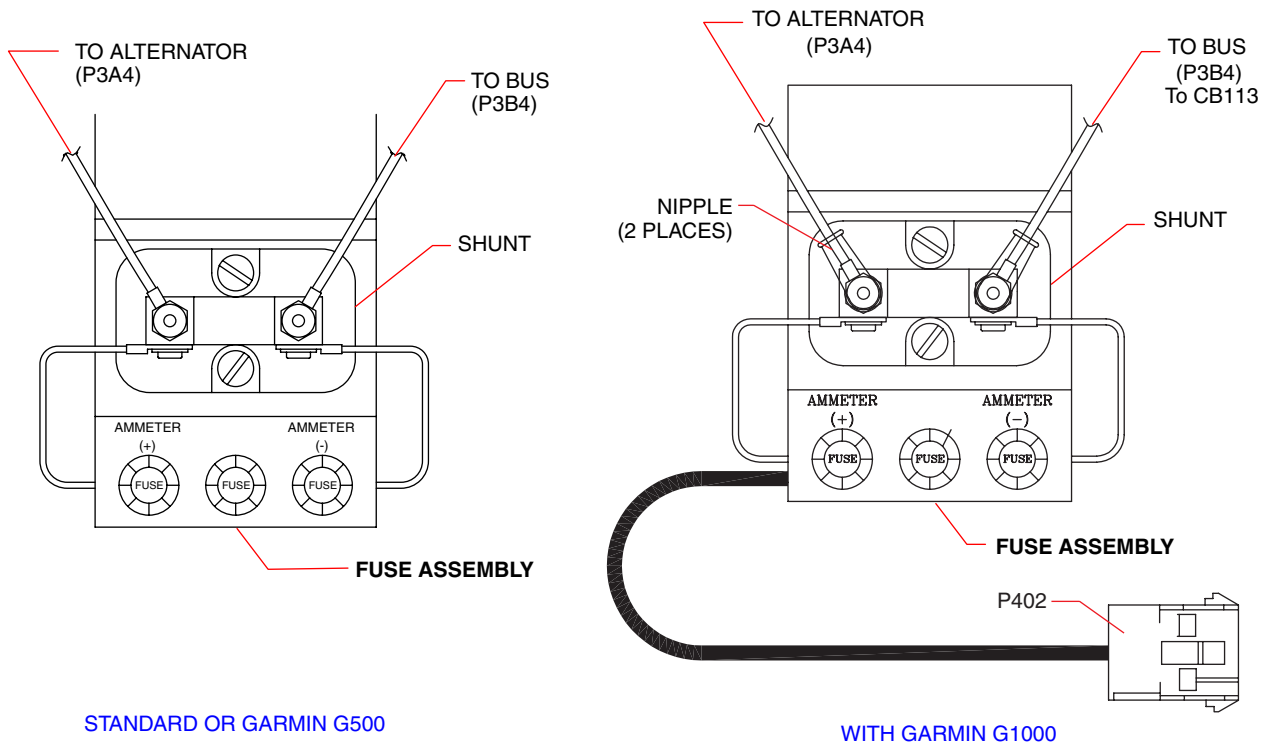


107570 F
108000 C

UNDER INSTRUMENT PANEL
RIGHT SIDE, LOOKING OUTBOARD

Electrical/Electrical Component Locator
Figure 7

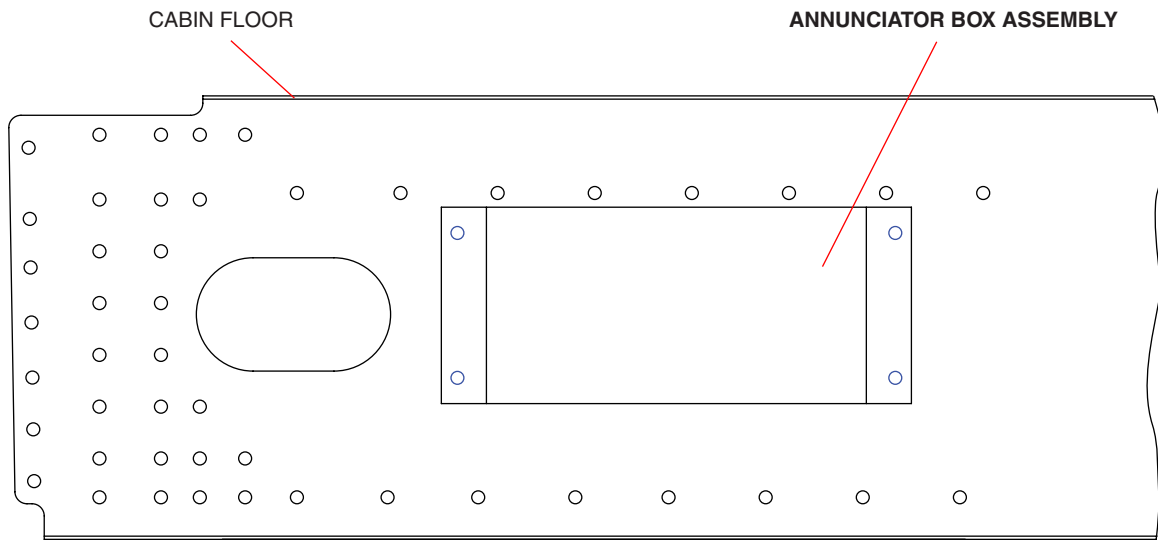
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



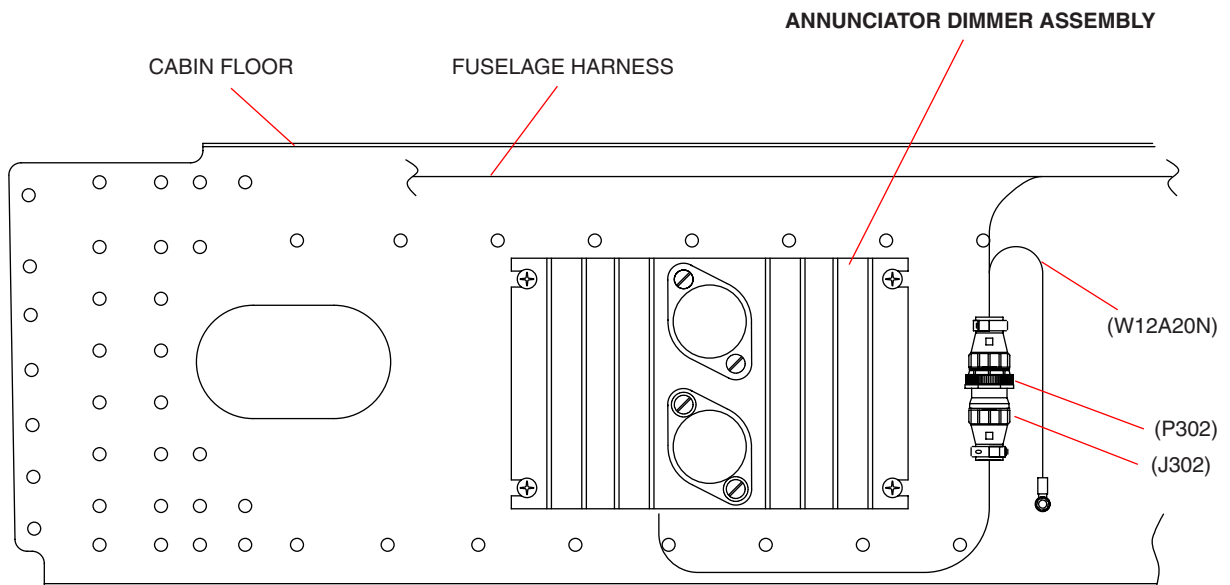
LOOKING DOWN AT FIREWALL, LEFT SIDE

Electrical/Electrical Component Locator
Figure 8

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



STANDARD AND GARMIN G500

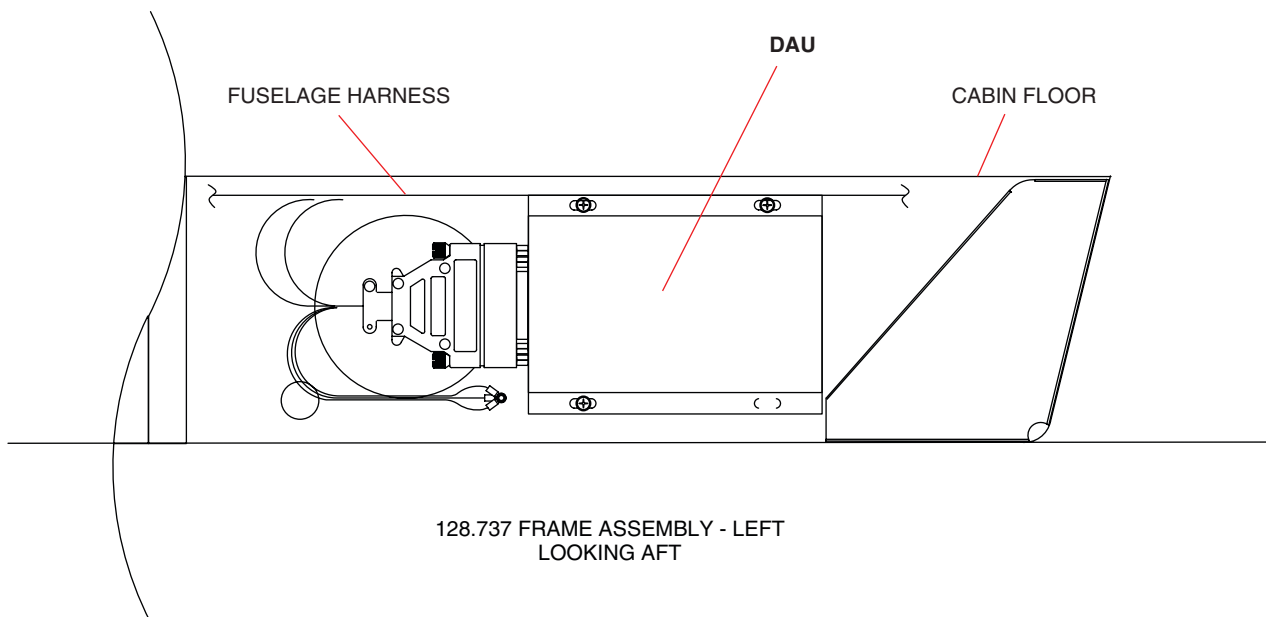
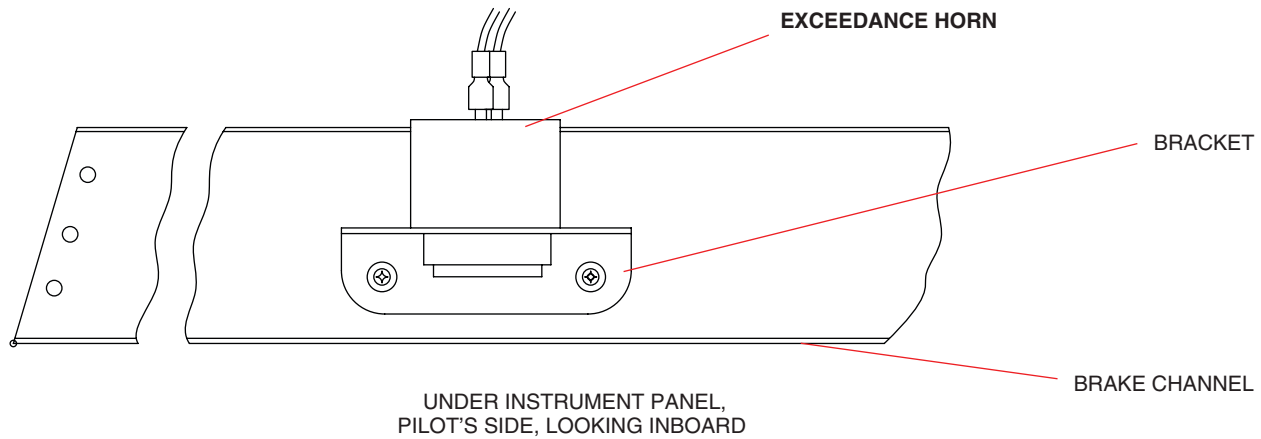


WITH AVIDYNE INTEGRA

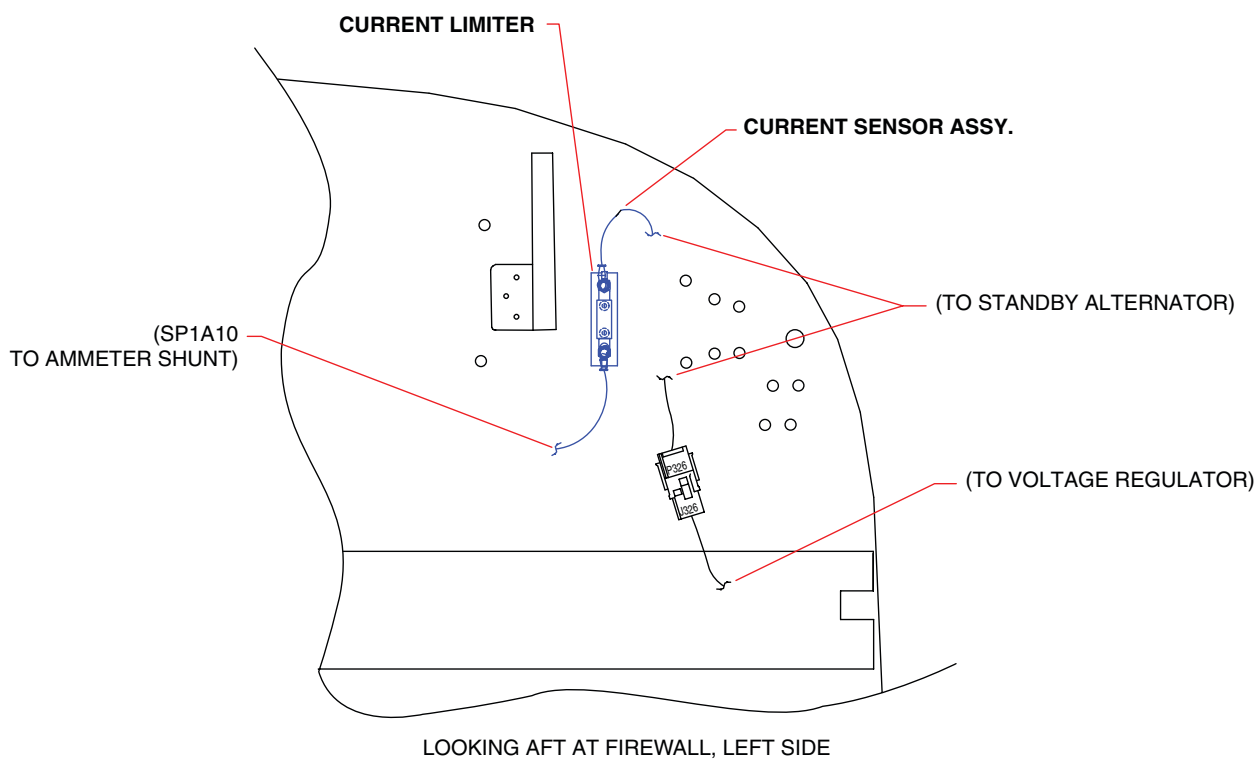
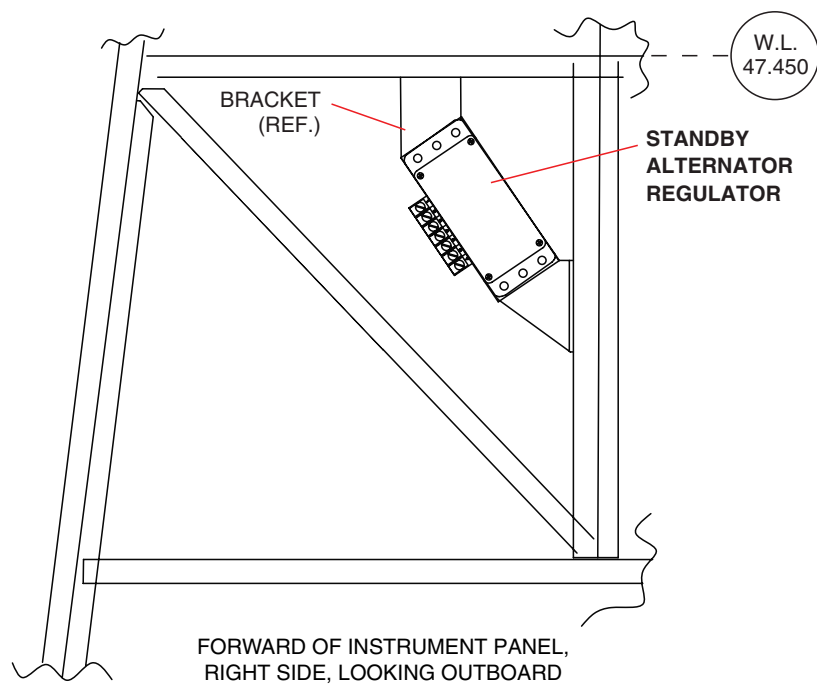
128.737 FRAME ASSEMBLY - RIGHT
LOOKING AFT

Electrical/Electrical Component Locator
Figure 9

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



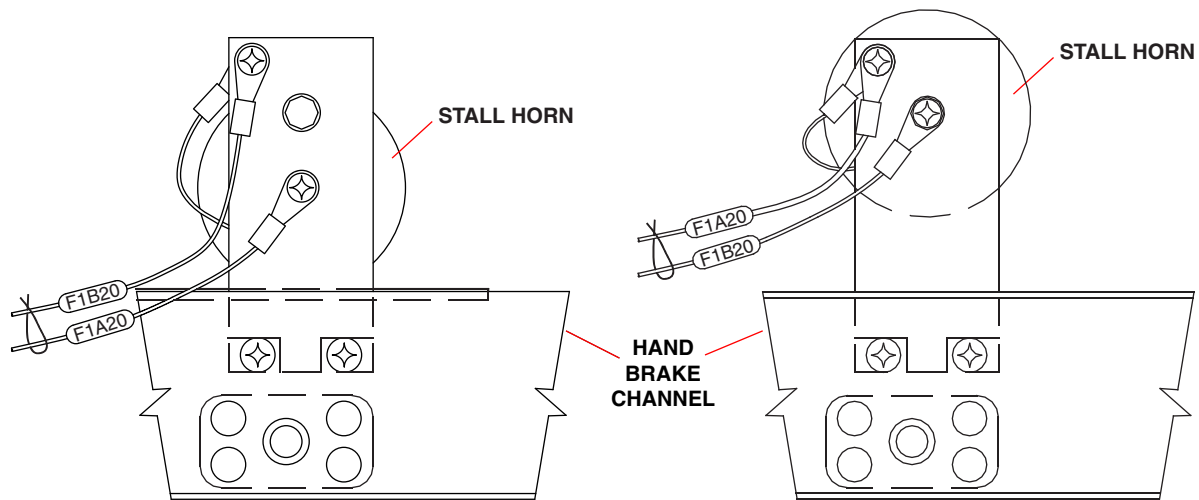
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Electrical/Electrical Component Locator
Figure 11

Effectivity
2843622 thru 2843682
with Avidyne Entegra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

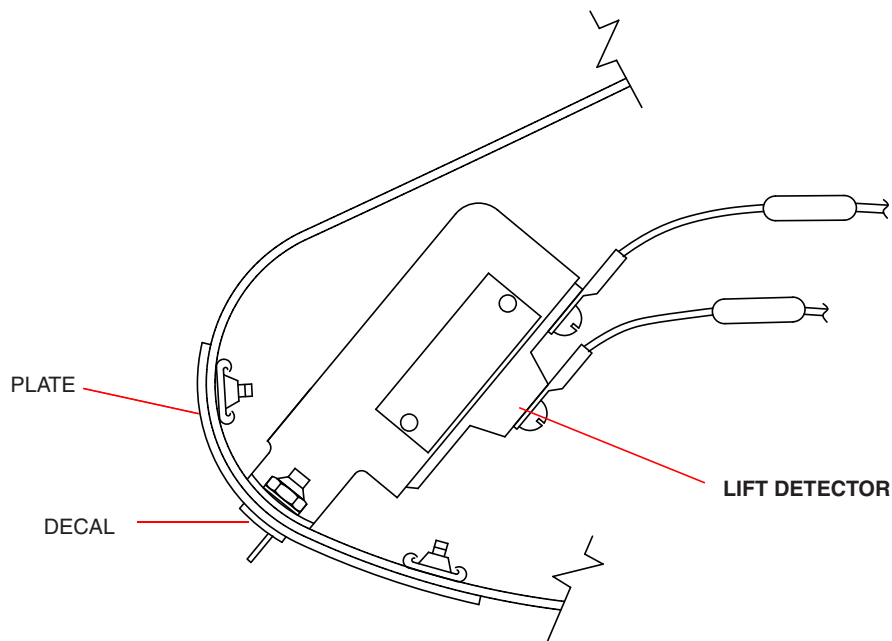


UNDER INSTRUMENT PANEL
LOOKING LEFT FROM AIRCRAFT CENTERLINE
ROTATED 180°

S/N's 2843001 THRU 2843680
Original Equipment

S/N's 2843681 AND UP
AND S/N's 2843001 THRU
2843680 WITH KIT NO. 88472

STANDARD, GARMIN G500, OR AVIDYNE ENTEGRA



LOOKING INBOARD - LEFT WING

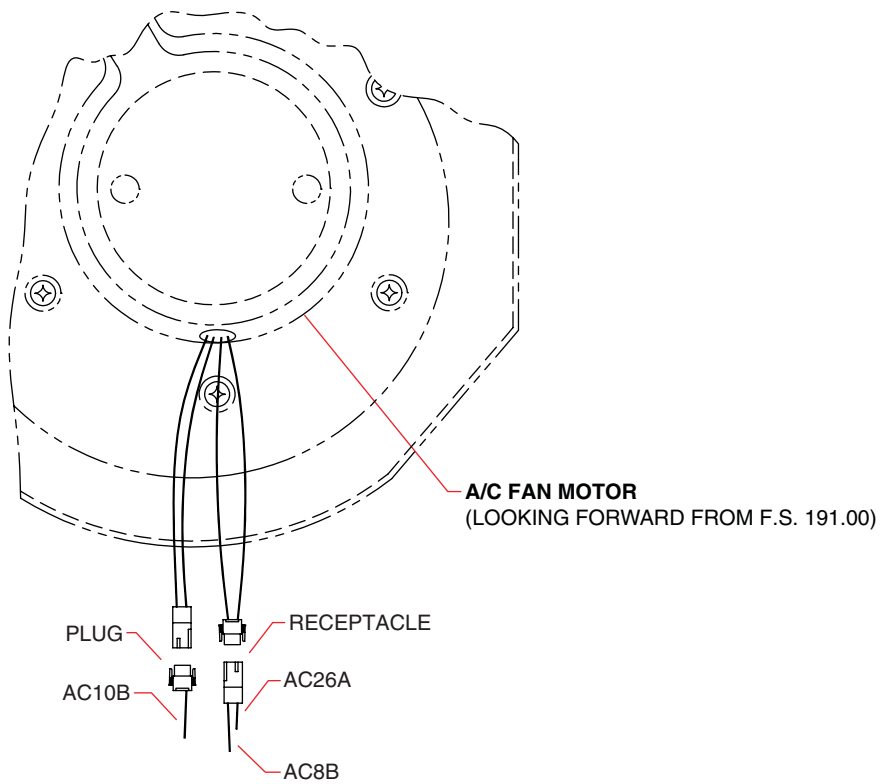
Electrical/Electrical Component Locator
Figure 12

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

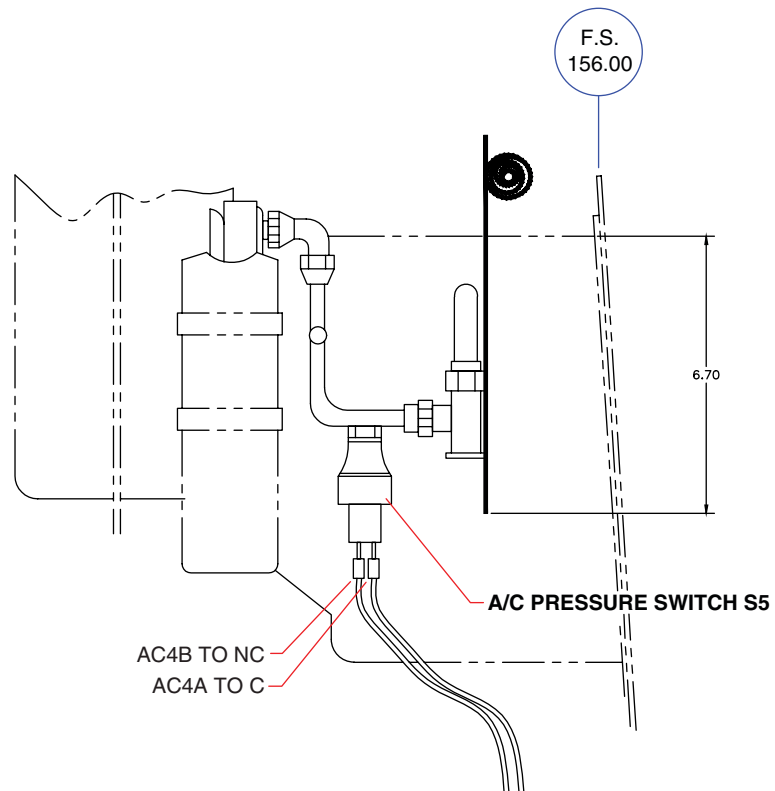
THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107577 C 4



FWD →

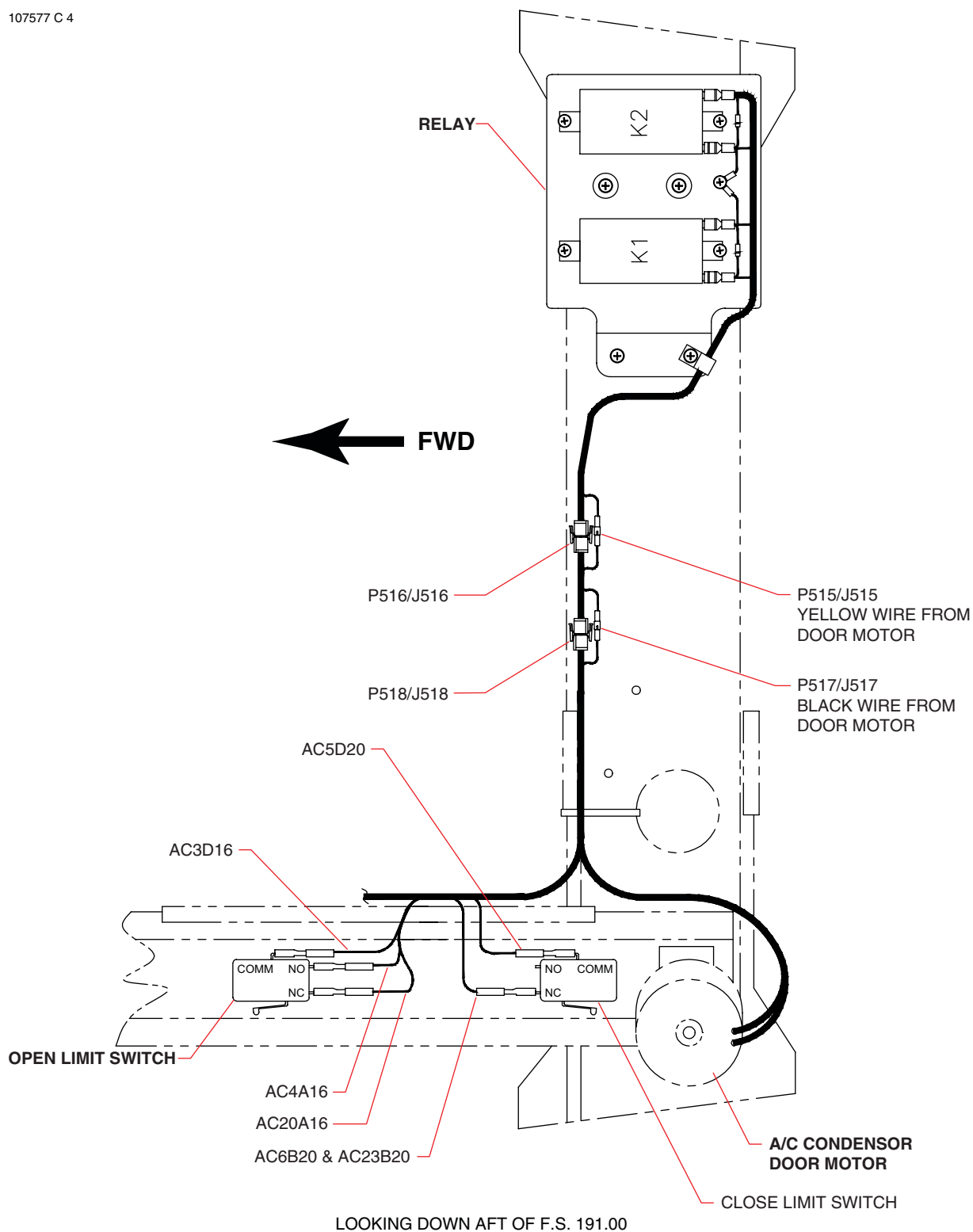


Effectivity
with Garmin G1000
or G1000 NXi

Electrical/Electrical Component Locator
Figure 13

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107577 C 4

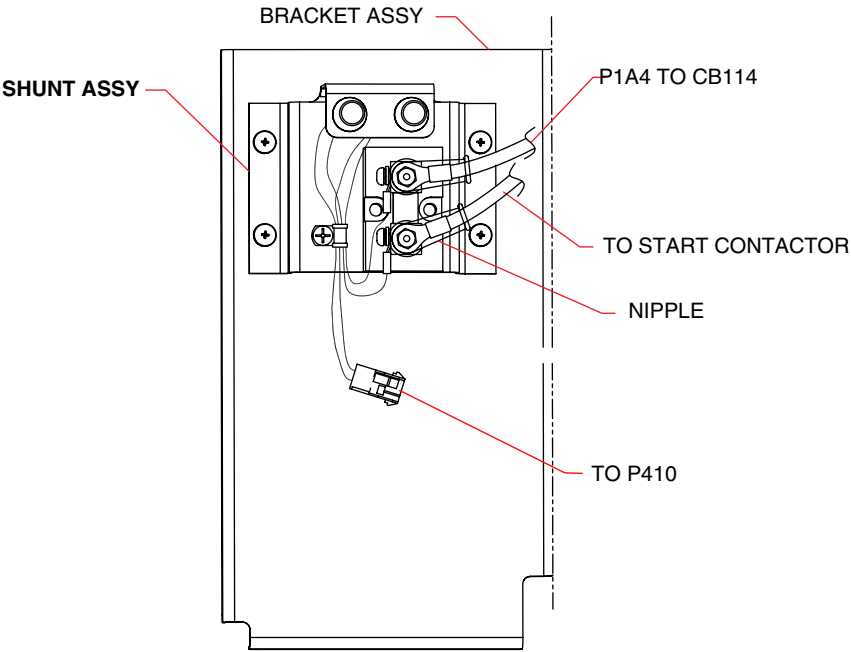


Electrical/Electrical Component Locator
Figure 14

Effectivity
with Garmin G1000
or G1000 NXi

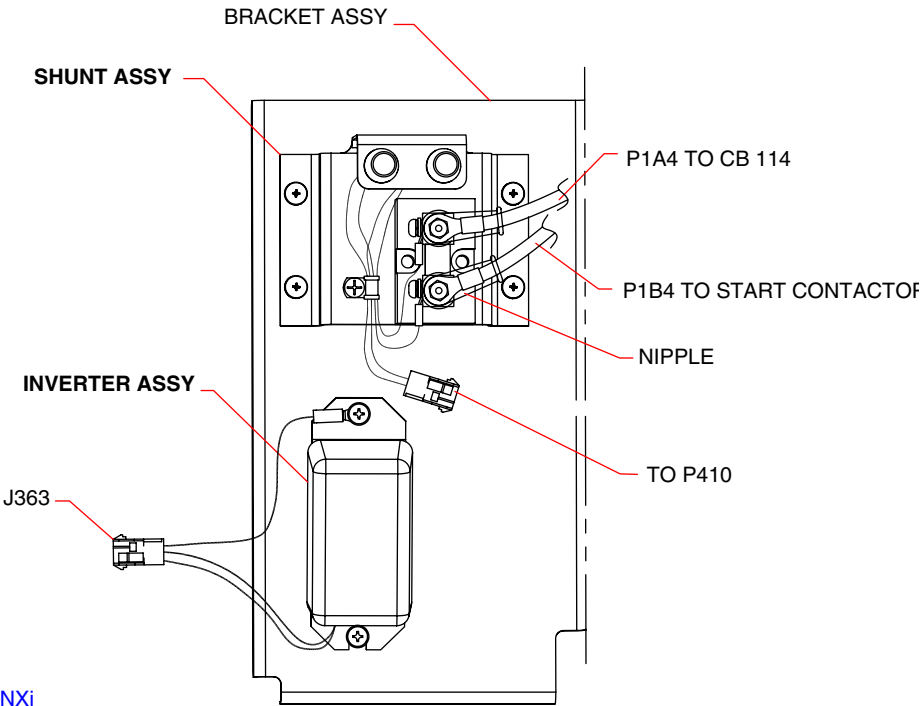
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107570 G



WITH GARMIN G1000

108000 C



WITH GARMIN G1000 NXi

RIGHT SIDE, LOOKING FORWARD
Electrical/Electronic Component Location
Figure 15

CHAPTER

51

STRUCTURES

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 51

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
51-List of Effective Pages	1	Mar 15/20			
	2	Mar 6/14			
51-Table of Contents	1	Mar 15/20			
	2	Mar 6/14			
51-00-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
51-10-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
	5	Mar 6/14			
	6	Mar 6/14			
51-70-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
	5	May 15/19			
	6	Mar 6/14			
	7	Mar 6/14			
	8	Mar 6/14			
	9	Mar 6/14			
	10	Mar 6/14			
	11	Mar 15/20			
	12	Mar 6/14			
51-80-00	1	May 15/19			
	2	May 15/19			
	3	Nov 15/17			
	4	Nov 15/17			
	5	May 15/19			
	6	May 15/19			
	7	May 15/19			
	8	May 15/19			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 51 - STRUCTURES

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	51-00-00	1
<u>INVESTIGATION, CLEANUP AND AERODYNAMIC SMOOTHNESS</u>	51-10-00	1
Corrosion Control		1
Forms of Corrosion		1
Conditions Affecting Corrosion		1
Inspection		3
Corrosion Removal and Control		3
Corrosion Prone Areas		4
<u>REPAIRS</u>	51-70-00	1
Fiberglass Repairs		1
Touch-up and Surface Repairs		1
Fracture and Patch Repairs		2
Thermoplastic Repairs		3
Pressure Sensitive Safety Walk Installation		11
Metal / Wire Stitching Repair		11
<u>ELECTRICAL BONDING</u>	51-80-00	1
General		1
100 Hour Inspection		1
On Condition Inspection		1
Garmin G1000/G1000 NXi Equipment Electrical Bonding Check		3
Lightning Diverter Installation		5
Inspection		5
Removal		5
Installation		5
Required Materials		5
Surface Preparation		5
Procedure		7
Repair		7
Storage and Handling of Materials		8

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

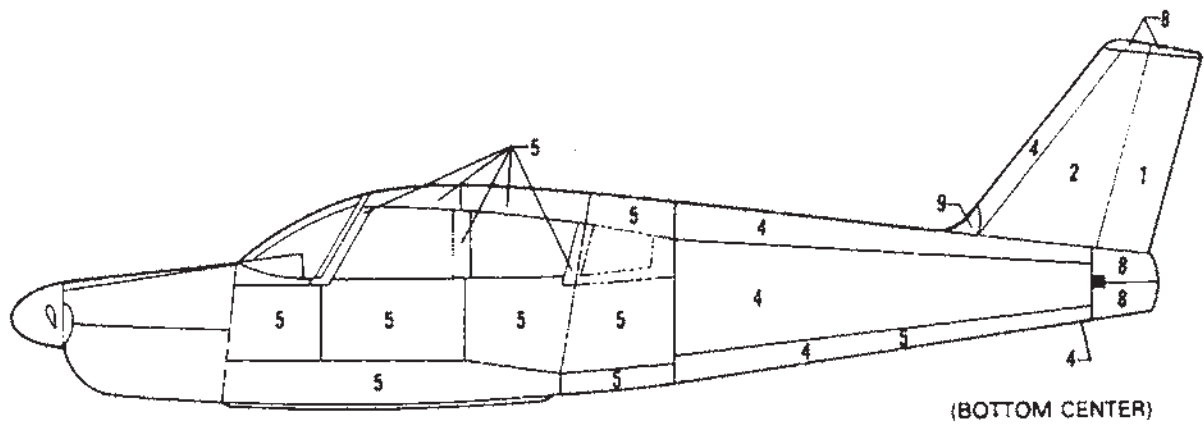
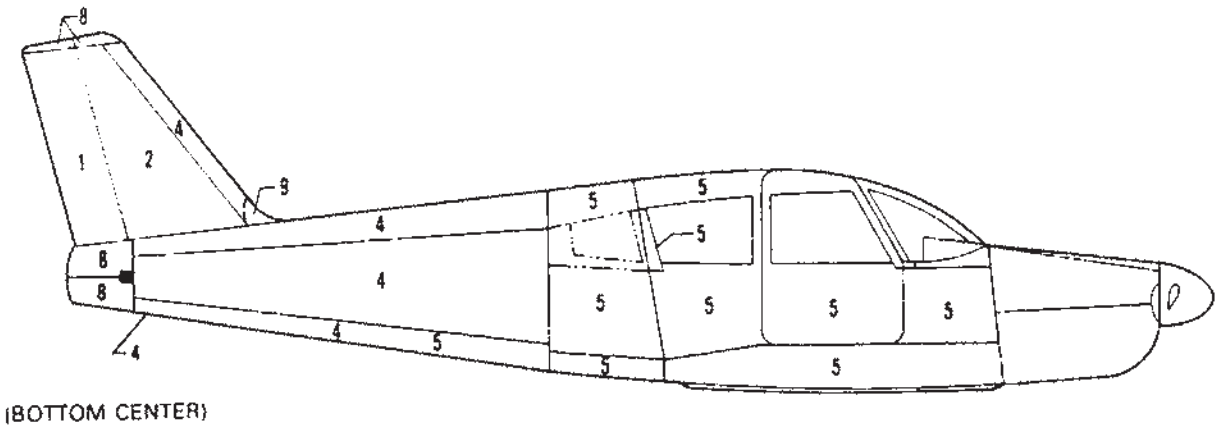
GENERAL

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

DESCRIPTION

The PA-28-181 Archer III is an all metal semi-monocoque structure. The fuselage is constructed of bulkheads, stringers, and stiffeners, to which all of the outer skin is riveted. The cabin entrance door is on the right side of fuselage above the wing. Wings and empennage are all metal, full cantilever semi-monocoque type construction with removable tips.

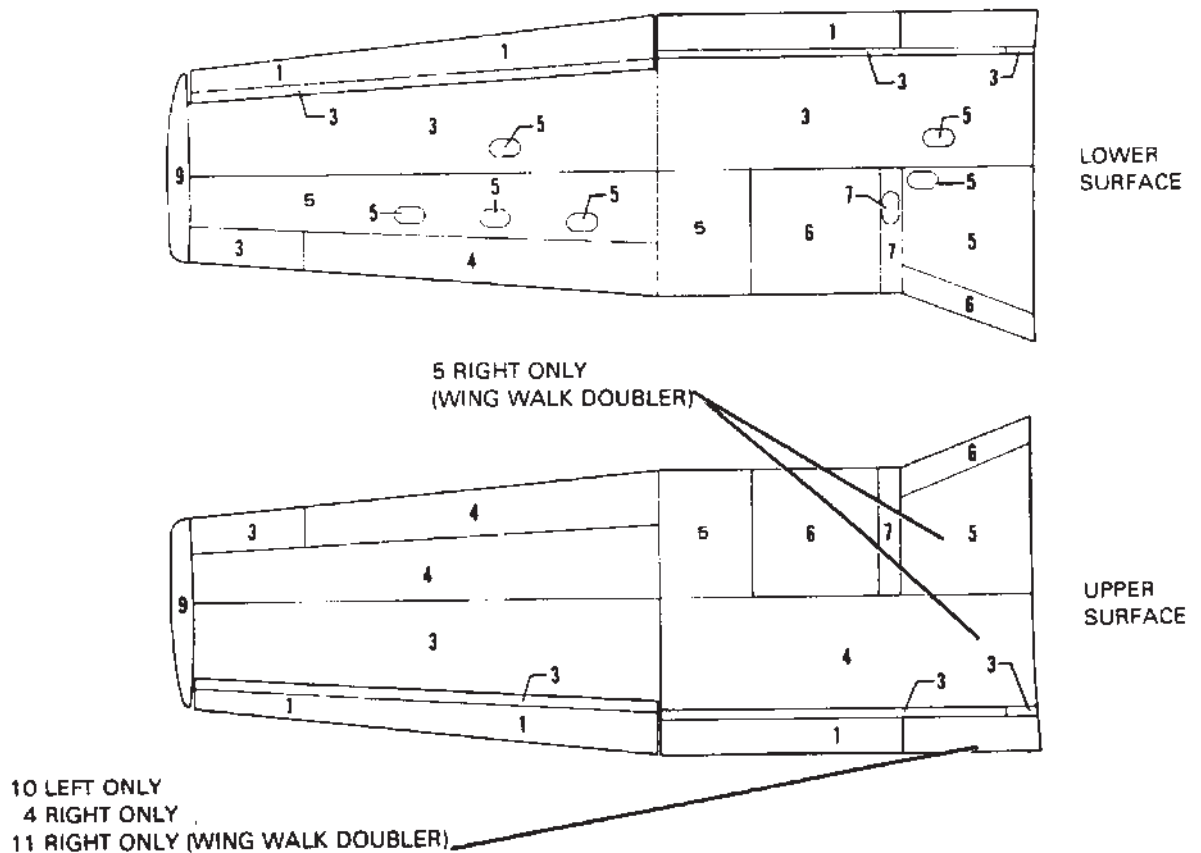
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



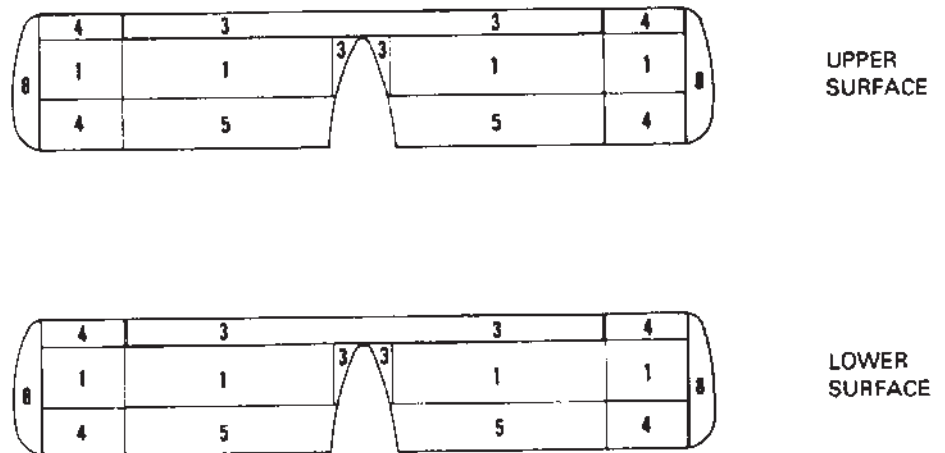
LOCATION	MATERIAL	THICKNESS
1	2024-T3	0.016
2	2024-Q(1)	0.020
3	2024-T3	0.020
4	2024-T3	0.025
5	2024-T3	0.032
6	2024-T3	0.040
7	2024-T3	0.051
8	FIBERGLASS	
9	THERMOPLASTIC	
10	2024-Q(2)	0.020
11	2024-Q(3)	0.025

Skin Material Specifications
Figure 1 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



987



LEFT WING SHOWN, RIGHT SAME
AND OPPOSITE EXCEPT AS NOTED

- (1) HEAT TREAT TO 2024-T3 AFTER FORMING
 - (2) HEAT TREAT TO 2024-T4 AFTER FORMING
 - (3) HEAT TREAT TO 2024-T42 AFTER FORMING
- LEFT WING SHOWN, RIGHT WING SAME AND
OPPOSITE EXCEPT AS NOTED

Skin Material Specifications
Figure 1 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

INVESTIGATION, CLEANUP AND AERODYNAMIC SMOOTHNESS

Corrosion Control

Corrosion is the deterioration of metal by chemical or electrochemical attack. Water which is allowed to remain on the aircraft and industrial pollution are the major causes of corrosion in aircraft. The two general types of corrosion are:

- Direct chemical attack (i.e. spilled battery acid).
- Electrochemical attack which requires a medium (usually water).

The latter is the most common and is responsible for most forms of aircraft corrosion.

Since corrosion is a constant threat, the only effective method to control it is a routine of regular inspection, cleaning, and surface refinishing.

A. Forms of Corrosion

See Chart 1.

The following are the most common forms of corrosion:

- (1) Surface Corrosion appears as a general roughening or pitting on the surface usually accompanied by a powdery deposit of corrosion products. It may spread under the surface and not be recognized until the paint or plating is lifted off the surface in small blisters.
- (2) Dissimilar Metal Corrosion may occur when two dissimilar metals are contacting each other. This type may be serious because it usually takes place out of sight. The only way to find it before structural failure is by disassembly and inspection. Insulating is necessary between two contacting dissimilar surfaces (2 to 3 coats of zinc chromate on each surface; plus, if one of the surfaces is magnesium, a 0.003 inch thick piece of vinyl tape).
- (3) Intergranular Corrosion is difficult to detect in its early stages. When severe, it causes the surface of the metal to exfoliate (flake or lift).
- (4) Stress Corrosion is the result of sustained tensile stresses and corrosive environment. It usually occurs in assemblies such as aluminum alloy bellcranks with pressed in bushings; landing gear shock struts with pipe thread grease fittings, clevis pin joints and shrink fit parts.
- (5) Fretting Corrosion takes place when two parts rub together, constantly exposing fresh active metal to the corrosive effects of the atmosphere.
- (6) Filiform Corrosion is the appearance of numerous meandering thread like filaments of corrosion on the surface of various types of metal.

B. Conditions Affecting Corrosion

Some conditions which affect the occurrence of corrosion are:

- (1) Heat and humidity increase corrosion.
- (2) Different (i.e. – dissimilar) metals and their relative sizes affect resistance or susceptibility to corrosion.
- (3) Frequent contributing factors to corrosion:
 - (a) Soil and atmosphere dust.
 - (b) Oil, grease, and exhaust residues.
 - (c) Salt water and salt moisture condensation.
 - (d) Spilled battery acids and caustic cleaning solution.
 - (e) Welding, brazing, and soldering flux residue.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1
TYPES OF METAL CORROSION**

Type of Material	Type of Corrosion	Remedy ⁽²⁾
Steel.	Rust ⁽¹⁾ .	Complete removal of corrosion by mechanical means.
Aluminum.	White to grey powdery material.	Mechanical polishing or brushing with material softer than aluminum.
Magnesium (highly susceptible to corrosion).	White powdery snow-like mounds and white spots.	Mechanical polishing or brushing for a smooth finish.
Cadmium (plating).	White to brown to black mottling of surface (plating is still protecting until iron appears).	Mechanical removal of corrosion is limited to metal surfaces from which cadmium has been depleted.
Chromium (plating).	May pit in chloride environment.	Polishing and buffing.
— NOTES — (1) Red rust generally shows on bolts, nuts, and other aircraft hardware. Rust in these areas is generally not dangerous, however, it shows a need for maintenance and the possibility of corrosive attack in more critical areas. Any surface corrosion on highly stressed steel parts is potentially dangerous. A careful removal of corrosion using mild abrasives (rouge or fine grit aluminum oxide paper) is necessary. Do not overheat metal when removing corrosion. (2) For abrasion, do not use dissimilar material (for example steel wool on aluminum). Remove only material required to clean affected area.		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (4) A clean aircraft will resist corrosion better than a dirty one. Cleaning frequency depends on several factors, including geographical location, type of operation, etc. Remove soil as soon as possible, especially when in a high temperature area.
- (5) After cleaning, verify that no cleaning solution remains in any holes, crevices, or joints as it may lead to increased corrosion. All exposed areas (landing gear, flap tracks, control surface, hinge parts, etc) must be lubricated after cleaning.

C. Inspection

CAUTION: INSPECTION FOR CORROSION MUST BE PERFORMED BY PERSONS FAMILIAR WITH CORROSIVE PROBLEMS AND REMEDIES.

Check for corrosion at every inspection. In trouble areas, inspection frequency must be increased. In addition to routine inspections:

- (1) Aircraft operating around a marine environment must be given special inspections on a weekly basis. See Per Specific Operation / Operating Environment, 5-30-00.
- (2) Aircraft operating in semi-acid conditions must be inspected monthly. Semi-acid conditions are likely to occur in industrialized areas where sulphur-bearing particles in dust, smoke, and smog will attack painted surfaces. See Per Specific Operation / Operating Environment, 5-30-00.
- (3) Inspection for corrosion must be performed by personnel familiar with corrosive problems and remedies.
 - (a) Daily and preflight inspection must include engine frontal areas, all intake vents, engine compartments, gaps, seams, and faying surfaces in exterior skins, wheel and wheel well areas, battery compartment, fuel cell, all other drains, and any bilge areas not requiring extensive removal of inspection access covers.
 - (b) Detailed inspection must include above referenced areas along with areas requiring removal of inspection plates and panels to thoroughly inspect internal cavities of aircraft.
- (4) Paint tends to hide corrosion in its initial stages. The results of corrosion can sometimes be seen as blisters, flakes, chips, and other irregularities in paint.

D. Corrosion Removal and Control

CAUTION: THE DEPTH OF MATERIAL REMOVED MUST NOT EXCEED SAFE LIMITS.

CAUTION: REMOVAL OF SEVERE CORROSION MAY BE CONSIDERED A MAJOR REPAIR. ANY REPAIR OF THIS TYPE MUST BE APPROVED BY THE FAA BEFORE THE AIRPLANE CAN BE RETURNED TO SERVICE.

Corrosion cannot be prevented or eliminated on aircraft; it can only be reduced to an acceptable level by proper control methods.

All corrosion products must be removed prior to refinishing. If not removed, corrosion will begin again, even though affected area is refinished.

- (1) Before beginning any rework:
 - (a) Position airplane in a wash rack or provide some type of washing apparatus for rapid rinsing of all surfaces.
 - (b) Connect static ground line to airplane.
 - (c) Remove airplane battery if required.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (d) Protect pitot-static ports, engine openings, air scoops, louvers, wheels, tires, and other portions of airplane from moisture and chemical brightening agents.
- (e) Protect surfaces next to rework areas from chemical paint strippers, corrosion removal agents, and surface treatment materials.
- (2) Evaluate corrosion damage to determine type and extent of repairs required. Proceed as follows:
 - (a) Light Corrosion: discoloration or pitting. Remove by light hand sanding or a small amount of chemical treatment.
 - (b) Moderate Corrosion: similar to light corrosion except there is blistering or evidence of scaling and flaking. Remove by extensive hand or mechanical sanding.
 - (c) Severe Corrosion: similar to moderate corrosion with severe blistering, exfoliation, scaling, or flaking. Remove by extensive mechanical sanding or grinding.

E. Corrosion Prone Areas

Certain areas are more prone to corrosion than others. The following list is a general guide to areas where corrosion is frequently found.

- (1) Areas around steel fasteners are susceptible to corrosion. The paint on these areas cracks which allows moisture to seep in and corrode the underlying metal. Each time the fastener is removed, it should be coated with fluid resistant epoxy primer (or equivalent) before reinstallation. The paint should be wet when the fastener is installed.
- (2) Fluids tend to seep into faying surfaces, seams and joints due to capillary action. The effect of this type of intrusion is usually detectable by irregularities in the skin's surface.
- (3) Spot welded assemblies are particularly prone to corrosion. The only means to prevent this type of corrosion is by keeping potential moisture entry points in the spot weld filled with a sealant or preservative compound. On an aluminum spot welded assembly, a chromate conversion coating before paint is applied will help prevent corrosion.
- (4) Areas exposed to exhaust gases may have their finish damaged by deposits. These deposits may result in an aggressive attack on the metal by corrosion. Heat from the exhaust may also blister or otherwise damage the paint. Gaps, seams, hinges and fairings are some places where exhaust gas deposits may be trapped and not reached by normal cleaning methods.
- (5) The wheel well and landing gear are the most exposed parts of the aircraft. Due to the complexity of its shape, assemblies and fittings, maintaining a protective coverage is difficult. The especially troublesome areas are:
 - (a) Magnesium wheels: around bolt heads, lugs and wheel well areas:
 - (b) Exposed rigid tubing, B-nuts, ferrules, under clamps and tubing identification tape:
 - (c) Exposed position indicator switches and other electrical equipment:
 - (d) Crevices between stiffeners, ribs and lower skin surfaces.
- (6) Flaps, flight control slots and equipment installed in these areas may corrode unnoticed unless a careful surveillance is maintained.
- (7) Engine frontal areas, air inlet ducts and the leading edge of wings, because they are constantly exposed to abrasion by dirt, dust, gravel and rain, should be checked frequently for the beginning of corrosion.
- (8) Hinges (piano hinges especially) are extremely vulnerable to corrosion. Their protective coatings wear away and they naturally trap dirt, salt and moisture.
- (9) Control cables may have bare spots in their preservative coating which will lead to corrosion. Cables having external corrosion must be checked for internal corrosion. If internal corrosion is present, replace the cable. If only external corrosion is present, remove corrosion with wire brush and recoat cable with preservative.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (10) Check and clean drain holes regularly.
- (11) Battery compartment and vent openings are especially prone to corrosion due to spilled electrolyte. Fumes from overheated battery electrolyte will spread to adjacent areas and cause rapid corrosion of unprotected surfaces. Frequent cleaning and neutralization of deposits will minimize corrosion in this area.
- (12) Magnesium parts are prone to corrosion. Special attention must be given to their surface treatment, proper insulation (due to dissimilar metal corrosion), and paint coatings.
- (13) Electrical components and connectors must be checked. Inspection frequency is based on operational environment and past trouble.
- (14) Skin joints and lap-overs are two areas that can trap and hold moisture. Corrosion in these areas may go unnoticed unless particular attention is paid to them during inspection.
- (15) Hoses, having an internal wire braid, which are located in a position where they are frequently water soaked, need a protective treatment.
- (16) Drilled holes and trimmed ends of sandwich panels must be protected. Use an inhibitor solution or sealant application. Any gaps or cavities which allow dirt or moisture to enter must be filled with sealant.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

REPAIRS

WARNING: NO ACCESS HOLES ARE PERMITTED IN ANY CONTROL SURFACE.

WARNING: USE OF PATCH PLATES FOR REPAIRS OF ALL MOVABLE CONTROL SURFACES IS PROHIBITED. USE OF ANY FILLER MATERIAL NORMALLY USED FOR REPAIR OF MINOR DENTS AND/OR MATERIALS USED FOR FILLING INSIDE OF SURFACES IS ALSO PROHIBITED ON ALL MOVABLE CONTROL SURFACES.

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO CONTROL SURFACE SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

Structural repair methods used for minor repairs must be in accordance with FAA Advisory Circular 43.13-1, latest revision. To assist in making repairs, Figure 1, 51-00-00, identifies type and thickness of various skin material used.

Repairs to areas defined in FAR Part 43, Appendix A, must be shown (using approved engineering data) to not diminish strength or the Fatigue Life of the component, if a life limit is stated herein (see 4-00-00) or in the aircraft type certificate data sheet (TCDS).

When a repair is proposed, it is the responsibility of the repairer per AC 43.13-1 to determine that the proposed repair is not contrary to manufacturer's data. The repairer or aircraft owner or his agent should contact Piper directly to determine that a proposed repair is not in conflict with minimum type design capability.

Temporary repairs, when required, must add Instructions for Continued Airworthiness (ICA) to the maintenance record. Any such ICA must be based on approved data.

Specific, limited, repair procedures for control surface skins are authorized herein in 55-20-00, 55-30-00, 55-40-00, and 57-50-00.

1. Fiberglass Repairs

The repair procedure in this section will describe the methods for the repair of fiberglass reinforced structures. This section describes Touch-up and Surface Repairs such as blisters, open seams, delaminations, cavities, small holes and minor damages that have not harmed the fiberglass cloth material. Also covered are Fracture and Patch Repairs such as puncture, breaks and holes that have penetrated through the structure and damaged the fiberglass cloth. A repair kit, Piper P/N 766-222, that contains the necessary material for such repairs, is available through Piper Distributors.

NOTE: Very carefully follow resin and catalyst mixing instructions furnished with repair kit.

A. Touch-up and Surface Repairs

- (1) Remove wax, oil and dirt from around the damaged area with acetone. Methylethylketone or equivalent and remove paint to gel coat.
- (2) The damaged area may be scraped with a fine blade knife or a power drill with a burr attachment to roughen the bottom and sides of the damaged area. Feather the edge surrounding the scratch or cavity. Do not undercut the edge. (If the scratch or cavity is shallow and penetrates only the surface coat, continue to step (8))
- (3) Pour a small amount of resin into a jar lid or on a piece of cardboard, just enough to fill the area being worked on. Mix an equal amount of milled fiberglass with the resin, using a putty knife or stick. Add catalyst, according to kit instruction, to the resin and mix thoroughly. A hypodermic needle may be used to inject gel into small cavities not requiring fiberglass millings mixed with the gel.
- (4) Work the mixture of resin, fibers and catalyst into the damaged area, using the sharp point of a putty knife or stick to press it into the bottom of the hole and to puncture any air bubbles which may be present. Fill the scratch or hole above the surrounding undamaged area about 0.062 of an inch.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (5) Lay a piece of cellophane or waxed paper over the repair to cut off air and start the cure of gel mixture.
- (6) Allow the gel to cure 10 to 15 minutes until it feels rubbery to the touch. Remove the cellophane and trim flush with the surface, using a sharp razor blade or knife. Replace the cellophane and allow to cure completely for 30 minutes to an hour. The patch will shrink slightly below the structure surface as it cures. (If wax paper is used, make sure the wax is removed from surface.)
- (7) Rough up the bottom and edges of the hole with the electric burr attachment or rough sandpaper. Feather hole into surrounding gel coat, do not undercut.
- (8) Pour out a small amount of resin, add catalyst and mix thoroughly, using a cutting motion rather than stirring. Use no fibers.
- (9) Using the tip of a putty knife or fingertips, fill the hole to about .062 of an inch above the surrounding surface with the gel coat mixture.
- (10) Lay a piece of cellophane over the patch to start the curing process. Repeat step (6), trimming patch when partially cured.
- (11) After trimming the patch, immediately place another small amount of gel coat on one edge of the patch and cover with cellophane. Then, using a squeegee or the back of a razor blade, level with area surrounding the patch; leave the cellophane on patch for one to two hours or overnight, for complete cure.
- (12) After repair has cured for 24 hours, sand patched area, using a sanding block with fine wet sandpaper. Finish by priming, again sanding and applying color coat.

B. Fracture and Patch Repairs

- (1) Remove wax, oil and dirt from around the damaged area with acetone, methylethylketone or equivalent.
- (2) Using a key hole saw, electric saber saw, or sharp knife cut away ragged edges. Cut back to sound material.
- (3) Remove paint three inches back from around damaged area.
- (4) Working inside the structure, bevel the edges to approximately a 30 degree angle and rough-sand the hole and the area around it, using 80 grit dry paper. Feather back for about two inches all around the hole. This roughens the surface for strong bond with patch.
- (5) Cover a piece of cardboard or metal with cellophane. Tape it to the outside of the structure, covering the hole completely. The cellophane should face toward the inside of the structure. If the repair is on a sharp contour or shaped area, a sheet of aluminum formed to a similar contour may be placed over the area. The aluminum should also be covered with cellophane.
- (6) Prepare a patch of fiberglass mat and cloth to cover an area two inches larger than the hole.
- (7) Mix a small amount of resin and catalyst; enough to be used for one step at a time, according to kit instructions.
- (8) Thoroughly wet mat and cloth with catalyzed resin. Daub resin on mat first, and then on cloth. Mat should be applied against structures surface with cloth on top. Both pieces may be wet out on cellophane and applied as a sandwich. Enough fiberglass cloth and mat reinforcements should be used to at least replace the amount of reinforcements removed in order to maintain the original strength. If damage occurred as a stress crack, an extra layer or two of cloth may be used to strengthen area.
- (9) Lay patch over hole on inside of structure, cover with cellophane, and squeegee from center to edges to remove all air bubbles and assure adhesion around edge of hole. Air bubbles will show white in the patch and they should all be worked out to the edge. Remove excess resin before it gels on the part. Allow patch to cure completely.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (10) Remove cardboard or aluminum sheet from outside of hole and rough-sand the patch and edge of hole. Feather edge of hole about two inches into undamaged area.
- (11) Mask area around hole with tape and paper to protect surface. Cut a piece of fiberglass mat about one inch larger than the hole and one or more pieces of fiberglass cloth two inches larger than the hole. Brush catalyzed resin over hole, lay mat over hole and wet out with catalyzed resin. Use a daubing action with brush. Then apply additional layer or layers of fiberglass cloth to build up patch to the surface of structure. Wet out each layer thoroughly with resin.
- (12) With a squeegee or broad knife, work out all air bubbles in the patch. Work from center to edge pressing patch firmly against the structure. Allow patch to cure for 15 to 20 minutes.
- (13) As soon as the patch begins to set up, but while still rubbery, take a sharp knife and cut away extra cloth and mat. Cut on outside edge of feathering. Strip cut edges of structure. Do this before cure is complete, to save extra sanding. Allow patch to cure overnight.
- (14) Using dry 80 grit sandpaper on a power sander or sanding block, smooth patch and blend with surrounding surface. Should air pockets appear while sanding, puncture and fill with catalyzed resin. A hypodermic needle may be used to fill cavities. Let cure and re-sand.
- (15) Mix catalyzed resin and work into patch with fingers. Smooth carefully and work into any crevices.
- (16) Cover with cellophane and squeegee smooth. Allow to cure completely before removing cellophane. Let cure and re-sand.
- (17) Brush or spray a coat of catalyzed resin to seal patch. Sand patch, finish by priming, again sanding and applying color coat.

NOTE: Brush and hands may be cleaned in solvents such as acetone or methylethylketone. If solvents are not available, a strong solution of detergent and water may be used.

2. Thermoplastic Repairs

The following procedure will assist in making field repairs to items made of thermoplastic which are used throughout the airplane. "Chart 1" lists materials needed to perform these repairs along with suggested suppliers. Common safety precautions should be observed when handling some of the materials and tools used while making these repairs. Refer to Vendor Information, Chapter 91, for supplier addresses.

A. Surface Preparation

- (1) Surface dirt and paint if applied must be removed from the item being repaired. Household cleaners have proven most effective in removing surface dirt.
- (2) Preliminary cleaning of the damaged area with perchlorethylene or V M & P Naphtha will generally ensure a good bond between epoxy compounds and thermoplastic.

B. Surface Scratches, Abrasion or Ground-in-Dirt

See "Figure 1".

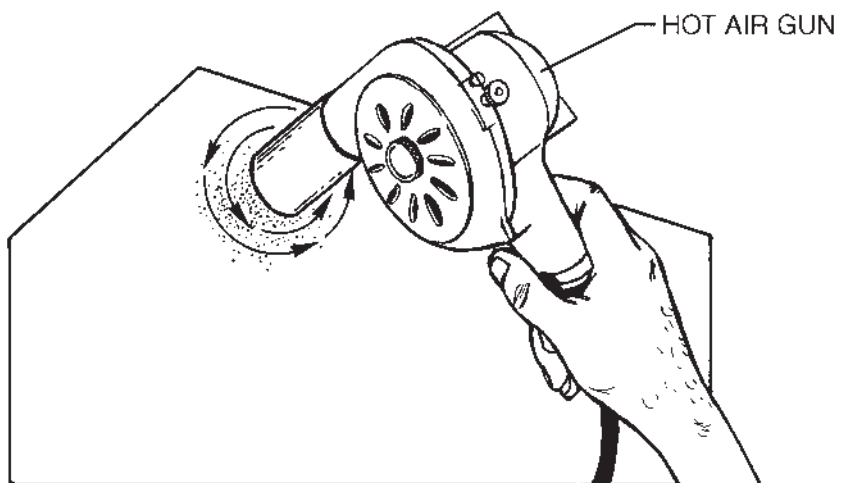
- (1) Shallow scratches and abraded surfaces are usually repaired by following directions on containers of conventional automotive buffing and rubbing compounds.
- (2) If large dirt particles are embedded in thermoplastic parts they can be removed with a hot air gun capable of supplying heat in the temperature range of 300° to 400° F. Use care not to overheat the material. Hold the nozzle of the gun about 1/4 of an inch away from the surface and apply heat with a circular motion until the area is sufficiently soft to remove the dirt particles.
- (3) The thermoplastic will return to its original shape upon cooling.

C. Deep Scratches, Shallow Nicks and Small Holes - Less than 1 inch in diameter

See "Figure 2".

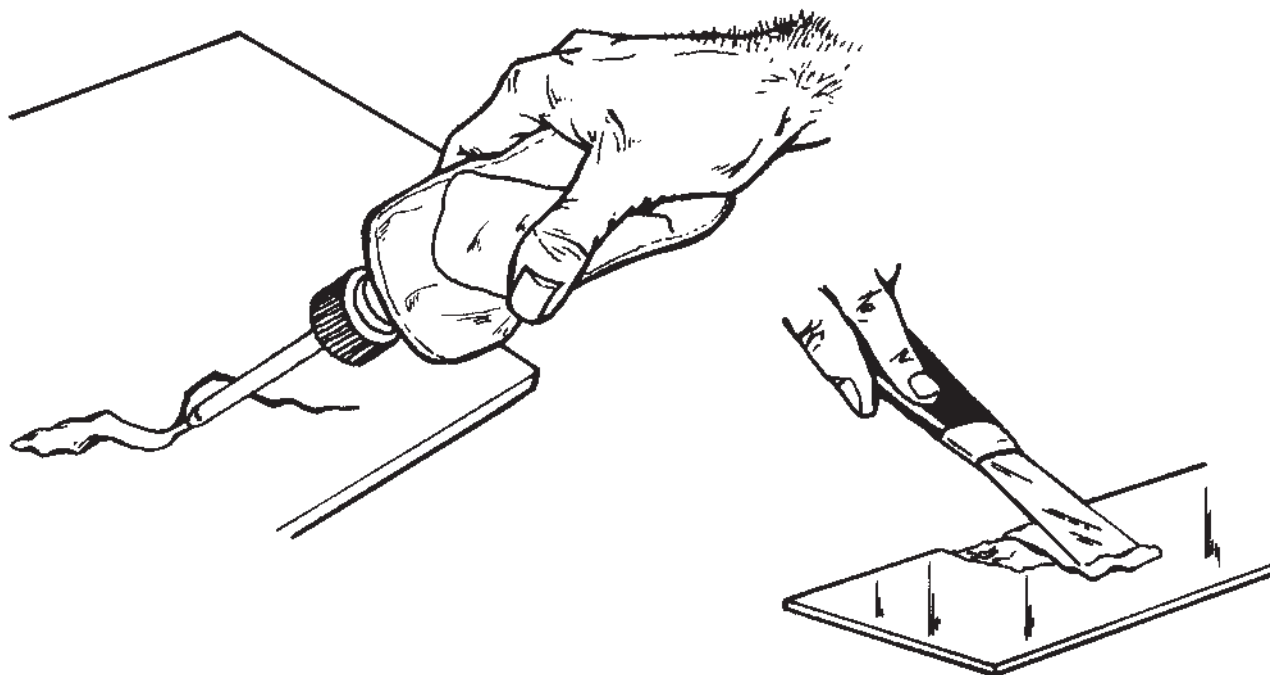
- (1) Solvent cements will fit virtually any of these applications. If the area to be repaired is very small, it may be quicker to make a satisfactory cement by dissolving thermoplastic material of the same type being repaired in solvent until the desired paste like consistency is achieved.

871



Surface Scratches - Abrasions or Ground in Dirt
Figure 1

871



Deep Scratches, Shallow Nicks and Small Holes
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

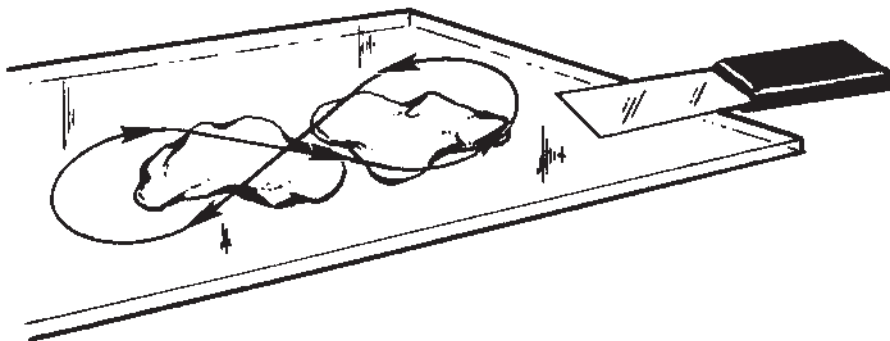
**CHART 1
LIST OF MATERIALS (THERMOPLASTIC REPAIRS)**

Items	Descriptions	Suppliers
Buffing and Rubbing Compounds.	Automotive Type - Rubbing Compound	Obtain From Local Suppliers
	Ram Chemical #69 x 1.	Ram Chemicals Gardena, CA 90248
	Mirror Glaze #1.	Mirror Bright Polish, Co.Inc. Irvine, CA 92713
Cleaners.	Fantastic Spray. Perchlorethylene.	Obtain From Local Suppliers
	V M & P Naphtha (Lighter Fluid).	
ABS-Solvent Cements.	Solarite #11 Series.	Solar Compounds Corp. Linden, N.J. 07036
Solvents.	Methylethylketone.	Local Suppliers.
	Methylene Chloride.	
Epoxy Patching Compound.	Solarite #400.	Solar Compounds Corp. Linden, N.J. 07036
Hot Melt Adhesives Polyamids and Hot Melt Gun.	Stick Form 1/2 in. dia. 3 in. long.	Sears Roebuck & Co. or local Hardware Stores.
Hot Air Gun.	Temp. Range 300° to 400° F	Local Suppliers.

- (2) This mixture is then applied to the damaged area. Upon solvent evaporation, the hard durable solids remaining can easily be shaped to the desired contour by filing or sanding.
- (3) Solvent adhesives are not recommended for highly stressed areas, or thin walled parts or for patching holes greater than 1/4 inch in diameter.
- (4) For larger damages, an epoxy patching compound is recommended. This type material is a two part, fast curing, easy sanding commercially available compound.
- (5) Adhesion can be increased by roughing the bonding surface with sandpaper and by utilizing as much surface area for the bond as possible.
- (6) The patching compound is mixed in equal portions on a hard flat surface using a figure eight motion. The damaged area is cleaned with perchlorethylene or V M & P Naphtha prior to applying the compound (see "Figure 3").
- (7) A mechanical sander can be used after the compound is cured, providing the sander is kept in constant motion to prevent heat buildup.
- (8) For repairs in areas involving little or no shear stress, the hot melt adhesives, polyamids which are supplied in stick form, may be used. This type of repair has a low cohesive strength factor.

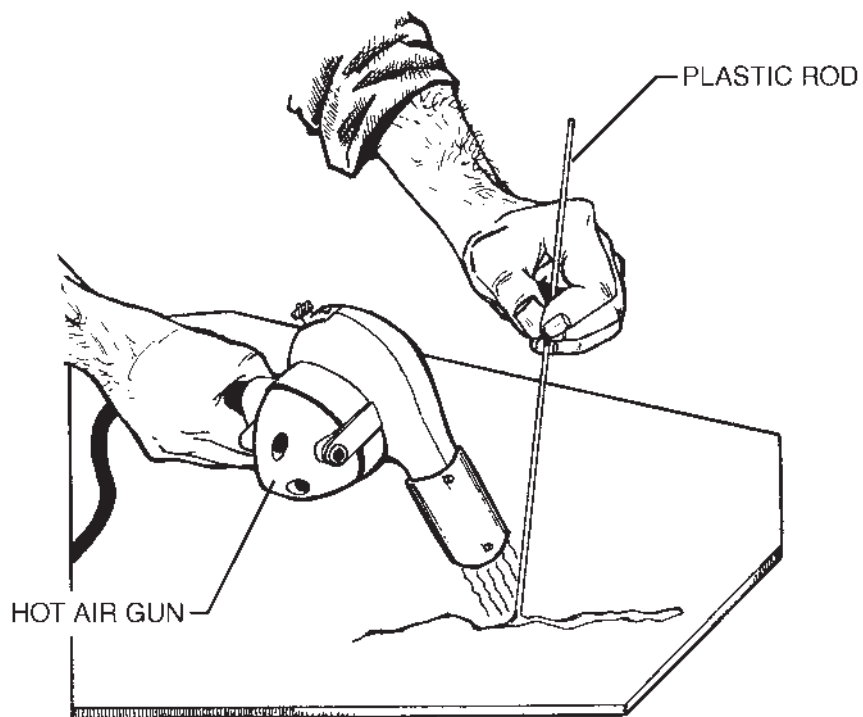
825

MIX THOROUGHLY USING "FIGURE 8" MOTION



Mixing of Epoxy Patching Compound
Figure 3

870



Welding Repair Method
Figure 4

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

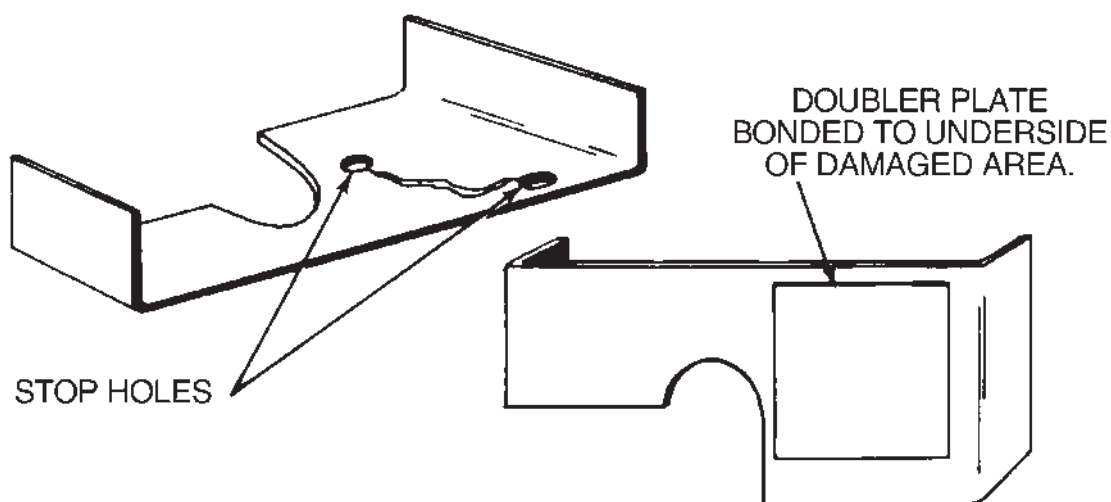
- (9) For repairs in areas involving small holes, indentations or cracks in the material where high stress is apparent or where thin walled sections are used, the welding method is suggested.
- (10) This welding method requires a hot air gun and ABS rods. To weld, the gun should be held to direct the flow of hot air into the fusion (repair) zone, heating the damaged area and rod simultaneously. The gun should be moved continuously in a fanning motion to prevent discoloration of the material. Pressure must be maintained on the rod to ensure good adhesion (see "Figure 4").
- (11) After the repair is completed, sanding is allowed to obtain a surface finish of acceptable appearance.

D. Cracks

See "Figure 5".

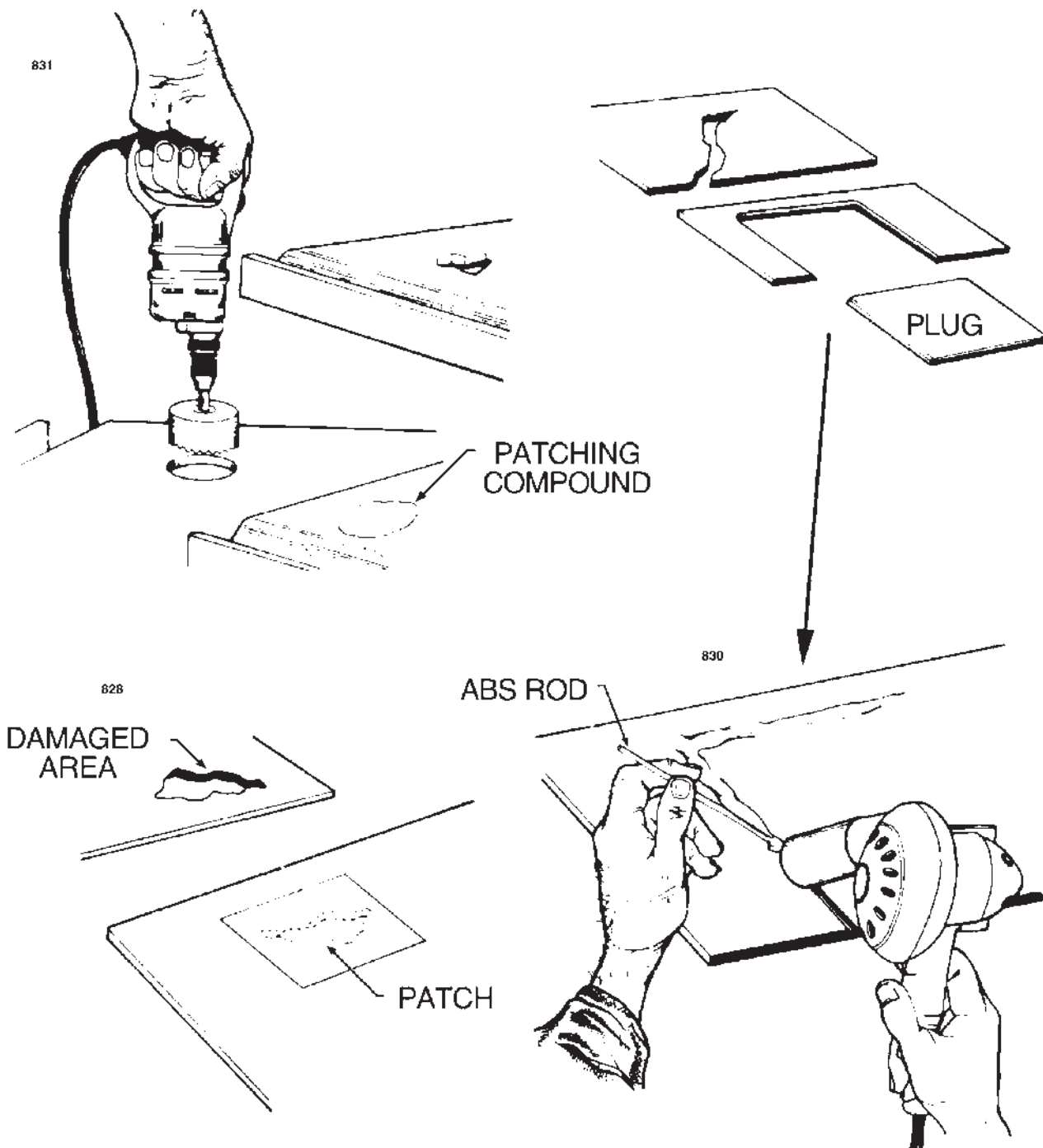
- (1) Before repairing a crack in the thermoplastic part, first determine what caused the crack and alleviate that condition to prevent it from recurring after the repair is made.
- (2) Drill small stop holes at each end of the crack.
- (3) If possible, a double plate should be bonded to the reverse side of the crack to provide extra strength to the part.
- (4) The crack should be "V" grooved and filled with repair material, such as solvent cement, hot melt adhesive, epoxy patching compound or it should be hot air welded, whichever is preferred.
- (5) After the repair has cured, it may be sanded to match the surrounding finish.

827



Repairing of Cracks
Figure 5

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Various Repairs Figure 6

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

E. Repairing Major Damage - Larger than 1 inch in diameter

See "Figure 6".

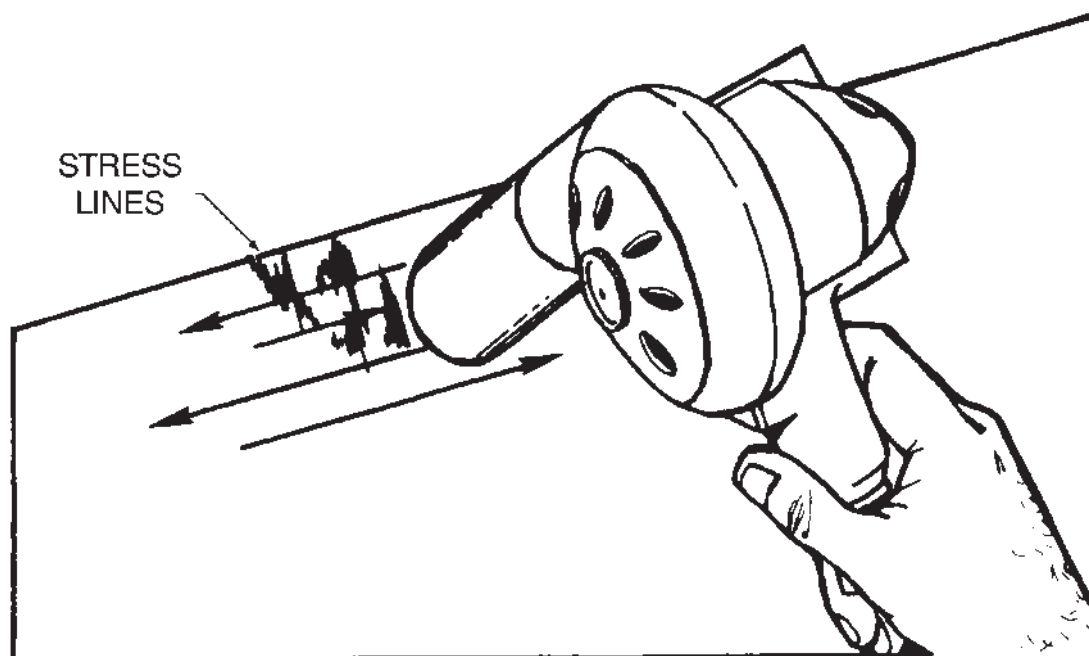
- (1) If possible, a patch should be made of the same material, and cut slightly larger than the section being repaired.
- (2) When appearances are important, large holes, cracks, tears, etc, should be repaired by cutting out the damaged area and replacing it with a piece of similar material.
- (3) When cutting away the damaged area, under cut the perimeter and maintain a smooth edge. The patch and/or plug should also have a smooth edge to ensure a good fit.
- (4) Coat the patch with solvent adhesive and firmly attach it over the damaged area.
- (5) Let the patch dry for approximately one hour before any additional work is performed.
- (6) The hole, etc, is then filled with the repair material. A slight overfill of the repair material is suggested to allow for sanding and finishing after the repair has cured. If patching compound is used, the repair should be made in layers, not exceeding a 1/2 inch thickness at a time. This will allow the compound to cure and ensure a good solid buildup of successive layers as required.

F. Stress Lines

See "Figure 7".

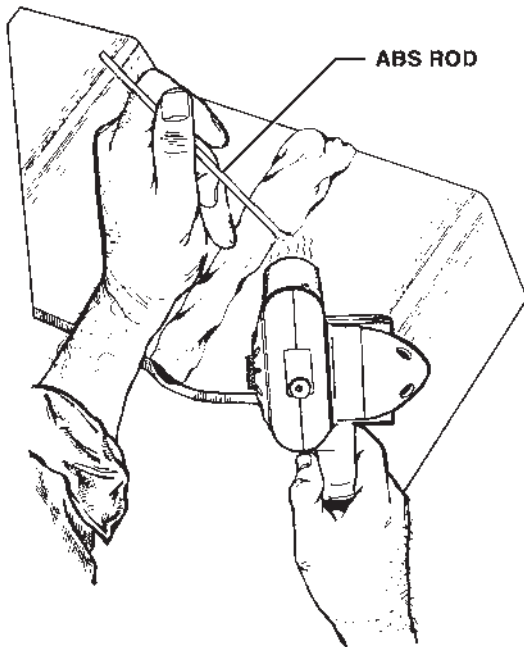
- (1) Stress lines produce a whitened appearance in a localized area and generally emanate from the severe bending or impacting of the material (see "Figure 8").
- (2) To restore the material to its original condition and color, use a hot air gun or similar heating device and carefully apply heat to the affected area. Do not overheat the material.

827



Repair of Stress Lines
Figure 7

829



832



Repair of Impacted Damage
Figure 8

G. Painting the Repair

- (1) An important factor in obtaining a quality paint finish is the proper preparation of the repair and surrounding area before applying any paint.
- (2) It is recommended that parts be cleaned prior to painting with a commercial cleaner or a solution made from one-fourth cup of detergent mixed with one gallon of water.
- (3) The paint used for coating thermoplastic can be either lacquers or enamels, depending on which is preferred by the repair facility or customer.

NOTE: It is extremely important that solvent formulations be considered when selecting a paint, because not all lacquers or enamels can be used satisfactorily on thermoplastic. Some solvents used in the paints can significantly affect and degrade the plastic properties.

- (4) Another important matter to consider is that hard, brittle coatings that are usually best for abrasion resistance should not be used in areas which incur high stress, flexing or impact. Such coating may crack, thus creating a weak area.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Pressure Sensitive Safety Walk Installation

(PIR-PPS45010, Rev. G.)

Pressure sensitive safety walk (i.e. - non-skid) is installed on the right wing root, right inboard flap end, and the top of the boarding step to provide a secure non-slip path to the cabin door.

A. Surface Preparation

- (1) Allow newly painted surfaces to dry a minimum of 2 hours prior to applying the safety walk.
- (2) If the paint becomes contaminated, remove the contamination with clean dry rags or paper wipers moistened with MIL-S-18718 Safety Solvent.
- (3) Prior to applying the safety walk, scuff the applicable surface with Scotch-Brite and wipe with a clean dry cloth, ensuring that no moisture remains on the surface.

B. Application Procedure

- (1) Do not apply when surface temperature is below 50°F.
- (2) Peel back the full width of the protective liner leading edge approximately two inches.
- (3) Adhere the leading edge of the safety walk to the forward edge of the area being covered.
- (4) Remove the remaining protective liner as the safety walk is being adhered from front to back.
- (5) Roll firmly with a long handled cylindrical brush in both lengthwise directions.
- (6) Seal all edges of the safety walk with "3M Company Safety Walk Edge Sealing Compound" (P/N 914-055) or "Flex-Tred Edge Sealer" (P/N 688-440). Position the bead with half the bead on the safety walk and half on the surface on which the safety walk is mounted.

4. Metal / Wire Stitching Repair

(PIR-PPS20024, Rev. B.)

See "Figure 9".

CAUTION: METAL/WIRE STITCHING (AND THE ALTERNATE METHOD OF JOINING DESCRIBED BELOW) SHALL ONLY BE USED FOR NON-STRUCTURAL, NON-LOAD CARRYING APPLICATIONS.

A metal/wire stitching process is used to staple fabric and rubber seal materials to engine baffles and some composite materials. The following alternate method of joining is approved for field use when replacing these fabric and rubber seal materials.

Alternate (Rivet) Method of Joining.

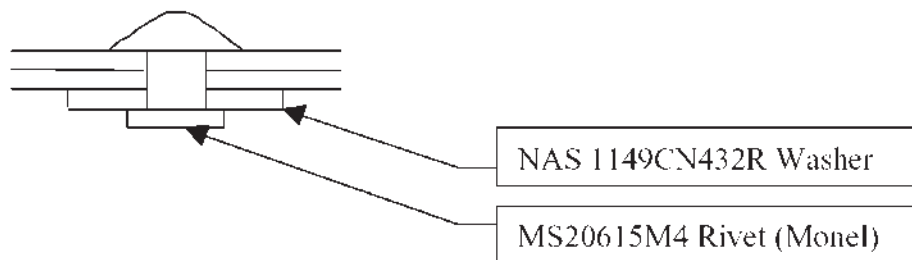
- (1) Substitute two rivets in lieu of each staple where stitching was previously used or is specified. A minimum spacing of .75 inch must be maintained.
- (2) When materials being joined include Stainless Steel, Galvanized Steel or Steel, use:
 - (a) MS20615M4 Rivet (Monel) and NAS1149CN432R Washer (See "Figure 9".)
 - (b) Install with manufactured (factory) head against hardest material. Install washer against opposite side of joint and upset rivet (bucktail) against washer.
- (3) When materials being joined include only aluminum and nonmetallic materials use:
 - (a) MS20470A4 Rivet and NAS1149DN432H Washer (See "Figure 9".)
 - (b) Install with manufactured (factory) head against hardest material. Install washer against opposite side of joint and upset rivet (bucktail) against washer.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

When materials being joined include Stainless Steel, Galvanized Steel or Steel, use:

MS20615M4 Rivet (Monel)
NAS1149CN432R Washer

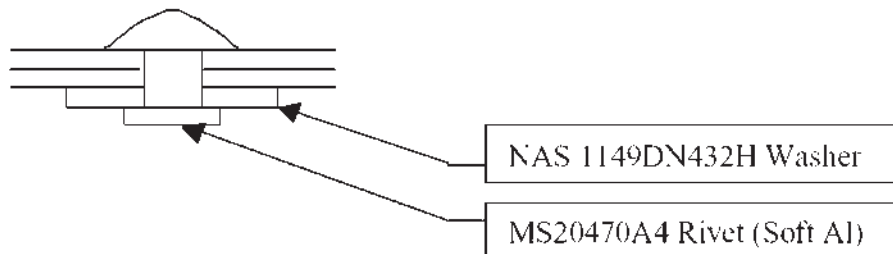
Install with manufactured (factory) head against hardest material. Install washer against opposite side of joint and upset rivet (bucktail) against washer.



When materials being joined include only aluminum and nonmetallic materials use:

MS20470A4 Rivet
NAS1149DN432H Washer

Install with manufactured (factory) head against hardest material. Install washer against opposite side of joint and upset rivet (bucktail) against washer.



Metal / Wire Stitching Repair
Figure 9

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

ELECTRICAL BONDING

See also 23-60-00.

1. General

(PIR-PPS55006, Rev. AO.)

All electrical and electronic equipment and specified components shall be installed in such a manner as to provide a continuous low resistance path (bonds) from the equipment enclosure/component to the airplane structure. Bonds must be installed to ensure that the structure and equipment are electrically stable and free from the hazards of lightning, static discharge, electrical shock, etc.

- A. All parts shall be bonded with as short a lead as possible.
- B. All bonding surfaces shall be cleaned prior to the installation of the bonded joint.
- C. All nuts used in bonding shall be of the self-locking type. (Do Not use fiber-locking type).
- D. All electrical bonding shall be accomplished without affecting the structural integrity of the airframe.

2. 100 Hour Inspection

(PIR-AC 43.13-1, Rev. B.)

Each 100 hours, visually inspect shield and shield terminations of each electrical harness for integrity, condition, and security. If electrical arcing is evident, check for intermittent contact between conducting surfaces. Arcing can be prevented by bonding or insulation, as appropriate.

Inspect the components listed in "Chart 1" as follows:

- A. Bond connections shall be secure and free from corrosion.
- B. Bonding jumpers installed so as not to interfere in any way with the operation of moveable components of the aircraft.
- C. No self-tapping screws used for bonding purposes.
- D. Exposed conducting frames or parts of electrical or electronic equipment should have a low resistance bond of less than 2.5 milliohms to structure. If the equipment design includes a ground terminal or pin, which is internally connected to such exposed parts, a ground wire connection to such terminal will satisfy this requirement.
- E. Parts shall be bonded directly to the primary structure rather than to other bonded parts.
- F. Where aluminum or copper is bonded to dissimilar metallic structures, ensure installed hardware (typically washers) is as called out in the parts catalog to minimize electrolytic corrosion and ensure the hardware should corrode first.

3. On Condition Inspection

Whenever any electrically bonded component (see "Chart 1") is removed and reinstalled, or visual inspection reveals the electrical bonding to be suspect, measure resistance between component and aircraft structure.

To ensure proper operation and suppression of radio interference from hazards, electrical bonding of equipment must not exceed the maximum allowable resistance values specified in "Chart 1".

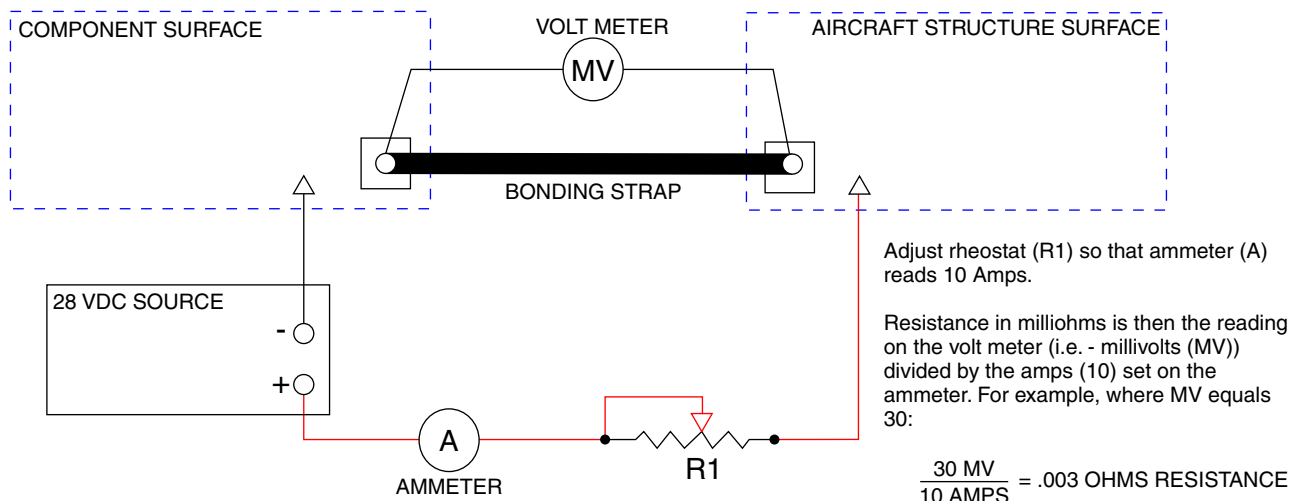
- A. Measurements should be performed after the grounding and bonding mechanical connections are complete to determine if the measured resistance values meet the basic requirements.
- B. A high quality test instrument (an AN/USM-21A or equivalent) will accurately measure the very low resistance values specified.
- C. Another method of measurement is the millivolt drop test as shown in "Figure 1".

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1
ELECTRICAL BONDING RESISTANCE INDEX**

Component	Maximum Allowable Resistance Value in Ohms
Engine Mount(s)	.003
Generator(s)	.010
Ailerons	.003
Elevator / Stabilator	.003
Rudder	.003
Alternator(s)	.010
Trim Tab(s)	
Conventional Hinge	.003
Piano Hinge	.010
Instrument Panel Inserts	.010
Exterior Lights Mounted on Non-Conductive Material	.003
Avionics 'Black Boxes'	.003
NOTE: Harnesses should be installed and connected for this check, internal chassis wiring through the connector to ground is permissible for this grounding.	
Battery Ground Point	.010
NOTE: Where jumper wires or cables are used to accomplish a proper bond, resistance between the jumper terminal and the component or structure shall not exceed .001 ohms. The controlling points for measuring resistance will be within the limits of the cleaned area to be bonded and within 1/4 inch of the exterior limits of the bonding jumper terminal or material called for in the bill of materials of the drawing. Resistance to ground will be measured from wire terminal to structure for electrical / electronic equipment not internally grounded and from mounting flange to structure for equipment that is internally grounded.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Millivolt Drop Test
Figure 1

4. Garmin G1000/G1000 NXi Equipment Electrical Bonding Check

The following procedure verifies proper electrical bonding for Garmin G1000/G1000 NXi system equipment. Perform when equipment is removed and installed, for troubleshooting, and each 1000 hours.

NOTE: Any area that fails shall be re-bonded and re-tested per AC 43.13-1 latest revision.

A. Required Equipment

A milli-ohmmeter capable of measuring 0.001–1.00 ohms.

B. GRS 77 AHRS / GSU 75 ADAHRS

- (1) The unit must be installed in rack with connector removed.
- (2) Test each AHRS unit between unit base and airframe.
- (3) PASS: = ≤ 10 mohms

C. GDC 74 ADC

- (1) The unit must be installed in rack with connector removed.
- (2) Test each ADC unit between unit base and airframe.
- (3) PASS: = ≤ 10 mohms

D. GMU 44 Magnetometer

- (1) Make sure unit is unplugged and secured in mount, mount secured to inspection cover.
- (2) Test between the sensor base and inspection cover mating area with wing skin.
- (3) PASS: = ≤ 10 mohms

E. GDU 10XX Display Unit (2 ea.)

- (1) The Display units must be secured to Instrument Panel with connectors removed.
- (2) Test from a clean metal spot on back side of GDU to back of Instrument Panel.
- (3) PASS: = ≤ 20 mohms.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

F. GTP 59 OAT Probe

- (1) OAT secured to wing skin with harness disconnected.
- (2) Test between the OAT probe and a point on airframe approximately two feet away.
- (3) Use the nut on the OAT probes as test points.
- (4) PASS: = ≤ 2.5 mohms

G. SYSTEM 55X Computer, if installed.

- (1) The unit must be installed in rack with connectors removed.
- (2) Test from a clean metal spot on AP computer to back side of Instrument Panel.
- (3) PASS: = ≤ 20 mohms.

H. GPS Antennas

- (1) GPS antenna secured to airframe with coax cable removed.
- (2) Test from the screws to a point on the airframe that is two feet away.
- (3) PASS: ≤ 2.5 m Ω

I. MFD and PFD Racks

- (1) Test between the rack and aircraft floor.
- (2) PASS: ≤ 10 m Ω

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

5. Lightning Diverter Installation

((PIR-PPS50075, Rev. H)

Lightning Diverters are required with the GDL 59 option only (available in S/N's 22843823, 2843852, 2843854 and up). When installed, one lightning diverter is installed on each side of the dorsal fairing. See "Figure 2" on page 51806.

A. Inspection

Each 100 hours time-in-service, inspect the Lightning Diverters as follows:

NOTE: Any of the following conditions is cause for replacement.

- (1) Paint or adhesive covering the Nickel-plated segments (conductive segments).
- (2) More than 10% of the Nickel-plated segments (conductive segments) missing.
- (3) More than three adjacent Nickel-plated segments (conductive segments) missing.
- (4) Delamination of the assembly.
- (5) Any breaks, cuts, cracks, or tears extending beyond one layer.
- (6) Any break, cut, crack, or tear that causes a disconnection of the Nickel-plated segments from the diverter strip.

B. Removal

- (1) Remove the grounding screw and finishing washer from the upper end of the diverter strip.
- (2) Remove the screw and finishing washer from the lower end of the diverter strip.
- (3) Carefully peel the diverter strip from the surface of the dorsal fairing.

C. Installation

NOTE: In order to function properly, each diverter strip must be installed on the outermost surface of the aircraft, fully exposed to the surrounding atmosphere. Do not cover any portion of the nickel-plated segments with graphics, paint, edge sealant or any other material.

(1) Required Materials

Piper Service Kit No. 88559-003 contains one (1) Diverter Strip and the materials required to install it.

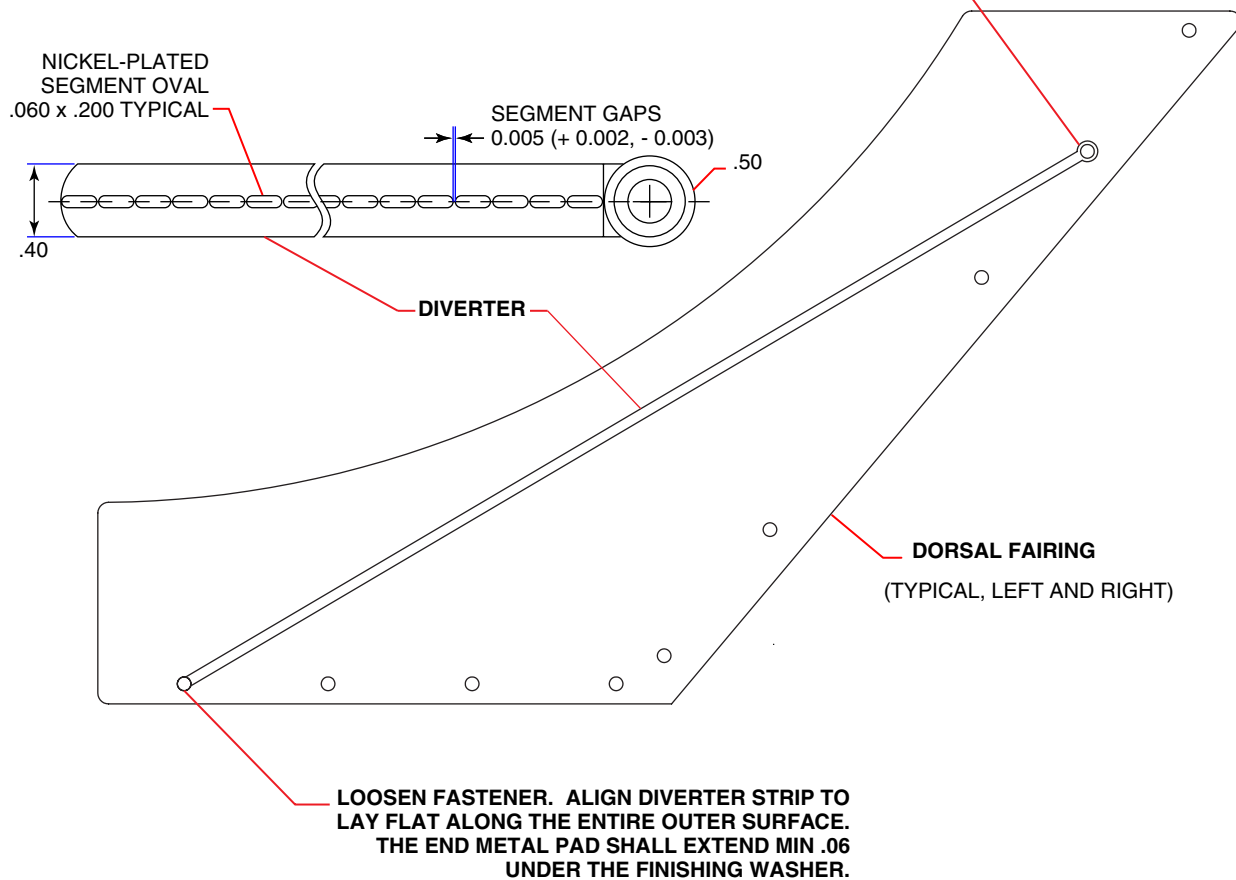
(2) Surface Preparation

- (a) Locate lightning diverter strips per "Figure 2" on page 51806.
- (b) Mark the location and mask off the adjoining surfaces using masking tape.
- (c) Using a fine Scotch-Brite® pad or equivalent, lightly scuff the installation surface using a small circular pattern. Dry wipe sanding residues using a clean cloth.
- (d) Solvent clean the installation surface using isopropyl alcohol and a clean cloth (SAE AMS3819 CLASS 1 GD-A).
- (e) Ensure all materials are within shelf life before applying primer or installing diverter strip. Shake (if applicable) 3M Primer 94 well before opening. Apply 3M Primer 94 (saturated in a P/N 280-686 cloth or pen P/N 279-847) to the installation surface (and backface of as-received bare diverter strip, if applicable), using the minimum amount that will coat the surface. More is not better.
- (f) Allow surfaces to dry for 10 minutes (minimum) and 30 minutes maximum) before applying tape to diverter strip and taped diverter strip to aircraft surface.
- (g) Add 3M F9473PC tape installation to diverter strip prepared per (e) and (f) and trim excess tape prior to aircraft installation.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108017 A 4

REMOVE SCREW AND FINISHING WASHER. PLACE TERMINATED END OF DIVERTER STRIP UNDER FINISHING WASHER. INSERT SCREW AND TIGHTEN TO ALLOW THE DIVERTER STRIP TO BE ROTATED INTO POSITION.



Effectivity
with GDL 59 option only

Lightning Diverter Installation
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(3) Procedure

- (a) Remove protective paper from acrylic adhesive on backside of diverter strip, handling by its edges only.
- (b) Using the location marks (See "Figure 2") as a guide, carefully place diverter strips onto the surface of the dorsal fairing.
- (c) Carefully apply even pressure to surface of diverter strip to assure adequate diverter adhesive bonding and attachment. Pay particular attention to apply pressure to the diverter strip edges. The entire strip should lay flat on the surface with no buckled or raised edges to catch the air stream.
- (d) Remove masking (tape) from surface.
- (e) Apply 3M 3950 Edge Sealer to the edges of the diverter strip (not the metallic surface) by straddling the white diverter strip and the aircraft surface with a ¼-inch brush or dauber and wipe this interface in a smooth continuous motion to provide a fillet-type of seal that extends onto the diverter strip and aircraft structure by approximately 0.1 inch. Ensure that the entire edge is sealed without gaps and verify that the metallic segments are left uncoated. Touch up as required with additional brush coats of edge sealer within two hours. Wipe excess with dry wiper.
 - 1) Solvent wiping with Mineral Spirits may be performed as follows, if necessary to remove excessive or partially cured sealer.
 - a) Moisten a cloth with solvent by pouring onto the cloth.
 - b) Wipe the surface with the moistened cloth in one direction only, followed by wiping with a dry cloth in the same direction. The dry wipe shall occur while the surface is still wet and the applied solvent has not yet evaporated.
 - c) Repeat steps a) and b), as necessary, until excess or partially cured sealer is removed.
 - 2) Air dry or apply heat (up to 250°F) to immediate area to achieve a tack-free condition of edge sealer.

D. Repair

Limited repairs to loose or lifting edges may be accomplished as follows:

- (1) Carefully mask an area on the dorsal fairing 1/16 inch around the diverter strip and on the diverter strip 1/16 inch from the edge.
- (2) Solvent clean the area to be abraded and the area under the loose section of the diverter strip using isopropyl alcohol. Avoid prying the diverter strip up so as not to deform the area.
- (3) Prepare the exposed edge area of the diverter strip by abrading with 220 or finer abrasive paper.
- (4) Repeat the solvent cleaning as directed above.
- (5) Apply two more layers of masking tape on top for the previously applied masking tape being careful to align the edges of the tape because these will define the final repair shape.
- (6) Shake 3M Primer 94 well before opening. Wipe faying surfaces in repair area with a pre-saturated 3M Primer 94 wiper using the minimum amount that will coat the repair areas. Allow surfaces to dry for 10 minutes (minimum) and 30 minutes (maximum) before applying repair adhesive.
- (7) Apply 3M DP-100 (P/N 279-471) under the loose diverter strip and seat the strip.
- (8) Apply the 3M DP-100 over the repair area flush with the top of the masking tape, using a straight edge to create a continuous even overlay of the repair area.
- (9) As soon as the surface of the repair is tack free remove the masking tape by pulling away from the repair and being careful not to disturb the repair.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(10) Inspect the repair for lifted ragged edges. If found, wait 24 hours and if they are still present, trim as required to a fair condition and apply a thin layer of 3M DP-100 to the trimmed area to form a smooth transition to the adjacent surface while staying as close as possible to edge of the sealant.

(11) Allow the repair to cure for a minimum of 24 hours before returning to service.

E. Storage and Handling of Materials

(1) Diverter Strip

Store in original unopened package. Bare diverter strips have unlimited shelf life.

(2) Adhesion Promoter and Repair Adhesive

Stored in original unopened package away from a heat source and oxidizing agents and sunlight between 60° to 80°F. Shelf life shall not exceed 1 year from date of manufacture for 3M Primer 94 and 15 months for 3M DP-100.

(3) Storage Criteria of Edge Sealer

Store in a cool, dry environment. Tightly cap the container after each use. Opening container introduces air that reduces useful shelf life.

CHAPTER

52

DOORS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 52

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
52-List of	1	Mar 6/14			
Effective Pages	2	Mar 6/14			
52-Table of Contents	1	Mar 6/14			
	2	Mar 6/14			
52-00-00	1	Mar 6/14			
	2	Mar 6/14			
52-10-00	1	Mar 6/14			
	2	Mar 6/14			
52-30-00	1	Mar 6/14			
	2	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 52 - DOORS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	52-00-00	1
Description		1
Door Snubber Seals - Replacement		1
<u>PASSENGER / CREW</u>	52-10-00	1
Cabin Door		1
Removal		1
Installation		1
Adjustment		1
Door Latch Assembly		1
Removal		1
Installation		1
Adjustment		1
Door Lock Assembly		2
Removal		2
Installation		2
Door Safety Latch		2
Removal		2
Installation		2
Adjustment		2
<u>CARGO</u>	52-30-00	1
Baggage Door		1
Removal		1
Installation		1
Baggage Door Lock Assembly		1
Removal		1
Installation		1
Baggage Door Hinge		2
Removal		2
Installation		2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

GENERAL

1. Description

This chapter gives information on service and replacement procedures of the cabin and baggage doors.

2. Door Snubber Seals - Replacement

Door snubber seals are incorporated in the door jamb to improve door sealing in the cabin door.

NOTE: If existing seal is torn or badly deteriorated, it should be replaced. If seal is loose or bond is "marginal", it should be rebonded. Adhesives listed below are recommended for rebonding:

3M EC 1300L (Preferred)

Proco Adhesive 6205-1

Scotch Grip 2210

A. To replace door snubber seal, proceed with the following steps:

- (1) Remove windlace retainers, "roll" back windlace (tape to secure) out of way, remove sill scuff plate and disconnect door holder.
- (2) Remove all striker plates except where shown in "Figure 1", Section A-A.
- (3) With a plastic scraper or other appropriate instrument, scrape off snubber while applying mineral spirits as necessary to loosen strip and wipe off excess adhesive with a clean cloth.

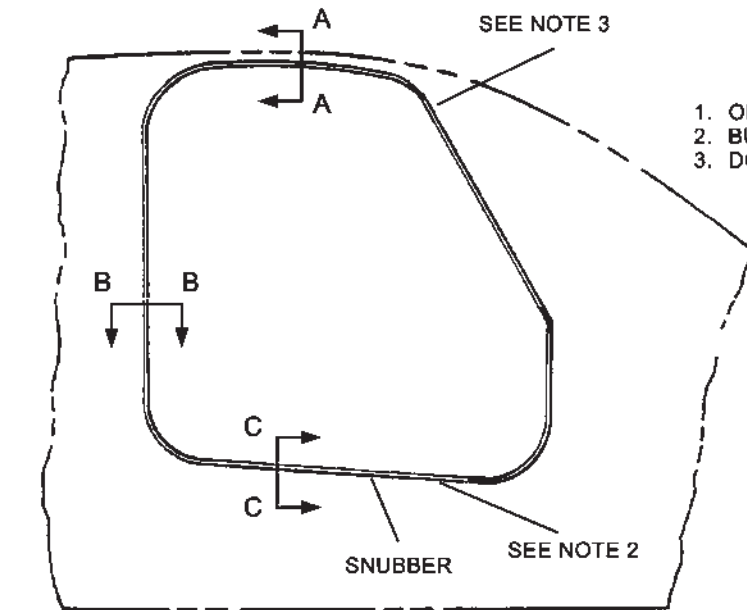
B. Install snubber as follows:

- (1) If door jamb is flaking or excessively scuffed, rub down with wet and dry emery cloth. Clean surface using Prep-Sol or equivalent cleaner which will not leave an oily residue.
- (2) Mask jamb as shown in View D of "Figure 1".
- (3) Apply adhesive to door jamb as shown in View D of "Figure 1".
- (4) Apply adhesive to inside surface of snubber.
- (5) Position snubber with protruding leg facing outboard beginning at lower center of door jamb and work progressively around jamb applying pressure to snubber to remove any trapped air and to ensure a proper bond. Do not prestretch snubber as this can induce cracks.

NOTE: Normal tack time for 3M EC 1300L is 30-45 minutes at 75°F. However, adhesive that has "set" may be reactivated by a clean rag moistened with Toluol or MEK.

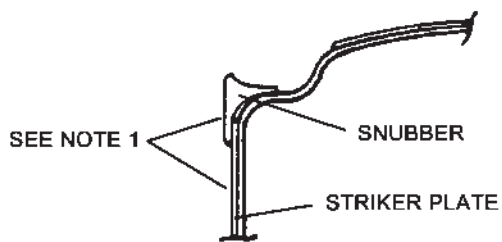
- (6) It takes approximately 1 day for bond to cure. Do Not allow door to close during this period. It is recommended that door be left open as long as possible to effect curing.
- (7) Remove masking tape if used and clean off excessive adhesive smears using Mineral Spirits or Toluol and a clean cloth. Install striker plates, sill scuff plate and windlace as shown in "Figure 1". Connect door holder.
- (8) Check that doors close properly and readjust as necessary to achieve a flush fit. Latching effort must not have increased.
- (9) With all hardware and plates installed, coat snubbers with silicone.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

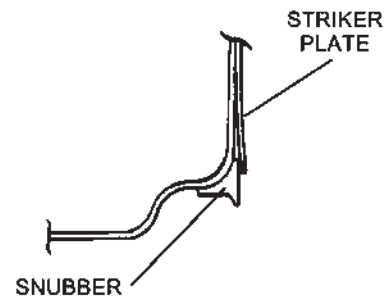


NOTES

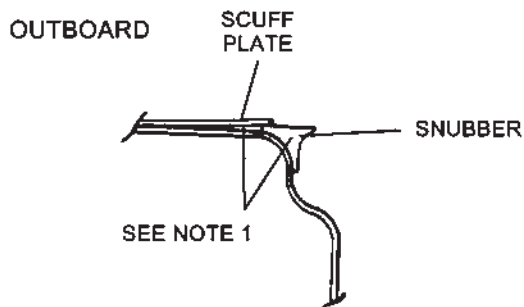
1. ORIENT SNUBBER FLAT WITH THIS SURFACE.
2. BUTT JOINT OCCURS AT DOOR DRAIN AREA.
3. DO NOT STRETCH SNUBBER AROUND CORNERS.



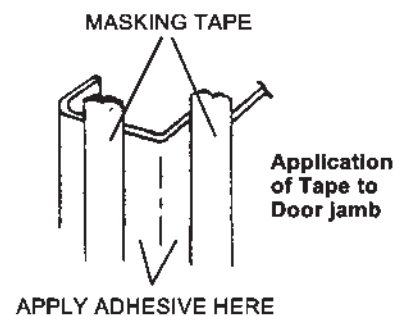
VIEW A-A
(ROTATED)



VIEW B-B



VIEW C-C



VIEW D

Door Snubber Seal Installation
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

PASSENGER / CREW

1. Cabin Door

A. Removal

- (1) Remove the clevis bolt, washer and bushing from the door holder assembly.
- (2) Remove cotter pins, clevis pins and washers from door hinges.
- (3) Remove the door from the airplane.

B. Installation

- (1) Insert the door into position and install the washers, clevis bolts and cotter pins on the door hinges.
- (2) For adjustment of door, refer to Adjustment, below.
- (3) Hook up and install the clevis bolt, bushing and washer into the door holder assembly.

C. Adjustment

- (1) To acquire the proper vertical adjustment of the door, insert the necessary washer combination between the cabin door hinge and fuselage eye bolt.
- (2) To ensure long life of door seals and improve sealing characteristics, lubricate with a dry lubricant in a spray can.

2. Door Latch Assembly

A. Removal

- (1) Remove door latch assembly by removing door trim upholstery and the screws holding latch plate and latch assembly to door.
- (2) Disconnect latch pull rod from the inside door handle.
- (3) Remove complete latch assembly.

B. Installation

- (1) Place latch assembly into position on door.
- (2) Connect latch pull rod to inside door handle.
- (3) Replace screws holding latch plate and assembly to door. Install door trim upholstery and secure with screws.

C. Adjustment

- (1) Loosen screws on striker plate.
- (2) Adjust and tighten screws.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Door Lock Assembly

A. Removal

- (1) Remove door trim upholstery by removing attachment screws.
- (2) Loosen nut on lock assembly and remove lock by turning it sideways.

B. Installation

- (1) Install lock in door by turning it sideways and placing it through the opening.
- (2) Replace nut on back of lock assembly and tighten.
- (3) Replace door trim upholstery and secure with attachment screws.

4. Door Safety Latch

A. Removal

- (1) Remove the two handles and five screws holding pan inside the door.
- (2) Remove pan and pull latch assembly through opening on door.

B. Installation

- (1) Place latch assembly into position for installation.
- (2) Replace pan and install the five screws and handles.
- (3) Check latch assembly for operation and verify it is not rubbing panels.

C. Adjustment

- (1) Remove two screws from latch plate at top of door opening.
- (2) Remove plate and turn loop assembly in or out for adjustment.
- (3) Replace latch plate and secure with two attachment screws.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CARGO

1. Baggage Door

The baggage door is on the right side of the fuselage of wing trailing edge.

A. Removal

With door open, remove hinge pin from hinge and remove door.

B. Installation

Place door so hinge halves are properly matched and install hinge pin. It is not necessary to replace hinge pin with a new pin if it is not bent or worn.

2. Baggage Door Lock Assembly

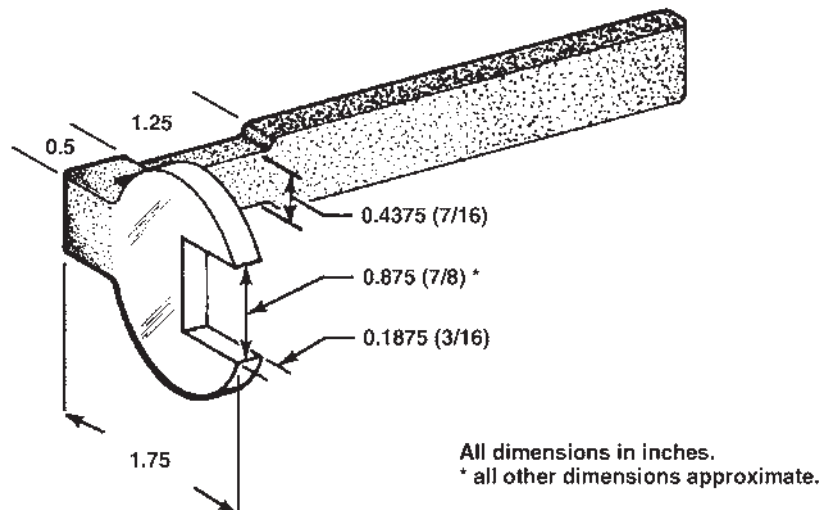
A. Removal

- (1) With door open remove nut from back of lock assembly with a special made wrench. (The tool may be fabricated per dimensions in Figure 1.)
- (2) Remove lock assembly through the front of the door.

B. Installation

- (1) Place lock into position for installation.
- (2) Install nut on lock assembly and tighten with special wrench.

888



Fabricated Tool for Baggage Door Lock
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Baggage Door Hinge

A. Removal

- (1) Remove door from airplane as per removal of baggage door.
- (2) Remove hinge half from airplane or door by drilling out the rivets and removing hinge.

B. Installation

- (1) Place hinge halves together and install hinge pin.
- (2) Install door in the closed position and drill the two end rivet holes. Install the rivets.
- (3) Operate door and check proper fit and installation. Drill remaining holes and install rivets.

CHAPTER

53

FUSELAGE

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 53

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
53-List of	1	Mar 6/14			
Effective Pages	2	Mar 6/14			
53-Table of Contents	1	Mar 6/14			
	2	Mar 6/14			
53-20-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 53 - FUSELAGE

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>MAIN</u>	53-20-00	1
Aft Wing Attach Fittings 100 Hour Inspection		1
Background		1
Procedure		1
Aft Wing Attach Fittings Replacement		3
Removal		3
Installation		3

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

MAIN

1. Aft Wing Attach Fittings 100 Hour Inspection

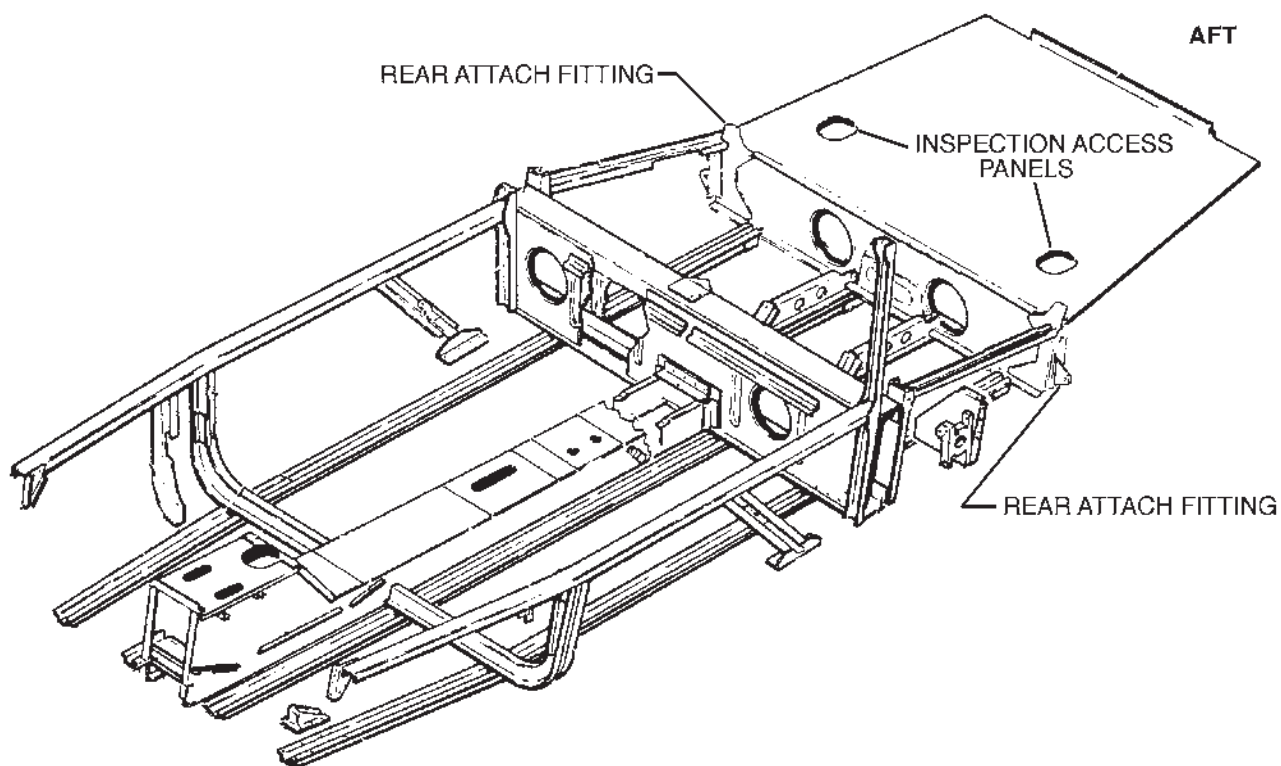
A. Background

Should the seals for the windows and doors not be maintained, leaks may develop which, if not corrected, will allow an ingress of water. This water contamination will wet the insulation around the aft wing attach fittings creating a highly corrosive environment.

B. Procedure

Each 100 hours, inspect to determine condition of the aircraft window and door seals, the condition of the aft wing attach fittings, the insulation material around the affected area, and the drain holes in the bottom fuselage skin at the aft attach fittings area.

- (1) Gain access to the left and right aft wing attach fittings. (See "Figure 1".)
 - (a) Remove rear seats and the rear floorboard.
 - (b) Remove interior mouldings and carpet as necessary.
 - (c) Remove the carpet from the baggage area floor and remove the two access panels in the baggage area floor.



Aft Wing Spar Attachment
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (2) Inspect thoroughly the left and right aft wing attach fittings for evidence of flaking paint and/or corrosion. (Flaking paint may be a symptom of hidden corrosion.) If no corrosion exists, continue with these instructions.
 - (a) If corrosion is superficial and there is no metal flaking and/or pitting, clean and paint fittings, using a good quality aircraft primer.
 - (b) If serious corrosion is found, consult the Piper Illustrated Parts Catalog (P/N 761-898) for replacement part numbers and obtain and install new parts before next flight.
- (3) Upon completion of the inspection and after replacement or refurbishment of fittings, treat the aft attach fittings area using DINOL AV 8 corrosion compound (P/N 89500-800). The treatment may be brushed or sprayed.
- (4) Inspect insulation in and around the rear fittings.
 - (a) If insulation is wet or matted down where it has been wet, it will be necessary to replace this insulation and it will be necessary to inspect all windows, doors, and exterior panels leading to the cabin.
 - 1) Check door seals for deterioration, cracks, and voids in adhesive.
 - 2) Check window seals for voids, cracks, and deterioration.
 - 3) Perform a leak check with water to determine where the water is entering. Cure all leak paths before continuing these instructions.
 - 4) Consult the Piper Illustrated Parts Catalog (P/N 761-898) for replacement part numbers and obtain and install new parts before continued operation.
 - 5) If sealing windows, use P/N 279-058 Sealant (Bostik 1100 FS) or equivalent.
 - 6) If using insulation other than Piper original material, be sure that the insulation is flame resistant and conforms to FAR part 23.853.
 - (b) If the insulation material has not been wet, or if new material is being installed, ensure a six (6) inch clearance in the insulation has been cut out in all directions around each attach fitting.
- (5) Locate the two 0.191 inch drain holes, one beneath each rear attach fitting, in the bottom fuselage skin and ensure each is clean and free of obstruction.
- (6) Re-install floorboards, seats, interior panels, and other articles previously removed. Perform a functional test of any system or component that may have been interrupted or removed.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Aft Wing Attach Fittings Replacement

NOTE: The following is basic guidance. More extensive disassembly may be required to remove the rear attach fitting(s). Thoroughly access the job before beginning to determine if additional steps or parts may be required. Consult the Piper Illustrated Parts Catalog (P/N 761-898) for additional parts as required.

A. Removal

- (1) Remove electrical power from aircraft by disconnecting the battery.
- (2) Place jacks under wings and tail - tie down to stabilize aircraft.
- (3) Remove seats, removable floorboards and interior panels necessary to gain access to the rear wing attach fittings.
- (4) On L/H side, remove bus bar assembly from spar.
- (5) If necessary, drill off cargo compartment floor and remove from aircraft.

NOTE: If both fittings are to be changed, remove and replace one fitting at a time.

- (6) Remove bolt from wing rear spar and fuselage attach fitting.
- (7) Carefully drill out the rivets that attach the fitting to the spar.
- (8) With all the rivets removed, remove wing attach fitting from the aircraft. Discard fitting.
- (9) Clean and inspect the areas that were under bracket for any signs of corrosion.
 - (a) If corrosion is found, repair or replace parts as necessary. Coat the area with primer and allow to dry.
 - (b) If no corrosion is found, coat the area with primer. Allow time to dry.

B. Installation

- (1) Install new wing attach fitting and align rivet holes. It may be necessary to ream open the bolt hole to proper size. The hole is close tolerance and should be .3745 / .3765 (3/8). Replace attach fitting bolt should there be any sign of wear or corrosion.
- (2) Re-rivet wing attach fitting into place with appropriate fasteners.

NOTE: For hard to reach areas, it is permissible to replace the existing MS20470AD-5 rivets with Hi Lok fasteners. Use HL30-5 with HL-94 Hi Lok collars. Torque to 15 to 25 inch lbs. Observe standard practices for use of Hi Lok fasteners.

- (3) Install wing spar and fuselage attach fitting bolt per 57-40-00.
- (4) Seal edges of attach fittings with PRC PR1422 (or equivalent) before installing interior.
- (5) Complete same process to the opposite side.
- (6) Reinstall cargo door floorboard and interior and seats.
- (7) Connect battery and check for operation.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

55

STABILIZERS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 55

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
55-List of Effective Pages	1	Mar 6/14			
	2	Mar 6/14			
55-Table of Contents	1	Mar 6/14			
	2	Mar 6/14			
55-00-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
	5	Mar 6/14			
	6	Mar 6/14			
55-20-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
	5	Mar 6/14			
	6	Mar 6/14			
55-30-00	1	Mar 6/14			
	2	Mar 6/14			
55-40-00	1	Mar 6/14			
	2	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 55 - STABILIZERS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	55-00-00	1
Description		1
Repairs		1
Control Surface Balancing		1
Checking Balance		1
Balancing Equipment		4
Skin Bead Repair		6
Limitations		6
Procedure		6
<u>STABILATOR</u>	55-20-00	1
Stabilator		1
Removal		1
Installation		3
Stabilator Trim Tab		3
Removal		3
Installation		3
Balancing		5
Checking Freeplay		5
Balancing Stabilator		5
Attach Brackets Corrosion Control Inspection		6
Skin Bead Repair		6
<u>VERTICAL STABILIZER</u>	55-30-00	1
Vertical Fin		1
Removal		1
Installation		1
Skin Bead Repair		1
<u>RUDDER</u>	55-40-00	1
Rudder		1
Removal		1
Installation		1
Balancing		2
Skin Bead Repair		2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

GENERAL

This chapter describes removal, installation, and specific, limited, repair procedures for the vertical and horizontal stabilizers (i.e., vertical fin, rudder, and stabilator).

NOTE: When torquing structural assemblies, use standard torque values as found in Chart 2, 91-10-00, unless otherwise stated in this section.

1. Description

The all metal empennage group is a full cantilever design consisting of a stabilator, vertical stabilizer (fin), and rudder, all with removable thermoplastic tips. The stabilator has a trim tab attached that is controllable from the cockpit. The stabilator also incorporates a one channel main spar that runs the full length of the stabilator and hinges to the aft bulkhead assembly of the fuselage.

NOTE: The Archer III Parts Catalog, P/N 761-898, provides detailed views of the individual structural components.

All exterior surfaces are coated with enamel or acrylic lacquer. As an option the airplane may be completely primed with zinc chromate or equivalent.

2. Repairs

WARNING: NO ACCESS HOLES ARE PERMITTED IN ANY CONTROL SURFACES.

WARNING: USE OF PATCH PLATES FOR REPAIRS OF ALL MOVABLE CONTROL SURFACES IS PROHIBITED. USE OF ANY FILLER MATERIAL NORMALLY USED FOR REPAIR OF MINOR DENTS AND/OR MATERIALS USED FOR FILLING INSIDE OF SURFACES IS ALSO PROHIBITED ON ALL MOVABLE CONTROL SURFACES.

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO CONTROL SURFACE SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

Structural repair methods used must be in accordance with FAA Advisory Circular 43.13-1, latest revision. Specific, limited, repair procedures for control surface skins are authorized herein in 55-20-00, 55-30-00, and 55-40-00. See also 51-70-00.

3. Control Surface Balancing

A. Checking Balance

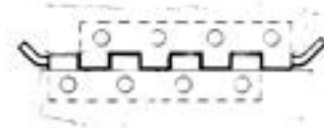
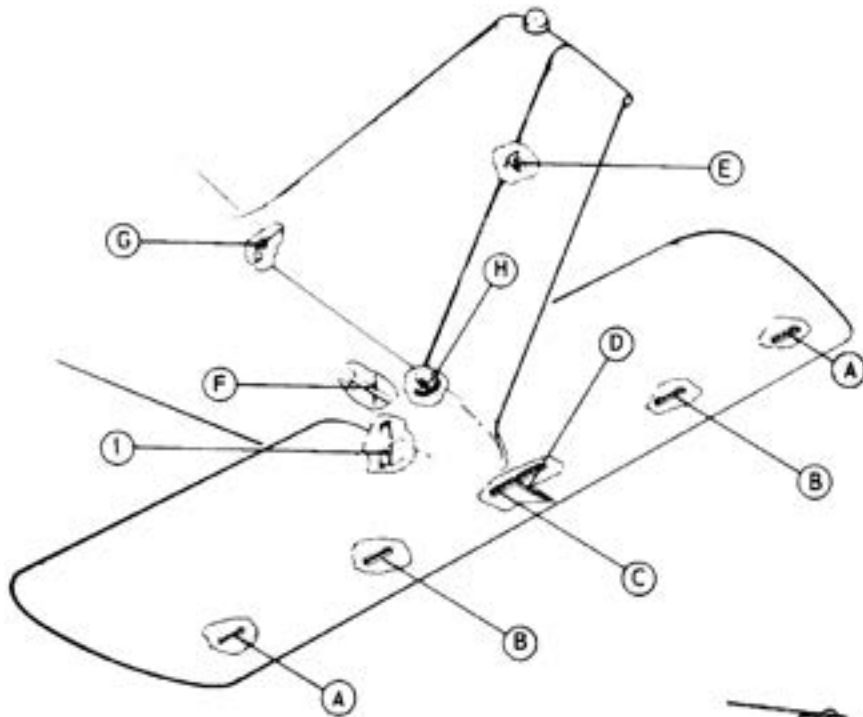
The movable control surfaces have been statically balanced at the time of installation at the factory and normally should not require rebalancing. Where possible the control surfaces were set with the balance weight on the heavy side of the limits, to permit limited repair or paint touch-up without adjusting the balance weight. It should be noted however, that spare control surfaces are delivered unpainted and the static balance will not necessarily fall within the limits provided, especially on stabilators and rudders. All replacement control surfaces, or surfaces that have been repainted or repaired, should be rebalanced when completed according to the procedures and limits given in 55-20-00 (Stabilator) or 55-40-00 (Rudder), as applicable.

Before balancing any control surface, it must be complete and in its final flight configuration as specified under Balancing Equipment, below.

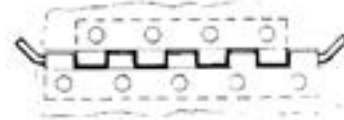
If optional equipment is added or removed after balancing, the control surface must be rebalanced. During balancing, trim/servo tabs must be maintained in their neutral positions.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

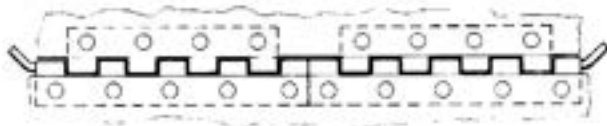
68425 BQ/BR



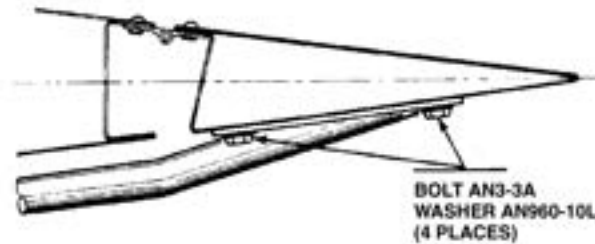
SKETCH A



SKETCH B



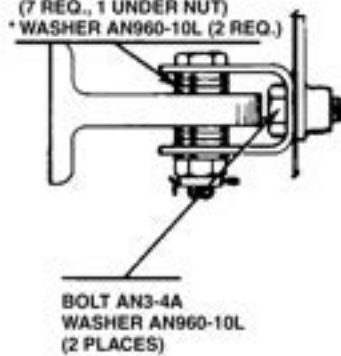
SKETCH C



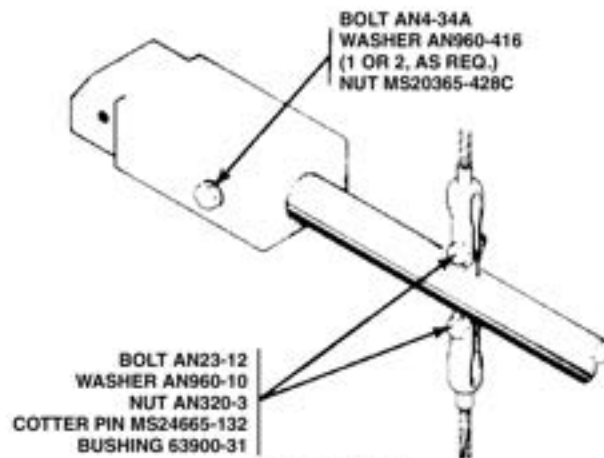
SKETCH D

* USE ANY WASHER COMBINATION BETWEEN FLANGES
OF UPPER AND LOWER PIVOT TO SUIT
BEST CENTERING AND OPERATION OF RUDDER

BOLT AN3-11
NUT AN310-3
COTTER PIN MS24665-132
* WASHER AN960-10
(7 REQ., 1 UNDER NUT)
* WASHER AN960-10L (2 REQ.)



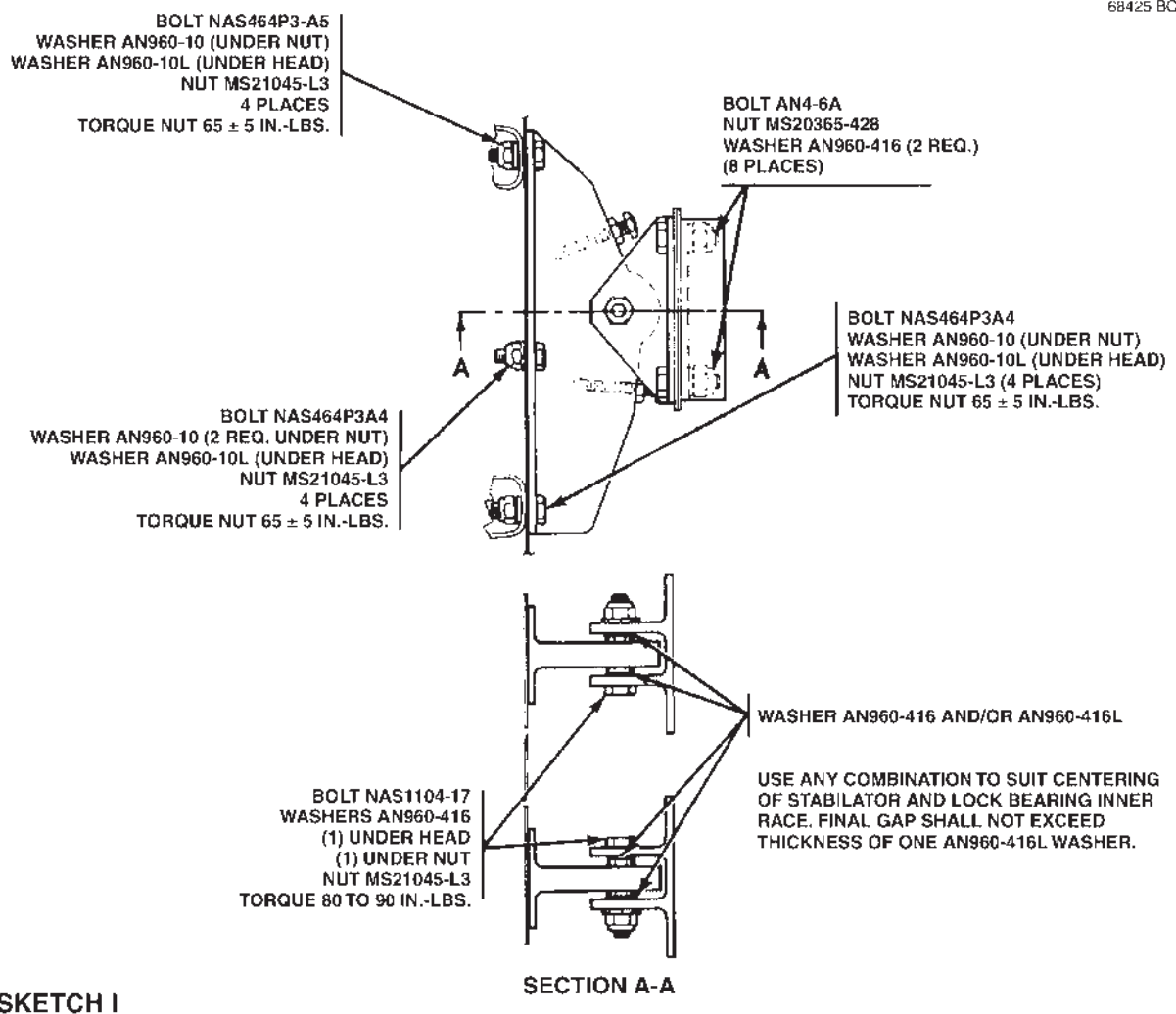
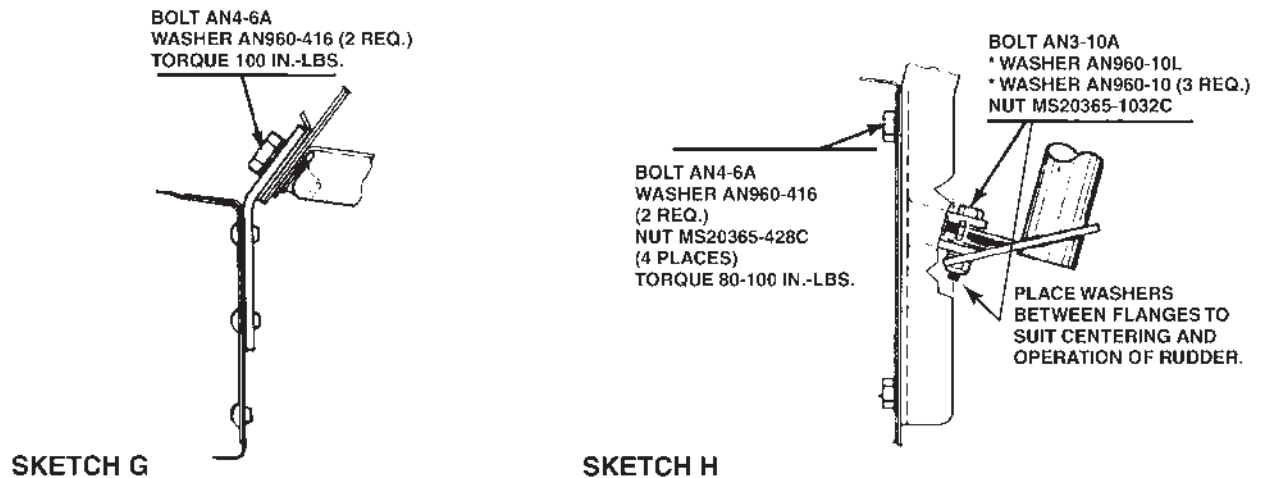
SKETCH E



SKETCH F

Empennage Installation
Figure 1 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Empennage Installation
Figure 1 (Sheet 2 of 2)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Balancing Equipment

(PIR-PPS50015, Rev. AG.)

Balancing must be done using a suitable tool capable of measuring unbalance in inch-pounds from the centerline of the control surface hinge pin. See the tool configuration in Figure 2. Other tool configurations may be used if accuracy is maintained and recalibration capability is provided.

To use this tool:

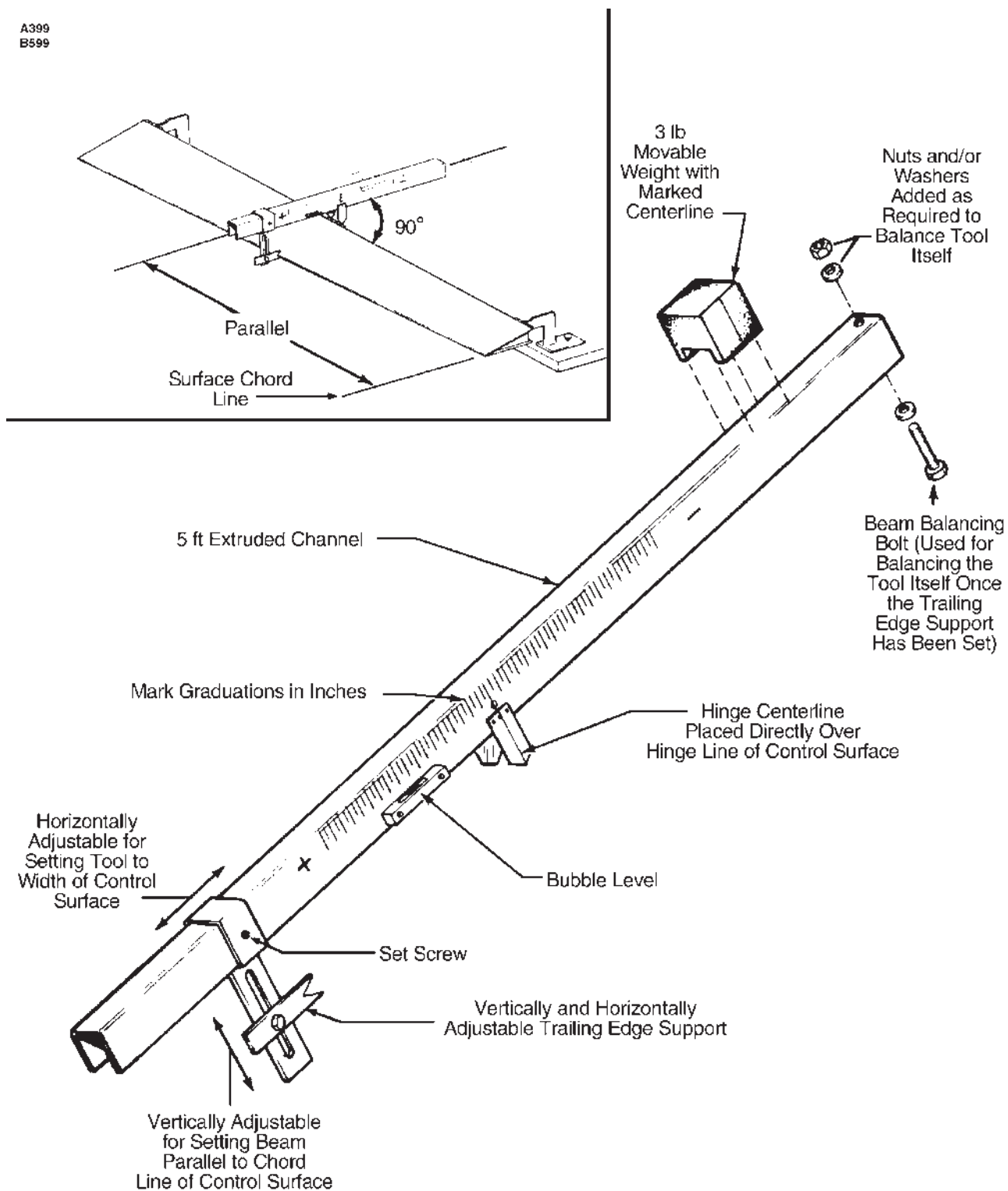
- (1) Ensure that the control surface is in its final flight configuration (i.e., including tips, trim/servo tabs as applicable, surface and tab actuating arms or pushrods with bearings as applicable, and all optional equipment which will be mounted on or in the surface when it is flown, including position lights and wiring, static wicks, etc.). The surface should be painted, decals applied, and trim/servo tabs should be in the neutral position.

NOTE: Because paint is a considerable balance factor, it is recommended that existing paint be removed prior to repainting a control surface.

- (2) Place hinge bolts through control surfaces and place control surface on a holding fixture.
- (3) Calibrate the tool.
 - (a) Avoiding rivets, place the balancing tool on the control surface with the tool's hinge centerline directly over the hinge line of the control surface.
 - (b) Adjust the movable trailing edge support to fit the width of the control surface. Tighten the set screw on the trailing edge support.
 - (c) Adjust the trailing edge support vertically until the beam is parallel with the control surface chord line.
 - (d) Remove the tool from the control surface and balance the tool itself by adding or removing nuts or washers from the beam balancing bolt. When balancing the tool, the movable weight must be at the bar's hinge centerline.
- (4) After balancing the tool, reattach it to the control surface per "Figure 2" and as described in the appropriate section for that control surface. Keep the beam positioned 90° from the control surface hinge line.
- (5) Determine balance of control surface by sliding movable weight along the balance beam.
- (6) Read the scale when the bubble level has been centered. Multiply by three to determine inch-lbs. (I.E. - Since the movable weight weighs three pounds, every inch it is moved from the center of the beam equals three inch-lbs of force.)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

A399
B599



Control Surface Balancing Tool
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

4. Skin Bead Repair

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO CONTROL SURFACE SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

NOTE: This repair is authorized only as a temporary measure until replacement parts (i.e. - skins) can be obtained and installed.

A. Limitations

Repair of minor cracks in stabilator, vertical fin, and rudder control surface skins only is authorized, but limited as follows:

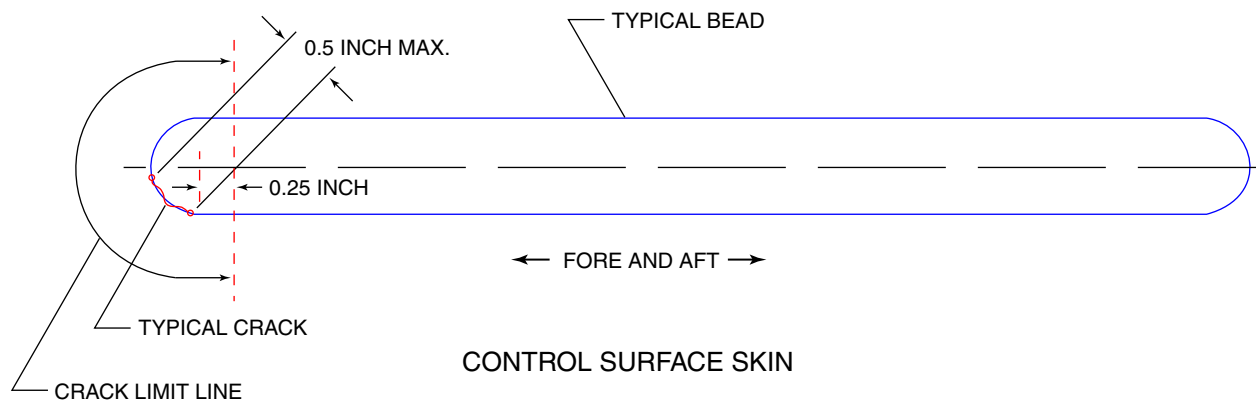
- (1) Cracks of no more than 0.5 inch at the ends of the skin stiffening beads;
- (2) No more than two cracks per surface side.
- (3) Cracks are limited to either end of a bead (see "Figure 3"), but not on the same bead;
- (4) For wrap-around skins, two crack repairs are acceptable per side, but repairs may not be opposite to one another on opposite sides (i.e. - top and bottom or left and right).
- (5) Bead crack repairs on top surface stabilator skins are not authorized.

B. Procedure

Only cracks confined to the bead end area shown in "Figure 3" may be repaired.

- (1) Cracks 0.5 inch long or less may be repaired by stop drilling;
- (2) Stop drill the extreme ends of the crack with a #50 (0.070) drill.

NOTE: Cracks stop drilled once cannot be stop drilled again, should crack growth continue.



Skin Bead Repair
Figure 3

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

STABILATOR

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO BOTTOM STABILATOR SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

1. Stabilator

A. Removal

Refer to 55-00-00, "Figure 1".

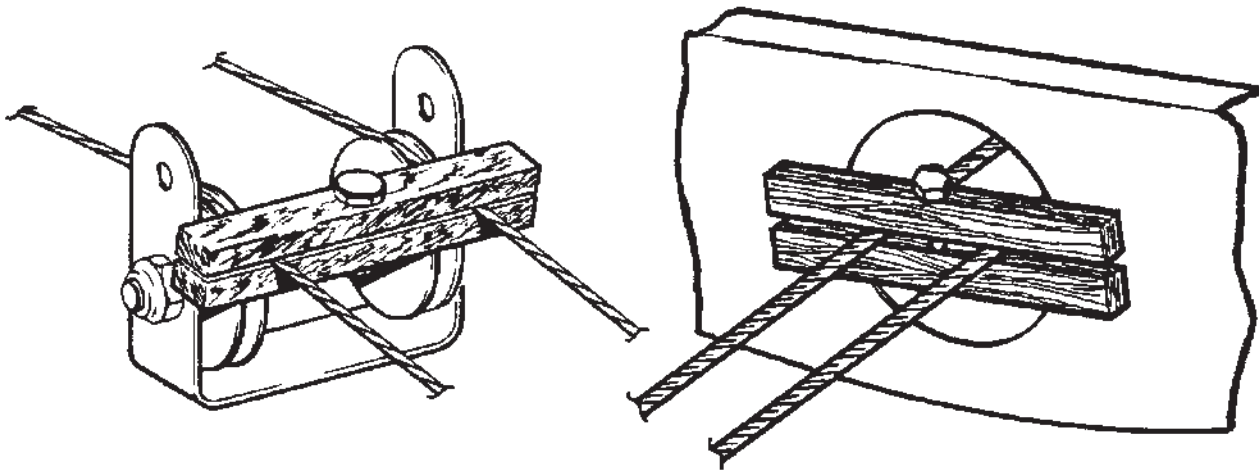
CAUTION: BEFORE ENTERING THE AFT PORTION OF FUSELAGE, ATTACH A STAND TO THE TAIL SKID FOR SUPPORT. USE A HEAVY PAD TO PROTECT THE INSIDE OF THE FUSELAGE. DISTRIBUTE WEIGHT ON TOP OF THE BULKHEADS TO AVOID DAMAGE TO THE FUSELAGE SKIN.

CAUTION: USE RUDDER PEDALS OR TOW BAR TO MOVE RUDDER TO EXTREME LEFT OR RIGHT FOR CLEARANCE.

CAUTION: AT EACH REMOVAL OF THE STABILATOR, CONDUCT STABILATOR ATTACH BRACKETS CORROSION CONTROL INSPECTION, BELOW.

- (1) Remove screws from around upper and lower tail cone fairing assembly and remove fairing separately.
- (2) Block trim cable at barrel of trim screw assembly to prevent cable from unwrapping.
- (3) Remove access panel to the aft section of fuselage at the back wall of the baggage compartment.
- (4) Install cable blocks, per "Figure 1", on the stabilator trim control cable at the first set of pulleys forward of the cable turnbuckles to prevent the forward cable from unwrapping.
- (5) Disconnect trim cables at turnbuckles within the aft section of fuselage.
- (6) Relieve tension from stabilator control cables by loosening one of the cable turnbuckles in the aft section of fuselage.
- (7) Disconnect stabilator control cables from stabilator balance arm by removing cotter pins, nuts, washers, bushings, and clevis bolts.
- (8) Disconnect tab control arm connecting links from trim screw by removing nut, washers, bushings and bolts.
- (9) Disconnect trim assembly from the aft bulkhead of fuselage by removing attaching nuts, washers, and bolts of the horizontal and diagonal support brackets.
- (10) Move trim assembly up through tail cone fairing cutout in stabilator and remove, with cable, from airplane.
- (11) Remove stabilator by disconnecting it at its hinge points. Remove attaching nuts, washers, and bolts.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Method of Securing Control Cable
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Installation

WARNING: IF THE STABILATOR HAS BEEN REPLACED, REPAINTED, OR REPAIRED AS AUTHORIZED IN THIS MANUAL, OR THE TRIM TAB HAS BEEN REPLACED OR REPAINTED; THE STABILATOR MUST BE BALANCED BEFORE INSTALLATION. SEE BALANCING, BELOW.

CAUTION: A CLEARANCE OF 0.25 ± 0.06 INCH BETWEEN STABILATOR AND THE SIDE OF FUSELAGE AND 0.18 INCH MINIMUM BETWEEN ALL PARTS OF STABILATOR AND TAIL CONE ASSEMBLY MUST BE MAINTAINED THROUGHOUT STABILATOR TRAVEL. USE A PROPER WASHER COMBINATION ON STABILATOR HINGES FOR NECESSARY TOLERANCES.

- (1) Insert stabilator in position and install attaching hinge bolts, washers, and nuts.
- (2) Move trim assembly through the cutout in stabilator and attach assembly brackets to the aft bulkhead with bolts, washers, and nuts. Insert trim cable ends into fuselage.
- (3) Attach stabilator control cables to stabilator balance arm with clevis bolts. Bushings, washers, nuts and cotter pins.
- (4) Connect the ends of the fore and aft trim cables at the turnbuckles within the aft section of fuselage.
- (5) Remove cable block from trim control cable within fuselage.
- (6) Set stabilator control cable tension and check rigging and adjustment per Rigging and Adjustment of Stabilator, see 27-30-00.
- (7) Remove cable blocks from trim cable at barrel of trim screw assembly.
- (8) Set stabilator trim control cable tension and check rigging and adjustment per instructions in 27-30-00. Connect tab control arm to trim screw (with the control arm connecting links) with bolt, bushings, washers, and nut. Check tab attachment bolt head is on the side next to trim indicator cable to ensure no interference with indicator cable.
- (9) Remove pad from the aft section of fuselage and replace access panel.
- (10) Install tail cone fairing and remove tail stand.

2. Stabilator Trim Tab

A. Removal

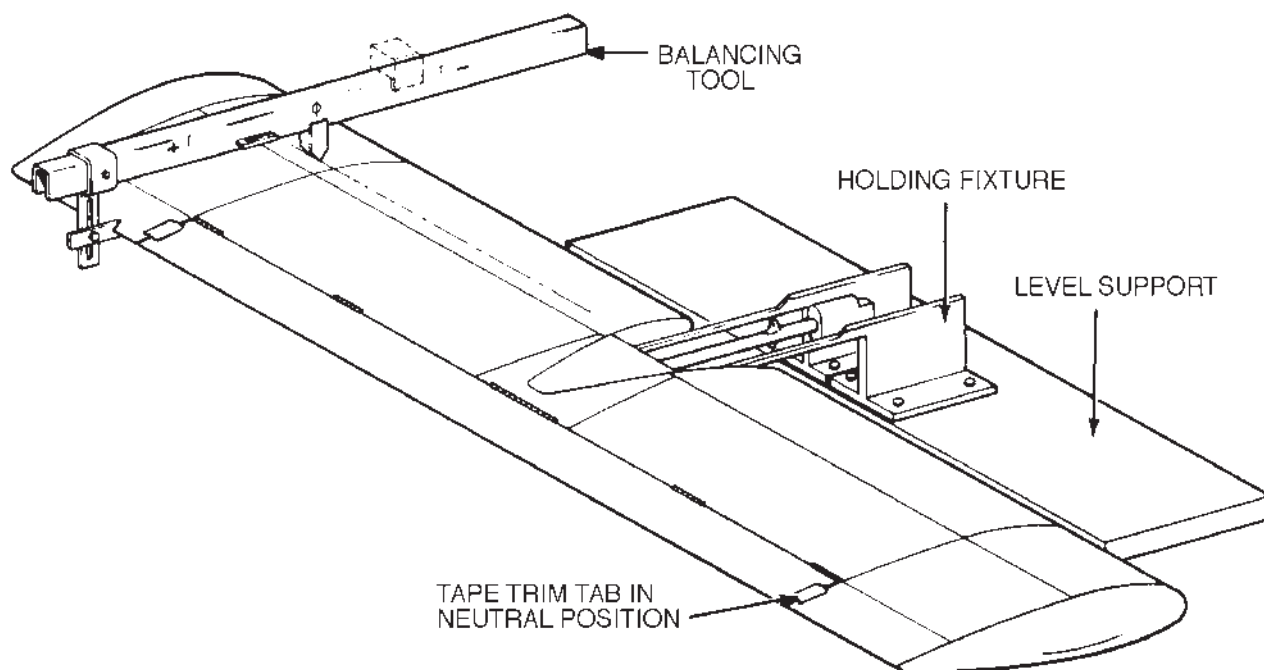
Refer to 55-00-00, "Figure 1".

- (1) Disconnect stabilator trim control rod by removing bolts that attach control rod to stabilator trim tab.
- (2) Remove stabilator trim hinge pins by cutting one end of the wire pins.
- (3) Remove stabilator trim tab.

B. Installation

- (1) Place trim tab in position on the aft end of stabilator.
- (2) Insert new pins and secure by bending end to a 45 degree angle.
- (3) Install control rod and attach with the four bolts and washers.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



BALANCE LIMITS	
HEAVY SIDE LEADING EDGE	HEAVY SIDE TRAILING EDGE
+5 IN. LB.	-40.0 IN. LB.

Stabilizer Balancing
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Balancing

WARNING: ALL CONTROL SURFACES THAT HAVE BEEN REPLACED, REPAINTED, OR REPAIRED AS SPECIFIED IN THIS MANUAL MUST BE BALANCED BEFORE INSTALLATION.

A. Checking Freeplay

Do the following checks before balancing to verify free play in stabilator and stabilator trim tab:

- (1) Stabilator: Check for any free play at its attachment points by grasping each half near the tip and gently trying to move it up and down, fore and aft, and in and out. No play is allowed.
- (2) Stabilator Trim Tab: Set stabilator trim tab in neutral position. Neutral position is determined with airplane properly rigged per 27-20-00 instructions and trim indicator in neutral position. Use a straightedge long enough to extend from the ground to a few inches above trim tab trailing edge. Place straightedge next to trim tab inboard (center) trailing edge, secure stabilator in neutral and grasping tab, gently move it up and down. Mark the limit of tab free play on straightedge. Overall travel (free play) must not exceed 0.06 inch. Use a dial indicator and fixed stand.

B. Balancing Stabilator

See Control Surface Balancing, 55-00-00, and "Figure 2".

To balance stabilator, assembly must be complete including trim tab, tab pushrod and end bearing, stabilator tips and all attaching screws, and in its final Flight configuration as described in Balancing Equipment under Control Surface Balancing in 55-00-00. Before balancing, tape trim tab in neutral position with a small piece of tape. Place complete assembly on knife edge supports in a draft-free area allowing unrestricted movement. Place tool on stabilator with beam perpendicular to hinge centerline. Do not place tool on trim tab. Use and calibrate tool as described in Balancing Equipment under Control Surface Balancing in 55-00-00. Read scale when bubble level has been centered by adjustment of the movable weight and determine static balance limit. If static balance is not within limits given, proceed as follows:

- (1) If stabilator is out of limits on leading edge heavy side, remove balance plates from mass balance weight until static balance is within limits. Do not adjust stabilator tip balance weight.
- (2) If stabilator is out of limits on trailing edge heavy side, add balance plates to mass balance weight until static balance is within limits.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

4. Attach Brackets Corrosion Control Inspection

NOTE: This inspection incorporates the requirements of Piper Service Bulletin No. 856.

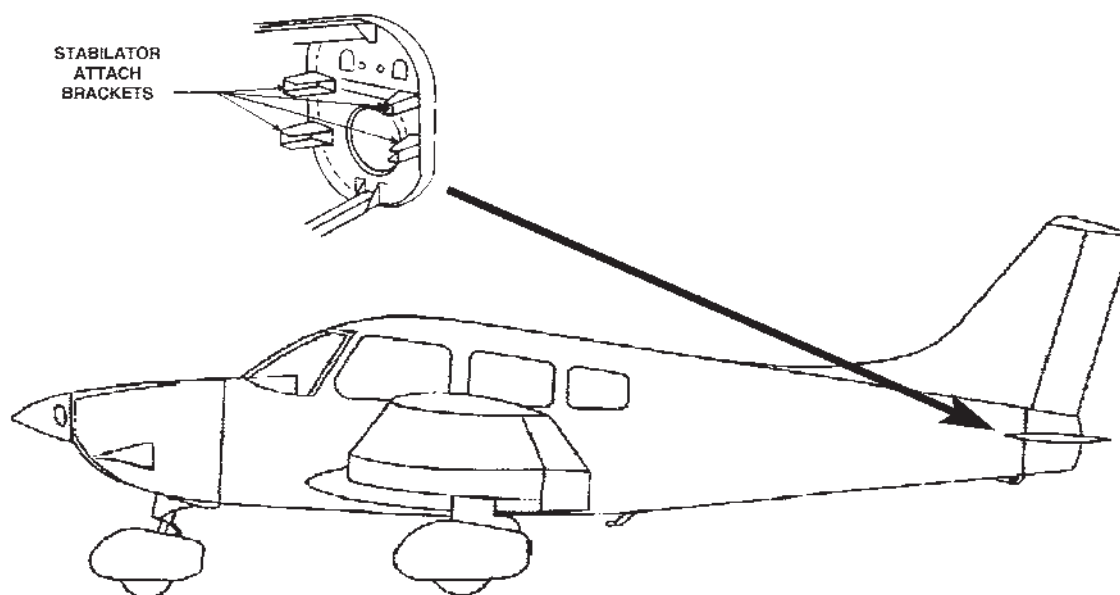
At each annual inspection (and at each removal of the stabilator):

- A. Remove upper and lower tailcone fairing assembly.
- B. Remove the aft fuselage closeout plate assembly.
- C. Inspect the steel attach fittings (4 places) for the stabilator and adjacent fuselage structure for presence of rust and/or corrosion. (See "Figure 3".)
- D. If rust and/or corrosion is present, repair or replace as required, and add corrosion protection per latest revision of AC43.13-1.
- E. Reinstall aft fuselage closeout plate assembly. (Verify integrity of rubber seals, replace if required).
- F. Reinstall upper and lower tailcone fairing assembly.

5. Skin Bead Repair

Limited stabilator skin repairs are authorized for the bottom skin surface only as specified in Repairs - Skin Bead Repair, 55-00-00.

NOTE: This repair is authorized only as a temporary measure until replacement parts (i.e. - skins) can be obtained and installed.



Stabilator Attach Brackets Corrosion Control Inspection
Figure 3

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

VERTICAL STABILIZER

1. Vertical Fin

A. Removal

Refer to 55-00-00, Figure 1.

- (1) Remove screws from upper and lower tail cone fairing, fin tip cover, and fairing at forward base of fin.
- (2) Remove rudder per instructions given in 55-40-00.
- (3) Disconnect leads from antenna terminals (optional) and attach a line to leads to aid installation.
- (4) Disconnect wire antenna (optional), if installed, that attaches to leading edge of fin.
- (5) Disconnect positive lead to rotating beacon (optional), if installed, and attach a line prior to removal. Disconnect ground lead by removing attaching screw.
- (6) Remove stabilator trim assembly and aft trim cable in accordance with Stabilator Trim Controls - Aft Stabilator Trim Assembly - Removal, 27-30-00.
- (7) Remove bolt and washer attaching leading edge of fin to fuselage.
- (8) Remove nuts, washers, and bolts that secure fin spar to the aft bulkhead, and remove vertical fin.

B. Installation

- (1) Insert vertical fin into position and install bolts, washers, and nuts that secure fin spar to the aft bulkhead. Torque as shown in Figure 1, 55-00-00.
- (2) Install bolt and washer attaching leading edge of fin to fuselage. Torque as shown in Figure 1, 55-00-00.
- (3) Install stabilator trim assembly and aft trim cable per instructions given in Stabilator Trim Controls - Aft Stabilator Trim Assembly - Installation, 27-30-00.
- (4) Install rudder per instructions given in 55-40-00.
- (5) Pull electrical and antenna leads through vertical fin with the line that was attached.
- (6) Connect antenna leads to proper terminals and secure with washers and nuts.
- (7) Connect electrical leads at the disconnects and insulate.
- (8) Rig and adjust rudder and trim control cables per 27-20-00.
- (9) Check operation of radios and electrical lights.
- (10) Replace all fairings and access plates, and secure with attaching screws.

2. Skin Bead Repair

Limited vertical fin skin repairs are authorized only as specified in Repairs - Skin Bead Repair, 55-00-00.

NOTE: This repair is authorized only as a temporary measure until replacement parts (i.e. - skins) can be obtained and installed.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

RUDDER

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO RUDDER SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

Rudder

A. Removal

Refer to 55-00-00, Figure 1.

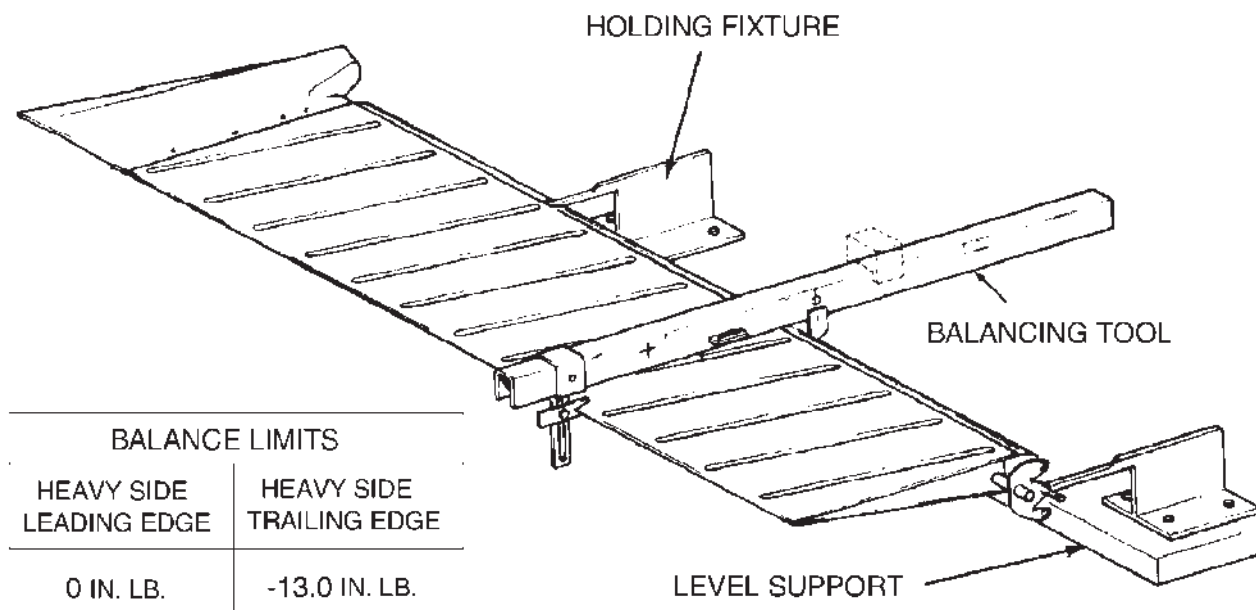
- (1) Remove screws from around upper tail cone fairing assembly and remove fairing.
- (2) Remove rudder tip by removing attaching screws and disconnect tail position light wire at the quick disconnect at tip of rudder. Open access panel in rear of baggage compartment to access the aft section of fuselage.
- (3) Relieve cable tension from rudder control system by loosening one of the cable turnbuckles in the aft section of fuselage.
- (4) Disconnect two control cables from rudder horn by removing cotter pins, nuts, washers, bushings, and bolts.
- (5) Remove cotter pins, nuts, washers, and bolts from upper and lower rudder hinge pivot points.
- (6) Pull rudder up and aft from vertical fin.

B. Installation

WARNING: IF THE RUDDER HAS BEEN REPLACED, REPAINTED, OR REPAIRED AS AUTHORIZED IN THIS MANUAL, THE RUDDER MUST BE BALANCED BEFORE INSTALLATION. SEE BALANCING, BELOW.

- (1) Place rudder in position and install hinge bolts, washers, nuts, and cotter pins.
NOTE: Use any washer combination of hinge assembly for best centering and operation of rudder.
- (2) Connect tail position light electrical lead at the quick disconnect and cover the connector with an insulating sleeve. Tie both ends of sleeve with number six electrical lacing twine.
- (3) Connect control cables to rudder horn with bolts, washers, nuts, and cotter pins.
- (4) Check rudder per Rigging and Adjustment of Rudder, 27-20-00.
- (5) Install upper tail cone fairing and rudder tip and secure with attachment screws. Secure access panel to the aft section of fuselage.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Balancing Rudder
Figure 1

3. Balancing

WARNING: ALL CONTROL SURFACES THAT HAVE BEEN REPLACED OR REPAINTED MUST BE BALANCED BEFORE INSTALLATION.

See Control Surface Balancing, 55-00-00, and Figure 1.

To balance the rudder, the assembly must be complete including the tip assembly with all attaching screws, position light wiring, and in its final Flight configuration as described in Balancing Equipment under Control Surface Balancing in 55-00-00. Place complete assembly horizontally on knife edge supports in a draft-free area that allows unrestricted movement. Place balancing tool (see Figure 2, 55-00-00) on rudder with beam perpendicular to hinge centerline. Calibrate tool as described in Balancing Equipment under Control Surface Balancing in 55-00-00. Read scale when bubble level has been centered by adjustment of the movable weight and determine static balance limit. If static balance is not per limits in Figure 1, proceed as follows:

- A. Leading Edge Heavy: This condition is highly improbable; recheck calculations and measurements.
- B. Trailing Edge Heavy: If the mass balance weight is too light or rudder is too heavy due to painting, strip paint and repaint. If rudder is too heavy due to repairs, the repair must be removed and damaged parts replaced.

NOTE: A non-adjustable mass balance weight is molded in the nose of rudder tip. All rudders must be maintained within static balance limits per Figure 1.

4. Skin Bead Repair

Limited rudder skin repairs are authorized only as specified in Repairs - Skin Bead Repair, 55-00-00.

NOTE: This repair is authorized only as a temporary measure until replacement parts (i.e. - skins) can be obtained and installed.

CHAPTER

56

WINDOWS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 56

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
56-List of	1	Mar 6/14			
Effective Pages	2	Mar 6/14			
56-Table of Contents	1	Mar 6/14			
	2	Mar 6/14			
56-10-00	1	Mar 6/14			
	2	Mar 6/14			
56-20-00	1	Mar 6/14			
	2	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 56 - WINDOWS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>FLIGHT COMPARTMENT</u>	56-10-00	1
Windshield		1
Removal		1
Installation		1
<u>PASSENGER COMPARTMENT</u>	56-20-00	1
Side Windows		1
Removal		1
Installation		1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

FLIGHT COMPARTMENT

Windshield

Refer to "Figure 1".

A. Removal

- (1) Remove the collars from around the bottom of the windshield and the trim strip from between the windshield halves by removing the attaching screws.
- (2) Remove the windshield by raising the lower portion of the windshield and carefully pulling it out and down to release the top and side edges.

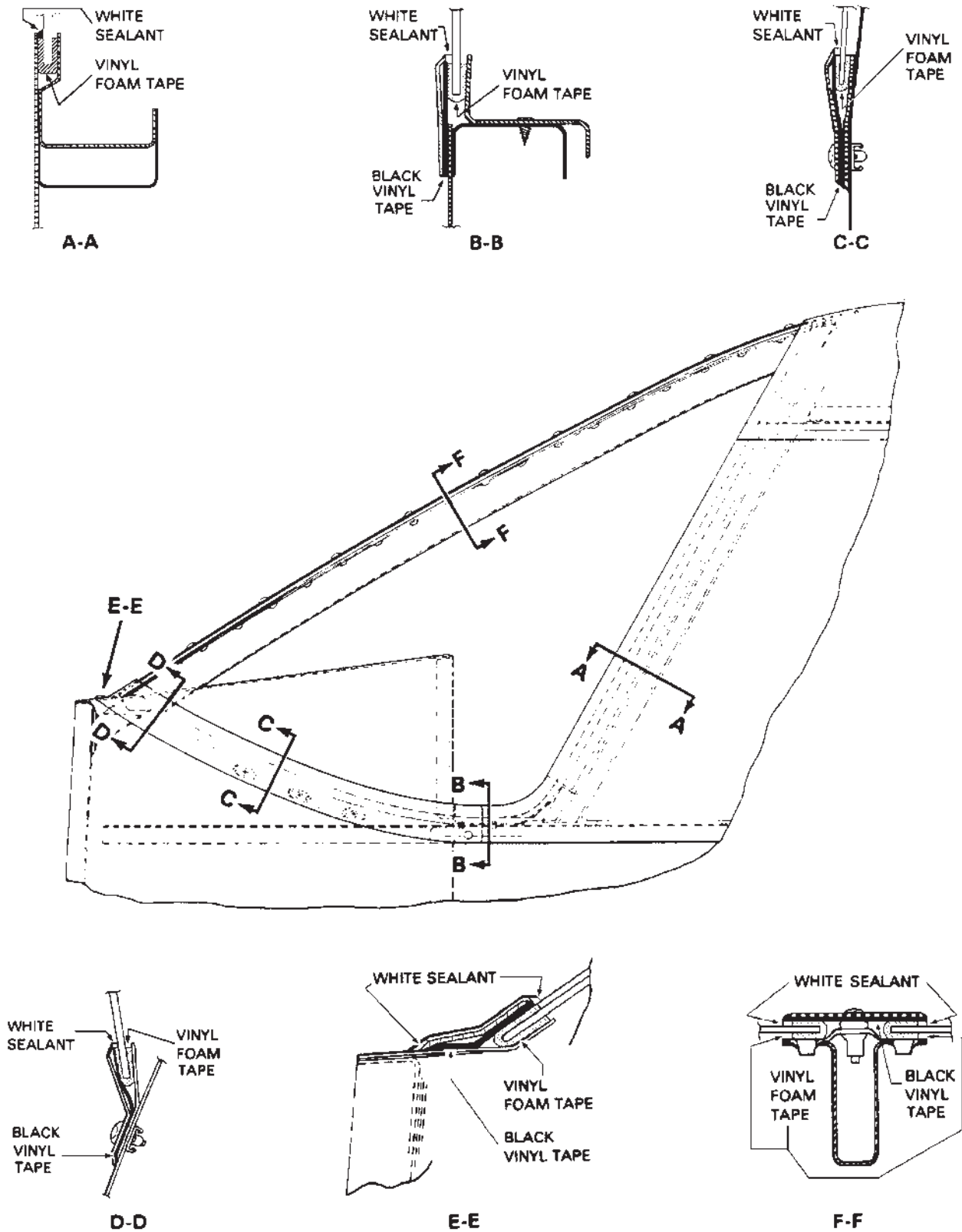
NOTE: A damaged windshield should be saved to provide a pattern for shaping the new window.

- (3) Clean old tape and sealer off the affected mating surfaces.

B. Installation

- (1) Verify new windshield outside contours are the same as the old windshield. If not the same, cut or grind new windshield to proper dimensions.
- (2) Apply black vinyl plastic tape around outer edges of entire windshield.
- (3) Apply Behr-Manning vinyl foam tape number 560 or equivalent over plastic tape, completely around edges of windshield.
- (4) Apply Behr-Manning sealant number PR 307, or equivalent, under edge of moldings and trim strips.
- (5) Place windshield in position for installation and slide windshield aft and up into place. Do not dislocate tape around the edges. Allow clearance between the two windshields at the divider post for expansion.
- (6) Lay sealant at the bottom and center (inboard) of windshield in the hollow between the outside edge and channel.
- (7) Lay a small amount of sealant under center trim strip, install, and secure.
- (8) Lay black vinyl tape on the underside of collar molding, install, and secure.
- (9) Use sealant on any areas around windshield that will allow water to penetrate past windshield.
- (10) Remove excess exposed sealer and tape.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Windshield Installation (Typical)
Figure 1

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

PASSENGER COMPARTMENT

Side Windows

Refer to "Figure 1".

These airplanes are equipped with single pane side windows.

A. Removal

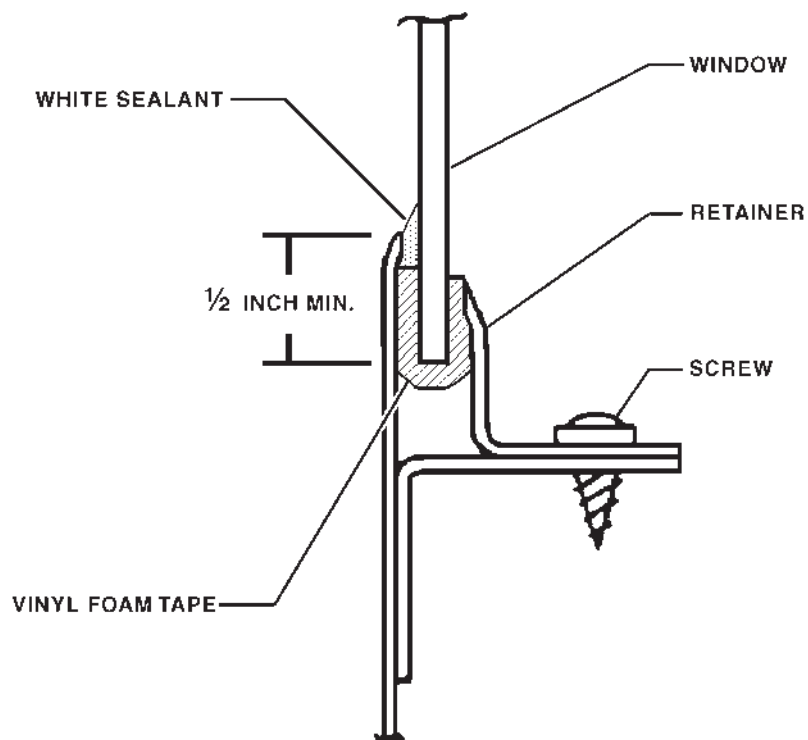
- (1) Remove retainer molding from around the top and sides of window by removing attachment screws.
- (2) Carefully slide window up and out of bottom retainer moulding (which is riveted in place) and remove window from frame.
- (3) Remove excess tape and sealer from window, frame and retainer moldings.

NOTE: A damaged window should be saved to provide a pattern for shaping the new window.

B. Installation

- (1) Cut or grind new window to the same dimension as window removed.
- (2) Apply Norton vinyl foam tape No. V530 or V760 or equivalent, on both sides of window around outer edges.
- (3) Apply PRC Sealant No. PR 307, or equivalent, completely around outer surface of windows at all attachment flanges.

85435 A



Side Window Installation
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (4) Insert window into frame by sliding window into bottom retainer at least 1/2 inch. Install top and side retainer moldings.
- (5) Secure the top and side retainer moldings with attachment screws and tighten until vinyl foam tape is 25 percent compressed by retainers.
- (6) Remove excess exposed sealer and tape.

CHAPTER

57

WINGS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 57

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
57-List of Effective Pages	1	Jul 30/21			
	2	Mar 6/14			
57-Table of Contents	1	Jul 30/21			
	2	Mar 6/14			
57-00-00	1	Mar 6/14			
	2	Mar 6/14			
57-10-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
57-20-00	1	Mar 6/14			
	2	Mar 6/14			
57-40-00	1	Mar 6/14			
	2	Nov 15/17			
	3	Jul 30/21			
	4	Jul 30/21			
	5	Nov 15/17			
	6	Jul 30/21			
	7	Nov 15/17			
	8	Nov 15/17			
	9	May 15/19			
	10	Nov 15/17			
	11	May 15/19			
	12	Nov 15/17			
57-50-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
	5	Mar 6/14			
	6	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 57 - WINGS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	57-00-00	1
Description		1
Repairs		1
<u>MAIN FRAME</u>	57-10-00	1
Wing Spar Inspection		1
Background		1
Procedure		1
Determining Usage Class		1
Inspection Requirements		2
Inspection		3
Wing Rib Inspection - 100 Hour - W.S. 36.22 R.H.		3
<u>AUXILIARY STRUCTURE</u>	57-20-00	1
Wing Tip		1
Removal		1
Repair		1
Installation		1
<u>ATTACH FITTINGS</u>	57-40-00	1
Wing		1
Removal		1
Installation		4
Wing Aft Spar-to-Fuselage Attachment Hardware 100 Hour Inspection		6
Wing Aft Attach Fitting Inspection		9
Inspection		9
Structural Repair		11
Corrosion Protection		11
<u>FLIGHT SURFACES</u>	57-50-00	1
Aileron		1
Removal		1
Installation		1
Checking Free Play		1
Balancing Aileron		4
Wing Flap		5
Removal		5
Installation		5
Skin Bead Repair		6
Limitations		6
Procedure		6

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

GENERAL

1. Description

Each wing is an all-metal, full cantilever, semi-monocoque type structure with removable tips and access panels. Attached to each wing are the aileron, flap, main landing gear and fuel tank. The wings are attached to each side of the fuselage by inserting the butt ends of the main spars into a spar box carry-through. The spar box is an integral part of the fuselage structure which provides, in effect, a continuous main spar with splices at each side of the fuselage. There are also fore and aft attachments at the front and rear spars.

NOTE: The major subassemblies of the wing may be removed individually or the wing may be removed as a unit. To remove a wing, a fuselage and wing supporting cradle is required.

2. Repairs

WARNING: NO ACCESS HOLES ARE PERMITTED IN ANY CONTROL SURFACES.

WARNING: USE OF PATCH PLATES FOR REPAIRS OF ALL MOVABLE CONTROL SURFACES IS PROHIBITED. USE OF ANY FILLER MATERIAL NORMALLY USED FOR REPAIR OF MINOR DENTS AND/OR MATERIALS USED FOR FILLING INSIDE OF SURFACES IS ALSO PROHIBITED ON ALL MOVABLE CONTROL SURFACES.

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO CONTROL SURFACE SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

Structural repair methods used must be in accordance with FAA Advisory Circular 43.13-1, latest revision. Specific, limited, repair procedures for control surface skins are authorized herein in 57-50-00. See also 51-70-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

MAIN FRAME

1. Wing Spar Inspection

WARNING: FAILURE TO FULLY COMPLY WITH THIS INSPECTION COULD SERIOUSLY AFFECT THE STRUCTURAL INTEGRITY, SAFETY AND AIRWORTHINESS OF THE AIRCRAFT.

NOTE: This inspection incorporates the recurring inspection requirements of Piper Service Bulletin No. 978A. For initial compliance, see the service bulletin.

A. Background

On March 30, 1987, a PA-28 engaged in pipeline patrol operations suffered an inflight wing separation resulting in a fatal accident. Investigation revealed the wing failure was due to propagation of a fatigue crack, which originated in the wing lower main spar cap.

Based on more than 500 inspections of PA-28 and PA-32 airplanes with more than 5,000 hours total time-in-service, and extensive wing fatigue and fracture analysis by Piper, the following inspection requirements have been developed.

NOTE: In the course of the inspections cited above, only two (2) negative findings were reported on a pair of PA-32's operating in a severe environment and with considerable damage histories. Piper understands that the majority of aircraft are, have been, and will continue to be operated well within the aircraft's design parameters during all of their operational life. HOWEVER, Piper also realizes that some small number of aircraft engage in operations which are defined herein as "severe" or "extreme" and those airplanes will require more frequent wing removal and inspection.

B. Procedure

First, determine the airplane's "usage class"; second, determine the recurring inspection intervals; and, third, when required, accomplishing the wing spar inspection.

(1) Determining Usage Class

NOTE: Airplane operating history and usage class should have been established during initial compliance with Piper Service Bulletin No. 978A, check the logbook entry.

Complete documentation and/or knowledge of the airplane's entire operating history is required in order to make a valid determination of "Usage Class" and inspection intervals.

(a) Usage Class "A" – NORMAL

All aircraft which do not and have nor engaged in operations considered as "Severe," "Extreme," or "Unknown" in the Usage Classes described below. Most aircraft will fall into this "Usage Class." Normal flight training operations fall into this class as well.

NOTE: If there is any doubt as to the airplane's operating history, it is recommended that the initial inspection be conducted in accordance with the " 50 Hours" inspection requirement, below.

(b) Usage Class "B" – SEVERE

Aircraft which have engaged in severe usage, involving contour or terrain following operations, (such as power/pipeline patrol, fish/game spotting, aerial application, aerial-advertising, police patrol, livestock management or other activities) where a significant part of the total flight time has been spent below 1,000 feet AGL altitude.

NOTE: Aircraft with part of total time-in-service in Usage Class "B" operations and part in Usage Class "A," may adjust inspection intervals by a "Factored Service Hours" calculation. See "Factored Service Hours," below.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(c) Usage Class "C" – EXTREME

Aircraft which have been damaged due to operations from extremely rough runways, flight in extreme damaging turbulence or other accident/incident which required major repair or replacement of wing(s), landing gear or engine mount.

(d) Usage Class "D" – UNKNOWN

Aircraft and/or wings of unknown or undetermined operational or maintenance history.

(e) Factored Service Time

NOTE: This formula applies only to airplanes in Usage Class "B" - Severe. It may be used to calculate the initial and repetitive inspection times in factored hours, provided a portion of the airplane's operating time-in-service has been in Usage Class "A" - Normal.

Determine Factored Service Time as follows:

Example	Hours in Severe Service +	Hours in <u>Normal Service</u> 17	= Factored Service Hours
1)	800 +	$\frac{4000}{17}$	= 1035
2)	1000 +	$\frac{50000}{17}$	= 3941

Results

- 1) Initial inspection not required at this time. Will require initial inspection when Total Factored Service Hours reach 3700.
- 2) Initial inspection required within the next 50 hours time-in-service.

(2) Inspection Requirements

(a) Each 50 Hours:

- ☐ For airplanes in "Usage Class D" (i.e. - UNKNOWN usage), conduct Wing Spar Inspection and establish usage class for next inspection based on current aircraft operations.

(b) Each 1600 Hours:

- ☐ For airplanes in "Usage Class B" (i.e. - SEVERE usage), beginning at 3700 hours total time-in-service, and each 1600 hours thereafter, conduct Wing Spar Inspection.
- ☐ For airplanes in "Usage Class C" (i.e. - EXTREME usage), conduct Wing Spar Inspection, each 1600 hours time-in-service.

(c) Each 6000 Hours:

- ☐ For airplanes in "Usage Class A" (i.e. - NORMAL usage), beginning at 62,900 hours total time-in-service, and each 6000 hours thereafter, conduct Wing Spar Inspection.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(3) Inspection

CAUTION: USE EXTREME CARE IN REMOVING AND REPLACING THE WING MAIN SPAR TO FUSELAGE (I.E. - SPAR CARRY-THROUGH) ATTACHMENT BOLTS (18 PER SIDE) TO PRECLUDE DAMAGING THE BOLT HOLES OR BOLT HOLES. DO NOT DRIVE THE BOLTS IN OR OUT OF THE HOLES. AS THE BOLTS ARE REMOVED, NUMBER EACH BOLT AND HOLE TO ENSURE REPLACEMENT IN THE SAME HOLE. USE PROPER TORQUE VALUES WHEN INSTALLING BOLTS. IF REPLACEMENT OF SOME BOLTS IS REQUIRED, ENSURE PROPER PART NUMBER AND GRIP LENGTH. INSTALLATION OF 18 NEW NUTS (SEE BOLT LEGEND, FIGURE 1, 57-40-00) DURING WING REINSTALLATION IS RECOMMENDED.

- (a) Remove both wings in accordance with Wings - Removal, 57-40-00.
- (b) Visually inspect, using a 10-power (minimum) magnifying glass and a dye-penetrant method or equivalent, for cracks in the wing lower spar cap from the wing skin line outboard of the outboard row of wing attach bolt holes to an area midway between the second and third row of bolt holes from the outboard row.
 - 1) If no cracks are found, prior to further flight, accomplish the actions specified in paragraph (c) below.
 - 2) If any cracks are found, prior to further flight, replace the spar or wing with a new or serviceable unit shown to be free of cracks when subjected to the inspections specified in this paragraph.
- (c) Visually inspect for cracks in each upper wing skin adjacent to the fuselage and forward of each main spar.
 - 1) If no cracks are found, reinstall the wings in accordance with Wings - Installation, 57-40-00.
 - 2) If cracks are found, prior to further flight, replace with new parts or repair in accordance with latest revision of AC 43.13-1, and reinstall the wings in accordance with Wings - Installation, 57-40-00.
- (d) Make an appropriate entry in the aircraft logbook documenting this inspection and any maintenance actions taken as a result.

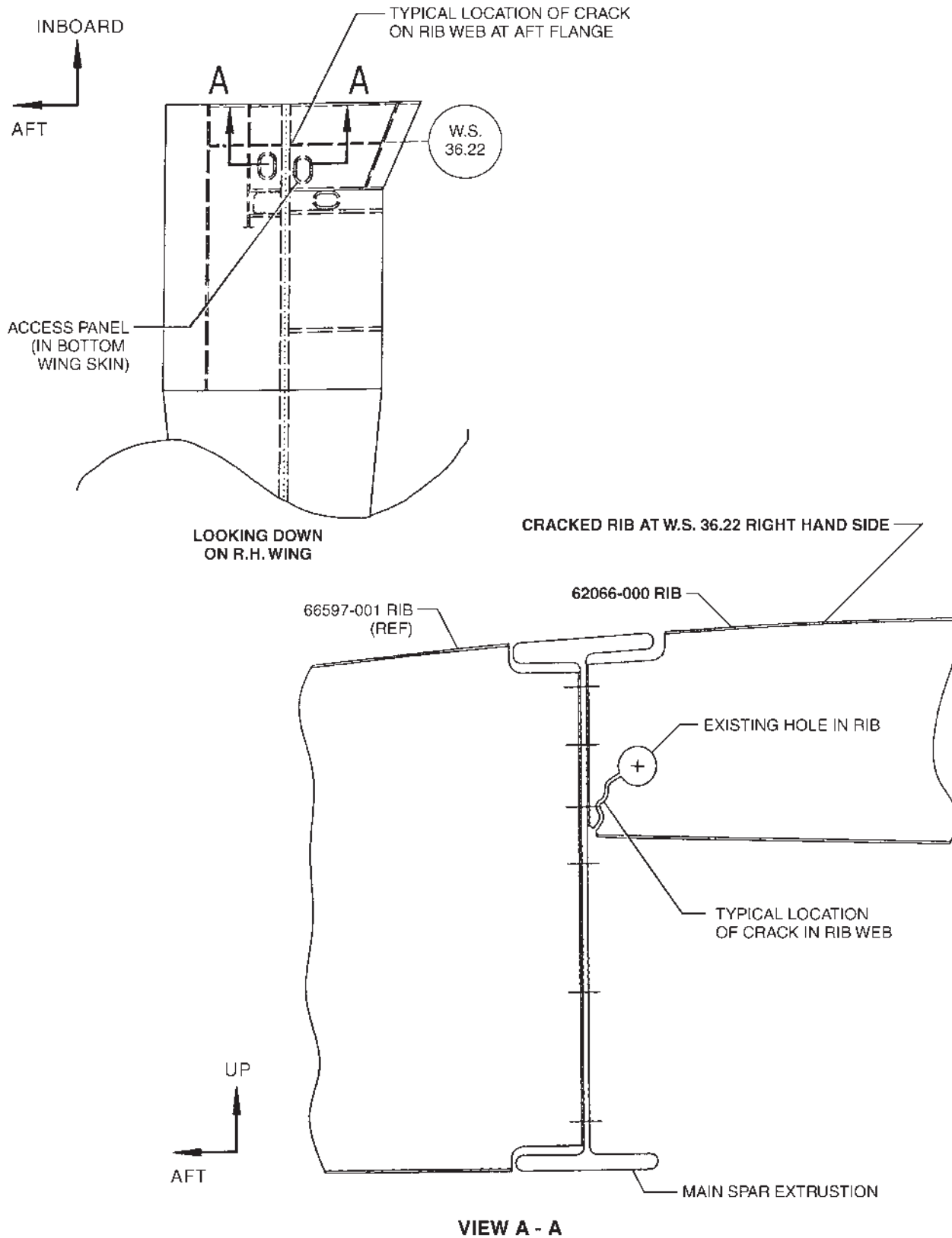
2. Wing Rib Inspection - 100 Hour - W.S. 36.22 R.H.

In S/N's 2843001 thru 2843546, as originally delivered, cracks have been noted to occur in the walkway center support rib. If left uncorrected, such cracking could affect the structural integrity of the rib. Accordingly, each 100 hours time-in-service, inspect the rib at W.S. 36.22 R.H. as follows:

NOTE: Installation of Piper Kit No. 767-363 relieves this repetitive inspection requirement.

- A. Open the inspection access panel on the lower right hand wing just outboard of wing station 36.22 (See "Figure 1"). Visually inspect the wing rib (P/N 62066-000) for crack development in the area shown in "Figure 1".
- B. If no evidence of cracking is found, close the access panel and proceed to Step D, below.
- C. If any evidence of cracking is found, repair by installing Piper Kit No. 767-363.
- D. Make an appropriate logbook entry documenting the inspection and/or kit installation.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Wing Rib Inspection
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

AUXILIARY STRUCTURE

Wing Tip

A. Removal

- (1) Remove screws holding wing tip to the wing. Do not damage wing or wing tip. The Archer III has a landing light glareshield installed on the wing tip. It is secured to the wing by the two attachment screws on the top and at the leading edge of the wing, and must be removed, and set aside, when these two screws are removed.
- (2) Pull off wing tip far enough to disconnect position, strobe and landing light wire assemblies. Disconnect ground lead at point of connection on wing rib. Disconnect positive lead at wire terminal or unscrew from light assembly.
- (3) Inspect wing tip to verify there are no cracks, severe nicks or minor damage. If repair is required, refer to 51-70-00.
- (4) Inspect tip light shield for cracks, bends, or other minor damage. The landing light lens must also be inspected for cracks or other minor damage..

B. Repair

Repair fiberglass wing tips per fiberglass repair procedures in 51-70-00. Badly damaged thermoplastic tips must be replaced.

C. Installation

- (1) Place the wing tip in position to connect navigation and strobe light leads, and the landing light wire assembly.
- (2) Connect ground lead to wing rib with screw and nut.
- (3) Connect positive lead to navigation light by connecting wire terminals or screwing connectors together.
- (4) Connect strobe and landing light wire assemblies.
- (5) Insulate wire terminals and check ground lead is free of dirt and film to ensure a good connection.
- (6) Insert wing tip into position and install screws around tip. Install landing light glare shield.
- (7) Verify there is no damage to wing tip or wing.
- (8) Check operation of lights.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

ATTACH FITTINGS

1. Wing

NOTE: The major subassemblies of the wing may be removed individually or the wing may be removed as a unit. To remove wing, a fuselage support cradle is required.

A. Removal

Refer to "Figure 1".

NOTE: Piper Kit No. 88479 provides detailed instructions for disconnecting and reconnecting the wing wiring, as well as parts to add a quick disconnect to the strobe light wiring.

- (1) Disconnect the battery.
- (2) Close fuel valve and drain fuel from wing to be removed. (See Fuel System, Draining Entirely, 12-10-00.)
- (3) Drain brake lines and reservoir. (See Draining Brake System, 12-10-00.)
- (4) Remove the seal at the wing root and adjacent access plates and inspection panels. (See Access Plates and Panels, 6-00-00.)
- (5) Remove front and back seats from airplane.
- (6) Expose spar box and remove cockpit side trim panel assembly of wing being removed.
- (7) Place airplane on jacks. (See Jacking, 7-10-00.)
- (8) Disconnect aileron balance and control cables at the turnbuckles within fuselage aft of spar.

NOTE: To facilitate reinstallation, mark cable and line ends to aid installation of control cables, and fuel and hydraulic lines. Attach a line where applicable to cables before drawing them through fuselage or wing.

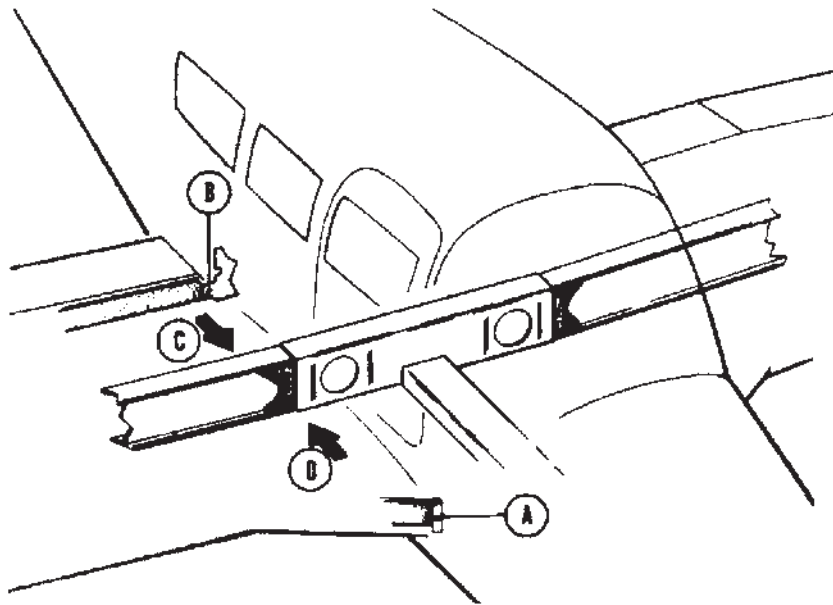
- (9) If left wing is being removed, remove cotter pin from pulley bracket assembly to allow left aileron balance cable end to pass between pulley and bracket.
- (10) Disconnect flap from torque tube by first extending flap to its full down position. Then, remove bolt and bushing from bearing at aft end of flap control rod.

CAUTION: TO PREVENT DAMAGE OR CONTAMINATION OF FUEL, HYDRAULIC, AND MISCELLANEOUS LINES, PLACE A PROTECTIVE COVER OVER LINE FITTINGS AND ENDS.

- (11) Disconnect fuel line at fitting located aft of spar at wing butt line.
- (12) Remove clamps necessary to release electrical harness assembly. Disconnect leads from terminal strip assembly by removing cover, appropriate nuts, and washers.
- (13) With trim panel removed, disconnect hydraulic brake line at fitting located within cockpit at leading edge of wing.
- (14) If left wing is being removed, disconnect pitot and static tubes at the elbows located within cockpit at wing butt line.
- (15) Arrange and put in place a suitable fuselage cradle and supports for both wings.
- (16) Remove wing jacks.
- (17) For the wing(s) being removed, remove front and rear wing spar to fuselage attach nuts, washers and bolts. Discard nuts.

NOTE: Take note of the number and placement of washers at each attach point to facilitate reinstallation.

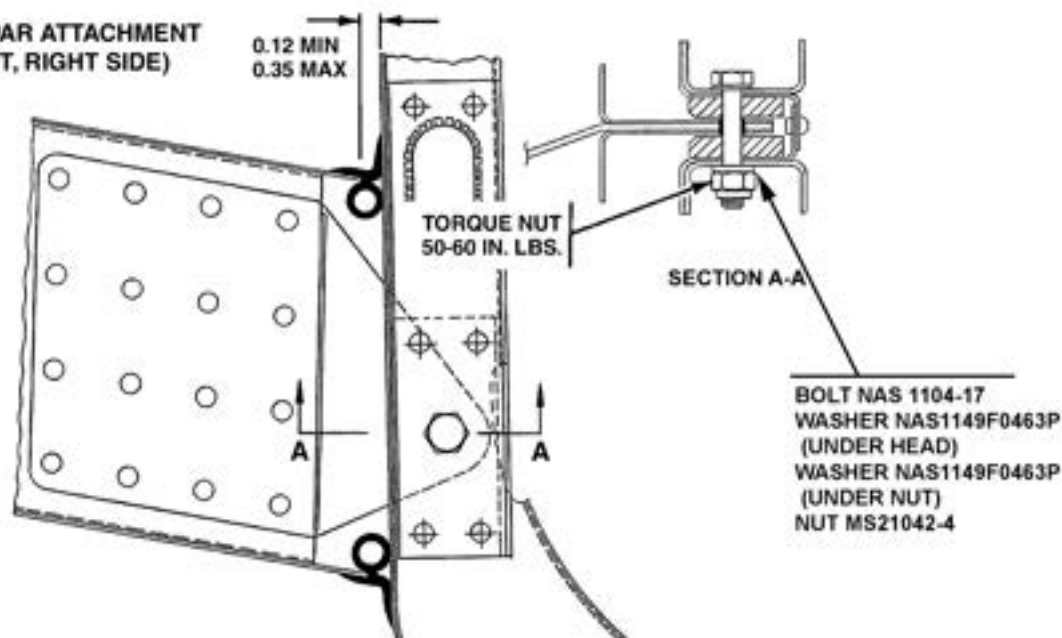
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Wing Installation
Figure 1 (Sheet 1 of 4)

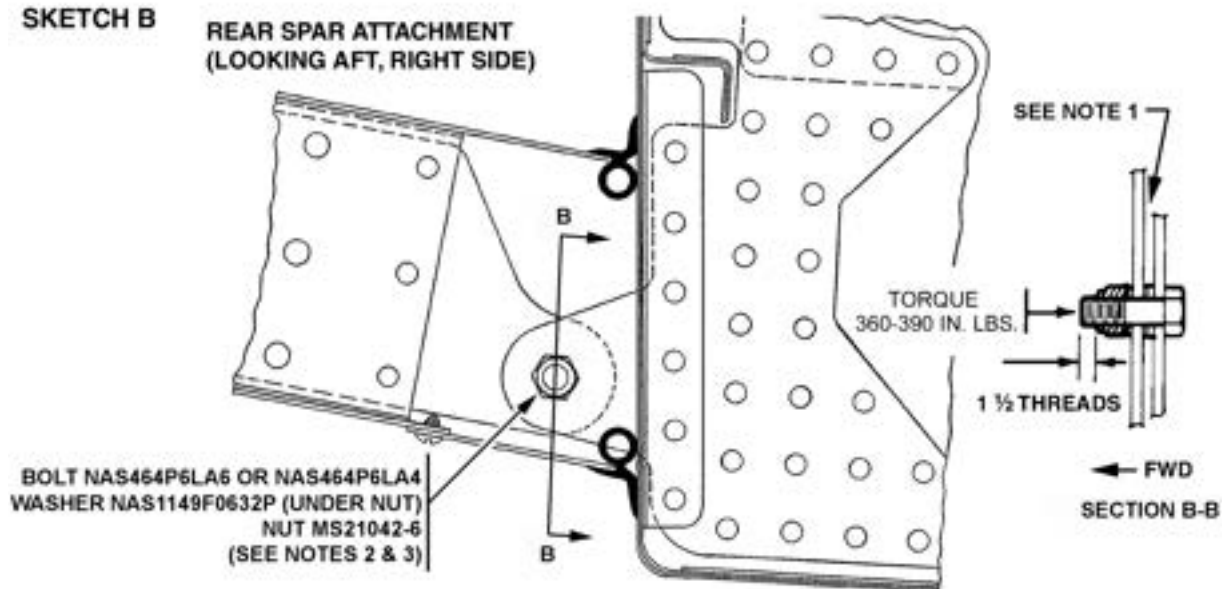
SKETCH A

FORWARD SPAR ATTACHMENT
(LOOKING AFT, RIGHT SIDE)



SKETCH B

REAR SPAR ATTACHMENT
(LOOKING AFT, RIGHT SIDE)



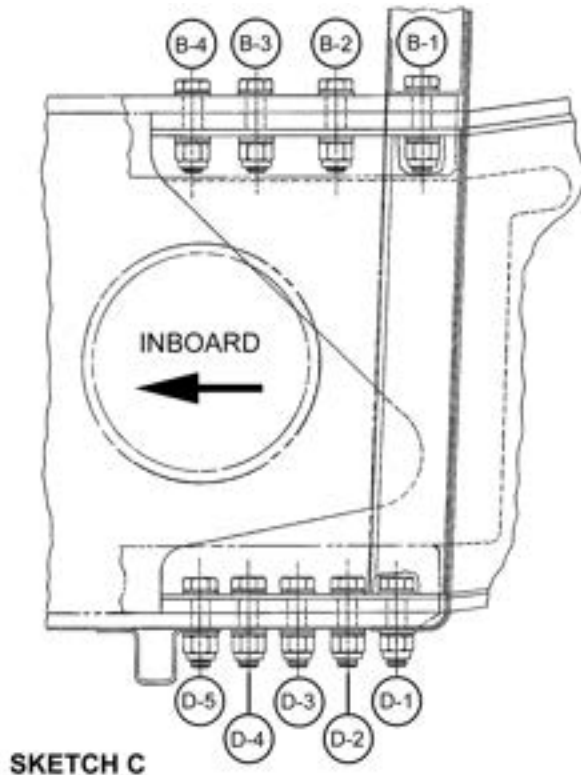
- NOTES: (1) Use any combination of NAS1149F0663P and NAS1149F0632P as required to shim gap between fuselage and wing fittings.
(2) New service replacement wings are not drilled for the rear spar attachment bolt. Accordingly, using suitable tooling to ensure proper hole alignment, drill a .3745 / .3765 inch hole in the rear attach fitting.
(3) Use bolt NAS464P6LA4 when no gap is present between fuselage and wing fittings. Use bolt NAS464P6LA6 when gap greater than 0.015 IN is present between fuselage and wing fittings.

Wing Installation
Figure 1 (Sheet 2 of 4)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

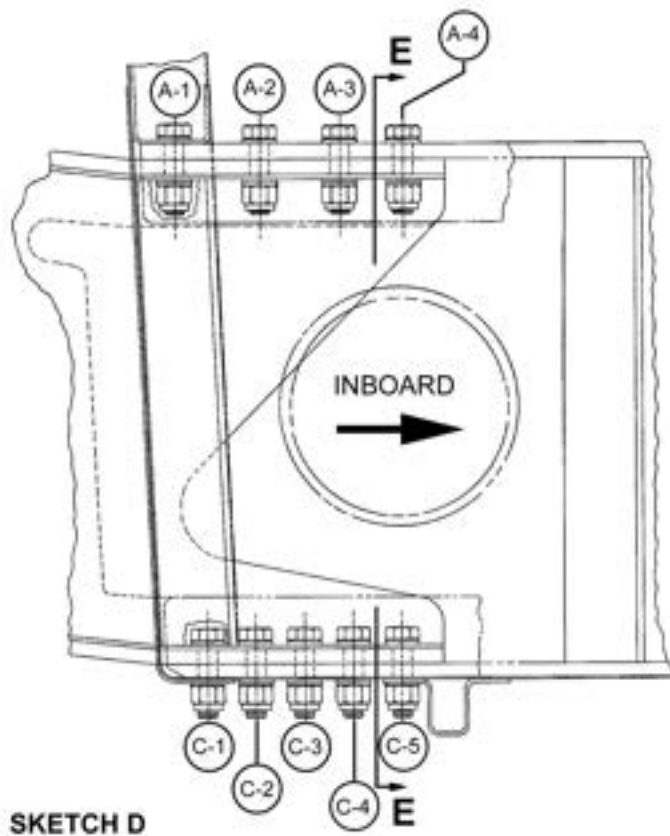
BOLT LEGEND			WASHER	
POS.	BOLT ⁽¹⁾	NUT ⁽¹⁾	UNDER HEAD	UNDER NUT
A-1	NAS6606-13 ⁽³⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P, 96352-3 ⁽⁵⁾ (1 ea.)
A-2	NAS6606-11 ⁽²⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P, 96352-3 ⁽⁵⁾ (1 ea.)
A-3	NAS6606-11 ⁽²⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P, 96352-3 ⁽⁵⁾ (1 ea.)
A-4	NAS6606-11 ⁽²⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P, 96352-3 ⁽⁵⁾ (1 ea.)
B-1	NAS6606-15 ⁽⁴⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P (2 ea.)
B-2	NAS6606-13 ⁽³⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P (2 ea.)
B-3	NAS6606-13 ⁽³⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P (2 ea.)
B-4	NAS6606-13 ⁽³⁾	MS21042-6	NAS1149F0663P	NAS1149F0663P (2 ea.)
C-1	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (1 ea.)
C-2	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (2 ea.)
C-3	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (2 ea.)
C-4	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (2 ea.)
C-5	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	96352-3 ⁽⁵⁾ (1 ea.)
D-1	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (1 ea.)
D-2	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (2 ea.)
D-3	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (2 ea.)
D-4	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	NAS1149F0663P (2 ea.)
D-5	NAS6606-13 ⁽³⁾	MS21042-6	96352-3 ⁽⁵⁾	96352-3 ⁽⁵⁾ (1 ea.)
(1) Torque bolt heads on Upper Spar Cap and Nuts on Lower Spar Cap 360–390 in-lbs. The following alternate bolts are approved: (2) NAS464P6LA11 (3) NAS464P6LA13 (4) NAS464P6LA15 (5) The 96352-3 washers feature a rounded edge (i.e., radius) on one side. Ensure that the flat side of each 96352-3 washer is installed against the bolt head, nut, or adjacent washer. The rounded edge is designed to face and abut the aircraft structure.				

Wing Installation
Figure 1 (Sheet 3 of 4)

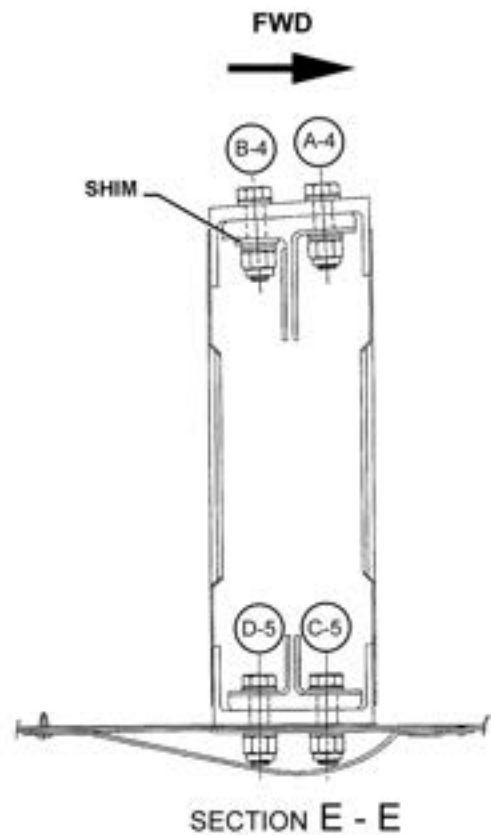


SKETCH C

WARNING
DO NOT DRIVE BOLTS IN OR OUT OF THE MAIN SPAR ATTACHING BOLT HOLES (SKETCHES C AND D). TAKE EXTRA CARE IN REMOVING AND REPLACING THESE BOLTS TO PRECLUDE DAMAGING THE BOLT HOLES.



SKETCH D



Wing Installation
Figure 1 (Sheet 4 of 4)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

WARNING: DO NOT DRIVE OUT WING MAIN SPAR TO FUSELAGE ATTACH BOLTS. TAKE EXTREME CARE NOT TO DAMAGE BOLTS OR BOLT HOLES. NUMBER BOLTS AND BOLT HOLES TO ENSURE THAT, IF REUSED, THE SAME BOLTS ARE REINSTALLED IN THE SAME HOLES.

- (18) For the wing(s) being removed, remove 18 main spar to fuselage (i.e., spar carry-through) attachment bolts. Discard nuts.
- (19) Slowly remove wing being certain that all electrical leads, cables, and lines are disconnected. Ensure that no undue up or down pressure is exerted on the inboard spar within the spar carry-through.

B. Installation

Refer to "Figure 1" on page 57402.

NOTE: Whenever a wing is removed and reinstalled, conduct Wing Spar Inspection, 57-10-00, and make an appropriate aircraft logbook entry documenting the inspection for that wing.

NOTE: When installing a "replacement" wing, perform Stall Warning Flight Test Procedure, 27-30-00, upon completion of wing installation.

NOTE: If a factory replacement wing is being installed, the wing aft spar fitting must have a 0.3745 - 0.3765 diameter hole drilled in line with the existing hole in the fuselage fitting, using suitable tooling to ensure alignment of the holes.

NOTE: When replacing a wing assembly, verify wing butt clearance is maintained. (Refer to Sketch A, "Figure 1".)

NOTE: Piper Kit No. 88479 provides detailed instructions for disconnecting and reconnecting the wing wiring, as well as parts to add a quick disconnect to the strobe light wiring.

- (1) Check fuselage is positioned solidly on support cradle.
- (2) Place wing in position for installation, spar end a few inches from side of fuselage and set on supports.
- (3) Prepare the various lines, control cables, etc, for inserting into the wing or fuselage when wing is slid into place. Ensure that the bushing is in place in the fuselage forward wing attach fitting (see "Figure 1", Sketch A, View A-A).
- (4) Slide wing into position on fuselage. Ensure that lines, cable, and electrical leads are carefully fed into place.

WARNING: DO NOT DRIVE SPAR TO FUSELAGE ATTACH BOLTS IN. TAKE EXTREME CARE NOT TO DAMAGE BOLTS OR BOLT HOLES. IF REUSING BOLTS, ENSURE THE SAME BOLTS ARE REINSTALLED IN THE SAME HOLES.

- (5) Install the eighteen (18) main spar to fuselage (i.e., spar carry-through) attachment bolts in accordance with the bolt legend in "Figure 1". Use 18 new nuts (see bolt legend, "Figure 1").

NOTE: Be sure that the wing attachment shim is oriented as shown in Section E-E, "Figure 1".

- (6) Install the bolt, washers, and nut that secures the front wing spar to fuselage attach fittings as specified in Sketch A, "Figure 1".
- (7) Insert the required number of washers at the rear wing spar between the forward face of the wing fitting and aft face of the fuselage fitting. After the required washers are inserted between the fittings, install the bolt, washers, and nut that secures the rear wing spar to fuselage attach fittings. (Refer to Sketch B, "Figure 1".)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CAUTION: BE CERTAIN THAT ALL BOLTS, NUTS AND WASHERS ARE INSTALLED IN ACCORDANCE WITH "FIGURE 1" (I.E., THE BOLT LEGEND AND ALL THE SKETCHES).

- (8) Torque the bolt heads on the upper main spar cap and the nuts on the lower main spar cap as specified in "Figure 1", bolt legend. Torque the forward wing spar to fuselage attach nut as specified in "Figure 1", Sketch A. Torque the rear wing spar to fuselage attach nut as specified in "Figure 1", Sketch B.
- (9) Install the wing jacks and tail support to the tail skid with approximately 250 pounds of ballast on the base of the tail support. Remove the fuselage cradle and wing supports.
- (10) If the left wing was removed, reconnect the pitot and static tubes at the elbows located within the cockpit at the wing butt line. One tube may be painted red, denoting the pitot tube. In the event that a heated pitot is installed, the electrical plus lead must be connected at the fuselage.
- (11) Connect the hydraulic brake line onto the fitting located within the cockpit at the leading edge of the wing.
- (12) Connect the electrical leads to the appropriate posts on the terminal strip and install the washers and nuts. (For assistance in connecting the electrical lead, refer to the Electrical Schematics in Chapter 91.) Place the clamps along the electrical harness to secure it in position and install the terminal strip dust cover.
- (13) Remove the cap from the fuel line and connect it at the fitting located aft of the spar at the wing butt line.
- (14) Connect the aileron balance and control cables at the turnbuckles that are located within the fuselage aft of the spar. After the left balance cable has been inserted through the bracket assembly and connected, install a cotter pin cable guard into the hole that is provided in the bracket assembly.
- (15) Connect the flap by placing the flap handle in the full flap down position; place the bushing on the outside of the rod end bearing and insert and tighten the bolt.
- (16) Check the rigging and control cable tension of the ailerons and flaps. (Refer to Aileron Controls - Rigging and Adjustment, 27-10-00 and Wing Flap Controls - Rigging and Adjustment, 27-50-00.)
- (17) Service and refill the brake system with hydraulic fluid. (Refer to Brake System, 12-10-00.) Bleed the system per Brakes - Bleeding Brakes, 32-40-00, and check the system for leaks.
- (18) Service and fill the fuel system. (Refer to Fuel System, 12-10-00.) Open the fuel valve and check for leaks and fuel flow.
- (19) Check the operation of all electrical equipment and pitot and static system.
- (20) Remove the airplane from the jacks.
- (21) Install the cockpit trim panel assembly, spar box carpet, the front and back seats. Check operation of pilot and co-pilot seats.
- (22) Replace all the wing root seal and all access plates and panels on the wing(s) involved.

NOTE: It is permissible to trim bulb section from molding at flap bellcrank arm to prevent flap binding.
- (23) Connect battery.
- (24) Ground run airplane to verify proper operation of fuel and brake systems.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Wing Aft Spar-to-Fuselage Attachment Hardware 100 Hour Inspection

Each 100 hours time-in-service, inspect the aft wing spar-to-fuselage attachment hardware for both the right and left wings as follows:

NOTE: Perform the following with weight on wheels (i.e., not on jacks).

- A. Remove the lower wing-to-fuselage fairing in the area of the wing aft spar.
 - B. Lower the flaps to gain access to the head of the wing-to-fuselage attachment bolt.
 - C. Inspect the bolt for tightness in the fittings.
 - (1) If bolt is tight:
 - (a) Ensure that the washer(s) are in place on the bolt and ensure the bolts are torqued as specified in "Figure 1", Sketch B.
 - (b) Re-install the fairings and make a log book entry indicating completion of this inspection.
 - (2) If the bolt is loose:
 - (a) Remove the bolt and inspect the holes in the fittings for size and make sure no out-of-round condition exists outside of allowable limits. The specified hole size for each fitting is 0.3745 - 0.3765 inch diameter.
 - (b) If the holes meet the requirements specified above, inspect gap between the fittings.
 - 1) If gap is below 0.032 inches, it is acceptable to install a replacement nut P/N 404-532 (MS21042-6), bolt P/N 402-915 (NAS464P6LA6), and washers P/N's 690-629 (NAS1149F0663P) and P/N 690-620 (NAS1149F0632P) and torque as specified in "Figure 1", Sketch B. Ensure that 1½ threads of the bolt protrude from the nut.
 - 2) If the gap is above 0.032 inches, install a thick or thin washer (or any combination) as necessary to fill the gap, as described in "Figure 1", Sketch B, prior to installation of the nut/bolt combination above.
- NOTE:** If the gap (before shimming with washers) exceeds 0.15 inches, contact Piper factory Technical Support through your Piper Dealer for further instructions.
- (c) If the holes do not meet the requirements specified above, install Piper Kit No. 767-383.
 - (d) Upon successful disposition, re-install the fairings and make a log book entry indicating completion of this inspection.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Wing Aft Attach Fitting Inspection

NOTE: This inspection incorporates the recurring inspection requirements of Piper Service Bulletin No. 1244C.

NOTE: Airplanes which installed Piper Kit 764-998 with kit instructions marked with drawing number 87584, revision C or D, see Piper Service Bulletin 1244C for required action.

NOTE: See also FAA Advisory Circular (AC) 43-4A Corrosion Control for Aircraft. Available from <http://www.airweb.faa.gov>.

A. Inspection

Each two thousand (2,000) hours or seven (7) calendar years time-in-service, whichever occurs first, inspect the aft wing attach fittings and adjacent structure for both the right and left wings as follows:

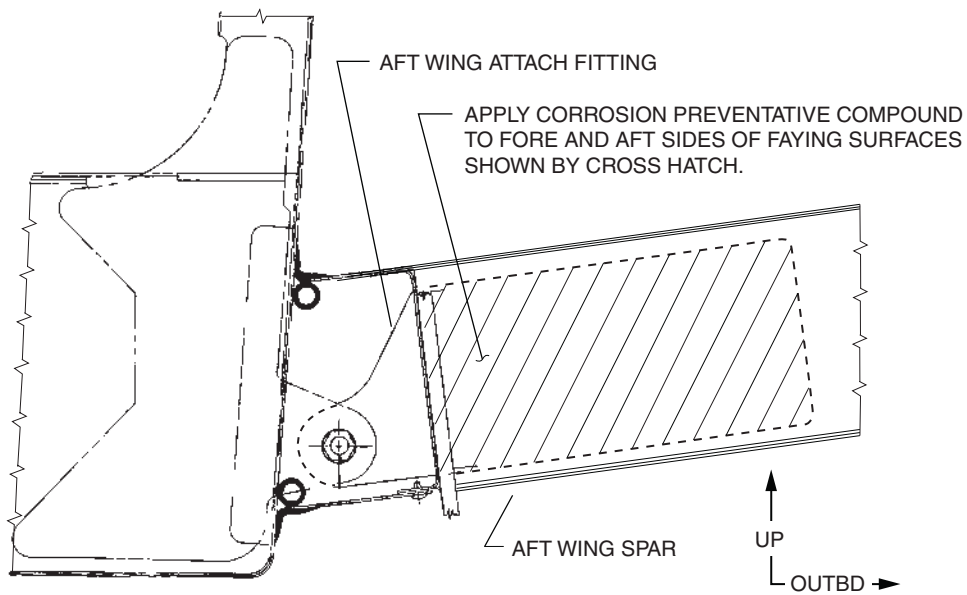
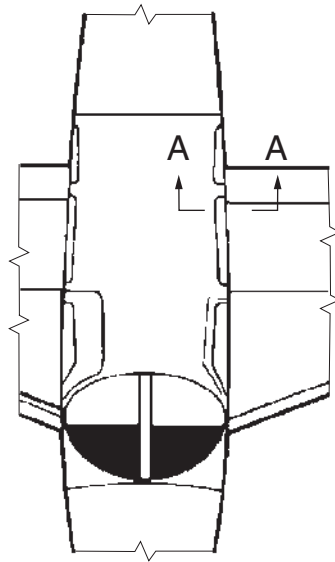
- (1) Remove wing inspection plates and fairings, as required to gain visual access to the aft wing attach fittings. See Access and Inspection Provisions in 6-40-00.
- (2) Identify the aft wing attach fittings which are riveted to the aft wing spars. See "Figure 2" on page 574010. Using a solvent-based degreaser spray that conforms to SAE AMS 1525 (such as LPS Presolve Orange Degreaser) and/or an alkaline cleaner that complies with SAE AMS 1526 (such as Chemetall Ardrex 6333A), thoroughly clean the aft wing attach fittings and the adjacent wing spar structure (fore and aft sides of each wing spar), removing surface oil, grease, loose paint, and soil, followed by a clean water rinse and dry.
- (3) Carefully inspect for evidence of corrosion. The initial stages of corrosion are often masked by paint coatings and hidden under faying surfaces such as riveted lap joints. Since corrosion products occupy more volume than the original metal, carefully inspect these areas for irregularities such as blisters, flakes, chips, lumps, bulging skins and missing rivets.
 - (a) If no corrosion is present proceed to "Corrosion Protection" on page 574011.
 - (b) If superficial corrosion is detected, remove per FAA Advisory Circular AC 43.13-1B, Chapter 6, Section 7. After removal of the corrosion, verify that all the affected areas meet or exceed the minimum thicknesses in "Chart 1". If the affected areas meet the minimums, then treat the corrosion in accordance with guidance from AC 43.13-1B, Chapter 6, Section 8 or 10. Then, paint the affected areas using a good quality aircraft primer that complies with MIL-PRF-23377 (such as Akzo-Nobel 10P30-5). Proceed to "Corrosion Protection" on page 574011.
 - (c) If corrosion is detected and removal of corrosion in the affected areas will result in a part thickness in any location that is less than the minimum values shown in "Chart 1", structural repair is required. Proceed to "Structural Repair" on page 574011.

**CHART 1
CORROSION LIMITS**

Part Description	Minimum Thickness
Aft wing spar (aluminum)	0.060 inches
Aft wing attach fitting (steel)	0.117 inches

NOTE: Measure thickness using a nondestructive inspection method, such as ultrasound, eddy current, or equivalent, with a measurement accuracy of ± 0.005 inches or better.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



VIEW A-A
LOOKING AFT AT LEFT HAND SIDE

Wing Aft Attach Fitting
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Structural Repair

Order and install Kit, Corrosion - Aft Spar Rework, Piper P/N 764-998. This kit provides parts and instructions to replace (via a splicing operation) the aft spar fitting, as well as the inboard 10.80 inches of the aft wing spar on both left and right hand sides. Corrosion damage beyond these areas may require additional and/or different repairs. If that is the case, contact Piper Aircraft at (772) 299-2141. Piper normal business hours are 7:30 AM to 4:30 PM EST, Monday through Friday.

NOTE: When ordering Kit 764-998 specify the kit instructions must be revision F or higher. The kit instructions will be marked with drawing number 87584, revision F or higher.

Upon completion of structural repair, make a logbook entry documenting installation of Piper Kit No. 764-998 and proceed to Corrosion Protection, below.

C. Corrosion Protection

Treat the area identified in View A-A, "Figure 2" on page 574010, with Ardrox (Dinitrol) AV8, or other MIL-PRF-16173 Class I or II, Grade 1 or 4 compliant Corrosion Preventive Compound (procure locally, or order Piper P/N 89500-800). The treatment may be brushed or sprayed.

NOTE: After applying Corrosion Preventive Compound verify that all drain holes and drain passages are clear before proceeding.

- D.** Reinstall inspection plates and fairings. Perform a functional test of any system or component that may have been disconnected or removed.
- E.** Make a logbook entry documenting compliance with this inspection.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

FLIGHT SURFACES

1. Aileron

Refer to "Figure 1".

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO AILERON SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

A. Removal

- (1) Disconnect the aileron control rod at the aileron attachment point by removing the nut, washers and bolt from the rod end bearing. To simplify installation note location of washers removed.
- (2) Remove the attaching nuts, bolts and washers from the hinges at the leading edge of the aileron, and remove the aileron.

B. Installation

WARNING: AILERONS THAT HAVE BEEN REPLACED, REPAINTED, OR REPAIRED AS AUTHORIZED IN THIS MANUAL, MUST BE BALANCED BEFORE INSTALLATION. SEE BALANCING, BELOW.

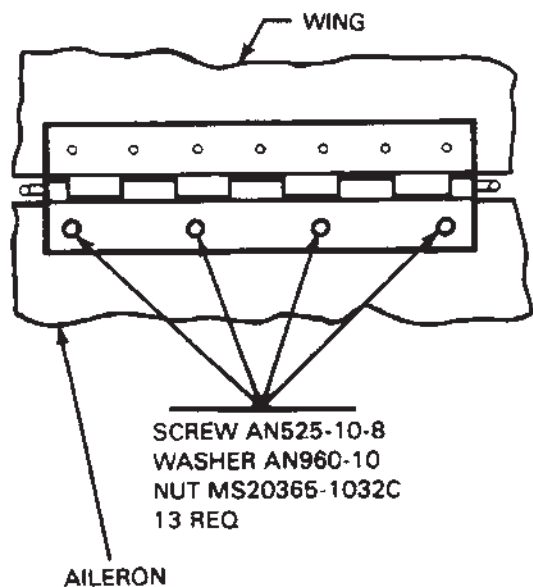
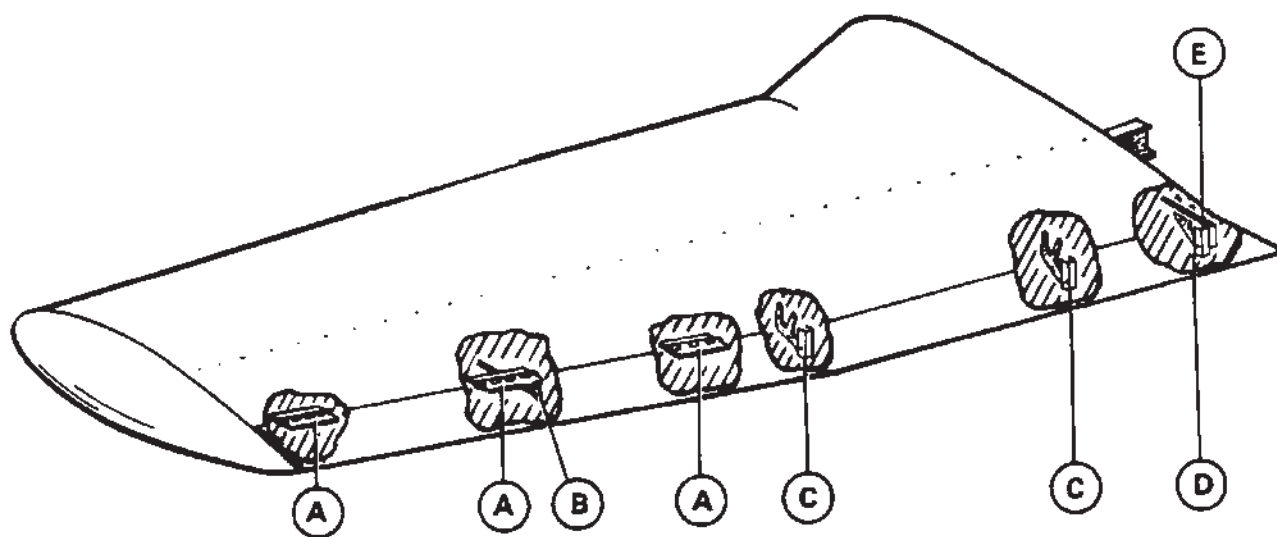
- (1) Move the aileron into place and install attaching bolts, washers and nuts. Ascertain that the aileron is free to move with no interference.
- (2) Attach the aileron control rod with bolts, washers and nut, dividing the washers so that the aileron is free to rotate from stop to stop without the control rod binding or rubbing on the opening in the aft spar. Be certain that the rod end bearing has no side play when tightening the bolt and that the rod does not contact the side of the bracket.
- (3) Actuate the aileron controls to ensure freedom of movement.

C. Checking Free Play

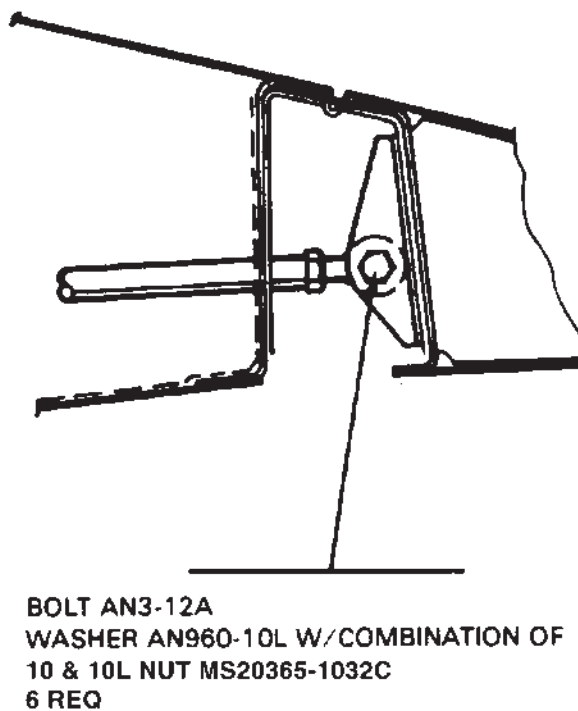
Before balancing, check amount of free play in aileron as follows:

Set aileron in its neutral position and secure. Obtain a straightedge long enough to extend from ground up to a few inches above aileron trailing edge. Place straightedge next to aileron trailing edge and gently move aileron up and down, mark limit of travel (free play) on straightedge. Overall travel (free play) must not exceed 0.24 of an inch. If free play exceeds limit, repair as required to eliminate excessive free play. Grasp aileron and move it spanwise (inboard/ outboard) to verify maximum end play of 0.035 inch is not exceeded.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



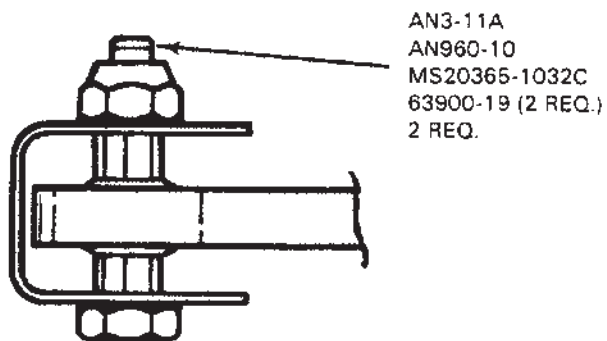
SKETCH A



SKETCH B

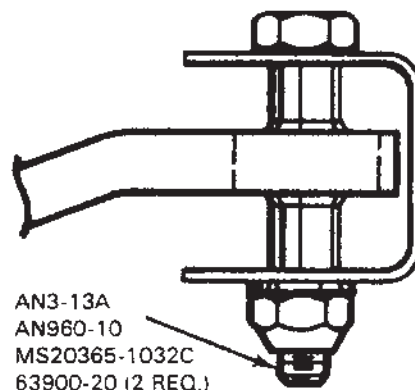
Aileron and Flap Installation
Figure 1 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



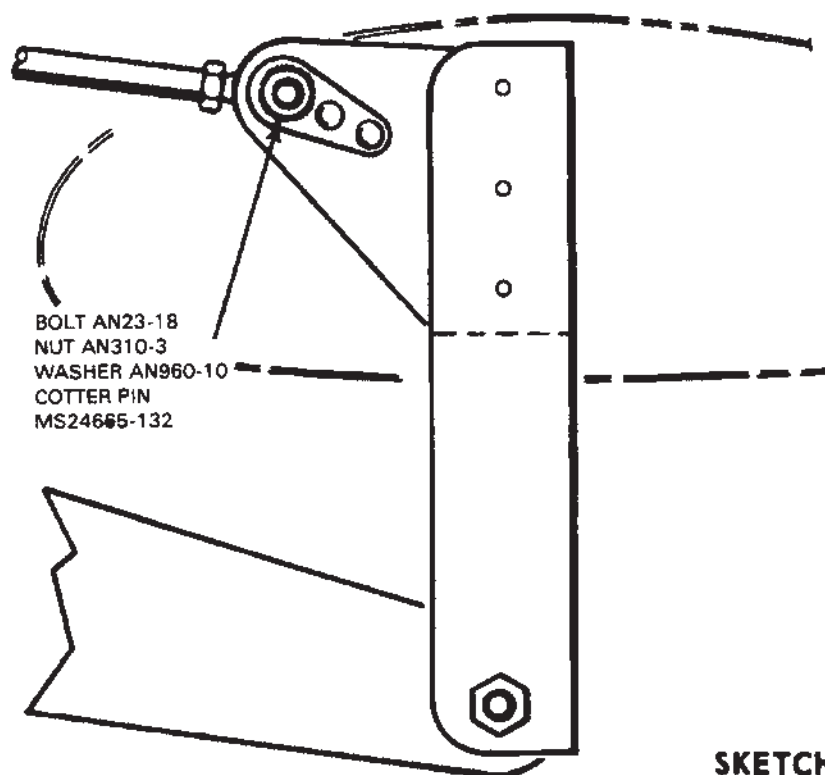
AN3-11A
AN960-10
MS20365-1032C
63900-19 (2 REQ.)
2 REQ.

SKETCH C



AN3-13A
AN960-10
MS20365-1032C
63900-20 (2 REQ.)

SKETCH D

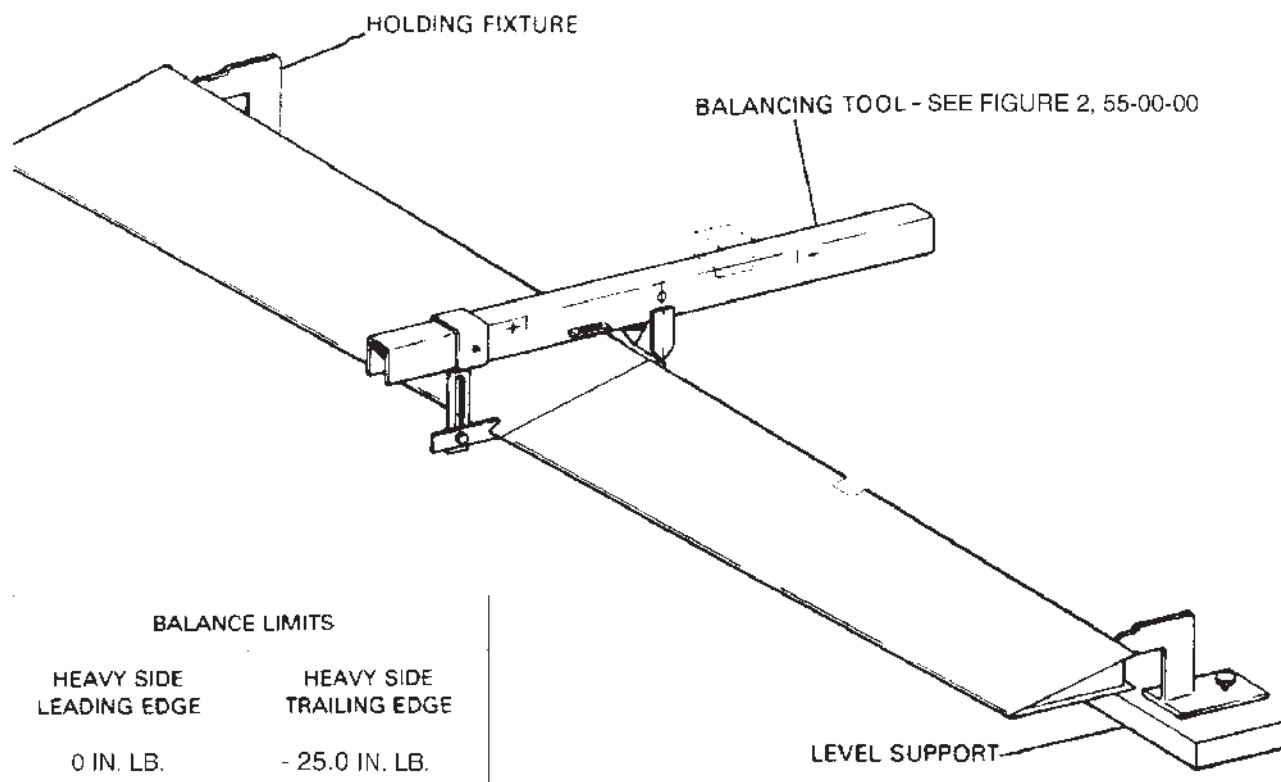


BOLT AN23-18
NUT AN310-3
WASHER AN960-10
COTTER PIN
MS24665-132

SKETCH E

Aileron and Flap Installation
Figure 1 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Balancing Aileron
Figure 2

D. Balancing Aileron

Refer to "Figure 2".

The aileron assembly must be complete including static wicks, all attaching screws, and in its final flight configuration as described in Balancing Equipment under Control Surface Balancing in 55-00-00.

Position aileron on balancing fixture in a draft free area, allowing unrestricted movement of aileron. Place balancing tool (See Figure 2, 55-00-00) on aileron, avoid rivets and keep beam perpendicular to hinge centerline. Calibrate and use balancing tool as described in Balancing Equipment under Control Surface Balancing in 55-00-00. Read scale when bubble level has been centered by adjustment of movable weight and determine static balance. If static balance is not within limits per 57-50-00, "Figure 2", proceed as follows:

- (1) Leading Edge Heavy: This condition is highly improbable; recheck measurements and calculations.
- (2) Trailing Edge Heavy: There are no provisions for adding weight to counteract a trailing edge heavy condition. Verify exact cause of unbalance. If aileron is too heavy because of painting over old paint, strip all paint from aileron and repaint. If aileron is too heavy resulting from repair to skin or ribs, replace all damaged parts and recheck balance.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Wing Flap

Refer to "Figure 1".

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS.

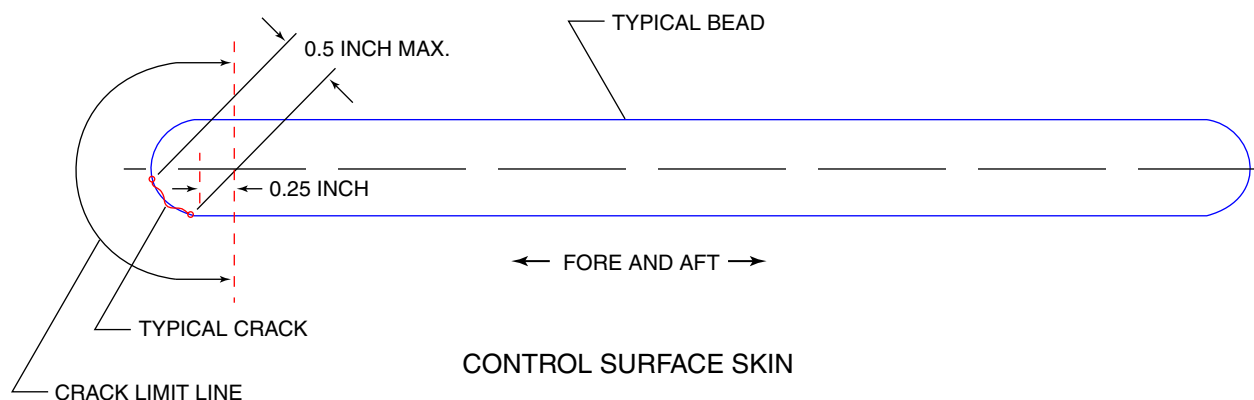
A. Removal

- (1) Extend the flaps to their fullest degree and remove the bolt and bushing from the rod end bearing.
- (2) Remove the nuts, washers, bushing and hinge bolts that hold the flap to the wing assembly.
- (3) Pull the flap straight back off the wing.

B. Installation

- (1) Replace the wing flap by placing the flap onto its proper position and inserting the hinge bolts, bushings, washers and nuts.
- (2) With the flap control in the full flap position, place the bushing on the outboard side of the rod end bearing and insert and tighten the bolt.
- (3) Operate the flap several times to be certain it is operating freely. (Refer to 27-50-00, Wing Flap Controls, Rigging and Adjustment.)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Skin Bead Repair
Figure 3

3. Skin Bead Repair

Refer to "Figure 3".

CAUTION: CONTROL SURFACE SKINS MUST BE REPLACED IF THEY SUSTAIN DAMAGE OR EXHIBIT CRACKS. LIMITED REPAIRS TO CONTROL SURFACE SKINS ARE AUTHORIZED ONLY AS PROVIDED IN THIS MANUAL.

NOTE: This repair is authorized only as a temporary measure until replacement parts (i.e. - skins) can be obtained and installed.

A. Limitations

Repair of minor cracks in aileron control surface skins only is authorized, but limited as follows:

- (1) Cracks of no more than 0.5 inch at the ends of the skin stiffening beads;
- (2) No more than two cracks per surface side.
- (3) Cracks are limited to either end of a bead (see "Figure 3"), but not on the same bead;
- (4) For wrap-around skins, two crack repairs are acceptable per side, but repairs may not be opposite to one another on opposite sides (i.e. - top and bottom).

B. Procedure

Only cracks confined to the bead end area shown in "Figure 3" may be repaired.

- (1) Cracks 0.5 inch long or less may be repaired by stop drilling;
- (2) Stop drill the extreme ends of the crack with a #50 (0.070) drill.

NOTE: Cracks stop drilled once cannot be stop drilled again, should crack growth continue.

CHAPTER

61

PROPELLERS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 61

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
61-List of	1	Mar 6/14			
Effective Pages	2	Mar 6/14			
61-Table of Contents	1	Mar 6/14			
	2	Mar 6/14			
61-10-00	1	Mar 6/14			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 61 - PROPELLERS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>PROPELLER ASSEMBLY</u>	61-10-00	1
Propeller		1
Removal		1
Cleaning, Inspection, and Repair		1
Installation		2
Blade Track		2
Dynamic Balancing		2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

PROPELLER ASSEMBLY

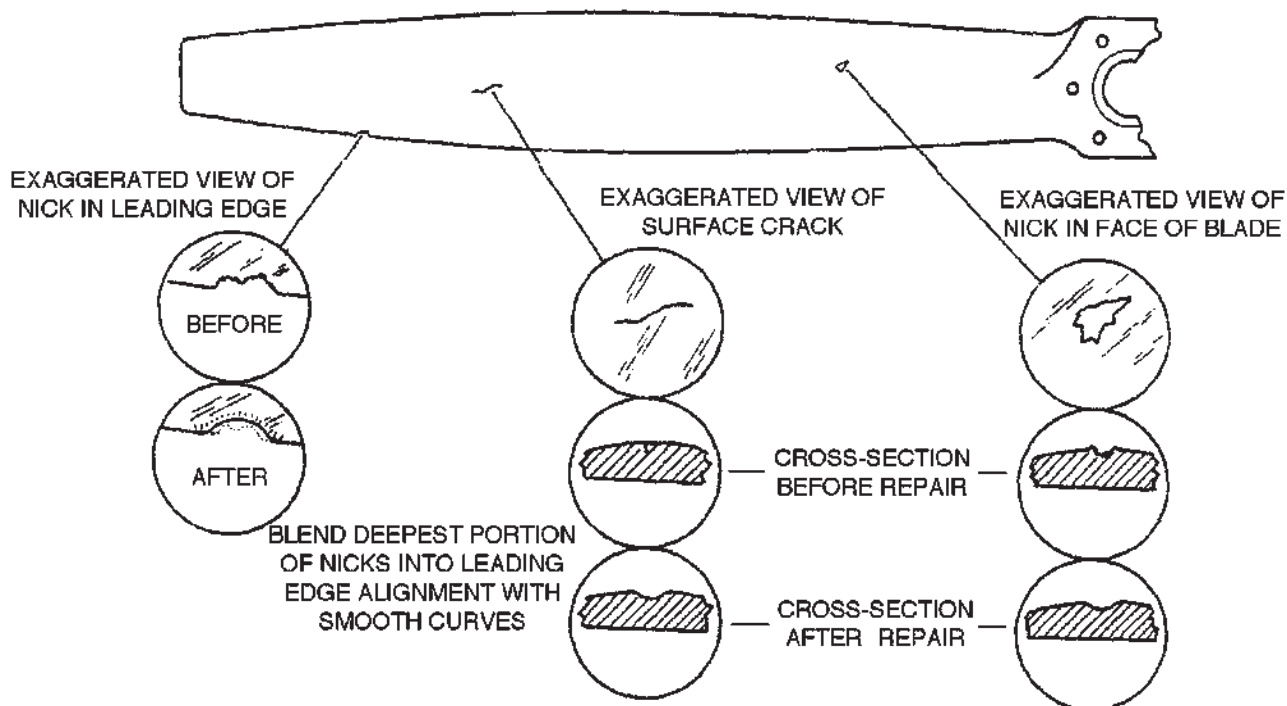
1. Propeller

A. Removal

- (1) Ensure master and magneto switches are off.
- (2) Move fuel selector to off position and place mixture control in idle cut-off.
- (3) Note position of each component to aid installation.
- (4) Remove screws attaching spinner assembly and remove spinner.
- (5) Remove safety wire securing six attaching bolts and remove bolts.
- (6) Remove propeller, bulkhead, and spacer. Spacer stays with propeller and bulkhead.

B. Cleaning, Inspection, and Repair

- (1) Clean spinner, back plate and propeller surfaces with a non-corrosive solvent, and inspect for nicks, scratches, corrosion, and cracks.
- (2) Nicks in leading edges of blades should be filed out and all edges rounded, as cracks sometimes start from such places. Use fine emery cloth for finishing. (Refer to "Figure 1" for propeller blade care.) A propeller with severe nicks, scratches, corrosion or cracks should be returned to a propeller overhaul shop or the manufacturer for inspection and repair.
- (3) Each blade face should be sanded lightly and painted, when necessary, with a flat black paint to retard glare. A light application of oil or wax may be applied to the surfaces to prevent corrosion.



NOTE: Minor nicks, cracks, and scratches can be removed with a riffle file or crocus cloth. See latest revision of AC 43-13.1.

Typical Nicks and Removal Methods
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. Installation

See "Figure 2".

- (1) Ensure magneto switch is OFF.
- (2) Place alternator drive belt in groove of starter ring gear and position starter gear on flange of crank shaft. Verify stamped "O" on gear is aligned with "O" on crankshaft flange.
- (3) Assemble propeller, bulkhead, and spacer as follows:
 - (a) Insert six (6) AN8H-82AS bolts into propeller hub.
 - (b) Assemble bulkhead to propeller by aligning bolt holes with bolts inserted into propeller hub. Position bulkhead in place over bolts.

CAUTION: EACH PROPELLER AND SPACER ARE DRILLED AS A UNIT AND ARE NOT INTERCHANGEABLE.

- (c) Locate spacer over bolts inserted into propeller hub. Be sure the number 1 stamped on the the spacer lies on the number 1 blade CL.
- (4) Install assembled propeller, bulkhead, spacer and bolts by positioning blade number 1 at the zero (0) mark on the engine ring gear, and so that bolts align with bolt holes in ring gear. Insert bolts into ring gear and finger tighten. Use a torque wrench for final tightening and tighten in sequence so all bolts are pulled down evenly. Tighten AN8H-82AS bolts to 60-65 foot lbs.

NOTE: If propeller - engine combination feels rough on initial run-up or flight, propeller may be rotated 180 degrees from initial installation.

- (5) Check propeller blade track, see below.
- (6) Safety propeller mounting bolts with MS20995-C41 wire.

NOTE: Boss on spinner bulkhead may be wrapped with P/N 289-789 Teflon tape (up to four layers maximum) in order to obtain a snug fit into bore in propeller.

- (7) Install spinner. Secure with AN526C1032R8 screws.
- (8) Adjust alternator drive belt per Checking Alternator Belt Tension, 24-30-00.

2. Blade Track

Blade track is ability of one blade tip to follow other, while rotating, in almost same plane. Excessive difference in blade track (more than 0.0625 inch) indicates bent blades or improper propeller installation. Check blade track as follows:

- A. With engine shut down and blades vertical, secure to aircraft a smooth board just under tip of lower blade. Move tip fore and aft through its full blade-shake travel, making small pencil marks at each position. Then center tip between these marks and scribe a line on board for full width of tip.
- B. Carefully rotate propeller by hand to bring opposite blade down. Center tip, and scribe a pencil line, and check lines are not separated more than 0.0625 inch.
- C. Propellers having excess blade track must be removed and inspected for bent blades. Bent blades require repair and overhaul of assembly.

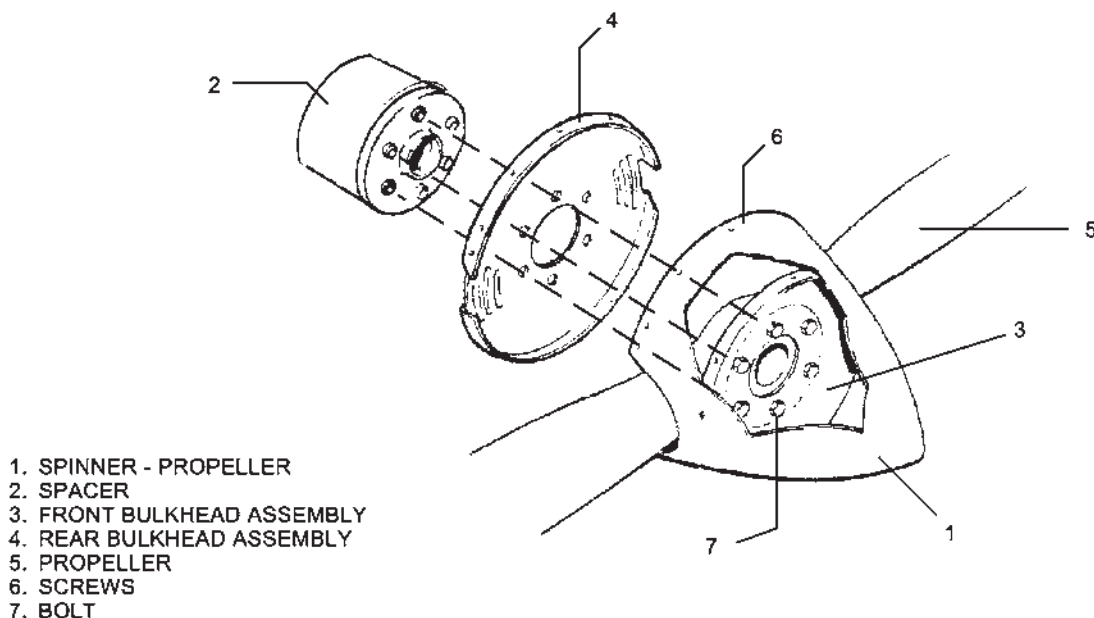
3. Dynamic Balancing

(PIR-85191AX)

If an engine/propeller installation has a vibration, and the source of vibration can not be found other than engine and propeller combined, then dynamically balance the engine, propeller, and spinner together using Chadwick-Helmuth equipment and procedures. Add balance weights, as indicated by the results of the Chadwick-Helmuth dynamic balancing, as follows:

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- A. When dynamic balancing determines that weight at one location is sufficient:
- (1) At the intersection of the five (5) inch radius from center of spinner bulkhead [or 1.25 inches inboard from the one (1) inch bulkhead flange] and a radial from center of spinner bulkhead to the location where the test weights were attached to bring components into balance; drill one (1) 0.189 - 0.191 inch diameter hole in the 83349-004 rear spinner bulkhead assembly.
 - (2) Using an AN3-*A bolt (* = length as required) and an MS21042-3 nut, attach washers P/N 80122-122** (aka P/N 494-146) as required to equal the weight of the test weight but not to exceed four (4) washers on each side of bulkhead or a total of eight (8) washers at any one location [** = weight of one (1) washer equals 7.0 grams].
- B. When dynamic balancing determines that weights need to be located at two (2) or more locations:
- (1) Drill three (3) .189/.191 inch diameter holes 120 degrees apart on the five (5.0) inch radius from center of aft spinner bulkhead. Locate these holes so that the weights and mounting hardware will clear the propeller blades.
 - (2) Distribute 80122-122** (aka P/N 494-146) washers as required between the three holes to maintain dynamic balance and secure washers to bulkhead using an AN3-*A bolt (* = length as required) and an MS21042-3 nut. Do not exceed four (4) washers on each side of bulkhead or a total of eight (8) washers at any one location [** = weight of one (1) washer equals 7.0 grams].
- C. Place decal P/N 583-410 (Hartzell P/N WAR-001) on each side of aft spinner bulkhead.
- D. After balancing make one index mark on spinner and one on spinner bulkhead using a felt pen.



Propeller Installation
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

70

STANDARD PRACTICES - ENGINE

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 70

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
70-List of	1	Mar 6/14			
Effective Pages	2	Mar 6/14			
70-Table of Contents	1	Mar 6/14			
	2	Mar 6/14			
70-00-00	1	Mar 6/14			
	2	Mar 6/14			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 70 - STANDARD PRACTICES - ENGINE

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	70-00-00	1
Standard Practices - Engine		1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

GENERAL

Standard Practices - Engine

Review the following suggestions before working on the power plant.

- A. To ensure proper reinstallation and/or assembly, tag and mark all parts, clips, and brackets as to their location prior to their removal and/or disassembly.

NOTE: Use tags or temporary marking methods which are durable enough to ensure identification during ordinary handling, storage and final assembly of parts.

- B. During removal of various tubes or engine parts, inspect them for indications of scoring, burning or other undesirable conditions. To facilitate reinstallation, observe the location of each part during removal. Tag any unserviceable part and/or units for investigation and possible repair.
- C. Extreme care must be taken to prevent foreign matter from entering the engine, such as lockwire, washers, nuts, dirt, dust, etc. This precaution applies whenever work is done on the engine, either on or off the aircraft. Suitable protective caps, plugs, and covers must be used to protect all openings as they are exposed.

NOTE: Dust caps used to protect open lines must always be installed OVER the tube ends and NOT IN the tube ends. Flow through the lines may be blocked off if lines are inadvertently installed with dust caps in the tube ends.

- D. Should any items be dropped into the engine, the assembly process must stop and the item removed, even though this may require considerable time and labor. Ensure that all parts are thoroughly clean before assembling.
- E. Never reuse any lockwire, lockwashers, tablocks, tabwashers or cotter pins. All lockwire and cotter pins must fit snugly in holes drilled in studs and bolts for locking purposes. Cotter pins should be installed so the head fits into the castellation of the nut, and unless otherwise specified, bend one end of the pin back over the stud or bolt and the other end down flat against the nut. Use only corrosion resistant steel lockwire and/or cotter pins. Bushing plugs shall be lockwired to the assembly base or case. Do not lockwire the plug to the bushing.
- F. All gaskets, packings and rubber parts must be replaced with new items of the same type at reassembly. Ensure the new nonmetallic parts being installed show no sign of having deteriorated in storage.
- G. When installing engine parts which require the use of a hammer to facilitate assembly or installation, use only a plastic or rawhide hammer.

CAUTION: ENSURE THAT ANTI-SEIZE COMPOUNDS ARE APPLIED IN THIN EVEN COATS, AND THAT EXCESS COMPOUND IS COMPLETELY REMOVED TO AVOID CONTAMINATION OF ADJACENT PARTS.

- H. Anti-seize lubrication should be applied to all loose-fit spline drives which are external to the engine and have no other means of lubrication. For certain assembly procedures, molybdenum disulfide in either paste or powdered form mixed with engine oil or grease may be used.
- I. Temporary marking methods are those markings which will ensure identification during ordinary handling, storage, and final assembly of parts.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

CHAPTER

71

POWERPLANT

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 71

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
71-List of Effective Pages	1	May 31/20	71-60-00	1	Jun 1/16
	2	Mar 6/14		2	Jun 1/16
				3	Jun 1/16
71-Table of Contents	1	May 31/20		4	Jun 1/16
	2	Mar 6/14		5	Jun 1/16
				6	Mar 6/14
71-00-00	1	Mar 15/20			
	2	May 15/19			
	3	May 15/19			
	4	May 15/19			
	5	May 15/19			
	6	May 15/19			
	7	May 15/19			
	8	May 31/20			
	9	Mar 15/20			
	10	Mar 15/20			
	11	May 31/20			
	12	May 31/20			
	13	May 31/20			
	14	May 31/20			
	15	May 31/20			
	16	May 31/20			
	17	May 31/20			
	18	Nov 15/17			
	19	May 31/20			
	20	May 31/20			
	21	May 31/20			
	22	May 31/20			
	23	May 31/20			
	24	May 31/20			
	25	May 31/20			
	26	May 31/20			
71-10-00	1	May 31/20			
	2	May 31/20			
	3	May 31/20			
	4	May 31/20			
71-20-00	1	May 15/19			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 71 - POWERPLANT

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	71-00-00	1
Lycoming Model O-360-A4M Engine - Carbureted		1
Description and Operation		1
Troubleshooting		3
Lycoming Model IO-360-B4A Engine - Fuel Injected		8
Description and Operation		8
Troubleshooting		12
Engine		18
Removal		18
Installation		18
Static RPM Determination		20
Static RPM Test Procedure		20
Scope		20
Required Equipment		20
Test Procedure		20
Simplified Test Procedure		20
Expanded Test Procedure		26
Test Results		26
<u>COWLING</u>	71-10-00	1
Cowling		1
Removal		1
Installation		1
Cleaning, Inspection and Repair		2
<u>MOUNTS</u>	71-20-00	1
Engine Shock Mounts		1
Engine Mount Corrosion Inspection, Immersion in Water		2
<u>AIR INTAKES</u>	71-60-00	1
Carburetor Ice Detector		1
Description		1
Functional Check		1
Normal Maintenance		1
Ice Detector Probe		1
Removal		1
Installation		3
Component Testing		3

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

GENERAL

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

Two different Lycoming engines are approved for installation in the PA-28-181 ARCHER airplane and consist of a carbureted engine and a fuel-injected engine. Both engines are 180 horsepower, four cylinder, wet sump, horizontally opposed, direct drive, air cooled powerplants. The cylinders are not directly opposed from each other but are staggered, thus permitting a separate throw on the crankshaft for each connecting rod.

This section is comprised of instructions for the removal and installation, minor repairs and service of the propeller, engine, induction system components, ignition system components and engine lubrication system.

For further instructions and for major repairs, consult the appropriate publications of the engine or component manufacturer.

1. Lycoming Model O-360-A4M Engine - Carbureted

Standard in [S/N's](#) 2843001 thru 2843820, 2843822 thru 2842851. Available in 2843853–2843949 and 2881013 and up.

A. Description and Operation

See "Figure 1" on page 71002. Refer to Engine Specifications in 6-00-00, Chart 1.

The induction system on this engine consists of a wet type air filter, a Marvel-Schebler float-type carburetor and a diaphragm-type fuel pump.

The engine incorporates an electric fuel priming system for cold engine starting.

The O-360-A4M engine is equipped with Slick 4370 (RH) and 4371 (LH) magnetos. These magnetos are engineered to give trouble free ignition, are completely self contained, and have an impulse coupling on the left magneto to aid in starting. These magnetos are serviceable units.

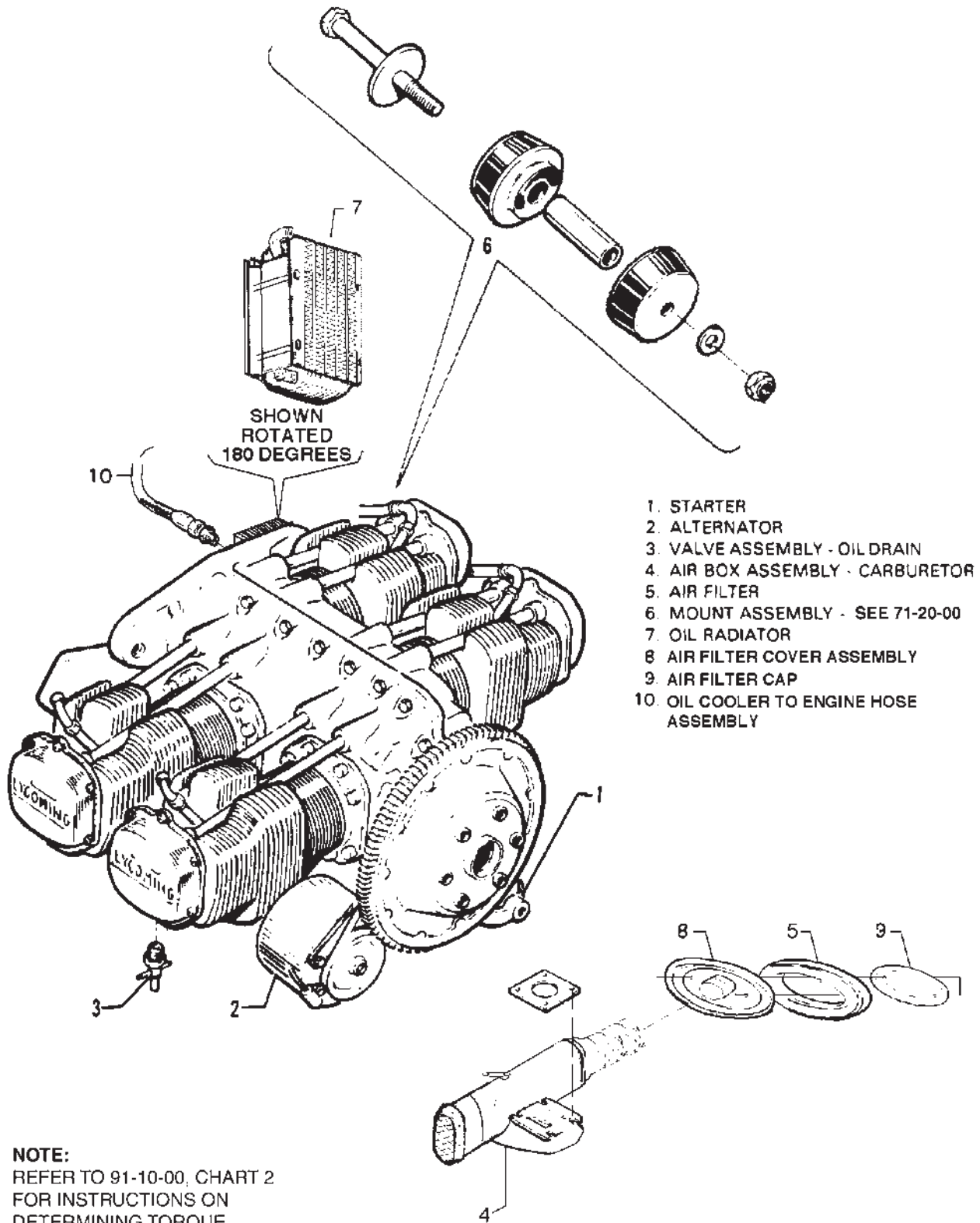
In addition to the previously mentioned components, each engine is furnished with a starter, 70 ampere alternator, 28 volt electrical system, shielded ignition, vacuum pump drive and fuel pump. The exhaust system is stainless steel with two mufflers. A shroud is provided to supply heat for both the cabin and carburetor.

The lubrication system is the pressure wet sump type. The oil pump is located in the accessory housing and draws oil through a drilled passage leading from the oil suction screen located in the sump. The oil from the pump then enters a drilled passage in the accessory housing, which feeds the oil to a threaded connection on the rear face of the accessory housing, where a flexible line leads the oil to the external oil cooler. Pressure oil from the cooler returns to a second threaded connection on the accessory housing from which point a drilled passage conducts the oil through the pressure screen or filter. In the event that cold oil or an obstruction should restrict the flow of oil to the cooler, an oil bypass also is provided to pass the oil directly from the oil pump to the oil pressure screen or filter.

The oil pressure screen or filter element, located on the accessory housing is provided as a means to filter any solid particles from the oil that may have passed through the suction screen in the sump. After being filtered, the oil is fed through a drilled passage to the oil pressure relief valve, located in the upper right side of the crankcase in front of the accessory housing. This relief valve regulates the engine oil pressure by allowing excess oil to return to the sump while the balance of the pressure oil is fed to the main oil gallery in the right half of the crankcase. Residual oil is returned by gravity to the sump where, after passing through the suction screen in the sump, it is again circulated through the engine.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85472



NOTE:
REFER TO 91-10-00, CHART 2
FOR INSTRUCTIONS ON
DETERMINING TORQUE.

[Effectivity](#)
[O-360-A4M Engine](#)

Engine Installation
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Troubleshooting

WARNING: GROUND THE MAGNETO PRIMARY CIRCUIT BEFORE PERFORMING ANY CHECKS OF THE ENGINE.

See "Chart 1".

**CHART 1 (Sheet 1 of 5)
TROUBLESHOOTING ENGINE - O-360-A4M**

Trouble	Cause	Remedy
Failure of engine to start.	Lack of fuel.	Check fuel system for leaks. Fill fuel tank. Clean dirty lines, strainers or fuel valves.
	Under priming.	Toggle primer switch for 1 or 2 seconds.
	Over priming.	Leave ignition OFF and mixture control in IDLE CUT-OFF. Open throttle and crank engine for a few seconds. Turn ignition ON and continue with normal start.
	Incorrect throttle setting.	Open throttle to one-tenth of its range.
	Defective spark plugs.	Clean and adjust or replace spark plug or plugs. Refer to 6-10-00, Chart 1 for spark plug gap adjustments.
	Defective ignition wire.	Check with electric tester and replace any defective wires.
	Improper operation of magneto breaker.	Check timing of magnetos.
	Internal failure.	Check oil sump screen for metal particles. If found, complete overhaul of the engine may be indicated.
	Improper switch wiring for left magneto starting.	Reverse magneto switch wires.
	Magnetized impulse coupling	Demagnetize impulse couplings (left magneto only).

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 2 of 5)
TROUBLESHOOTING ENGINE - O-360-A4M**

Trouble	Cause	Remedy
Failure of engine to start. (cont.)	Frozen spark plug electrodes.	Replace spark plugs or dry out removed plugs.
	Defective battery.	Replace with charged battery.
	Lack of sufficient fuel flow.	Disconnect fuel line and check fuel flow.
	Water in carburetor.	Drain carburetor and fuel lines.
	Mixture control in idle cut-off.	Open mixture control.
Failure of engine to idle properly.	Shorted ignition switch or loose ground.	Check and replace or repair.
	Incorrect carburetor idle adjustment.	Adjust throttle stop to obtain correct idle.
	Idle mixture.	Adjust mixture. Refer to engine manufacturer's handbook for proper procedure.
	Leak in the induction system.	Tighten all connections in the induction system. Replace any defective parts.
	Uneven cylinder compression.	Check condition of piston rings and valve seats.
	Faulty ignition system.	Check entire ignition system.
	Open primer.	Lock primer.
	Improper spark plug setting for altitude.	Check spark plug gap.
	Dirty air filter.	Clean or replace.
Low power and uneven running engine.	Insufficient fuel pressure.	Adjust fuel pressure.
	Mixture too rich; indicated by sluggish engine operation, red exhaust flame and black smoke.	Check primer. Adjustment of carburetor indicated.
	Mixture too lean; indicated by overheating or backfiring.	Check fuel lines for dirt or other restrictions. Check fuel supply.
	Leaks in induction system.	Tighten all connections. Replace defective parts.
	Defective spark plugs.	Clean and adjust or replace spark plug.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 3 of 5)
TROUBLESHOOTING ENGINE - O-360-A4M**

Trouble	Cause	Remedy
Low power and uneven running engine. (cont.)	Excessive blow-by.	Usually caused by weak or stuck rings. Overhaul.
	Improper engine operation.	Check entire engine.
	Improper grade of fuel.	Fill tank with recommended grade.
	Magneto breaker points not working properly.	Clean points. Check internal timing of magneto.
	Defective ignition wire.	Check wire with electric tester. Replace defective wire.
	Defective spark plug terminal connectors.	Replace connectors on spark plug wire.
	Restriction in exhaust system.	Check for loose muffler baffles.
Failure of engine to develop full power.	Improper ignition timing.	Check magnetos for timing and synchronization.
	Throttle lever out of adjustment.	Adjust throttle lever.
	Leak in induction system.	Tighten all connections, and replace defective parts.
	Restriction in carburetor air scoop.	Examine air scoop and remove restriction.
	Improper fuel.	Fill tank with recommended fuel.
	Faulty ignition.	Tighten all connections. Check system. Check ignition timing.
	Carburetor heat ON or leaking.	Select carburetor heat OFF or adjust.
Rough running engine.	Improper fuel flow.	Check fuel strainer, gauge and flow at inlet.
	Cracked engine mounts.	Repair or replace engine mount.
	Defective mounting bushings.	Install new mounting bushings.
	Unbalanced propeller.	Remove propeller and have it checked for balance.
	Bent propeller blades.	Check propeller for blade track.
	Lead deposit on spark plug.	Clean or replace plugs.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 4 of 5)
TROUBLESHOOTING ENGINE - O-360-A4M**

Trouble	Cause	Remedy
Rough running engine. (cont.)	Malfunctioning engine.	Check entire engine.
	Uneven compression.	Check compression.
Low oil pressure.	Insufficient oil.	Check oil supply.
	Dirty oil screens.	Remove and clean oil screens.
	Defective pressure gauge.	Replace gauge.
	Air lock or dirt in relief valve.	Remove and clean oil pressure relief valve.
	Leak in suction line or pressure line.	Check gasket between accessory housing crankcase.
	High oil temperature.	See "High Oil Temperature" in Trouble column.
	Stoppage in oil pump intake passage.	Check line for obstruction. Clean suction screen.
	Worn or scored bearings.	Overhaul engine.
High oil temperature.	Insufficient air cooling.	Check air inlet and outlet for deformation or obstruction.
	Insufficient oil supply.	Fill oil sump to proper level.
	Clogged oil lines, screens, or oil cooler.	Remove and clean oil screens. Replace or overhaul oil cooler.
	Failing or failed bearing.	Examine sump for metal particles and, if found, overhaul engine.
	Defective thermostats.	Replace.
	Improper grade of oil.	Replace with oil conforming to specifications.
	Defective temperature gauge.	Replace gauge.
	Excessive blow-by.	Usually caused by weak or stuck rings. Overhaul engine.
	Improper engine operation.	Check entire engine.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 5 of 5)
TROUBLESHOOTING ENGINE - O-360-A4M**

Trouble	Cause	Remedy
Excessive oil consumption.	Failing or failed bearing.	Check sump for metal particles and, if found, overhaul engine.
	Failure of rings to seat.	Use mineral base oil. Climb to cruise altitude at full power and operate at 75% cruise power setting until oil consumption stabilizes.
	Worn or broken piston rings.	Install new rings.
	Incorrect installation of piston rings.	Install new rings.
	External oil leakage.	Check engine carefully for leaking gaskets, O-rings, or sand holes.
	Leakage through engine fuel pump vent.	Replace fuel pump O-ring.
	Leakage through engine breather or vacuum pump breather.	Check engine and overhaul or replace vacuum pump.
	Improper grade of oil.	Replace with oil conforming to specifications.
Overpriming.	Cold weather.	Leave ignition OFF and mixture control in IDLE CUT-OFF. Open throttle and crank engine for a few seconds. Turn ignition ON and continue with normal start.
Inaccurate pressure readings.	Cold weather.	High or low pressure readings due to extremely cold weather are not necessarily a malfunction. Small and long oil lines will not transfer pressure readings accurately until engine is warm.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Lycoming Model IO-360-B4A Engine - Fuel Injected

Installed in [S/N's](#) 2843821 and 2843852. Available in 2843854–2843935, and 2881001 and up.

A. Description and Operation

See "Figure 2" on page 71009. Refer to Engine Specifications in 6-00-00, Chart 1.

The induction system on this engine consists of a wet type air filter, a RSA-type fuel injector servo, and a diaphragm-type fuel pump.

The fuel injection system is a conventional, Bendix-type RSA5 system, consisting of a fuel injection servo that meters fuel delivery based on engine intake airflow, a flow divider that evenly distributes fuel to the 4 cylinders and injection nozzles that direct vaporized fuel into the cylinder head intake ports. An alternate air control is provided in the event of blockage of the primary, filtered airflow path to the engine. The design of the system will also continue to provide the required, minimum heat rise to prevent or eliminate icing of the system by pulling airflow from around the exhaust tailpipe.

The IO-360-B4A engine is equipped with two Slick 4373 magnetos. These magnetos are engineered to give trouble free ignition, are completely self contained, and have an impulse coupling to aid in starting. These magnetos are serviceable units.

In addition to the previously mentioned components, each engine is furnished with a starter, 70 ampere alternator, 28 volt electrical system, shielded ignition, and fuel pump. The exhaust system is stainless steel with two mufflers. A shroud is provided to supply heat for the cabin.

The lubrication system is the pressure wet sump type. The oil pump is located in the accessory housing and draws oil through a drilled passage leading from the oil suction screen located in the sump. The oil from the pump then enters a drilled passage in the accessory housing, which feeds the oil to a threaded connection on the rear face of the accessory housing, where a flexible line leads the oil to the external oil cooler. Pressure oil from the cooler returns to a second threaded connection on the accessory housing from which point a drilled passage conducts the oil through the pressure screen or filter. In the event that cold oil or an obstruction should restrict the flow of oil to the cooler, an oil bypass also is provided to pass the oil directly from the oil pump to the oil pressure screen or filter.

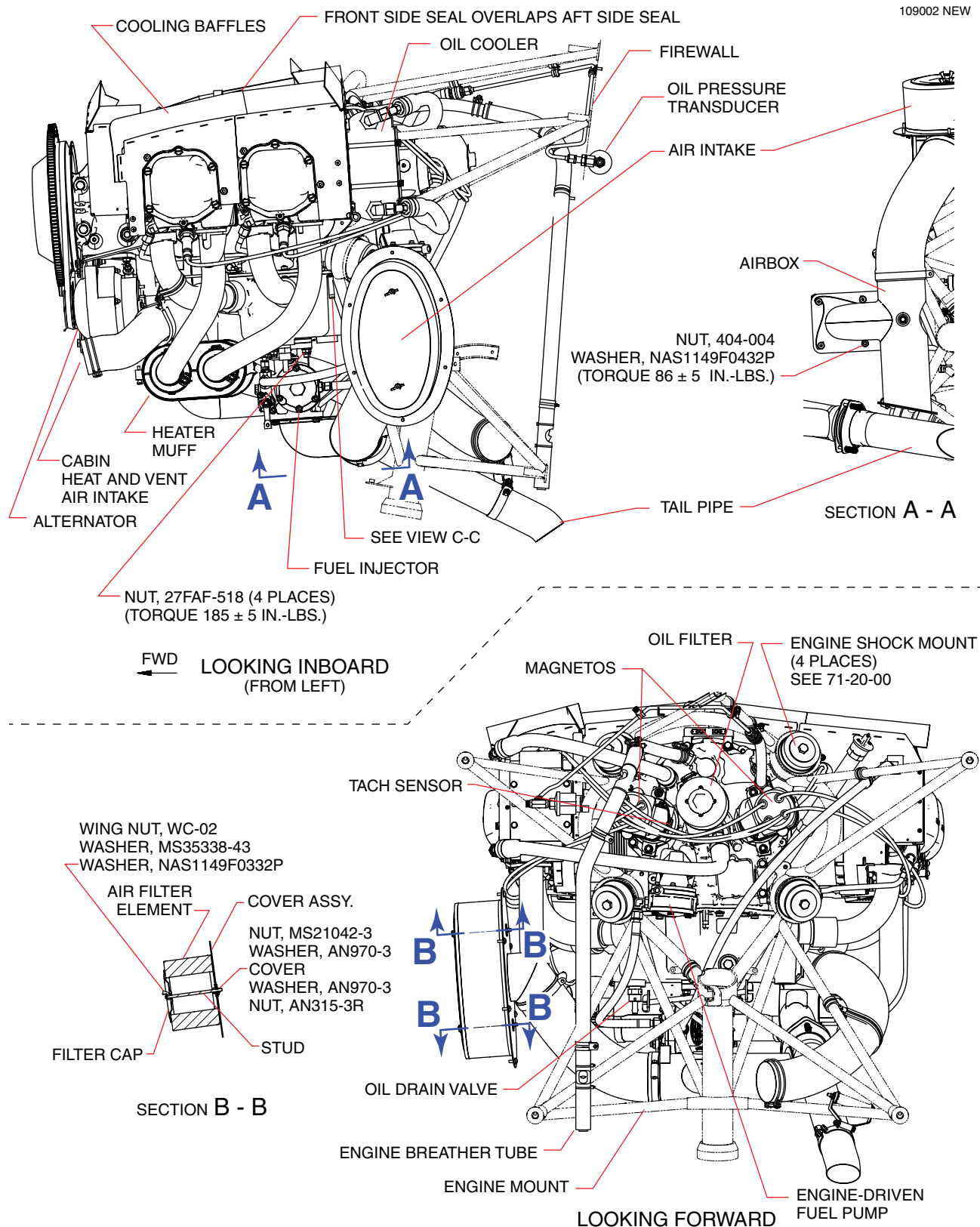
An optional 2nd oil cooler installation is mounted on a bracket assembly attached to the firewall when installed. The oil cooler receives cooling airflow from a "NACA" style scoop mounted in the right side of the lower cowl. Exhaust airflow exits through the lower cowl on the right side of the airplane. Addition of the 2nd oil cooler adds approximately 1 quart of oil to the system. However, the minimum/maximum engine sump capacity remains the same.

Oil flow with the 2nd oil cooler is illustrated 79-20-00. The oil system uses hoses to route oil from the engine, through the oil coolers, and back to the engine. The oil coolers are plumbed in series in the engine oil system circuit, flowing through the original oil cooler first and then through the optional 2nd oil cooler. Winterization plates are supplied to restrict airflow over both oil coolers during cold weather operation to be able to maintain sufficient oil temperatures.

The oil pressure screen or filter element, located on the accessory housing is provided as a means to filter any solid particles from the oil that may have passed through the suction screen in the sump. After being filtered, the oil is fed through a drilled passage to the oil pressure relief valve, located in the upper right side of the crankcase in front of the accessory housing. This relief valve regulates the engine oil pressure by allowing excess oil to return to the sump while the balance of the pressure oil is fed to the main oil gallery in the right half of the crankcase. Residual oil is returned by gravity to the sump where, after passing through the suction screen in the sump, it is again circulated through the engine.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

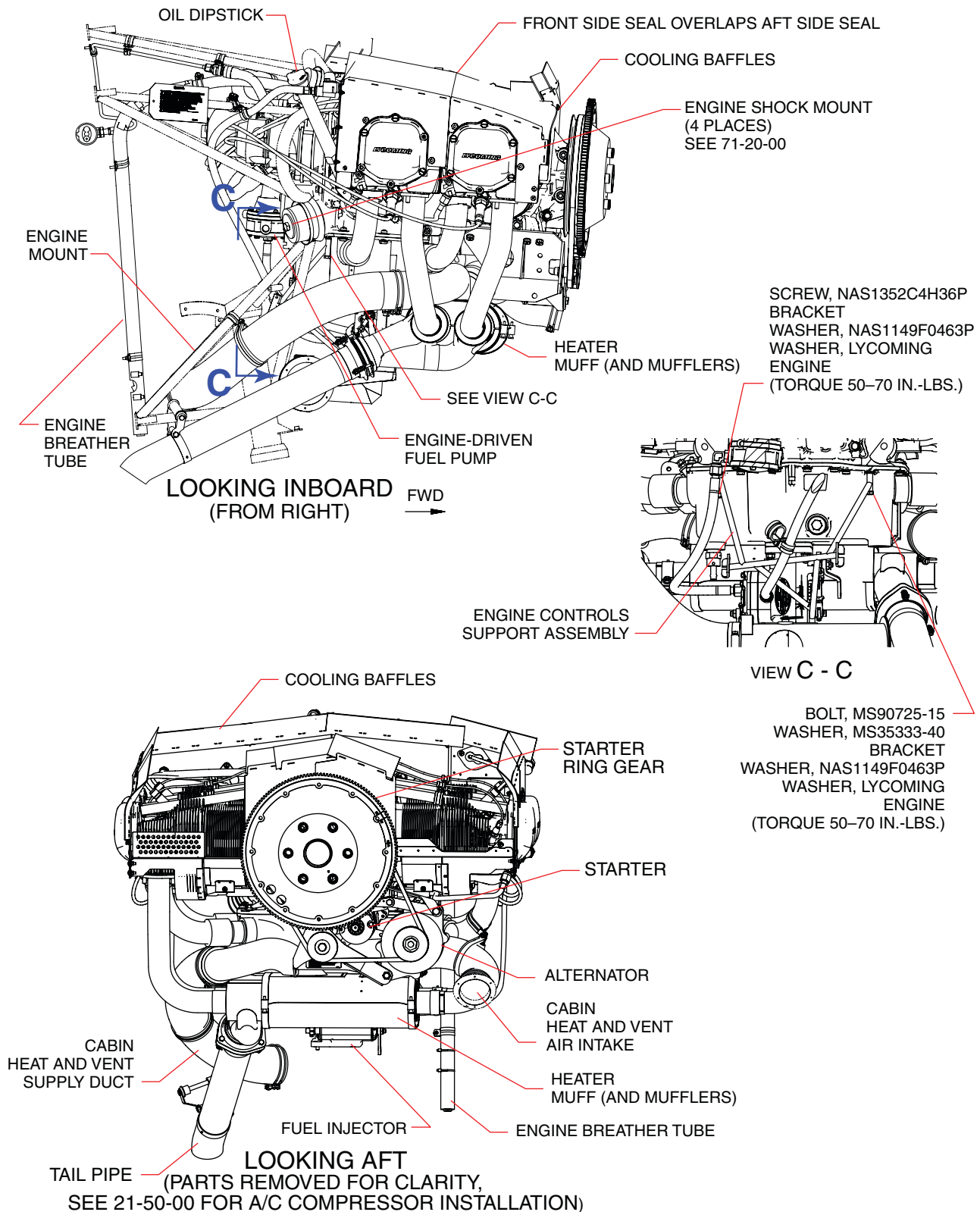
109002 NEW



Engine Installation
Figure 2 (Sheet 1 of 2)

Effectivity
IO-360-B4A engine

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

B. Troubleshooting

WARNING: GROUND THE MAGNETO PRIMARY CIRCUIT BEFORE PERFORMING ANY CHECKS OF THE ENGINE.

See "Chart 2" on page 710013.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 1 of 4)
TROUBLESHOOTING ENGINE - IO-360-B4A**

Trouble	Cause	Remedy
Failure of engine to start.	Lack of fuel.	Check fuel system for leaks. Fill fuel tank. Clean dirty lines, strainers or fuel valves. Check fuel selector valve for proper tank. Check fuel pressure with electric boost pump ON. Check mixture control knob for full rich.
	Overpriming.	Open throttle and "unload" engine by engaging starter. Mixture in idle-cut-off.
	Incorrect throttle setting.	Open throttle to one eighth of its range.
	Defective spark plugs.	Clean and adjust or replace spark plugs.
	Defective ignition wire.	Check with electric tester and replace defective wires.
	Defective battery.	Replace with charged battery.
	Improper operation of magneto breaker.	Clean points. Check internal timing of magnetos.
	Lack of sufficient fuel flow.	Disconnect fuel line at fuel injector and check fuel flow.
	Internal failure.	Check oil screens for metal particles. If found, complete overhaul of engine may be indicated.
Failure of engine to idle properly.	Incorrect idle mixture.	Adjust mixture.
	Leak in the induction system.	Tighten all connections in the induction system. Replace any parts that are defective.
	Incorrect idle adjustment.	Adjust throttle stop to obtain correct idle.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 2 of 4)
TROUBLESHOOTING ENGINE - IO-360-B4A**

Trouble	Cause	Remedy
Failure of engine to idle properly. (cont.)	Uneven cylinder compression.	Check condition of piston rings and valve seats.
	Faulty ignition system.	Check entire ignition system.
	Insufficient fuel pressure.	Adjust fuel pressure.
Lower power and uneven running.	Mixture too rich; indicated by sluggish engine operation, red exhaust flame at night Extreme cases indicated by black smoke from exhaust.	Readjustment of fuel injector by authorized personnel is indicated.
	Mixture too lean; indicated by overheating or backfiring.	Check fuel lines for dirt or other restrictions. Check fuel injection nozzles. Adjust fuel injector.
	Leaks in induction system.	Tighten all connections. Replace defective parts.
	Defective spark plugs.	Clean and gap or replace spark plugs.
	Improper fuel.	Fill tank with fuel of recommended grade.
	Magneto breaker points not working properly.	Clean points. Check internal timing of magnetos.
	Defective ignition wire.	Check wire with electric tester. Replace defective wire.
	Defective spark plug terminal connectors.	Replace connectors on spark plug wire.
Engine fails to develop full power.	Leak in the induction system.	Tighten all connections and replace defective parts.
	Throttle lever out of adjustment.	Adjust throttle lever.
	Improper fuel flow.	Check strainer, gauge and flow at fuel injector inlet.
	Restriction in air scoop.	Examine air scoop and remove restrictions.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 3 of 4)
TROUBLESHOOTING ENGINE - IO-360-B4A**

Trouble	Cause	Remedy
Engine fails to develop full power. (cont.)	Improper fuel.	Drain and refill tank with recommended fuel.
	Faulty ignition.	Tighten all connections. Check system with tester. Check ignition timing.
Rough engine.	Cracked engine mount.	Replace or repair mount.
	Defective mounting bushings.	Install new mounting bushings.
	Uneven compression.	Check compression.
Low oil pressure.	Insufficient oil.	Fill sump with recommended oil.
	Air lock or dirt in relief valve.	Remove and clean oil pressure relief valve.
	Leak in suction line or pressure line.	Check gasket between accessory housing and crankcase.
	Dirty oil strainers.	Remove and clean oil strainers.
	Defective pressure gauge.	Replace gauge.
	Stoppage in oil pump intake passage.	Check line for obstruction.- Clean suction strainer.
	High oil temperature.	See "High Oil Temperature" in "Trouble" column.
High oil temperature.	Insufficient air cooling.	Check air inlet and outlet for deformation or obstruction.
	Insufficient oil supply.	Fill oil sump to proper level with specified oil.
	Low grade of oil.	Replace with oil conforming to specifications.
	Clogged oil lines, screens, or oil cooler.	Remove and clean oil screens. Replace or overhaul oil cooler.
	Excessive blow-by.	Usually caused by worn or stuck rings.
	Failing or failed bearing.	Examine sump for metal particles. If found, overhaul of engine is indicated.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 2 (Sheet 4 of 4)
TROUBLESHOOTING ENGINE - IO-360-B4A

Trouble	Cause	Remedy
High oil temperature. (cont.)	Defective temperature gauge.	Replace gauge.
Excessive oil consumption.	Low grade of oil.	Fill tank with oil conforming to specifications.
	Failing or failed bearings.	Check sump for metal particles.
	Worn piston rings.	Install new rings.
	Incorrect installation of piston rings.	Install new rings.
	Failure of rings to seat (new nitrided cylinders.)	Use mineral base oil. Climb to cruise altitude at full power and operate at 75% cruise power setting with high oil temperature until oil consumption stabilizes.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Engine

Refer to "Figure 1" on page 71002 and "Figure 2" on page 71009.

A. Removal

CAUTION: PLACE A TAIL STAND UNDER AIRPLANE TAIL BEFORE REMOVING ENGINE.

- (1) Turn off all electrical switches in cockpit, then disconnect battery ground wire at battery.
- (2) Move fuel selector lever in cockpit to OFF position.

CAUTION: BE SURE ALL ELECTRICAL LEADS ARE DISCONNECTED BEFORE REMOVING COWLING.

- (3) Remove engine cowlings by releasing cowling fasteners or attachment screws.
- (4) Remove propeller. (Refer to Chapter 61.)
- (5) Disconnect starter positive and ground leads at starter and their attachment clamps.
- (6) Disconnect cabin heat and defroster ducts from muffler.
- (7) With O-360-A4M engine only, disconnect primer line at tee connection.
- (8) Disconnect throttle and mixture cables at carburetor/fuel injector and carburetor heat/alternate air control at airbox. Remove carburetor/fuel injector if necessary.
- (9) Disconnect engine-driven mechanical fuel pump supply line at pump.
- (10) Disconnect engine oil cooler lines from cooler.
- (11) Disconnect magneto P leads at magnetos. Insert protective cover over connection.
- (12) Disconnect engine oil temperature lead and engine breather tube at aft end of engine.
- (13) With O-360-A4M engine only, if installed, disconnect tachometer drive cable from rear of engine.
- (14) Untie ignition harness, hoses, and lines at aft end of engine.
- (15) If installed, disconnect vacuum pump lines at pump.
- (16) Disconnect oil pressure line from rear of engine.
- (17) Disconnect alternator leads and cable attachment clamps.
- (18) If installed, discharge the air conditioning system per 21-50-00 and disconnect air conditioning refrigerant hoses at the compressor.
- (19) Attach a 1/2 ton (minimum) hoist to hoisting straps and relieve tension from mounts.
- (20) Check engine for any attachments remaining to obstruct removal.
- (21) Drain engine oil, if needed, and close drain.
- (22) Remove the four engine shock mount assemblies and swing engine free, being careful not to damage any attaching parts.

B. Installation

- (1) Attach a 1/2 ton (minimum) hoist to engine hoisting straps and swing engine into alignment with its attaching points on the mounts.
- (2) Insert an engine mount bolt through the hole of a engine shock mount attachment point (a washer is installed next to bolt head) and slide half of shock mount assembly on bolt. Repeat for other three mounts.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (3) Position the engine mounting lugs to align with engine mount attaching points, then move engine rearward onto mounts.
- (4) Slide onto each mounting bolt a spacer washer, spacer, and forward half of mount. Install washer and nut, and tighten nuts to the torque specified under "Engine Shock Mounts" on page 71201.
- (5) If installed, connect air conditioning refrigerant hoses at the compressor.
- (6) Connect alternator leads and secure cables with clamps.
- (7) Connect oil pressure line, oil temperature lead, and engine breather tube to aft end of engine.
- (8) With O-360-A4M engine only, if equipped, connect tachometer drive cable.

NOTE: Soak felt washer (P/N 494-005) in engine oil and insert washer in engine end of tachometer drive cable when installing.

- (9) If equipped, connect vacuum pump line at pump.
- (10) Secure ignition harness, hoses, and lines at aft end of engine using koroseal lacing.
- (11) Connect both lines to oil cooler.
- (12) Connect engine-driven mechanical fuel pump supply line at pump.
- (13) Connect magneto P leads to magnetos.
- (14) Connect throttle, mixture, and carburetor heat / alternate air cables at appropriate engine components.
- (15) With O-360-A4M engine only, connect primer line at tee connection.
- (16) Connect cabin heat and defroster ducts to muffler.
- (17) Connect starter positive and ground leads at starter and secure with attachment clamps.
- (18) Verify magneto switches are OFF and install propeller. (Refer to 61-10-00.)
- (19) Ensure engine is filled with proper grade oil. (Refer to Lubrication Chart, 12-20-00.)
- (20) Connect battery negative (ground) wire at battery.
- (21) Open throttle completely and select an appropriate tank on the fuel selector valve. Turn on electric fuel pump and check fuel lines for leaks.
- (22) Install engine cowlings and remove tail stand.

CAUTION: TO AVOID POSSIBLE HIGH SPEED BEARING FAILURE DUE TO LACK OF LUBRICATION DURING INITIAL STARTS AFTER ENGINE INSTALLATION, REFER TO LATEST REVISION LYCOMING SERVICE INSTRUCTION NO. 1241 FOR INSTRUCTIONS PRIOR TO INITIAL ENGINE LUBRICATION.

- (23) Perform an engine operational check. Refer to engine manufacturer's appropriate operator's manual.
- (24) If installed, recharge the air conditioning system per 21-50-00.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4. Static RPM Determination

(PIR-PPS55018, Rev. C.)

A. Static RPM Test Procedure

The maximum static RPM value for a fixed pitch propeller equipped aircraft provides an indication that the engine/propeller combination is meeting rated power output.

Low static RPM indicates a low engine power or incorrect propeller (higher pitch/longer diameter) while a high static RPM indicates high engine power or incorrect propeller (lower pitch/shorter diameter), any of which is not desirable. For this reason it is important that each engine/propeller combination meets the criteria of this section. However, many factors influence engine power and therefore the actual static RPM can change significantly. This section provides a procedure whereby accurate and repeatable static RPM values may be obtained.

B. Scope

This section describes the ground test procedure for determining the maximum static RPM value for each fixed pitched propeller listed in "Chart 3", Propeller Applicability.

C. Required Equipment

- (1) Vu-Thru Tachometer
- (2) Instrument or means to obtain outside air temperature and relative humidity or dew point. The following list of instruments may be used, but are not the only means:
 - (a) Automatic Terminal Information Service (ATIS).
 - (b) Calibrated Thermometer.
 - (c) Calibrated Psychrometer.
 - (d) National Weather Service.
 - (e) Omega Hand Held Hygrometers, Models RH-201 and RH-30 or Equivalent.

D. Test Procedure

A simplified test procedure is provided to test static RPM under limited conditions. In the event that the test conditions do not fall within the limits of "Chart 4", proceed to the expanded test procedure.

E. Simplified Test Procedure

- (1) Obtain ambient outside air temperature and dew point.
- (2) Head aircraft into the wind.
- (3) Apply full throttle. Avoid prolong runs at full power.
- (4) Allow oil temperature to reach 180 ± 10 degrees.
- (5) Record the test static RPM using the Vu-Thru tachometer

NOTE: If wind speed exceeds 10 knots record static RPM and oil temperature into the wind, left crosswind, downwind, and right crosswind. Average the four test static RPM values.

- (6) Using the outside air temperature and dew point enter "Chart 4" and read the corresponding BASELINE RPM value. With baseline value and tested static RPM, proceed to Step G, Test Results on page 710026.

NOTE: Use the temperature and dew point values on "Chart 4" which most closely correspond to the test condition. Interpolate baseline RPM if temperature and/or dew point fall equally between two or more blocks.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 3
PROPELLER APPLICABILITY**

Propeller	Tolerance of BASELINE
76EM8S5-0-62	+/- 50 RPM
76EM8S14-0-62	+/- 50 RPM

**CHART 4
STATIC RPM WITH 76EM8S5-0-62 OR 76EM8S14-0-62 PROPELLERS**

TEMP	BASELINE RPM (TYP)		DEW POINT (TYP)									
40	2240	40	2240	36	2240	33	2240	30	2250	26	2250	23
									2250	21	2250	17
											2250	12
50	2240	50	2250	46	2250	43	2250	39	2250	35	2260	31
									2260	27	2260	21
											2270	16
60	2250	60	2250	56	2250	53	2260	50	2260	45	2270	41
									2270	34	2270	28
											2280	21
70	2240	70	2250	67	2250	63	2260	60	2270	55	2270	50
									2280	44	2280	36
											2290	27
80	2230	80	2240	76	2250	73	2260	68	2270	65	2280	60
									2280	53	2290	45
											2300	33
85	2230	85	2240	81	2250	77	2260	73	2270	69	2280	65
									2290	58	2300	50
											2310	40
90	2220	90	2230	86	2240	83	2250	78	2260	74	2270	69
									2290	63	2300	55
											2310	43
95	2200	95	2220	91	2230	87	2240	83	2260	78	2270	73
									2290	67	2300	59
											2310	47
100	2190	100	2200	96	2220	93	2240	88	2250	84	2270	78
									2280	72	2300	64
											2320	52

NOTE: Temperature and Dew Point in Degrees F.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 5
STATIC RPM WORKSHEET

Aircraft Model: _____

Aircraft S/N: _____

Date: _____

OAT: _____

Relative Humidity (Temp ____) (Dew PT ____) _____ %

Wind above 10 Knots

Tested

Static RPM: _____ Average

Oil Temp: _____

Rpm: _____ (See "Chart 6" on page 710023.)

Delta rpm (subtract) _____ (See "Chart 7" on page 710024.)

BASELINE Static rpm _____

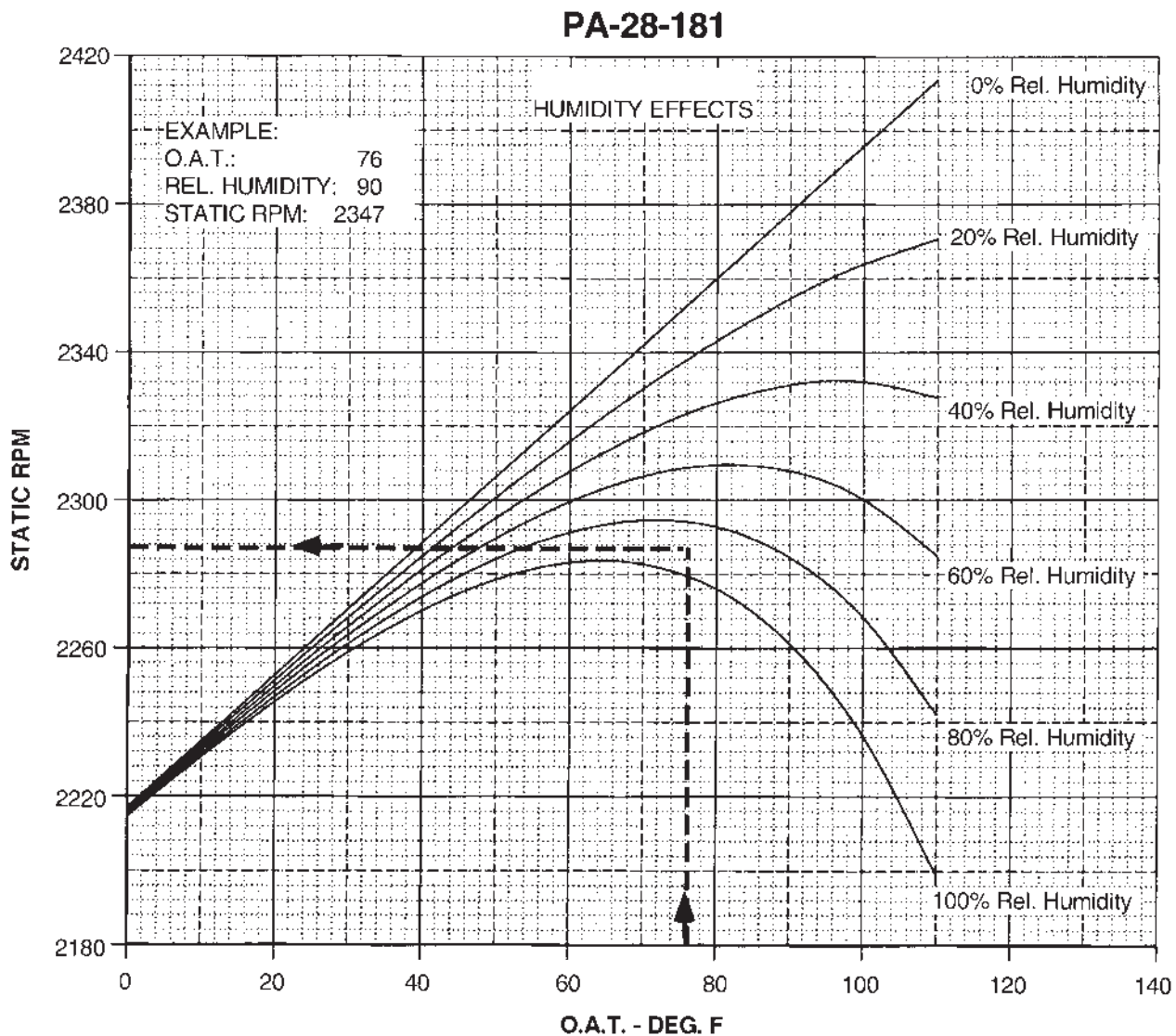
Tested _____

Static rpm: _____

Result to be within tolerance _____ (See "Chart 3" on page 710021.)

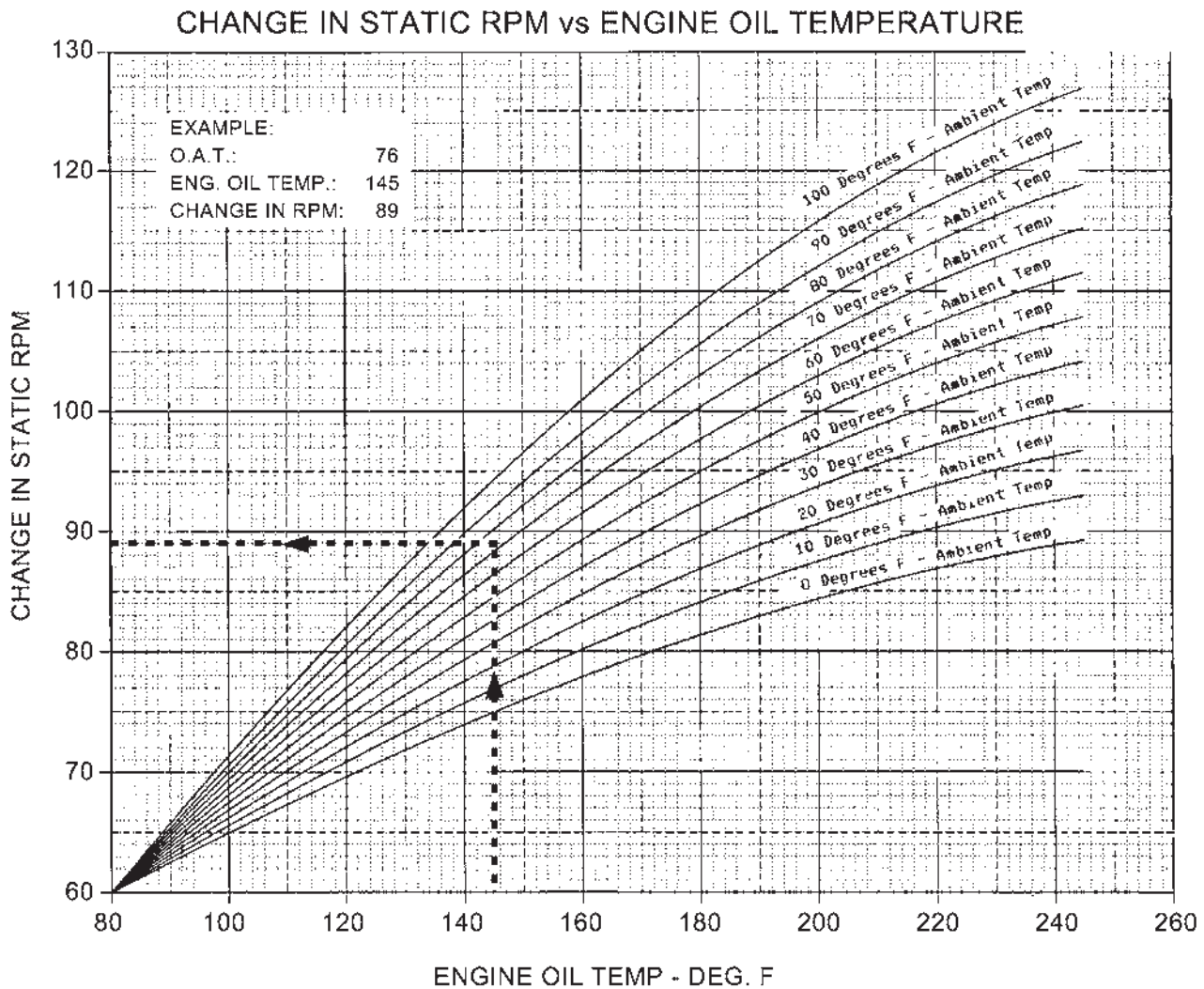
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 6
STATIC RPM (SEA LEVEL $\pm$ 500 FEET PRESSURE (ALTITUDE ONLY))



PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 7
CHANGE IN STATIC RPM VS. ENGINE OIL TEMPERATURE

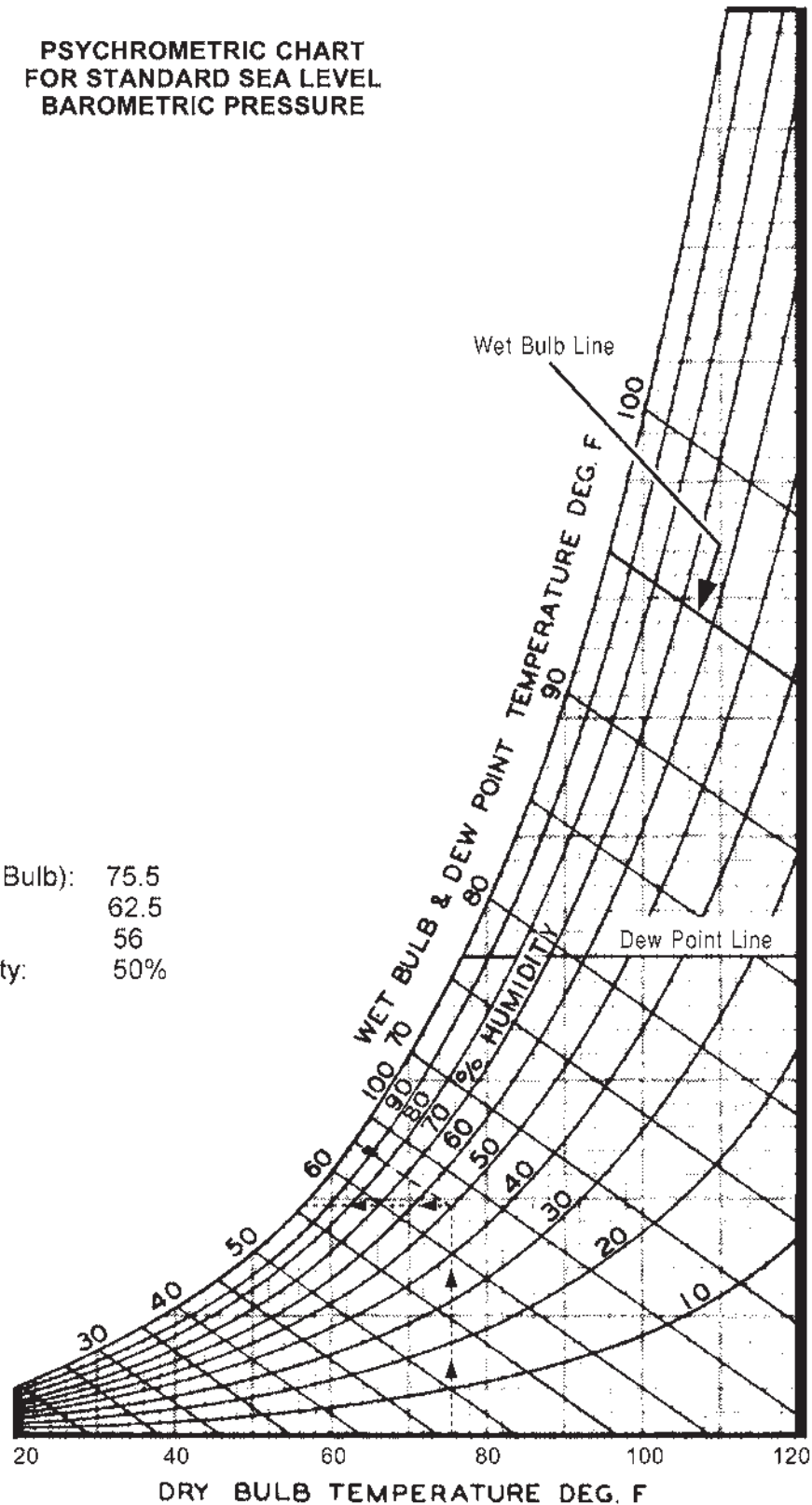


PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 8
PSYCHROMETRIC CHART

PSYCHROMETRIC CHART
FOR STANDARD SEA LEVEL
BAROMETRIC PRESSURE

EXAMPLE:
O.A.T. (Dry Bulb): 75.5
Wet Bulb: 62.5
Dew Point: 56
Rel. Humidity: 50%



**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

F. Expanded Test Procedure

The Static RPM Worksheet ("Chart 5" on page 710022) should be printed and used to document the following expanded test procedure.

- (1) Obtain ambient outside air temperature and relative humidity.

NOTE: Relative humidity may be obtained using a psychrometric chart ("Chart 8" on page 710025) if the outside air temperature, and dew point, or wet bulb are known.

- (2) Head aircraft into the wind.
- (3) Apply full throttle. Avoid prolonged runs at full power.
- (4) Allow oil temperature to reach at least 80 degrees F.
- (5) Record the test static RPM using the Vu-Thru tachometer and engine oil temperature.

NOTE: If wind speed exceeds 10 knots record static RPM and oil temperature into the wind, left crosswind, downwind, and right crosswind. Average the four test static RPM values.

- (6) With the outside air temperature and relative humidity, read static RPM from "Chart 6" on page 710023.
- (7) With the oil temperature and outside air temperature, read delta RPM from "Chart 7" on page 710024.
- (8) Subtract the delta RPM obtained from "Chart 7" on page 710024, from the static RPM obtained from "Chart 6" on page 710023. This is the BASELINE.

G. Test Results

The tested static RPM from the Vu-Thru tachometer shall be within the tolerance specified in "Chart 3" on page 710021 of the BASELINE static RPM.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

COWLING

Cowling

A. Removal

Refer to Figure 1.

- (1) Remove the two machine screws on both sides of propeller shaft opening.
- (2) Remove the studs securing the upper cowling to the cowling channel assembly (6 on each side of the cowling).
- (3) Remove the upper cowling by raising rear edge and pulling slightly aft.
- (4) To remove lower cowling:
 - (a) Remove nose wheel strut fairing by:
 - 1) Remove the two machine screws installed sideways through each side of both sections of the fairing.
 - 2) Remove the forward section of fairing by removing the 5 screws securing it to the cowling.
 - 3) Remove aft fairing section by removing the four remaining machine screws.
 - 4) Do not remove cowling attachment machine screw located under nose wheel fairing at this time.
 - (b) Loosen hose clamps securing the alternator ventilating air (with O-360-A4M engine only) and the cabin air hose(s) to inlet ducts. Remove hose(s).
 - (c) In airplanes with a fuel-injected engine and the optional 2nd oil cooler, loosen hose clamp securing the secondary oil cooler air duct hose to the NACA inlet duct. Remove duct hose.
 - (d) Remove the top 5 machine screws along each aft edge of the lower cowling. Do not remove the sixth attachment machine screw, located on bottom aft edge of lower cowling, at this time.

NOTE: With the 5 top machine screws removed, there should be enough "give" in lower cowling to loosen carburetor air box hose clamp from filter cover.
 - (e) Loosen carburetor heat/alternate air box hose clamp. Remove hose.

NOTE: It is easier to complete lower cowling removal with two people.
 - (f) Supporting lower cowling assembly, remove the two machine screws on bottom aft edge of cowling and the forward attachment screw located under nose strut fairing.
 - (g) Carefully lower and remove lower cowling assembly.

B. Installation

Refer to Figure 1.

- (1) Using two people, one on each side of the airplane, position lower cowling onto airplane. Temporarily secure with the two top aft edge machine screws.

NOTE: The following steps can be completed by one person.
- (2) Install the two machine screws into bottom aft edge of cowling and the forward attachment screw located under nose strut fairing.
- (3) Install the remaining five machine screws along the right aft edge only.
- (4) Remove the left top aft machine screw.

NOTE: With the top aft machine screw removed from the left side of cowling, there should be enough "give" in lower cowling to install carburetor air box hose and clamp to filter cover.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (5) Attach hose to carburetor heat/alternate air box and tighten clamp.
- (6) Install remaining five machine screws along left aft edge of cowl.
- (7) Attach alternator ventilating air (with O-360-A4M engine only) and cabin air hose(s) to appropriate vents. Tighten clamps.
- (8) In airplanes with a fuel-injected engine and the optional 2nd oil cooler, install the secondary oil cooler air duct hose to the NACA inlet duct and secure with clamp.
- (9) Install upper cowling in position by keeping rear edge raised and pushing slightly forward. Be sure that the lower edge of cowling is outside of the left and right cowl inserts.

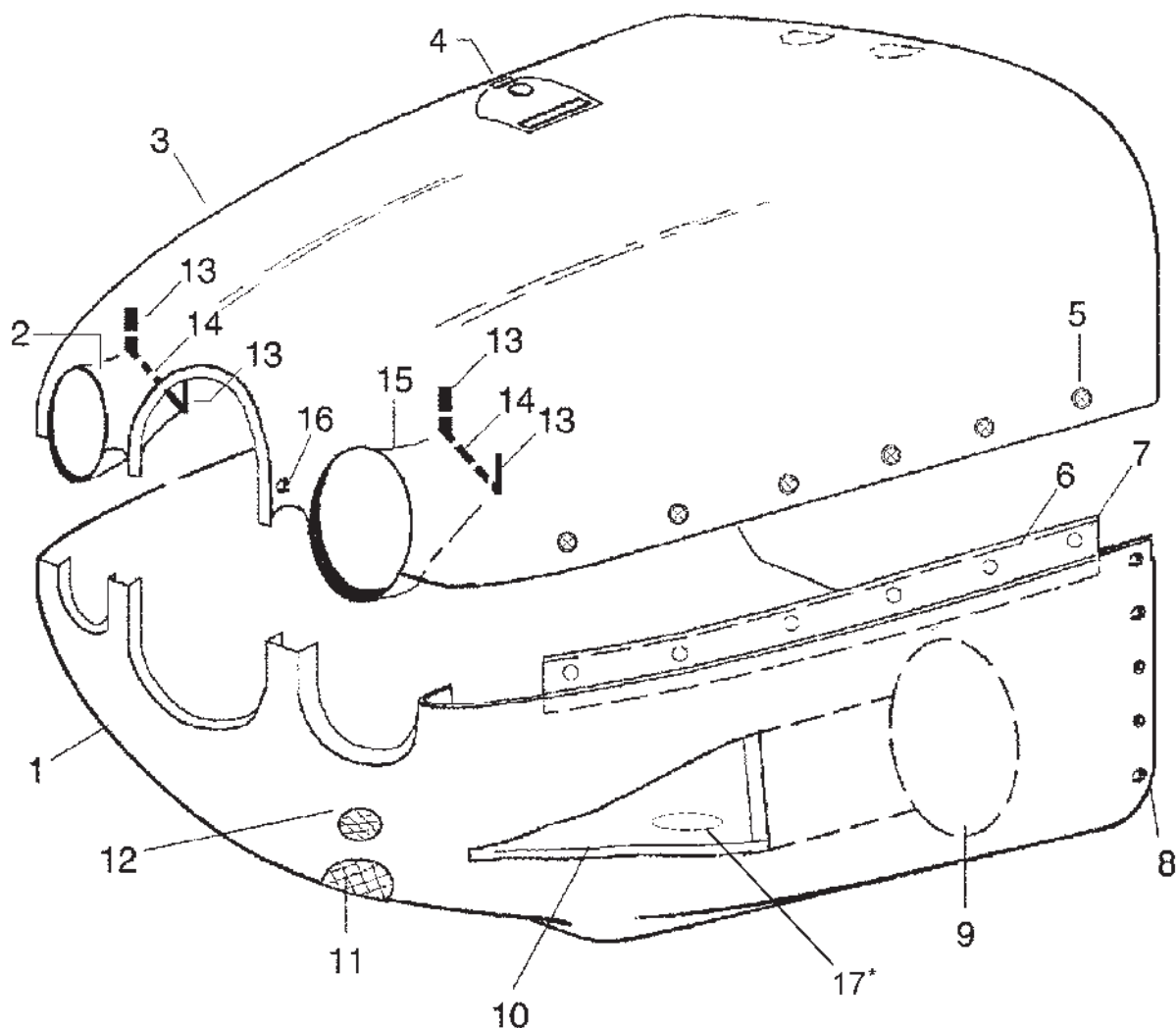
NOTE: When installing upper cowling, be sure that the baffle seals and retainer are inboard (behind or under the cowling lip) of the left and right air inlets.

- (10) Install the studs securing upper cowling to the cowling insert.
- (11) Install the two machine screws on both sides of propeller shaft opening.
- (12) Check that all screws and studs are tight.
- (13) Install nose strut fairing.
 - (a) Locate aft section of fairing in proper position and secure with 4 screws.
 - (b) Locate forward section of fairing in proper position so that it overlaps aft section.
 - (c) Install remaining five screws securing fairing to cowling. Be sure that screws inserted through aft holes in forward section of fairing also go through the front holes in rear section of fairing.
 - (d) Install the two screws located in each side of, and running through, both fairing sections.

C. Cleaning, Inspection and Repair

- (1) Clean cowling with suitable cleaning solvent and wipe dry with clean cloth.
- (2) Inspect cowling for dents, cracks, loose rivets, elongated holes, and damaged or missing fasteners.
- (3) Repair all defects to prevent further damage.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

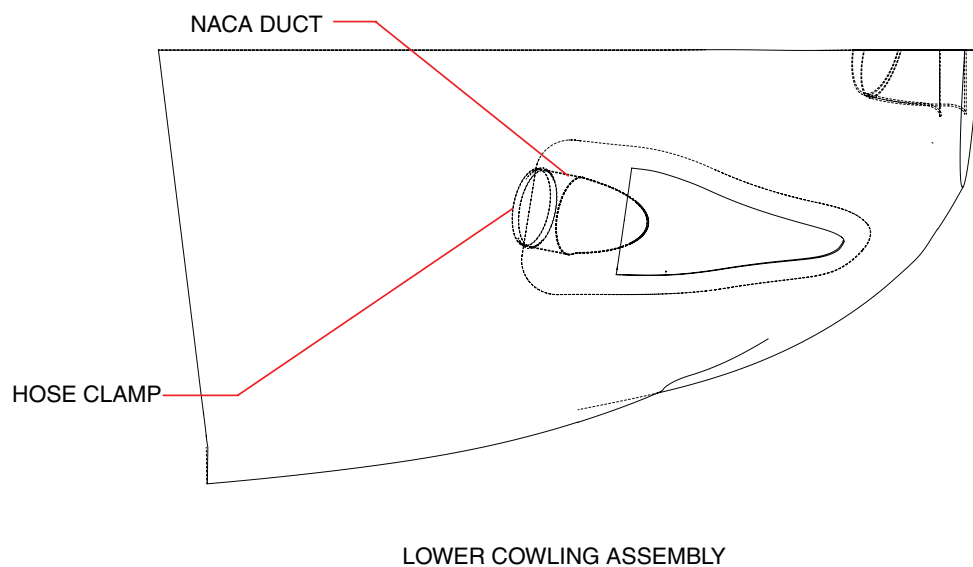


1. LOWER COWLING ASSEMBLY	8. LOWER COWLING
2. RIGHT AIR INLET	MACHINE SCREWS
3. UPPER COWLING ASSEMBLY	9. AIR BOX
4. OIL FILLER DOOR	10. NACA DUCT
5. COWLING STUDS	11. CABIN HEAT AIR INLET SCREEN
- LEFT AND RIGHT	12. ALTERNATOR AIR INLET
- 6 EACH SIDE	SCREEN (with O-360-A4M engine only)
6. LEFT AND RIGHT	13. BAFFLE SEALS
COWLING INSERT	14. BAFFLE SEAL RETAINERS
7. COWLING CHANNEL ASSEMBLY	15. LEFT AIR INLET
- LEFT AND RIGHT	16. MACHINE SCREWS
	- 1 EACH SIDE
	17.*OPTIONAL LOWER COWLINGS WITH
	ACCESS HOLE(S).

Cowling Installation
Figure 1 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

28P71A001 A



[Effectivity](#)
[Fuel Injected Engine with](#)
[2nd oil cooler option](#)

Cowling Installation
Figure 1 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

MOUNTS

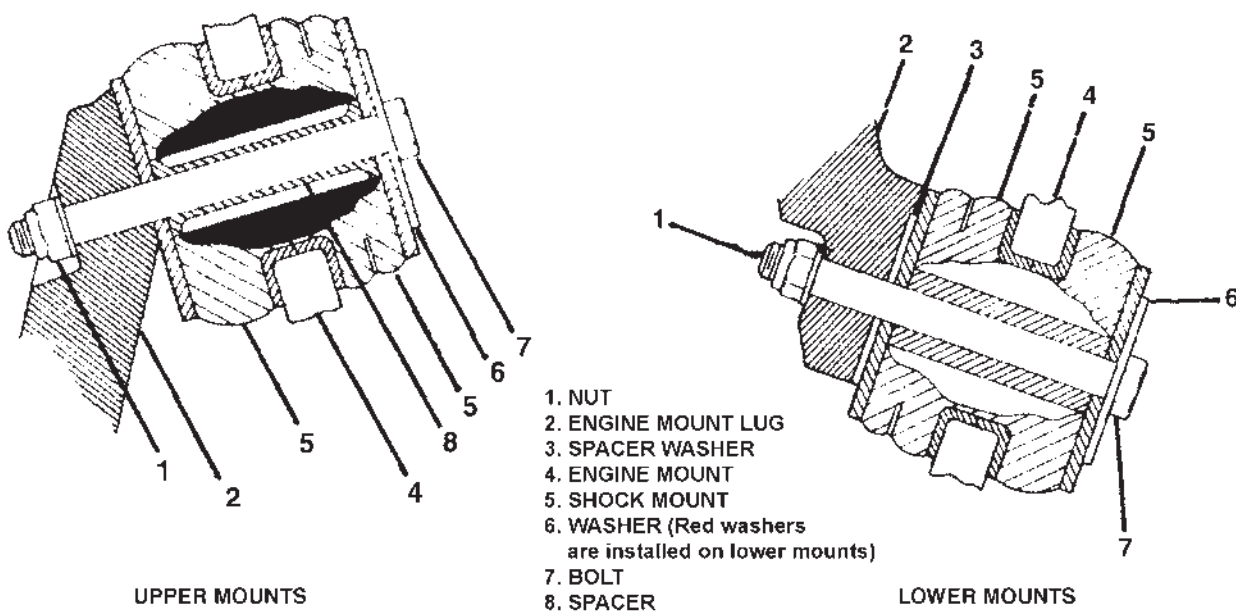
1. Engine Shock Mounts

Replacement of Engine Shock Mounts (See 71-00-00, Figure 1.)

- A. Remove the engine cowl.
- B. Relieve the engine weight on the mounts using a one-half ton hoist attached to the engine lifting points.
- C. Remove the four engine mounting bolts and the lower half of the mount assemblies.
- D. Carefully raise the engine just enough to remove the shock mounts. Check all lines, wires and cables for interference. Disconnect any lines and cables if necessary.
- E. Check all components for wear, damage or cracks and install new mounting kit.
- F. Lower the engine slowly and use mounting bolts to keep the components aligned.
- G. When the engine is supported by the mount, check the mounts for proper seating.
- H. Install the mounting bolt, nut, washer and torque 450 to 500 inch-pounds plus friction drag torque and safety.

NOTE: See Torque Requirements in 91-10-00 for information on determining friction drag torque.

- I. Reconnect any lines, wires or cable that were disconnected and install engine cowl.



Engine Shock Mounts
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Engine Mount Corrosion Inspection, Immersion in Water

The following guidance is general in nature and should be applied or varied to fit the individual situation based on water level during immersion, length of time immersed, length of time since exposure, etc. Proceed as follows:

A. Inspection

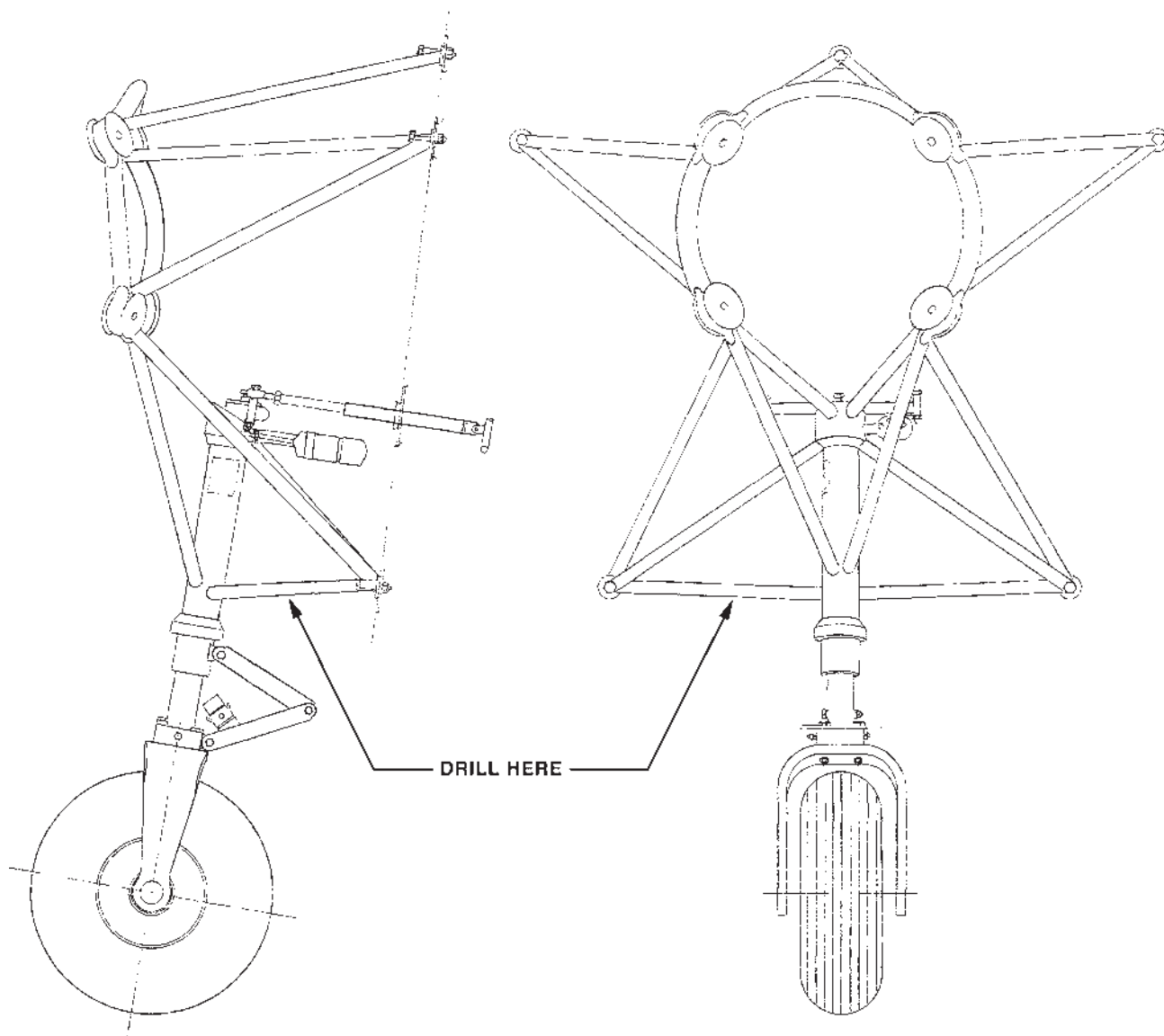
- (1) Level the aircraft in accordance with 8-20-00.
- (2) In two of the larger, lower engine-mount tubes as indicated in "Figure 2"; drill a 3/16 inch hole in the bottom of each tube, at the approximate mid-point.
- (3) Visually inspect the interior surface of each tube through the 3/16 inch hole for evidence of internal corrosion. Pay particular attention to the lower end of each tube as this is where corrosion is most likely to appear first.
- (4) Should evidence of corrosion be detected in step (3), above, replace the engine mount. If no corrosion is detected, proceed with Corrosion Prevention, paragraph B, below.

B. Corrosion Prevention

If no evidence of corrosion is detected in step (3), above, proceed as follows:

- (1) Place a drip pan below the inspection holes in each engine mount tube.
- (2) Insert a plastic tube thru each inspection hole and feed it up to the high point of the engine mount tube.
- (3) Using a syringe inserted into the end of the plastic tube, pump linseed oil into the upper end of the engine mount tube while rotating the syringe/plastic tube assembly to assure maximum coverage. Continue pumping until the lower end of the engine mount tube is filled with linseed oil to the level of the inspection hole.
- (4) Now, draw the plastic tube out of the upper end of the engine mount tube and reinsert it in the opposite direction, feeding it to the lower end of the engine mount tube.
- (5) Suck excess linseed oil out of the engine mount tube with the syringe/plastic tube assembly.
- (6) When linseed oil can no longer be picked up by the syringe/plastic tube assembly, remove it and allow the engine mount tube to drain into drip pans for approximately two hours.
- (7) Purge excess oil from tubes by applying air pressure to each 3/16 inch inspection hole, one at a time.
- (8) Ensure that roughly the same amount of linseed oil that was pumped in is retrieved in the drip pans.
- (9) Apply a liberal coating of an approved fuel tank sealant (see List of Consumables, 91-00-00) to each inspection hole and seal the hole with an appropriate blind rivet. After installing the rivet, apply a liberal coating of the approved fuel tank sealant over the head of the rivet.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Engine Mount Installation
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

AIR INTAKES

Carburetor Ice Detector

See Figure 1.

A. Description

The optional carburetor ice detection system is an advisory system only and is designed to alert the pilot to impending engine power loss or stoppage due to ice/frost accumulation inside the carburetor. The pilot should apply carburetor heat in response to this warning. Unlike temperature sensing devices, the carburetor ice detection system utilizes an electronic light source and feedback sensor (i.e. - optical probe). A red warning light inside the cockpit is activated when the probe's radiated light beam and photo-detector sensor, located in the carburetor throat, is blocked due to ice/frost formation. In the absence of carburetor ice/frost the red warning light automatically deactivates.

A rotary sensitivity adjustment control knob is provided to adjust the system sensitivity level for ice/frost detection. This setting should be just above the threshold where the red warning light deactivates and should be set after engine start.

B. Functional Check

- (1) Aircraft master switch ON.
- (2) Ice detector switch ON.
- (3) Adjust sensitivity knob until RED light (ice light) goes OUT. This is a critical setting.
- (4) Turn ice detection system OFF, then ON. Red light must flash ON, then OFF, indicating all components are operating normally.

C. Normal Maintenance

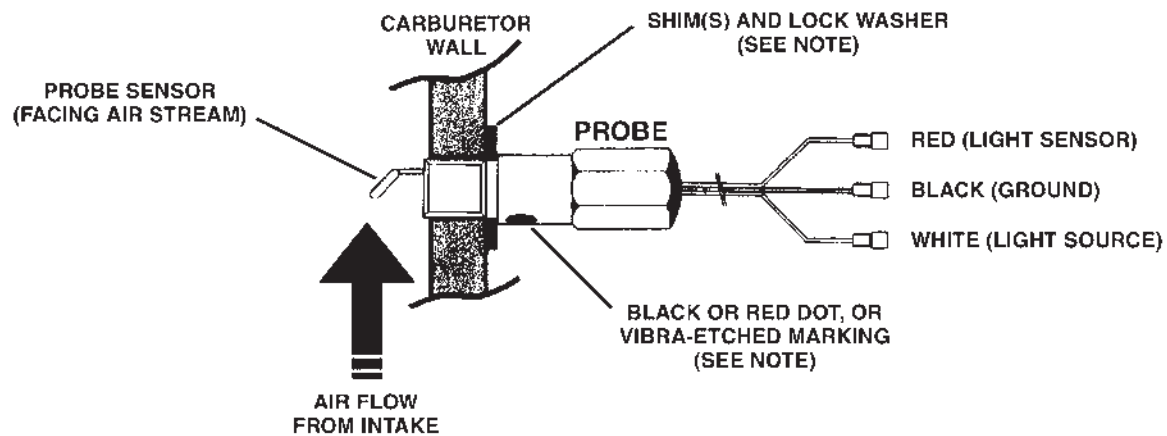
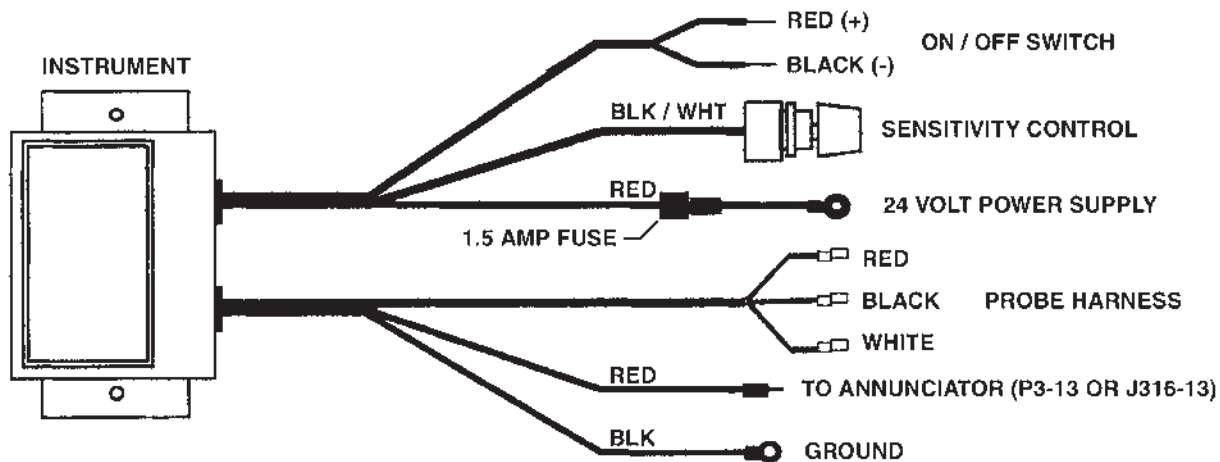
- (1) With increasing time of operation on the engine a slight film of fuel residue may form on the probe, which may result in a slight reduction of sensitivity as compared to the original setting when the ice detector is first installed. This will be observed when it is required to turn the sensitivity adjustment knob to an ever increasing clockwise or higher setting as time goes on. However, the basic ice detection sensitivity is not reduced when adjusted as prescribed herein.
- (2) In the event the sensitivity adjustment control must be turned to the full clockwise position and the red warning light does not deactivate, then the probe must be removed and cleaned with a soft cloth (preferably a cotton swab) and white gasoline. Exercise caution not to bend or move the probe's photo-detecting sensing component. Once cleaned, reinstall the probe assembly and check out the system using the instructions prescribed in this manual.

D. Ice Detector Probe

- (1) Removal
 - (a) Remove engine cowling.
 - (b) Probe is mounted in carburetor upstream of the throttle valve control arm. Remove safety wire and carefully unscrew probe from carburetor. Measure and note how far probe extends into carburetor. Note number of shims used.
 - (c) Where wires for probe come off engine mount, remove wire insulation sleeves; note the respective wire interconnects and disconnect wires.
 - (d) If engine is to be operated, install a suitable plug.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85519G



NOTE: Install shims (i.e. - AN960-416L or NAS1149F0432 washers) as required to ensure black or red dot, or vibra-etched marking on probe housing faces carburetor air inlet.

Carburetor Ice Detector
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Installation

- (a) If plug is installed, remove plug from carburetor housing just below throttle valve on the forward side of carburetor.

CAUTION: DO NOT BEND PROBE COMPONENTS.

- (b) Open throttle valve and carefully screw in probe. When installed, index mark on probe housing must face carburetor air inlet. If necessary use shims to position probe properly.
- (c) Tighten probe as much as possible, by hand, and then only a quarter turn more using a 3/8 inch short handle open end wrench.
- (d) Connect appropriate wires and position sleeves over connectors. If heat shrink has not been used, tie with no. 6 electrical lacing wire.
- (e) Clamp or ty-wrap probe harness each 12 inches to prevent cable movement due to engine vibration. Allow 6 to 8 inches slack between the clamping at the carburetor and the clamping at the engine mount to allow for movement

E. Component Testing

Individual testing of either the instrument or probe may be performed using a previously tested and accepted probe or instrument, respectively.

CAUTION: DO NOT ATTEMPT TO TEST PROBE OR INSTRUMENT BY APPLYING VOLTAGE. A VOLTAGE OVER 2 VOLTS WILL BURN OUT PROBE LAMP, THE SENSOR AND THE INSTRUMENT RED LIGHT SWITCHING TRANSISTOR.

NOTE: No useful measurements can be taken with an ohmmeter connected to the probe.

NOTE: Aircraft & Rotorcraft Products, Inc. is the only FAA approved repair station for the ice detector instrument. Return defective instruments to:

ARP, Inc.
2 Middle Cross Road
Shoreham, NY 11786-1440
Phone (631) 744-1893

(1) Instrument Test

Performed with a known good probe.

(a) Setup

- 1) Turn the power supply power switch to the OFF position.
- 2) Set the instrument power switch to the OFF position and turn the sensitivity adjustment knob to full counter-clockwise (CCW) position.
- 3) Attach the instrument's power wires to the power supply (instrument's RED power supply wire to the [+] terminal on the power supply, and BLK wire to the [-] terminal).
- 4) Connect the instrument's three probe wires to the probe (RED to RED, WHT to WHT, and BLK to BLK).

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(b) Procedure

- 1) Turn ON the power supply and verify supply voltage with the multimeter. Voltage should be between 24-30 volts for 28VDC power supply.
- 2) Turn the instrument power switch to the ON position. Verify that the RED warning light illuminates and no radiated light is emitted from the probe.
- 3) Turn the sensitivity adjustment knob to full clockwise (CW) position. Verify that the radiated light emitted from the probe activates and gets brighter, and the RED warning light extinguishes.
- 4) Turn the sensitivity adjustment knob back to full counter-clockwise (CCW) position. Verify that the radiated light emitted from the probe gets dimmer and then deactivates, and the RED warning light illuminates.
- 5) Turn the instrument power switch to the OFF position.

(2) System Circuit Test

Performed with a known good probe.

- (a) Setup per Instrument Test, Setup, above.
- (b) Place the probe in an area without direct light.
- (c) Turn the instrument power switch to the ON position.
- (d) Turn the sensitivity adjustment knob clockwise until the RED warning light extinguishes.
- (e) Turn the instrument power switch to the OFF position and then back ON.
- (f) Verify that the RED warning light illuminates and then turns off indicating that the system is functioning properly.
- (g) Turn the instrument power switch to the OFF position.

(3) Probe Insulation Resistance Test

Measure insulation resistance from the probe housing to each of the probe's three wires (RED, WHT, and BLK). Resistance should be greater than 2 megohms.

(4) Probe Sensitivity Test

Performed with a known good instrument.

(a) Setup

- 1) Turn the power supply power switch to the OFF position.
- 2) Set the instrument power switch to the OFF position and turn the sensitivity adjustment knob to full counter-clockwise (CCW) position.
- 3) Attach the instrument's power wires to the power supply (instrument's RED power supply wire to the [+] terminal on the power supply, and BLK wire to the [-] terminal).
- 4) Connect the instrument's three probe wires to the probe (RED to RED, WHT to WHT, and BLK to BLK).

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(b) Adjustment

- 1) Turn ON the power supply and verify supply voltage with the multimeter. Voltage should be between 24-30 volts for 28Vdc power supply.
- 2) Turn the instrument power switch to the ON position. Verify that the RED warning light illuminates and no radiated light emitted from the probe.
- 3) Place the probe in a dark area.
- 4) Slowly turn the sensitivity adjustment knob clockwise until the RED warning light extinguishes.
- 5) Verify that the sensitivity setting is below 7 (nominal readings are between 4 and 7). To optimize probe sensitivity, adjust the light sensor so it faces directly towards the probe radiated light source.
- 6) Repeat steps (3) through (5) until optimum sensitivity is achieved.
- 7) Return the sensitivity adjustment knob back to full counter-clockwise (CCW) position.
- 8) Turn the instrument power switch to the OFF position.

(c) Procedure

- 1) Place the probe in an area without direct light.
- 2) Turn the instrument power switch to the ON position.
- 3) Turn the sensitivity adjustment knob clockwise (CW) until the RED warning light extinguishes.
- 4) Place an object (i.e.: a piece of paper) between the probe's radiated light source and the light sensor.
- 5) Verify that the RED warning light illuminates.
- 6) Remove the object from the probe.
- 7) Verify that the RED warning light extinguishes.
- 8) Set the instrument power switch to the OFF position.
- 9) Set the power supply power switch to the OFF position.
- 10) Disassemble test setup.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

73

ENGINE FUEL AND CONTROL

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 73

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
73-List of Effective Pages	1	Mar 15/20			
	2	Mar 6/14			
73-Table of Contents	1	Mar 15/20			
	2	Mar 6/14			
73-10-00	1	May 15/19			
	2	May 15/19			
	3	May 15/19			
	4	Mar 15/20			
	5	Mar 15/20			
	6	May 15/19			
73-20-00	1	May 15/19			
	2	Jun 1/16			
	3	Mar 15/20			
	4	Jun 1/16			
	5	Jun 1/16			
	6	Jun 1/16			
	7	Mar 15/20			
	8	Jun 1/16			
73-30-00	1	May 15/19			
	2	Jun 1/16			
	3	Jun 1/16			
	4	Mar 6/14			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 73 - ENGINE FUEL AND CONTROL

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>DISTRIBUTION</u>	73-10-00	1
Primer System		1
Description		1
Primer Jets		1
Fuel Injector Nozzles		4
Removal		4
Cleaning and Inspection		4
Installation		4
<u>CONTROLLING</u>	73-20-00	
Carburetor		1
Inspection		1
Throttle Arm		1
Idle Mixture Adjustment		1
Idle Speed Adjustment		2
Fuel Injector		3
Inspection		3
Idle Speed and Mixture Adjustment		3
<u>INDICATING</u>	73-30-00	
Fuel Pressure Gauge		1
Description		1
Troubleshooting		1
Fuel Flow Display		1
Avidyne Entegra and Garmin G1000/G1000 NXi with O-360-A4M Engine		1
Description		1
Troubleshooting		1
Garmin G1000/G1000 NXi with Fuel-Injected Engine		1
Description		1
Troubleshooting		1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

DISTRIBUTION

1. Primer System

With Lycoming Model O-360-A4M Engine - Standard in S/N's 2843001 thru 2843820, 2843822 thru 2842851. Available in 2843853 and up.

Refer to Figure 1 on page 73102.

A. Description

The electrical primer system installed on the Archer III is virtually trouble free. Should the primer system fail to operate check that there is power to the primer switch. If the switch checks satisfactorily, check that the electric fuel pump is working by selecting the Fuel Pump switch ON and check that a pressure reading is observed on the fuel pressure gauge. The solenoid may be checked by removing one of the primer injectors and momentarily activate the primer switch. If there is no fuel flow, and the primer switch and electric pump have checked satisfactorily, the problem is a bad solenoid. Refer to Chapter 91 for the electrical schematic of the fuel pump and priming system.

B. Primer Jets

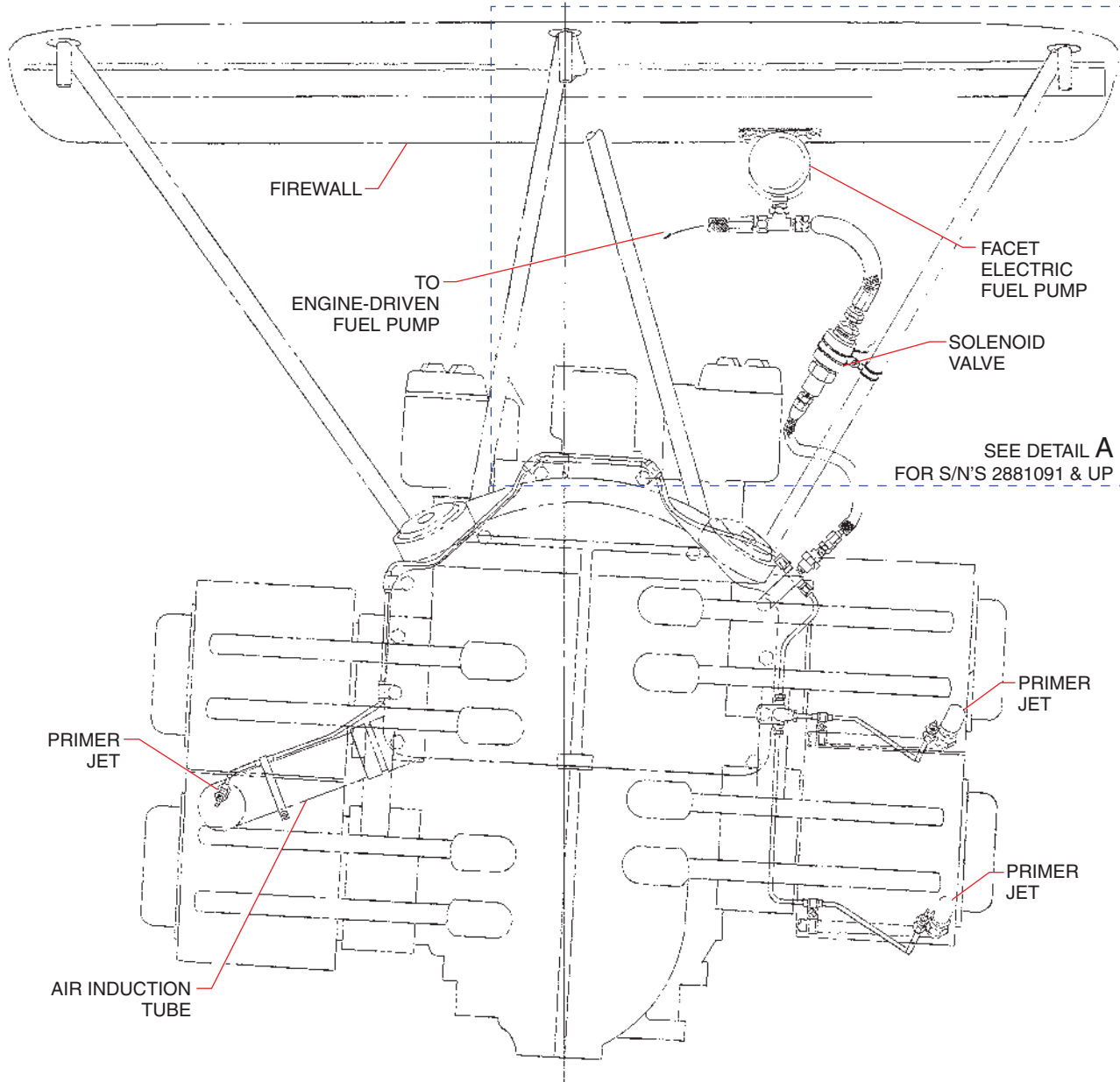
The fuel primer jets are maintained in the same manner.

- (1) To remove primer jets, disconnect supply line from each jet. With a deep socket and light pressure, remove jet from cylinder.
- (2) To clean jet, soak in carbon remover solution long enough to loosen any dirt and blow clean with air pressure. Do not use sharp objects or wire brush to clean jet tube.
- (3) Install jet finger tight so threads are not crossed and tighten to a torque of 60 inch-pounds. Align and install fuel supply lines, tighten to a snug fit.

NOTE: If there is further fuel stoppage of primer system, check supply lines for stoppage, bent, or collapsed walls.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

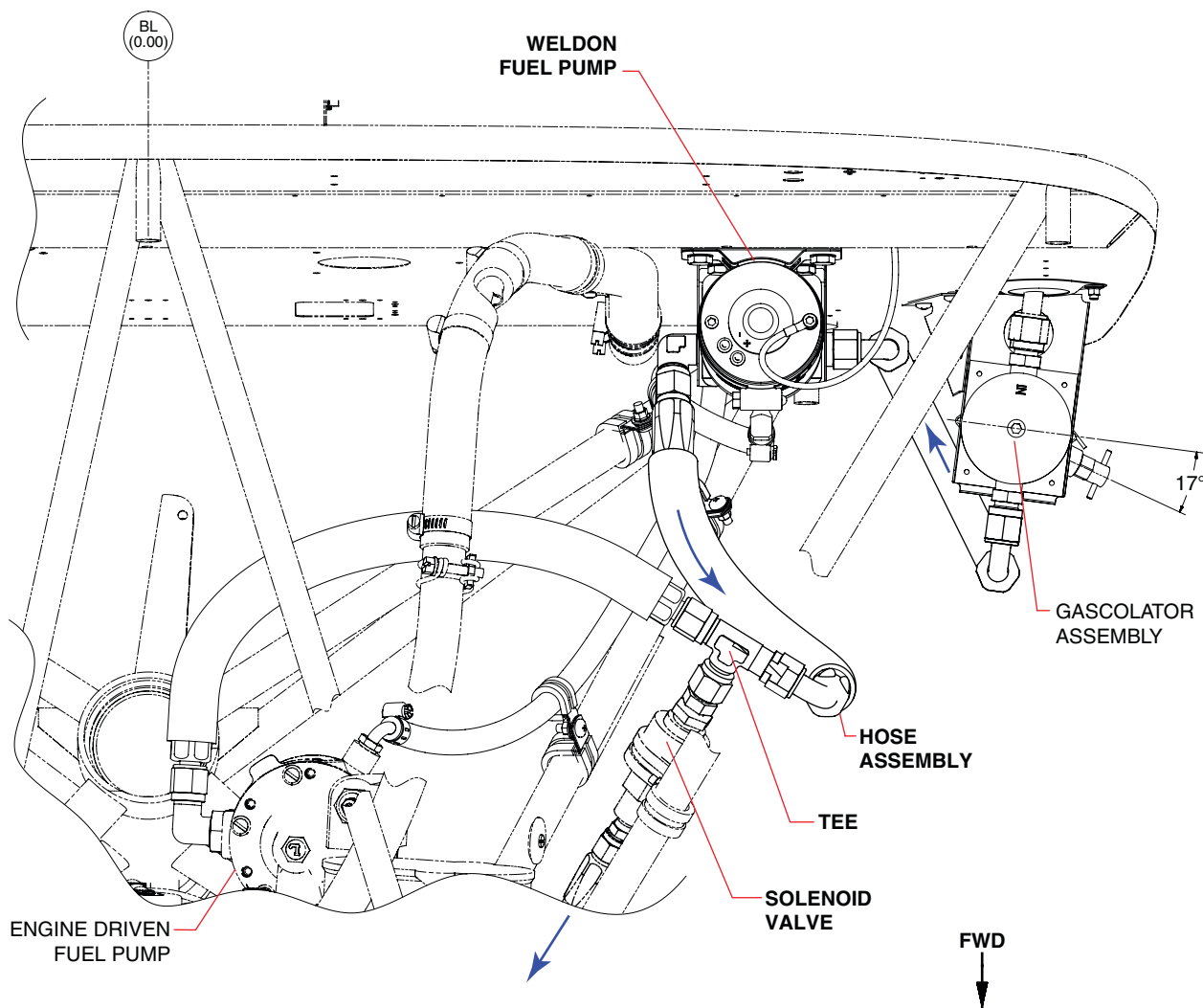
89367 B



LOOKING DOWN AT PRIMER SYSTEM
(ATTACHED TO UNDERSIDE OF ENGINE)

Effectivity
with O-360-A4M engine in
2843001-2843820,
2843822-2843851,
2843853-2943949, and
2881013-2881082 only

Fuel Primer System
Figure 1 (Sheet 1 of 2)



DETAIL A

Fuel Primer System
Figure 1 (Sheet 2 of 2)

Effectivity
with O-360-A4M Engine
in 2881091 and up.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Fuel Injector Nozzles

Installed in S/N's 2843821 and 2843852. Available in 2843853 and up. See "Figure 2" on page 73105.

A. Removal

NOTE: The nozzles must be carefully removed as they or the cylinders may be damaged.

- (1) Turn the master switch OFF.
- (2) Turn fuel selector to OFF.
- (3) Disconnect the negative (ground) cable from the battery.
- (4) Remove the upper cowling.
- (5) Disconnect the fuel line from the nozzle.
- (6) Carefully remove the nozzle, using the correct size deep socket.
- (7) Clean and inspect the nozzle.

B. Cleaning and Inspection

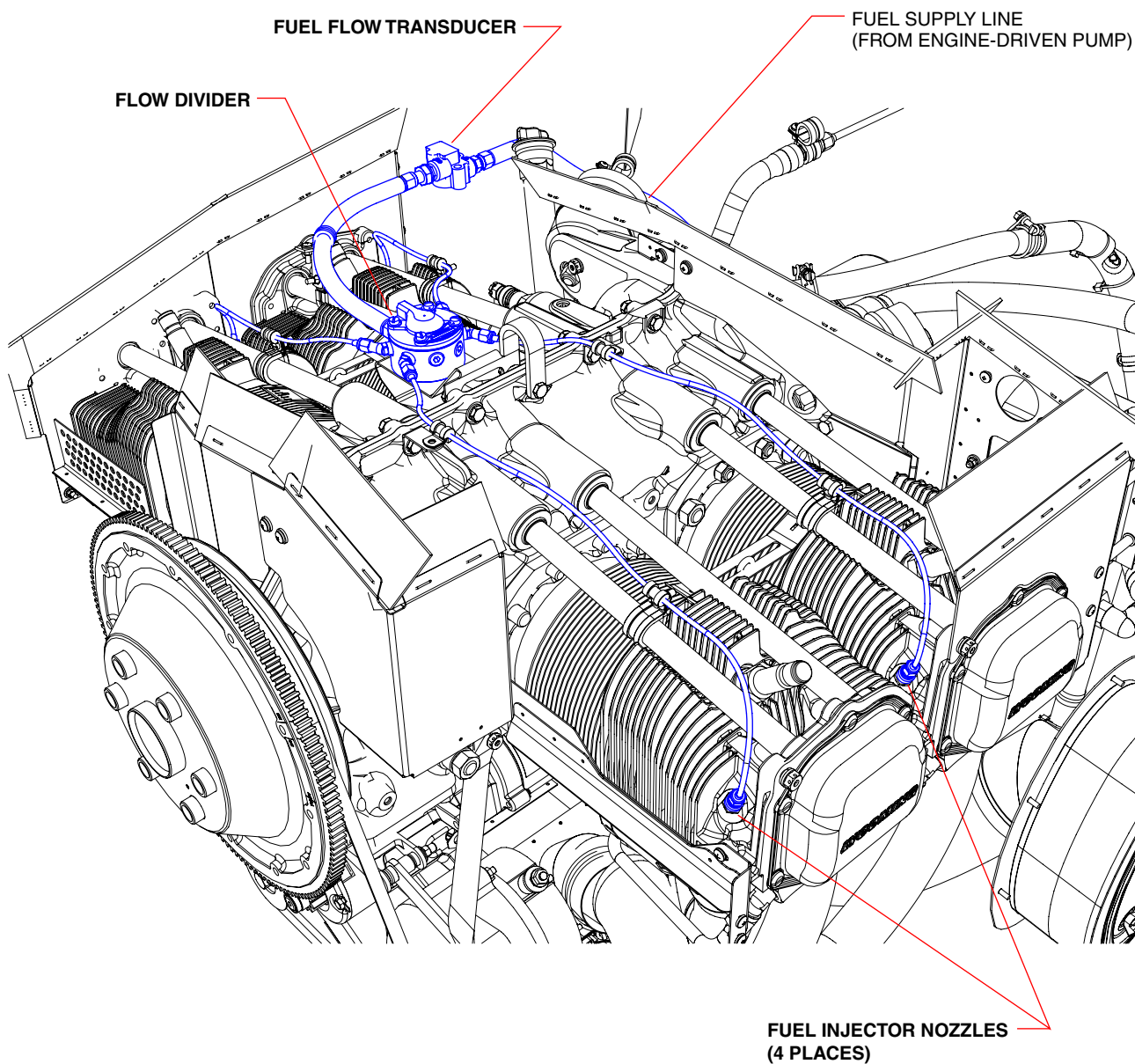
- (1) Refer to Lycoming Service Instruction No. 1275, latest revision.
- (2) Clean the nozzle with acetone or equivalent and blow out all foreign particles with compressed air in the direction opposite that of fuel flow. Do not use wire or other hard objects to clean orifices. ()
- (3) Inspect the nozzle and cylinder threads for nicks, stripping or cross-threading.
- (4) Inspect for battered or rounded hexagons.
- (5) A test procedure for nozzles is described in Lycoming Service Instruction No. 1275.

C. Installation

- (1) Insert the nozzle by hand. Secure using the correct size deep socket.
- (2) Connect the fuel line to the nozzle.
- (3) Connect the negative (ground) cable to the battery.
- (4) Turn fuel selector to desired tank.
- (5) Turn ON the master switch.
- (6) Turn ON electric fuel pump, inspect for leaks.
 - (a) If leaks found, tighten connections, replace components as required to achieve leak free condition.
 - (b) When no leaks are observed, proceed to next step.
- (7) Turn OFF electric fuel pump.
- (8) Turn OFF the master switch.
- (9) Turn fuel selector to OFF.
- (10) Install the upper cowling.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

109002 New



(SOME PARTS REMOVED FOR CLARITY)

Fuel Injection System - Fuel Distribution
Figure 2

[Effectivity](#)
IO-360-B4A engine

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CONTROLLING

1. Carburetor

With Lycoming Model O-360-A4M Engine - Standard in S/N's 2843001 thru 2843820, 2843822 thru 2842851. Available in 2843853 and up.

See "Figure 1" on page 73202.

A. Inspection

At each annual or 100 hour inspection:

- (1) Inspect tightness and safety of all nuts and screws which fasten carburetor to engine.
- (2) Inspect all fuel lines for tightness and evidence of leakage.
- (3) Inspect throttle and mixture control rods and levers for travel, tightness, and safety.
- (4) Clean fuel inlet screen.
- (5) Remove plug at the aft position of carburetor and drain any accumulation of foreign matter.
- (6) Inspect carburetor air box for wear and full travel of heat door.
- (7) Inspect adjustment of idle mixture and idle speed. (Refer to "Idle Mixture Adjustment", below, and "Idle Speed Adjustment" on page 73202.)

B. Throttle Arm

CAUTION: VERIFY TORQUE HANDLE IS CORRECTLY CALIBRATED TO ENSURE ATTACHING SCREW IS NOT UNDER OR OVER TIGHTENED.

- (1) Remove screw securing throttle arm to carburetor. Do not remove throttle arm.
- (2) Remove and discard lock tab.
- (3) Check if there is a hole through head of screw. If not, drill a 1/16 diameter hole through head of screw.
- (4) Install screw. Tighten to a torque of 20 to 28 inch-pounds.
- (5) Using 0.032 inch diameter safety wire, tie wire to idle stop lever, and continue as shown in "Figure 1" on page 73202.
- (6) Sequence and direction of tying may vary with carburetor model. Tie together idle stop arm, throttle arm, and attaching screws.

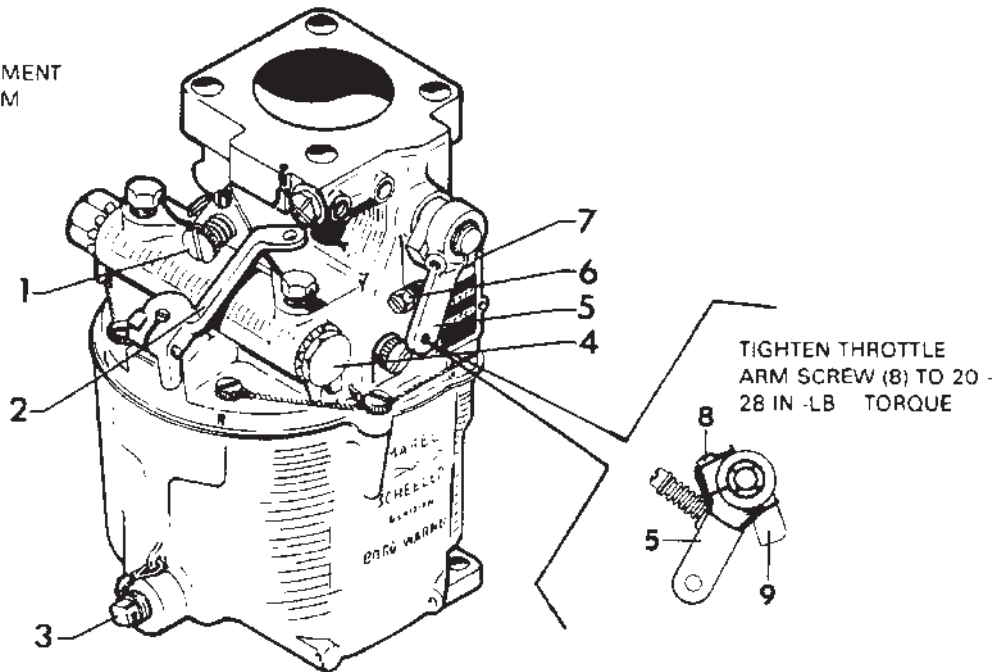
C. Idle Mixture Adjustment

WARNING: FOR INDOOR ENGINE WARM-UP, PROVIDE A BARRIER AROUND ENGINE TO PREVENT SERIOUS INJURY. ALSO PROVIDE ADEQUATE VENTILATION OF WORK AREA.

- (1) Do standard engine starting procedure and operate engine for at least two minutes between 800 and 1200 rpm for proper engine warmup.
- (2) Draw back on cockpit throttle control lever for a reading of approximately 550 rpm on tachometer.
- (3) Turn idle mixture adjusting screw near the rear of carburetor, clockwise, leaning the fuel mixture. Continue until engine begins to run roughly (engine speed will decrease).
- (4) Turn screw counterclockwise until engine runs smoothly again. Continue to turn screw (same direction) until engine begins to run roughly again. At this point, fuel mixture will be too rich and engine speed will decrease.
- (5) Advance screw to midway between lean and rich fuel mixture; engine rpm will reach a maximum speed for idle mixture settings.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

1. IDLE MIXTURE ADJUSTMENT
2. MIXTURE CONTROL ARM
3. BOWL DRAIN
4. FUEL INLET SCREEN
5. THROTTLE ARM
6. IDLE ADJUSTMENT
7. ARM SET SCREW
8. SCREW
9. IDLE STOP ARM



Carburetor
Figure 1

[Effectivity](#)
with O-360-A4M Engine

D. Idle Speed Adjustment

- (1) Pull back the cockpit throttle control until it is completely aft and in the closed position. Observe the engine speed on the tachometer.
- (2) Adjust idle adjustment screw to obtain from 550 to 650 RPM. Rotate the screw clockwise to increase the speed of the engine; counterclockwise to decrease the engine speed. The screw is located on the throttle arm.

NOTE: One complete revolution of idle screw gives a variation of approximately 100 rpm idling speed

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Fuel Injector

With Fuel-Injected Engine - Installed in S/N's 2843821 and 2843852. Available in 2843853 and up.

See "Figure 2" on page 73204.

A. Inspection

Inspect the following items at each annual inspection or 100 hours, whichever comes first:

- (1) Inspect self-locking nuts which fasten the injector to the engine for security and condition. If loose or suspect, replace nuts and torque per Figure 1 on page 71005.
- (2) Inspect all fuel lines for tightness and evidence of leakage.
- (3) Inspect throttle and mixture control rod ends and levers for condition and security.
- (4) Remove and clean the injector inlet strainer at the first 25 hours of operation and each 50 hour inspection thereafter. Inspect the screen for distortion or openings in the strainer. Replace for either of these conditions. Clean screen assembly in solvent and dry with compressed air. Damaged strainer "O" rings should be replaced. To install the screen assembly, place the gasket on the screen assembly and install the assembly in the throttle body and tighten to 35–40 inch-pounds torque.

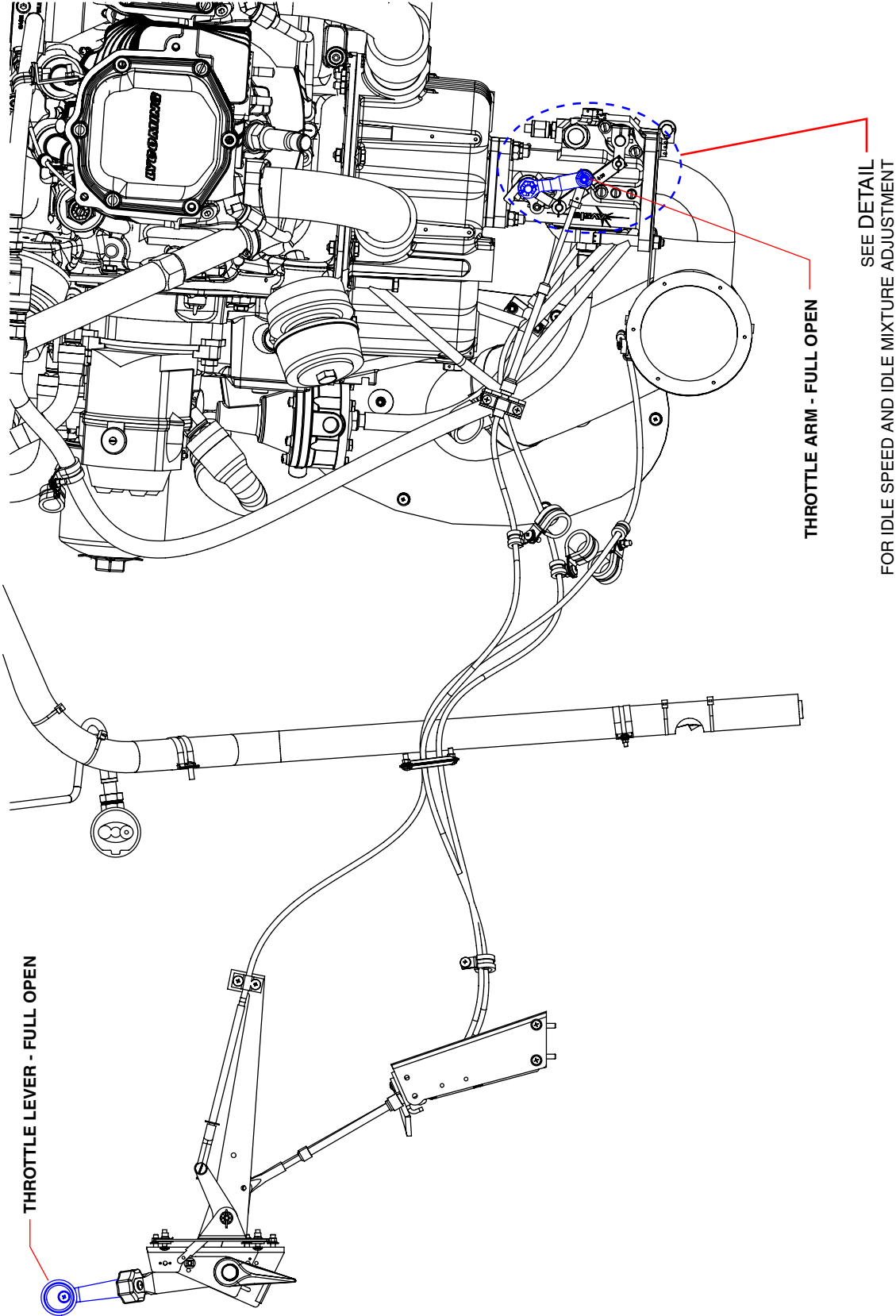
B. Idle Speed and Mixture Adjustment

Verify throttle and mixture controls are rigged per Throttle and Mixture Control Lever Rigging (with Fuel-Injected Engine) on page 76101.

- (1) Start the engine and warm up in the usual manner until oil and cylinder head temperatures are normal.
- (2) Check magnetos. If the "mag-drop" is normal, proceed with idle adjustment.
- (3) Set throttle stop screw so that the engine idles at 600 ± 50 RPM. If the RPM changes appreciable after making the mixture adjustment during the succeeding steps, readjust the idle speed to the desired RPM.
- (4) When the idling speed has been stabilized, move the cockpit mixture control lever with a smooth, steady pull toward the "Idle-Cut-Off" position and observe the tachometer for any change during the leaning process. Caution must be exercised to return the mixture control to the "Full Rich" position before the RPM can drop to a point where the engine cuts out. An increase of more than 10 RPM while "leaning out" indicates an excessively rich idle mixture. An immediate decrease in RPM (if not preceded by a momentary increase) indicates the idle mixture is too lean.
- (5) If the above indicates that the idle adjustment is too rich or too lean, turn the idle mixture adjustment in the direction required for correction, and check this new position by repeating the above procedure. Make additional adjustments as necessary until a check results in a momentary pick-up of approximately 5 (never more than 10) RPM. Each time the adjustment is changed, the engine should be run up to 2000 RPM to clear the engine before proceeding with the RPM check. Make final adjustment of the idle speed adjustment to obtain the desired idling RPM with closed throttle. The above method aims at a setting that will obtain maximum RPM with minimum manifold pressure. In case the setting does not remain stable, check the idle linkage; any looseness in this linkage would cause erratic idling. In all cases, allowance should be made for the effect of weather conditions and field altitude upon idling adjustment.

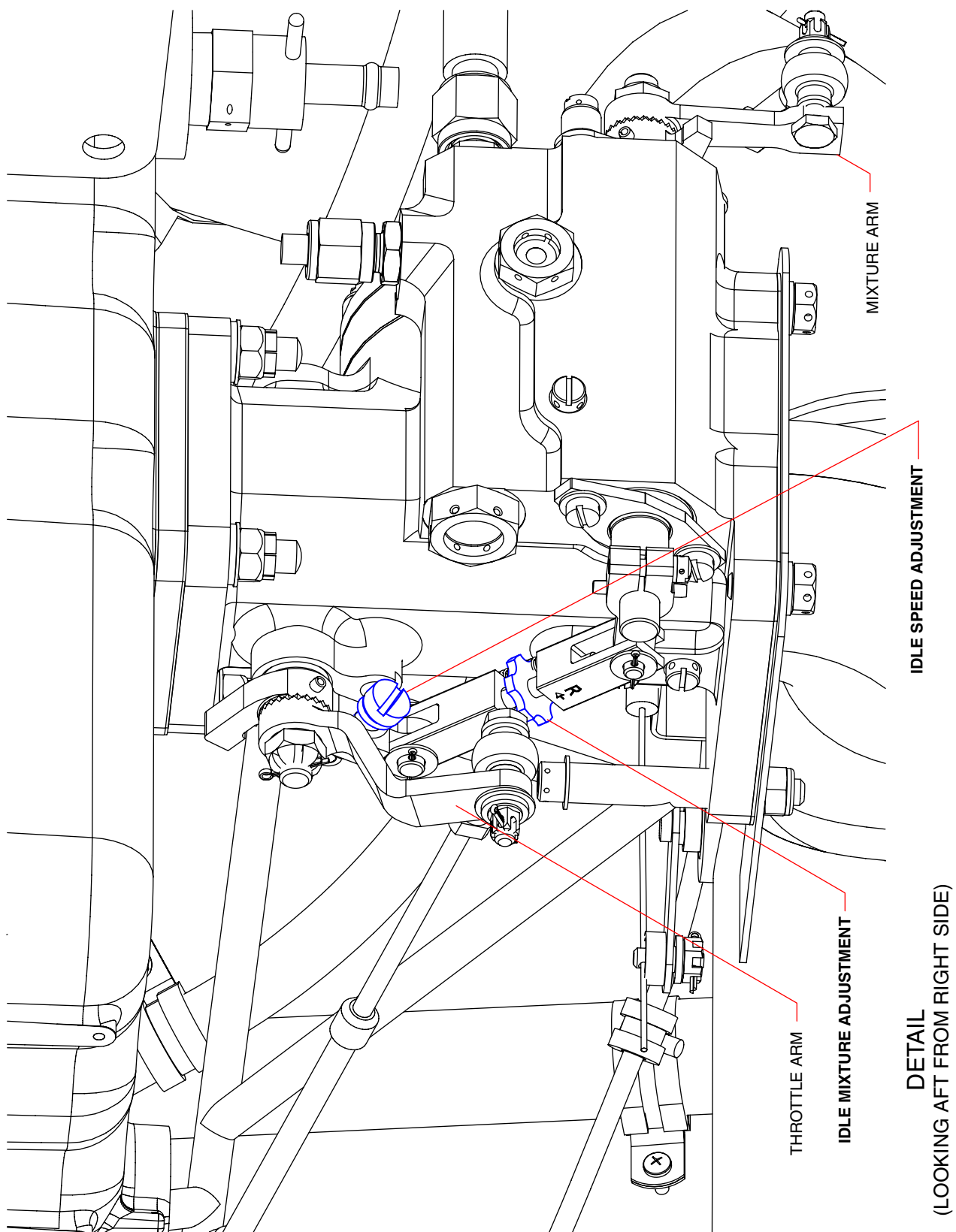
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

109003 C



Effectivity
with IO-360-B4A Engine

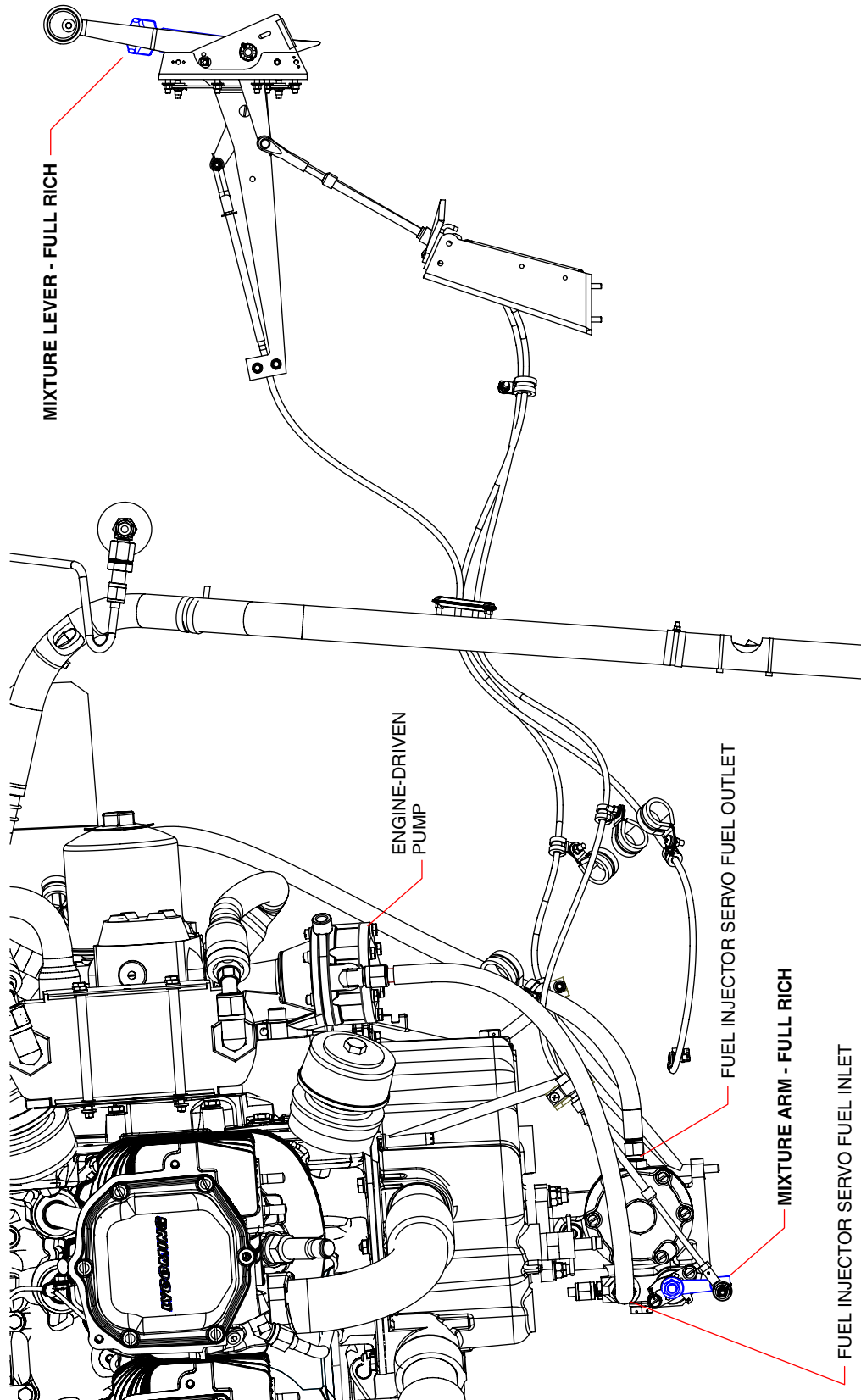
Fuel Injector Installation
Figure 2 (Sheet 1 of 3)



Fuel Injector Installation
Figure 2 (Sheet 2 of 3)

[Effectivity](#)
[with IO-360-B4A Engine](#)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Effectivity
with IO-360-B4A Engine

Fuel Injector Installation
Figure 2 (Sheet 3 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

INDICATING

1. Fuel Pressure Gauge

Standard and Garmin G500

A. Description

The fuel pressure gauge is one-third of an engine triple gauge mounted in the instrument panel. In S/N's 2843001 thru 2843823 the triple gauge is electro-mechanical. In S/N's 2843824 and up the triple gauge is digital.

Pressure information is transmitted electrically to the fuel pressure gauge by a sender unit clamped to the upper left engine mount. The sender unit is connected by an independent fuel line, to a tee fitting at the carburetor inlet, where it can sense the pressure of fuel entering the carburetor.

In S/N's 2843001 thru 2843823, refer to "Chart 2" on page 73302 and "Figure 1" on page 73303 for data required to calibrate the electro-mechanical fuel pressure gauge.

B. Troubleshooting

See "Chart 1" on page 73302.

2. Fuel Flow Display

A. Avidyne Entegra and Garmin G1000/G1000 NXi with O-360-A4M Engine

(1) Description

Fuel flow data is provided by a transducer in the fuel line to the inlet port of the carburetor.

(2) Troubleshooting

See 34-22-00, 34-25-01, 34-25-02, or 34-25-03 as appropriate.

B. Garmin G1000/G1000 NXi with Fuel-Injected Engine

(1) Description

Fuel flow data is provided by a transducer in the fuel line between the outlet port of the fuel injector and the fuel flow divider. See "Figure 2" on page 73105.

(2) Troubleshooting

See 34-25-01, 34-25-02, or 34-25-03 as appropriate.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

[Effectivity](#)

Standard or Garmin G500

**CHART 1
TROUBLESHOOTING FUEL PRESSURE GAUGE**

Trouble	Cause	Remedy
No fuel pressure indication.	Fuel valve stuck	Check valve.
	No fuel in tanks.	Check fuel, fill.
	Defective fuel pump(s).	Check pump(s) for pressure buildup. Check diaphragm and relief valves in engine driven pump. Check for obstruction in electric pump. Check bypass valve. Air leak in intake lines.
	Defective gauge.	Replace gauge.
	Tripped ENGINE GAUGE circuit breaker.	Reset circuit breaker. If breaker does not remain set, check wiring and components for short.
	Faulty sender.	Replace sender.
Pressure low or pressure surges.	Obstruction in inlet side of pump.	Trace lines and locate obstruction.
	Faulty bypass valve.	Replace.
	Faulty diaphragm.	Replace or rebuild pump.
Needle fluctuation.	Surge dome on pump filled with fuel.	Remove and empty.
	Air in line.	Loosen line at transducer, turn on electric pump. Purge line of air and retighten.
High fuel pressure with engine shut off right after flight.	Fuel in line expanding due to heat build-up in cowl.	Normal.

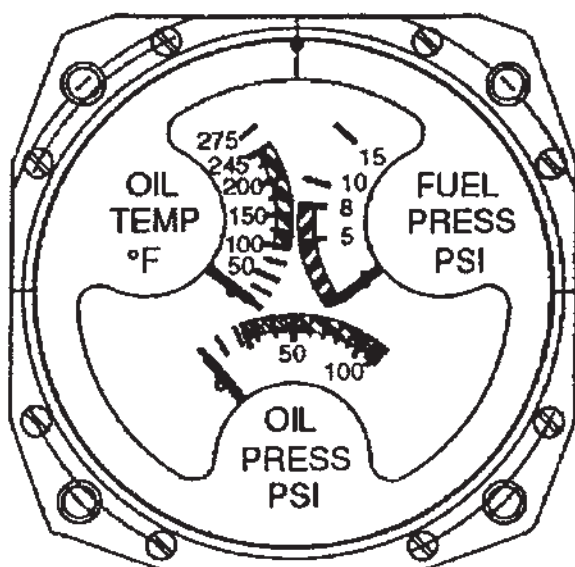
[Effectivity](#)

Standard or Garmin G500
2843001 thru 2843823

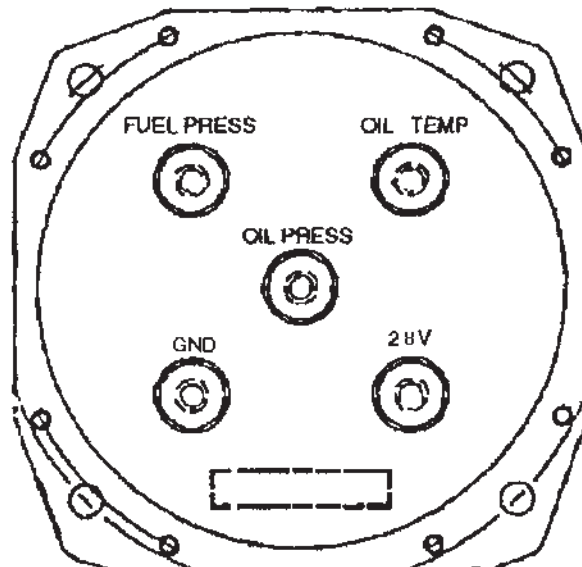
**CHART 2
INSTRUMENT CALIBRATION CHART**

CALIBRATION CHART OIL PRESSURE TOL $\pm$ 2%		CALIBRATION CHART FUEL PRESSURE		CALIBRATION CHART OIL TEMP. TOL $\pm$ 2%	
PSI	OHMS	PSI	OHMS	° F	OHMS
0	9	0	10	0	84.50
25	42	5	42	50	93.80
60	90	8	60	150	114.49
100	135	10	72	275	144.60

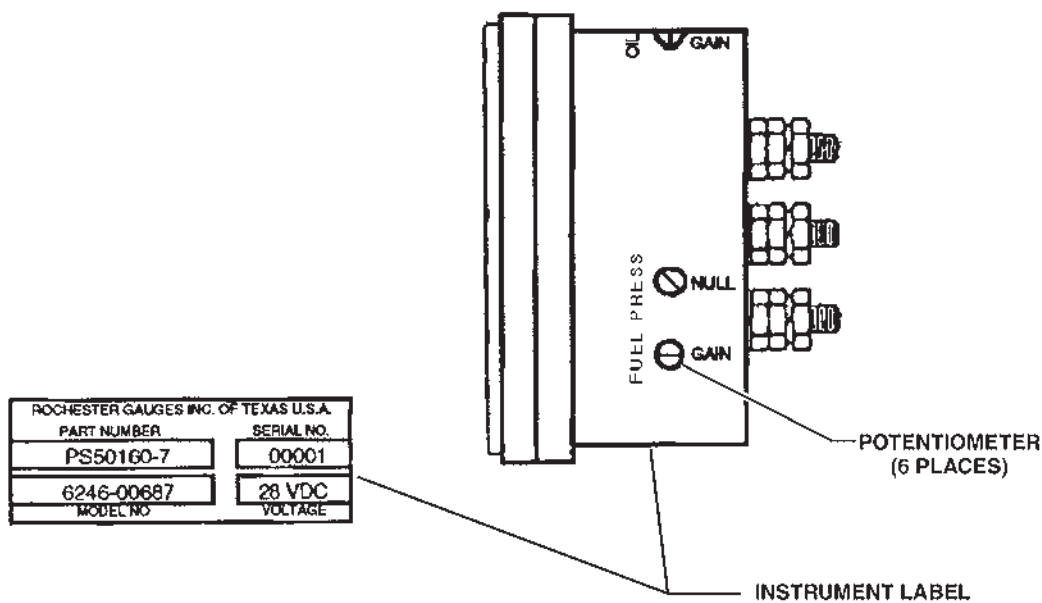
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



FRONT VIEW



REAR VIEW



PROFILE VIEW - FUEL PRESSURE ADJUSTMENT

Engine Triple Gauge - Fuel Pressure Gauge
Figure 1

[Effectivity](#)
[Standard or Garmin G500](#)
[2843001 thru 2843823](#)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

74

IGNITION

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 74

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
74-List of Effective Pages	1	Jul 30/21			
	2	Mar 6/14			
74-Table of Contents	1	Jul 30/21			
	2	Mar 15/20			
74-10-00	1	May 31/20			
	2	Mar 6/14			
	3	Jul 30/21			
	4	May 15/19			
	5	Mar 15/20			
	6	Mar 6/14			
	7	Mar 6/14			
	8	Mar 15/20			
	9	Mar 15/20			
	10	May 31/20			
	11	May 31/20			
	12	May 31/20			
	13	May 31/20			
	14	May 31/20			
	15	May 31/20			
	16	May 31/20			
74-20-00	1	Mar 15/20			
	2	May 15/19			
	3	Mar 15/20			
	4	May 15/19			
	5	May 15/19			
	6	May 15/19			
	7	Mar 15/20			
	8	May 15/19			
	9	Mar 15/20			
	10	Mar 15/20			
	11	May 15/19			
	12	Mar 15/20			
74-30-00	1	Jun 1/16			
	2	Jun 1/16			
	3	Jun 1/16			
	4	Mar 6/14			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 74 - IGNITION

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>ELECTRICAL POWER SUPPLY</u>	74-10-00	1
Ignition System		1
Description		1
Troubleshooting		1
Replacement Magnetos		1
Overhaul		1
Magnetos		3
100 Hour Inspection		3
Adjust Timing to Engine		3
Removal		5
Installation		8
Testing		9
SureSTART Magneto Booster		10
500 Hour Inspection		10
Removal		10
Cleaning		11
Installation		11
Testing		12
<u>DISTRIBUTION</u>	74-20-00	1
Ignition Harness		1
Inspection		1
General		1
Routing		1
Removal		2
Installation		3
Maintenance		5
Disassembly		5
Assembly		5
Spark Plugs		9
Removal		9
Inspection and Cleaning		9
Installation		10
<u>SWITCHING</u>	74-30-00	1
Description		1
Start Switch		1
Removal		1
Installation		1
Magneto Switches		2
Removal		2
Installation		3

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

ELECTRICAL POWER SUPPLY

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

Information provided in this section is intended to support only the most basic magneto inspection, timing, removal and installation. Refer to the appropriate vendor's engine and magneto maintenance manuals for all other magneto maintenance procedures. See Introduction - Supplementary Publications.

1. Ignition System

A. Description

Ignition of the fuel charge in each cylinder is accomplished by two spark plugs independently excited by one of two magnetos. Each magneto separately generates, times and distributes high tension (voltage) through leads to each cylinder. The magnetos are controlled by two switches in the overhead switch panel. With its switch OFF, the magneto is grounded and will not produce spark. The right magneto fires all the lower spark plugs. The left magneto fires all the upper spark plugs.

In airplanes with a Lycoming engine, Slick 4300 series magnetos are installed. With the O-360-A4M engine, the right magneto is standard and the left magneto is an impulse-coupled type installed to retard magneto ignition timing (see lag angle on magneto dataplate) and provide spark for engine starting. As the engine is cranked, a spring in the impulse coupling is wound. When the engine crankshaft reaches the proper position for starting, the spring in the impulse coupling is released to spin the rotating magnet and produce the spark required to fire the engine. After the engine starts, the impulse coupling flyweights disengage the coupling due to centrifugal action. The coupling then acts as a straight drive and the magneto fires at the normal firing position of the engine. With the IO-360-B4A engine, both magnetos are impulse-coupled.

The SureSTART magneto booster system is optional in airplanes with fuel-injected engines beginning in 2020. SureSTART integrates solid state electronics with conventional ignition hardware to deliver optimum spark energy for improved engine starting under all operating conditions. SureSTART delivers significantly more spark energy during start than conventional impulse coupled or retard breaker systems. This added energy enables the magnetos to fire partially fouled spark plugs, ignite less than optimum fuel mixtures, improve hot engine restarts, and improve starting performance during extreme cold weather operations.

B. Troubleshooting

See "Chart 1" on page 74102.

C. Replacement Magnetos

NOTE: Check the magneto data plate to verify the specific model number and series of the magneto being worked on.

D. Overhaul

Overhaul is required as conditions indicate, but in no case may Slick 4300 series magnetos time-in-service exceed the TBO for the engine. Magnetos must also be overhauled after a lightning strike or following a sudden engine stoppage.

NOTE: An alternative to overhaul is complete magneto replacement with a new magneto. .

For magneto overhaul procedures, see the latest revision of Slick's F-1100 Master Service Manual.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1
TROUBLESHOOTING IGNITION SYSTEM**

Trouble	Cause	Remedy
Failure of engine to start.	Defective spark plugs.	Clean and adjust or replace spark plugs.
	Defective ignition wire.	Check with electric tester and replace defective wires.
	Defective battery.	Replace with charged battery.
	Improper operation of magneto breaker.	Check points. Check internal timing of magnetos.
Failure of engine to idle properly.	Faulty ignition system.	Check entire ignition system.
Low power and uneven running.	Defective spark plugs.	Clean and gap or replace spark plugs.
	Magneto breaker points not working properly.	Clean points. Check internal timing of magnetos.
	Defective ignition wire.	Check wire with electric tester. Replace defective wire.
	Defective spark plug terminal connectors.	Replace connectors on spark plug wire.
Failure of engine to develop full power.	Faulty ignition.	Tighten all connections. Check system with tester. Check ignition timing.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Magnetos

A. 100 Hour Inspection

Every 100 hours or at annual inspection, whichever comes first, perform the following checks.

WARNING: BE SURE IGNITION SWITCH IS IN THE "OFF" POSITION AND THE CONDENSER P-LEAD IS GROUNDED.

- (1) At annual or 100 hour inspections, check magneto to engine timing. If engine timing has advanced or retarded (timing drift) more than 4 degrees from the previous inspection set point or more than 5 degrees since original installation, refer to the Slick by Champion Master Service Manual, L-1363, for guidance on troubleshooting and correction.

If the timing drift is 4 degrees or less, re-time the magneto to the engine per "Adjust Timing to Engine", see below. Record the set timing in the engine logbook inspection entry.

Note that timing drift of more than 4 degrees within any 100 hour period warrants immediate investigation and correction.

EXAMPLE: On a 25 degree base timing engine, if the timing is found to be 20 degrees Before Top Dead Center (BTDC) or 30 degrees BTDC, in a 100 hour interval, this is considered excessive timing and should be investigated for cause.

NOTE: Champion employs a magneto design where the wear of breaker cam surfaces and point surface erosion offset each other, resulting in a larger drift in engine timing.

Timing retards when the cam surface wears more quickly than the point surfaces. Timing advances when the point surfaces erode more quickly than the cam.

When magneto timing drift exceeds 5 degrees, the magneto output may be diminished and ignition of the fuel-air mixture becomes less effective. Symptoms of this condition can include: hard starting, a rough running engine, and RPM/differential RPM drops exceeding the engine manufacturers allowable preflight mag checks.

- (2) Adjust Timing to Engine

See "Figure 1" on page 74104.

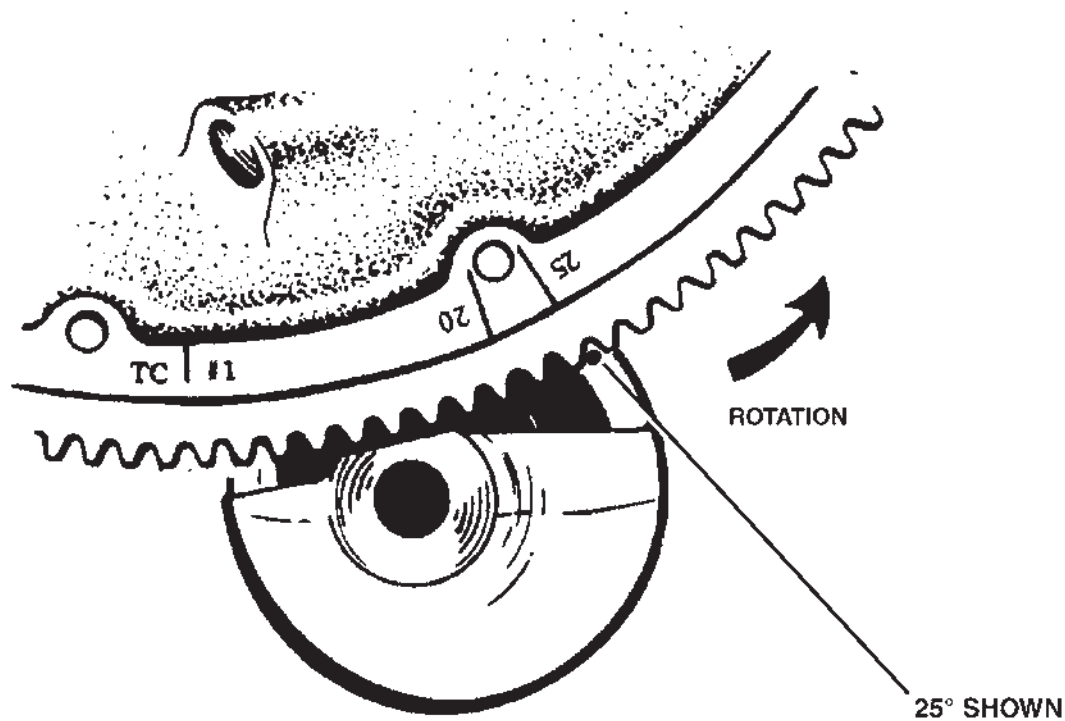
- (a) Turn the engine crankshaft in the normal direction of rotation until the No. 1 cylinder is in the full-advance firing position.

- 1) Remove a spark plug from No. 1 cylinder and place a thumb over the spark plug hole. Rotate the crankshaft in direction of normal rotation until the compression stroke is reached, this indicated by a positive pressure inside the cylinder tending to push the thumb off the spark plug hole.
- 2) Continue rotating the crankshaft until the advance timing mark on the front face of the starting ring gear is in alignment with the small hole located at the two o'clock position on the front face of the starter housing. When the mark on the gear (see "Figure 1") is centered on the timing mark, number one piston is at 25° BTC.

NOTE: Verify correct engine timing for the airplane being worked on by checking the engine dataplate.

- (b) Scribe a reference mark on the magneto mounting flange and engine accessory case.
- (c) Loosen the magneto mounting bolts, and connect a standard timing light between engine ground and the magneto condenser terminal.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

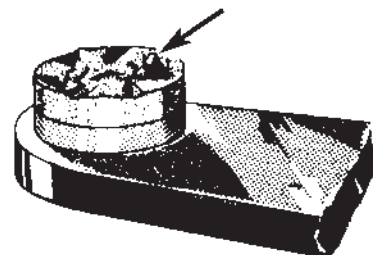
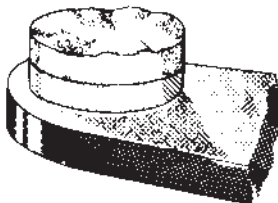


Engine Timing Marks (Typical)
Figure 1

NORMAL POINT IS SMOOTH AND FLAT. SURFACE HAS DULL GRAY "SANDBLASTED" APPEARANCE.

MINOR IRREGULARITIES - SMOOTH ROLLING HILLS AND DALES WITHOUT ANY DEEP PITS OR HIGH PEAKS. THIS IS A NORMAL CONDITION OF POINT WEAR.

WELL DEFINED MOUND EXTENDING NOTICEABLY ABOVE SURROUNDING SURFACE. REJECT POINTS.



Contact Points
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

WARNING: DO NOT ROTATE PROPELLER WHEN IGNITION SWITCH IS IN THE "ON" POSITION. THE MAGNETOS WILL FIRE THE SPARK PLUGS IF THE PROPELLER IS ROTATED - FATAL INJURY IS POSSIBLE.

- (d) Turn ignition switch ON.
- (e) Rotate the magneto, in its mounting, in the direction of normal operating rotation until the timing light indicates the contact breaker points are open.
- (f) Slowly rotate the magneto opposite normal rotation of the magneto on the engine mounting until the timing light (or audible signal) goes out.
- (g) Measure the distance from the reference mark previously scribed on the accessory case and the corresponding reference mark on the magneto.
 - 1) If this measurement is more than 1/8 inch, remove the magneto per Removal, below, and inspect/adjust the contact breaker points as described in Slick F1100 Master Service Manual: Maintenance, 500 Hour Inspection; and Magneto Assembly, Time the Magneto; respectively. A 1/8 inch change corresponds to an approximate 5° change in internal magneto timing.
 - 2) If this measurement is less than 1/8 inch, proceed to the next step.
- (h) Secure the magneto in this position, alternately tightening the magneto mounting clamps – first to 8 ft-lbs and finally to 17 ft-lbs of torque.
- (i) Turn ignition switch OFF.
- (3) Inspect harness. See Section 74-20-00.
- (4) Inspect vent holes. Ensure vent holes are clean and clear of any obstruction.
- (5) Inspect P-lead attachment. The P-lead connects the magneto primary circuit to the ignition switch. If the P-lead is disconnected, the magneto will be "HOT" and will fire the spark plug if the propeller is rotated. Verify that the P-lead is attached to the condenser stud. Torque to 13–15 in-lbs.

B. Removal

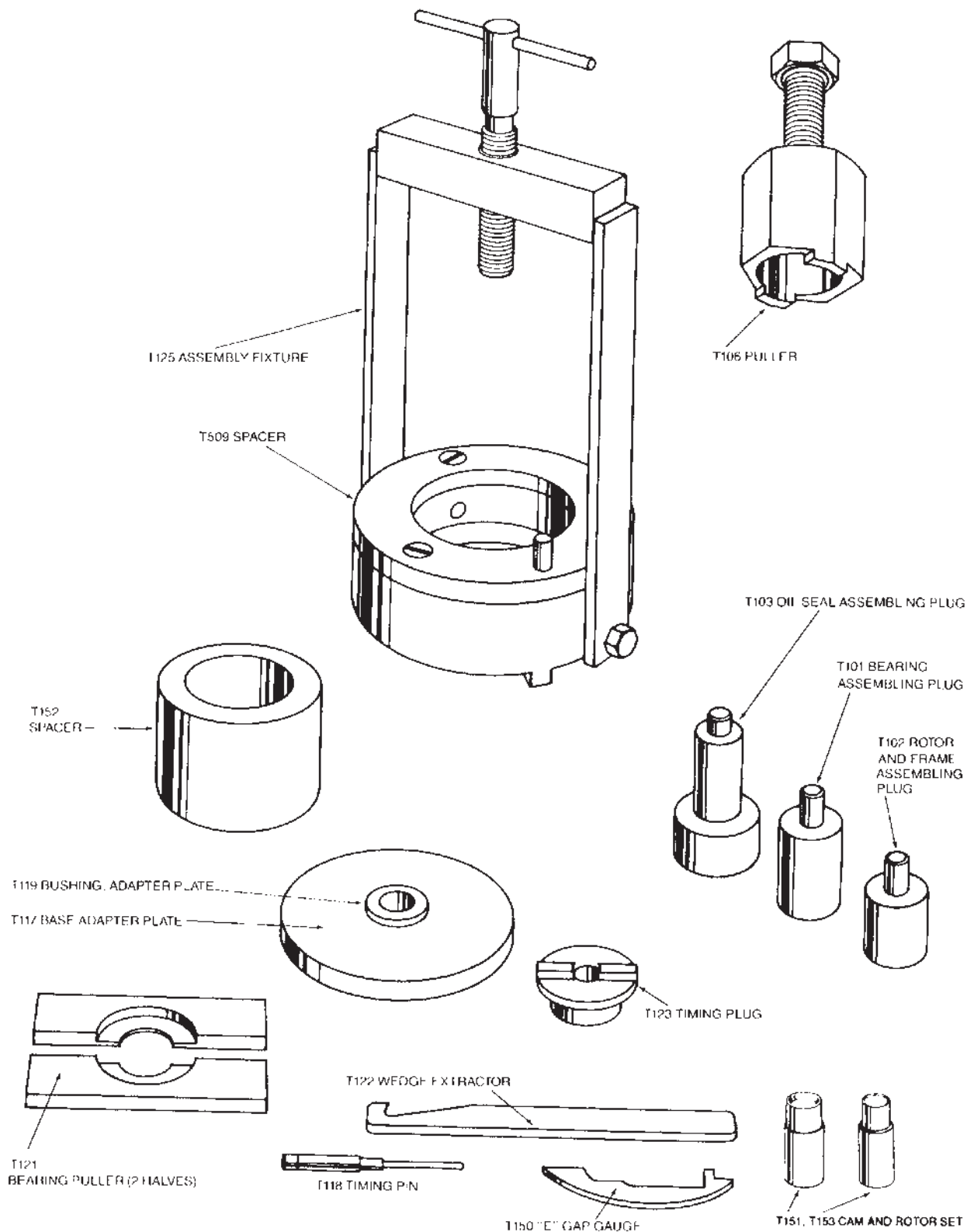
CAUTION: ASCERTAIN THAT THE PRIMARY CIRCUIT OF THE ENGINE IS GROUNDED BEFORE WORKING ON THE ENGINE.

Before removing the magnetos, make sure the magneto switches are OFF.

WARNING: THE MAGNETO IS NOT INTERNALLY GROUNDED, WHEN THE GROUND LEAD IS DISCONNECTED THE MAGNETO IS HOT. REMOVING THE HARNESS ASSEMBLY FIRST AND INSTALLING THEM LAST, MINIMIZES THE DANGER OF STARTING THE ENGINE ACCIDENTALLY WHEN THE GROUND LEAD IS REMOVED FROM THE MAGNETO.

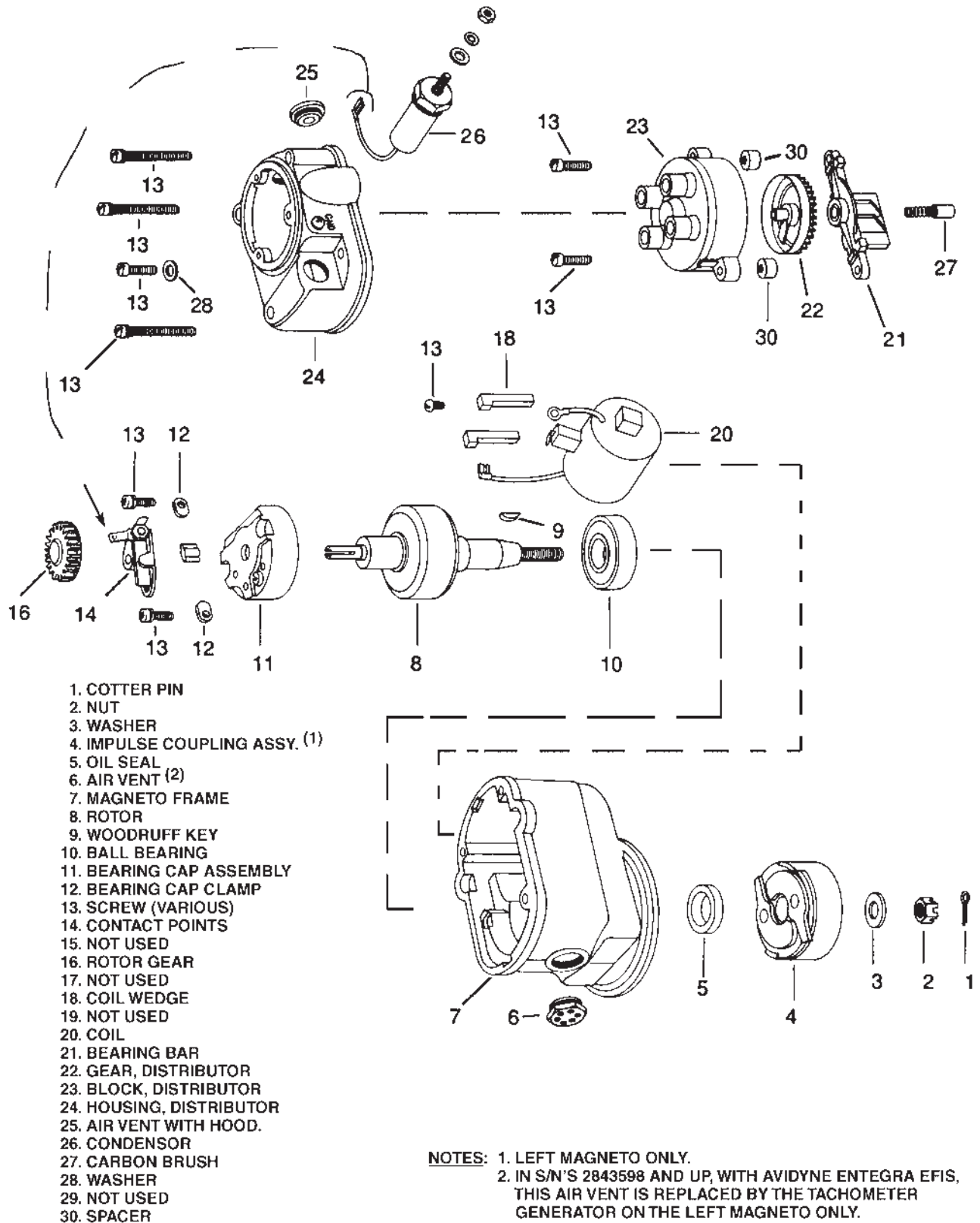
- (1) Turn the engine crankshaft in the normal direction of rotation until the No. 1 cylinder is in the full-advance firing position.
- (2) Remove the harness cap from the magneto. Before doing this, place an index mark on the harness cap and distributor housing to ensure proper alignment upon reassembly.
- (3) Disconnect the P-lead and pressurization tube from magneto.
- (4) Remove the nuts, washers and clamps, and remove the magnetos from the engine.
- (5) Cover the magneto accessory opening with suitable material to prevent internal engine contamination.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Slick T-100 Assembly and Timing Tool Kit
Figure 3

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Exploded View of 4300 Series Magneto
Figure 4

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. Installation

WARNING: BE SURE SWITCH IS IN OFF POSITION AND THE P LEAD IS GROUNDED.

When installing new or adjusting breaker points and before timing the magneto to the engine, it is important that the internal timing of the magneto be correct. To find number one tower, the following instructions should be performed:

NOTE: No need to spark out these magnetos.

- (1) Insert the T-118 timing pin in the L or R hole in the distributor block (depending on rotation of the magneto).
- (2) Turn rotor opposite the rotation of the magneto until the pin engages the gear.
- (3) If the pin is binding and will not go in the hole in the gear, you have hit the pointer on the gear. Pull the pin out, enough to continue opposite rotation until the pointer has passed, re-insert pin.
- (4) When the pin sticks through the hole in the gear about 1/4 inch, you are now ready to fire number one cylinder.
- (5) Turn the engine crankshaft in the normal direction of rotation until the No. 1 cylinder is in the full-advance firing position.
 - (a) Cover spark plug hole of number one cylinder with thumb. Rotate crankshaft until pressure is felt on thumb.
 - (b) Rotate crankshaft slowly to observe timing mark on alternator drive gear. When the mark on the gear (see "Figure 1" on page 74104) is centered in the viewing hole, number one piston is at 25° BTC.

NOTE: Verify correct engine timing for the airplane being worked on by checking the engine dataplate.

- (6) Place a new gasket on magneto flange. Install magneto carefully so drive coupling lugs mate with slots of drive bushings. Install holding washers, lockwashers, and nuts.

NOTE: Do not tighten completely. Allow for turning magneto for final timing.

- (7) After the magneto is installed on engine, remove the timing pin. The magneto is now ready to be timed to the engine.
- (8) Complete magneto to engine timing procedure listed under 100 Hour Inspection, above.

WARNING: THE MAGNETO IS NOT INTERNALLY GROUNDED, WHEN THE GROUND LEAD IS DISCONNECTED THE MAGNETO IS HOT. REMOVING THE HARNESS ASSEMBLY FIRST AND INSTALLING IT LAST, MINIMIZES THE DANGER OF STARTING THE ENGINE ACCIDENTALLY WHEN THE GROUND LEAD IS REMOVED FROM THE MAGNETO.

- (9) Replace the harness cap onto the magneto. Align the index marks made on the harness cap and distributor housing when removed.
- (10) Connect the P-lead and pressurization tube to magneto. Connect the retard breaker lead to the starting circuit to the left magneto.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

D. Testing

Verify that the T-118 Timing Pin has been removed.

- (1) Mount the magneto on a suitable test stand in the same relative position as installed on the engine.
- (2) Install a Slick High-Temperature Ignition Harness on the magneto and connect each output lead to a 5mm spark gap.

**CAUTION: DO NOT OPERATE THE MAGNETO UNLESS THE IGNITION HARNESS IS
INSTALLED AND THE OUTPUT LEADS ARE CONNECTED TO THE 5MM GAP.**

- (3) Impulse Coupling
 - (a) Rotate the test stand drive pulley in the same direction of rotation stated on the magneto data plate.
 - (b) The impulse coupling should engage the stop pin in the magneto frame below approximately 200 rpm. If the impulse coupling pawls slip past the stop pin or engage intermittently, the impulse coupling is not operating properly.
- (4) Coming-in Speed
 - (a) Determine the lowest speed at which the magneto can be turned and still spark all 5mm gaps without missing.
 - (b) The test gap must fire consistently at 200 rpm on non-impulse coupled magnetos and 350 RPM on impulse coupled magnetos.
- (5) High Speed Test
 - (a) Operate magneto at 1000, 2000, and 3000 rpm for five minutes at each speed.
 - (b) Observe sparking regularity at the spark gaps. Magneto must produce consistent spark at all speeds.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. SureSTART Magneto Booster

Optional.

See "Figure 5" on page 741013.

SureSTART receives input power from the switched positive terminal of the starter motor, and should be activated only when the starter motor is engaged. During engine start, SureSTART draws a maximum of 5 amperes at 6 to 25 volts and delivers a series of fast rising 375 volt maximum pulses to the primary of the magneto coil. This voltage is stepped up in the secondary of the coil, and is impressed across the spark plug electrodes through the magneto distributor and the high voltage harness. As a result, each plug fires with a very high energy, multi-strike spark. Proper ignition timing is achieved through the normal operation of the impulse coupling. SureSTART is energized only when the starter is engaged.

Refer to the following documents for instructions on maintenance and overhaul for continued airworthiness:

- Champion Aerospace Slick Master Service Manual F-1100
- Champion Aerospace Slick SlickSTART, Operation, Maintenance, and Troubleshooting Manual L-1492

A. 500 Hour Inspection

Every 500 hours, perform the following checks:

- (1) Inspect all connections and wires for corrosion, contamination, or arcing. The terminals must be proper alignment.
- (2) Inspect physical and electrical security of all connections and wiring.
- (3) Inspect security of SureSTART mounting.

B. Removal

- (1) Disconnect Aircraft Battery and Ignition Harness
 - (a) Confirm the aircraft ignition and switches on in the off position.
 - (b) Disconnect the negative ground lead from the battery. If the plane is equipped with the Garmin G1000/G1000 NXi, disconnect the P615 emergency battery connector. Secure the cables to prevent inadvertent contact with the terminals.
 - (c) Disconnect the ignition harness from the spark plugs to prevent accidental firing of the magnetos and possible engine starting and operation.
 - 1) Disconnect clamps holding wires to engine and accessories.
 - 2) Loosen coupling nuts at spark plugs and remove insulators from spark plug barrel well. Do not damage insulator spring when withdrawing insulator.
 - 3) Place a guard over harness insulators.
 - 4) Remove harness assembly terminal plate from magneto.
 - 5) Remove harness from airplane.
- (2) Remove the Wiring Harness and SureSTART Booster
 - (a) Locate SureSTART booster, installed on the aft facing center of the firewall. Disconnect the wires from the follow terminals:
 - Wire J4A20 from the the VIN terminal
 - Wire J5A20WHT from the 1 terminal.
 - Wire J5A20BLU from the GND terminal.
 - (b) Locate the starter solenoid on the aft facing right hand side of the firewall. Disconnect the J4B20 wire from the engine start contactor terminal.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (c) Locate the left magneto on the engine. Disconnect the J5A20WHT and J5A20BLU wires from the left magneto capacitor terminal and the left magneto ground terminal.
- (d) Remove the wiring harness from the engine.
- (e) On the aft facing center of the firewall, locate the SureSTART booster.
- (f) Remove the booster from the firewall. Retain the bolts, washers, and other mounting components used to secure the booster.

C. Cleaning

- (1) SureSTART may be cleaned using a mild detergent and water solution, and dried with a soft cloth.
- (2) Avoid contact of the SureSTART labels with solvents.
- (3) Minor corrosion of the SureSTART spade terminals may be removed with a fine grit emery cloth.

D. Installation

- (1) Install the SureSTART Booster and Wiring Harness
 - (a) On the aft facing center of the firewall install the SureSTART booster. Use the retained mounting components.
 - (b) Connect the following wires to their respective terminals on the booster:
 - Wire J4B20 to the terminal VIN.
 - Wire J5A20WHT to the terminal 1.
 - Wire J5A20BLU to the terminal GND.
 - (c) Route wire J4A20 with the existing nose wiring harness to the starter solenoid.
NOTE: Do not use tie-wraps in the engine compartment. Use KSL-1 lacing as required to secure wiring.
 - (d) Connect wire J4A20 to the engine start contactor terminal. Torque bolt on the terminal to 35-45 in-lbs.
 - (e) Route wires J5A20WHT AND J5A20BLU with the existing J1A18 wire to the left magneto.
 - (f) Connect the wires to their respective terminals:
 - Wire J5AWHT to left magneto capacitor terminal.
 - Wire J5ABLU to left magneto ground terminal
- (2) Connect Ignition Harness and Aircraft Battery
 - (a) Confirm the aircraft ignition and switches on in the off position.
 - (b) Reconnect the Ignition Harness
 - 1) Before installing harness on magneto, check mating surfaces for cleanliness.
 - 2) Place harness terminal plate on magneto and tighten nuts around plate alternately to seat cover squarely on magneto.
 - 3) Route ignition wires to their respective cylinders.
 - 4) Clamp harness assembly in position and replace engine baffle plate.
 - 5) Connect leads to spark plugs.
 - (c) Connect the negative lead to the battery. If the plane is equipped with the Garmin G1000/ G1000 NXi, connect the P615 emergency battery connector.
- (3) Verify Installation
 - (a) Inspect all wiring is secured and routed properly away from sources of heat, mechanical stresses and abrasions.
 - (b) Remove all tools used during installation.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

E. Testing

See "Figure 6" on page 741016.

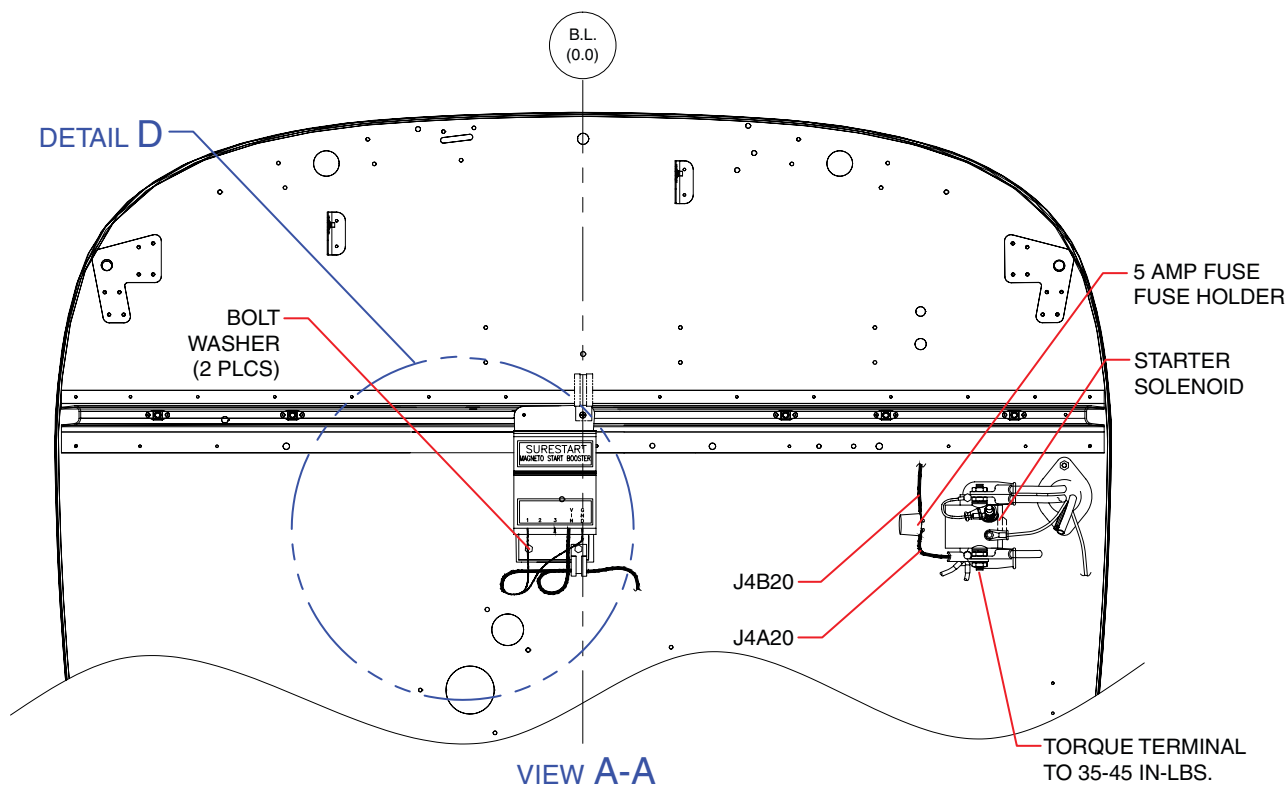
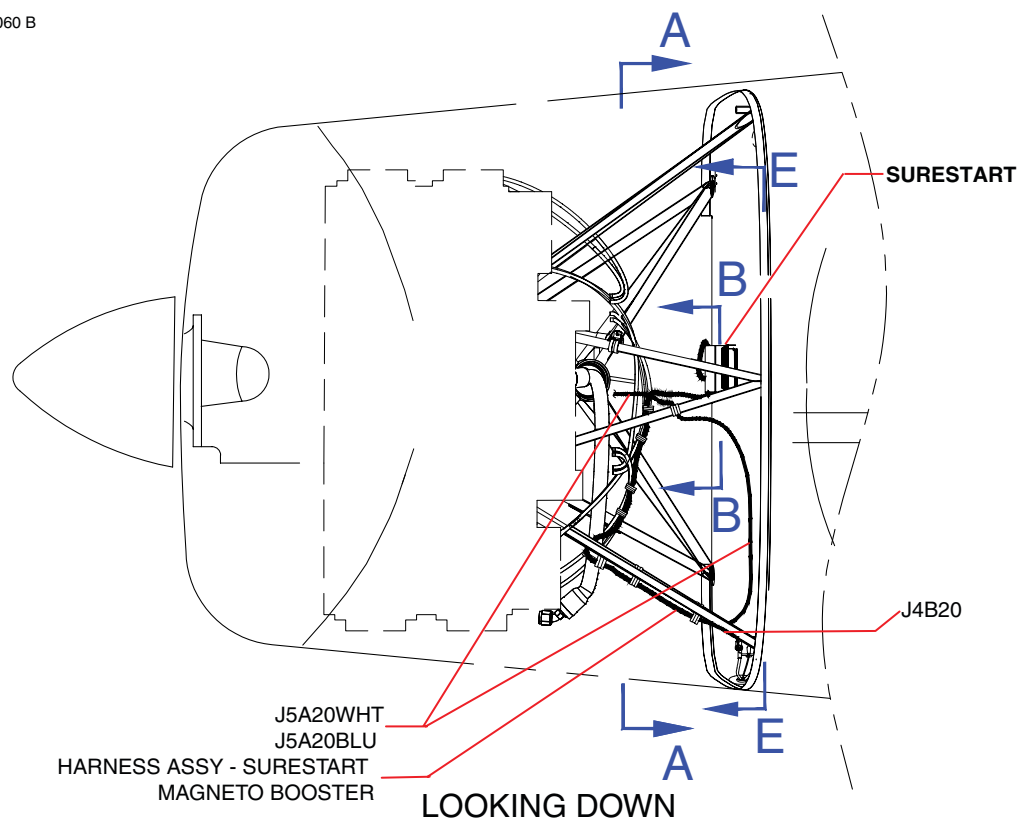
NOTE: Gardner Bender GET-213HV Electrical Voltage Tester or equivalent 120/240 VAC neon light type analog voltage tester or multimeter is required for proper testing of the SureSTART Magneto Booster. Digital multimeters will not work for this test.

WARNING: HIGH VOLTAGE.

- DO NOT TOUCH EXPOSED LEADS OR COMPONENTS WHILE SURESTART IS ENERGIZED.
 - THE OUTPUT OF SURESTART CAN GIVE A DANGEROUS ELECTRICAL SHOCK.
- (1) Operational Verification. The following steps MUST be accomplished in order.
 - (a) Remove all aircraft electrical connections to the SureSTART.
 - (b) Attach the Voltage Tester.
 - (c) Momentarily attach a 12 volt power source to the SureSTART.
 - (d) If the AC voltage tester light illuminates, the SureSTART is functioning properly.
 - (e) When test is complete, reattach all electrical connections to the SureSTART.
 - (2) Troubleshooting High Magneto Drop (approx. 500 rpm)
 - (a) If a high magneto drop is discovered during engine run up, the condition could be caused by a stuck relay in the SureSTART.
 - (b) This condition can be verified by disconnecting the wires from terminal 1 and terminal 3 on the SureSTART. If these two terminals have continuity between them, the relay is stuck closed and the SureSTART unit should be replaced under warranty.
 - (c) If an open circuit exists between terminal 1 and terminal 3, the SureSTART relay is working normally.

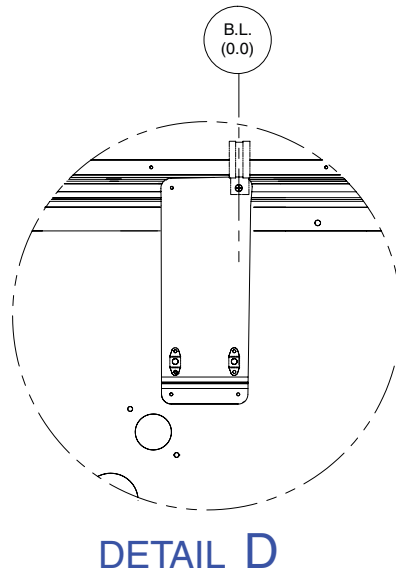
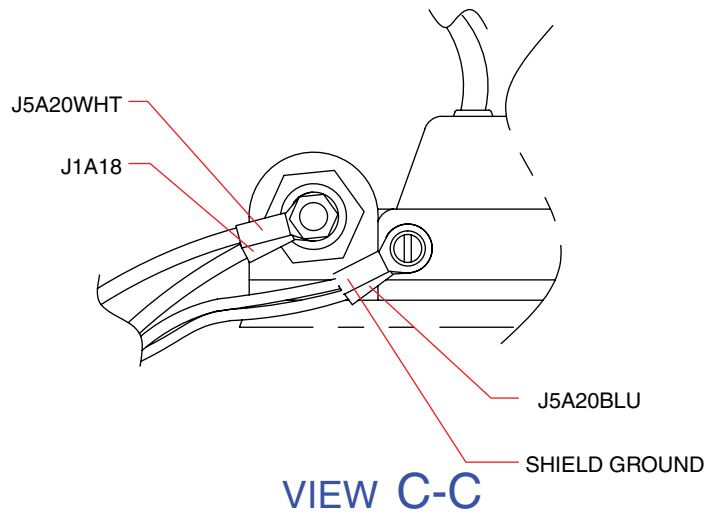
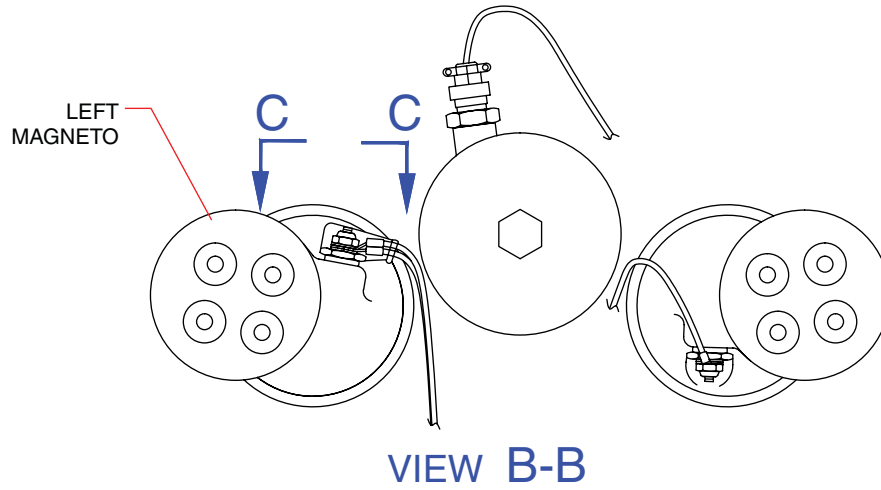
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108060 B



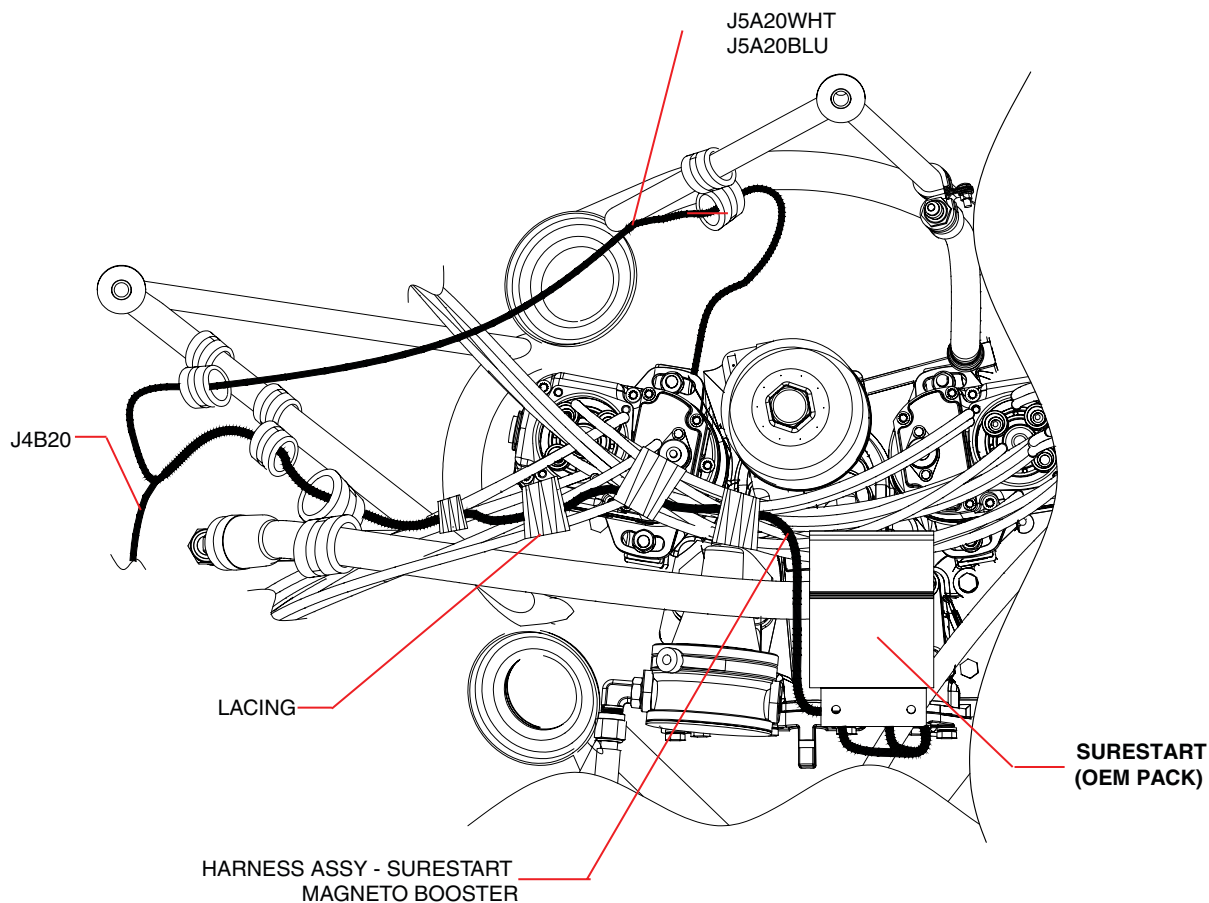
SureSTART Magneto Booster Installation
Figure 5 (Sheet 1 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



SureSTART Magneto Booster Installation
Figure 5 (Sheet 2 of 3)

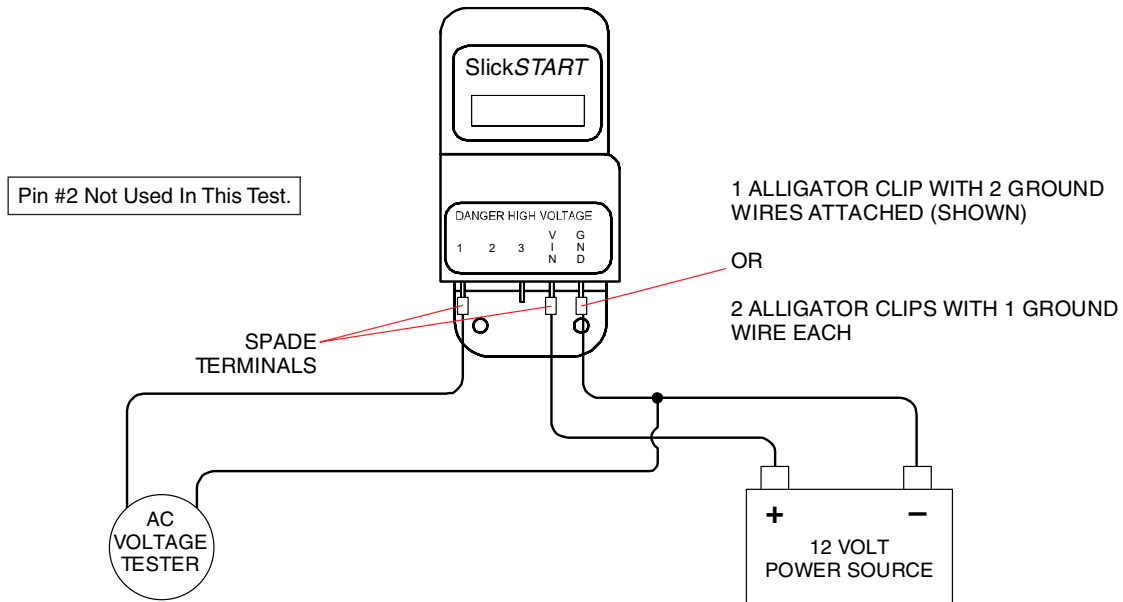
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



VIEW E-E
VIEW LOOKING FORWARD
FIREWALL REMOVED FOR CLARITY
OF HARNESS ROUTING

SureSTART Magneto Booster Installation
Figure 5 (Sheet 3 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



SureSTART Testing
Figure 6

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

DISTRIBUTION

1. Ignition Harness

A. Inspection

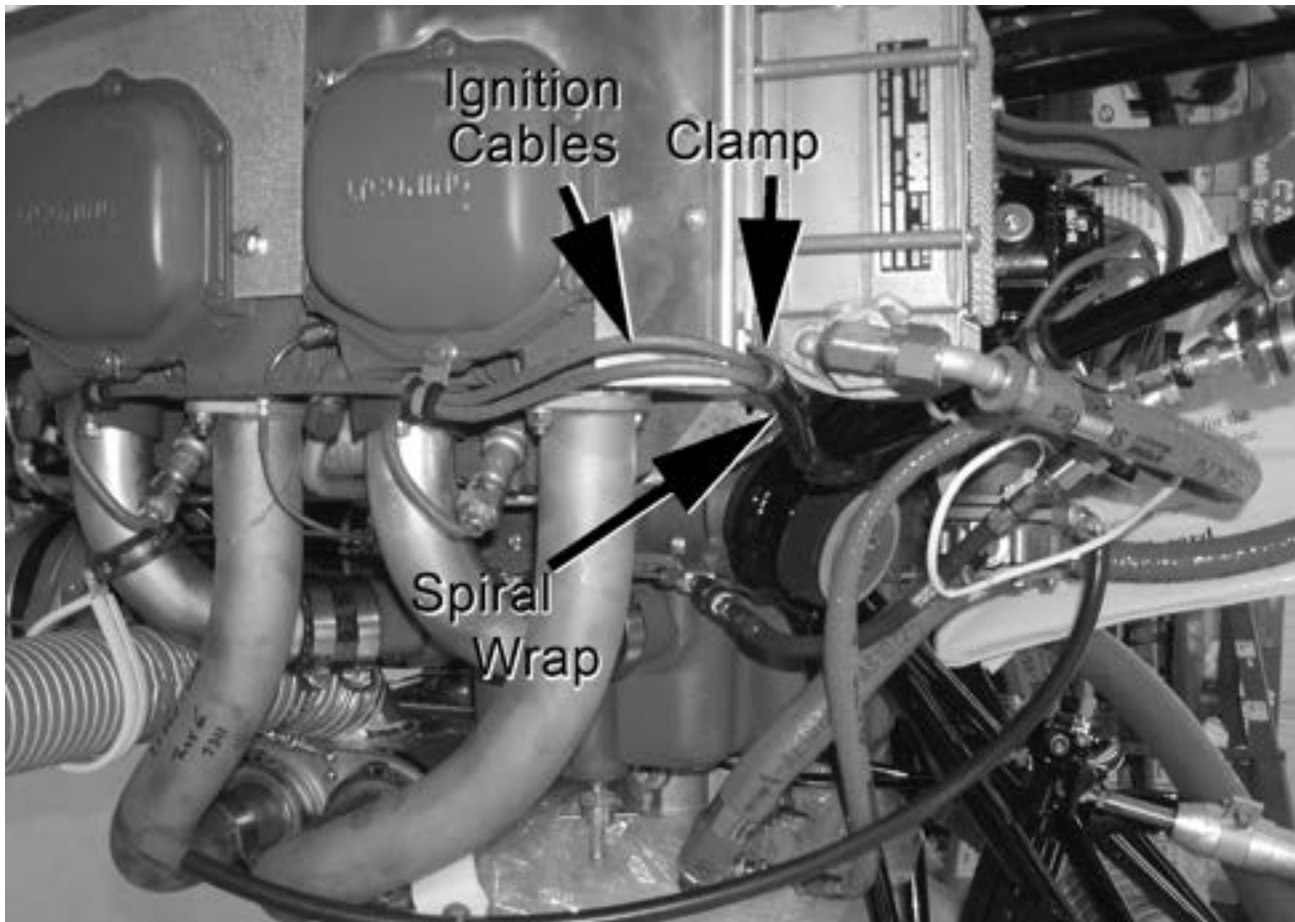
(1) General

- (a) Check lead assemblies for nicks, cuts, mutilated braiding, badly worn section or any other evidence of physical damage. Inspect spark plug sleeves for chafing or tears, and damage or stripped threads on coupling nuts. Check compression spring is not broken or distorted. Inspect grommet for tears. Check all mounting brackets and clamps to see that they are secure and not cracked.
- (b) Use an ohmmeter, buzzer, or other suitable low voltage device, and check each lead for continuity. If continuity does not exist, wire is broken and must be replaced.
- (c) For electrical test of harness assembly:
Use high voltage, direct current tester such as TAKK model 86 or 86A or equivalent direct current high voltage tester capable of delivering test potential of 10,000 volts. Connect ground lead to high voltage tester to outer shielding braid of a single lead. Connect plug terminal. Turn tester ON and apply 10,000 volts. Insulation resistance should be 100 megohms minimum. Check all other harness leads in same manner.
- (d) Minor repair to harness assembly, such as replacement of contact springs, spring retainer assemblies, insulating sleeves, or of one lead assembly, is done with harness assembly mounted on engine. To replace more than one lead assembly or cable outlet plate, harness should be removed from engine and sent to an overhaul shop.

(2) Routing

Ignition cables that are improperly routed and secured may make contact with the oil cooler and be damaged. Each 100 hours inspect as follows.

- (a) Remove the upper cowling of the engine. Check the placement of the ignition cables and clamp. Ensure that the ignition cables, which are identified in "Figure 1", do not contact or rub against the upper oil cooler.
- (b) If the ignition cables are interfering with the upper oil cooler or are not properly routed, inspect them for damage. If damage is found, replace the cables, and ensure that the cables are properly routed and secured. If no damage is found, properly route and secure the existing cables.
- (c) Check for protective spiral wrap around the cables. If there is none, install an eight-inch strip of spiral wrap around the ignition cables, from the clamp that secures the cables to the magneto.
- (d) Install upper engine cowling.



Ignition Cables Installation (Typical)
Figure 1

B. Removal

- (1) Disconnect clamps holding wires to engine and accessories.
- (2) Loosen coupling nuts at spark plugs and remove insulators from spark plug barrel well. Do not damage insulator spring when withdrawing insulator.
- (3) Place a guard over harness insulators.
- (4) Remove harness assembly terminal plate from magneto.
- (5) Remove harness from airplane.

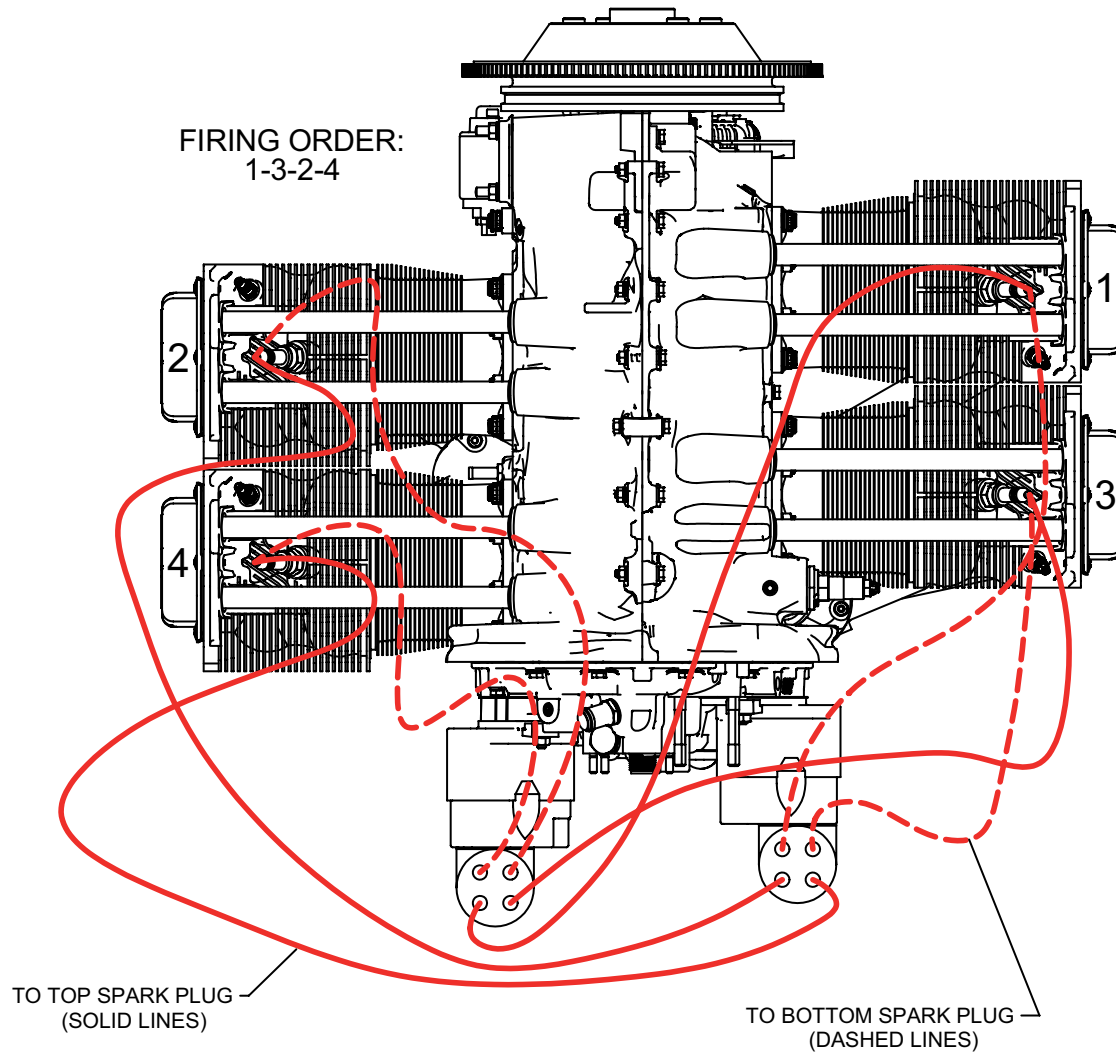
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. Installation

- (1) Before installing harness on magneto, check mating surfaces for cleanliness.
- (2) Place harness terminal plate on magneto and tighten nuts around plate alternately to seat cover squarely on magneto.
- (3) Route ignition wires to their respective cylinders as shown in "Figure 2" on page 74204.
NOTE: "Figure 2" should be used to determine which wire goes to which cylinder only.
- (4) Clamp harness assembly in position and replace engine baffle plate.

- (5) For Slick harnesses on Lycoming engines only:
Connect leads to spark plugs and torque per "Chart 1" on page 742010.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



The left magneto supplies ignition to Cyl 1 and 3 upper spark plugs and Cyl 2 and 4 lower spark plugs. The right magneto supplies ignition to Cyl 2 and 4 upper spark plugs and Cyl 1 and 3 lower spark plugs.

Ignition Wire Connections
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

D. Maintenance

Maintain Slick harnesses per the latest revision of the Slick Ignition Lead Assembly and Maintenance Manual, L-1499. If that document is not immediately available, proceed as follows:

(1) Disassembly

- (a) To remove spring, Slick M-2929, from damaged lead, turn spring counterclockwise while pulling gently. This will remove spring and M-1498 electrode screw from end of coiled conductor.
- (b) To separate spring and screw, hold electrode screw with pliers and turn spring clockwise until it is through the threaded portion.
- (c) Remove insulator sleeve from end of wire.
- (d) To remove lead from M-1568 harness cap, use diagonals or cutting pliers and cut lead off close to cap. Use drift or punch to tap ferrule loose from harness cap.

NOTE: Further service on Slick harnesses will require the use of Slick T-200 or M-1495 Service Tool Kit, see Introduction, Supplementary Publications, Vendor Publications, Magnetos.)

(2) Assembly

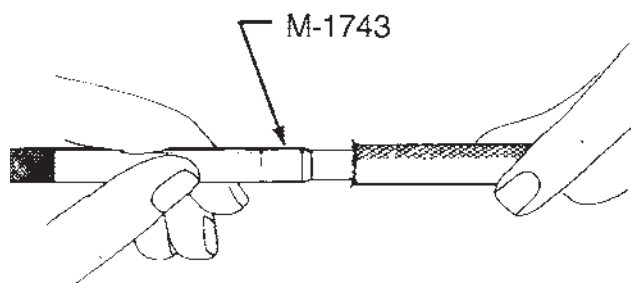
NOTE: Spark plugs have 5/8"-24 harness connectors.

- (a) Cut a piece of harness wire to length required. Do not stretch wire when measuring it.
- (b) On magneto end, make a final mark one inch from wire end. Another mark must be made 0.9375 inch from spark plug end of wire.
- (c) Flare out shielding, then without allowing any shielding to fold under, insert Slick T-112 or M-1743 stripping tool under braided shielding. (Refer to "Figure 3".)
- (d) Make sure stripping tool is inserted past cutting mark, and cut shielding with a sharp knife using a rolling motion. Remove shielding and stripping tool. Do not cut silicone insulation. (Refer to "Figure 4".)
- (e) Cut exposed insulation 0.125 inch back from end and roll insulation clockwise to remove. Do not use a pulling motion when removing insulation. Trim end of coiled conductor to make a clear hole for inserting stud. (Refer to "Figure 5".)
- (f) Using T-111 or M-1742 pin vise, insert T-110 or M-1741 drill (#72 drill), drill out silicone rubber from inside coiled conductor approximately 0.5 inch deep. (Refer to "Figure 6".)
- (g) On spark plug end of wire install M-1673 nut followed by M-1671 female taper hex ferrule. (Refer to "Figure 7".)
- (h) After installation of nut and ferrule, bend and rotate silicone insulation as per "Figure 8" to flare out shielding so drive ferrule can be inserted. Do not cut silicone insulation with sharp braiding while wire is being rotated.

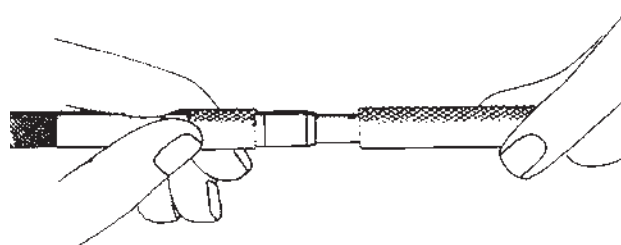
CAUTION: DO NOT REUSE THE M-1458 DRIVE FERRULE.

- (i) On spark plug end of wire install M-1458 male tapered drive ferrule over silicone insulation and under shielding to within 0.0625 inch from flange of ferrule. Make sure that shielding is away from ferrule flange then slide ferrule M-1671 over the M-1458 drive ferrule until tight. (Refer to "Figure 9".)
- (j) For spark plug end, mount M-1747 drive plate in a bench vise. Set hex ferrule in drive plate slot. Drive M-1458 drive ferrule flush against the hex ferrule using the M-1744 drive tool. (Refer to "Figure 10".) Or, press into place using T-109 pressing tool.
- (k) For magneto end of wire, insert wire through hole in M-1569 harness cap so shielding is through hole as shown in "Figure 11".

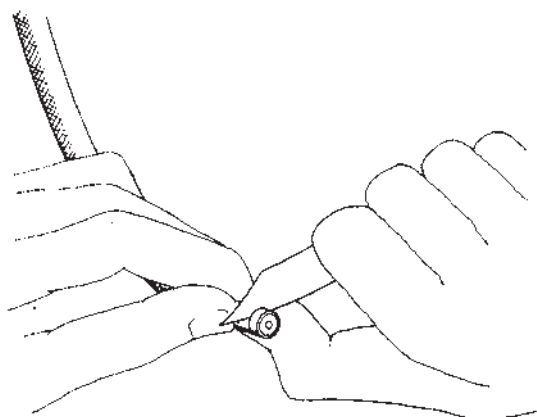
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



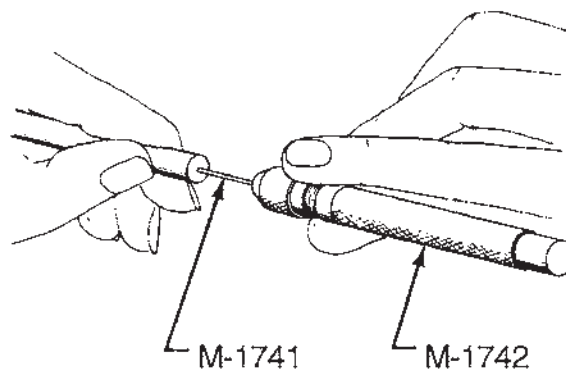
Stripping Tool
Figure 3



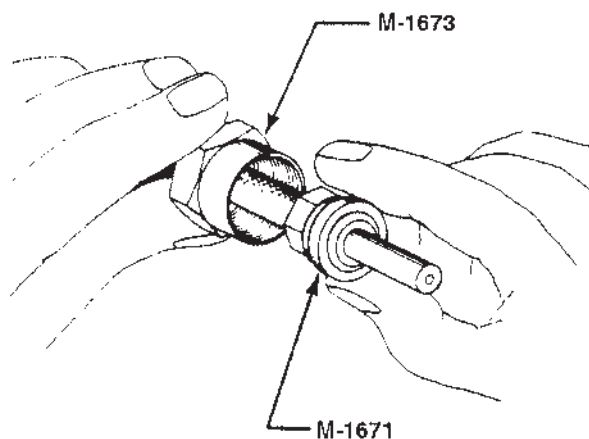
Inserting Stripping Tool
Figure 4



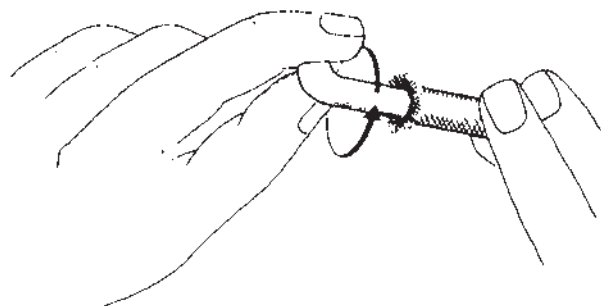
Cutting Insulation
Figure 5



Removing Silicone Rubber from Wire
Figure 6



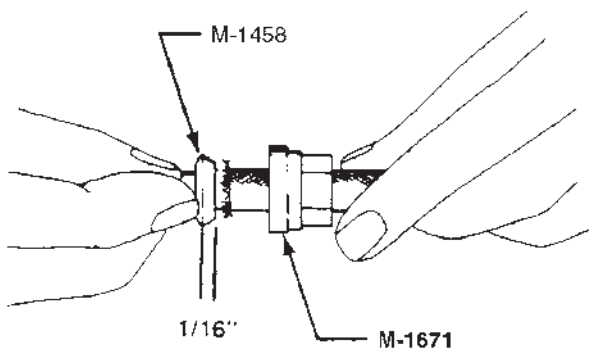
Installation of Plug Endnut
Figure 7



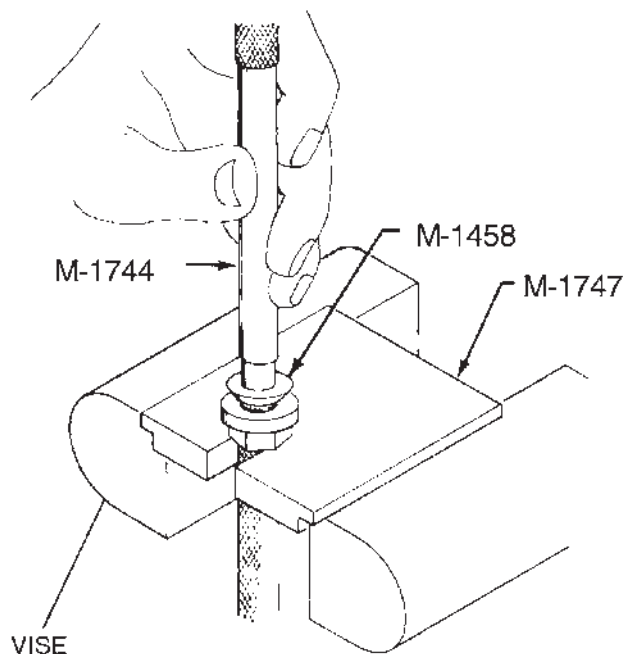
Flaring out the Shielding
Figure 8

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (l) Install an M-1458 male tapered drive ferrule over insulation and under shielding as in step 9, then drive ferrule into M-1569 harness cap using M-1744 drive tool, similar to step 10. (Refer to "Figure 12".) Or, press into place using T-109 pressing tool.
- (m) Clamp threaded end of M-1498 electrode screw in T-111 or M-1742 pin vise. Insert tapered pin of electrode screw into center of coiled conductor by turning pin vise counterclockwise and pushing at same time until screw is flush with insulation. This is done at both ends of the wire assembly. (Refer to "Figure 13".)
- (n) On magneto end of wire, place M-1738 insulator sleeve over silicone insulation. On spark plug end of wire, use M-1677 insulator sleeve. (Refer to "Figure 14".)
- (o) Turn M-2929 spring clockwise on electrode screw three full turns until end is flush with first large coil of spring. This applies to both ends of wire. (Refer to "Figure 15".)

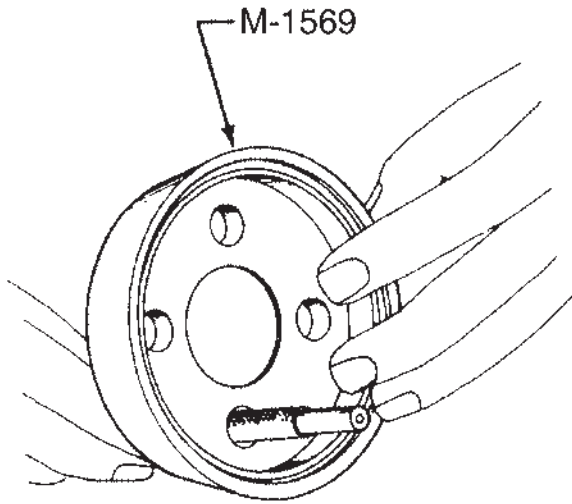


Installation of Ferrule
Figure 9

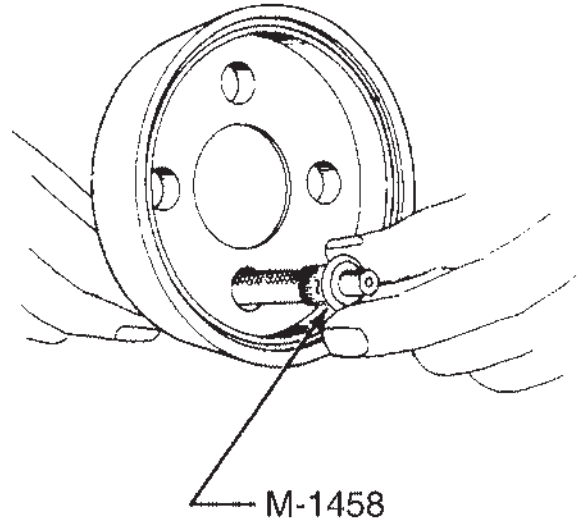


Driving Tool
Figure 10

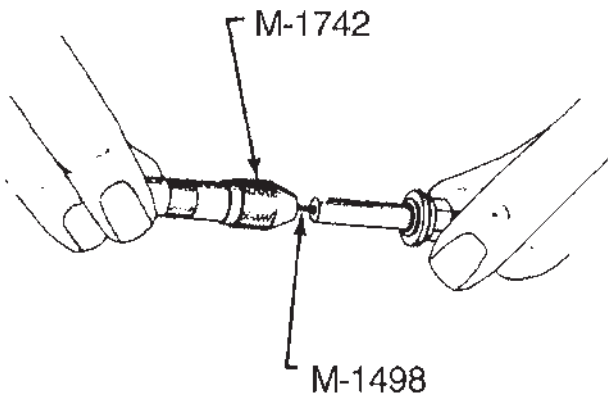
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



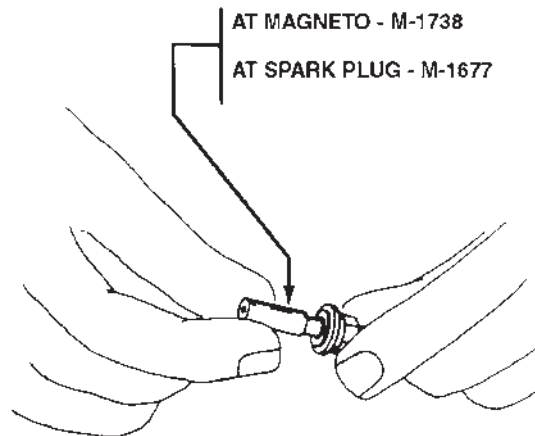
Installation of Harness Cap
Figure 11



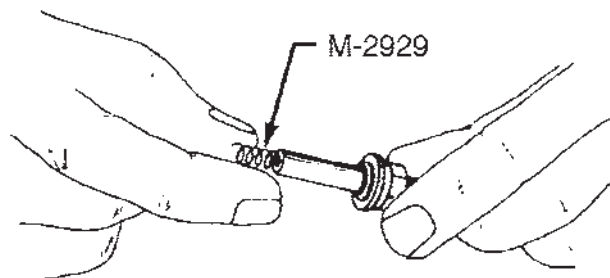
Securing Wire in Harness Cap
Figure 12



Installation of Electrode Screw
Figure 13



Installation of Insulator Screw
Figure 14



Installation of Spring
Figure 15

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Spark Plugs

A. Removal

CAUTION: WHEN WITHDRAWING IGNITION CABLES LEAD CONNECTION FROM PLUG, CAREFULLY PULL LEAD STRAIGHT OUT AND IN LINE WITH CENTER LINE OF PLUG BARREL; OTHERWISE, A SIDE LOAD WILL BE APPLIED WHICH FREQUENTLY RESULTS IN DAMAGE TO BARREL INSULATOR AND CONNECTOR. A LEAD CANNOT BE REMOVED EASILY IN THIS MANNER, RESISTING CONTACT BETWEEN NEOPRENE COLLAR AND BARREL INSULATOR WILL BE BROKEN BY A ROTARY TWISTING OF COLLAR. AVOID UNDUE DISTORTION OF COLLAR AND POSSIBLE SIDE LOADING OF BARREL INSULATOR.

- (1) Loosen coupling nut on harness lead and remove terminal insulator from spark plug barrel well.

CAUTION: DO NOT ALLOW FOREIGN OBJECTS TO ENTER SPARK PLUG HOLE.

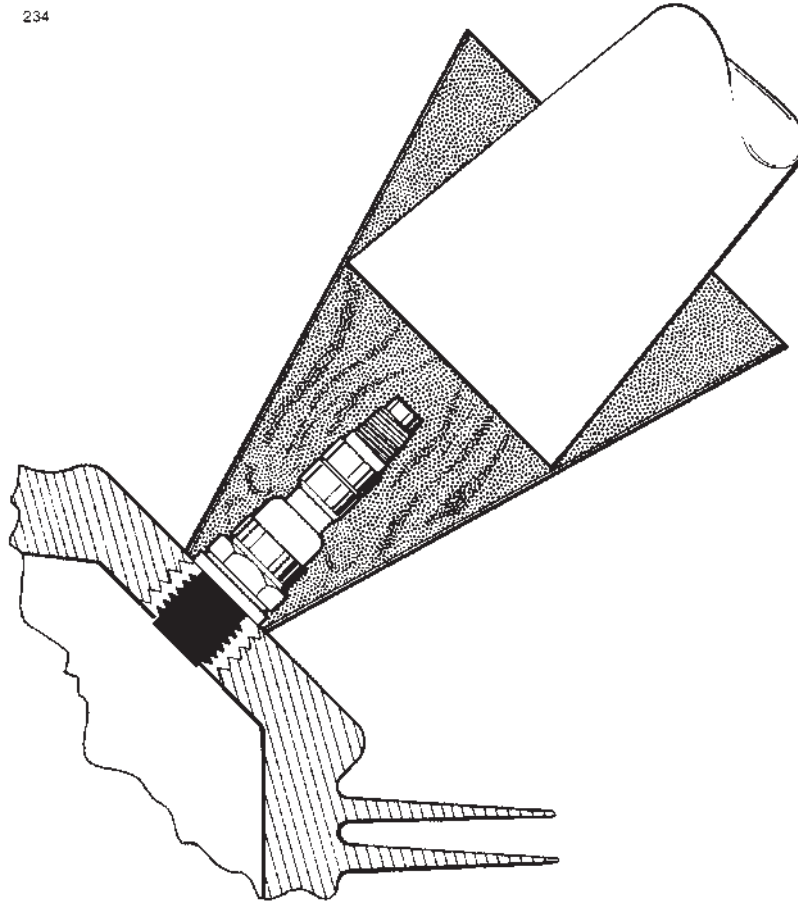
- (2) Remove spark plug from engine.

NOTE: A torque wrench is not required to remove spark plugs.

- (a) In the course of engine operation, carbon and other combustion products are deposited on the end of spark plugs and will penetrate lower threads to some degree. As a result, a greater torque is required for removing a plug than for installation. Torque limitations given do not apply to plug removal, as sufficient torque must be used to unscrew plug.
- (b) The higher torque required to remove plugs is not as detrimental as in installation, since it cannot stretch the threaded section. It does, however, impose a shearing load on this section and may, if sufficiently severe, produce a failure in this location.
- (3) Immediately upon removal, place spark plugs in a tray in a manner that will identify their position in the engine.
- (4) Removal of seized spark plugs in cylinder is done by application of liquid carbon dioxide (CO₂) by a conical metal funnel adapter with a hole at the apex just large enough to accommodate the funnel of a 20 lb bottle. (Refer to "Figure 16".) When a seized spark plug cannot be removed by normal means, funnel adapter is placed over and around spark plug. Place funnel of CO₂ bottle inside funnel adapter and release carbon dioxide to chill and contract spark plug. Break spark plug loose with a wrench. A warm cylinder head at the time carbon dioxide is applied will aid in removal of excessively seized plug.

B. Inspection and Cleaning

- (1) Visually inspect each spark plug for the following non-repairable defects.
- (a) Severely damaged shell or shield; threads nicked up, stripped, or crossthreaded.
 - (b) Badly battered or rounded shell hexagons.
 - (c) Out-of-round or damaged shielding barrel.
 - (d) Chipped, cracked, or broken ceramic insulator portions.
 - (e) Badly eroded electrodes worn to approximately 50 percent of original size.
 - (f) Discard spark plugs that fail to meet the "Normal Electrode Condition" characteristics shown in "Figure 17" on page 742011.
- (2) Clean spark plug as required; remove carbon and foreign deposits.
- (3) Test spark plug both electrically and for resistance.
- (4) Set electrode gap as specified in 6-00-00 Chart 1.



Removing Frozen Spark Plug
Figure 16

C. Installation

CAUTION: DO NOT INSTALL ANY SPARK PLUG THAT HAS BEEN DROPPED.

- (1) Before installing spark plugs, make sure that threads within cylinder are clean and not damaged.

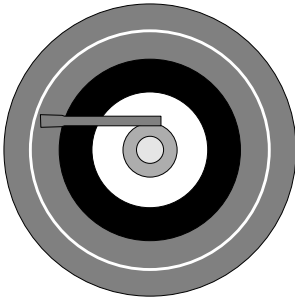
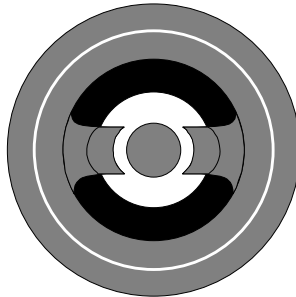
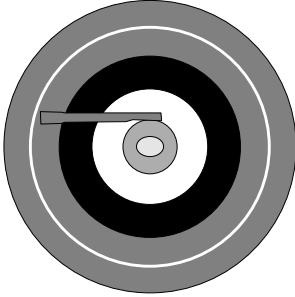
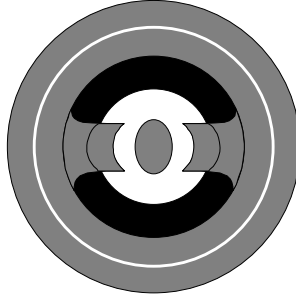
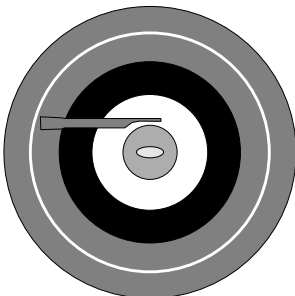
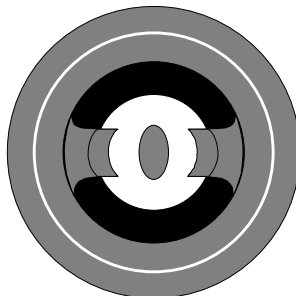
CAUTION: MAKE CERTAIN DEEP SOCKET IS PROPERLY SEATED ON SPARK PLUG HEXAGON AS DAMAGE TO PLUG WILL RESULT IF WRENCH IS COCKED TO ONE SIDE WHEN PRESSURE IS APPLIED.

- (2) Apply anti-seize compound sparingly on threads; install spark plugs using a new copper gasket. Tighten to a torque of 420 in·lb.
- (3) Carefully insert terminal insulator in spark plug and tighten coupling nut per "Chart 1".

CHART 1
SPARK PLUG COUPLING TORQUE

Spark Plug Coupling Threads	Torque (In·lb)
5/8-24	90 - 95

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

	FINE WIRE ELECTRODE	MASSIVE ELECTRODE
NORMAL ELECTRODE CONDITION •INSULATOR TIP GRAY, TAN OR LIGHT BROWN •FEW COMBUSTION DEPOSITS •ELECTRODES NOT BURNED OR ERODED •PROPER TYPE AND HEAT RANGE PLUG FOR ENGINE AND SERVICE. •SPARK PLUG SHOULD BE CLEANED, REGAPPED AND TESTED BEFORE REINSTALLTION		
NORMAL WORN-OUT CONDITION •ELECTRODES ERODED BY HIGH VOLTAGE SPARKING AND BY CORROSIVE GASES FORMED DURING COMBUSTION TO LESS THAN 1/2 ORIGINAL THICKNESS •MORE VOLTAGE NEEDED TO FIRE SPARK PLUGS - OFTEN MORE THAN IGNITION SYSTEM CAN PRODUCE. •REPLACE WITH NEW APPROVED AVIATION SPARK PLUGS.		
SEVERE WORN-OUT CONDITION •EXCESSIVELY ERODED CENTER AND GROUND ELECTRODES PLUS EXTENSIVE NECKING OF FINE WIRE GROUND ELECTRODES INDICATE ABNORMAL ENGINE POWER OR PLUGS LONG OVERDUE FOR REPLACEMENT. •DISCARD SPARK PLUGS AND CHECK HEAT RANGE BEFORE INSTALLING NEW ONES. •REPLACE WITH NEW APPROVED AVIATION SPARK PLUGS IN APPROPRIATE HEAT RANGE.		

Spark Plug Inspection Criteria
Figure 17

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

SWITCHING

1. Description

The magneto switches and the start switch are located in the overhead switch panel.

2. Start Switch

Refer to "Figure 1".

A. Removal

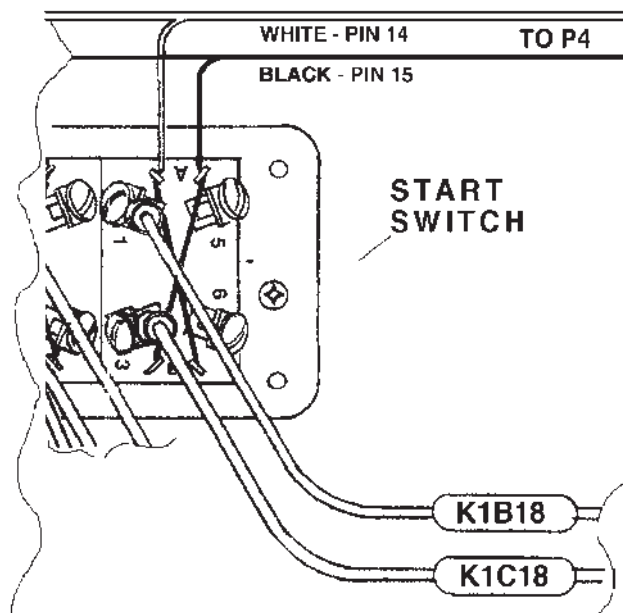
- (1) Check that start switch is in OFF position.
- (2) Disconnect (pull) START & ACC. circuit breaker.
- (3) Disconnect negative (ground) cable from battery.
- (4) Drop the overhead switch panel by removing the six screws securing the panel in place.

NOTE: Note and mark wire locations before removing them from the start switch.

- (5) Remove wires K1B18 and K1C18 from screw connections on back side of start switch.
- (6) Unsolder the white and black wires from back of switch.
- (7) Remove Switch.

B. Installation

- (1) Solder the white and black wires to back of start switch as shown in "Figure 1".
- (2) Install wires K1B18 and K1C18 to screw connections on back side of start switch as shown in "Figure 1".
- (3) Check for proper operation of start switch as follows:
 - (a) Ensure all connectors in back of switch panel are properly joined
 - (b) Ensure negative (ground) battery cable disconnected.
 - (c) Attach ohmmeter to starter contactor coil at point where wire K1E18 is connected. Ground ohmmeter to airframe.
 - (d) Depress start switch. Ohmmeter must indicate a closed circuit.
- (4) Install start switch in switch panel.
- (5) After ensuring all connectors are properly joined, install overhead switch panel by installing the six screws securing the panel in place.
- (6) Connect negative (ground) cable to battery.
- (7) Engage (push in) START & ACC. circuit breaker.



Start Switch Installation
Figure 1

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

3. Magneto Switches

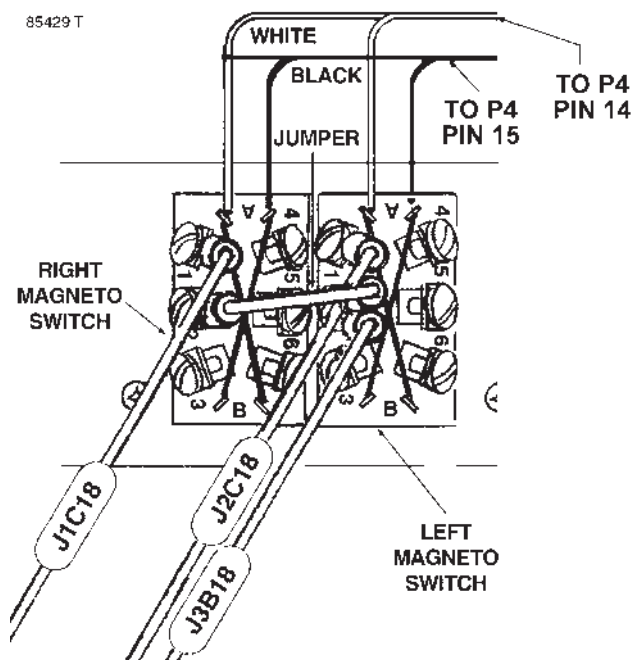
Refer to "Figure 2".

A. Removal

- (1) Check that start switch is in OFF position.
- (2) Disconnect (pull) START & ACC. circuit breaker.
- (3) Disconnect negative (ground) cable from battery.
- (4) Drop the overhead switch panel by removing the six screws securing the panel in place.

NOTE: Note and mark wire locations before removing them from start switch.

- (5) To remove left magneto switch:
 - (a) Remove wires J2C18 and J3B18 from screw connections on back side of switch.
 - (b) Remove jumper from screw connection on back side of switch.
 - (c) Unsolder the white and black wires from back of switch.
 - (d) Remove Switch.
- (6) To remove right magneto switch:
 - (a) Remove wire J1C18 from screw connection on back side of switch.
 - (b) Remove jumper from screw connection on back side of switch.
 - (c) Unsolder the white and black wires from back of switch.
 - (d) Remove Switch.



Magneto Switch(es) Installation
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Installation

- (1) To install left magneto switch:
 - (a) Solder the white and black wires to back of switch.
 - (b) Connect jumper to screw connection on back side of switch.
 - (c) Connect wires J2C and J3B to screw connections on back side of switch.
- (2) To install right magneto switch:
 - (a) Solder the white and black wires to back of switch.
 - (b) Install jumper to screw connection on back side of switch.
 - (c) Install wire J1C from screw connection on the back side of switch.
- (3) Check for proper operation of magneto switch(es) as follows:
 - (a) Ensure all connectors in back of switch panel are properly joined
 - (b) Remove P lead from right magneto.
 - (c) Attach P lead to ohmmeter and ground to airframe.
 - (d) With right magneto switch OFF, and left magneto switch ON, the ohmmeter must indicate a closed circuit.
 - (e) With start switch ON, the ohmmeter must indicate a closed circuit.
 - (f) With right magneto switch ON, or with both magneto switches ON, and start switch OFF, the ohmmeter should indicate an open circuit.
 - (g) Connect P lead to right magneto.
 - (h) Check that start switch and both magneto switches are in the OFF position.
- (4) Install magneto switch(es) into switch panel.
- (5) After ensuring all connectors are properly joined, install overhead switch panel by installing the six screws securing the panel in place.
- (6) Connect negative (ground) cable to battery.
- (7) Engage (push in) START & ACC. circuit breaker.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

76

ENGINE CONTROLS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 76

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
76-List of Effective Pages	1	Oct 15/20			
	2	Mar 6/14			
76-Table of Contents	1	Oct 15/20			
	2	Mar 6/14			
76-10-00	1	Oct 15/20			
	2	Jun 1/16			
	3	Oct 15/20			
	4	Mar 15/20			
	5	Nov 15/17			
	6	Nov 15/17			
	7	Nov 15/17			
	8	Nov 15/17			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 76 - ENGINE CONTROLS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>POWER CONTROL</u>	76-10-00	1
Throttle and Mixture Control Lever Rigging (with O-360-A4M Engine)		1
Throttle Lever Adjustment		1
Mixture Lever Adjustment		1
Throttle and Mixture Control Lever Rigging (with Fuel Injected Engine)		1
Throttle Lever Adjustment		1
Mixture Lever Adjustment		3
Engine Run Test		4
Control Quadrant Assembly		5
Removal		5
Installation		5

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

POWER CONTROL

1. Throttle and Mixture Control Lever Rigging (with O-360-A4M Engine)

Throttle and mixture controls are adjusted so that, when the throttle arm on carburetor is rotated forward against its full throttle stop, and the mixture control is rotated forward against its full rich stop, the cockpit throttle and mixture control levers must spring back from their full forward position as specified below. (See "Figure 1" on page 76102.)

A. Throttle Lever Adjustment

- (1) At the carburetor, disconnect the rod end of the throttle control cable from the control arm. Loosen the jamnut that secures the rod end.
- (2) Adjust linkage by rotating the rod end on the cable for a 0.160 ± 0.020 inch spring back on the instrument stop when in the full throttle position.
- (3) Connect the rod end to the control arm and tighten to a torque of 35–40 inch-pounds.
- (4) On aircraft with air conditioning systems, a micro switch is below the throttle control and is set to actuate in the full open position. With the throttle control adjusted as described above, adjust the micro switch to actuate at this point.

B. Mixture Lever Adjustment

- (1) At the carburetor, disconnect the rod end of the mixture control cable from the control arm. Loosen the jamnut that secures rod end.
- (2) Adjust the linkage by rotating the rod end on cable for 0.160 ± 0.020 inch spring back on the instrument panel stop when in the full rich position.
- (3) Connect the rod end to the control arm, and safety.

C. Check security of the cable casing attachment.

- D. Pull the throttle and mixture levers in cockpit full aft to verify that the idle screw contacts its stop and the mixture control arm contacts its lean position. A mixture control lock is in the quadrant cover which prevents the mixture control from being moved to the idle cutoff position inadvertently. The lock must be depressed before the control can be moved completely aft. Verify that the lock operates freely with no tendency to bind or hang up.

2. Throttle and Mixture Control Lever Rigging (with Fuel Injected Engine)

Throttle and mixture controls are adjusted so that when the throttle arm on the fuel injector is rotated forward against its full throttle stop and the mixture control is rotated forward against its full rich stop, the throttle and mixture cockpit control levers should have 0.285 ± 0.020 of an inch clearance from the instrument panel stop when in full throttle or full rich position.

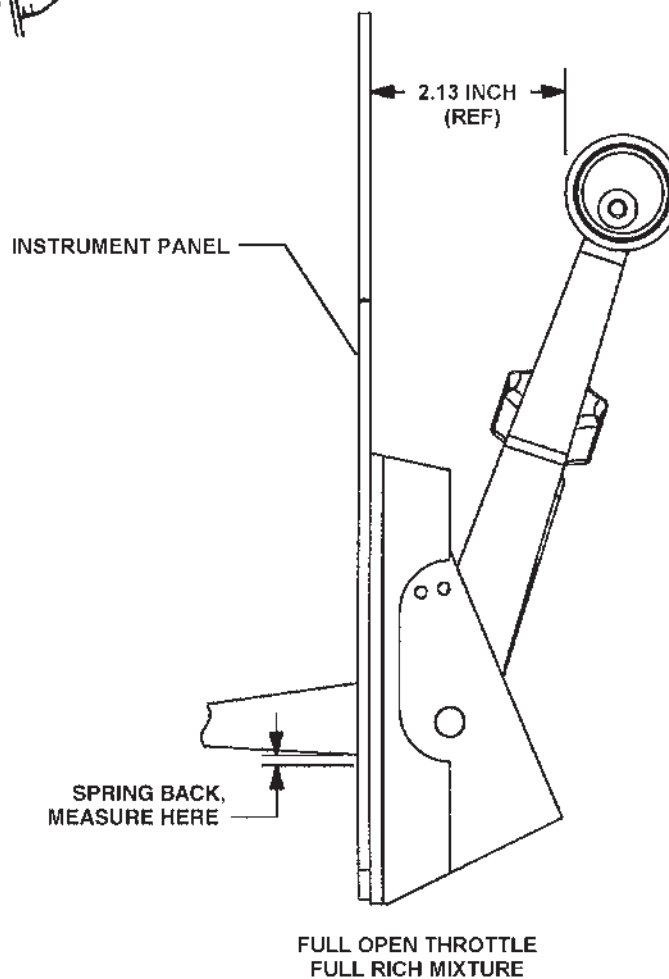
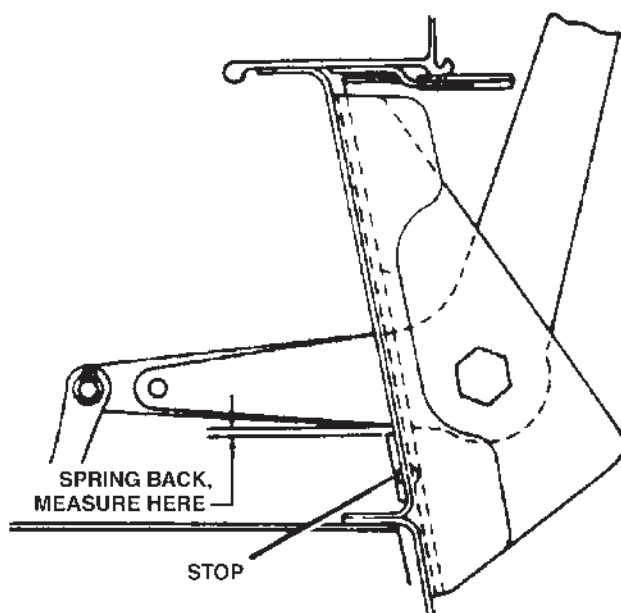
See "Figure 2" on page 76103.

A. Throttle Lever Adjustment

- (1) At the fuel injector, disconnect the rod end of the throttle control cable from the fuel servo throttle control arm. Loosen the jam nut that secures the rod end.
- (2) Adjust the linkage by rotating the rod end on the cable to obtain 0.285 ± 0.020 of an inch clearance from the instrument panel stop when in full throttle position.
- (3) In airplanes equipped with air conditioning, a micro-switch is located below the throttle control and should be set to actuate in the full open position. With the throttle control adjusted to obtain proper clearance from the instrument panel stop, adjust the micro-switch to actuate at this point also.
- (4) Reconnect the rod end to the fuel servo throttle control arm and safety.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

65848 AP



[Effectivity](#)
with O-360-A4M Engine

Engine Controls Rigging
Figure 1

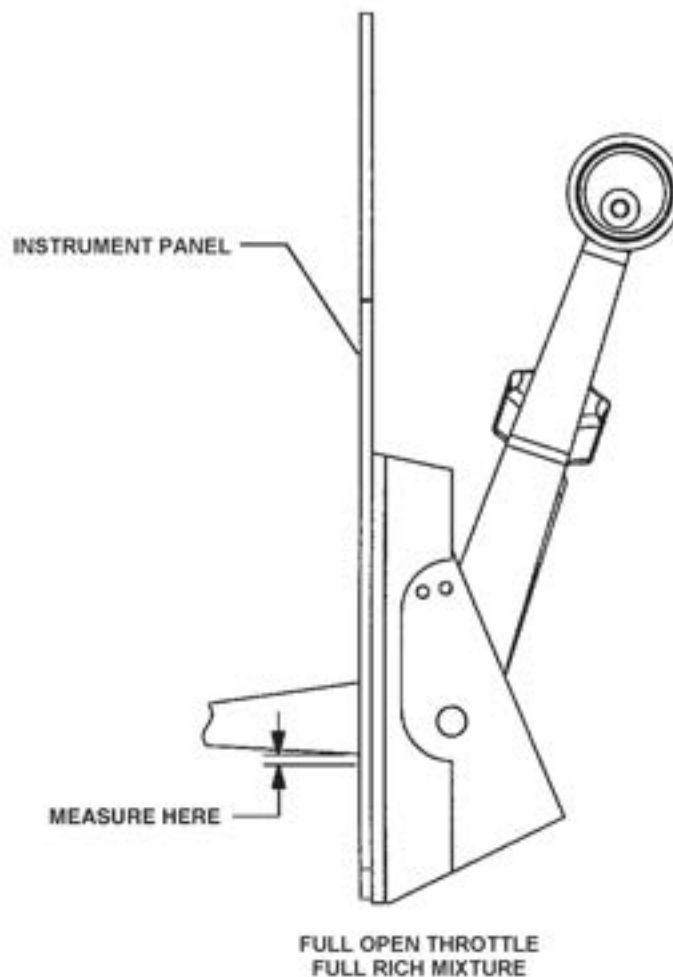
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

B. Mixture Lever Adjustment

NOTE: Check the routing and security of the mixture cable to prevent interference between the cable and the nose gear linkage.

- (1) At the fuel injector, disconnect the rod end of the mixture control cable from the fuel servo mixture control arm. Loosen the jam nut that secures the clevis end.
- (2) Adjust the linkage by rotating the rod end on the cable to obtain 0.285 ± 0.020 of an inch clearance from the instrument panel stop when in full rich position.
- (3) Reconnect the rod end to the fuel servo mixture control arm and safety.

NOTE: Check security of cable casing attachments.



Engine Controls Rigging
Figure 2

[Effectivity](#)
with Fuel-Injected Engine

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. Engine Run Test

(PIR-PPS60249-1, Rev. B.)

- (1) Perform Normal Start.
- (2) With engine at 2000 RPM, check and record the following:
 - (a) Mag drop, left and right. (Max 175, w/50 RPM diff).
 - (b) Oil pressure at 180 degree oil temp.
 - (c) RPM drop with alternate air engaged (30-100 RPM).
 - (d) Stabilized oil temperature.
 - (e) Maximum static RPM (2175-2375 RPM). See Static RPM Determination in 71-00-00.
- (3) Perform Idle Speed and Mixture Adjustments.
 - (a) Turn air conditioning off, If equipped.
 - (b) Close throttle and check for engine idle at approx. 600+/- 50 RPM.
 - (c) Move the mixture control lever smoothly to the idle-cut-off position and observe tachometer, return to full rich just before engine cuts out. An increase of 50 RPM or more indicates an excessively rich mixture, and an immediate decrease in RPM indicates the mixture is too lean.
 - (d) If idle mixture must be adjusted re-check using steps A and B listed above. Run the engine up to 2000 RPM to clear the engine between checks.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Control Quadrant Assembly

See "Figure 4" on page 76107

A. Removal

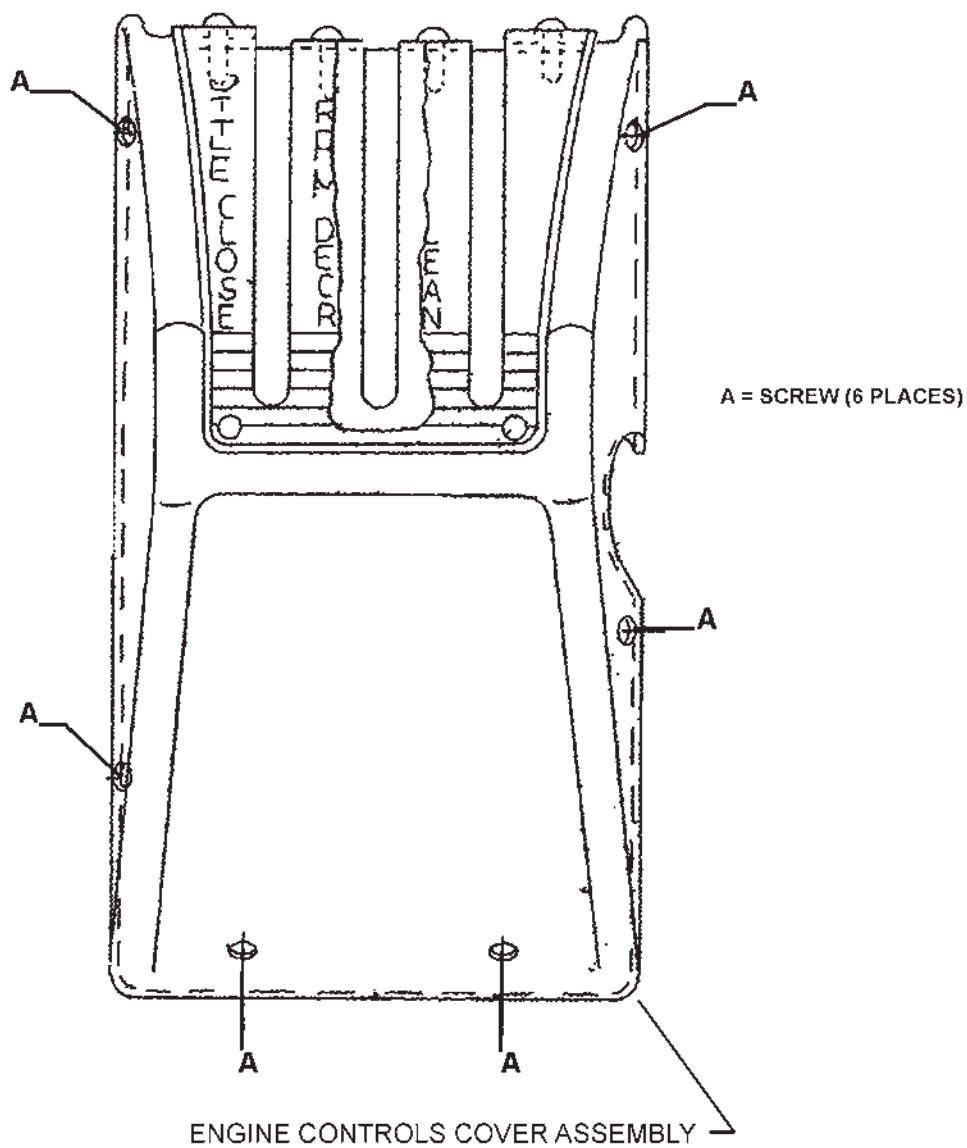
- (1) Unscrew six screws, labeled "A", out of the twelve screws around the cover plate.
See "Figure 3" on page 76106 .
- (2) Lift the cover off of the quadrant control and maneuver around the levers with a slight twist or bend as needed to remove the cover over the levers.
- (3) Cut and remove heat shrink tubing over throttle. If the throttle is not being replaced skip all steps that involve removing the throttle.
- (4) Carefully remove the bolthead by pushing it through both levers and remove the friction handle. By doing this the tabulated spacer, the CAM, and tabulated washer will be removed in the process.
- (5) Unscrew nut and remove all washers and crescent washers..
- (6) Slide the CAM, washers, and handle from the bolthead.
- (7) Unscrew the Throttle handle.
- (8) Remove the switch plate and disconnect the wires at the J732 connector.
- (9) To dislodge the Throttle and/or Mixer lever remove cottering pin washer, and pin from the adjacent terminal towards the front of the plane. Remove the lever(s) that need to be replaced.

B. Installation

- (1) Install the switch plate and wires back onto the throttle.
- (2) Screw the handle back onto the throttle lever and replace the plastic sleeve with 3/16 inch heat shrink tubing using the following or equivalent to the following: Insultite FP 301-1 by Electronized Chemicals Corporation, Thermofit RNF-100 by Raychem Corporation, GPO-135 Type 1 by Remtek Corporation, FP-301 by 3M.
- (3) Attach the throttle and mixer lever to the equivalent terminal. Push the pin from the left of the terminal and apply the washer and push the cotter pin through the pin going through the terminal.
- (4) Connect the wires at the J732 connection from the throttle.
- (5) Install friction handle on the bolthead with the flat side towards throttle. Add the tabulated washer on the bolt and add the CAM spacer. Angle side towards the handle and line up screws from the bracket.
- (6) Push the bolthead through the plate, mixer lever, and the friction plate.
- (7) Set the spacer between the two friction plates that are adjacent both levers and push the bolthead through hardware, throttle lever and bracket.
- (8) Install the washers as displayed in "Figure 4" to the bolthead. Adjust the crescent washers curve to face adjacent crescent washer.
- (9) Place the bolt and cottering pin to secure bolthead to bracket. if handle is loose add washer(s) as needed behind the bolt and in front of the crescent washers to tighten the handle in place.
- (10) Install the quadrant cover plate and screw the six screws into panel.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

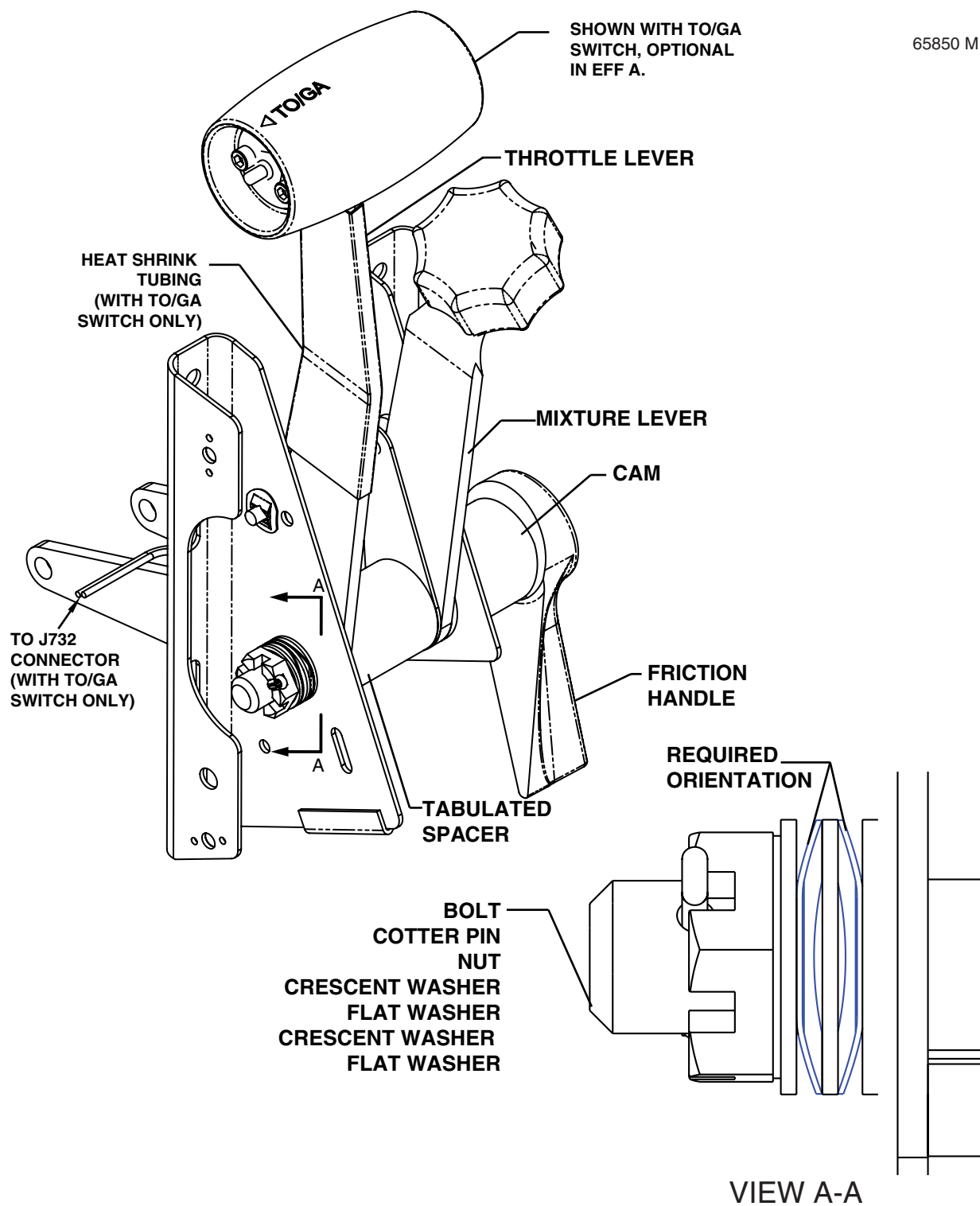
67232 AN



Engine Controls Cover Installation
Figure 3

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

65850 M



(SOME PARTS REMOVED FOR CLARITY)

Control Quadrant Assembly
Figure 4

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

77

ENGINE INDICATING

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 77

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
77-List of Effective Pages	1	May 31/20			
	2	Mar 6/14			
77-Table of Contents	1	May 31/20			
	2	Mar 6/14			
77-00-00	1	Nov 15/17			
	2	Mar 6/14			
77-10-00	1	Nov 15/17			
	2	Mar 6/14			
77-20-00	1	May 31/20			
	2	May 31/20			
	3	Sep 1/16			
	4	Sep 1/16			
	5	May 31/20			
	6	May 31/20			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 77 - ENGINE INDICATING

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	77-00-00	1
Description		1
Removal and Installation		1
<u>POWER</u>	77-10-00	1
Tachometer Indicator		1
Description		1
Troubleshooting		1
<u>TEMPERATURE</u>	77-20-00	1
Exhaust Gas Temperature (EGT) (Optional)		1
Gauge		1
Description		1
Troubleshooting		1
Removal		1
Installation		1
Probe		1
Removal		1
Installation		2
Cleaning and Inspection		2
Cylinder Head Temperature (CHT) (Optional)		5
Sensor/Probe Replacement		5
Cylinder Head Scanner		5
Cylinder Head Temperature Indicator Calibration Check		5

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

GENERAL

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

This chapter gives information on service and replacement procedures of the engine indicating system.

1. Description

NOTE: In airplanes equipped with Avidyne Entegra, engine data is collected by the Data Acquisition Unit (DAU) and is displayed on the Multi-Function Display (MFD) and Primary Flight Display (PFD). See 34-22-00, and 91-77-40.

NOTE: In airplanes equipped with Garmin G1000/G1000 NXi in 34-25-01, 34-25-02, 34-25-03 as appropriate, and 91-77-40.

These airplanes use traditional 3-inch analog engine instruments, which are electrically or mechanically actuated. These instruments and their specific functions are addressed in 77-10-00, 77-20-00, and 79-30-00.

2. Removal and Installation

See Face Mounted Instruments, 39-10-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

POWER

Tachometer Indicator

NOTE: In airplanes equipped with Avidyne Entegra, engine data is collected by the Data Acquisition Unit (DAU) and is displayed on the Multi-Function Display (MFD) and Primary Flight Display (PFD). A tachometer generator is installed on the left magneto to provide this data.

NOTE: In airplanes equipped with Garmin G1000/G1000 NXi, see 34-25-01, 34-25-02, and 34-25-03 as appropriate; and 91-77-40.

A. Description

The tachometer is connected to engine accessory by a flexible cable and provides a reading of crankshaft speed in revolutions per minute. The instrument has a mechanism for recording and displaying engine operating time. The time recorder will be accurate (i. e., records 1:00 hour in 60 minutes) at 75% power setting under standard sea level conditions.

B. Troubleshooting

See "Chart 1".

**CHART 1
TROUBLESHOOTING TACHOMETER**

Trouble	Cause	Remedy
No reading on indicator, either permanent or intermittent.	Broken shaft.	Replace instrument.
	Loose cable connections.	Tighten cable.
Pointer oscillates excessively.	Rough spot on, or sharp bend in shaft.	Repair or replace.
	Excessive friction in instrument.	Replace instrument.
Indicator changes in climb.	Excessive clearance in speed cup.	Replace instrument.
Pointer goes all the way to stop; more noticeable in cold weather.	Excessive lubricant in instrument.	Replace instrument.
Pointer jumps at idle.	Speed cup hitting rotating magnet.	Replace instrument.
Tachometer cable breaks.	Cable bent too sharply.	Reroute cable.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

TEMPERATURE

1. Exhaust Gas Temperature (EGT) (Optional)

NOTE: In airplanes equipped with Avidyne Entegra, engine data is collected by the Data Acquisition Unit (DAU) and is displayed on the Multi-Function Display (MFD) and Primary Flight Display (PFD). See 34-22-00 and 91-77-40.

NOTE: In airplanes equipped with Garmin G1000/G1000 NXi, see 34-25-01, 34-25-02, and 34-25-03 as appropriate; and 91-77-40.

A. Gauge

(1) Description

This instrument aids the pilot in selecting an economical fuel-air mixture for cruising flight at a power setting of 75 percent or less, and to adjust mixture setting at altitudes above 5,000 feet. It monitors the temperature of exhaust gases leaving the engine cylinders. The gauge is adjustable. If found defective after checking with troubleshooting chart, it must be replaced. If leads to gauge are defective, they must be replaced. Because the resistance of the electrical leads is critical for proper gauge operation, they must be replaced with the same type and length of wire.

(2) Troubleshooting

See "Chart 1".

(3) Removal

- (a) Disconnect wires from EGT gauge at instrument panel.
- (b) Remove four bolts holding gauge to instrument panel and remove gauge.

(4) Installation

- (a) Install EGT gauge into instrument panel and secure with four bolts.
- (b) Connect thermocouple wires to rear of EGT gauge.

**CHART 1
TROUBLESHOOTING EGT GAUGE**

Trouble	Cause	Remedy
Gauge inoperative.	Defective gauge, probe, or wiring.	Check probe and lead wires for chafing, wires for chafing, breaks, or shorting between wires and metal structure.
	Adjusting potentiometer turned off scale.	Set potentiometer.
Fluctuating reading.	Loose, frayed, broken electrical leads, or faulty connections.	Clean and tighten connections. Repair or replace defective leads.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

B. Probe

(1) Removal

- (a) Remove wires from wire harness going to engine.
- (b) Loosen clamp holding EGT probe to number one cylinder exhaust manifold and remove probe.

(2) Installation

NOTE: In S/N's 2843001 thru 2843649, original equipment probe (thermocouple) P/N 481-388 is no longer available and has been replaced by P/N 481-403 for service. Piper Kit 88420-002 must be installed upon initial installation of P/N 481-403 probe (thermocouple).

- (a) Install probe into hole in number one cylinder exhaust manifold and secure with clamp. Torque per "Figure 1" and safety wire.
- (b) Route thermocouple wires with existing wire harness to instrument panel.

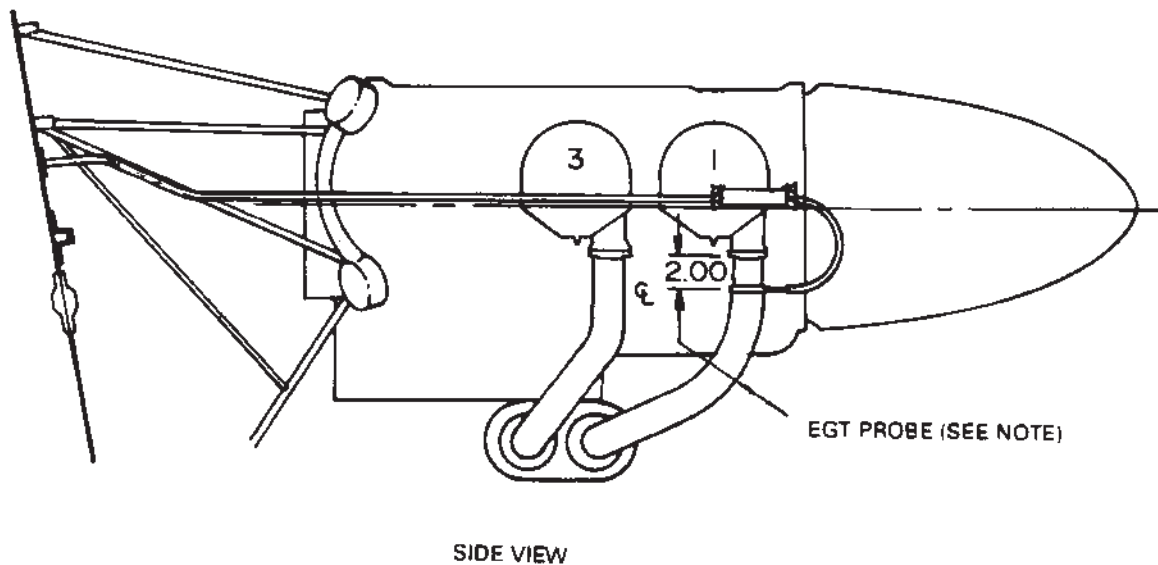
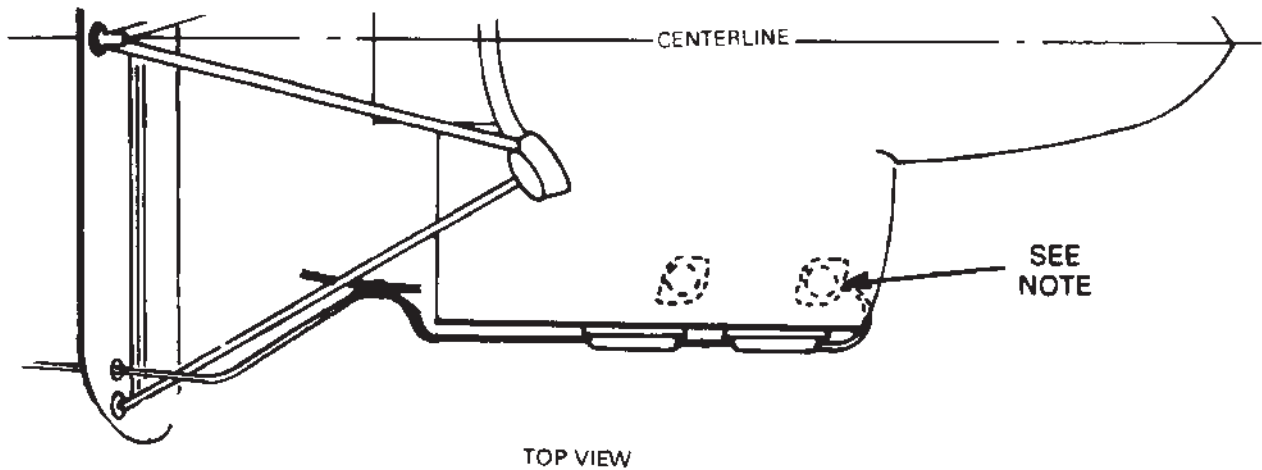
C. Cleaning and Inspection

CAUTION: DO NOT CONNECT OHMMETER ACROSS METER. IT WILL BURN OUT THE MOVEMENT OF THE METER.

Unless mechanical damage is evident, broken glass, bent or broken pointer, or broken case, the following checks should be performed before removing the instrument.

- (1) Remove probe and check for broken weld (at the tip end) or burnt off end. Measured resistance of probe should be 0.8 ohms. Clean the connections with steel wool before reassembly.
- (2) Disconnect lead wires at instrument and measure. Resistance with lead wires connected to probe should be 3.3 ohms. Clean connections with steel wool before reassembly.
- (3) With leads connected to instrument, heat probe with propane torch to dull red. The meter should read up to the fourth graduation or approximately 1500°F. Before making this check, make sure that the adjustment screw, which is located in the rear of the instrument case, is in the center of its travel. If this screw has been turned to either end of full travel, it will shut instrument off and no indication will be shown on the pointer. If meter still does not read, replace it.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



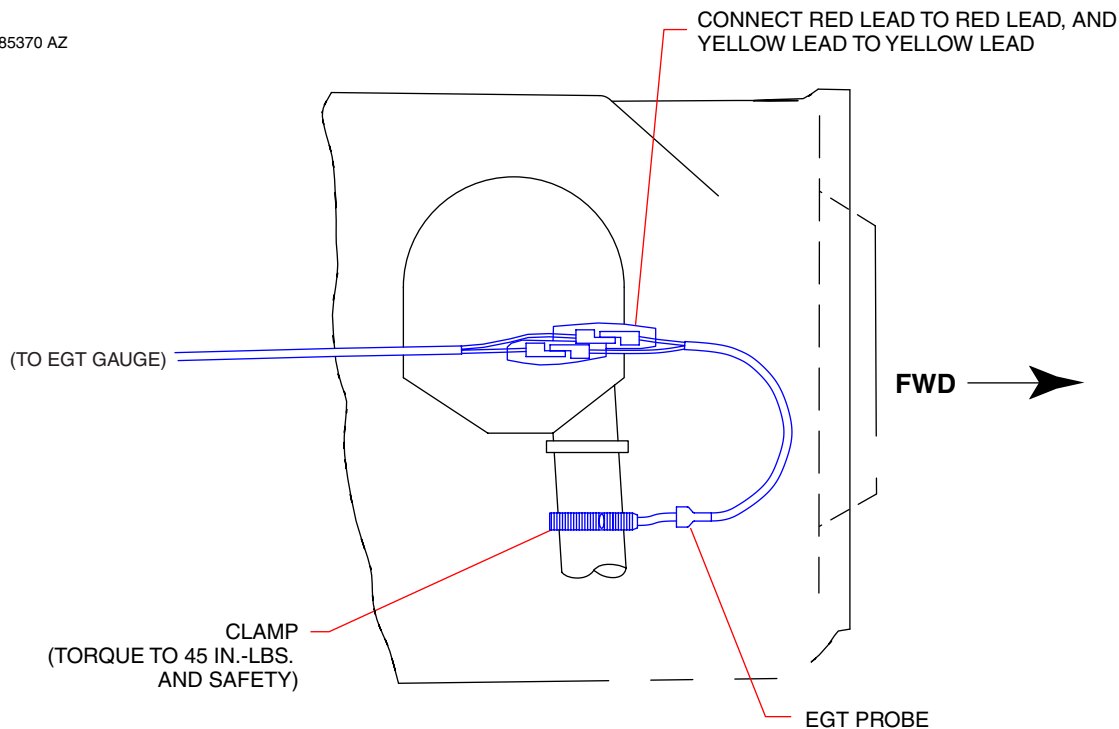
NOTE:

0.129 INCH HOLE IN NUMBER 1 CYLINDER EXHAUST MANIFOLD IN LINE WITH CENTERLINE OF ENGINE. TIGHTEN CLAMP TO 45 INCH POUNDS TORQUE AND SAFETY WIRE.

EGT Probe Installation
Figure 1 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370 AZ

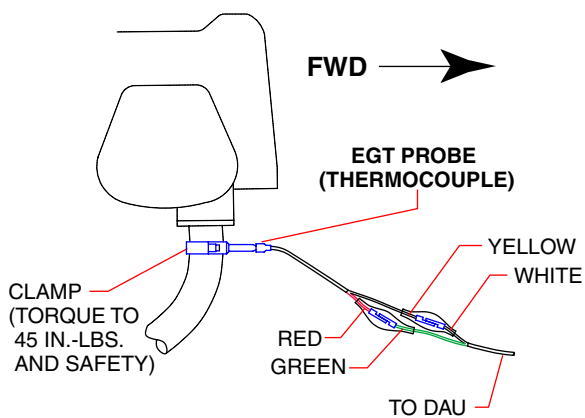


STANDARD

ENGINE COMPARTMENT
LOOKING INBOARD RH SIDE, FWD CYLINDER SHOWN

101910 B

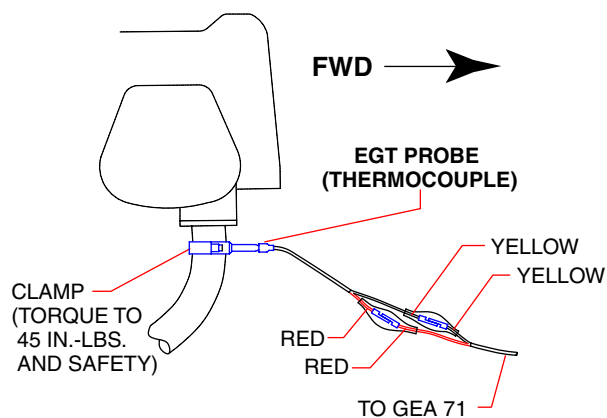
STANDARD ON CYLINDER NO. 1 AS SHOWN,
ON ALL CYLINDERS WITH EMAX OPTION.



EXHAUST GAS TEMPERATURE (EGT)
SENSOR INSTALLATION
WITH AVIDYNE INTEGRA

107570 A

ON ALL CYLINDERS



EXHAUST GAS TEMPERATURE (EGT)
SENSOR INSTALLATION
WITH GARMIN G1000

ENGINE COMPARTMENT
LOOKING INBOARD RH SIDE, FWD CYLINDER SHOWN

EGT Probe Installation
Figure 1 (Sheet 2 of 2)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Cylinder Head Temperature (CHT) (Optional)

Installed in 2881106. Available in 2881304 and up.

A. Description

CHT probes are installed in all cylinders and the temperature indication is collected by the Garmin G1000 GEA and displayed on the engine page of the MFD. Caution and Warning CAS messages will be displayed at appropriate values to provide indication to the pilot when approaching/exceeding the CHT limit. See Garmin Pilot's Guide for more information.

B. Troubleshooting

See "Chart 2".

C. Probe Replacement

See "Figure 2" on page 77206.

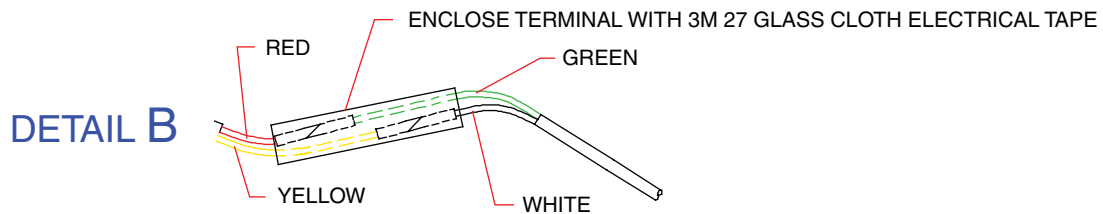
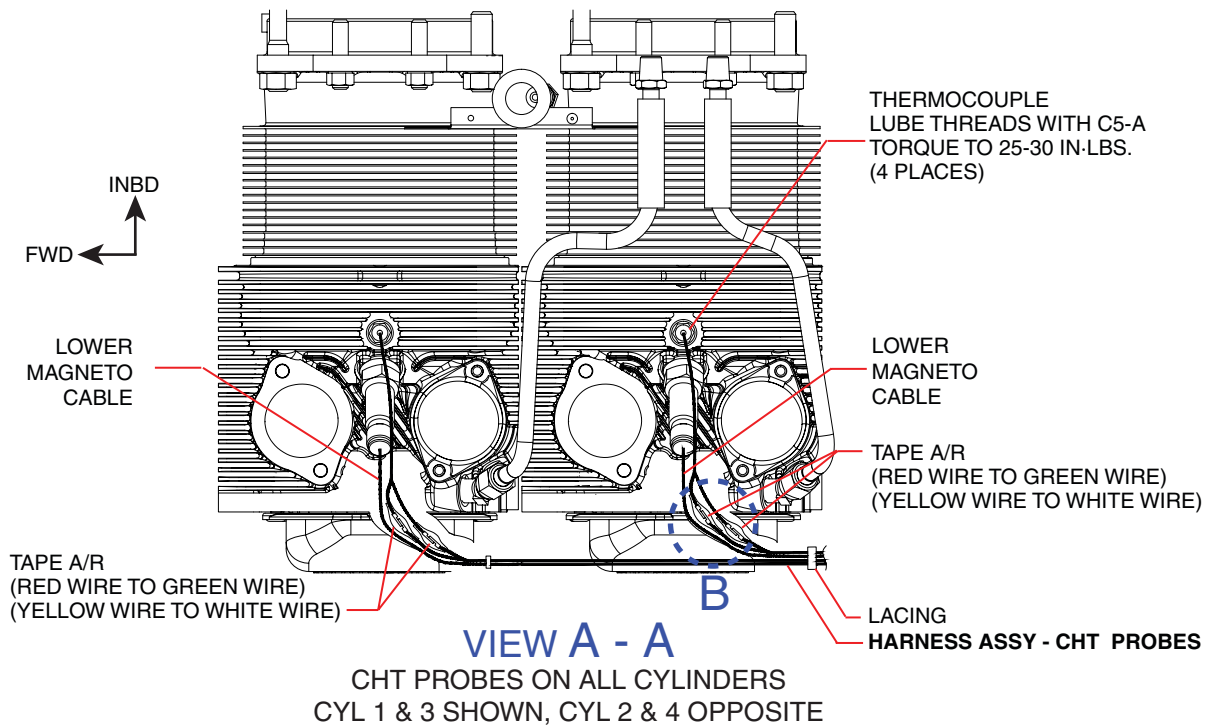
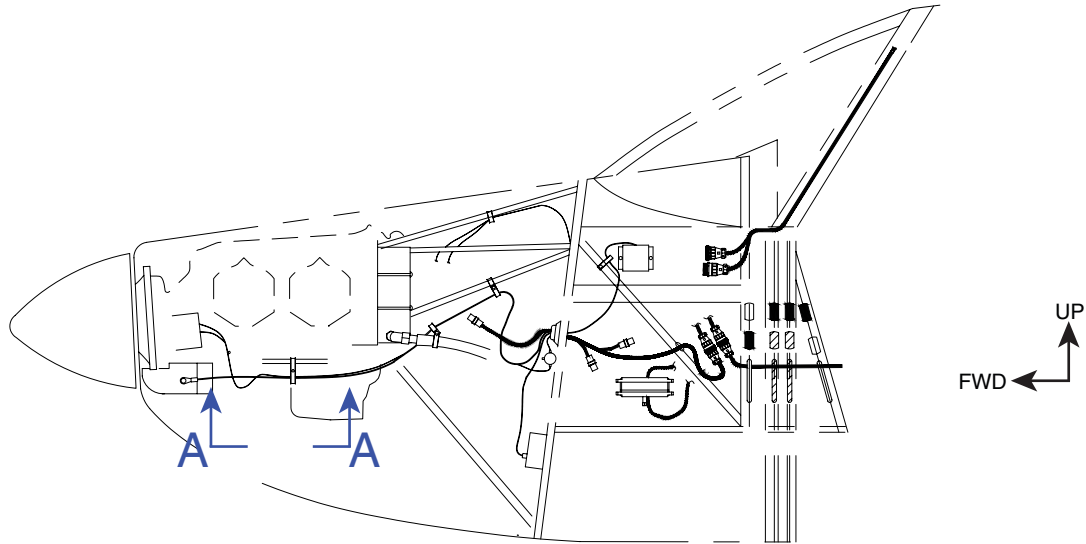
- (1) Remove the engine cowling as required (see 71-10-00) to expose the cylinder heads.
- (2) Remove the existing CHT probe mounted in the lower portion of the cylinder.
- (3) Lubricate probe threads and install a new CHT probe into the hole in the cylinder. Torque as specified in "Figure 2" on page 77206.
- (4) Run the aircraft and operationally check for a proper CHT indication.
- (5) Re-install the engine cowling.

**CHART 2
TROUBLESHOOTING CHT INDICATION**

Trouble	Cause	Remedy
No indication.	Defective GEA, MFD, probe, or wiring.	Check GEA and MFD per 34-25-03. Check probe, and lead wires chafing, breaks, or shorting between wires and metal structure.
Fluctuating reading.	Loose, frayed, broken electrical leads, or faulty connections.	Clean and tighten connections. Repair or replace defective leads.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108000 T 2 4



Cylinder Head Temperature (CHT) Installation
Figure 2

CHAPTER

78

EXHAUST

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 78

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
78-List of	1	Mar 15/20			
Effective Pages	2	Mar 6/14			
78-Table of Contents	1	Mar 15/20			
	2	Mar 6/14			
78-00-00	1	Mar 6/14			
	2	Mar 15/20			
	3	Mar 15/20			
	4	Mar 15/20			
	5	Mar 15/20			
	6	Mar 15/20			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 78 - EXHAUST

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>GENERAL</u>	78-00-00	1
Exhaust System		1
100 Hour Inspection		1
Removal		2
Installation		2
Optional Low Noise Muffler		3
100 Hour Inspection		3
300 Hour / Annual Inspection		3
Removal and Installation		5

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

GENERAL

1. Exhaust System

NOTE: Mufflers should be replaced at or before 1000 hours time-in-service.

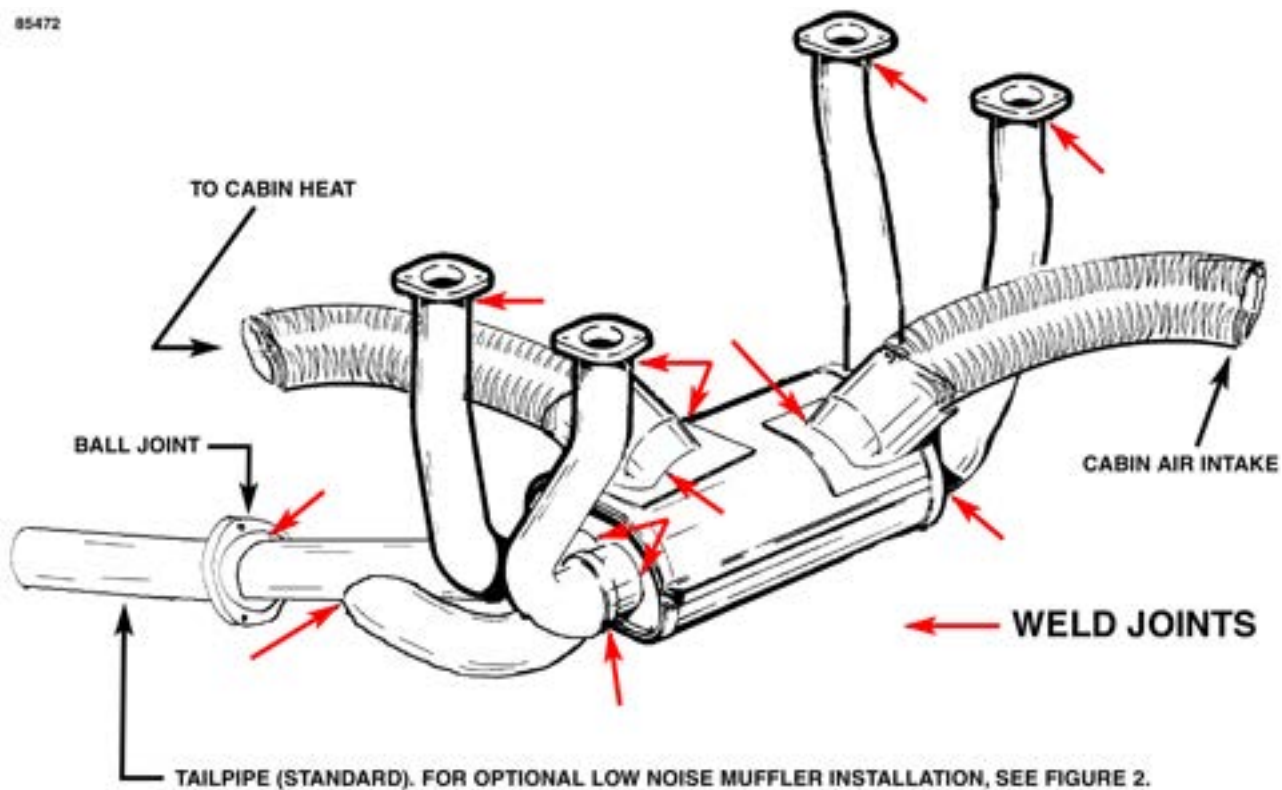
A. 100 Hour Inspection

See "Figure 1".

The entire exhaust system, including heat exchange shroud, muffler, muffler baffles, stacks, and all exhaust connections must be rigidly inspected each 100 hours. The possibility of exhaust system failure increases with time-in-service. Check more carefully as time-in-service on the installed muffler increases. The system must be checked carefully before winter operation when cabin heat is in use.

Remove (see removal and installation, below) the tail pipe and stacks for muffler baffle inspection. Remove or loosen all exhaust shields, carburetor and cabin heat muffs, shrouds, heat blankets, etc., as required for complete system inspection. Perform cleaning operations and inspect all external surfaces for dents, cracks, and missing parts.

Pay particular attention to welds, clamps, supports, support attachment lugs, slip joints, stack flanges, and gaskets. Inspect internal baffles or diffusers. Any cracks, warpage, or severe oxidation are cause for muffler replacement.



Exhaust System Inspection Points
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

If any component is inaccessible for visual inspection, do the following:

- (1) Do submerged pressure check of muffler and exhaust stack at 2 psi air pressure.
- (2) Ground test using carbon monoxide indicator by heading airplane into wind, warming engine on ground, advancing throttle to full static rpm with cabin heat valves open, and taking readings of heated airstream inside cabin at each outlet (including rear seat heat outlet, if installed). If carbon monoxide concentration exceeds 0.005 percent or if a dangerous reading is on an indicator not calibrated in percentages, muffler must be replaced.

B. Removal

CAUTION: WHEN REMOVING OR INSTALLING COUPLING CLAMP, SLIDE CLAMP OVER END OF PIPE BEFORE ASSEMBLY / DISASSEMBLY. EXCESSIVE SPREADING CAN LEAD TO PREMATURE FAILURE OF CLAMP.

- (1) Remove cowling, see 71-10-00.
- (2) Loosen clamps, disconnect, and remove intake and exhaust air duct hoses and clamps from upper shroud assembly.
- (3) Disconnect tailpipe (or low noise muffler assembly) at the ball joint by removing three (3) bolts, nuts, washers, springs, and cotter pins.
- (4) Disconnect tailpipe (or low noise muffler assembly) mounting clamp assembly from hanger strap by removing the bolt, washers, nut, and cotter pin securing clamp to hanger strap.
- (5) Remove tailpipe (or low noise muffler assembly) and clamp.
- (6) Remove EGT probe(s) from exhaust stack(s) or disconnect their electrical leads from the electrical harness.
- (7) Supporting the exhaust shroud/muffler assembly, remove two bolts and washers from each of the four exhaust stubs and then remove the shroud assembly/muffler assembly with attached exhaust stubs and gaskets from the airplane.

C. Installation

CAUTION: APPLY FEL-PRO TYPE C5-A ANTI-SEIZE LUBRICANT TO ENTIRE SLIP JOINT SURFACE TO PREVENT SLIP JOINT BINDING.

NOTE: When installing an exhaust clamp having an alignment pin be certain that the pin engages the mating holes in exhaust pipe and muffler to prevent separation of components.

- (1) Supporting the exhaust shroud/muffler assembly, with the four exhaust stubs attached, position it to align the exhaust stubs with the engine exhaust ports. Ensuring the gasket is in place atop each exhaust stub, secure the four exhaust stubs to the engine with two (ea.) bolts and washers. Torque per appropriate engine manufacturer's documentation.
- (2) Reinstall EGT probe(s) in exhaust stack(s) or reconnect their electrical leads to the electrical harness.
- (3) Position tailpipe (or low noise muffler assembly) with attached mounting clamp assembly into ball joint.
- (4) Connect tailpipe (or low noise muffler assembly) mounting clamp assembly to hanger strap with bolt, washers, nut, and cotter pin.
- (5) Connect tailpipe (or low noise muffler assembly) at the ball joint by removing three (3) bolts, nuts, washers, springs, and cotter pins.
- (6) Reattach intake and exhaust air duct hoses to upper shroud assembly. Secure with hose clamps.
- (7) Install cowling, see 71-10-00.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Optional Low Noise Muffler

Refer to "Figure 2" on page 78004.

The standard tailpipe can be replaced with a muffler as an option.

A. 100 Hour Inspection

- (1) Inspect four AN3C-3A bolts securing the two sections of the muffler together for security.
- (2) Check for cracks in exterior surfaces of the muffler.
- (3) Check bolt flange, ball joint, and associated parts for cracks, distortion and hot spots. Examine attaching hardware for security and wear.
- (4) At lower end of tailpipe, inspect two attaching brackets and associated hardware that secures the muffler to the engine mount for cracks, wear and security.
- (5) Inspect inner structure of muffler for cracks, damage or blockage by looking into the tailpipe.
- (6) Replace any cracked or damaged parts before returning to service.
- (7) Make logbook entry that inspection was accomplished and record any repairs made.

B. 300 Hour / Annual Inspection

Each 300 hours or at annual inspection, whichever comes first:

- (1) Remove muffler as described for tailpipe in "B. Removal" on page 78002.
- (2) Disassemble muffler and inspect as follows:
 - (a) Remove four bolts and washers from body of muffler.

CAUTION: WHEN REMOVING THE TAILPIPE/TUBE ASSEMBLY, THE INSULATION TENDS TO CATCH AND TEAR ON THE NUTPLATES. EXTRA CARE IS REQUIRED TO AVOID DAMAGING THE INSULATION.

- (b) Pull the inner tube/tailpipe assembly out of muffler by holding the ball joint and pulling on the tailpipe. (Use care to prevent damage to insulation.)
 - (c) Examine the insulation matting for broken fibers, especially around the holes in the perforated tube. If 50% or more of the fibers are broken, replace the insulation as described below.

NOTE: Inspecting the insulation through the holes is usually sufficient to determine the condition of the insulation matting. If, however, the area of the matting exposed seems insufficient to determine overall condition of the matting, the matting must be removed for inspection.

- (3) Inspect all parts of muffler for cracks, erosion, distortion, warpage, hot spots and loose components. Check threads of nutplates for proper locking action. If bolts can be screwed in by hand, replace nutplates with like parts as these are special high temperature nutplates.
- (4) If insulation has to be replaced, proceed as follows:
 - (a) Remove old insulation from outer surface of inner tube.
 - (b) Determine size of new insulation and cut accordingly.
 - (c) Wrap two layers of Durablanket "S" 4 lb. (P/N 691-600) insulation tightly around outer surface of inner tube.
 - (d) Wrap one layer of Durablanket "S" 6 lb. (P/N 691-601) on top of first two layers.

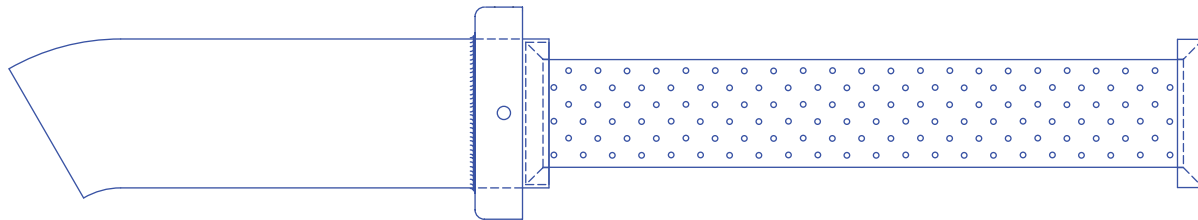
NOTE: For ease of installation, masking tape may be used to secure each layer of insulation (i.e. - Durablanket). If so, use masking tape sparingly.

- (e) Assemble muffler per following steps.

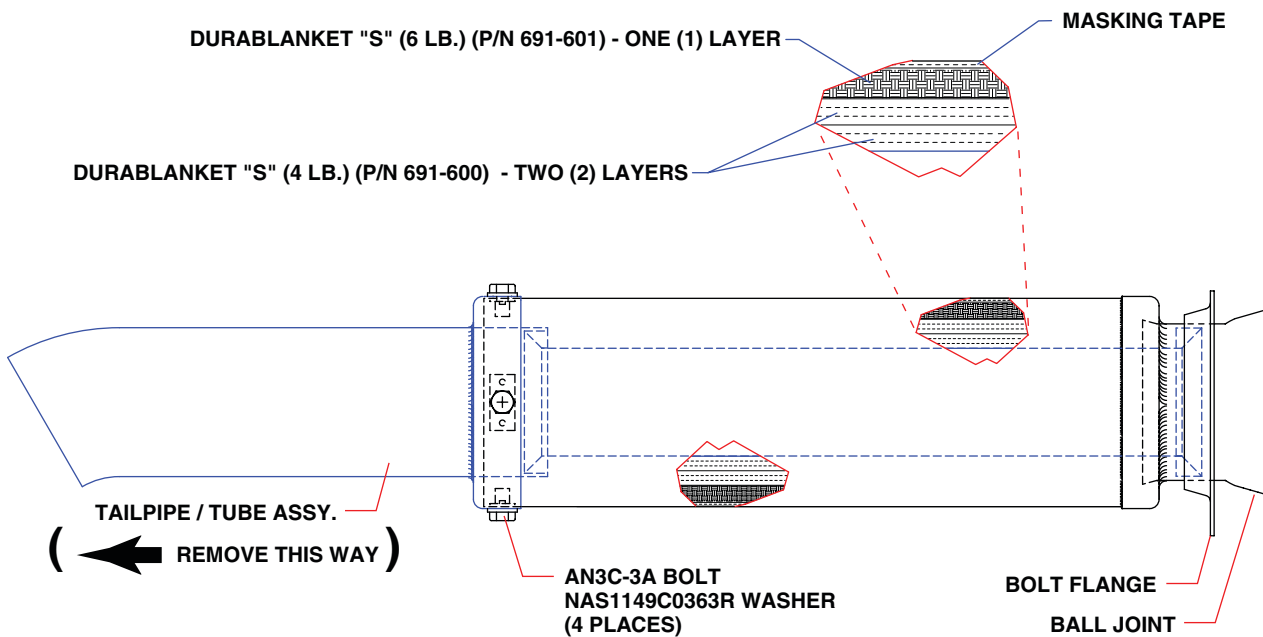
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (5) If all parts are serviceable and insulation is ok or has been replaced, assemble muffler by sliding inner tube into outer tube. (Care must be taken to prevent the insulation from snagging on outer housing and being pulled from inner tube.)
- (6) Install four bolts and washers removed during disassembly. Torque bolts to 38–43 in.-lbs plus drag friction.
- (7) Reinstall muffler to exhaust shroud / muffler assembly as described for tailpipe in "C. Installation" on page 78002.
- (8) Make logbook entry that inspection was accomplished and record any repairs made.

104628 B



**TAILPIPE / TUBE ASSY.
(REMOVED FROM MUFFLER AND FIBERGLASS INSULATION REMOVED)**



**Optional Low Noise Muffler
Figure 2**

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. Removal and Installation

- (1) Remove muffler as described for tailpipe in "B. Removal" on page 78002.
- (2) Reinstall muffler to exhaust shroud / muffler assembly as described for tailpipe in "C. Installation" on page 78002.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

79

OIL

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 79

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
79-List of Effective Pages	1	May 31/20			
	2	Mar 6/14			
79-Table of Contents	1	May 31/20			
	2	Mar 6/14			
79-20-00	1	May 31/20			
	2	May 31/20			
	3	May 31/20			
	4	May 31/20			
	5	May 31/20			
	6	May 31/20			
	7	May 31/20			
	8	May 15/19			
79-30-00	1	May 15/19			
	2	May 15/19			
	3	Nov 15/17			
	4	Nov 15/17			
	5	Nov 15/17			
	6	Nov 15/17			
	7	Nov 15/17			
	8	Nov 15/17			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 79 - OIL

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>DISTRIBUTION</u>	79-20-00	1
Standard (Upper) Oil Cooler		1
Removal		1
Installation		1
Oil Cooler Replacement		3
Optional (Lower) Oil Cooler		4
Removal		4
Installation		4
 <u>INDICATING</u>	 79-30-00	 1
Oil Pressure		1
Gauges		1
Description		1
Troubleshooting		2
Sender		2
Removal		2
Installation		2
Testing		2
Switch		6
Removal		6
Installation		6
Oil Temperature		7
Indicator		7
Description		7
Troubleshooting		7
Sensor		7
Removal		7
Installation		7

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

DISTRIBUTION

1. Standard (Upper) Oil Cooler

The standard (upper) oil cooler is located at the upper left rear of the engine baffling. See "Figure 1" on page 79202.

A. Removal

- (1) Remove engine cowling per Removal in 71-10-00.
- (2) If desired, drain oil from the engine per Oil System, Oil Sump, Draining in 12-10-00.

CAUTION: DO NOT APPLY EXCESSIVE TORQUE TO OIL COOLER FITTINGS WHEN REMOVING OIL HOSES. USE A BACKUP WRENCH.

- (3) Using a backup wrench, disconnect and cap oil hoses in the following order:

NOTE: Be prepared to catch residual oil from the hoses and oil cooler.

- (a) Oil cooler outlet (top fitting).
 - (b) Oil cooler inlet (bottom fitting).
- (4) Remove the nuts (4 ea.), washers (16 ea.), tubes (4 ea.), and bolts (4 ea.), that secure the oil cooler to the engine baffle.
- (5) Remove the oil cooler.

B. Installation

NOTE: If replacing the oil cooler and the new oil cooler did not come with elbow fittings installed, see "Oil Cooler Replacement" on page 79203.

- (1) Visually inspect oil cooler and oil hoses prior to installation. Look for evidence of defects, damage, distortion, and check that they are free of foreign materials such as dirt, sand, metal chips, etc. Verify the fittings are free of galling, nicks, and scratches on the threads.
- (2) Position the oil cooler in place at the engine baffle ensuring inlet and outlet ports are outboard. Secure with bolts (4 ea.), washers (16 ea.), tubes (4 ea.), and nuts (4 ea.) as shown in "Figure 1" on page 79202.

CAUTION: DO NOT ALLOW SEALANT TO ENTER THE SYSTEM.

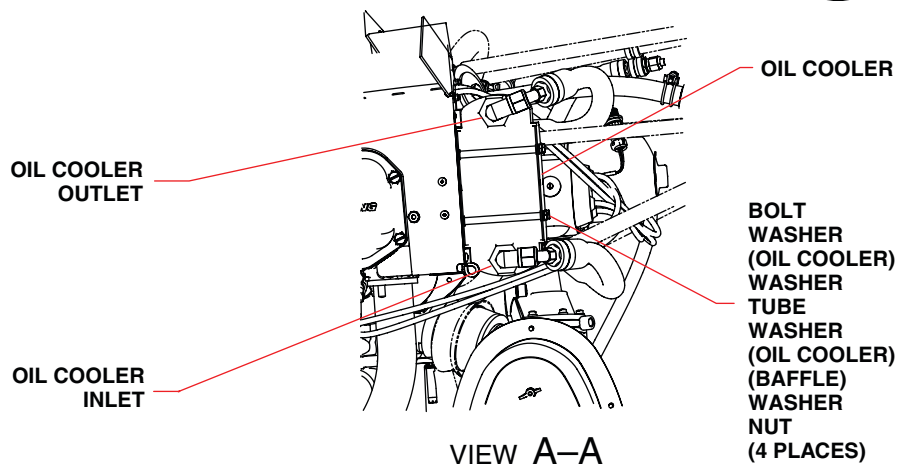
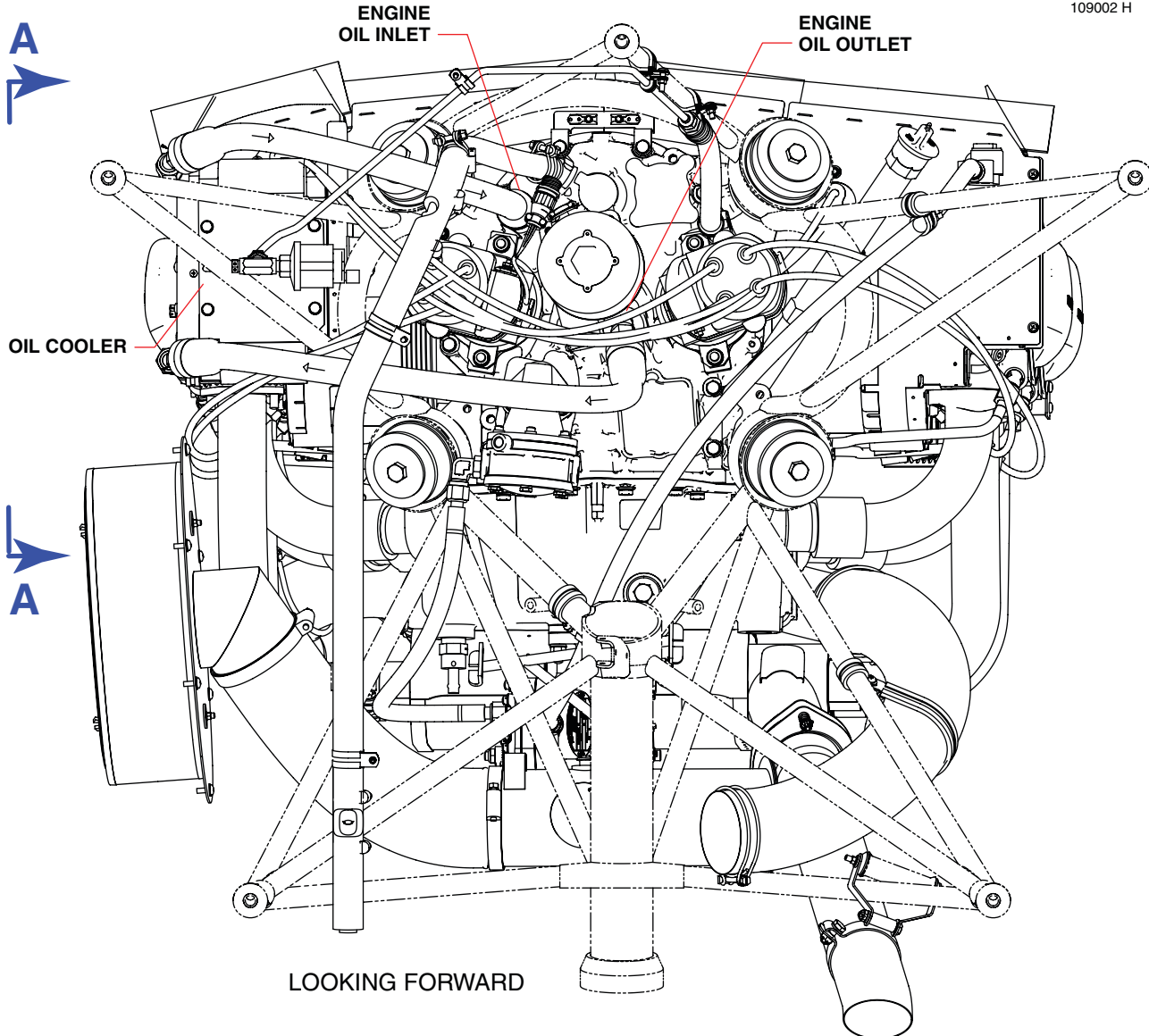
- (3) Apply Lubon 404EU Lubricant and Sealant to the male threads on the oil cooler elbow fittings.
- (4) Uncap and attach oil hoses to oil cooler fittings as follows:
 - (a) Engine oil supply (outlet) hose to upper oil cooler inlet (bottom) fitting. Tighten hand-tight adjusting the 45° hose end to clock the hose 15° +0°/-2° down.
 - (b) Engine oil return (inlet) hose (or, if lower oil cooler option installed, hose from lower oil cooler inlet (top) fitting) to upper oil cooler outlet (top) fitting. Tighten hand-tight adjusting the 45° hose end to clock the hose 18° ±2° up.

CAUTION: DO NOT APPLY EXCESSIVE TORQUE TO OIL COOLER FITTINGS WHEN INSTALLING OIL HOSES. USE A BACKUP WRENCH.

- (5) Using a backup wrench, tighten the fittings to the torque shown in 91-10-00, Chart 1.
- (6) If the engine was previously drained of oil, fill the engine per Oil System, Oil Sump, Filling in 12-10-00.
- (7) Perform an engine operational check. Refer to correct engine manufacturer's operator's manual.
- (8) After operational check, check for oil leaks.
- (9) Reinstall engine cowling per Installation in 71-10-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

109002 H



Standard (Upper) Oil Cooler Installation
Figure 1

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

2. Oil Cooler Replacement

Replacement oil coolers for the upper installation are available with and without elbow pipe fittings installed. Replacement oil coolers for the optional lower installation are not available with the reducers and straight pipe fittings installed.

- A. Remove shipping plugs from the oil cooler's inlet and outlet ports.

CAUTION: DO NOT APPLY SEALANT TO THE FIRST TWO THREADS OR ALLOW SEALANT TO ENTER SYSTEM.

- B. Apply Loctite No. 567 PST Sealant to the male pipe thread fittings on the elbow fittings or reducer fittings to be installed. Do not apply to the first two threads or allow sealant to enter system.

CAUTION: DO NOT APPLY EXCESSIVE TORQUE TO OIL COOLER WHEN INSTALLING PIPE FITTINGS. USE A BACKUP WRENCH ON THE OIL COOLER FITTING BOSS WITH A SCISSORS MOTION, SO NO LOAD IS TRANSMITTED TO OIL COOLER.

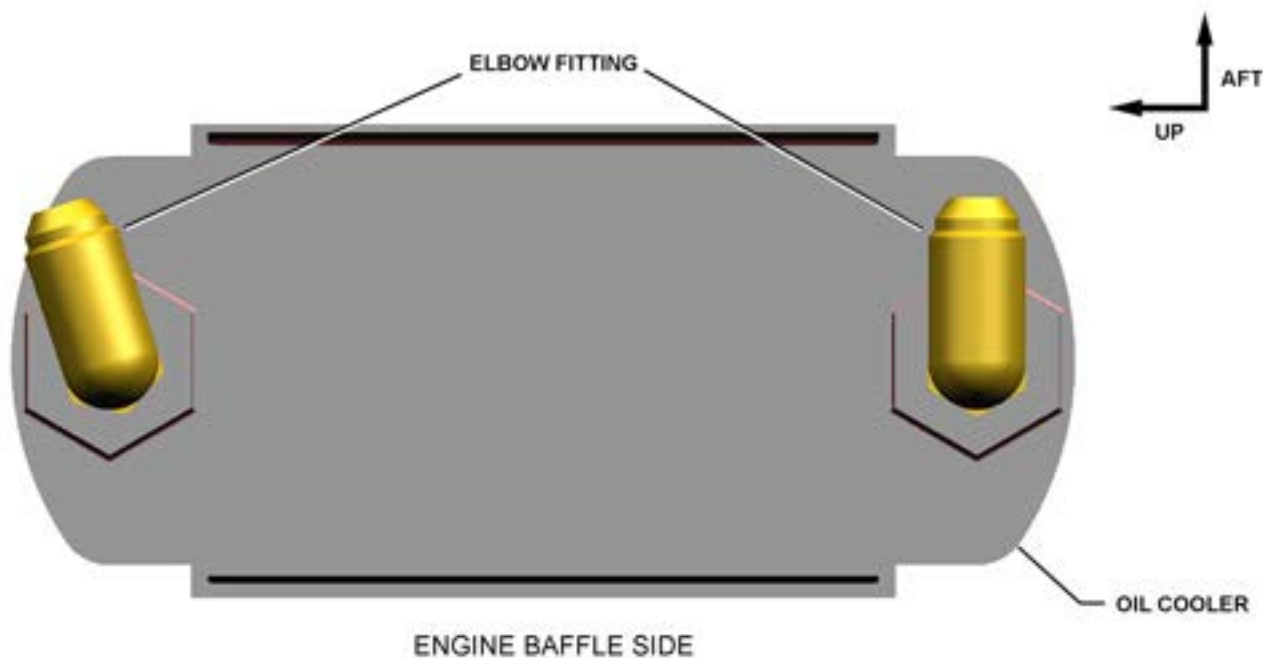
- C. Install elbow fittings or reducer fittings into oil cooler only far enough to seal with sealing compound or O-ring (if present).

- D. For upper oil cooler installation only:

- (1) Clock elbow pipe fittings on upper oil cooler as shown in "Figure 2".
- (2) If an elbow fitting cannot be positioned correctly using a torque of 10–15 ft·lb, another fitting must be used.

- E. For optional lower oil cooler installation only:

- (1) Apply Loctite No. 567 PST Sealant to the male pipe thread fittings on the straight pipe fittings to be installed. Do not apply to the first two threads or allow sealant to enter system.
- (2) Install straight pipe fittings into reducers only far enough to seal with sealing compound.



Clocking Upper Oil Cooler Elbow Fittings
Figure 2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

3. Optional (Lower) Oil Cooler

Installed in [S/N](#) 2881106. Available in 2020 and up.

When installed, the lower oil cooler is connected in series with the upper oil cooler to provide additional cooling for airplanes routinely operating in extreme conditions. It is mounted to a bracket assembly on the lower right front of the firewall and receives airflow from a dedicated NACA duct in the lower cowling. See "Figure 3" on page 79205.

A. Removal

- (1) Remove upper engine cowling per Removal in 71-10-00.
- (2) Remove the fresh air inlet hose from the air duct.
- (3) If desired, drain the oil from the engine per Oil System, Oil Sump, Draining in 12-10-00.

CAUTION: DO NOT APPLY EXCESSIVE TORQUE TO OIL COOLER FITTINGS WHEN REMOVING OIL HOSES. USE A BACKUP WRENCH.

- (4) Using a back-up wrench, disconnect and cap oil hoses from the oil cooler in the following order:

NOTE: Be prepared to catch residual oil from the hoses and oil cooler.

- (a) Outlet (bottom fitting). Let hose and oil cooler drain for a while.
- (b) Inlet (top fitting).
- (5) Remove the bolts (4 ea.), washers (12 ea.), and tubes (4 ea.) that secure the oil cooler and air duct.
- (6) Remove the air duct from the oil cooler.
- (7) Remove the lower oil cooler from the bracket assembly.

B. Installation

NOTE: If replacing the oil cooler, see "Oil Cooler Replacement" on page 79203.

- (1) Visually inspect the oil cooler, air duct, duct hose, and oil hoses prior to installation. Look for evidence of defects, damage, distortion, and ensure that they are free of foreign materials such as dirt, sand, metal chips, etc. Verify the fittings installed on the cooler are free of galling, nicks, and scratches on the threads.
- (2) Position the lower oil cooler in place on the bracket assembly ensuring the inlet and outlet ports are inboard. Position the air duct in place on the oil cooler and secure with bolts (4 ea.), washers (12 ea.), and tubes (4 ea.) as shown in "Figure 3" on page 79205.

CAUTION: DO NOT ALLOW SEALANT TO ENTER THE SYSTEM.

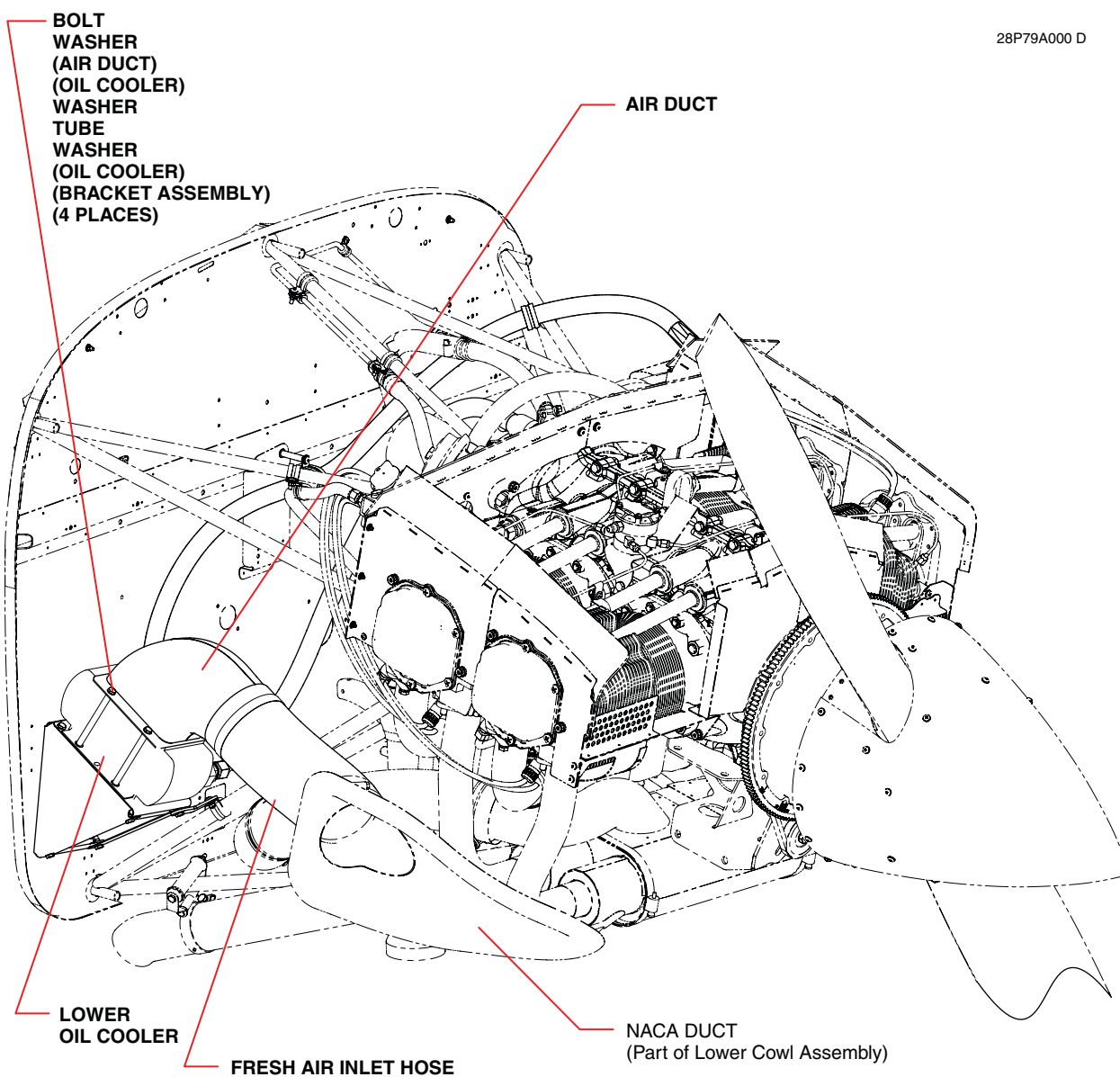
- (3) Apply Lubon 404EU Lubricant and Sealant to the male threads on the oil cooler fittings.
- (4) Uncap and attach oil hoses to oil cooler fittings as follows:
 - (a) Lower oil cooler outlet (bottom) fitting to engine oil return inlet (above oil filter) hose.
 - (b) Lower oil cooler inlet (top) fitting to upper oil cooler outlet (top) fitting hose.

CAUTION: DO NOT APPLY EXCESSIVE TORQUE TO OIL COOLER FITTINGS WHEN INSTALLING OIL HOSES. USE A BACKUP WRENCH.

- (5) Using a backup wrench, tighten the fittings to the torque shown in 91-10-00, Chart 1.
- (6) If engine was previously drained of oil, fill engine per Oil System, Oil Sump, Filling in 12-10-00.
- (7) Perform an engine operational check. Refer to correct engine manufacturer's operator's manual.
- (8) After operational check, check for oil leaks.
- (9) Reinstall upper engine cowling per Installation in 71-10-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

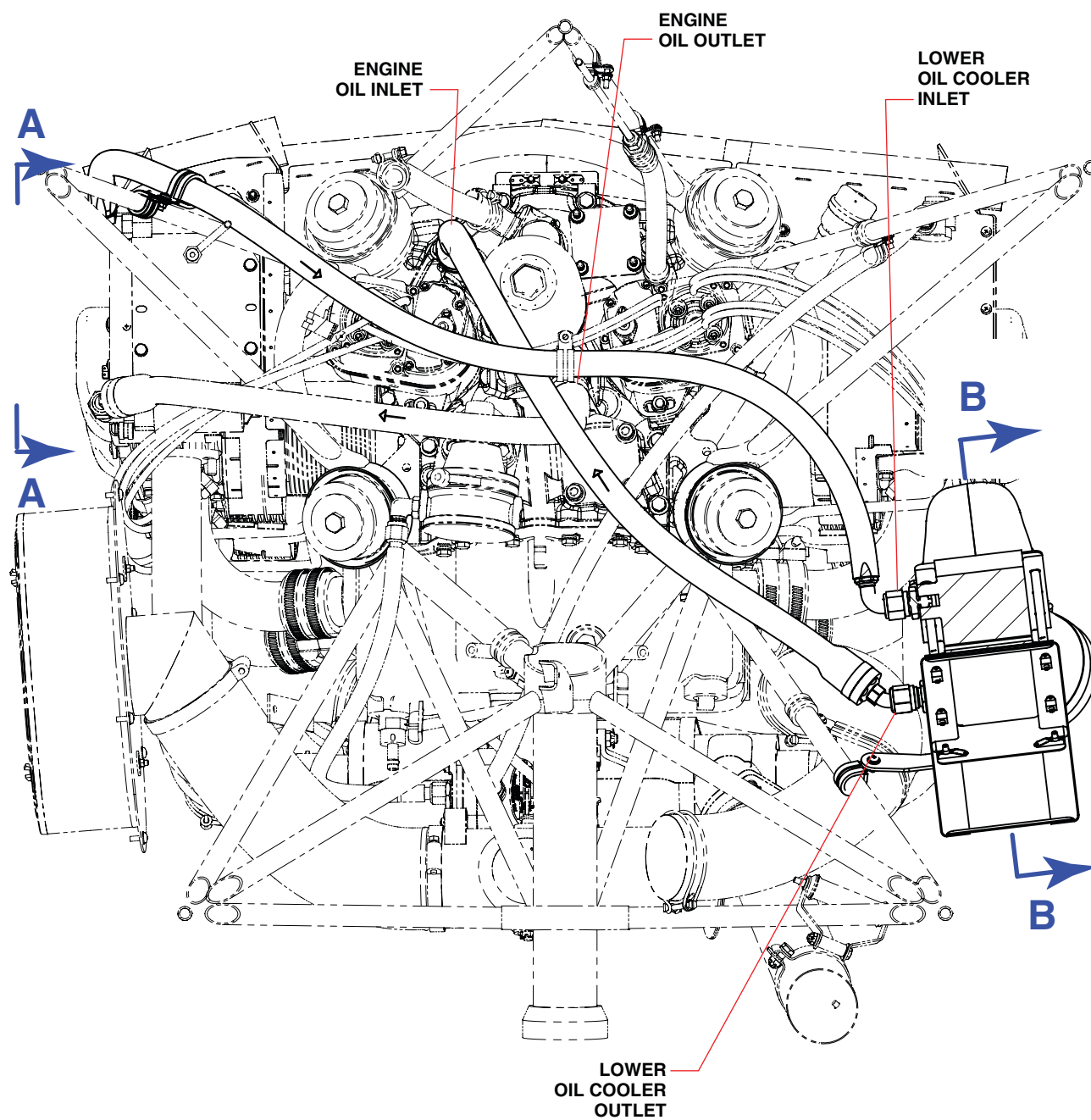
28P79A000 D



COWLING REMOVED FOR CLARITY

Optional (Lower) Oil Cooler Installation
Figure 3 (Sheet 1 of 3)

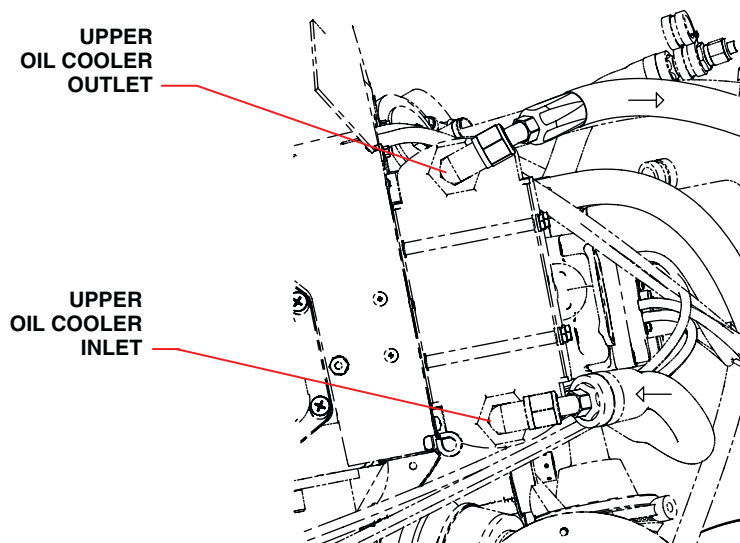
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



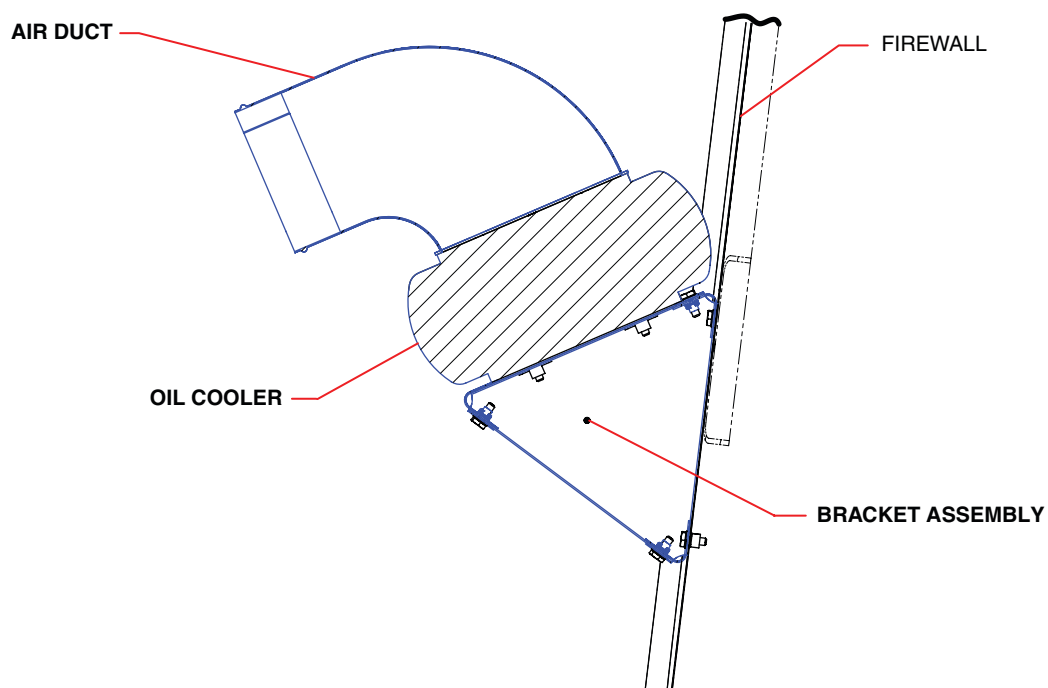
LOOKING FWD FROM FIREWALL
(SOME COMPONENTS HIDDEN FOR CLAIRTY)

Optional (Lower) Oil Cooler Installation
Figure 3 (Sheet 2 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



VIEW A-A



SECTION B-B
(SOME COMPONENTS HIDDEN FOR CLARITY)

Optional (Lower) Oil Cooler Installation
Figure 3 (Sheet 3 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

INDICATING

NOTE: In aircraft equipped with Avidyne Entegra, engine data is collected by the Data Acquisition Unit (DAU) and is displayed on the Multifunction Display (MFD) and Primary Flight Display (PFD). See 34-22-00 and 91-77-40. Oil pressure annunciation does not change.

NOTE: In airplanes equipped with Garmin G1000/G1000 NXi, engine data is fed to the GEA and displayed on the MFD or PFD. See 34-25-01, 34-25-02, or 34-25-03, as appropriate, and 91-77-40.

1. Oil Pressure

Oil pressure data is provided by one sender mounted on the firewall. The sender is fed through a hose from a pressurized engine oil port. In Standard and G500-equipped airplanes the sender feeds to the oil pressure gauge and the annunciator in the instrument panel. For airplanes equipped with Avidyne Entegra or Garmin G1000/G1000 NXi, see Notes above.

A. Gauges

(1) Description

In Standard or Garmin G500 equipped planes, oil pressure and temperature are displayed in the 3-IN-1 (i.e., Triple Gauge) Engine Instrument Gauge. In S/N's 2843001 thru 2843823 the triple gauge is electro-mechanical. In S/N's 2843824 and up the triple gauge is digital.

The 3-IN-1 gauge is face mounted (see 39-10-00 for removal and replacement) and consists of the fuel pressure gauge, the oil temperature gauge, and the oil pressure gauge, mounted in a common circular instrument head. Since the instruments are inseparable, if any one becomes defective, necessitating replacement, it will require replacing the entire 3-IN-1 instrument.

Oil pressure is sensed by a sender installed to a union tee. An oil pressure switch, that controls the oil pressure (OIL PRESS) annunciator and the hour meter, is attached to the opposite end of the union tee. There are three wires leading from the switch to an electrical connector. When the engine is not running, the switch closes the circuit to the annunciator light and opens the circuit to the hour meter. As soon as the engine starts, and the pressure sensor senses oil pressure, it throws the oil pressure switch, which activates the hour meter and turns the OIL PRESS annunciator light OFF.

**CHART 1
TROUBLESHOOTING OIL PRESSURE GAUGE**

Trouble	Cause	Remedy
Excessive error at zero.	Pointer loose on shaft.	Replace instrument.
Excessive scale error.	Improper calibration adjustment.	Replace instrument.
Excessive pointer oscillation.	Air in line or rough engine relief.	Disconnect line and fill with light oil. Check for leaks. If trouble persists, clean and adjust relief valve.
	Bad oil pressure sender.	Replace sender.
	Bad instrument.	Replace instrument
Sluggish operation of pointer or pressure fails to build up.	Loss of oil pressure.	Immediately shut down (stop) engine.
	Engine relief valve open.	Clean and check valve.
	Bad oil pressure sender.	Replace sender.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

(2) Troubleshooting

See "Chart 1" on page 79301.

B. Sender

In S/N's 2843001 thru 2843822, with Standard, Avidyne Entegra, or Garmin G500, the oil pressure sender is mounted to the firewall, under the pilot's (left) instrument panel.

In S/N's 2843701, 2843703 and up, with Garmin G1000/G1000 NXi, the oil pressure sender is also mounted to the firewall, under the pilot's (left) instrument panel.

In S/N's 2843824 and up, with Standard or Garmin G500, the oil pressure sender is mounted on the upper right engine mount tube.

See "Figure 1" on page 79303.

(1) Removal

- (a) Disconnect the negative battery cable.
- (b) Disconnect the electrical leads from the sender.
- (c) Using a back up wrench on the union tee, remove oil pressure sender.

NOTE: There will be some residual oil in the line leading to the sender and switch. Provide a means to catch any spillage that may occur when sender is removed.

(2) Installation

- (a) Install sender to union tee and finger tighten.
- (b) Using a back up wrench on union tee, tighten sender to tee.
- (c) Connect electrical leads to sender.
- (d) Perform resistivity check between sender's body and aircraft ground, resistance should be less than .003 ohms.
- (e) Connect the negative battery cable.
- (f) Perform operational check.

(3) Testing

- (a) Standard, Avidyne Entegra, Garmin G500, or Garmin G1000 equipped airplanes with Transducers P/N 548-729

These oil pressure transducers work on the relationship of pressure to resistance. As the pressure increases so does the resistance which drives the position of the needle of the oil pressure gauge/display. To test these oil pressure transducers proceed as follows:

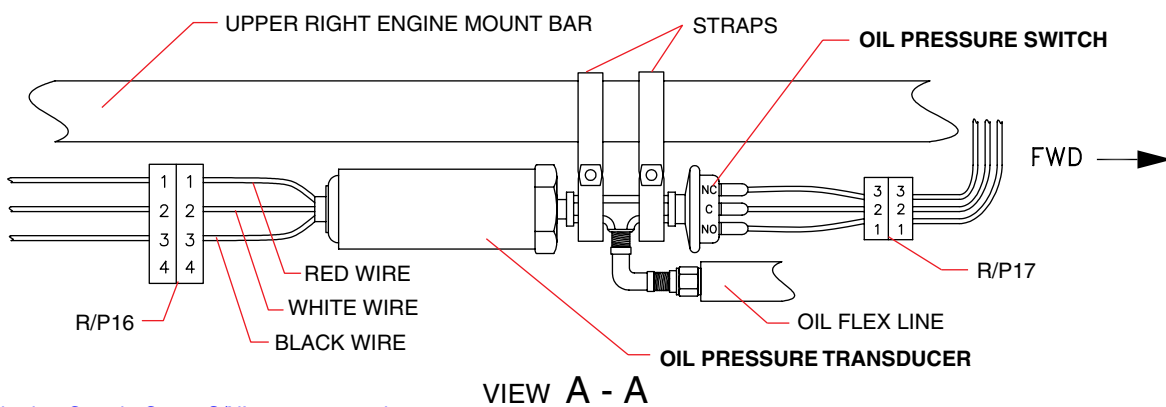
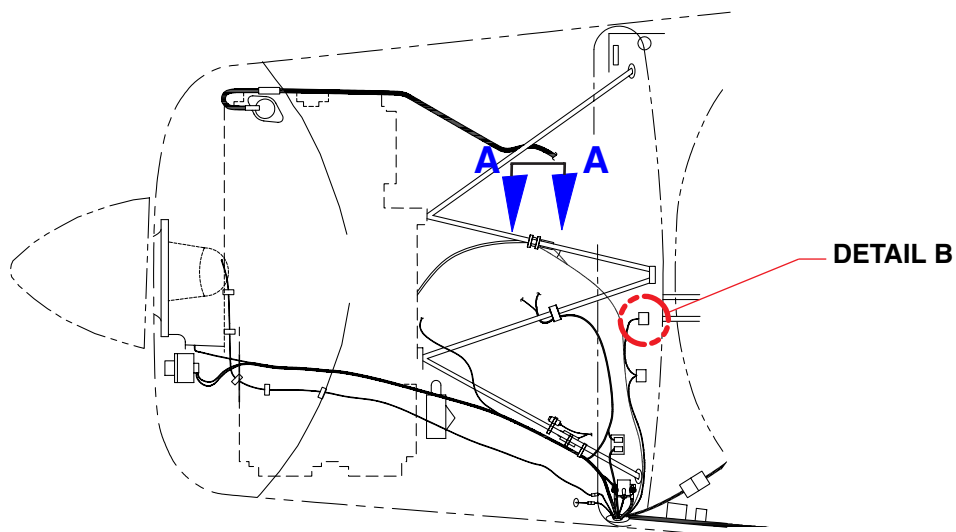
- 1) Connect a calibrated pressure source to the pressure port.
- 2) Attach ohmmeter leads to one pole extending from sender and one to sender itself.
- 3) Raise and lower pressure to transducer and verify resistance values are within tolerances in "Chart 2".

**CHART 2
OIL PRESSURE TRANSDUCER (P/N 548-729) TEST SPECIFICATIONS**

Pressure (Psig)	Resistance (Ohms)	Tolerance (Ohms)
0	10	± 3
25	46	± 5
60	90	± 5
90	126	± 6

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370

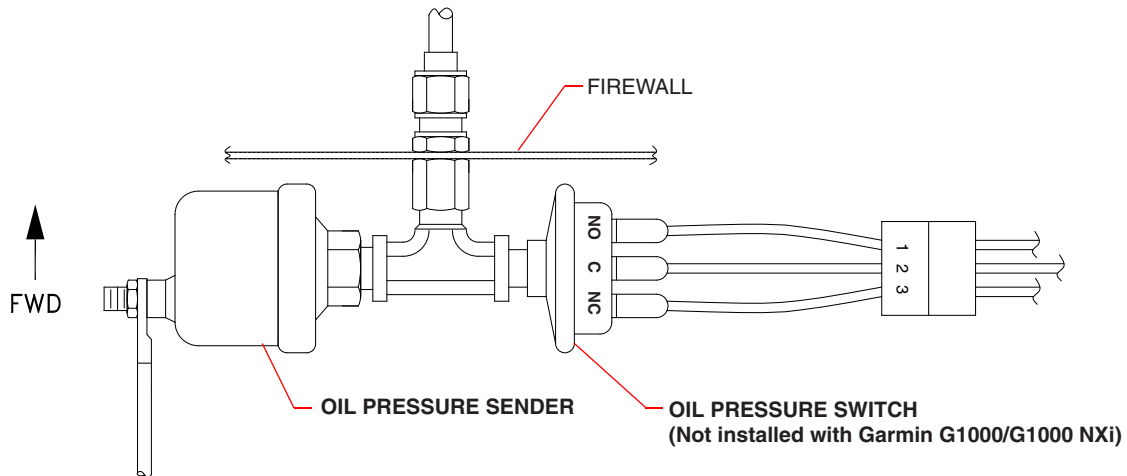


Standard or Garmin G500, S/N's 2843824 and up

Oil Pressure Sender and Switch
Figure 1 (Sheet 1 of 2)

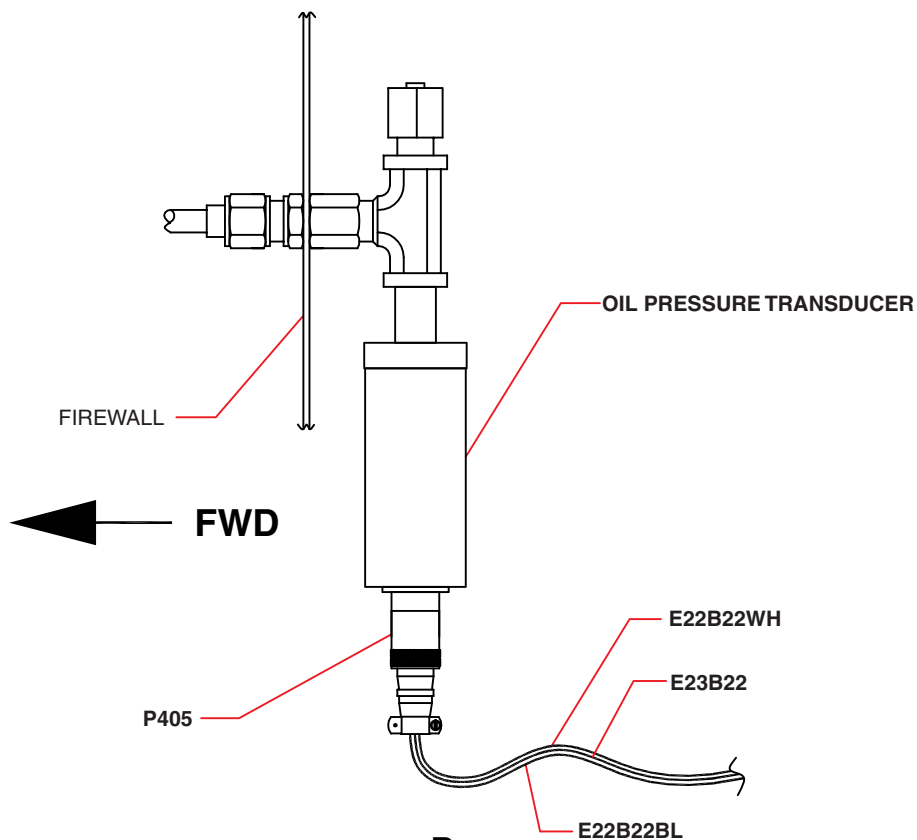
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370
108000 L



DETAIL B
LOOKING UP

Standard, Avidyne Entegra or Garmin G500, S/N's 2843001 thru 2843822;
Garmin G1000/G1000 NXi S/N's 2843701, 2843703-2843880



DETAIL B
LOOKING OUTBOARD

Garmin G1000 NXi S/N's 2843881 and up

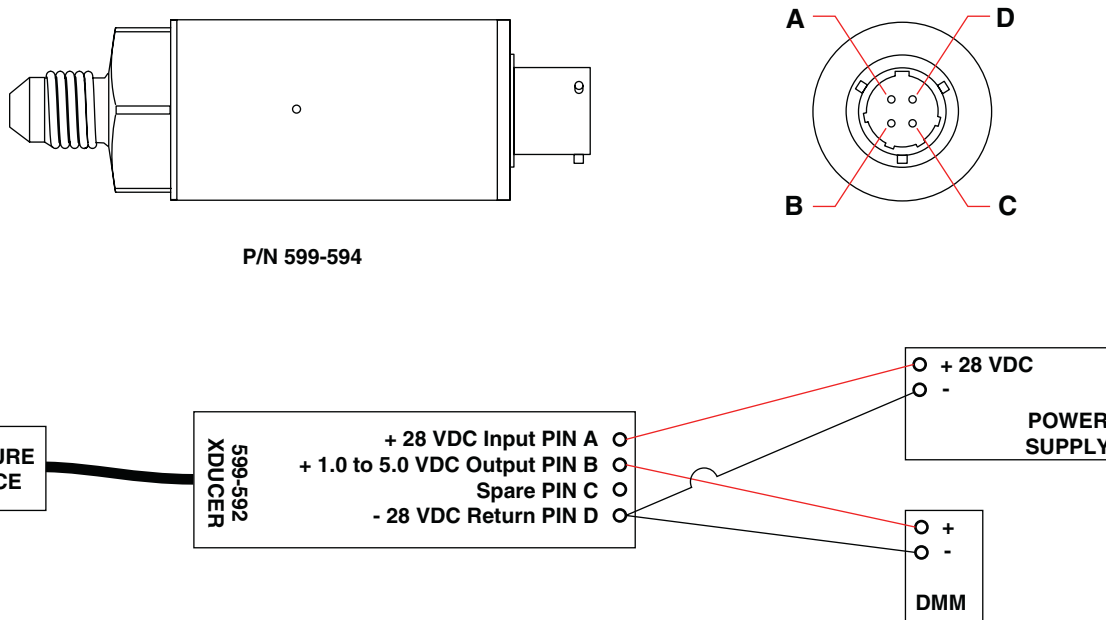
Oil Pressure Sender and Switch
Figure 1 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

(b) [Garmin G1000 NXi equipped airplanes with Transducer P/N 599-594](#)

These oil pressure transducers work on the relationship of pressure to voltage. As the pressure increases so does the voltage output which in turn is processed into the oil pressure display. To test these oil pressure transducers proceed as follows:

- 1) Remove the transducer per "Removal" on page 79302.
- 2) Using a calibrated regulated pressure source and a 28 VDC power source, setup the transducer for testing as shown in "Figure 2".
- 3) Slowly applying regulated pressure, record the voltage shown on the digital multimeter (DMM) at each stage as shown in "Chart 3" on page 79306, until a maximum pressure of 150 PSI is reached.
- 4) Then, slowly decrease the regulated pressure and, again, record the voltage shown on the digital multimeter (DMM) at each stage as shown in "Chart 3" until zero (0) PSI is achieved.
- 5) The transducer is good if it meets the specifications shown in "Chart 3". Any other result is cause for transducer replacement.
- 6) Install the transducer per "Installation" on page 79302.



Oil Pressure Transducer P/N 599-594 Test Setup
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 3
OIL PRESSURE TRANSDUCER (P/N 599-594) TEST SPECIFICATIONS

Pressure (Psig)	Output (Vdc)	Tolerance (Vdc)
0	1.0	± 2%
30	1.8	± 2%
60	2.6	± 2%
90	3.4	± 2%
120	4.2	± 2%
150	5.0	± 2%
120	4.2	± 2%
90	3.4	± 2%
60	2.6	± 2%
30	1.8	± 2%
0	1.0	± 2%

C. Switch

In S/N's 2843001 thru 2843822, with Standard, Avidyne Entegra, or Garmin G500, the oil pressure switch is mounted to the firewall, under the pilot's (left) instrument panel.

In S/N's 2843824 and up, with Standard or Garmin G500, the oil pressure switch is mounted on the upper right engine mount tube.

No switch is used with the Garmin G1000/G1000 NXi.

See "Figure 1" on page 79303.

(1) Removal

- Disconnect the negative battery cable.
- Disconnect the electrical connector.
- Using a back up wrench on the union tee, remove oil pressure switch.

NOTE: There will be some residual oil in the line leading to the sender and switch. Provide a means to catch any spillage that may occur when switch is removed.

(2) Installation

- Wrap switch threads with teflon sealant tape (3M-Teflon No. 48 x 1/4 inch).
- Install switch to union tee and finger tighten.
- Using a back up wrench on union tee, tighten switch to tee.
- Join electrical connector.
- Reconnect the negative battery cable
- Perform operational check.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

2. Oil Temperature

A. Indicator

(1) Description

Oil temperature is displayed in the 3-IN-1 (i.e., Triple) Engine Instrument Gauge as described under "Oil Pressure" on page 79301. Oil temperature is sensed by a sensor installed in the accessory section of the engine immediately in front of the oil filter. Temperature is transmitted to the instrument electrically.

(2) Troubleshooting

See "Chart 4".

B. Sensor

(1) Removal

- (a) Remove safety wire securing cannon plug connector to sensor.
- (b) Remove cannon plug connector.
- (c) Remove sensor.

(2) Installation

- (a) Install oil temperature sensor into engine.
- (b) Install cannon plug connector and safety.
- (c) Perform operational check.

**CHART 4
TROUBLESHOOTING OIL TEMPERATURE GAUGE**

Trouble	Cause	Remedy
Instrument fails to read.	Broken or damaged sensor.	Check engine unit.
	Open wire.	Check wiring to instrument.
Excessive scale error.	Improper calibration adjustment	Replace instrument.
Pointer fails to move as engine is warmed up.	Broken or damaged sensor.	Check engine unit.
	Open wire(s).	Check wiring to instrument.
Dull or discolored markings.	Age.	Replace instrument.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

80

STARTING

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 80

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
80-List of Effective Pages	1	May 15/19			
	2	Mar 6/14			
80-Table of Contents	1	May 15/19			
	2	Mar 6/14			
80-10-00	1	Sep 1/16			
	2	Mar 6/14			
	3	Mar 6/14			
	4	Mar 6/14			
	5	Mar 6/14			
	6	Mar 6/14			
	7	May 15/19			
	8	Mar 6/14			
	9	Nov 15/17			
	10	Nov 15/17			
	11	Nov 15/17			
	12	Nov 15/17			
	13	Nov 15/17			
	14	Nov 15/17			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHAPTER 80 - STARTING

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>CRANKING</u>	80-10-00	1
Cranking Limitations		1
Hartzell Engine Technologies (HET) Starter (aka Kelly Aerospace, Electrosystems, Prestolite)		1
Description		1
Troubleshooting		1
Removal		1
Installation		2
Cranking Tests		4
Bench Tests		5
No-Load Test		5
Stall-Torque Test		5
Sky-Tec Starter		7
Description		7
Troubleshooting		7
Installation as a Service Replacement		9
Removal		10
Installation		10
Shear Pin Replacement		12
Starter Control Circuit		13
Starting with External Power		13

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CRANKING

1. Cranking Limitations

Do not crank for more than ten (10) seconds. Allow twenty (20) seconds for cool-down between cranking attempts. Repeat no more than six (6) times. If start not achieved on the sixth attempt, let starter cool for thirty (30) minutes before reattempt.

2. Hartzell Engine Technologies (HET) Starter (aka Kelly Aerospace, Electrosystems, Prestolite)

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

Factory installed in S/N's 2843001 thru 2843647.

A. Description

See "Figure 1".

When the starting circuit is energized, battery current is applied to the starting motor terminal. Current flows through the field coils creating a strong magnetic field. At the same time, current also flows through the brushes and commutator, and finally through the armature to ground. The result is a high cranking torque, for a limited period of time, with a high current flow at a minimum loss of voltage.

The drive end gear of the armature mates with the reduction gear which drives the Bendix shaft. The Bendix drive is held in position on the shaft by a spiral pin. As the armature turns the reduction gear, the Bendix drive pinion meshes with the starter drive gear by inertia and action of the spiral grooves within the Bendix unit. A detent pin engages in a notch in the screw threads which prevents demeshing if the engine fails to start. When the engine does start and reaches a predetermined speed, centrifugal action forces the detent pin to release and allows the pinion to demesh from the starter drive gear.

B. Troubleshooting

See Chart 1.

NOTE: In Chart 1, for any remedy which requires disassembly and cleaning or repair of the starter; replacement with a new, or known good, unit is always an alternative solution.

NOTE: NEVER USE JUMPER CABLES to test voltage to the starter. The "toothed" jaws of jumper cables are meant to "bite" into soft, leaded terminals on car batteries, and simply WILL NOT provide enough contact with the starter terminal to supply the needed amperage to engage the starter properly.

NOTE: Use an analog voltage meter if you can. Digital meters take intermittent 'snap shots' of voltage. In situations where voltage is being supplied intermittently (even in rapid cycles), the digital meter will simply not provide the correct 'picture' of the aircraft's voltage situation.

C. Removal

CAUTION: TO PREVENT SHORT CIRCUITING, DISCONNECT THE GROUND CABLE FROM THE BATTERY BEFORE REMOVING THE STARTER FROM THE ENGINE.

- (1) Disconnect ground cable from battery.

CAUTION: ROTATION OF THE STARTER POST WILL CAUSE INTERNAL DAMAGE TO THE STARTER. ALWAYS HOLD THE STARTER POST'S BOTTOM NUT IN PLACE WHEN TORQUING OR REMOVING THE TOP NUT.

- (2) Disconnect the starter cable from the terminal post (or stud): Hold the bottom nut on the terminal (or starter) stud in place with a wrench to prevent the stud from rotating. Loosen the top nut.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

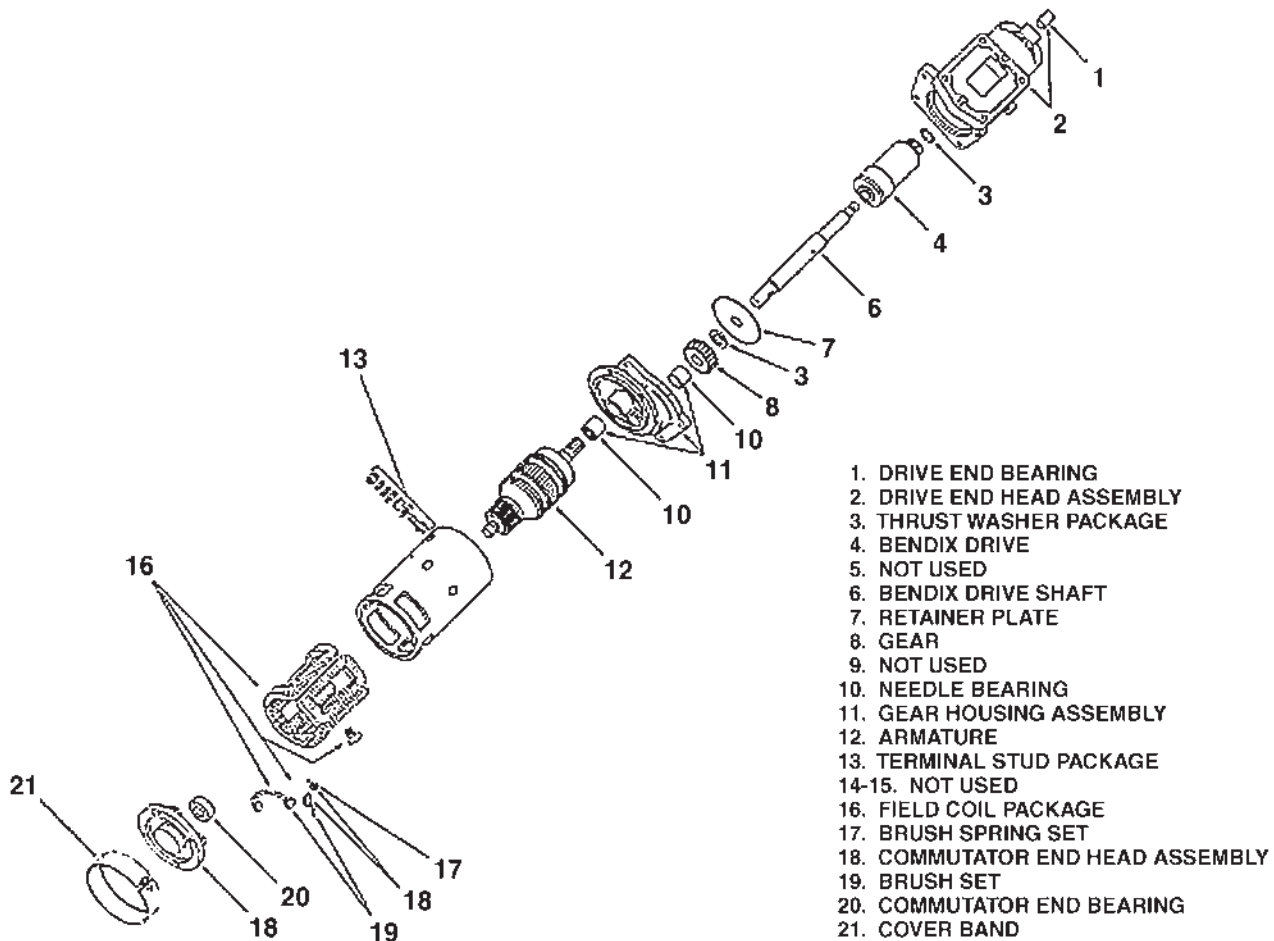
- (3) Remove starter mounting bolts.
- (4) Lift off starter motor.

D. Installation

- (1) Clean all traces of rust, corrosion, or dirt from all mounting surfaces and mounting hardware. All ground points or straps must be clean and tight.
- (2) Place starting motor in position with no stresses or binding forces being present and install mounting bolts. Torque bolts to 204 in.-lbs. or as specified in Lycoming SSP-1776.

CAUTION: ROTATION OF THE STARTER POST WILL CAUSE INTERNAL DAMAGE TO THE STARTER. ALWAYS HOLD THE STARTER POST'S BOTTOM NUT IN PLACE WHEN TORQUING OR REMOVING THE TOP NUT.

- (3) Reinstall starter cable to starter terminal post (or stud): Hold the bottom nut on the terminal (or starter) stud in place with a wrench to prevent the stud from rotating. Tighten the top nut. Torque to 40 in.-lbs. or as specified in Lycoming SSP-1776.
- (4) Reconnect ground cable to negative post of battery.
- (5) Perform cranking tests, below.



Exploded View of Hartzell Engine Technologies Starter
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 1 of 2)
TROUBLESHOOTING STARTER**

Trouble	Cause	Remedy
Motor fails to operate.	Low battery charge.	Check and recharge if necessary.
	Defective or improper wiring or loose connections.	Refer to wiring diagram and check all wiring.
	Defective starter solenoid or control switch.	Replace faulty unit.
	Binding, worn, or improperly seated brush, or brushes with excessive side play.	Brushes should be a free fit in the brush boxes without excessive side play. Binding brushes and brush boxes should be wiped clean with a gasoline (undoped) moistened cloth. A new brush should be run in until at least 50% seated; however, if facilities are not available for running in brushes, then the brush should be properly seated by inserting a strip of No. 000 sandpaper between the brush and commutator with the sanded side next to the brush.
	CAUTION: DO NOT USE COARSE SANDPAPER OR EMERY CLOTH.	
		Pull sandpaper in the direction of rotation, being careful to keep it in the same contour as the commutator.
	Dirty commutator.	If commutator is rough or dirty, smooth and polish with No. 000 sandpaper. If too rough and pitted, remove and turn down. Blow out all particles.
	Shorted, grounded, or open armature.	Remove and replace with an armature known to be in good condition.
	Grounded or open field circuit.	Test and then replace with new part.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 1 (Sheet 2 of 2)
TROUBLESHOOTING STARTER**

Trouble	Cause	Remedy
Motor operates at proper speed but fails to crank.	Faulty Bendix drive.	Remove Bendix drive assembly. Clean and check engine. Reinstall.
Low motor and cranking speed.	Worn, rough, or improperly lubricated motor or starter.	Disassemble, clean, inspect and relubricate, replacing ball bearings, if worn.
	Same electrical causes listed under "Motor fails to operate."	Same remedies listed for these troubles.
Excessive arcing of motor brushes.	Binding, worn, or improperly seated brush or brushes, with excessive side play.	See information above dealing with this trouble.
	Dirty, rough, pitted or scored commutator.	Clean as outlined above.
Excessive wear and arcing of motor brushes.	Rough or scored commutator.	Remove and turn commutator down on a lathe.
	Armature assembly not concentric.	Reface commutator.

E. Cranking Tests

NOTE: NEVER USE JUMPER CABLES to test voltage to the starter. The "toothed" jaws of jumper cables are meant to "bite" into soft, leaded terminals on car batteries, and simply WILL NOT provide enough contact with the starter terminal to supply the needed amperage to engage the starter properly.

NOTE: Use an analog voltage meter if you can. Digital meters take intermittent 'snap shots' of voltage. In situations where voltage is being supplied intermittently (even in rapid cycles), the digital meter will simply not provide the correct 'picture' of the aircraft's voltage situation.

The starting circuit should be inspected at regular intervals. The frequency should be determined by the type of starting conditions and the amount of starter usage. In any case, it is recommended that the following tests be conducted each six months or every 100 hours time-in-service.

- (1) Check the battery with a hydrometer to make sure it is fully charged and filled to the proper level. A load test should be made on the battery to verify proper condition before proceeding.
- (2) Check all starter circuit wiring, making sure all connections, including battery terminals, are clean and tight and that all insulation is sound and complete.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (3) A voltage loss test should be made to locate any high-resistance connections that would impair starting motor electrical efficiency. Using a low-reading voltmeter scale while cranking engine (or at approximately 100 amperes current flow) measure for the following limits:
 - (a) Voltage loss from the insulated (positive) battery post to the starter motor terminal = 0.3 volt maximum.
 - (b) Voltage loss from the battery negative (ground) terminal to the starter motor frame = 0.1 volt maximum.

NOTE: If voltage loss exceeds the above limits, measure the voltage drops across all connections to discover the faulty connection. When within the maximum limits proceed to next step.

- (4) The starter motor should be operated for several seconds with the ignition OFF. The starter motor engagement should be prompt and the motor should turn freely at a uniform speed without binding or producing unusual sounds.
- (5) Re-engage the starter two or three times, listening for prompt engagement, without the clashing of gears, and to determine that the pinion disengages properly when the starter switch is released.

F. Bench Tests

See "Figure 2" and "Figure 3".

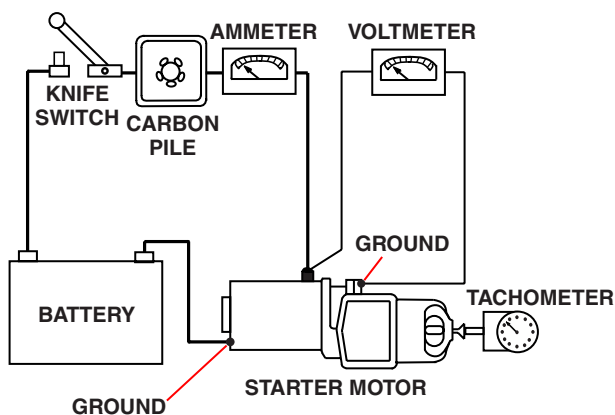
(1) No-Load Test

- (a) Connect as shown in "Figure 2".
- (b) Current measured on voltmeter should be within specifications shown in "Chart 2". If current is too high, the bearings may be mis-aligned or end play may be unacceptable. Two or three sharp raps on the frame with a rawhide hammer will often help to align the bearings and free the armature.
- (c) If the starter passes the No-Load Test, proceed to the Stall-Torque Test, below.

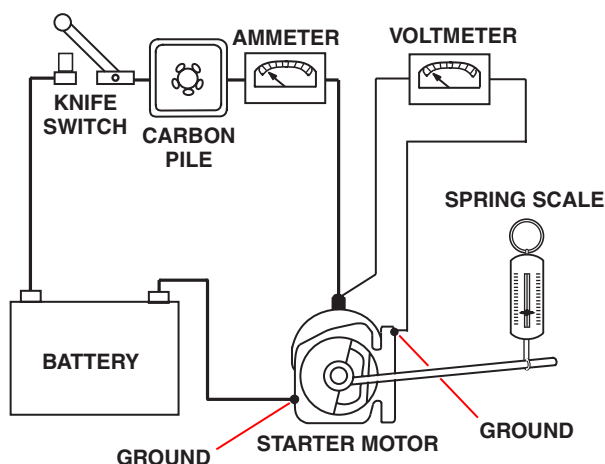
(2) Stall-Torque Test

To see if the starter is producing its rated cranking power:

- (a) Make test connections and set-up as shown in "Figure 3".
- (b) See specifications in "Chart 2".
- (3) If torque and current are not within specifications, overhaul or replace the starter.



No Load Current Test
Figure 2



Stall Torque Test
Figure 3

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 2
STARTER SERVICE TEST SPECIFICATIONS

Model	MHB-4016
Brush Tension	
Min.	32 oz.
Max.	40 oz.
No-Load Test (75°F)	
Volt	20
Max. Amps	35
Min. RPM	1300
Stall Torque Test	
Amps	260
Min. Torque, Ft.-Lbs.	27
Approx. Volts	14

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

3. Sky-Tec Starter

WARNING: FAILURE TO CONSULT APPLICABLE VENDOR PUBLICATION(S), WHEN SERVICING OR INSPECTING VENDOR EQUIPMENT INSTALLED IN PIPER AIRCRAFT, MAY RENDER THE AIRCRAFT UNAIRWORTHY. (SEE INTRODUCTION - SUPPLEMENTARY PUBLICATIONS.)

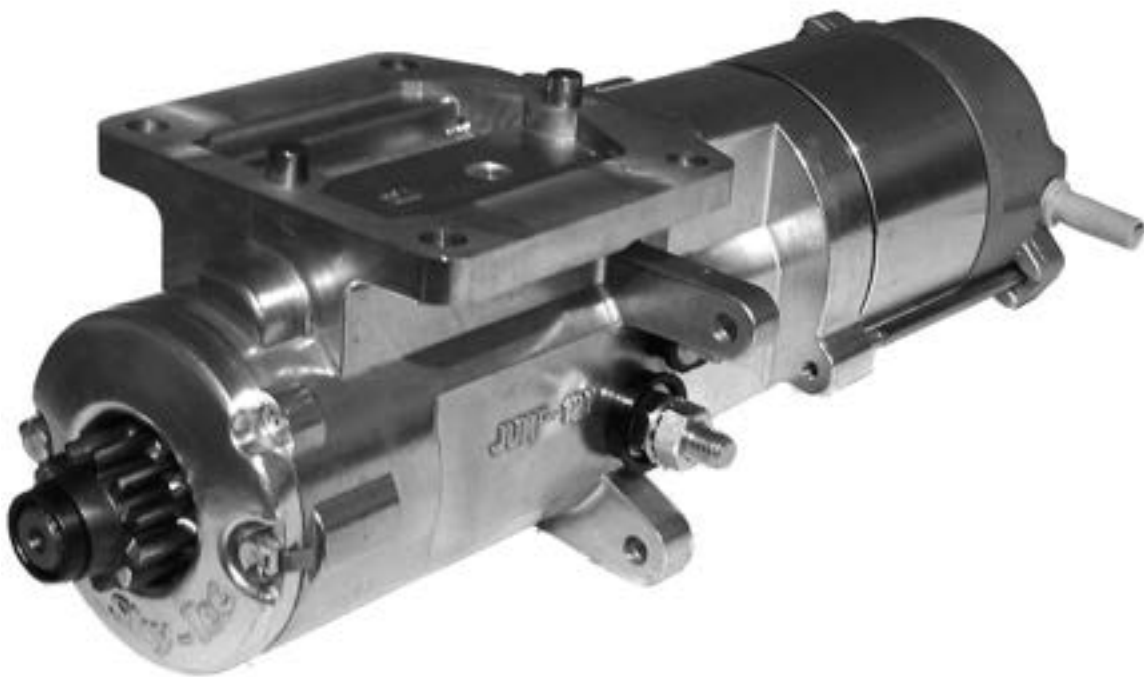
Factory installed in S/N's 2843648 and up; and authorized as service replacements in S/N's 2843001 and up. See "Figure 4".

A. Description

The Sky-Tec 149-NL/EC high-performance starter has significant differences from the earlier starters made by Hartzell Engine Technologies (HET) (formerly Kelly Aerospace, Electrosystems, Prestolite). The Sky-Tec starters use a more modern, more reliable, bendix-free, design. No periodic maintenance is required. The recommended TBO is 2700 hours. Engine cranking speed may be up to twice as fast as with previous starters. The lightweight of these starters does, however, provide less mass to extract heat from starter components. Accordingly, strict adherence to Cranking Limitations, above, is essential to prevent overheating.

B. Troubleshooting

See "Chart 3".

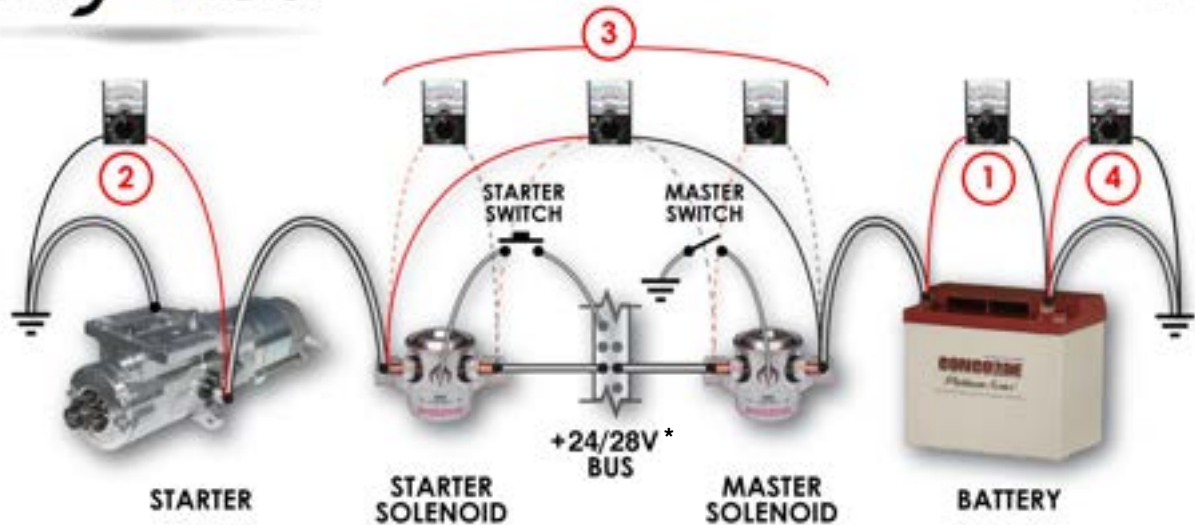


Sky-Tec High-Torque Inline Starter
Figure 4

CHART 3
TROUBLESHOOTING - SKY-TEC STARTER



AIRCRAFT STARTING SYSTEM TROUBLESHOOTING GUIDE
REV_3.0



IMPORTANT NOTES: DO NOT REMOVE THE STARTER FROM THE AIRCRAFT TO PERFORM TESTING! For accuracy and relevance, starter testing should be conducted in the aircraft while the starter is in its failure mode. Please do NOT use jumper cables to test starters - it will not provide useful information. Use an analog voltmeter if at all possible. An ohmmeter will not provide useful information - keep it simple & follow these easy steps

Pretest Considerations: If possible, visually inspect the starter and/or interview pilot/operators for starting history. Indications of long cranking periods, burning odor or smoke from the starter, kickback(s), a cracked starter mount, a fast spinning starter w/no prop movement, oil in starter, grinding noise or a damaged ring gear are generally indications that the starter is in need of repair and the following tests will not be helpful. Remove the starter for repair or overhaul.

Testing Relevance: The following testing procedure is most relevant to starters that are low performing including slow cranking and/or failure to crank the engine over a compression stroke. If a starter is damaged by overcranking or a stuck firewall solenoid, voltage in step one may read below acceptable levels thus incorrectly indicating a potential battery problem. Therefore, in such cases some consideration must be to the pretest conditions noted above (if it smells burned...). If the only effect of energizing the starter results only in an audible "click" with no prop movement, confirm step 2 to isolate problem to starter or starter contactor.

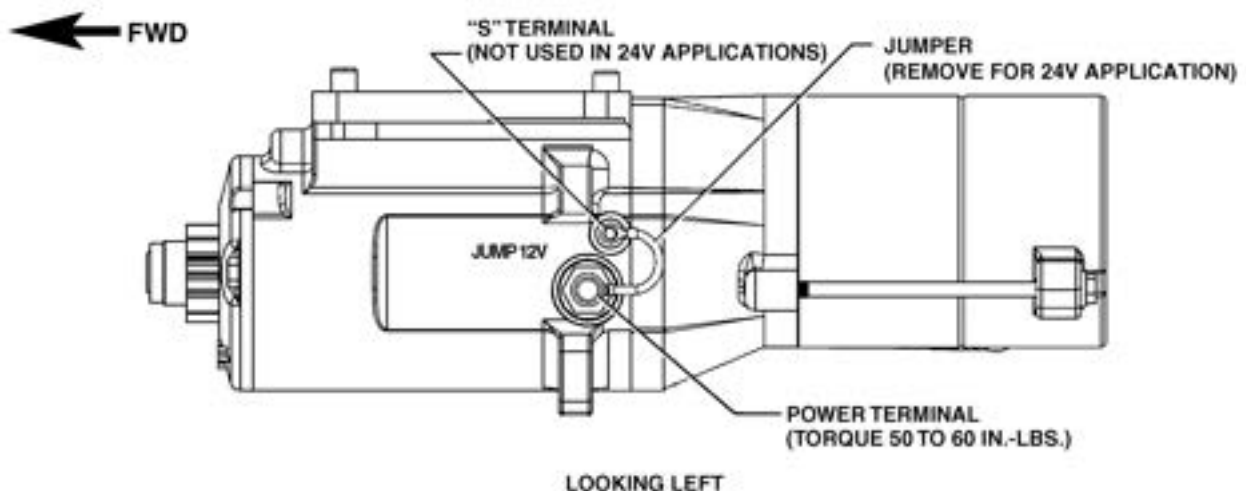
	TEST	RECORD	RESULT	ANALYSIS
STEP 1	Record voltage at the battery while cranking the starter in its failure mode.	<u> </u> VOLTS	Below 20.0* volts? Above 20.0* volts? - Proceed to Step 2	Questionable battery. See Testing Relevance above as a shorted (cooked) starter will pull voltage down appreciably. However, if starter rotates at all, this is generally not a shorted starter condition.
STEP 2	Record voltage at the starter while cranking the starter in its failure mode.	<u> </u> VOLTS	No voltage recorded Above 18.0* volts? Below 18.0* volts and: - Difference between Step 1 and Step 2 exceeds 4.0* volts - Difference between Step 1 and Step 2 less than 4.0* volts	Starter OK. Test Starter Solenoid or switch (Step 3) Suspect Starter. Suspect Cables, terminals and/or solenoids - proceed to Steps 3 & 4 Borderline Condition - Call Sky-Tec with test results to discuss. If happens more when cold, suspect battery. When hot, suspect cables/terms/sols.
* Halve all voltages for 12/14 volt systems.				
OPTIONAL:				
STEP 3	Record voltages between each and every cable terminal and across solenoids while cranking the starter in its failure mode.		Assuming the voltage difference noted in Step 2 exceeded 4.0* volts, flush out any appreciable loss in voltage in any cable or solenoid by placing the meter along each link in the diagram. A tight electrical system will lose no more than 0.5 volts between the battery and starter. Be sure to conduct these tests while cranking the starter in its failure mode.	
STEP 4	Record voltages between battery & ground and starter & ground while cranking the starter in its failure mode.		If no appreciable loss of voltage is noted in Step 3, flush out the integrity of all electrical system grounds. Pay close attention to battery and engine grounds. Clean up or repair any questionable ground connections and re-test.	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. Installation as a Service Replacement

Engines with high-time magnetos and weak electrical systems should be thoroughly inspected prior to installing any lightweight, high-torque starter. Failure to do so may make your aircraft susceptible to poor starter performance or damage from kickbacks.

- (1) As shown in "Figure 5", ensure the jumper between the small "S" terminal and the larger power terminal is not installed. Cover each terminal with a MS2571-1S or MS2571-2S (or equivalent) terminal nipple, as appropriate.
- (2) Inspect the Magneto system thoroughly.
Make sure that the magnetos are in compliance with all service bulletins. Make sure that the magneto impulse coupling is within service specifications. Kickbacks will shear a drive pin. Check the impulse couplers prior to attempting even a single start.
- (3) Inspect the voltage supply system.
If the Sky-Tec starter fails to turn the engine significantly faster than the OEM starter, immediately inspect the aircraft's voltage supply system. Lightweight starters can require as much as 45% more output from the battery – or as many as 300 Amps during initial cranking.
- (4) Troubleshoot the entire voltage system
All Sky-Tec starters are tested to verify power output before leaving the factory. If a new starter does not spin quickly or seems weak, see "Chart 3". Do not return a "weak" starter without first completing the troubleshooting procedure in "Chart 3".
- (5) Replace Hardware
 - (a) Replace all washers with four (4) AN936-516 internal star lock washers or AN split-type lock washers. Do not use flat washers.
 - (b) In some cases, the stock 5/16-in. bolt may be too long. If so, replace with shorter bolt of same type and strength.



Jumper Removal for 24 Volt Applications
Figure 5

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

D. Removal

CAUTION: TO PREVENT SHORT CIRCUITING, DISCONNECT THE GROUND CABLE FROM THE BATTERY BEFORE REMOVING THE STARTER FROM THE ENGINE.

- (1) Disconnect ground cable from negative post of battery.
- (2) Disconnect starter cable from power terminal post.
- (3) Disconnect the alternator ground wire and the starter ground wire from mounting lug by removing bolt, nut and washers. See "Figure 6" on page 801011.
- (4) Support starter motor. Remove one (1) each mounting bolt and internal tooth "star" lock washer; and three (3) each mounting nuts and internal tooth "star" lock washers.
- (5) Remove starter motor.

E. Installation

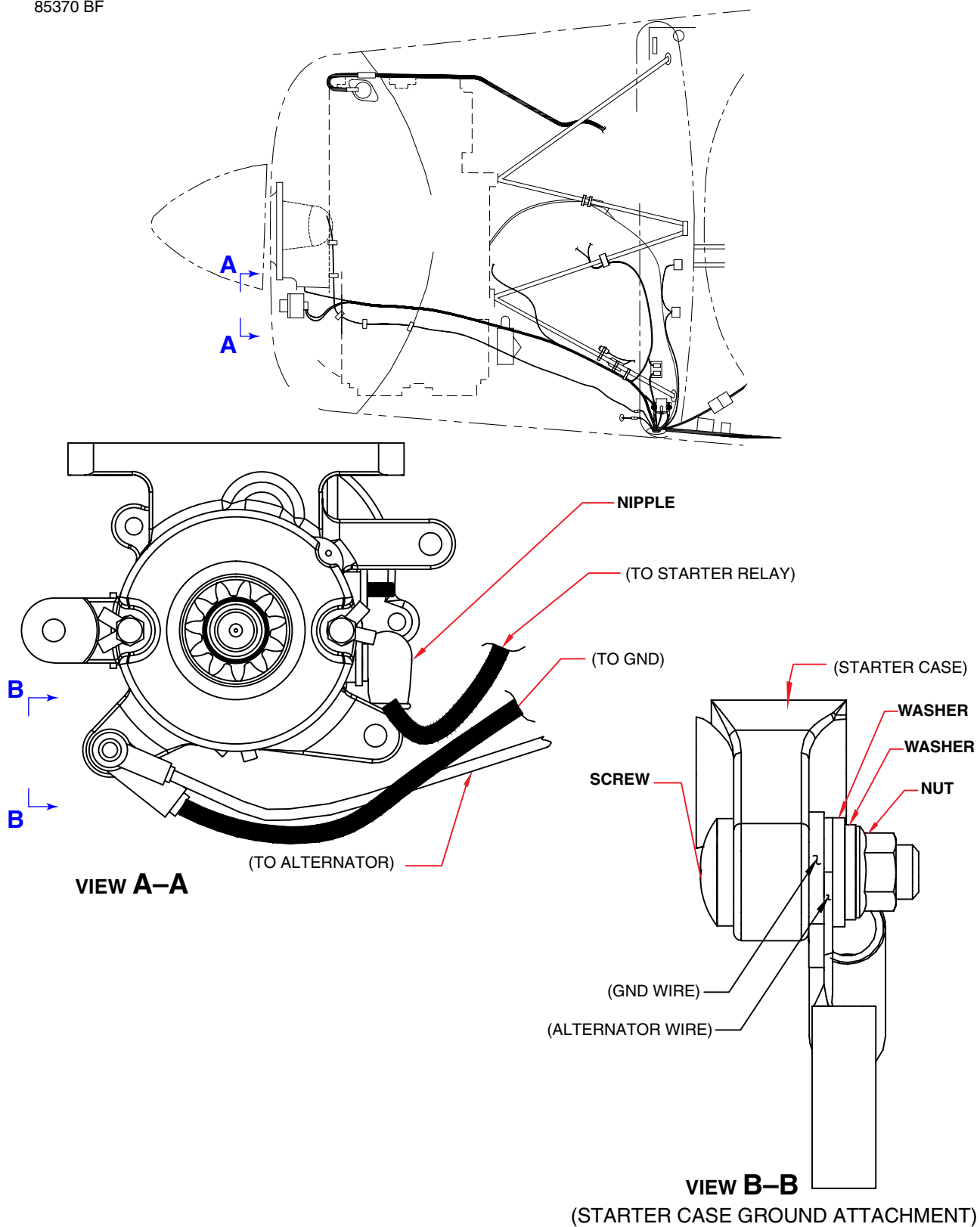
- (1) Clean all traces of rust, corrosion, or dirt from all mounting surfaces and mounting hardware. All ground points or straps must be clean and tight.
- (2) Place starting motor in position with no stresses or binding forces being present and install three (3) each internal tooth "star" lock washers and mounting nuts; and one (1) each internal tooth "star" lock washer and mounting bolt. Torque bolt and nuts to 100 in.-lbs.

CAUTION: TAKE CARE NOT TO OVER-TORQUE THE POWER TERMINAL POST NUT. THE POWER TERMINAL POST IS COPPER AND CAN EASILY BE STRIPPED.

- (3) Connect the alternator ground wire and the starter ground wire to mounting lug using bolt, nut and washers. See "Figure 6" on page 801011.
- (4) Reinstall starter cable to power terminal post using an internal tooth "star" lock washer or split lock washer, as desired. Torque the power terminal post nut as specified in "Figure 5" and reinstall terminal nipple.
- (5) Reconnect ground cable to negative post of battery.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370 BF



Sky-Tec Starter Installation
Figure 6

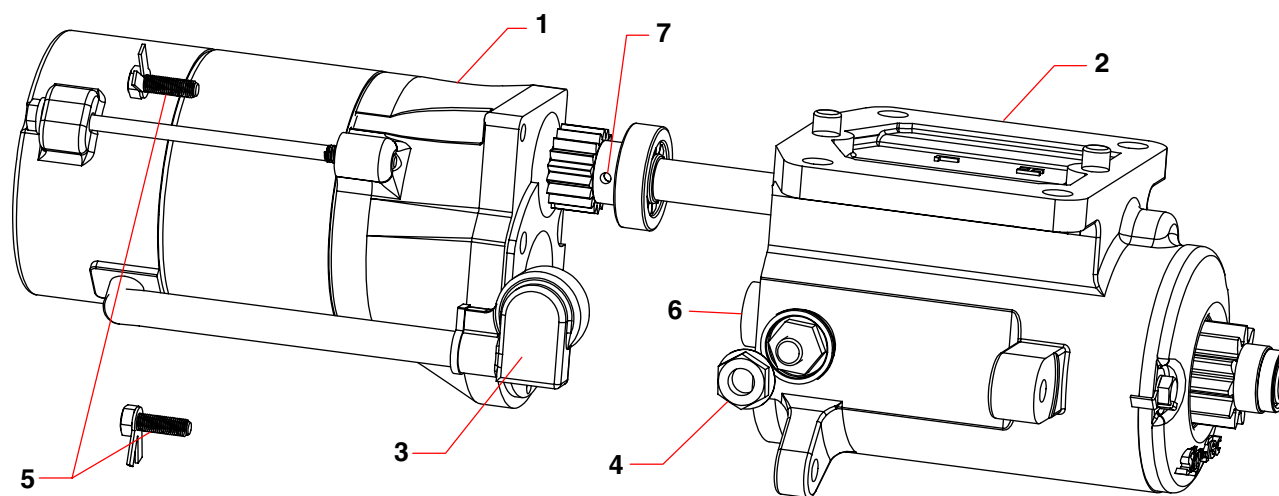
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

F. Shear Pin Replacement

See "Figure 7".

The shear pin is designed as the weak link to minimize starter and ring gear damage in the event of a premature ignition misfire event (i.e. - kickback). If the starter pinion engages the flywheel and the starter motor spins (or sounds like it's spinning) and the starter's pinion gear does not rotate (and neither does the flywheel, engine, and propeller) then the shear pin has done its job and must be replaced.

- (1) Remove starter from airplane per Removal, above.
- (2) Lift the insulating boot on the motor lead and remove the M8 locking nut with a 12mm wrench and remove the motor lead wire from the stud.
- (3) Remove the two M5 x 25MM hex screws and locking tab washers holding the motor adapter to the main mount.
- (4) Separate the two assemblies being careful not to dislodge the solenoid plunger residing in the main mount.
- (5) Replace the shear pin in the lay-shaft.
- (6) Reassemble the motor adapter and main mount, installing the two M5 screws and torquing them as specified in "Figure 7".
- (7) Reconnect the motor lead, secure with the M8 locking nut, and cover with the insulating boot.
- (8) Install starter in airplane per Installation, above.



1. MOTOR ADAPTER
2. MAIN MOUNT
3. INSULATING BOOT
4. NUT (M8 LOCKING)
5. HEX SCREWS (M5 X 25MM) AND LOCKING TAB WASHERS
(TORQUE TO 50 IN.-LBS.)
6. SOLENOID PLUNGER
7. LAY-SHAFT (SHEAR PIN GOES HERE)

Shear Pin Replacement
Figure 7

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

4. Starter Control Circuit

- A. Inspect the control circuit wiring between the battery, solenoid and manual starting switches for breaks, poor connections and faulty insulation. Tighten all connections and make sure solenoid is firmly mounted and makes a good ground connection.
- B. Check the voltage loss across the switch contacts during normal starting. If loss is in excess of 0.2 volts per 100 amperes, the solenoid should be replaced.
- C. If solenoid fails to operate when the manual starting switch is turned on or if it fails to release when the manual starting switch is released, it should be removed and tested to specifications, if available. If either opening or closing voltages are not to specifications, or tests cannot be performed, replace the solenoid.

5. Starting with External Power

See 24-40-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

CHAPTER

91

CHARTS & WIRING DIAGRAMS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91

LIST OF EFFECTIVE PAGES

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
91-List of Effective Pages	1	Jul 30/20	91-X-REF	1	May 15/19
	2	Jul 30/20		2	May 15/19
	3	Mar 15/20		3	May 15/19
	4	May 31/20		4	May 15/19
91-Table of Contents				5	May 15/19
	1	Jul 30/20		6	May 15/19
	2	Jul 30/20		7	May 15/19
	3	Jul 30/20		8	May 15/19
	4	Jul 30/20		9	May 15/19
91-10-00				10	May 15/19
	1	Mar 15/20	91-11-30	1	Nov 15/17
	2	May 15/19		2	Sep 1/16
	3	May 15/19	91-21-20	1	Mar 6/14
	4	May 15/19		2	Mar 6/14
	5	May 15/19		3	Nov 15/17
	6	Nov 15/17		4	Nov 15/17
	7	May 15/19		5	Nov 15/17
	8	Jun 1/16		6	Mar 6/14
	9	Jun 1/16	91-21-50	1	Sep 1/16
	10	Jun 1/16		2	Sep 1/16
	11	Nov 15/17		3	Sep 1/16
	12	Jun 1/16		4	Sep 1/16
	13	Jun 1/16		5	Mar 6/14
	14	Jun 1/16		6	Nov 15/17
	15	Jun 1/16		7	Nov 15/17
	16	May 15/19		8	Sep 1/16
	17	May 15/19	91-22-10	1	Mar 6/14
	18	May 15/19		2	Mar 6/14
	19	May 15/19		3	Mar 6/14
	20	May 15/19		4	Mar 6/14
	21	May 15/19		5	Nov 15/17
	22	Nov 15/17		6	Nov 15/17
	23	Nov 15/17		7	Nov 15/17
	24	Nov 15/17		8	Nov 15/17
	25	May 15/19		9	Nov 15/17
	26	May 15/19		10	Nov 15/17
	27	Nov 15/17		11	Nov 15/17
	28	Nov 15/17		12	Nov 15/17
	29	Nov 15/17		13	Nov 15/17
	30	Nov 15/17		14	Nov 15/17
	31	Nov 15/17		15	Nov 15/17
	32	Nov 15/17		16	Nov 15/17
	33	Nov 15/17			
	34	Nov 15/17			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91

LIST OF EFFECTIVE PAGES (continued)

CHAPTER SECTION	PAGE	DATE	CHAPTER SECTION	PAGE	DATE	
91-22-10 (cont.)	17	Nov 15/17	91-24-60	1	Sep 1/16	
	18	Nov 15/17		2	Nov 15/17	
	19	Nov 15/17		3	Nov 15/17	
	20	Nov 15/17		4	Nov 15/17	
				5	Nov 15/17	
91-23-00	1	Mar 6/14		6	May 15/19	
	2	Mar 6/14		7	Nov 15/17	
				8	May 15/19	
91-23-10	1	Nov 15/17	91-25-10	1	Mar 6/14	
	2	Mar 6/14		2	Mar 6/14	
91-23-15	1		91-25-60	1	Mar 6/14	
	2	Nov 15/17		2	Sep 1/16	
	3	Sep 1/16		3	Nov 15/17	
	4	Sep 1/16		4	Sep 1/16	
91-23-50	1	Nov 15/17	91-27-30	1	May 15/19	
	2	Nov 15/17		2	May 15/19	
	3	Nov 15/17		3	May 15/19	
	4	Nov 15/17		4	May 15/19	
	5	Nov 15/17		5	May 15/19	
	6	May 15/19		6	May 15/19	
	7	May 15/19		7	May 15/19	
	8	Nov 15/17		8	May 15/19	
	9	May 15/19		Mar 15/20		
	10	May 15/19	91-27-50	1	Nov 15/17	
	11	May 15/19		2	Sep 1/16	
	12	May 15/19				
	13	May 15/19		91-28-20	1	Jun 1/16
	14	May 15/19	2		Nov 15/17	
	15	May 15/19				
	16	May 15/19	91-28-40	1	Sep 1/16	
	17	May 15/19		2	Nov 15/17	
	18	May 15/19		3	Nov 15/17	
	91-24-30	1	Mar 6/14		4	Nov 15/17
		2	Mar 6/14		5	Nov 15/17
3		Mar 6/14		6	Nov 15/17	
4		Mar 6/14		7	Nov 15/17	
5		Jul 30/20		8	Nov 15/17	
6		Nov 15/17	91-30-30	1	Sep 1/16	
7		Nov 15/17		2	Sep 1/16	
8		Nov 15/17		3	Sep 1/16	
9		Nov 15/17		4	May 15/19	
		10	Nov 15/17			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91

LIST OF EFFECTIVE PAGES (continued)

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
91-31-20	1	Nov 15/17	91-34-20 (cont.)	7	Mar 15/20
	2	Sep 1/16		8	Nov 15/17
91-31-30				9	May 15/19
	1	Jun 1/16		10	May 15/19
	2	Nov 15/17		11	May 15/19
	3	Sep 1/16		12	May 15/19
	4	Nov 15/17		13	Nov 15/17
	5	Nov 15/17		14	Nov 15/17
	6	Sep 1/16		15	Nov 15/17
	7	Nov 15/17		16	Nov 15/17
91-31-50	8	Sep 1/16		17	Mar 15/20
				18	Mar 15/20
	1	Sep 1/16		19	Mar 15/20
	2	Sep 1/16		20	Mar 15/20
	3	Sep 1/16		21	Mar 15/20
	4	Nov 15/17		22	Mar 15/20
				23	Mar 15/20
				24	Mar 15/20
91-33-10	2	Sep 1/16		25	Mar 15/20
	3	Sep 1/16		26	Mar 15/20
	4	May 15/19			
	5	Sep 1/16	91-34-40	1	Sep 1/16
	6	Sep 1/16		2	Sep 1/16
	7	Nov 15/17		3	Sep 1/16
	8	Nov 15/17		4	Sep 1/16
	9	Sep 1/16		5	Nov 15/17
	10	Sep 1/16		6	Nov 15/17
	11	Sep 1/16			
	12	Nov 15/17	91-34-50	1	Mar 6/14
91-33-40				2	Sep 1/16
	1	Sep 1/16		3	Nov 15/17
	2	Sep 1/16		4	Nov 15/17
	3	Sep 1/16		5	Sep 1/16
	4	Nov 15/17		6	Sep 1/16
	5	Nov 15/17		7	Sep 1/16
	6	Sep 1/16		8	Sep 1/16
	7	Sep 1/16		9	Nov 15/17
91-34-20	8	Nov 15/17		10	Nov 15/17
				11	May 15/19
	1	Mar 6/14		12	Nov 15/17
	2	Mar 6/14		13	Nov 15/17
	3	Mar 6/14		14	Nov 15/17
	4	Mar 6/14		15	Nov 15/17
	5	Sep 1/16		16	Nov 15/17
	6	Nov 15/17		17	Nov 15/17
				18	Nov 15/17

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91

LIST OF EFFECTIVE PAGES (continued)

<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>	<u>CHAPTER SECTION</u>	<u>PAGE</u>	<u>DATE</u>
91-34-50 (cont.)	19	Nov 15/17			
	20	Nov 15/17			
	21	Nov 15/17			
	22	Nov 15/17			
	23	Nov 15/17			
	24	Nov 15/17			
	25	Nov 15/17			
	26	Nov 15/17			
91-37-10	1	Jun 1/16			
	2	Jun 1/16			
	3	Mar 6/14			
	4	Mar 6/14			
91-74-10	1	Sep 1/16			
	2	May 31/20			
91-77-20	1	Mar 6/14			
	2	May 31/20			
91-77-40	1	Mar 6/14			
	2	Mar 6/14			
	3	Nov 15/17			
	4	Nov 15/17			
	5	Nov 15/17			
	6	May 15/19			
91-79-30	1	Nov 15/17			
	2	Nov 15/17			
	3	Nov 15/17			
	4	May 15/19			
91-80-10	1	Mar 6/14			
	2	Mar 6/14			
	3	Nov 15/17			
	4	Nov 15/17			
91-97-10	1	Nov 15/17			
	2	Nov 15/17			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91 - CHARTS & WIRING DIAGRAMS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>SECTION</u>	<u>PAGE</u>
<u>CHARTS</u>	91-10-00	1
Torque Requirements		1
Conversion Tables		3
Hose Specifications		3
Consumable Materials		3
Vendor Contact Information		3
Electrical / Electronic Component Reference Designation Codes		3
<u>WIRING DIAGRAM CROSS-REFERENCE</u>	91-X-REF	1
<u>WIRING DIAGRAMS (SCHEMATICS)</u>	91-21-20 & UP	1

<u>Subject</u>	<u>Page No.</u>	<u>Subject</u>	<u>Page No.</u>
ADF		Avidyne Entegra	
KR-87	9134509	DAU	9177401
RCR-650	9134501	DC-50 Antenna Coupler	9134203
Air Conditioning	9121501	EMax Engine Monitor	9177201
Door Relays	9134403	Exceedance Horn	9134203
AK-350	9134502	Magnetometer	9134205
Alternator		MFD	9123151, 9134203
Alternator Out Switch	9124301, 9180102	Outside Air Temperature	9134205
Power	9124301, 9124305	PFD	9122109,
Standby Alternator Sense	9124302, 9180102		9134202, 91345021
Altitude Encoder	9134502	Standby Attitude Indicator	9134204
Ammeter	9180102	Avionics	
Dimming	9124301	Blocks and Grounds	9124303
Annunciator	9131501	Cooling	9121205, 9134209
Dimmer	9133403	Dimming	9133104, 9133109
Pitot Heat Off/Inop	9130301	Master Contactor	9123001
AoA Indexer	9127308	Master Relays	9130303
Aspen EBD	91342017	Master Switch	9123001, 9130303
Attitude Indicator	9134204, 91342025	Battery	
Audio Panel		Contactor	9133403, 9180101
GMA 340	9123501	Emergency	9124309
GMA 1347	9123504	Main	9124307, 9133403, 9180101
GMA 1360	9123506	Cabin Speaker	9133403
Autopilot		CDI	
S-TEC System 55	9122101	GI-106A	9134508, 91345025
S-TEC System 55X	9122105	Cigar Lighter	9125101
Trim Master Switch	9124304	Circuit Breakers	9124601
		Clock	9131301

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91 - CHARTS & WIRING DIAGRAMS

TABLE OF CONTENTS (continued)

<u>SUBJECT</u>		<u>SECTION</u>	<u>PAGE</u>
<u>WIRING DIAGRAMS (SCHEMATICS)</u> (continued)			
<u>Subject</u>	<u>Page No.</u>	<u>Subject</u>	<u>Page No.</u>
Cockpit		Garmin G5 EFI	91342018
Speaker	9123501, 9123504	Garmin G500	
CO Detector	9131201	AHRS	91342014
Communications		Air Data Computer	91342016
VHF	9123101	MFD	91342014
Cross-Reference	91-X1	PFD	91342014
Cylinder Head Temperature	9177202	Garmin G1000	
DAU	9177401	AHRS	91342013
DME		Air Data Computer	91342015
KN-63	91345013	Engine Indicating	9177403
S-TEC 451	9134506	MFD	9134206, 91342013
EBD. <i>See</i> Aspen EBD		NAV/GPS	91345023
EGT	9177201, 9177401, 9177403	PFD	9134206,
Electrical Generation	9124305		91342013, 9134405
ELT		Garmin G1000 NXi	
Artex ELT 110	9125601	ADAHRS	91342019
Artex ELT 1000	9125603	Engine Indicating	9177404,
Artex ME406 ELT	9125602		9177405, 9177406
Emergency Power	9124309	MFD	9134206
Engine		NAV/GPS	91345023
EGT	9177201, 9177401, 9177403	PFD	9134206, 9134406
EMax Engine Monitor	9177201	GDC 74A	91342013,
Gauge (3-Way)	9179301		91342014, 91342015
Hour Meter	9131304	GDL 59	9131307
Primer	9128201, 9180102	GDL 69A	9123152
Sensors	9177403	GDL 88	91345024
Start	9180101	GDU 10XX. <i>See</i> Garmin G1000	PFD and MFD
Tach Generator	9177401, 9177403	GDU 10XX No. 2 (MFD)	9123152
Exceedance Horn	9134203	GDU 620	91342025
External Power	9133403, 9180101	GDU 620 PFD/MFD	91221017, 9123153
Flap Position Indicator	9127501	GEA 71	9177403
Flightcom 403	91235011	GFC 700	91221018
Flight Data Monitoring	9131305	GI 106A	9134508
Fresh Air Blower	9121201	GIA No. 1	9123504, 9123509,
Fuel			9134206, 9134209,
Engine Primer	9128201, 9180102		91342013, 91342015,
Flow Sensor	9177402		9134503, 9134504
Pressure Indicator	9179301	GIA No. 2	91235010, 9134206,
Pump	9128201, 9180102		9134209, 91342013,
Quantity	9127302, 9127303,		91342015, 9134503, 9134504
	9128401, 9133403		
Fuse Assembly	9124301		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91 - CHARTS & WIRING DIAGRAMS

TABLE OF CONTENTS (continued)

<u>SUBJECT</u>		<u>SECTION</u>	<u>PAGE</u>
<u>WIRING DIAGRAMS (SCHEMATICS)</u> (continued)			
<u>Subject</u>	<u>Page No.</u>	<u>Subject</u>	<u>Page No.</u>
GMA 340	9123153, 9123501, 9123502, 9123508, 9134506, 9134509, 91345011, 91345012, 91345014, 91345017, 91345020	Lights (cont.)	
		Strobe	9133401
		Switch	9133105
		Taxi	9133407
GMA 1347	9123152, 9123504, 9123509, 9134206, 91345010, 91345015, 91345016	Low Voltage Monitor	9124301, 9130303
		Magnetos	9174101, 9180102
		Switches	9174101
GMA 1360	9123506, 91235017	Maintenance Data Recorder	9131307
GMU 44	91342013, 91342019	Manual Electric Trim	9127305
GNS 430	9134507, 91345014	Master Caution Switch	9131504
No. 1	9134202, 91345017	Master Warning Switch	9131504
No. 2	9134508, 91345020	NAV/COM/GPS	
Ground Blocks	9124608	No. 1	91345017
GRS 77	91342013	No. 2	91345020
GRT 10	9123152	Nav Indicator	
GSU 75	91342019	GI-106A	9134508
GTS 800	9134405	NY-164 Antenna	9134401
GTX 3X5R	9134406, 9134504	Oil Pressure	
GTX 33	9134503	Indicator	9179301
GTX 330	9134502, 9134505	Sensor	9177402, 9177403, 9179301
Hour Meter	9131301	Switch	9131301, 9131304
Engine	9131304	Oil Temp	
Flight Time	9131303	Indicator	9179301
Instruments		Sensor	9177401, 9177403, 9179301
Standby Attitude Indicator	9134204	Outside Air Temperature	9134205, 91342015
Turn Coordinator	9134201	Overvoltage Regulator	9180102
Intercom	9123509	Overvoltage Relay	9124301
KDI-572	91345014	Passenger Interphone	
KN-63	91345013	Avidyne Entegra	9123508
KR-87	9134509	Pitot	
Lightning Suppressor	9131302	Heat	9130301, 9133403
Lights		Pressure Switch	9131303
Anti-Collision	9133401	Placards	9111301
Cabin Flood	9133101, 9133403	Power Distribution	9124601
Courtesy	91331011, 9133403	Primary Power	
Dimmers	9133102	Garmin G1000	9124307
Dome	91331010, 91331012, 9133403	SKY-497 SkyWatch	9134401
Instrument Panel	9133102	SkyWatch	9134401
Landing	9133407	Stall Warning	9127301, 9133403
Navigation	9133401	Standby Instruments	91342017
Radio	9133109		
Reading	91331010, 91331012, 9133403		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHAPTER 91 - CHARTS & WIRING DIAGRAMS

TABLE OF CONTENTS (continued)

SUBJECT

SECTION

PAGE

WIRING DIAGRAMS (SCHEMATICS) (continued)

Subject	Page No.	Subject	Page No.
Static			
Heat	9133403		
S-TEC Manual Electric Trim	9127305, 9127307		
Stereo			
Avidyne Entegra	9123508		
StormScope	9134403		
SureSTART Magneto Booster	9174102		
Switches			
Magnetos	9174101		
Overhead	9133403, 9133404		
Starter	9180102		
TAS			
GTS 800	9134405		
TCR-451	9134506		
Terminal Block			
Avidyne Entegra	9124302		
Traffic Advisory System			
GTS 800	9134405		
SkyWatch	9134401		
Transponder			
GTX 3X5R	9134406, 9134504		
GTX 33/33ES	9134503		
GTX 330	9134502, 9134505		
Turn Coordinator	9134201		
USB Ports	9124607		
Vacuum System			
Auxiliary	9137101		
VHF Comms	9123101		
Vision 1000	9131305		
Voltage Regulator	9124301, 9180102		
Weather Mapping System			
StormScope	9134403		
Wiring	9197101		
WX-500 StormScope	9134403		
XM Satellite Datalink	9123151		

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

CHARTS

1. Torque Requirements

(PIR-PPS20015-1, Rev. AI.)

CAUTION: DO NOT OVERTORQUE FITTINGS.

“Chart 1” lists the torque values for flared fittings of various sizes and material.

NOTE: When installing flared fittings, verify that male threads are properly lubricated.

The torque values given in “Chart 2” on page 91104 are derived from oil-free cadmium-plated threads and are recommended for all airframe installation procedures where torquing is required, unless other values are specified in subject chapter/section. Engine torque values are found in the latest revision of Lycoming Service Table of Limits SSP-1776 and propeller torque values are found in 61-10-00.

NOTE: All torque values given are installation torques for installation purposes only and shall not be construed as retained torque.

NOTE: If normal operation requires movement between any of the components being clamped together, tighten the nut (or bolt) enough to insure intended operation of the assembly.

- A. Calibrate the torque wrench periodically to assure accuracy, and recheck frequently.
- B. If the fastener, screw, or nut is listed in “Chart 2” on page 91104, but the mating fastener is not listed, tighten only to the low end of the torque range specified for the listed fastener. In addition, the following limitations shall apply:
 - (1) Fastener and nut threads shall be clean and dry (free of lubricants). If the subject chapter/section requires the fastener and/or nut to be lubricated prior to tightening and does not specify a torque requirement, use the Chart 2 torque range reduced 50 percent.
 - (2) “Chart 2” on page 91104 shall be used for free running nuts, provided minimal friction drag is determined as specified below.

**CHART 1
FLARE FITTING TORQUE VALUES**

(PIR-AC65-9A.)

Torque — Inch-Pounds						
Tubing OD Inches	Aluminum Alloy Tubing		Steel Tubing		Hose End Fitting and Hose Assemblies	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1/8	20	30	—	—	—	—
3/16	30	40	90	100	70	120
1/4	40	65	135	150	100	250
5/16	60	85	180	200	210	420
3/8	75	125	270	300	300	480
1/2	150	250	450	500	500	850
5/8	200	350	650	700	700	1150
3/4	300	500	900	1000	—	—
7/8	500	600	1000	1100	—	—
1	500	700	1200	1400	—	—
1-1/4	600	900	—	—	—	—
1-1/2	600	900	—	—	—	—

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

- (3) The friction drag torque can be determined as follows Run the nut down to near contact (but not in contact) with the bearing surface and check the "friction drag torque" required to turn the nut.

NOTE: Check the friction drag torque by attaching a scale type torque wrench to the nut and determining the torque required to turn the nut on the bolt. (Before the nut makes contact with the bearing surface.)

- (4) The friction drag torque (if any) shall be added to the desired torque specified in "Chart 2". This final torque should register on the indicator or be the setting for a snap-over torque limiting device. The final torque values (with friction drag included) are shown in "Chart 2" for some select fastener/nut combinations. If the value is not listed then it shall be calculated per "(3)", above.
- (5) Torque requirements do not apply to cross-recessed or slotted screws or to fasteners installed into rivnuts, pressnuts or other nuts not designed to rotate for wrenching at the fastener unless otherwise specified in the subject chapter/section.
- (6) Fasteners listed in "Chart 2" on page 91104 installed into nutplates, and which are accessible to be torqued at the fastener, must be tightened to the low end of the torque range specified in the appropriate "shear" column.

NOTE: When the fastener is stationary and the nut is torqued, use the lower side of the torque range. When the nut is stationary and the fastener is torqued, use the higher side of the torque range. In this case, ensure one (1) washer is installed under the head as follows:

- (a) If the subject chapter/section does not specify the use of a washer under the head, install one (1) NAS1149 .032 thick washer under the head. If additional washers are required under nut to adjust for grip length variation as described under Threaded Fastener Installation in 20-00-00 reduce them .032 to allow for the additional .032 washer now installed under head. Check to ensure threads are not bearing loads, due to the added .032 washer thickness.
- (b) All added washers are to be of the correct diameter, material and finish that matches the fastener being installed.
- (7) Apply a smooth, even pull when applying torque pressure. If chattering or a jerking motion occurs during final torque, back off and re-torque.
- (8) When installing a castellated nut, torque nut to the maximum allowable torque for the particular fastener/nut combination then back off to the nearest castellation, and install the cotter pin.
- (9) Unless otherwise specified in the subject chapter/section, when castellated nuts are used with a cotter pin on moving joints, the nut shall not be torqued to "Chart 2" values. Nuts shall be tightened to remove looseness in the joint and then the cotter pin installed.
- (10) Unless otherwise specified in the subject chapter/section, when parts are used on engines or other vendor supplied assemblies using Piper furnished or existing supplier threaded fasteners, tightening torque limits specified by the latest applicable supplier specifications supersede those in "Chart 2" on page 91104.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

C. **Marking After Tightening**

Nuts (or fasteners and screws if no nut is involved) that have been final tightened to torque values as specified in the subject Chapter/Section, in Chart 2, or in the appropriate component manufacturer's documentation, shall be marked with "Torque Seal" (or equivalent) inspection lacquer.

NOTE: For more details on torquing, refer to FAA AC 43.13-1, latest revision.

2. **Conversion Tables**

The following charts contain various conversion data that may be useful when figuring capacities, lengths, temperatures, and various weights and measures from the English system to the metric system or back again:

"Chart 3", Torque Conversion

"Chart 4", Decimal Conversions

"Chart 5", Temperature Conversion

"Chart 6", Weights and Measures Conversion

"Chart 7", Metric Conversion

"Chart 8", Drill Sizes

3. **Hose Specifications**

See "Chart 9" on page 911015.

4. **Consumable Materials**

See "Chart 10" on page 911016 for general consumables.

See "Chart 11" on page 911022 for sealants.

5. **Vendor Contact Information**

See "Chart 12" on page 911025.

6. **Electrical Wire Coding**

See "Chart 13" on page 911028.

7. **Electrical Symbols**

See "Chart 14" on page 911031.

8. **Electrical / Electronic Component Reference Designation Codes**

See "Chart 15" on page 911033.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 1 of 4)
RECOMMENDED NUT TORQUES**

The following tables are partially derived from FAA AC 43.13-1B.

Some fasteners and nuts are listed in more than one group. Select torque from appropriate group depending on application (tension vs shear).

If the chapter/section calls out a fastener and nut that are not in the same group, use the lower of the two torque values.

NASM21042 contains wrenching torque values that are intended for testing purposes only, for aircraft assemblies use torque values shown herein.

Although MS21042, NAS1291, and NAS679 nuts are reduced height, they are included in both tension and shear groups and may be used for both applications.

Unless otherwise specified by the chapter/section, size #6 screws used with self-locking nutplates shall be torqued to no greater than 4–5 in-lbs with an appropriate calibrated driver.

If final torque (with friction drag included) is not listed it shall be calculated per paragraphs 1 B “(3)” and “(4)”, above.

NOTE: Within Chart 2, Tables 1 and 2 are not used.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 2 of 4)
RECOMMENDED NUT TORQUES**

Table 3

Standard Fasteners

Standard Fasteners		Fastener Size		Tension		Shear	
Fasteners	Nuts			Torque (in-lbs)		Torque (in-lbs)	
				No Friction Drag	W/ Friction Drag	No Friction Drag	W/ Friction Drag
AN3 thru 20 AN42 thru 49 AN386 AN525 MS20033 thru 20046 MS20073 MS20074 MS21046 MS24694 MS27039	<u>Tension</u> AN310 AN315 MS20365 ⁽¹⁾ MS21042 MS21044 MS21045 NAS679 NAS1291	Fine Thread	8-36	12-15		7 - 9	
			10-32	20 - 25	38 - 43	12 - 15	30 - 33
			1/4-28	50 - 70	65 - 100	30 - 40	60 - 70
			5/16-24	100 - 140	160 - 200	60 - 85	120 - 145
			3/8-24	160 - 190	240 - 270	95 - 110	175 - 190
			7/16-20	450 - 500	550 - 600	270 - 300	370 - 400
			1/2-20	480 - 690	-	290 - 410	-
			9/16-18	800 - 1000	-	480 - 600	-
			5/8-18	1100 - 1300	-	600 - 780	-
			3/4-16	2300 - 2500	-	1300 - 1500	-
			7/8-14	2500 - 3000	-	1500 - 1800	-
			1-14	3700 - 4500	-	2200 - 3300	-
			1 1/8-12	5000 - 7000	-	3000 - 4200	-
			1 1/4-12	9000 - 11000	-	5400 - 6600	-
	<u>Shear</u> AN316 AN320 MS20364 ⁽¹⁾ MS21083 MS21245 NAS509	Coarse Thread	8-32	12 - 15	27 - 30	7 - 9	22 - 24
			10-24	20 - 25	38 - 43	12 - 15	30 - 33
			1/4-20	40 - 50	70 - 80	25 - 30	55 - 60
			5/16-18	80 - 90	140 - 150	48 - 55	108 - 115
			3/8-16	160 - 185	240 - 265	95 - 110	175 - 190
			7/16-14	235 - 255	335 - 355	140 - 155	240 - 255
			1/2-13	400 - 480	-	240 - 290	-
			9/16-12	500 - 700	-	300 - 420	-
			5/8-11	700 - 900	-	420 - 540	-
			3/4-10	1150 - 1600	-	700 - 950	-
			7/8-9	2200 - 3000	-	1300 - 1800	-
			1-8	3700 - 5000	-	2200 - 3000	-
			1 1/8-8	5500 - 6500	-	3300 - 4000	-
			1 1/4-8	6500 - 8000	-	4000 - 5000	-

(1) superseded by MS21042

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 3 of 4)
RECOMMENDED NUT TORQUES**

Table 4 High Strength Fasteners

High Strength Fasteners		Fastener Size		Tension		Shear	
Fasteners	Nuts			Torque (in-lbs)		Torque (in-lbs)	
				No Friction Drag	W/ Friction Drag	No Friction Drag	W/ Friction Drag
MS20004 thru 20024 NAS333 thru 340 NAS464 NAS624 thru 644 NAS1580 NAS6203 thru 6220 NAS6303 thru 6320 ⁽²⁾ NAS6603 thru 6620 NAS6703 thru 6720	<u>Tension</u>	Fine Thread	8-36	No Data	-	No Data	-
	AN310		10-32	25 – 30	46 – 48	15 – 20	33 – 38
	AN315		1/4-28	80 – 100	110 – 130	50 – 60	50 – 90
	MS20365 ⁽¹⁾		5/16-24	120 – 145	180 – 205	70 – 90	130 – 150
	MS21042		3/8-24	200 – 250	280 – 330	120 – 150	200 – 230
	MS21044		7/16-20	520 – 630	620 – 730	300 – 400	400 – 500
	MS21045		1/2-20	770 – 950	-	450 – 550	-
	NAS679		9/16-18	1100 – 1300	-	650 – 800	-
	NAS1291		5/8-18	1250 – 1550	-	750 – 950	-
	<u>Shear</u>		3/4-16	2650 – 3200	-	1600 – 1900	-
	AN316		7/8-14	3550 – 4350	-	2100 – 2600	-
	AN320		1-14	4500 – 5500	-	2700 – 3300	-
	MS20364 ⁽¹⁾		1 1/8-12	6000 – 7300	-	3600 – 4400	-
	MS21083		1 1/4-12	11000 – 13400	-	6600 – 8000	-
	MS21245						
	NAS509						
		Coarse Thread	All	No Data			

(1) superseded by MS21042

(2) not applicable for aluminum coated fasteners

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 2 (Sheet 4 of 4)
RECOMMENDED NUT TORQUES**

Table 5 Aluminum Fasteners

Aluminum Fasteners		Fastener Size		Tension		Shear	
Fasteners	Nuts			Torque (in-lbs)		Torque (in-lbs)	
				No Friction Drag	W/ Friction Drag	No Friction Drag	W/ Friction Drag
AN3DD	<u>Tension</u>	Fine Thread	8-36	5 – 10	-	3 – 6	-
			10-32	10 – 15	28 – 33	5 – 10	23 – 28
			1/4-28	30 – 45	60 – 75	15 – 30	45 – 60
			5/16-24	40 – 65	100 – 125	25 – 40	85 – 100
			3/8-24	75 – 110	155 – 190	45 – 70	125 – 150
			7/16-20	180 – 280	280 – 380	110 – 170	210 – 270
	<u>Shear</u>		1/2-20	280 – 410	-	160 – 260	-
		Coarse Thread	All	No Data			

Table 6 MS17825 Castle Nuts

Aluminum Fasteners		Fastener Size		Tension		Shear	
Fasteners	Nuts			Torque (in-lbs)		Torque (in-lbs)	
				No Friction Drag	W/ Friction Drag	No Friction Drag	W/ Friction Drag
.190 .250 .3125 .375 .4375 .500	<u>Tension</u>	Fine Thread	8-36	No Data	-	No Data	-
			10-32	28	-	16	-
			1/4-28	65	-	35	-
			5/16-24	180	-	70	-
			3/8-24	260	-	100	-
			7/16-20	460	-	180	-
			1/2-20	720	-	240	-
			9/16-18	880	-	320	-
	<u>Shear</u>		5/8-18	1300	-	480	-
			3/4-16	2200	-	880	-
			7/8-14	3700	-	1500	-
			1-14	5400	-	2400	-
			1 1/8-12	8000	-	4000	-
			1 1/4-12	11000	-	5600	-
		Coarse Thread	All	No Data			

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 3
TORQUE CONVERSION**

INCH POUNDS (IN.-LBS.) TO CENTIMETER KILOGRAMS (CMKG.)

CENTIMETER KILOGRAMS (CMKG.) TO INCH POUNDS (IN.-LBS.)

FOOT POUNDS (FT.-LBS.) TO METER KILOGRAMS (MKG.)

METER KILOGRAMS (MKG.) TO FOOT-POUNDS (FT.-LBS.)

IN.-LBS.	CMKG.	FT.-LBS.	MKG.	FT.-LBS.	MKG.	MKG.	FT.-LBS.
5	5.76	2.5	.346	115	15.900	1	7.23
10	11.52	5	.691	120	16.591	2	14.46
15	17.28	7.5	1.037	125	17.282	3	21.69
20	23.04	10	1.383	130	17.974	4	28.98
25	28.80	12.5	1.728	135	18.665	5	36.16
30	34.56	15	2.074	140	19.356	6	43.39
35	40.32	17.5	2.419	145	10.047	7	50.63
40	46.08	20	2.765	150	20.739	8	57.86
45	51.84	22.5	3.111	155	21.430	9	65.09
50	57.60	25	3.456	160	22.121	10	72.32
55	63.36	27.5	3.802	165	22.813	11	79.56
60	69.12	30	4.148	170	23.504	12	86.79
65	74.88	32.5	4.493	175	24.195	13	94.02
70	80.64	35	4.839	180	24.887	14	101.26
75	86.40	37.5	5.185	185	25.578	15	108.49
80	92.16	40	5.530	190	26.269	16	115.72
85	97.92	42.5	5.876	195	26.960	17	122.95
90	103.68	45	6.222	200	27.652	18	130.19
95	109.44	47.5	6.567	205	28.343	19	137.42
100	115.20	50	6.913	210	29.034	20	144.65
105	120.96	52.5	7.258	215	29.726	21	151.89
110	126.72	55	7.604	220	30.417	22	159.12
115	132.48	57.5	7.950	225	31.108		
120	138.24	60	8.295	230	31.800		
		62.5	8.641	235	32.491		
		65	8.987	240	33.182		
		67.5	9.332	245	33.873		
		70	9.678	250	34.565		
		72.5	10.024	255	35.256		
		75	10.369	260	35.947		
		77.5	10.715	265	36.639		
		80	11.060	270	37.330		
		82.5	11.406	275	38.021		
		85	11.752	280	38.713		
		87.5	12.097	285	39.404		
		90	12.443	290	40.095		
		92.5	12.789	295	40.786		
		95	13.134	300	41.478		
		97.5	13.480				
		100	13.826				
		105	14.517				
		110	15.208				
CMKG.	IN.-LBS.						
50	43.4						
100	86.8						
150	130.2						
200	173.6						
250	217.0						
300	260.4						
350	303.8						
400	347.2						
450	390.6						
500	434.0						
550	477.4						
600	520.8						
650	564.2						
700	607.6						

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

CHART 4
DECIMAL CONVERSIONS

4ths	8ths	16ths	32nds	64ths	TO 3 PLACES	TO 2 PLACES	M.M. EQUIV
1/4	1/8	1/16	1/32	1/64	.016	.02	.397
					.031	.03	.794
			3/64		.047	.05	1.191
					.062	.06	1.587
			5/64		.078	.08	1.984
					.094	.09	2.381
			7/64		.109	.11	2.778
					.125	.12	3.175
		3/16	9/64		.141	.14	3.572
					.156	.16	3.969
			11/64		.172	.17	4.366
					.188	.19	4.762
			13/64		.203	.20	5.159
					.219	.22	5.556
			15/64		.234	.23	5.953
					.250	.25	6.350
	3/8	5/16	17/64		.266	.27	6.747
					.281	.28	7.144
			19/64		.297	.30	7.540
					.312	.31	7.937
			21/64		.328	.33	8.334
					.344	.34	8.731
			23/64		.359	.36	9.128
					.375	.38	9.525
		7/16	25/64		.391	.39	9.922
					.406	.41	10.319
			27/64		.422	.42	10.716
					.438	.44	11.112
			29/64		.453	.45	11.509
					.469	.47	11.906
			31/64		.484	.48	12.303
					.500	.50	12.700

4ths	8ths	16ths	32nds	64ths	TO 3 PLACES	TO 2 PLACES	M.M. EQUIV
3/4	5/8	9/16	17/32	33/64	.516	.52	13.097
					.531	.53	13.494
			35/64		.547	.55	13.891
					.562	.56	14.288
			37/64		.578	.58	14.684
					.594	.59	15.081
			39/64		.609	.61	15.478
					.625	.62	15.875
		11/16	41/64		.641	.64	16.272
					.656	.66	16.669
			43/64		.672	.67	17.065
					.688	.69	17.462
			45/64		.703	.70	17.859
					.719	.72	18.256
			47/64		.734	.73	18.653
					.750	.75	19.050
	7/8	13/16	49/64		.766	.77	19.447
					.781	.78	19.844
			51/64		.797	.80	20.241
					.812	.81	20.637
			53/64		.828	.83	21.034
					.844	.84	21.431
			55/64		.859	.86	21.828
					.875	.88	22.225
		15/16	57/64		.891	.89	22.622
					.906	.91	23.019
			59/64		.922	.92	23.416
					.938	.94	23.812
			61/64		.953	.95	24.209
					.969	.97	24.606
			63/64		.984	.98	25.003
					1.000	1.00	25.400

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 5
TEMPERATURE CONVERSION**

CENTIGRADE - FAHRENHEIT

Example: To convert 20°C, to Fahrenheit, find 20 in the center column headed (°F - °C); then read 68.0°F, in the column (°F) to the right. To convert 20°F, to Centigrade; find 20 in the center column and read -6.67°C, in the (°C) column to the left.

°C	°F - °C	°F	°C	°F - °C	°F
-56.7	-70	-94.0	104.44	220	428.0
-51.1	-60	-76.0	110.00	230	446.0
-45.6	-50	-58.0	115.56	240	464.0
-40.0	-40	-40.0	121.11	250	482.0
-34.0	-30	-22.0	126.67	260	500.0
-28.9	-20	-4.0	132.22	270	518.0
-23.3	-10	14.0	137.78	280	536.0
-17.8	0	32.0	143.33	290	554.0
-12.22	10	50.0	148.89	300	572.0
-6.67	20	68.0	154.44	310	590.0
-1.11	30	86.0	160.00	320	608.0
4.44	40	104.0	165.56	330	626.0
10.00	50	122.0	171.11	340	644.0
15.56	60	140.0	176.67	350	662.0
21.11	70	158.0	182.22	360	680.0
26.67	80	176.0	187.78	370	698.0
32.22	90	194.0	193.33	380	716.0
37.78	100	212.0	198.89	390	734.0
43.33	110	230.0	204.44	400	752.0
48.89	120	248.0	210.00	410	770.0
54.44	130	266.0	215.56	420	788.0
60.00	140	284.0	221.11	430	806.0
65.56	150	302.0	226.67	440	824.0
71.00	160	320.0	232.22	450	842.0
76.67	170	338.0	237.78	460	860.0
82.22	180	356.0	243.33	470	878.0
87.78	190	374.0	248.89	480	896.0
93.33	200	392.0	254.44	490	914.0
98.89	210	410.0	260.00	500	932.0

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 6
WEIGHTS AND MEASURES CONVERSION**

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
CENTIMETERS	0.3937 0.03281	IN. FT.	KILOGRAMS	2.205 35.27 1000	LB. OZ. GRAMS
CU. CENTIMETERS	0.001 0.06102 0.0002642	LITERS CU. IN. U.S. GAL.	LITERS	1000 61.03 0.03532 0.2642 0.22 1.057	CU. CM. CU. IN. CU. FT. U.S. GAL. IMPERIAL GAL. QUARTS
CU. FT.	28.320 1.728 7.481 28.32	CU. CM. CU. IN. U.S. GAL. LITERS	METERS	39.37 3.281 1000	IN. FT. MM.
CU. IN.	16.39 0.01639 0.004329 0.01732	CU. CM. LITERS U.S. GAL. QUARTS	METER-KILOGRAM	7.233 9.807	FT.-LB. JOULES
CU. METERS	1000000 35.314 61.023 264.17 999.97	CU. CM. CU. FT. CU. IN. GAL. LITERS	OUNCES, AVDP	0.0625 28.35 437.5	LB., AVDP GRAMS GRAINS
FEET	0.3048 12.000 304.8 0.3333	METERS MILS MM. YARDS	OUNCES, FLUID	29.57 1.805	CU. CM. CU. IN.
FT.-LB.	0.1383 0.001285 0.000000376	M-KG BTU KW-HR	LB., AVDP	453.6 7000 16.0	GRAMS GRAINS OUNCES
FLUID OZ.	8 29.6	DRAM CU. CM.	SQUARE INCH	6.4516	SQ. CM.
GAL., IMPERIAL	277.4 1.201 4.546	CU. IN. U.S. GAL. LITERS	POUND PER SQUARE INCH (PSI)	0.0703	KG.-CM SQUARED
GAL., U.S. DRY	268.8 0.1556 1.164 4.405	CU. IN. CU. FT. U.S. GAL., LIQ. LITERS	STATUTE MILE	1.609 0.8684	KILOMETER NAUTICAL MILE
GAL., U.S. LIQ.	231.0 0.1337 3.785 0.8327 128	CU. IN. CU. FT. LITERS IMPERIAL GAL. FLUID OZ.	NAUTICAL MILE	1.151	STATUTE MILE
IN.	2.540 .08333	CM. FT.	QUART	.9463	LITER
JOULES	0.000948 0.7376	BTU FT.-LB.	MILLIMETER	1000	MICRON
			MICRON	0.001 0.000039	MILLIMETER INCH
			INCH POUNDS	11.521	METER GRAMS
			INCH OUNCES	0.72	METER GRAMS
			POUNDS	0.453	KILOGRAMS

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 7
METRIC CONVERSION**

- Example Convert 1.5 inches to millimeters.
- (1) Read down inches column to 1. inches.
 - (2) Read across top inch column to 0.5.
 - (3) Read down and across to find millimeters (1.5 inches is 38.10 millimeters).

INCHES TO MILLIMETER										
INCHES	0.0000	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009
	MILLIMETER									
0.000		0.0025	0.0050	0.0076	0.0101	0.0127	0.0152	0.0177	0.0203	0.0228
0.001	0.0254	0.0279	0.0304	0.0330	0.0355	0.0381	0.0406	0.0431	0.0457	0.0482
0.002	0.0508	0.0533	0.0558	0.0584	0.0609	0.0635	0.0660	0.0685	0.0711	0.0736
0.003	0.0762	0.0812	0.0838	0.0863	0.0889	0.0914	0.0939	0.0965	0.0990	0.1015
0.004	0.1016	0.1041	0.1066	0.1092	0.1117	0.1143	0.1168	0.1193	0.1219	0.1244
0.005	0.1270	0.1295	0.1320	0.1346	0.1371	0.1397	0.1422	0.1447	0.1473	0.1498
0.006	0.1524	0.1549	0.1574	0.1600	0.1625	0.1651	0.1676	0.1701	0.1727	0.1752
0.007	0.1778	0.1803	0.1828	0.1854	0.1879	0.1905	0.1930	0.1955	0.1981	0.2006
0.008	0.2032	0.2057	0.2082	0.2108	0.2133	0.2159	0.2184	0.2209	0.2235	0.2260
0.009	0.2286	0.2311	0.2336	0.2362	0.2387	0.2413	0.2438	0.2463	0.2489	0.2514

INCHES	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
	MILLIMETER									
0.00		0.025	0.050	0.076	0.101	0.127	0.152	0.177	0.203	0.228
0.01	0.254	0.279	0.304	0.330	0.355	0.381	0.406	0.431	0.457	0.482
0.02	0.508	0.533	0.558	0.584	0.609	0.635	0.660	0.685	0.711	0.736
0.03	0.762	0.787	0.812	0.838	0.863	0.889	0.914	0.939	0.965	0.990
0.04	1.016	1.041	1.066	1.092	1.117	1.143	1.168	1.193	1.219	1.244
0.05	1.270	1.295	1.320	1.346	1.371	1.397	1.422	1.447	1.473	1.498
0.06	1.524	1.549	1.574	1.600	1.625	1.651	1.676	1.701	1.727	1.752
0.07	1.778	1.803	1.828	1.854	1.879	1.905	1.930	1.955	1.981	2.006
0.08	2.032	2.057	2.082	2.108	2.133	2.159	2.184	2.209	2.235	2.260
0.09	2.286	2.311	2.336	2.362	2.387	2.413	2.438	2.463	2.489	2.514

INCHES	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
	MILLIMETER									
0.0		0.254	0.508	0.762	1.016	1.270	1.524	1.778	2.032	2.286
0.1	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
0.2	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
0.3	7.620	7.874	8.128	8.382	8.636	8.890	9.144	9.398	9.652	9.906
0.4	10.160	10.414	10.668	10.922	11.176	11.430	11.684	11.938	12.192	12.446
0.5	12.700	12.954	13.208	13.462	13.716	13.970	14.224	14.478	14.732	14.986
0.6	15.240	15.494	15.748	16.002	16.256	16.510	16.764	17.018	17.272	17.526
0.7	17.780	18.034	18.288	18.542	18.796	19.050	19.304	19.558	19.812	20.066
0.8	20.320	20.574	20.828	21.082	21.336	21.590	21.844	22.098	22.352	22.606
0.9	22.860	23.114	23.368	23.622	23.876	24.130	24.384	24.638	24.892	25.146

INCHES	0.00	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	MILLIMETER									
0.0		2.54	5.08	7.62	10.16	12.70	15.24	17.78	20.32	22.86
1.0	25.40	27.94	30.48	33.02	35.56	38.10	40.64	43.18	45.72	48.26
2.0	50.80	53.34	55.88	58.42	60.96	63.50	66.04	68.58	71.12	73.66
3.0	76.20	78.74	81.28	83.82	86.36	88.90	91.44	93.98	96.52	99.06
4.0	101.60	104.14	106.68	109.22	111.76	114.30	116.84	119.38	121.92	124.46
5.0	127.00	129.54	132.08	134.62	137.16	139.70	142.24	144.78	147.32	149.86
6.0	152.40	154.94	157.48	160.02	162.56	165.10	167.64	170.18	172.72	175.26
7.0	177.80	180.34	182.88	185.42	187.96	190.50	193.04	195.58	198.12	200.66
8.0	203.20	205.74	208.28	210.82	213.36	215.90	218.44	220.98	223.52	226.06
9.0	228.60	231.14	233.68	236.22	238.76	241.30	243.84	246.38	248.92	251.46

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 8
DRILL SIZES**

Decimal/Millimeter Equivalents of Drill Sizes From 1/2" to No. 80											
Size	Decimal Equiv.	Millimeter Equiv.	Size	Decimal Equiv.	Millimeter Equiv.	Size	Decimal Equiv.	Millimeter Equiv.	Size	Decimal Equiv.	Millimeter Equiv.
1/2	0.500	12.7000	G	0.261	6.6294	5/32	0.1562	3.9687	51	0.067	1.7018
31/64	0.4843	12.3031	F	0.257	6.5278	23	0.154	3.9116	52	0.0635	1.6129
15/32	0.4687	11.9062	E-1/4	0.250	6.3500	24	0.152	3.8608	1/16	0.0625	1.5875
29/64	0.4531	11.5094	D	0.246	6.2484	25	0.1495	3.7973	53	0.0595	1.5113
7/16	0.4375	11.1125	C	0.242	6.1468	26	0.147	3.7338	54	0.055	1.397
27/64	0.4218	10.7156	B	0.238	6.0452	27	0.144	3.6576	55	0.052	1.3208
Z	0.413	10.4902	15/64	0.2343	5.9531	9/64	0.1406	3.5719	3/64	0.0468	1.1906
13/32	0.4062	10.3187	A	0.234	5.9436	28	0.1405	3.5687	56	0.0465	1.1811
Y	0.404	10.2616	1	0.228	5.7912	29	0.136	3.4544	57	0.043	1.0922
X	0.397	10.0838	2	0.221	5.6134	30	0.1285	3.2639	58	0.042	1.0668
25/64	0.3906	9.9212	7/32	0.2187	5.5562	1/8	0.125	3.1750	59	0.041	1.0414
W	0.386	9.8044	3	0.213	5.4102	31	0.120	3.048	60	0.040	1.016
V	0.377	9.5758	4	0.209	5.3086	32	0.116	2.9464	61	0.039	0.9906
3/8	0.375	9.5250	5	0.2055	5.2197	33	0.113	2.8702	62	0.038	0.9652
U	0.368	9.3472	6	0.204	5.1816	34	0.111	2.8194	63	0.037	0.9398
23/64	0.3593	9.1262	13/64	0.2031	5.1594	35	0.110	2.794	64	0.036	0.9144
T	0.358	9.1281	7	0.201	5.1054	7/64	0.1093	2.7781	65	0.035	0.899
S	0.346	8.7884	8	0.199	5.0546	36	0.1065	2.7051	66	0.033	0.8382
11/32	0.3437	8.7300	9	0.196	4.9784	37	0.104	2.6416	1/32	0.0312	0.7937
R	0.339	8.6106	10	0.1935	4.9149	38	0.1015	2.5781	67	0.032	0.8128
Q	0.332	8.4328	11	0.191	4.8514	39	0.0995	2.5273	68	0.031	0.7874
21/64	0.3281	8.3337	12	0.189	4.8006	40	0.098	2.4892	69	0.029	0.7366
P	0.323	8.2042	3/16	0.1875	4.7625	41	0.096	2.4384	70	0.028	0.7112
O	0.316	8.0264	13	0.185	4.699	3/32	0.0937	2.3812	71	0.026	0.6604
5/16	0.3125	7.9375	14	0.182	4.6228	42	0.0935	2.3749	72	0.025	0.635
N	0.302	7.6708	15	0.180	4.572	43	0.089	2.2606	73	0.024	0.0696
19/64	0.2968	7.5387	16	0.177	4.4958	44	0.086	2.1844	74	0.0229	0.58166
M	0.295	7.4930	17	0.173	4.3942	45	0.082	2.0828	75	0.021	0.5334
L	0.290	7.3660	11/64	0.1718	4.3656	46	0.081	2.0574	76	0.020	0.508
9/32	0.2812	7.1425	18	0.1695	4.3053	47	0.0785	1.9939	77	0.018	0.4572
K	0.281	7.1374	19	0.166	4.2164	5/64	0.0781	1.9844	1/64	0.0156	0.3969
J	0.277	7.0358	20	0.161	4.0894	48	0.076	1.9304	78	0.016	0.4064
I	0.272	6.9088	21	0.159	4.0386	49	0.073	1.8542	79	0.0145	0.3683
H	0.266	6.7564	22	0.157	3.9878	50	0.070	1.778	80	0.0135	0.3429
17/64	0.2656	6.7462									

DRILL SIZES AVAILABLE

Drill may be obtained in regular sizes to a 4 inch diameter, and increase in 64ths of an inch. The regular metric drills vary from 2 to 76mm and increase in 0.5mm variations.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 9
HOSE SPECIFICATIONS**

SINGLE WIRE BRAID FABRIC COVERED

MIL PART NO.	TUBE SIZE O.D.	HOSE SIZE I.D.	HOSE SIZE O.D.	RECOMMENDED OPER. PRESS	MIN BURST PRESS	MAX PROOF PRESS	MIN BEND RADIUS
MIL-H-8794- 3-L	3/16	1/8	.45	3,000	12,000	6,000	3.00
MIL-H-8794- 4-L	1/16	3/16	.52	3,000	12,000	6,000	3.00
MIL-H-8794- 5-L	5/16	1/4	.58	3,000	10,000	5,000	3.38
MIL-H-8794- 6-L	3/8	5/16	.67	2,000	9,000	4,500	4.00
MIL-H-8794- 8-L	1/2	13/32	.77	2,000	8,000	4,000	4.63
MIL-H-8794-10-L	5/8	1/2	.92	1,750	7,000	3,500	5.50
MIL-H-8794-12-L	3/4	5/8	1.08	1,500	6,000	3,000	6.50
MIL-H-8794-16-L	1	7/8	1.23	800	3,200	1,600	7.38
MIL-H-8794-20-L	1 1/4	1 1/8	1.50	600	2,500	1,250	9.00
MIL-H-8794-24-L	1 1/2	1 3/8	1.75	500	2,000	1,000	11.00
MIL-H-8794-32-L	2	1 13/16	2.22	300	1,400	700	13.25
MIL-H-8794-40-L	2 1/2	2 3/8	2.88	200	1,000	300	24.00
MIL-H-8794-48-L	3	3	3.56	200	800	300	33.00

Construction Seamless synthetic rubber inner tube reinforced with one fiber braid, one braid of high tensile steel wire and covered with an oil resistant rubber impregnated fiber braid.

Identification Hose is identified by specification number, size number, quarter year and year, hose manufacturer's identification.

Uses Hose is approved for use in aircraft hydraulic, pneumatic, coolant, fuel and oil systems.

Operating Temperatures:

Sizes -3 thru -12 Minus 65°F. to plus 250°F.

Sizes -16 thru -48 Minus 40°F to plus 275°F.

NOTE Maximum temperatures and pressures should not be used simultaneously.

MULTIPLE WIRE BRAID RUBBER COVERED

MIL PART NO.	TUBE SIZE O.D.	HOSE SIZE I.D.	HOSE SIZE O.D.	RECOMMENDED OPER. PRESS	MIN BURST PRESS	MAX PROOF PRESS	MIN BEND RADIUS
MIL-H-8788- 4-L	1/4	7/32	.63	3,000	16,000	8,000	3.00
MIL-H-8788- 5-L	5/16	9/32	.70	3,000	14,000	7,000	3.38
MIL-H-8788- 6-L	3/8	11/32	.77	3,000	14,000	7,000	5.00
MIL-H-8788- 8-L	1/2	7/16	.86	3,000	14,000	7,000	5.75
MIL-H-8788-10-L	5/8	9/16	1.03	3,000	12,000	6,000	6.50
MIL-H-8788-12-L	3/4	11/16	1.22	3,000	12,000	6,000	7.75
MIL-H-8788-16-L	1.00	7/8	1.50	3,000	10,000	5,000	9.63

Hose Construction Seamless synthetic rubber inner tube reinforced with one fabric braid, two or more steel wire braids, and covered with a synthetic rubber cover (for gas applications, request perforated cover).

Identification Hose is identified by specification number, size number, quarter year and year, hose manufacturer's identification.

Uses High pressure hydraulic, pneumatic, coolant, fuel and oil.

Operating Temperature:

Minus 65°F to plus 200°F.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 1 of 6)
CONSUMABLE MATERIALS - GENERAL**

Material	Specification	Product	Vendor
ABS-Solvent/ Cements		Solarite, #11 Series	Solar Compounds Corp.
Adhesive		EC 801 EC 807 EC 1357 Scotch Grip 210 (Rubber Adhesive)	Minnesota Mining and Manufacturing Adhesive Coating and Sealers Division
Anti-Galling Solution	MIL-PRF-907	Kopr-Kote	Jet-Lube, Inc.
Anti-Seize Compound (Graphite Petrolatum)	SAE-AMS-2518	Armite Product	Armite Laboratories
		Anti-Seize Compound	Exxon Oil Company
		Royco 44	Royal Lubricants Co.
Anti-Seize Compound	TT-A-580 (TT-S-1732)	Armite Product	Armite Laboratories
Anti-Seize Thread Compound "HIGH TEMPERATURE"		Fel-Pro C5-A	Fel-Pro Incorporated
Buffing and Rubbing Compounds		Automotive Type Rubbing Compound	Local Supplier
		Ram Chemical #69	Ram Chemicals
Compound for Polishing		Mirror Glaze	Mirror Bright Polish Co., Incorporated
Plexiglas Polish and Cleaner	P-P-560	Part Number 403D	Permatex Co., Inc. Kansas City, Kansas 66115
Cleaners		Fantastic Spray Perchlorethylene VM&P Naphtha (Lighter Fluid)	Local Supplier
Corrosion Retardant Compounds	MIL-PRF-16173 (Piper P/N 197-508)	LPS-3 Heavy Duty Rust Inhibitor	Holt Lloyd Corp.
	(Piper P/N 197-509)	Metal Parts Protector Protector Flex	Chemi-Cap. Chemical Packaging Corp.
Deicer Boot Surface Coatings		Agemaster	B.F. Goodrich
Dry Lubricant		MS-122AD	Miller-Stephenson
Epoxy Patching Compound		Solarite #400	Solar Compounds Corp.
Gasket Cement		Permatex No. 2	Permatex Company, Inc.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 2 of 6)
CONSUMABLE MATERIALS - GENERAL**

Material	Specification	Product	Vendor
Grease, Actuator		2196-74-1	Dukes Astronautics Co.
Grease, Aircraft Instrumentation, Gear and Actuator Screw (Temp. Range -100°F to +250°F)	MIL-PRF-23827 (See Note at end.)	Supermil Grease No. A72832	Amoco
		Royco 27A Royco 78	Royal Lubricants Co.
		Shell 6249 Grease	Shell Oil Company
		RR-28	Socony Mobil Oil Co.
		Castrolase A1	Burmah-Castrol LTD.
		Low-Temp. Grease E.P. Unitemp E.P.	Texaco Incorp.
		5114 E.P. Grease AV55	Standard Oil of Calif.
		RPM Aviation Grease 5, Supermil Grease No. 8723	
		Aeroshell Grease 7 Aeroshell Grease 7A Braycote 627S	Shell Oil Company
		Mobil Grease 33 (755-162 (12.5oz Tube))	Mobil Oil Corporation
		B.P. Aero Grease 31B	B.P. Trading Limited
		L-1212	Sinclair Refining Co.
		1916 Uni-Temp Grease	California Texas Oil Corporation
Grease Ball and Roller Bearing	DOD-G-24508	Regal ASB-2 Formula TG-10293	Texaco Incorporated
		Andok B	Exxon Company, U.S.A.
		Code 1-20481, Darina Grease 1 XSG-6213	Shell Oil Company
		Code 71-501, Darina Grease 2 XSG-6152	
		Code 71-502, Alvania Grease 2 XSG-6151	
		Code 71-012, Cyprina Grease 3 XSG-6280	
		Code 71-003	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 3 of 6)
CONSUMABLE MATERIALS - GENERAL**

Material	Specification	Product	Vendor
Grease, General Purpose, Wide Temperature Range (-65°F to +350°F)	MIL-PRF-81322	Marfax All Purpose, High Temp. Grease Regal AFB2 Regal Starfak Premium	Texaco Incorporated
		Aeroshell No. 5 Aeroshell No. 6 Aeroshell No. 22 Shell Alvania EP2 Shellaire Grease HT	Shell Oil Company
		Mobil Grease 77 or Mobilux EP2	Mobil Oil Corporation
		Royco 22 Royco 45A Royco II	Royal Lubricants Company
		Mobil Grease 28	Mobil Oil Corporation
		L-1231	Sinclair Refining Company
		PED 3040	Standard Oil of Calif. Royal Lubricants Co.
Grease, Lubricating, Molybdenum Disulfide, Low and High Temperature	MIL-G-21164	Aeroshell Grease No. 17	Shell Oil Company
		Royco 64C	Royal Lubricants Co.
		Castrol MSA (c)	Burmah Castrol LTD.
Grease, Plug Valve, Gasoline and Oil Resistant	SAE-AMS-G-6032	Royco 32	Royal Lubricant Co.
		Castrol PV	Burmah Castrol LTD.
		Parker Fuel Lube 44	Parker Seal Company
		B.P. Aero Grease 32	B.P. Trading Limited
		L-237	Lehigh Tenneco Chemicals Co., Inc.
Grease, Waterproof, High and Low Temperature		Rockwell 950	Rockwell International
		Aero Lubriplate	LUBRIPLATE Lubricants Co.
"Hot Melt" Adhesive Polyamids and "Hot Melt" Gun.	Stick Form 1/2 in. diameter, 3 in. long		Local Supplier

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 4 of 6)
CONSUMABLE MATERIALS - GENERAL**

Material	Specification	Product	Vendor
Hydraulic Fluid	MIL-PRF-5606	Brayco 756D	Bray Oil Company
		TL-5874	Texaco Incorporated
		PED 3565	Standard Oil Company of California
		Aircraft Hydraulic Oil AA	Texaco Incorporated
		RPM Aviation Oil No. 2 Code PED 2585 PED 3337	Standard Oil Company of California
		3126 Hydraulic Oil (Univis 40)	Exxon Company U.S.A.
		Aeroshell Fluid 4, SL-7694	Shell Oil Company
		Aero HF	Mobil Oil Corporation
		Royco 756, 756A and 756B	Royal Lubricants Co.
Isopropyl Alcohol	Fed. Spec. TT-I-735		Local Supplier
Isocryl Tape	(PMS-C1012-2)		Schnee Moorehead Chemicals, Incorporated
Kevlar		Kevlar	Kevlar Special Products
Leak Detector Solution for Oxygen Systems	MIL-PRF-25567	ALPHA 73 Oxygen Leak Detector Type 1	U.S. Gulf Corporation
		Leak Tec #16-OX	American Gas and Chemical Co. LTD.
Loctite	ASTM-D-5363	Loctite 420 Grade AA	Loctite Corporation
	ASTM-D-5363 Grade H and HV	Loctite 222	
		Loctite 27121	
Lubricant, O-Rings		Parker O-Lube	Parker Hannifin Corp
Methylethylketone	Fed. Spec. TT-M-261		Local Supplier
Molybdenum Disulfide	SAE-AMS-M-7866	Molykote-Type G	Dow Corning Corp. (Paste)
		Molykote - Type 2 (Powder)	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 5 of 6)
CONSUMABLE MATERIALS - GENERAL**

Material	Specification	Product	Vendor
Oil, Air Conditioner, R12		Frigidaire #525	Virginia Chemical
		Suniso #5	Sun Oil Company of Pennsylvania
		Texaco Capilla "E"	Texaco Incorporated
Oil, Air Conditioner, HFC-134a, POE	Piper P/N 197-511	Ester-25065	
Oil Lubricating, General Purpose, Low Temperature	MIL-PRF-7870	Caltex Low Temp. Oil	Caltex Oil Products Company
		Sinclair Aircraft Orbit Lube	Sinclair Refining Company
		1692 Low Temp Oil	Texaco Incorporated
		Aviation Instrument Oil	Standard Oil Company of California
		Royco 363	Royal Lubricants Co.
Primer, Fluid Resistant Epoxy	Piper P/N 279-179	EWDE072A/B	PPG Aerospace PRC-DeSoto
	Piper P/N 279-506	10P8-10NF / EC-283	Akzo Nobel Aerospace Coatings
	Piper P/N 279-108	10P30-5 / EC-275 44GN036	Deft, Inc.
Rain Repellent	FSCM 50150	Repcon	Unelco Corporation
Refrigerant, A/C HFC-134a	1,1,1,2-Tetrafluoroethane and/or CAS# 811-97-2		Procure locally.
Safety Walk Pressure Sensitive		Flexfred 300	Wooster Products, Incorporated

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 10 (Sheet 6 of 6)
CONSUMABLE MATERIALS - GENERAL**

Material	Specification	Product	Vendor
Silicone Compound	SAE-AS-8660 (MIL-C-21567)	DC-4, DC-6 Compound	Dow Corning
		G-624	General Electric Co. Silicone Products Department
Solvents	Fed. Spec. PD 680 Type I - Stoddard Solvent Type II - High Temperature	Methylethyl Ketone Methylene Chloride Acetone	Local Suppliers
		Y2900	Union Carbide; Plastic Division
			Local Supplier
			Local Supplier
Propeller Slip Ring Cleaning Solvent		CRC-2-26	Corrosion Reaction Consultants, Inc.
Toluol	TT-M-261		Local Supplier
Trichlorethylene	MIL-T-7003	Perm-A-Clor	Dextrex Chemical Industries, Inc.
		Turco 4217	Turco Products, Inc.
Teflon Tape	.003" x .5" wide/-1		Minnesota Mining and Manufacturing Company Shamban W.S. and Co.
	.003" x .25" wide/-2		Johnson & Johnson, Inc. Permacel Division
Thread Lubricant, Oleo Strut, Air Valve	MIL-PRF-907	Kopr-Kote	Jet-Lube, Inc.
Thread Sealant for High Pressure Oxygen System	AA-58092	Permacel 412	Johnson & Johnson, Inc. Permacel Division
Vinyl Foam	1 in. x 1/8 in.	530 Series, Type I	Norton Tape Division
Vinyl, Foam Tape	1/8 in. x 1 in.	501 Series, Type II	Norton Tape Division
Vinyl, Black Plastic	2 in. x 9 mil. and/or 1 1/2 in. x 9 mil.		
NOTE: Take precautions when using MIL-PRF-23827 and engine oil. These lubricants contain chemicals harmful to painted surfaces.			

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 11(Sheet 1 of 3)
CONSUMABLE MATERIALS - SEALANTS**

Sealant Type	Manufacturer Product (Specific Gravity & Cured Hardness)	Class/ Worklife (hrs)	Typical Time at 77°F/50%RH		Piper Code			Shelf Life at 80°F (months)
			Tack Free	Cure to 30A	2.5-oz Semco	6-oz Semco	Gallon Can Kit	
Type 1 Fuel Tank and Fuselage Pressurized Structure See Note 1 and see also Type 6.	3M AC -236 (SG=1.64, ≥60A)	A-2	24	48	279-554	279-060	279-514	9
		B-½	8	24	279-483	279-516	---	9
		B-2	24	48	279-555	279-517	---	9
		B-4	48	90	279-556	279-066	279-515	9
	3M AC -350 (SG=1.40, ≥48A)	A-2	8	12	279-518	279-185	279-524	9
		B-½	2-3	2-3	279-519	279-186	---	9
		B-2	7-8	7-8	279-520	279-187	---	9
		B-4	32-36	32-36	279-521	279-183	279-525	9
	Flamemaster CS3204 (SG=1.66, ≥55A)	A-2	24	72	279-526	279-213	279-532	9
		B-½	8	30	279-527	279-217	---	9
		B-2	24	72	279-528	279-212	---	9
		B-4	36	90	279-529	279-220	279-533	9
	Royal WS -8020 (SG=1.52, ≥50A)	A-2	<24	<48	279-822	279-821	279-810	9
		B-½	<10	<24	279-534	279-557	---	9
		B-2	<24	<48	279-535	279-548	---	9
		B-4	<36	<90	279-823	279-824	279-807	9
	Royal WS - 8020RC (SG=1.45, ≥50A)	A-2	<10	<30	279-536	179-202	179-209	9
		B-½	<5	<5	279-537	179-203	---	9
		B-2	<9	<14	279-538	179-204	---	9
		B-4	<24	<26	279-539	179-205	179-210	9
	PPG PR -1440 (SG=1.57, ≥46A)	A-2	<36	72	279-540	279-545	279-544	9
		B-½	<4	8	279-541	279-546	---	9
		B-2	<8	11	279-542	279-122	---	9
Type 1LD Fuel Tank and Fuselage Pressurized Structure See Note 2	Royal WS -8032 (SG=1.10, ≥48A)	B-½	<4	<6	279-428	279-432	---	9
		B-2	<6	<9	279-429	279-433	---	9
	PPG PR -2007 (SG=1.10, ≥45A)	B-½	4	6	279-426	279-430	---	9
		B-2	<6	8	279-427	279-431	---	9

(PIR-PPS45012-1 Rev. AU.)

- (1) Use Accelerator below if desired.
(2) Low Density. Use Accelerator below if desired.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 11 (Sheet 2 of 3)
CONSUMABLE MATERIALS - SEALANTS**

Sealant Type	Manufacturer Product & Class (Specific Gravity & Cured Hardness)	Worklife/ Assembly Time (hrs)	Typical Time at 77°F/50%RH		Piper Code	Shelf Life at 80°F (months)
			Tack Free	Cure to 30A		
Type 2 Access Doors and Panels in Pressurized Structure See Note 3	3M AC-215 B-2 (SG=1.52, 45A)	2	24	48	279-184	12
	Flamemaster CS3330ci B-2 (SG=1.50, 35A)	2	18	30	279-820	9
	PPG PR-1428 B-2 (SG=1.50, 50A)	2	<8	24	279-036	12
	Royal WS8010 B-1/2 (SG=1.50, 53A)	30 min	<3	<4	279-497	9
	Royal WS8010 B-2 (SG=1.50, 53A)	2	<6	<12	279-496	9
Type 3 Fill and Drain Coating in Small Tanks	3M EC-776SR (SG=0.86)	-	20 min	24	279-229	6
	Flamemaster CS3600 (SG=0.88)	-	20 min	24-48	279-547	12
	PPG PR-1005-L (SG=0.85)	-	20 min	48	179-750	12
Type 4, Group I General Purpose Silicone See Note 4	Momentive RTV102 -White (SG=1.05, 30A)	-	20 min	24	179-758	12
	Momentive RTV103 -Black (SG=1.05, 30A)	-	20 min	24	179-759	12
	Momentive RTV108 -Clear (SG=1.05, 30A)	-	20 min	24	179-760	12
Type 4, Group III Engine Compartment Silicone See Note 5	Momentive RTV106 -Red (SG=1.07, 30A)	-	20 min	24	179-763	12
Type 5 Wet Fastener Installation in Pressurized Structure. See Note 6	3M AC-236 C-20 (SG=1.64, 60A)	8(20)	60	<336	279-196	9
	3M AC-350 C-8(24) (SG=1.40, 50A)	8(24)	96	96	279-523	9
	Royal WS-8032 C-8 (SG=1.17, 50A)	8(24)	<168	<168	279-550	9
	PPG P/S 890 C-8(20) (SG=1.54, 45A)	8(20)	<168	<168	279-531	9
	PPG PR-1440 C-20 (SG=1.57, 46A)	8(20)	<168	<168	279-192	9
	PPG PR-1776 C-8 (SG=1.29, 48A)	8(24)	<120	120	279-551	9
Type 6 Fuel Tank and Fuselage Pressurized Structure See Note 7	3M AC-250 A-1/6 (SG=1.61, 55A)	10 min	70 min	2	279-244	6
	3M AC-250 B-1/6 (SG=1.62, 55A)	10 min	1	2	279-245	6
	PPG PS 860 B-1/6 (SG=1.65, 45A)	20 min	<3	8	279-191	6
Type 7 Firewall See Note 8	Cytec DAPCO 2100 (SG=1.37, 50A)	10 min	15 min	24	279-522	6
	Cytec DAPCO 2200 (SG=1.37, 50A)	30 min	1	4	279-530	6
	Esterline Fastblock 100 (SG=1.25, 63A)	4	6	<48	279-543	6
	Flamemaster CS1900 (SG=1.33, 80A)	2	<4	<60	279-226	12
	Momentive RTV133 (SG=1.23, 45A)	1	3-5	48	279-029	12
	PPG PR-812 (SG=1.33, 75A)	2	<24	48	279-549	12

(3) Low Adhesion.

(4) Minimum exposure to fuel, not paintable.

(5) Minimal exposure to fuel, intermittent temperature up to 600°F not paintable.

(6) Use Accelerator below if desired. AMS specifications for class C sealants contain no standard cure requirements.

(7) Short Work Life Repairs.

(8) 15 minutes at 2,000 °F.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 11 (Sheet 3 of 3)
CONSUMABLE MATERIALS - SEALANTS**

Sealant Type	Manufacturer Product & Class (Specific Gravity & Cured Hardness)	Worklife/ Assembly Time (hrs)	Typical Time at 77°F/50%RH		Piper Code	Shelf Life at 80°F (months)
			Tack Free	Cure to 30A		
Type 8 Pressurized Windows or Deice Boot Edge Sealer	Flamemaster CS3247 B-4 (SG=1.63, 45A)	4	<36	<90	279-227	9
	PPG PR-1425CF B-2 (SG=1.44, 47A)	2	<8	12	279-019	9
	Flamemaster CS3247 B-2 (SG=1.63, 45A)	2	<24	48	279-560	9
Type 9 Accelerator See Note 9	PPG PR-716 Turquoise Liquid	-	<30 min	-	279-816	9
	PPG PR-717 Green Liquid	-	<30 min	-	279-552	9
	PPG P/S 815 Clear Aerosol	-	<2	-	279-553	6

(9) See above for applicability.

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 12 (Sheet 1 of 3)
VENDOR CONTACT INFORMATION**

A

American Gas and
Chemical Co. LTD
220 Pegasus Avenue
Northvale, NJ 07647
201-767-7300

Amoco Oil Co.
200 E. Randolph Drive
Chicago, IL 60601
312-856-5111

Armite Laboratories
1845-49 Randolph Street
Los Angeles, CA 90001
213-587-7744

Akzo Nobel Aerospace Coatings
East Water Street
Waukegan, IL 60085
847-625-3340
<http://www.anac.com/>

B

BP Trading Limited
Moore Lane
Brittanic House
London E.C. 2
England

Bray Oil Company
1925 N. Marianna Avenue
Los Angeles, CA 98103
213-268-6171

Burmah - Castrol Inc.
30 Executive Avenue
Edison, NJ 08817
201-287-3140

C

California Texas Oil Corp.,
380 Madison Avenue
New York, NY 10017

Caltex Oil Products Co.
New York, NY 10020

CEE BEE Chemical Co.
9520 E. CEE BEE Drive
Box 400
Downey, CA 92041

Chemi-cap
Chemical Packaging Corp.
1100 N.W. 70th Street
Ft. Lauderdale, FL 33309
305-665-9059

Corrosion Reaction
Consultants, Inc.
Limekin Pike
Dresher, PA 19025

D

Deft, Inc.
17451 Von Karman Ave.
Irvine, CA 92614
800-544-3338
<http://www.deftfinishes.com/>

Dextrex Chemical
P. O. Box 501
Detroit, MI 48232

Dow Corning Corporation
Alpha Molykote Plant
64 Harvard Avenue
Stanford, CT 06902

Dukes Astronautics Co.
7866 Deering Avenue
Canoga Park, CA 91304

E

Exxon Oil Company
1251 Avenue of the Americas
New York, NY 10020
212-398-3093

F

Fel-Pro Incorporated
7450 N. McCormick Blvd.
Box C1103
Skokie, IL 60076
312-761-4500

G

General Electric Co.
Silicone Products Dept.
Waterford, NY 12188
518-237-3330

H

H. S. Bancroft Corp.
One Rockhill
Industrial Park
Cherry Hill, NJ 08003
609-854-8000

J

Jet Lube, Inc.
P.O. Box 21258
Houston, TX 77226-1258
800-538-5823
<http://www.jetlube.com>

Johnson & Johnson, Inc.
Permaceel Division
501 George Street
New Brunswick, NJ 08901
201-524-0400

K

Kevlar Special Products
E.I. DuPont de Nemours & Co.,
(Inc.)
Textile Fibers Department
Centre Road Building
Wilmington, DE 19898
302-999-3156

L

Lehigh - Tenneco Chemicals Co.,
Inc.
Chestertown, MD 21620
301-778-1991

Loctite Corporation
777 N. Mountain Road
Newington, CT 06111
800-243-8160
In CT 800-842-0225

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**Chart 12 (Sheet 2 of 3)
VENDOR CONTACT INFORMATION**

LPS Laboratories
4647 Hugh Howell Rd.
Tucker, GA 30084
800-241-8334
<http://www.lpslabs.com/>

LUBRIPLATE Lubricants Co.
129 Lockwood St.
Newark, NJ 07105
800-733-4755
<http://www.lubriplate.com>

M

Miller-Stephenson
George Washington Hwy.
Danbury, CT 06810
203-743-4447
<http://www.miller-stephenson.com>

Minnesota Mining and MFG
3M Center
St. Paul, MN 55144
612-733-1110

Mirror Bright Polish Co., Inc.
Irvine Industrial Complex
P.O. Box 17177
Irvin, CA 92713
714-557-9200

Mobil Oil Corporation
150 E. 42nd Street
New York, NY 10017
212-883-4242

Morton Inc.
7341 Anaconda Ave
Garden Grove, CA 92641
724-373-2837
Fax 724-373-1913

N

Norton Tape Division
Department 6610
Troy, NY 12181
518-273-0100

P

Parker Hannifin Corp.
O-Ring Division
2360 Palumbo Drive
Lexington, KY 40509
859-269-2351
<http://www.parker.com>

Parker Seal Company
17325 Euclid Avenue
Cleveland, OH 44112
216-531-3000

Permatex Co., Inc.
P.O. Box 11915
Newington, CT 06111
203-527-5211

PPG Aerospace PRC-DeSoto
11601 United Street
Mojave, California 93501
661-824-4532
818-549-7999
<http://corporateportal.ppg.com/na/aerospace/>

R

Radiator Specialty Co.
P.O. Box 34689
Charlotte, NC 28234
704-377-6555

Ram Chemicals
201 E. Alondra Blvd.
Gardena, CA 90248
213-321-0710

Rockwell International
600 Grant Street
Pittsburgh, PA 15219
412-565-2000

Royal Lubricants Company
River Road
E. Hanover, NJ 07936
201-887-3100

S

Schnee Moorhead Chemicals, Inc.
PO Box 171305
Irving, TX 75017-1305
800-878-7876
<http://www.schneemorehead.com>

Shamban W.S. and Co.
1857 Centinela Avenue
Santa Monica, CA 90404
213-397-2195

Shell Oil Company
One Shell Plaza
Houston, TX 77003
713-220-6697

Sinclair Refining Co.
600 Fifth Avenue
New York, NY 10020

Socony Mobil Oil Co.
Washington 5, DC 20005

Solar Compounds Corp.
1201 W. Blancke Street
Linden, NJ 07036
201-862-2813

Standard Oil of California
225 Bush Street
San Francisco, CA 94104
415-894-7700

Sun Oil Company of Penna
5 Penn Center Plaza
Philadelphia, PA 19103
215-972-2000

T

Taxacone Company
P.O. Box 10823 TR
Dallas, TX 75208

Texaco, Inc.
2000 Westchester Avenue
White Plains, NY 10650
914-253-4000

Turco Products Inc.
24600 S. Main Street
Box 6200
Carson, CA 90749
213-835-8211

U

U.S. Gulf Corp.
P.O. Box 233
Stoney Brook, NY 11790
212-683-9221

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**Chart 12 (Sheet 3 of 3)
VENDOR CONTACT INFORMATION**

Unelko Corporation
727 E. 110th Street
Chicago, IL 60628

Union Carbide; Plastic Div.
270 Park Avenue
New York, NY 10017
212-551-3763

V

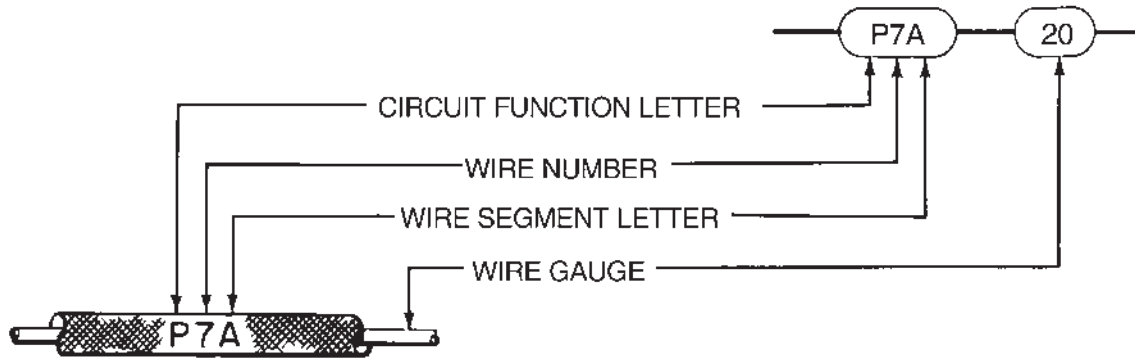
Virginia Chemical
3340 W. Norfolk Rd.
Portsmouth, VA 23703
703-484-5000

W

Wooster Products, Inc.
1000 Spruce Street
Wooster, OH 44691
800-321-4936
In OH 216-264-2844

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 13 (Sheet 1 of 3)
ELECTRICAL WIRE CODING**



FUNCTION LETTER (Circa 2010 and Prior)	FUNCTION LETTER (Circa 2010 and Later)	CIRCUIT
AC	H	Air Conditioning
	F	Airspeed Indicator
PF	F	Alternator Field Control
	L	Altitude Indicator / Altimeter
	F	Attitude Indicator
A	C	Autopilot
	H	Avionics Cooling
	L	Avionics Lights
	P	Battery
	H	Cabin Heating
	L	Cabin Lights
	H	Cabin Ventilation
	D	Clock
C		Control Surface
	E	DAU
	C	Electric Trim
	M	ELT Switch
K		Engine Control, Starter
	J	Engine Ignition
E		Engine Instrument
	Q	Engine Priming
	K	Engine Starting
	E	Engine Temperature
	M	Entertainment System
	W	Exceedance Horn
	C	Flap Position/Control
	F	Flight Display/ MFD
F		Flight Instruments
	E	Fuel Flow
	E	Fuel Pressure
	Q	Fuel Pumps

(PIR-PPS55006, Rev. AH.)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**Chart 13 (Sheet 2 of 3)
ELECTRICAL WIRE CODING**

FUNCTION LETTER (Circa 2010 and Prior)	FUNCTION LETTER (Circa 2010 and Later)	CIRCUIT
Q	Q	Fuel Qty
	G	Gear Extension and Retraction
	G	Gear Position and Warning
GND		Ground
	T	Hazard Awareness (IHAS, Skywatch, etc.)
H		Heating, Ventilating
	D	Hours Meters
	G	Hydraulic Pump, Power, and Control “
J		Ignition
G		Landing Gear
	L	Landing Lights
L		Lighting
	E	Manifold Pressure
M		Misc. Equipment, Cigar Lighter, Hour Meter
	L	Navigation Lights
	E	Oil Pressure
Q		Oil Quantity
	E	Oil Temperature
OX		Oxygen
	W	Oxygen System
	L	Panel Lights
	H	Pitot Heat
	P	Power Distribution
	P	Power Generation
	P	Power Monitoring
X		Power, AC
P		Power, DC
	P	Power, External
PP		Propeller
	K	Propeller Control
	E	Propeller Overspeed Governor
RZ		Radio Audio
RC		Radio Cooling
RG		Radio Gnd
RP		Radio Power
	R	Radio, ADF
	R	Radio, Comm and Nav
	R	Radio, DME
	R	Radio, Headphone, Microphone and Speakers
	R	Radio, Transponder
	L	Recognition Lights
	W	Stall Detection and Warning
S		Stall Warning
	T	Stormscope
	L	Switch Lights

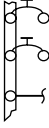
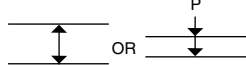
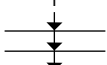
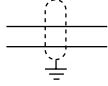
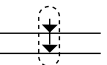
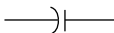
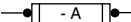
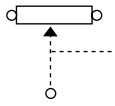
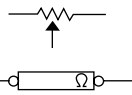
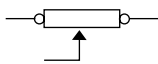
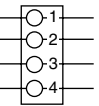
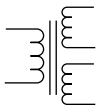
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**Chart 13 (Sheet 3 of 3)
ELECTRICAL WIRE CODING**

FUNCTION LETTER (Circa 2010 and Prior)	FUNCTION LETTER (Circa 2010 and Later)	CIRCUIT
	E	Tachometer
	L	Taxi Lights
	D	Vacuum System
GB		Vent / Defogger
W		Warning
	H	Windshield Heat

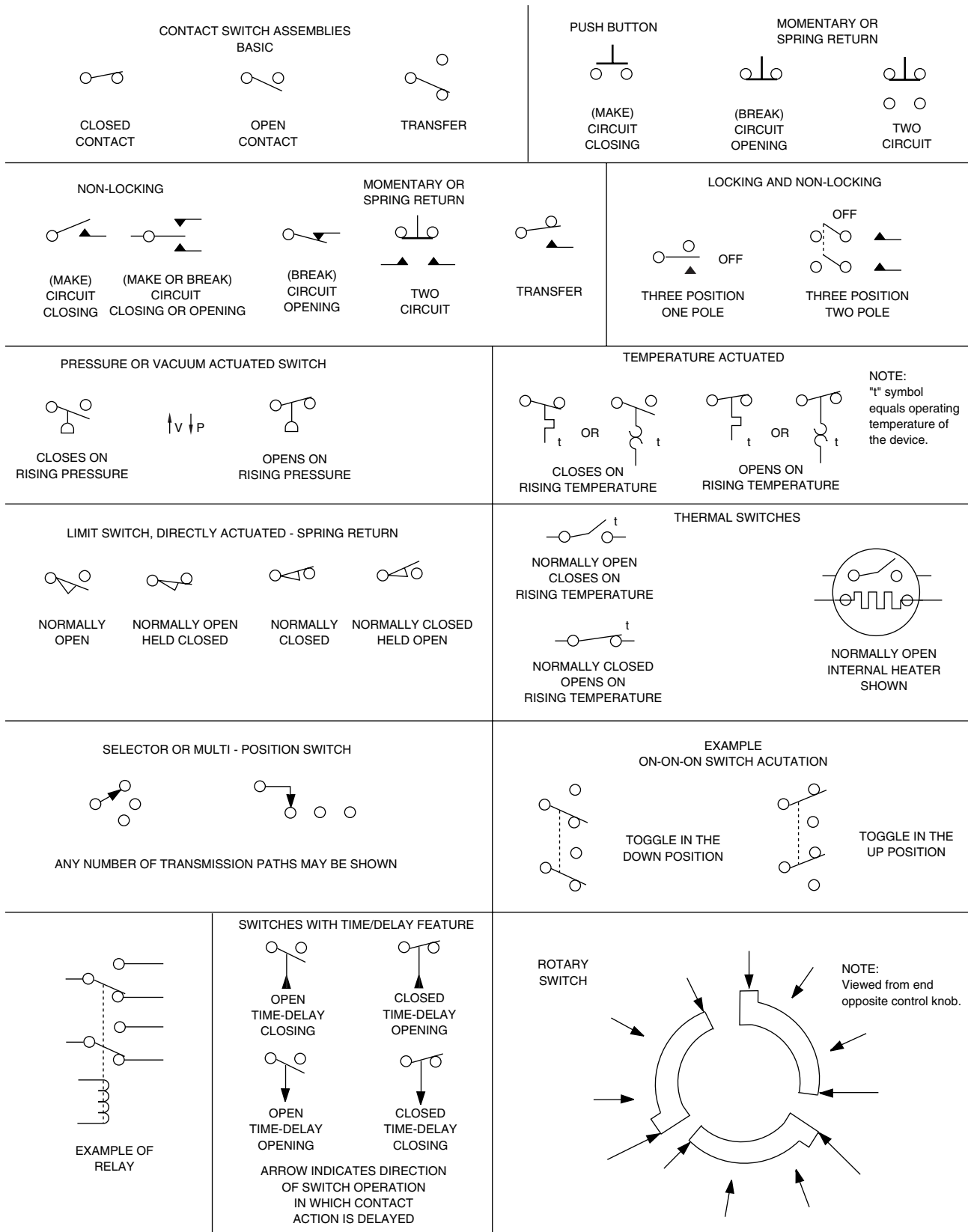
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 14 (Sheet 1 of 2)
ELECTRICAL SYMBOLS**

AIRCRAFT LOCATION SYMBOLS			ADJUSTABILITY		BATTERIES		BUS	
 FUSELAGE STATION	 WATER LINE	 BUTT LINE	 GENERAL	 GENERAL	 MULTICELL			
CABLES AND CONDUCTORS								
 GROUPING OF LEADS	 TWISTED PAIR	 TWISTED TRIPLE	 SHIELDED SINGLE CONDUCTOR	 COAXIAL CABLE	 SHIELDED TWO CONDUCTOR W / GROUND	 SHIELDED TWISTED PAIR		
CAPACITOR	CIRCUIT BREAKERS				CONNECTORS		CURRENT LIMITER	
 GENERAL	 CB BASIC	 PUSH BREAKER	 PUSH-PULL BREAKER	 SWITCH BREAKER	 RECEPTACLE	 PLUG	 MATED PLUG & RECEPTACLE	
DIODES			FUSE		GROUNDS			
 GENERAL	 ZENER, UNIDIRECTIONAL	 ZENER, BIDIRECTIONAL	 OR 		 GROUND OR CIRCUIT RETURN			 GROUND TO CHASSIS (WITH TERMINAL)
HORN	HEATED ELEMENT	SQUIB ELECTRIC IGNITER	INDICATOR LIGHT (* LETTER DENOTES COLOR - ASTERISK IS NOT PART OF SYMBOL)		LAMPS			
			 INDICATOR LIGHT (* LETTER DENOTES COLOR - ASTERISK IS NOT PART OF SYMBOL)		 INCANDESCENT LAMP		 FLUORESCENT LAMP	
MOTOR	METER	POLARITY			POTENTIOMETER			
	 * LETTER DENOTES THE TYPE OF METER i.e. A = AMMETER	 POSITIVE			 NEGATIVE			
								
RELAY COIL	RESISTOR	RHEOSTAT	SPLICE		TERMINAL BOARD			
			 PERMANENT					
			DISCONNECT					
TRANSDUCER		TRANSFORMERS		TRANSISTORS				
		 SINGLE PHASE (3) WINDING W/CORE		 PNP TYPE		 NPN TYPE		
		 NON SATURATING		THERMAL ELEMENT (TRANSDUCER)		COILS		
				 GENERAL		 GENERAL	 ADJUSTABLE	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

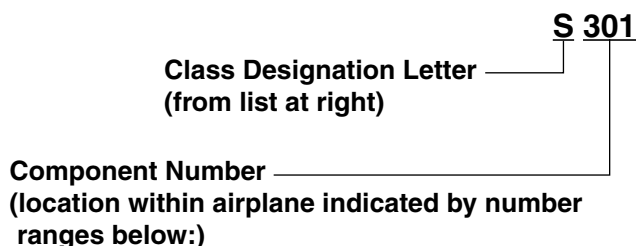
**Chart 14 (Sheet 2 of 2)
ELECTRICAL SYMBOLS**



**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

**CHART 15
ELECTRICAL / ELECTRONIC COMPONENT REFERENCE DESIGNATION CODES**

All electrical / electronic components are assigned a unique reference code which indicates component function and general location within the airplane.



- 100 to 199 -- Electrical - Left Wing and Nacelle
- 200 to 299 -- Electrical - Right Wing and Nacelle
- 300 to 399 -- Electrical - Fuselage area (inside cabin)
- 400 to 499 -- Electrical - Fuselage area (outside cabin)
- 500 to 599 -- Avionics - Left Wing and Nacelle
- 600 to 699 -- Avionics - Right Wing and Nacelle
- 700 to 799 -- Avionics - Fuselage area (inside cabin)
- 800 to 899 -- Avionics - Fuselage area (outside cabin)

So, the example above, S301, represents either a flasher, switch, or thermostat located in the left fuselage area inside the cabin.

Component	Class Letter
Alternator	G
Annunciator	DS
Antenna	E
Battery	BT
Blower / Fan / Motor	B
Capacitor	C
Circuit Breaker	CB
Clock	M
Compass	M
Contactor	K
Diode	D or CR
Flasher	S
Fuse	F
Generator	G
Heater	HR
Horn	LS
Hour Meter	M
Indicator Lamp	DS
Instrument	M
Jack	J
Light	L
Magneto	G
Miscellaneous Electrical Part	E
Plug	P
Potentiometer	R
Power Supply	PS
Pump	B
Receptacle	J
Rectifier	CR or D
Relay / Solenoid	K
Resistor	R
Sensor	A or MT
Shunt	R
Speaker	LS
Splice	SP
Starter	B
Switch	S
Terminal	E
Terminal Board	TB
Thermocouple	TC
Thermostat	S
Transducer	A or MT
Transformer	T
Transistor	Q
Voltage Regulator	VR
Zener Diode	D

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

WIRING DIAGRAM (SCHEMATICS) CROSS-REFERENCE

Each schematic in this manual contains a drawing index number in one of the corners of the schematic, showing the drawing number, revision level, and sheet number (i.e., 101900 A 23) of the Piper engineering drawing the schematic was created from.

Later schematics in this manual were created from harness assembly drawings which typically show only portions of a functional system's wiring on each sheet. In harness assembly drawings, internal cross-reference is to other numbered sheets within that same drawing - typically shown (SH 15) = sheet 15. The following provides sheet locating information by drawing number, sheet number and the Section Number, Figure Number, and Sheet Number where that harness assembly drawing sheet is used in this manual.

To follow a drawing internal cross-reference found in a schematic, note the sheet number you are looking for, note the engineering drawing number from the drawing index number found in the corner of the schematic, compare both to the following information to determine where your cross-reference sheet is used.

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
6311	1	91-25-60	1	
Artex ELT 110				
2843001 thru 2843656				
36983	1	91-21-20	1	1
Ram Air & Blower	3	91-21-20	1	4
Assembly Installation				
85387	1	91-37-10	1	1
Auxiliary Vacuum	1	91-37-10	1	2
Pump System				
85399	1	91-23-00	1	
Electrical Schematic	1	91-24-30	1	
2843001 thru	1	91-25-10	1	
2843202	1	91-27-30	1	1
	1	91-28-20	1	1
	1	91-28-40	1	1
	1	91-30-30	1	1
	1	91-30-30	1	2
	1	91-31-30	1	1
	1	91-31-50	1	1
	1	91-33-10	1	
	1	91-33-10	2	1
	1	91-33-10	3	1
	1	91-33-10	4	
	1	91-33-10	5	
	1	91-33-10	6	
	1	91-33-40	1	1
	1	91-33-40	1	2
	1	91-33-40	2	1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
85399 (cont.)	1	91-34-20	1	
	1	91-74-10	1	
	1	91-79-30	1	1
	1	91-79-30	1	2
	1	91-80-10	1	1
99979	1	91-21-50	1	1
Electrical Installation	1	91-21-50	1	2
- Air Conditioning	1	91-21-50	1	3
	1	91-21-50	1	4
100684	7	91-22-10	1	1
System Installation	7	91-22-10	1	2
- S-TEC 55 Autopilot	7	91-22-10	1	3
	7	91-22-10	1	4
100831	1	91-27-30	2	1
S-TEC Manual				
Electric Trim				
101280	1	91-21-20	1	2
Electrical Schematic	1	91-23-00	1	
2843203 thru	1	91-24-30	1	
2843414	1	91-24-30	2	2
	1	91-27-30	1	1
	1	91-28-20	1	1
	1	91-28-40	1	1
	1	91-30-30	1	2
	1	91-31-30	1	1
	1	91-31-50	1	1
	1	91-33-10	1	
	1	91-33-10	2	1
	1	91-33-10	3	1
	1	91-33-10	4	
	1	91-33-10	5	
	1	91-33-10	6	
	1	91-33-40	1	1
	1	91-33-40	1	2
	1	91-33-40	2	1
	1	91-34-20	1	
	1	91-74-10	1	
	1	91-79-30	1	1
	1	91-79-30	1	2
	1	91-80-10	1	1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
101292	1	91-37-10	1	3
Auxiliary Vacuum Pump Installation				
101753	1	91-34-20	5	
Harness Assembly, Avidyne Entegra, MAG/OAT				
101900	4	91-34-20	2	
Harness Assembly,	5	91-34-20	3	
Avionics - Avidyne	6	91-34-50	7	1
2843598 thru	7	91-34-50	7	2
2843682	8	91-34-50	8	1
	9	91-34-50	8	2
	10	91-23-50	1	1
	11	91-34-50	2	1
	12	91-22-10	2	5
	13	91-22-10	2	6
	14	91-34-50	3	1
	15	91-34-50	3	2
	16	91-34-40	1	1
	17	91-34-40	2	1
	18	91-34-50	4	
	19	91-23-50	4	
	20	91-22-10	2	7
	21	91-34-50	1	
	23	91-24-30	3	1
	24	91-24-30	3	2
	25	91-34-50	5	1
	26	91-34-50	6	1
	26	91-34-50	6	2
	27	91-23-15	1	
101902	5	91-80-10	1	2
Harness Assembly,	6	91-33-40	1	3
Electrical - Avidyne	7	91-77-40	1	1
2843598 thru	8	91-77-40	1	2
s2843682	11	91-27-30	1	2
	12	91-31-50	1	2
	12	91-34-20	4	
	13	91-30-30	1	3
	14	91-33-10	2	2
	17	91-24-60	1	1
	18	91-33-10	3	2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
101902 (cont.)	20	91-77-20	1	
	21	91-24-30	2	
104467	1	91-21-20	1	2
Electrical Schematic	1	91-23-00	1	
2843415 thru	1	91-24-30	1	
2843597	1	91-27-30	1	1
	1	91-28-20	1	1
	1	91-28-40	1	1
	1	91-30-30	1	2
	1	91-31-30	1	1
	1	91-31-50	1	1
	1	91-33-10	1	
	1	91-33-10	2	1
	1	91-33-10	3	1
	1	91-33-10	4	
	1	91-33-10	5	
	1	91-33-10	6	
	1	91-33-40	1	1
	1	91-33-40	1	2
	1	91-33-40	2	1
	1	91-34-20	1	
	1	91-74-10	1	1
	1	91-79-30	1	1
	1	91-79-30	1	2
	1	91-80-10	1	1
104580	7	91-22-10	2	1
System Installation -	7	91-22-10	2	2
S-TEC 55X Autopilot	7	91-22-10	2	3
	7	91-22-10	2	4
106644	2	92-25-60	2	
Artext ME406 ELT, 2843657 and up				
107401	14	91-28-40	1	2
Modifications - Fuel Quantity Gauge - Electronic - 2843700 and up				
107418	1	91-31-30	4	1
Harness Assembly, Vision 1000 - 2843711 and up	2	91-31-30	4	2

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
107419	3	91-23-50	5	1
Harness Assembly,	4	91-23-50	5	2
Flightcom - Audio	5	91-23-50	5	3
	5	91-23-50	5	4
	5	91-23-50	5	8
	6	91-23-50	5	5
	7	91-23-50	5	6
	8	91-23-50	5	7
	9	91-23-50	5	9
	10	91-23-50	5	10
107451	3	91-34-50	10	
107573	2	91-24-60	2	1
Harness Assembly,	3	91-24-60	2	1
Circuit Breaker,	4	91-24-60	2	2
G1000 / G1000 Nxi				
107579	4	91-24-30	6	2
Emergency Power Supply				
107580	4	91-24-30	4	
Electrical Schematic,	4	91-24-30	4	
G1000 2843701,	5	91-24-30	5	
2843703 and up	5	91-24-30	5	
	6	91-24-30	6	1
	7	91-24-60	1	2
	8	91-77-40	2	1
	8	91-77-40	2	1
	9	91-80-10	1	3
	9	91-80-10	1	3
	10	91-31-50	2	
	11	91-31-30	1	2
	12	91-28-20	1	2
	12	91-28-20	1	2
	12	91-28-40	2	1
	13	91-30-30	1	4
	13	91-30-30	1	4
	14	91-21-20	1	3
	15	91-21-50	1	5
	15	91-21-50	1	6
	16	91-33-40	1	4
	16	91-33-40	1	4
	16	91-33-40	1	5

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
107580 (cont.)	16	91-33-40	1	5
	17	91-33-40	2	2
	18	91-33-10	7	1
	18	91-33-10	7	1
	18	91-33-10	7	1
	18	91-33-10	7	1
	19	91-33-10	3	2
	20	91-33-10	2	3
	20	91-33-10	2	3
	21	91-34-20	10	
	22	91-34-20	10	
	23	91-34-20	6	
	24	91-34-20	8	1
	24	91-34-20	8	1
	25	91-34-20	9	1
	25	91-34-20	9	1
	26	91-34-50	9	
	27	91-23-10	1	
	27	91-23-10	1	
	27	91-23-10	1	
	28	81-23-50	3	1
	29	91-34-50	2	2
	30	91-21-20	2	
	30	91-21-20	2	
	31	91-22-10	2	8
	32	91-22-10	2	9
	33	91-22-10	2	10
	34	91-27-30	2	2
	35	91-34-40	3	
	35	91-34-40	3	
	36	91-23-15	2	1
	37	91-34-50	5	2
	38	91-34-50	6	3
	40	91-23-50	2	2
	40	91-23-50	2	2
	40	91-23-50	2	2
	40	91-23-50	2	2
107585	7	91-34-20	7	1
Harness Assembly, G1000, Avionics				

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
107587	2	91-34-20	12	2
Standby Instruments-Aspen EBD				
107588	5	91-23-50	3	1
Harness Assembly -	6	91-23-50	3	2
Audio				
107591	7	91-22-10	2	11
Harness Assembly -	7	91-27-30	2	3
Autopilot				
107592	2	91-34-40	3	1
GTS 800 Traffic Advisory System				
107593	2	91-34-50	5	2
King ADF (Optional)				
107595	2	91-23-15	2	1
XM Satellite /	2	91-23-15	2	2
GDL 69A				
107845	2	91-31-30	2	
Harness Assembly - Optional Flight Time Meter				
108001	3	91-24-30	6	2
Harness Assembly - Fuselage, NXi				
108002	4	91-24-30	4	
Electrical Schematic -	5	91-24-30	5	
G1000 Nxi	6	91-24-30	6	2
	7	91-24-60	1	3
	8	91-77-40	2	2
	9	91-80-10	1	4
	10	91-31-30	1	2
	11	91-28-20	1	2
	11	91-28-40	2	2
	12	91-27-30	1	3
	12	91-30-30	1	4
	13	91-21-20	1	3
	14	91-21-50	1	5
	15	91-33-40	1	5
	16	91-33-40	2	2
	17	91-33-10	7	
	18	91-33-10	3	4
	19	91-33-10	2	3
	20	91-25-60	3	

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
108002 (cont.)	21	91-34-20	10	
	22	91-34-20	6	
	23	91-34-20	11	1
	24	91-34-20	11	1
	24	91-34-20	11	2
	25	91-34-50	9	
	26	91-23-10	1	
	27	91-23-50	2	1
	28	91-34-50	2	3
	29	91-21-20	2	
	30	91-22-10	2	8
	31	91-22-10	2	9
	32	91-22-10	2	10
	33	91-27-30	2	2
	34	91-34-40	3	2
	35	91-23-15	2	1
	36	91-31-30	5	
	37	91-34-50	5	2
	38	91-34-50	6	3
	39	91-31-30	4	1
	40	91-23-50	2	2
	41	91-24-60	3	
	42	91-31-20	1	10
108005	4	91-11-30	1	
Harness Assembly - Instrument Panel - G1000 Nxi				
108009	1	91-25-60	3	
Artex ELT 1000				
108011	5	91-28-40	2	2
Harness Assembly -	5	91-77-40		
Avionics - G1000 NXi	6	91-34-20	7	2
108013	2	91-34-50	2	3
Harness Assembly - G1000 Nxi - Transponder				
108015	2	91-34-20	11	1
Harness Assembly -	3	91-34-20	11	2
G1000 Nxi - GSU 75	4	91-34-20	11	3
	5	91-34-20	11	4

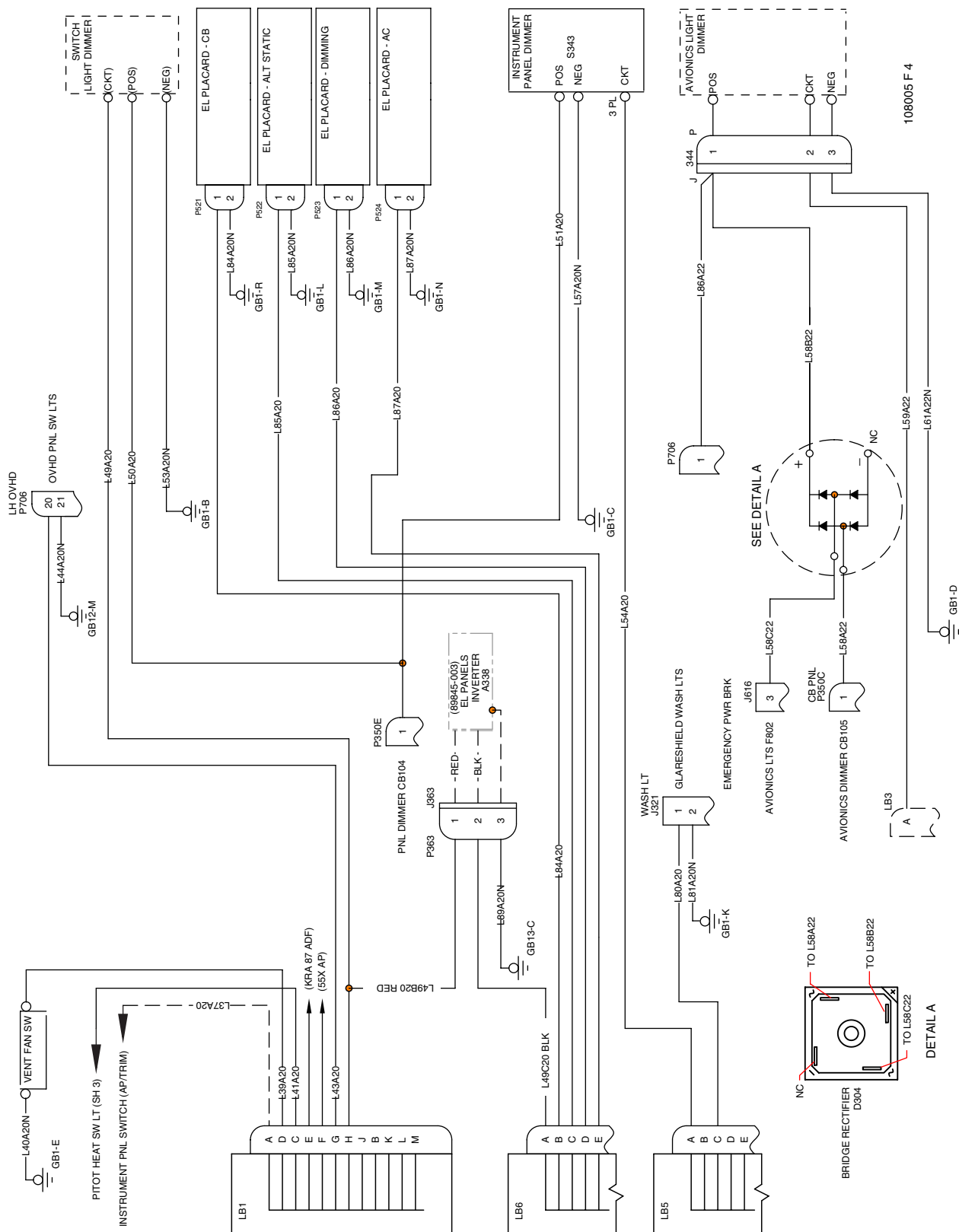
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Engineering		Maintenance Manual		
<u>Drawing Number</u>	<u>Sheet Number</u>	<u>Section Number</u>	<u>Figure Number</u>	<u>Sheet Number</u>
108039	2	91-24-60	3	
USB Ports Harness Assembly				
108041	1	91-31-20	1	
CO Detector				
108047	2	91-27-50	1	
Harness Assembly, Flap Position Indicator				
108049	2	91-31-30	3	
Harness Assembly, Engine Hour Meter				
108051	4			
Harness Assembly,	5	91-28-40	2	3
Avionics, NXi	5	91-77-40	2	4
Phase 2 with	6			
GFC 700	7	91-34-20	7	4
	8	91-24-60	4	
108053	2	91-22-10	3	3
Harness Assembly -	3	91-22-10	3	1
GFC 700	4	91-22-10	3	2
G500-28203	5	91-34-20	12	
G500 Avionics	6	91-34-20	8	2
Harness Assembly	7	91-34-20	9	2
	8	91-34-50	2	4
	9	91-34-50	7	3
	10	91-34-50	8	3
	10	91-34-50	11	
	11	91-23-50	2	2
	12	91-23-50	2	3
	13	91-34-40	1	2
	14	91-34-40	2	2
	15	91-22-10	2	12
	16	91-34-50	5	3
	17	91-23-15	2	2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



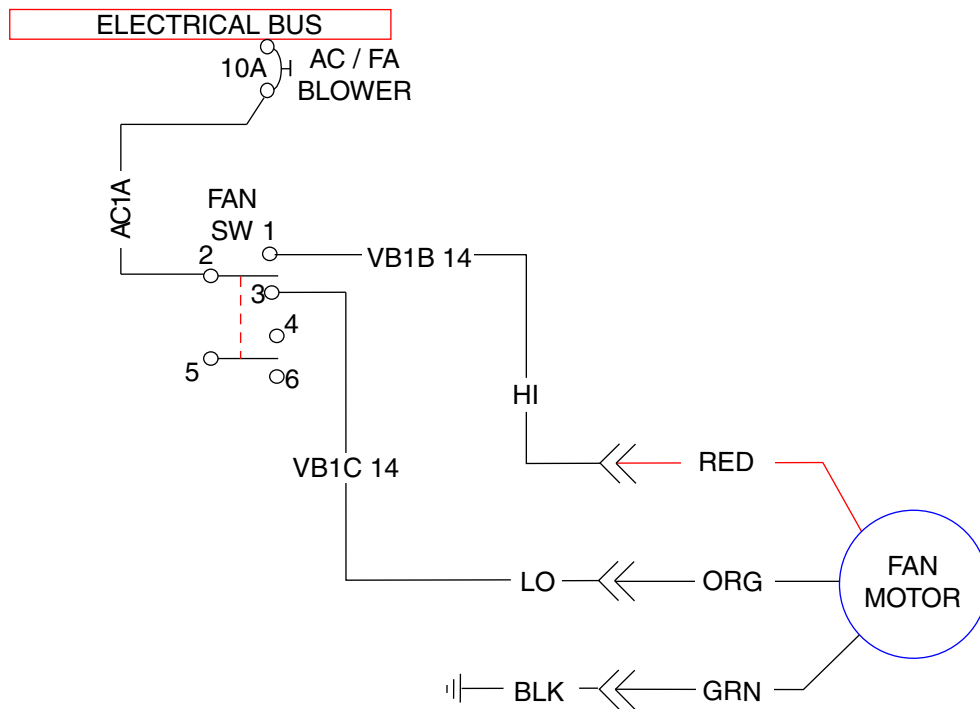
Electro-Luminescent Placards
Figure 1

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

36983 AY



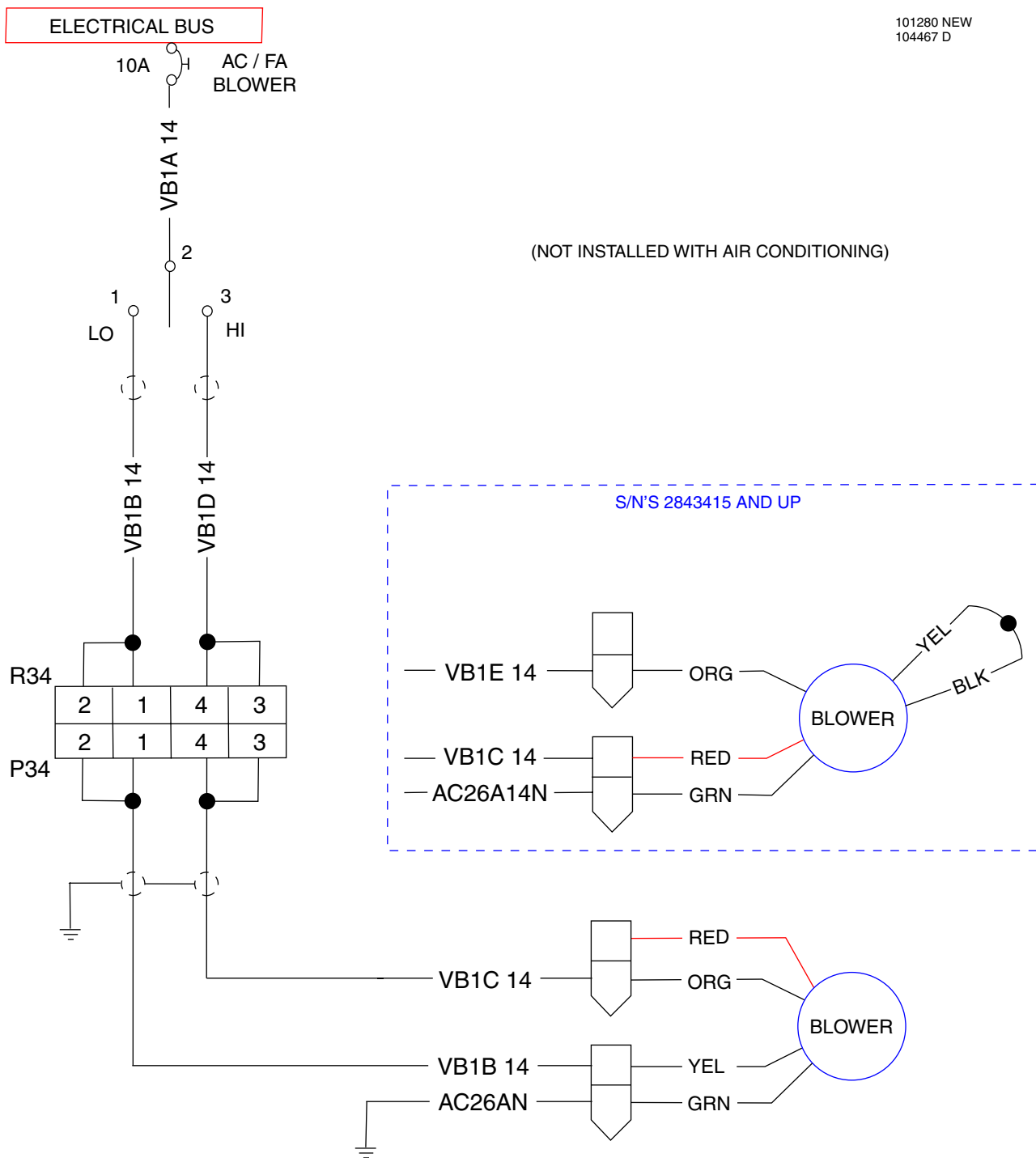
(NOT INSTALLED WITH AIR CONDITIONING)

Fresh Air Blower (Optional)
Figure 1 (Sheet 1 of 4)

[Effectivity](#)
2843001 thru 2843202

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101280 NEW
104467 D

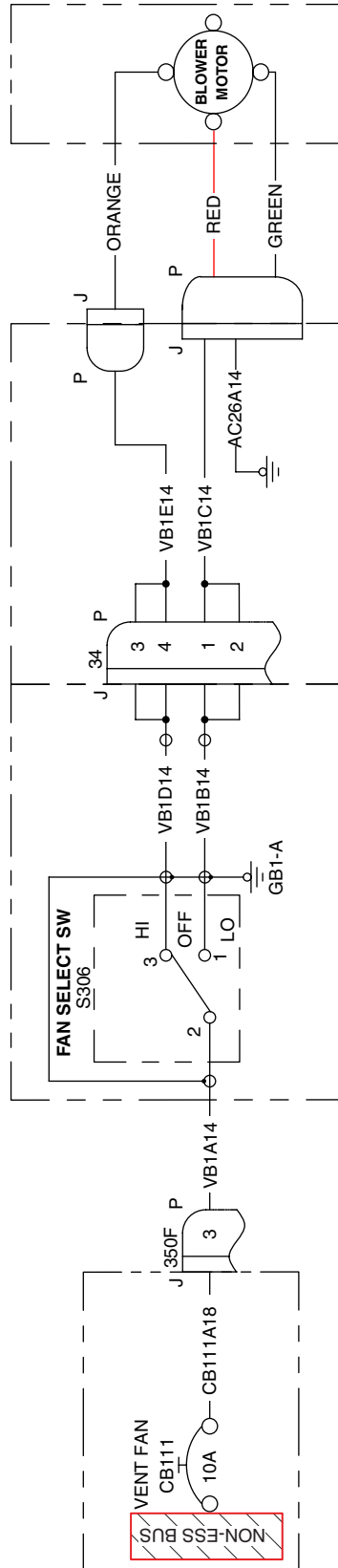


[Effectivity](#)
2843203 and up

Fresh Air Blower (Optional)
Figure 1 (Sheet 2 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107580 NEW 14
108002 NEW 13

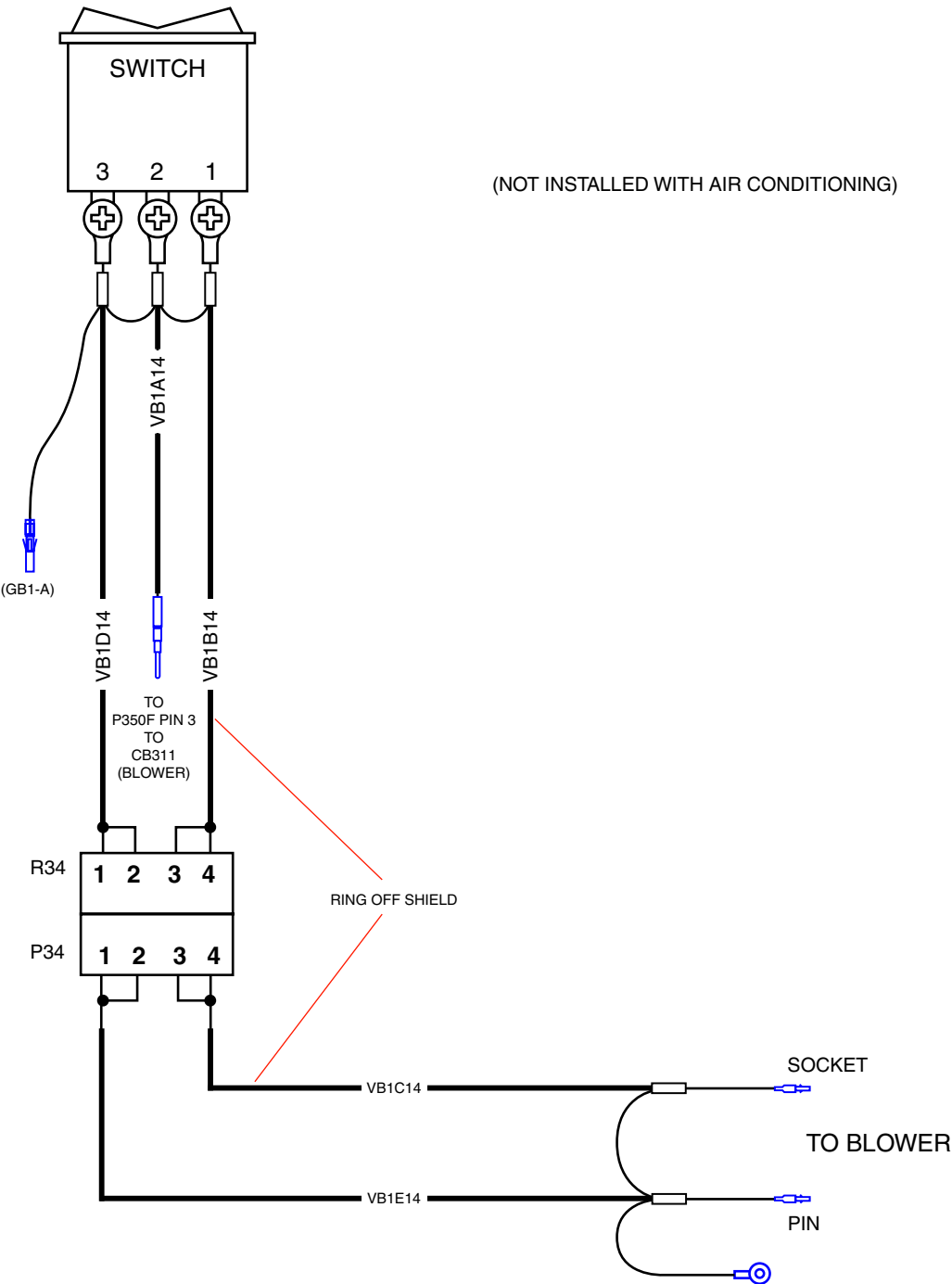


Fresh Air Blower (Optional)
Figure 1 (Sheet 3 of 4)

Effectivity
with Garmin G1000
or G1000 NXi

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

36983 3 AY
101281 G

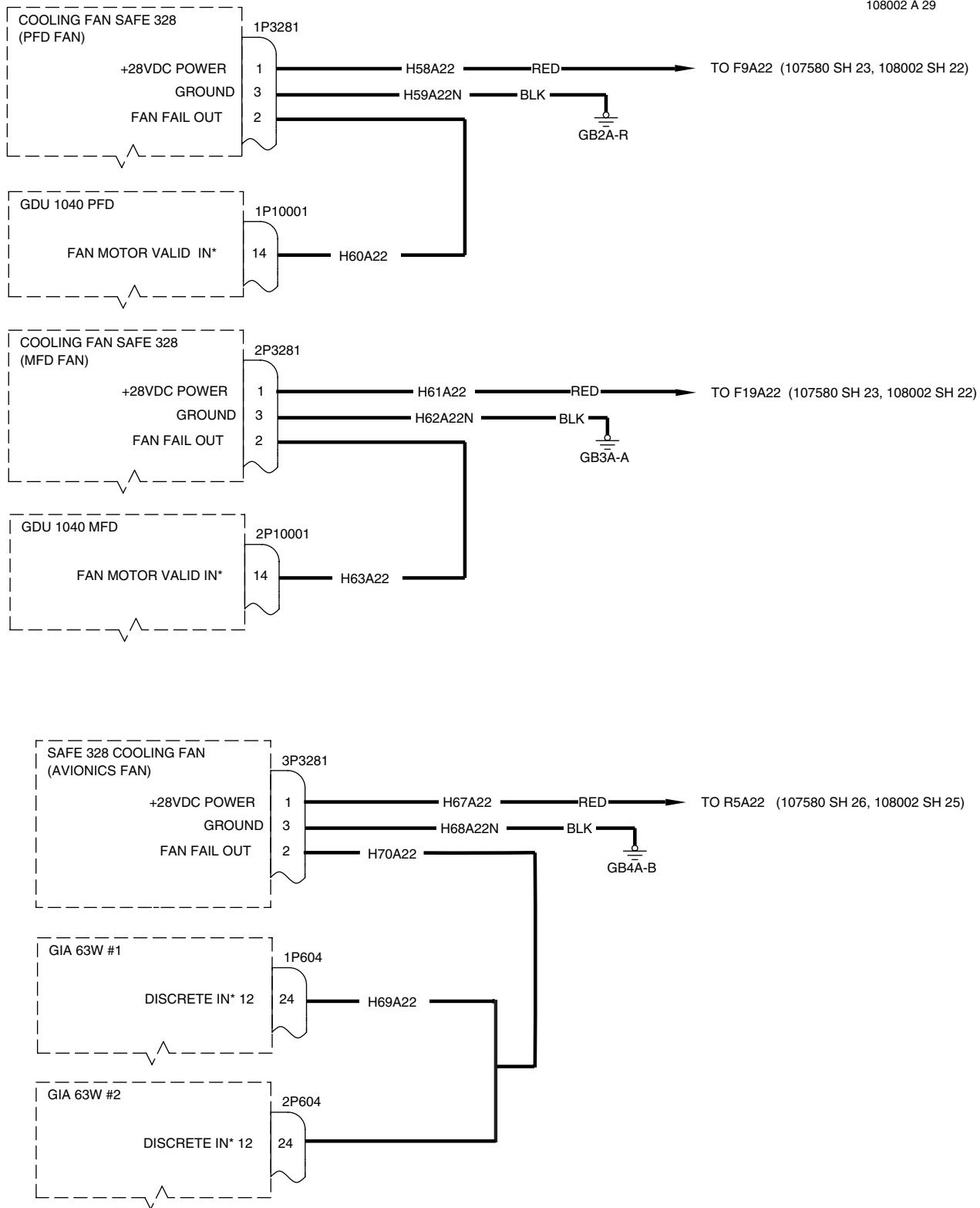


[Effectivity](#)
2843701, 2843703 and up

Fresh Air Blower (Optional)
Figure 1 (Sheet 4 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107580 A 30
108002 A 29



Avionics Cooling
Figure 2

Effectivity
with Garmin G1000
or G1000 NXi

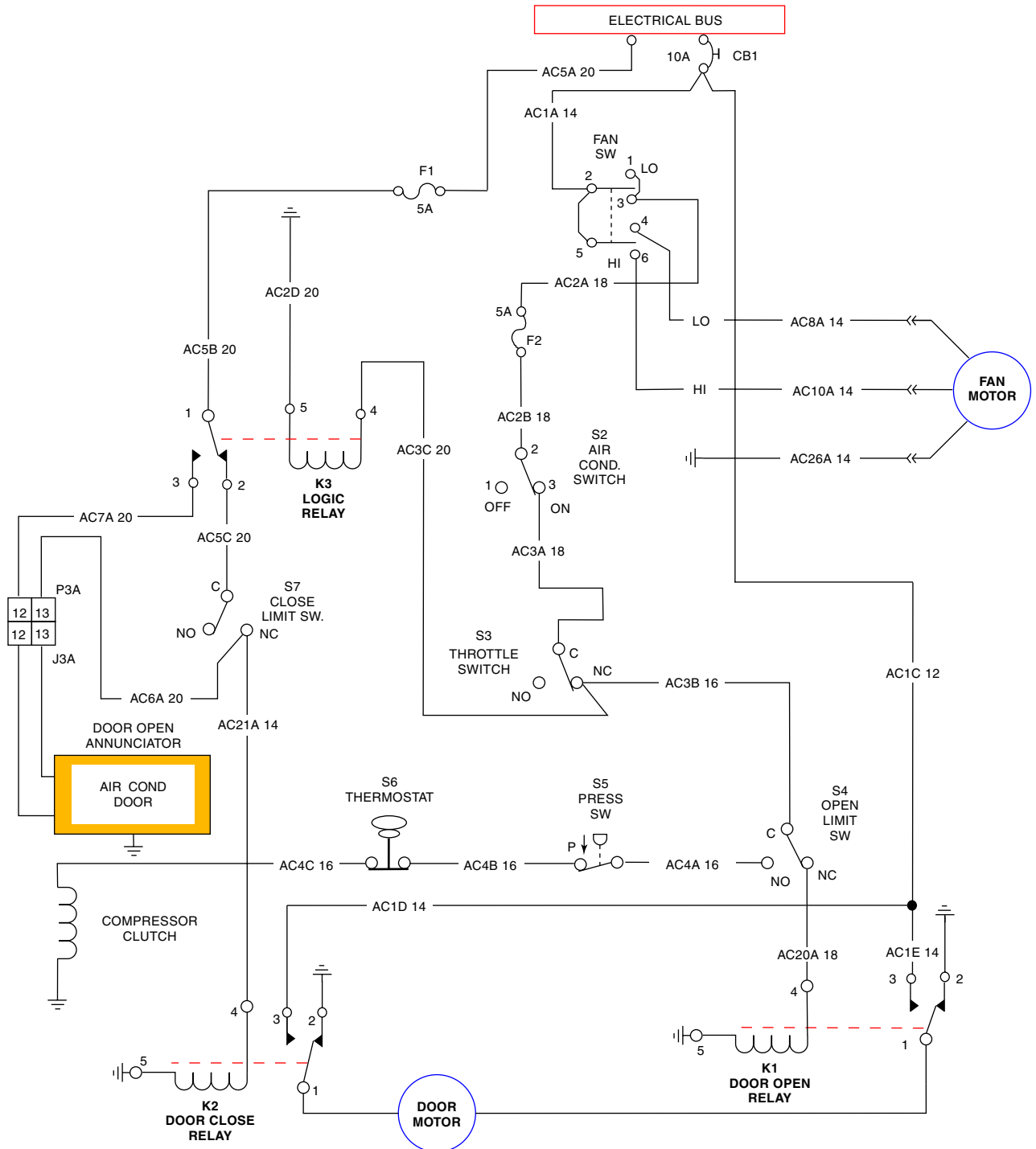
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

99979 AW

SHOWN WITH FAN SWITCH OFF, AIR COND SWITCH IN ON POSITION,
THROTTLE NOT WIDE OPEN, PRESSURE SWITCH BELOW MAX PRESSURE,
THERMOSTAT CALLING FOR COOLING AND CONDENSER DOOR CLOSED.



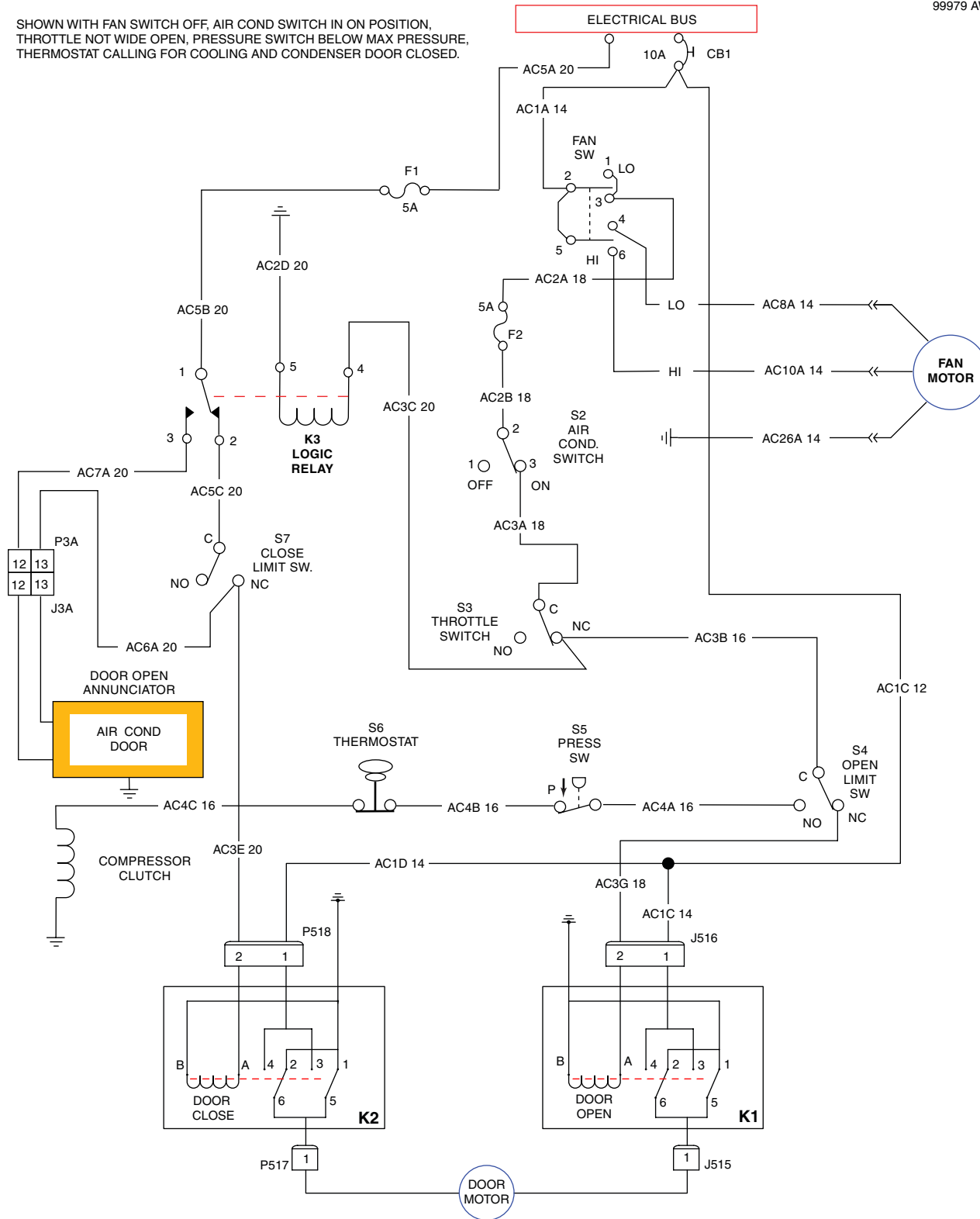
Air Conditioning
Figure 1 (Sheet 1 of 6)

[Effectivity](#)
2843001 thru 2843202

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

99979 AW

SHOWN WITH FAN SWITCH OFF, AIR COND SWITCH IN ON POSITION,
THROTTLE NOT WIDE OPEN, PRESSURE SWITCH BELOW MAX PRESSURE,
THERMOSTAT CALLING FOR COOLING AND CONDENSER DOOR CLOSED.



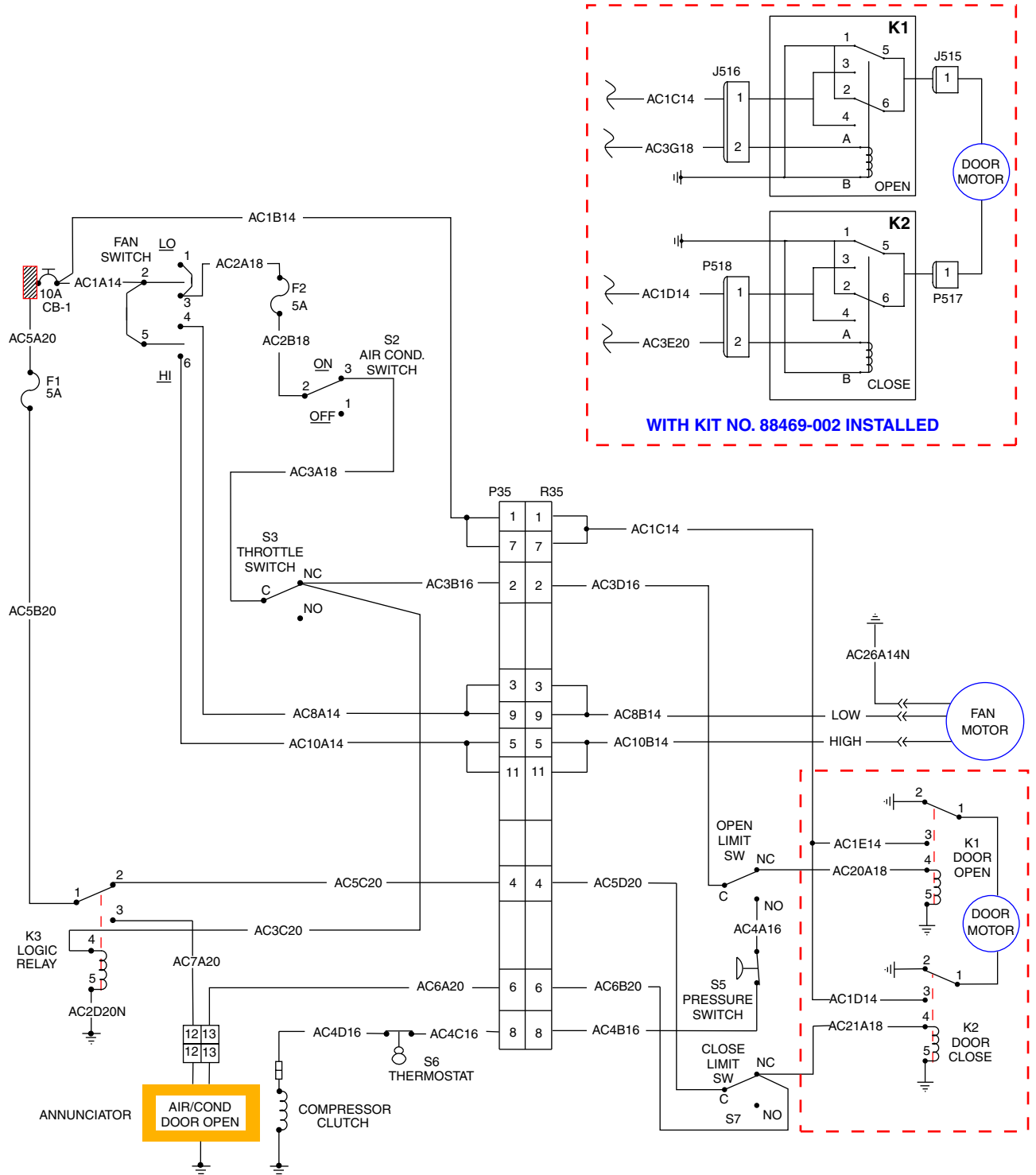
Effectivity
2843001 thru 2843202
with Kit No. 88469-002 Installed

Air Conditioning
Figure 1 (Sheet 2 of 6)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

99979 AW

SHOWN WITH FAN SWITCH OFF, AIR COND SWITCH IN ON POSITION,
 THROTTLE NOT WIDE OPEN, PRESSURE SWITCH BELOW MAX PRESSURE,
 THERMOSTAT CALLING FOR COOLING AND CONDENSER DOOR CLOSED.



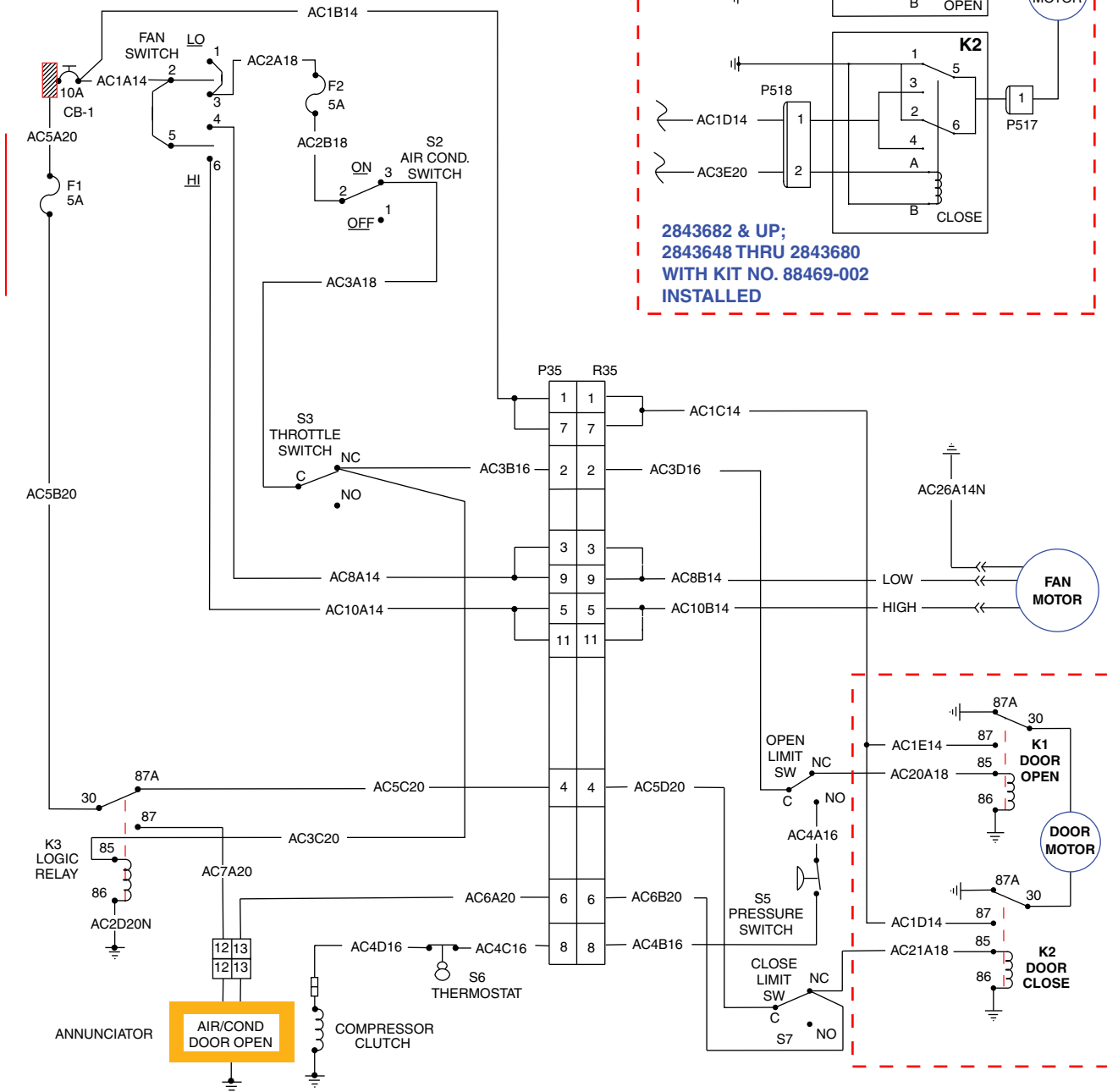
Air Conditioning
 Figure 1 (Sheet 3 of 6)

Effectivity
 2843203 thru 2843647

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

99979 AW

SHOWN WITH FAN SWITCH OFF, AIR COND SWITCH IN ON POSITION,
THROTTLE NOT WIDE OPEN, PRESSURE SWITCH BELOW MAX PRESSURE,
THERMOSTAT CALLING FOR COOLING AND CONDENSER DOOR CLOSED.



**2843682 & UP;
2843648 THRU 2843680
WITH KIT NO. 88469-002
INSTALLED**

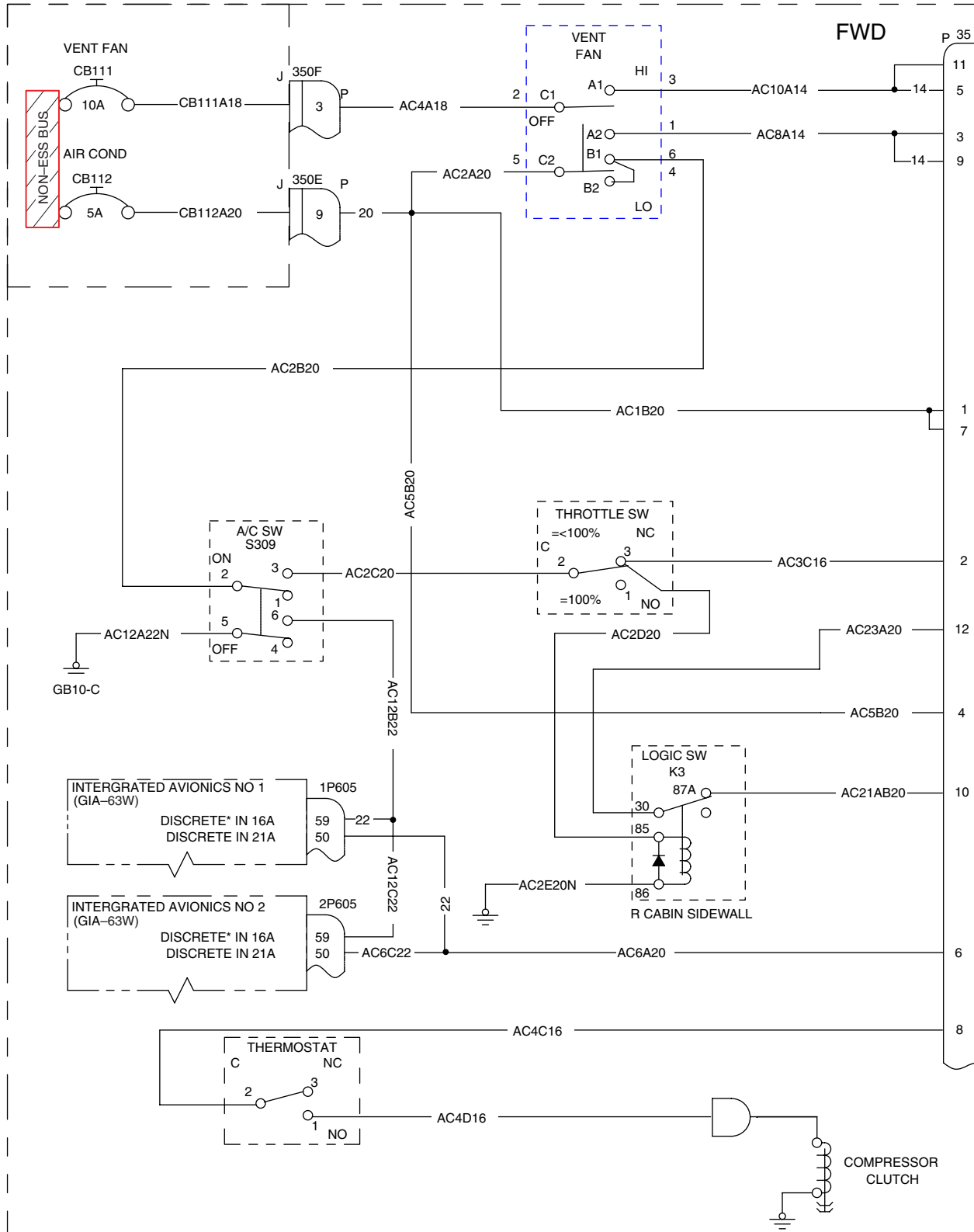
Effectivity
2843648 and up

Air Conditioning
Figure 1 (Sheet 4 of 6)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Effectivity
with Garmin G1000
or G1000 NXi

Air Conditioning
Figure 1 (Sheet 5 of 6)

[illegible]

91-21-50 **PAGE 7**
Nov 15/17

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

S-TEC System 55
Figure 1 (Sheet 1 of 4)



NOTE: Connect lead marked "Audio Amp" to connector P1 at harness installation.

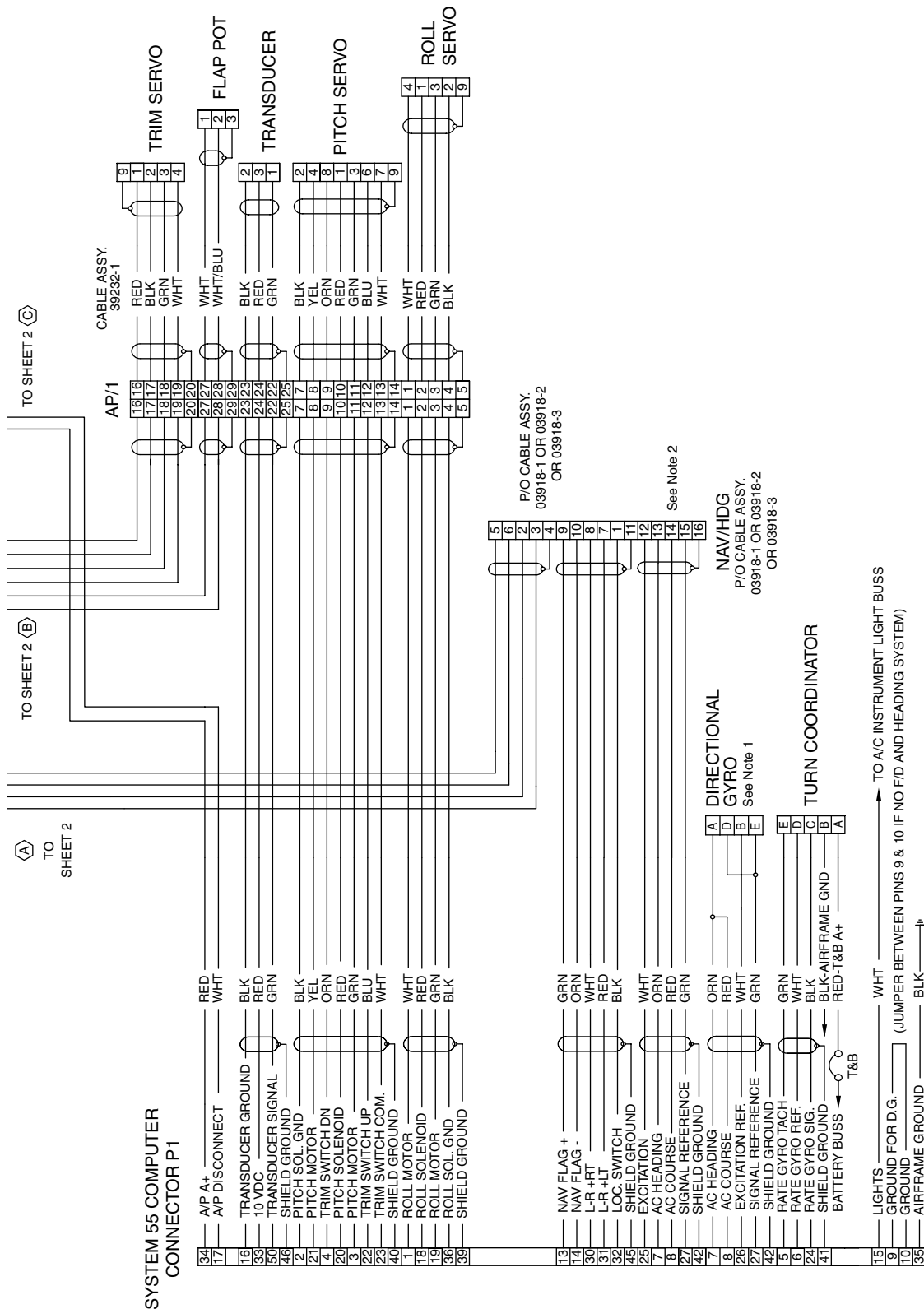
100684 K 7



- NOTES:**
1. Cable assembly 39235(-) P1 will contain directional gyro feed only when required.
 2. For heading system (ST-180) installation refer to

NOTE: Connect lead marked "Audio Amp" to connector P1 at harness installation.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

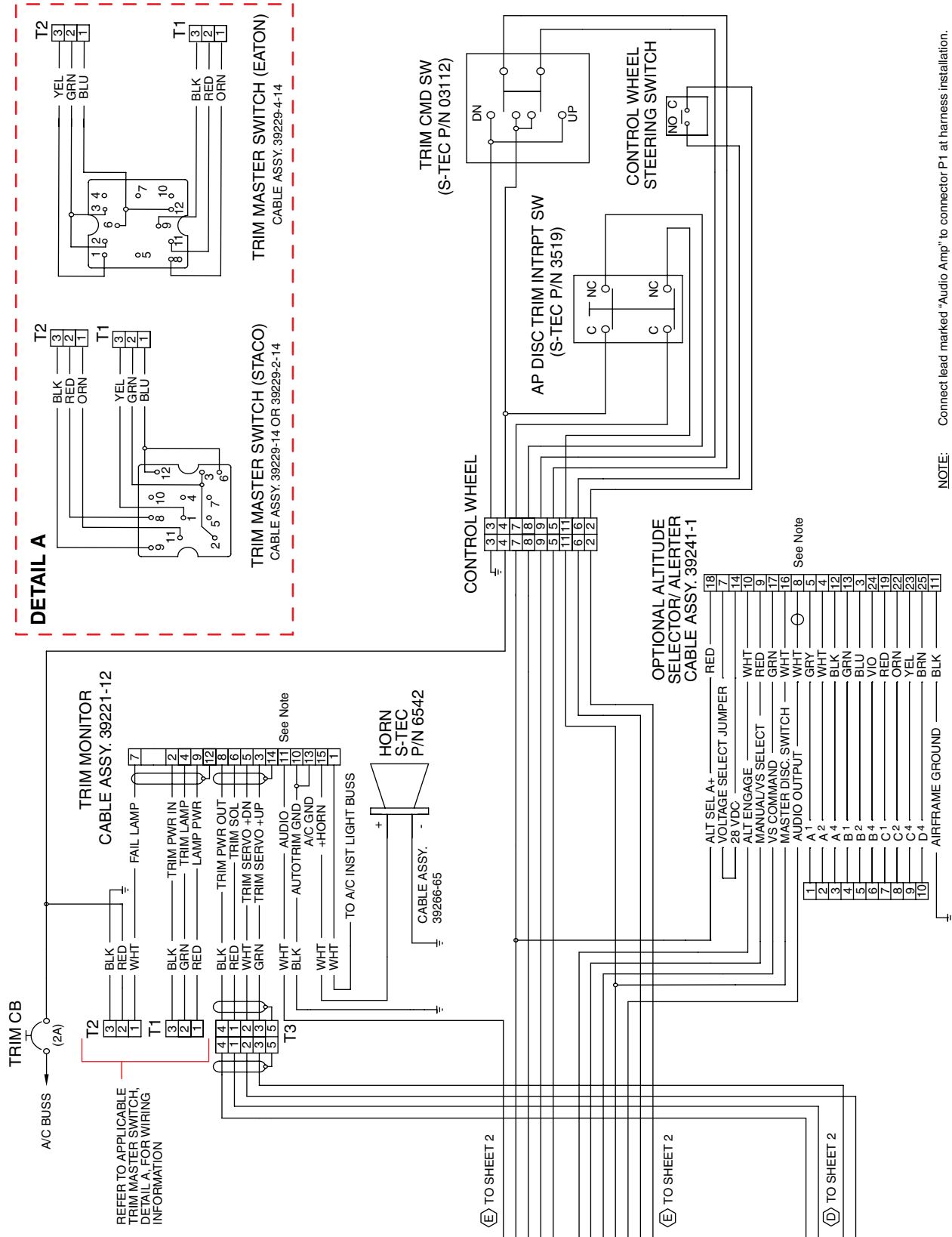


- NOTES:**
1. Cable assembly 39236-() P1 will contain directional gyro lead only when required.
 2. For heading system (ST-180) installation refer to Installation Bulletin No. 180.

S-TEC System 55
Figure 1 (Sheet 3 of 4)

Effectivity
2843203 thru 2843414

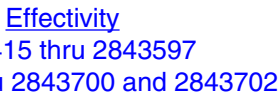
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Effectivity
2843203 thru 2843414

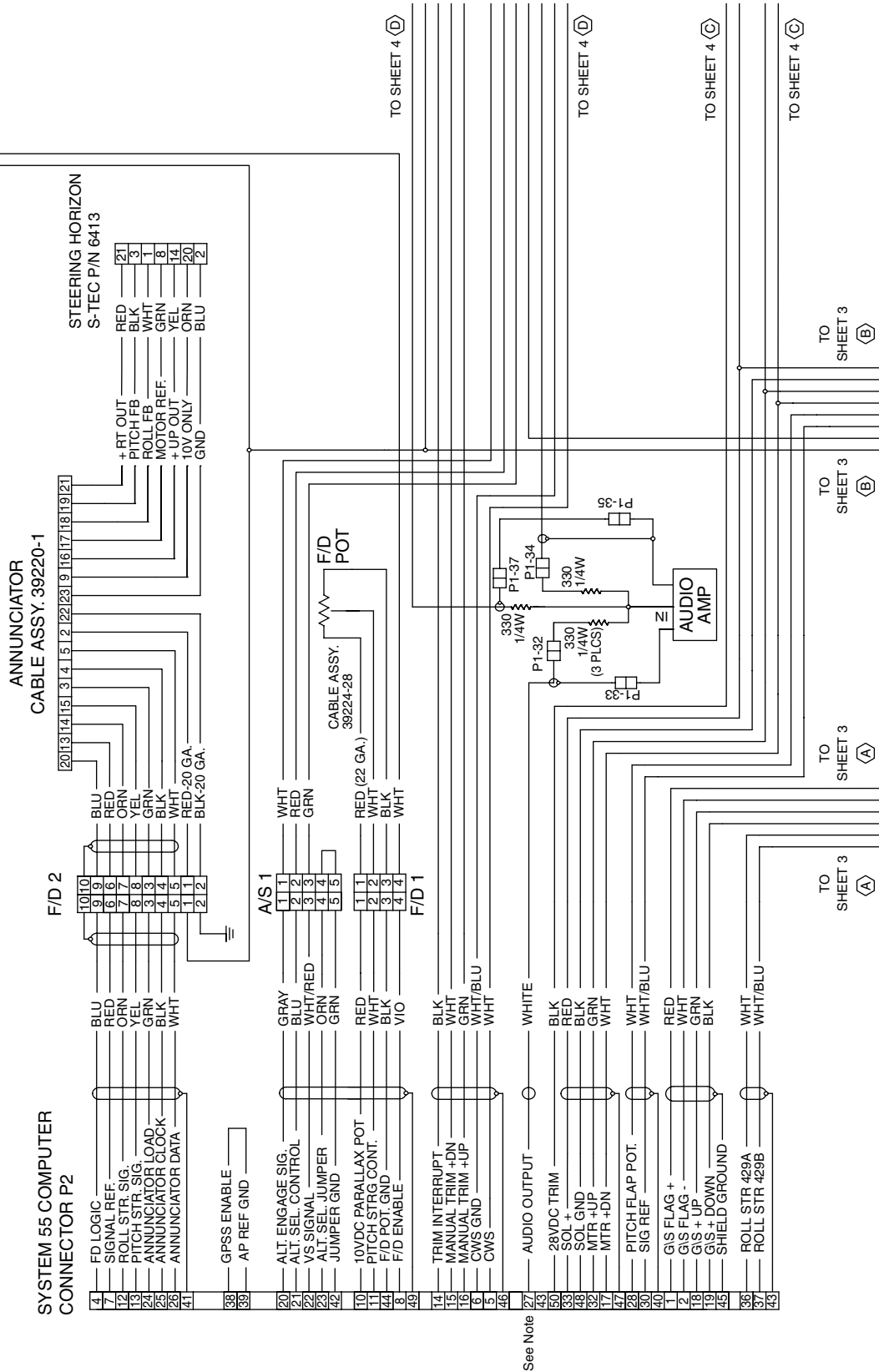
S-TEC System 55
Figure 1 (Sheet 4 of 4)

S-TEC System 55X
Figure 2 (Sheet 1 of 13)



PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

NOTE: Connect lead marked "Audio Amp" to any available non-muted input of the audio amplifier. Connect shield to any convenient airframe ground near the audio amp connector. Audio inputs may be joined into a common audio amp input by using 300 ohm, 1/4 watt resistors.

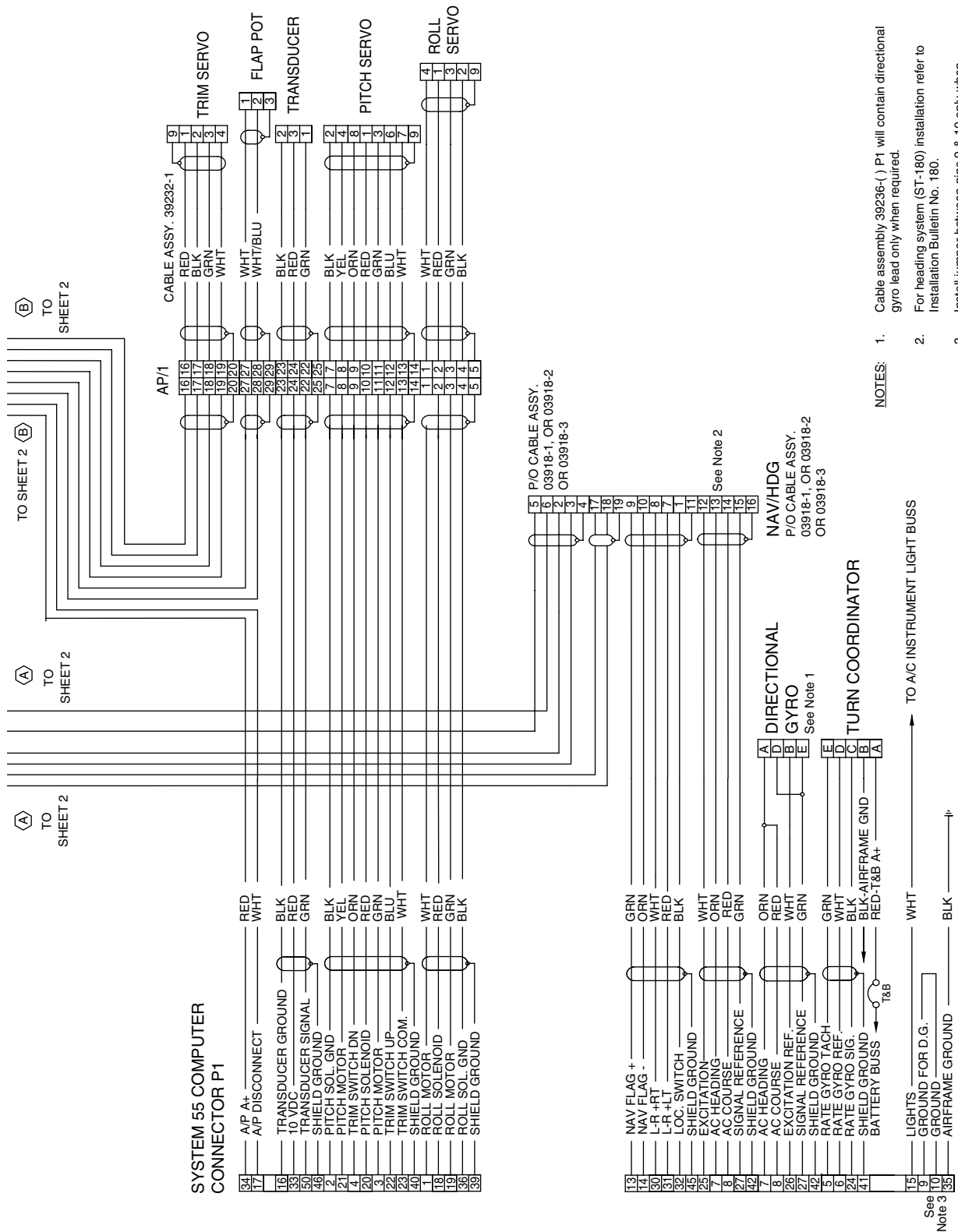


S-TEC System 55X
Figure 2 (Sheet 2 of 13)

Effectivity

2843415 thru 2843597
2843683 thru 2843700 and 2843702

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



S-TEC System 55X
Figure 2 (Sheet 3 of 13)

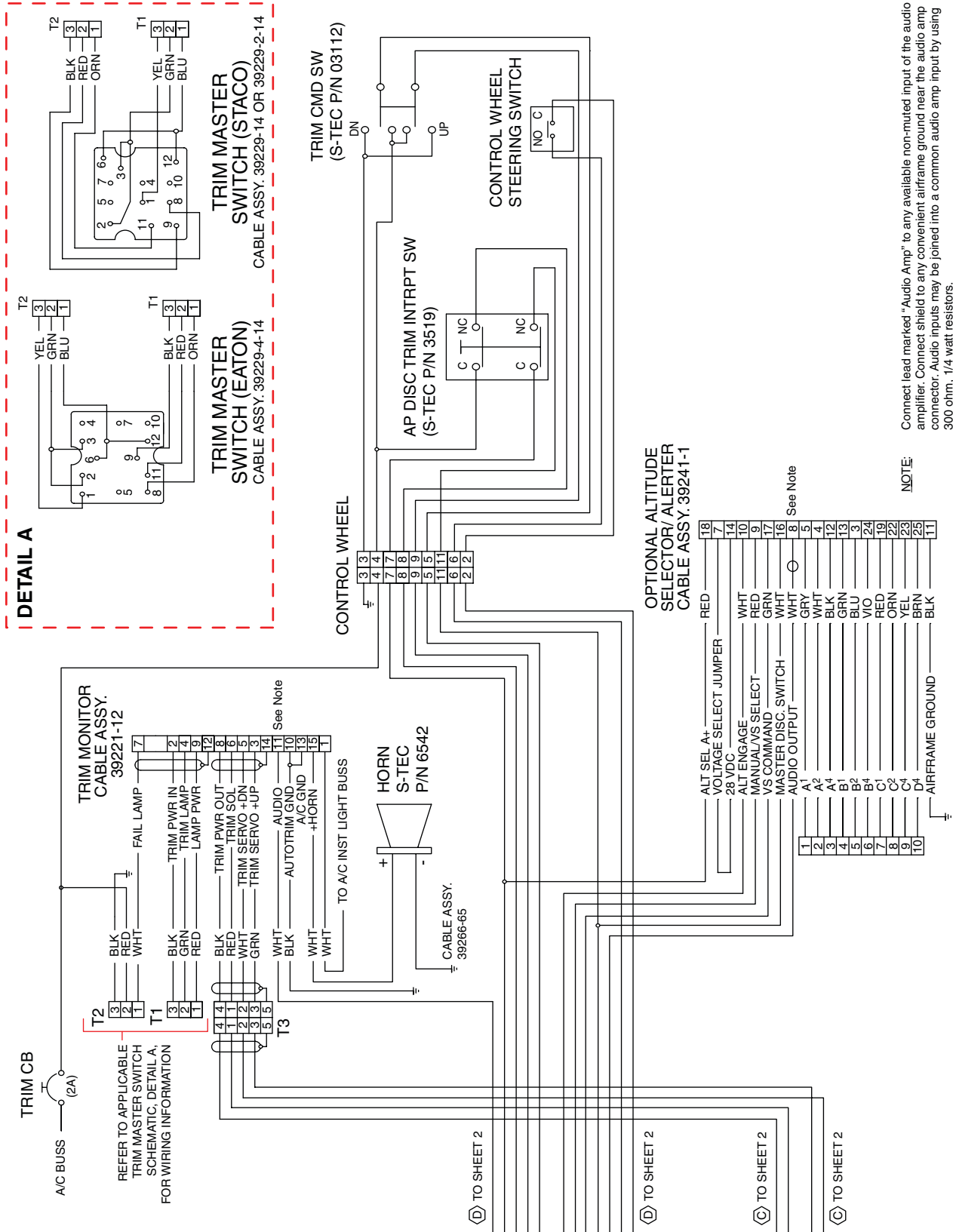
Effectivity

2843415 thru 2843597
2843683 thru 2843700 and 2843702

91-22-10

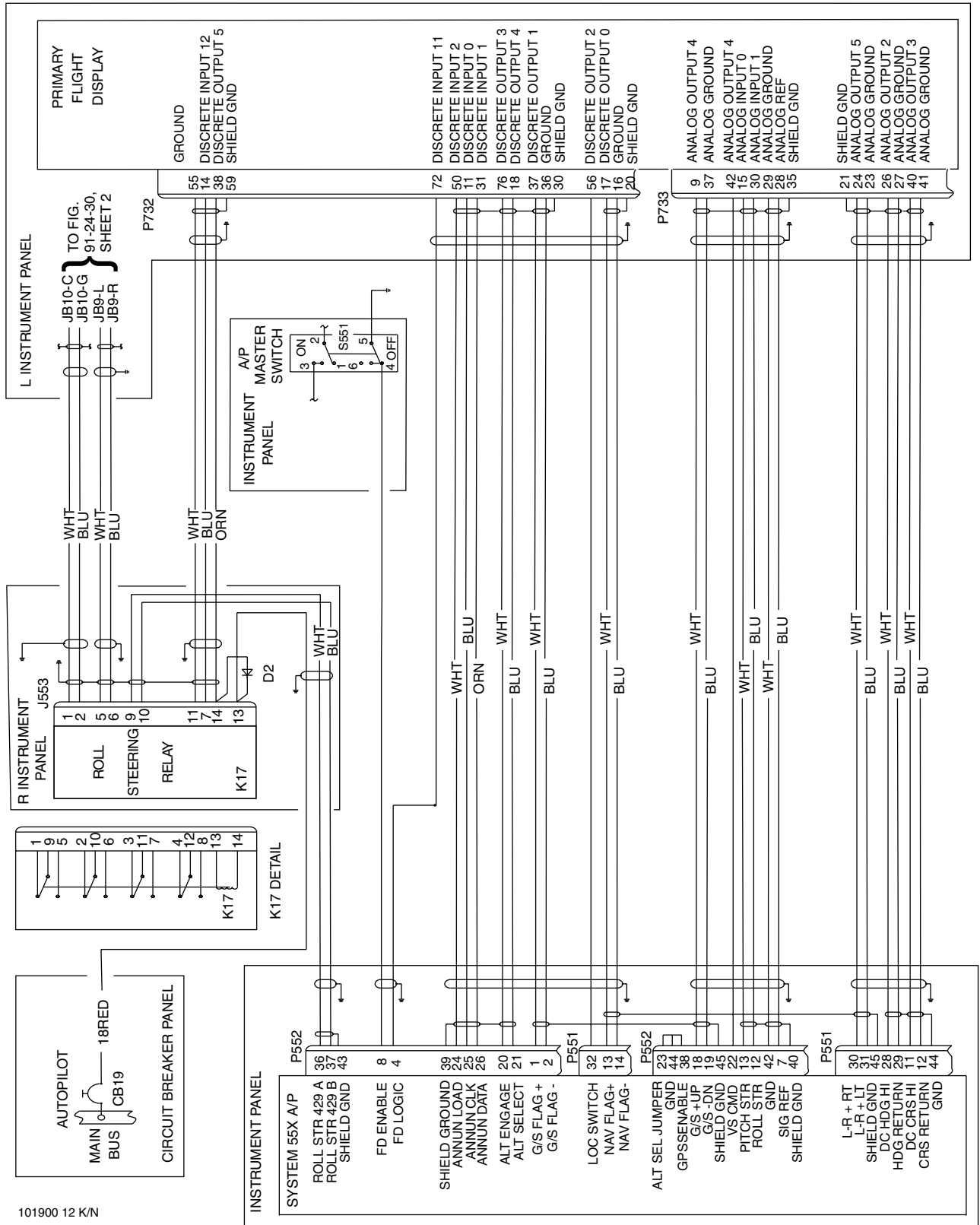
PAGE 7
Nov 15/17

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



S-TEC System 55X
Figure 2 (Sheet 4 of 13)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

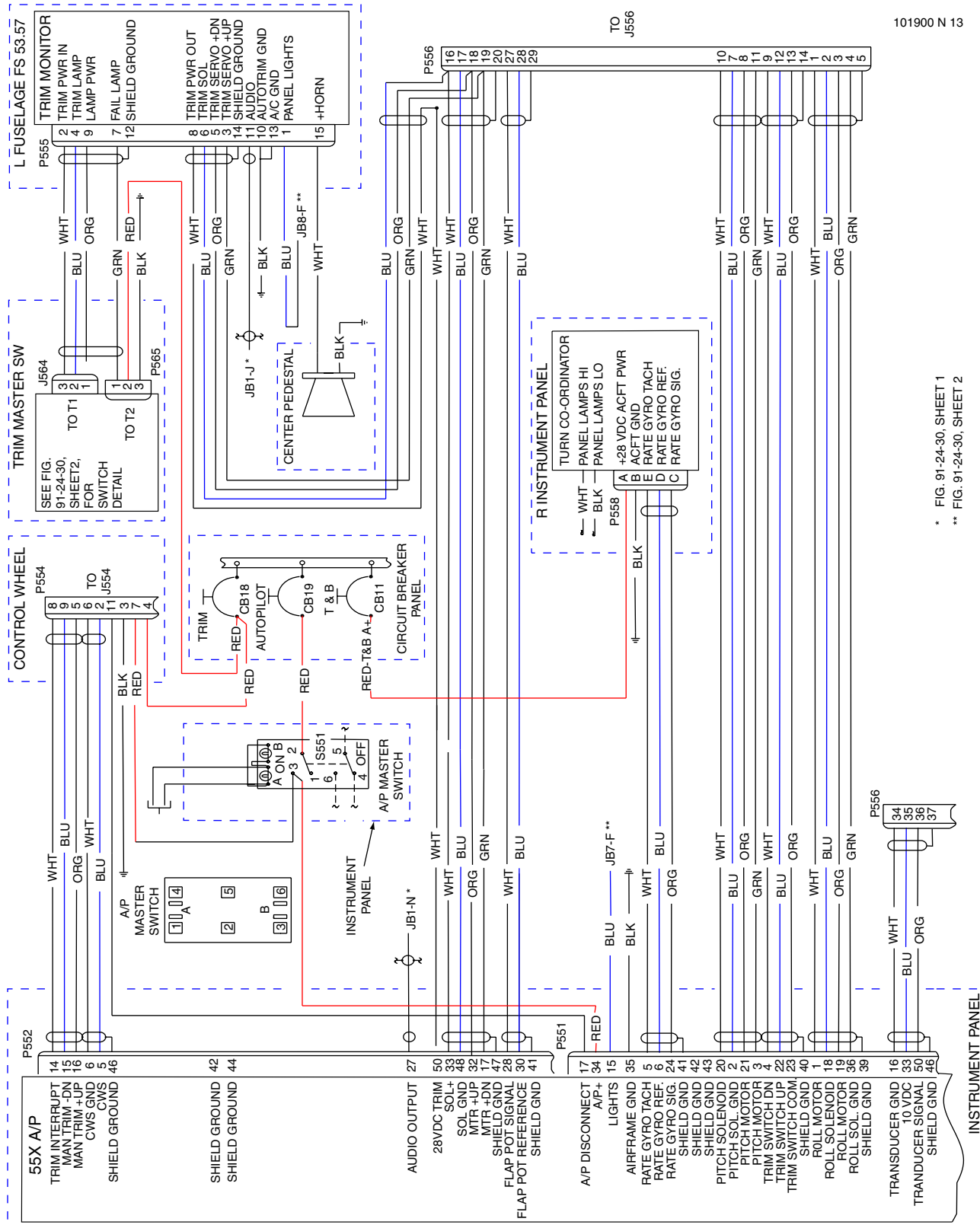


101900 12 K/N

S-TEC System 55X
Figure 2 (Sheet 5 of 13)

Effectivity
with Avidyne Entegra

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



* FIG. 91-24-30, SHEET 1

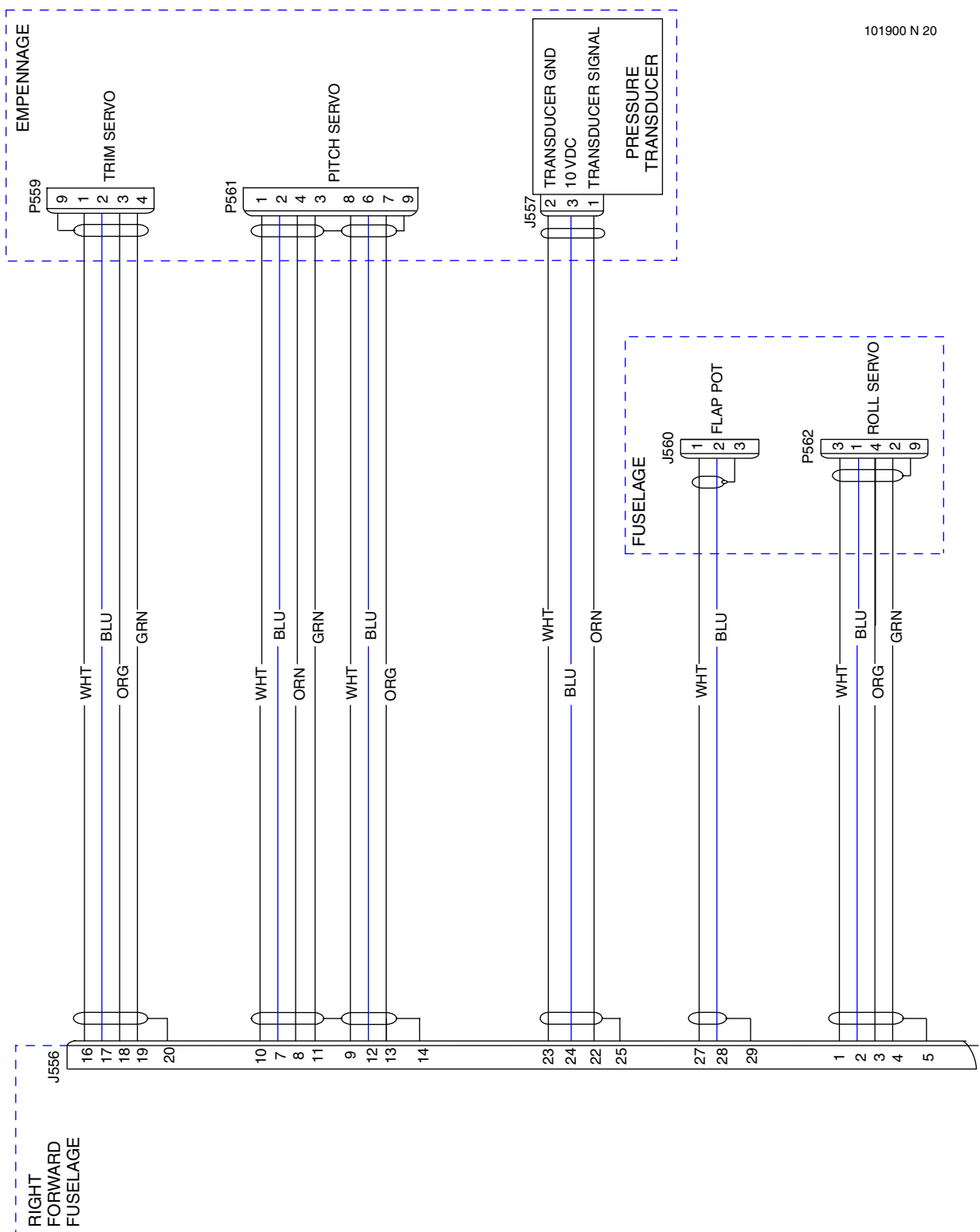
FIG. 91-24-30, SHEET 2

Effectivity with Avidyne Entegra

S-TEC System 55X
Figure 2 (Sheet 6 of 13)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

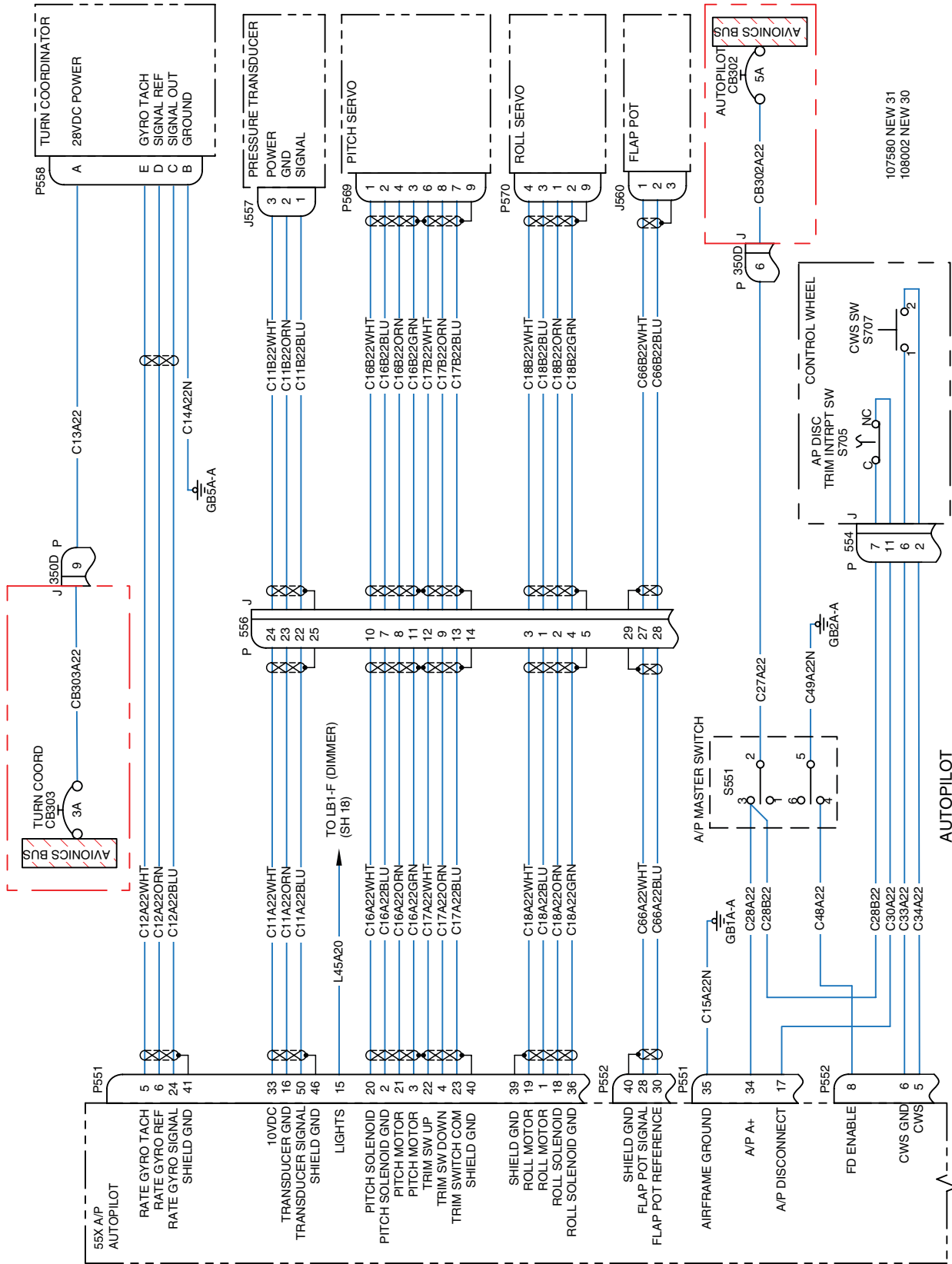
101900 N 20



S-TEC System 55X
Figure 2 (Sheet 7 of 13)

Effectivity
with Avidyne Integra

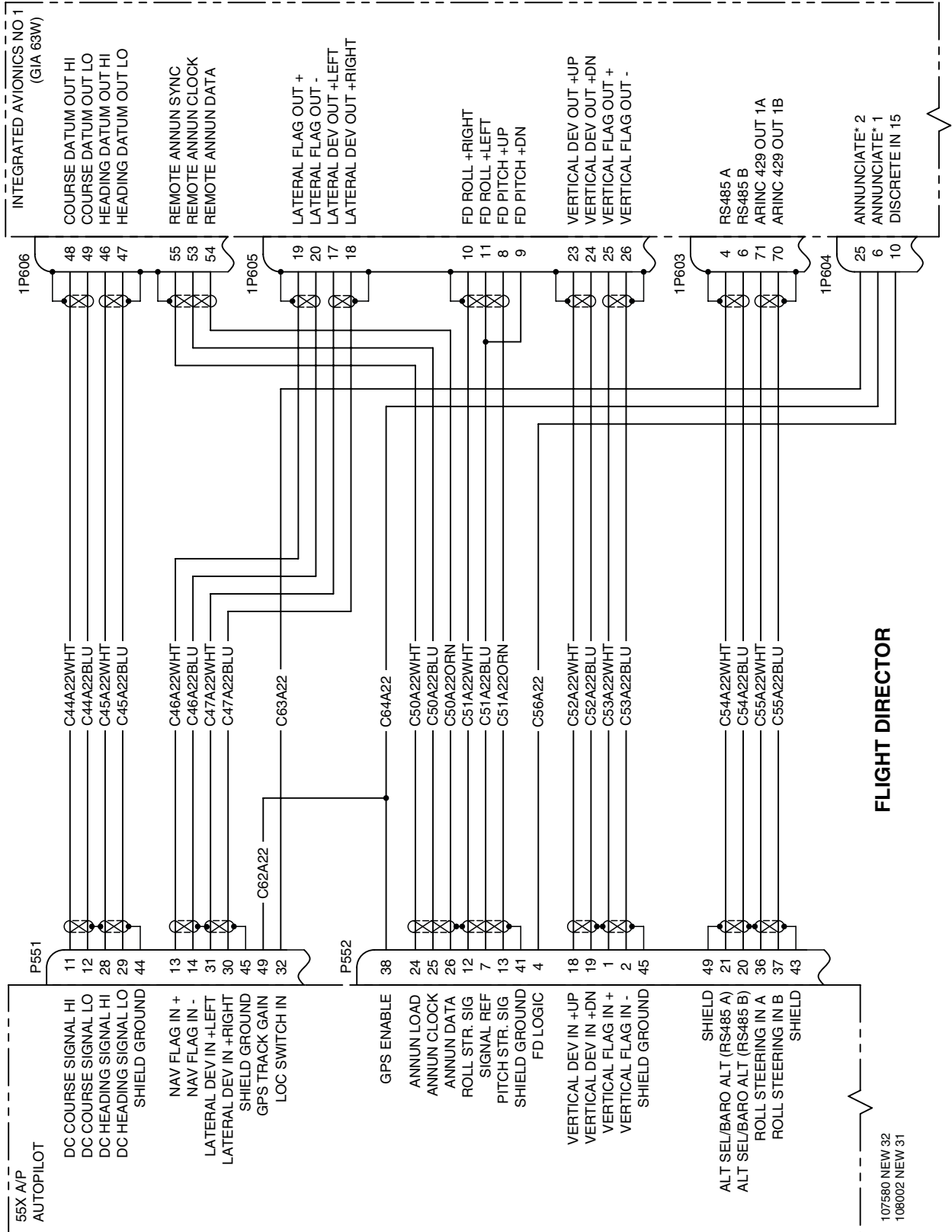
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



S-TEC System 55X
Figure 2 (Sheet 8 of 13)

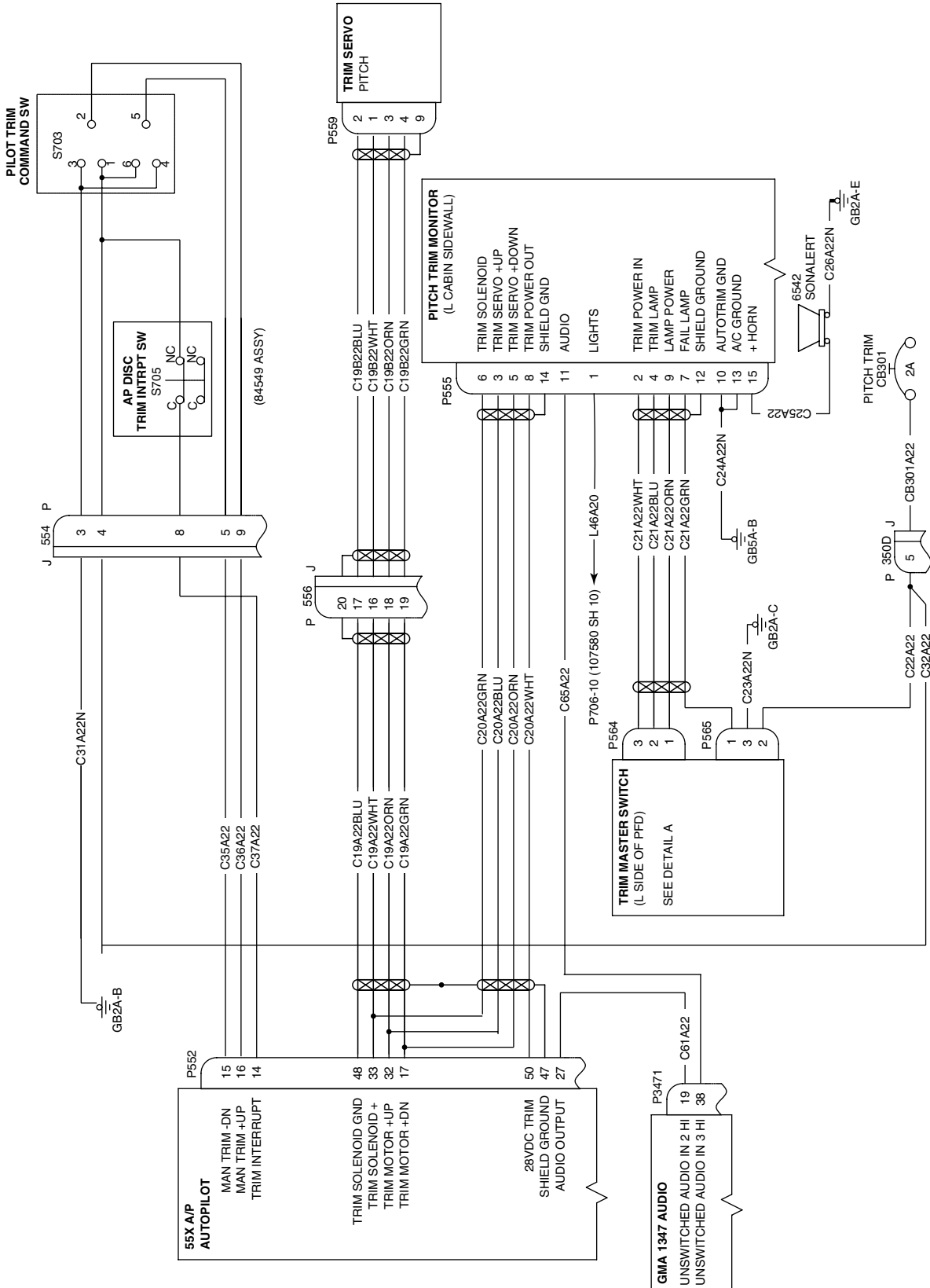
107580 NEW 31
108002 NEW 30

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



S-TEC System 55X
Figure 2 (Sheet 9 of 13)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

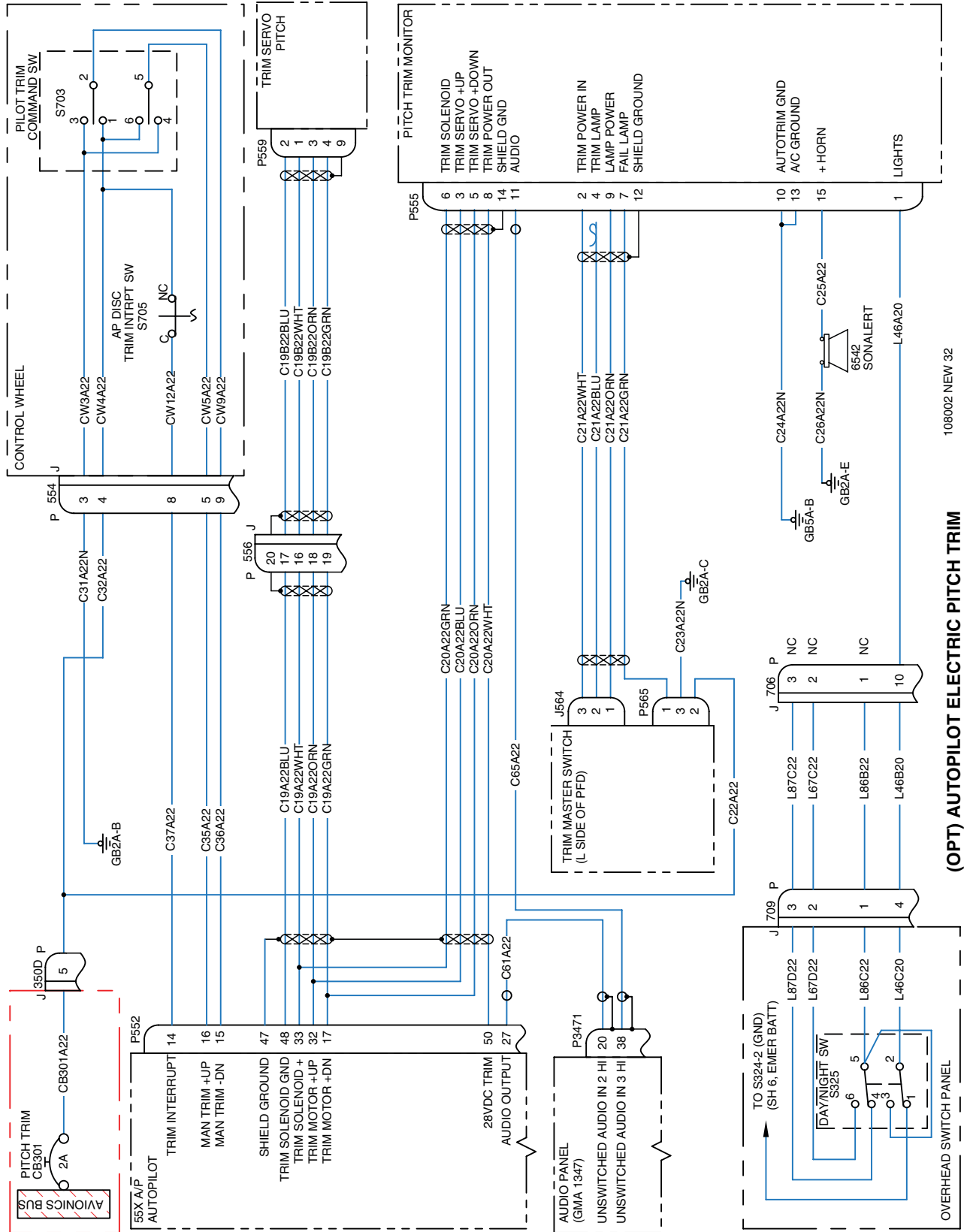


107580 NEW 33

AUTOPILOT ELECTRIC PITCH TRIM

S-TEC System 55X
Figure 2 (Sheet 10 of 13)

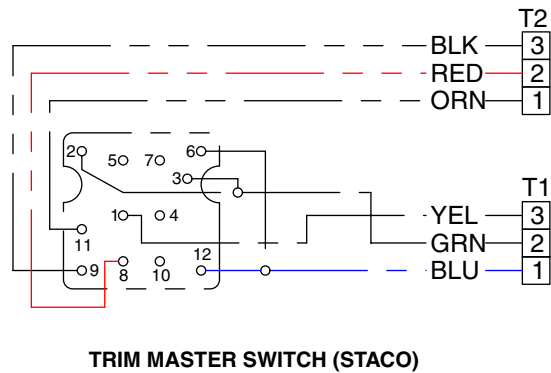
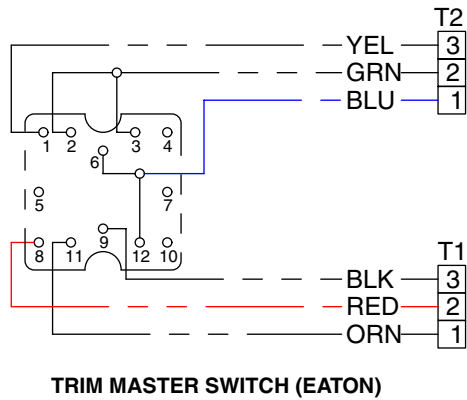
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



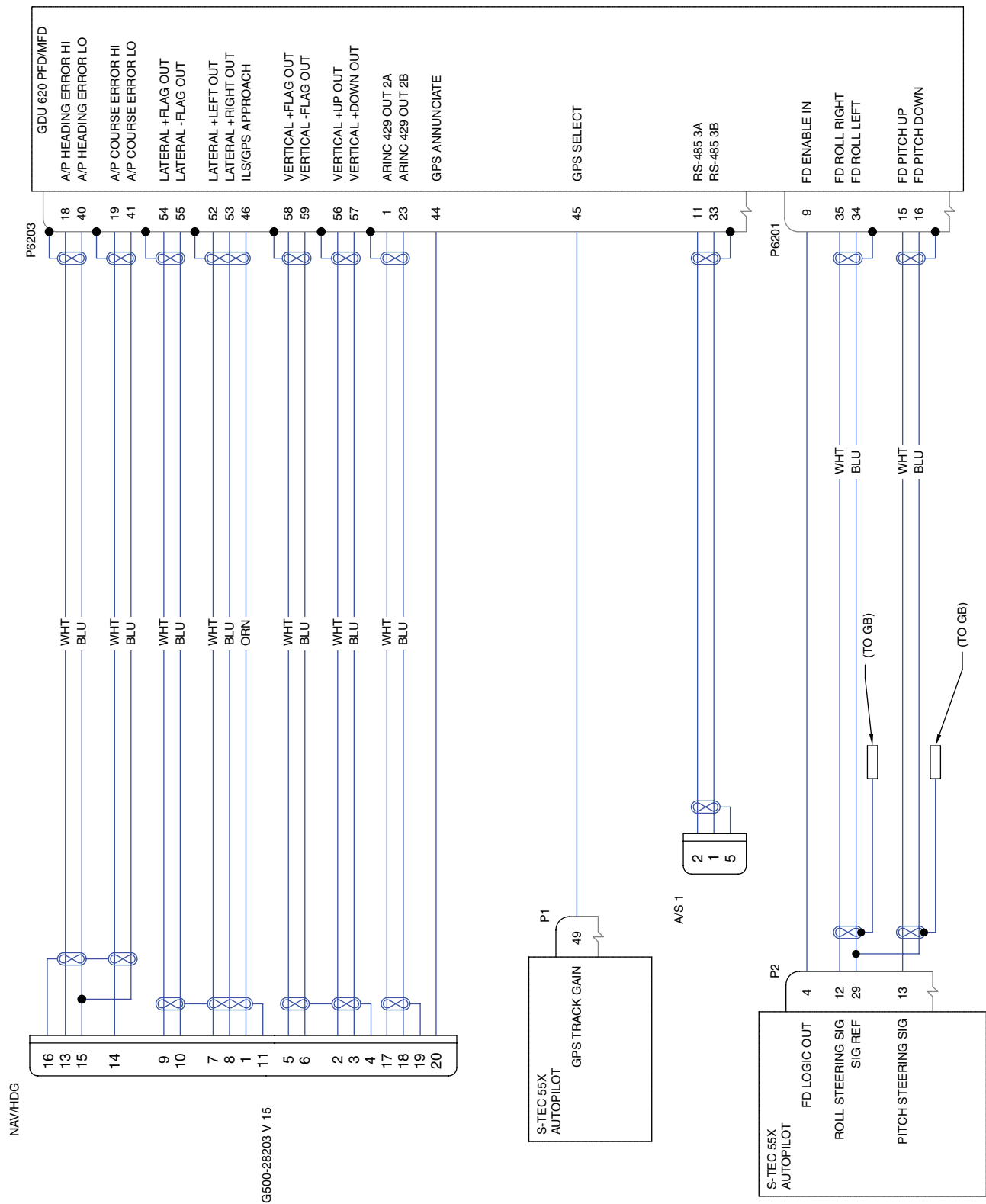
55X A/P Pitch Trim
Figure 2 (Sheet 11 of 13)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107591 NEW 7



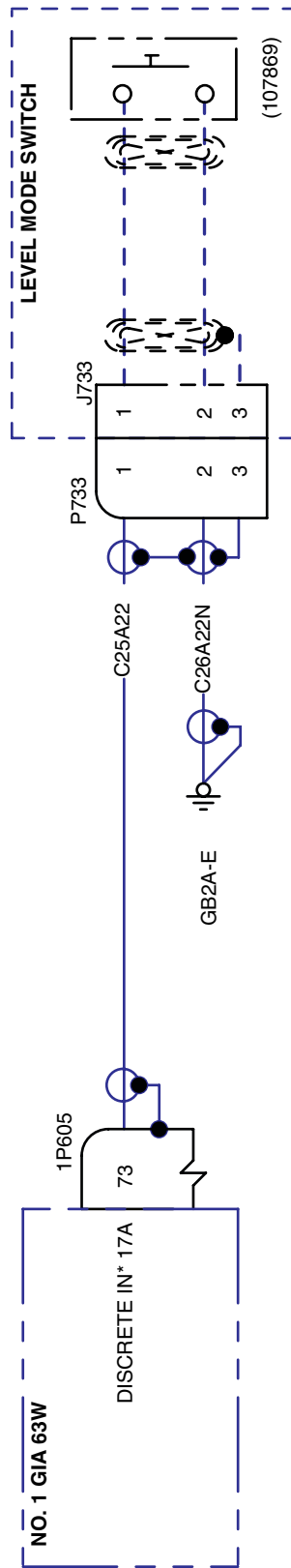
DETAIL A



S-TEC System 55X
Figure 2 (Sheet 13 of 13)

Effectivity
with Garmin G500

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

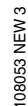


108053 NEW 2

GFC 700 AFCS

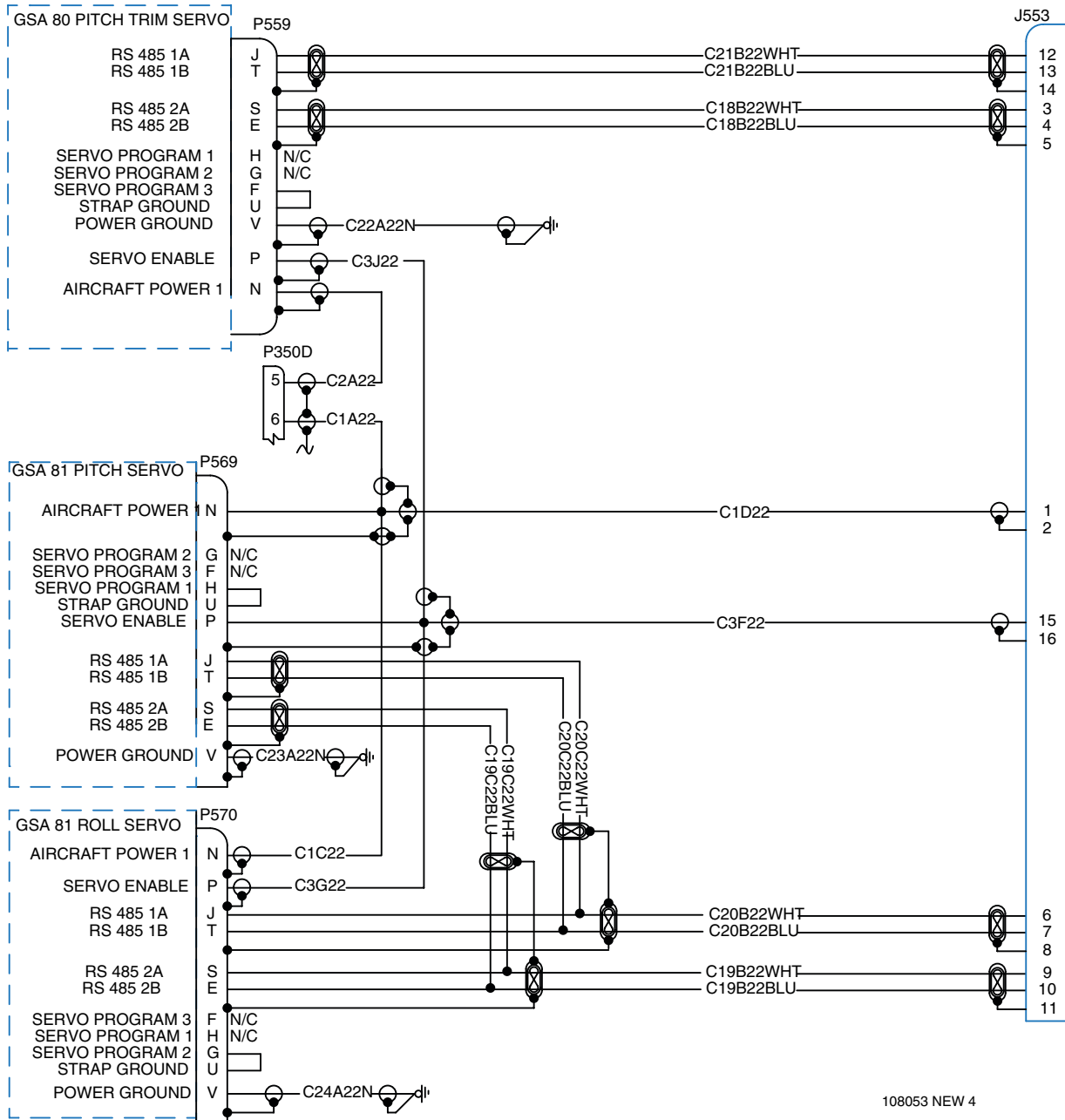
Figure 3 (Sheet 1 of 3)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



GFC 700 AFCS
Figure 3 (Sheet 2 of 3)

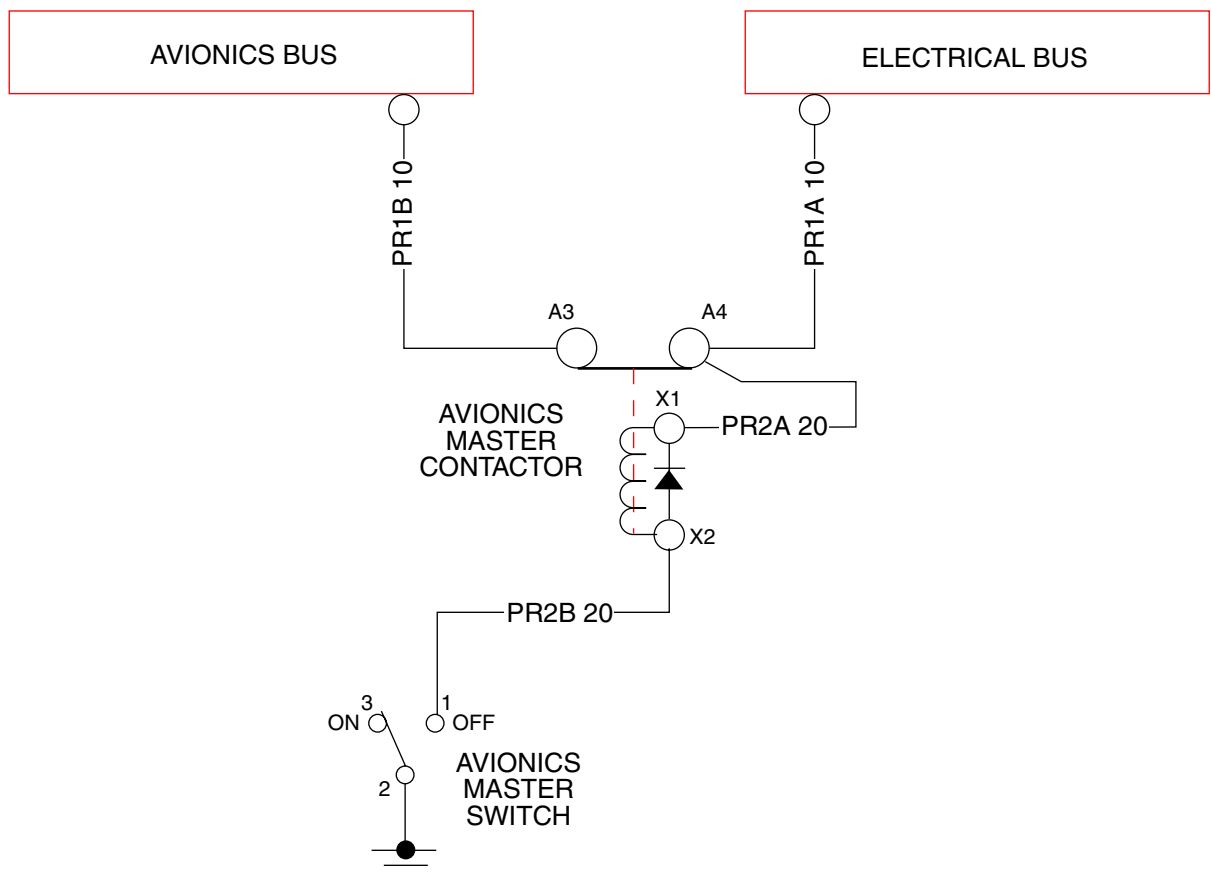
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



GFC 700 AFCS
Figure 3 (Sheet 3 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D

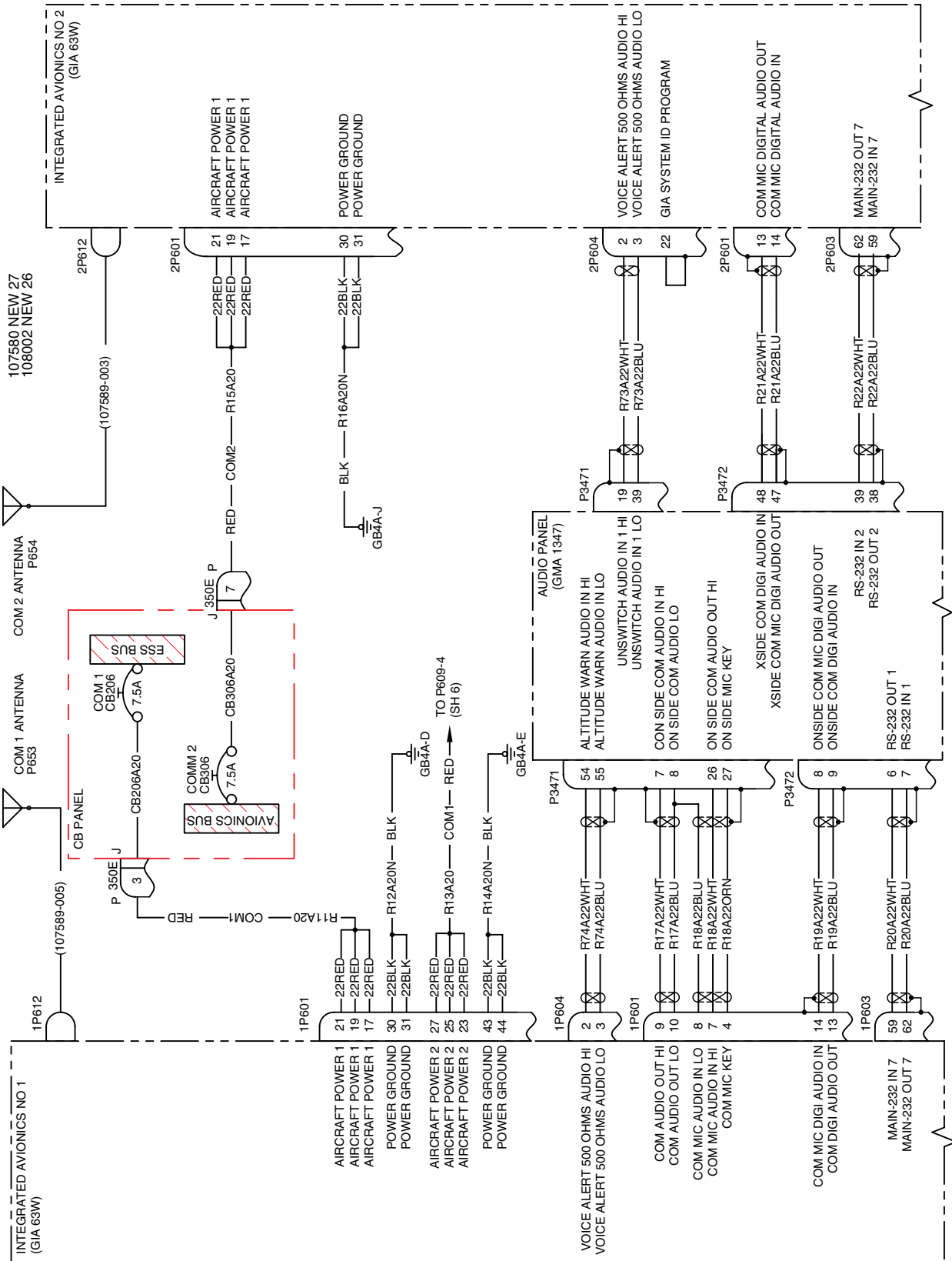


Avionics Master Switch
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

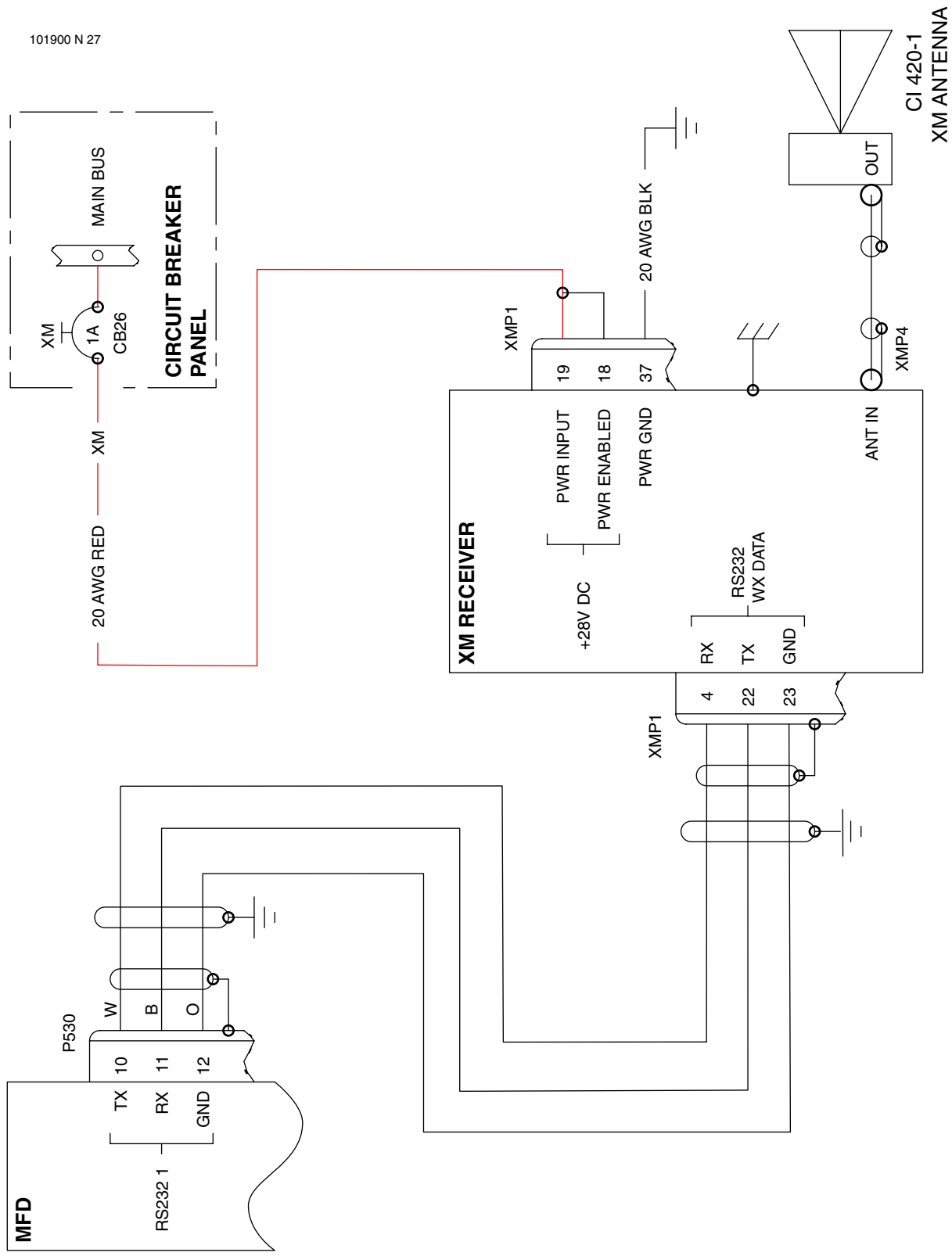
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



VHF Communications
Figure 1

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

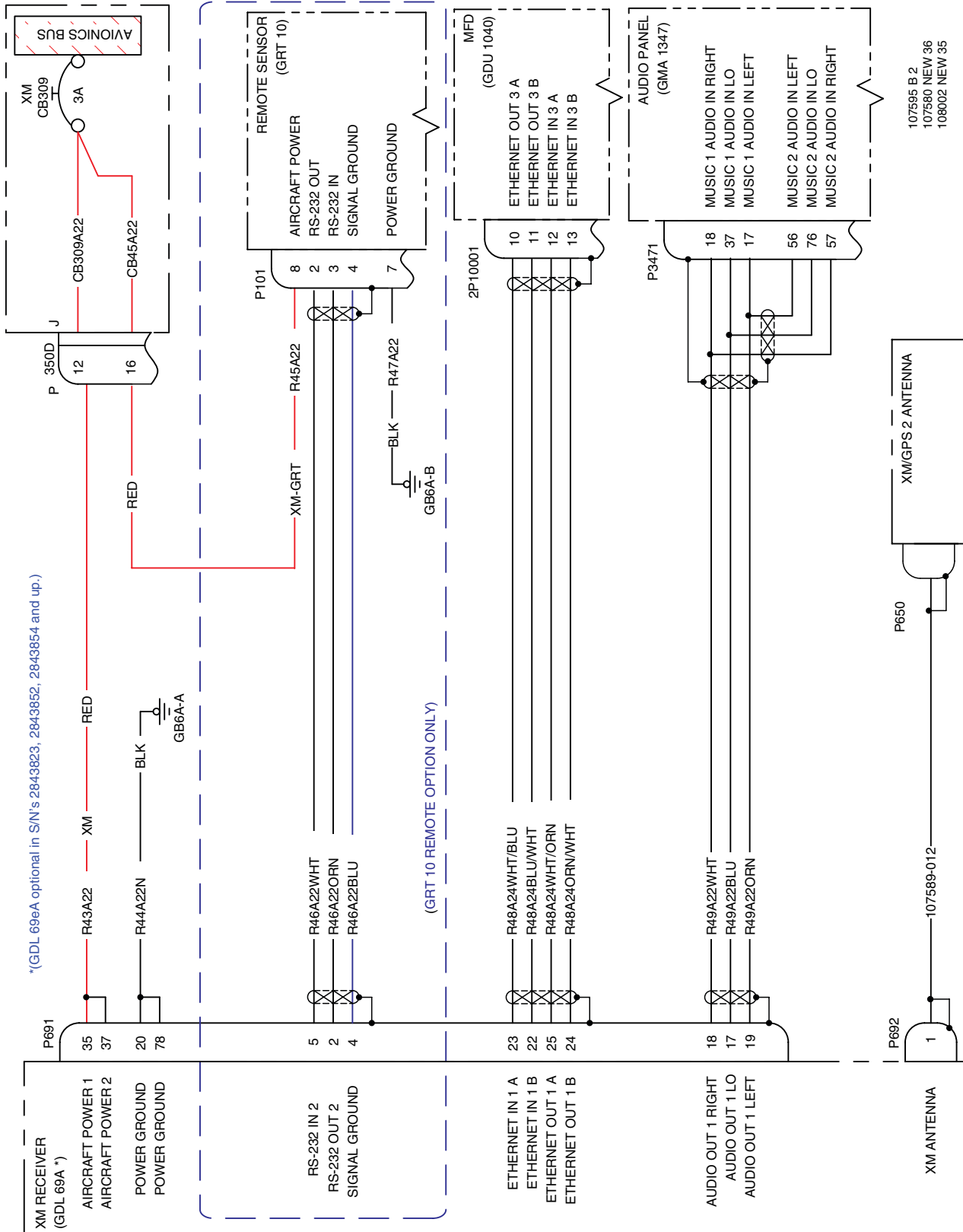
THIS PAGE INTENTIONALLY BLANK



XM Weather Datalink (Optional)
Figure 1

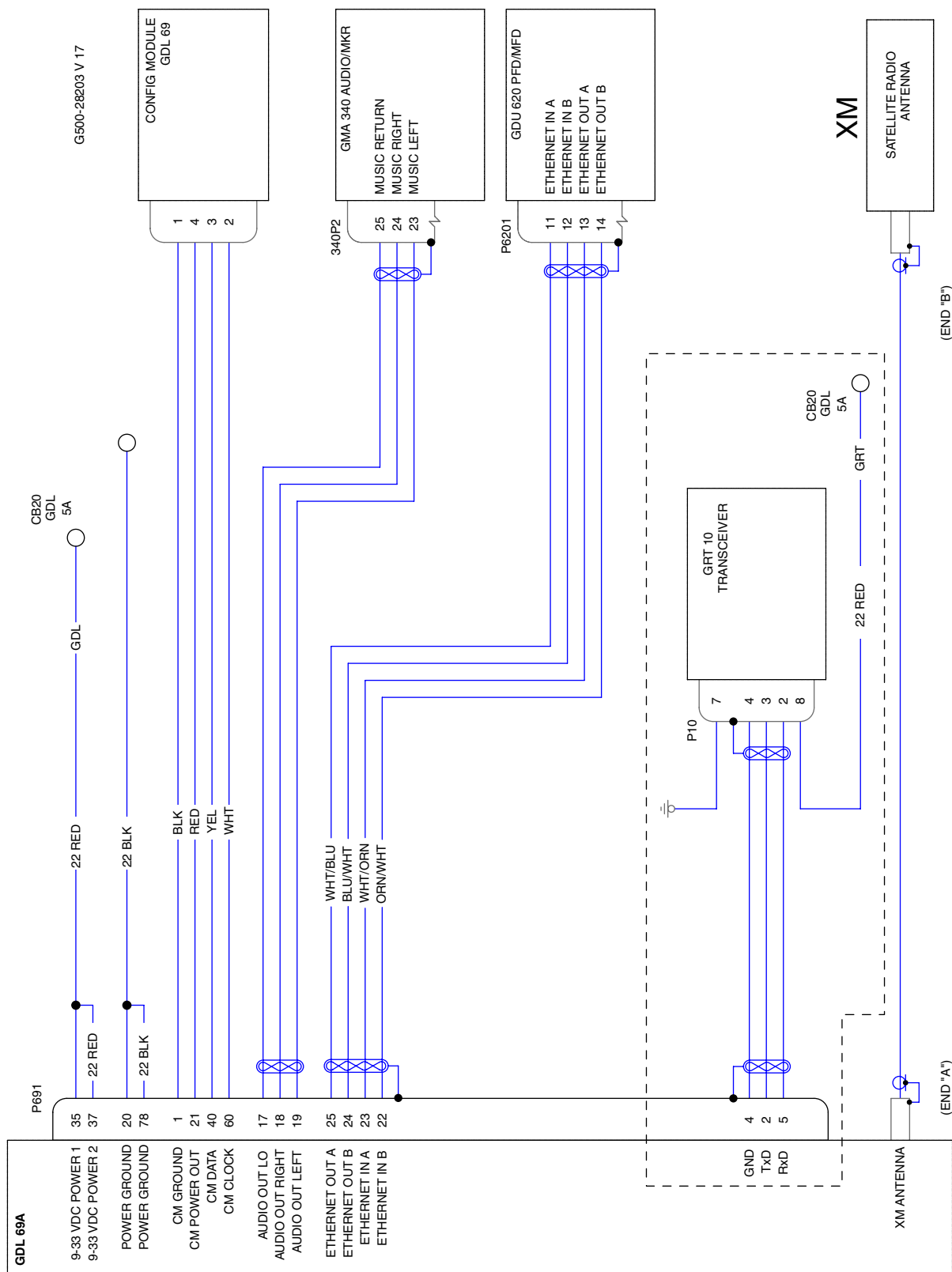
[Effectivity](#)
[with Avidyne Integra](#)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



XM Satellite (GDL 69A)
Figure 2 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



XM Satellite (GDL 69A)
Figure 2 (Sheet 2 of 2)

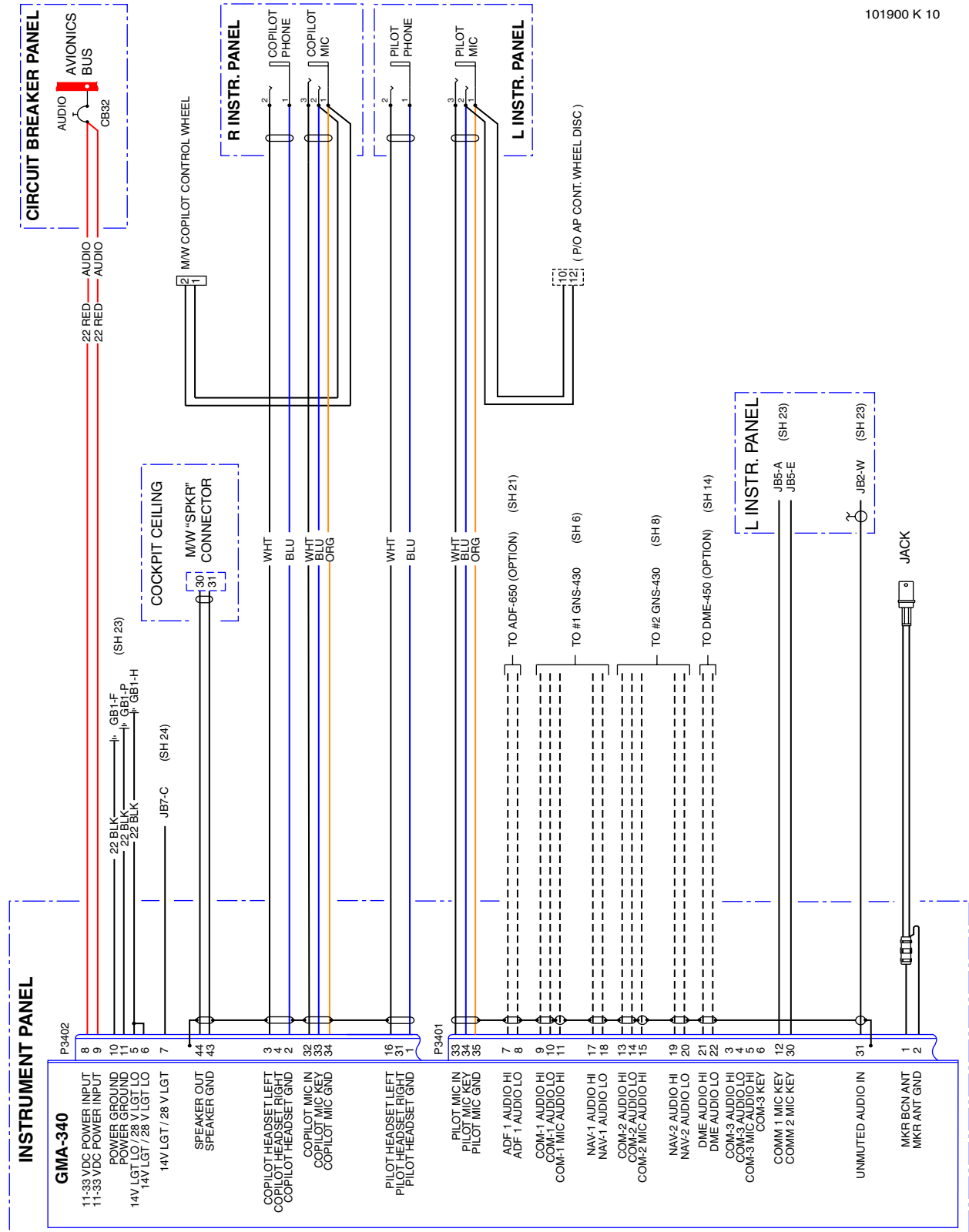
Effectivity
with Garmin G500

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

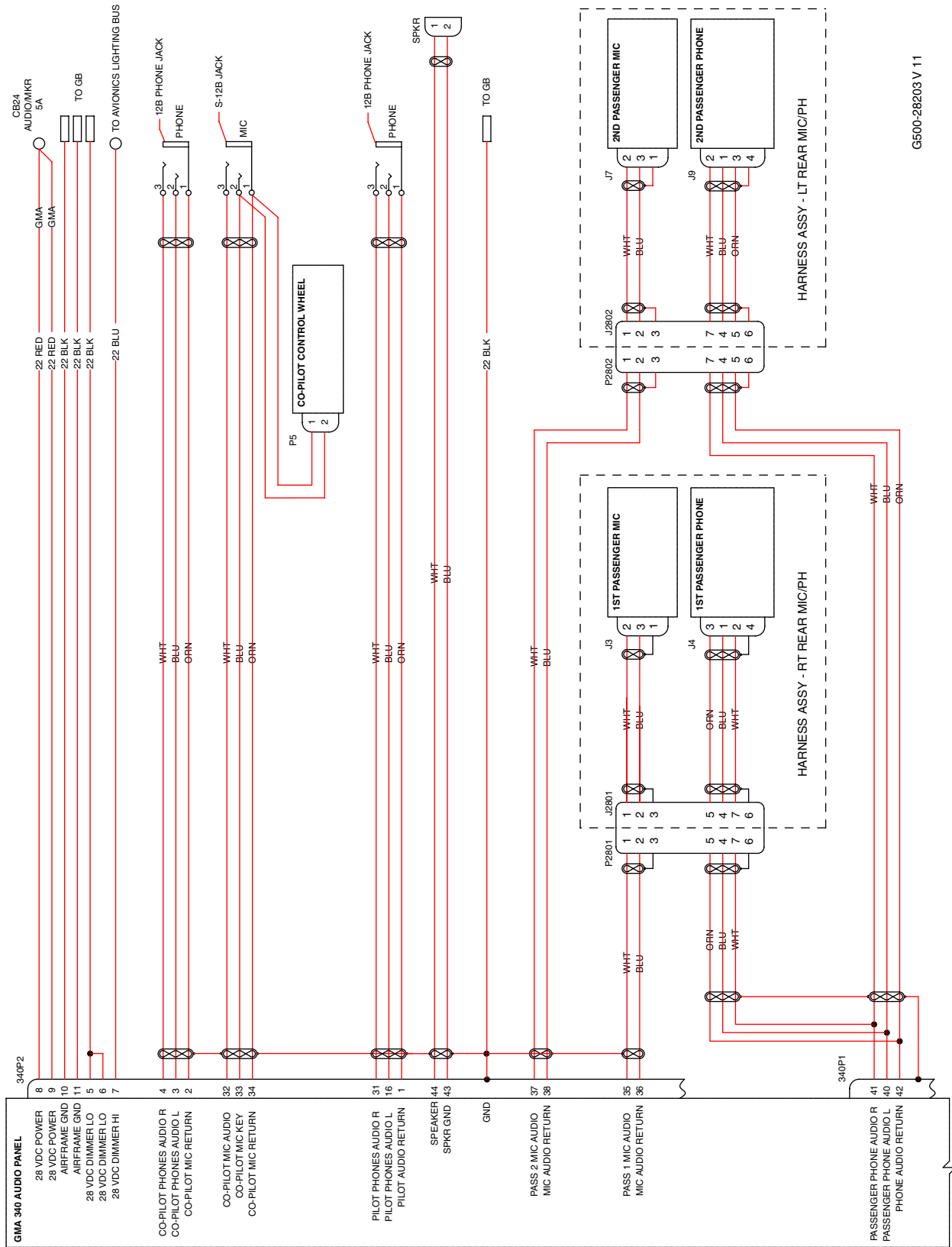
101900 K 10



GMA 340 Audio Panel
Figure 1 (Sheet 1 of 3)

Effectivity
with Avidyne Entegra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

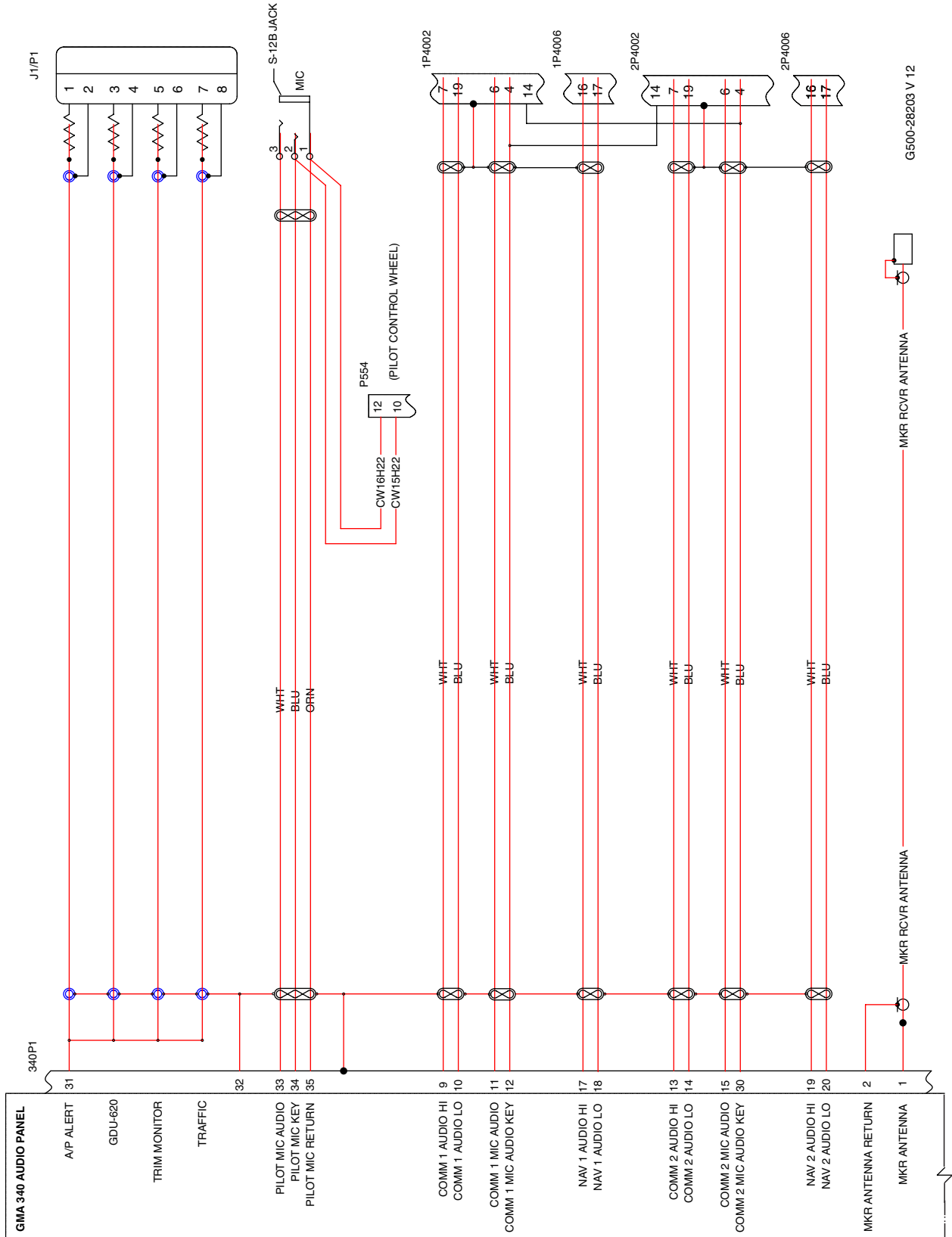


G500-28203 V 11

Effectivity
with Garmin 500

GMA 340 Audio Panel
Figure 1 (Sheet 2 of 3)

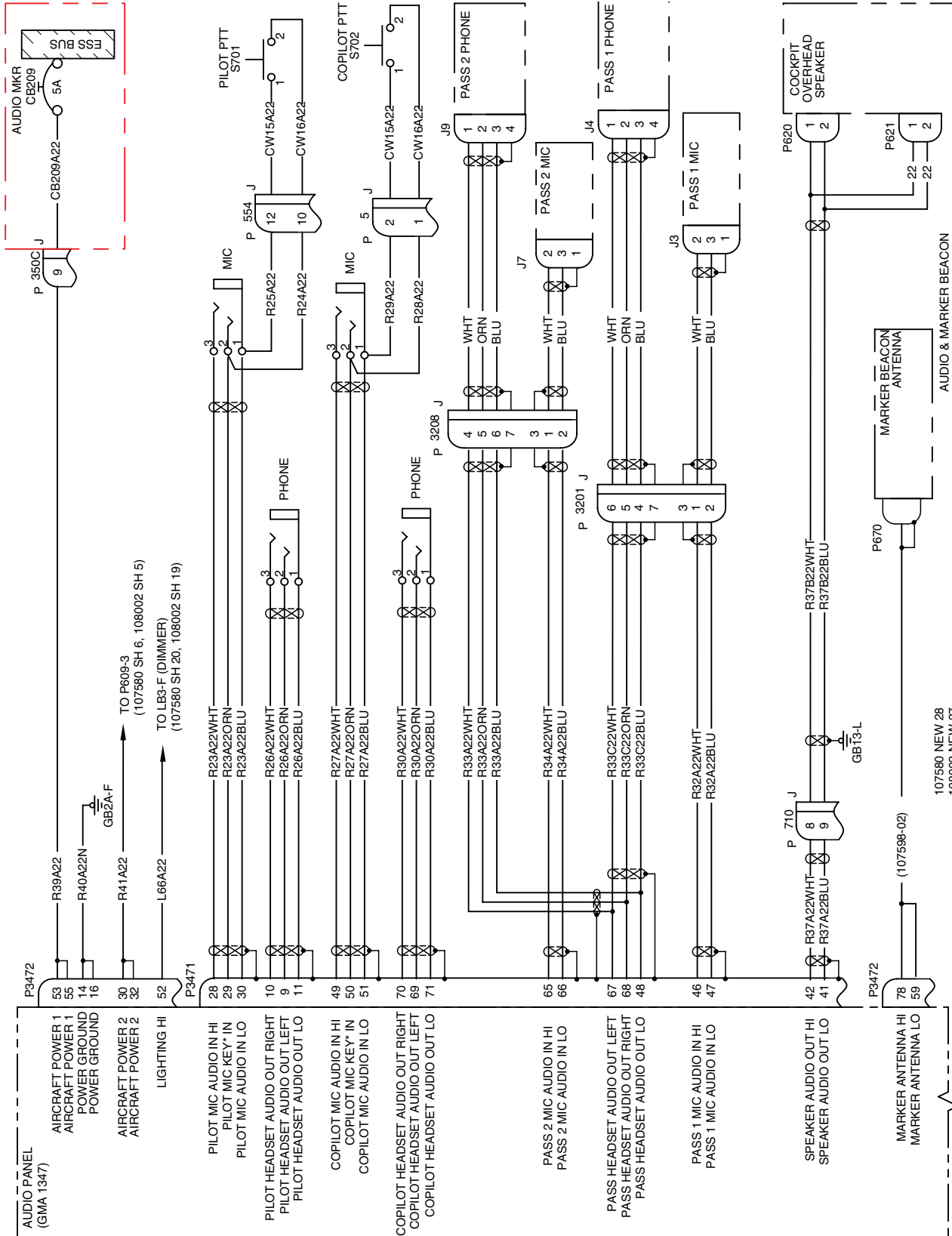
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GMA 340 Audio Panel
Figure 1 (Sheet 3 of 3)

Effectivity
with Garmin 500

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

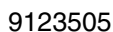


GMA 1347 Audio Panel
Figure 2 (Sheet 1 of 2)

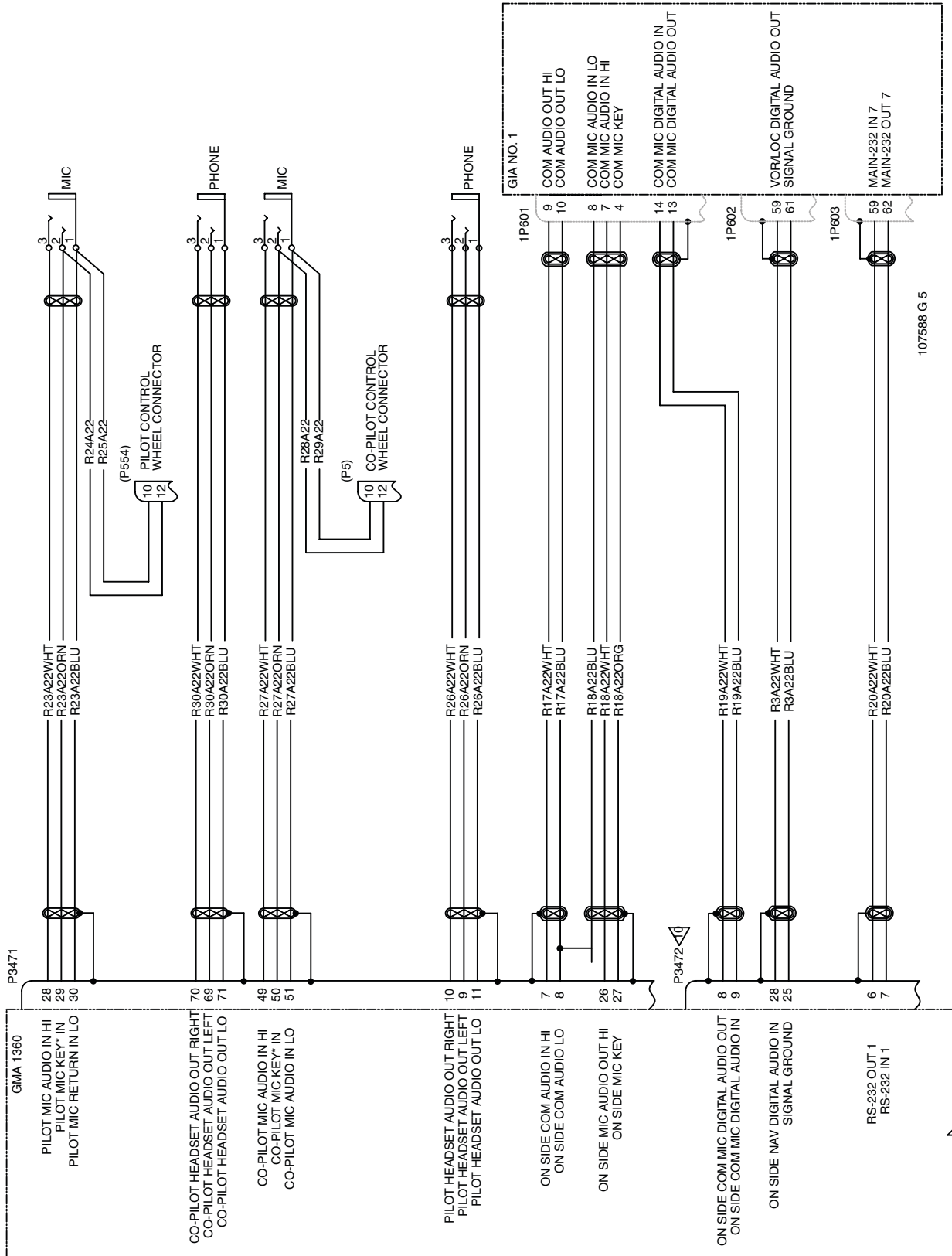
Effectivity

with Garmin G1000 or G1000 NXi
2843701, 2843703-2843999

Effectivity
with Garmin G1000 or G1000 NXi
2843701, 2843703–2843999

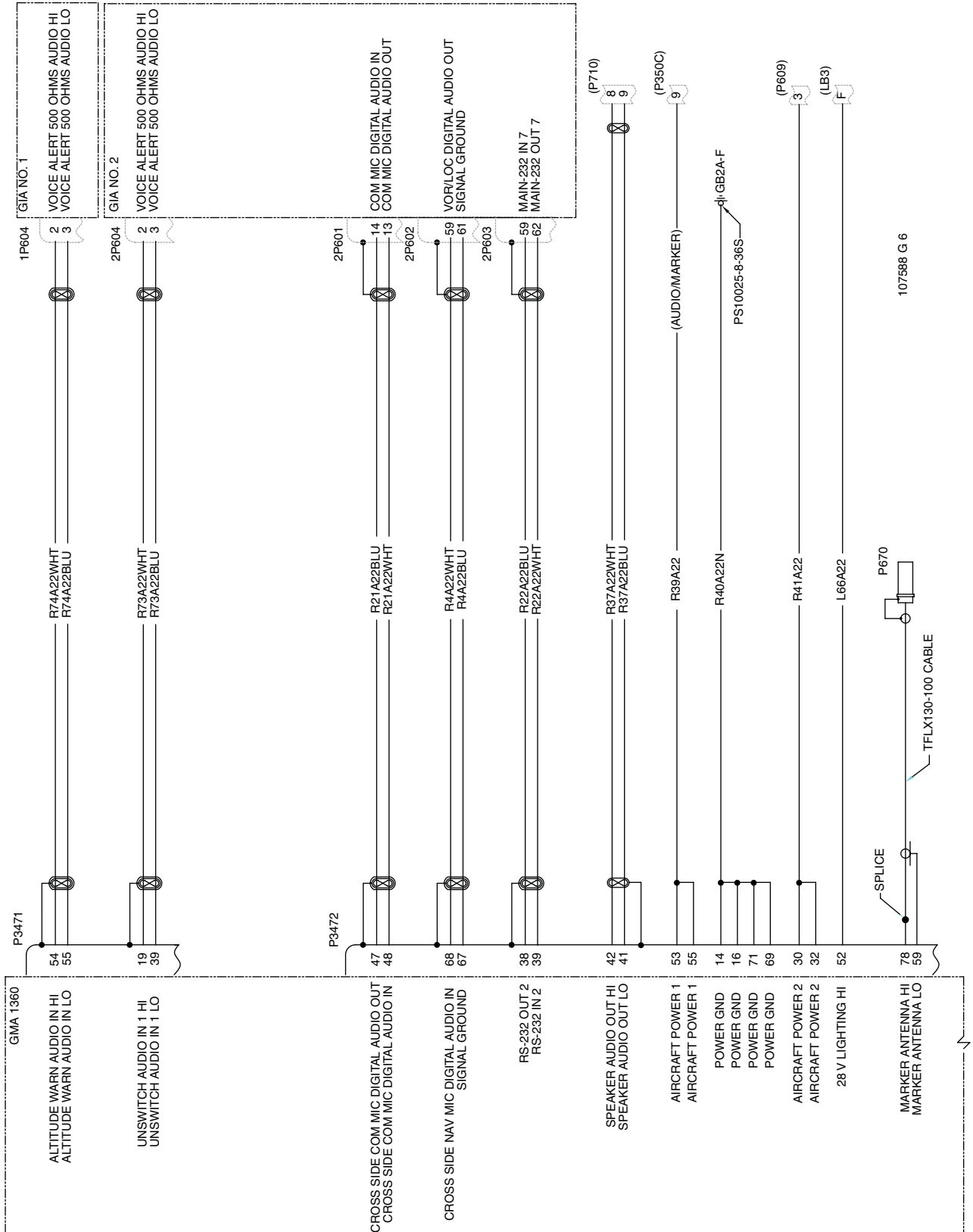


PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GMA 1360 - Audio Panel
Figure 3 (Sheet 1 of 2)

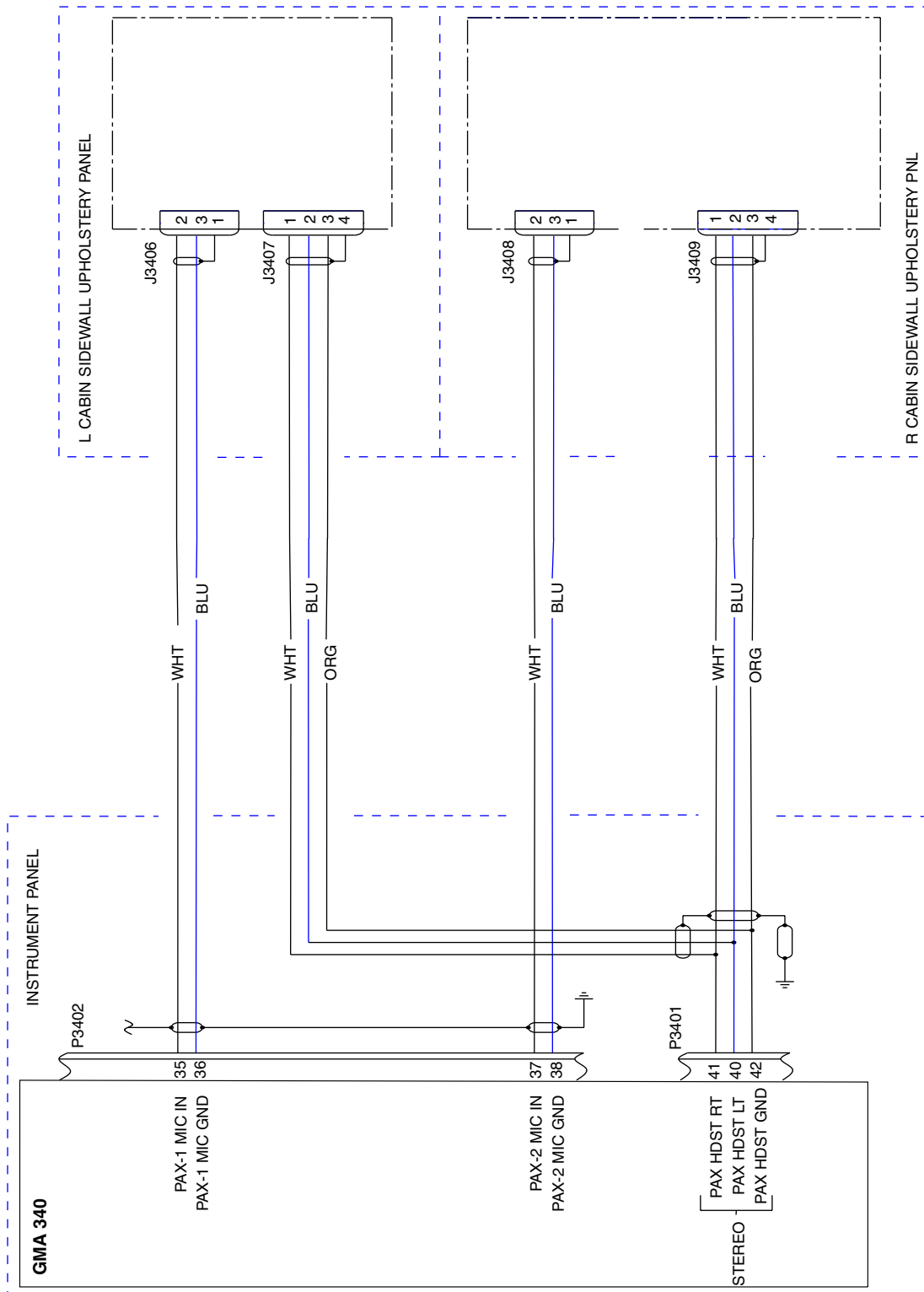
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



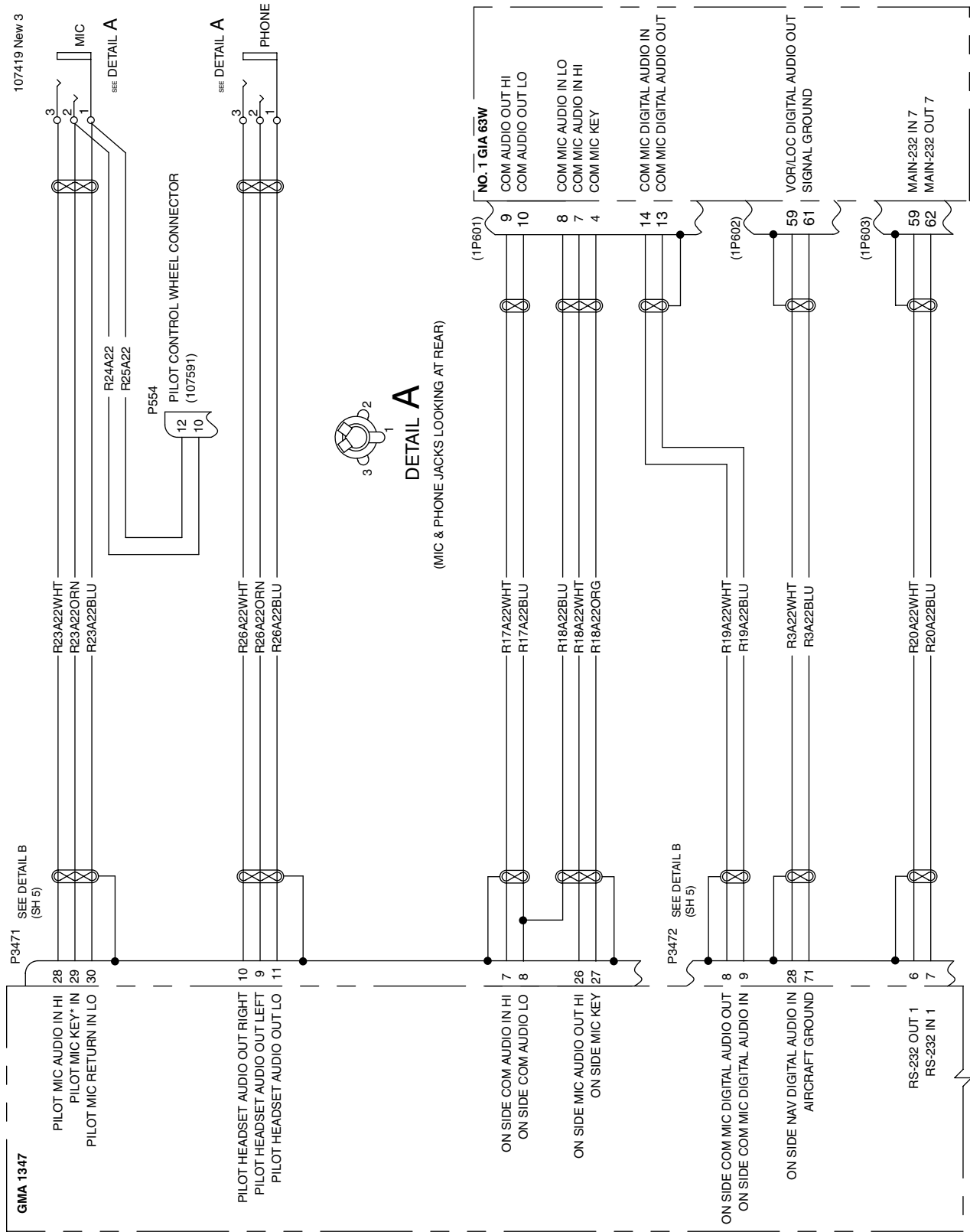
GMA 1360 Audio Panel
Figure 3 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101900 N 19

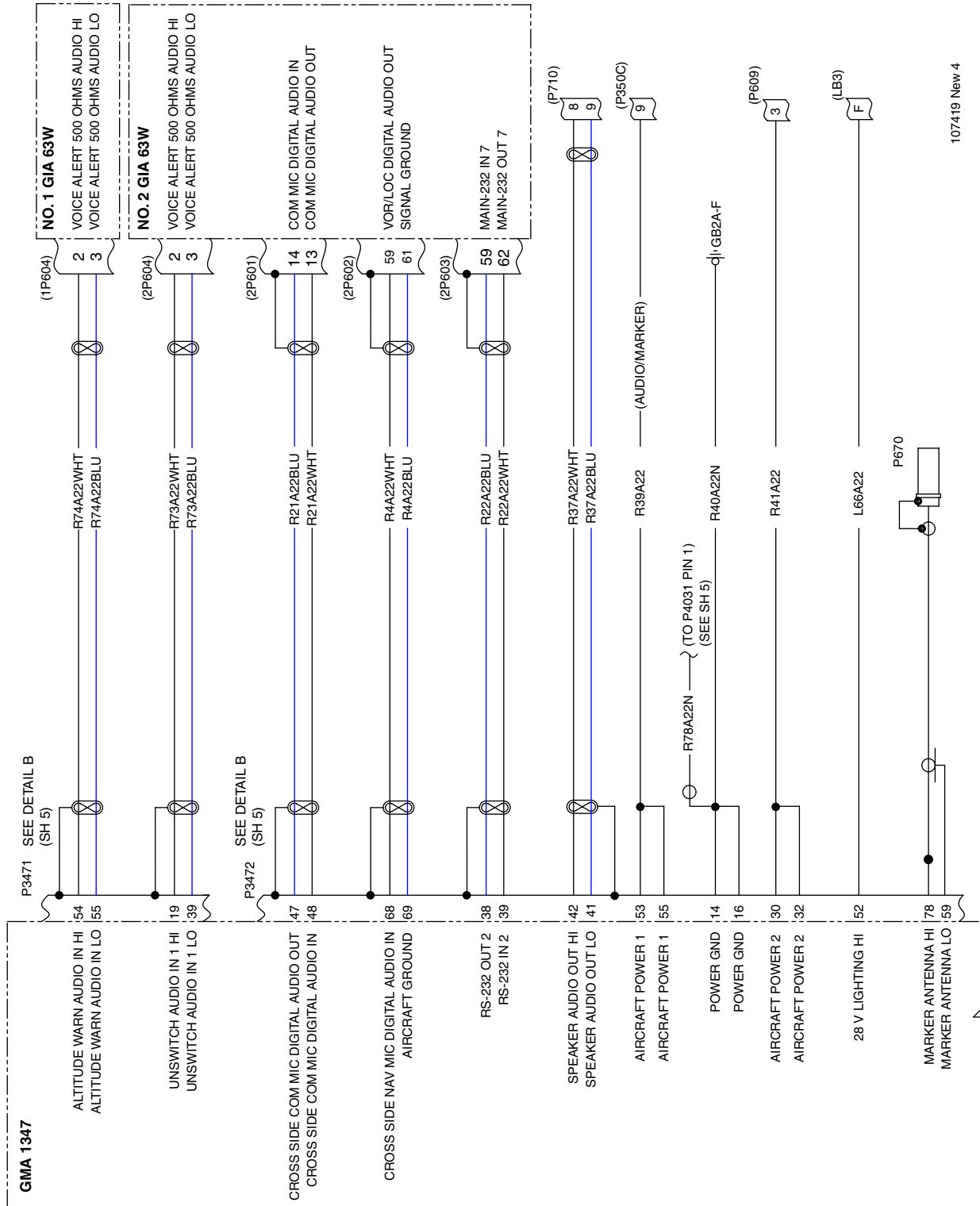


PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Aft Passenger Intercom (Optional)
Figure 5 (Sheet 1 of 10)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

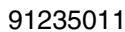


Aft Passenger Intercom (Optional)
Figure 5 (Sheet 2 of 10)

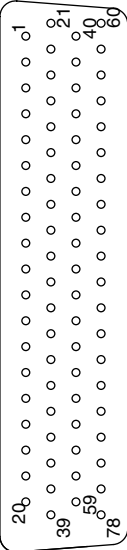
Effectivity

2843711 and up, with
Garmin G1000 or G1000 NXi

Effectivity
2843711 and up, with
Garmin G1000 or G1000 NXi



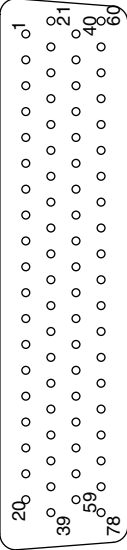
107419 D 5



P3472

DETAIL B

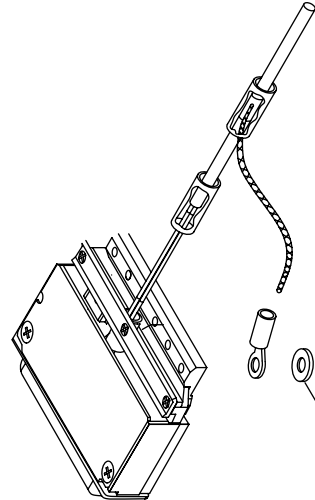
(REAR CONNECTOR VIEW)



P3471

DETAIL B

(REAR CONNECTOR VIEW)



NAS1149CN832R WASHER A/R

MS35338-42 WASHER A/R

MS35206-242 SCREW A/R

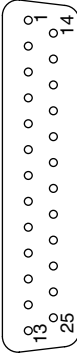
OR

MS35206-243 SCREW A/R

NOTE: 2 SHIELDS PER RING TERMINAL
2 LUGS PER SCREW HOLE, MAX

DETAIL C

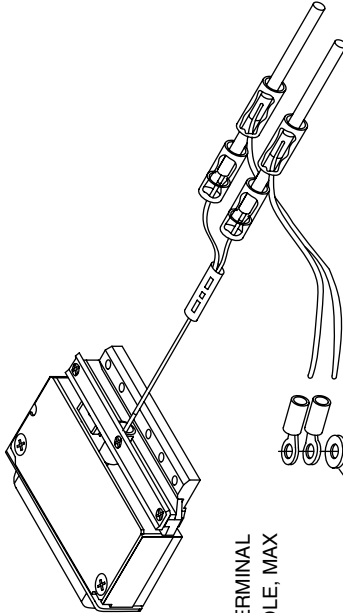
(SHIELD BLOCK GROUND INSTALLATION)



P4031

DETAIL E

(REAR CONNECTOR VIEW)



NOTE: 2 SHIELDS PER RING TERMINAL
2 LUGS PER SCREW HOLE, MAX

NAS1149CN832R WASHER A/R

MS35338-42 WASHER A/R

MS35206-242 SCREW A/R

OR

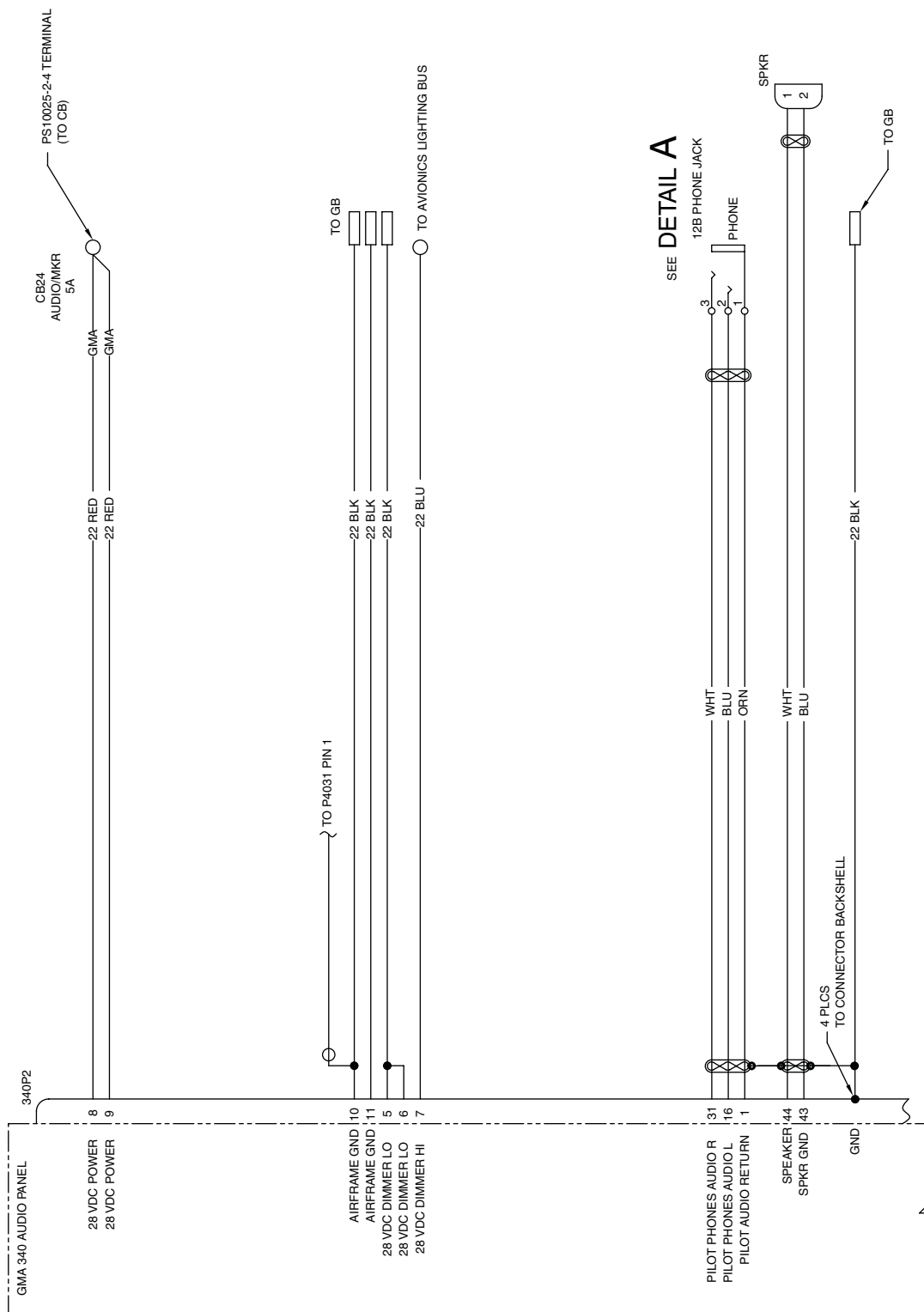
MS35206-243 SCREW A/R

DETAIL D

(SPliced SIGNAL WIRE INSTALLATION)

Aft Passenger Intercom (Optional)
Figure 5 (Sheet 4 of 10)

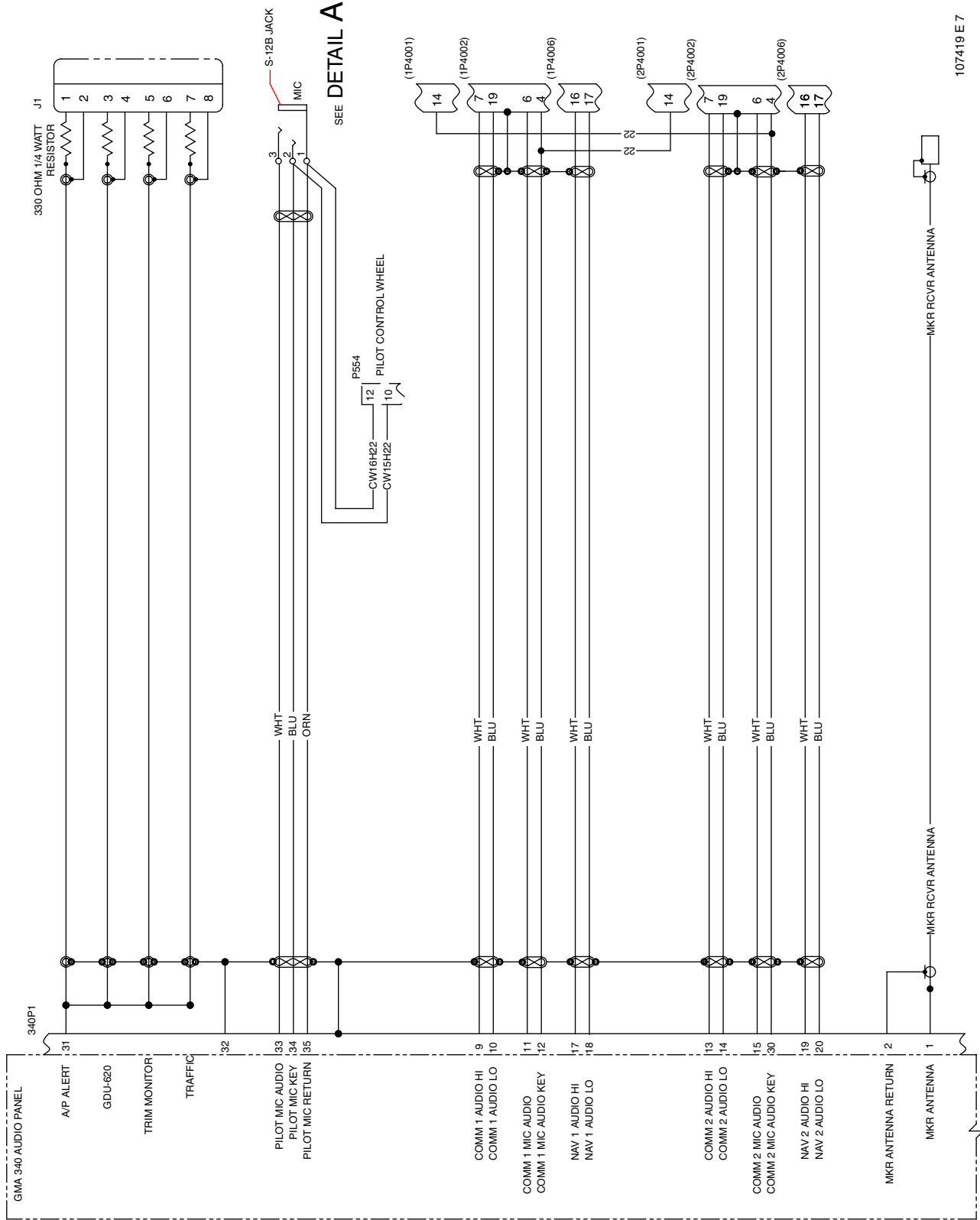
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



107419 E 6

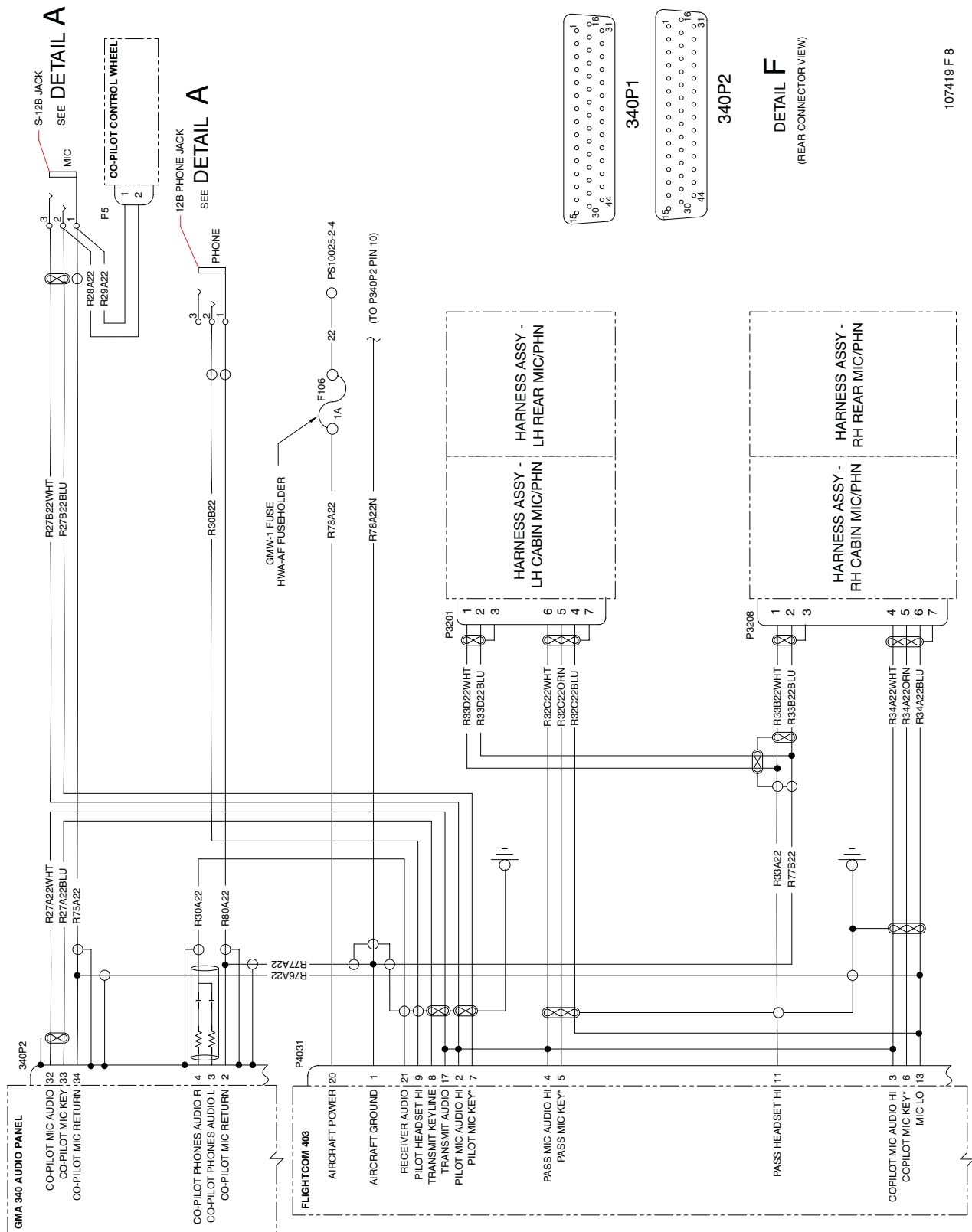
Aft Passenger Intercom (Optional)
Figure 5 (Sheet 5 of 10)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

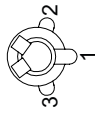


Aft Passenger Intercom (Optional)
Figure 5 (Sheet 6 of 10)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

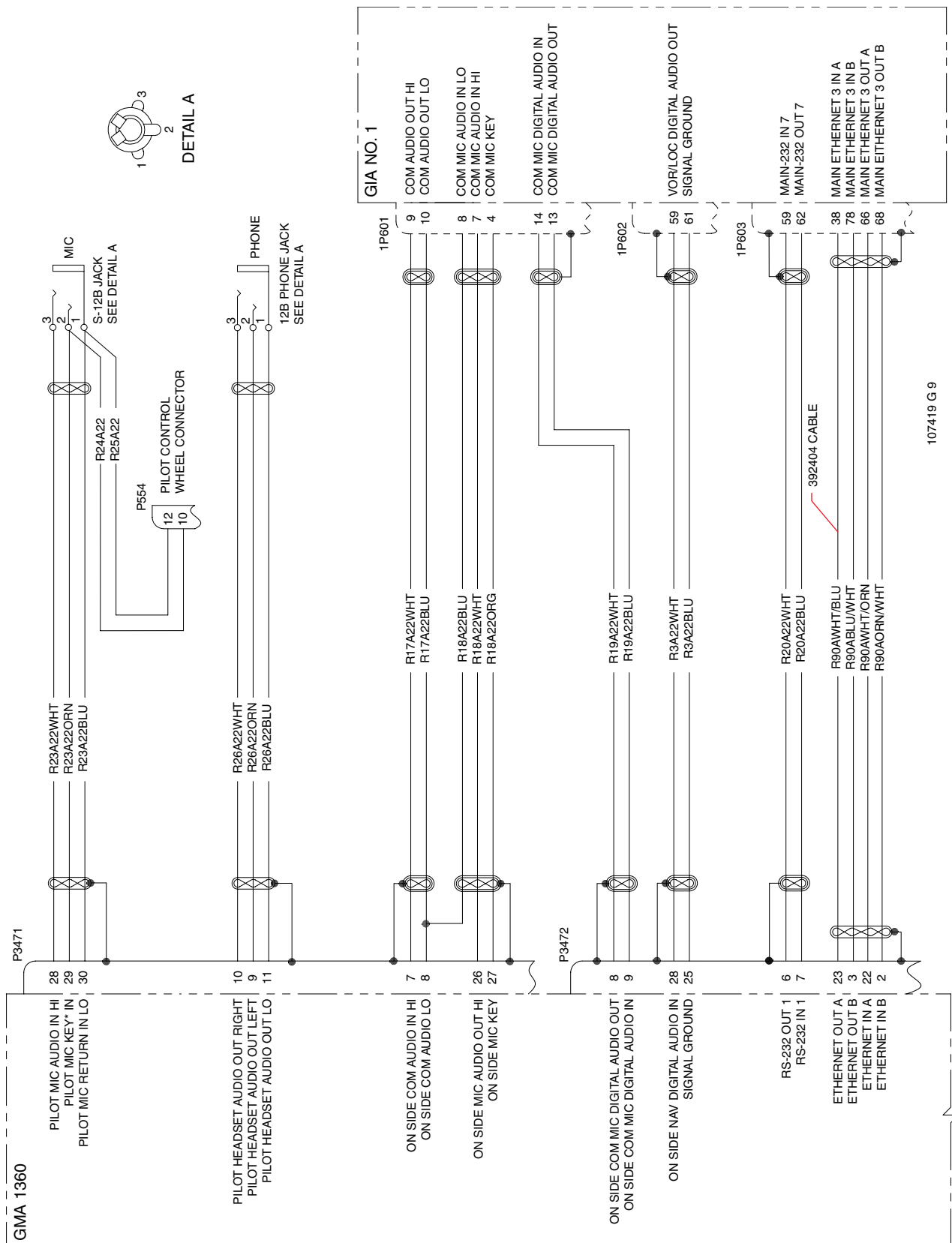


Aft Passenger Intercom (Optional)
Figure 5 (Sheet 7 of 10)



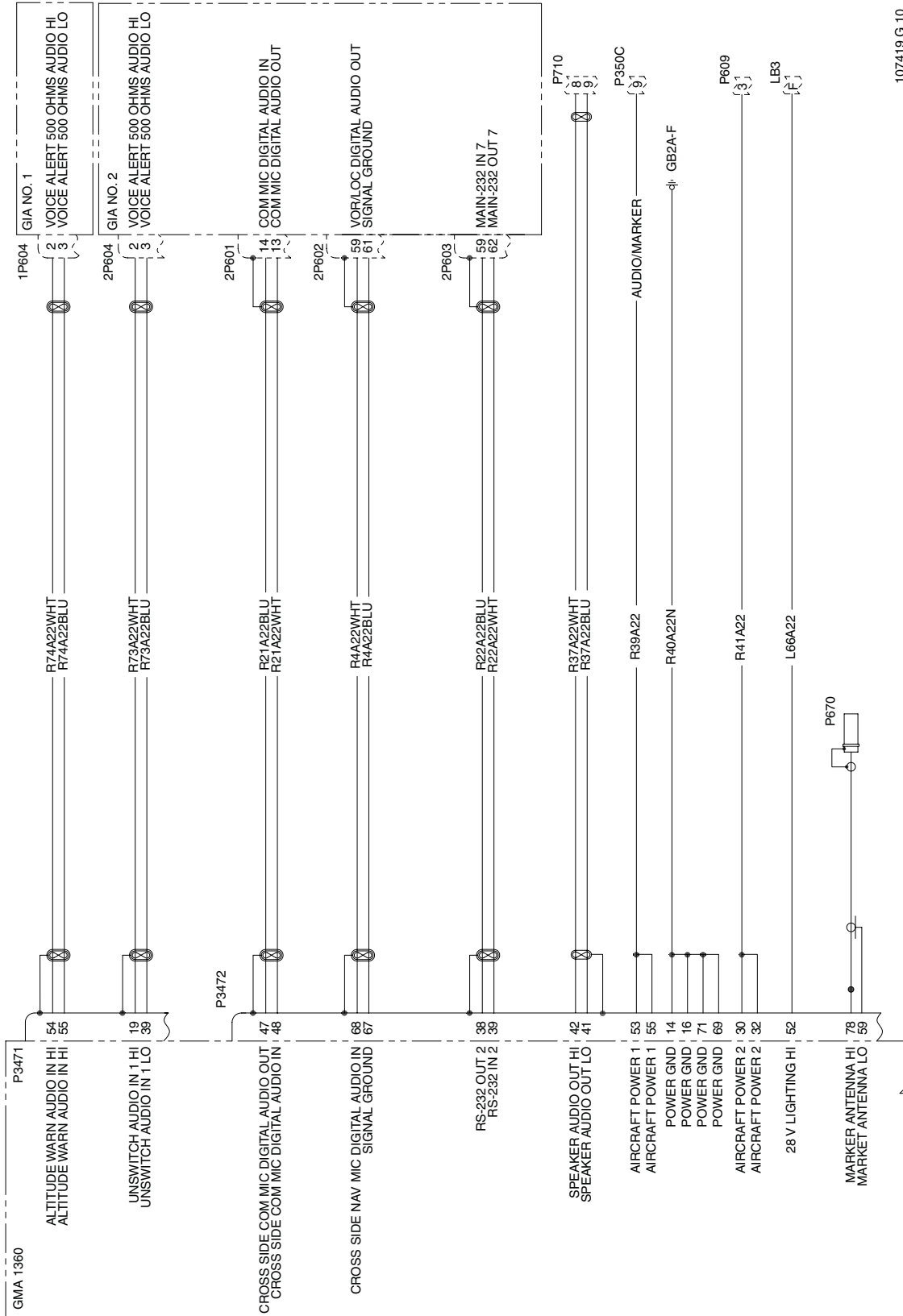
Effectivity

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



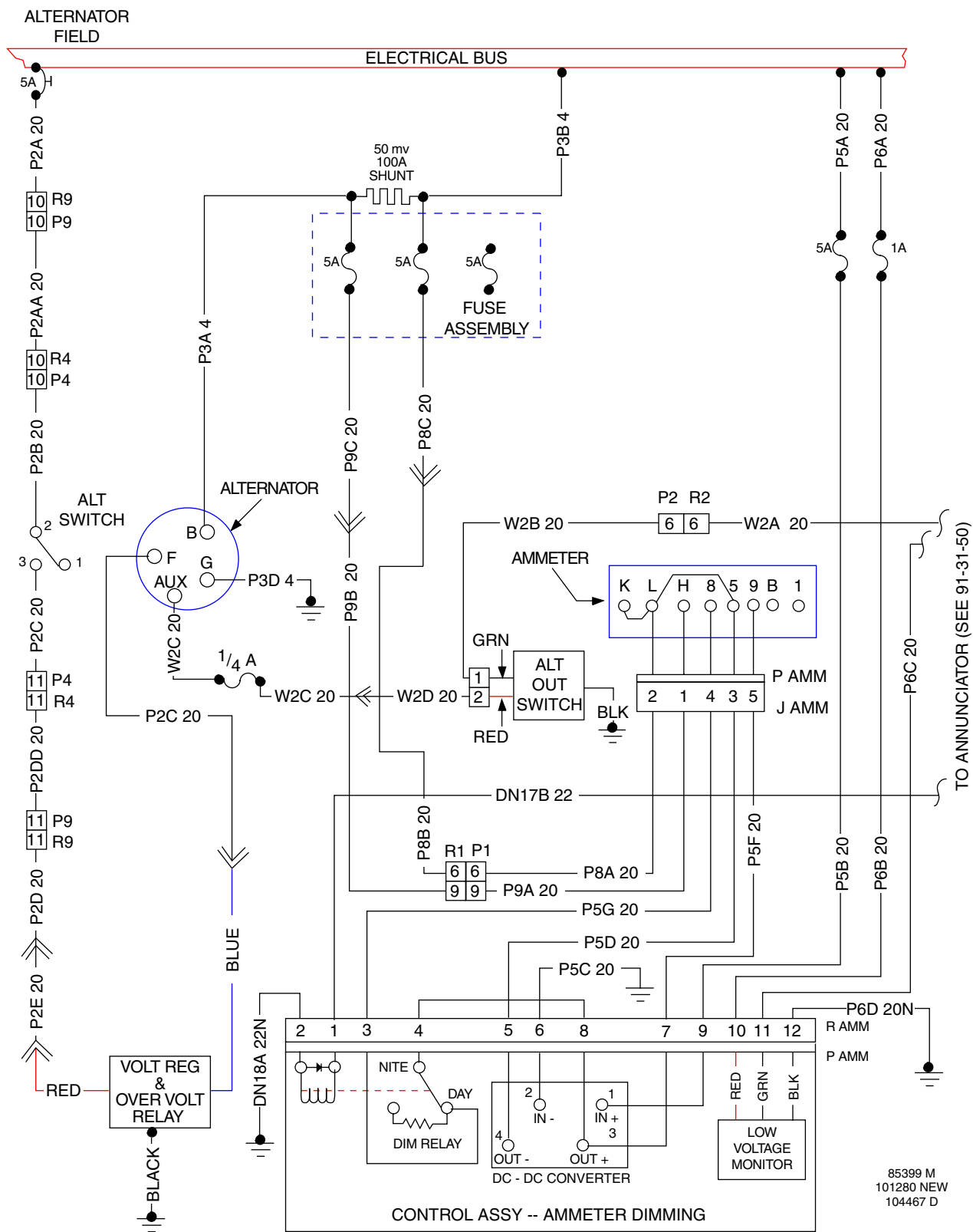
Aft Passenger Intercom (Optional)
Figure 5 (Sheet 9 of 10)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



107419 G 10

Aft Passenger Intercom (Optional)
Figure 5 (Sheet 10 of 10)

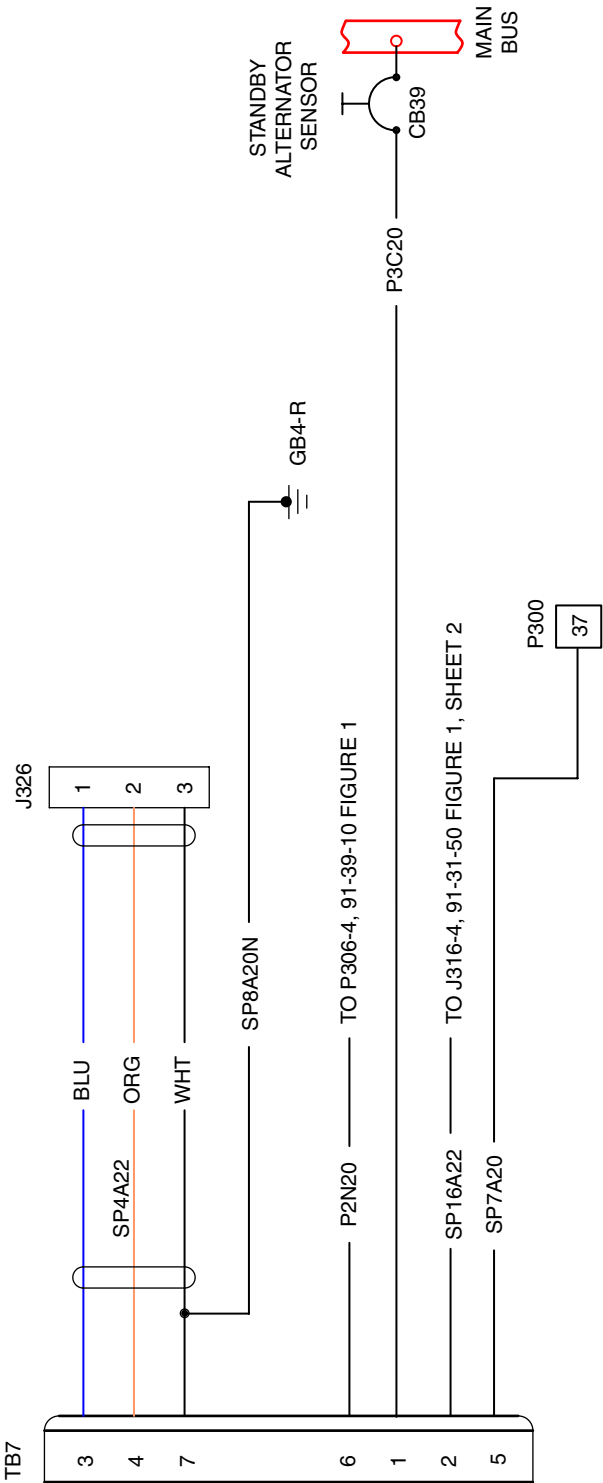
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

Alternator Power

Figure 1

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101902 U 21

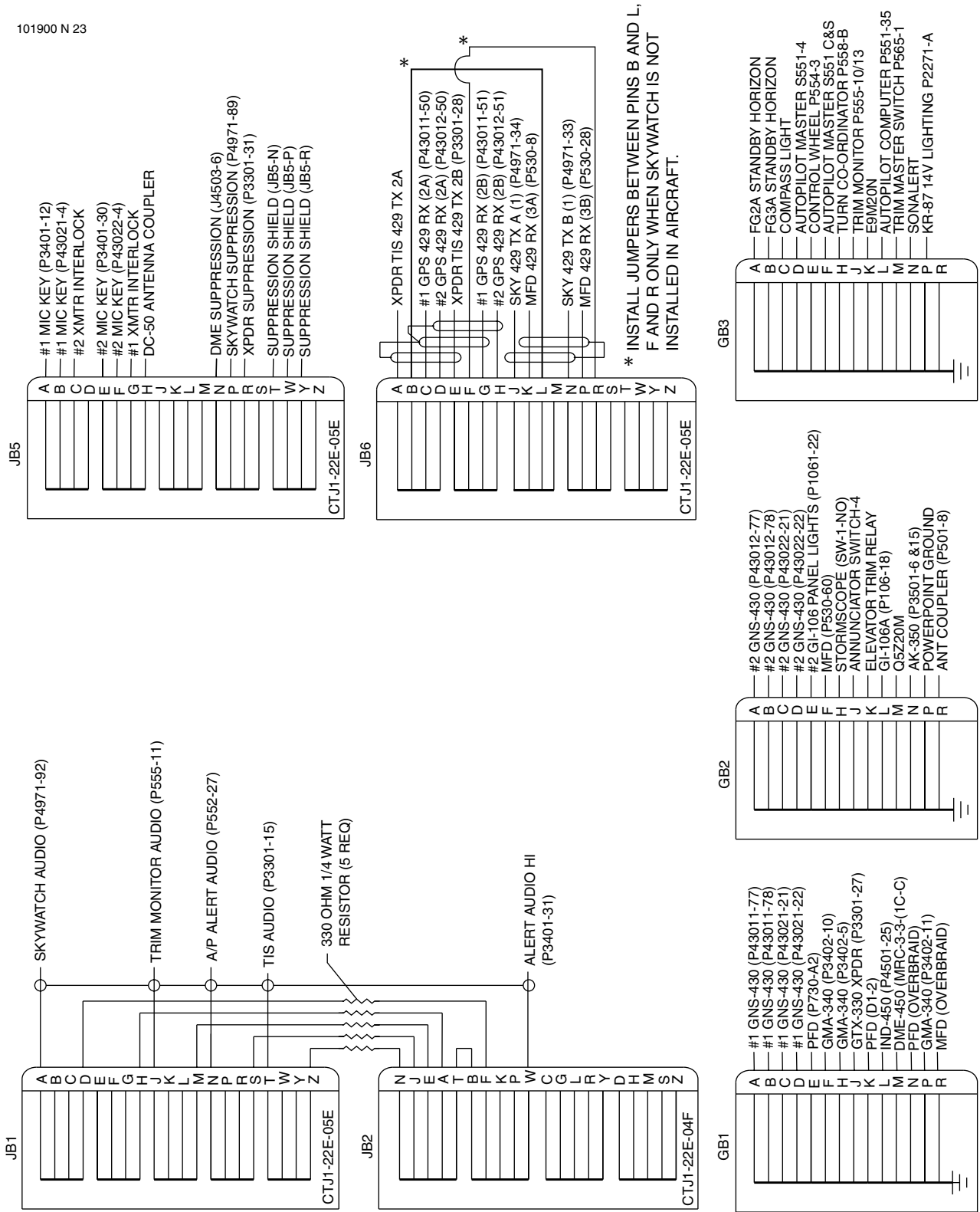


[Effectivity](#)
2843622 thru 2843682
with Avidyne Entegra

Terminal Block
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101900 N 23

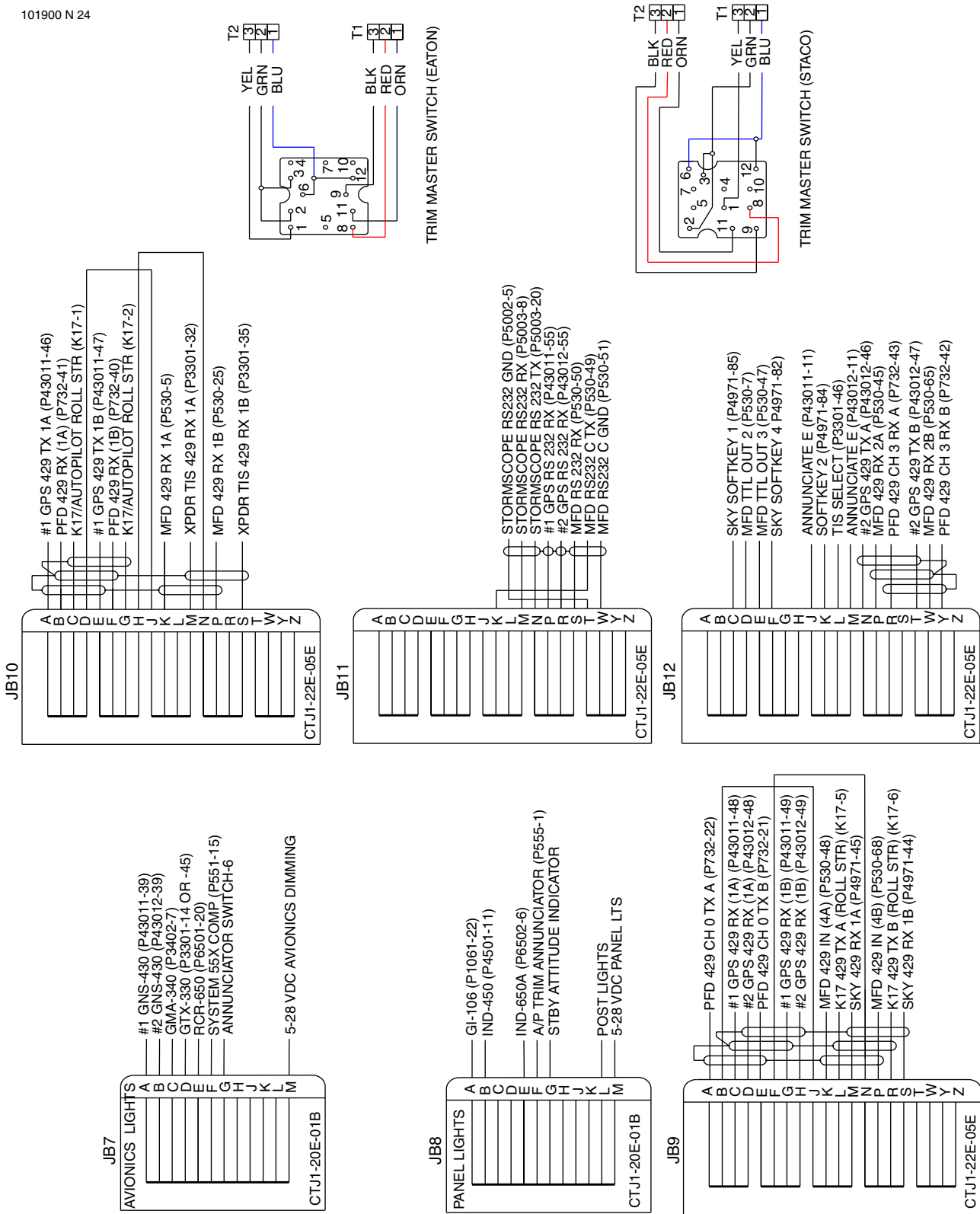


Avionics Blocks and Grounds
Figure 3 (Sheet 1 of 2)

Effectivity
with Avidyne Entegra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

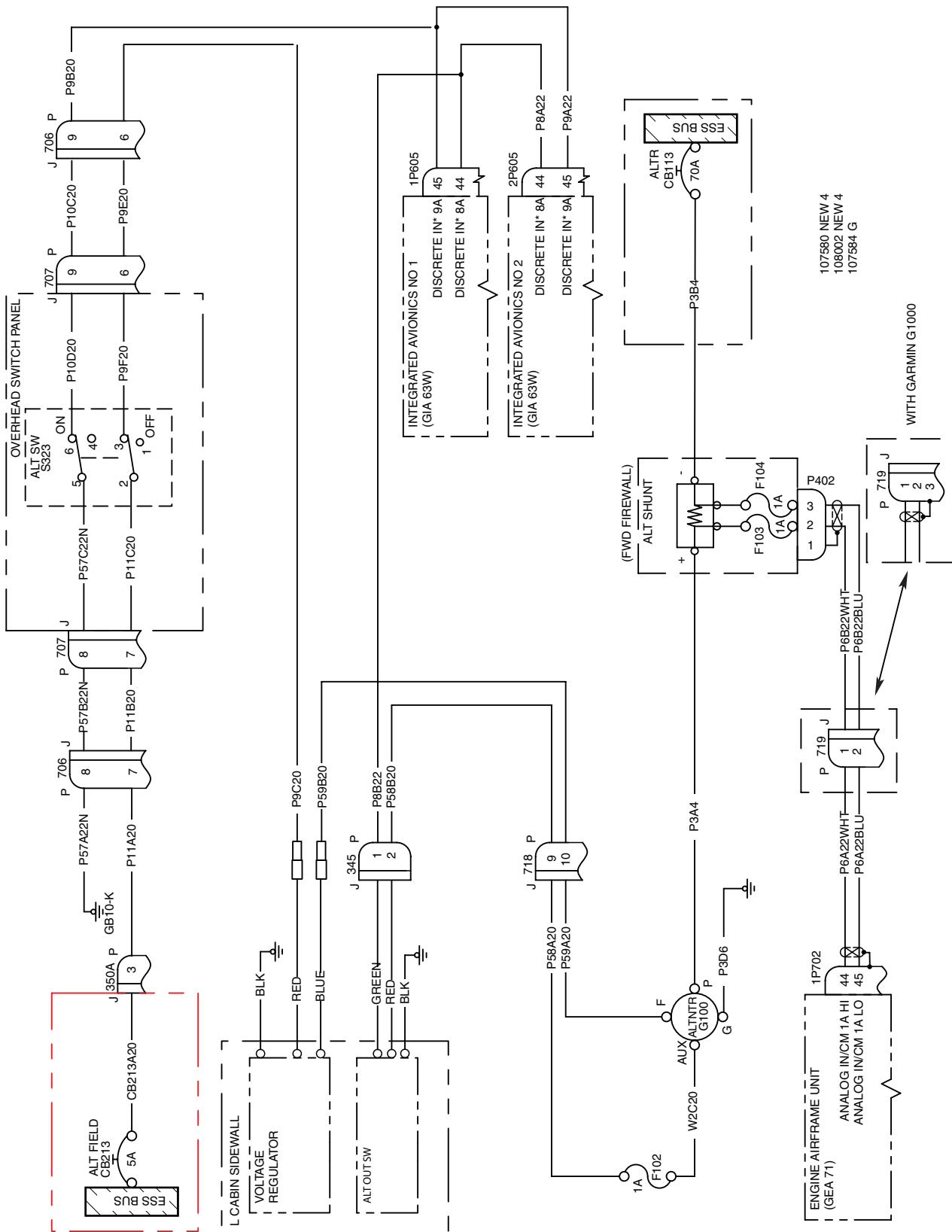
101900 N 24



Effectivity
with Avidyne Integra

Avionics Blocks and Grounds
Figure 3 (Sheet 2 of 2)

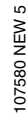
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Electrical Generation

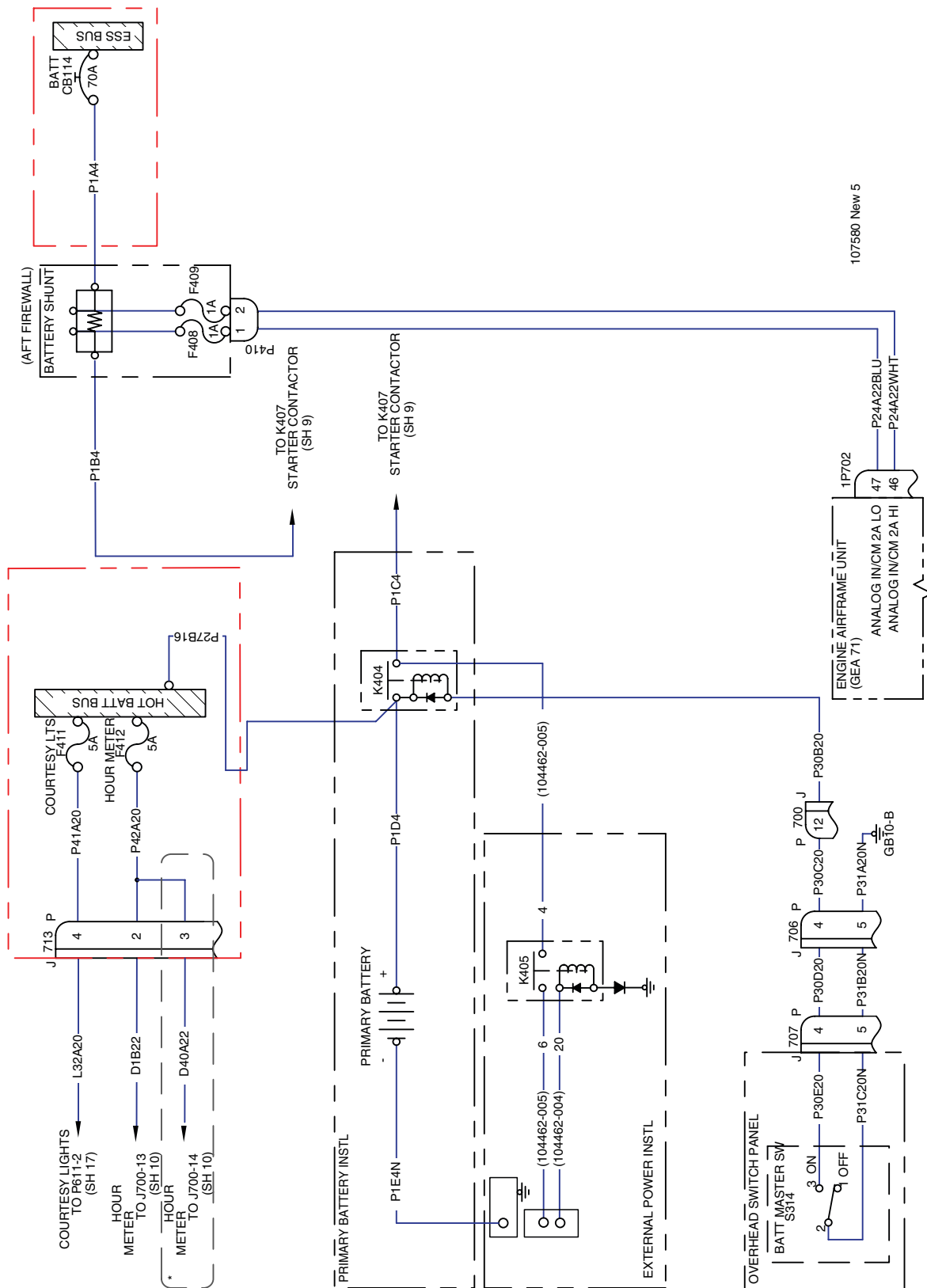
Figure 4

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Primary Power
Figure 5 (Sheet 1 of 2)

PIPER AIRCRAFT, INC. PA-28-181, ARCHER III MAINTENANCE MANUAL

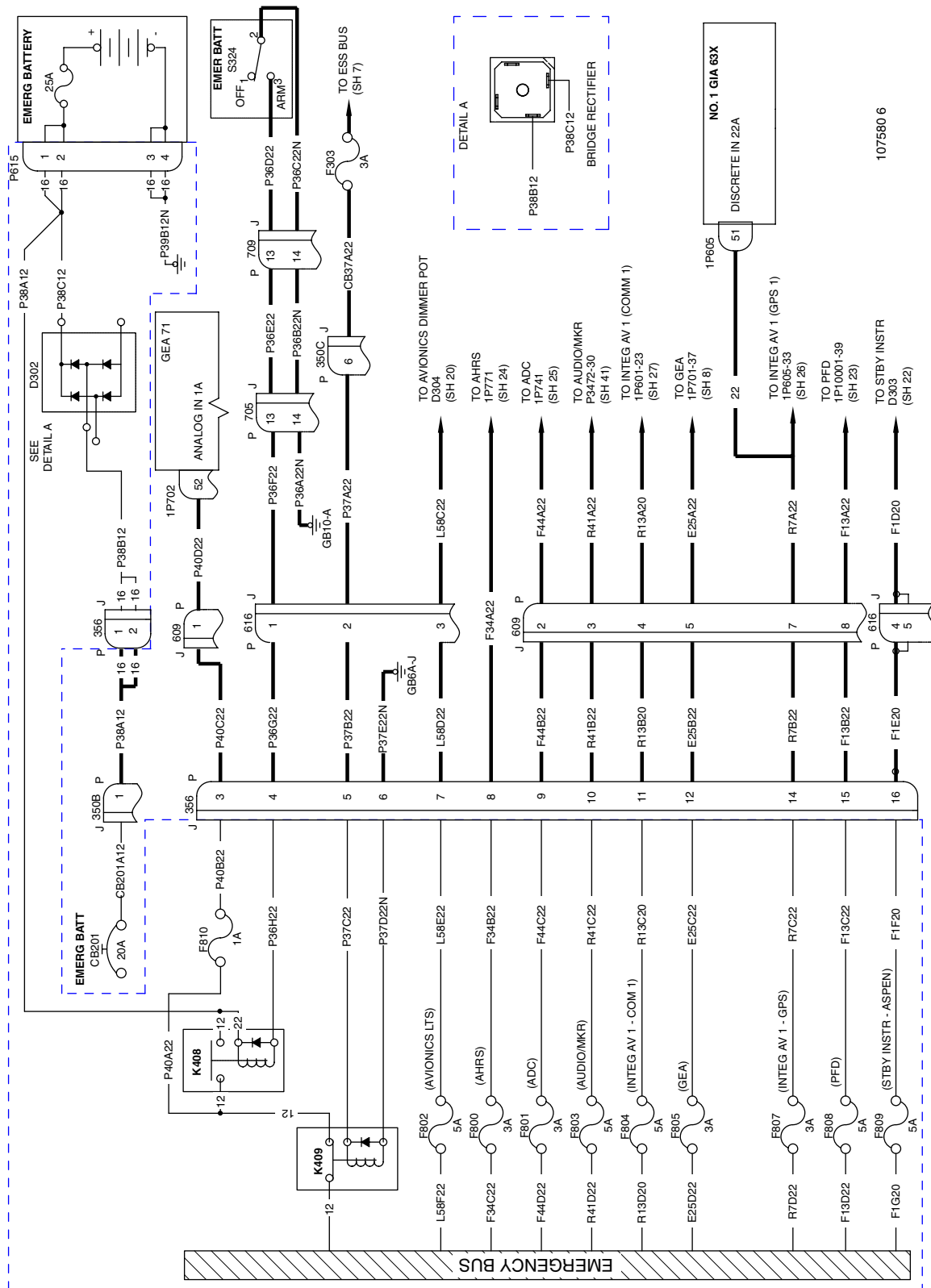


Primary Power
Figure 5 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

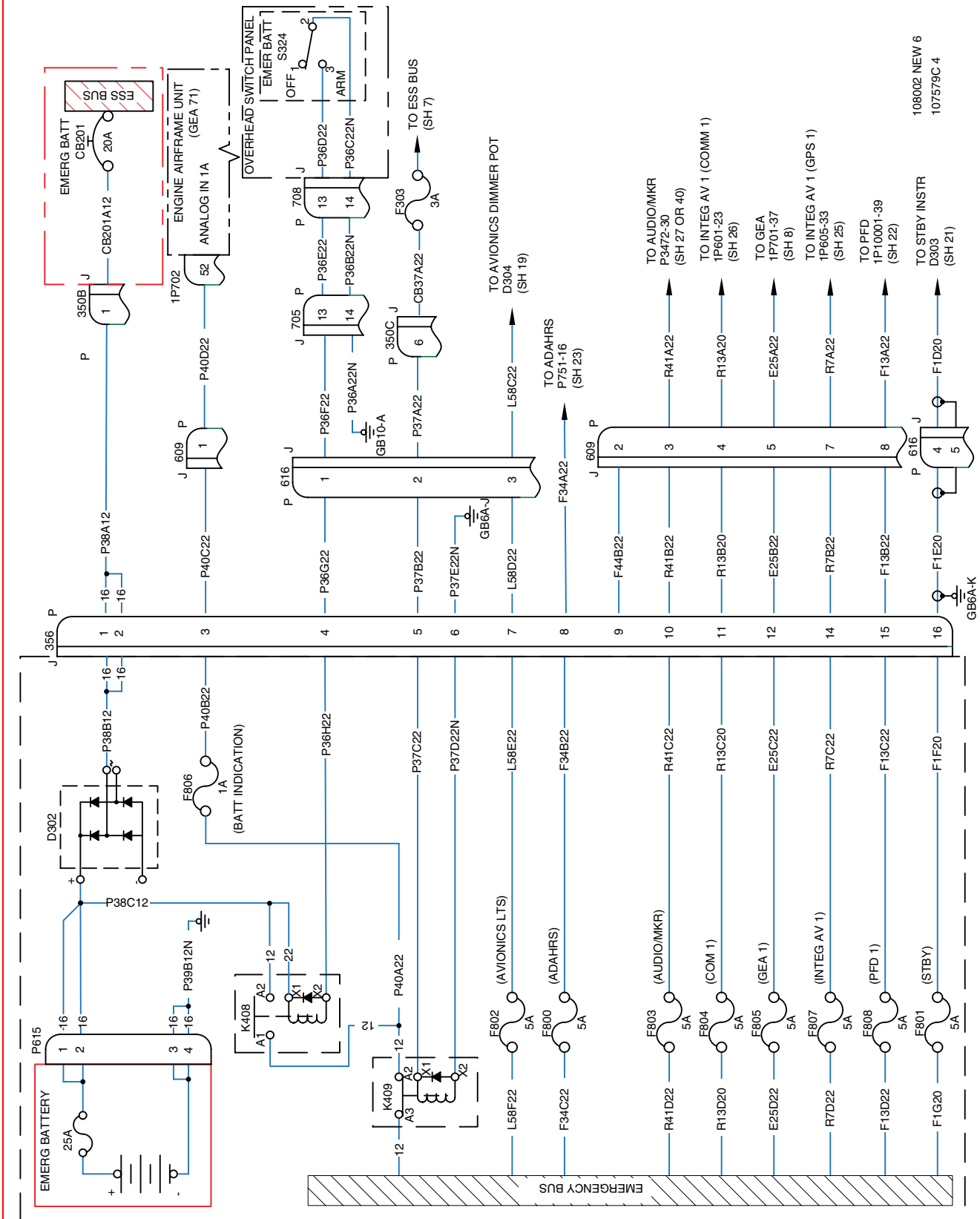
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Emergency Power
Figure 6 (Sheet 1 of 2)

Effectivity with Garmin G1000

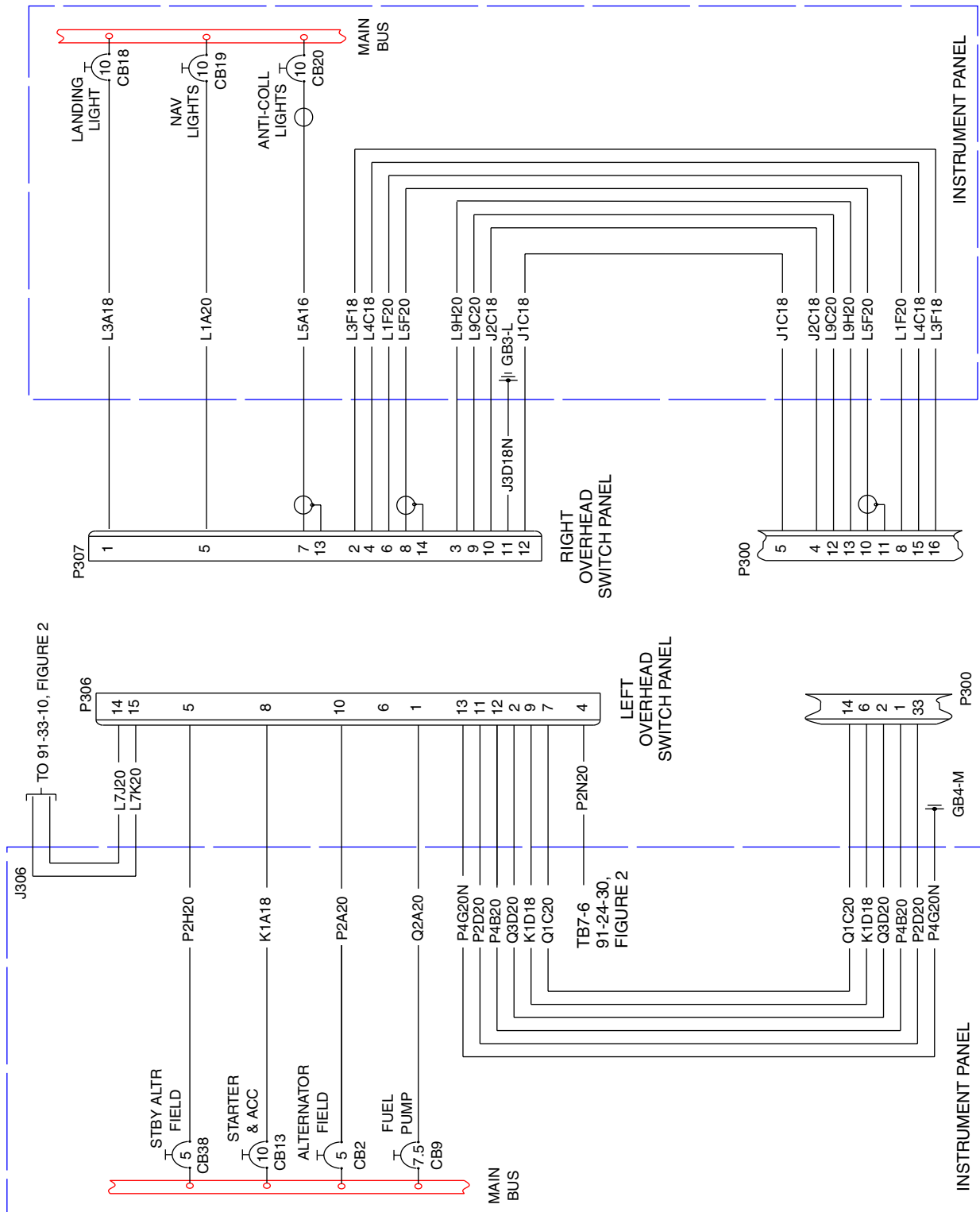
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Emergency Power
Figure 6 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

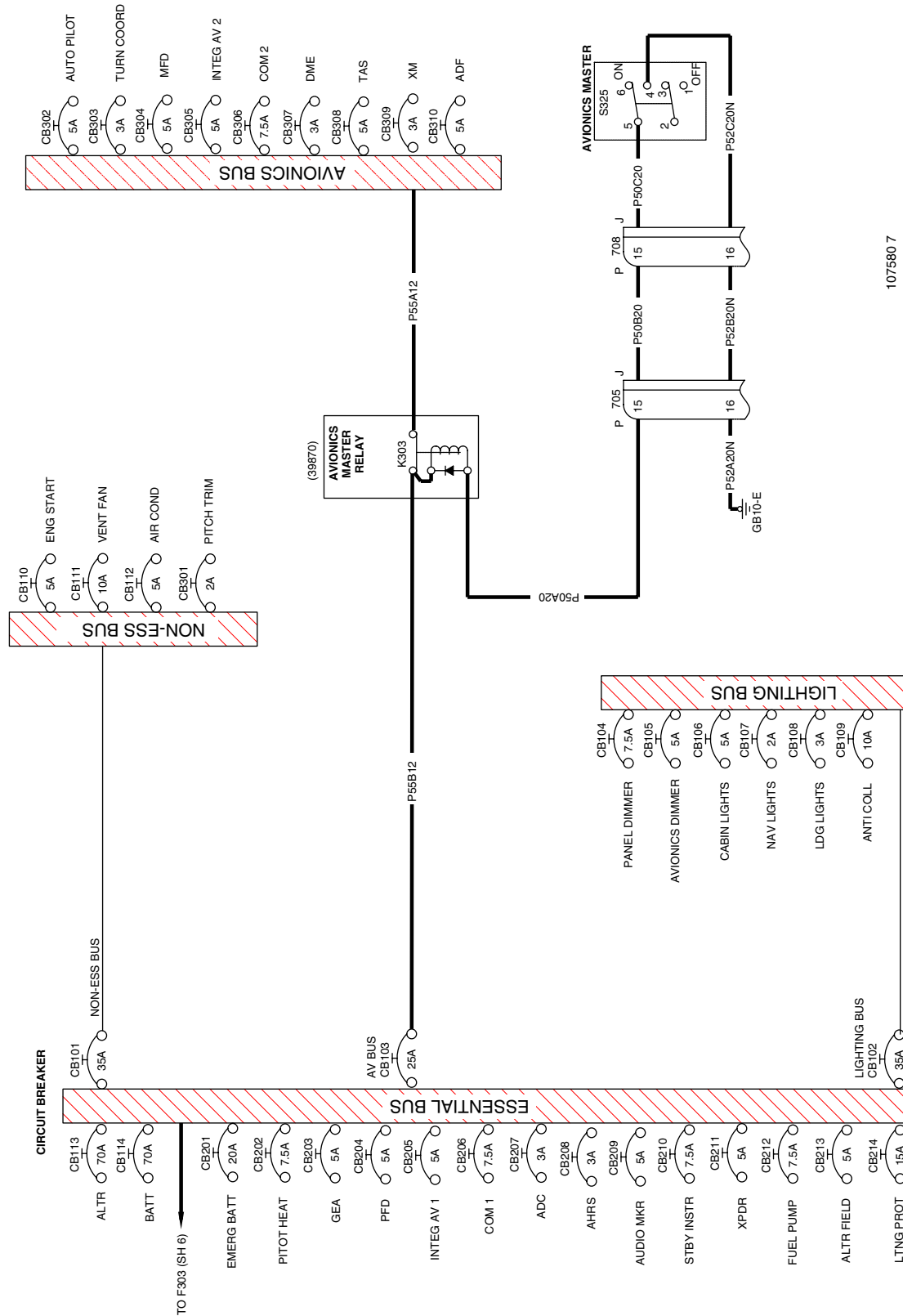
101902 U 17



Power Distribution
Figure 1 (Sheet 1 of 3)

Effectivity
with Avidyne Integra

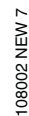
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



107580 7

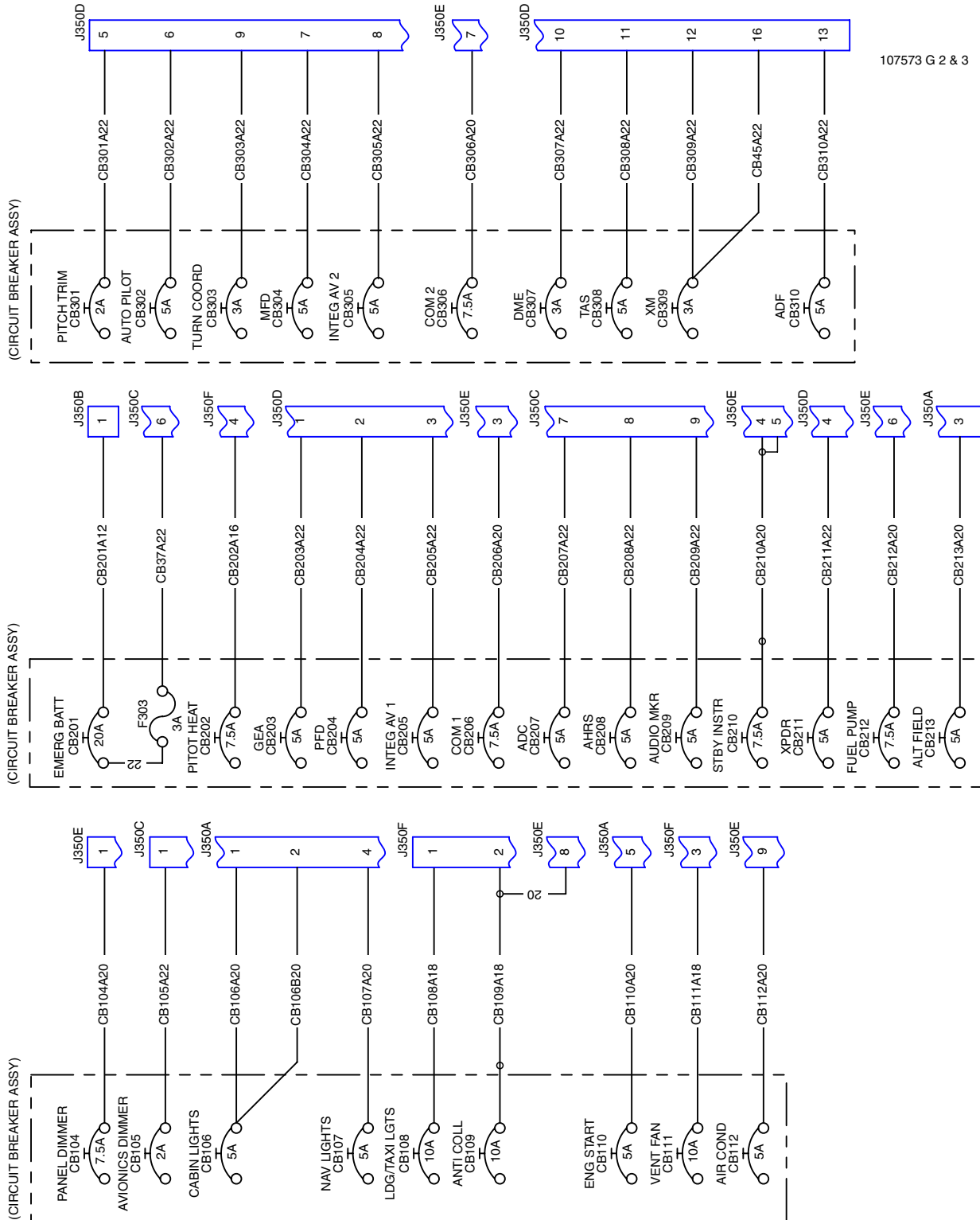
Power Distribution
Figure 1 (Sheet 2 of 3)

Effectivity
with Garmin G1000 NXi
2843852, 2843854–2843999



91-24-60 **PAGE 3**
Nov 15/17

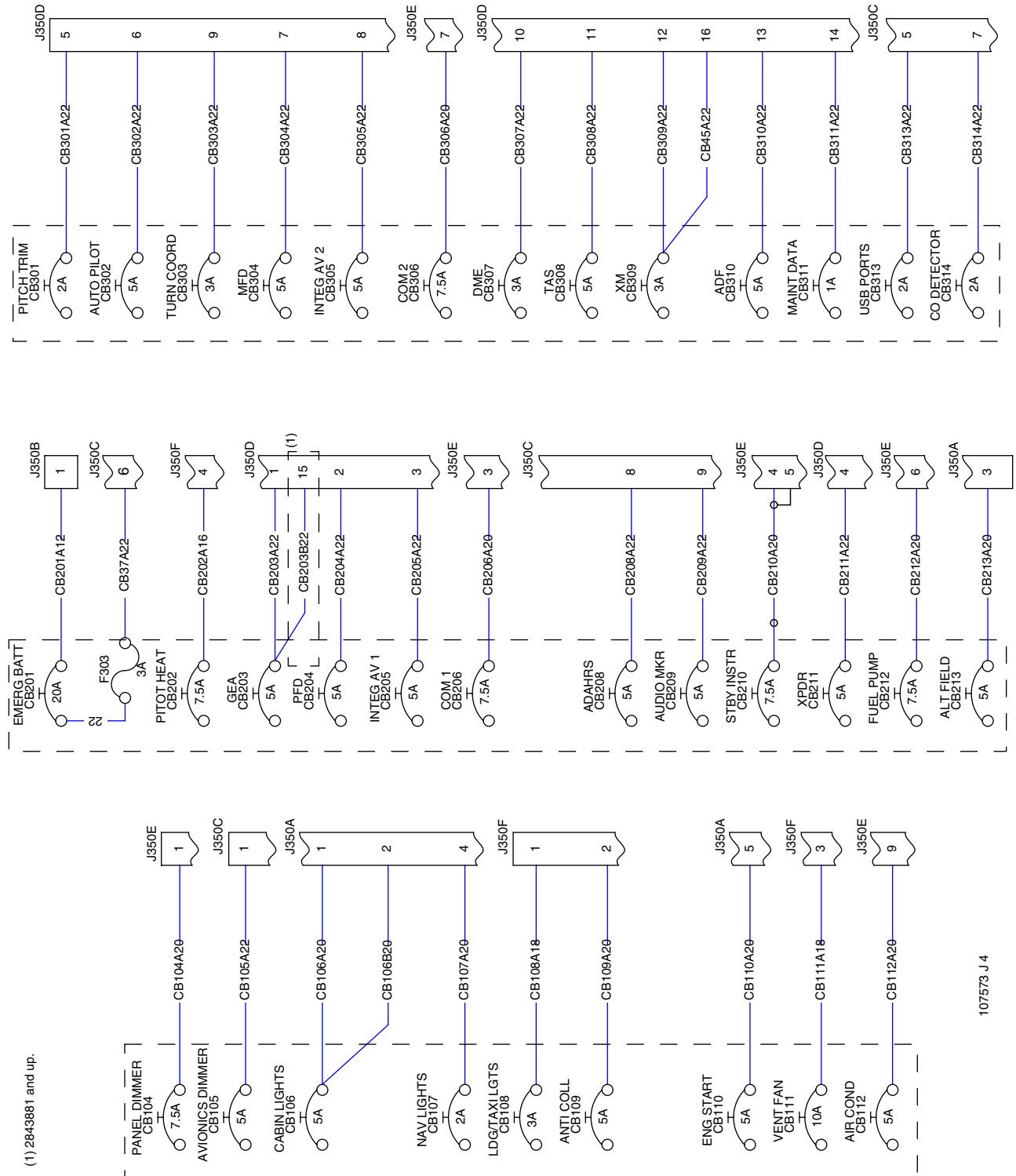
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



107573 G 2 & 3

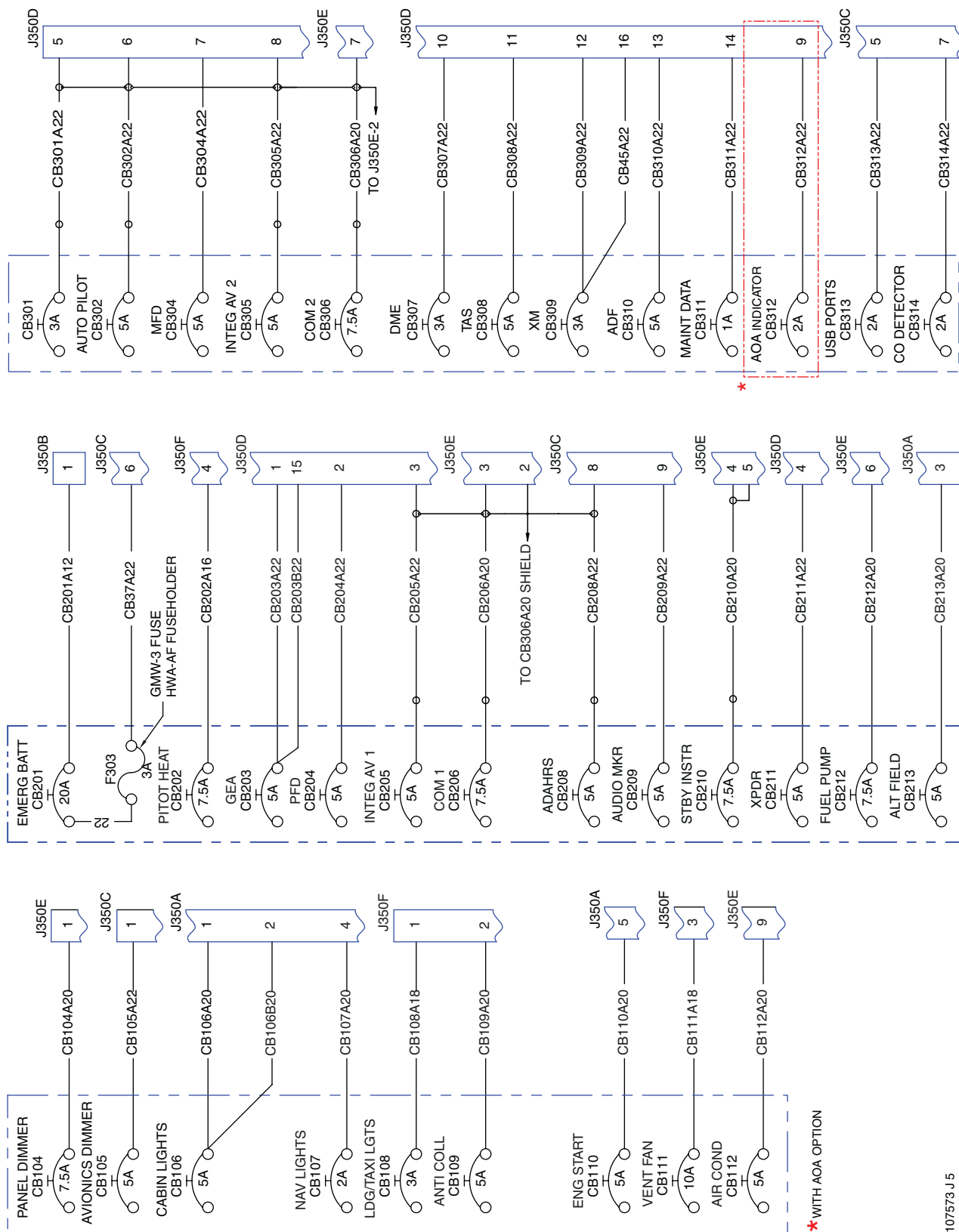
Circuit Breaker Panel
Figure 2 (Sheet 1 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



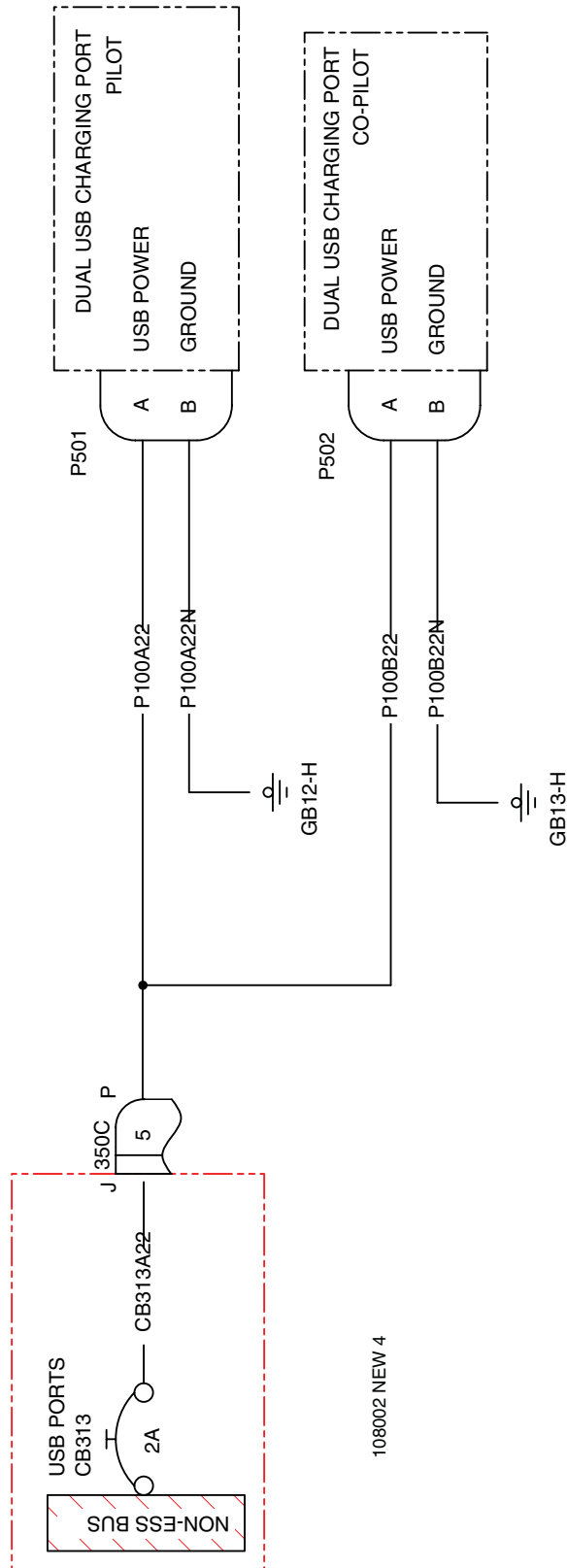
Circuit Breaker Panel
Figure 2 (Sheet 2 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Circuit Breaker Panel
Figure 2 (Sheet 3 of 3)

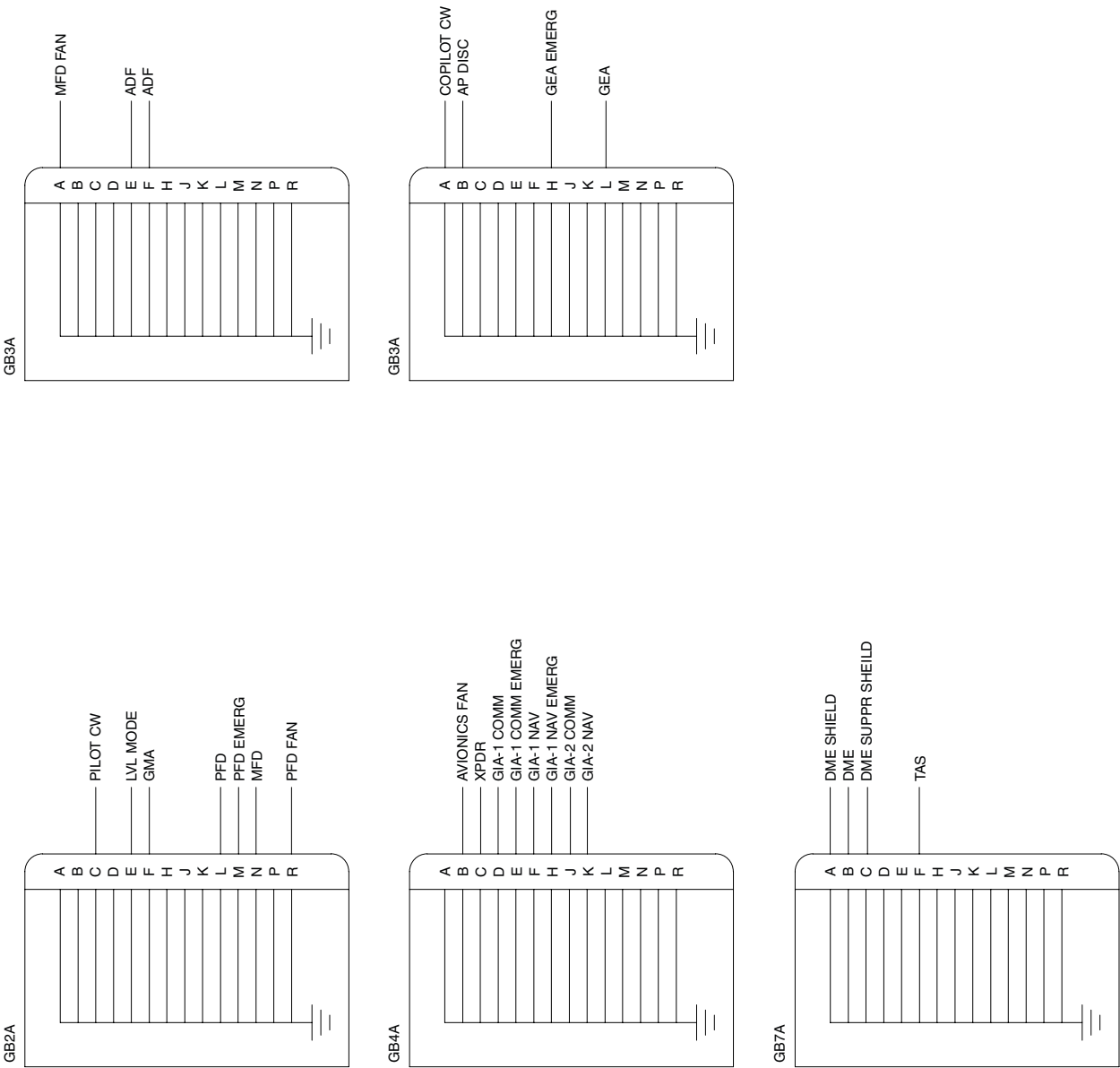
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



108002 NEW 4

USB Ports
Figure 3

[Effectivity](#)
with Garmin G1000 NXi



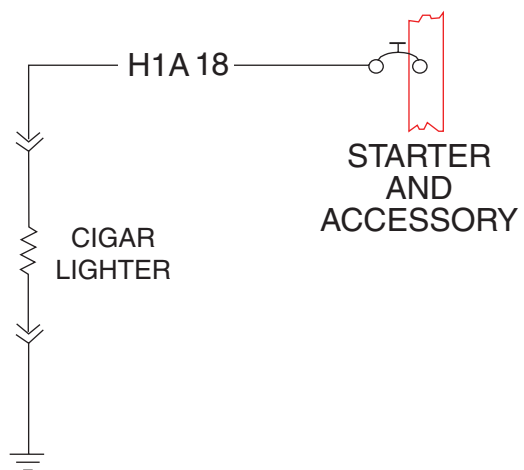
108051 A 8

[Effectivity](#)
with Garmin G1000 NXi
S/N's 2843823, 288001 and up

Ground Blocks
Figure 4

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 G / M



Cigar Lighter
Figure 1

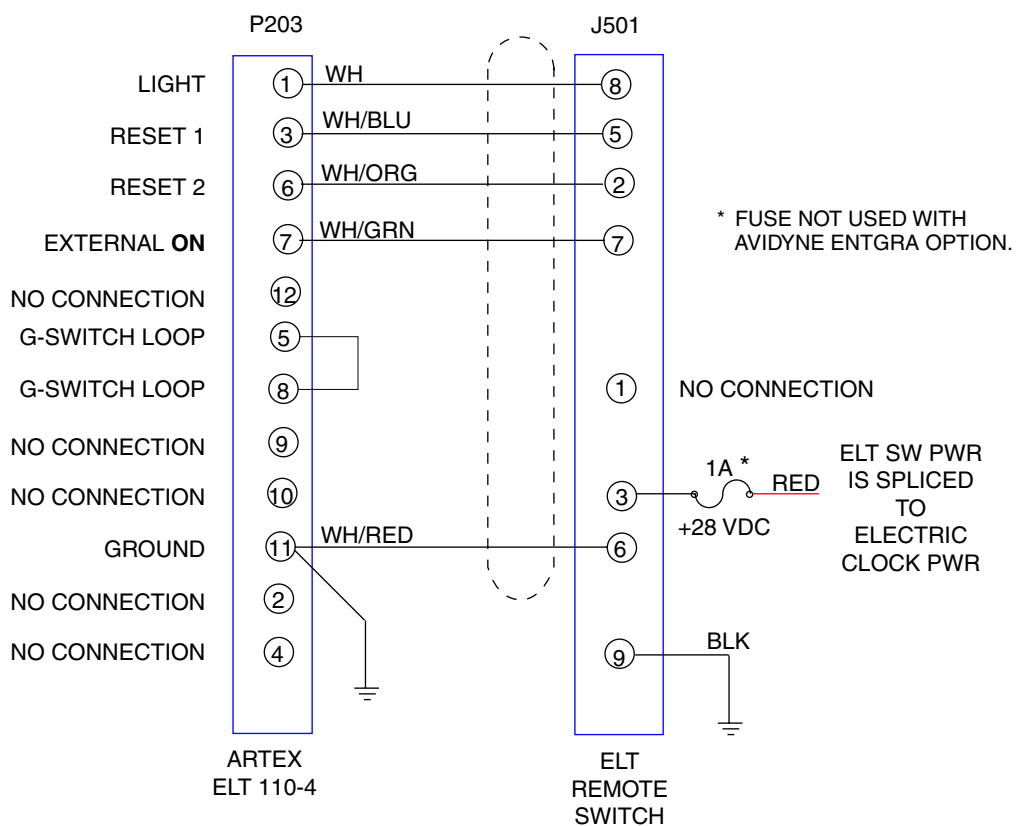
[Effectivity](#)
2843001 thru 2843076

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

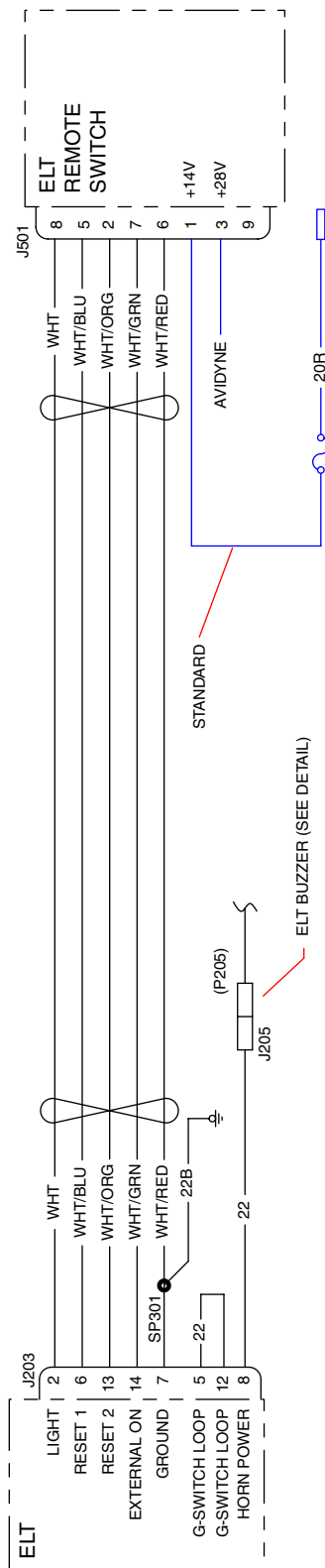
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

06311 T



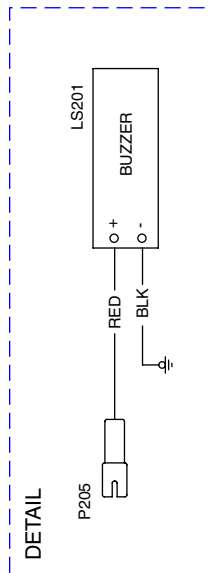
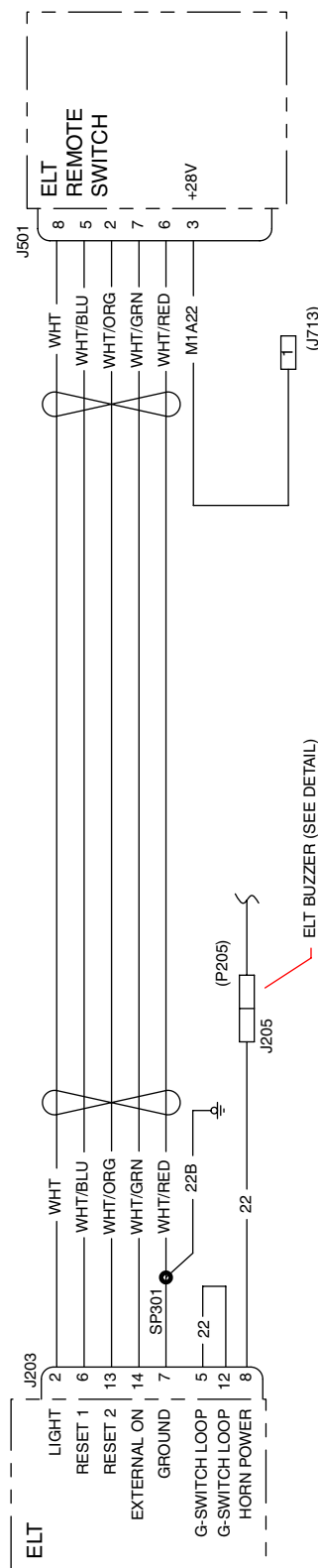
Artex ELT 110 (Emergency Locator Transmitter)
Figure 1

[Effectivity](#)
2843001 thru 2843656



STANDARD AND AVIDYNE INSTALLATION

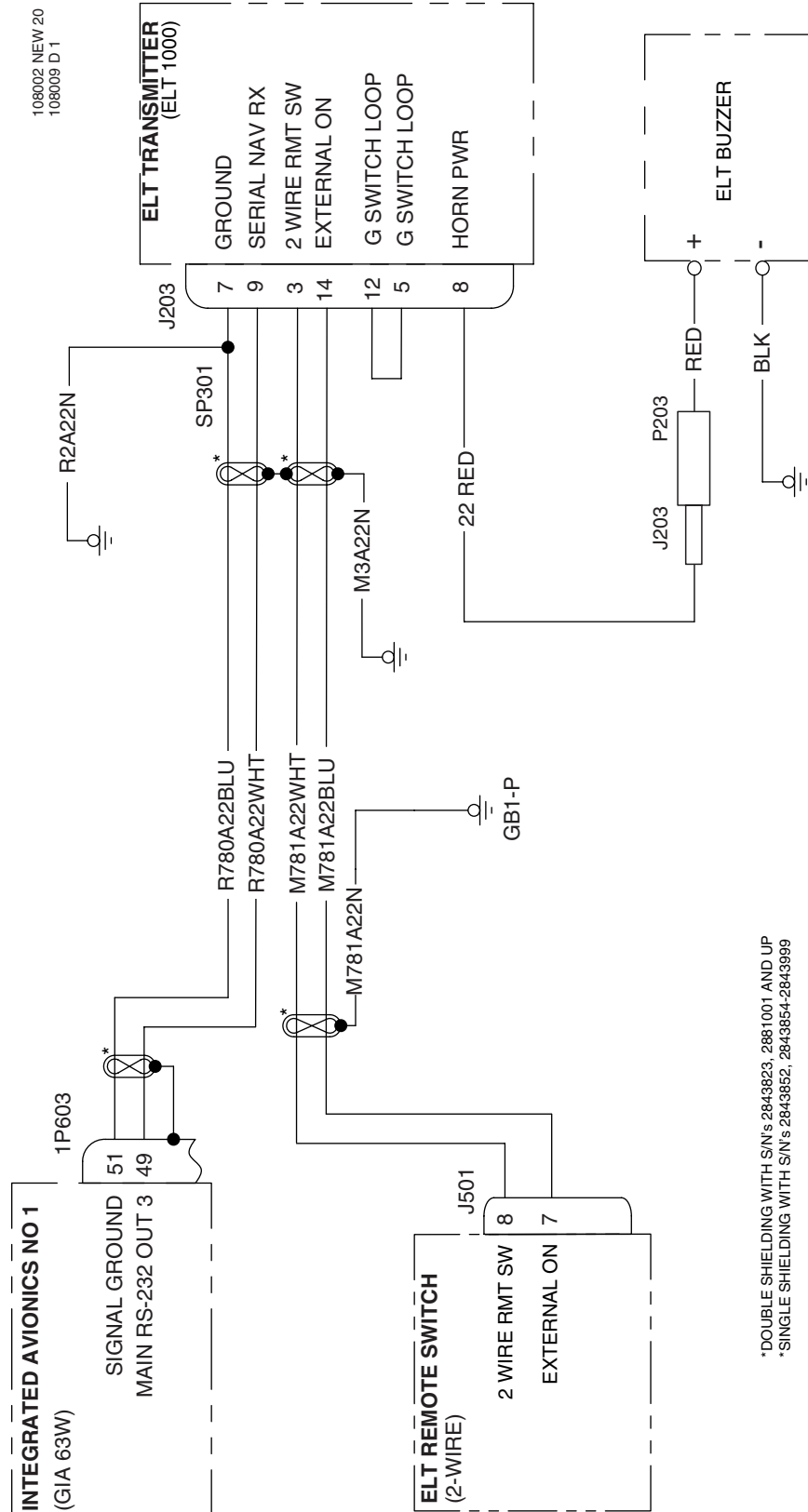
GARMIN G1000 INSTALLATION



106644 E 2 & 3

Artex ME406 ELT (Emergency Locator Transmitter)
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Artex ELT 1000 (Emergency Locator Transmitter)
Figure 3

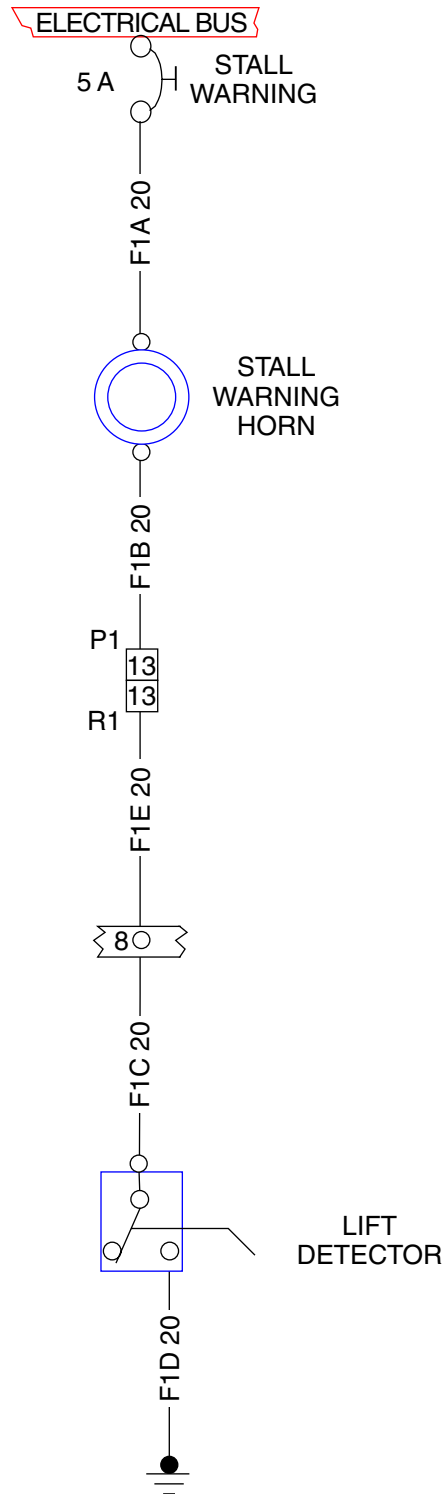
Effectivity
with Garmin G1000 NXi

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

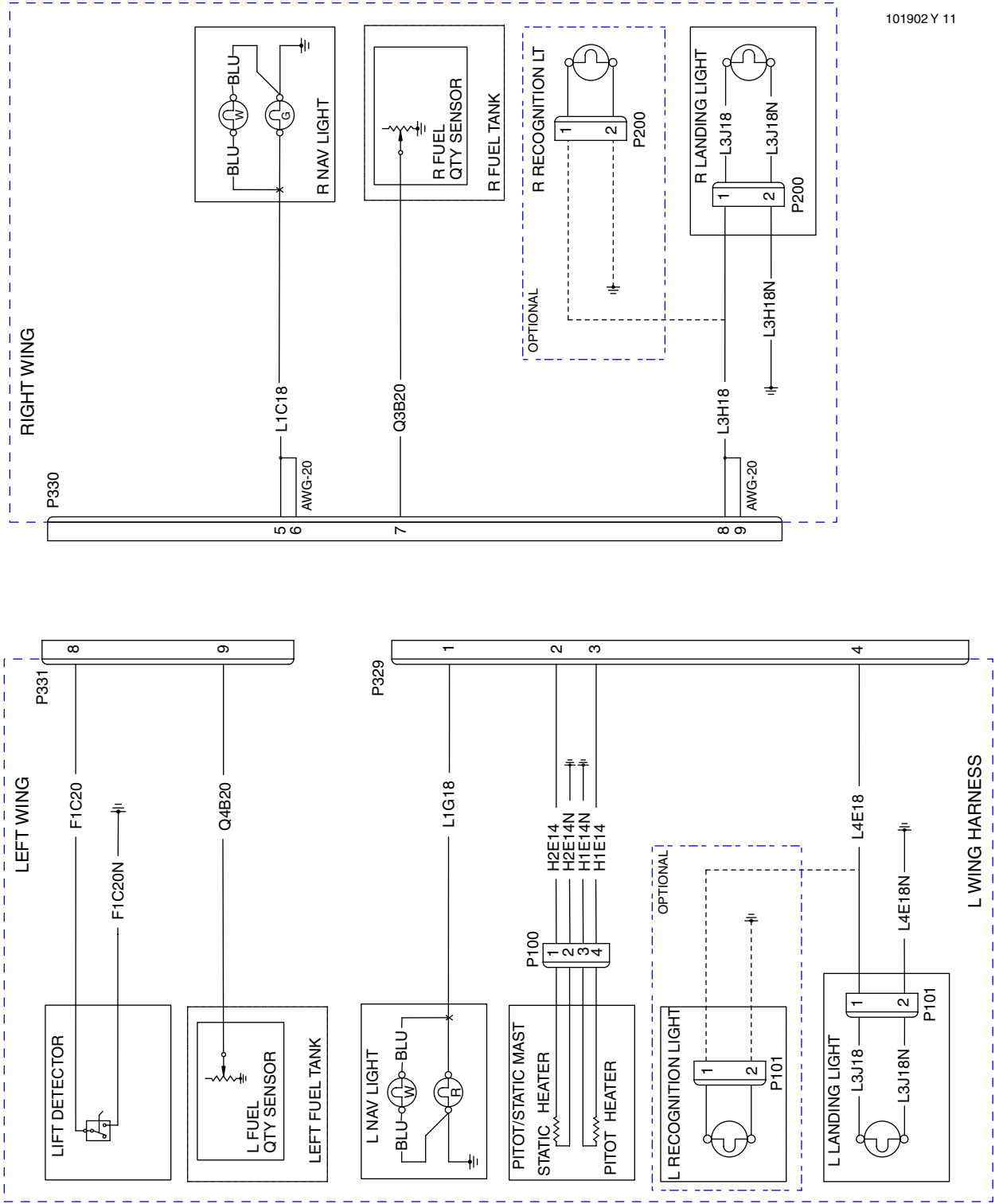
85399 M
101280 NEW
104467 D



Stall Warning
Figure 1 (Sheet 1 of 3)

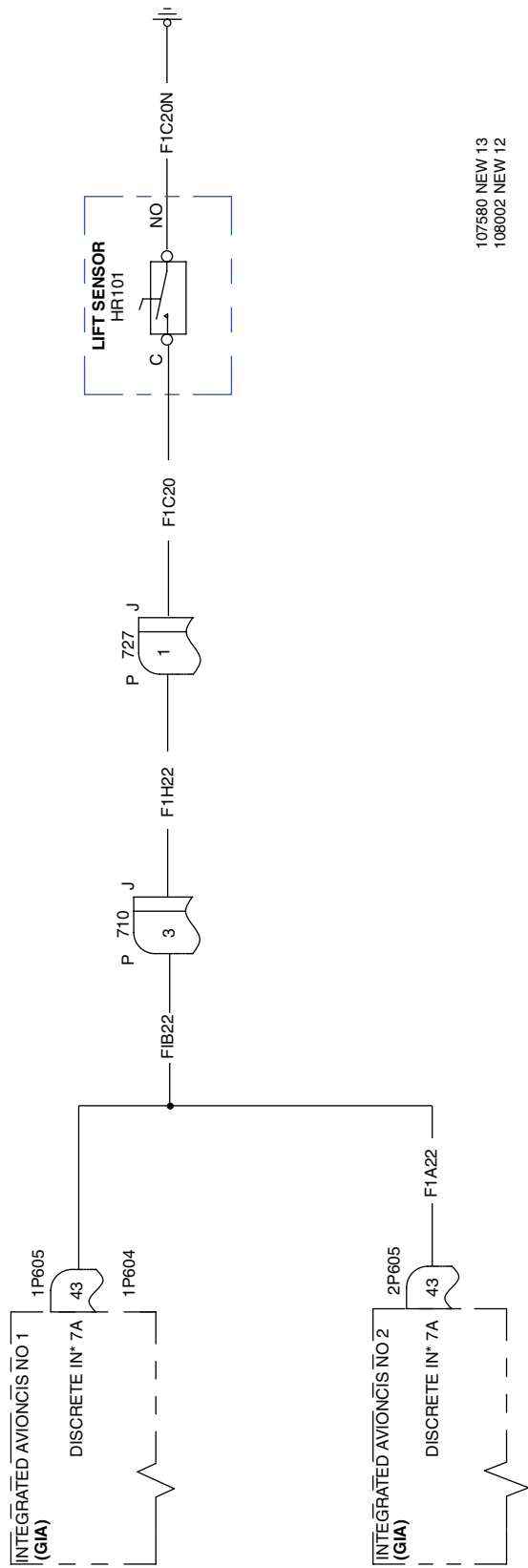
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101902 Y 11



Effectivity
with Avidyne Integra

Stall Warning
Figure 1 (Sheet 2 of 3)



107580 NEW 13
108002 NEW 12

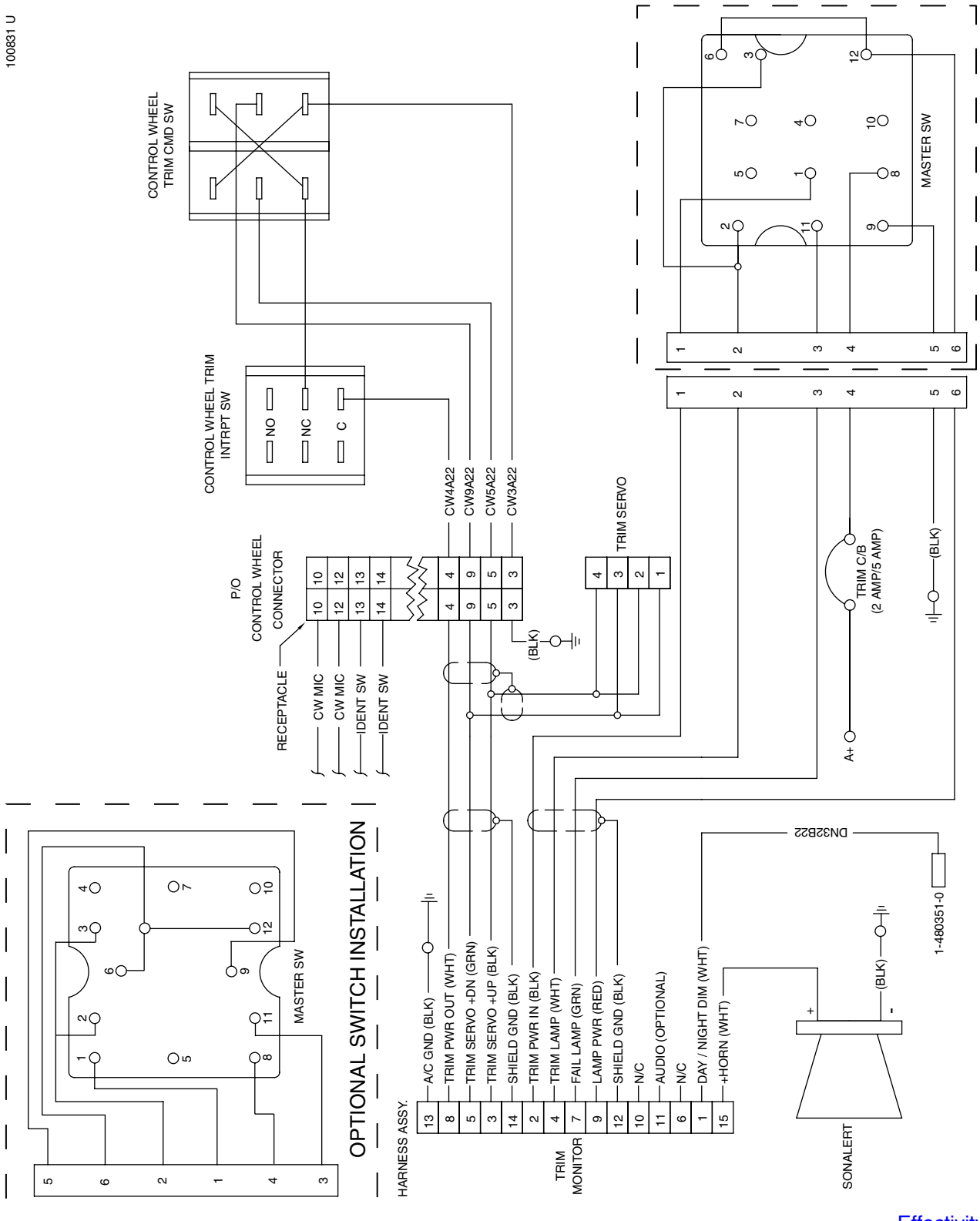
Stall Warning
Figure 1 (Sheet 3 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

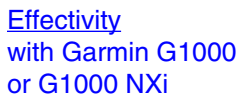
100831 U



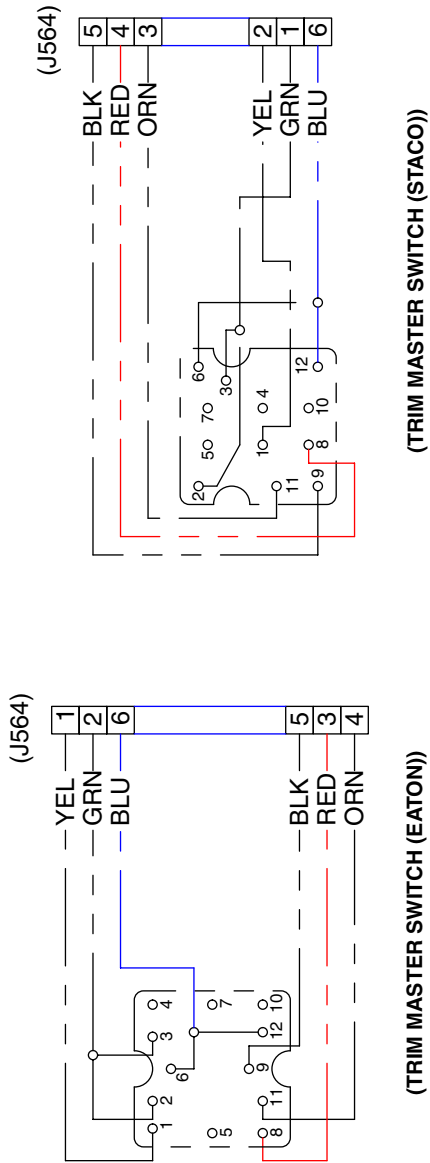
S-TEC Manual Electric Trim (Optional)
Figure 2 (Sheet 1 of 3)

Effectivity
2843058 and up
with Standard, Avidyne
Entegra, or Garmin G500

S-TEC Manual Electric Trim (Optional)
Figure 2 (Sheet 2 of 3)



107591 NEW 7

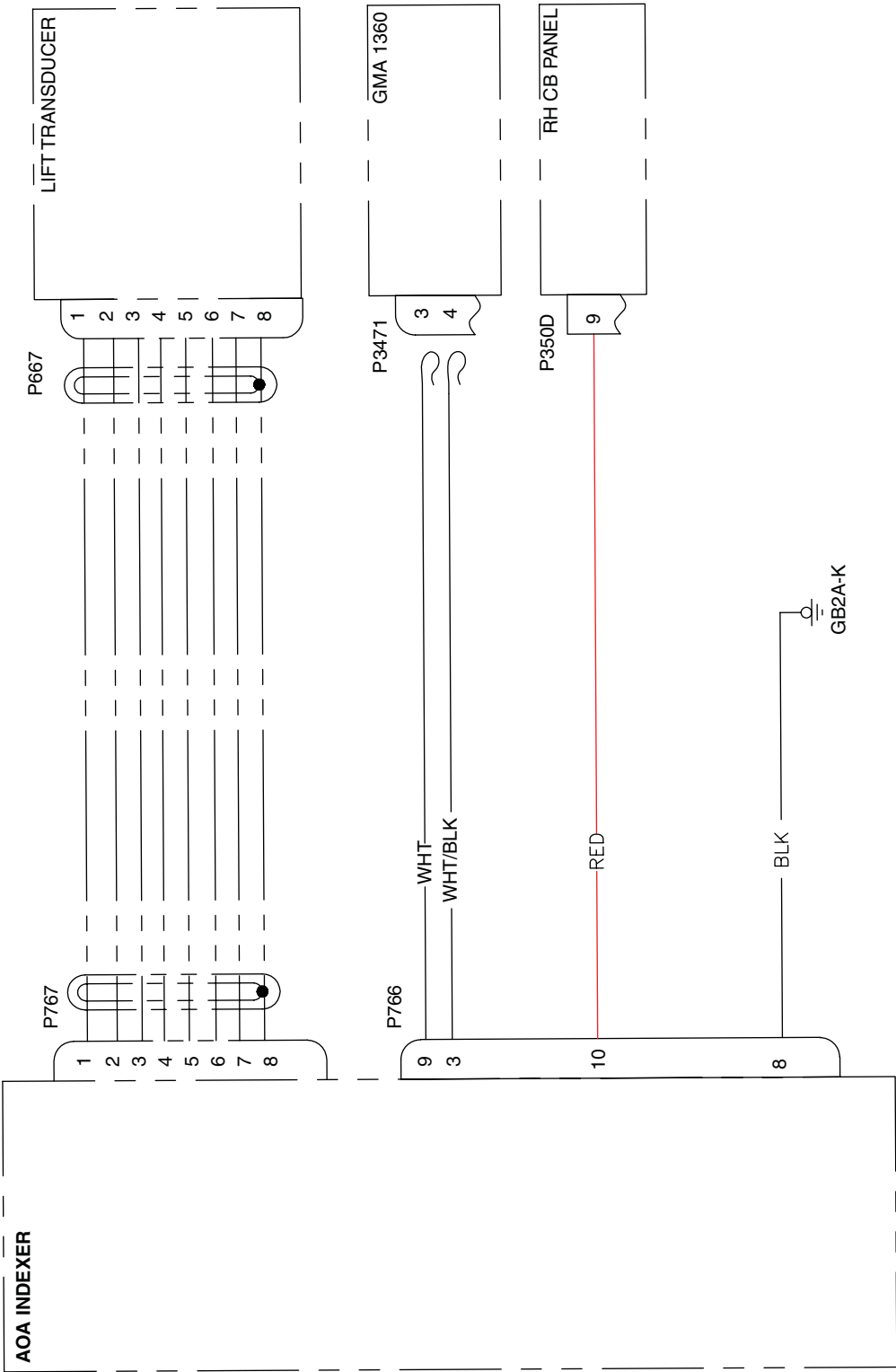


DETAIL A

S-TEC Manual Electric Trim (Optional)
Figure 2 (Sheet 3 of 3)

[Effectivity](#)
with Garmin G1000
or G1000 NXi

108019 NEW 2

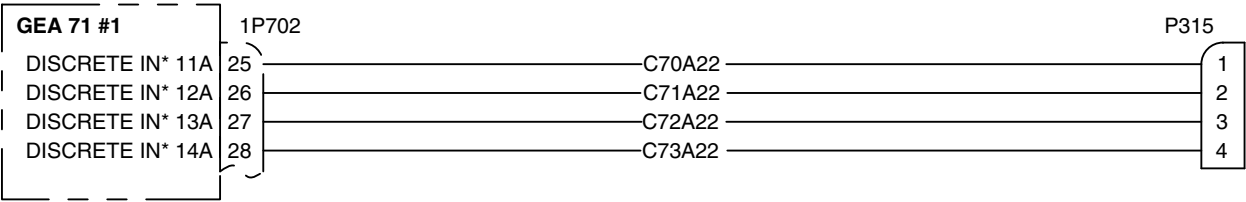


Effectivity
2881221 and up

AoA Indexer (Optional)
Figure 3

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108047 NEW



Flap Position Indicator
Figure 1

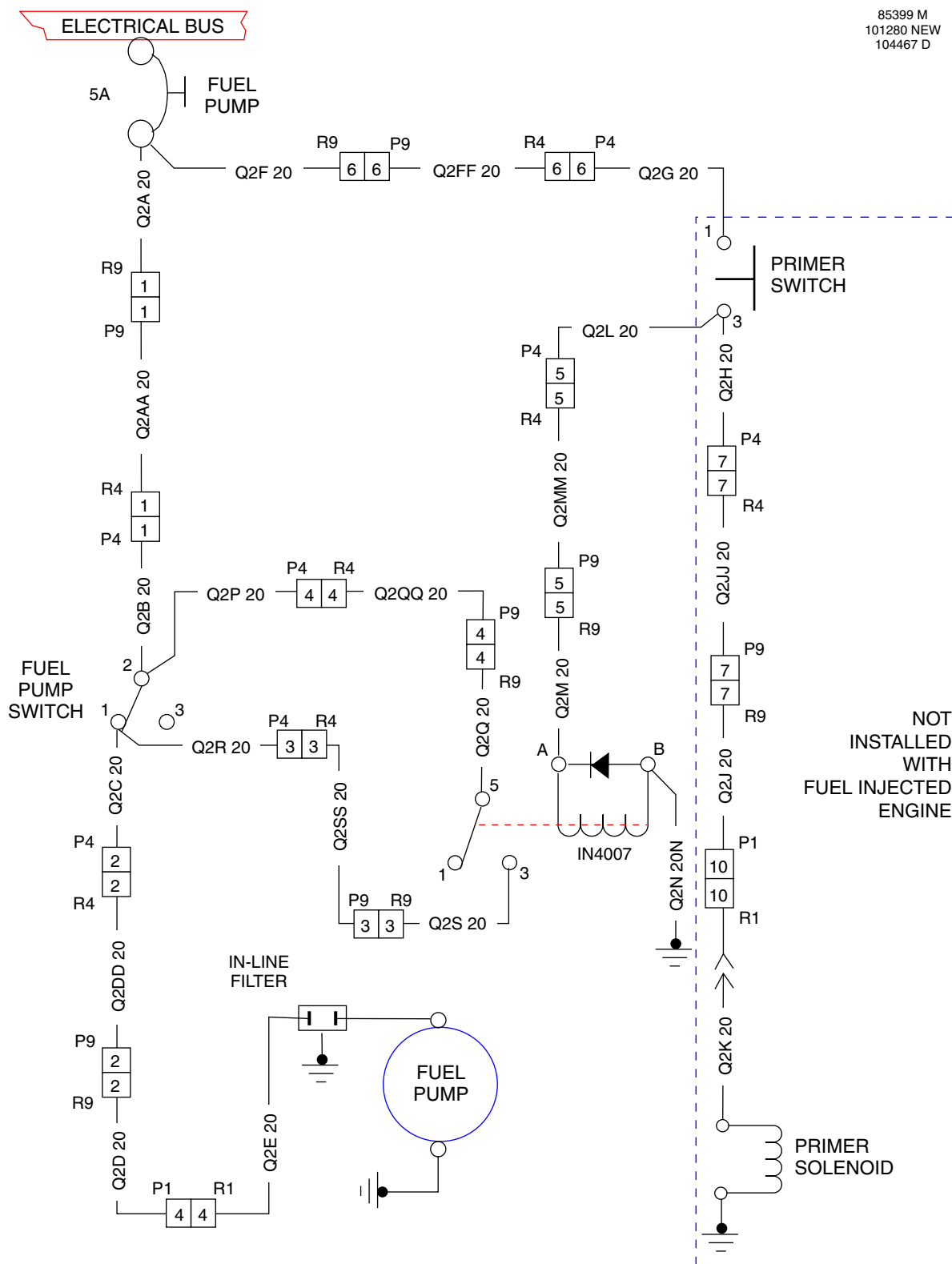
[Effectivity](#)
with Garmin G1000 NXi
2843852, 2843854–2843999

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

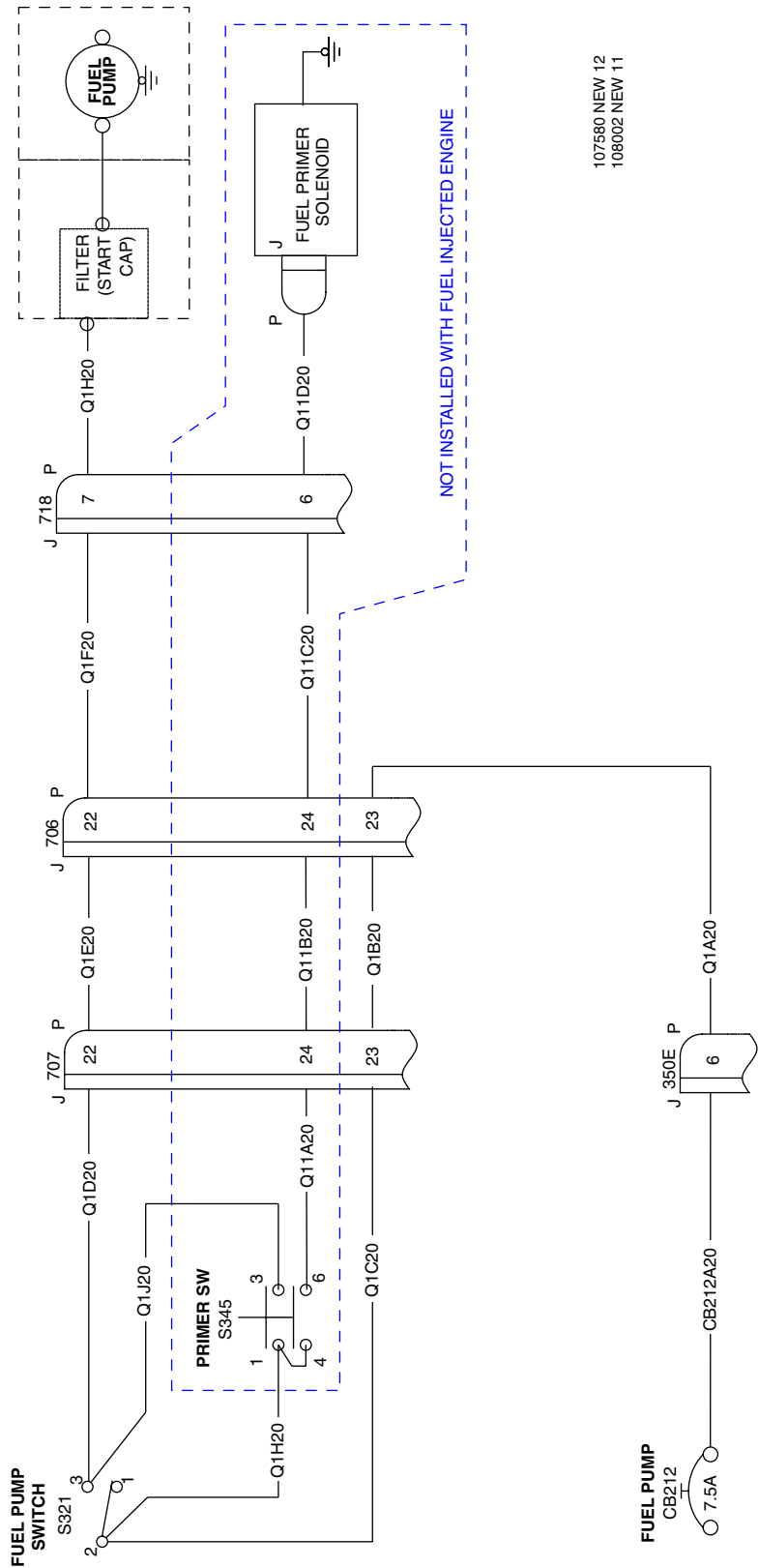
85399 M
101280 NEW
104467 D



Fuel Pump / Engine Primer
Figure 1 (Sheet 1 of 2)

Effectivity
Standard or Garmin G500

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

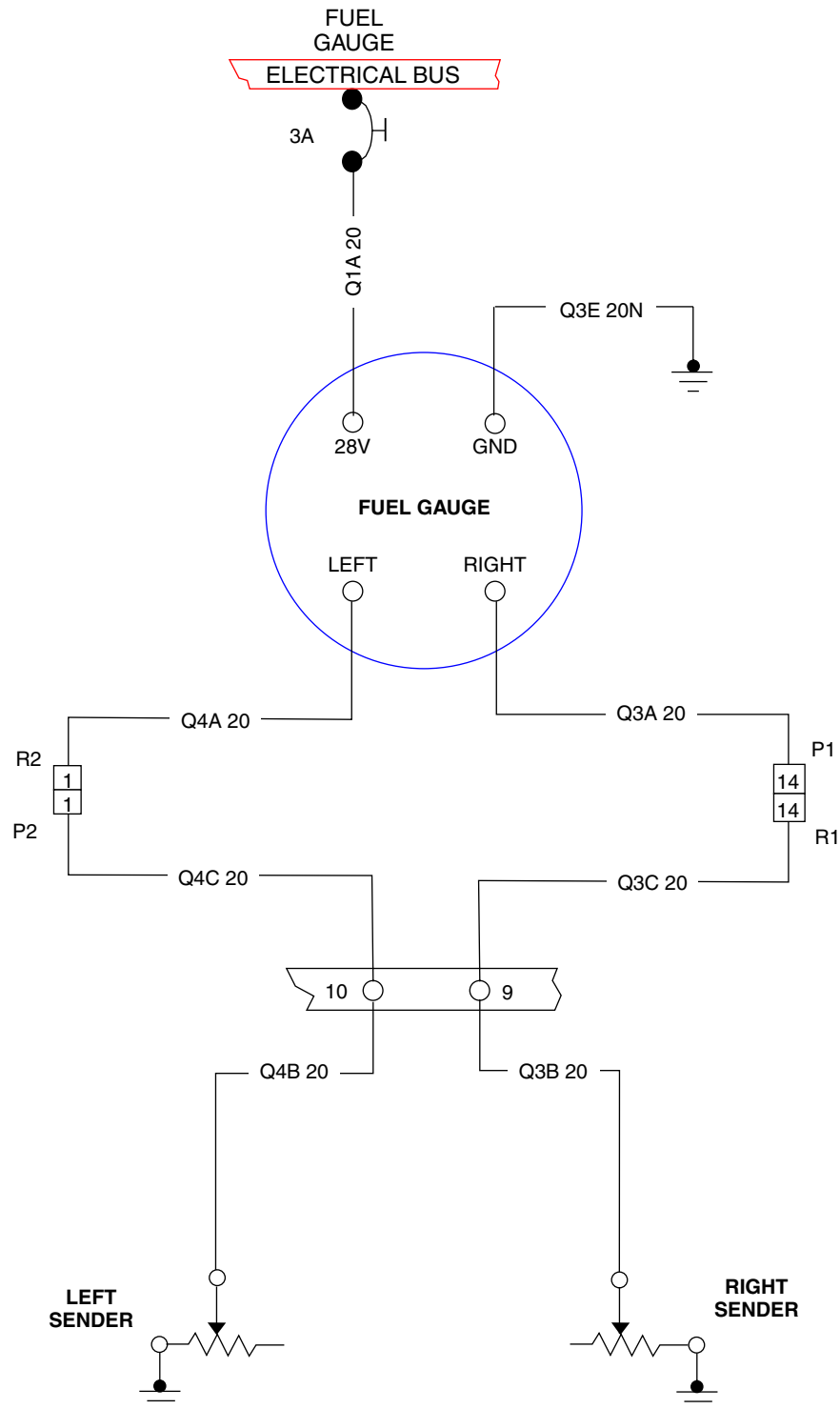


107580 NEW 12
108002 NEW 11

Fuel Pump / Engine Primer
Figure 1 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D

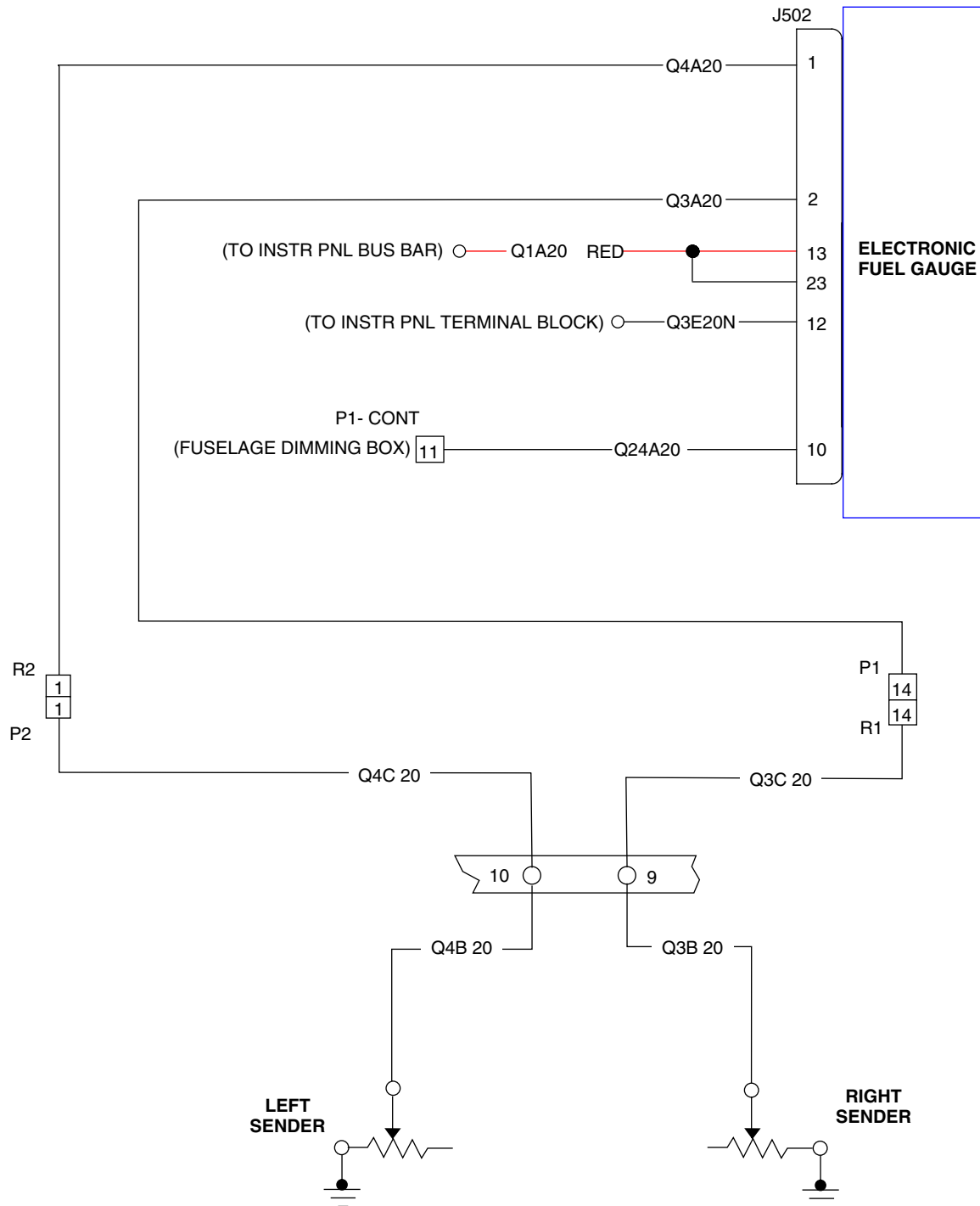


Fuel Quantity
Figure 1 (Sheet 1 of 3)

[Effectivity](#)
2843001 thru 2843597
2843683 thru 2843699

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

107401 D 14



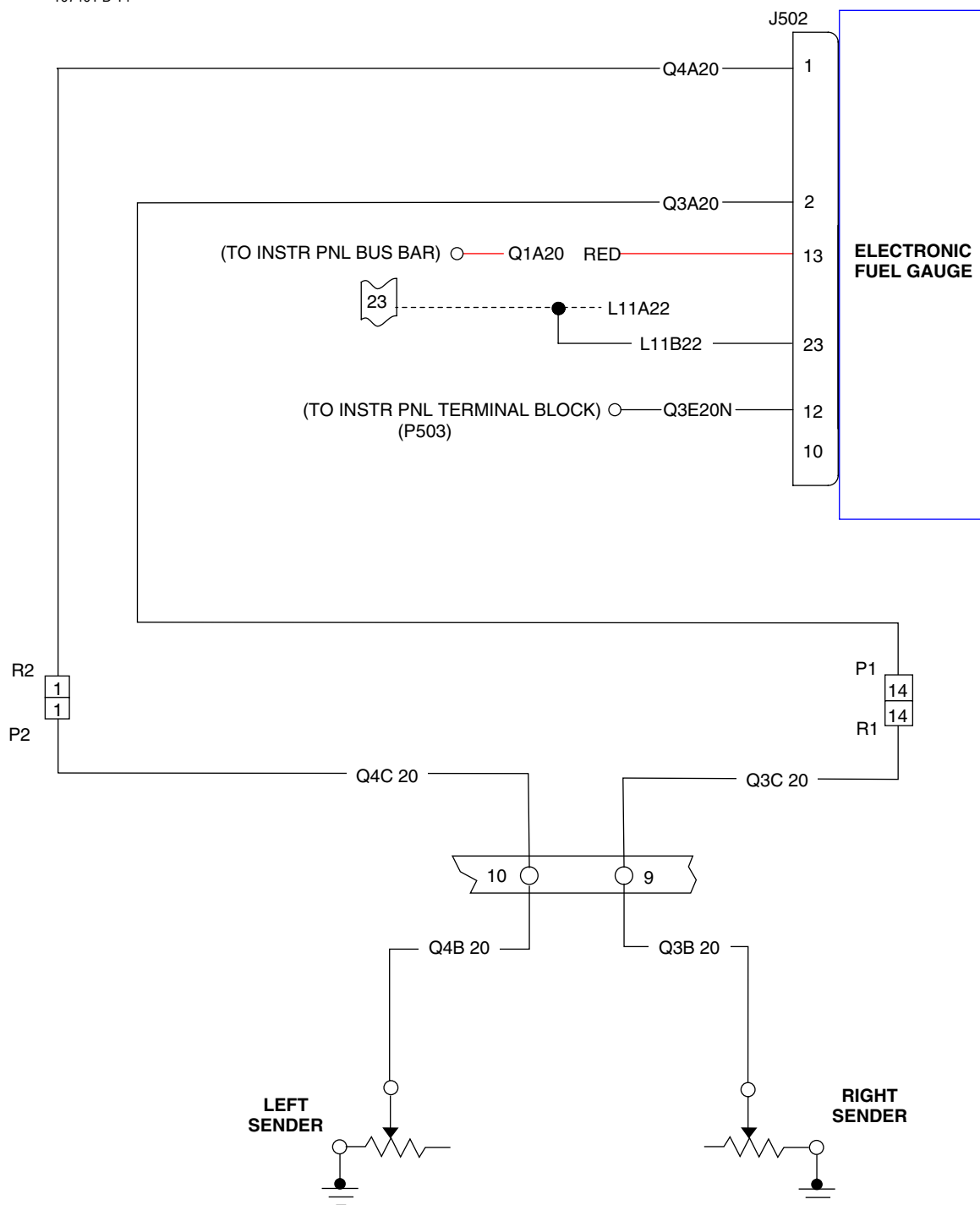
Effectivity

Standard or with Garmin G500
2843700–2843899; and
2843001 thru 2843597,
2843683 thru 2843699 with
Kit No. 88536-001 installed

Fuel Quantity
Figure 1 (Sheet 2 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107401 D 14



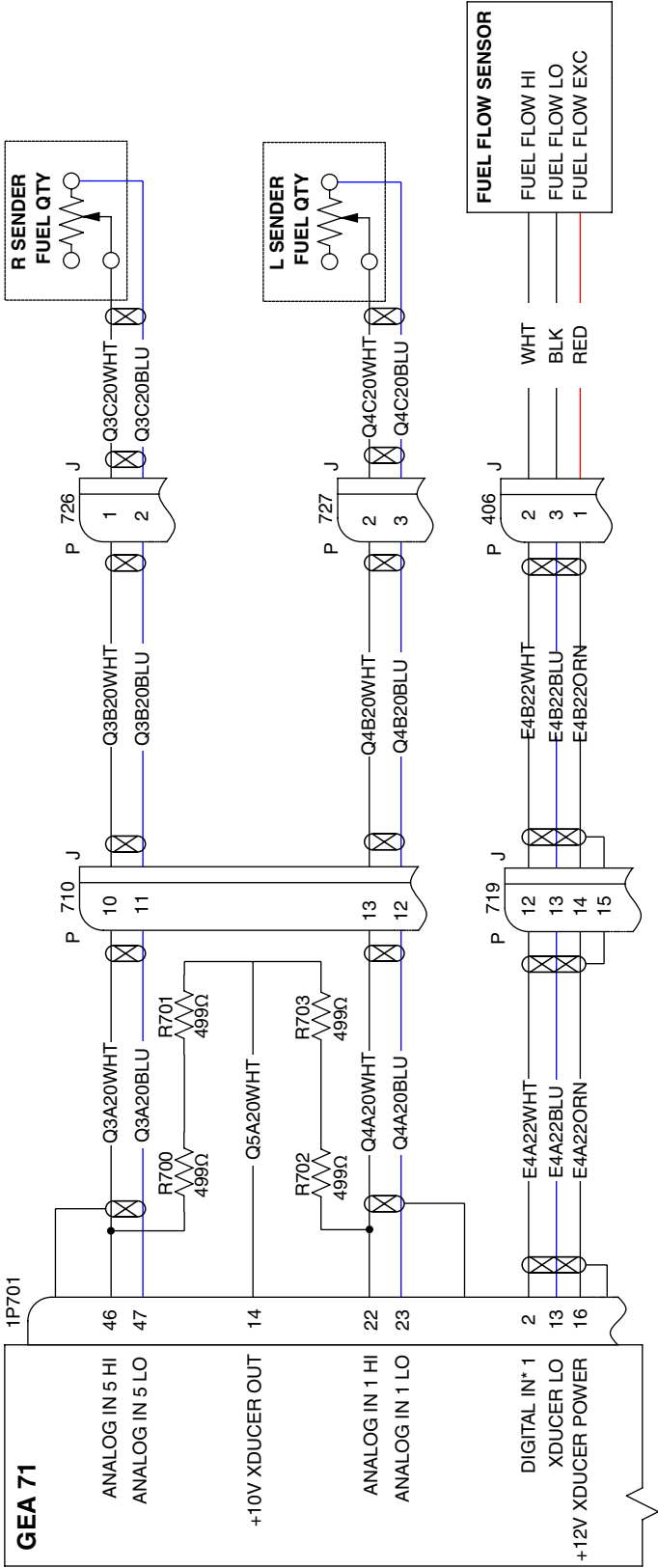
Fuel Quantity
Figure 1 (Sheet 3 of 3)

Effectivity
Standard or with Garmin G500
2843900 and up

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

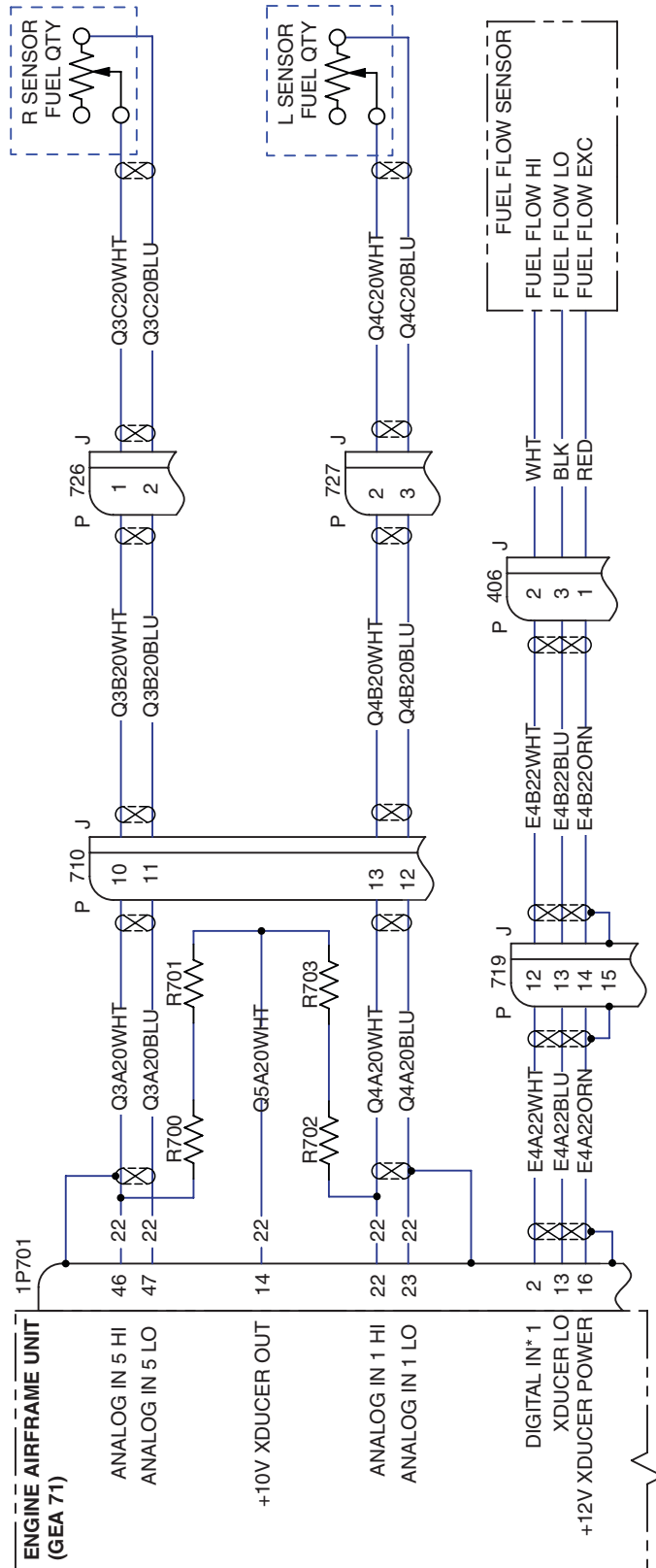
107580 NEW 12



Fuel Quantity
Figure 2 (Sheet 1 of 3)

Effectivity
with Garmin G1000

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

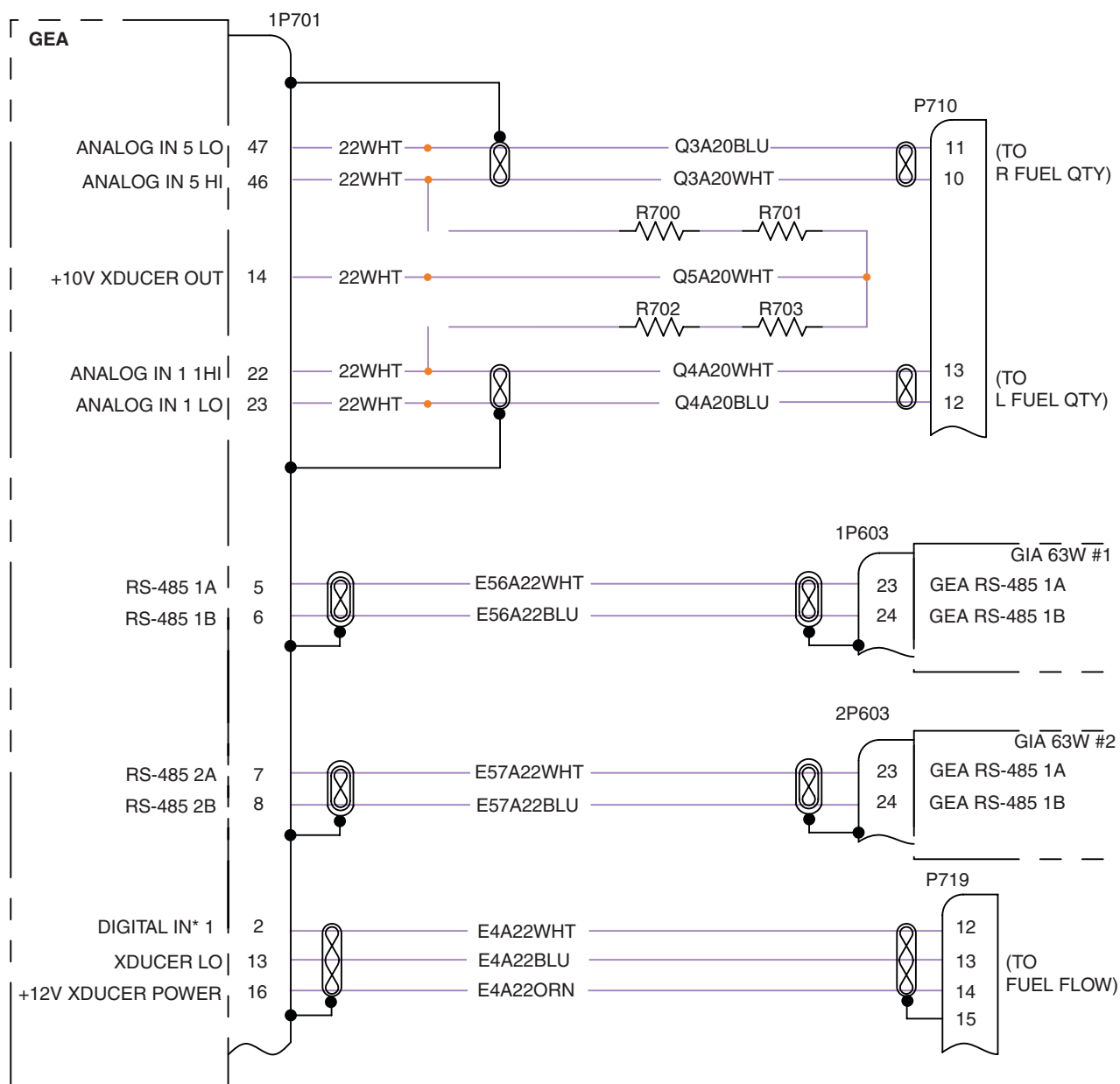


108002 New 11
108011 New 5

Fuel Quantity
Figure 2 (Sheet 2 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108051 A 5



Fuel Quantity
Figure 2 (Sheet 3 of 3)

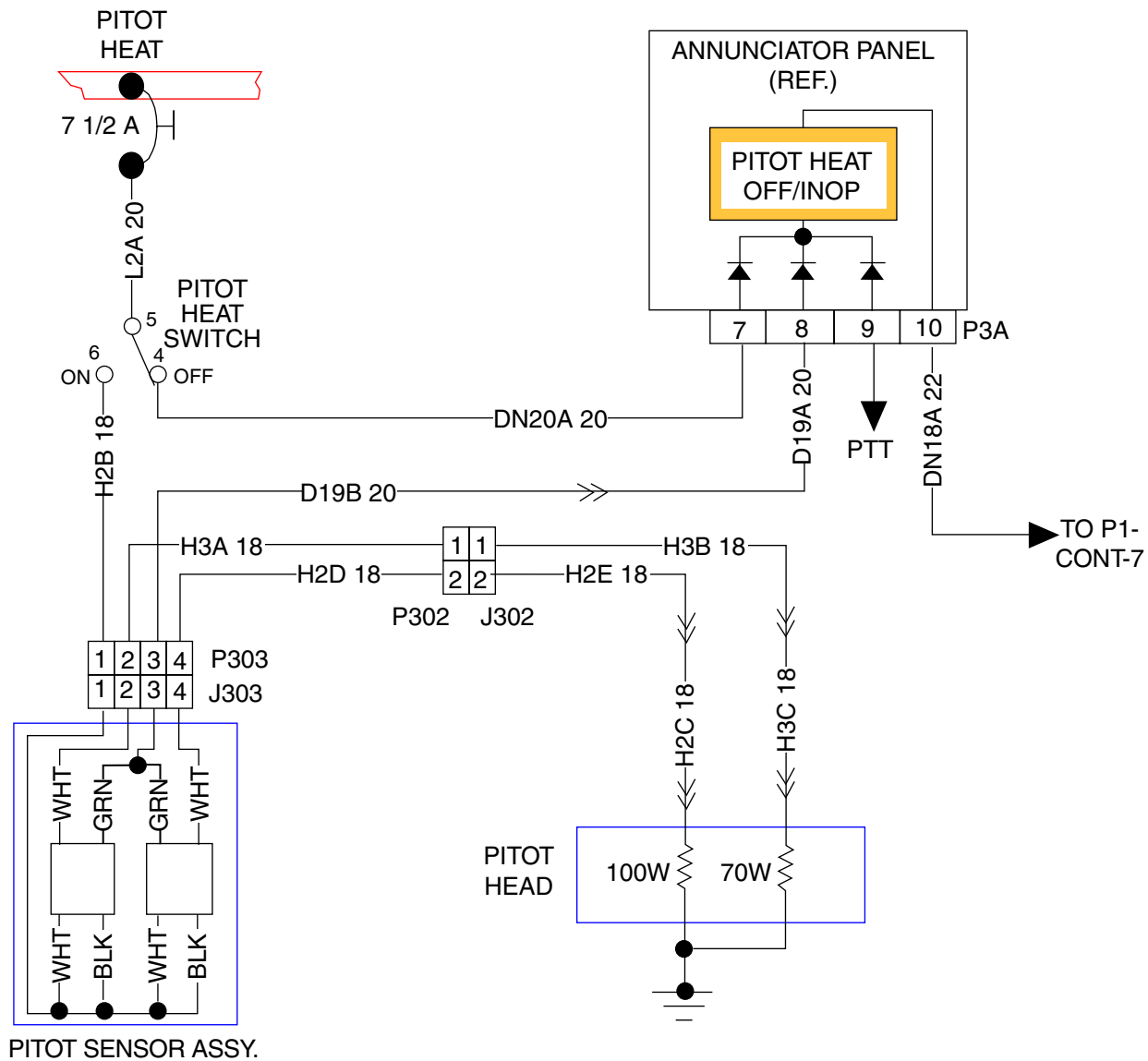
Effectivity
with Garmin G1000 NXi
2843823, 2881001 and up

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M

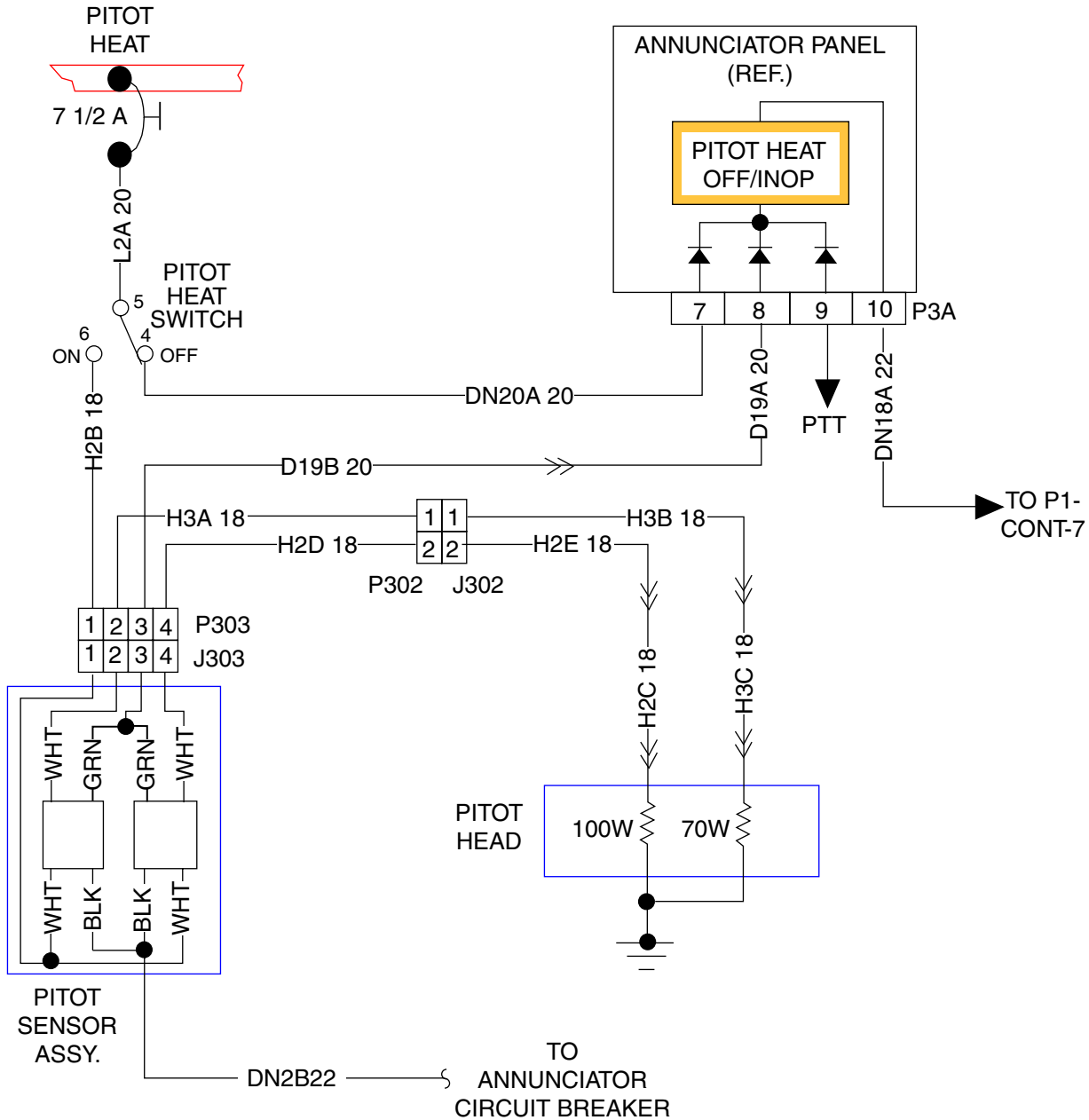


Pitot Heat
Figure 1 (Sheet 1 of 4)

Effectivity
2843001 thru 2843009

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D



Effectivity

Standard or with Garmin G500
2843010 thru 2843597
2843683 thru 2843700,
2843702 and up

Pitot Heat
Figure 1 (Sheet 2 of 4)

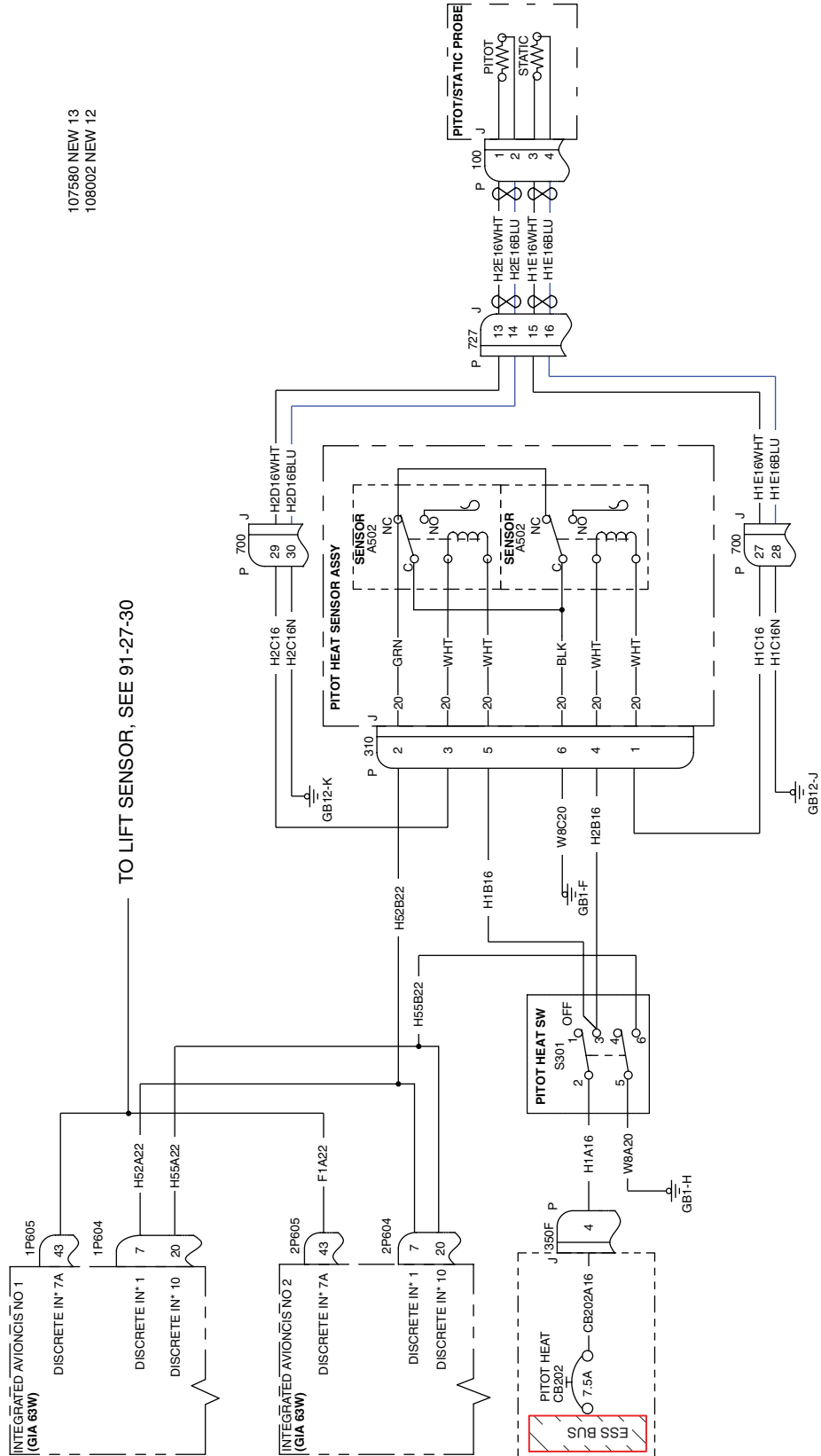
The diagram illustrates the electrical wiring for the Instrument Panel. Key components and connections include:

- AVIONICS BUS:** Connected to PR1B10 and PR1A10.
- MAIN BUS:** Connected to PR1A10 and PR2B20.
- AVIONICS MASTER SWITCH:** Controls the AVIONICS MASTER (X1, X2) and is connected to PR2B20.
- PITOT HEAT SWITCH:** Controls the PITOT HEAT (H1A14, H1B14, H2B14, W8A20) and is connected to the MAIN BUS.
- PITOT SENSOR ASSY:** Provides signals for PITOT (WHT-O, WHT-O), NC (BLK-O, GRN), and STATIC (WHT-O, WHT-O).
- LOW VOLT MON:** Monitors the LOW VOLT (RED, GRN, BLK) and is connected to the MAIN BUS.
- Connections to Fuselage Side Wall:** Includes connections to P310 (W8C20, H1C14, H1B14, W11A20, H2C14, H2B14) and P311 (P6B20, P6C20, P6D20N).
- Connections to J316-16 (SH 12):** Includes connections to P6A20 (1A) and GB4-C.

Effectivity
with Avidyne Integra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

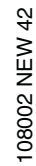
107580 NEW 13
108002 NEW 12



Pitot Heat

Figure 1 (Sheet 4 of 4)

Effectivity with Garmin G1000 NXi



91-31-20 **PAGE 1**
Nov 15/17

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK



Effectivity
Standard or Garmin G500

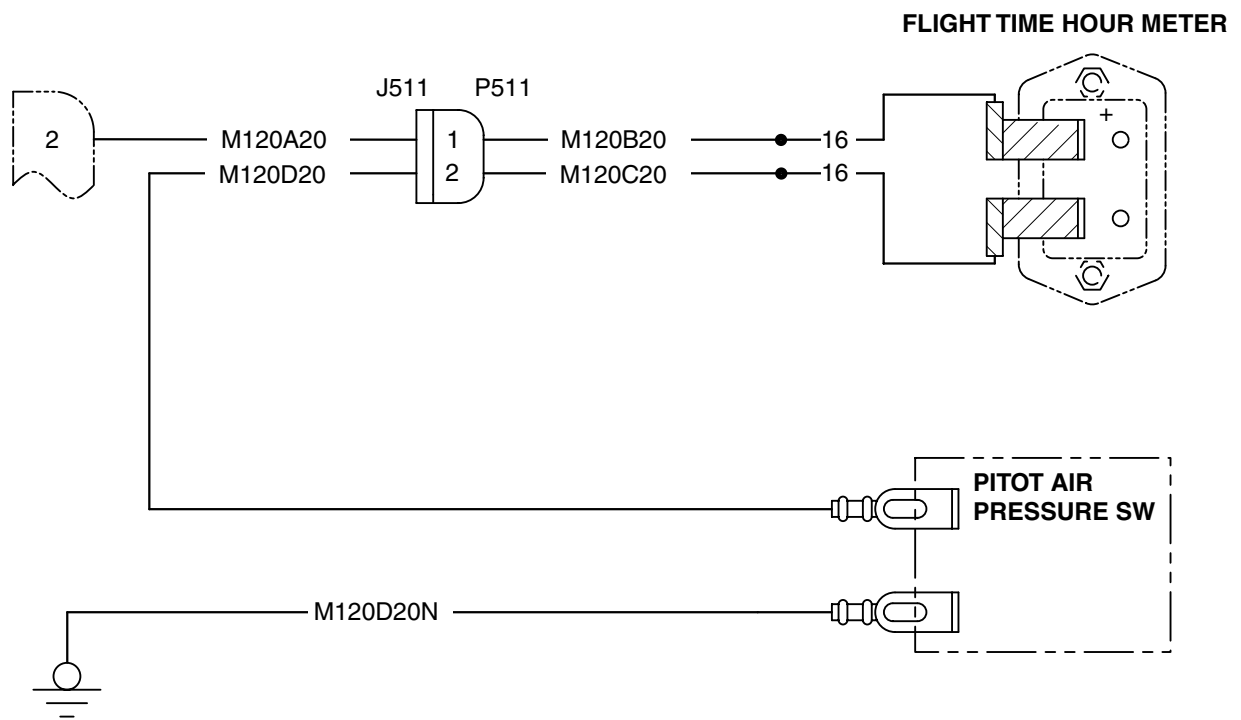
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Clock/Hour Meter
Figure 1 (Sheet 2 of 2)

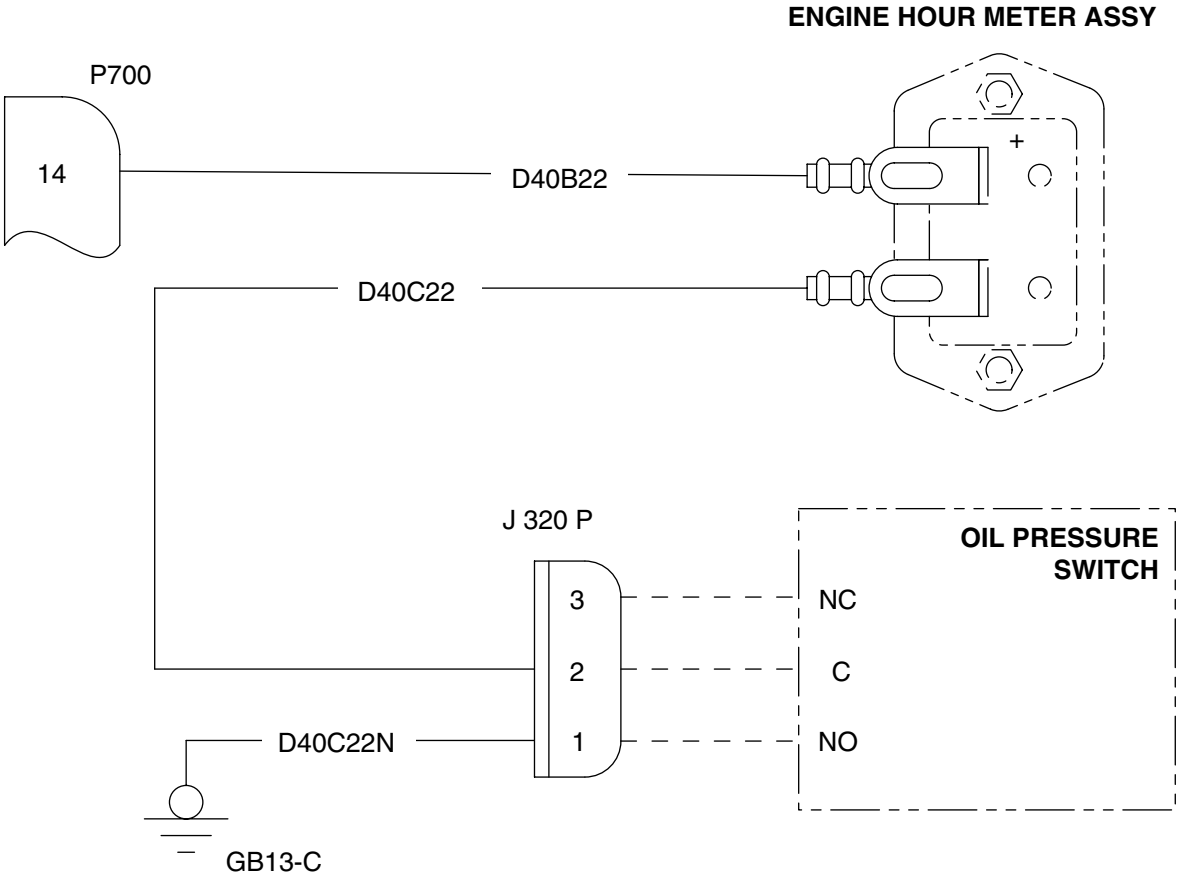
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107845 D 2



Flight Time Meter (Optional)
Figure 2

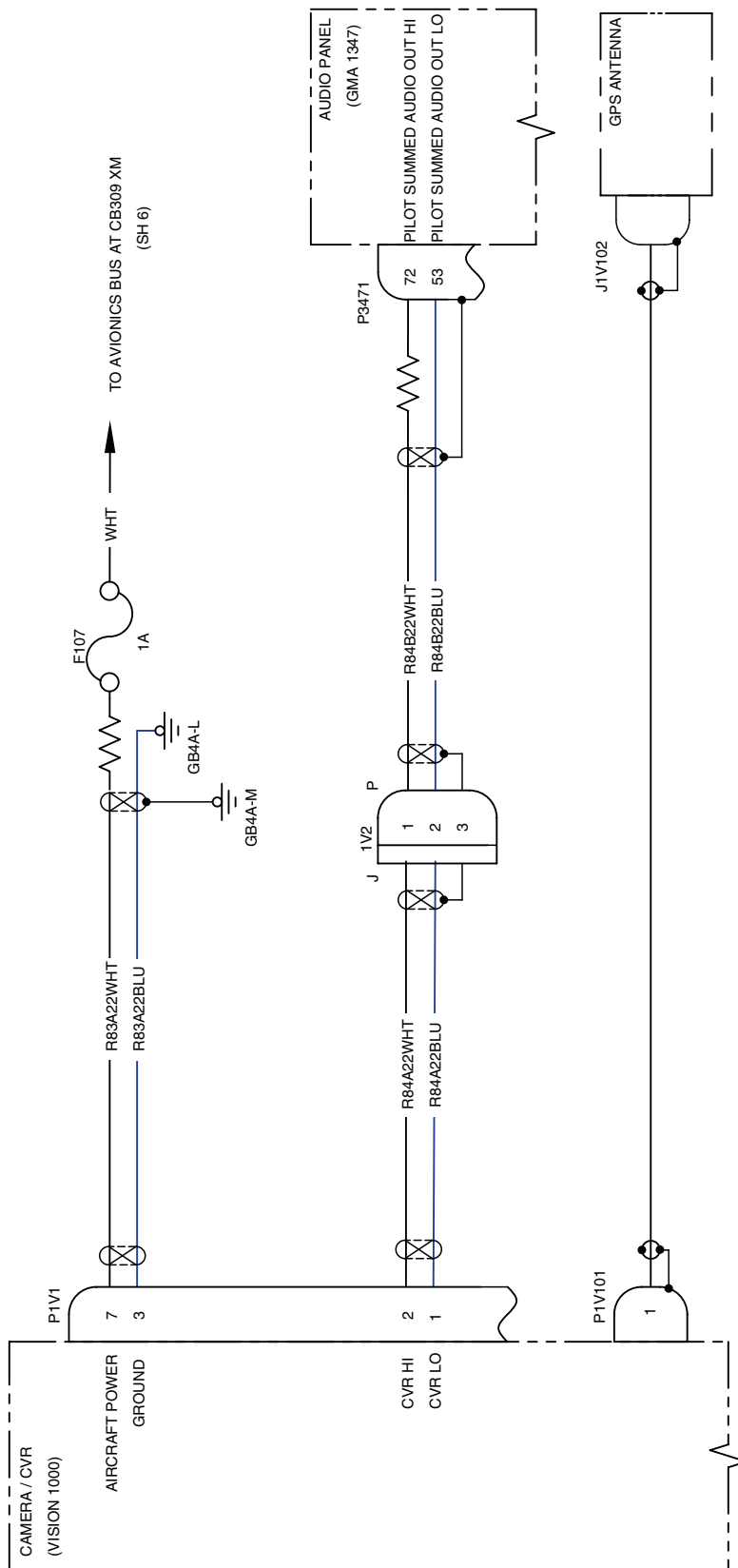
[Effectivity](#)
2843807 and up
Standard or Garmin G500



[Effectivity](#)
with Garmin G1000 NXi

Engine Hour Meter (Optional)
Figure 3

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



107418 B 1
109002 NEW 39

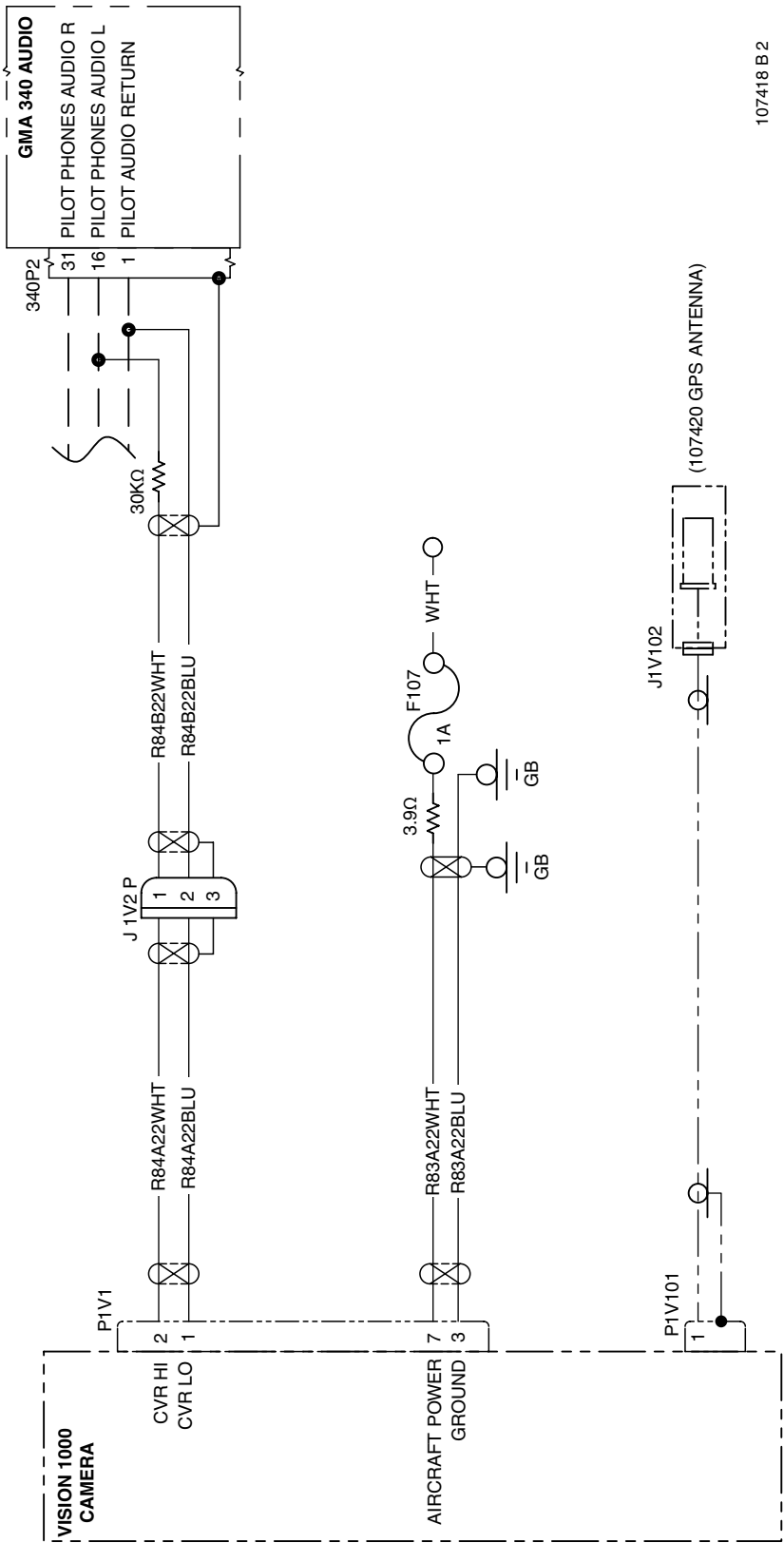
Vision 1000 Flight Data Monitoring System (Opt.)

Figure 4 (Sheet 1 of 2)

[Effectivity](#)

2843711 and up
with Garmin G1000 or G1000 NXi

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

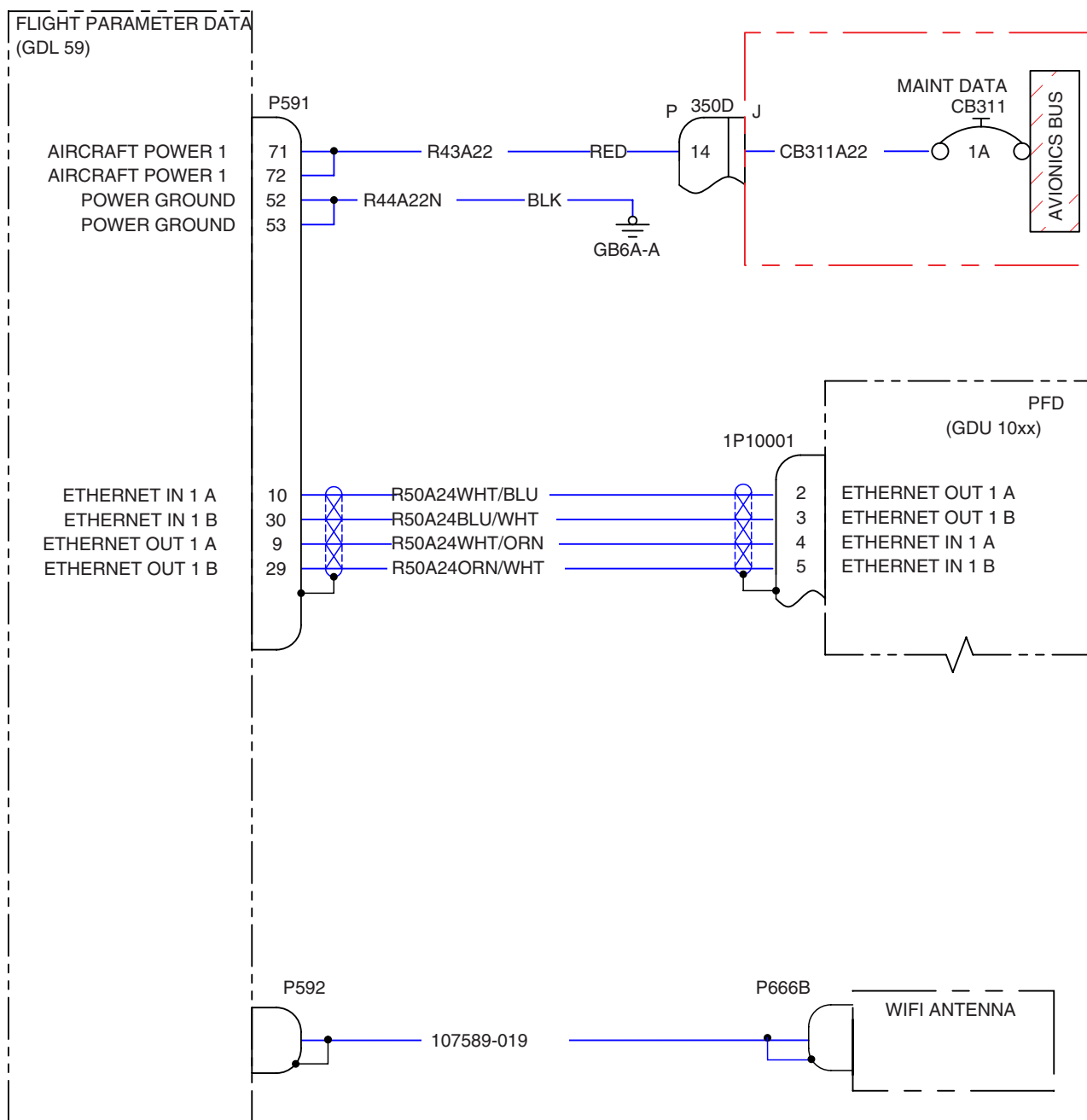


107418 B 2

Effectivity
2843736 and up
with Garmin G500

Vision 1000 Flight Data Monitoring System (Opt.)
Figure 4 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



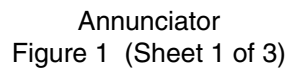
GDL 59 Maintenance Data Recorder (Opt.)
Figure 5

[Effectivity](#)
with Garmin G1000 NXi

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

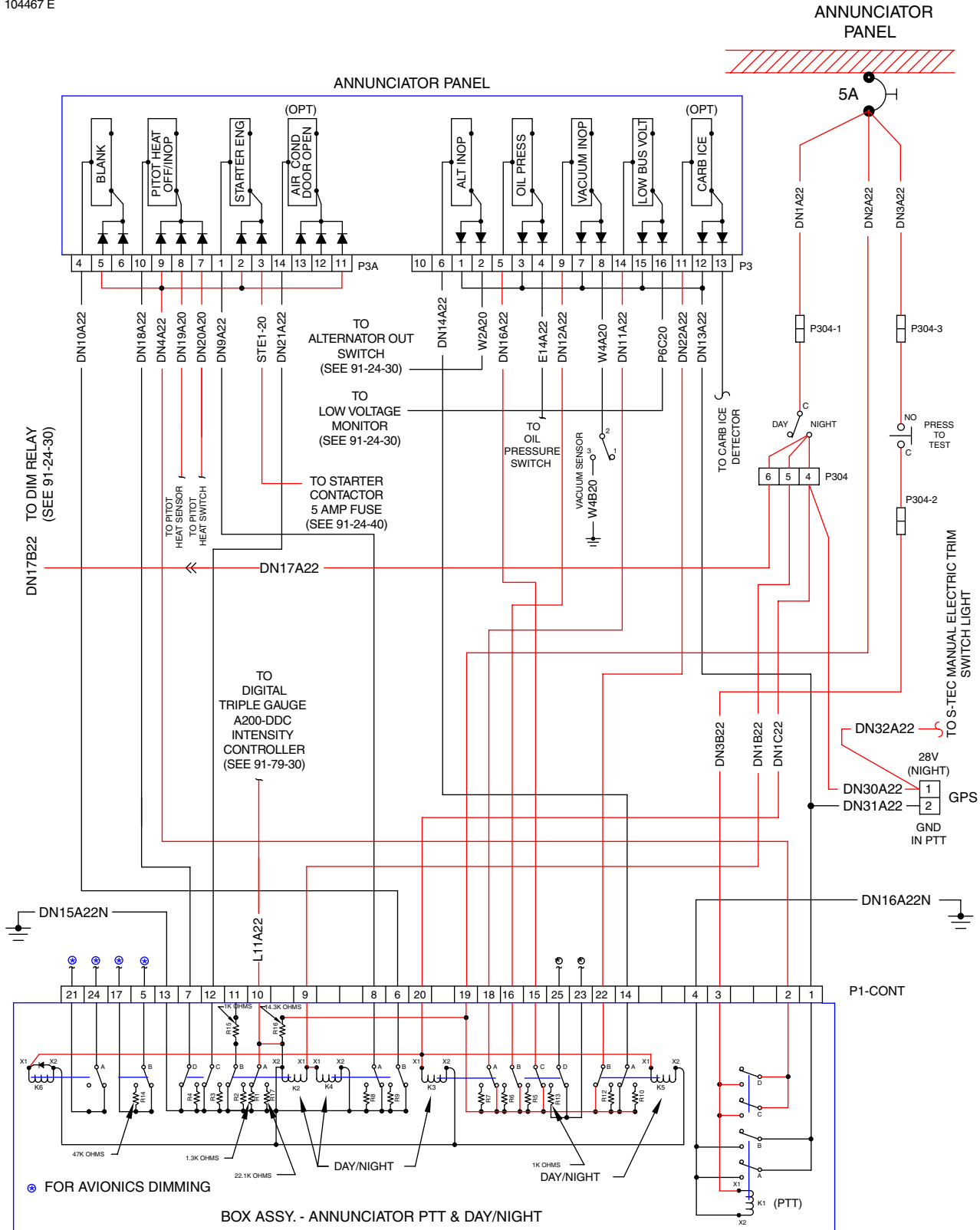
85399 M
101280 NEW
104467 D



91-31-50 **PAGE 1**
Sep 1/16

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

104467 E

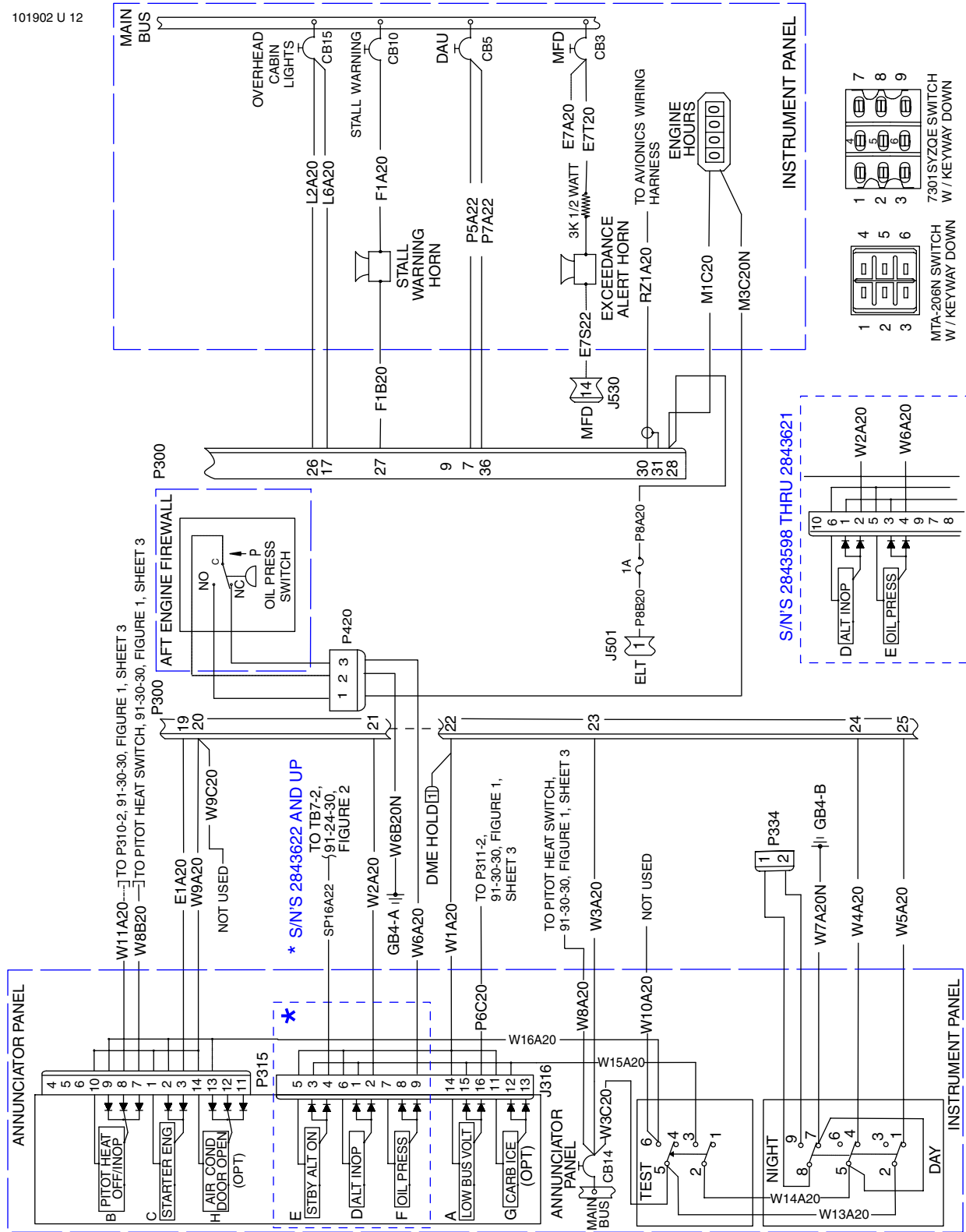


Effectivity
Standard or Garmin G500
2843824 and up

Annunciator
Figure 1 (Sheet 2 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

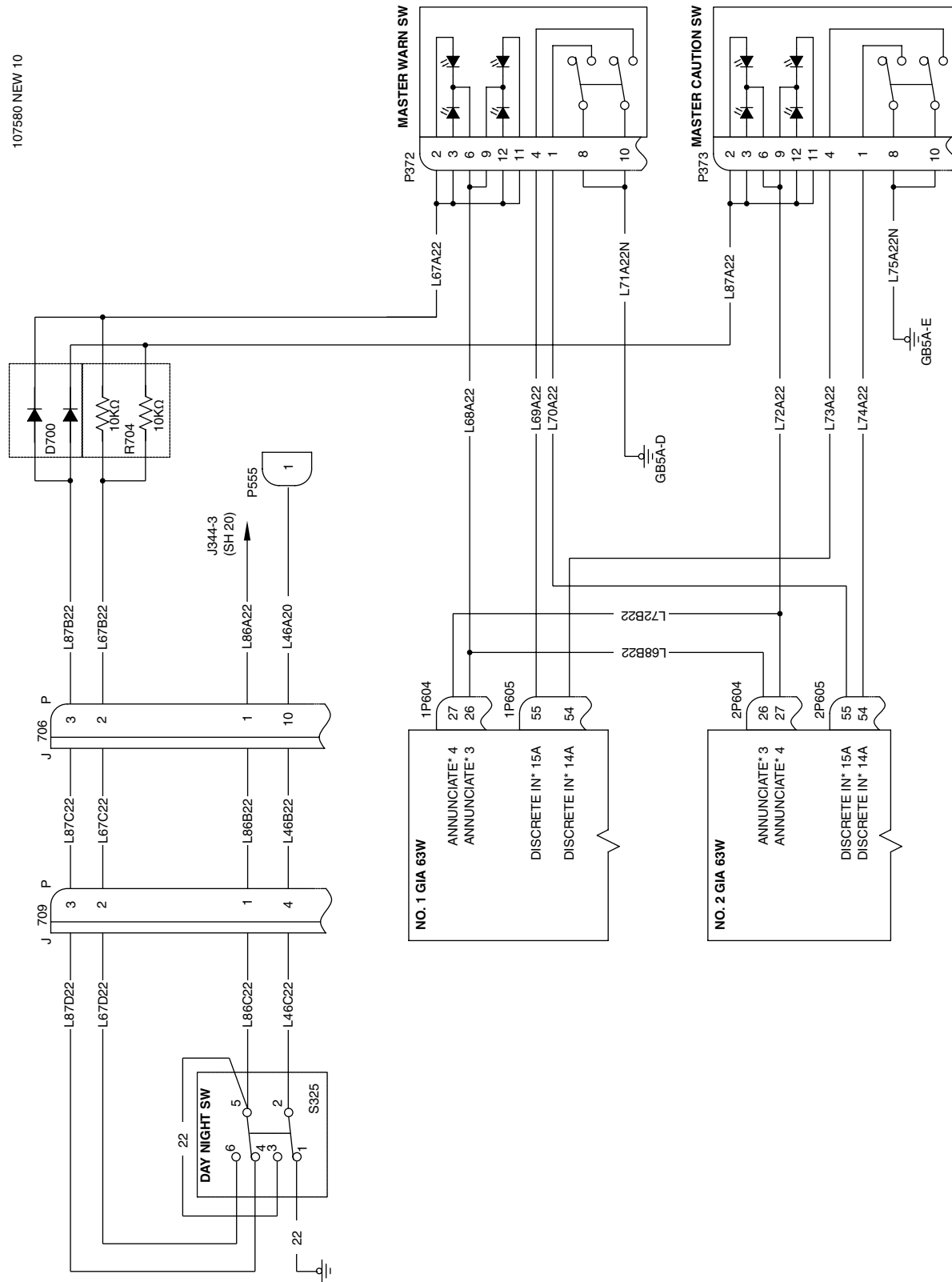
101902 U 12



Annunciator
Figure 1 (Sheet 3 of 3)

Effectivity
with Avidyne Integra

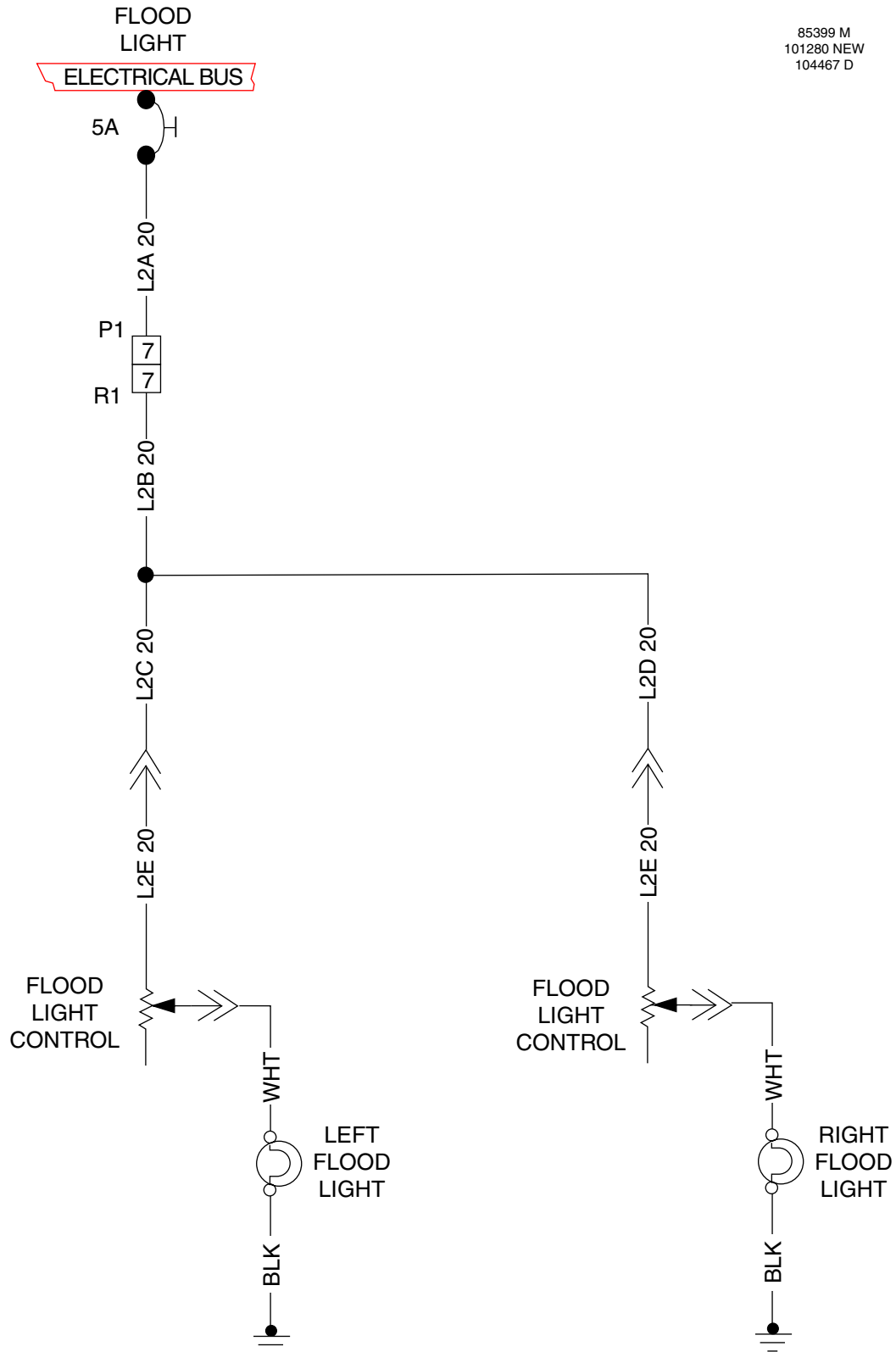
107580 NEW 10



Master Warning / Caution Switch
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

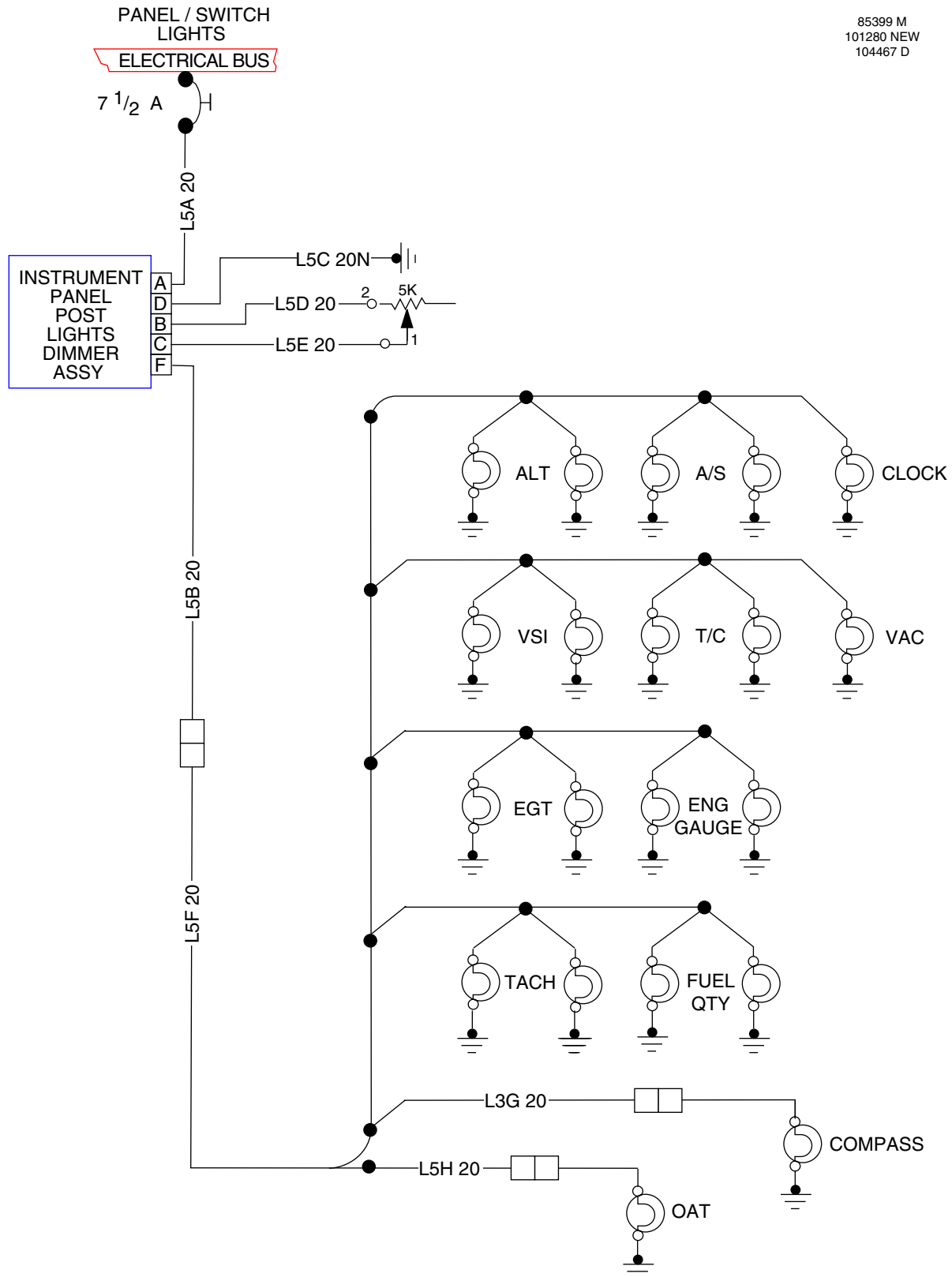
85399 M
101280 NEW
104467 D



Flood Lights
Figure 1

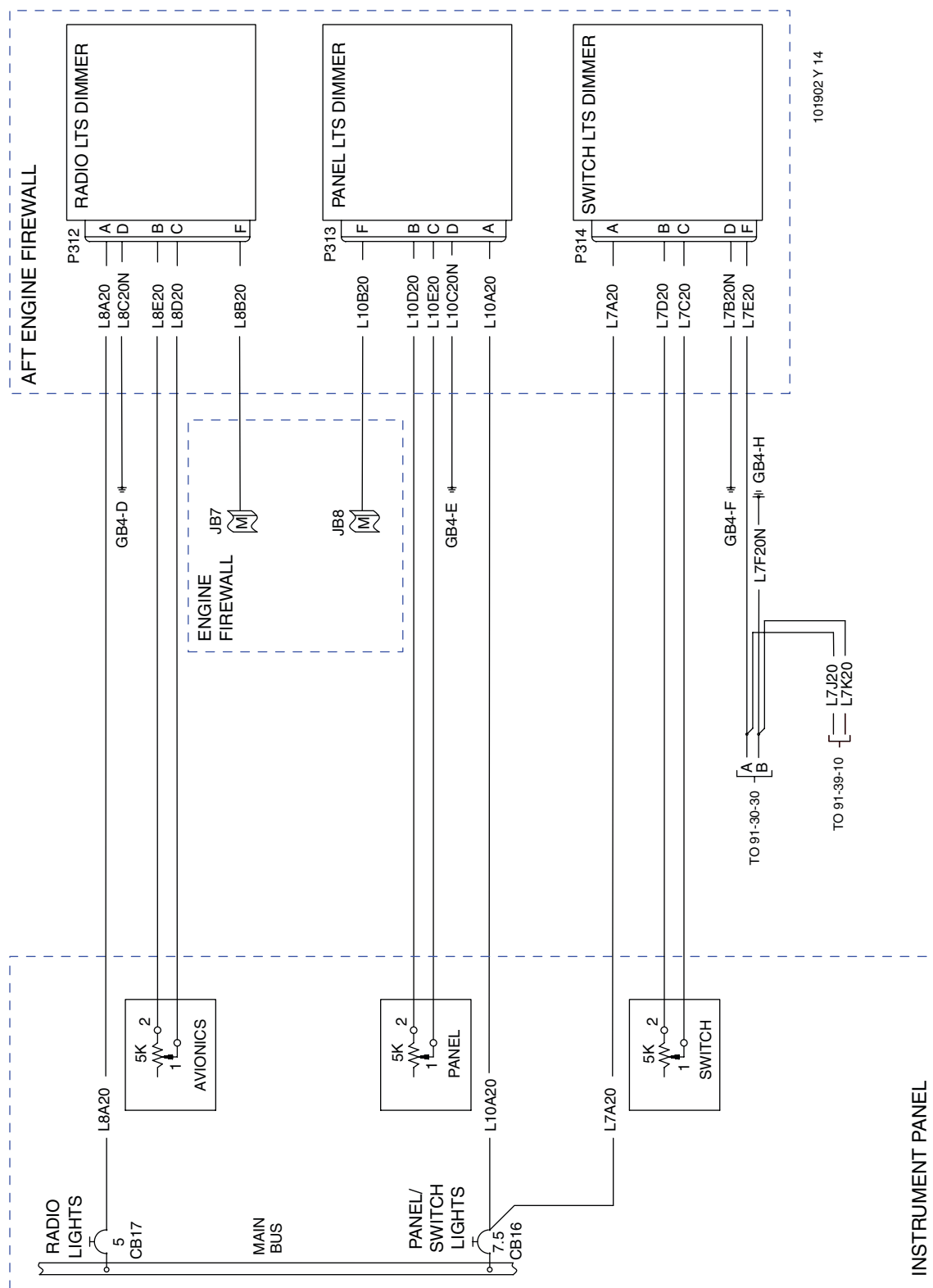
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D



Panel Lights
Figure 2 (Sheet 1 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



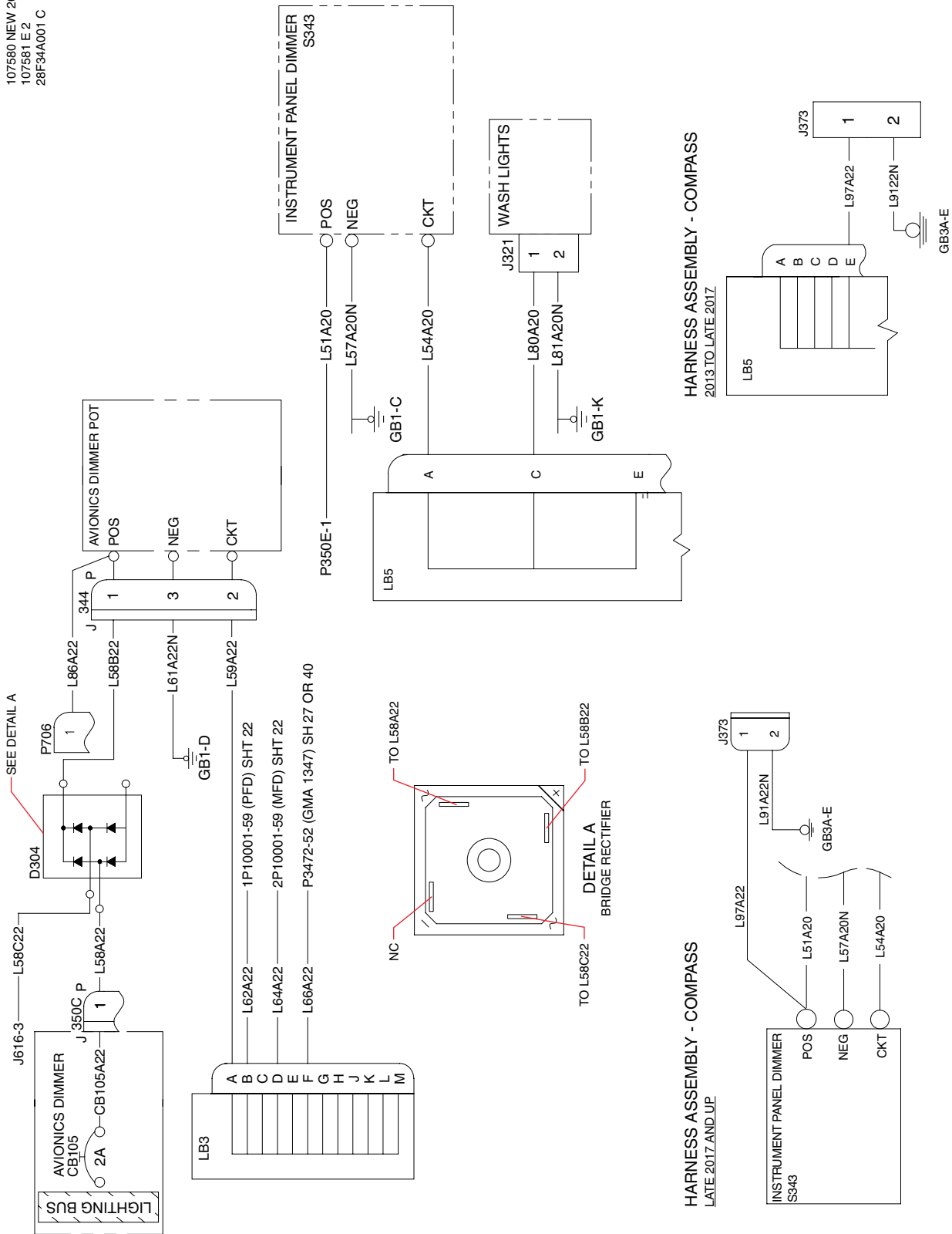
101902 Y 14

Panel Lights
Figure 2 (Sheet 2 of 3)

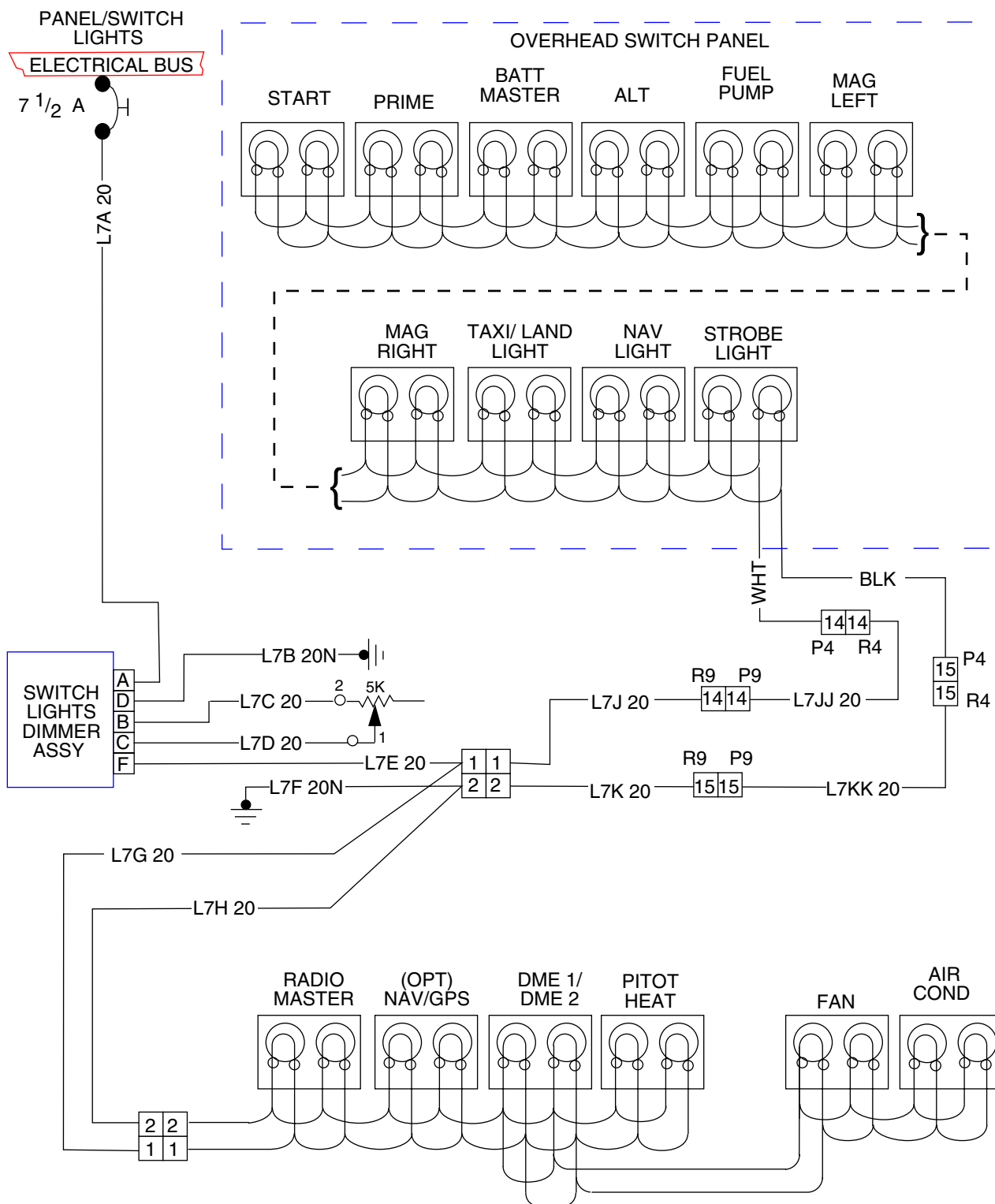
Effectivity
with Avidyne Integra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107580 NEW 20
107581 E 2
28F34A001 C



Panel Lights
Figure 2 (Sheet 3 of 3)

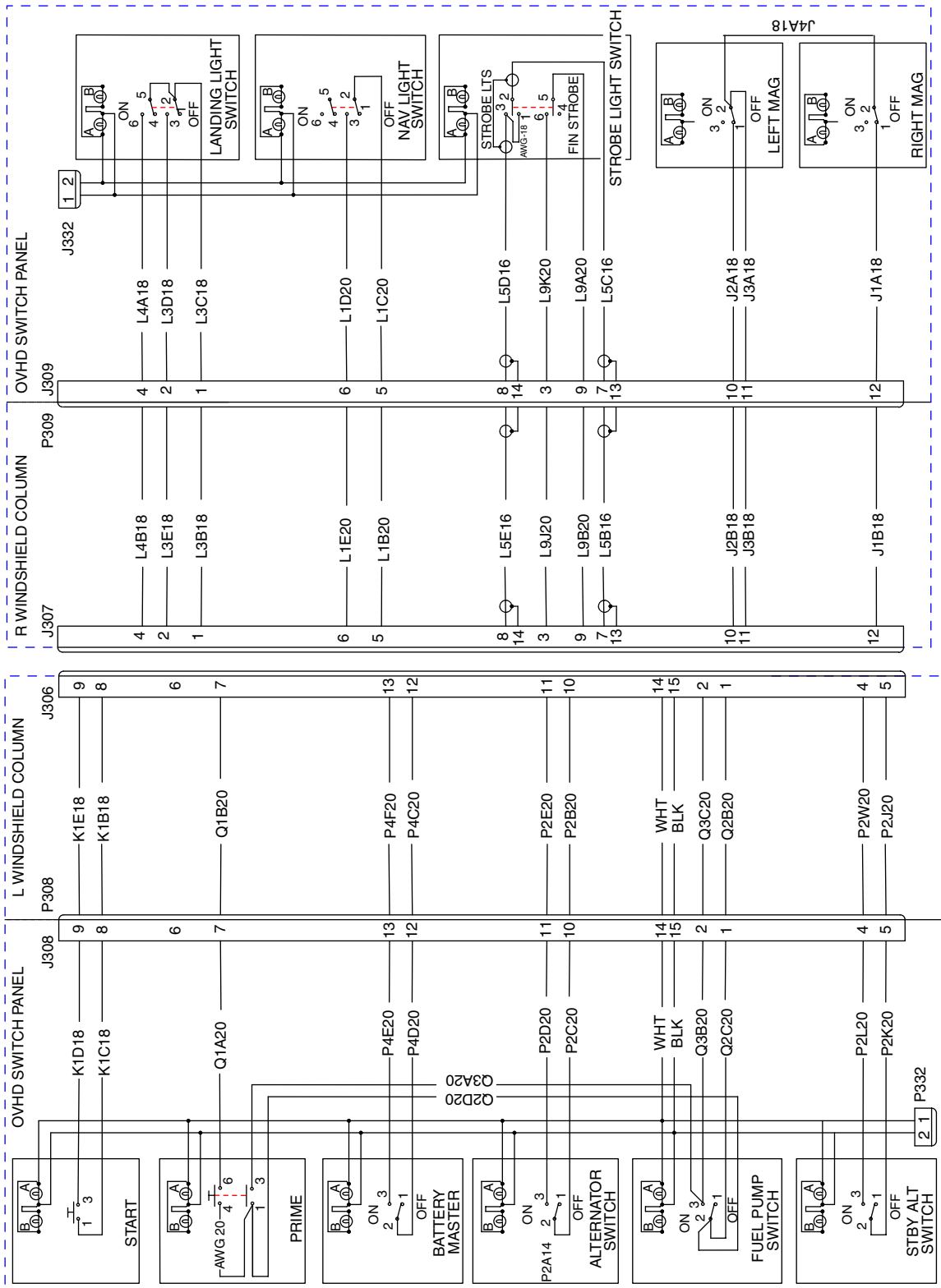
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

85399 M
101280 NEW
104467 D

Switch Lights
Figure 3 (Sheet 1 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

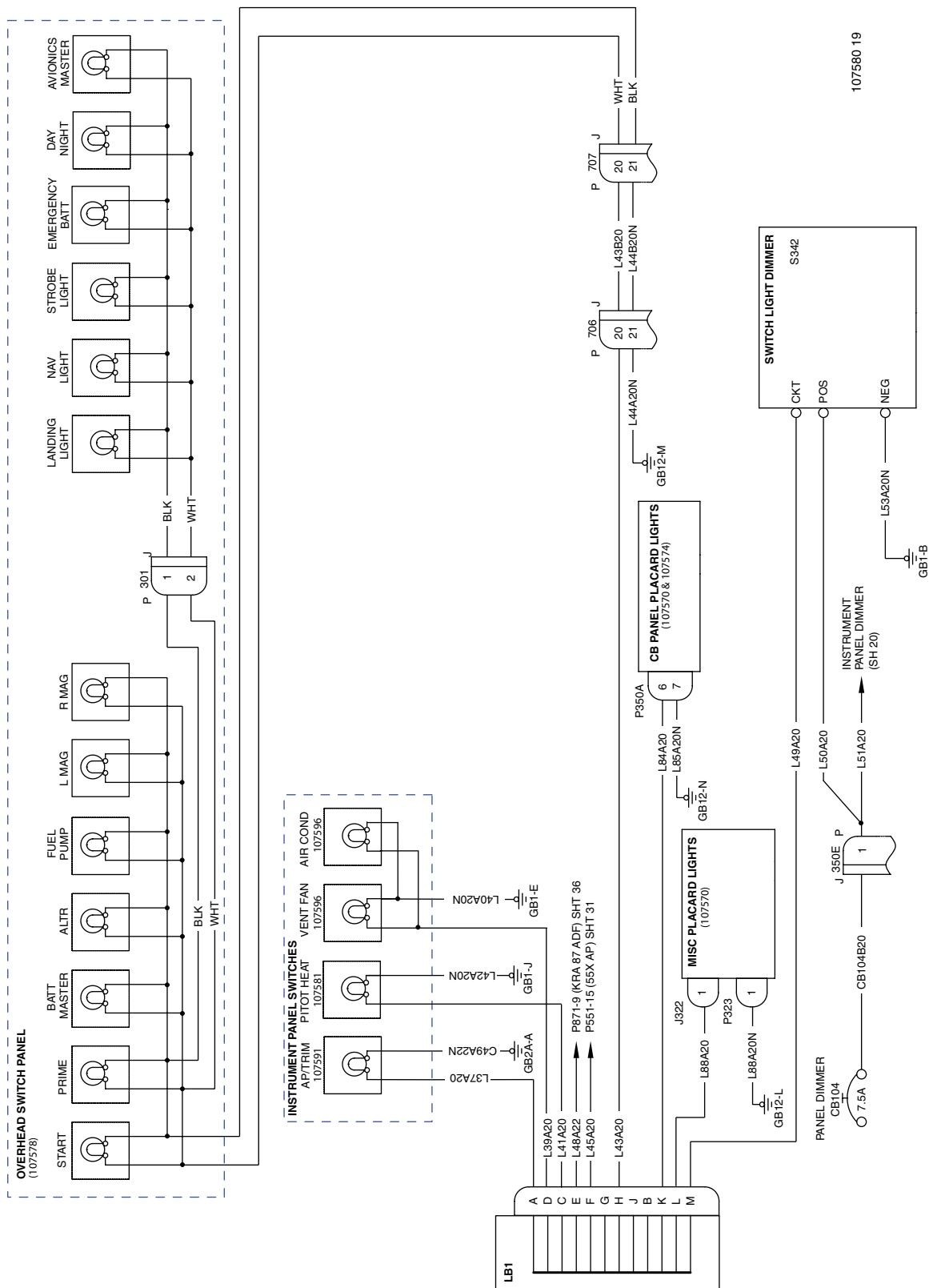
101902 U 18



Effectivity
with Avidyne Entegra

Switch Lights
Figure 3 (Sheet 2 of 4)

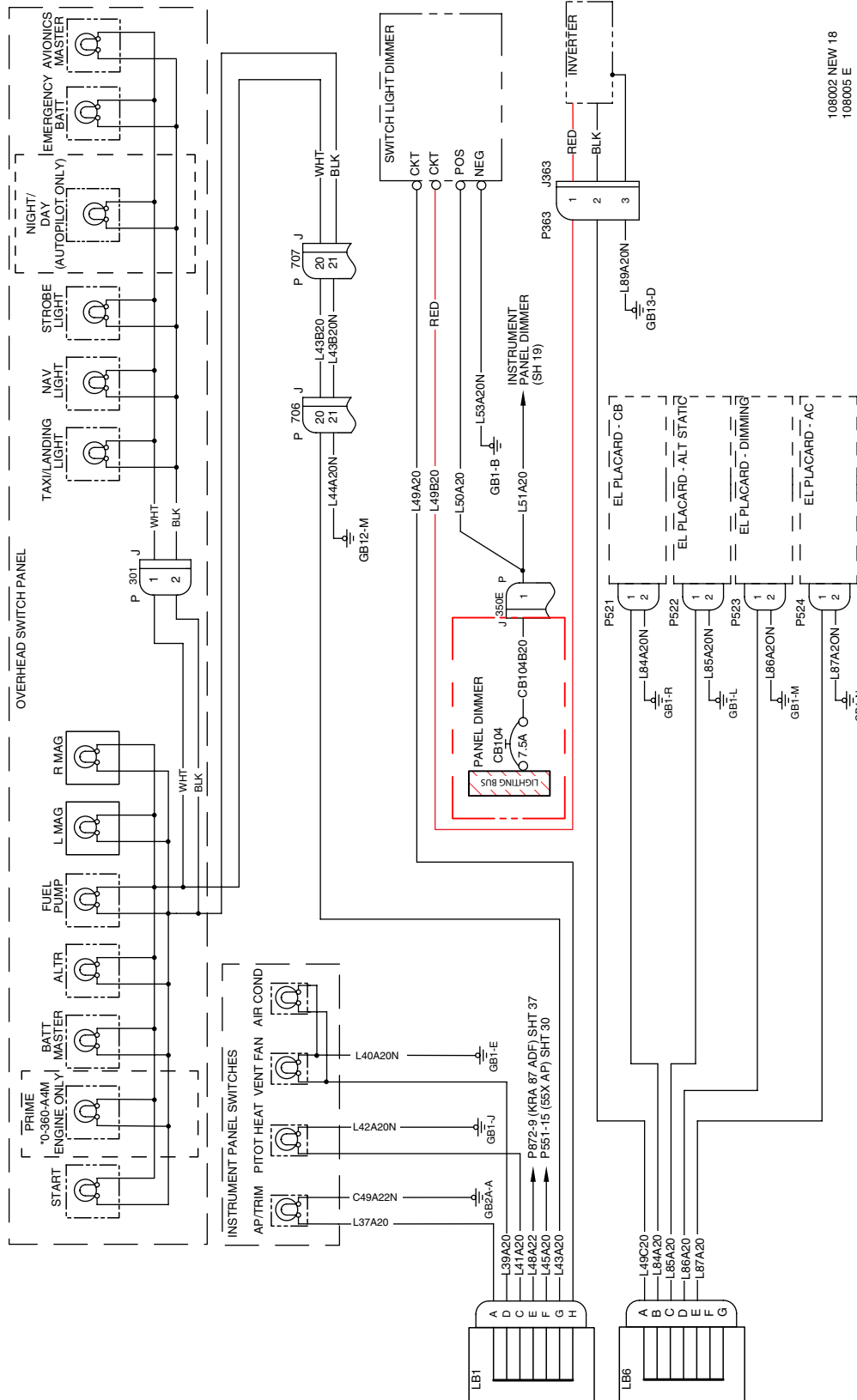
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Switch Lights
Figure 3 (Sheet 3 of 4)

Effectivity
with Garmin G1000

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



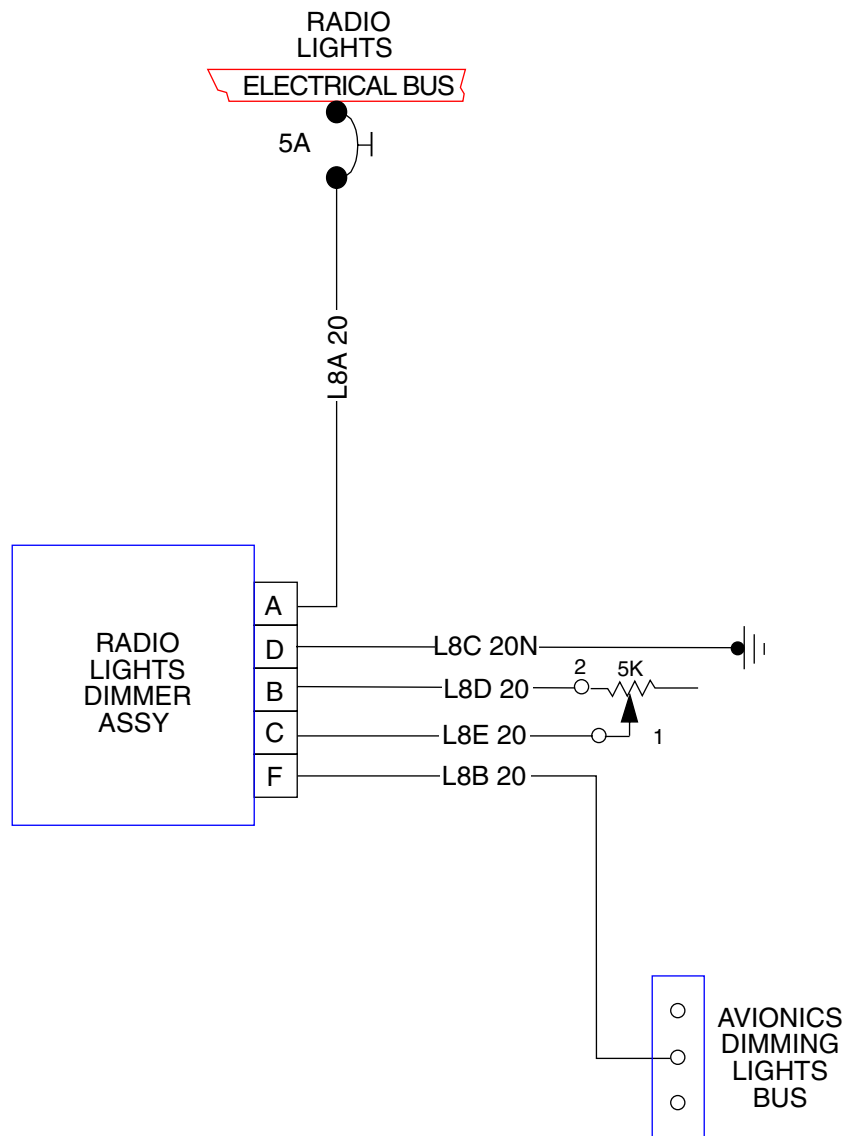
108002 NEW 18
108005 E

Effectivity
with Garmin G1000 NXi
2843852, 2843854-2843999

Switch Lights
Figure 3 (Sheet 4 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

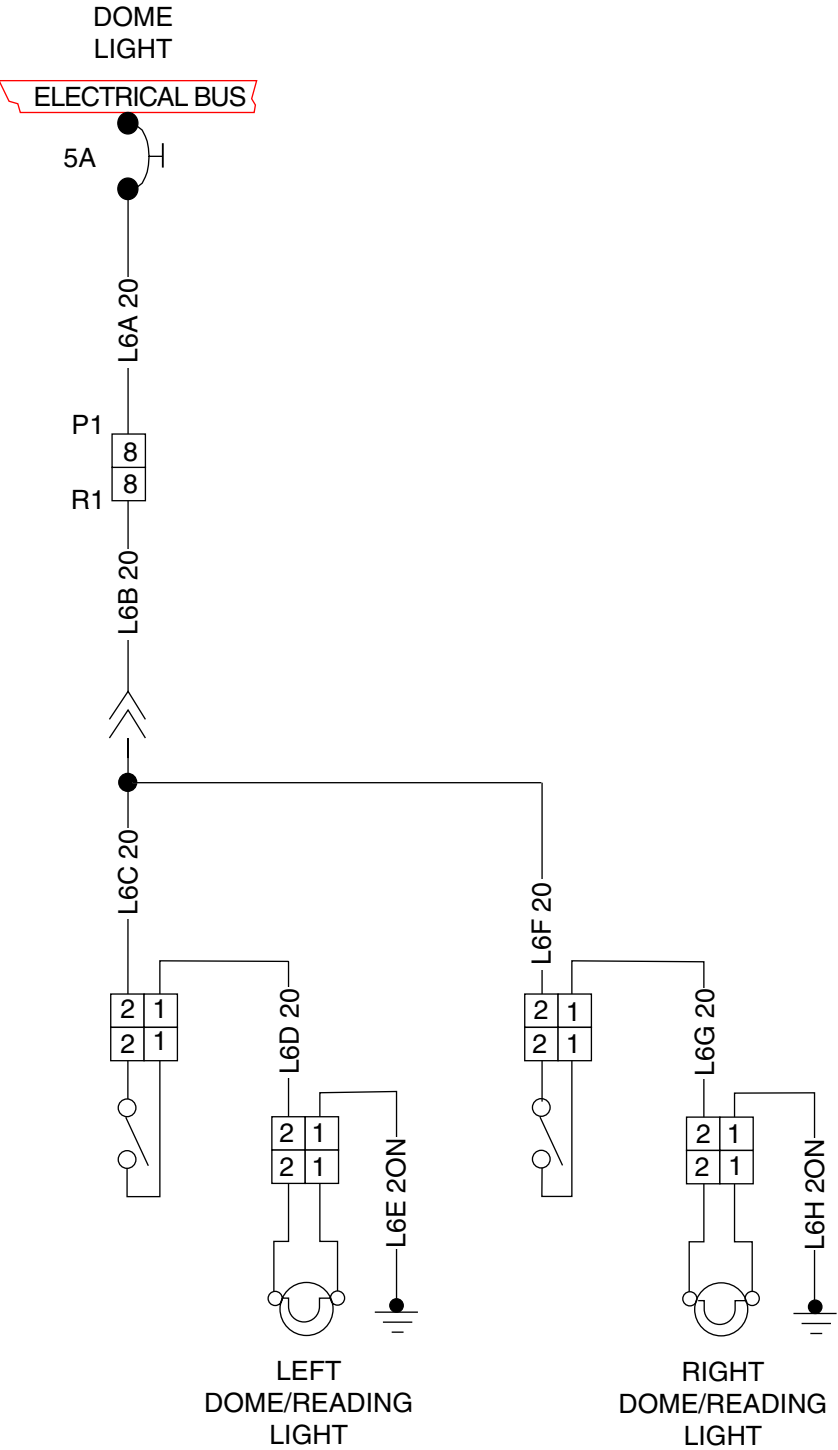
85399 M
101280 NEW
104467 D



Radio Lights
Figure 4

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

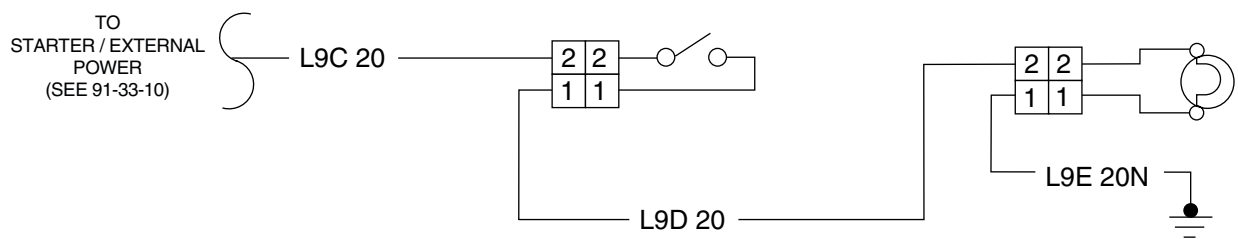
85399 M
101280 NEW
104467 D



Dome and Reading Lights
Figure 5

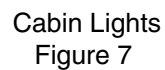
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D



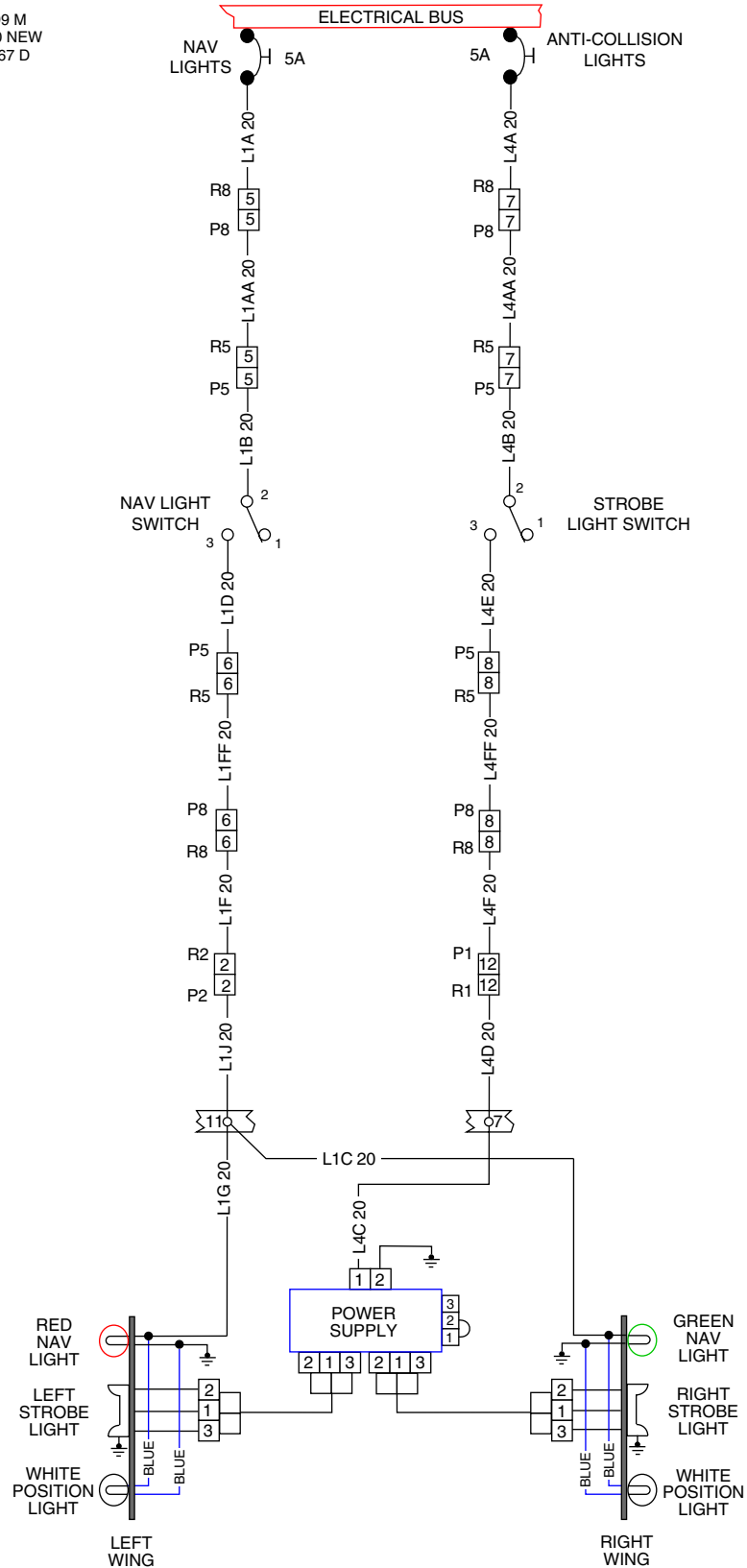
Courtesy Light
Figure 6

107580 NEW 18
108002 NEW 17



**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

85399 M
101280 NEW
104467 D



Navigation and Anti-Collision Lights
Figure 1 (Sheet 1 of 5)

Effectivity

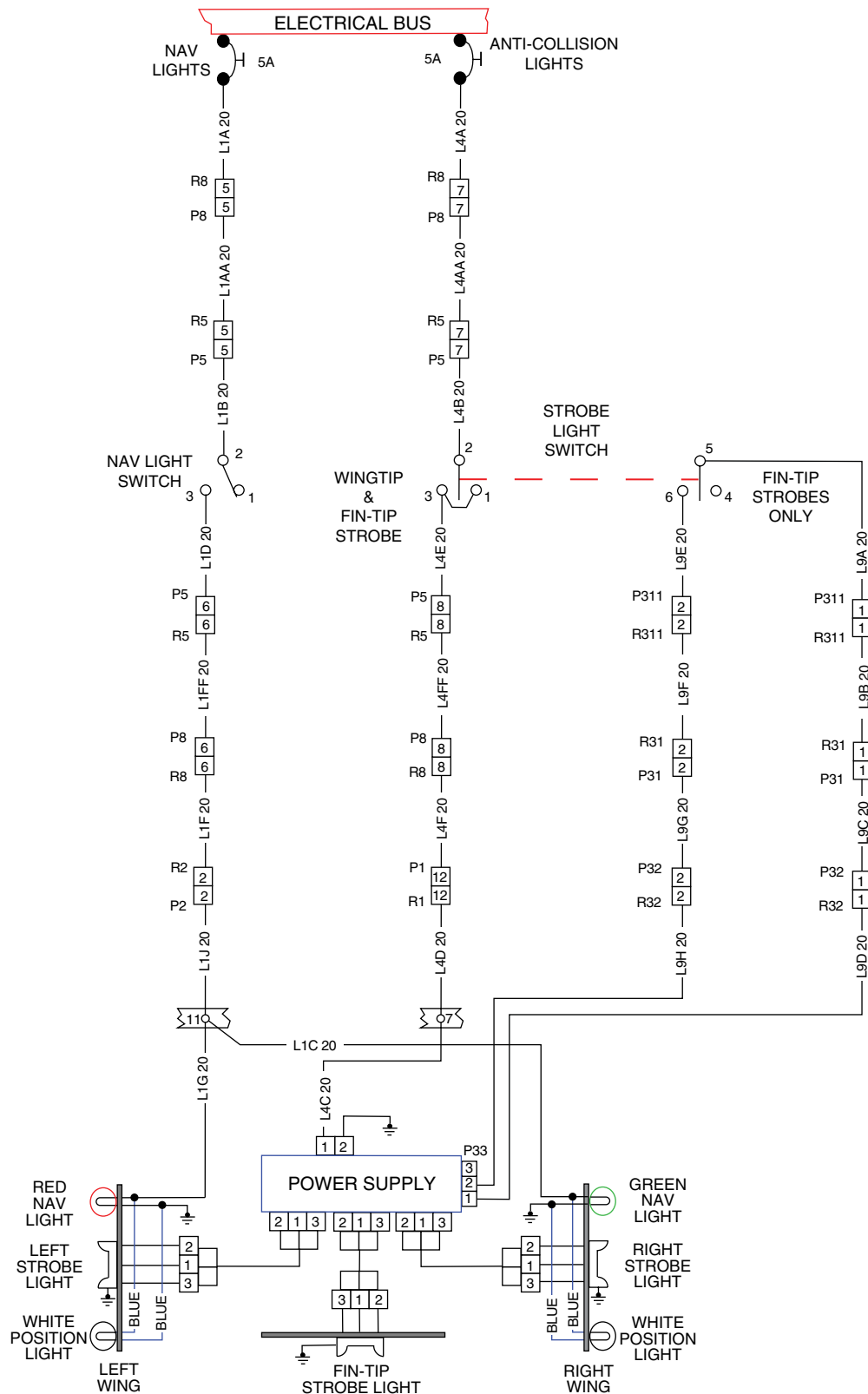
Standard, Avidyne Entegra, or Garmin G500
2843001-2843700, 2843702, 2843736 and up

91-33-40

PAGE 1
Sep 1/16

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D

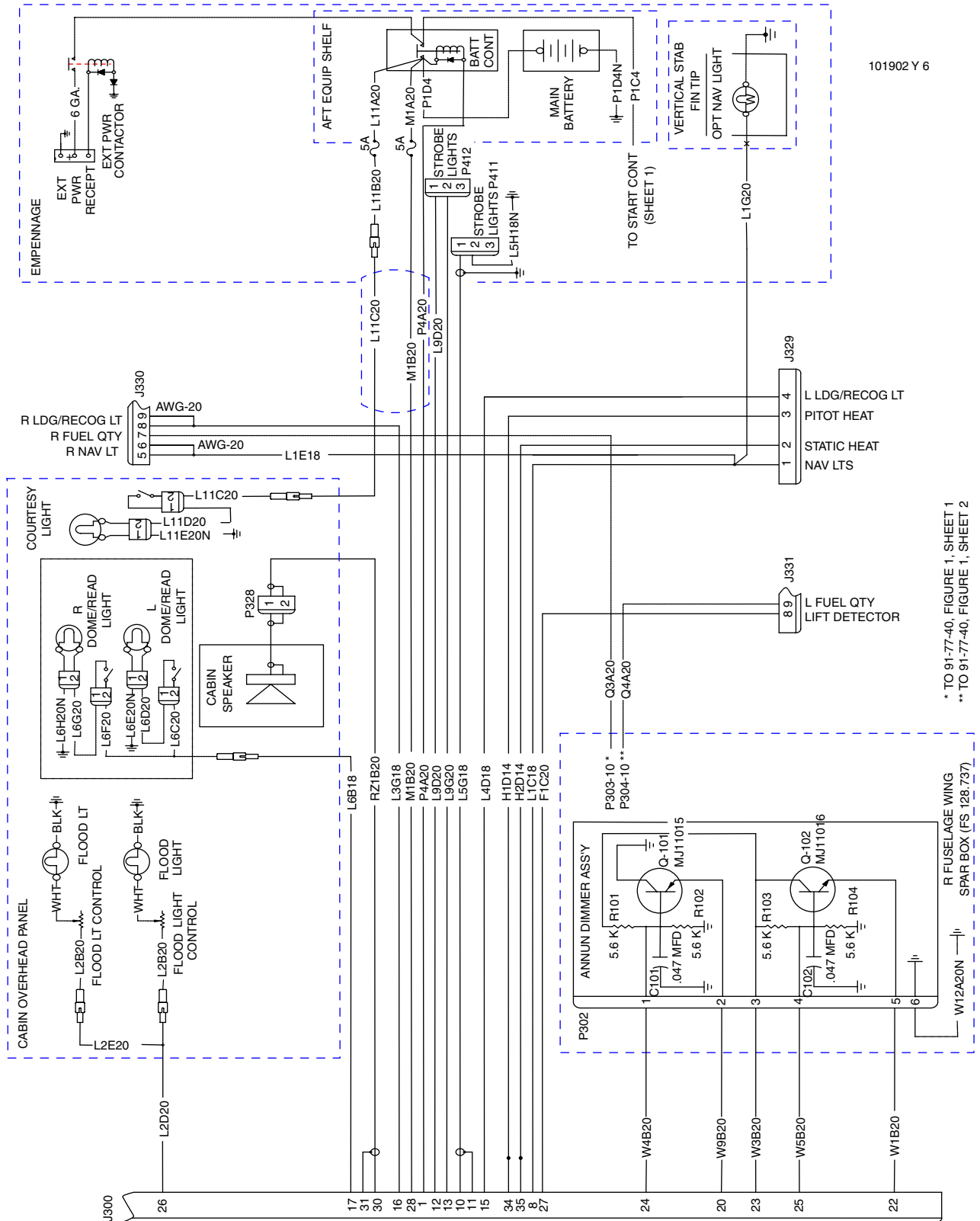


Navigation and Anti-Collision Lights
Figure 1 (Sheet 2 of 5)

Effectivity

Standard, Avidyne Entegra, or Garmin G500
2843001-2843700, 2843702, 2843736 and up
with Fin-tip Strobe option

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

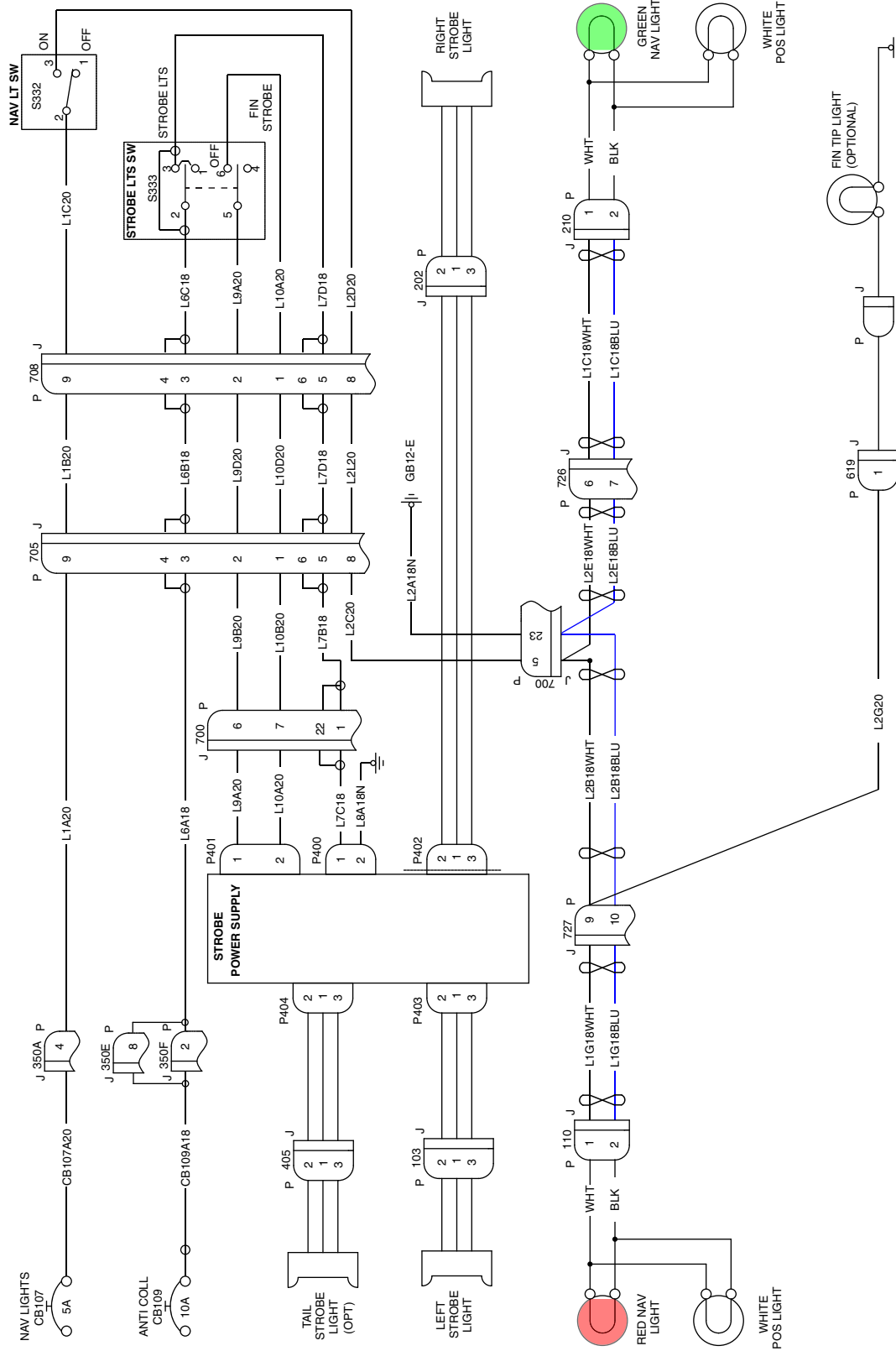


Navigation and Anti-Collision Lights
Figure 1 (Sheet 3 of 5)

Effectivity
with Avidyne Integra

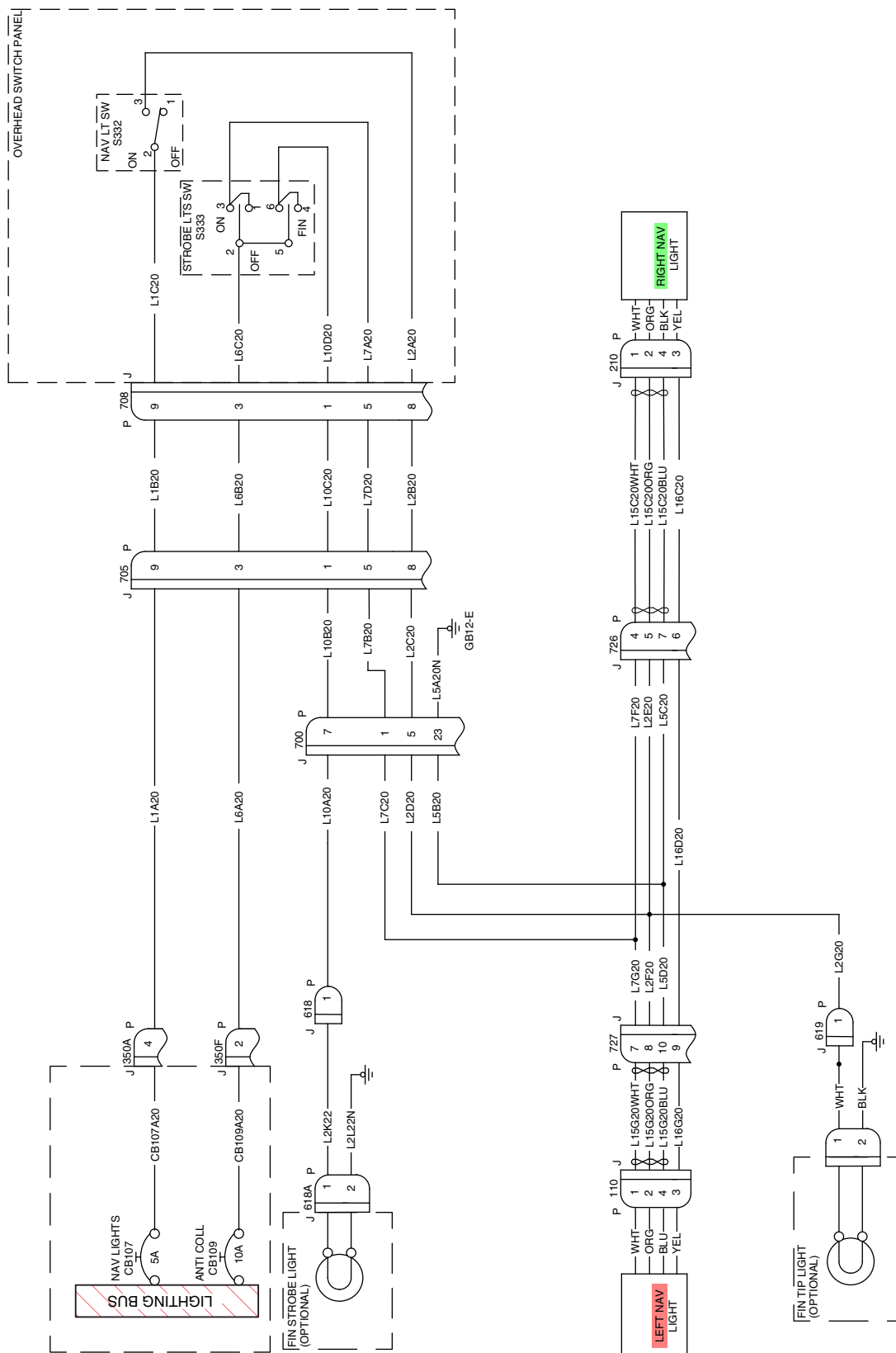
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

107580 16



Navigation and Anti-Collision Lights
Figure 1 (Sheet 4 of 5)

PIPER AIRCRAFT, INC. PA-28-181, ARCHER III MAINTENANCE MANUAL



Navigation and Anti-Collision Lights
Figure 1 (Sheet 5 of 5)

Effectivity with Garmin G1000 NXi

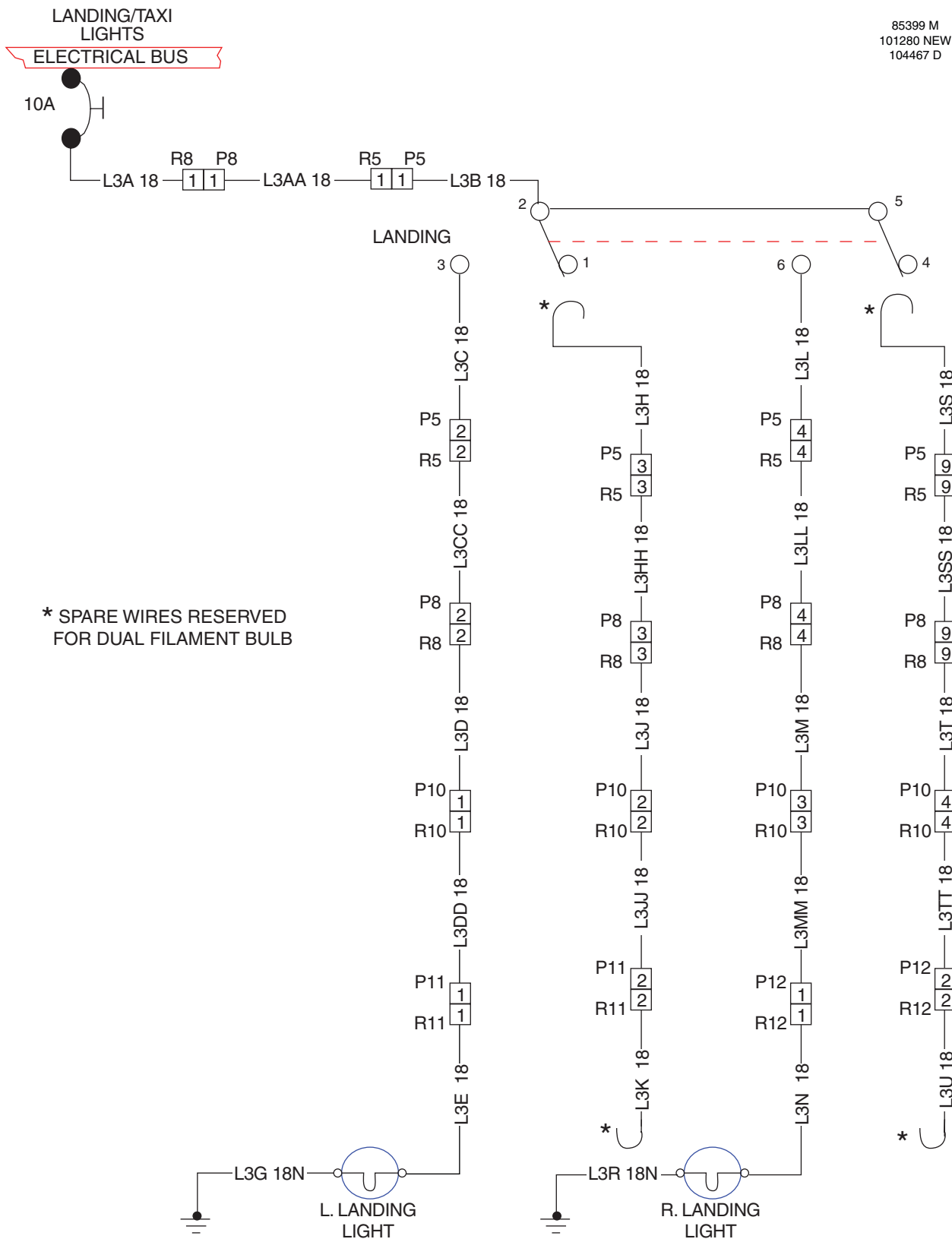
108002 NEW 15

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

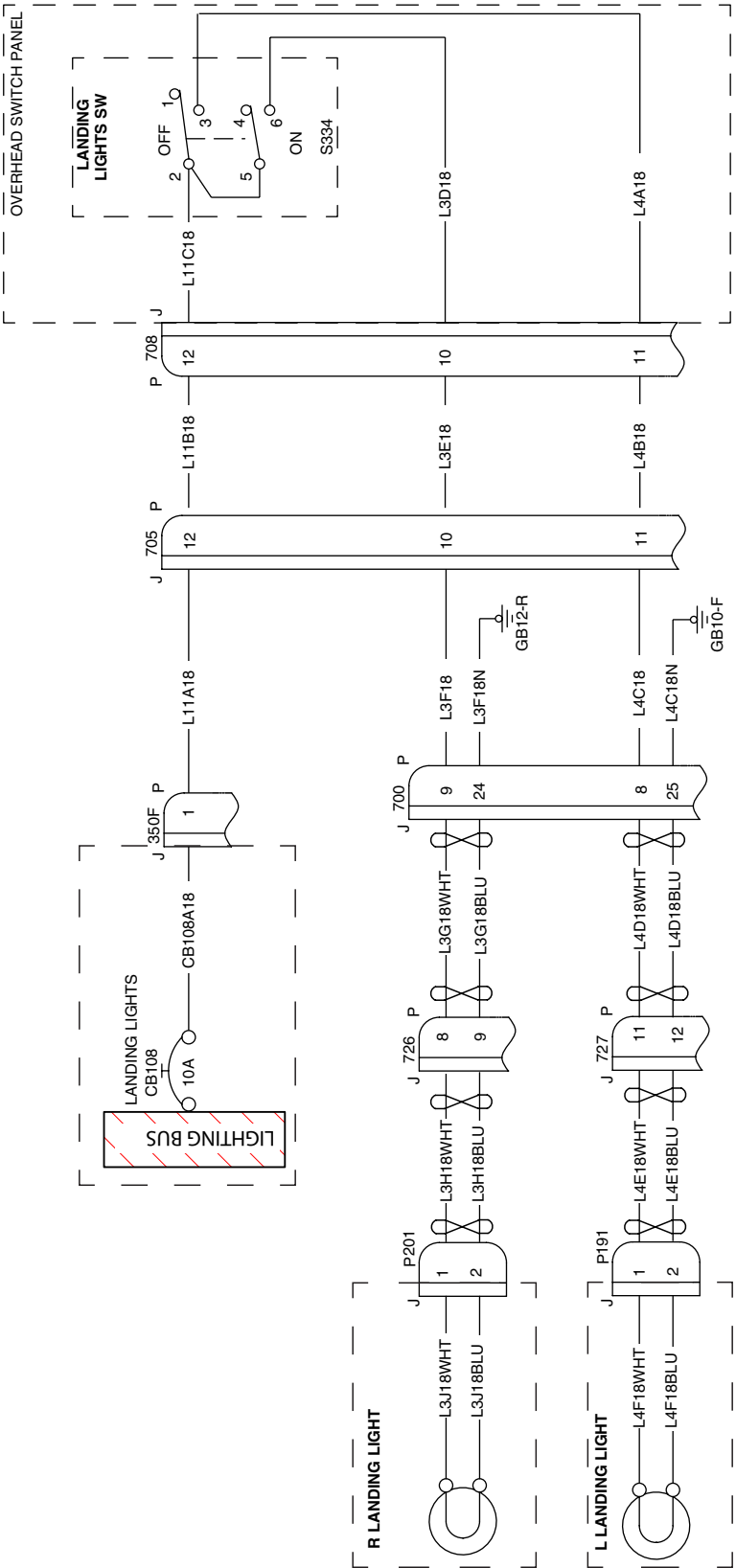
85399 M
101280 NEW
104467 D



Landing / Taxi Lights
Figure 2 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

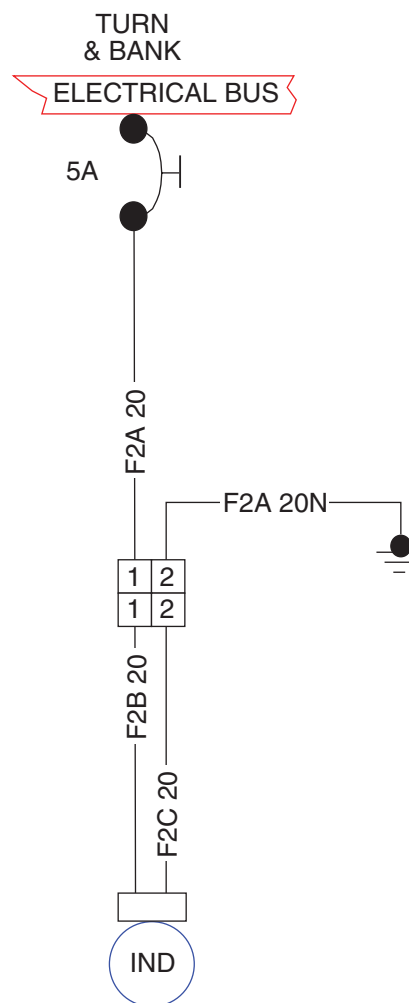
107580 NEW 17
108002 NEW 16



Landing / Taxi Lights
Figure 2 (Sheet 2 of 2)

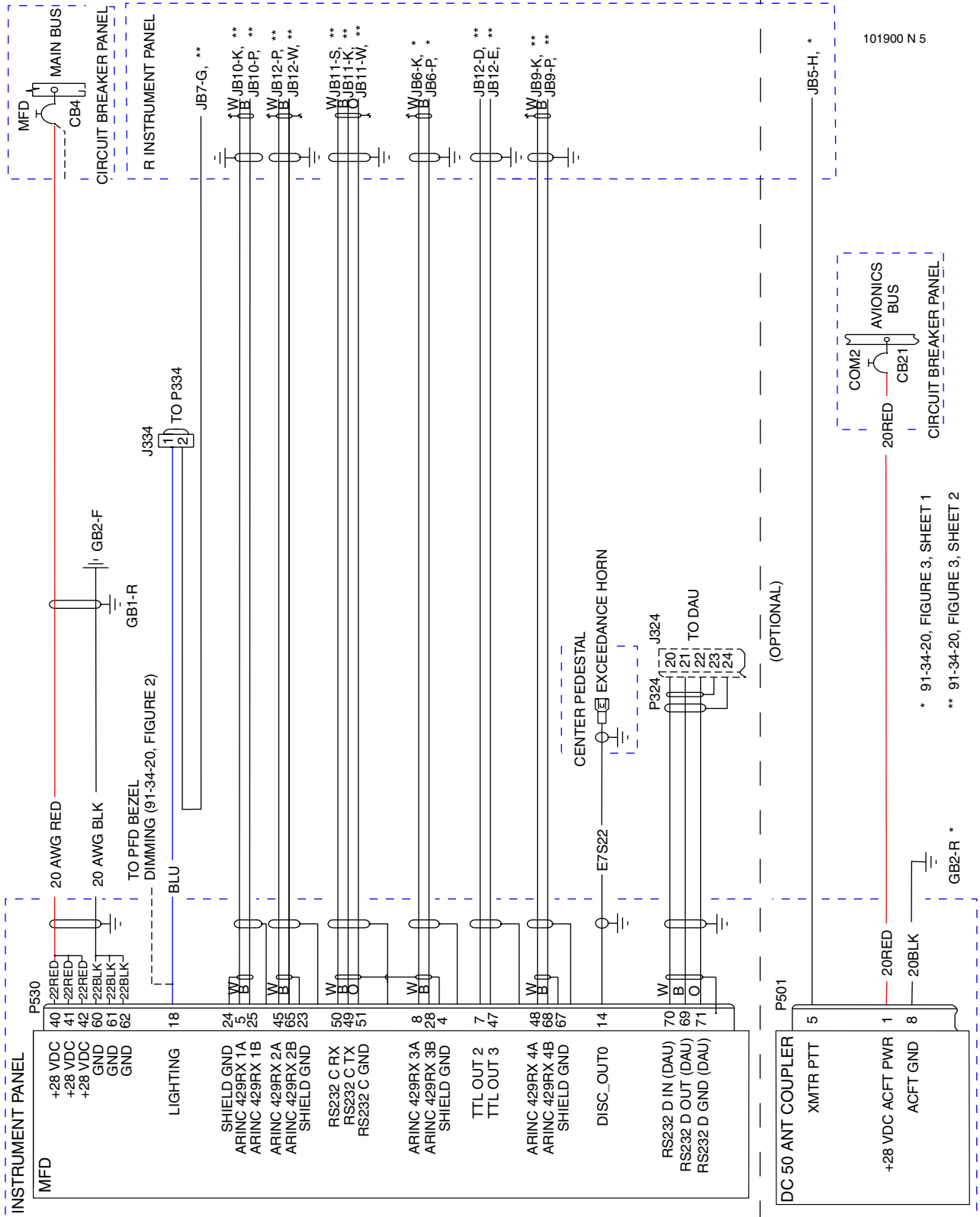
Effectivity
with Garmin G1000
or G1000 NXi

85399 M
101280 NEW
104467 D



9134201

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

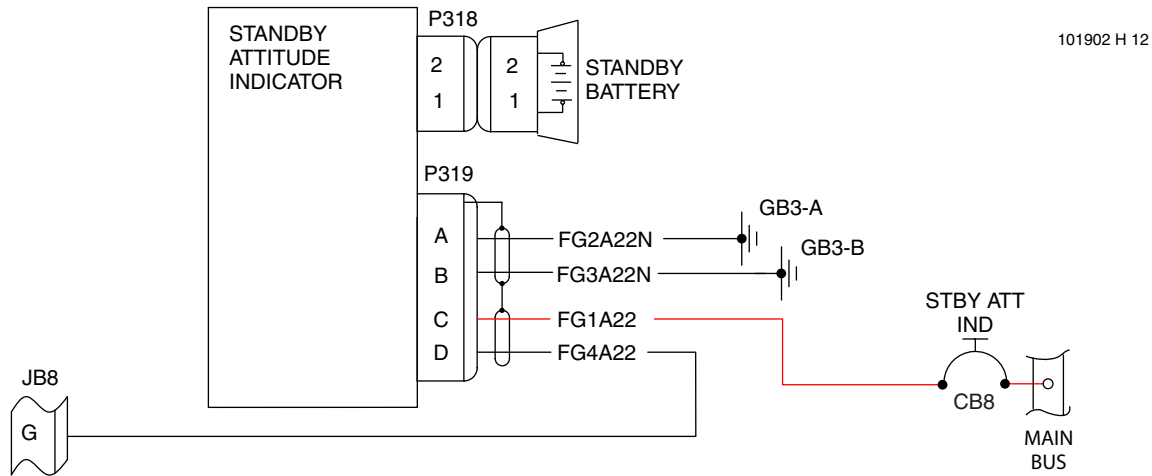


101900 N 5

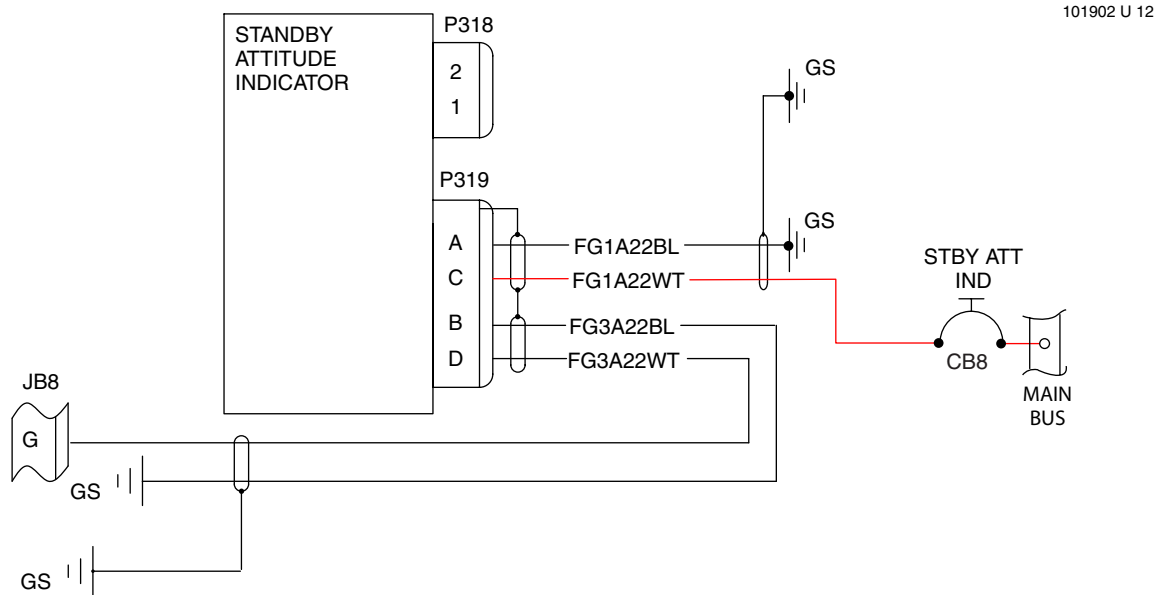
Multifunction Flight Display
Figure 3

Effectivity
with Avidyne Integra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



S/N'S 2843598 THRU 2843610 BEFORE COMPLIANCE WITH SB 1162B



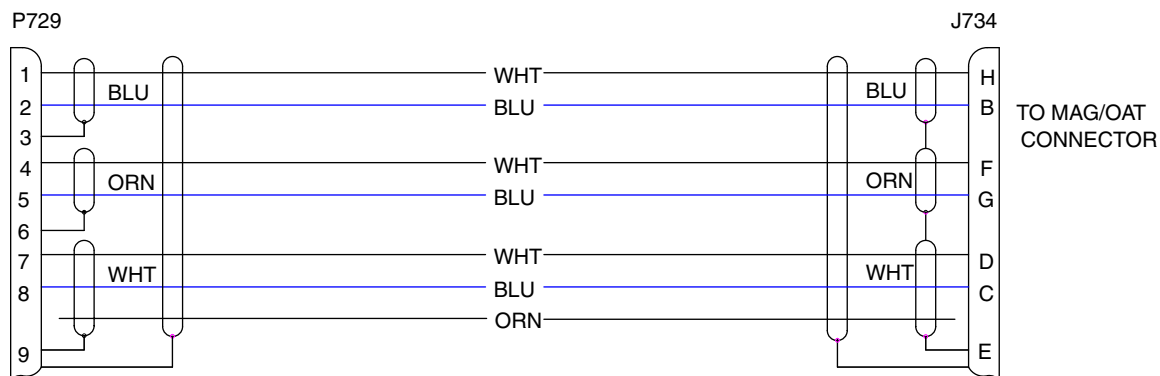
S/N'S 2843611 AND UP;
AND, 2843598 THRU 2843610 WITH KIT NO. 767-419 INSTALLED PER SB 1162B

Effectivity
with Avidyne Entegra

Standby Attitude Indicator
Figure 4

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101753 D



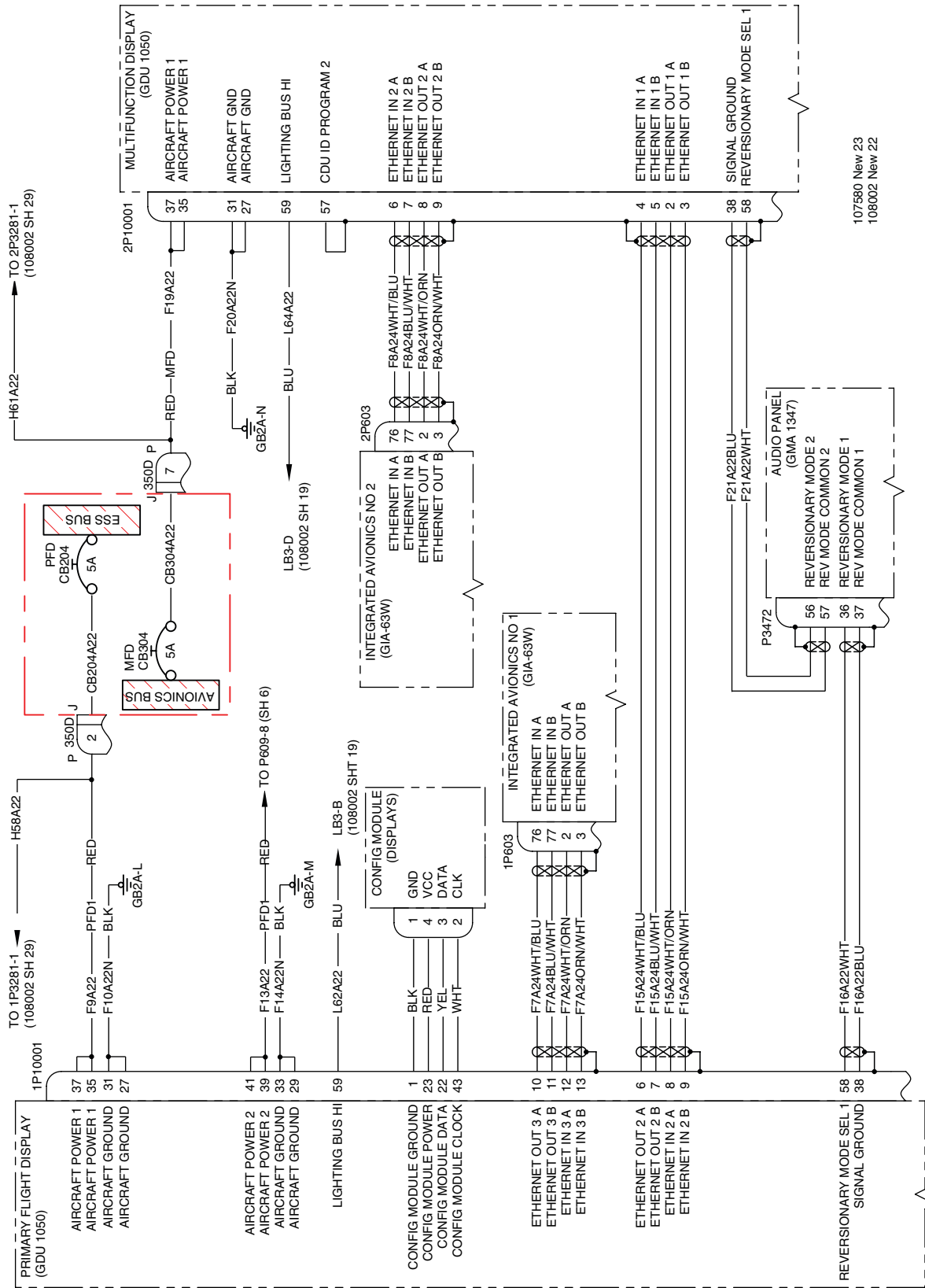
For airplanes with Garmin G500; or G1000 in S/N's 2843701, 2843703 thru 2843822, 2843824 thru 2843851, and 2843853, see GRS 77 AHRS and GDC 74A Air Data Computer.

For airplanes with Garmin G1000 in S/N's 2843823, 2843852, 2843854 and up, see GSU 75 ADAHRS.

Magnetometer / Outside Air Temperature
Figure 5

[Effectivity](#)
with Avidyne Entegra

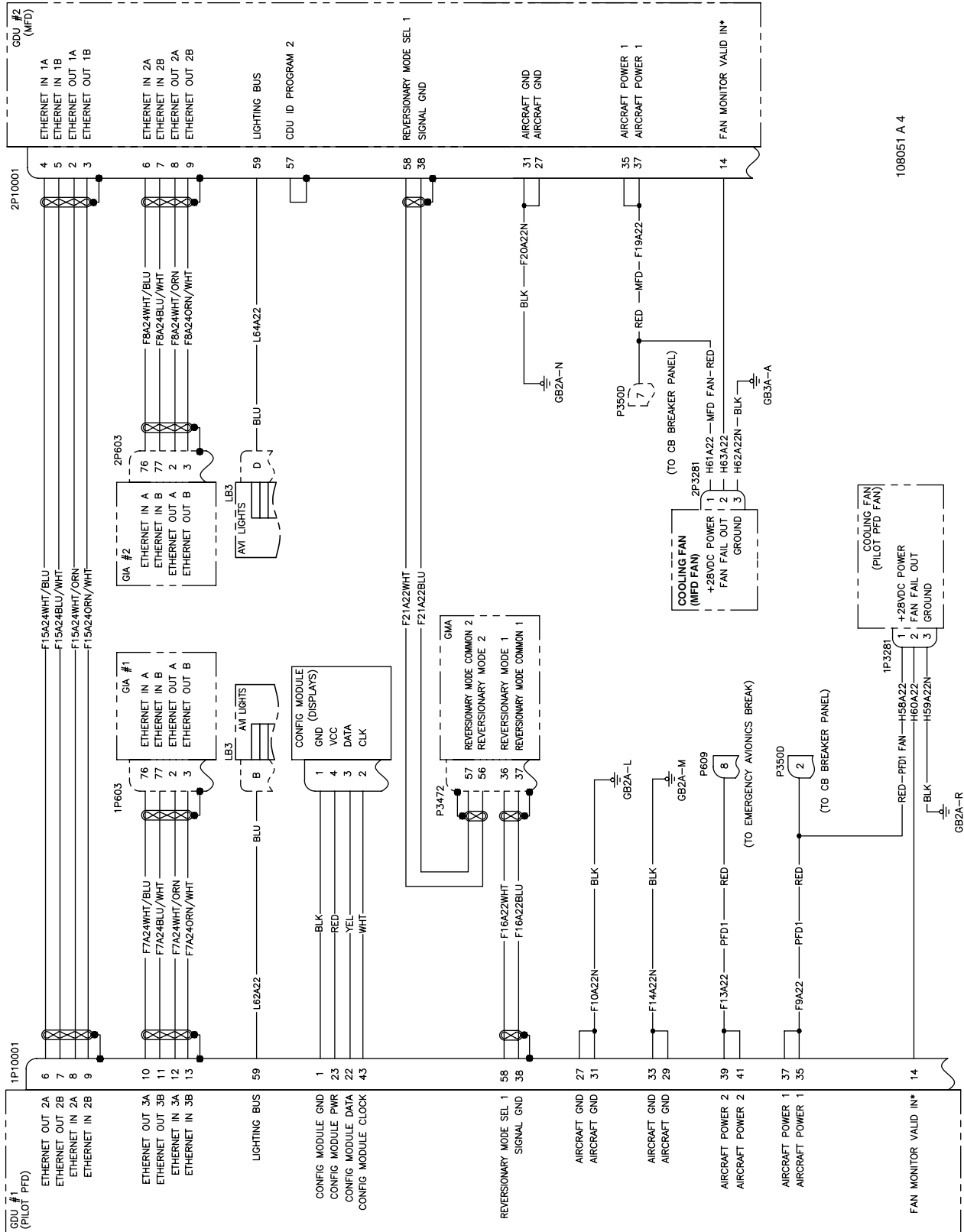
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



107580 New 23
108002 New 22

PFD and MFD
Figure 6 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



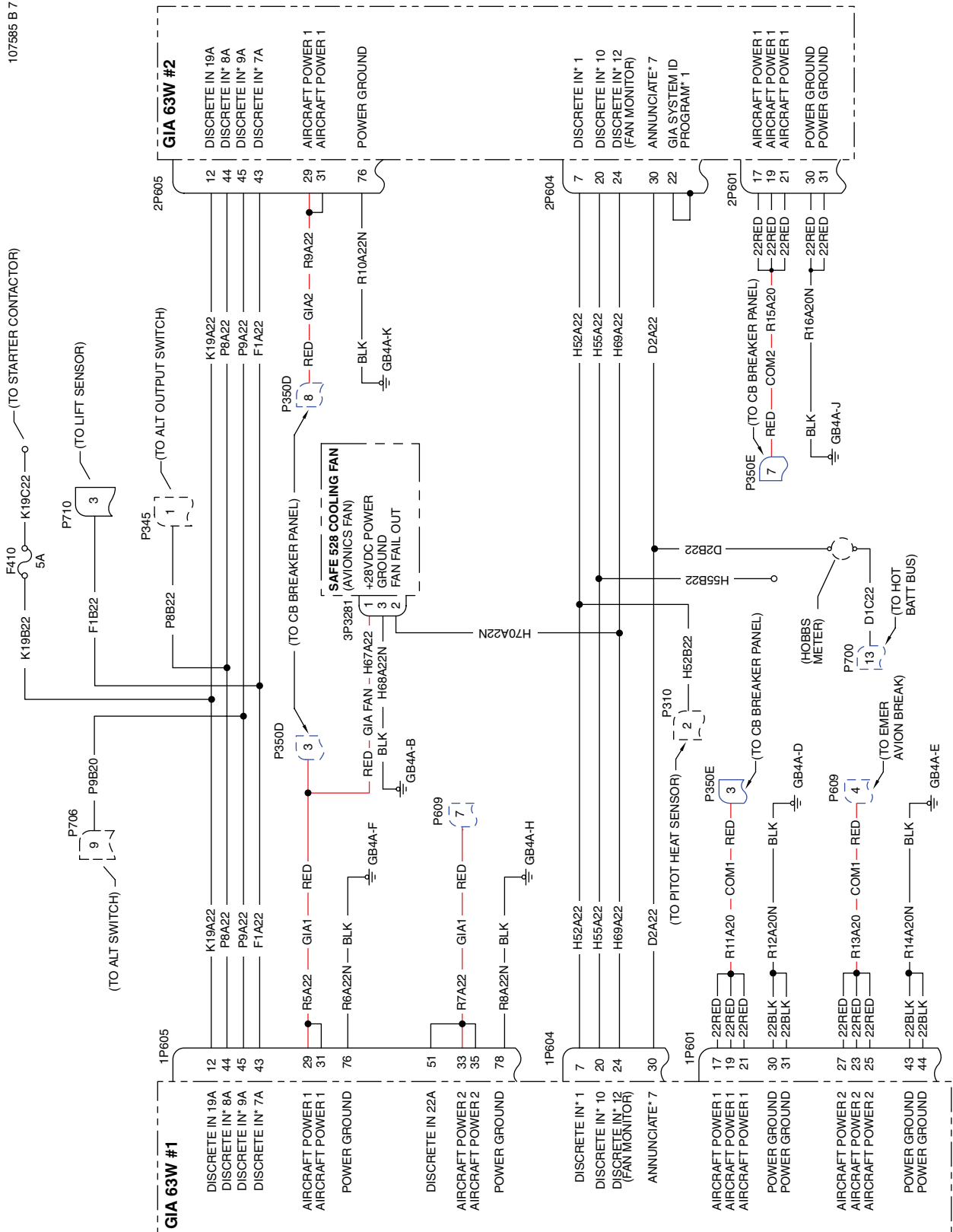
PFD and MFD
Figure 6 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

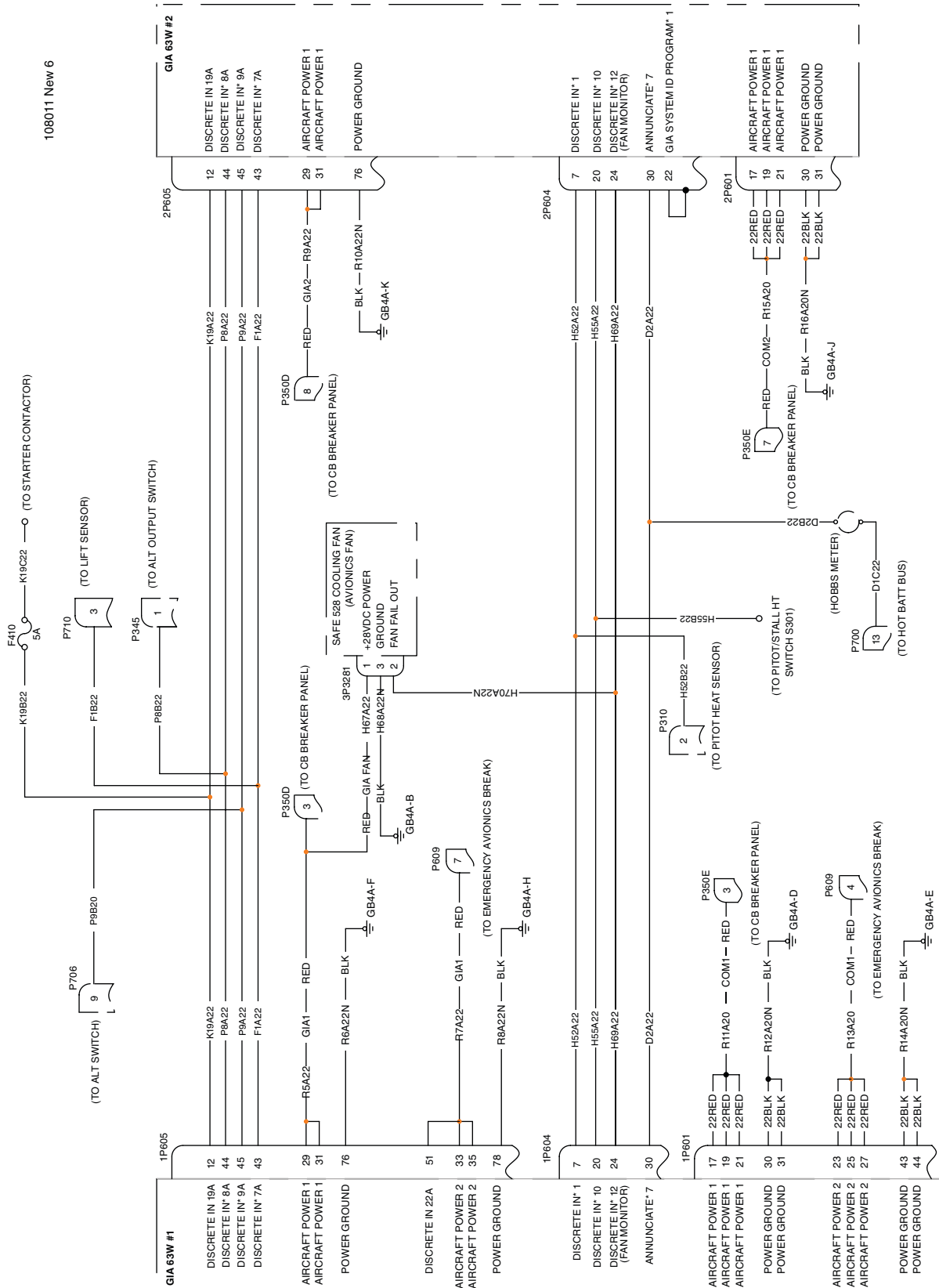
107585 B 7



GIA No. 1 and No. 2
Figure 7 (Sheet 1 of 4)

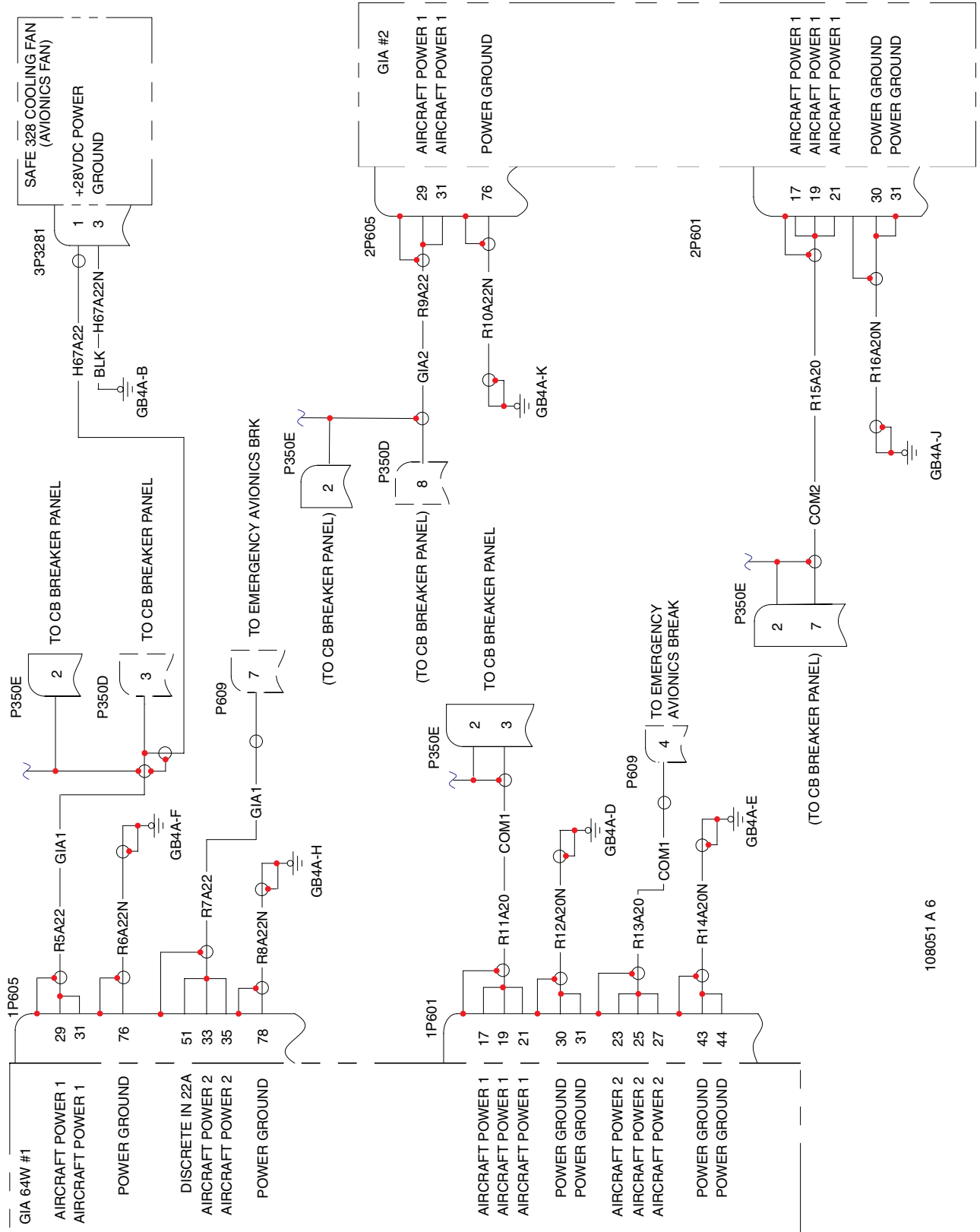
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108011 New 6



GIA No. 1 and No. 2
Figure 7 (Sheet 2 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

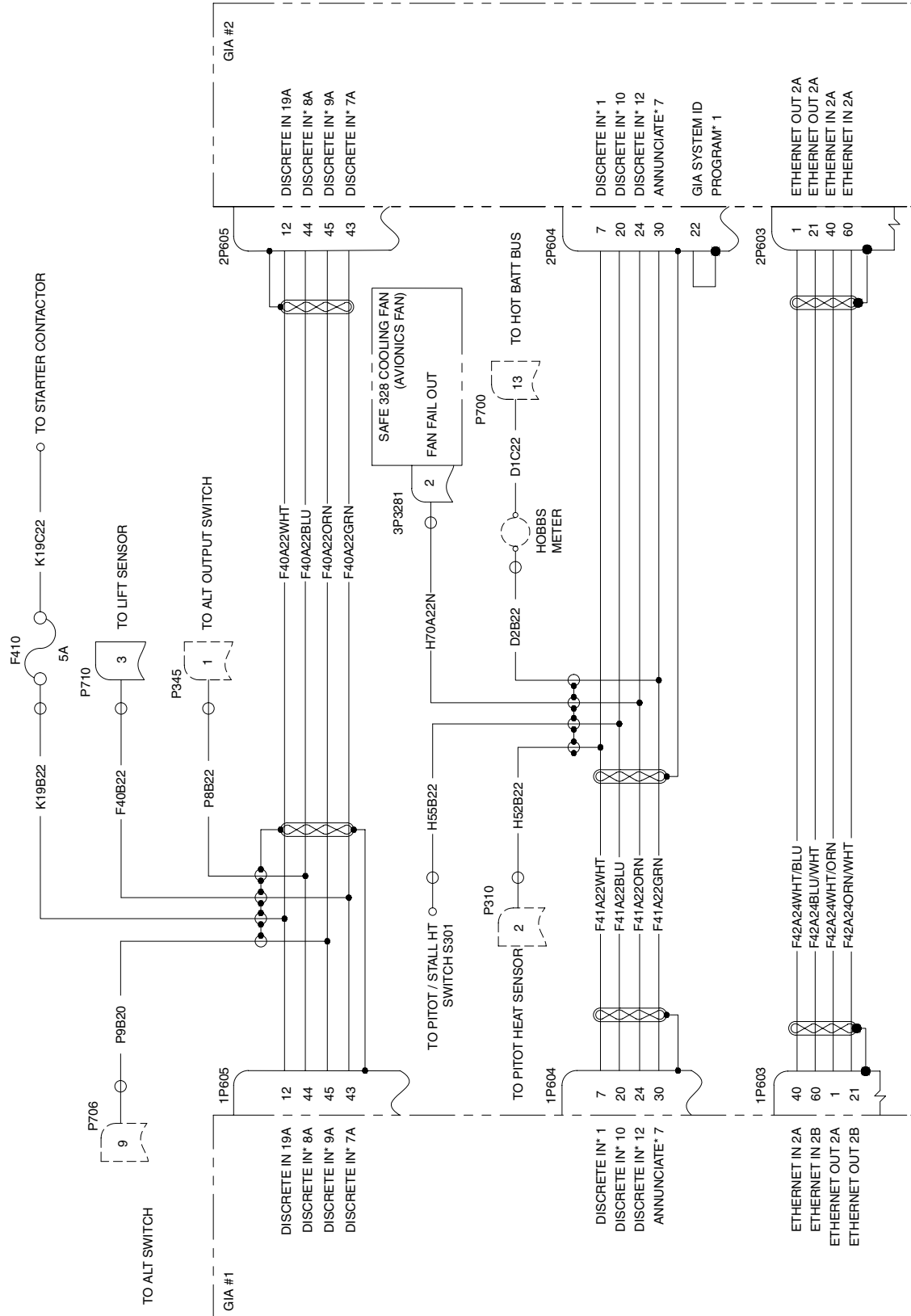


GIA No. 1 and No. 2
Figure 7 (Sheet 3 of 4)

[Effectivity](#)
with Garmin G1000 NXi
2843823, 2881001 and up

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108051 E 7

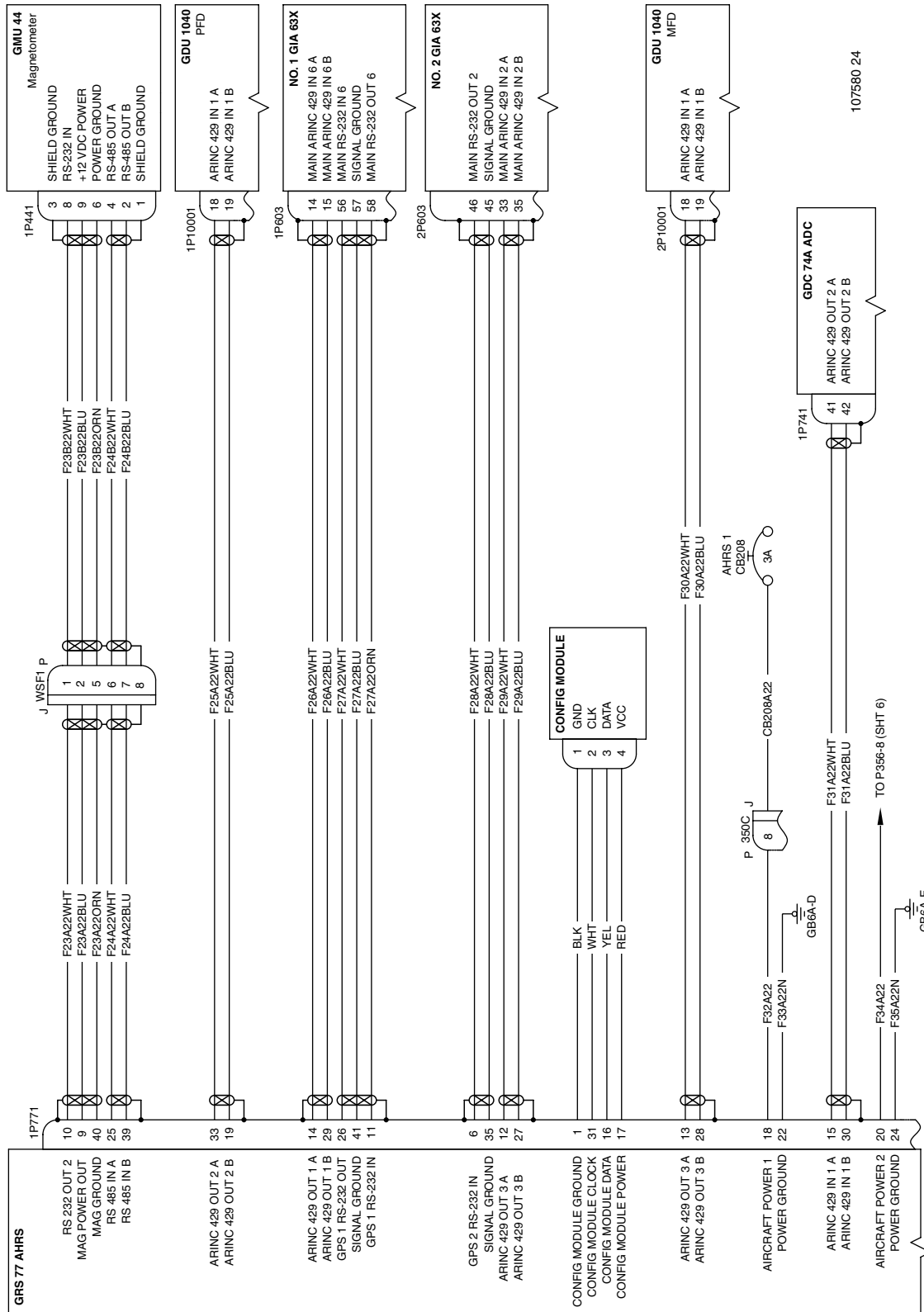


GIA No. 1 and No. 2
Figure 7 (Sheet 4 of 4)

[Effectivity](#)

with Garmin G1000 NXi
2843823, 2881001 and up

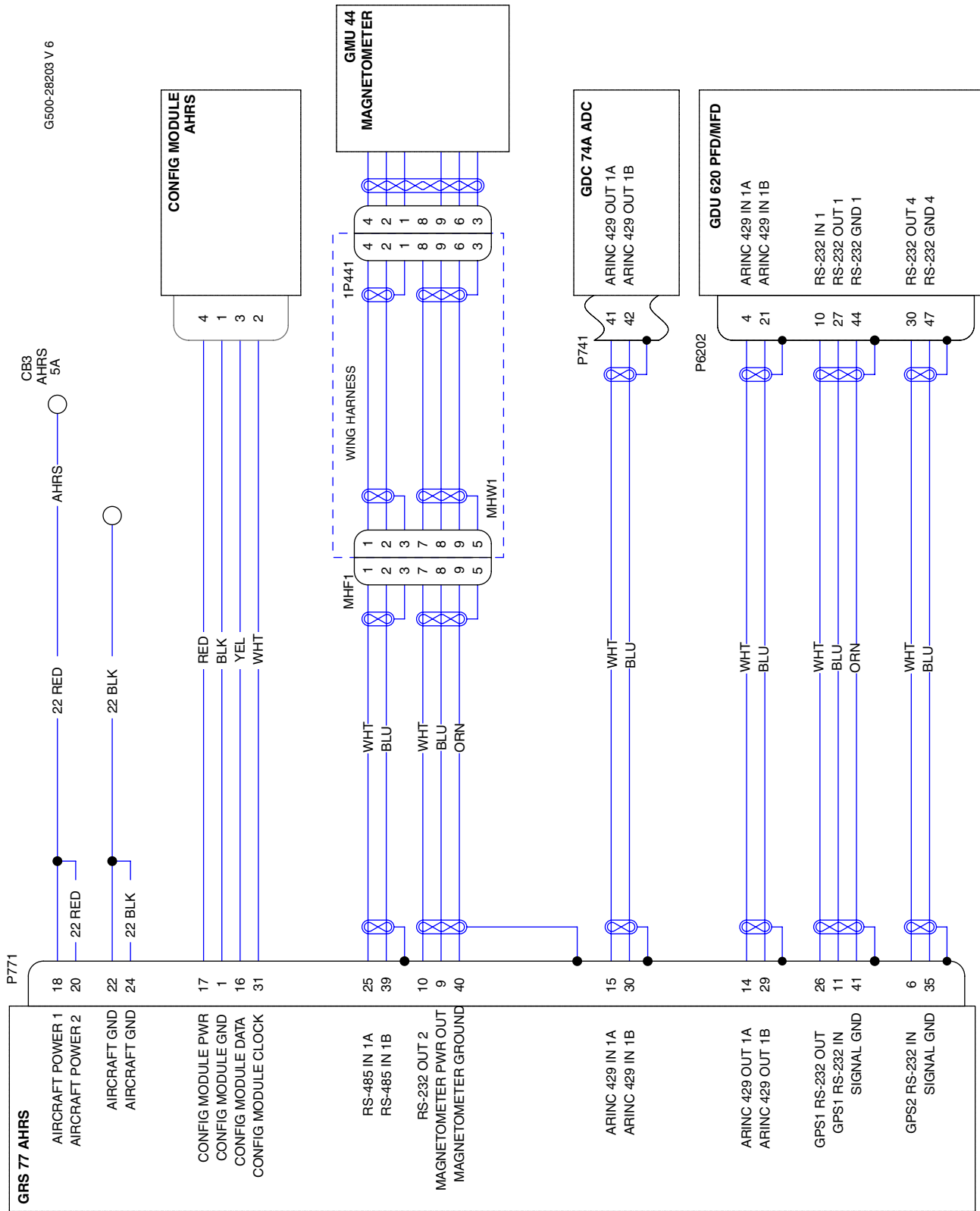
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GRS 77 AHRS
Figure 8 (Figure 1 of 2)

Effectivity
with Garmin G1000

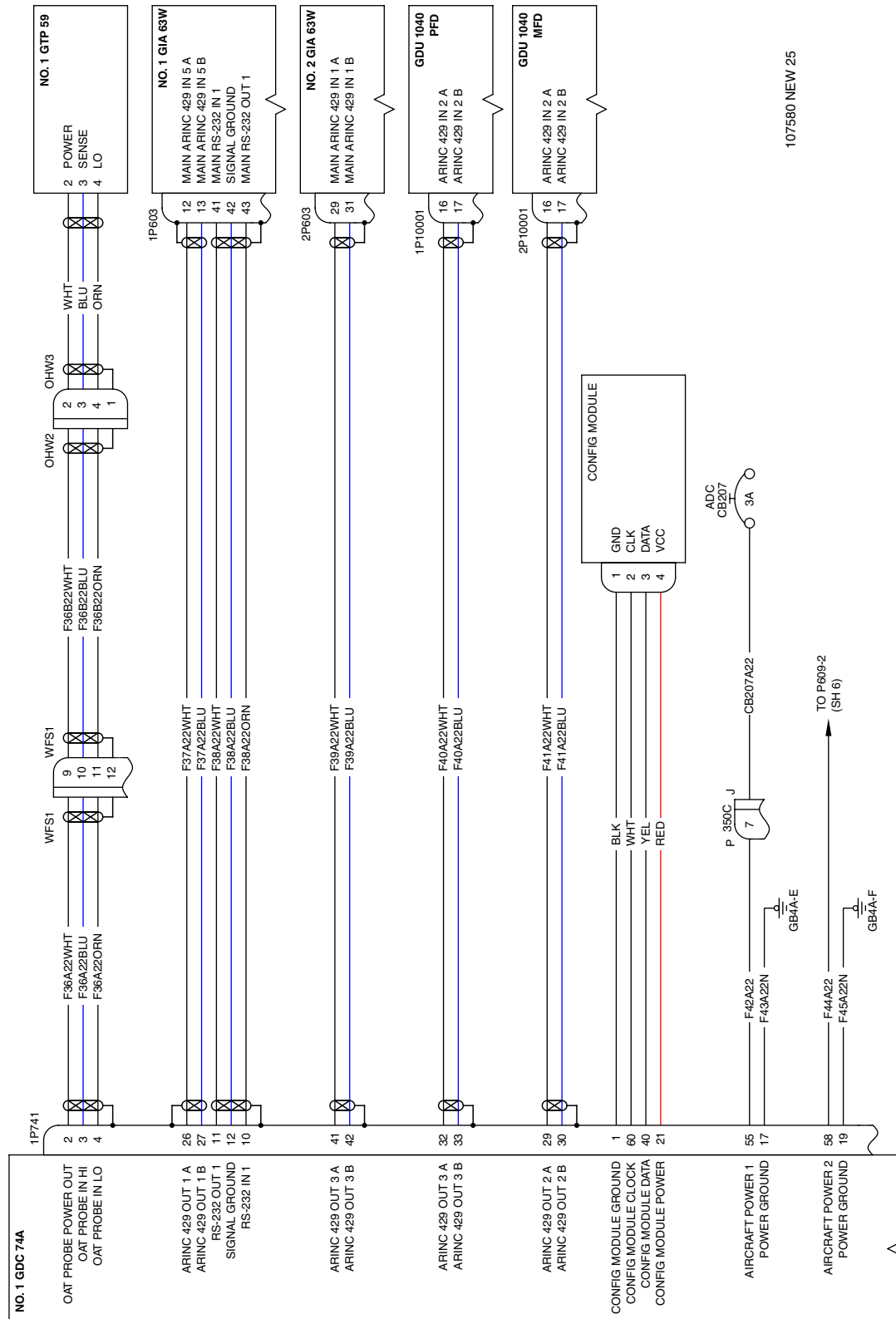
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Effectivity
with Garmin G500

GRS 77 AHRS
Figure 8 (Figure 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

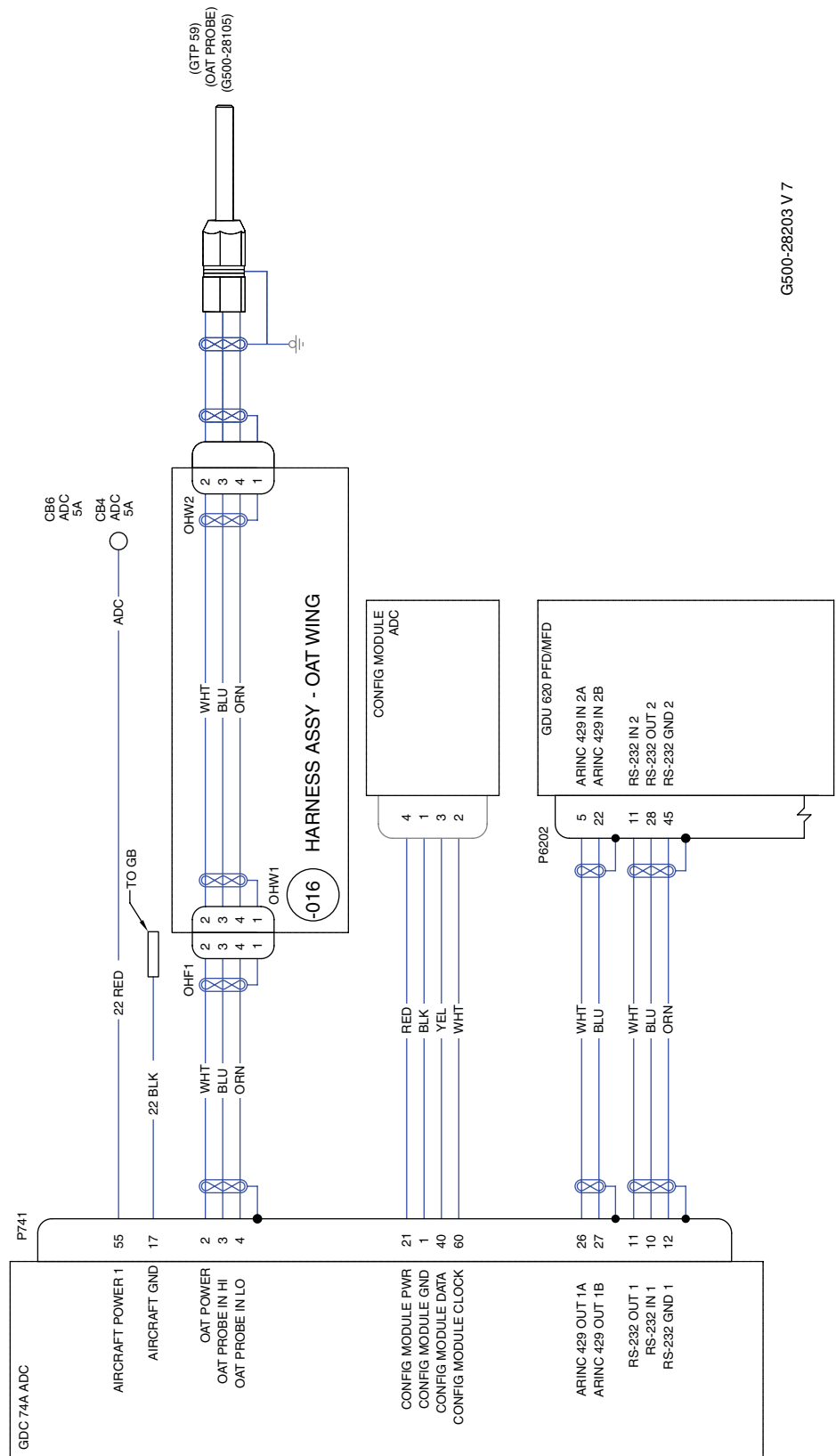


107580 NEW 25

GDC 74A Air Data Computer (ADC)
Figure 9 (Sheet 1 of 2)

Effectivity
with Garmin G1000

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

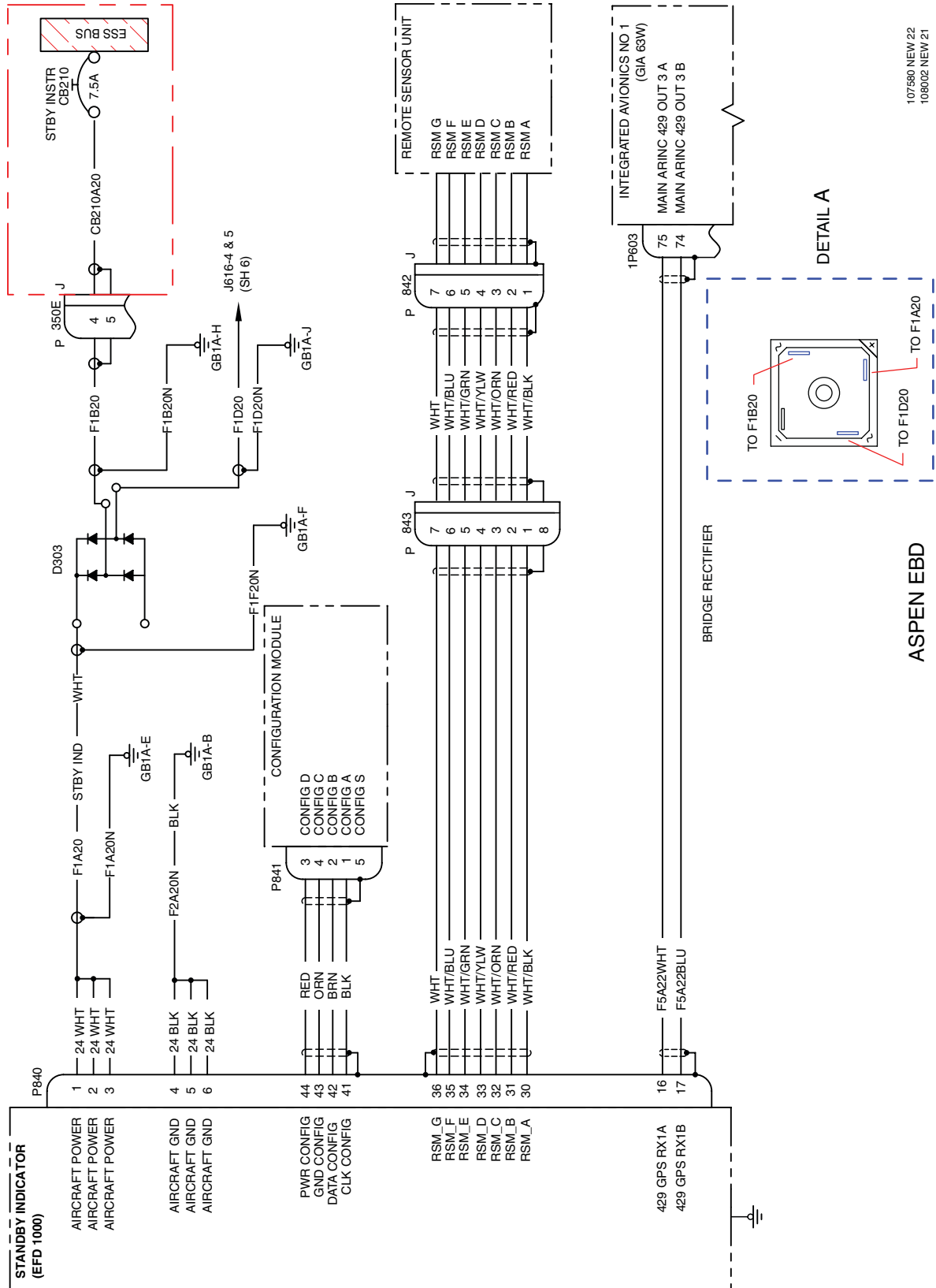


G500-28203 V 7

Effectivity
with Garmin G500

GDC 74A Air Data Computer (ADC)
Figure 9 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Standby Instrument
Figure 10 (Sheet 1 of 2)

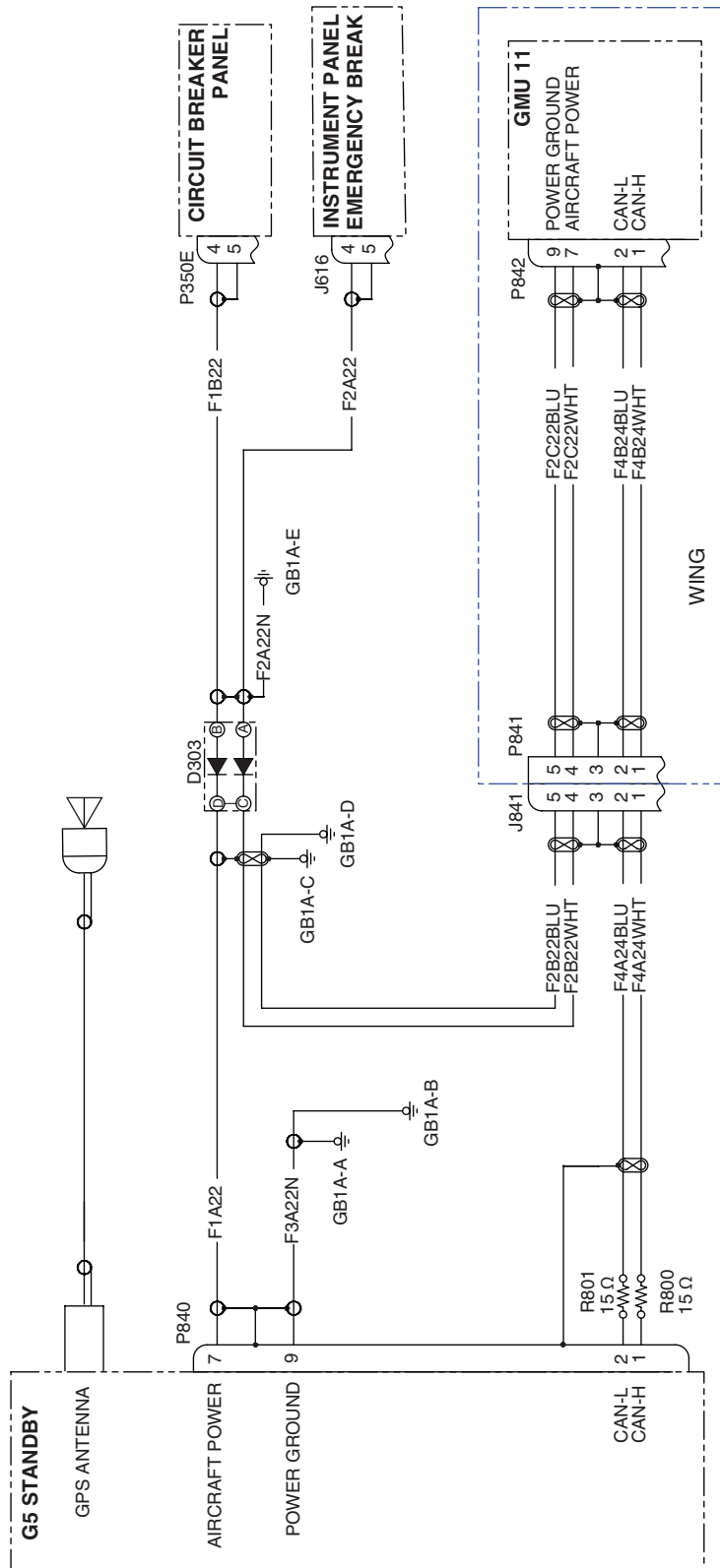
Effectivity
with Garmin G1000 or G1000 NXi
and Aspen EBD

91-34-20

PAGE 17
Mar 15/20

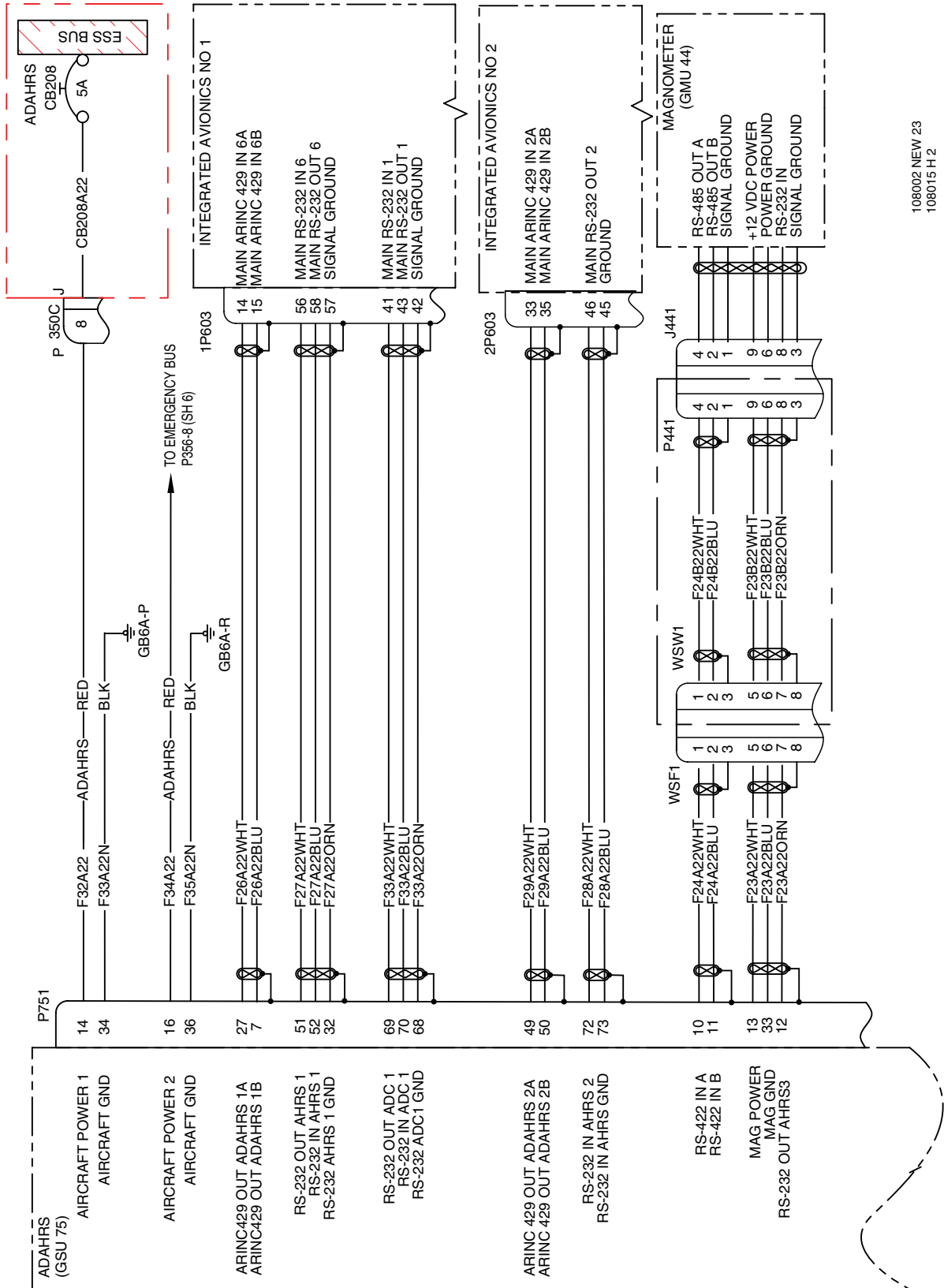
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

108063 NEW 3



Standby Instrument
Figure 10 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



108002 NEW 23
108015 H 2

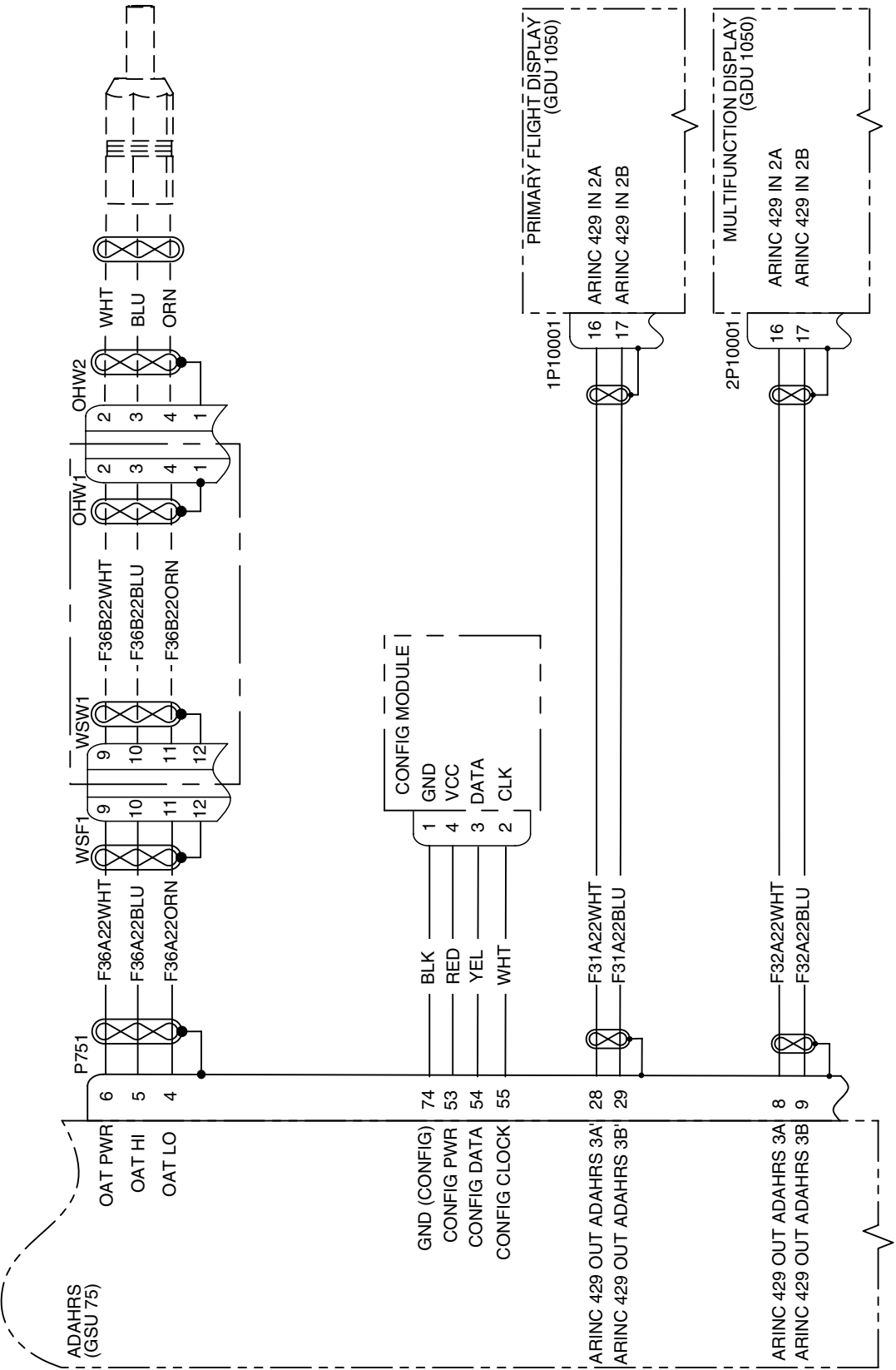
GSU 75 ADAHRS
Figure 11 (Sheet 1 of 6)

Effectivity
with Garmin G1000 NXi
2843701, 2843703-2843999;
2881001 and up

91-34-20

PAGE 19
Mar 15/20

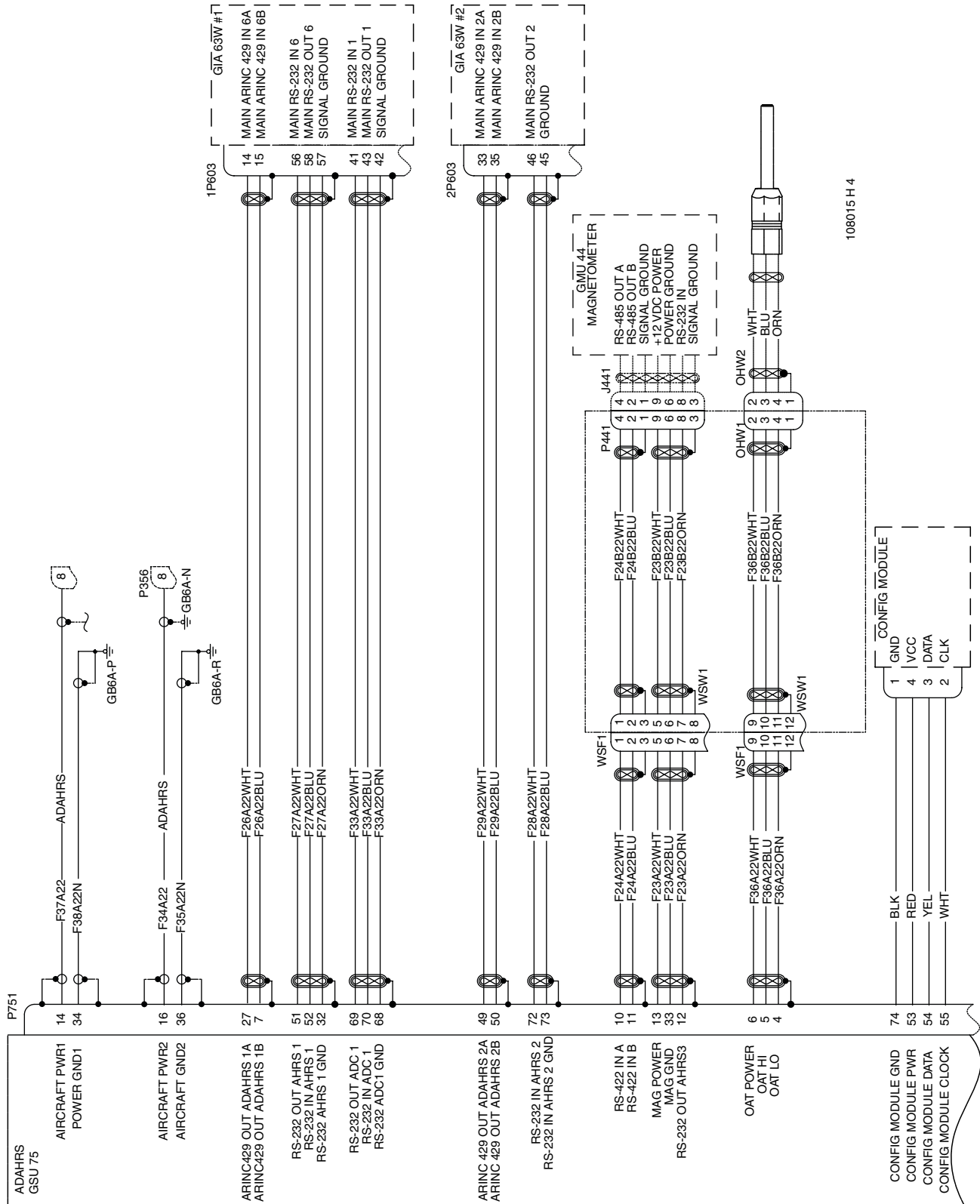
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



108002 NEW 24
108015 H 3

GSU 75 ADAHRS
Figure 11 (Sheet 2 of 6)

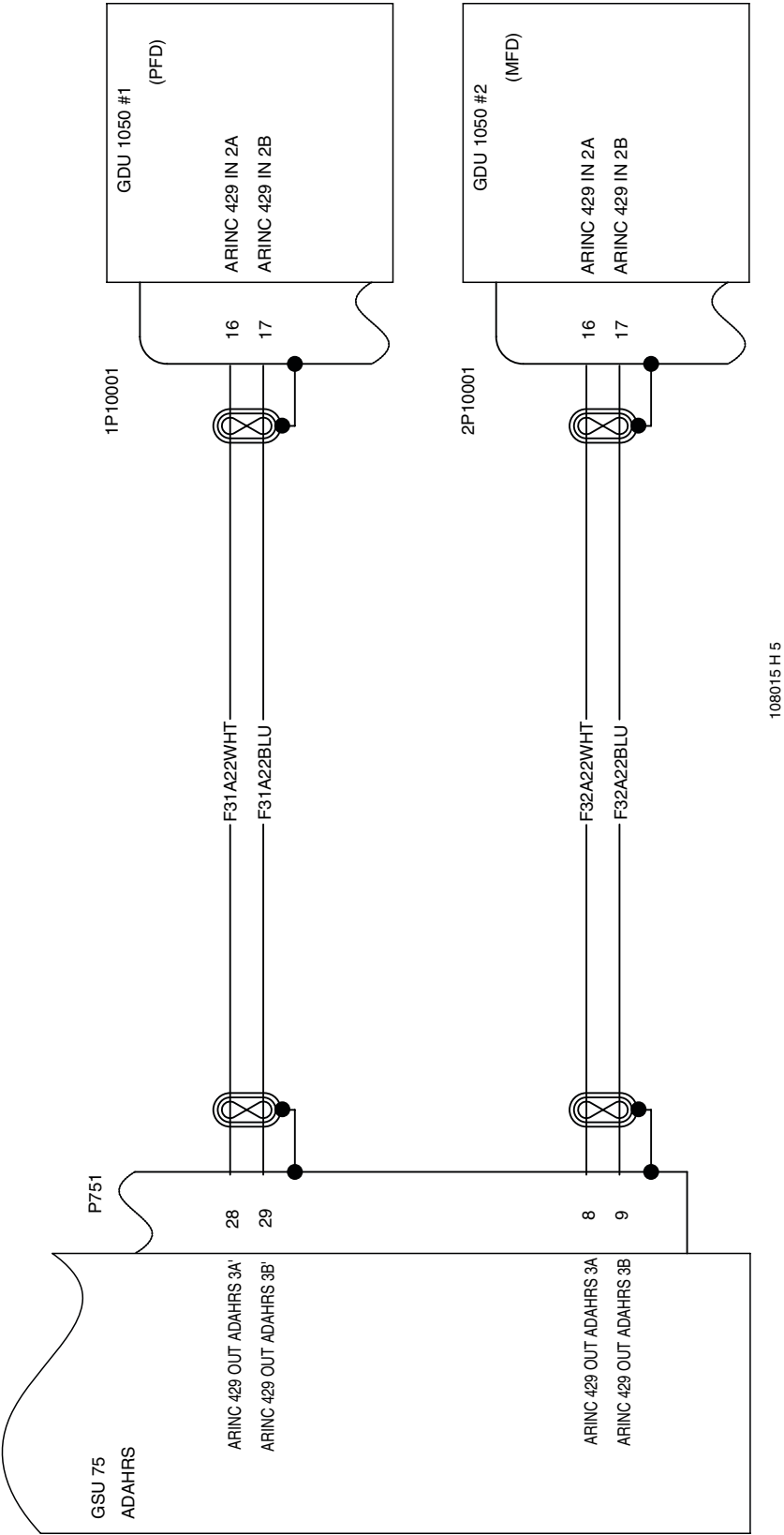
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



108015 H 4

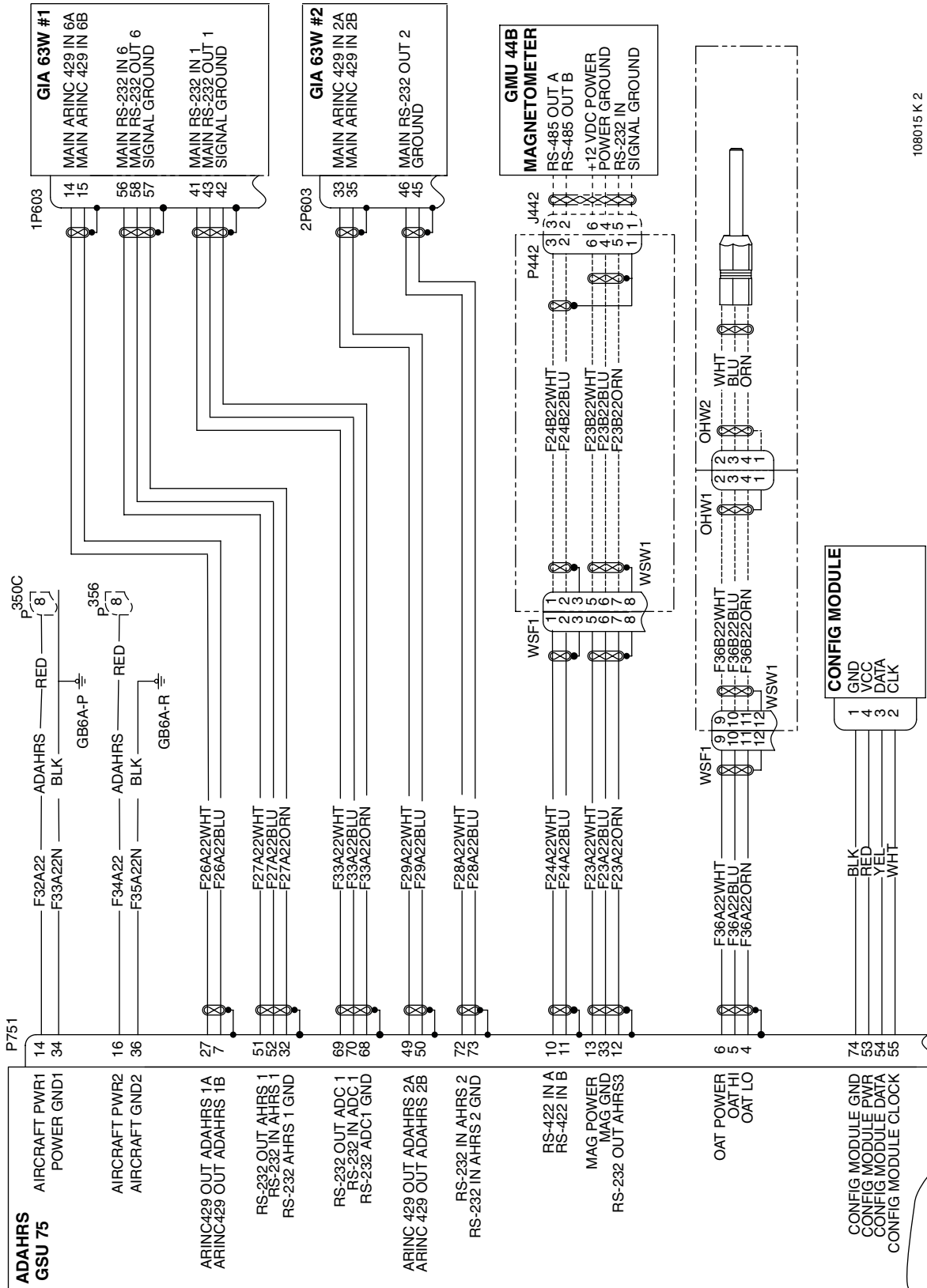
GSU 75 ADAHRS
Figure 11 (Sheet 3 of 6)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GSU 75 ADAHRS
Figure 11 (Sheet 4 of 6)

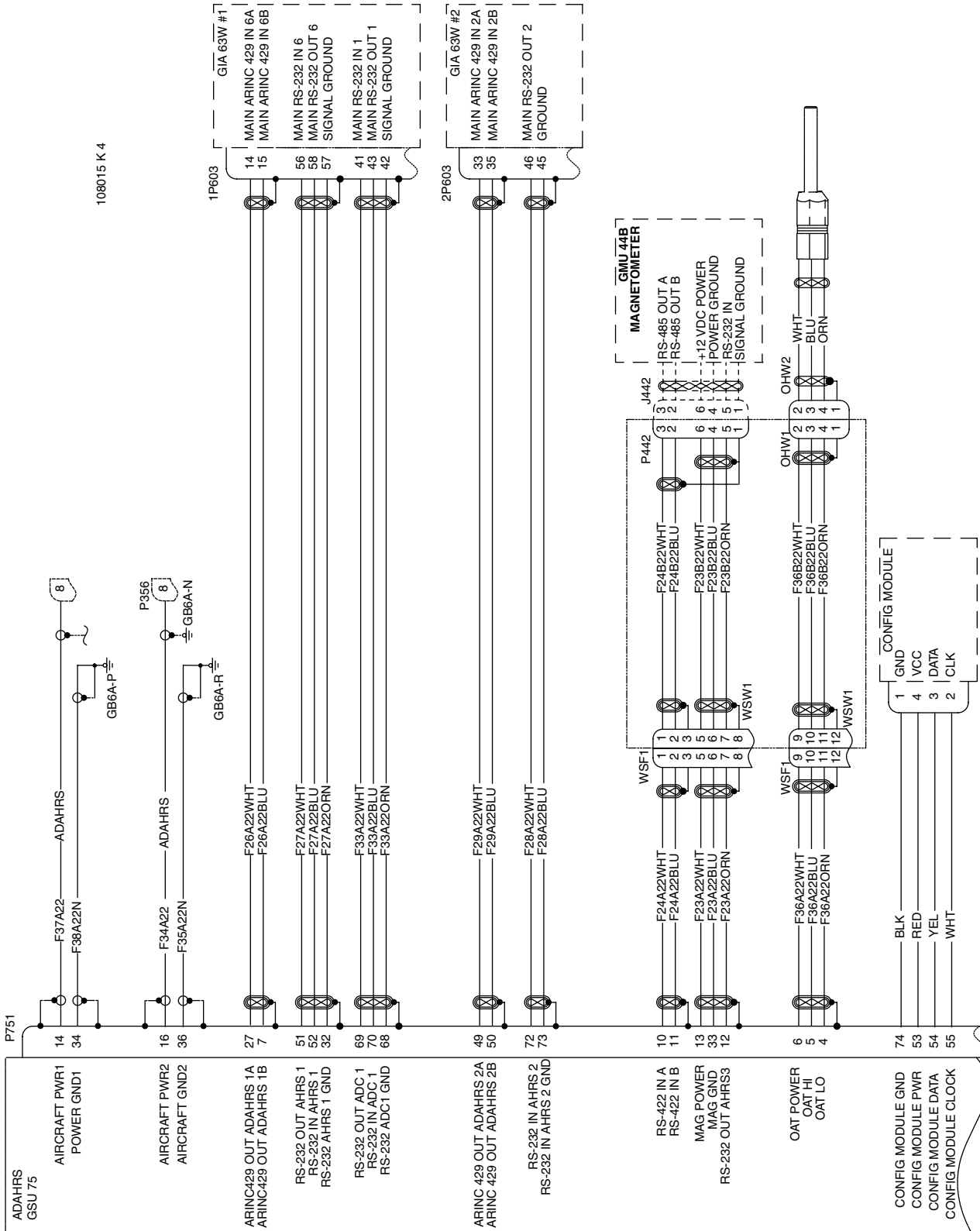
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



108015 K 2

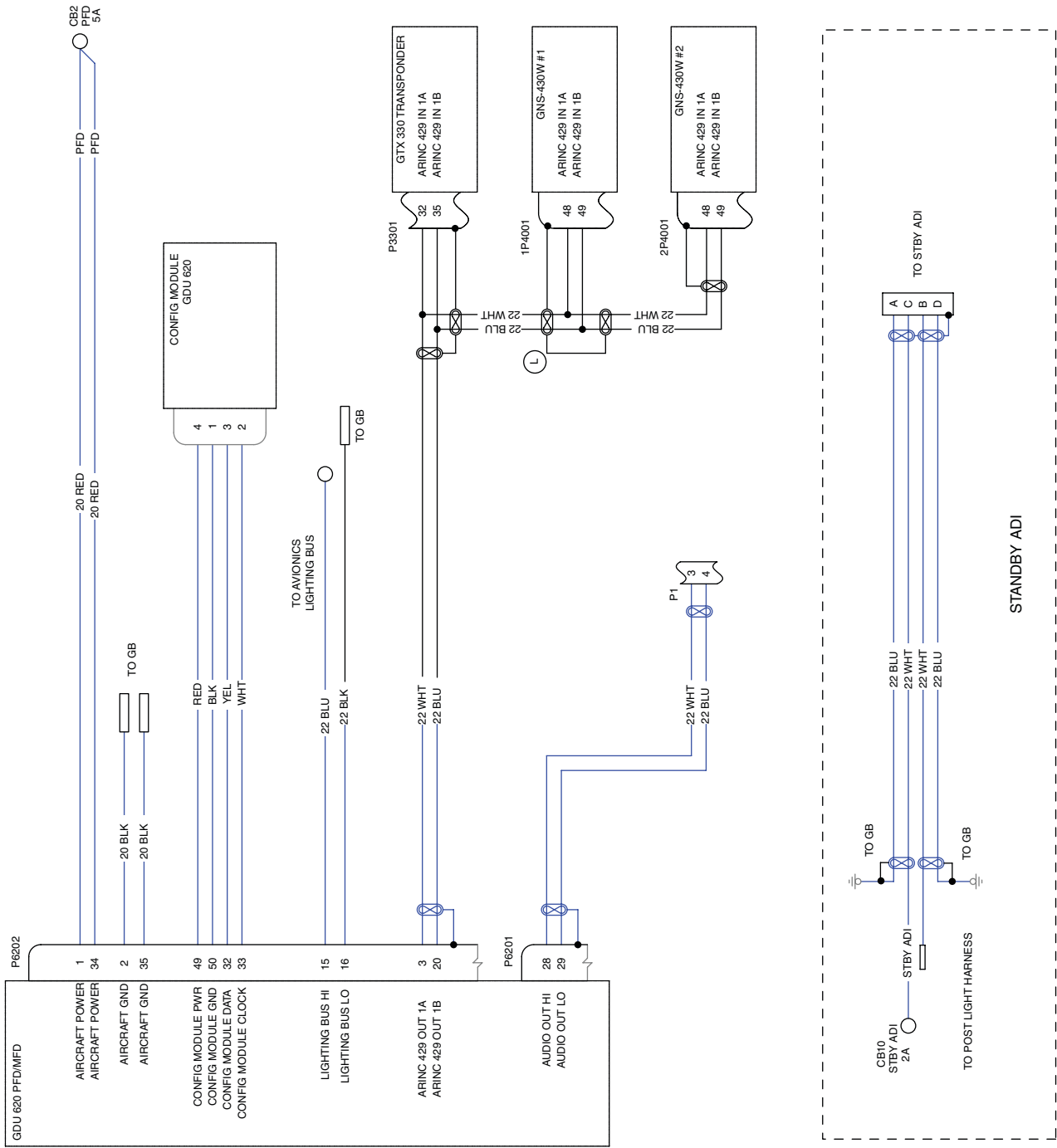
GSU 75 ADAHRS
Figure 11 (Sheet 5 of 6)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



GSU 75 ADAHRS
Figure 11 (Sheet 6 of 6)

Effectivity



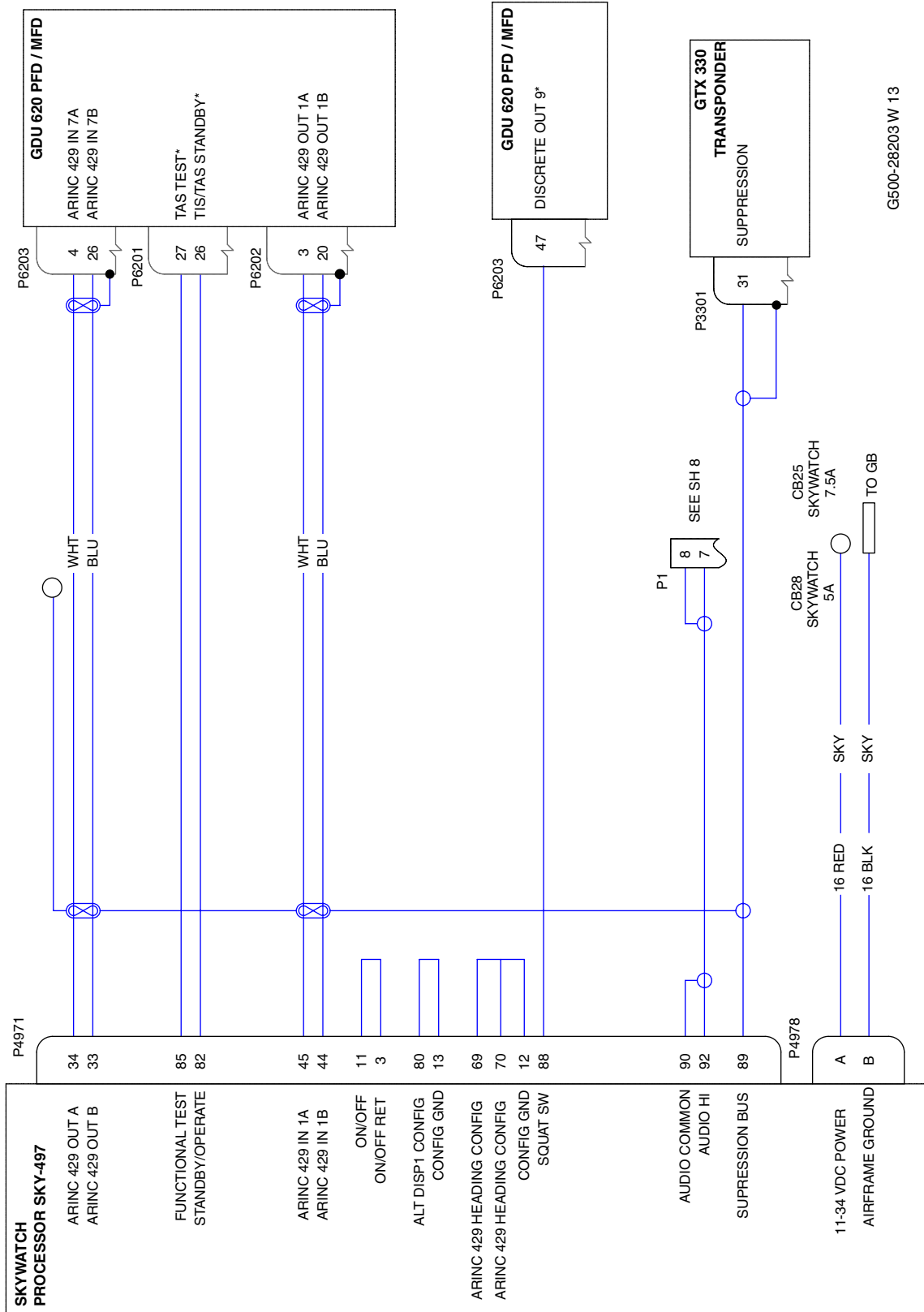
GDU 620 and Standby ADI
Figure 12

Effectivity
with Garmin G500

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

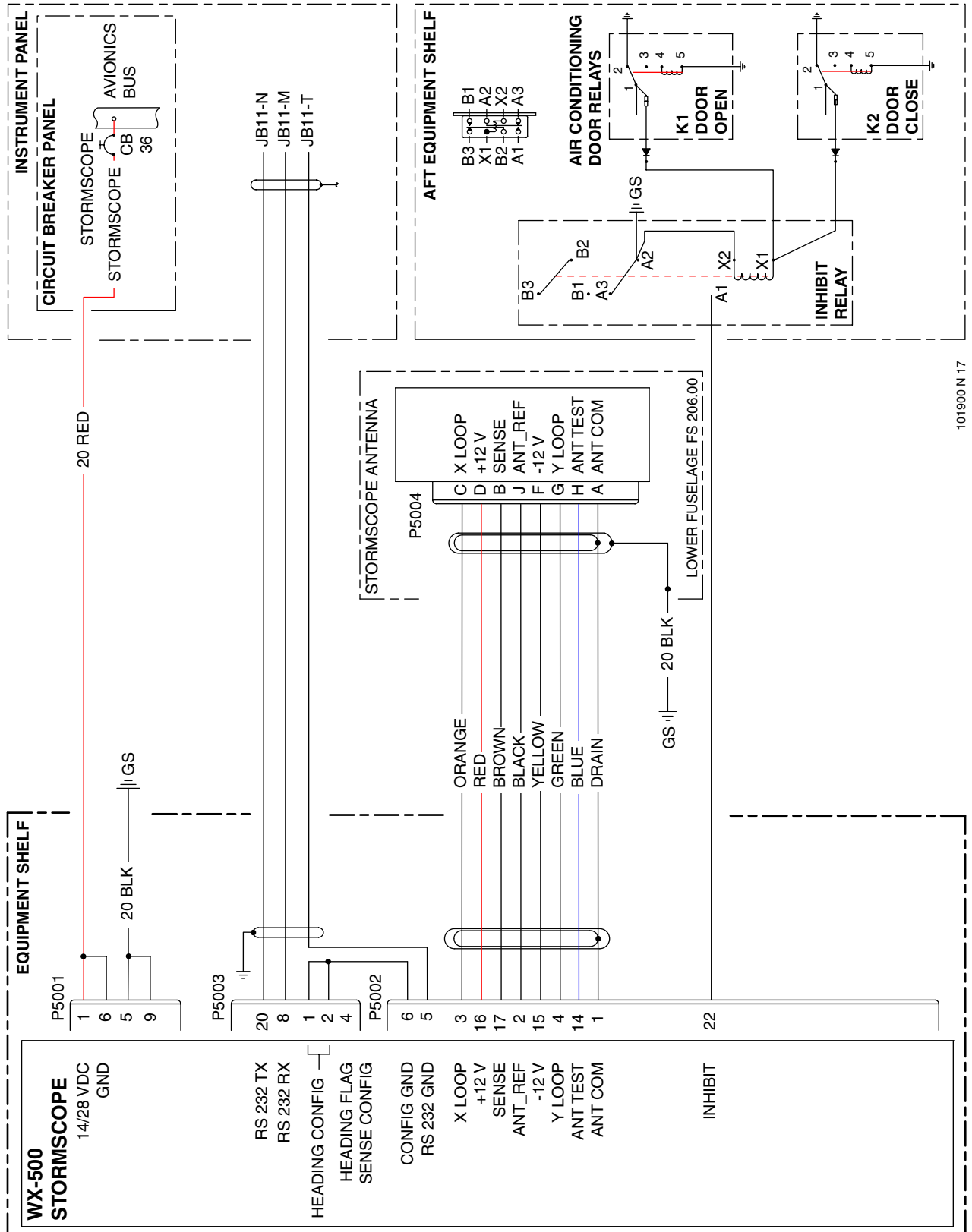


G500-28203 W 13

Effectivity with Garmin G500

SkyWatch (Optional)
Figure 1 (Sheet 2 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

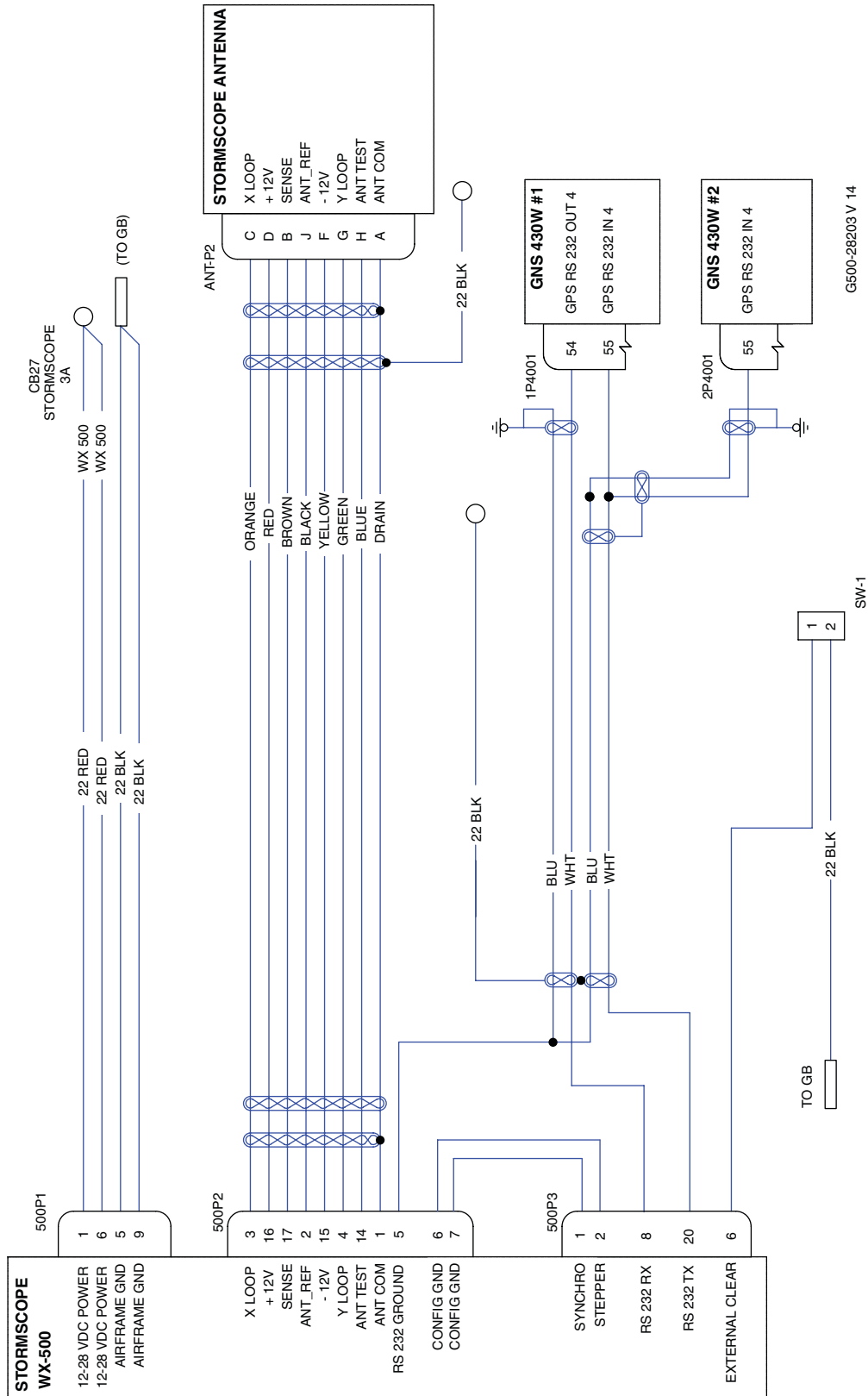


101900 N 17

StormScope (Optional)
Figure 2 (Sheet 1 of 2)

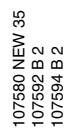
Effectivity
with Avidyne Integra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



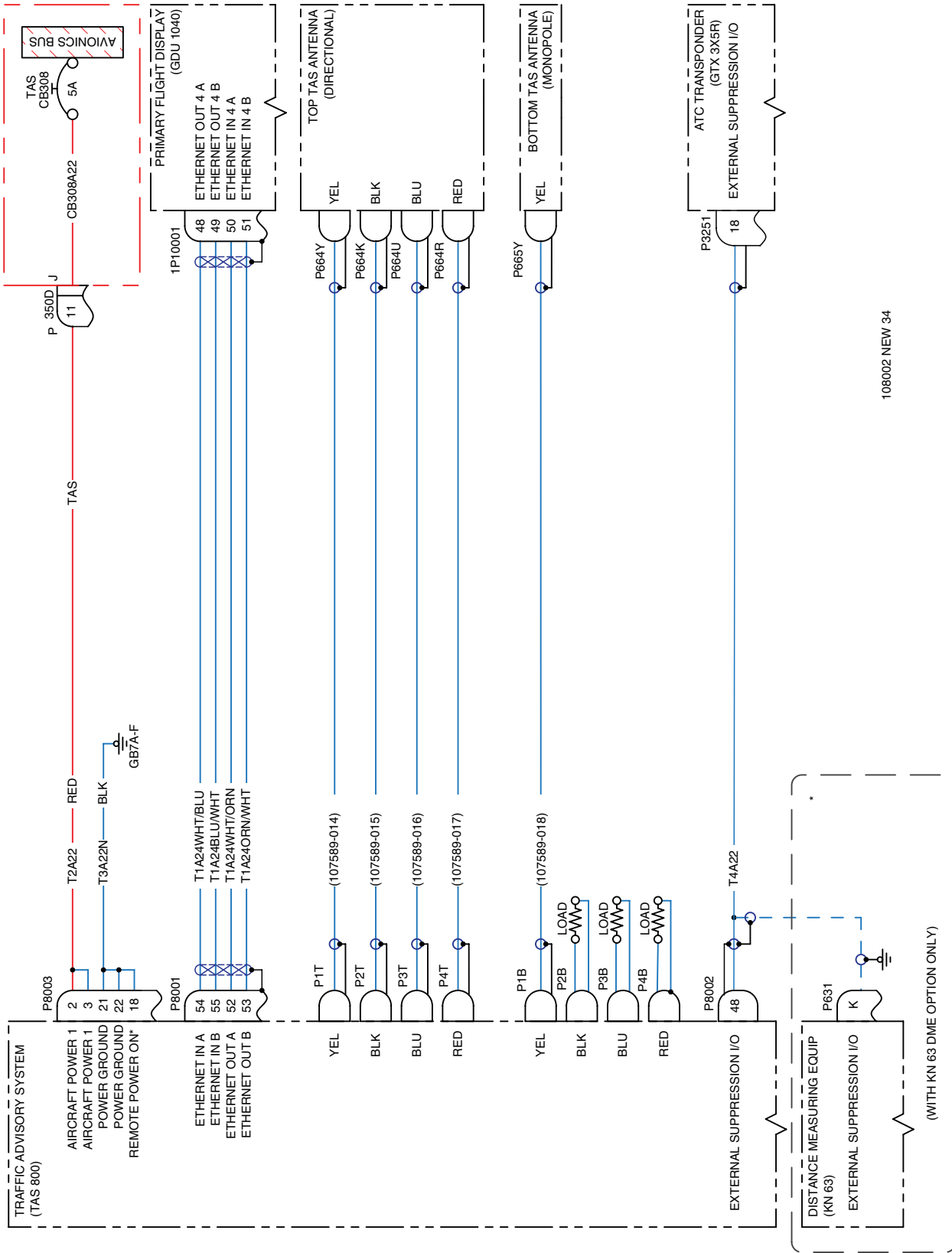
Effectivity
with Garmin G500

StormScope (Optional)
Figure 2 (Sheet 2 of 2)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

GTS 800 Traffic Advisory System
Figure 3 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

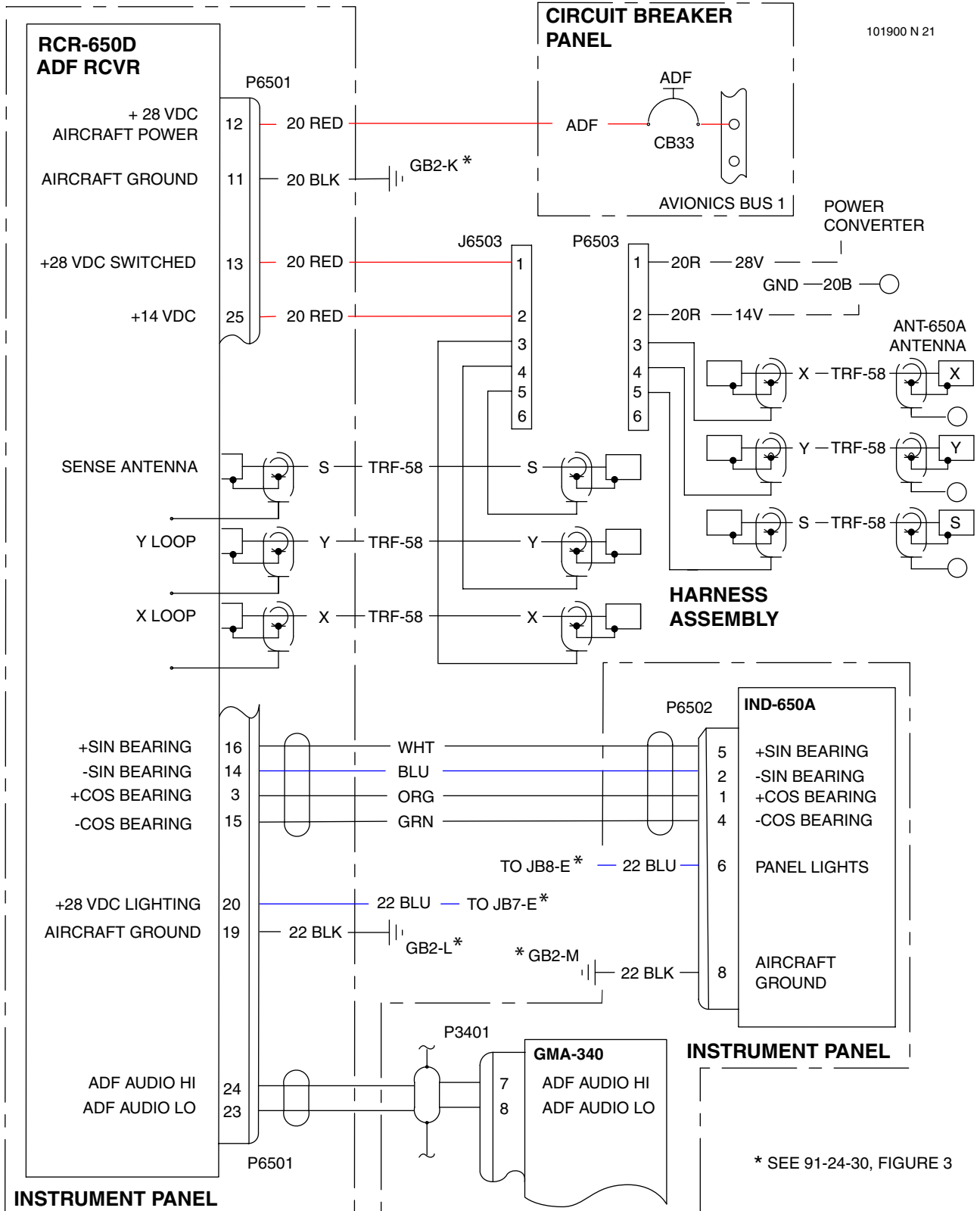


108002 NEW 34

GTS 800 Traffic Advisory System
Figure 3 (Sheet 2 of 2)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

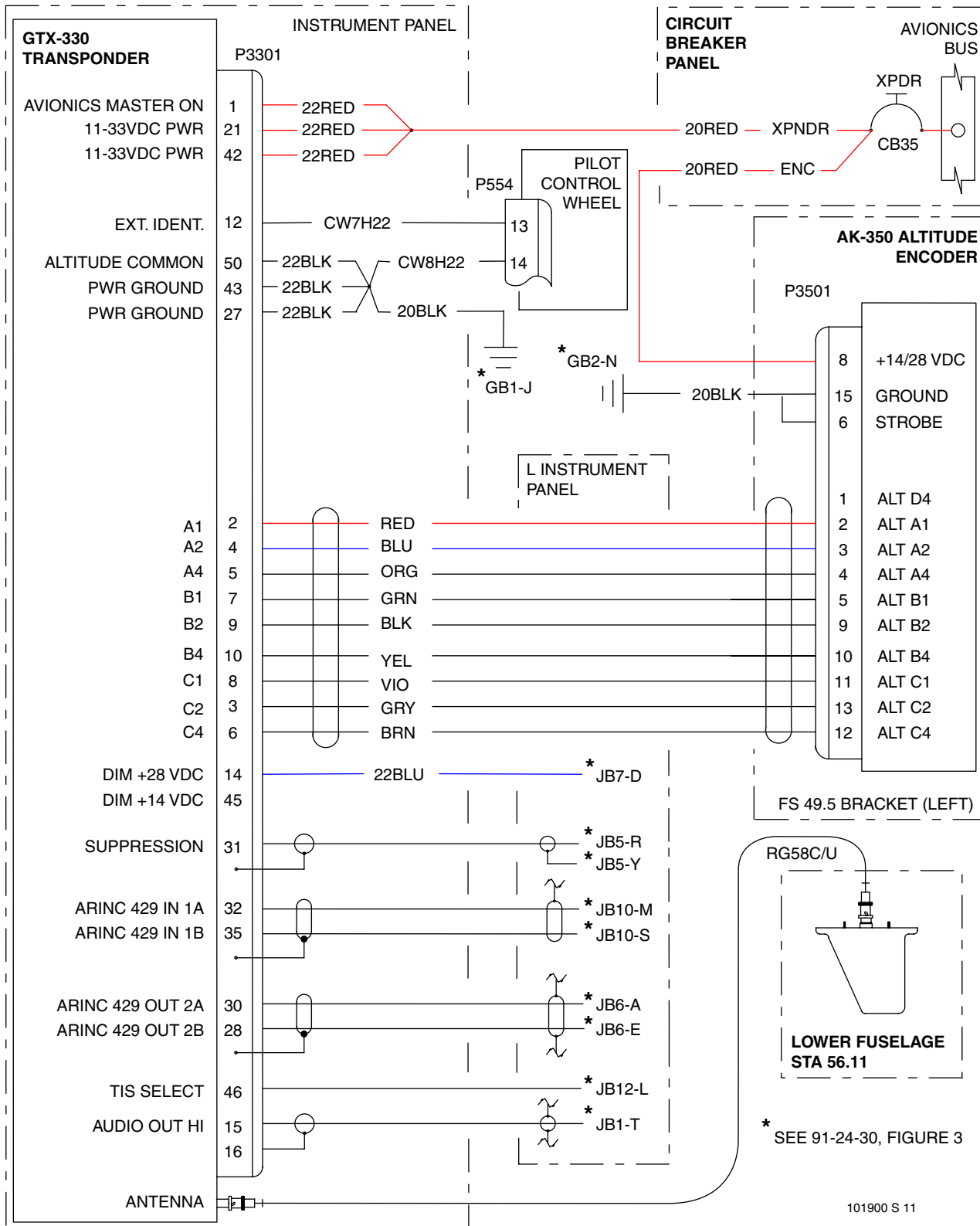
101900 N 21



S-TEC ADF (Optional)
Figure 1

Effectivity
2843598 thru 2843617
with Avidyne Integra

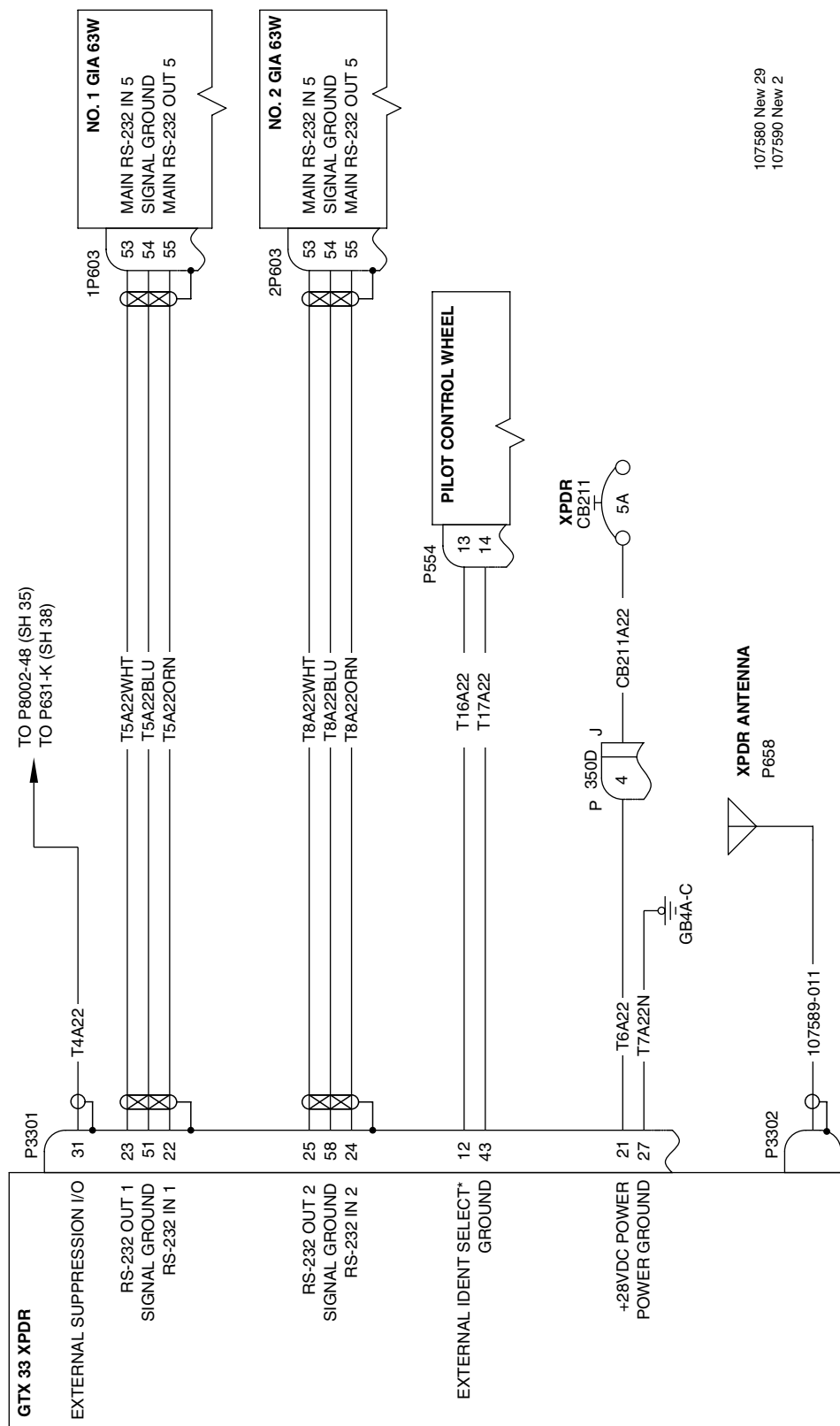
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Transponder
Figure 2 (Sheet 1 of 4)

Effectivity
with Avidyne Integra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

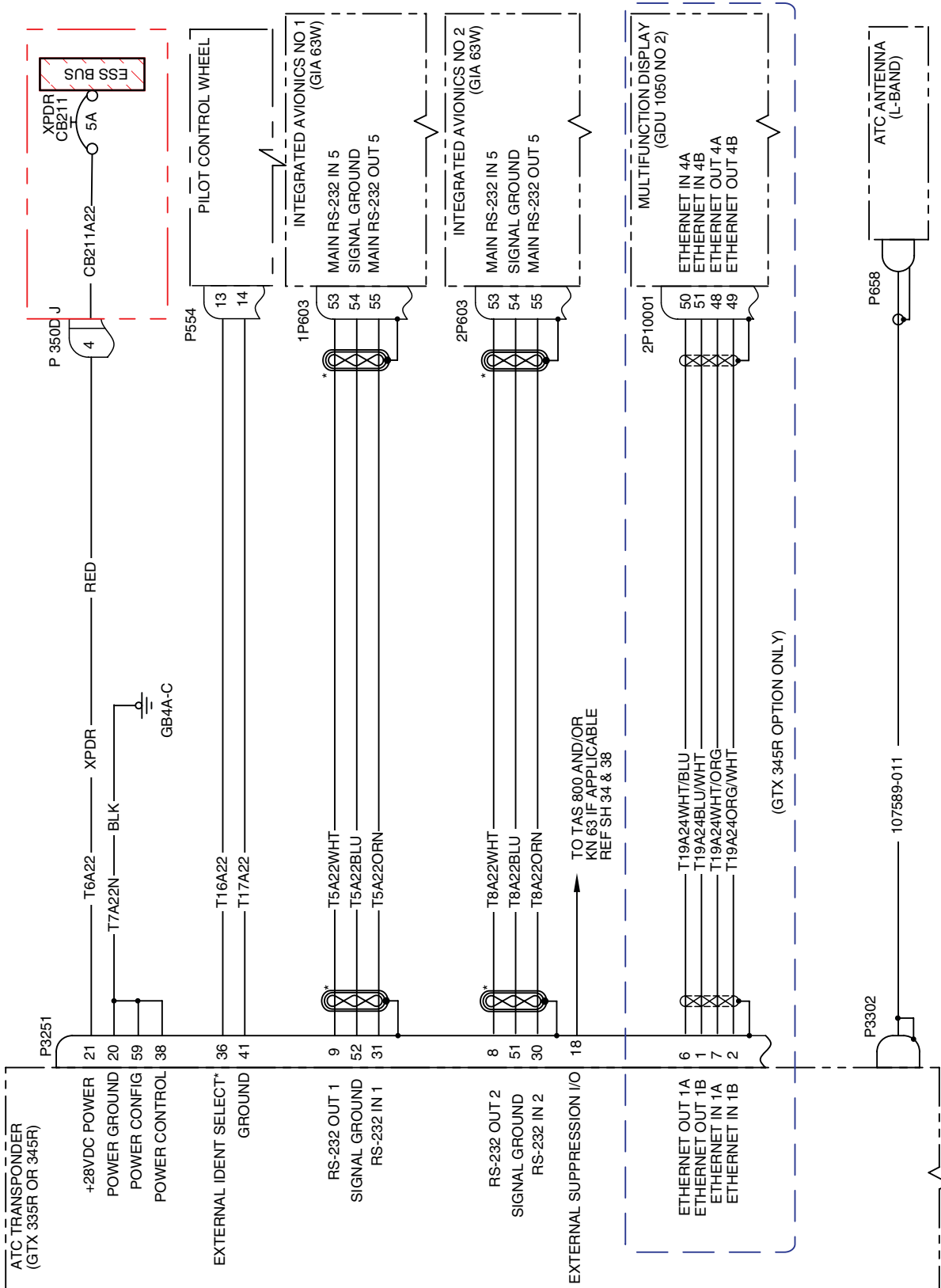


107580 New 29
107590 New 2

Transponder
Figure 2 (Sheet 2 of 4)

Effectivity
with Garmin G1000

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

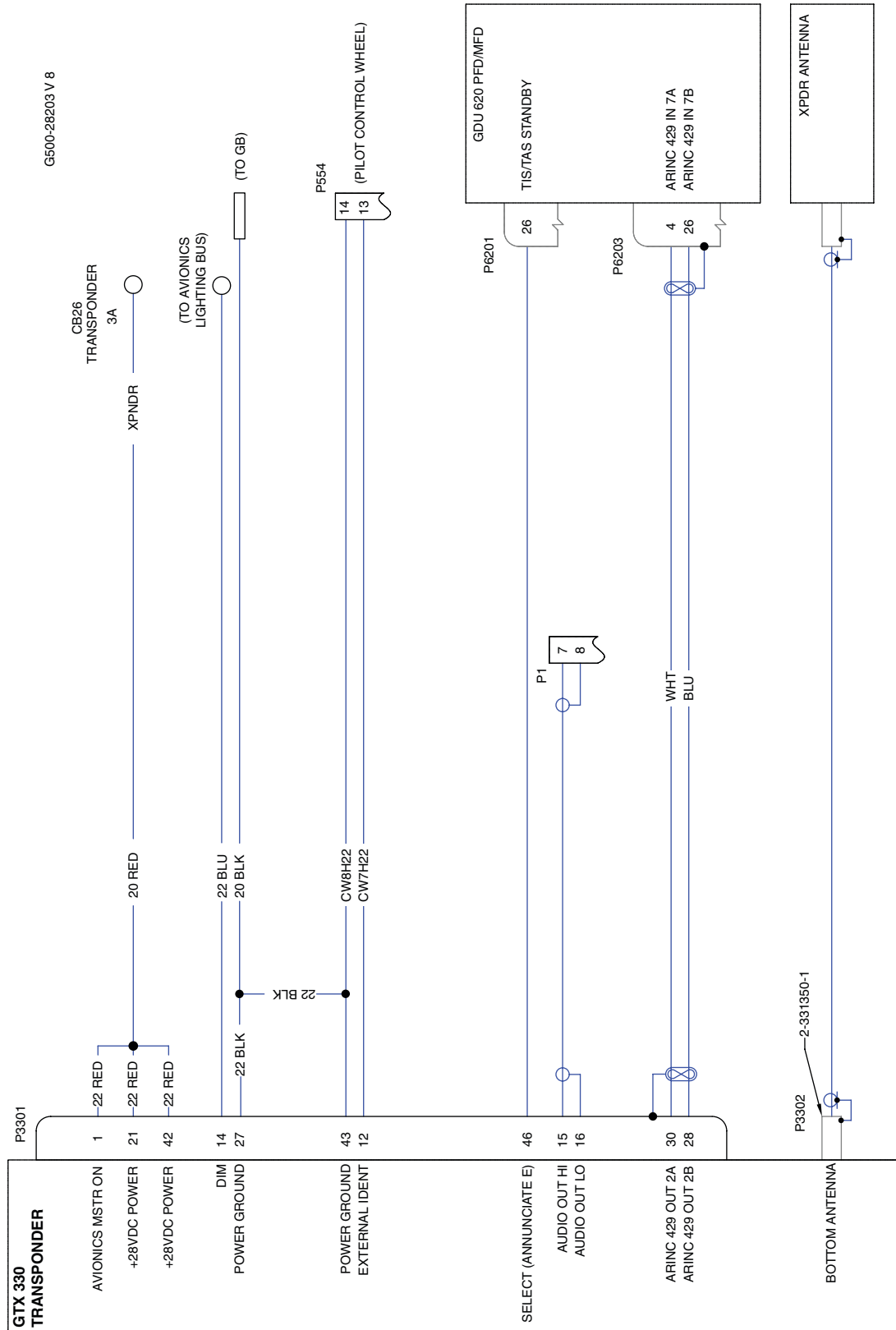


108002 New 28
108013 B 2

*Double shielding acceptable with single shielding in
S/N 2843852, 2843854-2843999.

Transponder
Figure 2 (Sheet 3 of 4)

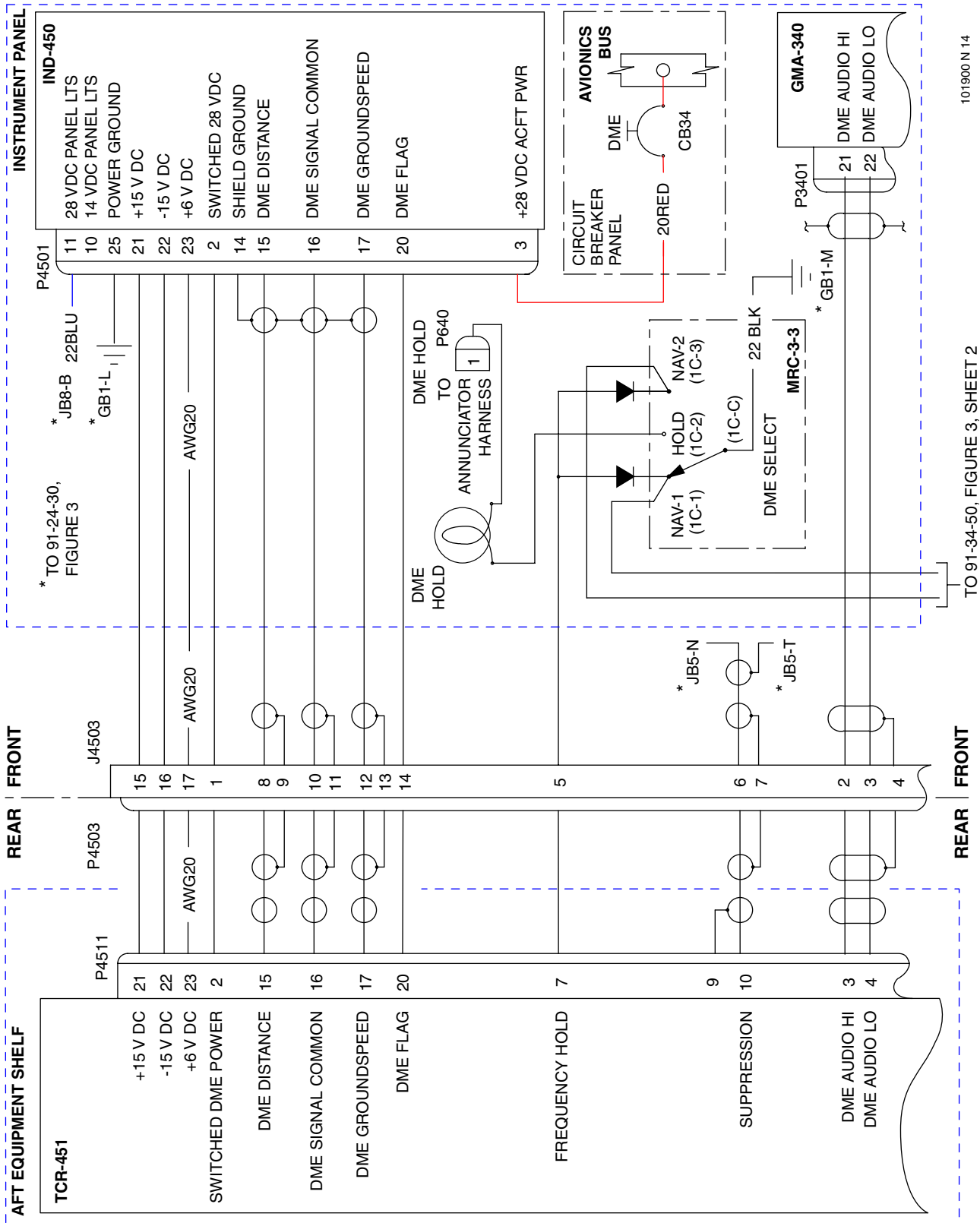
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Transponder
Figure 2 (Sheet 4 of 4)

Effectivity
with Garmin G500

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



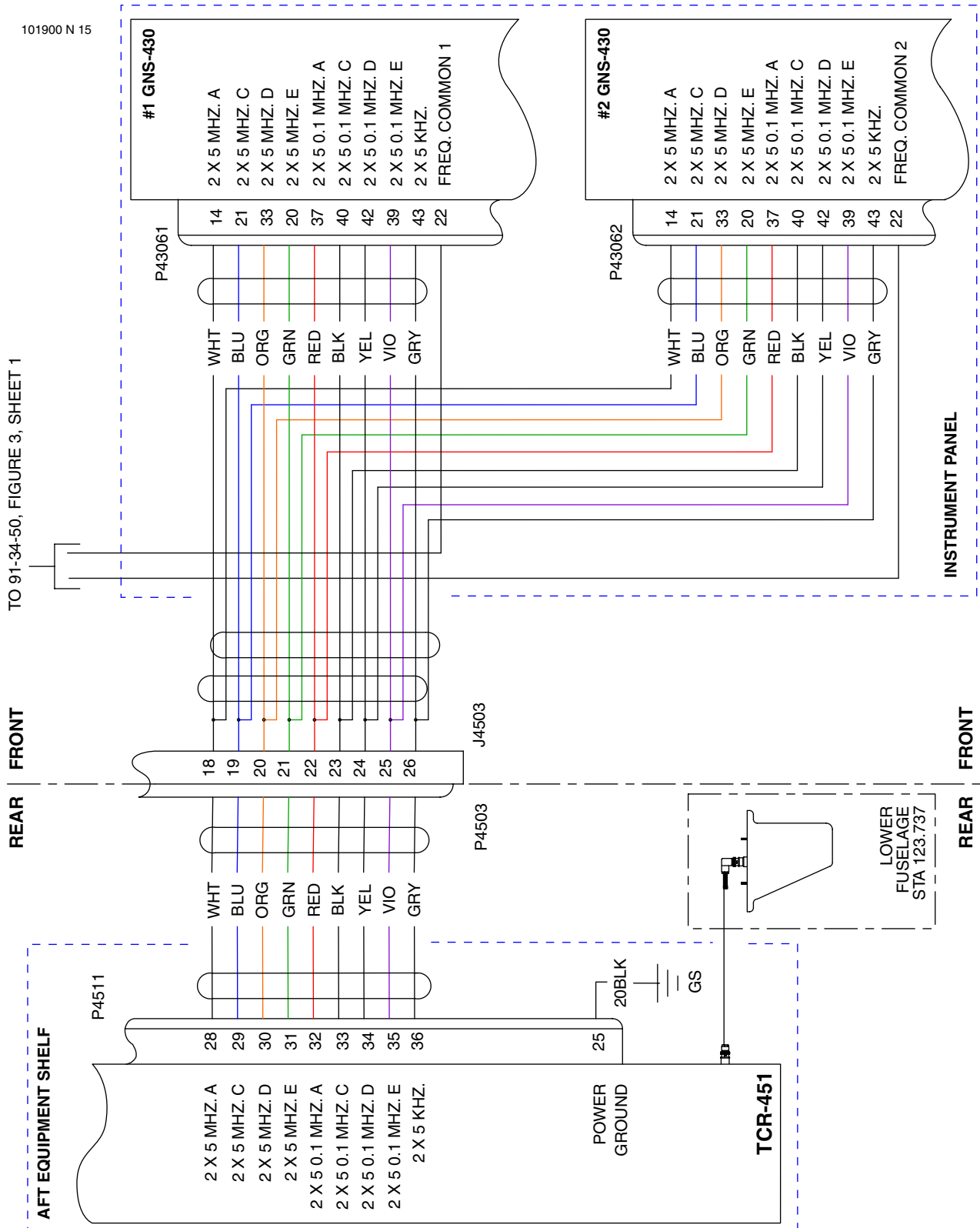
101900 N 14

TO 91-34-50, FIGURE 3, SHEET 2

Effectivity
2843598 thru 2843617
with Avidyne Integra

S-TEC DME (Optional)
Figure 3 (Sheet 1 of 2)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

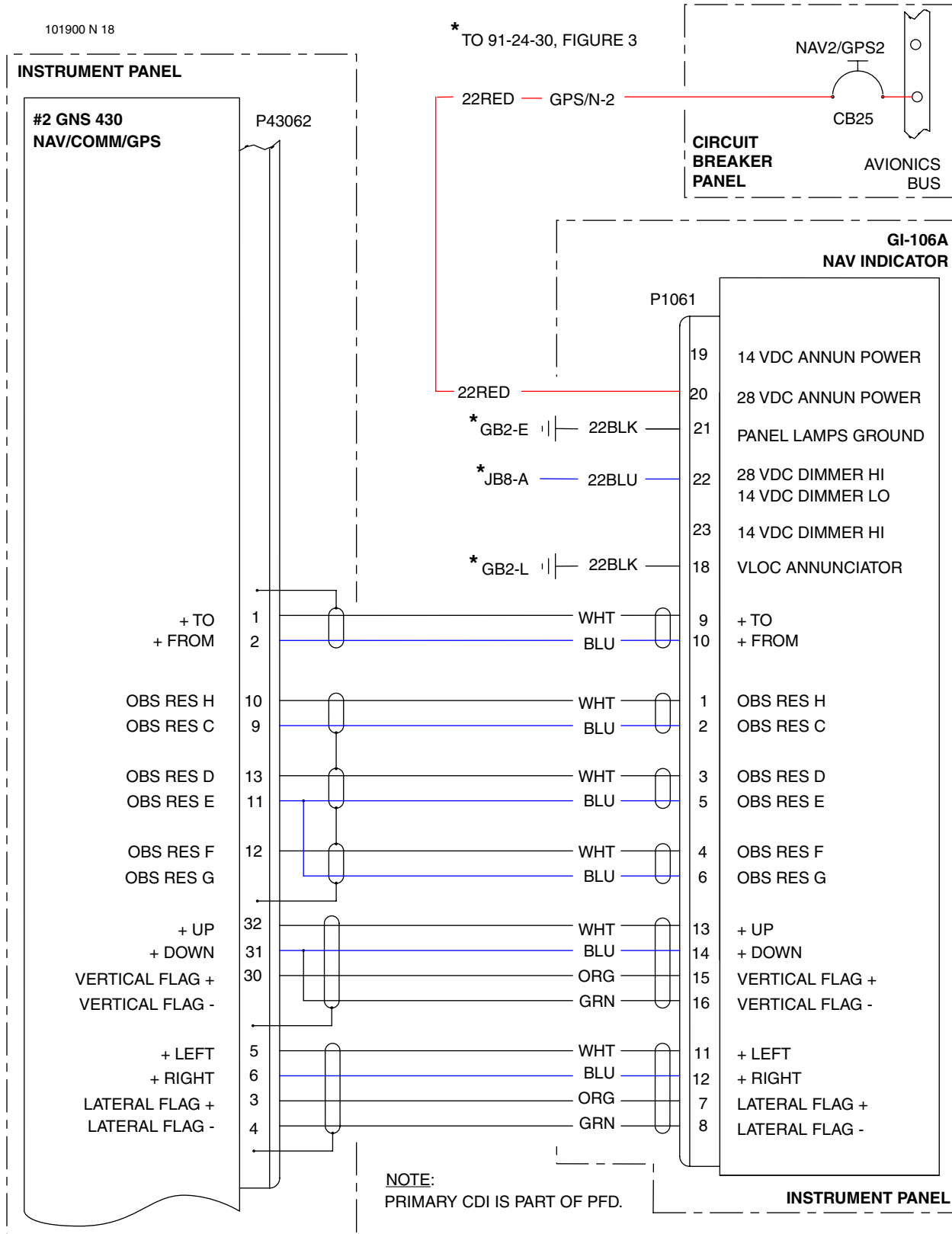


S-TEC DME (Optional)
Figure 3 (Sheet 2 of 2)

Effectivity
2843598 thru 2843617
with Avidyne Entegra

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

101900 N 18



Effectivity
with Avidyne Entegra

#2 GI-106A CDI (Optional)
Figure 4

101900 N 25

KR-87 ADF RECEIVER

Pin	Signal
13	20RED — ADF
S	20BLK — *GB2-L
9	22BLU — *JB7-E
A	28V DIMMER
B	DC SIN OUT
D	DC COS OUT
E	4.5V COMMON
H	BOTTOM MOUNT ANTENNA
M	GROUND
P	GROUND
R	GROUND
10	AUDIO OUT
12	ANTENNA POWER
8	LOOP ENABLE
6	32 HZ < + 90°
F	32 HZ < 0°
15	GROUND
	RF INPUT

KI-227-00 ADF INDICATOR

Pin	Signal
A	+28V LIGHTING (ONLY)
C	DC SIN HI
E	DC COS HI
B	+4.5V COMMON
H	A/C GROUND

KA-44B ADF ANTENNA

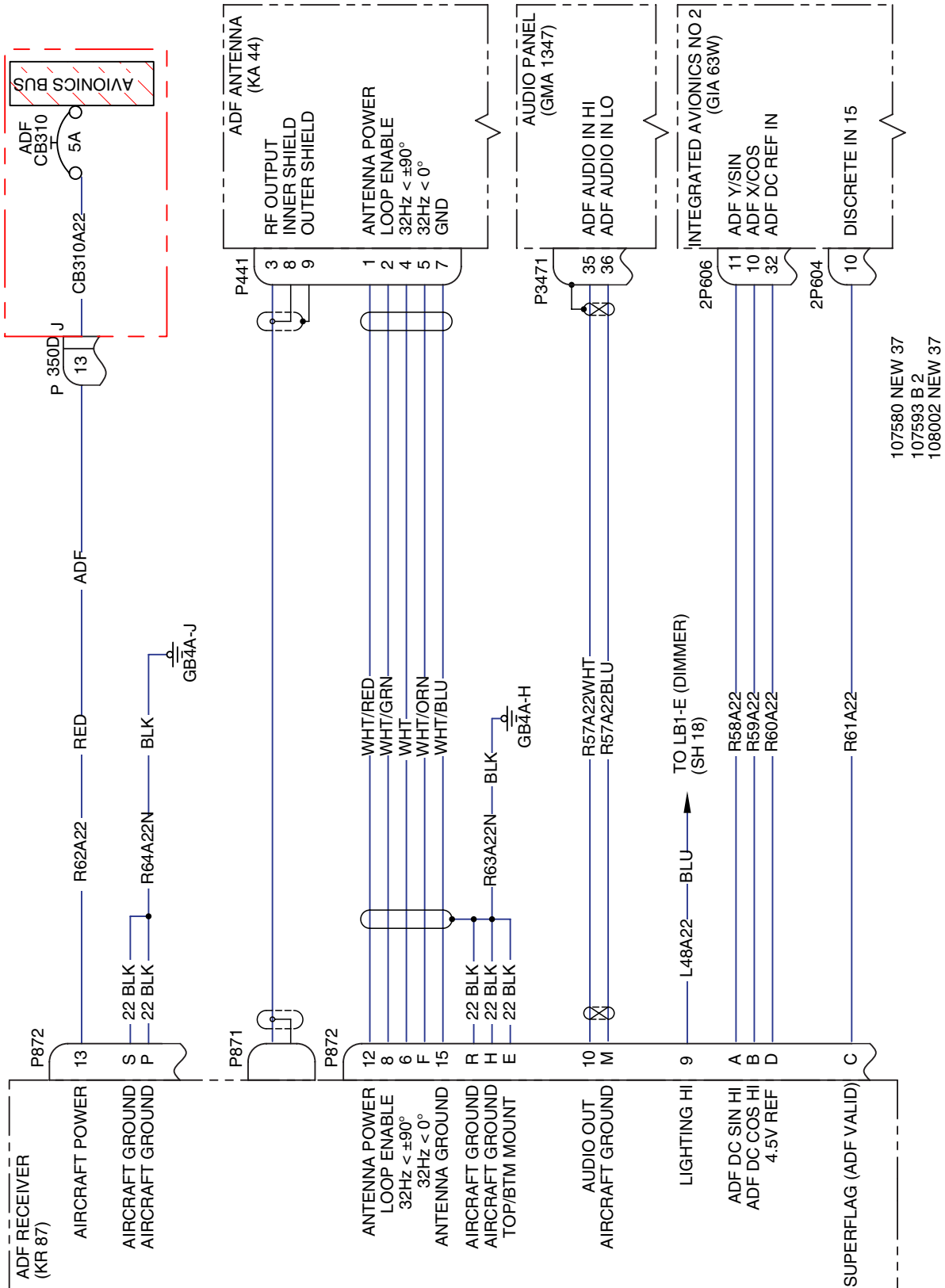
Pin	Signal
1	ANTENNA POWER
2	LOOP ENABLE
4	32HZ < ± 90
5	32HZ < 0
7	GROUND
9	OUTER SHIELD
3	RF OUTPUT
8	INNER SHIELD

Wiring Schematic:

- KR-87 ADF RECEIVER** (P871) connections:
 - Pin 13 (20RED) to ADF indicator.
 - Pin S (20BLK) to *GB2-L.
 - Pin 9 (22BLU) to *JB7-E.
 - Pin A (28V DIMMER) to ADF indicator.
 - Pin B (DC SIN OUT) to ADF indicator.
 - Pin D (DC COS OUT) to ADF indicator.
 - Pin E (4.5V COMMON) to ADF indicator.
 - Pin H (BOTTOM MOUNT ANTENNA) to ADF indicator.
 - Pin M (GROUND) to ADF indicator.
 - Pin P (GROUND) to ADF indicator.
 - Pin R (GROUND) to ADF indicator.
 - Pin 10 (AUDIO OUT) to GMA-340.
 - Pin 12 (ANTENNA POWER) to KA-44B ADF ANTENNA.
 - Pin 8 (LOOP ENABLE) to KA-44B ADF ANTENNA.
 - Pin 6 (32 HZ < + 90°) to KA-44B ADF ANTENNA.
 - Pin F (32 HZ < 0°) to KA-44B ADF ANTENNA.
 - Pin 15 (GROUND) to KA-44B ADF ANTENNA.
 - RF INPUT to KA-44B ADF ANTENNA.
- KI-227-00 ADF INDICATOR** (P2271) connections:
 - Pin A (+28V LIGHTING (ONLY)) to ADF indicator.
 - Pin C (DC SIN HI) to ADF indicator.
 - Pin E (DC COS HI) to ADF indicator.
 - Pin B (+4.5V COMMON) to ADF indicator.
 - Pin H (A/C GROUND) to ADF indicator.
- KA-44B ADF ANTENNA** (P441) connections:
 - Pin 1 (ANTENNA POWER) to KA-44B ADF ANTENNA.
 - Pin 2 (LOOP ENABLE) to KA-44B ADF ANTENNA.
 - Pin 4 (32HZ < ± 90) to KA-44B ADF ANTENNA.
 - Pin 5 (32HZ < 0) to KA-44B ADF ANTENNA.
 - Pin 7 (GROUND) to KA-44B ADF ANTENNA.
 - Pin 9 (OUTER SHIELD) to KA-44B ADF ANTENNA.
 - Pin 3 (RF OUTPUT) to KA-44B ADF ANTENNA.
 - Pin 8 (INNER SHIELD) to KA-44B ADF ANTENNA.

Effectivity
2843618 thru 2843682
with Avidyne Integra

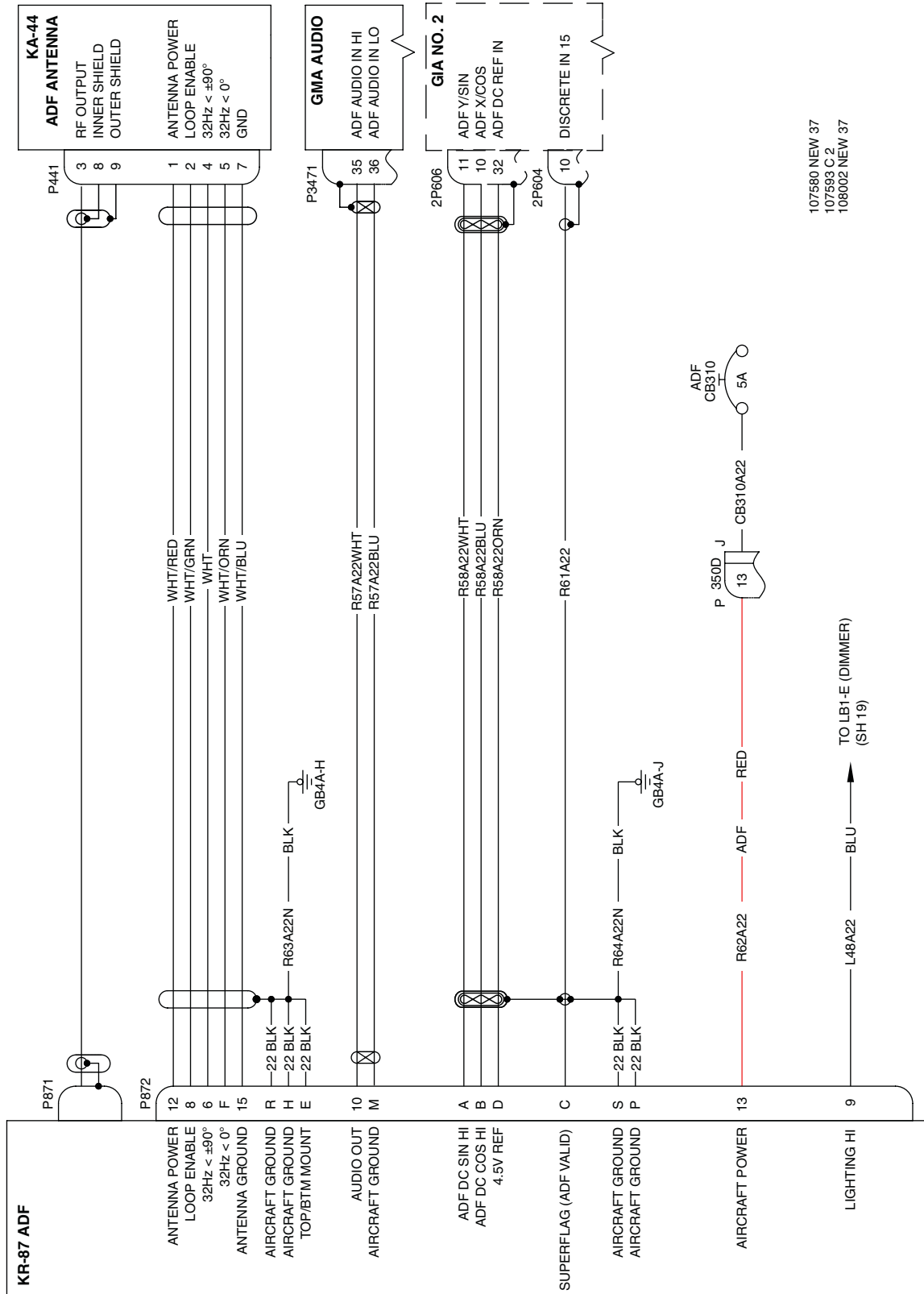
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



107580 NEW 37
107593 B 2
108002 NEW 37

King ADF (Optional)
Figure 5 (Sheet 2 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

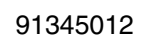


107580 NEW 37
107593 C 2
108002 NEW 37

King ADF (Optional)
Figure 5 (Sheet 3 of 4)

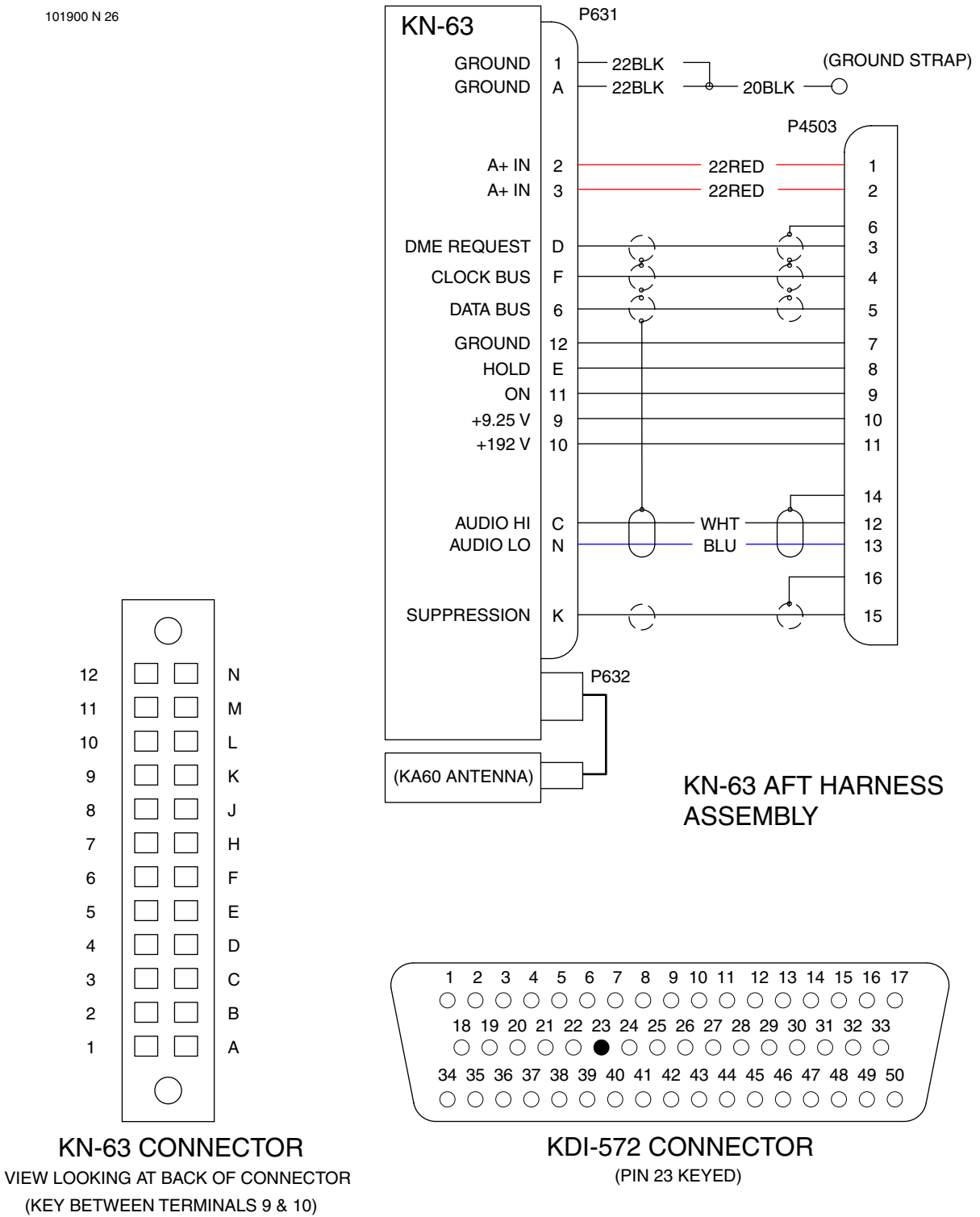
Effectivity
with Garmin G1000 NXi
2843823, 2881001 and up

G500-28203 V 16



PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101900 N 26

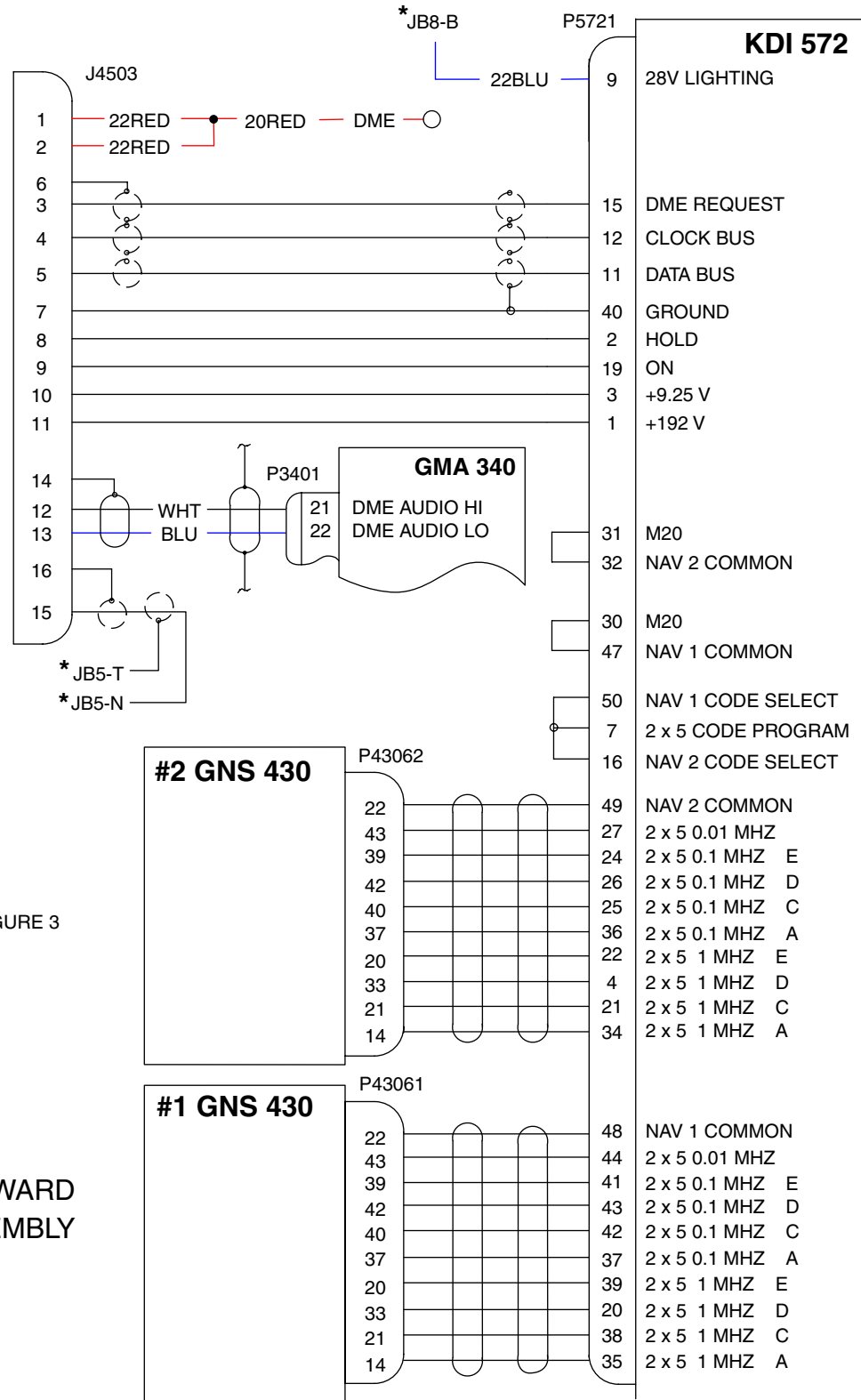


King DME (Optional)
Figure 6 (Sheet 1 of 4)

[Effectivity](#)
2843618 thru 2843682
with Avidyne Entegra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101900 N 26



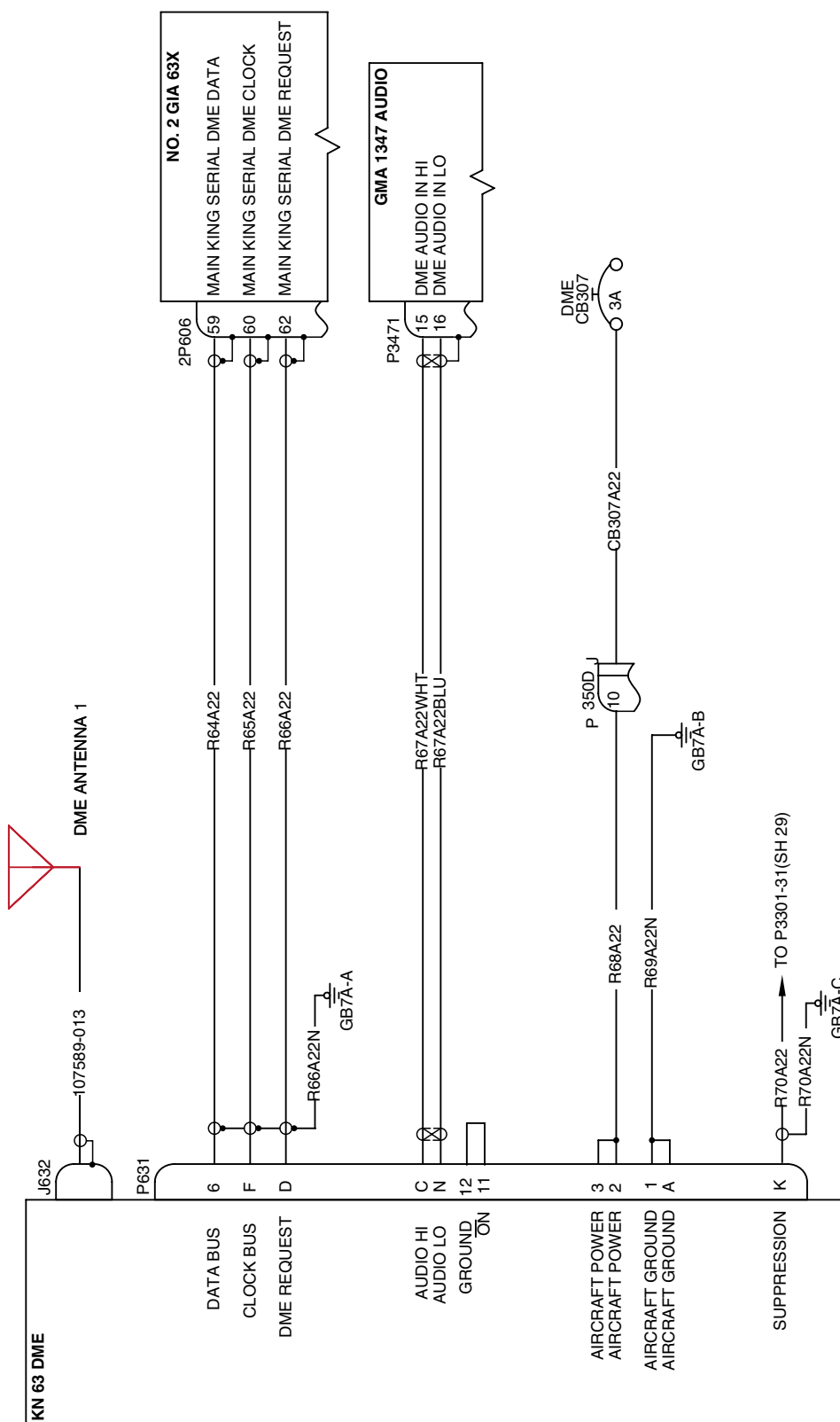
* TO 91-24-30, FIGURE 3

KN-63 FORWARD
HARNESS ASSEMBLY

Effectivity
2843618 thru 2843682
with Avidyne Integra

King DME (Optional)
Figure 6 (Sheet 2 of 4)

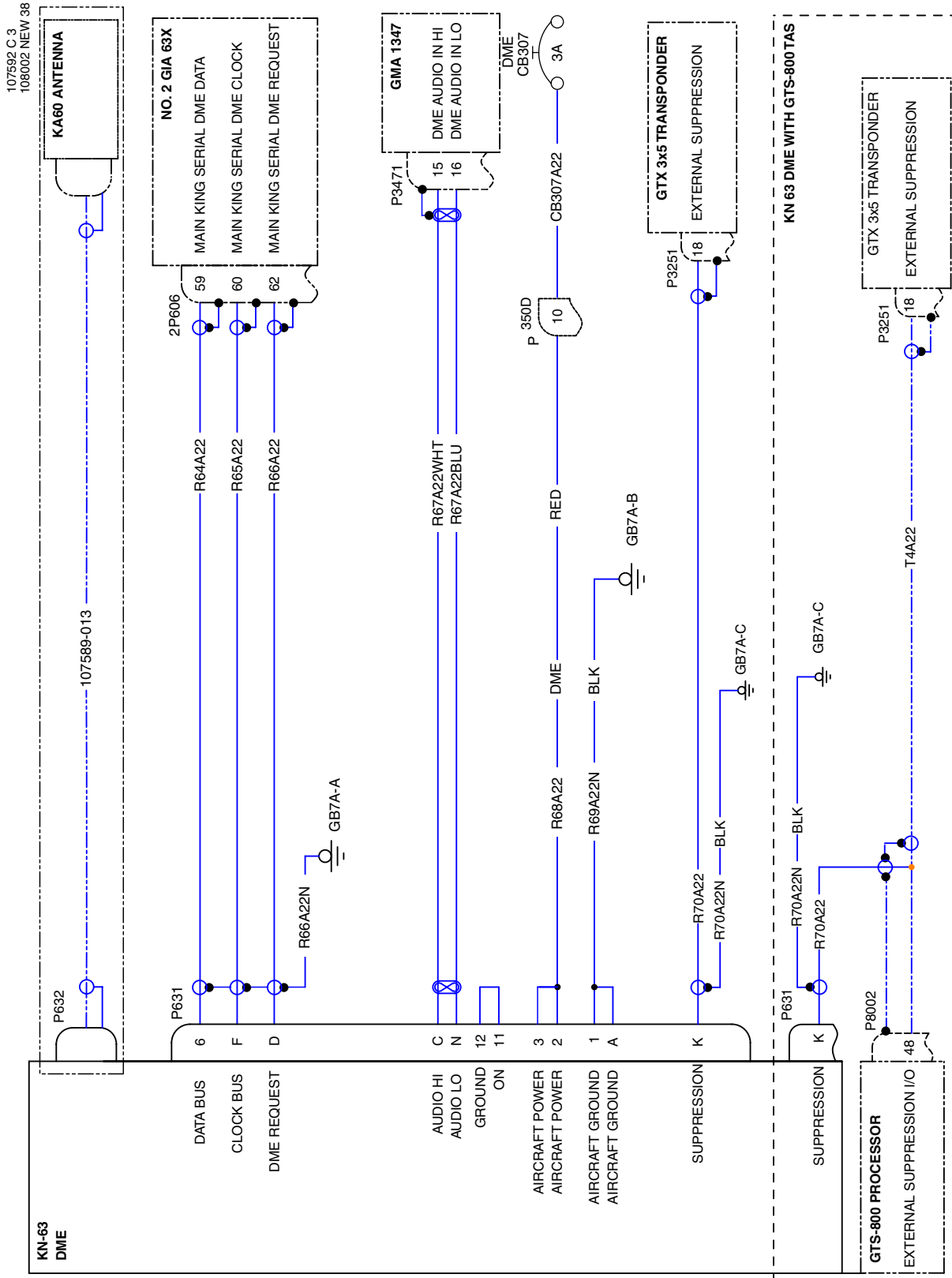
PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



King DME (Optional)
Figure 6 (Sheet 3 of 4)

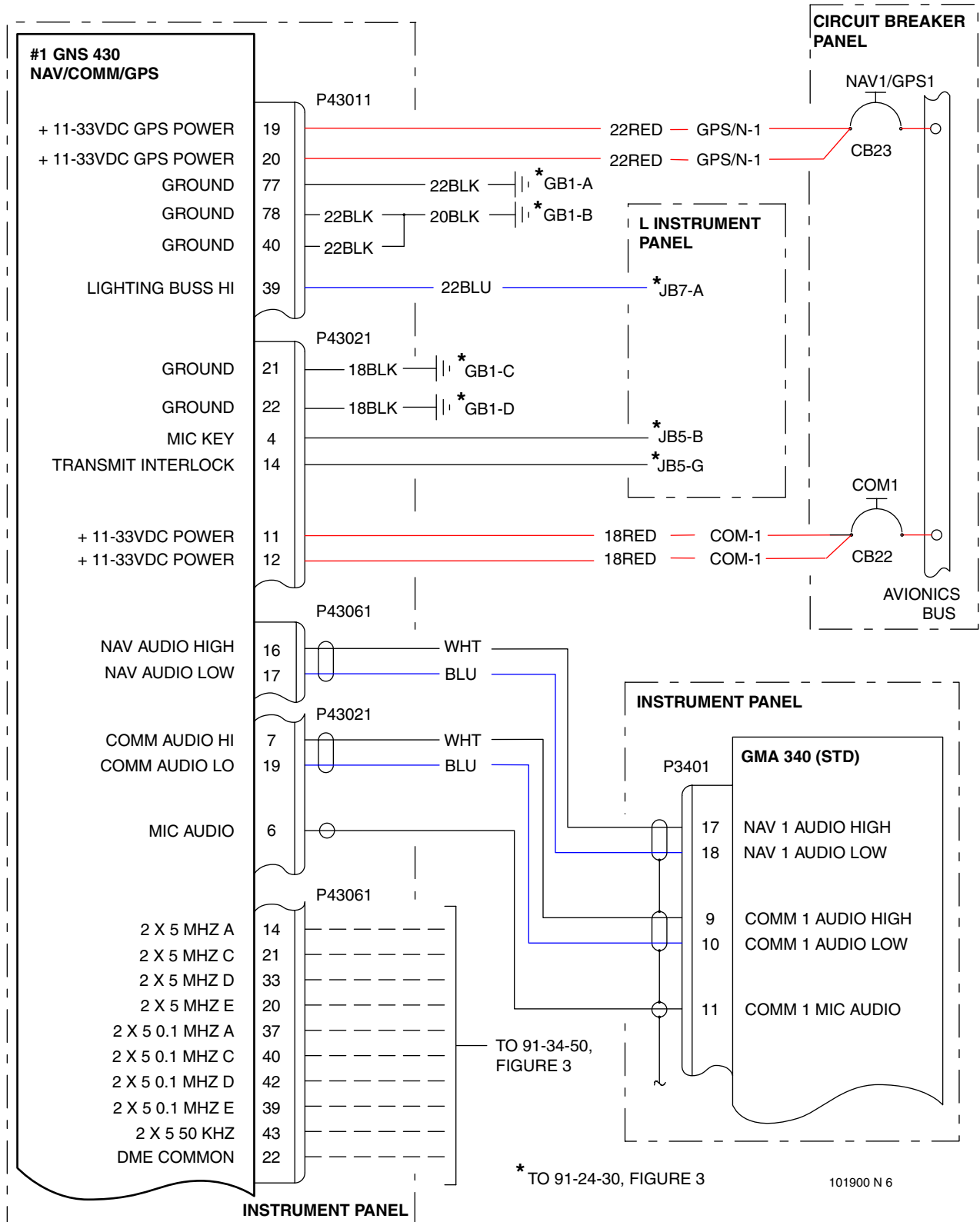
107580 NEW 38
107592 B 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



King DME (Optional)
Figure 6 (Sheet 4 of 4)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

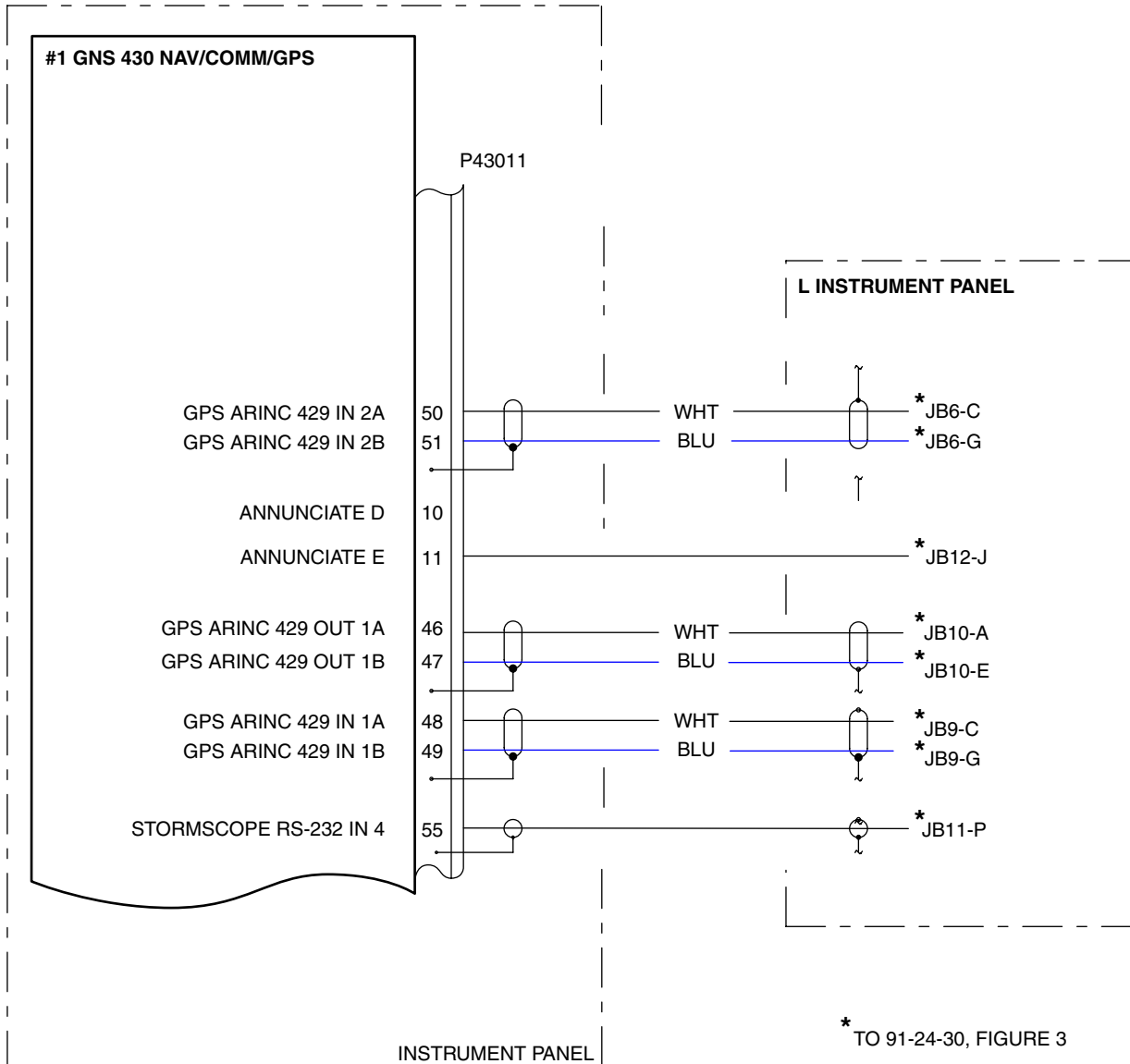


Nav/Com/GPS #1
Figure 7 (Sheet 1 of 3)

[Effectivity](#)
[with Avidyne Integra](#)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101900 N 7

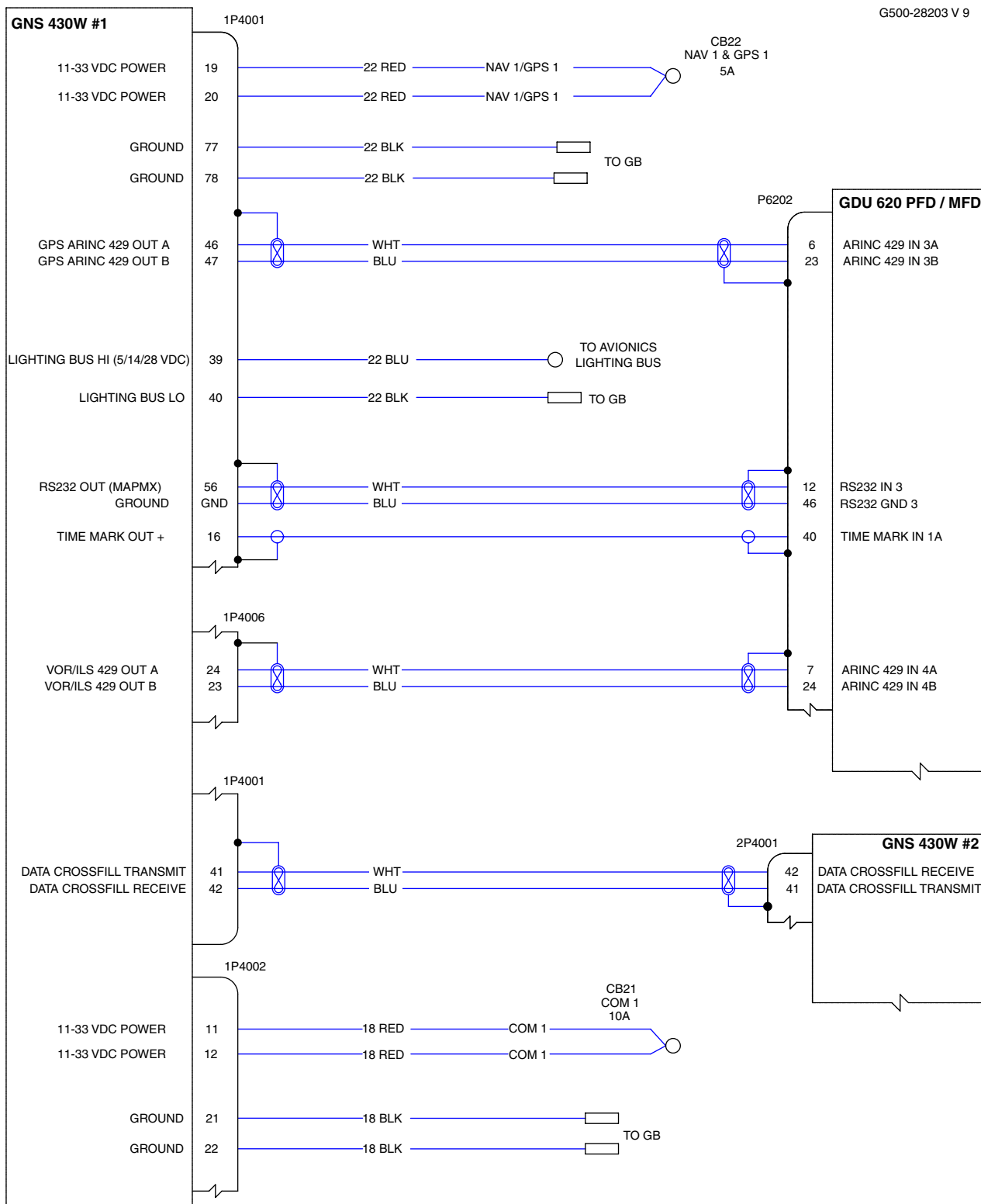


Effectivity
with Avidyne Entegra

Nav/Com/GPS #1
Figure 7 (Sheet 2 of 3)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

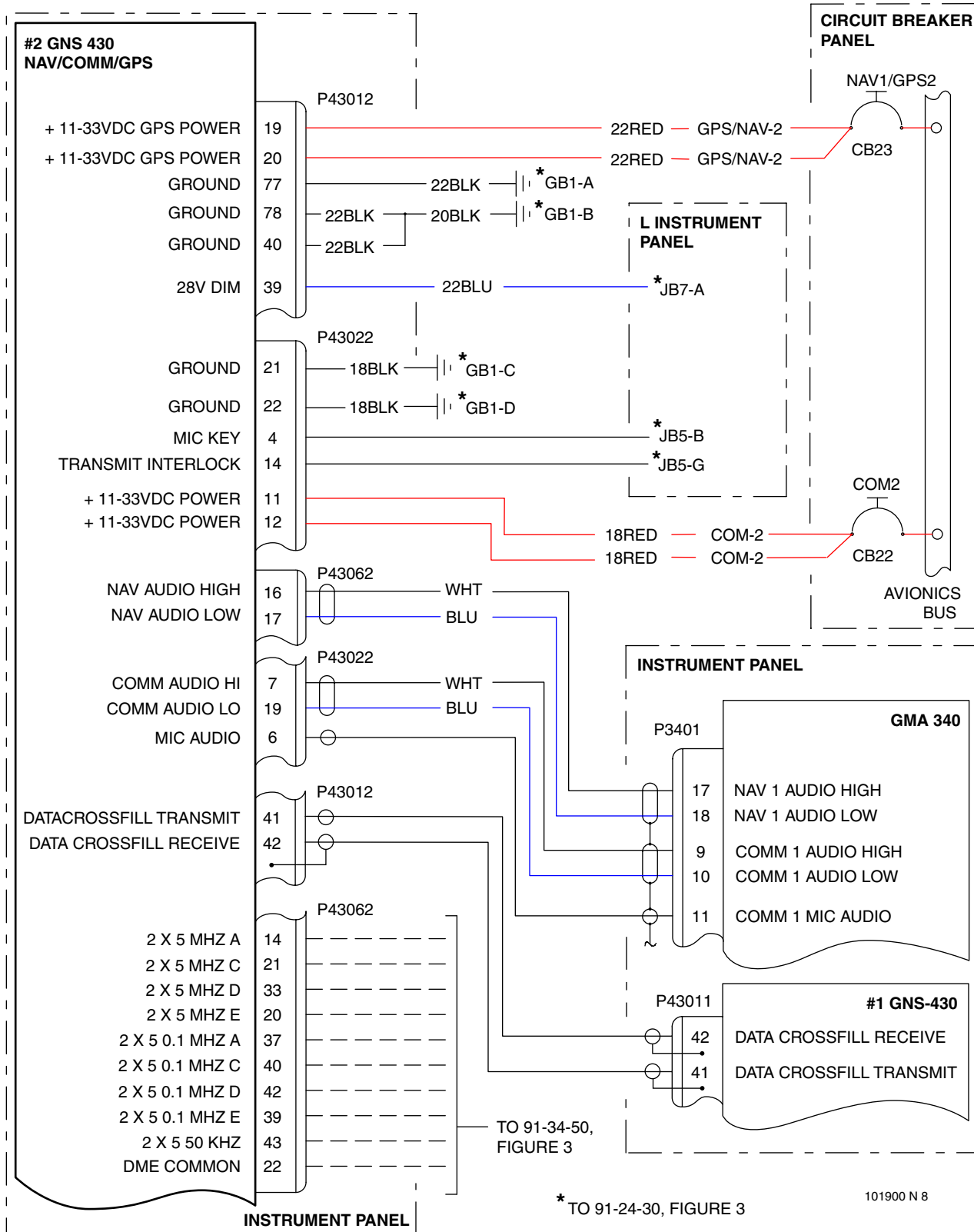
G500-28203 V 9



Nav/Com/GPS #1
Figure 7 (Sheet 3 of 3)

[Effectivity](#)
with Garmin G500

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



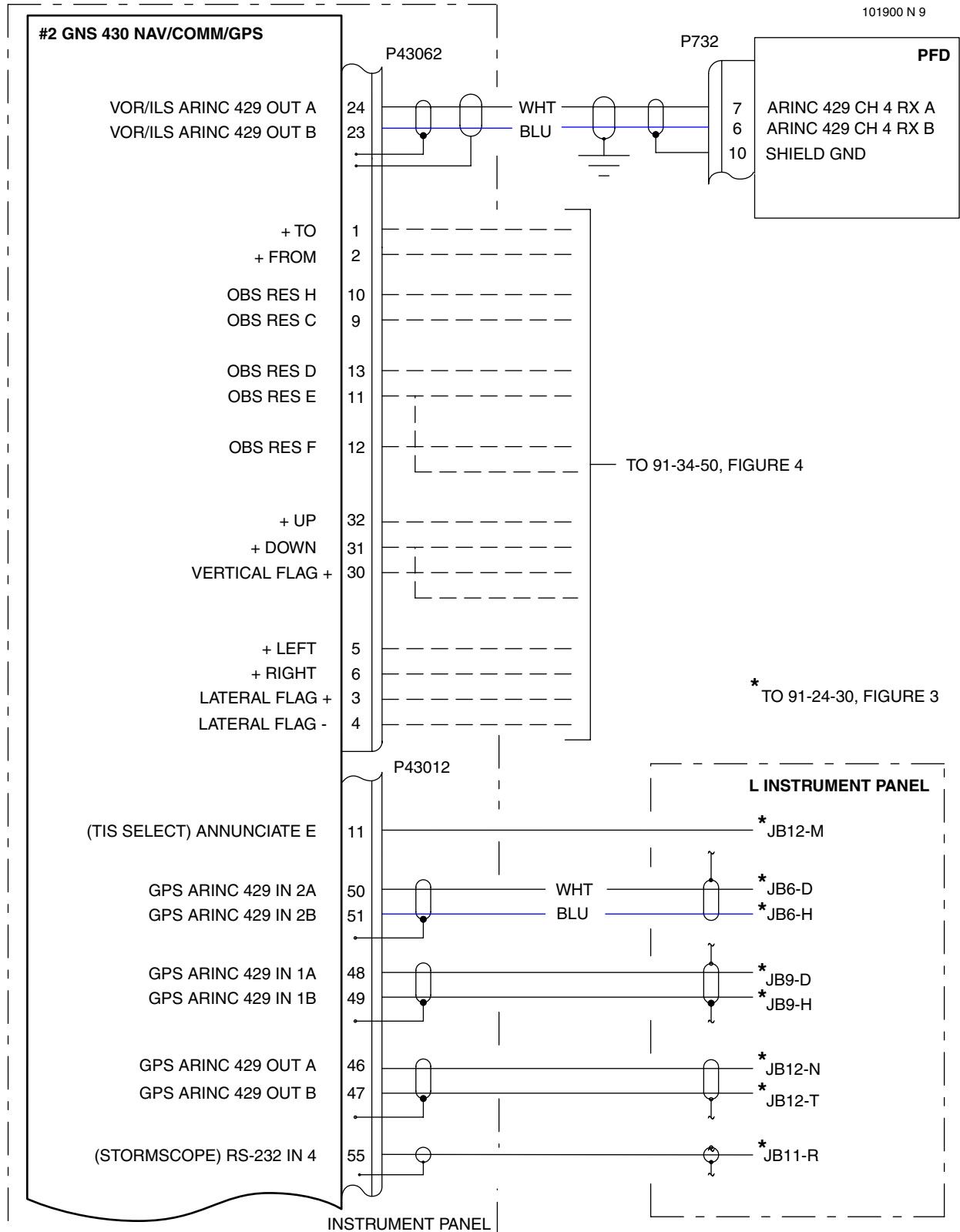
101900 N 8

Effectivity
with Avidyne Entegra

Nav/Com/GPS #2
Figure 8 (Sheet 1 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

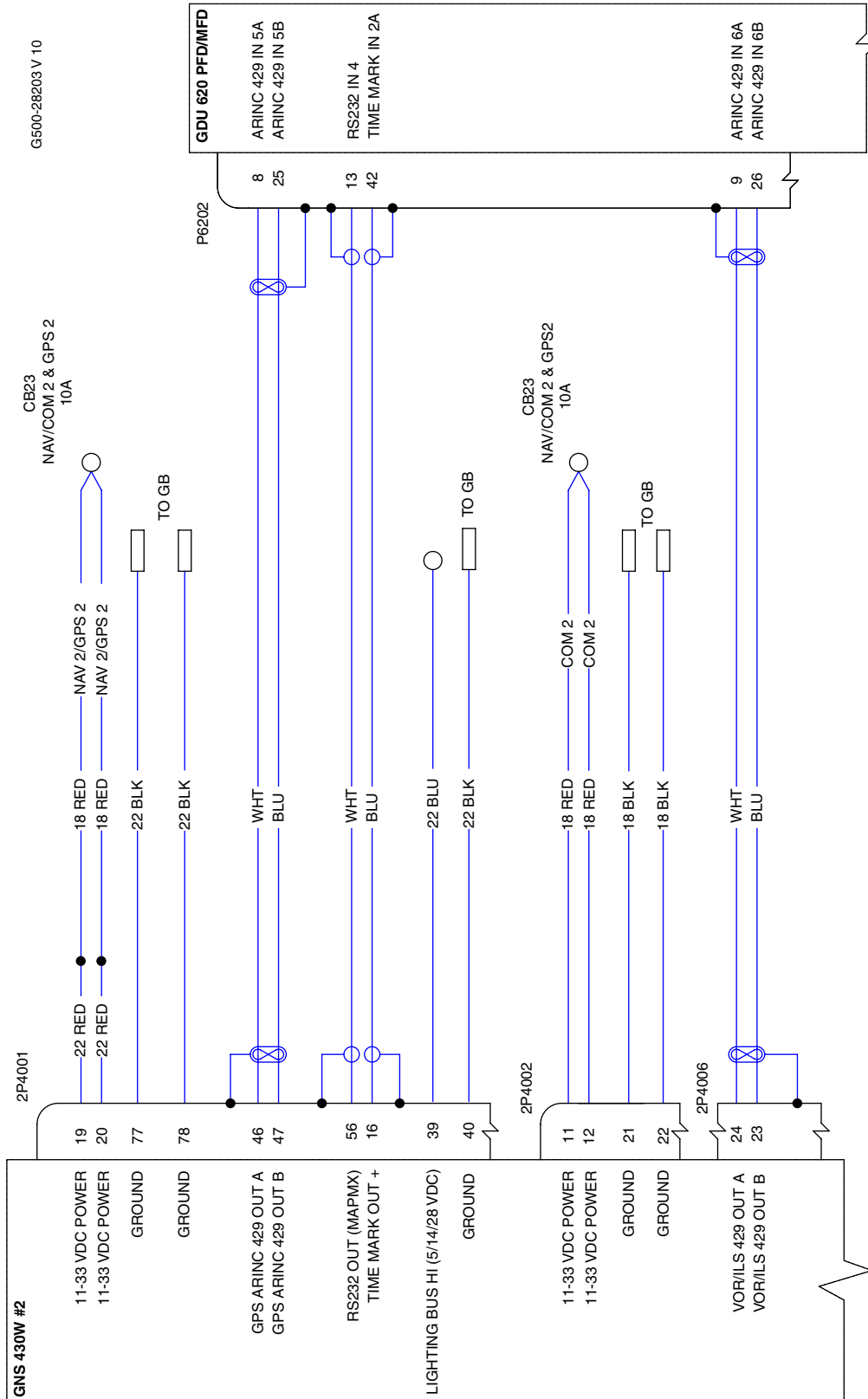
101900 N 9



Nav/Com/GPS #2
Figure 8 (Sheet 2 of 3)

Effectivity
with Avidyne Integra

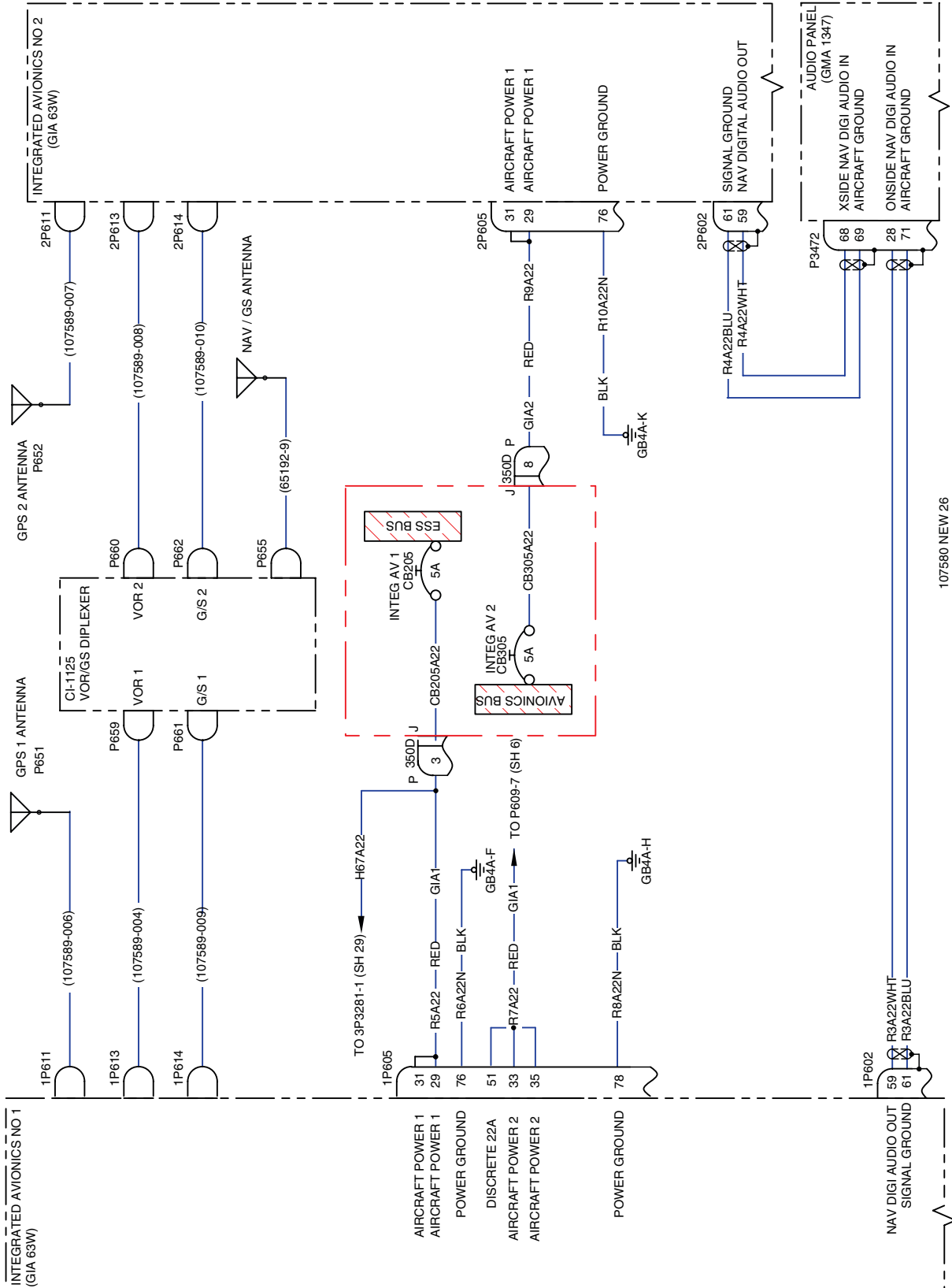
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Effectivity with Garmin G500

Nav/Com/GPS #2
Figure 8 (Sheet 3 of 3)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

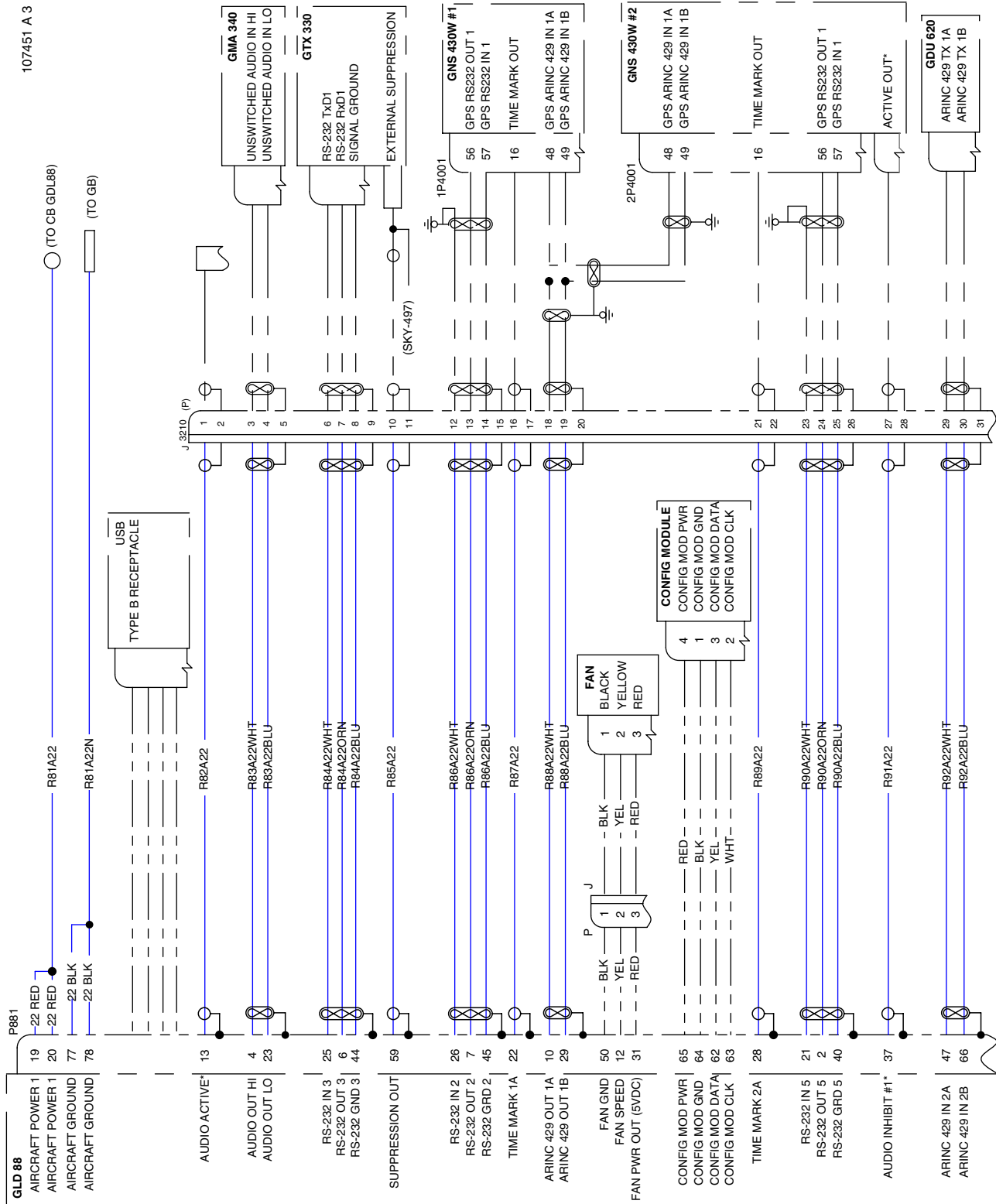


107580 NEW 26
108002 NEW 25

NAV/GPS
Figure 9

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

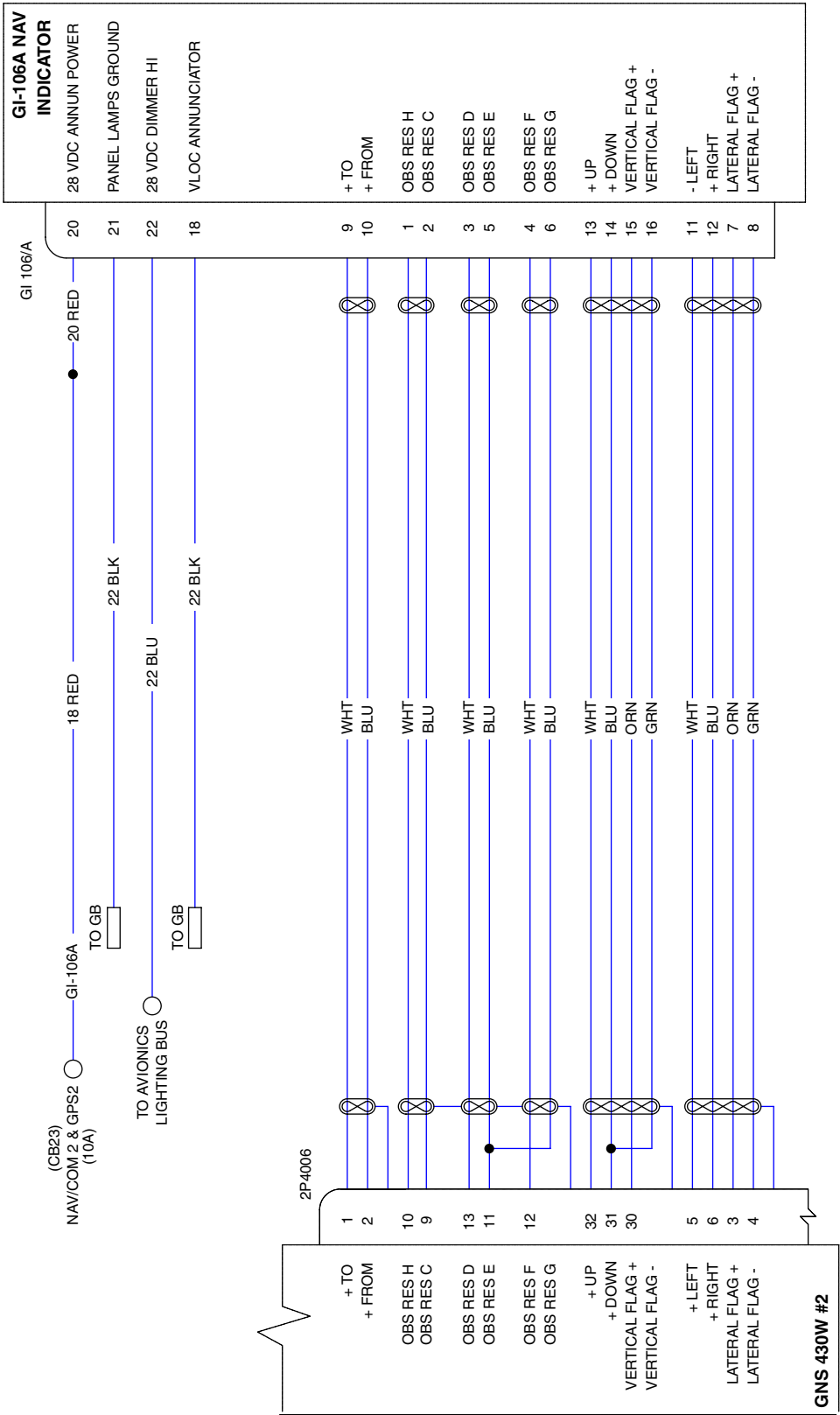
107451 A 3



Effectivity
2843736 and up
with Garmin G500

GDL 88 (Optional)
Figure 10

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



G500-28203 V 10

GI-106A CDI
Figure 11

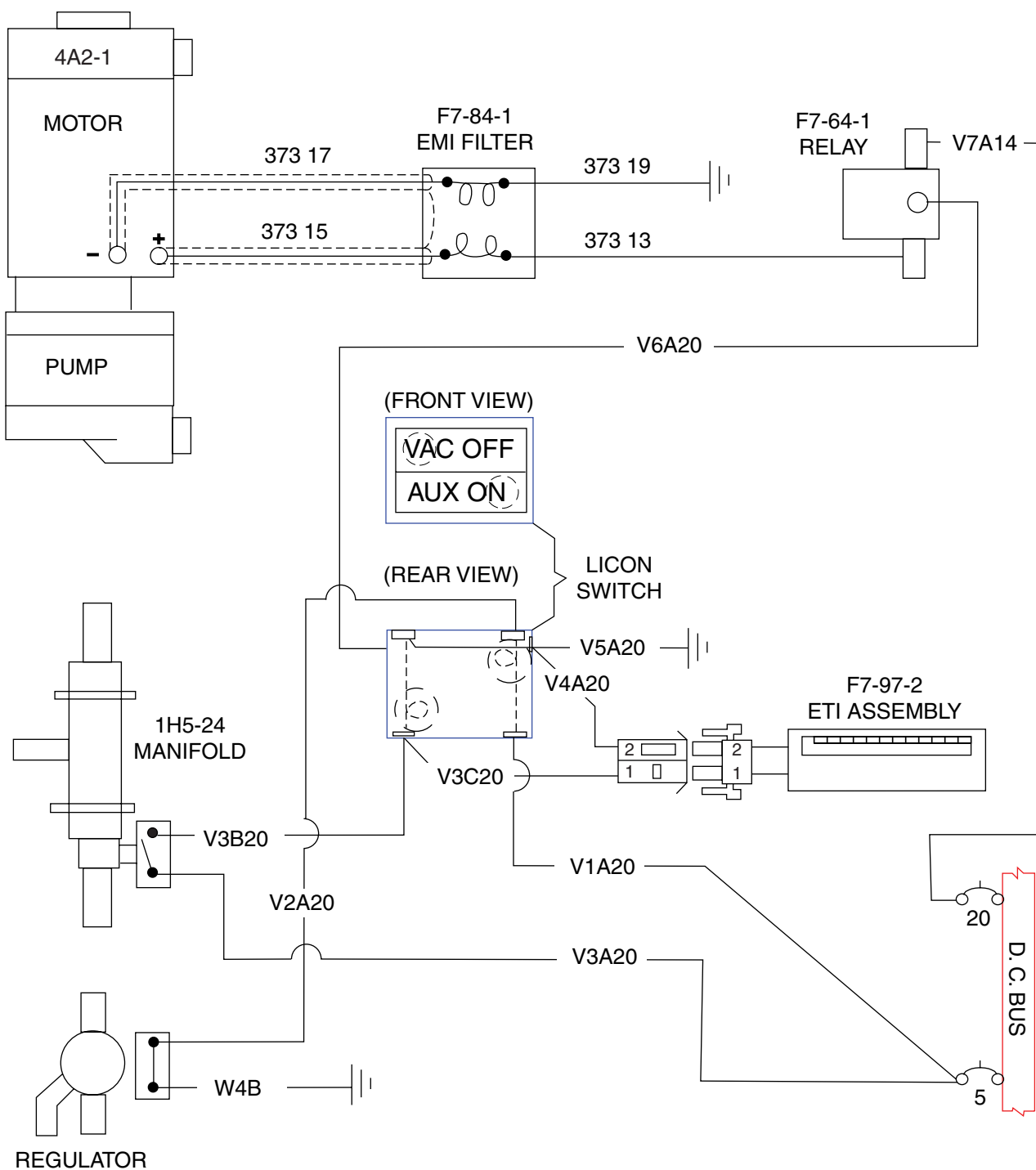
Effectivity
with Garmin G500

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

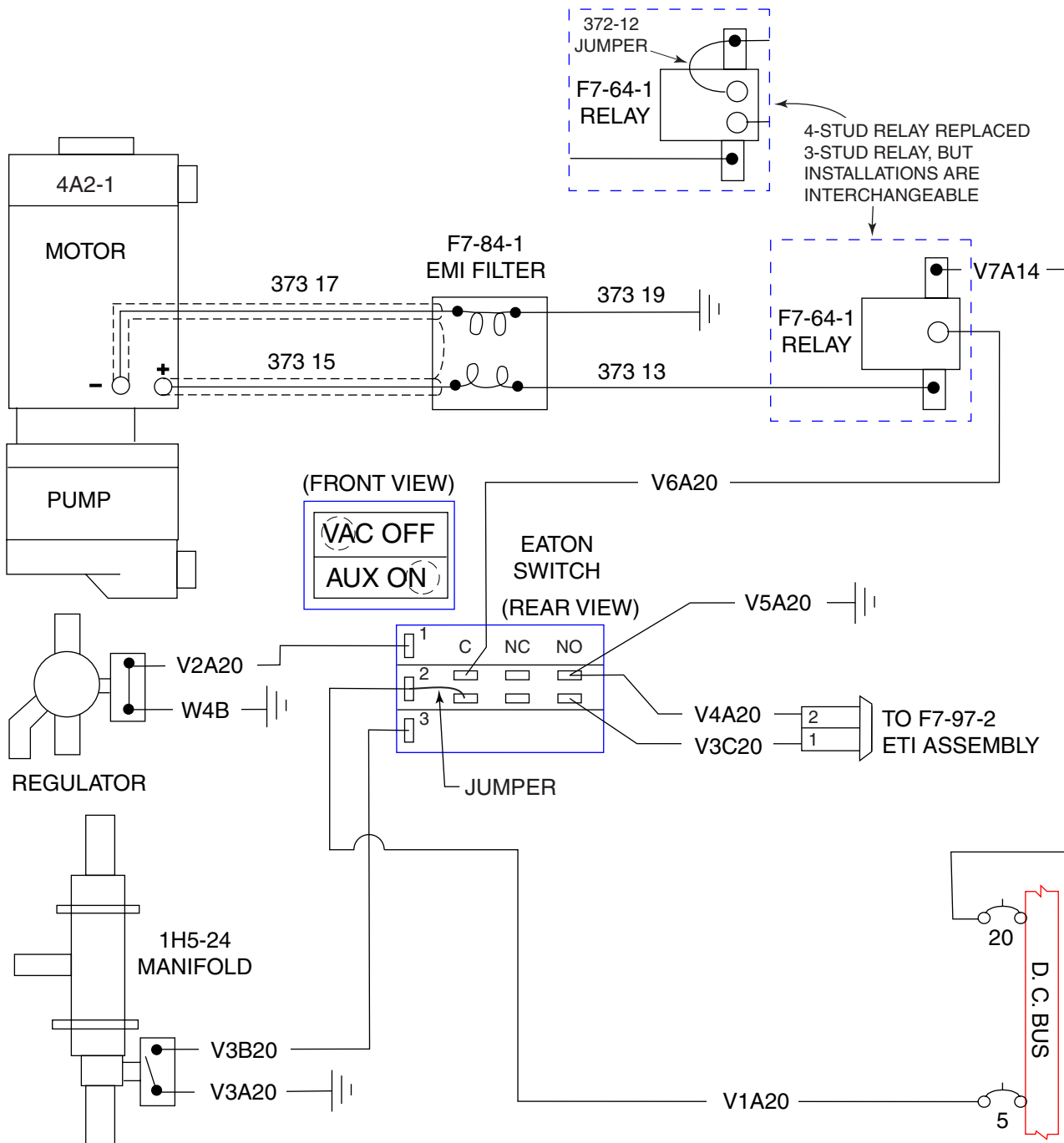
85387 D/G



Auxiliary Vacuum System
Figure 1 (Sheet 1 of 3)

Effectivity
2843001 thru 2843008

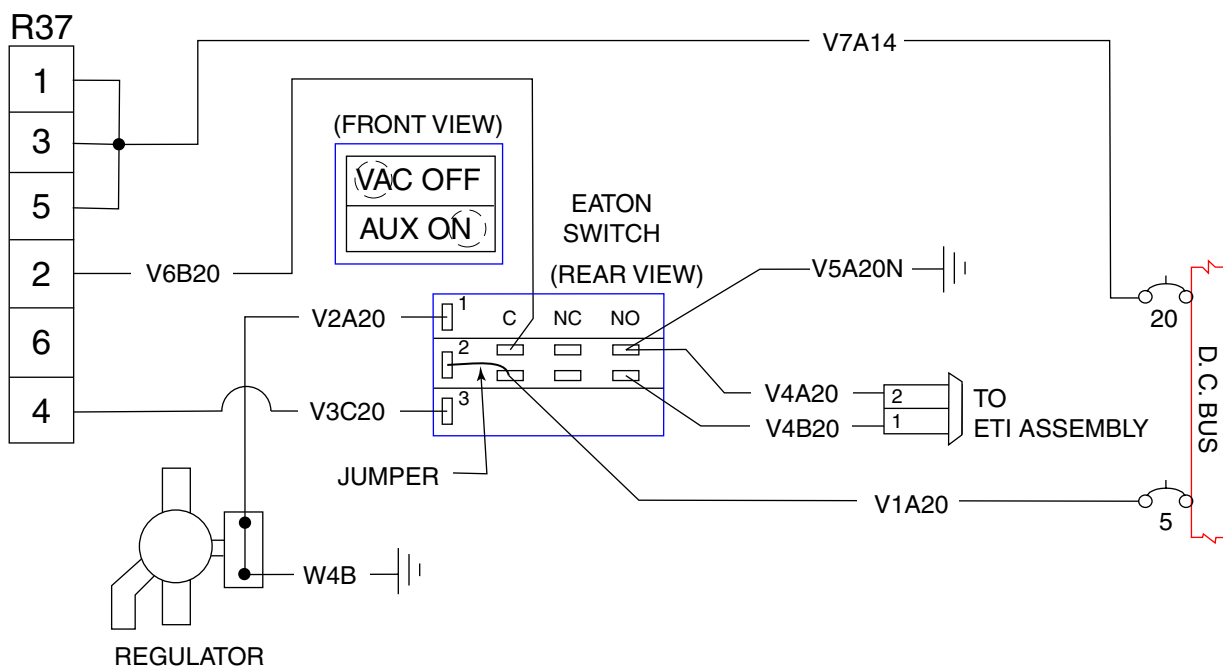
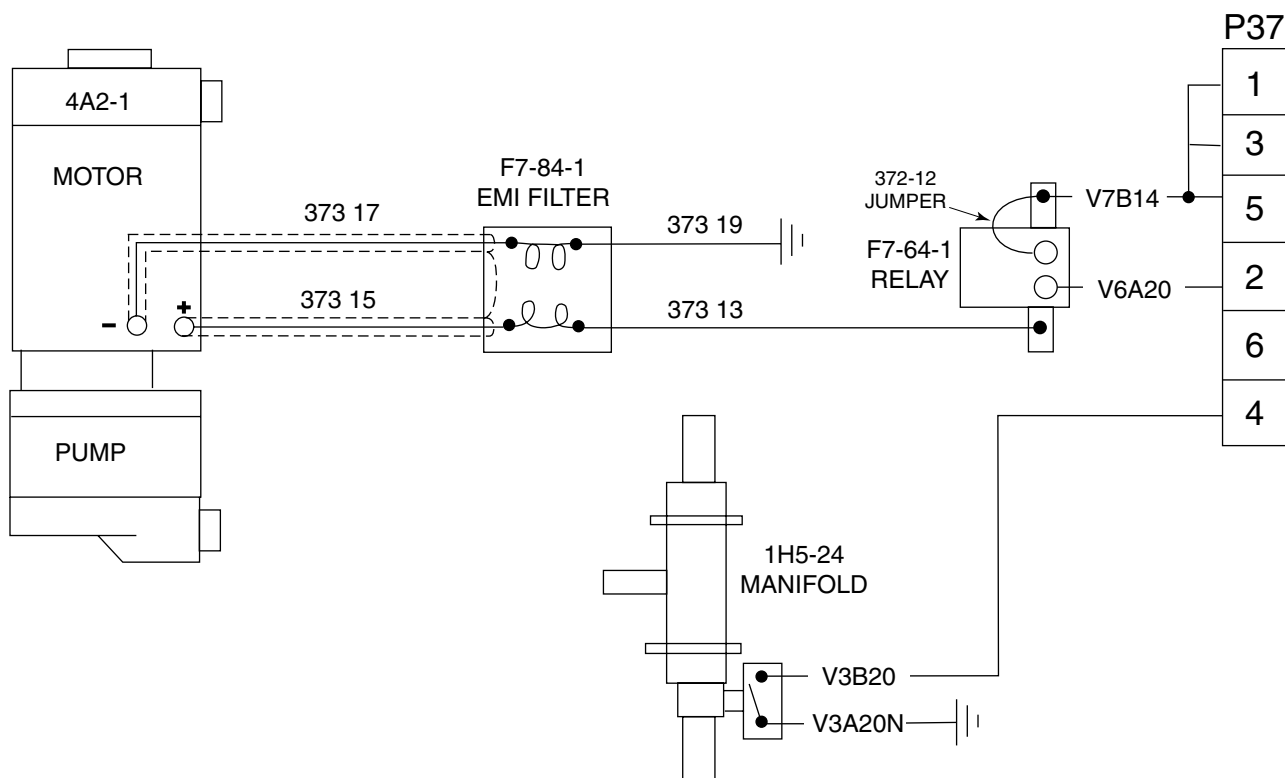
85387 G



Effectivity
2843009 thru 2843202

Auxiliary Vacuum System
Figure 1 (Sheet 2 of 3)

101292 B



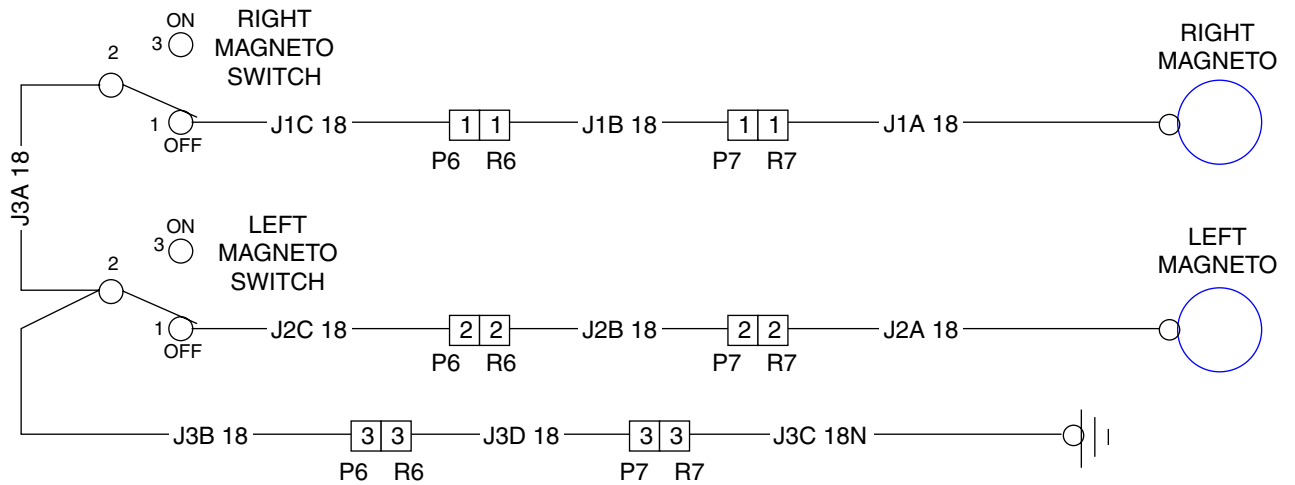
Effectivity
2843203 and up

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

THIS PAGE INTENTIONALLY BLANK

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D



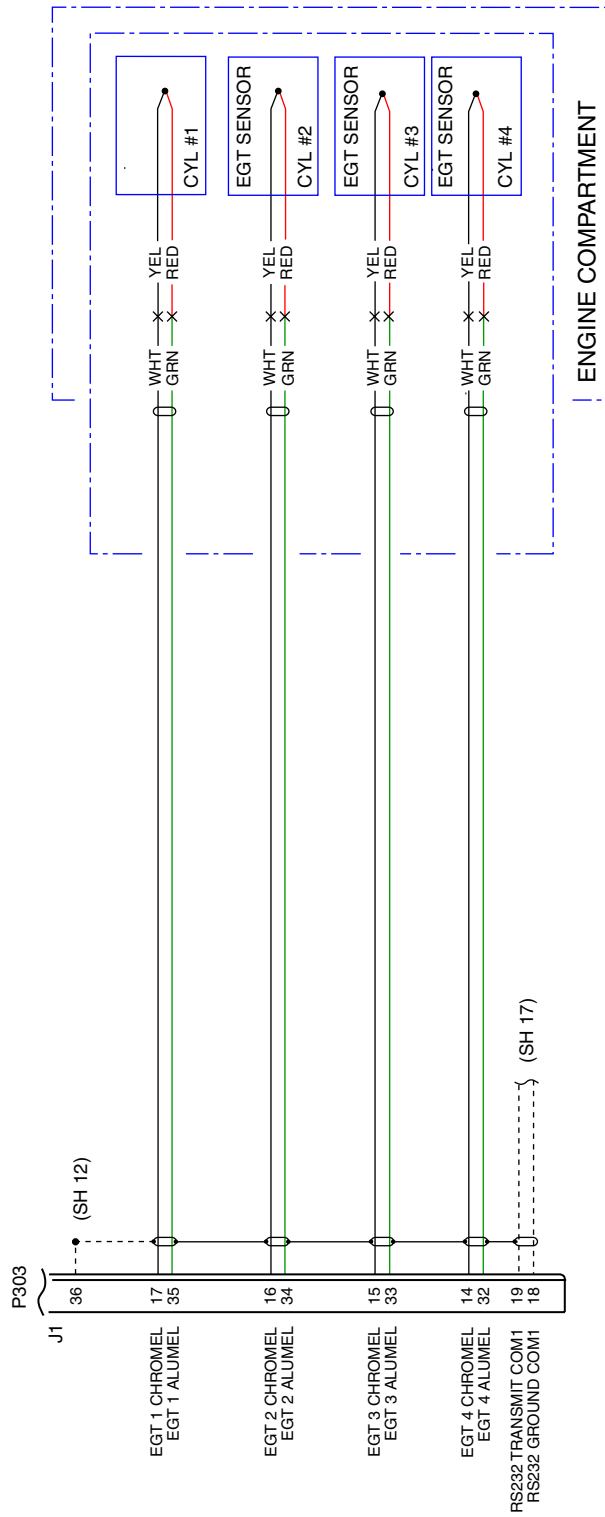
Magnetos
Figure 1



SureSTART Magneto Booster
Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101902 Y 20



EMax Engine Monitor (Optional)
Figure 1

[Effectivity](#)
with Avidyne Entegra

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

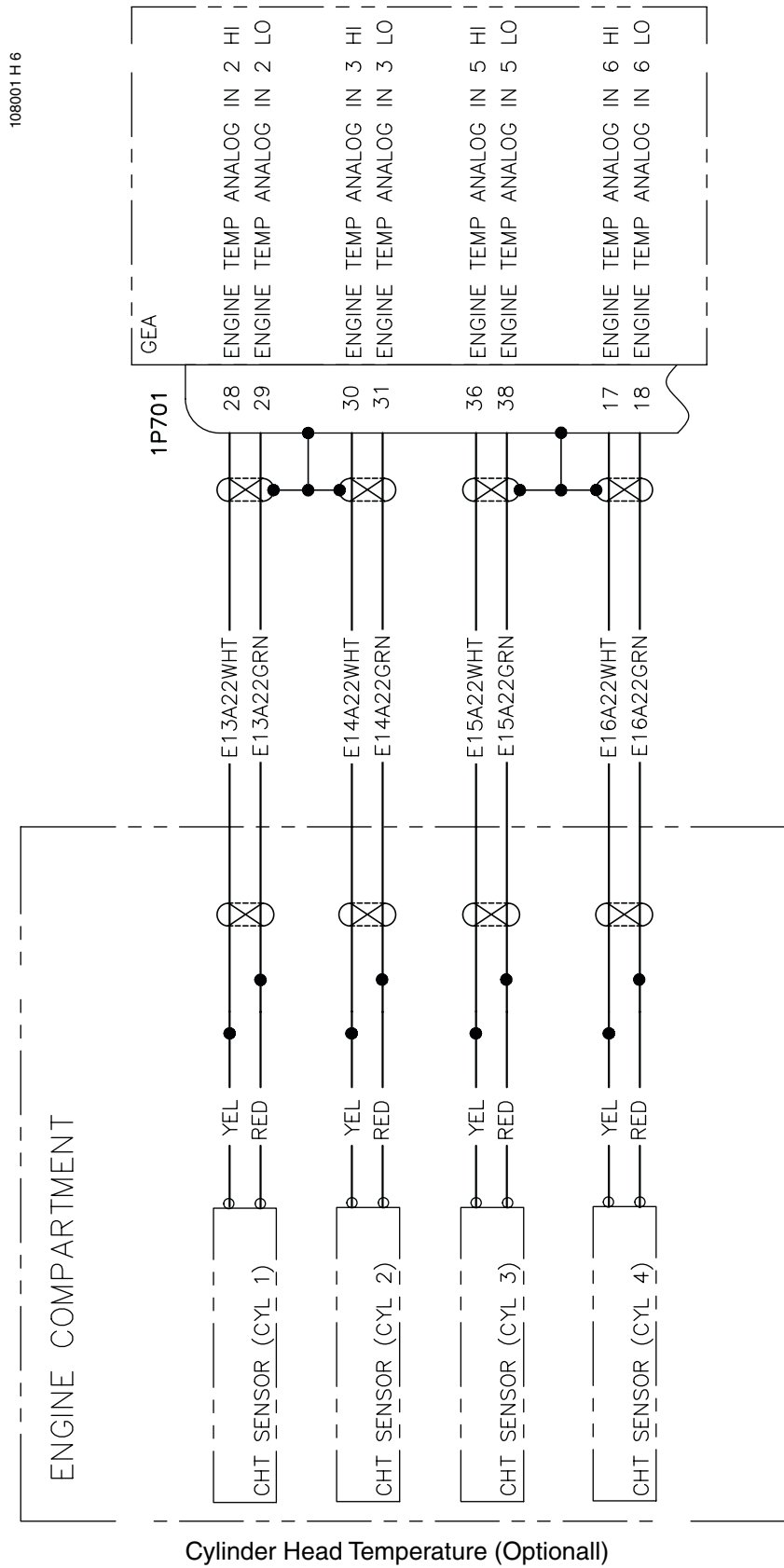
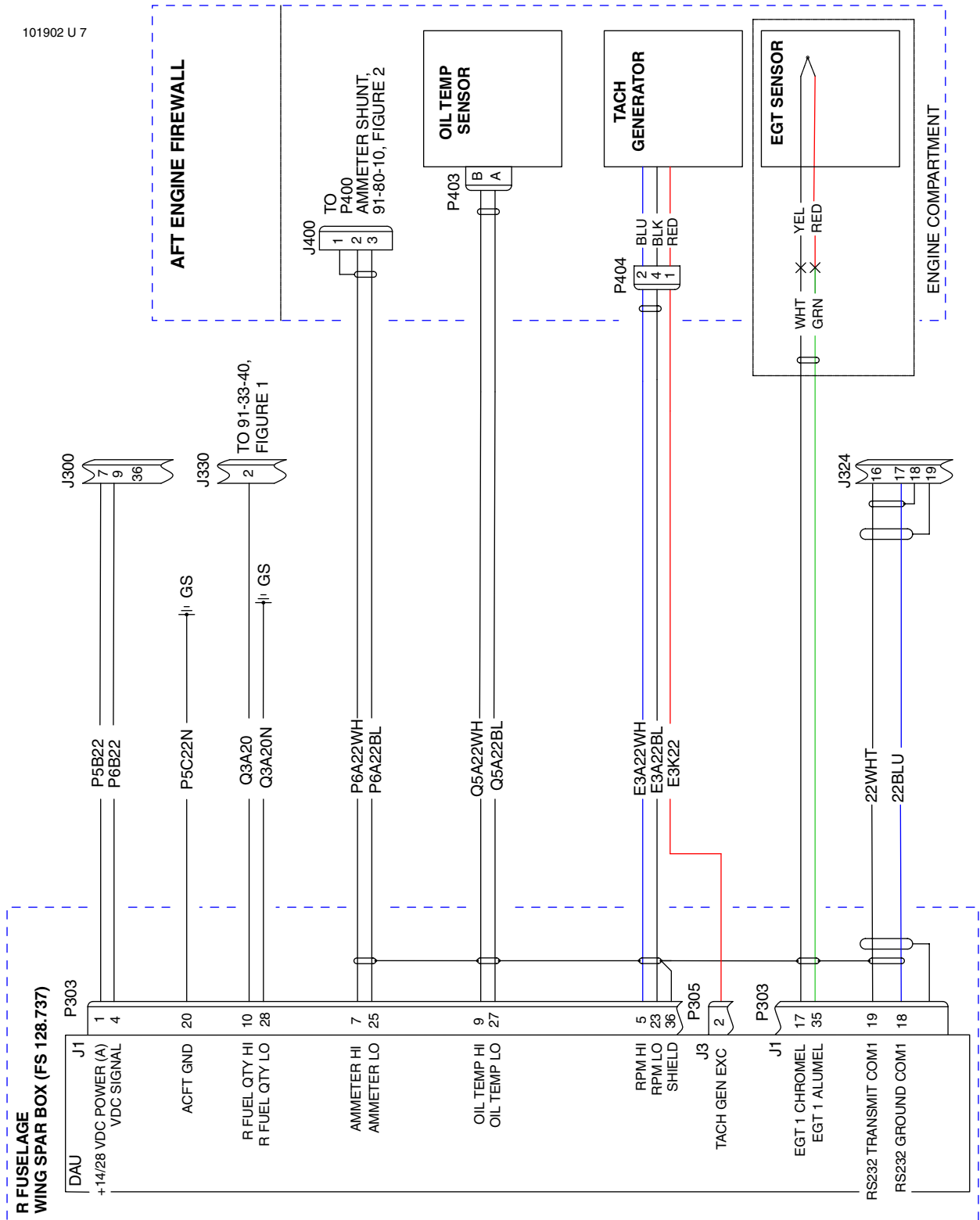


Figure 2

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

101902 U 7

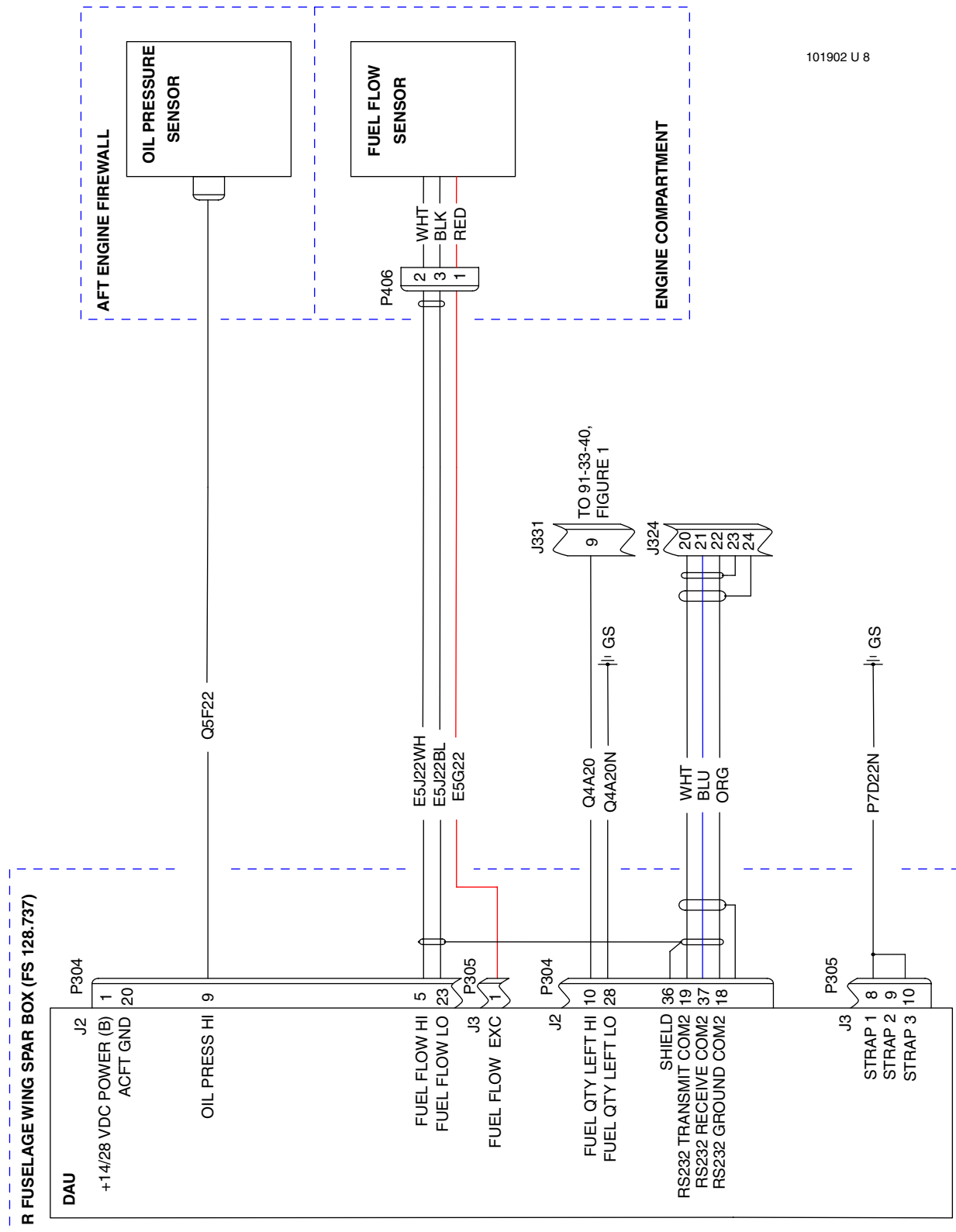


Data Acquisition Unit (DAU)
Figure 1 (Sheet 1 of 2)

Effectivity
with Avidyne Integra

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

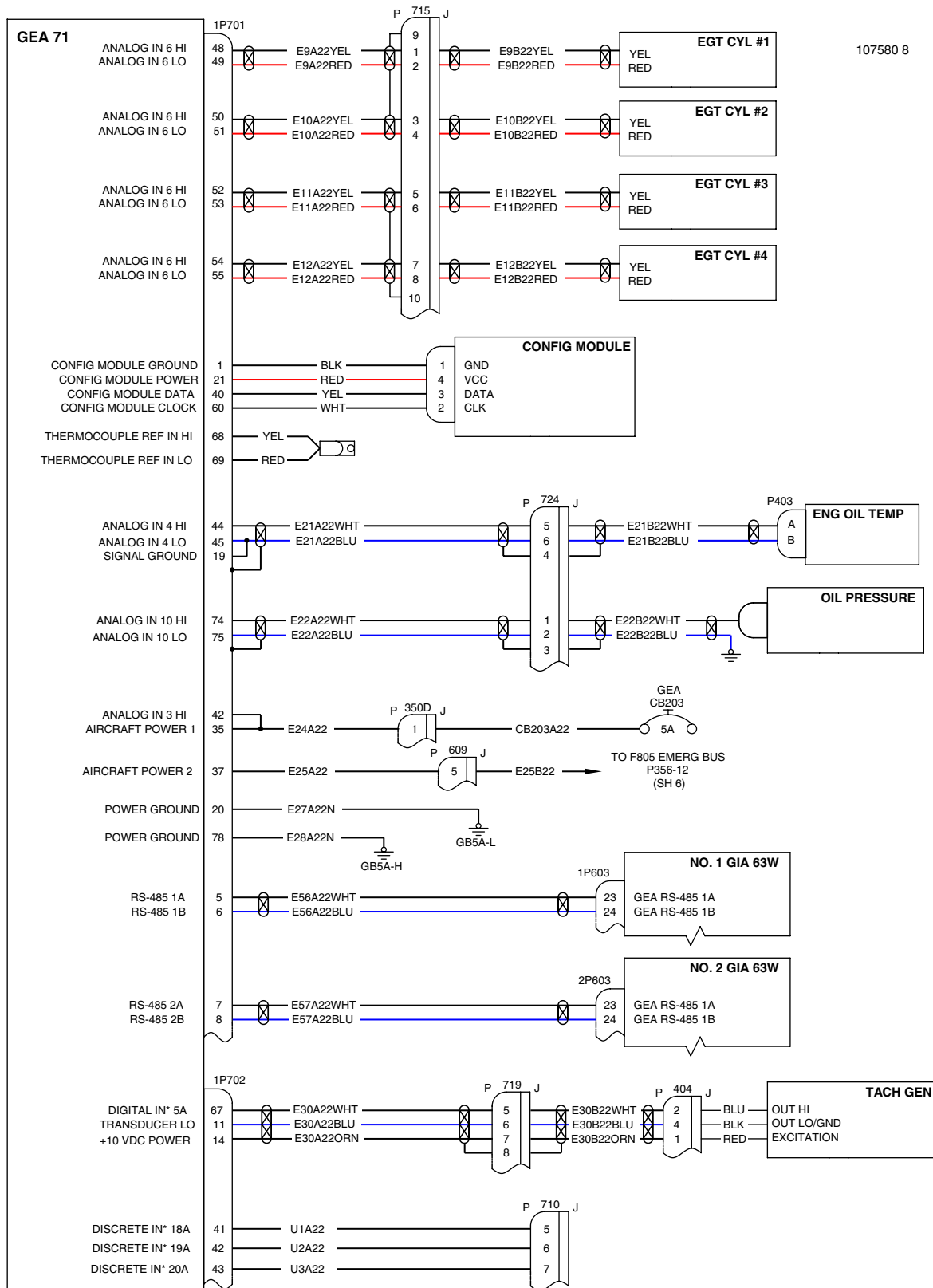
101902 U 8



Effectivity with Avidyne Entegra

Data Acquisition Unit (DAU)
Figure 1 (Sheet 2 of 2)

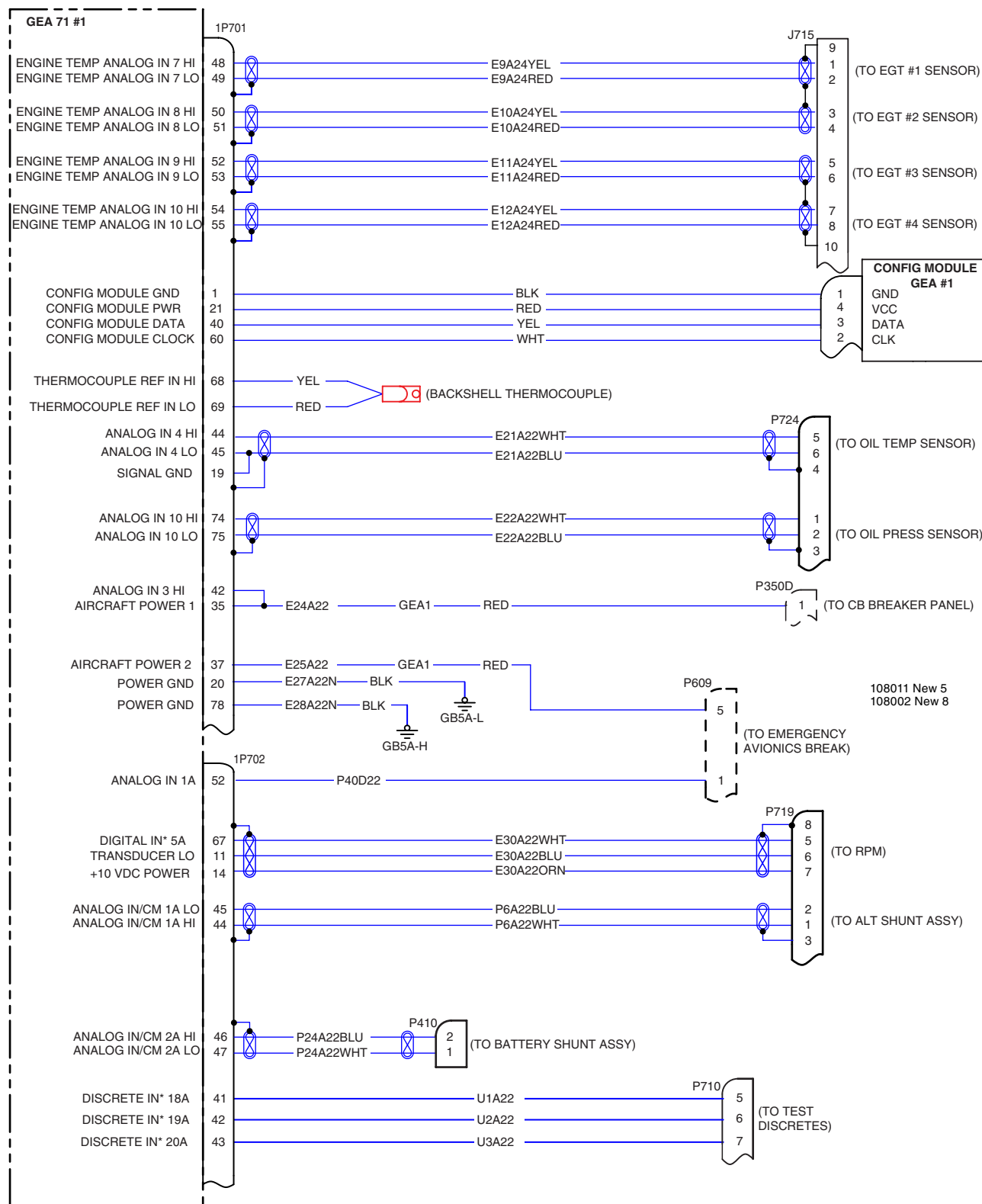
**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Engine Sensors
Figure 2 (Sheet 1 of 4)

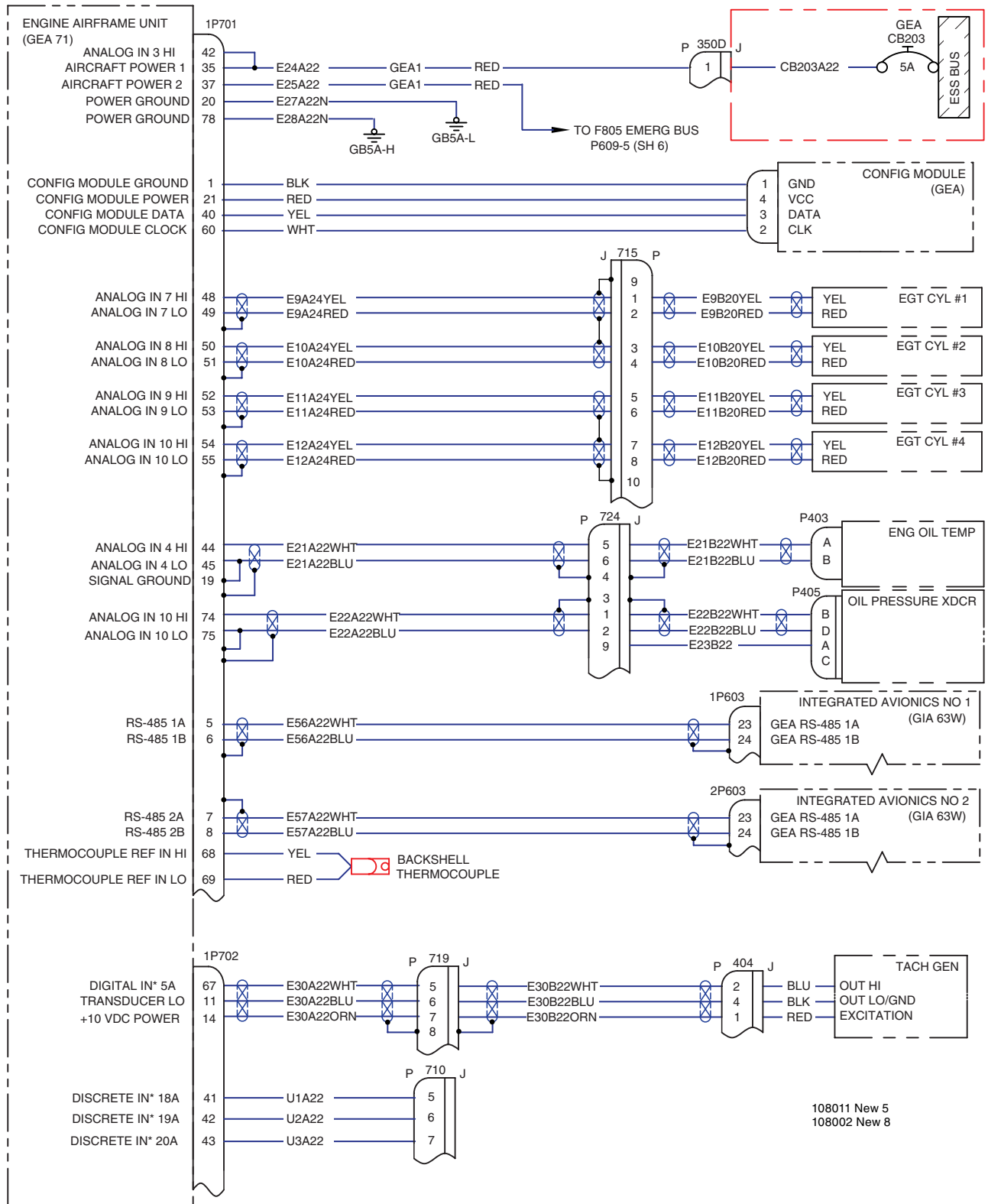
Effectivity
with Garmin G1000

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



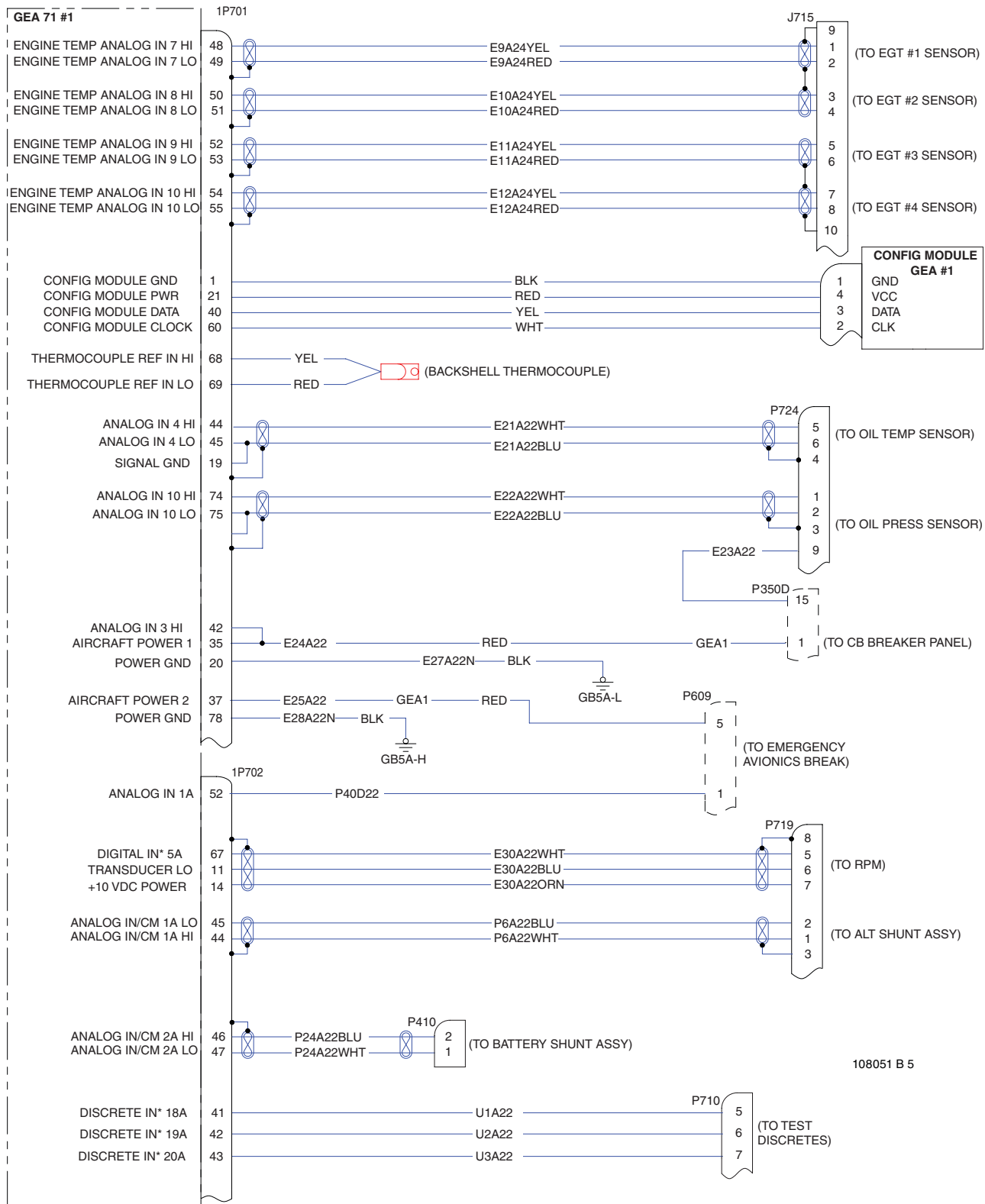
Engine Sensors
Figure 2 (Sheet 2 of 4)

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



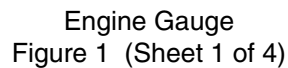
Engine Sensors
Figure 2 (sheet 3 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL



Engine Sensors
Figure 2 (sheet 4 of 4)

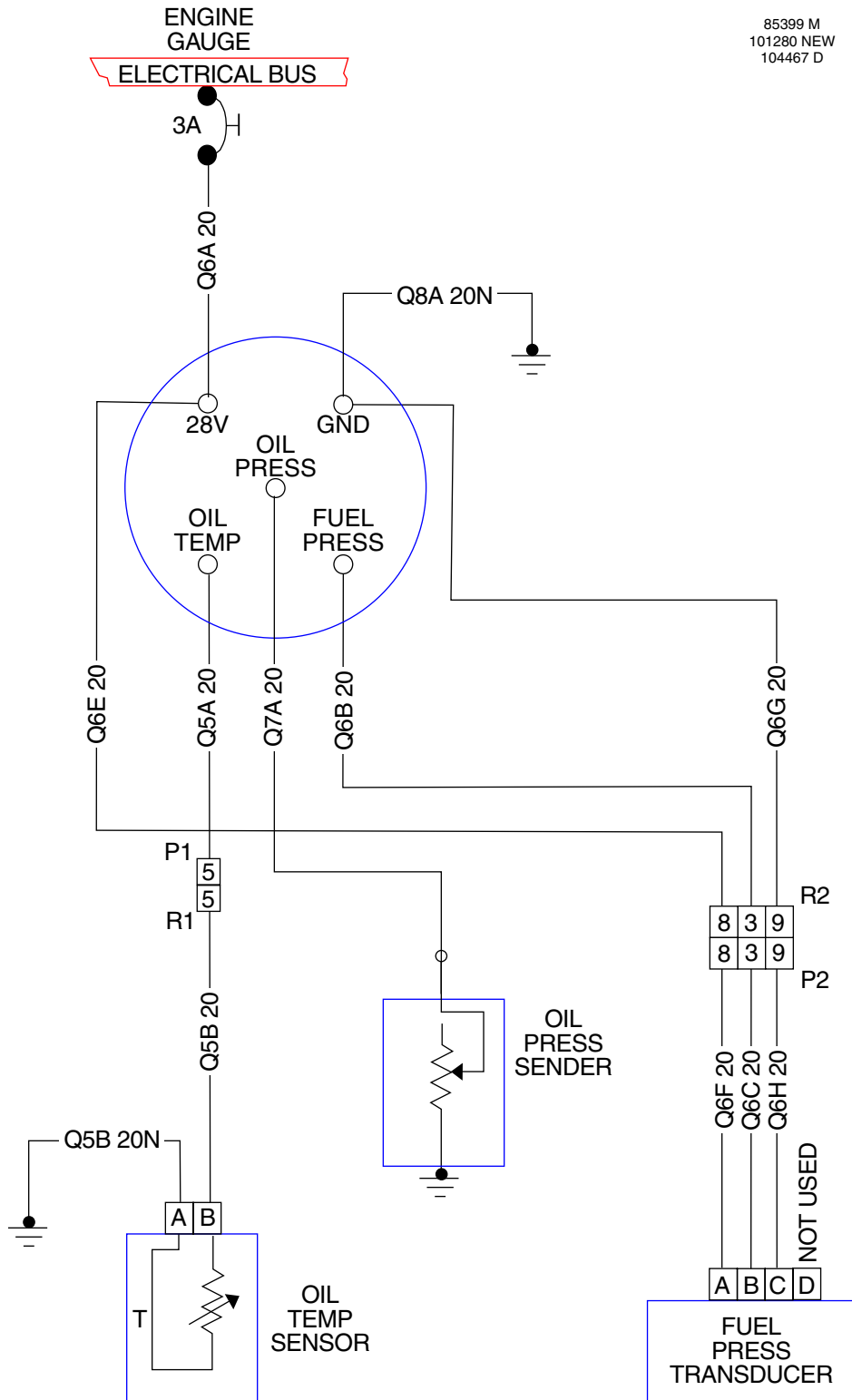
85399 M



91-79-30 **PAGE 1**
Nov 15/17

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D

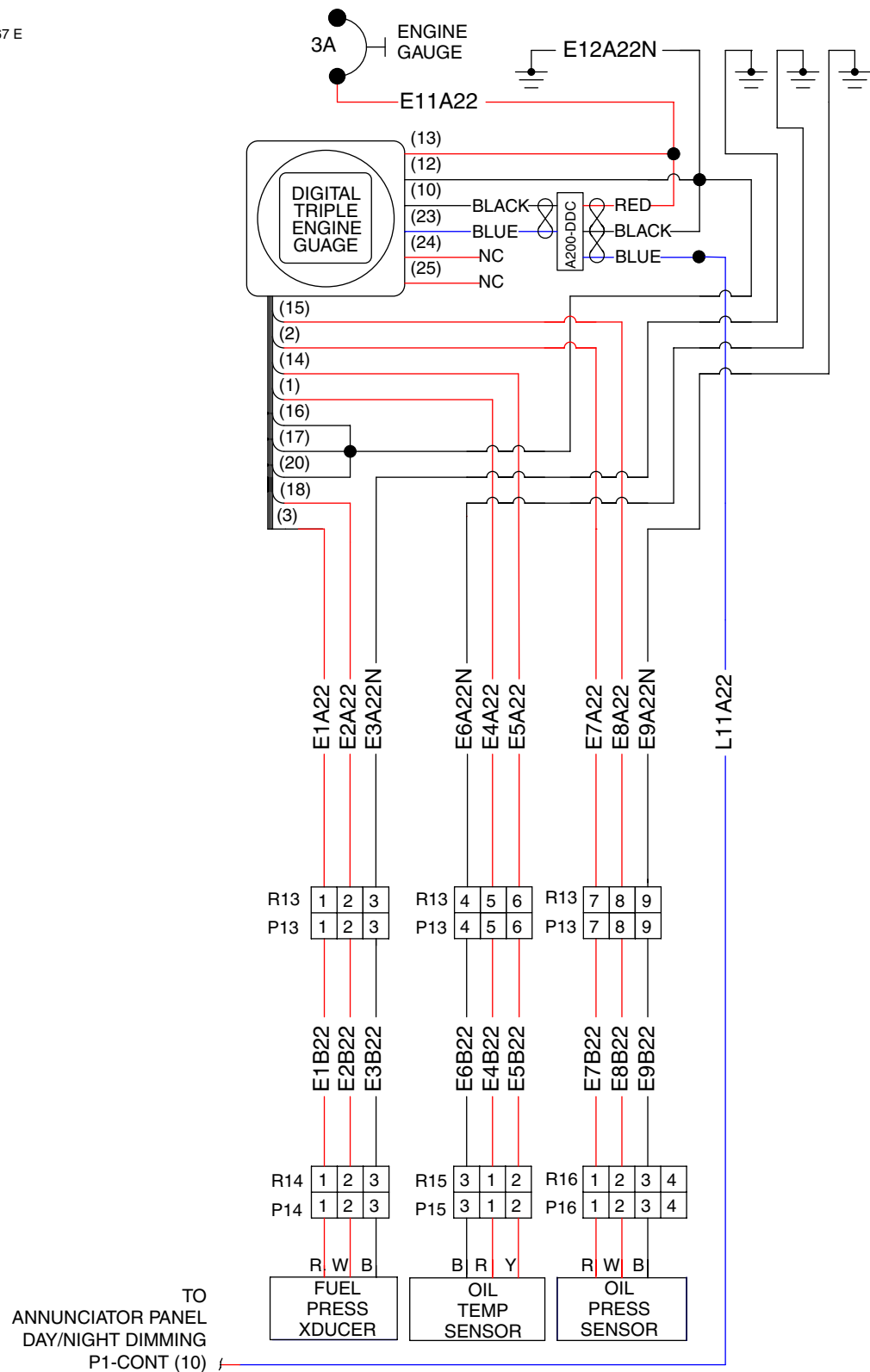


Effectivity
Standard or Garmin G500
2843028 thru 2843823

Engine Gauge
Figure 1 (Sheet 2 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

104467 E

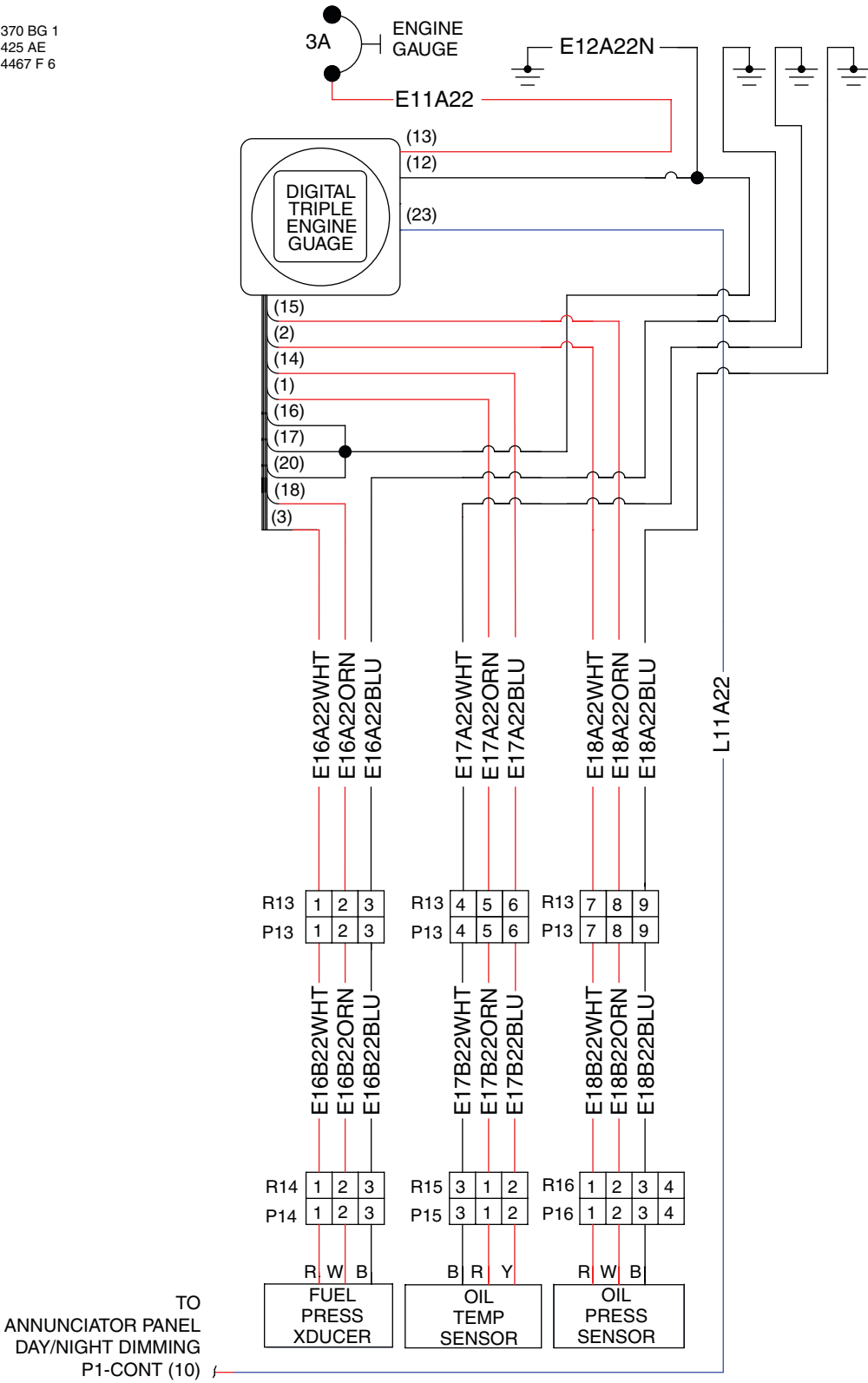


Engine Gauge
Figure 1 (Sheet 3 of 4)

Effectivity
Standard or Garmin G500
2843824-2843899

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85370 BG 1
85425 AE
104467 F 6

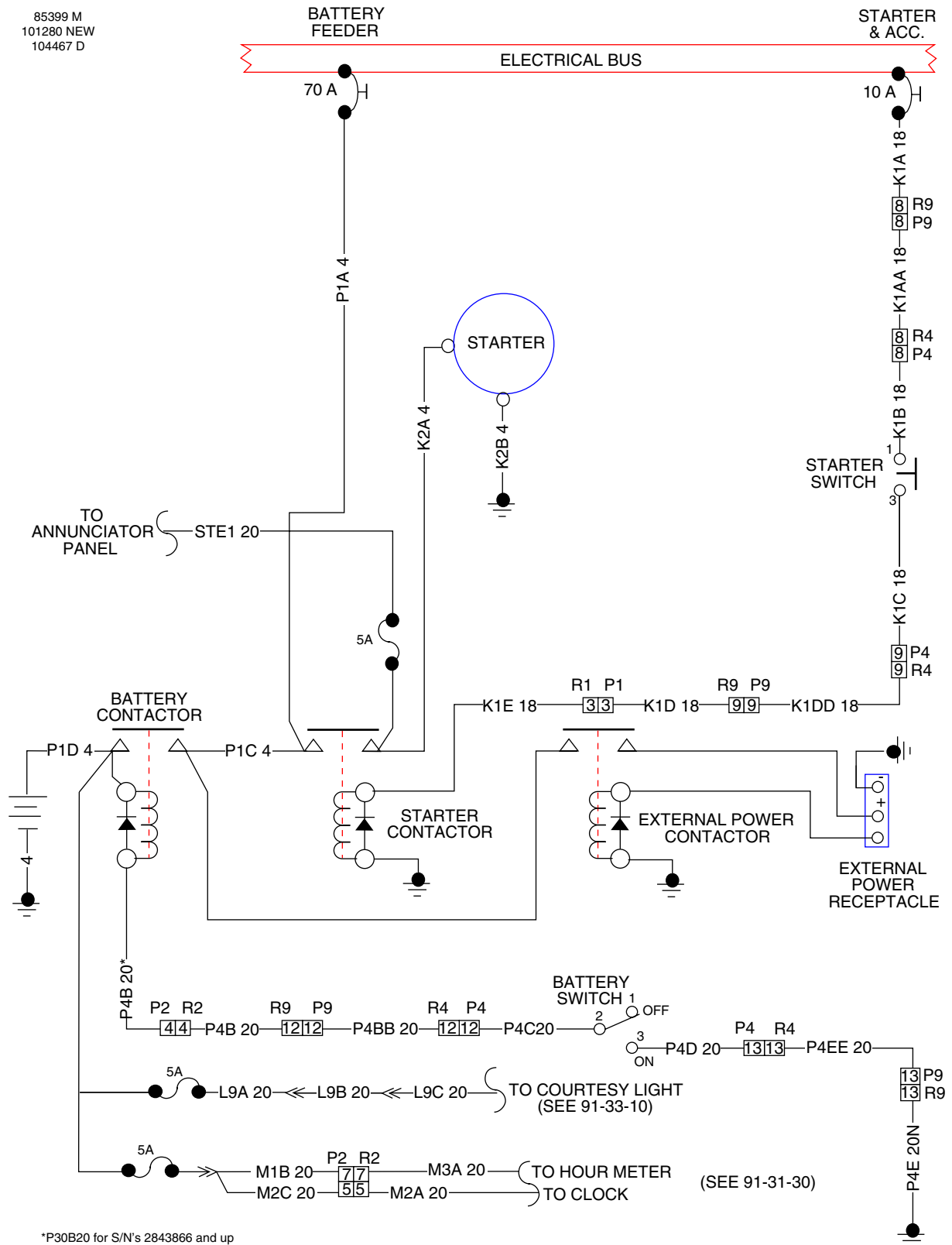


Effectivity
Standard or Garmin G500
2843900 and up

Engine Gauge
Figure 1 (Sheet 4 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

85399 M
101280 NEW
104467 D



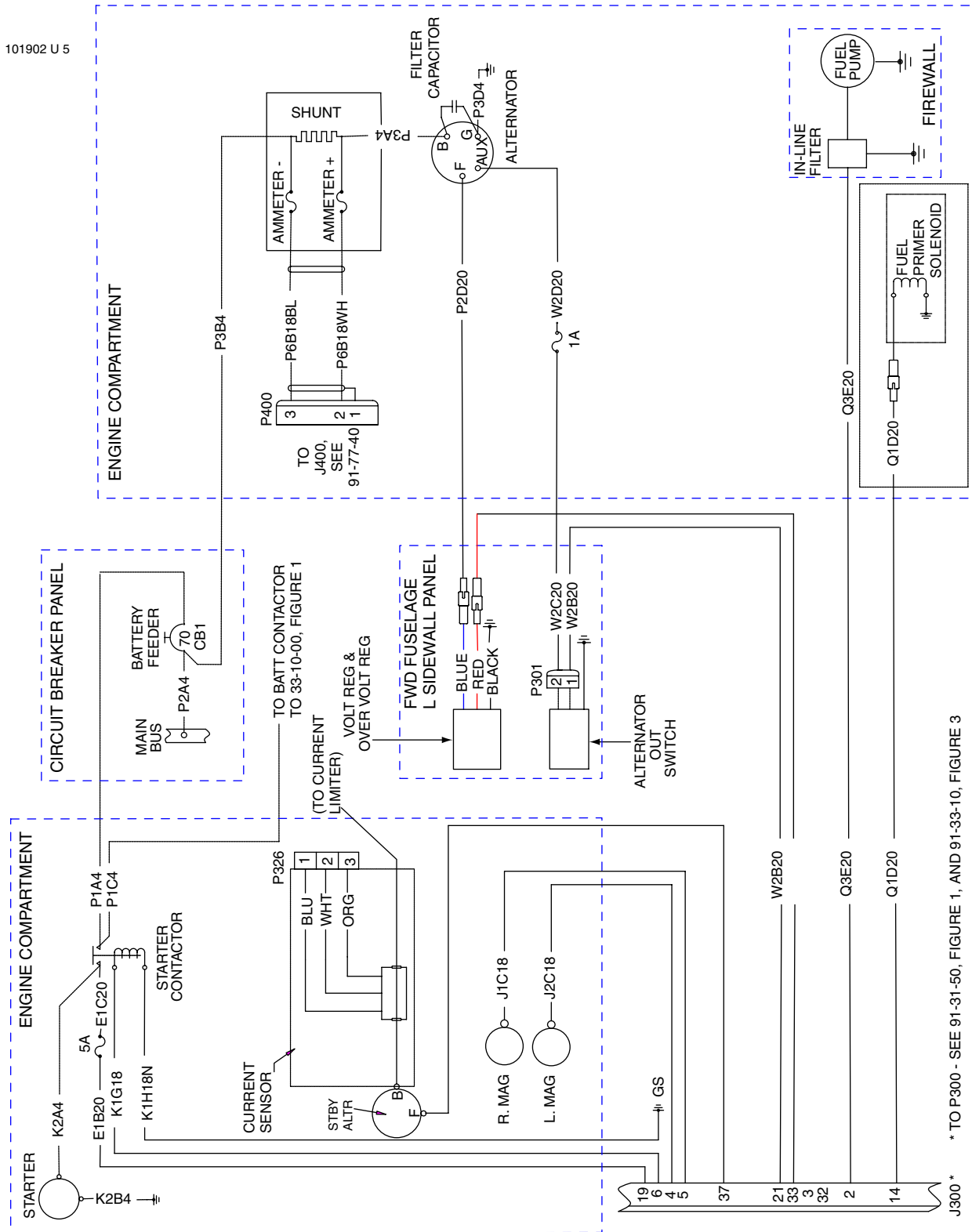
*P30B20 for S/N's 2843866 and up

Starter
Figure 1 (Sheet 1 of 4)

Effectivity
with Garmin G1000
2843866 and up

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

101902 U 5

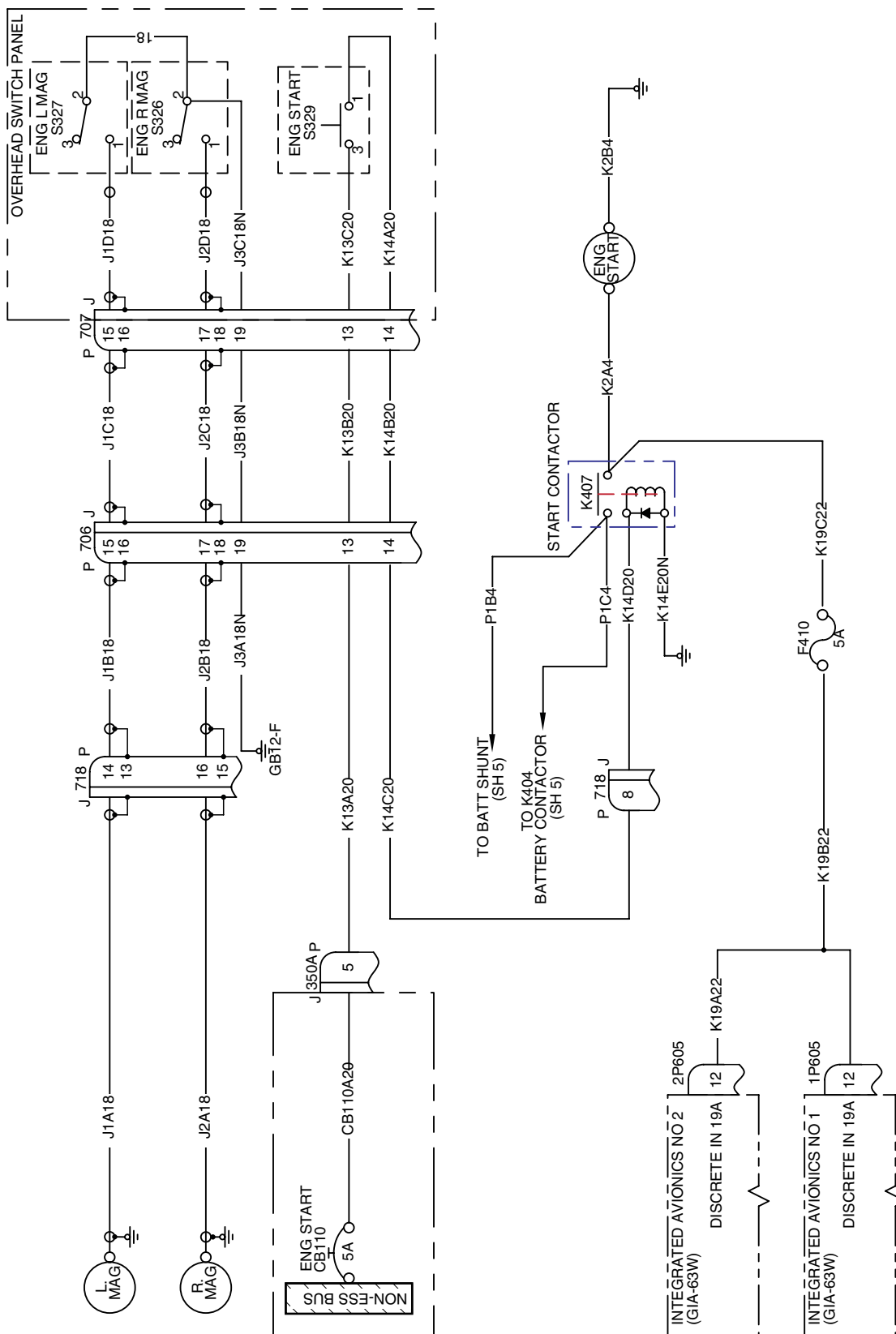


* TO P300 - SEE 91-31-50, FIGURE 1, AND 91-33-10, FIGURE 3

Effectivity with Avidyne Entegra

Starter
Figure 1 (Sheet 2 of 4)

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

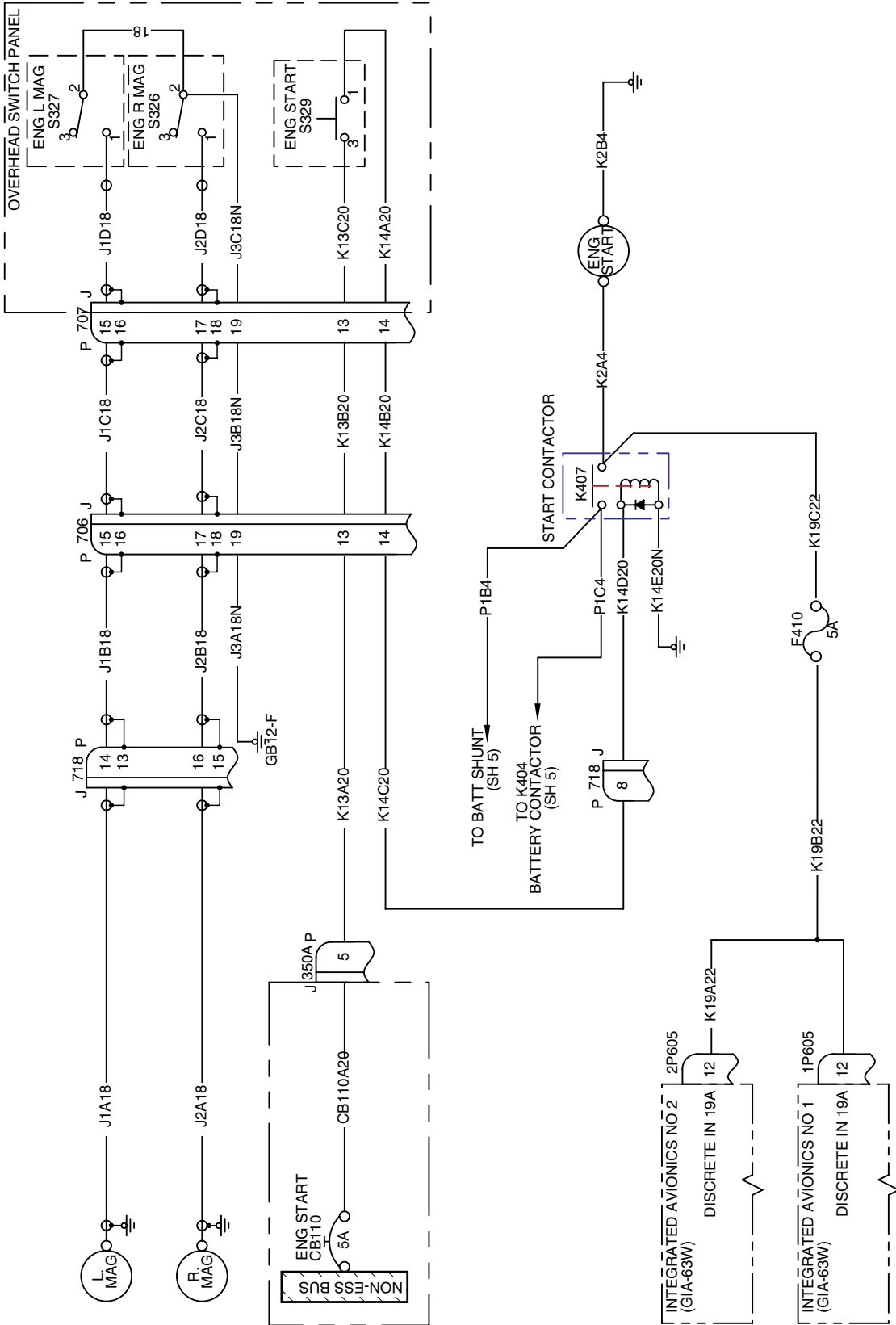


Starter

Figure 1 (Sheet 3 of 4)

107580 9

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**



Starter
1 (Sheet 4 of 4)

108002 NEW 9

**PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL**

WIRING

Airplanes equipped with Garmin GFC 700 Automatic Flight Control Systems have additional EMI shielding on some harness assemblies. If repair is required, see EMI Shielding in 20-97-00.

PIPER AIRCRAFT, INC.
PA-28-181, ARCHER III
MAINTENANCE MANUAL

— END —