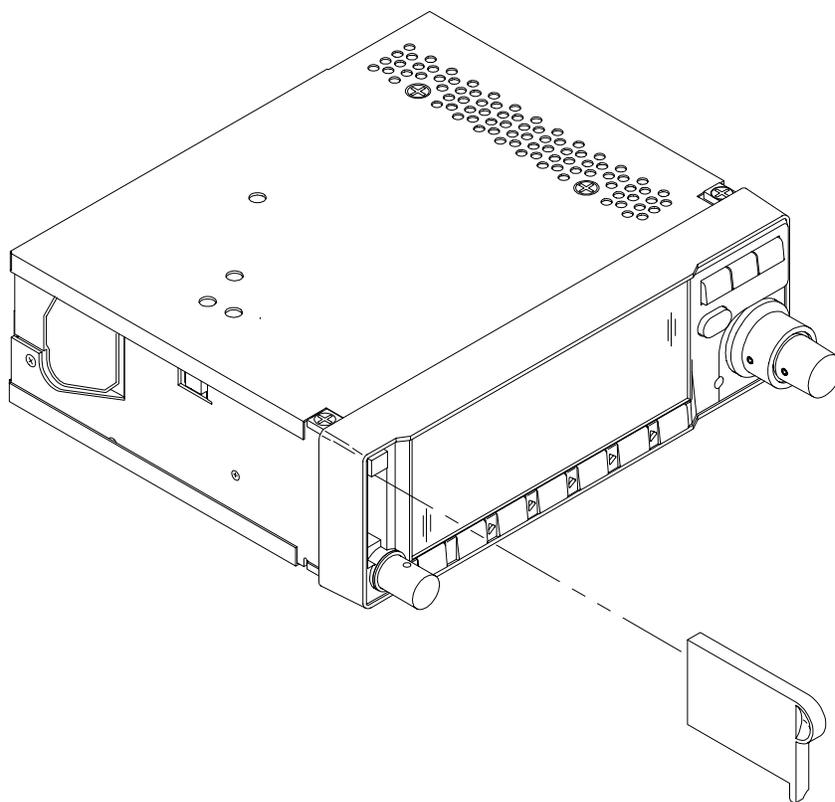




GARMIN®

GNC 300 INSTALLATION MANUAL



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SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual describes the physical, mechanical, and electrical characteristics and the installation requirements for the GNC 300 Aviation Kit.

After installation of the GNC 300 system, FAA Form 337 must be completed by an appropriately certificated agency to return the aircraft to service.

1.2 TECHNICAL CHARACTERISTICS

The GNC 300 offers the versatility of fixed installation in a panel mounted aviation rack as well as complete portability.

For TSO Compliance, see Appendix A.

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 either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. The article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the Administrator.

1.2.1 PHYSICAL CHARACTERISTICS

Width:	6.25 inches
Height:	2 inches
Depth:	5.65 inches
GNC 300 Weight:	2.4 lbs.
GA 56 Antenna Weight:	4 oz.
Aviation Rack Weight:	10 oz.
Max Air Speed:	Subsonic
(Structural rating for antenna)	

1.2.2 OPERATIONAL CHARACTERISTICS

Operating Temperature Range:	-20 °C to +55 °C
Humidity:	95% non-condensing
Altitude Range:	-1,500 to 50,000 ft.
Power Range	10 to 15.1 VDC
Power Requirements:	1.2A @ 13.8v (not transmitting)
	5.5A @ 13.8V (transmitting)

1.2.3 INTERFACES

The GNC 300 provides interfaces to various general aviation instruments. Figure 1-1 defines the function of each pin on the 37 pin DSUB connector located at the back

of the rack. Figure 1-2 defines the function of each pin in the 26 pin HD-DSUB connector (J102) located above the 37 pin connector at the back of the rack. Figures 1-3 and 1-4 defines the interconnects between the rack and other instruments. The following interfaces are provided.

1.2.3.1 37 PIN CONNECTOR (J101)

CDI: (Pins 1 and 4)	Capable of driving up to three 1000 ohm parallel loads, +150 millivolts full scale deflection with a maximum output of +300 millivolts.
To/From: (Pins 2 and 4)	Capable of driving up to three 200 ohm parallel loads, +82 millivolts full scale deflection. Units with Mod Status 1: +190 millivolts full scale deflection.
Nav Flag: (Pins 3 and 4)	Capable of driving up to three 1000 ohm parallel loads, 375 millivolts for flag out-of-view, and +40 millivolts for flag in-view.
OBI data: (Pins 7, 8, and 23)	Output providing bearing to waypoint data for a Bendix/King RMI (KI 229 or equivalent).
Message annunciator: (Pin 20)	Output capable of driving negative logic message annunciators by sinking up to 500mA.
RS232 chan 1 output data: (Pin 24)	Output capable of driving devices as listed in Section 4. Conforms to the EIA specification RS-232C.
RS232 chan 2 output data: (Pin 19)	Output capable of driving devices as listed in Section 4. Conforms to the EIA specification RS-232C.
RS232 chan 1 input data: (Pin 17)	Input capable of receiving data from devices listed in Section 4. Conforms to the EIA specification RS-232C.
Arrival annunciator: (Pin 12)	Output capable of driving negative logic annunciator by sinking up to 500mA.
GPS approach active ann: (Pin 13)	Output capable of driving negative logic annunciator by sinking up to 500mA. See GNC 300 Pilot's Guide, (GPN 190-00067-00), for more information.
GPS approach arm ann: (Pin 28)	Output capable of driving negative logic annunciator by sinking up to 500mA. See GNC 300 Pilot's Guide, (GPN 190-00067-00), for more information.
ARINC 429 Output A & B: (Pins 15 and 16)	Output capable of interfacing with any device that has an input conforming to the GAMA ARINC 429 (low speed) specification.

NAV Super Flag Output: (Pin 10)	Output capable of driving positive logic NAV Super Flag by sourcing up to 500mA for flag out of view (NAV valid).
RS422 input: (Pins 11 & 27)	Input capable of receiving serial OBS data from Collins Pro Line 2 EFIS DSP unit.
GPS approach arm low: (Pin 9)	Input, when grounded, controls approach mode.
GPS OBS: (Pins 4,14,35 and 37)	Capable of interfacing with a standard OBS resolver.
ARINC 429 Input A & B: (Pins 32 & 33)	Input capable of receiving data from ARINC 429 (low speed) devices as listed in Section 4.
Battery +,-, Charge Enable (Pins 30, 34, 29)	Connection for GARMIN remote battery accessory.

1.2.3.2 26 PIN CONNECTOR (J102)

MIC Audio Hi and Lo:: (Pins 2 and 3)	Input requiring 275mV RMS into 470 ohm load. (Standard carbon or dynamic MIC containing transistorized pre-amp.)
MIC Key: (Pin4)	Input, when grounded, keys the transmitter.
COMM Audio Hi and Lo: (Pins 5 and 6)	Output capable of driving a 500 ohm load with 100mW.
MIC Intercomm: (Pin 8)	Input requiring 125mV RMS into 470 ohm load. (Standard carbon or dynamic MIC containing transistorized pre-amp.)
Remote Transfer: (Pin 10)	Input, when grounded, swaps the active and standby COMM frequencies.
TX Interlock: (Pin 12)	Input, when grounded, reduces receiver sensitivity so squelch will not break when another transceiver is keyed.
Altimeter input: (Pins 14-24)	Capable of receiving encoded output data from any parallel altimeter device.
Remote Enter: (Pin 26)	Input, when ground, functions the same as the enter key on the GNC 300 front panel.

Sequence Hold Low: Input, when grounded, activates HOLD mode. See
(Pin 13) the GNC 300 Pilot's Guide (GPN 190-00067-00) for
more information.

1.2.3.3 COMM Antenna Connector (J4)

Capable of providing 5 watts, minimum, at 13.8V. Sensitivity of 6 dB SNR, minimum, at 2 uV hard. The COMM antenna shall be approved to TSO C37() and C38().

1.3 LICENCE REQUIREMENTS

The transmitter, as installed in the aircraft, requires an Aircraft Radio Station Licence. This licence is obtained by filing the FCC Form 404. While awaiting the receipt of the station licence, a copy of FCC Form 404 is kept in the aircraft.

This equipment has been type accepted by the FCC and entered on the type accepted equipment list, as GARMIN GNC 300 and must be identified as GARMIN GNC 300 on your Form 404, Aircraft Radio Station Licence application.

CAUTION

THE VHF TRANSMITTER IN THIS EQUIPMENT IS GUARANTEED TO MEET FEDERAL COMMUNICATIONS COMMISSION ACCEPTANCE OVER THE OPERATING TEMPERATURE RANGE. MODIFICATIONS NOT EXPRESSLY APPROVED BY GARMIN COULD VOID THE LICENCES' AUTHORITY TO OPERATE THE EQUIPMENT.

SECTION 2 INSTALLATION CONSIDERATIONS

Careful planning and consideration of the suggestions in this section are required to achieve the desired performance and reliability from the GNC 300.

2.1 ANTENNA CONSIDERATIONS

2.1.1 GPS ANTENNA LOCATION

The GNC 300 GA 56 Antenna must be mounted on top of the aircraft. For best performance select a location with an unobstructed view of the sky above the aircraft when in level flight. Figure 2-1 illustrates a typical GPS antenna installation.

For rotorcraft, locate the GA 56 antenna:

- 1) As far from the main rotor hub as possible. This reduces the percentage of time the blade blocks the antenna.
- 2) As far below the blade surface as possible if installing the antenna under the blade. This reduces signal distortion caused by the blades.

The antenna should be located at least 3 feet from transmitting antennas such as VHF Comm, HF transmitter, DME, Transponder, and Radar.

2.1.2 COMM ANTENNA LOCATION

The COMM antenna should be well removed from all projections, engines and propellers. The ground plane surface directly below the antenna should be a flat plane over as large an area as possible (18 inches square minimum).

The antenna should be mounted a minimum of 6 feet away from any DME antennas, 4 feet from any ADF sense antennas, and a minimum of 3 feet from the GNC 300 and its GPS antenna.

The GNC 300 COMM antenna connector is specified to have installed GPN 330-00067-00 (1.57542 GHz notch filter) to minimize interfering harmonics.

2.1.3 ELECTRICAL BONDING

No special precautions need to be taken to provide a bonding path between the GPS antenna and the aircraft structure.

Follow the manufacturers instructions for the COMM antenna.

2.1.4 ANTENNA LIMITATIONS

GARMIN'S GA 56 Antennas are recommended for installations where the airspeed of the aircraft will be subsonic.

GARMIN's GA 56, Mod 1 or later, must be used.

See the COMM antenna specification for its limitations.

2.1.5 VHF COMM INTERFERENCE OF GPS

On many panel-mounted aircraft, VHF COMM's can radiate strong harmonics from the unit and antenna. The GNC 300 COMM section will not interfere with its GPS section. However, placement of the GNC 300 GPS antenna relative to all COMM's and COMM antenna, including its own, is critical.

Use the following guidelines, in addition to others in this document, when locating the GNC 300 and its antennas.

GPS Antenna: Locate as far as possible from all COMM antennas and all COMMs (including the GNC 300). The GPS antenna will be much less sensitive to COMM antennas that use a 1.57542 GHz notch filter.

GNC 300: Locate as far as possible from all COMM antennas.

If a COMM antenna is found to be the problem, a 1.57542 GHz notch filter (GPN 330-00067-00) may be installed in the VHF COMM coax, as close to the COMM as possible. This filter (GPN 330-00067-00) is required for the GNC 300 transmitter).

If a COMM is found to be radiating, the following can be done:

- 1) Replace or clean VHF COMM rack connector to assure good coax ground.
- 2) Place a grounding brace between the GNC 300, VHF COMM, and ground.
- 3) Shield the VHF COMM wiring harness.

2.1.6 COMM ANTENNA INSTALLATION INSTRUCTIONS

The COMM antenna should be installed according to the manufacturer's recommendations.

2.2 RACK CONSIDERATIONS

2.2.1 ACCESSIBILITY

Plan a location which gives the pilot complete and comfortable access to the entire keypad and which is plainly visible from the pilot's perspective. Check that there is adequate depth for the rack in the instrument panel. A location away from heating vents or other sources of heat generation is optimal. Figure 2-2 illustrates a typical aviation rack installation.

2.3 CABLING AND WIRING

The recommended antenna cable type for both antennas is M17/155-0001 (RG-58A/U) per MIL-C-17. Maximum allowable length for the GPS antenna using this cable type is 40 feet. Other cable types with 50 ohms nominal impedance and longer lengths can be used for the GPS antenna, provided the installer insures that the attenuation does not exceed 10dB at 1.5 GHz for the specific installation. Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling, particularly the COMM antenna cable, and routing near aircraft control cables.

Cabling for the GNC 300 should not be routed near components or cabling which are sources of electrical noise.

Do not route the COMM antenna cable near any ADF antenna cables.

Route the GPS antenna cable as far as possible away from all COMMs and COMM antenna cable.

2.4 COOLING AIR

Cooling air is not required for the GNC 300 but is highly recommended because, as with any electronic equipment, reduced operating temperature can contribute to increased reliability. Additionally, location of the GNC 300 in a stack of other power

dissipating equipment can produce unacceptably high ambient air temperatures around the unit. A 5/8 inch diameter air fitting is provided on the rear of the mounting rack for the purpose of admitting cooling air under such conditions.

2.5 MINIMUM INSTALLATION REQUIREMENTS

Below is a list of required devices for A1 and A2 certification. Figure 1-3 shows various equipment that can be used. For a specific list of equipment used in the initial STC see GPN 190-00067-06. Deviations from this equipment should be approved by the FAA or the governing organization.

Pressure Altitude Device

This device delivers pressure altitude data to the GNC 300. This data can come from an encoder or serializer.

Manual Course Device

This device delivers the manual course selected to the GNC 300. Course information can come from an analog resolver or from an EFIS via the ARINC 429 bus or RS-422 bus.

HSI/CDI Device

This device displays Nav Flag, Left/Right and To/From. This can be displayed on the EFIS or HSI.

External Annunciators and Switches

NAV	Annunciator
GPS	Annunciator
NAV/GPS	Switch
HOLD	Annunciator
AUTO	Annunciator
GPS Sequence	Switch
Approach Actv	Annunciator (not required for A2)
Approach Arm	Annunciator (not required for A2)
GPS Approach	Switch (not required for A2)
Message	Annunciator
Arrival	Annunciator

The installer is advised to ensure that the switches and annunciators are the functional equivalent to and perform at least as well as the GARMIN devices used in the initial STC. The GARMIN switches and annunciators are sunlight readable and in the primary view of the pilot. Figure 2-3 shows what the GARMIN switch/annunciators look like. For other information concerning switch/annunciators see the Generic Airplane Flight Manual Supplement (190-00067-04) as well as current FAA directives.

Qualified GPS Antenna

This antenna must be one of those listed in the accessories list.

2.6 EXTERNAL ALTITUDE INPUT

Pressure altitude input from an external source may be derived from a RS-232 compatible serial altitude input or Parallel Gray Code/Gillham Altitude as described in Section 4 of this manual. Gillham Altitude is not required when serial altitude is used.

SECTION 3 INSTALLATION PROCEDURE

3.1 INSTALLATION ACCESSORIES

The following installation accessories are available:

ANTENNA AND RACK OPTIONS

010-10040-01	GA 56 ANTENNA KIT, W/O CABLE (Mod 1, or later)	
Includes:	011-00134-00 GA56 ANTENNA SUB-ASSEMBLY	1
	115-00031-00 BACKING PLATE	1
	210-10004-09 NUT, SELF-LOCKING, #8-32	4
	253-00002-00 ANTENNA GASKET	1
010-10040-02	GA 56 FLANGE MOUNT ANTENNA (Mod 1, or later)	
Includes:	011-00147-00 FLANGE MOUNT GA56 ANTENNA SUB-ASSEMBLY	1
	115-00080-00 NUT PLATE	1
	211-62212-14 SCREW, #10-32 X 5/8	4
	253-00011-00 ANTENNA GASKET	1
320-00003-00	15 FT LOW-LOSS AVIATION ANT. EXTENSION CABLE WITH RIGHT ANGLE BNC CONNECTOR	
320-00003-02	30 FT LOW-LOSS AVIATION ANT. EXTENSION CABLE WITH RIGHT ANGLE BNC CONNECTOR	
330-00087-00	CONNECTOR, BNC, MALE, CLAMP	
	Note: One cable assembly and one BNC connector are required to make the antenna cable, or it can be fabricated by the installer from materials meeting the requirements of paragraph 2.3.	
011-00154-00	MOUNTING RACK, (WITHOUT CONNECTORS)	
	Note: A mounting rack is required for approved installations. The following hardware is required for installation of the mounting rack, but is not provided:	
	#6-32 Flat Head Screw (4 ea.) #6-32 Self-locking Nut (4 ea.)	
011-00313-00	CONNECTOR, (J1 and J2) Kit	

DATA BASE OPTIONS

010-10051-00	MEMORY CARD - WORLDWIDE DATABASE
010-10051-01	MEMORY CARD - AMERICAS DATABASE
010-10051-02	MEMORY CARD - INTERNATIONAL DATABASE
010-10032-03	MEMORY CARD - USER

ANNUNCIATOR OPTIONS

<u>GPN</u>	<u>MID-CONTINENT P/N</u>	<u>DESCRIPTION</u>
013-00029-10	MD41-448	INTEGRATED SW/ANN UNIT, HOR, 28V
013-00029-11	MD41-444	INTEGRATED SW/ANN UNIT, HOR, 14V
013-00029-12	MD41-448 (5V)	INTEGRATED SW/ANN UNIT, HOR, 28V (5V LIGHTING)
013-00029-15	MD41-458	INTEGRATED SW/ANN UNIT, VERT, 28V
013-00029-16	MD41-454	INTEGRATED SW/ANN UNIT, VERT, 14V
013-00029-17	MD41-458 (5V)	INTEGRATED SW/ANN UNIT, VERT, 28V (5V LIGHTING)

MISCELLANEOUS OPTIONS

010-10075-00	PC KIT
190-00067-00	GNC 300 PILOT'S GUIDE
190-00067-01	GNC 300 QUICK REFERENCE GUIDE
190-00067-06	GNC 300 IN MOONEY M20J DOCUMENTED INSTALLATION
330-00067-00	GPS 1.57542 GHZ NOTCH FILTER
362-00014-00	WALL ADAPTER - 110/220VAC
010-10057-00	28 TO 14V CONVERTER (Consists of 011-00181-00)
010-10074-00	REMOTE BATTERY PACK (Consists of 011-00182-00)

The following installation accessories are required but not provided:

COMM ANTENNA: BROAD BAND 50 OHM VERTICALLY POLARIZED WITH COAXIAL CABLE.
HEADPHONES: 500 OHM NOMINAL IMPEDANCE
MICROPHONE: LOW IMPEDANCE CARBON OR DYNAMIC WITH TRANSISTORIZED PRE-AMP.

3.2 ANTENNA INSTALLATION

For the COMM antenna, follow the manufacturers instructions.

The remainder of this section applies to the GPS antenna. The GA 56 Antenna outline and footprint dimensions are shown in Figures 3-1 and 3-2.

- A. Using the backing plate as a template, mark the location of the mounting holes and the through hole for coax cable. Drill or punch the holes.
- B. The antenna installation must provide adequate support for the antenna considering a maximum drag load of 5 lbs. for the GA 56 antennas (at subsonic speed). Install a doubler plate to reinforce thin skinned aircraft. Observe guidelines for acceptable installation practices as outlined in AC 43.13-2A.
- C. Seal the antenna and gasket to the fuselage using a good quality electrical grade sealant. Use caution to insure that the antenna connector is not contaminated with sealant. Insure that the mounting screws are fully tightened and that the antenna base is well seated against the gasket. CAUTION: Do not use construction grade RTV sealant or sealants containing acetic acid. These sealants may damage the electrical connections to the antenna. Use of these type sealants may void the antenna warranty.

3.3 CABLE INSTALLATION

- A. Route the coax cable to the rack location keeping in mind the recommendations of Section 2. Secure the cable in accordance with good aviation practice.
- B. Trim the coaxial cable to the desired length and install the BNC connector (330-00087-00) per the cabling instructions on Figure 3-3. If the connector is provided by the installer, follow the connector manufacturer's instructions for cable preparation.
- C. Contacts for the 37 and 26 pin connectors must be crimped into the individual wires of the aircraft wiring harness. The following tables list contact part numbers (for reference) and recommended crimp tools:

Contacts					
	Standard Density Connectors				Hi Dens. Connector
	37 socket connector (J1 on unit)		9 pin connector (on battery pack)		26 pin connector (J2 on unit)
	20-24 AWG socket contact	18 AWG socket contact	20-24 AWG pin contact	18 AWG pin contact	22-28 AWG pin contact
Garmin p/n	336-00022-00	336-00023-00	336-00024-00	336-00025-00	336-00021-00
military p/n	M39029/63-368	n/a	M39029/64-369	n/a	M39029/58-360
Amp	205090-1	n/a	205089-1	n/a	204370-2
Positronic	M39029/63-368	FC6018D	M39029/64-369	MC6018D	M39029/58-360
ITT Cannon	031-1007-042	see note	330-5291-037	see note	030-2042-000

Tools							
	Hand Crimping Tool	Standard Density Connectors (size 20 contacts)				Hi Dens. Connector (size 22D)	
		pin or socket contacts (20-24 AWG)		pin or socket contacts (18 AWG)		pin contacts (22-28 AWG)	
		positioner	insert/extract	positioner	insert/extract	positioner	insert/extract
military p/n	M22520/2-01	M22520/2-08	M81969/1-02	n/a	M81969/1-02	M22520/2-09	M81969/1-04
Positronic	9507	9502-5	M81969/1-02	9502-11	M81969/1-02	9502-3	M81969/1-04
ITT Cannon	995-0001-584	995-0001-604	980-2000-426*	see note	274-7048-000*	995-0001-739	n/a
Amp	601966-1	601966-5	91067-2	n/a	n/a	601966-6	91067-1
Daniels	AFM8	K13-1	M24308/1-02	K774	M24308/1-02	K42	M24308/18-1
Astro	615717	615725	M81969/1-02	see note	M81969/1-02	615724	M81969/1-04

* Insert/extract tools from ITT Cannon are all plastic, others are plastic with metal tip.

Non- GARMIN part numbers shown are not maintained by GARMIN and consequently are subject to change without notice.

NOTE: Alternate contacts for 18 AWG wire: As an alternate to the Positronic contacts listed (and provided in the install kit), the installer may use contacts made by ITT Cannon as follows: Socket contact - ITT Cannon p/n: 031-10007-001, Pin contact - ITT Cannon p/n: 330-5291-055. These contacts require the use of a different crimp tool positioner than that shown in the table, with part numbers as follows: Daniels p/n: K250, Astro p/n: 616245, or ITT Cannon p/n: 980-00005-722.

See Appendix B for information regarding obsolete stamped type contacts.

3.4 RACK INSTALLATION

- A. Figure 3-4 shows outline dimensions for the aviation rack. Install the rack in a rectangular 6.320" x 2.000" hole in the instrument panel. Exercise caution when installing the rack into the instrument panel. The rack is designed to facilitate removal of the GNC 300 for portable use. Deformation of the rack may make it difficult to install and remove the GNC 300.
- B. Install the rack in the aircraft panel using four #6-32 countersunk screws and four self-locking nuts or other FAA approved methods as per Advisory Circular 43.13-1A. The screws are inserted from the inside through the holes in the sides of the rack (see Figure 3-5).

3.5 GNC 300 INSTALLATION AND REMOVAL

The GNC 300 is installed in the rack by gently sliding it straight in until it rests against the back of the rack. A 3/32 inch hex drive tool is then inserted into the access hole at the bottom of the unit face. Rotate the hex tool clockwise while pressing on the left side of the Bezel until the unit is firmly seated in the rack.

To remove the unit from the rack, insert the hex drive tool into the access hole on the unit face and rotate counter-clockwise until the mounting screw turns freely and the unit protrudes about 3/8 inch from the panel.

Be sure not to over tighten the unit into the rack. The application of hex drive tool torque exceeding 15 in*lbs can damage the locking mechanism.

3.6 COMM ANTENNA INSTALLATION CHECK

Check for insertion loss and VSWR. VSWR should be checked with an in-line type wattmeter inserted in the coaxial transmission line between the transceiver and the antenna. Any problem with the antenna installation will most likely be seen as a high reflected power. A VSWR of 3:1 will result in a 25% loss in power.

SECTION 4 POST INSTALLATION CONFIGURATION & CHECKOUT PROCEDURE

Before starting the below operations, unit initialization must occur. Do this by first removing any data cards and then turning the unit on. Press enter in response to "Select operating mode Normal ok?". Press enter in response to "No Jeppesen database rte/prx limited to user wpts ok?". After the satellite status page is displayed for 5 seconds the unit may be turned off. Proceed with the following steps.

4.1 TEST MODE OPERATIONS

With power applied to the aviation rack and the GNC 300 unit off, depress and hold the ENT key and turn the unit on (release the ENT key when the display activates). The first page displayed is the Display Test Page. While in TEST MODE, test pages can be selected by ensuring the cursor is off and rotating the outer knob either direction. To change data on the displayed test page, depress the CRSR key and the cursor will highlight the standby COMM frequency. Press cursor again to move to configuration selections. The inner knob will change the data on the selected field. The ENT key or the outer knob will advance to the next field on the page. Pressing the CRSR key again will stop the current field from flashing, allowing the outer knob to select the next test page. The ENT key is used to enter a new value into the OBI data field after selecting the desired value using the inner and outer knobs (see the appropriate chapter of the Pilot's Guide for more information on page and data selection). Note that some pages found in test mode are intended for bench testing and are not discussed here.

4.2 INSTALLATION CONFIGURATION

Note that the below pages are in the order found when rotating the outer knob clock-wise starting at the Display Test Page. See Section 4.1 to get to this page.

4.2.1 DISPLAY ADJUSTMENT

This page allows the setting of display parameters that affect the display brightness in automatic mode.

“response time” sets the speed with which the brightness responds to ambient light changes. The higher the number the slower the display responds.

“min” sets the minimum brightness of the display. The higher the number the brighter the minimum brightness.

“slope” sets the sensitivity the brightness of the display has to changes in ambient light. The higher the number the brighter the display will be for a given increase in ambient lighting.

4.2.2 I/O CHANNEL 1

Select the I/O CHANNEL 1 Test Page. Change the selectable input and output to match that of the installed equipment. The available options are:

Input:	<u>Field</u>	<u>Description</u>
	off	No units connected to Channel 1 input
	icarus-alt	Serial altitude received from: Icarus, Model 3000, Mode C Serializer
	shadin-alt	Serial altitude received from: Shadin 9000T Serializer System (Non-TSO'd) Shadin 9200T Series Serializer System (Non-TSO'd) Shadin 8800T Series Encoder System (TSO'd)
	shadin-fuel	Fuel information received from: Shadin 91204XT Series Digital Fuel Management System (TSO'd) Shadin 91053XT Series Digital Fuel Management System (TSO'd)
	arnav/ei-fuel	Fuel information received from: Arnav, Model FC-10, Fuel Computer (TSO'd) Arnav, Model FT-10, Fuel Totalizer (TSO'd) Electronics International, Model FP-5L, Fuel Flow Computer (Non-TSO'd)
	shadin-adc	Air data information received from: Various models from the 9628XX-X family
	shadin-fadc	Fuel/Air data information received from: Various models from the 9628XX-X family

Note: Verify with manufacturer of data input device that unit supports GARMIN interface.

Output:	<u>Field</u>	<u>Description</u>
	off	No units connected to Channel 1 output
	aviation	Serial position, velocity and navigation data to: Argus, Model 3000, Moving Map Argus, Model 5000, Moving Map Argus, Model 7000, Moving Map Stormscope, Series II with Navaid, Moving Map Shadin, 91204X[T] Digital Fuel Management System (TSO'd) Shadin, 91053X[T] Digital Fuel Management System Electronics International, Model FP-5L, Fuel Flow Computer (Non-TSO'd) Shadin, Model 9628XX-X Fuel/Airdata Computer (TSO'd) GARMIN, GPS 195 GARMIN, GPS III

4.2.3 RS-422 CHANNEL

Select the RS-422 Channel Test Page. Change the selectable input and output to match that of the installed equipment. The available options are:

Input:	<u>Field</u>	<u>Description</u>
	off	No units connected to the RS-422 input
	Collins PL2 DSP	Collins Pro Line 2 Display Select Panel connected

Output:	<u>Field</u>	<u>Description</u>
	off	NO AVAILABLE SELECTIONS

4.2.4 ARINC 429 CHANNEL

Select the ARINC 429 Channel Test Page. Change the selectable output to match that of the installed equipment. The available options are:

Input:	<u>Field</u>	<u>Description</u>
	off	No units connected to ARINC 429 input
	Selected Course	Any ARINC 429 compatible unit that transmits the “Selected Course” word (label 100)
	Course/heading	Any ARINC 429 compatible unit that transmits the “Selected Course” (label 100), as well as the “True heading” (label 314) and/or “Magnetic heading” (label 320) words
	Heading	Any ARINC 429 compatible unit that transmits the “True heading” (label 314) and/or “Magnetic heading” (label 320) words

Output:	<u>Field</u>	<u>Description</u>
	off	No units connected to ARINC 429 output
	Collins PL2 EFS	Collins Pro Line 2 EFIS connected (w/ GAMA)
	King EFS 40/50	King Radio EFIS 40 or 50 connected (w/ GAMA)
	w/o GAMA labels	Any unit that receives standard 429 output

Below is a list of labels output by the GNC 300:

Navigation/position data

Label (octal)	<u>Description</u>
100	Selected course
114	Desired track
115	Bearing to waypoint
116	Cross track error
121	Horizontal command (to autopilot)
251	Distance to go
252	Time to go
310	Present position latitude
311	Present position longitude
312	Ground speed
313	Ground track
314	True heading
320	Magnetic heading
147*	Magnetic variation
261*	GPS navigation mode
275*	Navigation status
326*	Lateral scale factor
351*	Distance to destination
352*	Time to destination

Flight plan data

Label (octal)	<u>Description</u>
074*	Flight plan header
075*	Active from/to waypoints
113*	Message checksum
300*	Station magnetic variation/type/class
303*	Message length/type/number
304*	Waypoint identifier characters 1-3
305*	Waypoint identifier characters 4-6
306*	Waypoint latitude
307*	Waypoint longitude

Identification data

Label

(octal) Description

377 Equipment identifier

371* General Aviation equipment identifier

*These labels are formatted per the General Aviation Manufacturers Association (GAMA) definition. Note that the use of a 429 device w/o GAMA will cause the loss of the above asterisked labels. Some may be required for A1 certification. For example, label 326 changes the CDI scale for approach.

4.2.5 CDI CALIBRATION

Select the test page displaying CDI output calibration. Place the cursor on the alignment field by using the outer knob. Use the inner knob to adjust the CDI needle until it is centered. Once centered, turn the cursor off to complete the calibration process.

4.2.6 SELECTED COURSE CALIBRATION

Select the test page displaying the selected course input. Using an extremely accurate input source, input 150° to the GNC 300. The input course will indicate close to 150 and a “Calib?” field will appear in the lower right corner. Selecting the “Calib?” field will calibrate the GNC 300 to match the input source. Verify OBS operation by checking that the bearing displayed on the GNC 300 is within 2° of the selected bearing. Do this for every multiple of 30° around the OBS.

4.2.7 APPROACH SETTINGS

Select the Approach Settings Test Page. Move the cursor over the approach switch field to change the installation state.

The available options are:

Appr switch:	<u>Field</u>	<u>Description</u>
	none	The approach switch is not present
	instld	The approach switch is installed

NOTE: To verify the installation of the approach switch, the “instld” setting requires the approach switch to be pressed to confirm its presence. The following prompt is displayed in this case: “press appr switch to confirm” along with a “?” following “instld”. When the switch press is recognized the prompts are cleared and the “instld” setting is confirmed.

4.2.8 CONFIGURATION

Select the Configuration Test Page. Change the selectable Strap and Fuel selections to match that of the aircraft. The available options are:

Strap:	<u>Field</u>	<u>Description</u>
	Lnav 1	Number 1 (Pilot) long range NAV
	Lnav 2	Number 2 (Co-Pilot) long range NAV
	common	Common long range NAV

NOTE: The strap option affects the interpretation of RS-422 and ARINC 429 input data

For RS-422 input data the following applies:

Lnav 1	Only data marked for Lnav 1 is used
Lnav 2	Only data marked for Lnav 2 is used
common	Data marked for either Lnav 1 or Lnav 2 is used

For ARINC 429 input data the following applies:

Lnav 1	Only data with SDI=0 or SDI=1 is used
Lnav 2	Only data with SDI=0 or SDI=2 is used
common	Only data with SDI=0 is used

NOTE: SDI=0 is an “all call”.

Fuel:	av gas	Using Aviation gas (5.8 lbs/gal)
	Jet A	Using Jet A/Jet A-1 fuel (6.7 lbs/gal)
	Jet B	Using Jet B (JP-4) fuel (6.5 lbs/gal)

NOTE: The Fuel option is used to designate the type of fuel used so that the correct fuel density will be used in calculations.

4.2.9 REMOTE BATTERY SETTINGS

Remote Battery: none
instld

NOTE: If “instld” is selected when a battery is not installed erroneous voltages will be shown on the Power Test page and invalid battery messages will be issued in normal operating modes.

Low Battery: selectable between 8.0 volts and 9.6 volts by 0.2 volt steps

NOTE: In normal operating modes, The “Battery Low” message will be issued when the battery voltage is below the low battery value. The default value is 9.0 volts.

4.2.10 I/O CHANNEL 2

Note: This page is not found in the Test Pages but is included here to aid installation. For more information see SET pages in the Pilot's Guide (GPN 190-00067-00).

Select the I/O CHANNEL 2 Set Page. Change the selectable input and output to match that of the installed equipment. The available options are:

Input:	<u>Field</u>	<u>Description</u>
	off	NO AVAILABLE SELECTIONS
Output:	<u>Field</u>	<u>Description</u>
	off	No units connected to Channel 2 output
	plotting	Serial position, velocity, navigation and satellite data to: NMEA 0183 Version 2.0 compatible mapping device or GARMIN PC software.

NOTE: Below is a list of the NMEA 0183 sentences (with maximum number of characters) that the GNC 300 transmits.

RMC	-70 characters
GGA	-72 characters
GSA	-57 characters
GSV	-140 characters (70 characters x 2 sentences)
RMB	-70 characters
BOD	-35 characters
WPL	-38 characters
*PGRME	-35 characters
*GARMIN proprietary accuracy error sentence that is not a part of the NMEA 0183 standard.	

4.3 GROUND TEST

The GNC 300 ground test procedure incorporates a series of display pages to test CDI/flag, OBI, annunciators, external switches, altitude inputs, and power functions of the unit.

Note that the below pages are in the order found when rotating the outer knob counter-clockwise starting at the Display Test page. See Section 4.1 to get to this page.

4.3.1 POWER TEST

Select the Power Test page. This page reports the status of the GNC 300 external power source, remote battery and internal memory battery. In the below "voltage" represents the voltage currently measured for that function.

The first line, below the COMM frequencies, shows the source of external power as shown below:

External Power “voltage”
Battery Power
Wall Adapter

The presence of a Wall Adapter will override the other two sources. Battery Power will not be shown unless on the Remote Battery Settings Page the Remote Battery is selected as “instld”. The higher voltage of External Power or Battery Power will determine which is shown.

The next line shows the status of the Remote Battery as shown below:

Rmt Bat none (If on the Remote Battery Settings Page Remote Battery is selected as none)

Rmt Bat “voltage” “mode” “auto status”

“mode” represents the mode of the charger enable to the remote battery pack and is selectable. “On” enables the charger. “Off” disables the charger. “Auto” enables the charger if the External Power is the current source and its voltage is high enough. When in “Auto” mode “auto status” will be either “on” or “off” reflecting whether the charger is enabled or disabled.

The next line reports the status of the internal memory battery as shown below:

Mem Bat ok/low.

Note that the “TX” field will light on the display but the transmitter will not actually transmit when the GNC 300 is powered from the wall charger.

4.3.2 CDI AND FLAG TEST

Select the CDI Test Page. Using the controls on the GNC 300 front panel, make the selections indicated below and verify the interfaces as appropriate:

CDI

Full scale left	Ensure the CDI is deflected full scale left (5 dots)
Full scale right	Ensure the CDI is deflected full scale right (5 dots)
Centered	Ensure the CDI is centered

TO/FROM/FLAG

TO	Ensure TO flag is visible
FROM	Ensure FROM flag is visible
FLAG	Ensure TO and FROM are NOT visible

CDI FLAG

IN VIEW	Ensure CDI flag is in view
OUT OF VIEW	Ensure CDI flag is out of view

SUPERFLAG

IN VIEW	Ensure superflag in view
OUT OF VIEW	Ensure superflag out of view

4.3.3 ANNUNCIATOR TEST

Select the Annunciator Test Page. Using the controls on the GNC 300 front panel make the selections indicated below and verify the interfaces as appropriate:

MSG Annunciator

OFF	Ensure the Message Annunciator is OFF
ON	Ensure the Message Annunciator is ON

Arrival Annunciator

OFF	Ensure the Arrival Annunciator is OFF
ON	Ensure the Arrival Annunciator is ON

Approach Annunciator

OFF	Ensure all Approach Annunciators are OFF
ACTV	Ensure the Approach Active Annunciator is ON (Arm is OFF)
ARM	Ensure the Approach Arm Annunciator is ON (Active is OFF)

4.3.4 EXTERNAL SWITCH TEST

Select the External COM Switches Page. For each of the following installed remote switches perform the following:

Press Remote Enter and verify the Rmt ent field changes from off to on.

Press PTT and verify the PTT field changes from off to on.

Press Remote Transfer and verify the Rmt xfr field changes from off to on.

Next, select the External Switches Page. For each of the following installed remote switches perform the following:

Press GPS Appr and verify the “appr” field changes from off to on.

Press GPS Sequence and verify the “hold” field changes from off to on.

4.3.5 COMMUNICATIONS LOOPBACK TEST

This page displays the results of communication loop back tests. Four channels are tested: RS232 channels 1 and 2, RS 422 and ARINC 429. Results of the test are either “OPEN” or “OK”. Open means the channel's transmitter and receiver are not connected or the test failed. The tests are performed continuously while on this page

except for RS232 channel 2. This channel is only tested at power on and the results displayed on this page. Therefore the unit must be turned off and the receiver/transmitter connected or disconnected and then turn the unit on to perform the test.

To test the channels:

RS232 channel 1:	Connect RS232 channel 1 receiver and transmitter
RS232 channel 2:	Connect RS232 channel 2 receiver and transmitter
RS422:	Connect RS232 channel 1 to RS422 LOW (pin 27) and ground RS422 HI (pin 11)
ARINC 429:	Connect ARINC 429 receiver and transmitter

4.3.6 ALTITUDE INPUT TEST

Select the Gray Code Altitude Test Page if this input is used. Verify that the altitude input is reading the correct altitude. NOTE: This does not display serial altitude.

4.3.7 OBI TEST

Select the OBI Test Page. Using the controls on the GNC 300 front panel, make the selections indicated below and verify the interfaces as appropriate:

OBI Data

VALID	Ensure that the OBI indicates the proper value
INVALID	Ensure the OBI is invalid

OBI Value	Ensure that the OBI displays the value entered when the VALID option is selected
-----------	--

NOTE: The 3 lines that make up the OBI interface may be toggled individually. This may be done from the “Value” field. Cycle this field to the desired line (either CLOCK, DATA or SYNC) and toggle the output to HIGH or LOW.

4.3.8 SIGNAL ACQUISITION TEST

The Self Test Page will be displayed followed by the Data Base Page. Upon approval of the Data Base Page, the Satellite Status Page will be displayed. If unable to acquire satellites, relocate the aircraft away from obstructions which might be shading reception. If the situation does not improve, check the antenna installation.

Once GPS position information is available, use the DIRECT-TO key to activate the navigation function to a nearby NAVAID, intersection, or airport. Ensure any connected equipment is transmitting data to and/or is receiving data from the GNC 300 and is functioning properly (see the Pilot's Guide for more information on the DIRECT-TO function).

4.3.9 VHF COMM INTERFERENCE CHECK

- a) Go to the Satellite Status Page, verify that 7 to 8 satellites have been acquired
- b) See that the “NAV” flag is out of view
- c) Select 121.15 MHZ on COMM1
- d) Transmit for a period of 20 seconds
- e) Verify that the flag does not come into view
- f) Repeat steps d) and e) for the following frequencies:

121.175, 121.20, 131.250, 131.275 and 131.300
- g) Repeat steps c-f for all COMMs installed in the aircraft
- h) If the “NAV” flag comes into view, refer to Section 2.1.5 for options to improve performance.

4.3.10 VHF COMM CHECK

A flight test is recommended after the installation is completed to insure satisfactory performance. To check the communications transceiver, maintain an appropriate altitude and contact a ground station facility at a range of at least 50 nautical miles. Contact a ground station close in. Press the squelch disable button to defeat the automatic squelch feature and listen for any unusual electrical noise which would reduce the COMM receiver sensitivity by increasing the squelch threshold. If possible, verify the communications capability on both the high and low end of the VHF COMM band.

SECTION 5 CERTIFICATION

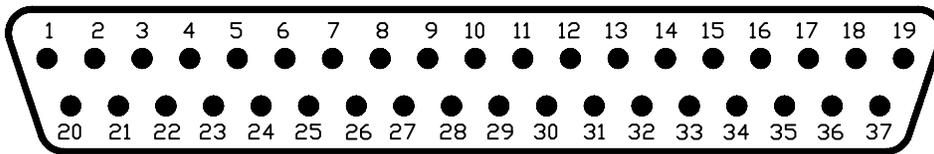
The GNC 300 is certified for IFR enroute, terminal and non-precision approaches.

The GNC 300's initial certification was accomplished via a STC by GARMIN in a Mooney M20J. See Appendix C for a copy of the STC.

All installations must be certified. For more information, see FAA Advisory Circular “Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment for use as a VFR and IFR Supplemental Navigation System”, Appendix 1. All new certifications after GARMIN's Mooney installation will be “Follow-On”.

SECTION 6 CONTINUED AIRWORTHINESS

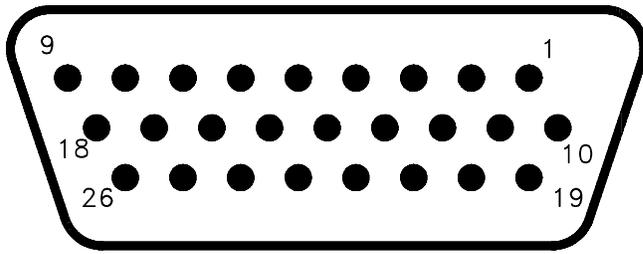
Maintenance of the GNC 300 is on condition only. Periodic maintenance of the GNC 300 is not required.



VIEW OF J101 CONNECTOR
FROM BACK OF RACK

J101			
PIN NO.			
1	-----	D-BAR LEFT +	
2	-----	TD +	
3	-----	FLAG +	
4	-----	FLAG -, D-BAR RIGHT +, FROM +, STATOR E, STATOR G	
5	-----	RESERVED	
6	-----	RESERVED	
7	-----	DBI CLOCK	
8	-----	DBI DATA	
9	-----	APPROACH ARM LOW	
10	-----	NAV SUPER FLAG	
11	-----	RS 422 IN HI	
12	-----	ARRIVAL ANNUN.	
13	-----	APPROACH ACTV ANNUN.	
14	-----	ROTOR C	
15	-----	ARINC 429 OUT B	
16	-----	ARINC 429 OUT A	
17	-----	RS232 IN 1	
18	-----	RS232 IN 2	
19	-----	RS232 OUT 2	
20	-----	MESSAGE ANNUN.	
21	-----	AIRCRAFT POWER 14 VDC	
22	-----	GROUND	
23	-----	DBI SYNC	
24	-----	RS232 OUT 1	
25	-----	AIRCRAFT POWER 14 VDC	
26	-----	GROUND	
27	-----	RS 422 IN LO	
28	-----	APPROACH ARM ANNUN.	
29	-----	CHARGE ENABLE	
30	-----	BATTERY + (POSITIVE)	
31	-----	RESERVED	
32	-----	ARINC 429 IN A	
33	-----	ARINC 429 IN B	
34	-----	BATTERY - (NEGATIVE)	
35	-----	STATOR D	
36	-----	RESERVED	
37	-----	STATOR F	

FIGURE 1-1 PINOUT DEFINITION, 37 PIN DSUB



VIEW OF J102 CONNECTOR
FROM BACK OF RACK

J102
PIN NO.

1	-----	RESERVED
2	-----	MIC AUDIO HI
3	-----	MIC AUDIO LO
4	-----	MIC KEY
5	-----	COMM AUDIO HI
6	-----	COMM AUDIO LO
7	-----	RESERVED
8	-----	MIC INTERCOMM
9	-----	RESERVED
10	-----	REMOTE TRANSFER
11	-----	RESERVED
12	-----	TRANSMIT INTERLOCK
13	-----	SEQUENCE HOLD LOW
14	-----	ALTITUDE D4
15	-----	ALTITUDE A1
16	-----	ALTITUDE A2
17	-----	ALTITUDE A4
18	-----	ALTITUDE B1
19	-----	ALTITUDE B2
20	-----	ALTITUDE B4
21	-----	ALTITUDE C1
22	-----	ALTITUDE C2
23	-----	ALTITUDE C4
24	-----	ALTITUDE COMMON
25	-----	GROUND
26	-----	REMOTE ENTER

FIGURE 1-2 PINOUT DEFINITION, 26 PIN HD-DSUB

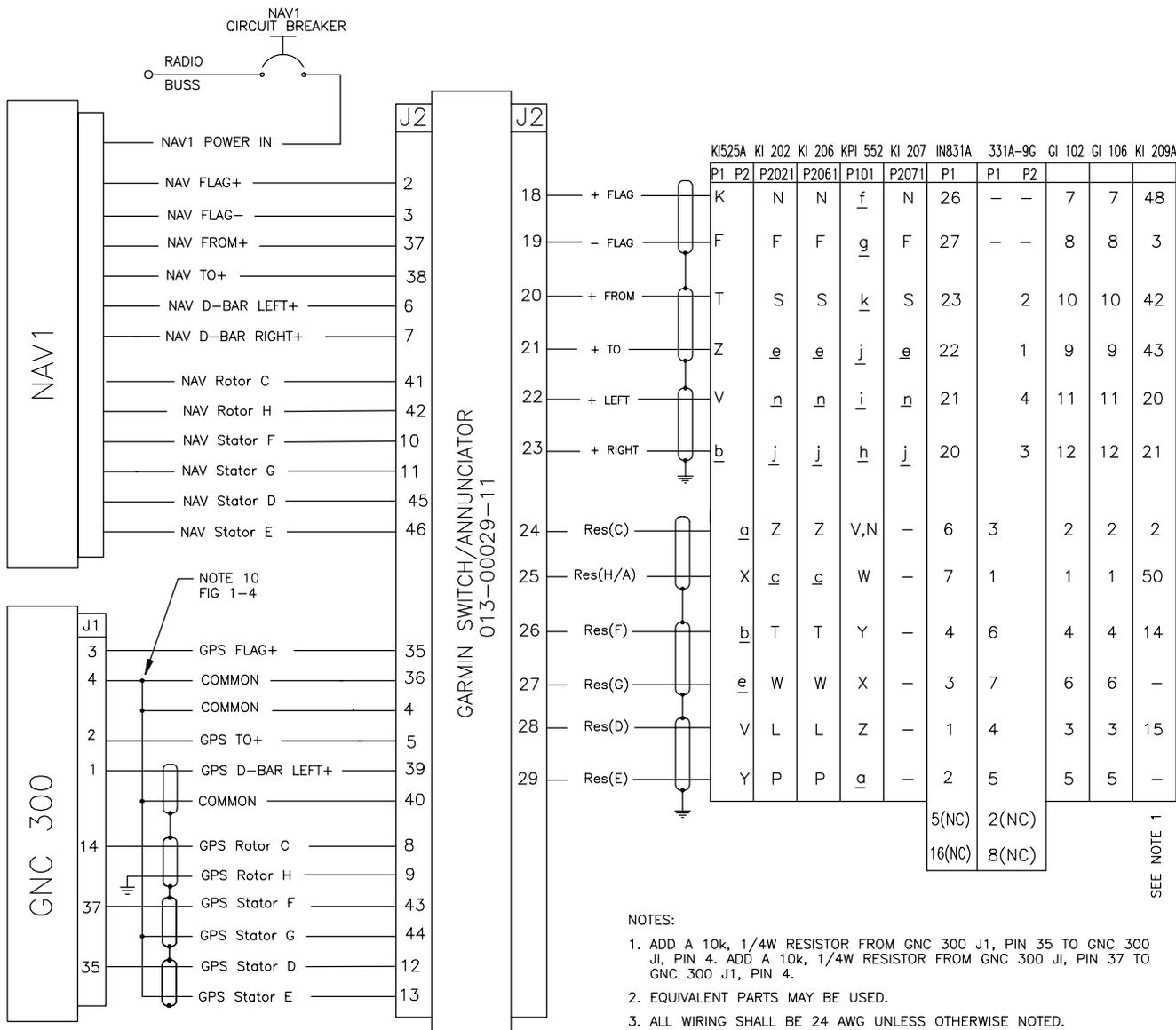
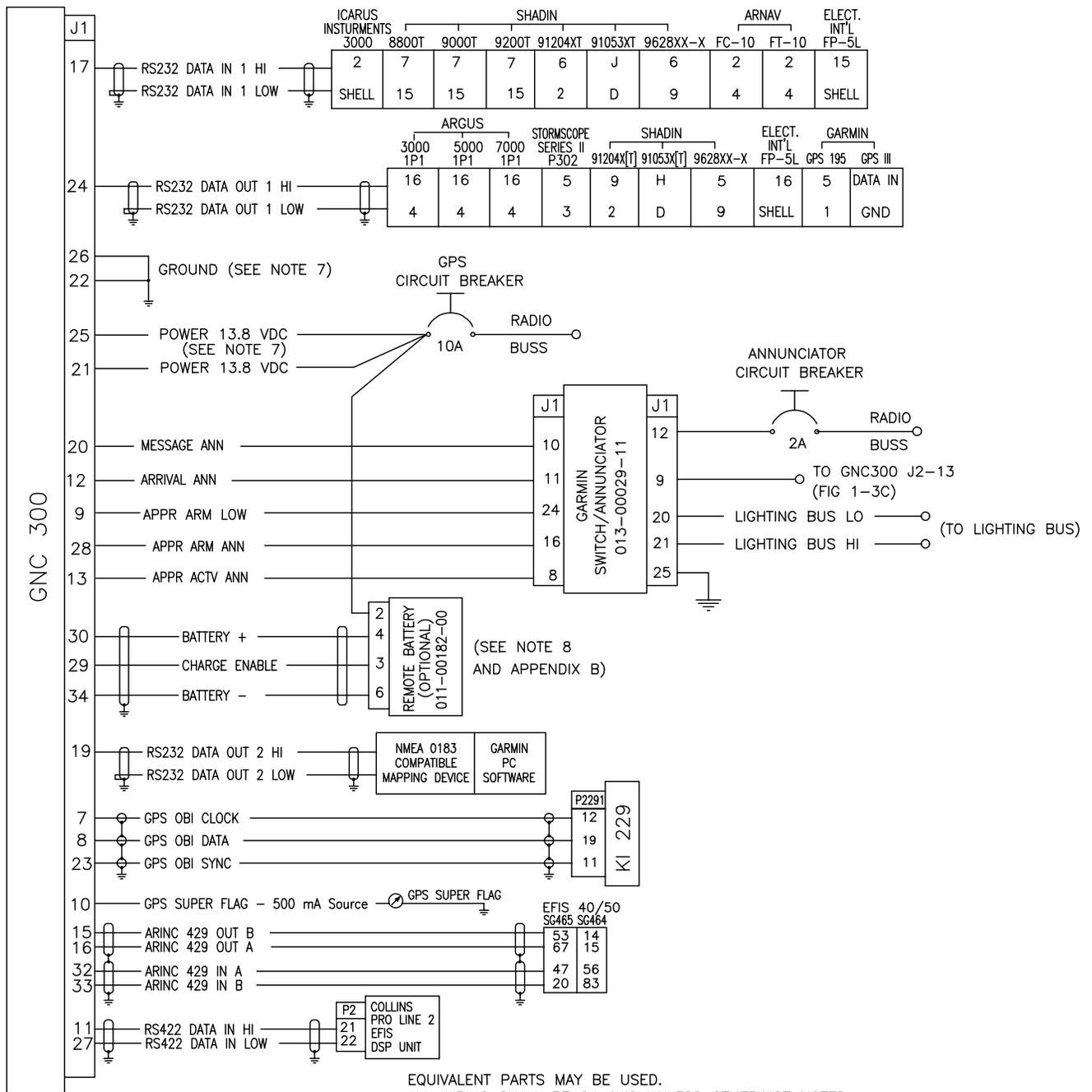


FIGURE 1-3A INTERCONNECT SCHEMATIC



EQUIVALENT PARTS MAY BE USED.
ALL WIRING SHALL BE 24 AWG UNLESS OTHERWISE NOTED.

FIGURE 1-3B INTERCONNECT SCHEMATIC

EQUIVALENT PARTS MAY BE USED.
 ALL WIRING SHALL BE 24 AWG UNLESS
 OTHERWISE NOTED.

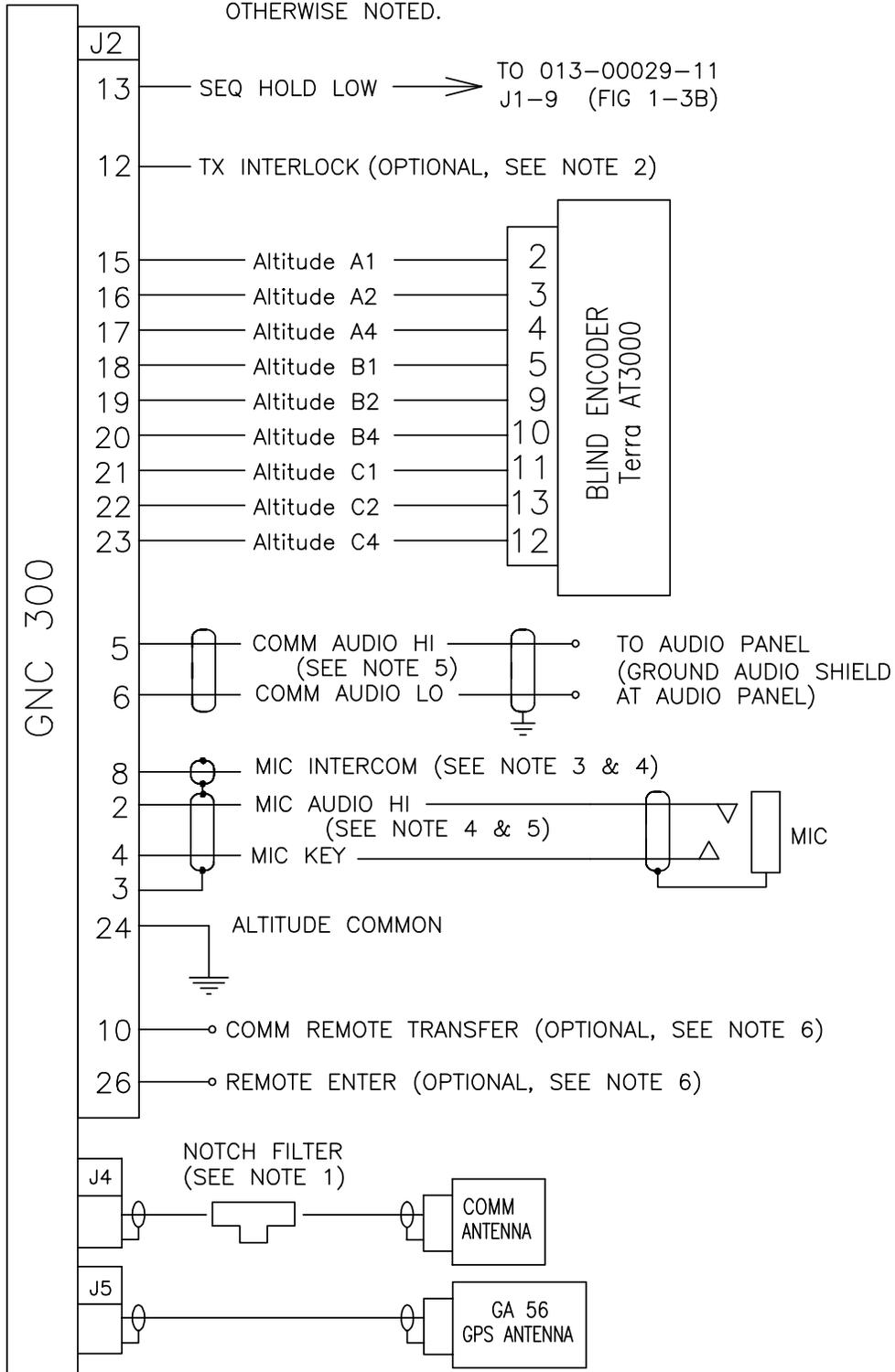
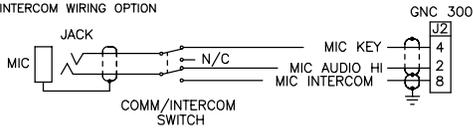


FIGURE 1-3C INTERCONNECT SCHEMATIC

Notes:

- 1) A 1.575 GHZ NOTCH FILTER (GARMIN p/n 330-00067-00) SHOULD BE INSTALLED IN THE COMM ANTENNA COAX AS CLOSE TO THE COMM TRANSMITTER AS POSSIBLE.
- 2) CONNECT TX INTERLOCK (J2-12) TO THE SECOND COMM'S MIC KEY TO MINIMIZE SQUELCH BREAKING ON THE GNC 300 WHEN THE SECOND COMM IS KEYED.

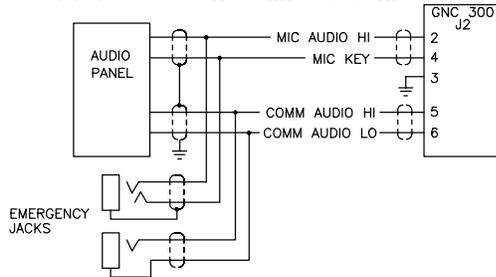
3) INTERCOM WIRING OPTION



- 4) CONNECTING 2 MIC'S TO THE MIC AUDIO HI/LO OR MIC INTERCOM AT THE SAME TIME MAY LOAD DOWN THE MIC BIAS AND RESULT IN WEAK OR DISTORTED AUDIO. MIC ISOLATION RELAYS ARE RECOMMENDED SO THAT ONLY ONE MIC IS ACTIVE AT A TIME.

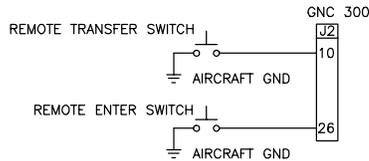
5) EMERGENCY COMM USE

ALLOW FOR DIRECT CONNECTION OF HEADPHONES AND MICROPHONE TO THE GNC 300 TO TAKE FULL ADVANTAGE OF THE REMOTE BATTERY PACK (GPN 011-00182-00). IN THE EVENT OF POWER LOSS OR FAILURE OF AN AUDIO PANEL, THIS WILL ALLOW THE USE OF THE GNC 300. DIRECT CONNECTION MAY ALREADY BE IMPLEMENTED, OR ACCOMPLISHED VIA AN EMERGENCY POSITION ON AN AUDIO PANEL, OR EMERGENCY JACKS MAY BE INSTALLED AS SHOWN BELOW.

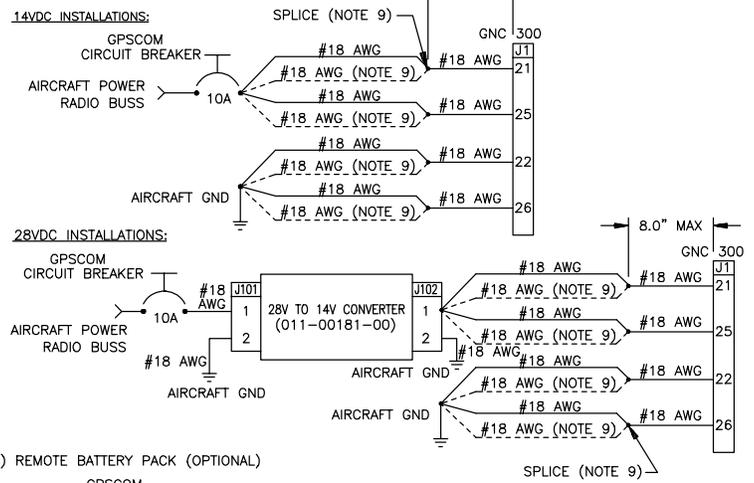


6) COMM REMOTE TRANSFER AND ENTER OPTIONS.

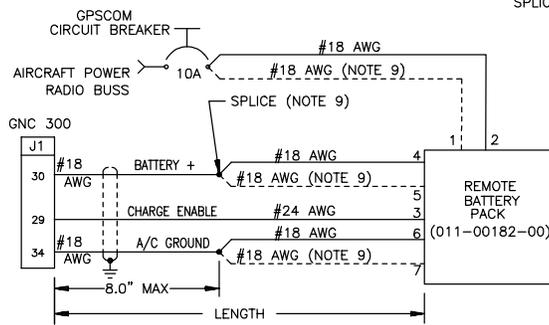
IF REMOTE TRANSFER IS NOT DESIRED, NO CONNECTION IS REQUIRED TO J2-10.
IF REMOTE ENTER IS NOT DESIRED, NO CONNECTION IS REQUIRED TO J2-26.
USE SPST MOMENTARY SWITCH FOR EACH FUNCTION.



7) AIRCRAFT POWER AND GROUND CONNECTIONS



8) REMOTE BATTERY PACK (OPTIONAL)



9) WIRE SIZE AND POWER LINE SPlicing

FOR 6 FEET AND LESS, USE 1 #18 AWG FOR EACH CONNECTION. FOR 6-12 FEET, USE 2 #18 AWG FOR EACH CONNECTION. USE GPN 330-00165-01 SOLDERLESS CONNECTOR (LARGE) AS CLOSE TO CONNECTOR AS POSSIBLE (8.0" MAX). USE JST CRIMP TOOL YS1614 OR EQUIVALENT.

MAXIMUM ALLOWABLE WIRE GAUGE INTO GNC 300 J1 AND 011-00182-00 PINS IS #22 AWG. FOR 18 AWG WIRE/TERMINATION AT GNC 300, USE SPECIAL 18 AWG TERMINATION SOCKET CONTACT (336-00023-00) SUPPLIED WITH CONNECTORS.

FOR REMOTE BATTERY PACK, USE SPECIAL 18 AWG TERMINATION PIN CONTACT (336-00025-00) SUPPLIED WITH REMOTE BATTERY. PROTECT EXPOSED CONDUCTOR ON SPECIAL LARGE TERMINATION CONTACTS WITH 3/8" [1 cm] LENGTH OF SHRINK TUBING (312-00005-05) SUPPLIED WITH CONNECTORS.

10) SIGNAL LINE SPlicing

USE GPN 330-00165-00 SOLDERLESS CONNECTOR (SMALL) TO SPlice 3 TO 8 #24 AWG WIRES. USE JST CRIMP TOOL YS2216 OR EQUIVALENT.

FIGURE 1-4 INTERCONNECT SCHEMATIC NOTES

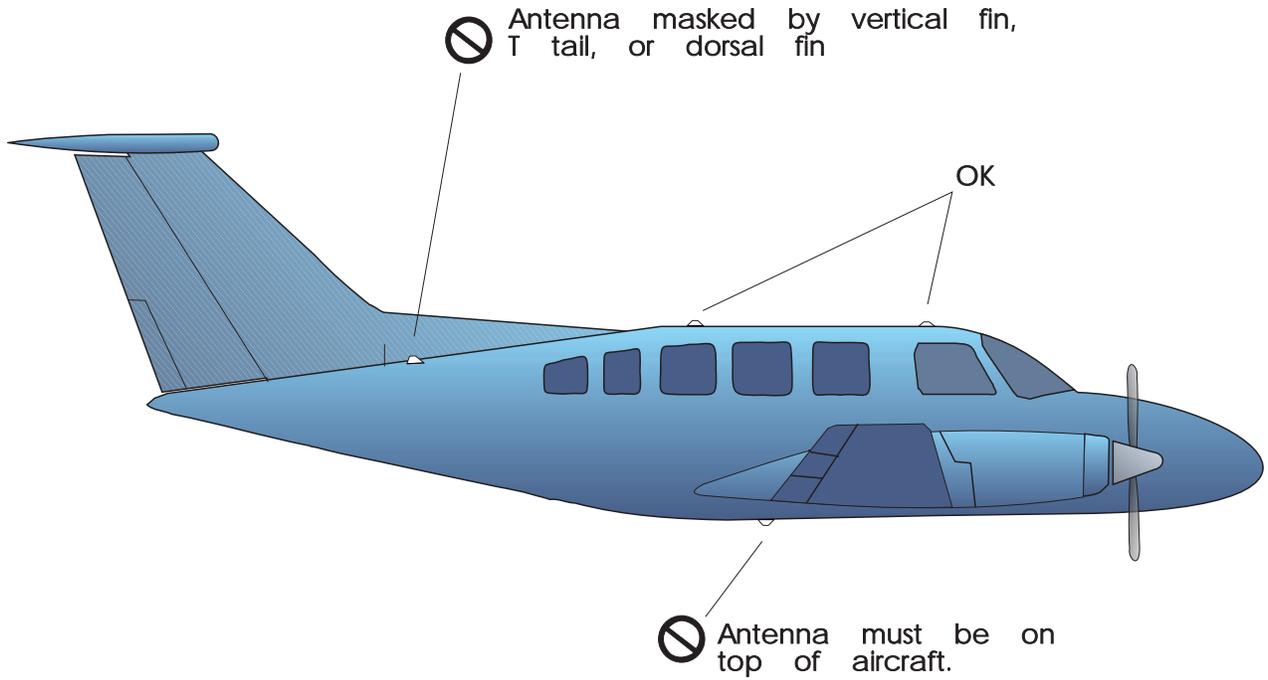


FIG 2-1
GPS ANTENNA INSTALLATION CONSIDERATIONS

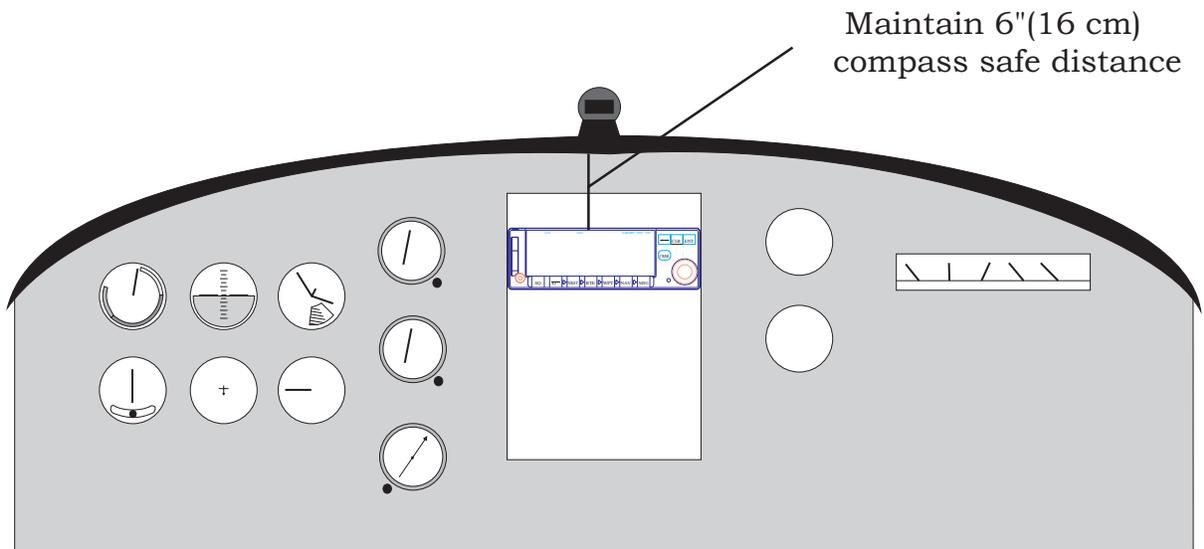
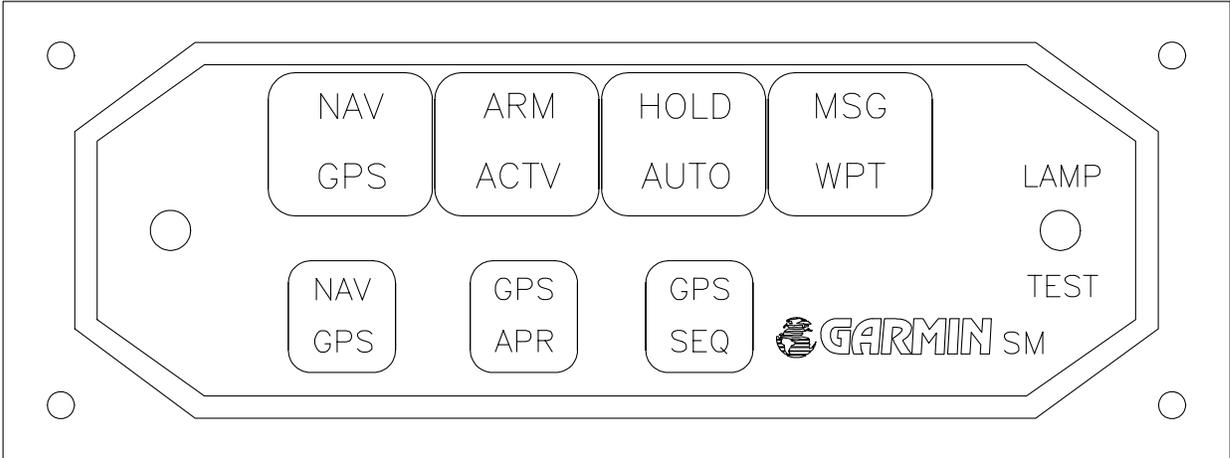


FIG 2-2
GNC 300 INSTALLATION CONSIDERATIONS

ANNUNCIATORS



SWITCHES

FIGURE 2-3 SWITCH/ANNUNCIATOR LAYOUT

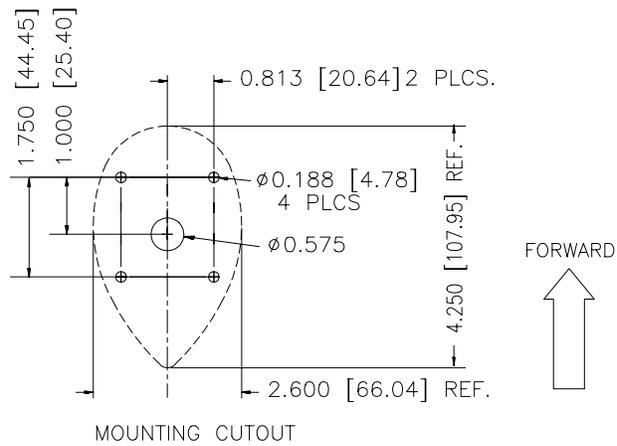
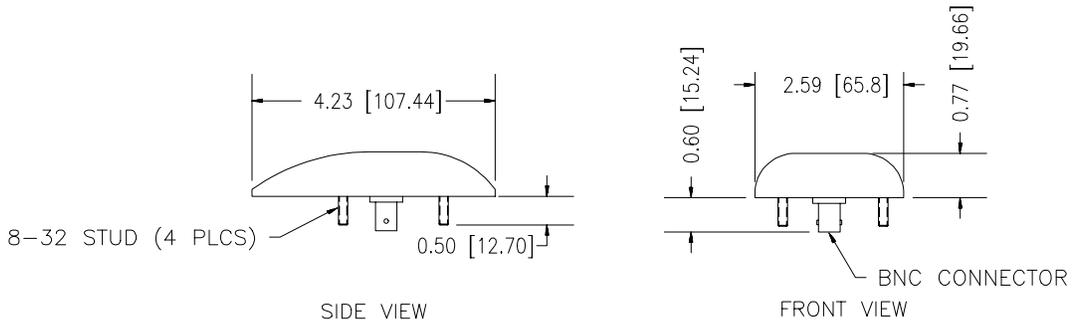
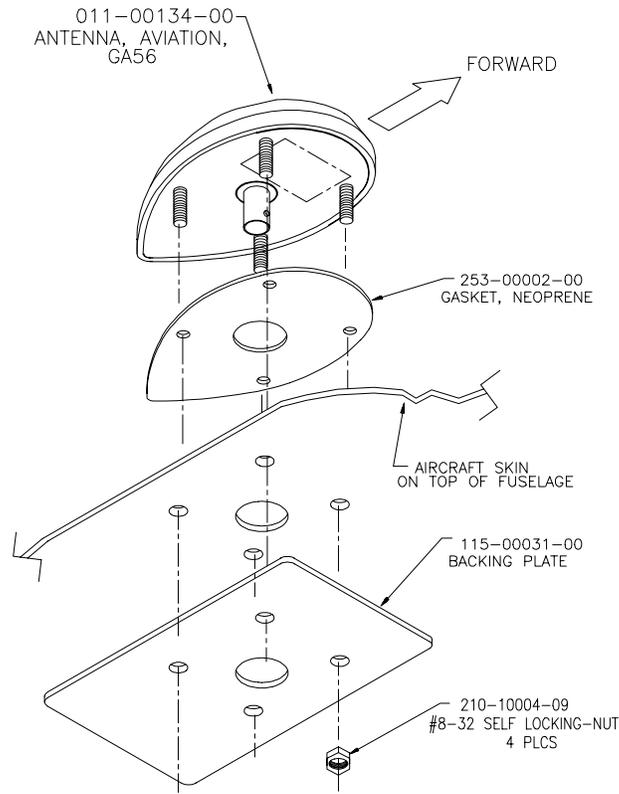


FIG 3-1
STUD MOUNT GA 56 ANTENNA INSTALLATION

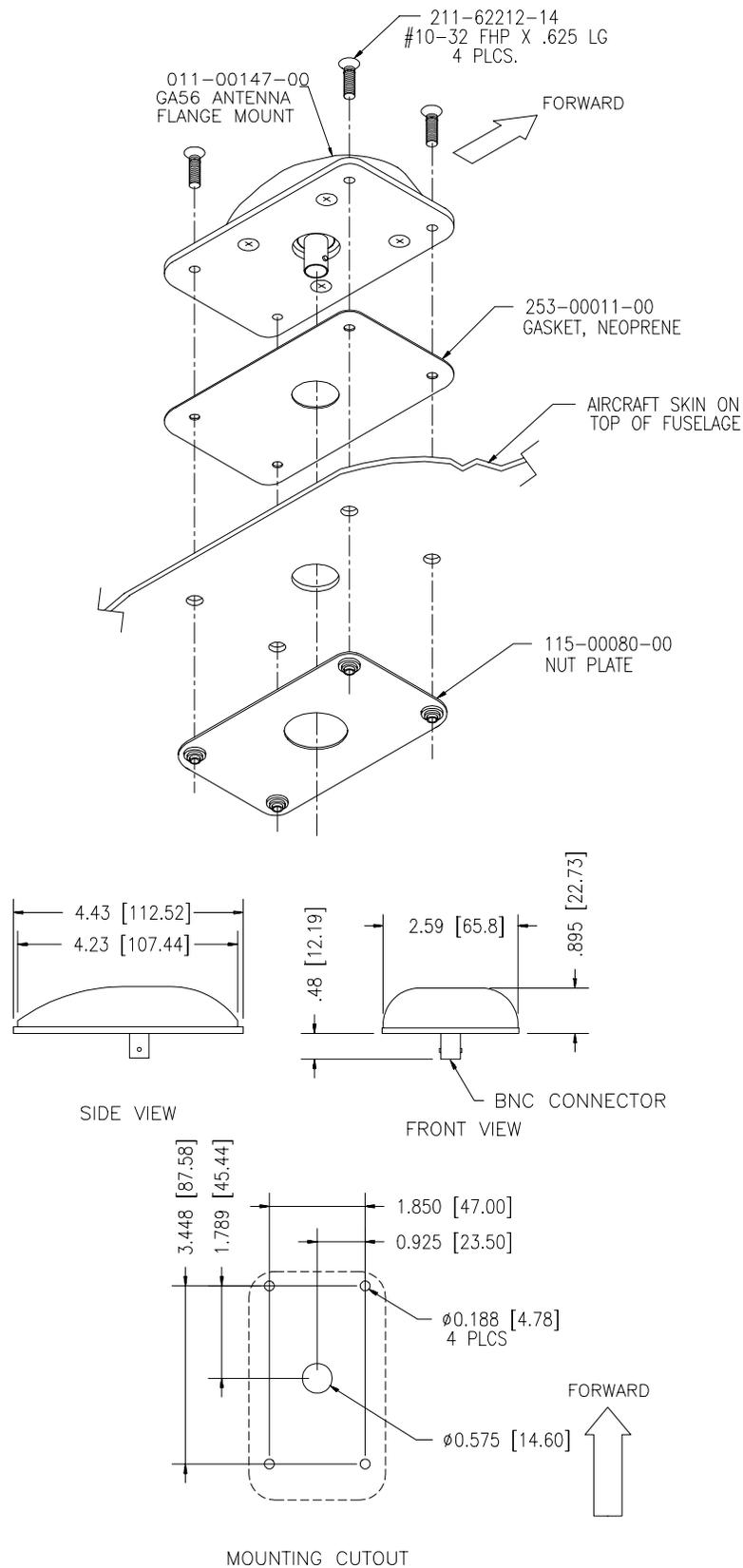


FIGURE 3-2
FLANGE MOUNT GA 56 ANTENNA INSTALLATION

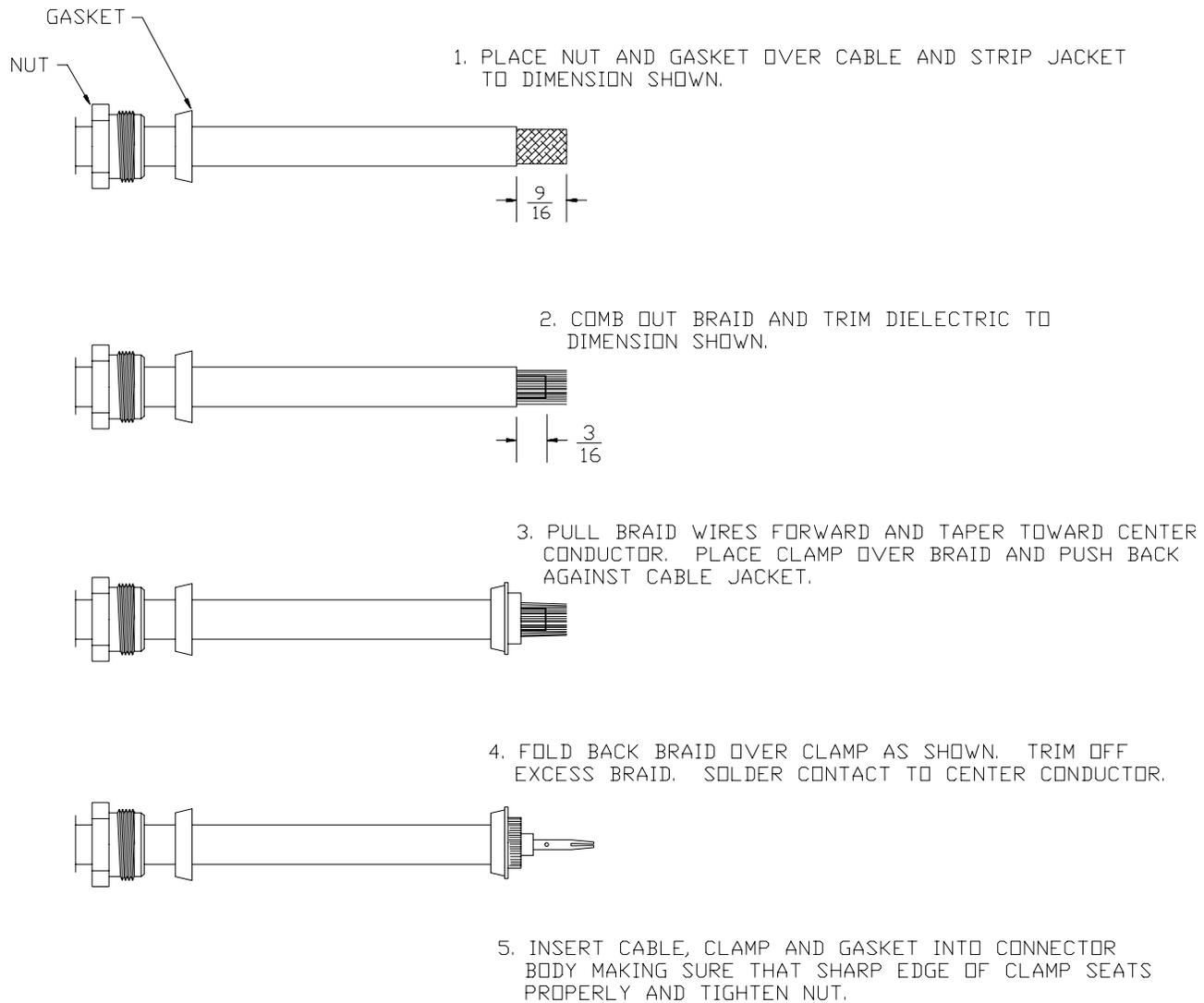


FIGURE 3-3 COAX CABLE INSTALLATION

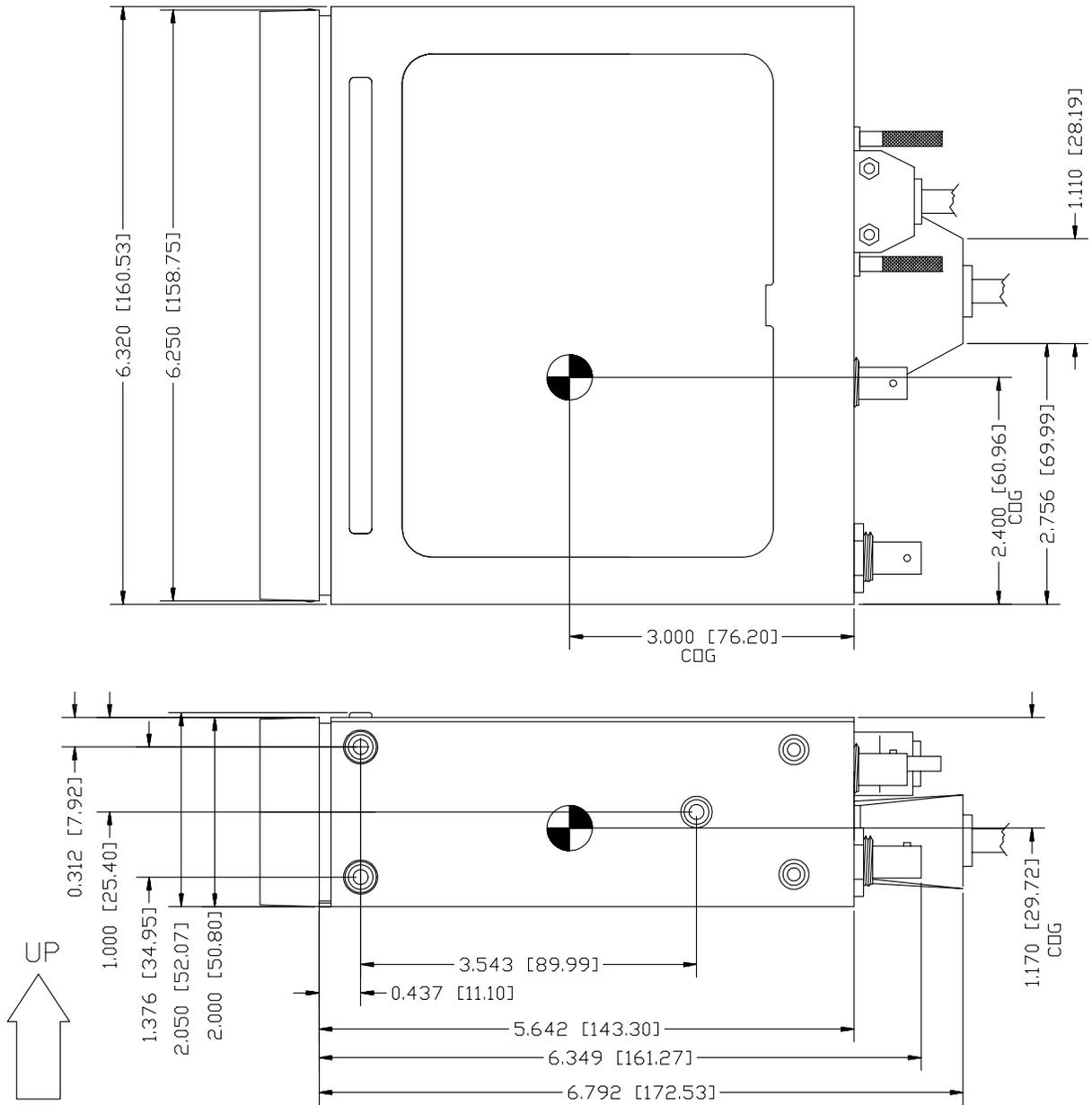


FIGURE 3-4 AVIATION RACK DIMENSIONS

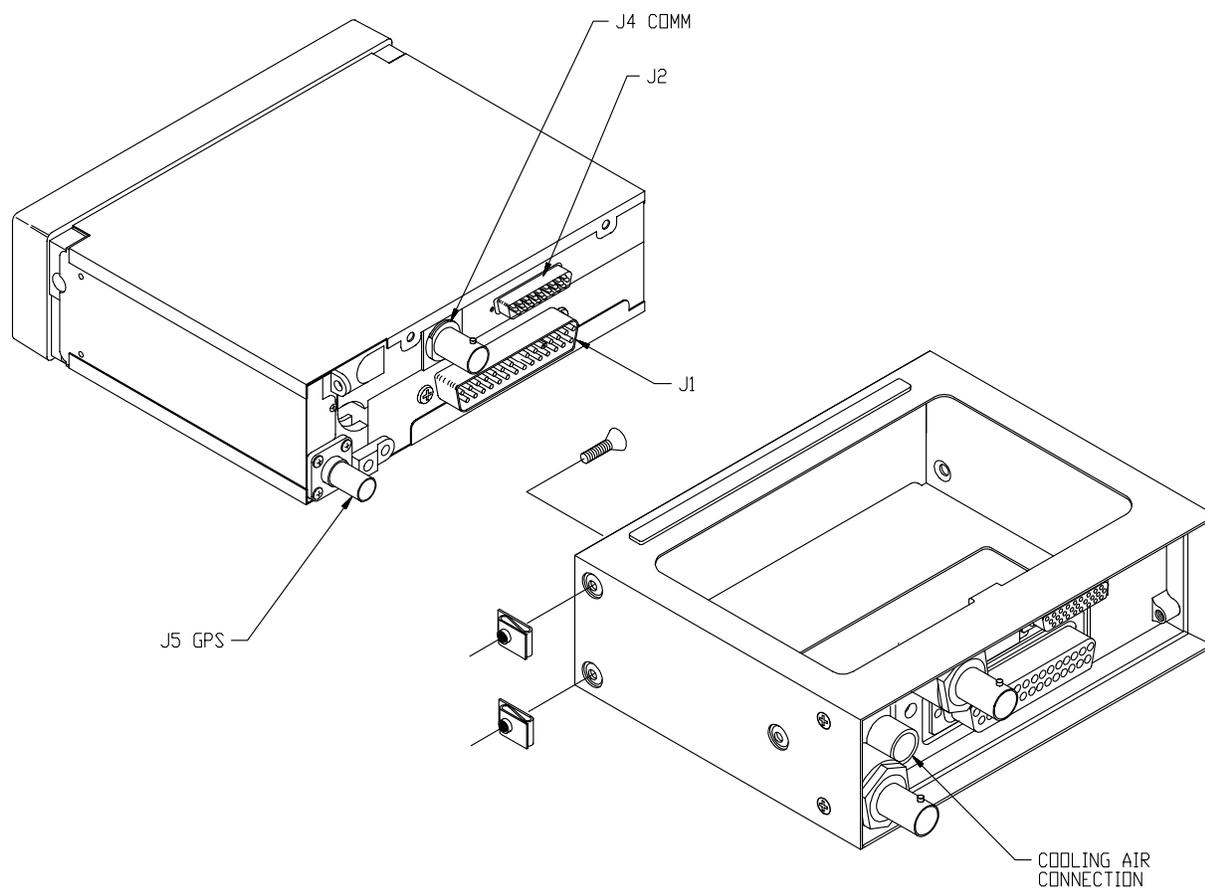


FIGURE 3-5 AVIATION RACK INSTALLATION

APPENDIX A CERTIFICATION DOCUMENTS
ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: GNC 300, GPS AIRBORNE RNAV / COMM SYSTEM

TYPE/MODEL/PART NO: 011-00128-00

GPS TSO: C129 CLASS A (1)
VHF COMM TRANSMITTER TSO: C37d CLASS 4
VHF COMM RECEIVER TSO: C38d CLASS C

MANUFACTURER'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION: 004-00014-00

MANUFACTURER: GARMIN INTERNATIONAL, INC.

ADDRESS: 1200 E. 151st STREET, OLATHE, KANSAS 66062

Conditions 1/	Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Categories A1 & D1 except as noted
Low Temperature	4.5.1	
High Temperature	4.5.2. & 4.5.3	
In-Flight Loss of Cooling	4.5.4	Cooling air not required
Altitude	4.6.1	
Decompression	4.6.2	
Overpressure	4.6.3	
Temperature Variation	5.0	Equipment tested to Category C
Humidity	6.0	Equipment tested to Category A
Shock	7.0	Equipment tested per DO-160C, Par. 7.2.1
Operational	7.2	
Crash Safety	7.3	
Vibration	8.0	Equipment tested without shock mounts to Categories B, M and N (Table 8-1)
Explosion	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

1/ The information listed below provides examples only. It is not intended to be a comprehensive listing of all test conditions.

Conditions 1/	Section	Description of Conducted Tests
Sand and Dust	12.0	Equipment identified as Category X, no test required
Fungus	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 tested is Class Z
Power Input	16.0	Equipment tested to Category B
Voltage Spike	17.0	Equipment tested to Category A
Audio Frequency Susceptibility	18.0	Equipment tested to Category B
Induced Signal Susceptibility	19.0	Equipment tested to Category A
Radio Frequency Susceptibility	20.0	Equipment tested to Category T
Radio Frequency Emission	21.0	Equipment tested to Category Z
Lightning Induce Transient Susceptibility	22.0	Equipment identified as Category XXXX, no test required
Lightning Direct Effects	23.0	Equipment identified as Category X, no test required
Icing	24.0	Equipment identified as Category X, no test required
Other Tests		
Remarks: Software: DO-178C, Level C (Major)		

ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: GA 56, GPS AVIATION ANTENNA

TYPE/MODEL/PART NO.: 011-00134-00/01/02

TSO NUMBER: C129
CLASS A(1)

MANUFACTURER'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION: 004-00015-00

MANUFACTURER: GARMIN INTERNATIONAL, INC.

ADDRESS: 1200 E. 151st STREET, OLATHE, KANSAS 66062

Conditions 1/	Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Category F2
Low Temperature	4.5.1	
High Temperature	4.5.2. & 4.5.3	
In-Flight Loss of Cooling	4.5.4	Cooling air not required
Altitude	4.6.1	
Decompression	4.6.2	Not tested
Overpressure	4.6.3	Not tested
Temperature Variation	5.0	Equipment tested to Category A
Humidity	6.0	Equipment tested to Category C
Shock	7.0	Equipment tested per DO-160C, Par. 7.2.1
Operational	7.2	
Crash Safety	7.3	Not applicable
Vibration	8.0	Equipment tested without shock mounts to Categories C, L, M and Y (Table 8-1)
Explosion	9.0	Equipment identified as Category X, no test required
Waterproofness	10.0	Equipment tested to Category S
Fluids Susceptibility	11.0	Equipment tested to Category F with Ethylene Glycol De-Icing Fluid

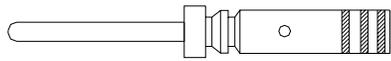
1/ The information listed below provides examples only. It is not intended to be a comprehensive listing of all test conditions.

Conditions 1/	Section	Description of Conducted Tests
Sand and Dust	12.0	Equipment identified as Category X, no test required
Fungus	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 identified as Category X, no test required
Power Input	16.0	Equipment identified as Category X, no test required
Voltage Spike	17.0	Equipment identified as Category X, no test required
Audio Frequency Susceptibility	18.0	Equipment identified as Category X, no test required
Induced Signal Susceptibility	19.0	Equipment identified as Category A, no test required
Radio Frequency Susceptibility	20.0	Equipment identified as Category T, no test required
Radio Frequency Emission	21.0	Equipment identified as Category Z, no test required
Lightning Induce Transient Susceptibility	22.0	Equipment identified as Category X, no test required
Lightning Direct Effects	23.0	Equipment identified as Category 2A, no test required
Icing	24.0	Equipment tested to Category C
Other Tests		
Remarks:		

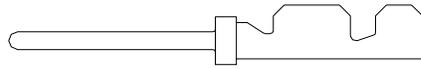
APPENDIX B CONNECTOR CHANGES

STAMPED CONTACT CONNECTOR USAGE

Garmin panel mount GPS radios have previously been shipped with stamped crimp type contacts. All products are now being shipped with machined mil-spec contacts with color-coded barrels. The following figures can be used to identify which type contact you have:



NEW MACHINED CONTACT



OLD STAMPED CONTACT

Some contacts are pins as shown, while others are the socket type. The type used will vary with the installation. When working with the stamped crimp type contacts, the following tools should be used:

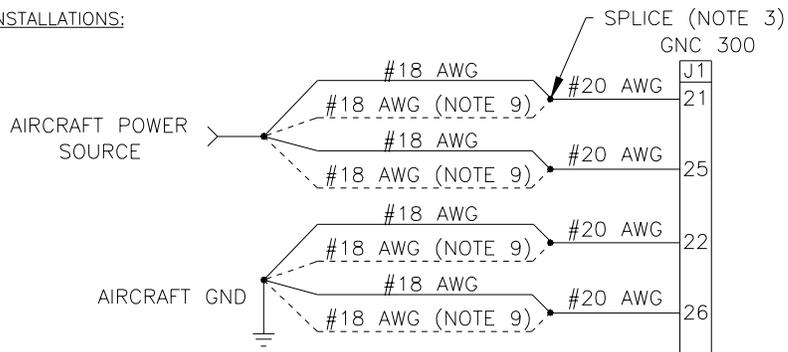
Tools	37 and 9 position connectors		26 position connector	
	supplier	Crimp Tool	Extraction Tool	Extraction Tool
Amp	58448-2	91067-22	90430-1	91285-1
ITT Cannon	995-2000-000	980-0008-124	995-2000-022	980-00004-804
Cinch	HTD-544	CIET-20-HDB	HTD-544	HTD-520

Part numbers shown are not maintained by Garmin and consequently are subject to change without notice.

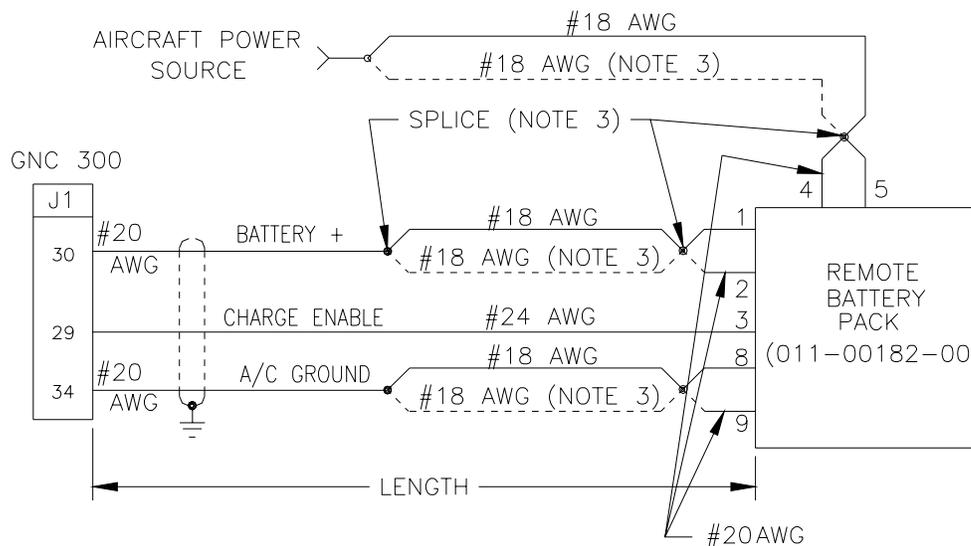
Special considerations must be made for aircraft power and remote battery (optional) connections, as shown in the following diagram:

1) AIRCRAFT POWER AND GROUND CONNECTIONS

14VDC INSTALLATIONS:



2) REMOTE BATTERY PACK (OPTIONAL)



3) WIRE SIZE AND POWER LINE SPLICING

FOR 6 FEET AND LESS, USE 1 #18 AWG FOR EACH CONNECTION. FOR 6-12 FEET, USE 2 #18 AWG FOR EACH CONNECTION.
 MAXIMUM ALLOWABLE WIRE GAUGE INTO GNC300 J1 AND 011-00182-00 PINS IS #20 AWG. USE GPN 330-00165-01 SOLDERLESS CONNECTOR (LARGE) AS CLOSE TO CONNECTOR AS POSSIBLE (8" MAX.) USE JST CRIMP TOOL YS1614 OR EQUIVALENT.

REMOTE BATTERY PIN ASSIGNMENTS

A change was made to the remote battery connectors starting with serial numbers 33050055. Units with lower serial numbers have pin contacts on the battery pack. Units 33050055 and up use socket contacts on the battery and the pin number assignments are different, however the individual contact locations are unchanged. The following table shows the pin assignments for the two different types of connectors:

Serial Number	below 33050055	33050055 and up
remote batt.	pins	sockets
mating plug	sockets	pins
function	contact number	contact number
battery +	1	5
battery +	2	4
charge enable	3	3
aircraft power	4	2
aircraft power	5	1
no connection	6	9
no connection	7	8
ground	8	7
ground	9	6

APPENDIX C STC PERMISSION

Consistent with N8110.69 or Order 8110.4, Aviation Authority approved installers are hereby granted permission to use STC# SA00372WI data to modify aircraft.

United States Of America
Department of Transportation - Federal Aviation Administration
Supplemental Type Certificate

Number SA00372WI

This Certificate is issued to Garmin International
9875 Widmer Road
Lenexa, KS 66215

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations.

Original Product - Type Certificate Number: 2A3
Make: Mooney
Model: M20J

Description of Type Design Change: Installation of GARMIN GNC300 VHF Communication Transceiver/GPS Receiver, in accordance with (1) GARMIN Master Drawing List, 005-0012-00, Revision A, dated September 14, 1995, and (2) FAA Approved Airplane Flight Manual Supplement (AFMS) for Mooney M20J with GARMIN GNC300 VHF Communication Transceiver/GPS Receiver, dated October 16, 1995, or later FAA approved revisions to (1) or (2).

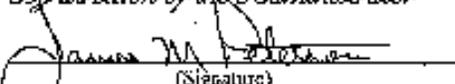
Limitations and Conditions: Compatibility of this design change with previously approved modifications must be determined by the installer.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: May 30, 1995
Date of issuance: October 16, 1995

Date reissued:
Date amended:



By direction of the Administrator

(Signature)
James M. Peterson
Associate ACO Mgr., Systems & Propulsion
Wichita Aircraft Certification Office

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.