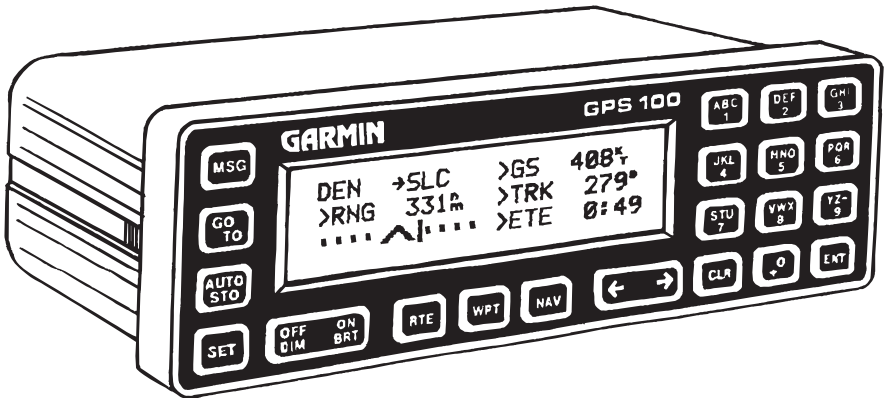
GARMIN SM

COMMUNICATION & NAVIGATION

GPS100
AVIATION KIT
INSTALLATION MANUAL



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REVISION RECORD

Initial	Rev. 0, 1 Mar 1991	Initial release and STC approval
1224	Rev. 1, 1 May 1991	Minor Change. Added this revision record page. Changed company name from PRONAV to GARMIN.
1254	Rev. B, 8 Aug 1991	Minor Change. Revised Photos to show GARMIN company name. Changed Rev sequencing to use alphabetic rev instead of numeric. Clarify antenna sealing requirements in 3.2.C
1385	Rev. C, 18 Nov 1991	Minor Change. Replace photographs with drawings for better reproducibility. Add page numbering. Add compass safe distance to Fig. 2-2. Revise text.
1506	Rev. D, 26 Feb 1992	Minor Change. Change coax cable type.
1549	Rev. E, 30 Mar 1992	Add Low Profile Antenna and Appendix A.
1608	Rev. F, 4 May 1992	Minor Change. Revise installation details in Appendix A.
1839	Rev. G, 15 May 1992	Change company address and add eco #'s to record page.

GPS 100 AVIATION KIT 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 GPS 100 Aviation Kit.

After installation of the GPS 100 system, FAA Form 337 must be completed by an appropriately certificated agency to return the aircraft to service.

NOTE: The GPS 100 must have software version 2.09 or later to interface properly with the aviation rack. If the GPS 100 being installed has an earlier software version, contact your nearest GARMIN service center to obtain a software update.

1.2 TECHNICAL CHARACTERISTICS

The GPS 100 offers the versatility of fixed installation in a panel mounted aviation rack as well as complete portability.

1.2.1 Physical Characteristics

Width:	6.25 Inches
Height:	2 inches
Depth:	3.95 inches
GPS 100 Weight:	28 oz.
Blade Antenna Weight:	8 oz.
Low Profile Antenna Weight:	4 oz.
Aviation Rack Weight:	11 oz.
Max Air Speed: (Structural rating for antenna)	Subsonic

1.2.2 Operational Characteristics

Temperature Range:	-15 °C to +70 °C
Humidity:	95% non-condensing
Altitude Range:	-1,500 to 50,000 ft.
Power Input:	11 to 33 VDC at 500mA MAX

1.2.3 Interfaces

The aviation rack contains an electronic module which provides interfaces to various general aviation instruments. Figure 1-1 defines the function of each pin on the 15 pin DSUB connector located at the back of the rack. Figure 1-2 depicts the interconnects between the rack and other instruments. The following interfaces are provided.

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 5)	Capable of driving up to three 200 ohm parallel loads, +82 millivolts full scale deflection.
Nav Flag: (Pins 3 and 6)	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 12)	Output providing bearing to waypoint data for a Bendix/King RMI (KI 229 or equivalent).
Message annunciators: (Pins 9 and 11):	Output capable of driving negative or positive logic annunciators.
Message audio: (Pin 10)	Output capable of producing 10 milliwatts into 500 ohms at a frequency of 2 KHz.
RS232 data: (Pin 13)	Output capable of driving ARGUS3000/5000/7000 and STORMSCOPE SERIES II with NAVAID moving map displays and Shadin fuel management system. Conforms to the EIA specification RS-232C.

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 GPS 100.

2.1 ANTENNA CONSIDERATIONS

2.1.1 SATELLITE VISIBILITY

The GPS 100 Blade or Low Profile Antenna must be mounted on top of the aircraft in the upright position. 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 blade antenna installation. Recommended installation locations for the Low Profile Antenna are the same.

2.1.2 NOISE SOURCES

The antenna should be located at least 3 ft from transmitting antennas such as VHF Comm, HF transmitter, DME, Transponder, and Radar. Cabling for the GPS 100 should not be routed near components or cabling which are sources of electrical noise.

2.1.3 ELECTRICAL BONDING

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

2.1.4 ANTENNA LIMITATIONS

The GPS 100 Blade and Low Profile Antennas are recommended for installations where the airspeed of the aircraft will be subsonic. For aerodynamic considerations, the Low Profile Antenna is recommended for operation above 200 kts.

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

Use only the antenna cable supplied in the installation kit. Other cabling may lead to degraded performance. Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling and routing near aircraft control cables.

2.4 ANNUNCIATORS

If the installation includes any electrical interface with other flight instruments, an annunciator may be required. Refer to current FAA directives.

SECTION 3 INSTALLATION PROCEDURE

3.1 INSTALLATION KIT CONTENTS

One of the following two installation kits is required for aircraft installation, depending on the type of antenna used.

The GPS 100 Aviation Installation Kit (010-10002-00) consists of the following parts:

P/N	DESCRIPTION	QTY
011-00013-00	BLADE ANTENNA SUBASSEMBLY	1
011-00014-00	RACK SUBASSEMBLY	1
115-00015-00	BACKING PLATE	1
117-00001-00	EJECTOR PIN	4
161-00024-00	PLACARD, INSTRUMENT PANEL	1
190-00004-00	INSTALLATION MANUAL (THIS MANUAL)	1
211-20001-00	#8-32 SS, PH, FLAT HEAD SCREW	4
253-00002-00	ANTENNA GASKET	1
320-00003-00	CABLE ASSY, COAX	1
330-00017-00	CONNECTOR, BNC, MALE, CLAMP	1
330-00024-00	CONNECTOR, 15 PIN DSUB, FEMALE	1

The GPS 100 Low Profile Aviation Installation Kit (010-10008-00) consists of the following parts:

P/N	DESCRIPTION	QTY
011-00042-00	LOW PROFILE ANTENNA SUBASSEMBLY	1
011-00014-00	RACK SUBASSEMBLY	1
115-00031-00	BACKING PLATE	1
117-00001-00	EJECTOR PIN	4
161-00024-00	PLACARD, INSTRUMENT PANEL	1
190-00004-00	INSTALLATION MANUAL (THIS MANUAL)	1
210-10004-09	NUT, SELF-LOCKING, #8-32	4
253-00002-00	ANTENNA GASKET	1
320-00003-00	CABLE ASSY, COAX	1
330-00017-00	CONNECTOR, BNC, MALE, CLAMP	1
330-00024-00	CONNECTOR, 15 PIN DSUB, FEMALE	1

The following equipment is required for installation but is not included in the installation kit:

#6-32 Flat Head Screw (4 ea.) #6-32 Self-locking Nut (4 ea.)

3.2 ANTENNA INSTALLATION

The Blade Antenna outline and footprint dimensions are shown in Figure 3-1. The Low Profile Antenna outline and footprint dimensions are shown in Figure 3-1A. Both antennas require the same Installation procedure.

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 14 lbs (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 supplied to the rack location keeping in mind the recommendations of Section 2. Secure the cable in accordance with good aviation practice.

B. Trim the supplied RG-59/U cable to the desired length and install the BNC connector (330-00017-00) per the cabling instructions on Figure 3-2.

3.4 RACK INSTALLATION

A. Figure 3-3 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 GPS 100 for portable use. Deformation of the rack may make it difficult to install and remove the GPS 100.

B. Install the rack in the aircraft panel using four #6-32 countersunk screws and four self-locking nuts. The screws are inserted from the inside through the holes in the sides of the rack (see Figure 3-4).

3.5 AVIATION INTERFACE SET-UP

Before installing the GPS 100 into the aviation rack, several operating parameters need to be set-up so that the GPS 100 can interface properly with the aviation rack and other avionics. Press the ON button. The Initialization page will appear. See Chapter 3 in the GPS 100 Owner's Manual for information on initialization. Approve the initialization page.

There are several set-up pages which can be viewed by pressing the SET key. Press the SET key until the CDI SETTINGS page is displayed. Move the cursor to highlight the setting for STEER TO. Press the clear key until "D-BAR" appears. Move the cursor to highlight the "OK" and press ENT. Press the SET key to continue through the set-up pages and set-up the following parameters:

STEER TO> D-BAR
OUTPUT> AVIATION

Ensure that the following parameters are set-up properly for your application. The following are typical settings for an aviation environment. See Chapter 10 in the GPS 100 Owner's Manual for more information on customizing the GPS 100 settings:

CDI SCALE>+ 5.00
>AUTO MAG
NAV> nm kt
ALT> ft FPM
DATUM> WGS 84 or as indicated on navigation charts for the area.

3.6 GPS 100 INSTALLATION

To install or remove the GPS 100 from the aviation rack, see the addendum to the GPS 100 Owner's Manual included in the installation kit. This addendum should be given to the end user.

3.7 PLACARD

After completing the installation, a placard stating "GPS limited to VFR use only" must be installed on the panel in clear view of the pilot. The placard may be Garmin p/n 161-00024-00 as supplied with the installation kit, or a suitable equivalent.

SECTION 4 CHECKOUT PROCEDURE

In order to verify the installation, the aircraft must be outside the hanger and well away from any buildings or aircraft that might block satellite signals. To perform the checkout procedure it is necessary to be familiar with operating the GPS 100 or to have the GPS 100 Owner's Manual available for reference.

With power applied to the aviation rack turn the GPS 100 on. The Self-Test Page will be displayed followed by the Initialization Page. The GPS 100 must be properly set-up per the instructions in Section 3.5 before performing the checkout procedure. Prior to approving the Initialization page verify the following interfaces as appropriate:

CDI	Ensure the CDI is deflected half scale left (2.5 dots).
TO/FROM	Ensure the TO/FROM flag is in a TO condition.
NAV FLAG	Ensure the NAV FLAG is out of view.
MESSAGE ANNUNCIATOR	Ensure the message annunciators are illuminated.
RMI	Ensure the RMI indicates 315°.

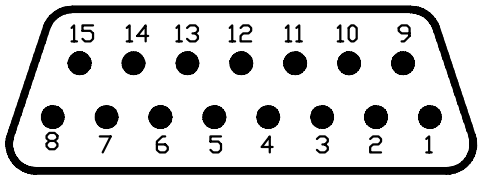
Approve the Initialization page, select the GPS Status page from Navigation Menu 1 (see Chapter 9 for more information on the GPS Status page). The process of satellite acquisition is fully automatic and under normal circumstances will require 2-3 minutes to obtain navigation information (15 minutes or less when searching the sky). 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.

AUDIO

Select the Event Timer 1 page from Navigation Menu 2 (see Chapter 10 of the GPS 100 Owner's Manual for more information on event timers). Set the count down timer to go off in 1 minute. Prior to viewing the message indicating "TIMER 1 EXPIRED" (while the "M" character is flashing in the upper right hand corner of the display), ensure the audio interface is operating properly.

ARGUS 3000/5000/7000 or STORMSCOPE SERIES II with NAVAID or SHADIN FUEL MANAGEMENT SYSTEM

Once GPS position information is available, use the AutoStore™ function to store a waypoint at your current position (see Chapter 8 of the GPS 100 Owner's Manual for information on the AutoStore™ function). After storing your location, GOTO the stored waypoint (see Chapter 6 of the GPS 100 Owner's Manual for information on the GOTO function). Ensure the ARGUS or STORMSCOPE or SHADIN fuel management system are receiving data from the GPS 100 and are functioning properly.



VIEW OF J100 CONNECTOR
FROM BACK OF RACK

J100 PIN NO.		
1	----------	D-BAR +LEFT
2	----------	FROM +
3	----------	FLAG +
4	----------	D-BAR +RIGHT
5	----------	TO +
6	----------	FLAG -
7	----------	OBI CLOCK
8	----------	OBI DATA
9	----------	MESSAGE LOW
10	----------	MESSAGE TONE
11	----------	MESSAGE HIGH
12	----------	OBI SYNC
13	----------	RS232 DATA OUT
14	----------	AIRCRAFT POWER
15	----------	GROUND

FIGURE 1-1 AV. RACK PINOUT DEFINITION

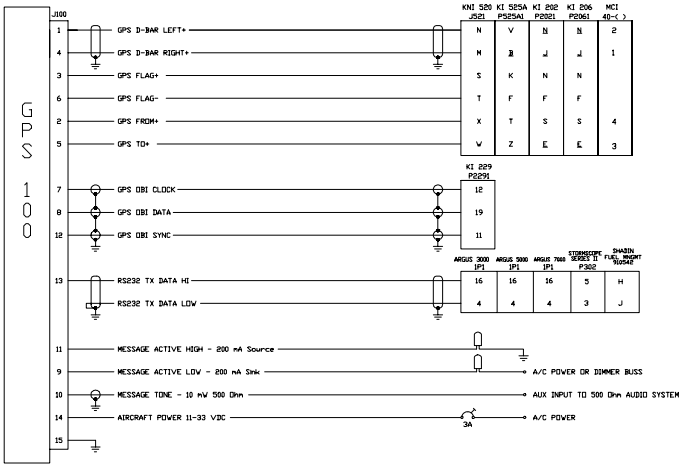


FIGURE 1-2 INTERCONNECT SCHEMATIC

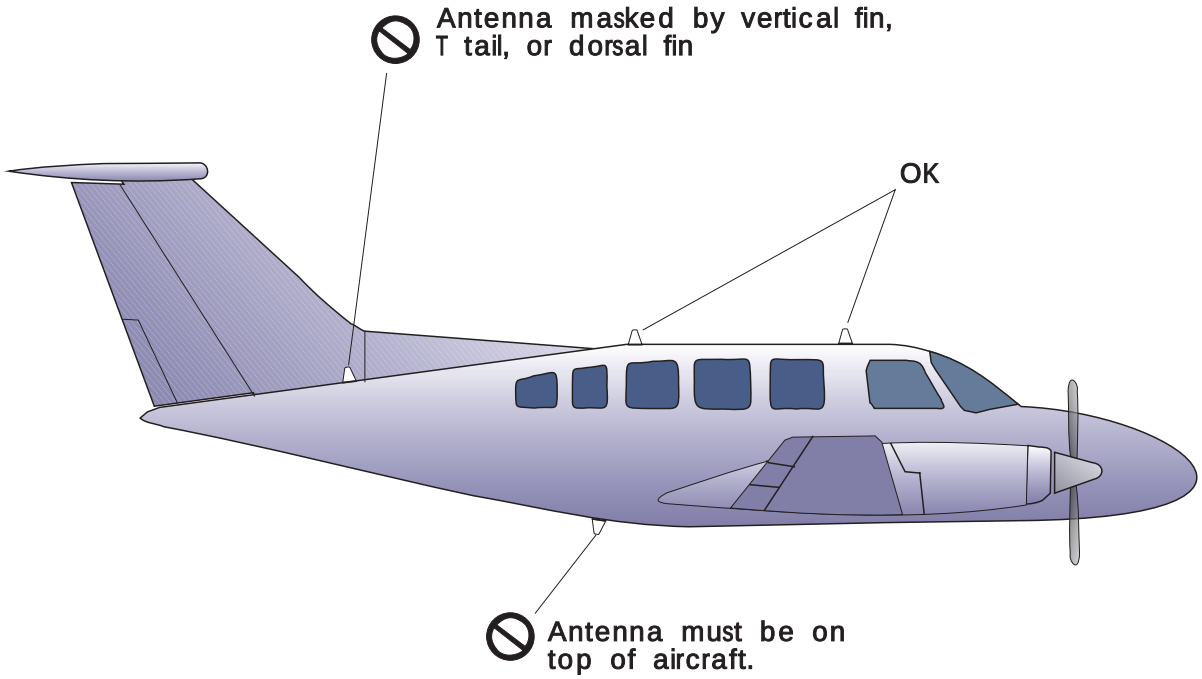
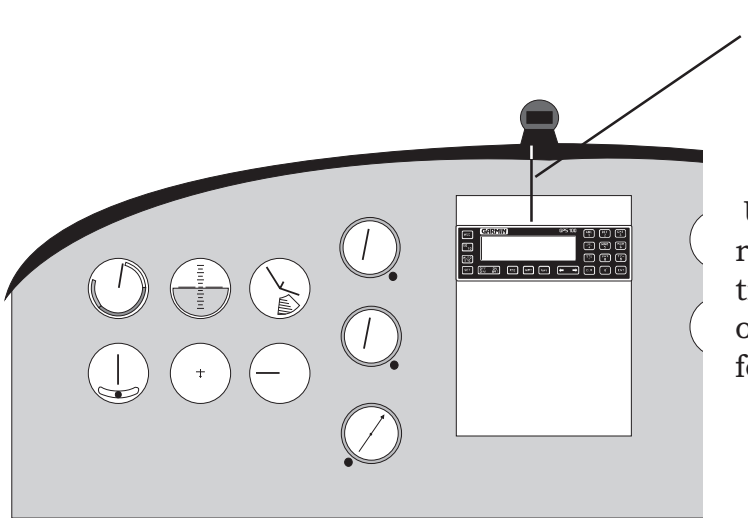


FIG 2-1
ANTENNA INSTALLATION CONSIDERATIONS



Unit to be mounted in aircraft radio rack as high as possible. If the location chosen is very low, or to the left of the pilot, it should be evaluated for display visibility.

FIG 2-2
GPS INSTALLATION CONSIDERATIONS

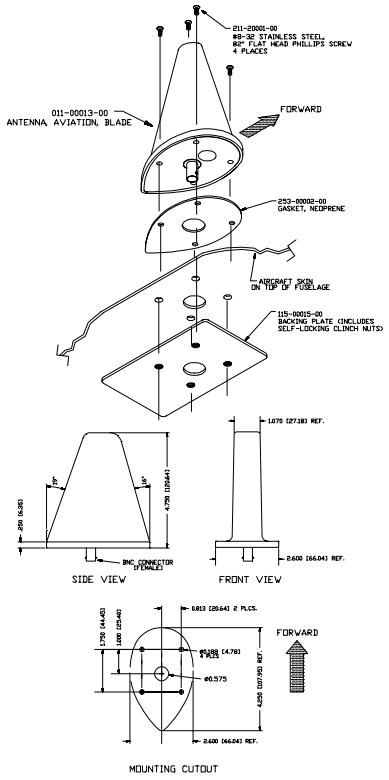


FIGURE 3-1 BLADE ANTENNA INSTALLATION

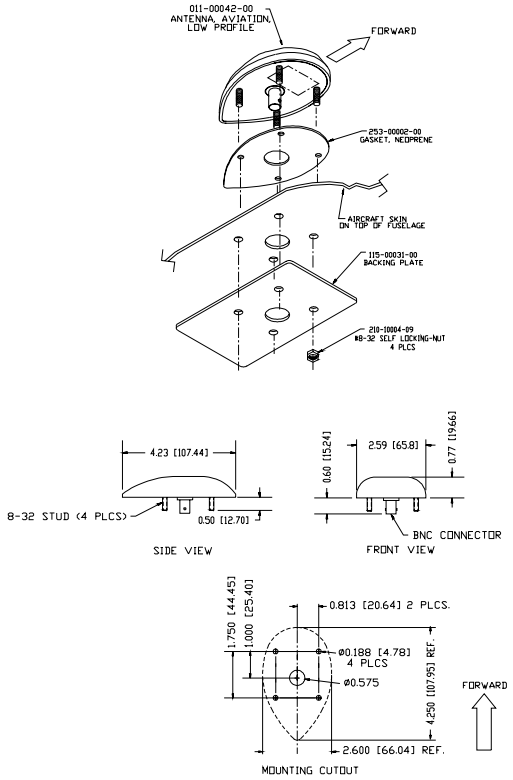


FIGURE 3-1A LOW PROFILE ANTENNA INSTALLATION

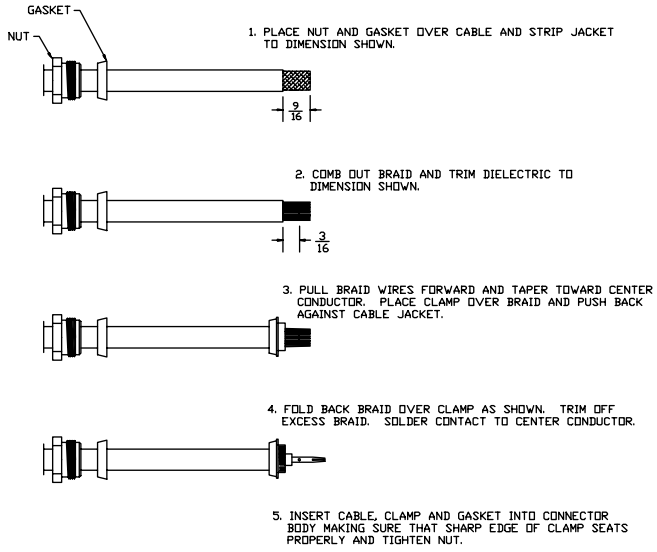


FIGURE 3-2 COAX CABLE INSTALLATION

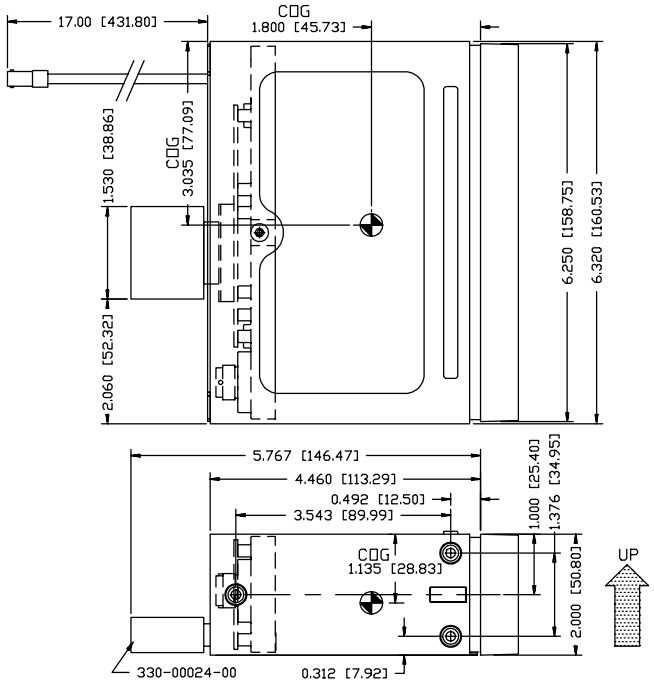


FIGURE 3-3 AVIATION RACK DIMENSIONS

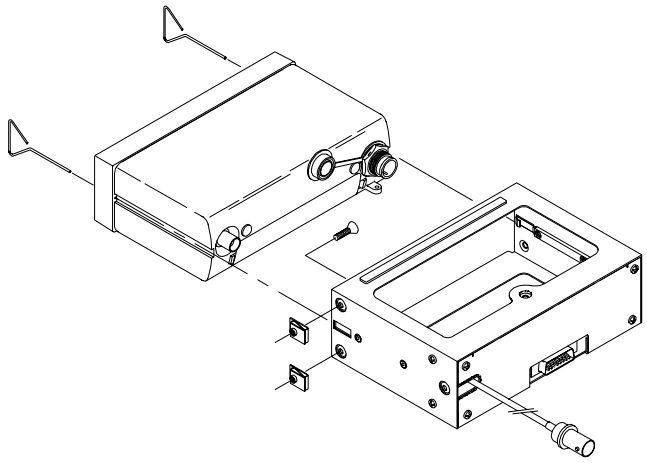


FIGURE 3-4 AVIATION RACK INSTALLATION

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APPENDIX A INSTALLATION DETAILS FOR BEECH B60

1.0 INTRODUCTION:

This appendix provides airframe specific information which is necessary to install the GARMIN GPS 100 navigation system in the Beech Duke Model B60 in accordance with STC (tbd). When so installed, the GPS 100 system is approved for use as a supplementary navigation system under Visual Flight Rules (VFR) only. A functional block diagram of the system is shown in Figure A-1.

The information provided herein is to be considered supplemental to the information contained in the GARMIN GPS 100 Aviation Kit Installation Manual, P/N 190-00004-00. Within this appendix, the base document will be referred to as the "Installation Manual".

2.0 INSTALLATION INSTRUCTIONS

2.1 ANTENNA

The GPS 100 antenna is to be installed on top of the cabin on the aircraft centerline at fuselage station 138.0. Figure A-2 illustrates the proper antenna positioning. Refer to section 2.1 of the Installation Manual for general antenna mounting requirements.

2.2 AVIATION RACK INSTALLATION

The GPS 100 aviation rack is to be installed on the right side of the instrument panel radio rack as shown in figure A-3. The controls and display of the GPS 100 must be readily visible to the pilot when seated at the controls.

To install the aviation rack, position it in the instrument panel in the desired position, assuring that the front is not twisted out of square. Match drill the flanges on the radio rack to the installation holes on the GPS 100 aviation rack. Using 4 each #6-32 screws and self locking nuts, attach the aviation rack to the aircraft panel. For additional information, refer to the Installation Manual.

2.3 WIRING

Fabricate an appropriate cable to connect the GPS 100 aviation rack to 28VDC power, a message annunciator, a remote switch (for selecting between GPS and standard navigation equipment), a transfer switch with integral white, illuminated annunciators with black markings (to control and indicate the status of the remote switch). Wiring connections are to be made in accordance with Figure A-4. Breaker locations are to be as shown in Figure A-5. Route and connect the wiring in accordance with Advisory Circular AC-43.13-2A. After the wiring installation is complete, carefully check the operation of all flight controls throughout their range to assure that no operational interference exists.

2.4 PLACARDS

After completion of the GPS 100 system installation, affix a durable placard on the instrument panel in the location shown in Figure A-3 which states “GPS limited to VFR use only". GARMIN placard p/n 161-00024-00 or an appropriate equivalent should be used for this purpose.

3.0 OPERATIONAL CHECKOUT

When the installation is complete, conduct a post installation checkout as specified in section 4 of the Installation Manual, being sure to check the proper operation of all connected instruments.

4.0 RETURN TO SERVICE

After installation, a new weight and balance must be computed to show the GPS 100 components. The aircraft should then be returned to service by completion of FAA form 337 by an appropriately certificated person.

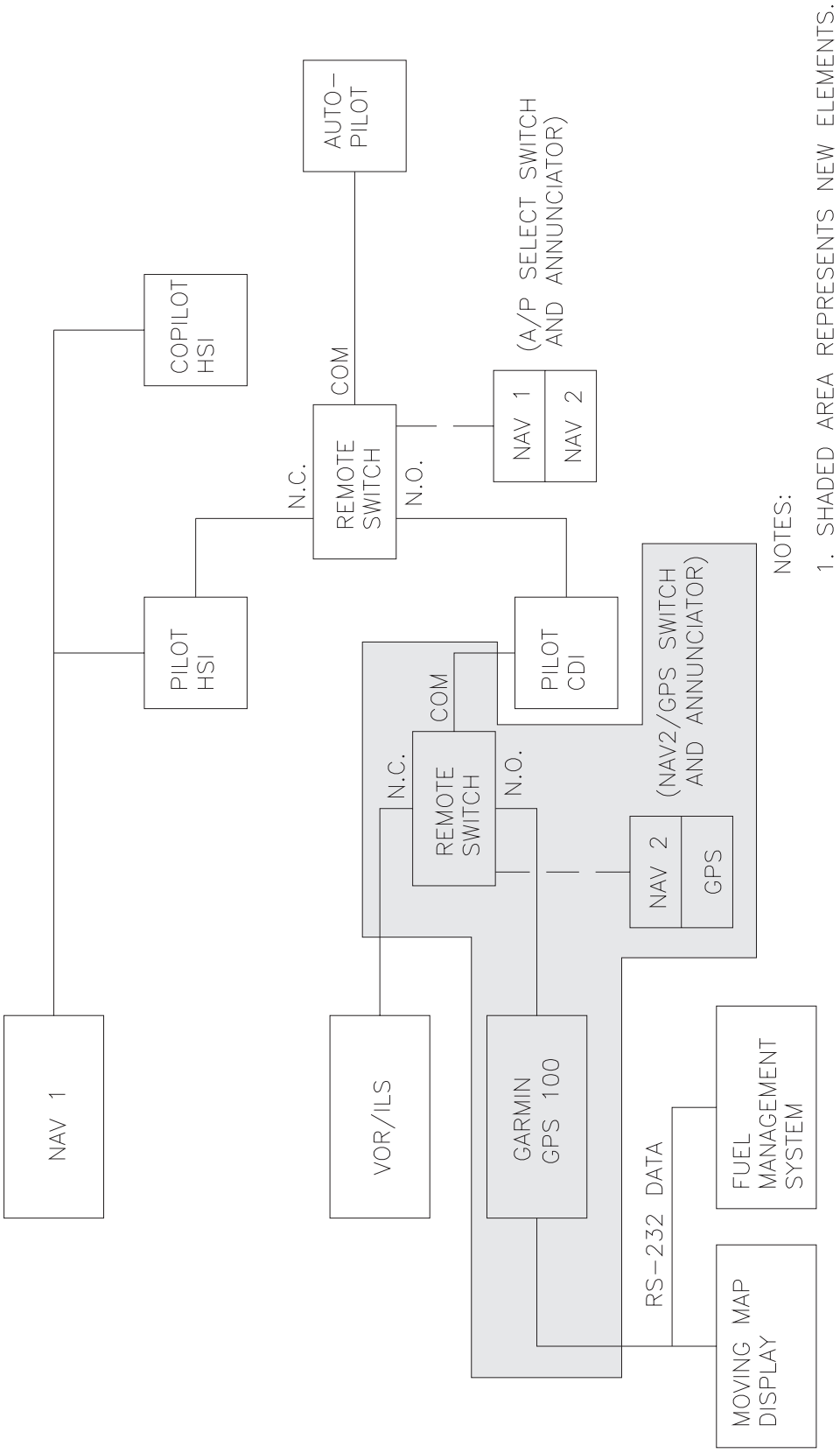
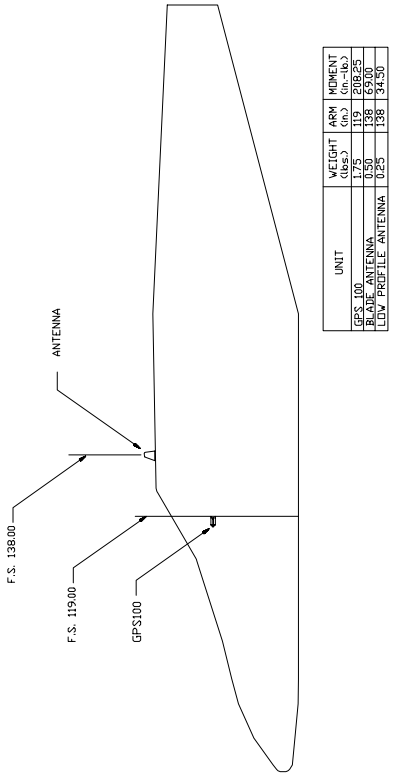


FIG A-1
FUNCTIONAL BLOCK DIAGRAM



UNIT	WEIGHT (lbs.)	ARM (in.)	MOMENT (in.-lbs.)
GPS 100	1.75	119	208.25
BLADE ANTENNA	0.50	138	69.00
LOW PROFILE ANTENNA	0.25	138	34.50

FIG A-2
FUSELAGE STATIONS AND WEIGHT AND BALANCE DATA

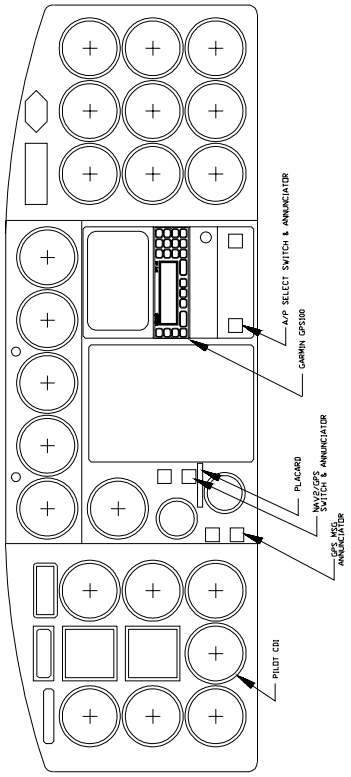


FIG A-3
PANEL LAYOUT

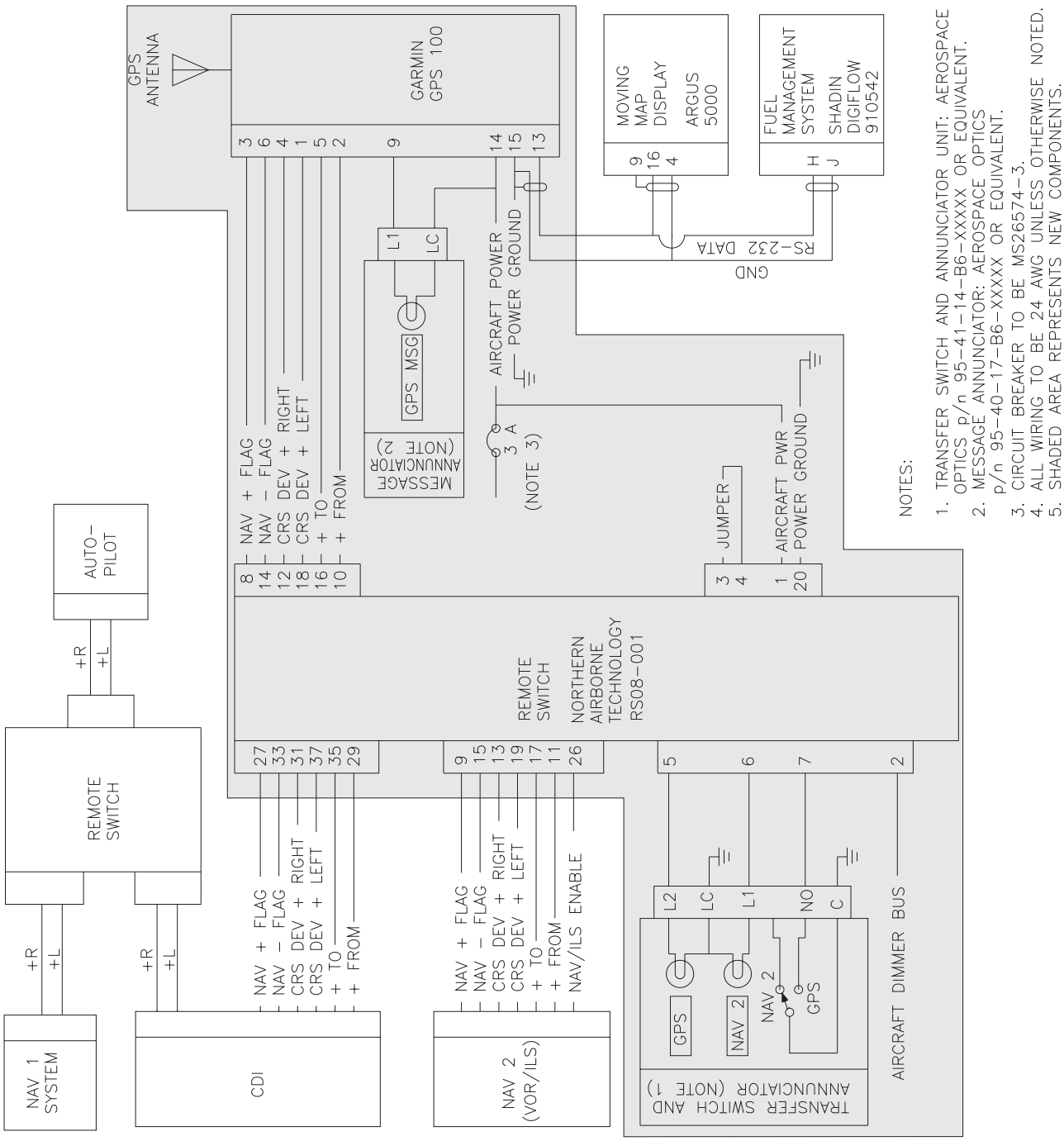


FIG A-4
WIRING DIAGRAM

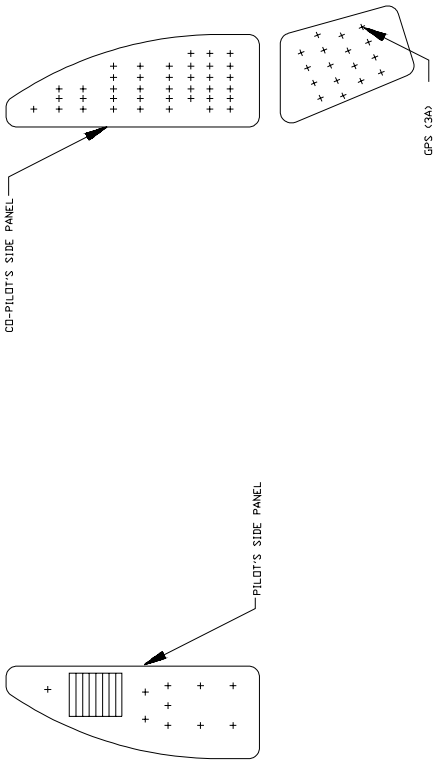


FIG A-5
BREAKER LOCATIONS