Apollo®
Model GX55 GPS
Installation Manual

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HISTORY OF REVISIONS

Revision	Date	Description
--	6/13/97	Initial release Word 6.0a document
-01	11/17/97	Update for Ver 2.0 Nav software.
-02	3/4/99	Update for Ver 3.0 Nav software
-02a	5/9/00	Add new extended data and SL30 output messages
-03	7/2/01	Add autopilot roll steering data and changes for GX SW Ver 3.3

IMPORTANT NOTE

"The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install this article on or within a specific type or class of aircraft to determine that the aircraft operating conditions are within TSO standards. The article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the Administrator."

Source: FAA TSO-C129

ORDERING INFORMATION

To receive additional copies of this publication, order part # **560-0960-03,** *Apollo GX55 GPS Installation Manual*.

REFERENCE PUBLICATIONS

Following are other publications referenced in this guide.

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SECTION 1 - INTRODUCTION

ABOUT THIS MANUAL

This manual describes the installation of the Apollo GX55 GPS unit. It is intended for use by persons certified by the Federal Aviation Administration (FAA) to install aircraft navigation devices. It includes installation and checkout procedures for the GX55 unit to standards described in FAA advisory circular AC 20-138.

Section 1	Provides an **introduction** to the Apollo GX55 unit. TSO certification information is also included in this section.
Section 2	Includes **installation** and checkout procedures.
Section 3	Includes complete **specifications**.
Section 4	Includes **limitations** for the equipment and installation.
Appendix A	Includes **troubleshooting** information.
Appendix B	Includes **periodic maintenance** requirements.
Appendix C	Includes the **environmental qualification form**.
Appendix D	Includes information on **accessories**.
Appendix E	Includes **serial data specifications**.
Appendix F	Includes **retrofit installation instructions**.

APOLLO GX55 DESCRIPTION

The Apollo GX55 GPS is a TSO-C129, Class A2 GPS supplemental navigation receiver for IFR en route and terminal operation. The unit features a moving map display and a database provided by means of a plug-in data card for convenience in changing and updating the database.

In addition to providing faster and more accurate answers to your navigation questions, the Apollo GX55 GPS is designed to make upgrading your navigation system easier. It is a plug compatible, slide in replacement for earlier II Morrow navigation units such as the 602, 604, 612, 618, and 800 Loran receivers and the 819 and 820 GPS receiver.

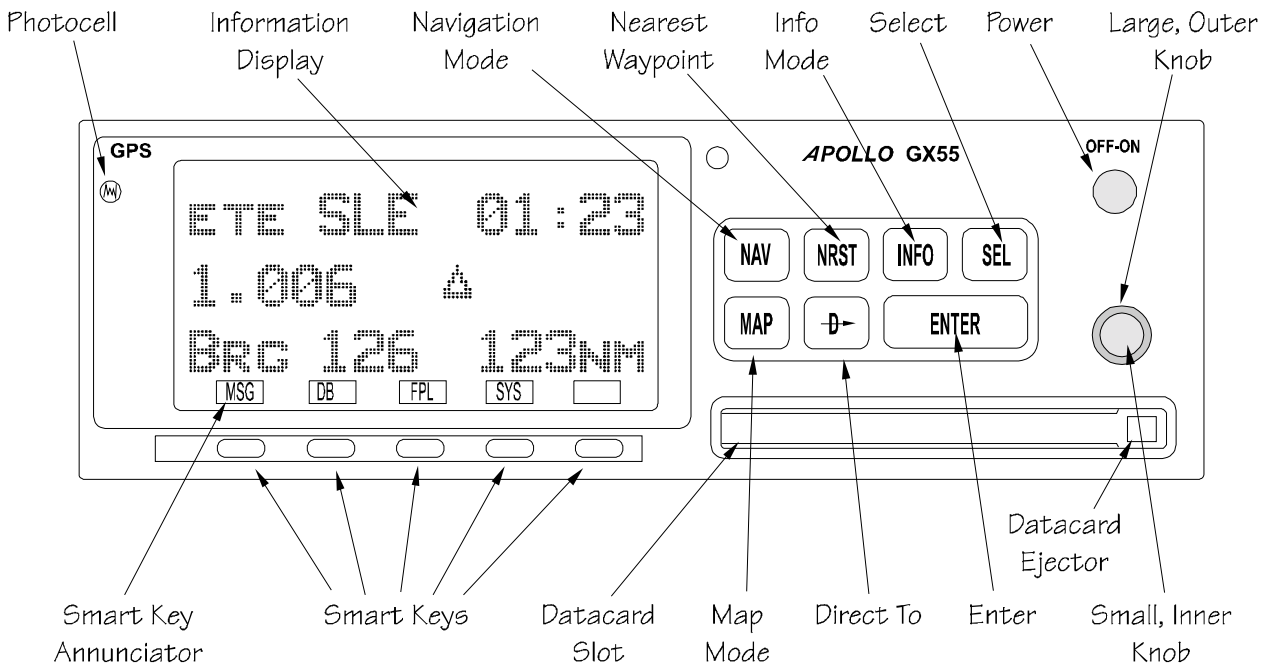


Figure 1 GX55 Front Panel

FEATURES

The GPS navigation features for the GX55 GPS include:

- High resolution, daylight readable graphics display
- Automatic display intensity
- Back-lit buttons
- Simple “Direct-To” navigation
- Datacard database for easy user update and replacement
- Nearest waypoint search (includes airports, VORs, NDBs, intersections, and user waypoints)
- Remote waypoint search
- Navigation displays -
  - Lat/Lon to 0.01 minute
  - Bearing and distance to waypoint
  - Ground speed and track angle
  - Desired track and distance between waypoints
  - Cross track error with numeric and graphic CDI
  - Display of the “TO” waypoint ident
  - ETE and ETA to the “TO” and destination waypoints
  - Altitude (from altitude encoder/converter input)
  - Minimum safe altitude and en route safe altitude information
- Map Displays
  - Full screen map with bearing, distance to waypoint, and zoom level

  - Split screen map with distance, speed, bearing, track, crosstrack error, To waypoint, and zoom level
  - Smart key, 1 button map declutter, Tri-state
  - On map waypoint selection for information, direct-to nomination
  - Track up, desired track up, and magnetic north up options
  - Runway diagrams and runway names displayed
  - 5nm ATC rings around airports with control towers
  - Airspaces displayed by sector or outer boundary
  - Airspace display controllable by type
  - Approach preview page
  - Route line displayed
- Automatic waypoint sequencing
- Built-in simulator for trip planning and training
- User definable navigation pages with auto sequencing
- 30 flight plans of 20 legs each
- 500 user waypoints created by lat/lon or by radial/distance from a reference waypoint
- User selectable units -
  - nm, miles, or km for distance displays
  - knots or mph for speed displays
  - feet or meters for altitude displays
- Real time clock (time and date) in UTC
- Countdown timer
- Flight timer
- Automatic or manual magnetic variation
- Parallel track offset
- Alerts for -
  - Loss of navigation data
  - Arrival at waypoint
  - Special use airspace
- Full range input supply voltage

SYSTEM CONFIGURATIONS

The GX55 can be installed in several configurations based upon individual requirements. This includes VFR or IFR GPS navigation. This section defines the minimum requirements.

VFR GPS NAVIGATION INSTALLATION

When installed for VFR operation, the GX55 requires only the following minimal connections.

- an A-33 or A-34 GPS antenna
- power input

The GX55 can also be connected to other external devices such as:

- an external non-numeric indicator, such as a CDI or HSI
- external lamp annunciators including “MSG” and “PTK”
- an autopilot
- a moving map display connected to an RS-232 serial output
- an altitude encoder/converter or air data computer
- an SL40 VHF Comm radio connected to an RS-232 serial output

When the GX55 is installed for VFR, a placard stating “GPS Limited to VFR Use Only” or an FAA approved equivalent statement must be placed next to the primary indicator

IFR GPS NAVIGATION INSTALLATION

When installed for IFR operation, the GX55 requires connections to several external indicators. The minimum connections for IFR operation is as follows.

- an A-33 or A-34 GPS antenna
- power input
- an external non-numeric indicator, such as a CDI or HSI
- external lamp annunciators including “MSG” and “PTK”

The GX55 can also be connected to other external devices such as:

- an autopilot
- a moving map display connected to an RS-232 serial output
- an altitude encoder/converter or air data computer
- an SL40 VHF Comm radio connected to an RS-232 serial output

DATABASE UPDATES

The GX55 utilizes a Flybrary database stored on a standard plug-in memory card for easy updating and replacement. Simply plug in the new datacard to update your existing database or change to a new database.

Contact the II Morrow factory for information on databases available for the GX55.

REGULATORY COMPLIANCE

The Apollo GX55 is designed and tested to meet the following TSOs:
FAA TSO-C129 Class A2 for GPS navigation

The Apollo GX55 comply with the FCC requirements specified in:
CFR 47, Part 15, Radio Frequency Devices, Subpart B, Unintentional Radiators

Note: *Operation of the GX55 connected to a PC is not currently authorized under FCC Part 15 regulations.*

The Apollo GX55 software is designed and tested to RTCA/DO-178B, level C.

Note: Un-authorized changes or modifications to the GX55 may void the compliance to regulatory agency requirements and authorization for continued equipment usage.

UNPACKING THE EQUIPMENT

Carefully unpack the equipment. Visually inspect the package contents for any evidence of shipping damage. Retain all shipping containers and packaging material in case reshipment is necessary.

PACKAGE CONTENTS

As shipped from the II Morrow factory, the Apollo GX55 package includes most items necessary for installation (or retrofit) other than supplies normally available at the installation shop, such as wire and cable ties, and required input and output equipment. The GX55 is supplied in three different configurations; New installations, Loran retrofit, and Flybuddy GPS retrofit. The standard items included in the package for each configuration are listed in Table 1.

OTHER REQUIRED MATERIALS

The GX55 is intended for use with standard aviation accessories. External devices required for various installations are listed in the System Configurations section on page 4. Depending upon the installation, this will include items such as:

- annunciators
- a CDI or HSI

Table 1 Package Contents

Part #	Description	Qty		
Units		New Install	Loran Retrofit	GPS Retrofit
430-6050-200	GX55 GPS			
Install kits	Part number: 424-2007	-200	-250	
162-1008	Right angle coax plug	1		
162-1060	TNC coax connector	1		
162-1063	TNC to BNC right angle adapter		1	
162-3001	14-pin mini ribbon connector	1		
202-0001	Cable tie	2		
202-0005	Tie mount	2		
204-0080	Spacer, nylon, ¾ x ¾ x 0.030		3	
221-0304	3-48 x 1/4 SS pan head Phillips machine screw	2		
221-0400	4-40 x 1/4 SS pan head Phillips machine screw with lock washer	2		
221-0406	4-40 x 3/8 SS pan head Phillips machine screw	2		
229-0608	6-32 x 1/2 SS button head Allen screw	6		
240-0310	#3 SS internally toothed lock washer	2		
240-0410	#4 SS internally toothed lock washer	2		
310-2030	Connector cover	1		
310-2032	Shoulder bushing	2		
418-0047	Mounting frame assy,	1		
998-0048	Hex driver 3/32”	1	1	
Manual kits	Part number: 564-0065-200			
560-0961-xx	GX55 User’s Manual	1		
560-0960-01	GX55 Installation Manual	1		
560-9002	Binder, 5½ x 8½ x ¾, 3 ring	1		
561-0237-xx	GX55 Quick Reference Guide	1		
Accessories				
560-0949-xx or 560-5047-xx	A-33 Installation Guide or A-34 Installation Guide	1		
590-1104 or 590-1112	A-33 GPS Antenna or A-34 GPS Antenna	1		

SECTION 2 - INSTALLATION

This section describes the installation of the GX55 (as a new installation) including mounting, wiring, and connections. A post installation checkout procedure is included at the end of this section. Procedures for installing the GX55 as a retrofit for a II Morrow 602, 604, 612, 618, or Flybuddy 800 Loran or Flybuddy 819 or 820 GPS are given in Appendix F.

PRE-INSTALLATION INFORMATION

Always follow good avionics installation practices per FAA Advisory Circulars (AC) 43.13-1A, 43.13-2A, and AC 20-138, or later FAA approved revisions of these documents.

Follow the installation procedure in this section as it is presented for a successful installation. Read the entire section before beginning the procedure. Perform the post installation checkout before closing the work area in case problems occur.

INSTALLATION OVERVIEW

A successful installation should start with careful planning including determination of mounting location for the GX55, antenna mounting, cable routing, and other required modifications. Once the mounting location has been determined, prepare the mounting frame for installation. It may be easier to complete the wiring harness and attach the connectors to the mounting frame before installing the mounting frame.

INSTALLATION CONSIDERATIONS

MOUNTING CONSIDERATIONS

The GX55 is designed to mount in the avionics stack in the aircraft instrument panel within easy view and reach of the pilot. The standard package includes a mounting frame for ease of mounting, connections, and service of the unit. Allow an additional one-inch clearance to the rear of the mounting frame for connectors and cables.

For typical installations, the GX55 does not require external cooling. When mounting the unit, ensure that a clearance of 1/8 to 1/4 inch exists between avionics units to allow for air circulation.

MINIMUM SYSTEM CONFIGURATION

The minimum system configuration and external connection requirements are described in the section on page 4.

ALTITUDE ENCODER/CONVERTER INPUT

The GX55 includes an altitude input, which is used by the GPS RAIM calculations as well as providing for altitude assist functions such as altitude preset and hold and 3D airspace alerts.

The GX55 altitude input can be connected from either an altitude encoder/converter or an air data computer. The minimum requirements for the altitude input are listed in the specifications on page 23.

EQUIPMENT MOUNTING

Once the cable assemblies have been made, attach the 14-pin mini ribbon and coaxial cable connectors to the rear of the mounting frame as illustrated in Figure 2. Route the wiring bundle as appropriate. The connectors should be attached to the mounting frame before installing the frame in the instrument panel. Connect the shield grounds directly to the rear of the mounting frame.

Once the cable assemblies are complete and the connectors are attached to the mounting frame, install the mounting frame assembly in the instrument panel. Be sure to use low profile head screws so the unit will slide in and out freely. Attach the front of the mounting frame to the instrument panel. Use support brackets to attach the rear of the frame to the aircraft.

To install the GX55 slide the unit chassis into the mounting frame. Ensure that the coax connector and the 14-pin ribbon cable connector on the back of the GX55 align with the mating connectors in the mounting tube, then use the 3/32 hex tool to tighten (clockwise) the locking screw. Refer also to the antenna installation information on page 10.

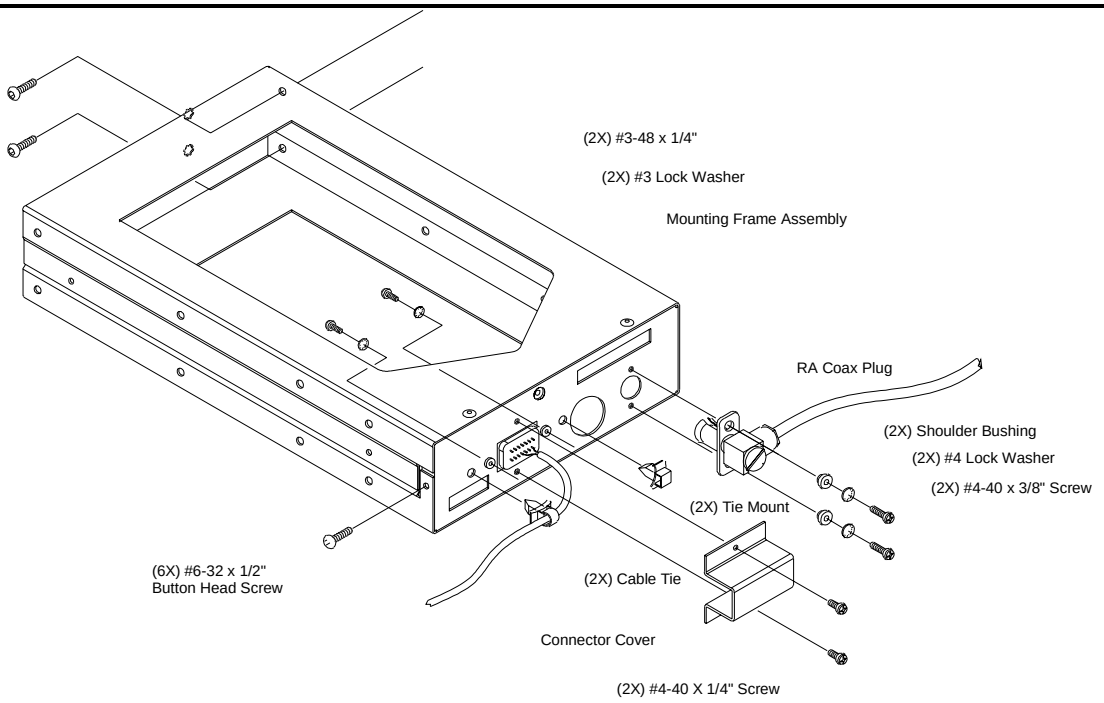


Figure 2 Mounting Frame Assembly

To remove the unit from the mounting frame, use the hex tool and turn the locking screw counter-clockwise. Then pull the GX55 out of the mounting frame. No special extraction tools are required.

ELECTRICAL CONNECTIONS

Wiring necessary for installation of the GX55 includes the rear panel electrical connections and the antenna cable placement. The 14 pin mini ribbon connector and coax connector must be assembled to the frame and may be wired before or after being installed in the mounting frame. The recommended connecting wire size for the 14-pin connector is 20 to 24 AWG. Wiring diagrams are included in Figure 5 (power and avionics) and Figure 6 (serial interface).

POWER

The GX55 power input is internally fused at 3 amps. A separate 2 amp (maximum) circuit breaker or fuse should be installed for downline overload or short circuit protection. Make the power connections to the unit using 20 AWG wire.

> ***Note:*** *Circuits should be protected in accordance with guidelines in AC 43.13-1A, chapter 11, section 2, paragraph 429.*

AVIONICS OUTPUTS

The GX55 includes avionics outputs for CDI/HSI indicators, autopilot, and annunciators. These outputs are to be connected as appropriate for the particular installation. The CDI/HSI outputs may be connected to a dedicated CDI or HSI or to a shared indicator using an appropriate switching relay. The avionics outputs available are listed in the Avionics Outputs specification on page 23. Connect the annunciator outputs to lamp indicators as described in the specifications. The minimum connections required for different installations are listed in the System Configurations on page 4.

If a switching relay is used to make connections to a shared CDI/HSI, it should be a minimum of an eight pole relay box with an appropriate selector switch with annunciation. Since the GX55 is not approved for approach operation, the ILS enable signal (see Figure 5) from a connected ILS receiver can be connected to automatically switch the indicators back to the nav receiver when an ILS frequency is selected.

SERIAL INTERFACE

The GX55 includes an RS-232 serial port for making optional connections. The serial port can be used for connecting to such devices as the Apollo SL40 comm, a moving map display, multi-function display, autopilot, VHF Nav/Com, Fuel Air/Data computer, or an altitude encoder/converter. Serial output connections should be limited to no more than three external units.

When making connections to the GX55, use a three conductor shielded cable. Make RxD, TxD, and signal ground connections to the 14-pin connector. Connect the shield(s) to the rear of the mounting frame. The shield leads must be < 1.25 inches. See Figure 6.

Complete serial interface specifications are included in Appendix E.

ANTENNA INSTALLATION AND CONNECTIONS

GPS ANTENNA

The mounting location and cable connections for the GPS antenna are very important. The antenna should be mounted no closer than two feet from VHF comm transmitter antennas, six inches from other antennas emitting less than 25 watts, and two feet from higher power antennas. Special care should be taken to ensure that the GPS antenna is not mounted in close proximity to antennas that may emit harmonic interference at the L1 frequency of 1575.42 MHz. Refer to the antenna installation manual for installation instructions.

The connectors are included in the installation kit, and are intended for use with RG-142B size coax cable. If using a different diameter coax, alternative connectors may be required. Assembly instructions for the connectors are included in Figure 3 and Figure 4. RG-142B cable can be used as long as the length is less than 20 feet. For longer lengths, use a low loss 50Ω coax.

Suggestion: *Temporarily locate the GPS antenna with coax connected to the GX55 and check the GPS performance as described in the GPS Operation and Position test in the Post Installation Checkout on page 17. Once a suitable location has been verified, then permanently mount the antenna.*

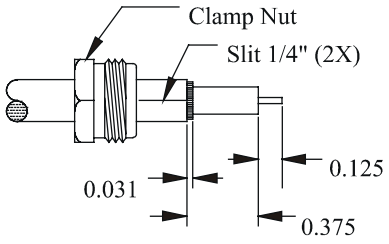
Note: *If using a GPS antenna that was already on the aircraft, or if mounting the antenna closer than two feet from a comm antenna, conduct the GPS Operation and Position test in the Post Installation Checkout on page 17. If the GX55 passes the test, then moving the antenna is not necessary.*

Once the antenna mounting position has been prepared, route the coax cable from the antenna to the GX55. Proper selection of coax cable and assembly of connectors is critical to GPS signal performance. The cable loss from the antenna to the GX55 should be limited to a maximum of 4 dB. Minimize the coax length for optimum performance and **DO NOT** coil excess cable. Leave only enough for service loops. The coaxial connectors and adapters, such as TNC to BNC, add additional loss to the cable and should be considered when computing the maximum 4 dB loss. A typical loss of 0.2dB can be used for each connection. The typical cable loss for 20 feet of RG-142B coax with a connector on each end is 4 dB.

During the post-installation checkout, susceptibility to harmonics of VHF comm transmitters will be evaluated. If problems arise, then better isolation, or distance, may be required between the GPS and comm antennas, or a notch filter may be installed in series with the antenna coax of the VHF comm transceiver to reduce or eliminate the harmonic interference. A notch filter for this use (part #162-1059) is available from II Morrow.

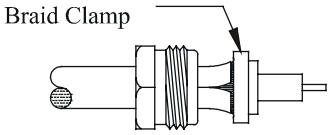
If a VHF comm transmitter causes problems with the GPS on the selected frequencies as listed in the post-installation checkout, the problem may be due to the ELT. This can be verified by disconnecting the ELT antenna coax at the ELT unit. If the ELT is found to cause the problem, then contact the ELT manufacturer or replace the ELT.

Step 1.



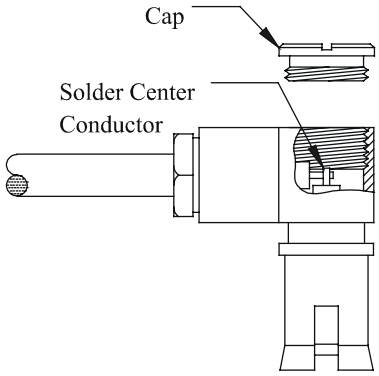
- Slide clamp nut over coax.
- Strip coax as illustrated.
- Cut two 1/4" slits in jacket 180 degrees apart.

Step 2.



- Slide braid clamp over end of coax and under the braid.

Step 3.

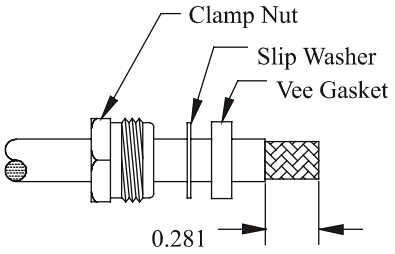


- Insert coax with braid clamp into connector and tighten clamp nut securely.
- Solder the center conductor of the coax to the contact as illustrated.
- Attach the cap and secure tightly.

Assembly instructions for right angle connector part #162-1008

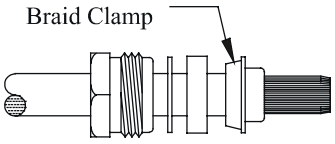
Figure 3 Rear Coax Connector Assembly

Step 1.



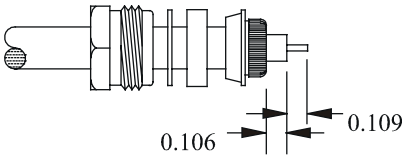
- Slide clamp nut, slip washer, and vee gasket over end of coax.
- Strip jacket as illustrated.

Step 2.



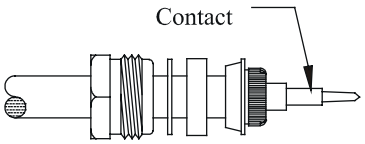
- Comb out braid.
- Slip braid clamp on and push back against coax jacket.

Step 3.



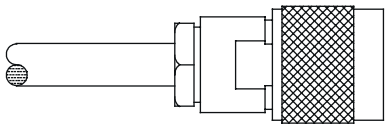
- Fold back braid wires as illustrated, trim to proper length, and form over clamp.
- Strip center conductor as illustrated.

Step 4.



- Solder center conductor to contact.

Step 5.



- Insert coax with braid clamp and contact into connector and tighten the clamp nut securely.

Assembly instructions for straight TNC connector part #162-1060

Figure 4 TNC Coax Connector Assembly

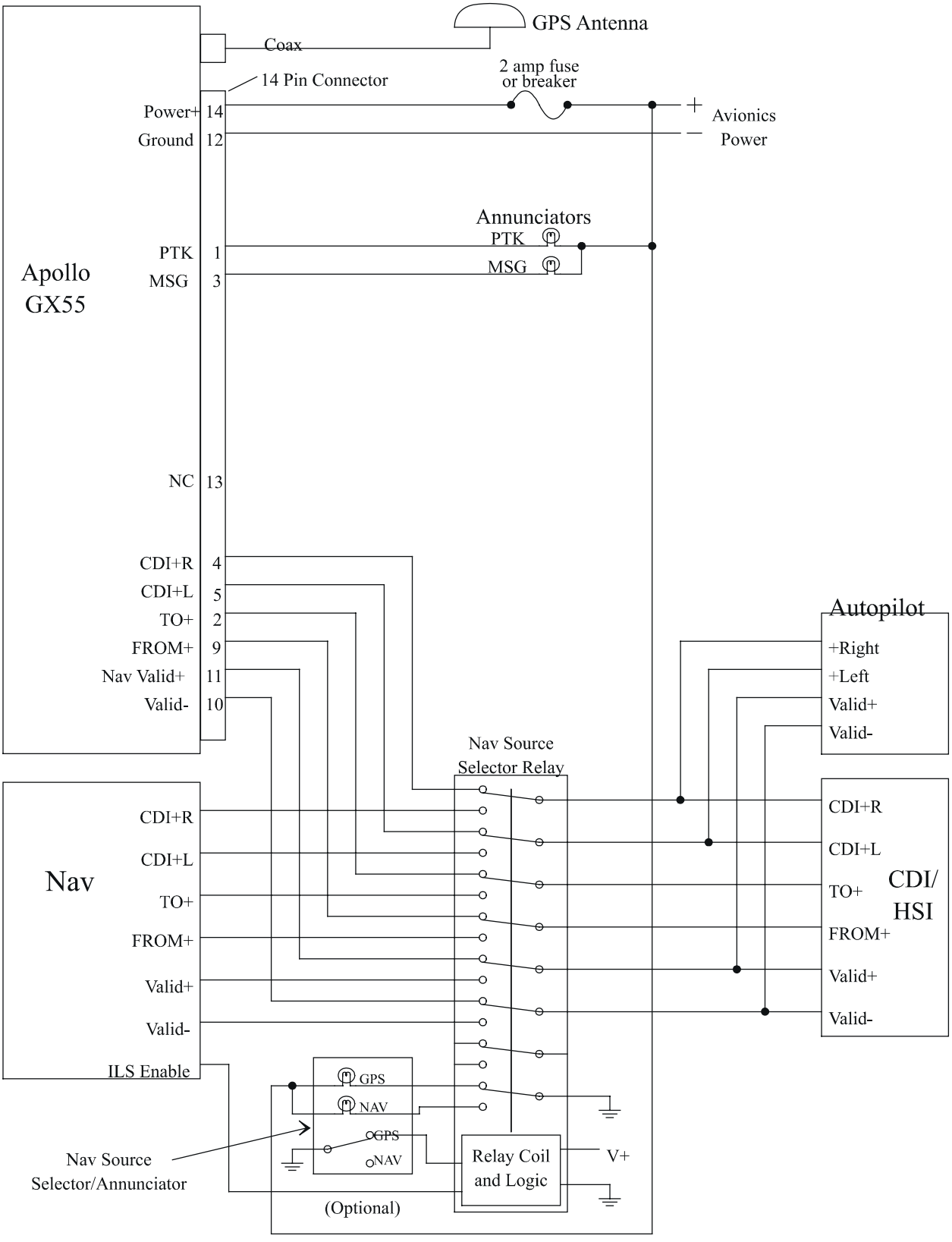
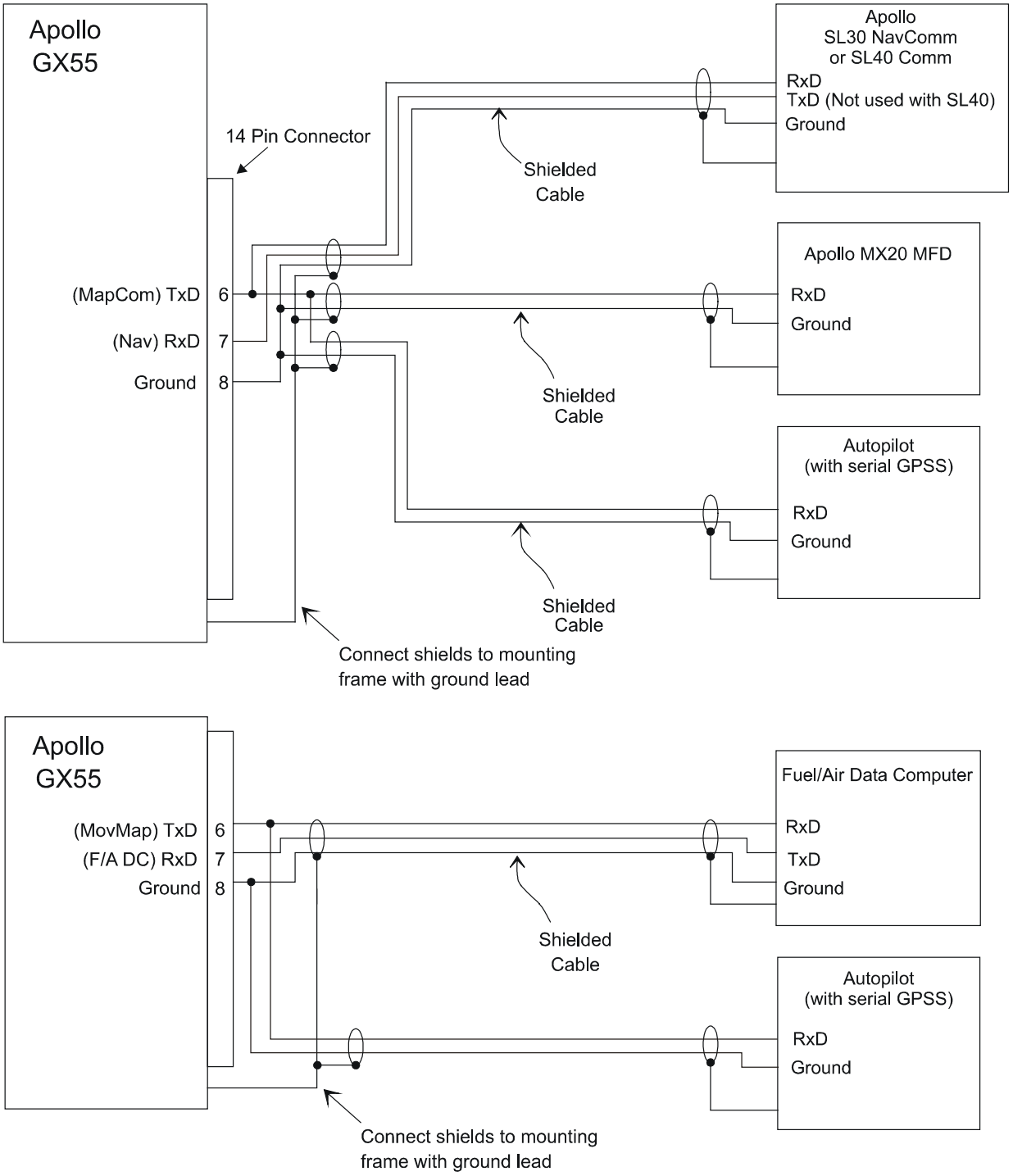


Figure 5 Power and Avionics Connections



Notes:
1. Use shielded cable for all RS-232 interface connections.
2. Serial outputs should be limited to three devices.
3. Connect cable shields to the rear of the mounting frame with pigtails < 1.25 inches.
4. Connect shields to chassis ground at both ends of each shielded cable.
5. Other units, such as a comm radio or a moving map display, can be connected with the fuel/air data computer.

Figure 6 RS-232 Serial Connections

POST INSTALLATION CHECKOUT

Once the unit is installed, complete the checkout procedure to verify proper operation. Refer to the User's Guide for operating instructions.

The steps that are not applicable to a particular installation may be skipped. A checkout log sheet is included on page **Error! Bookmark not defined.** to fill out during the checkout procedure. Make a photocopy of the log sheet for ease of use if desired.

The checkout procedure is broken into several groups. The GPS Navigation Checkout and the Final System Check should be completed with the aircraft moved clear of hangers and other structures.

Mounting / Wiring Check

Verify that all cables are properly secured and shields are connected to the rear of the mounting frame. Check the movement of the aircraft controls to verify that there is no interference.

TEST MODE CHECKOUT AND SETUP

The GX55 has a built-in test mode to simplify the checkout. To operate the GX55 in the test mode, hold down the leftmost and rightmost "smart keys" while switching on the power. To return to normal operation, switch the power off, then back on.

Avionics Outputs

Check the avionics output connections by using the test mode as follows. Rotate the LARGE knob to select each test.

1. Using the "CDI TRIANGLE" page, rotate the SMALL knob to check left, mid, and right.
2. Using the "TO/FROM FLAG" page, rotate the SMALL knob to check the Off, To, and From outputs.
3. Using the "LAMP OUTPUTS" page, rotate the SMALL knob to check all the connected annunciators.
4. Using the "VALID FLAG PAGES" page, rotate the SMALL knob to check all the connected valid flag outputs.

Installation Configuration

The GX55 must be configured to match the operation supported by the installation. This includes IFR, VFR, and SAR operation selections.

1. In test mode, rotate the LARGE knob to the "OPTIONS:" page.
2. Press SEL, rotate the SMALL knob to select VFR (IFR? NO), IFR (IFR? YES), SAR (SAR? YES) (Search and Rescue) operation, then press ENT when complete.

Note: *Make sure that all installation requirements are complete for the selected operation. Refer the System Configurations section on page 4 for installation requirements.*

Serial Interface Configuration

The GX55 RS-232 serial port can be configured for several different input and output formats. To select the serial port configurations:

1. In test mode, rotate the LARGE knob to the serial port configuration "CH RX TX" page.
2. Press SEL (the selection field will start flashing), rotate the SMALL knob to make the desired selection, then press ENT when complete.

The available serial port configurations are included in Appendix E. An example of typical settings is shown below.

CH	Rx	Tx
1:	NAV	MapCom

Other Test Mode Pages

The GX55 test mode includes several other pages that are not necessary for the checkout. They are as follows:

"TO TEST DISPLAY" ..... Can be used to check the GX55 front panel displays by pressing ENTER.

"TEST CONTROLS"..... Can be used to check the GX55 front panel controls. Press each button and rotate the SMALL knob to check the controls.

"OPERATION STATUS:"..... Factory use only. Should be set to "STANDARD."

"SYSTEM INITIALIZATION"..... Factory use only. Used to reset all internal memory including user waypoints, flight plans, and configuration data.

Caution: Using the system initialization function will cause all user data to be lost!

"SERIAL PORT TEST" ..... Factory use only. Used to check the RS-232 serial port.

"Extended MovMap Data Format" ..... Enable/Disable extended moving map data. This should be enabled when interfaced with an Apollo MX20 or Sandel HSI. Call Customer Service if you have questions.

"A/D CHANNEL 1:" ..... Factory use only. Used to check internal circuits and display voltages.

"EEPROM BYTE 0000:"..... Factory use only. Used to display eeprom setup memory.

GPS NAVIGATION CHECKOUT

Switch on the GX55 in the normal mode to complete this part of the checkout. The GX55 will go through a sequence of self-tests.

The GX55 requires a "seed" position, time, and date for the GPS sensor to know which satellites to look for. Once this is entered, it will be saved and updated automatically. If the GX55 is moved a great distance without being turned on, the seed position may have to be re-entered.

Entering the seed position:

1. During the display startup sequence, press SEL when the position page is displayed.
2. Rotate the LARGE knob to move the cursor to different fields, rotate the SMALL knob to input the correct lat/lon, and then press ENT to save the changes.

The seed position can also be input with reference to a waypoint. Refer to the user's manual for instructions.

Entering the time and date:

1. Press the SYS button, rotate the LARGE knob to display the "SYSTEM INFO" page, and press ENTER.
2. Press SEL, rotate the LARGE knob to move the cursor to different fields, rotate the SMALL knob to input the correct time, and then press ENT to save the changes.

GPS Operation and Position

This checkout is to be completed with the aircraft moved away from hangars and other structures that may obstruct the view of the satellites.

1. Turn on the GX55 and allow the unit to acquire a position. All other avionics should be turned off for this part of the test.
2. Check the position using the lat/lon navigation page. Press the NAV button and rotate the LARGE knob to the lat/lon page. The lat/lon should agree with a known reference position.
3. Check the signal reception using the GPS sensor displays in the System mode. Press the SYS button, rotate the LARGE knob to the "GPS SENSOR:" page, and press ENT. Then rotate the SMALL knob to display the GPS info. Typical signal levels are 50 or better.
4. Turn on other avionics one at a time and check the GPS signal reception to make sure it is not affected.
5. Check for VHF comm transmitter interference. This must be completed on all IFR installations.
   a) Verify that 5 to 8 satellites are in DATA and the NAV flag is out of view.
   b) Tune the comm to 121.150 MHz and transmit for 20 seconds.
   c) Verify that the position is not lost.
   d) Repeat for additional frequencies as follows.

121.125 MHz	131.225 MHz
121.175 MHz	131.250 MHz
121.200 MHz	131.275 MHz
121.225 MHz	131.300 MHz
121.250 MHz	131.325 MHz
131.200 MHz	131.350 MHz

   e) Repeat for each comm transmitter.
   f) If the GX55 is susceptible to VHF comm transmitter interference, then better isolation, or distance, may be required between the GPS and VHF antennas. With some comm transmitters, a notch filter may be required in series with the VHF comm antenna coax at the rear of the comm unit.

Note: *Older VHF comm transmitters may emit higher levels of harmonic interference causing greater problems and may be more difficult to deal with.*

INTERFACE CHECKS

The interfaces to other equipment, such as the SL40 or a moving map display, should be checked. Make sure the other equipment is connected and switched on. The Apollo GX must have a seed position and be navigating to a waypoint to check the interfaces.

To check the serial data output connections, verify the data from the GX55 can be displayed on the other units, such as a moving map display or the SL40.

Apollo SL30

When your Apollo GX is connected to and configured to communicate with an Apollo SL30 Nav/Comm, your Apollo GX will exchange information with the SL30. If the following steps do not perform correctly, check the electrical connections and configuration setup.

1. In the Apollo GX, view Tuned Station page in Nav mode. The tuned station identifier and frequency sent by the Apollo SL30 should be displayed.
2. In the Apollo SL30, Distance, Speed, and Time information for the selected station should be displayed. The Distance, Speed, and Time information for the selected station shown in the SL30 ensures that the GX and SL30 are communicating.

If your Apollo SL30 is only configured to receive, use the following steps for checkout.

1. In the SL30, press **NAV**.
2. Then, press **SEL**.
3. Note the you should see the three to four letter designator for either the Localizer for the destination or the closest VOR to your current position.

Apollo SL40

The Remote function will allow the SL40 to access the airport frequency database in an Apollo GPS receiver. If the following steps do not perform correctly, check the electrical connections and configuration setup.

1. In the SL40, press **RCL** to view the Remote (REM) frequencies.
2. Then, turn the **SMALL**, inner knob to display the available frequencies. The waypoint type and frequency are displayed.

Apollo MX20

The Apollo MX20 must be installed and setup according to its installation manual. If the following steps do not perform correctly, check the electrical connections and configuration setup.

1. Check the System Info page on the MX20 to verify that the data is available to each port and that it is being processed properly.
2. The GX55 Flight plan will be displayed on the MX20 on the FPL page.

Altitude Encoder and Fuel Air/Data Computer

In the System Mode check the Misc Sensors function. If the following steps do not show the correct information, check the electrical connections and configuration setup.

1. Press **SYS**. Turn the **LARGE** knob to Misc Sensors and press **ENTER**.
2. The Encoding Altimeter value will be displayed.
3. Turn the **LARGE** knob to view Air Data Info.
4. Turn the **LARGE** knob to view Fuel Info.

FINAL SYSTEM CHECK

The GX55 GPS navigation functions should be complete at this time. The final check includes checking database, entering a direct to waypoint, and checking the navigation functions. Start with the unit turned on and operating in the normal mode. Refer to the user's manual for operating instructions.

1. Verify a valid position is displayed.
2. Check the database to ensure it is for the right coverage area and is not expired. To check the database:
   a) Press SYS, rotate the LARGE knob to the "SYSTEM INFO" page, and press ENT.
   b) Rotate the LARGE knob to the Apollo GX "SOFTWARE VERSION" page
   c) Rotate the SMALL knob to display the database information. The database name, expiration date, and version will be displayed.
3. Enter a direct to waypoint. Press the DIRECT-TO button, use the LARGE and SMALL knobs to select a nearby waypoint, then press ENT. Or use the nearest search function to select a waypoint.
4. Verify the bearing and distance to the selected waypoint.

If the database is expired, or if a different coverage area is needed, contact the II Morrow factory for an update.

APOLLO GX55 POST-INSTALLATION CHECKOUT LOG Date: ___/___/___
By: _____

CONFIGURATION INFORMATION:

❑ GX55 GPS 430-6050-2__ Mod ____ Serial # _____
GPS Antenna: _____

TEST MODE CHECKOUT AND SETUP:

Avionics Outputs:

❑ [❑ N/A] CDI (left, mid, right)
❑ [❑ N/A] TO/FROM flag (OFF, TO, FROM)
❑ [❑ N/A] External annunciators
❑ [❑ N/A] Valid flag

Installation Configuration:

IFR?: ❑ Yes ❑ No
SAR?: ❑ Yes ❑ No

Serial Interface Configuration:

_____

GPS NAVIGATION CHECKOUT:

❑ Seed position entered
❑ Time, date entered

GPS Operation:

❑ Position check
❑ Signal reception check
❑ Interference from other avionics checked
❑ VHF Comm interference check

Interface Checks:

❑ [❑ N/A] RS-232 output checked
  ❑ [❑ N/A] Map/Mapcom
❑ [❑ N/A] RS-232 input checked
  ❑ [❑ N/A] Altitude Encoder
  ❑ [❑ N/A] NAV
  ❑ [❑ N/A] F/ADC

FINAL SYSTEM CHECK:

❑ Database checked
❑ Direct To waypoint entered
❑ Navigation data checked
❑ DST data acceptable*

* Note: Distance, Time, and speed information sent through the serial port must be displayed in an acceptable manner. See Limitations in Sec. 4.

COMMENTS:

SECTION 3 - SPECIFICATIONS

This section includes detailed electrical, physical, environmental, and performance specifications for the Apollo GX55.

ELECTRICAL

Input voltage	10VDC to 40VDC, reverse polarity protected
Input current (GPS navigation input)	500 mA typical, 750 mA max. at 13.75VDC 250 mA typical, 375 mA max. at 27.5VDC
Input power (GPS navigation input)	7 watts typical
Internal fuses	3 amp fast blow, surface mount on board. The fuse must be replaced with the same or equivalent type (contact the factory).
Memory backup	Internal lithium battery with a service life of approximately 4 to 6 years. See Appendix B for battery replacement instructions.

Note: *The GX55 will provide a message on the display when the lithium battery is running low and needs replacement.*

PHYSICAL

Height	2.00 inches (5.08 cm)
Width	6.25 inches (15.88 cm)
Depth	11.125 inches (28.26 cm) behind panel, including mounting frame and connectors
Weight (with mounting frame)	2.6 lb. (1.179 kg)

ENVIRONMENTAL

The Apollo GX55 units are designed and tested to meet appropriate categories of RTCA/DO-160C. The Environmental Qualification Form is included in Appendix C.

Operating temperature	-20°C to +55°C
Storage temperature	-55°C to +85°C
Temperature variation	2°C per minute
Humidity	95% at 50°C for 6 hours (2 day cycle)
Maximum altitude	55,000 feet
Cooling	Not required

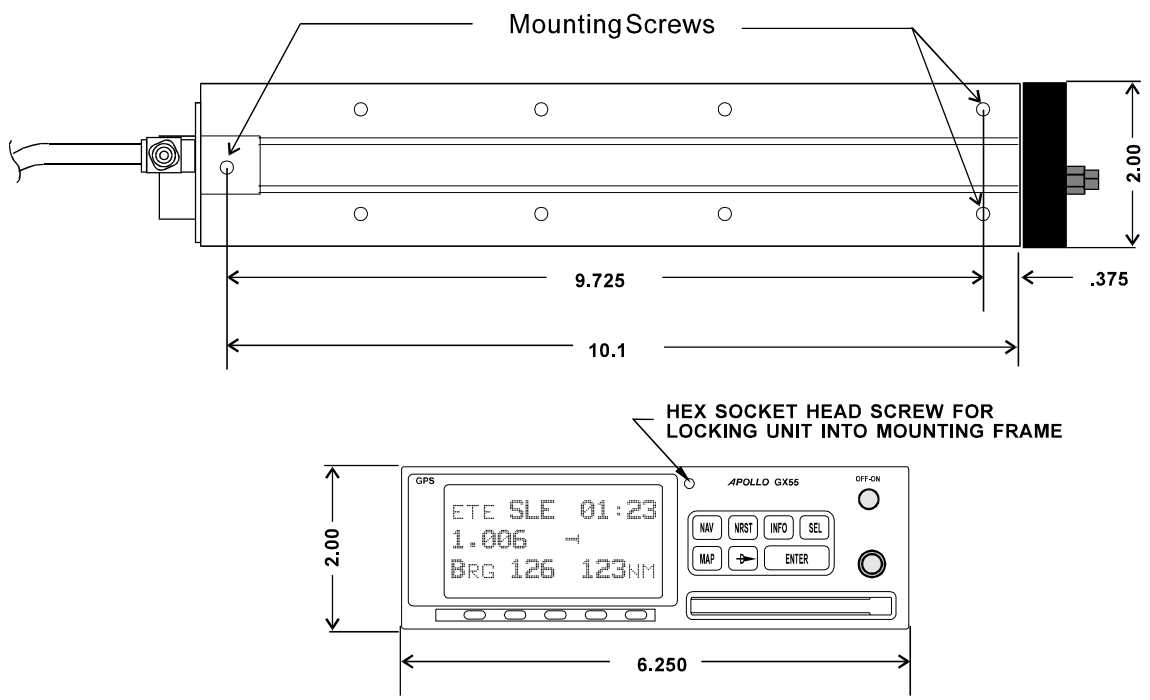


Figure 7 Unit Dimensions

GPS RECEIVER PERFORMANCE

Number of channels	8
Frequency	1575.42 MHz L1, C/A code
Sensitivity (acquisition)	-135 dBm
Sensitivity (drop lock)	-142 dBm
Dynamic range	> 20 dB
Lat/Lon position accuracy	15 meters RMS typical 25 meters, SEP, without SA 100 meters 2DRMS with SA
Velocity	1000 knots maximum
Acceleration	4G maximum
TTFF (time to first fix)	25 seconds typical with current almanac, position, time, and ephemeris 55 seconds typical with current almanac, position, and time
Reacquisition	2.5 seconds typical
Position update interval	1 second typical
Datum	WGS-84

AVIONICS OUTPUTS

CDI L/R deviation ..... ±150 mv full scale, will drive up to 200 ohm load

TO/OFF/FROM flag..... ±250 mv, TO/FROM indication, will drive up to 200 ohm load

Nav valid flag ..... +300 mv for valid indication, will drive up to 100 ohm load

Annunciators ..... Open collector outputs capable of sinking up to 400 mA for turning ON annunciator lamps

- MSG (message) ON indicates message(s) active
- PTK (parallel track) ON indicates parallel track is enabled

ALTITUDE INPUT REQUIREMENTS

The altitude data can be input to the GX55 from either an altitude encoder or serializer, or from an air data computer.

The minimum requirements of the optional altitude data input are as follows:
Input method..... RS-232

Type..... pressure altitude

Resolution..... 100 feet minimum

Accuracy..... must meet accuracy requirements of TSO-C88a

Note: *Installation of altitude input equipment, such as encoders, must be done according to their installation instructions.*

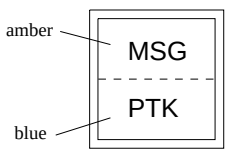
Note: *Specifications for the RS-232 altitude input are included on page 39.*

ANNUNCIATOR REQUIREMENTS

The GX55 installed for IFR operation require the following annunciators. Each annunciator should include a lamp of the proper voltage for the installation.

Legend	Color
MSG	amber
PTK	blue or white

The annunciators should be connected to a suitable dimming circuit for night time operation.



Example Annunciators

ANTENNA REQUIREMENTS

GPS ANTENNA

The GX55 is designed to operate properly with the A-33 or A-34 GPS antennas. The GX55 supplies 5 volts for the antenna.

SERIAL INTERFACE

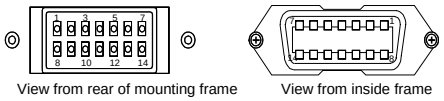
RS-232 .....Defined in Appendix E - Serial Interface Specifications

REAR CONNECTOR PINOUT

The GX55 includes a 14-pin rear panel connector for the GPS navigation connections. The pinout for the connector is listed in the following table.

Table 2 Navigation Interface Connector Pinout

Pin #	I/O	Connection	Function
1	O	PTK	Parallel track annunciator output
2	O	+ TO	+ To flag output
3	O	Message	Message annunciator output
4	O	CDI + Right	CDI + Right output
5	O	CDI + Left	CDI + Left output
6	O	TxD	RS-232 serial data output
7	I	RxD	RS-232 serial data input
8	O	Serial ground	RS-232 signal ground
9	O	+ FROM	+ From flag output
10	O	valid flag ground	signal ground connection
11	O	Nav + valid	Nav low level valid flag output
12	I	Power ground	main power ground input
13	--	reserved	do not connect
14	I	Power +	main DC power input



View from rear of mounting frame View from inside frame

SECTION 4 - LIMITATIONS

INSTALLATION

For minimum equipment and connections required for VFR or IFR installations, refer to the System Configurations on page 4.

Installations of the GX55 GPS navigation functions are to be made in accordance with AC 20-138, or other appropriate FAA approved guidelines.

When the GX55 is installed for VFR, a placard stating “GPS Limited to VFR Use Only” or an FAA approved equivalent statement must be placed next to the primary indicator.

When Nav tuning is provided to the GX, the GX will output Distance, Speed, and Time (DST) information on the MapCom output. It is the installers responsibility to ensure that this information is displayed in an acceptable fashion. For instance, in an installation where two Apollo SL30’s are integrated in the system, it is not appropriate to display DST information on the SL30 that is not providing the tuning information. Apollo SL30 SW version 1.2, or later, provides the means for disabling the display of DST information.

OPERATIONAL

An approved Aircraft Flight Manual Supplement is required for IFR installations.

Note: *A sample AFM supplement is available from II Morrow listing operational limitations.*

NOTES

APPENDIX A - TROUBLESHOOTING

This appendix provides information to assist troubleshooting if problems occur after completing the installation. Use Table 3 to assist in troubleshooting.

Table 3 Troubleshooting Guide

Problem	Cause	Solution
The GX55 does not power on.	The unit is not getting power.	Check power connections, breakers, and main avionics switch.
The GX55 does not compute a position.	Not receiving signals, or incorrect seed position, time, and date.	Make sure a correct position and time/date have been entered. Check the GPS antenna connections. Make sure the aircraft is clear of hangers, buildings, trees, etc.
The GPS signal levels are very low.	Improper antenna installation or coax routing.	Check GPS antenna installation, connections, and cable routing. The GPS antenna must be mounted on the top of the aircraft.
	Antenna shaded from satellites.	Make sure the aircraft is clear of hangers, buildings, trees, etc.
	RF interference at 1575.42MHz from VHF comm.	Move GPS antenna further from the comm antenna. Add a 1575.42 MHz notch filter in comm coax. Fix or replace the comm. Disconnect the ELT antenna coax.
GPS signal levels drop when avionics are turned on.	Noise interference from other avionics.	Turn all avionics off, then turn on each piece one at a time to isolate the source of the interference. Route cable and antenna away from sources of interference.
Display flashes from power interrupts	Caused by momentary power interruptions in the electrical system, typically due to changing power sources.	This is normal operation of the GX55, operation recovers in approximately 1 second. If it becomes a problem, check the electrical system.

CONTACTING THE FACTORY FOR ASSISTANCE

If the Apollo GX55 unit fails to operate despite troubleshooting efforts, contact the II Morrow factory for assistance.

II Morrow Inc.
2345 Turner Rd. SE
Salem, Oregon 97302
USA

Phone (503) 581-8101 or 1-800-525-6726

Be prepared with the following information about the installation:

- Installation configuration (accessories, antenna, ...)
- Model number, part number with mod levels, and serial number
- Software versions
- Description of problem
- Efforts made to isolate the problem
- other installed avionics

APPENDIX B - PERIODIC MAINTENANCE

The GX55 unit is designed to not require any regular general maintenance except as included in this section.

LITHIUM BATTERY REPLACEMENT

The internal keep-alive battery will require replacement after 4 to 6 years. Regular planned replacement is not necessary. The GX55 will display a "low battery" message when replacement is required. Once the low battery message is displayed, the battery should be replaced within 1 to 2 months. If the battery is not replaced, the internal ram memory and the system clock information will be lost.

To replace the battery, remove the GX55 from the aircraft, remove the top cover, and replace the battery. Make sure to insert the battery in the correct polarity. Replace the top cover, re-install the unit in the aircraft, and verify unit operation.

Battery replacement should be done only by the II Morrow factory or by a trained technician.

Note: The battery is to be replaced only with II Morrow part #148-1702, or a II Morrow approved equivalent.

Caution

The battery may explode if mistreated. Risk of fire, explosion, and burns. Do not recharge, disassemble, heat above 100°C, or incinerate.

Dispose of batteries promptly. Keep away from children.

Be sure the battery is inserted in the right direction.

EQUIPMENT CALIBRATION

The GX55 design requires very few adjustments or calibration to be made. In fact, there are **no** internal manual adjustments.

CLEANING THE FRONT PANEL

The front bezel, keypad, and display can be cleaned with a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Care should be taken to avoid scratching the surface of the display.

NOTES

APPENDIX C - ENVIRONMENTAL QUALIFICATIONS

The Apollo GX55 has been tested to the following environmental categories per procedures defined in RTCA/DO-160C.

Environmental Qualification Form		
Model: GX55 Part No: 430-6050-2xx TSO No: TSO-C129 Class A2		Manufacturer: II Morrow Inc. 2345 Turner Road SE Salem, Oregon 97302
Conditions	Section	Description of Conducted Tests
Temperature and Altitude In-flight Loss of Cooling Altitude Decompression Overpressure	4.0 4.5.4 4.6.1 4.6.2 4.6.3	Equipment tested to Category F1 with No cooling required Equipment tested to 55,000 feet Equipment tested to 8K to 55K in < 15 seconds Equipment tested for overpressure
Temperature Variation	5.0	Equipment tested to Category C, 2°C/min
Humidity	6.0	Equipment tested to Category A, standard humidity environment
Operational Shocks and Crash Safety	7	Equipment tested for both operational and crash safety shocks. (Equipment operated normally after the crash safety shocks.)
Vibration	8.0	Equipment tested without shock mounts to Categories B, M, & N
Explosion Proofness	9.0	Equipment identified as Category X, no test required
Waterproofness	10.0	Equipment identified as Category X, no test required
Fluids Susceptibility	11.0	Equipment identified as Category X, no test required
Sand and Dust	12.0	Equipment identified as Category X, no test required
Fungus Resistance	13.0	Equipment identified as Category X, no test required
Salt Spray	14.0	Equipment identified as Category X, no test required
Magnetic Effect	15.0	Equipment is Class Z
Power Input	16.0	Equipment tested to Categories A & B
Voltage Spike	17.0	Equipment tested to Category A
Audio Frequency Conducted Susceptibility - Power Inputs	18.0	Equipment tested to Categories A & B
Induced Signal Susceptibility	19.0	Equipment tested to Category Z
Radio Frequency Susceptibility (Radiated and Conducted)	20	Equipment tested to Category U
Emission of Radio Frequency Energy	21	Equipment tested to Category Z
Lightning Induced Transient Susceptibility	22.0	Equipment tested to - Category A3 for the GPS navigation connections Category A1 for the GPS antenna connector
Lightning Direct Effects	23.0	Equipment identified as Category X, no test required
Icing	24.0	Equipment identified as Category X, no test required
Remarks: Also tested to meet IEC 801-2 / 1984 & 1991 ESD requirements and EN55022 Class B emissions.		

NOTES

APPENDIX D - ACCESSORIES

This appendix includes information on accessory items available for the Apollo GX55. Refer to the information that is provided with those items for complete specifications and installation instructions.

FROM II MORROW

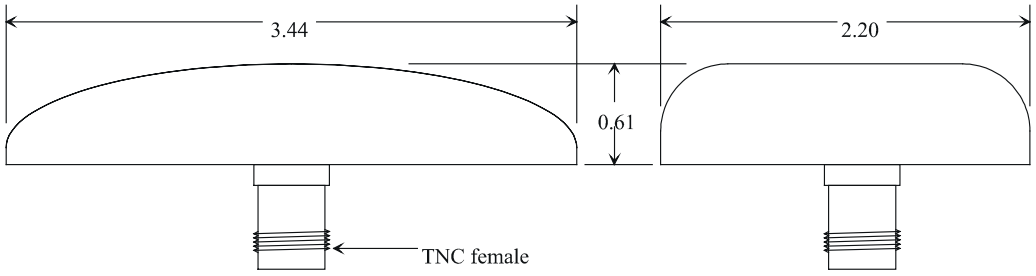
A-33 Antenna

II Morrow Part #:..... 590-1104

Manufacturer: ..... Aero Antenna

Manufacturer #: AT-575-9

The A-33 GPS antenna is a standard accessory item with the GX55. The A-33 includes a built-in preamp with 26 dB gain and has a low profile, low drag radome mounted on a die cast aluminum base. It has a maximum altitude of 55,000 feet and weighs only 3.9 ozs. See the installation manual for the A-33 for complete specifications and installation instructions.



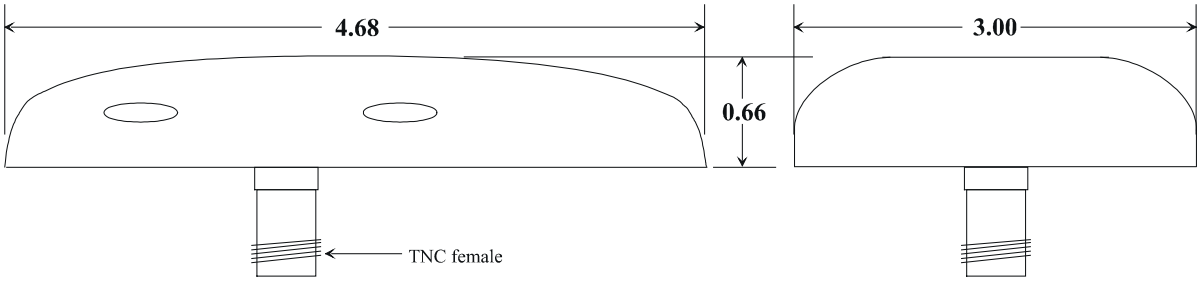
A-34 Antenna

II Morrow Part #:..... 590-1112

Manufacturer: ..... Aero Antenna

Manufacturer #: AT-575-93

The A-34 GPS antenna is a standard accessory item with the GX55. The A-34 includes a built-in preamp and has a low profile, low drag radome mounted on a die cast aluminum base. It has a maximum altitude of 55,000 feet and weighs only 7.0 ozs. See the installation manual for the A-34 for complete specifications and installation instructions. The A-34 mounts in the same footprint as the II Morrow A-16 and A-23 Loran antennas to simplify upgrading.



GX55 Power Cable Assy
II Morrow Part #: 500-4027-00

Manufacturer:.....II Morrow Inc.

The GX55 Power Cable Assy is an optional accessory item used to provide a power input to the GX55 from a DC power supply.

APPENDIX E - SERIAL INTERFACE SPECIFICATIONS

This appendix includes the RS-232 serial port interface specifications.

The RS-232 serial interface configurations supported by the GX55 are listed in Table 4. Instructions for configuring the serial port are included in the checkout procedure on page 15. Serial output connections should be limited to no more than three external units.

Table 4 RS-232 Serial Interface Selections

RX	TX	Comment
NONE	NONE	No input or output
NONE	MOVMAP	Moving map data output. Tested units include the following: EI FP5, JPI, Sandel 3308, Argus 3000, 5000, 7000 and Shadin Digiflow, Miniflow, Microflow. The installer must verify other devices.
NONE	MAPCOM	Moving map data output with SL40 comm data
NAV	MAPCOM	Nav info input of frequency, identifier, and OBS resolver value from Apollo SL30. Moving map data output with SL40 comm data.
ALTENC	NONE	Altitude encoder-converter data input, no output
ALTENC	MOVMAP	Altitude encoder-converter data input, moving map data output
ALTENC	MAPCOM	Altitude encoder-converter data input, moving map data output with SL40 comm data
KEYPAD	NONE	Keypad data input
KEYPAD	MOVMAP	Keypad data input, moving map data output
KEYPAD	MAPCOM	Keypad data input, moving map data output with SL40 comm data
FADC	MOVMAP	Fuel / Airdata input, moving map data output.
PC	SETUP	Used for factory test

MOVING MAP OUTPUT

The format of the moving map data output is as follows. Definitions of the output data is included in Table 5 and Table 6. A sample output message is included in Figure 8.

Baud rate: 9600
Data bits: 8
Stop bits: 1
Parity: ..... none
Output rate: ..... approx. 1 seconds
Message length: ..... variable, approx. 83 to 750 characters

The serial output messages are in the following format.

<STX><id><data><it><id><data><it>...<id><data><it><ETX>

<STX> ..... ASCII “start of text” character (1 byte, 02h)

<id> .....item designator (1 byte, from following table)
<data> .....item data (format listed in following table)
<it> .....item terminator (1 byte, 0Dh)
<ETX> .....ASCII “end of text” character (1 byte, 03h)

Table 5 Moving Map ASCII Navigation Data

ID	Data Format	Length	Description
A	sddmmhh	9	Present latitude s =sign: N for north, S for south dd = degrees mm = minutes hh = hundredths of minutes
B	sdddmmhh	10	Present longitude s = sign: E for east, W for west ddd = degrees mm = minutes hh = hundredths of minutes
C	ddd	3	Track (magnetic): ddd = degrees
D	ddd	3	Ground speed: ddd = knots
E	ddddd	5	Distance to active waypoint: ddddd = nm x 10
G	sdddd	5	Cross track error: s = sign: R for right, L for left of course dddd = distance off course, hundredths of nm
I	dddd	4	Desired track (magnetic): dddd = degrees x 10
K	ddd[dd]	3 to 5	Active waypoint identifier: ddd[dd] = ASCII waypoint identifier
L	dddd	4	Bearing to active waypoint (magnetic): dddd = degrees x 10
Q	sddd	4	Magnetic variation: s = sign: E for east, W for west ddd = degrees x 10
T	---A-----	9	Warnings: The 4th character will be an “A” when the navigation data is flagged, otherwise, all characters will be dashed. All other navigation data will be dashed when it is flagged.

Table 6 Moving Map Binary Route Data		
Byte	**Data Format**	**Description**
1	w	Item designator
2-3	dd	Current waypoint number in ASCII (01h to 20h)
4	xiannnnn	Sequence number x = undefined i = 1 if last waypoint a = 1 if active waypoint nnnnn = unsigned binary waypoint number
5-9	ddddd	ASCII waypoint identifier
10 11 12	sddddddd xxmmmmmm xhhhhhhh	Waypoint latitude - packed, unsigned binary s = sign: 0 for north, 1 for south ddddddd = degrees mmmmmm = minutes hhhhhhh = hundredths of minutes x = undefined
13 14 15 16	sxxxxxxx ddddddd xxmmmmmm xhhhhhhh	Waypoint longitude s = sign: 0 for east, 1 for west ddddddd = degrees mmmmmm = minutes hhhhhhh = hundredths of minutes x = undefined
17 18	nnnnnnnn nnnnnnnn	Magnetic variation at waypoint LS byte (msbit...lsbit) MS byte (msbit...lsbit) Two’s complement binary in sixteenths of degrees, easterly variation is positive.
19	<CR>	ASCII carriage return (0Dh)

BINARY NEAREST LIST DATA (WHEN EXTENDED DATA IS ENABLED ONLY)

The nearest waypoint lists are sent one waypoint per data transmission set. The lists are sent in the following order:

- LFAC
- VOR
- NDB
- INT
- User

There is a maximum of twenty waypoints per type. The waypoints are a maximum of 600 nm from the current position. The waypoints are order by distance from current position nearest to farthest. The maximum time to send all lists is 100 seconds. Each list is updated just prior to the first waypoint in the list being sent. If a list is empty a shorter record will be sent with the List Item Number set to 0xFF.

Table 7 Nearest Waypoint List Data

Byte	Format	Description
1	Z	'Z' **Item Designator**
2	sddddddd	**List Item Number:** Packed, unsigned binary values s = 1 End of list, 0 all other ddddddd = 1 – 20 list waypoint index sddddddd = 0xFF List Type is EMPTY **(BYTE *4* terminate Item)**
3	t	**Waypoint Type**: t = {a (airport) || v (VOR) || n (NDB) || i (INT) || u (USER)}
4	Cr	'\r' **Item Terminator** <0x0d> **(ONLY IF BYTE 2 = OxFF)**
4-8	ddddd	**ASCII Waypoint Identifier**
9 10 11	sddddddd xxmmmmmm xhhhhhhh	**Latitude of waypoint.** Packed, unsigned binary values for degrees, minutes and hundredths of minutes. s = 0 North latitude, 1 South latitude x = undefined ddddddd = Latitude degrees mmmmmm = Latitude minutes hhhhhhh = Latitude hundredths of minutes
12	sxxxxxxx	**Longitude of waypoint.** Packed, unsigned binary values for degrees,

13 14 15	ddddddd xxmmmmmm xhhhhhhh	minutes and hundredths of minutes. s = 0 East longitude, 1 West longitude x = undefined ddddddd = Longitude degrees mmmmmm = Longitude minutes hhhhhhh = Longitude hundredths of minutes
16	Cr	'\r' **Item Terminator** <0x0d>

ANNUNCIATOR OUTPUTS (WHEN EXTENDED DATA IS ENABLED ONLY)

Table 8 Annunciator Output Data

Id	Item Format	Len	Description
a	eampht	8	**Annunciator Flags:** e = **Approach Enabled** { '-' (off) || 'O'(on) } a = **Approach Active** { '-' (off) || 'O'(on) || 'B' (blink)} m = **Message** { '-' (off) || 'O'(on) || 'B' (blink)} p = **Parallel Track** { '-' (off) || 'O'(on) } h = **Hold** { '-' (off) || 'O'(on) || 'B' (blink)} t = **From/To** {'–' (off) || 'T' (To) || 'F' (From)}
c	vDddd	7	**CDI:** v = **Nav Flag** { '-' Flagged || 'v' Valid } D = Needle { 'C' Center || 'L' Left || 'R' Right } ddd = **Deflection Value** ASCII (000 – 120)
l (lower case L)	dddddd	6	Distance to Destination: dddddd = nm * 10
p	sdddd	7	s = ± dddd = {0000 - 5999} Pressure Altitude (-1500 to +5999 tens of feet +/- sea level). Field is dashed when invalid "-----".
v	vDddd	7	**VDI:** v = **VDI Flag** { '-' Flagged || 'v' Valid } D = Needle { 'C' Center || 'U' Up || 'D' Down } ddd = **Deflection Value** ASCII (000 – 120)

FLIGHT PLAN WAYPOINT TYPES (WHEN EXTENDED DATA IS ENABLED ONLY)

The following data is only transmitted when preceded by flight plan data. There is one character per flight plan waypoint transmitted.

Table 9 Flight Plan Waypoint Type

Id	Item Format	Len	Description
t	nnn…	1-21	n = { a (airport) || v (VOR) || n (NDB) || i (intersection) || u (user) || p (parallel track) || d (direct to) || F (FAF) || E (DME) || I (IAF) || H (MAHP) || M (MAP) || A (IFAF) || P (undefined approach waypoint type) }

Example Moving Map Data Output (Extended Data Disabled)

`AN 34 1570`	34°15.70’ latitude
`BW 118 4390`	118°43.90’ longitude
`C306`	306° track angle
`D210`	210 knots
`E02682`	268.2nm to waypoint
`GR0006`	0.6nm right of course
`I3059`	305.9° desired track
`KSFO`	SFO waypoint ident
`L3058`	305.8° bearing to waypoint
`QE140`	14.0° east magnetic variation
`T---------`	No alarms, data not flagged
`<binary data>`	From Table 9

Figure 8 Moving Map Data Output (Extended Data Disabled)

Example Moving Map Data Output (Extended Data Enabled)

AN 34 1570	34°15.70’ latitude
BW 118 4390	118°43.90’ longitude
C306	306° track angle
D210	210 knots
E02682	268.2nm to waypoint
GR0006	0.6nm right of course
I3059	305.9° desired track
KSFO	SFO waypoint ident
L3058	305.8° bearing to waypoint
QE140	14.0° east magnetic variation
T---------	No alarms, data not flagged
<binary data>	From Table 7
a—O--F	Approach Enabled Off, Active Off, Message On, Parallel Track Off, Hold Off, and From/To is FROM
cvR001	CDI Valid, Needle Right, Deflection 001°
p+0008	Pressure Altitude, +80 ft
vC000	VDI Valid, Needle Centered, Deflection is 000°
<binary data>	From Table 6
tda	Flight Plan Waypoint Type data, direct-to, airport type

Figure 9 Moving Map Data Output (Extended Data Enabled)

NAVCOMM DATA OUTPUT

The format of the comm data output is as follows. This data output is compatible with the SL30 or SL40 for sending frequency data to the comm.

Baud rate: 9600
Data bits: 8
Stop bits: 1
Parity: ..... none
Output rate: ..... approx. 1 second
Message length: ..... variable, approx. 83 to 750 characters

The comm data is output using the following format.

$PMRRC<msg_id><msg_data><chksum><cr>

The checksum is computed by an 8 bit addition of the msg_id and msg_data characters, ignoring carry if any. The resulting 8 bit checksum is converted to two ASCII characters by taking the upper and lower nibbles, adding 30h to each, and placing the most significant character first in the data message.

Airport Ident Output

This message is used to output the selected airport ident.

Message Format

$PMRRC04tiiii<chksum><cr>
$PMRRV<msg_id><msg_data><chksum><cr>

04 .....message id
t .....list type, outputs a 1
iiii.....ident, four character ASCII

Example Message
$PMRRC041SLE<space>99<cr>

Output ident of “SLE” for the following frequency information.

Frequency Data Output
This message is used to output the airport frequency information for the previously output ident.

Message Format
$PMRRC05tfmk<chksum><cr>

05 .....message id
t .....list type, input 1
f .....frequency type:

0 = TWR, tower frequency	8 = CTF, common traffic advisory frequency
1 = GND, ground frequency	9 = DEP, departure
2 = ATS, for ATIS	: (3Ah) = FSS, flight service station
3 = ATF, air traffic frequency	; (3Bh) = RFS, for remote flight service station
4 = APP, for approach	< (3Ch) = UNI, for unicom
5 = ARR, for arrival	= (3Dh) = MF, mandatory frequency
6 = AWS, automatic weather station	> (3Eh) = not defined, do not use
7 = CLR, clearance/delivery	? (3Fh) = undefined, for other frequency types

mk .....frequency:
m = desired frequency in MHz in hexadecimal, where m = desired frequency - 30h , with the desired frequency in the range of 118 to 136 MHz, or 162 MHz.
k = desired frequency in kHz where k = (desired frequency / 25 kHz) + 30h, with the desired frequency in the range of 000 to 975 kHz in 25 kHz steps, or 0 to 39.

Example Message
$PMRRC0511IT64<cr>

The above example message outputs a ground frequency type, 121.900 MHz.

Remote VOR List
The following two commands work together in allowing remotely connected devices to provide a list of VOR frequencies to the SL30. The remote device will send a sequence of Remote VOR Input commands (message identifier 20). When all of the VOR Input commands have been sent, the remote device should send a Remote VOR List Trailer command (message identifier 21) to terminate the list. The transmitted list will not be considered complete by the SL30 until it receives the trailer message. The unit will maintain a single remote VOR list, so each list received will replace any previous list. There may be up to twenty entries in the remote VOR list. Any entries past twenty will be ignored.

Remote VOR Input
This input is used to input VOR frequency data used for the remote recall function.

The data consists of five characters for the VOR station identifier followed by two characters defining the VOR frequency.

Message format:

"V" ..... Message Class. This is a VHF NAV message.
"20" ..... Message Identifier.
vvvv..... VOR station identifier. Note that if the station identifier is less than four characters, then the trailing characters will be filled with spaces. Station Identifiers are restricted to using ASCII characters 0-9 and A-Z.
mk..... Frequency: m = MHz, where m = desired MHz frequency – 30h, with the desired frequency ranging from 108 to 117, or 3Ch to 45h; k = kHz, where k = (desired kHz offset / 25 kHz) + 30h, with desired frequency range of 000 to 975 kHz in 50 kHz steps, or the even numbers from 30h to 56h. Note that the field will be checked to ensure that it is in range and a valid VOR frequency. Frequencies used for localizers, which are in the range of 108.10 to 111.95 MHz, will not be accepted in this message type.

Example message:
$PMRRV20UBG<Sp>E@<chksm><CR><LF>

VOR station identifier is "UBG ", VOR frequency is 117.400 MHz.

Remote VOR List Trailer
This input command marks the end of a VOR list sent by a remote device.

Message format:
"V" Message Class. This is a VHF NAV message.
"21" Message Identifier

Example message:
$PMRRV21<chksm><CR><LF>

Indicates the start of a remote VOR list.

REMOTE LOCALIZER LIST

The following two commands work together in allowing remotely connected devices to provide a list of localizer frequencies associated with an airport to the SL30. The remote device should first send the Remote Localizer List Header command (message identifier 22), followed by a sequence of Remote Localizer Input commands (message identifier 23). The SL30 maintains a single remote localizer list, so each new list received will replace any previous list. Subsequent receptions of localizer lists for the same airport are ignored. There may be up to twenty entries in the remote Localizer list. Any entries past twenty will be ignored.

Remote Localizer List Header

This input command marks the beginning of a Localizer list sent by a remote device. It specifies the five character airport identifier associated with the localizer frequencies in the list.

Message format:

"V".....Message Class. This is a VHF NAV message.
"22".....Message Identifier.
aaaa .....Airport identifier. Note that if the airport identifier is less than four characters, then the trailing characters will be filled with spaces. Airport Identifiers are restricted to using ASCII characters 0-9 and A-Z.

Example message:

$PMRRV22SLE<Sp><chksum><CR><LF>

Indicates the start of a remote localizer list associated with the airport "SLE ".

Remote Localizer Input

This input is used to input Localizer frequency data used for the remote recall function.

The data consists of three characters to identify the runway associated with the localizer, followed by two characters defining the frequency.

Message format:

"V".....Message Class. This is a VHF NAV message.
"23".....Message Identifier.
iiii.....Station or Runway identifier. This field will provide an identifier for the localizer which can be either the actual station identifier or a string indicating the runway associated with the localizer. The station identifier can be up to four characters long. A runway identifier will typically be two numbers that indicate the runway direction followed by the character "R", "C", or "L" to differentiate between parallel runways (right, center, and left). Note that if either type of identifier is less then four characters, then the trailing characters will be filled in with spaces. Identifiers are restricted to using ASCII characters 0-9 and A-Z.
mk .....Frequency: m = MHz, where m = MHz frequency – 30h, with the desired frequency ranging from 108 to 111 MHz, or 3Ch to 3Fh; k = (desired kHz offset / 25 kHz) + 30h, where the desired frequency ranges from 000 to 950 kHz, or the even numbers from 30h to 56h. Note that the field will be checked to ensure that it is in range and a valid localizer frequency. Frequencies used for VORs, which can also be found in the range of 108.10 to 111.95 MHz, will not be accepted in this message type.

Example message:

$PMRRV2331<Sp><Sp>><<chksm><CR><LF>

Identifier is "31 ", indicating a runway, and the localizer frequency is 110.300 MHz.

DISTANCE/SPEED/TIME MESSAGE

If an SL30 is connected to the GX with MovMap or MapCom output the following message will be sent to the SL30.

$PMRRV41xxxxyyyzzz<CHECKSUM><CR><LF>

xxxx is the distance to the station in 0.1nm units

yyy is the ground speed in knots

zzz is the time to the station in minutes

This message is used to output the range, ground speed, and ETA decoded from an external RNAV sensor (DME or GPS).

Message format:

"V" ..... Message class. This is a VHF NAV message.

"41" ..... Message identifier.

rrrr ..... Range from DME station in $1/10^{th}$ of a nautical mile units. The first two digits are the 10s and 1s place of the range, and the last digit is the $1/10^{th}$s place. This field may range in value from 0.0 NM ("0000") to 999.9 NM ("9999"). If the distance from the DME station is greater than 999.9NM, the value should be encoded as "----".

sss ..... Ground speed with respect to DME station in knots. This field may range in value from 0 knots ("000") to 999 knots ("999"). If the ground speed with respect to the DME station is greater than 999 knots, the value should be encoded as "---".

hmm ..... Time to station in hours and minutes. This field may range in value from 0 hours and 0 minutes ("000") to 9 hours and 59 minutes ("959"). If the time to the station is greater than 9 hours and 59 minutes, the value should be encoded as "---".

Example message:

$PMRRV410983055147<chksm><CR><LF>

Range from DME station is 98.3 NM, ground speed with respect to station is 55 knots, and the estimated time to the station is 1 hour and 47 minutes.

ALTITUDE ENCODER/CONVERTER INPUT

The format of the altitude input is as follows. Definition of the input message is included in Table 10. Several sample messages are illustrated in Figure 10.

Baud rate: 1200
Data bits: 8
Stop bits: 1
Parity: .....none
Expected input rate: .....approx. 1 second
Message length: .....17 characters

Table 10 Altitude Input Data

Byte	Data Format	Description
1	"#"	ASCII "#" (023h)
2	"A"	ASCII "A" (041h)
3	"L"	ASCII "L" (04Ch)
4	" "	ASCII space (020h)
5	"+" or "-"	Altitude sign: ASCII "+" or "-" (02Bh or 02Dh)
6-10	ddddd	Altitude in feet, right justified with leading zeros
11	"T"	ASCII "T" (054h)
12	"+" or "-"	Temperature sign: ASCII "+" or "-" (02Bh or 02Dh)
13-14	dd	Internal altimeter temperature
15-16	dd	Checksum of bytes 1 through 14, computed in hex, output in ASCII format (i.e., "FA" hex)
17	<CR>	ASCII carriage return (0Dh)

The altitude input can decode several status or error codes. These codes would be in place of the altitude data in characters 5 - 10 as follows.

"-09980" .....Heater not ready: expected during encoder warm-up or if there is a loss of signal from the encoder.

"-09981" .....Possible hardware problem: expected from encoder indicating a temperature greater than 55°C or if data is invalid.

"-09982" .....Altitude out of range: expected from the encoder indicating that the altitude is outside specified range of the encoder.

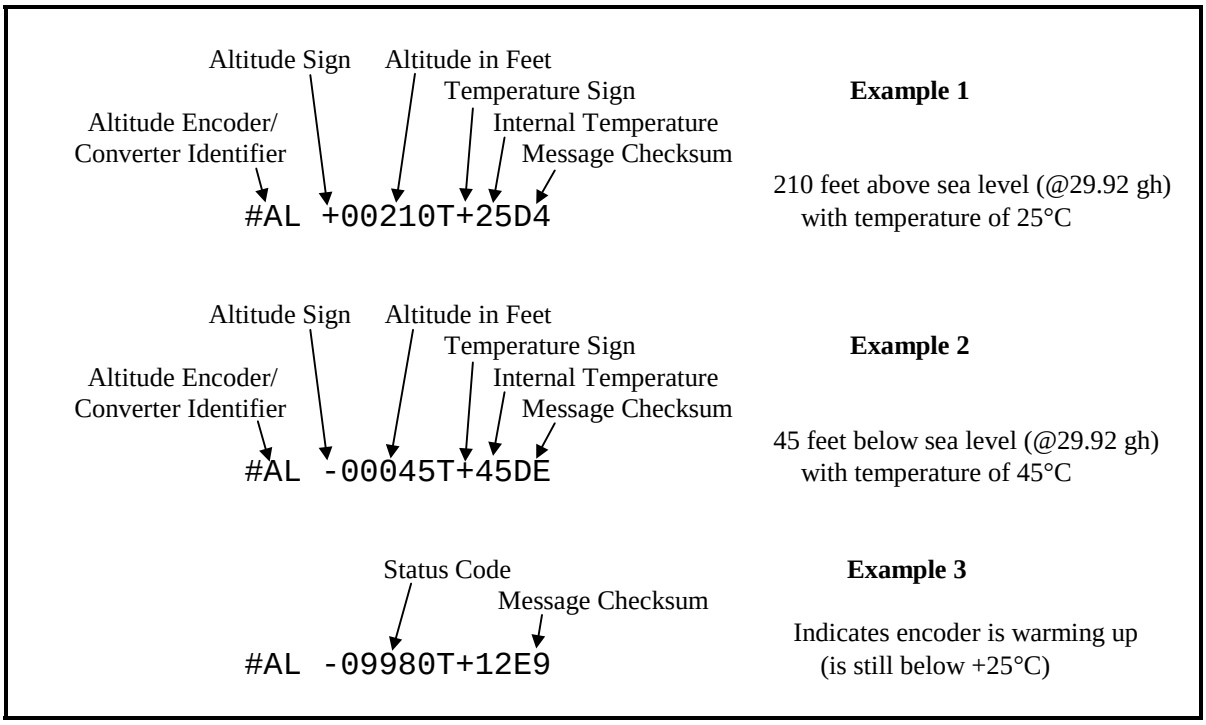


Figure 10 Altitude Data Input

FUEL / AIR DATA COMPUTER INPUT

The fuel/air data input is used to input fuel flow and airdata computer information from the fuel/air data computer. See **Error! Reference source not found.**, or contact Customer Service, for appropriate devices.

"S" DATA FORMAT

The format of the fuel/air data computer input is as follows, which conforms to the Shadin "S" format serial message. Definition of the input message data that the GX50/60/65 uses is included in Table 11. A sample input message is illustrated in Figure 11.

Baud rate: 9600
Data bits: 8
Stop bits: 1
Parity: ..... none
Expected input rate: ..... approx. 1 second
Message length: ..... variable (512 character max.)

The serial input message string is expected in the following format.

<STX><message><message> ... <message><chksum><ETX>

<STX>..... ASCII "start of text" character (STX = 02h)
<message>..... starts with an ASCII "S", then an ID character, followed by the message data, a carriage return (CR = 0Dh), and a line feed (LF = 0Ah) See the

following table. s = a sign indicator (-,+,E,W). d = a decimal digit (0-9)

<checksum>.....the message checksum, same format as message
<ETX>.....ASCII “end of text” character (ETX = 03h)

Table 11 Fuel/Air Data Message Data (S Format)

Item Desig	Message Format	Message Mnemonic	Field Width	Message Description
SA	ddd	IAS	7	Indicated Air Speed in knots
SB	ddd	TAS	7	True Air Speed in knots
SC	ddd	MACH	7	Mach Speed in thousandths
SD	sdddd	PALT	9	Pressure Altitude in tens of feet, +/- sea level
SE	sdddd	DALT	9	Density Altitude in tens of feet, +/- sea level
SF	sdd	OAT	7	Outside Air Temp - or “Total”, in degrees Celsius
SG	sdd	TAT	7	True Air Temp - or “Static”, in degrees Celsius
SH	ddd	WDIR	7	Wind Direction, 0 to 359 degrees from true north
SI	ddd	WSPD	7	Wind Speed in knots
SJ	sdd	TURN	7	Rate of Turn in +/- degrees/second, + is right, - is left
SK	sddd	VSPD	8	Vertical speed in tens of feet/minute
SL	ddd	HEAD	7	Heading, 0 to 359 degrees from true north
SM	dddd	RFF	8	Right Engine Fuel Flow in tenths of gallons/hour
SN	ddddd	RFU	9	Right Engine Fuel Used in tenths of gallons
SO	dddd	LFF	8	Left Engine Fuel Flow in tenths of gallons/hour
SP	ddddd	LFU	9	Left Engine Fuel Used in tenths of gallons
SQ	ddd	ERR	7	Error Log / Reason Indicator: 001 = temp sensor error; 000 = no errors
SR	ddddd	REM	10	Fuel remaining (0-9999.9 in gallons)
S*	ddd	CKSUM	7	Checksum of all characters preceding this record. The checksum is a one byte checksum (discarding carries) including all characters from the initial STX up to and including the line feed preceding the checksum message.

Example Fuel / Airdata Input Data	
<STX>SA223	223 knots indicated air speed
SB230	230 knots true air speed
SC101	0.101 mach
SD+3200	32,000 feet pressure altitude
SE+3312	33,120 feet density altitude
SF+05	+5°C outside air temp
SG-03	-3°C true air temp
SH010	wind direction at 10° (relative to true north)
SI015	wind speed at 15 knots
SJ+03	+3° / second right turn
SK-050	-50 feet / second vertical air speed
SL359	359° heading (relative to true north)
SM0123	12.3 gallons / hour - right engine fuel flow
SN0300	30.0 gallons used - right engine
SO0131	13.1 gallons / hour - left engine fuel flow
SP0310	31.0 gallons used - left engine
SQ000	no errors
SR01227	122.7 gallons remaining
S*123	Checksum (example only, not actual)
<ETX>	end of message string

Figure 11 Fuel / Airdata Data Input (S Format)

"Z" DATA FORMAT

The format of the fuel/air data computer input is as follows, which conforms to the Shadin "Z" format serial message. Definition of the input message data that the GX50/60/65 uses is included in Table 12.

Baud rate: 9600
Data bits: 8
Stop bits: 1
Parity: ..... none
Expected input rate: ..... approx. 1 second
Message length: ..... variable (512 character max.)

The serial input message string is expected in the following format.

<STX><message><message> ... <message><chksum><ETX>

<STX>..... ASCII "start of text" character (STX = 02h)
<message>..... starts with an ASCII "Z", then an ID character, followed by the message data, a carriage return (CR = 0Dh), and a line feed (LF = 0Ah) See the following table.
<checksum> ..... the message checksum, same format as message
<ETX> ..... ASCII "end of text" character (ETX = 03h)

Table 12 Fuel/Air Data Message Data (Z Format)

Item Desig	Message Format	Message Mnemonic	Field Width	Message Description
ZA	ddd	IAS	7	Indicated Air Speed in knots
ZB	ddd	TAS	7	True Air Speed in knots
ZC	ddd	MACH	7	Mach Speed in thousandths
ZD	sdddd	PALT	9	Pressure Altitude in tens of feet, +/- sea level
ZE	sdddd	DALT	9	Density Altitude in tens of feet, +/- sea level
ZF	sdd	OAT	9	Outside Air Temp - or "Total", in degrees Celsius
ZG	sdd	TAT	7	True Air Temp - or "Static", in degrees Celsius
ZH	ddd	WDIR	7	Wind Direction, 0 to 359 degrees from true north
ZI	ddd	WSPD	7	Wind Speed in knots
ZJ	sdd	TURN	7	Rate of Turn in +/- degrees/second, + is right, - is left
ZK	sddd	VSPD	8	Vertical speed in tens of feet/minute
ZL	ddd	HEAD	7	Heading, 0 to 359 degrees from true north
ZM	dddd	RFF	8	Right Engine Fuel Flow in tenths of gallons/hour
ZN	ddddd	RFU	9	Right Engine Fuel Used in tenths of gallons
ZO	dddd	LFF	7	Left Engine Fuel Flow in tenths of gallons/hour
ZP	ddddd	LFU	9	Left Engine Fuel Used in tenths of gallons
ZQ	ddd	ERR	7	Error Log / Reason Indicator: 001 = temp sensor error; 000 = no errors
ZR	ddddd	CKSM1	7	Checksum of labels A to Q (0 to 255)
ZS	ddd	GSP	7	Ground speed (0-999 knots)
ZT	ddd	TRK	7	Track (0 to 359 degrees, magnetic)
ZU	dddddd	DIS	1	Distance to Destination (0 to 999999, nm * 100)
ZV	sddd	MVAR	8	Magnetic Variation (0 to 999 degrees, deg * 10), s = E or W where E = east, W = west
ZW	ddmmhh	LAT	13	Current Latitude, s = N or S, dd = degrees, mm = minutes
ZX	sdddmmhh	LON	14	Current Longitude, s = E or W, ddd = degrees, mm = minutes, hh = hundredths of minutes
ZY	ddd	CKSUM2	7	Checksum of labels S to X (0 to 255)

GPSS SERIAL OUTPUT

The GPSS output message provides information to the appropriate autopilot for roll steering.

Baud Rate: 9600
Data Bit: ..... 8 BITS
Stop Bit: ..... 1 BIT
Parity: ..... None
Output Rate: ..... Approx. 1-sec ±0.5 sec
Buffer length Normal: ..... Approx. 32 bytes to ??? bytes

The Apollo GX Series will output serial data in the following format:

<STX><id><data><it><id><data><it>…<id><data><it><EXT>

where.

<STX>	is the ASCII start of character (1 byte <0x02>)
<id>	is the item designator (1 byte i.e. “B”)
<data>	is the item data (see item format in following pages)
<it>	is the item terminator (1 byte Cr <0x0d>)
<ETX>	is the ASCII end of character (1 byte <0x03>)

Table 13 - Ascii Autopilot/Fuel Computer data

Id	Item Format	Len	Item Description
C	ddd	3	**Track:** (magnetic); ddd=degrees
D	ddd	3	**ground speed:** ddd=knots
E	ddddd	5	**distance to active waypoint:** ddddd=nm * 10
L	dddd	4	**bearing to active waypoint:** (magnetic); dddd = degrees * 10
h	sddd	4	**Horizontal Command Signal:** s=sign: L = bank left. R = bank right. X = invalid data. ddd = degrees * 10

Example Fuel / Airdata Input Data	
<STX>SA223	223 knots indicated air speed
SB230	230 knots true air speed
SC101	0.101 mach
SD+3200	32,000 feet pressure altitude
SE+3312	33,120 feet density altitude
SF+05	+5°C outside air temp
SG-03	-3°C true air temp
SH010	wind direction at 10° (relative to true north)
SI015	wind speed at 15 knots
SJ+03	+3° / second right turn
SK-050	-50 feet / second vertical air speed
SL359	359° heading (relative to true north)
SM0123	12.3 gallons / hour - right engine fuel flow
SN0300	30.0 gallons used - right engine
SO0131	13.1 gallons / hour - left engine fuel flow
SP0310	31.0 gallons used - left engine
SQ000	no errors
SR01227	122.7 gallons remaining
S*123	Checksum (example only, not actual)
<ETX>	end of message string

Figure 12 Fuel / Airdata Data Input

APPENDIX F - RETROFIT INSTALLATIONS

This appendix includes specific instructions for replacing various II Morrow Apollo and Flybuddy Loran and GPS units with the Apollo GX55 GPS. The GX55 is plug compatible with and designed to fit in the mounting frame of the II Morrow 602, 604, 612, 618, and 800 Lorans and the 819 and 820 GPS units. Since the GX55 provides some functions that have changed or were not available on the earlier units, minor wiring changes may be required for some installations. Some additional wiring changes can provide improved functionality but are not necessary for operation. These changes are identified in the comments column of the following tables as "Change not required".

Installation of the GX55 as a replacement for these units basically consists of removing the unit being replaced from its mounting frame, installing 3 nylon spacers in the mounting frame (see Figure 13), sliding the GX55 into the mounting frame, and securing it with the locking screw. Depending on the antenna previously installed, the antenna may also have to be replaced and/or relocated. If the previous installation utilized annunciators, they may have to be relabeled or replaced with a different colored annunciator. Power connections and connections to the CDI or autopilot should not require any changes. A Nav Valid flag output has been added on the GX55. The GX55 may not support all the same serial interface formats as the units being replaced. Specific retrofit instructions for each of the units that the GX55 is intended to replace are given in the following paragraphs.

If the current installation is being upgraded for IFR use, CDI and annunciator connections are required. Be sure to review the IFR GPS Navigation Installation requirements beginning on Page 4.

For all retrofits, install 3 nylon spacers in the mounting frame as shown in Figure 13 below.

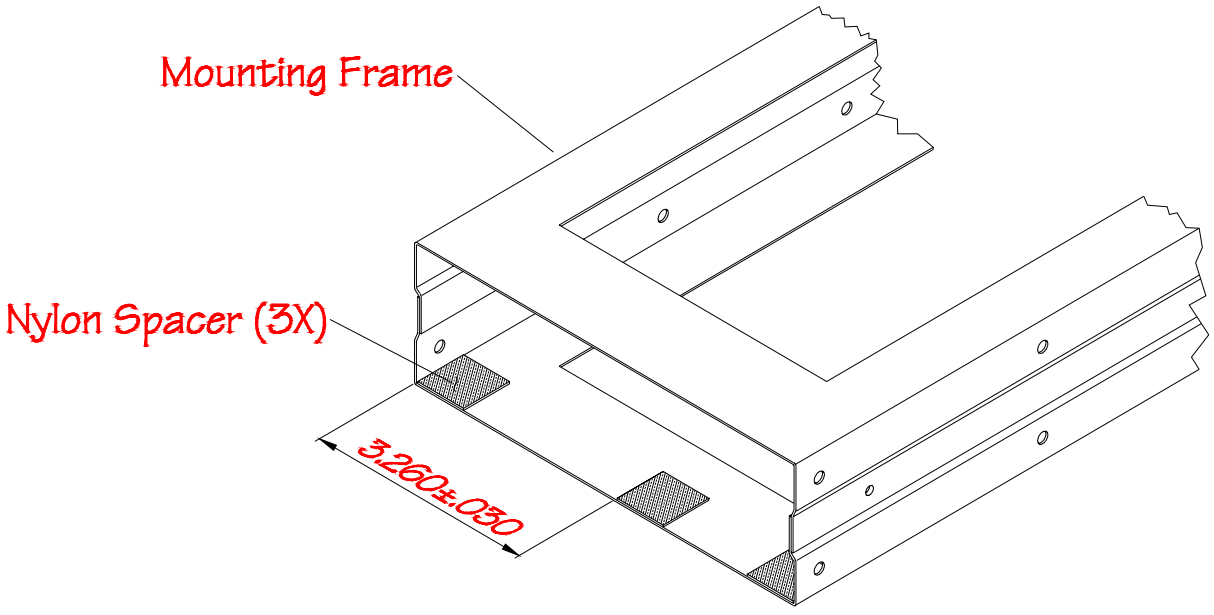


Figure 13 Nylon Spacer Installation

APOLLO 602 AND 604

ANNUNCIATORS

When replacing the Apollo model 602 or 604 Loran with the GX55 GPS, the Waypoint Alert annunciator must be relabeled as PTK (blue or white annunciator) and the Loran Warning annunciator must be relabeled MSG (amber annunciator).

WIRING

Wiring changes are listed in the following table.

Pin	Apollo 602 or 604	GX55	Comments
7	NC	RxD	Change not required
8	NC	Serial ground	Change not required
10	Shield	Nav Valid -	Disconnect serial shield, connect to mounting frame
11	NC	Nav Valid +	Change not required
Note: All other connections from the 602 or 604 should remain valid for the GX55.			

ANTENNA

The existing Loran antenna must be replaced with either the A-33 or A-34 GPS antenna. The A-34 has the same footprint as the A-16 and A-23 antennas to simplify the upgrade. Refer to the installation information on Page 10 to ensure that the mounting location and cabling meet the requirements of the GX55 GPS. The GPS antenna must be installed on top of the aircraft. Refer to either the A-33 Installation Guide, 560-0949 or the A-34 Installation Guide, 560-5047 for detailed instructions.

APOLLO 612 AND 618

ANNUNCIATORS

When replacing the Apollo model 612 or 618 Loran with the GX55 GPS, the Waypoint Alert annunciator must be relabeled as PTK (blue or white annunciator) and the Loran Warning annunciator must be relabeled MSG (amber annunciator). The Approach and Loran VFR annunciators (or optional buzzer on the 618) are not used by the GX55 and should be disconnected and removed.

WIRING

Wiring changes are listed in the following table.

Pin	Apollo 612 or 618	GX55	Comments
7	NC, 612 (Altitude encoder input, 618)	RxD	Change not required
10	Shield	Nav Valid -	Disconnect serial shield, connect to mounting frame
11	Approach Annunciator	Nav Valid +	Remove Annunciator connection
13	Loran VFR Annunciator (optional buzzer in 618)	NC	Remove Annunciator connection
Note: All other connections from the 612 or 618 should remain valid for the GX55.			

ANTENNA

The existing Loran antenna must be replaced with either the A-33 or A-34 GPS antenna. The A-34 has the same footprint as the A-16 and A-23 antennas to simplify the upgrade. Refer to the installation information on Page 10 to ensure that the mounting location and cabling meet the requirements of the GX55 GPS. The GPS antenna must be installed on top of the aircraft. Refer to either the A-33 Installation Guide, 560-0949 or the A-34 Installation Guide, 560-5047 for detailed instructions.

APOLLO 800 FLYBUDDY

ANNUNCIATORS

When replacing the Apollo model 800 Flybuddy Loran with the GX55 GPS, the Waypoint Alert annunciator must be relabeled as PTK (blue or white annunciator) and the Loran Warning annunciator must be relabeled MSG (amber annunciator).

WIRING

Wiring changes are listed in the following table.

Pin	Apollo 800 Flybuddy	GX55	Comments
13	Internally jumpered to ground	NC	Change not required
Note: All other connections from the 800 should remain valid for the GX55.			

ANTENNA

The existing Loran antenna must be replaced with either the A-33 or A-34 GPS antenna. The A-34 has the same footprint as the A-16 and A-23 antennas to simplify the upgrade. Refer to the installation information on Page 10 to ensure that the mounting location and cabling meet the requirements of the GX55 GPS. The GPS antenna must be installed on top of the aircraft. Refer to either the A-33 Installation Guide, 560-0949 or the A-34 Installation Guide, 560-5047 for detailed instructions.

APOLLO 819 AND 820 FLYBUDDY GPS

ANNUNCIATORS

When replacing the Apollo model 819 or 820 Flybuddy GPS with the GX55 GPS, the Waypoint Alert annunciator must be relabeled as PTK (blue or white annunciator) and the Loran Warning annunciator must be relabeled MSG (amber annunciator).

WIRING

Wiring changes are listed in the following table.

Pin	Apollo 819 or 820 Flybuddy	GX55	Comments
13	Internally jumpered to ground	NC	Change not required
Note: All other connections from the 819 or 820 should remain valid for the GX55.			

ANTENNA

Apollo 819 or 820 Flybuddy GPS installations may contain either an A-31, A-32, or A-33 GPS antenna. The A-33 GPS antenna is fully compatible with the GX55 and need not be replaced. However, refer to the installation information on Page 10 to ensure that the mounting location and cabling meet the requirements of the GX55 GPS. The A-31 and A-32 antennas are functional with the GX55 for VFR applications but not for IFR. If you intend to use the GX55 for IFR applications, the installed A-31 or A-32 antenna must be replaced with either an A-33 or A-34 GPS antenna. If you are replacing the A-31 or A-32, refer to the installation information on Page 10 and to the appropriate installation guide for detailed instructions. Installation guide numbers are 560-0949 for the A-33 and 560-5047 for the A-34.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