

**MAGNAVOX
DGPS 12 CHANNEL**

**INSTALLATION
AND
SERVICE MANUAL**

Prepared by

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ABOUT THIS MANUAL

Congratulations on your purchase of a Magnavox DGPS 12 Channel Navigator/Reference Station. It represents the finest in DGPS technology today.

As for this manual, it provides all the information you'll need to install and test your Magnavox DGPS receiver for proper operation. This manual is used for MX-9012R, MX 9112, or MX 9212 installations. Besides step-by-step procedures, you will find valuable information on what problems to avoid and how best to ensure trouble-free operation.

The instructions in this manual follow the order in which you're likely to use them. We suggest, however, that you read this manual through before proceeding. This will help you see the overall picture of what you must do. In this way, you'll be able to better anticipate installation requirements.

At the back of this manual you'll find two tear-out sheets: one is a Problem Report Sheet; the other, a Reader Comment Sheet. On the inside back cover is a Limited Warranty Statement and Service Request Information. If you would like more in-depth information about Magnavox DGPS products, refer to the referenced documents, below.

Thank you.

IMPORTANT NOTICE

GPS satellites still remain in the trial stages. Moreover, the stated policy of the U.S. Government is to degrade accuracy for non-military use to within 100 meters RMS. The Magnavox DGPS receivers provide increased accuracy when differential correction is available.

REFERENCED DOCUMENTS:

- **Magnavox DGPS 12 Channel Navigator Operator's Manual, R-7220:** Describes how to connect and operate the Magnavox Navigator using the Magnavox developed Control and Display (CDU) program.
- **Magnavox DGPS 12 Channel Reference Station Operator's Manual, R-7277:** Describes how to connect and operate the Magnavox Reference Station using the Magnavox developed Control and Display (CDU) program.
- **Magnavox DGPS 12 Channel Technical Reference Manual, R-7278.** Contains information for programming the Magnavox DGPS Navigators and Reference Stations.
- **NMEA-0183 Specification:** Defines the hardware and software requirements.
- **EIA RS-232C Specification:** Defines the hardware and software requirements for an RS-232 data interface.
- **EIA RS-422 Specification:** Defines the hardware and software requirements for an RS-422 data interface.

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UNPACKING YOUR DGPS NAVIGATOR

Perform the following three steps and verify the packaged items against those listed in Table 1.

1. Remove the contents from the packing container.
2. Save the packing container. You may need it for storage or return shipment.
3. Inspect each item for in-transit damage. If you see evidence of damage, notify both the carrier and Magnavox (see the back side of the manual cover).

Table 1. System Parts

DESCRIPTION	Part Number
Console Assembly, MX 9112	900555-808
Console Assembly, MX 9212	900555-807
Console Assembly, MX 9012R	900555-806
Volute Antenna Assembly w/15m Cable (MX 9212, MX 9012R)	819766-801
Low Profile Antenna Assembly w/gnd Plane (MX 9112)	723008-801
15 Meter RG-6 Cable (MX 9112)	567271-801
System Installation Kit, including the following: Power Cable Assembly Mounting Screws (4) Cable Ties (4) Type-F Coaxial Connector Mounting Template Mating DB-25P Connector	741699-803
Interface Cable Assembly	567284-2
CDU Program Diskette	471899-2
Magnavox DGPS 12 Channel Installation and Service Manual	R-7218
Magnavox DGPS 12 Channel Technical Reference Manual	R-7278
Magnavox DGPS 12 Channel Navigator Operator's Manual (MX 9112, MX 9212)	R-7220
Magnavox DGPS 12 Channel Reference Station Operator's Manual (MX 9012R, MX 9112)	R-7277

SYSTEM INSTALLATION

INSTALLATION PREPARATION

Installing your DGPS receiver is easy. But you do have important details to think about. If you plan your installation carefully, you'll save time, work, and materials. More importantly, your receiver will operate with fewer problems and more efficiency. If this is your first GPS installation, we suggest you allow 6 to 8 hours for installation and test.

Here are the most important items to consider before and during installation:

Antenna

- proper length and routing of cable.
- safe distance from high-power antennas and transmitters.
- appropriate height and mounting surface, providing a 360 degree view of horizon.

Receiver

- safe distance to navigating compass, equipments sensitive to small magnetic fields, or equipments emitting strong RF or magnetic fields.
- physical and visual accessibility for operator monitoring and peripheral interfaces.
- physical environment.

Interface

- do you need special cables?
- will you need an RS-422 to RS-232 converter?

Power

- cabling.
- dc power source.

Now that you know what the issues are, let's begin your installation. Table 2 lists the few tools needed.

SYSTEM INSTALLATION

Table 2. Tools and Materials for Installation and Maintenance

Tool or Material	Purpose
No. 1 Phillips Screwdriver	Assembling and Disassembling the Receiver Mounting Platforms
Open-end Wrench: 3/8-inch 7/16-inch	Installing Antenna Installing Antenna Connector
Electric Drill with No. 27 (9/64-inch) Bit	Mounting Receiver Housing
Pliers	Installing Power Cable
Volt-ohmmeter	Verifying Antenna Voltage and Resistance
3/16-inch Socket Wrench	Installing and Removing MULTI-PORT Interface Hex Standoffs.
Standard Screwdriver	Installing and Removing Interface Cable Screws
Gilbert #G-CRT-659 Crimping Tool (or equivalent)	Crimping the Antenna Connector (if necessary)

SYSTEM INSTALLATION

INSTALLING THE ANTENNA

Installing the antenna is the most crucial part of the system installation. How and where you install your antenna, with its cabling and integral preamplifier, can greatly affect its sensing efficiency. Figure 1 shows you both good and bad installation sites for the navigator antenna.

Keep the following guidelines in mind for an ideal site: Try to install the antenna where it has a clear view of the sky whether on land, sea, or air.

Easy Access to Maintenance

You want to locate the antenna for easy access and maintenance. Stay safely away from interfering high-power energy sources like radar and radio antennas. Locate the antenna at least 9 feet (about 3 meters) away from and out of the transmitting beam of high-power transmitters.

Avoiding Vertical Obstructions

You should not install the antenna closer than 15 feet (about 4.5 meters) to any large vertical obstruction. The object is for the antenna to see the horizon freely through 360 degrees and 5 to 90 degrees above the horizon. Be sure that you have the base of the antenna at least 3 feet (about 1 meter) above any large, metallic, horizontal surface.

Note: Small diameter obstructions, such as masts, booms, and kingpins do not seriously degrade signal reception, but such objects must not eclipse more than a few degrees of any given bearing.

Cable Lengths

Standard lengths of RG-6/U, 75-ohm, coaxial antenna cable are 50 feet (about 15 meters). If you need a longer cable length than the installation kit provides, you can extend the cable up to a total length of 100 feet, with additional RG-6/U coaxial cable connected by an RF throughline connector (bullet). If you need additional cable, order Magnavox part number MB0101, 50 Foot Cable Extension Kit. For cable lengths between 100 and 200 feet (30 to 60 meters), an in-line RF amplifier is required. Order Magnavox part number PA6817C, Cable Line Amplifier (does not include coaxial cable).

Avoiding EMI Effects

Try to route the coaxial cable between the antenna and the receiver connector directly; direct paths reduce electromagnetic interference (EMI) effects. When doing this, avoid running cable close to high-power lines, such as radar or radio-transmitter lines.

If you must cross antenna cables, do so at 90 degrees, so that magnetic fields are not coupled.

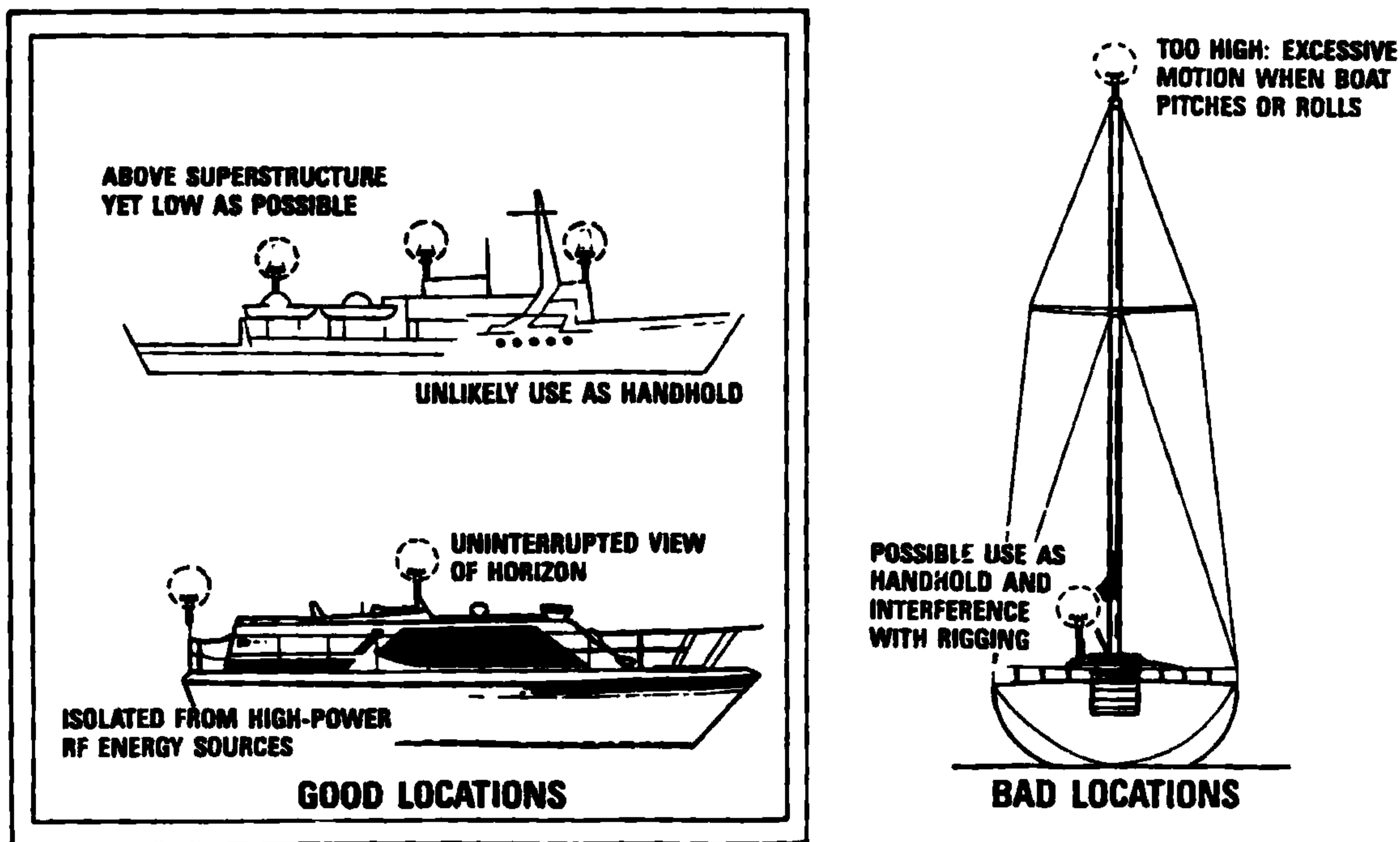
Finally, consider EMI effects related to antenna cable length; longer lengths can increase EMI effects.

Mounting the Antenna

You can clamp the antenna either to a rail or a pipe. Because the U-bolt holes are equally spaced, you can rotate the U-bolts 90 degrees for vertical or horizontal mounting.

PROCEDURE FOR NAVIGATOR ANTENNA INSTALLATION

1. Identify the ideal site to install the Navigator antenna, based on the following considerations:
 - a) Locate the antenna as far as you can from high-power transmitters, and 15 feet (about 4.5 meters) or more from an INMARSAT / SATCOM communications antenna.
 - b) Avoid emitted radiations from antenna sets.
 - c) Situate the antenna:
 - so that personnel won't use it as a handle or a leaning post (otherwise, post a CAUTION sign).
 - to be free from crashing waves during heavy seas.
 - just aft of midship, above the superstructure and as low as possible.
 - d) Ensure that moving objects won't damage the antenna.



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Figure 1. Navigator Antenna Mounting Location Recommendations

SYSTEM INSTALLATION

2. Attach the antenna to a rail or pole using a standard antenna mount, or other appropriate hardware, as shown in Figure 2.

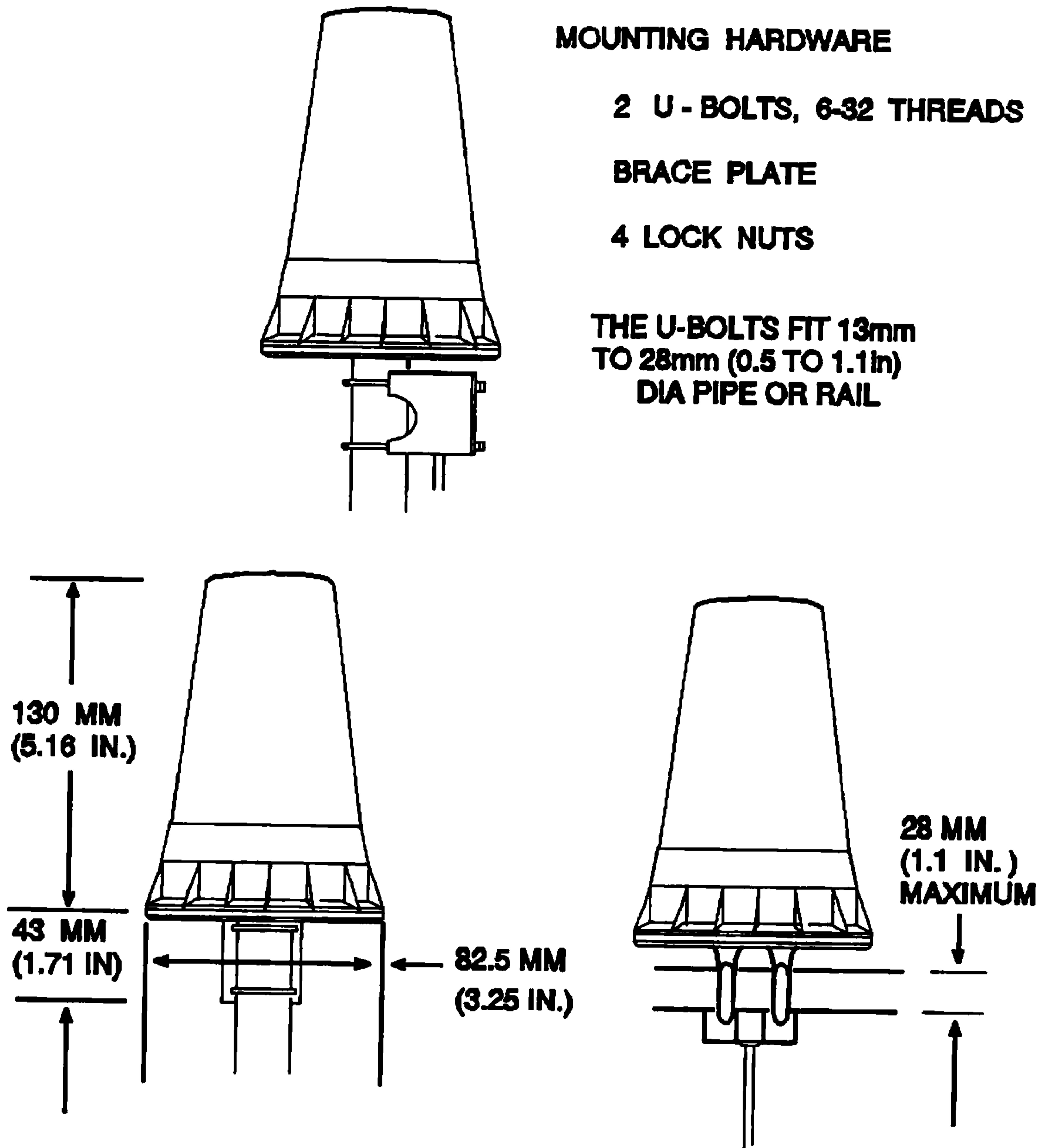


Figure 2. Navigator Vertical/Horizontal Antenna Mounting and Dimensions

3. Route the cable as directly as you can from the antenna, bring the end of the cable to the receiver installation site.

CAUTION

Be sure you don't crimp the cable with the tiedowns. Also, don't exceed the bend radius of 1 inch (25 mm). It will alter the electrical characteristics of the cable.

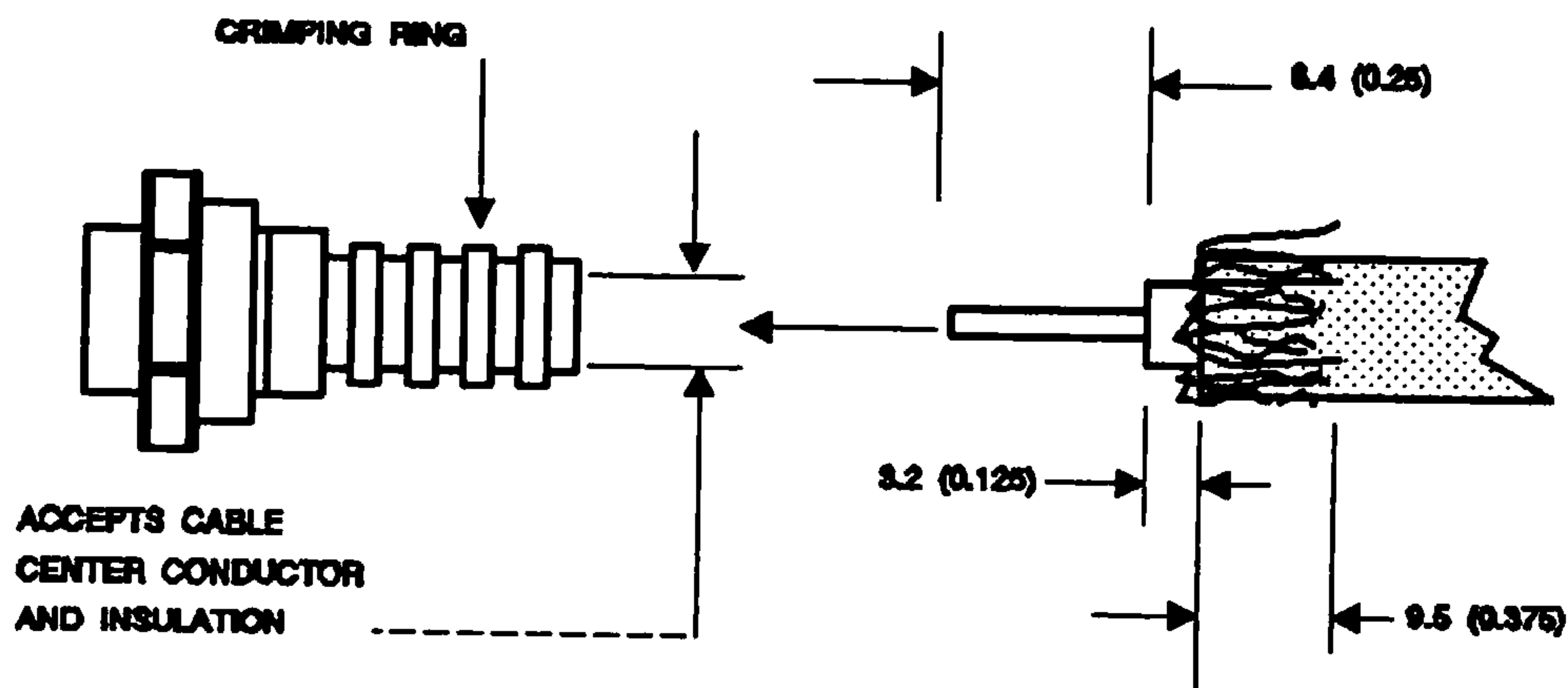
SYSTEM INSTALLATION

4. Cut the antenna cable to the required length. Leave a little extra length to correct any mistakes.
5. Install the F-type connector. Refer to Figure 3 for connector installation instructions.

CAUTION

Be sure that the center conductor of the cable comes through the connector and sticks out beyond the connector surface at least 3/8-inch (1 cm). Otherwise, you won't have a dependable antenna connection.

6. Use a volt-ohmmeter to verify that no short circuit exists between the center conductor and the shield of the coaxial connector after you attach it. You should measure about 2-K ohms \pm 10% between the antenna connector and ground (shield).



NOTE: ALL DIMENSIONS IN MILLIMETERS AND INCHES

1. CUT THE CABLE SO THAT ITS END IS A FLAT CROSS SECTION.
2. TRIM AND DRESS THE CABLE TO THE DIMENSIONS SHOWN. DO NOT NICK THE BRAID OR CENTER CONDUCTOR.
3. INSERT THE CENTER CONDUCTOR AND INSULATION INTO THE CONNECTOR AS FAR AS THE CABLE WILL GO (ALL OF BRAID SHOULD BE COVERED BY THE CONNECTOR CRIMPING RING; THE CENTER CONDUCTOR SHOULD STICK OUT BEYOND CONNECTOR AT LEAST 3/8 INCH)
4. SECURE THE CABLE TO THE CONNECTOR WITH A GILBERT NO. G-CRT-850 OR AN EQUIVALENT CRIMPING TOOL.

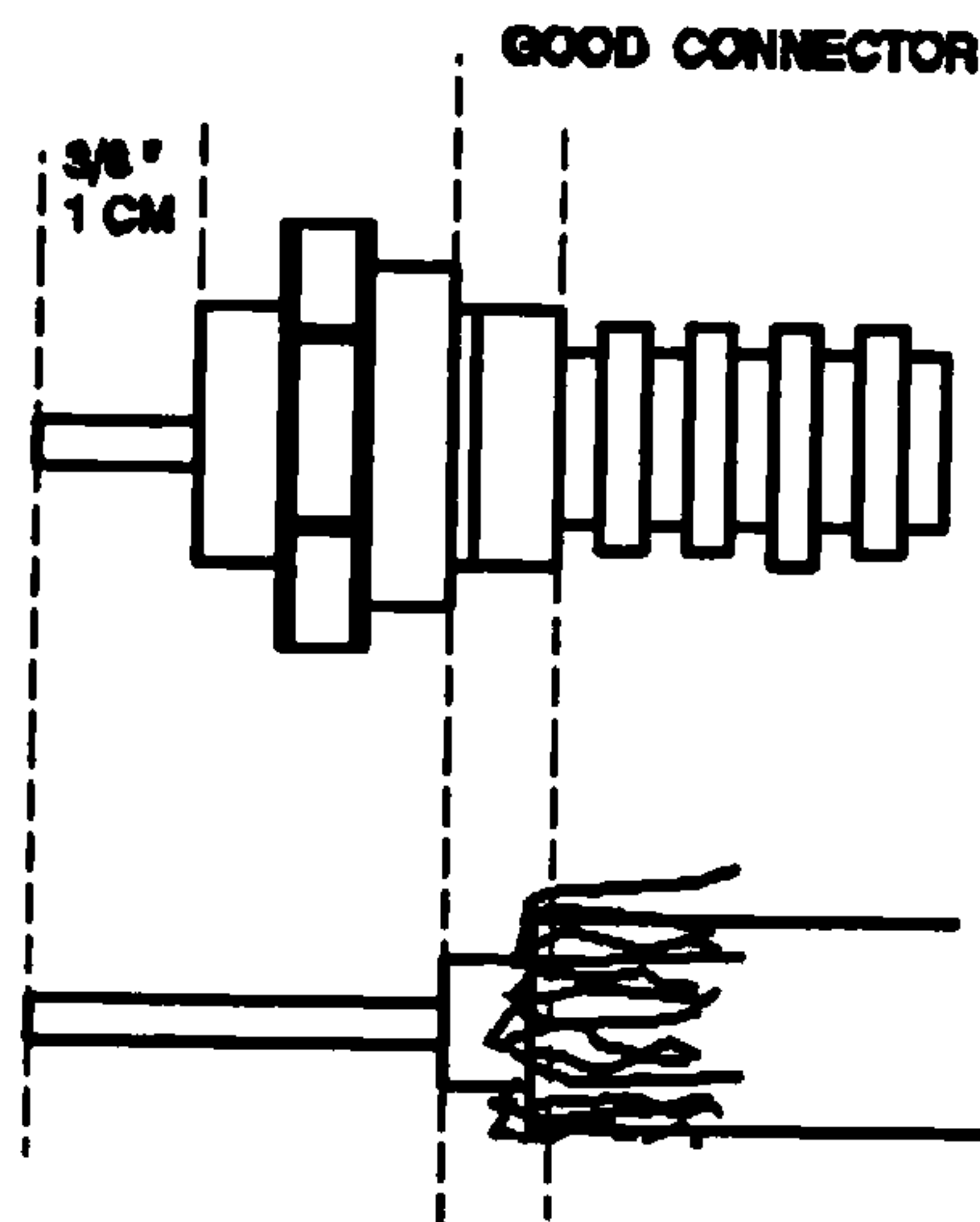


Figure 3. Antenna Connector Assembly

SYSTEM INSTALLATION

PROCEDURE FOR REFERENCE STATION ANTENNA INSTALLATION

1. Identify the ideal surveyed site to install the Reference Station antenna, based on the following considerations:

- a) Locate the antenna at a precisely surveyed site, and as far as you can from high-power transmitters.

CAUTION

Any error in either the physical location or user-entered coordinates of the Reference Station antenna will directly affect the calculated pseudorange correction accuracy.

- b) Avoid emitted radiations from antenna sets.
- c) Situate the antenna:

so that personnel won't use it as a handle or a leaning post (otherwise, post a CAUTION sign).

to be free from skyline obstructions.

in a fixed (non-moveable) mount at least 3 feet (1 meter) above metal platforms.

2. Attach the antenna to a rail or pole using a standard antenna mount, or other appropriate hardware, as shown in Figure 4.

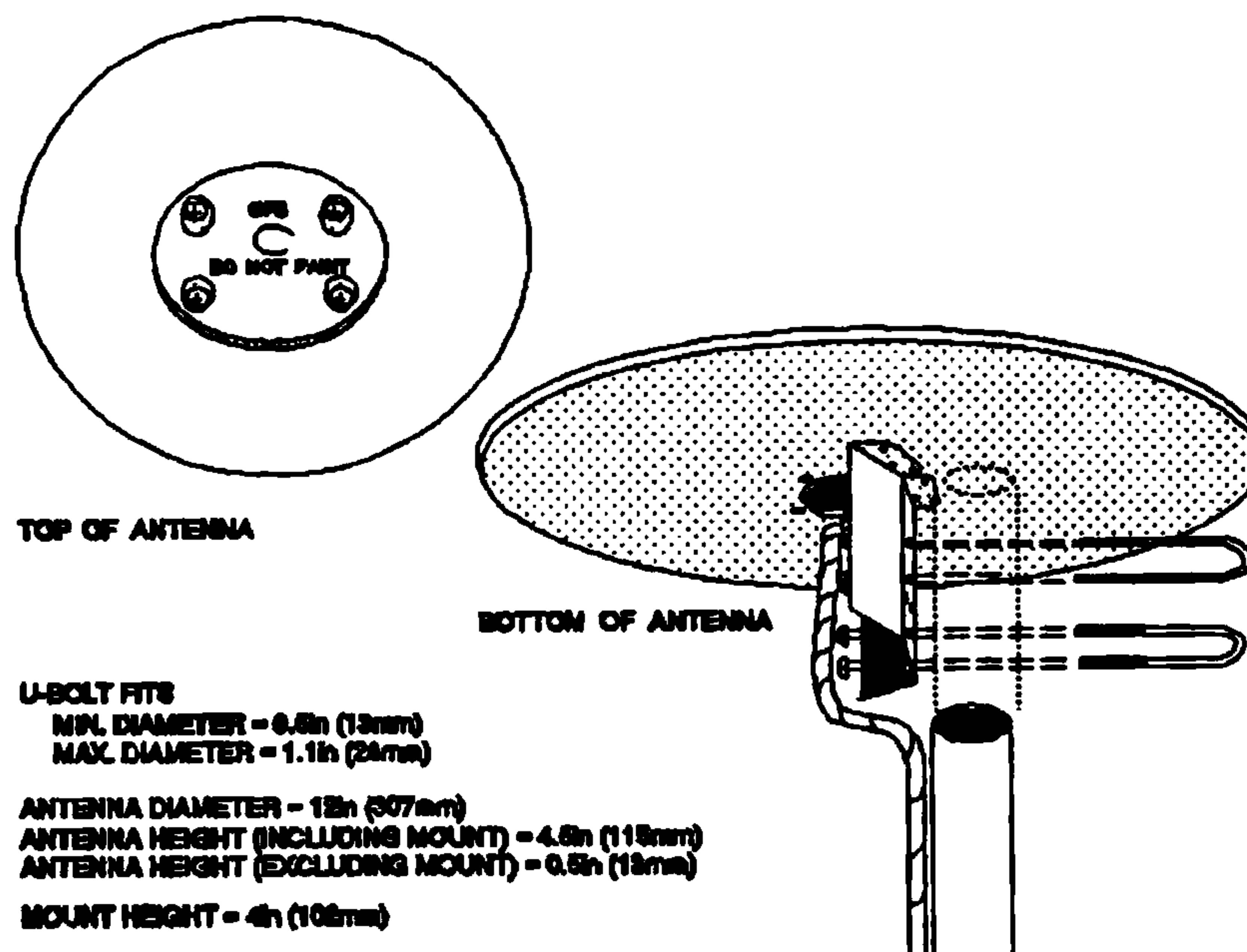


Figure 4. Reference Station Vertical/Horizontal Antenna Mounting and Dimensions

SYSTEM INSTALLATION

3. Connect the TNC connector end of the coaxial cable to the antenna. Figure 5 is provided to help you replace your TNC connector, if required.
4. Route the cable as directly as you can from the antenna, bring the end of the cable to the receiver installation site.

CAUTION

Be sure you don't crimp the cable with the tiedowns. Also, don't exceed the bend radius of 1 inch (25 mm). It will alter the electrical characteristics of the cable.

5. Cut the antenna cable to the required length. Leave a little extra length to correct any mistakes.
6. Install the F-type connector. Refer to Figure 3 for connector installation instructions.

CAUTION

Be sure that the center conductor of the cable comes through the connector and sticks out beyond the connector surface at least 3/8-inch (1 cm). Otherwise, you won't have a dependable antenna connection.

7. Use a volt-ohmmeter to verify that no short circuit exists between the center conductor and the shield of the coaxial connector after you attach it. You should measure about 2-K ohms \pm 10% between the antenna connector and ground (shield).

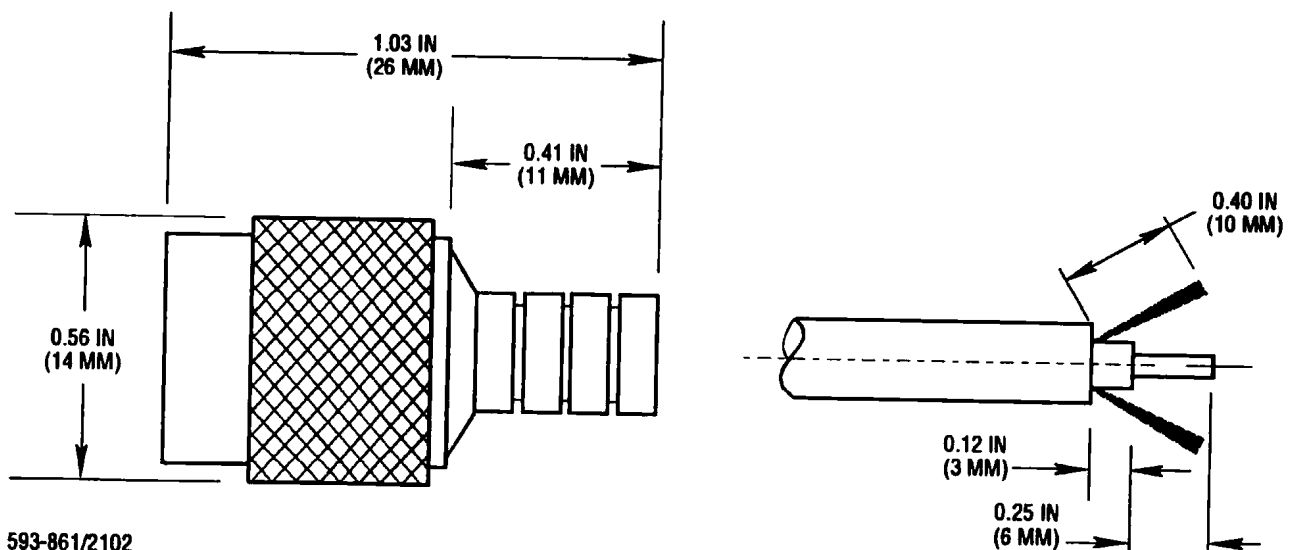


Figure 5. Reference Station Antenna Connector Assembly (TNC)

SYSTEM INSTALLATION

INSTALLING THE RECEIVER

Because of its compact size and light weight, you have lots of flexibility in how and where you install your Magnavox DGPS 12 Channel Receiver. An adjustable mounting platform lets you mount the unit in any orientation, even on the overhead. To ensure a precise installation, each unit comes with an installation template.

You will want to choose both a physically safe environment and an electromagnetically safe environment.

Choosing a Safe Physical Environment

Locate an installation site away from excessive heat sources, such as heating vents or equipment heat exhausts. Also avoid sites (examples would be port holes/windows and hatches that open to the outside) where the flow of humid salt air might corrode internal components.

Despite the sturdiness of the Magnavox receiver, don't subject it to hard, continuous vibration. If you think excess vibration is a problem, order the vibration isolation kit (P/N: B19807-801)

Allowing for Proper Distances

Give some thought to the location of the unit. You may wish to visually monitor the three status indicators (red, yellow and green LEDs, called traffic lights) on the front panel while working with other equipment. If you intend to monitor the receiver with a personal computer, you'll want to view the screen while at a particular location. A careful choice of receiver location will minimize cable lengths between components. For Navigators, you'll also want to allow a safe distance from the receiver to the navigation compass to minimize compass deviation. Refer to Table 3 as your guide.

Table 3. Compass Safe Distance

Equipment	Possible Compass Deviation		
	0.25°	1°	2°
Receiver	170 cm (67 in.)	105 cm (42 in.)	75 cm (30 in.)
Antenna	15 cm (6 in.)	16 cm (6 in.)	15 cm (6 in.)

Allowing Access to Rear Panel

You will want access to the ANTENNA input connector, the 1 PPS output connector (perhaps), and the MULTI-PORT Interface DB 25S connector (Figure 4).

Note: The 1 PPS (1 pulse per second) output connector provides an optional timing source; the 1-second timing pulses are accompanied by an ASCII message giving you the precise time of each pulse.

SYSTEM INSTALLATION

When installing, leave 5 inches (about 13 centimeters) or more of clearance behind the back panel of the unit. You will need that much room for dressing the cables and getting at the rear panel parts.

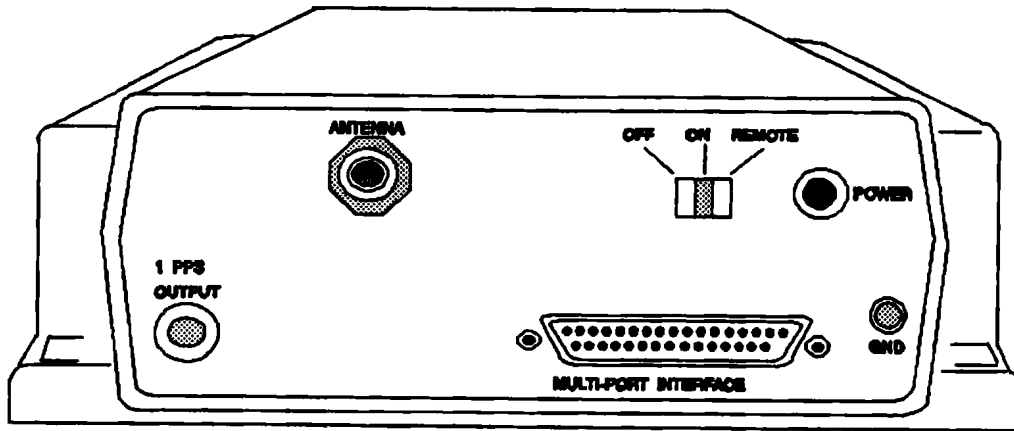


Figure 6. Rear Panel of the DGPS 12 Channel Receiver

Power and Memory Backup

Your receiver requires a minimum of 10 Vdc and a maximum of 32 Vdc. It requires an average of 320 milliamps at 15 Vdc (average: 4.8 watts; maximum: 6 watts).

An ON/OFF/REMOTE switch on the back panel determines whether the unit power is controlled locally or remotely. To control the unit power remotely, you must have the power switch set to the REMOTE position and be able to apply 5 Vdc to a relay switch in the unit. Remote power is controlled through the DB 25P connector, pins 1 and 25. Refer to the wiring diagram, Figure 8.

CAUTION

For reliable operation, you must provide dc power to the Magnavox receiver within the 10 to 32 Vdc range. Never apply voltages outside this range.

The Magnavox receiver power supply does provide over-voltage protection. In addition, an internal lithium battery gives you backup power protection for random access memory (RAM) for up to five years. Another safeguard is an internal thermal circuit breaker protecting the unit from electrical surges (you may have need to reset it; see "Resetting the Solid State Fuse" under "Maintenance").

SYSTEM INSTALLATION

PROCEDURE

1. Choose the best site for mounting the unit.
2. Install the unit using the template provided. Refer to Figure 7 and Table 1.

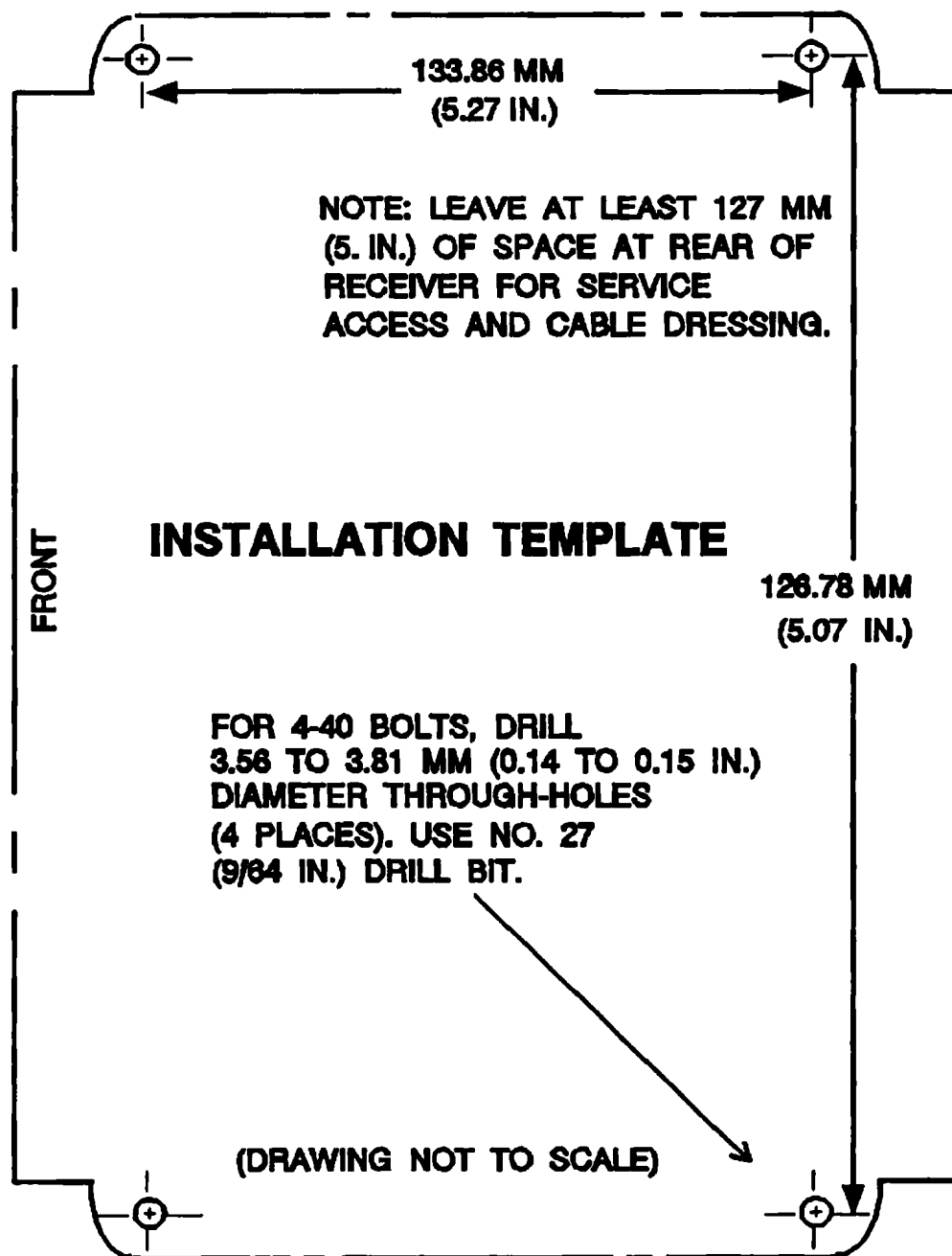


Figure 7. Installation Template

3. Connect the interface cable to the MULTI-PORT Interface connector. Tighten the connector screws with a slot screwdriver.

SYSTEM INSTALLATION

Connect a ground wire to the GND stud. Connect the ground wire at the other end to the electrical ground (the user supplies this variable length ground wire not smaller than 14 Awg.; no more than 1 meter - about 3 feet - in length). This wire helps disipate EMI signals to reduce interference in the Navigator and other equipments.

Connect the unit power cable to a dc power source.

CAUTION

Be sure you connect the positive lead of the power input cable (identified by the white strip) to the positive terminal of the dc power supply source. You can verify the polarity of the cable by checking for continuity between the outer ring of the connector and the negative (-) power lead.

Connect the antenna cable to the ANTENNA input connector (refer to Figure 6).

SYSTEM INSTALLATION

CONNECTING THE RECEIVER TO EXTERNAL EQUIPMENT

External equipment connects to the MULTI-PORT Interface connector on the rear panel of the receiver unit (see Figure 6). The interface consists of four Input/Output (I/O) serial ports; two RS-232 ports and two RS-422 ports. IBM compatible (DOS-based) software controls the communications. Figure 6 shows you the MULTI-PORT Interface connector pin assignments. If you are logging data with a personal computer (PC) on one of the two RS-422 ports (2 and 4), you will need the optional RS-422 to RS-232 data converter kit, P/N 741692-804. You determine the exact use of the individual I/O ports by your needs and choice of associated equipment. You may, for example, use the Magnavox Navigator to navigate as a stand-alone unit or as a component in an integrated system.

Standard Port Uses

Ports 1 and 3 are RS-232 ports; ports 2 and 4 are RS-422 ports. Port 1 is fixed as the Control Port. All ports are defaulted to 9600 baud. Here are their standard functions:

- Port 1 - RS-232, Operational control and data messages (9600 baud default) [input/output]
- Port 2 - RS-422, Measurement (Raw data) [output]
- Port 3 - RS-232, DGPS Corrections I/O (MX-50R) [input for navigators, output for reference stations]
- Port 4 - RS-422, Equipment/NMEA [input/output]

All ports have selectable baud rates of 300 to 19,200 baud. Table 4 details port functions of both data and electrical interfaces.

Table 4. Electrical Interfaces and Data Formats

	PORT 1	PORT 2	PORT 3	PORT 4
IN	RS-232	RS-422	RS-232	RS-422
OUT	RS-232	RS-422	RS-232	RS-422
DATA FORMATS				
	PORT 1	PORT 2	PORT 3	PORT 4
IN	CONTROL MESSAGES	NOT ACTIVE	DGPS I/O	NMEA-0183 EQUIPMENT
OUT	CONTROL MESSAGES	MEASUREMENT RAW DATA	DGPS I/O	NMEA-0183 EQUIPMENT

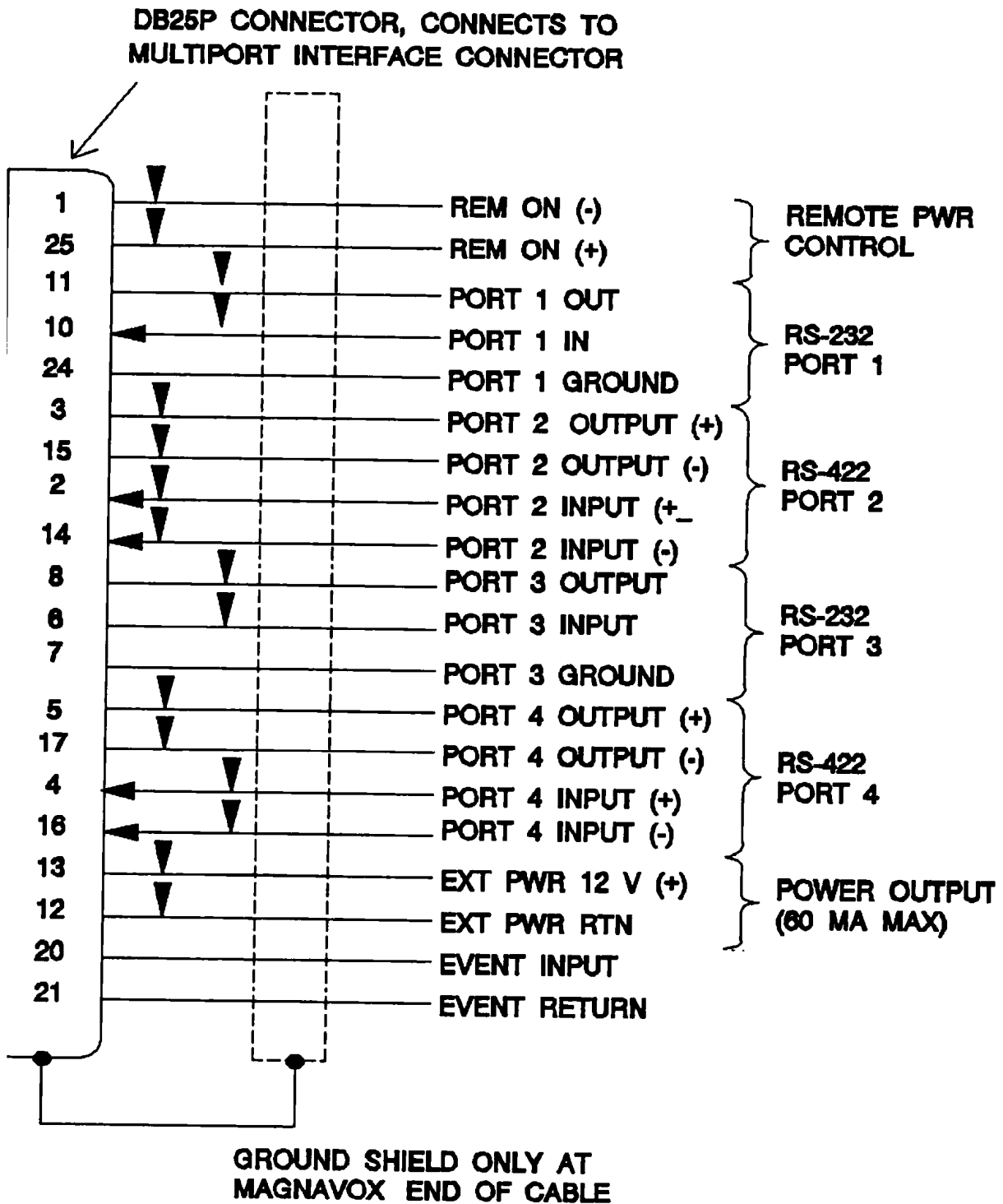


Figure 8. MULTI-PORT Interface Connector Pin Assignments

SYSTEM INSTALLATION

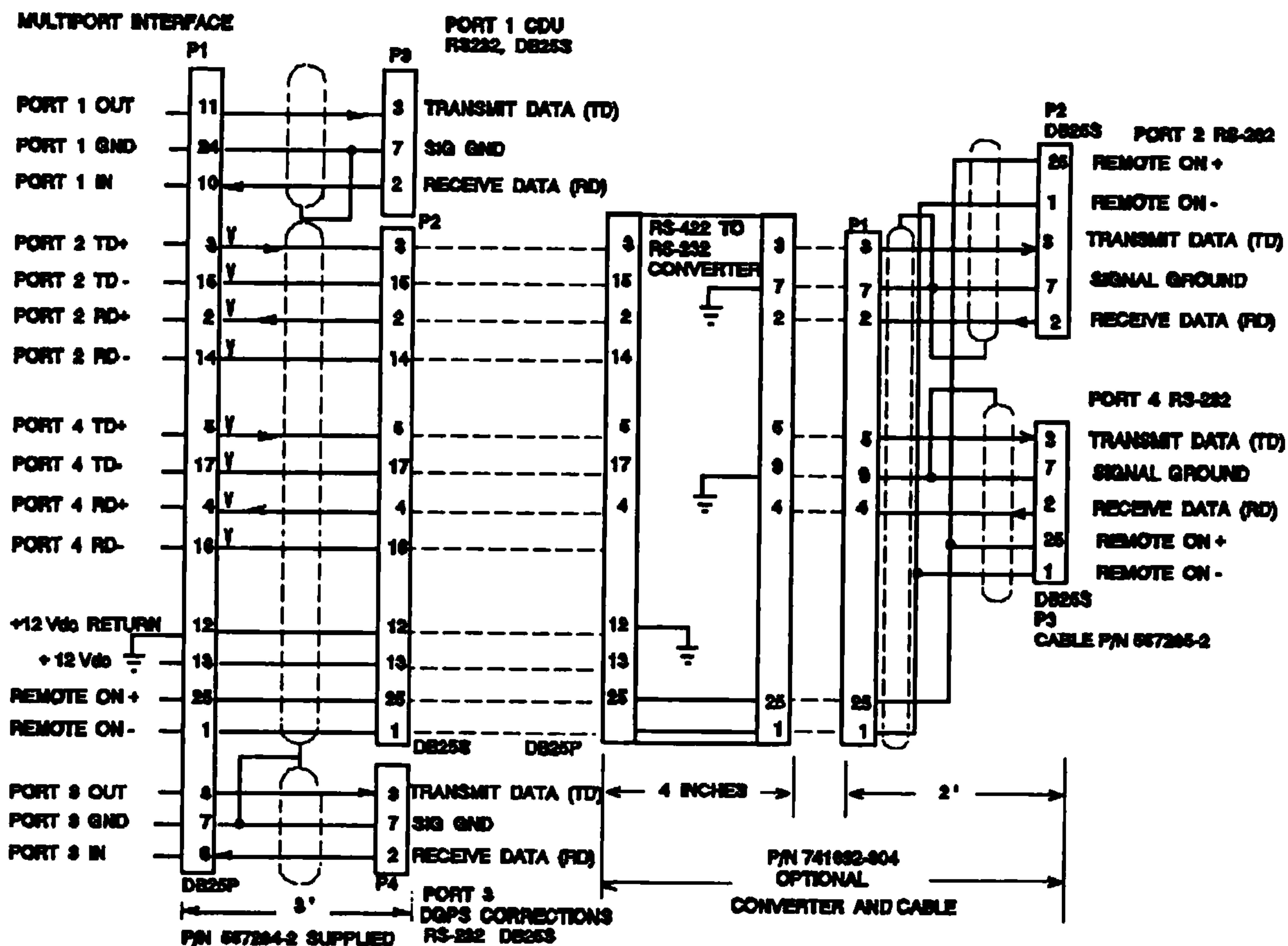


Figure 9. Magnavox Receiver to PC Interface Connector and Cables

INITIAL POWER-ON CONDITIONS

When you turn on the receiver the PC display unit may indicate "Sats Visible 0, used 0" (where the number of satellites is a number from 1 to 12). Elevation and azimuth values will also be zero. These are the correct displays until the receiver has acquired an almanac.

After the initial power-up, the receiver begins to collect a new almanac. This process takes 12 uninterrupted minutes of tracking time. This means that the receiver typically requires a total of 15 to 20 minutes, from the time it's turned on, to complete its collection of an almanac.

When the almanac has been acquired, the receiver stops tracking satellites briefly, while it conducts a search of collected data and compiles a table of satellite rise time predictions. The receiver is able to navigate (or calculate corrections) while making these calculations.

Your receiver will probably have already acquired an almanac. You can verify this by glancing at the lower right corner of the menu that first appears on the screen. If the number beside "Sats Visible" is not zero then you already have an almanac. The internal battery has preserved this information in memory from the time the unit was shipped from the factory.

If you have an almanac in your receiver, the unit will navigate (or calculate corrections) within 1 or 2 minutes of power up. Because the position shown on the screen maybe in Torrance, California, the initial displayed positions may be wrong when using a Navigator.

Continue below with **TEST PROCEDURE** and then refer to one of the "Magnavox DGPS 12 Channel Operator's Manuals" for a detailed description of the PC CDU program.

SYSTEM INSTALLATION

TEST PROCEDURE

When the installation is complete, perform the following steps to ensure proper operation:

1. Turn on the controlling device (Personal computer or other device.)
2. Set the OFF/ON/REMOTE switch (receiver rear panel) to the ON position. If the remote control option has been implemented set the switch to the REMOTE position and activate the remote control device.
3. Monitor the traffic lights (three LED's on the front panel of the receiver). The normal startup sequence is as follows:
 - RED: Indicates power on.
 - YELLOW: Passed self-test, attempting to acquire satellites. (Red light turns off).
 - GREEN (flashing): Tracking one or more satellites, but not yet navigating (or computing corrections). (Yellow light turns off).
 - GREEN: Magnavox receiver is navigating (or computing corrections). (No other lights are on).

During normal operation the receiver cycles between yellow (no tracking), flashing green (some tracking), and green (navigating/computing corrections). Changes occur as the number and geometry of tracked satellites vary.

The sequence above is for a receiver that has been turned on for the first time, or after its memory has been erased. If your receiver has an almanac, the four items described above may happen so quickly that some of them may not be noticed.

This concludes the System Installation portion of this manual. If the receiver appears to be functioning correctly, and if you are using a PC as a Control Display Unit, you will want to refer to the additional manual that was shipped with the receiver. See "Magnavox DGPS 12 Channel Operator's Manual".

THE RECEIVER ASSEMBLY

CAUTION

You must have a high order of specialized skill and training to service the Magnavox receiver. To avoid loss of warranty, we recommend that only Magnavox technicians perform service tasks. No user-servicable parts are available.

A plastic clam-shell case, consisting of two identical halves, houses the Magnavox receiver (Figure 10). The two halves are secured by four screws set into the recessed holes of each corner.

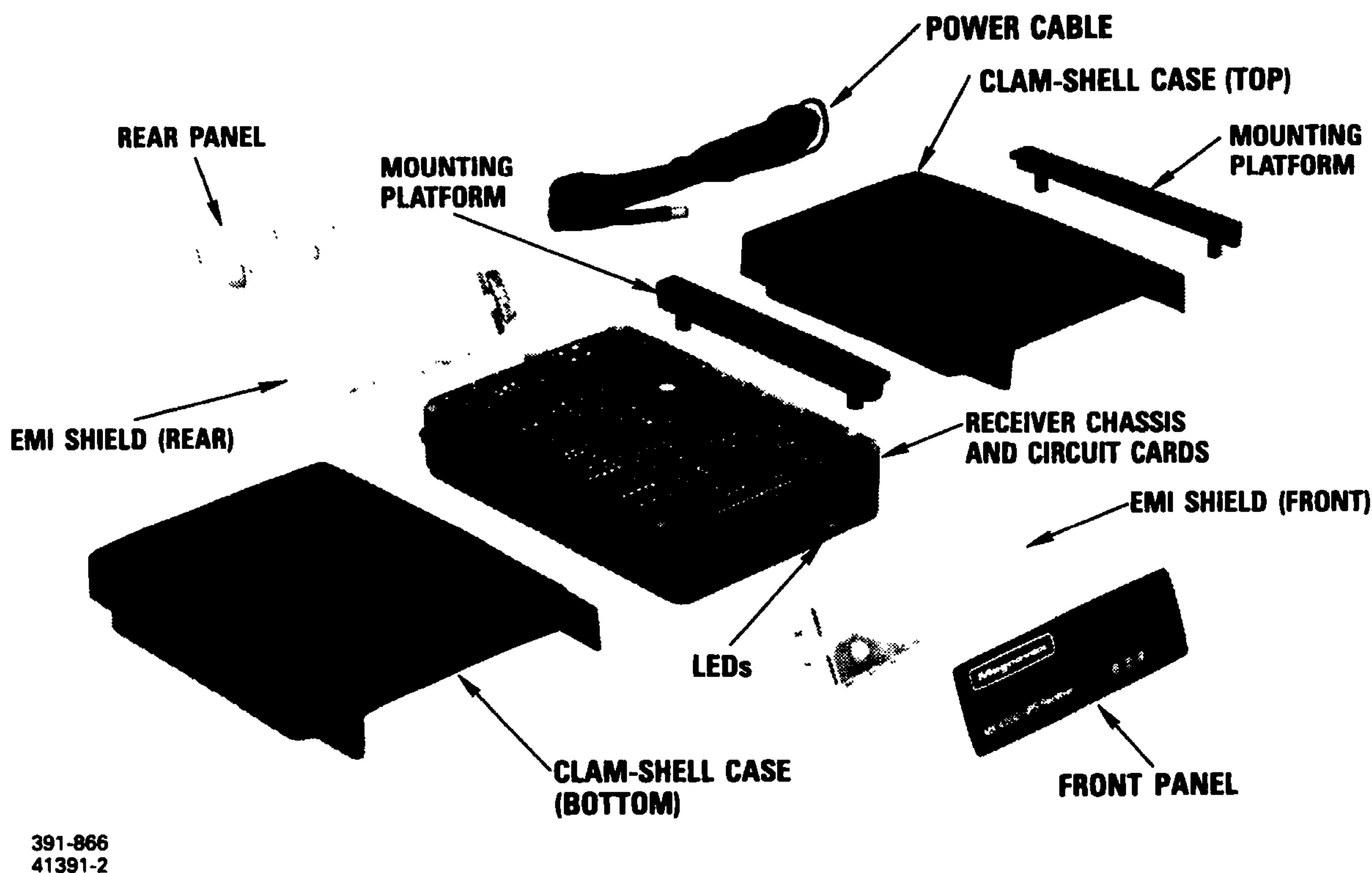


Figure 10. Receiver Partially Disassembled

For easy and flexible mounting, your receiver comes with two platforms. Inside each platform, two recessed and threaded busings serve as the female receptacle for the case housing screws. Four holes at the ends of the platforms are used to attach the receiver in any orientation to the chosen mounting surface. Your installation kit includes a template (refer to Figure 7). Use the template to determine the location of the mounting holes.

The receiver assembly contains two circuit cards: the RF/power supply (top) and the processor/memory (bottom). One 16-pin header connects them electrically. Bosses secure the corners of the two circuit cards. Each circuit card gets attached, at its center, to the chassis by one 1/4" Phillips screw.

MAINTENANCE

The front panel gets secured to the chassis as it slides into grooves along the front edges of the plastic cases. Projecting through the front panel are three status indicators. These are red, yellow, and green LEDs, referred to as "traffic lights".

The rear panel is attached to the chassis by one Phillips screw and parts on the two cards; namely, the Antenna connector on the RF/power supply card and the MULTI-PORT Interface connector on the processor card.

Additional rear panel parts are:

- ground stud (for chassis grounding)
- power mode switch (OFF/ON/REMOTE switch)
- power socket
- 1PPS output connector, optionally used for system timing.

REPLACING THE CIRCUIT CARDS**Disassembly****CAUTION**

Magnavox receiver components on the circuit cards are electrostatic discharge (ESD) sensitive. Take care to dissipate static charges both on the equipment and on your own person. Static charges can easily destroy the DGPS receiver circuits. If you're unaware of ESD safeguards, please have an authorized service center handle repairs.

For the following procedure, refer to Table 4 and Figure 11. The numbers in parentheses refer to the part index numbers in Figure 11.

1. Remove the quick-disconnect power cable (8) from the power socket.
2. Disconnect (unthread) the antenna cable from the antenna connector (5).
3. Disconnect the MULTI-PORT Interface cable. Unscrew the two slotted screws securing the connector.
4. Remove the four Phillips screws (1) that secure the case to the mounting base. The screws sit in recesses in the mounting platforms at the sides of the unit.
5. Separate the two halves of the outer casing (2). Be careful. The unit falls apart as you separate the two halves of the case. Set the cases, the front EMI shield (10), and the front panel (16) to the side.
6. Turn the receiver assembly upside down. The three LED's (15) should then be closest to the top of the front panel.
7. Remove the two 3/16-inch hex standoff nuts (7) on the sides of the MULTI-PORT Interface connector (11).
8. Remove the Antenna connector (5) nut and lock washer that secure the RF/power supply card (4) to the rear panel.
9. Remove the Phillips screw next to the power socket.
10. Set the rear panel (9) and the rear EMI shield (10) aside.

Removing the Circuit Cards

1. Remove the 1/4-inch Phillips screw (3) at the center of the processor card (14).
2. Grasp the processor card (14) at the sides with one hand and lift it gently, separating the header connector (17). Don't lift it from the front because you might damage the LED's.

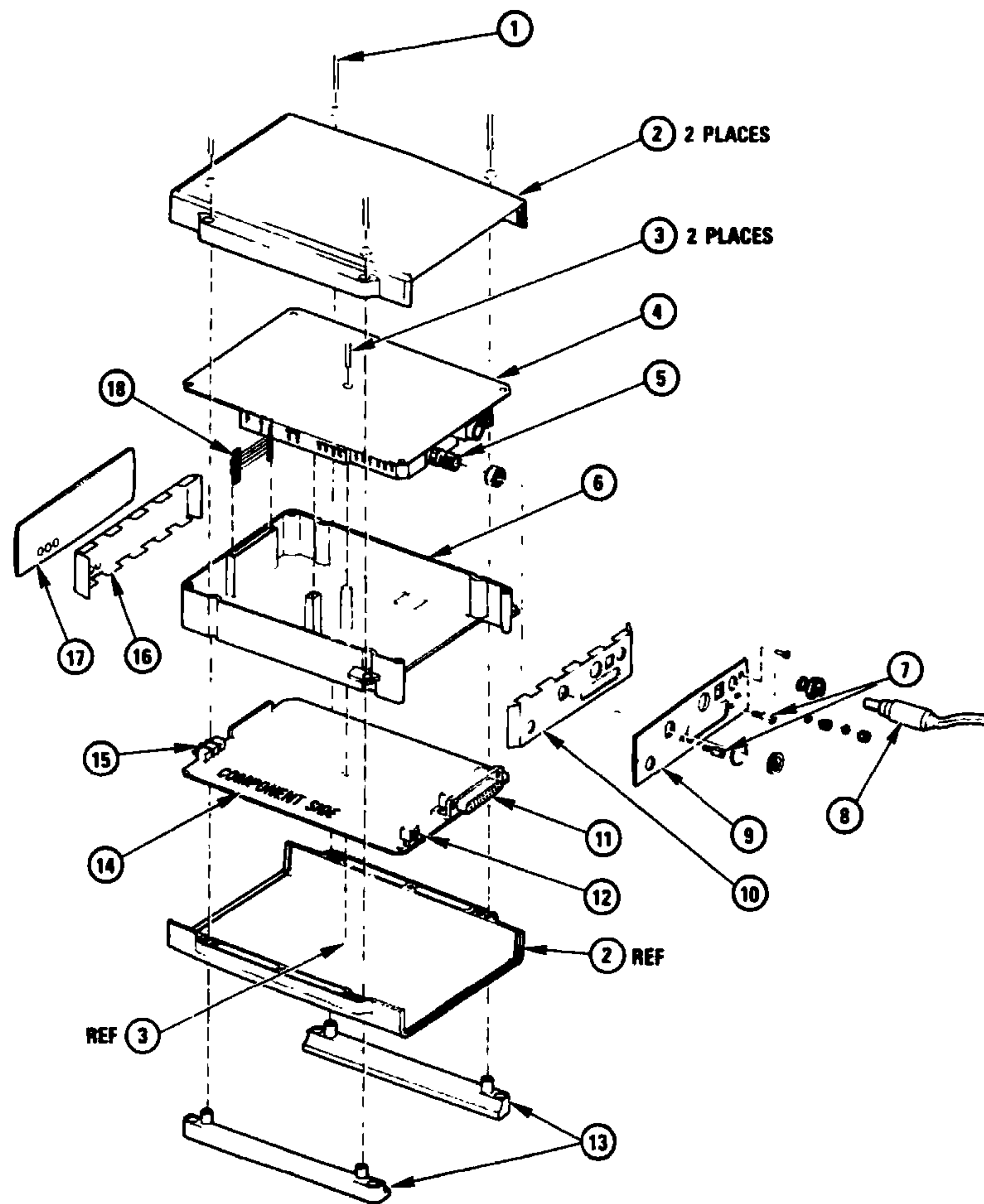
MAINTENANCE

3. Turn the assembly over and remove the phillips screw (3) from the center of the RF/power supply card (4).
4. Grasp the RF/power supply card (4) at the sides with one hand and lift it gently to separate the circuit card from the molded plastic chassis (6).

Table 5. Receiver Parts List

Figure & Index No.	Part	Part Number	Quantity
1	Housing Screw	Ref	4
2	Clam Shell Housing Case	Ref	2
3	Circuit Card Assembly Screw	Ref	2
4	RF/Power Supply Circuit	819822-801/802	1
5	Antenna Input Connector	Ref	1
6	Chassis	Ref	1
7	Hex Standoff	Ref	1 set
8	Power Cable Assembly	Ref	1
9	Rear Panel	Ref	1
10	EMI Shield	Ref	2
11	MULTI-PORT Interface Connector	Ref	1
12	1PPS Connector	Ref	1
13	Mounting Platform	Ref	2
14	Processor Circuit Card Assembly	819978-80X	1
15	Light Emitting Diode	Ref	3
16	Front Panel	Ref	1
17	Header, 16 pin	Ref	1

Ref. - Refer to parts list for the assembly, of which the item is a part.



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Figure 11. Exploded View of the Receiver

Replacing the Circuit Cards and Re-assembling the Unit

For the following procedure, refer to Table 4 and Figure 11. The numbers in parentheses refer to the part index numbers in Figure 11.

1. Slide the rear panel (9) and EMI shield (10) into position on the replacement RF/power supply card (4).
2. Replace the nut and washer on the Antenna input connector (5).
3. Replace the phillips head screw through the rear panel (9).
4. Verify that the header (17) is in place and firmly seated.
5. Fit the plastic molded chassis (6) onto the RF/power supply card (4). Hold the chassis (6) in your hand with its recessed side facing the component side of the RF/power supply card. Grasping the circuit card and the chassis in each hand, bring them together while tilting the chassis at roughly a 45-degree angle starting at the

MAINTENANCE

rear panel as you mate the two assemblies. Ease the header pins (17) through the rectangular opening in the chassis as you join the assemblies.

6. Check to see that the bosses are seated in the corner U-slots of the card.
7. Replace the 1/4-inch screw (3) at the circuit card center. Tighten only until snug. Don't over tighten.
8. Replace the processor card (14). Grasp the processor card in one hand and hold the chassis/RF/Power Supply assemblies in the other. Bring them together while tilting the processor card at roughly a 45-degree angle. Gently ease the two assemblies together while seeing that the header pins (17) seat properly.
9. Check to see that the bosses are secured in the U-slots at the corners of the card.
10. Replace the 1/4-inch screw (3) at the circuit card center. Tighten only until snug. Don't over tighten.
11. Replace the two hex standoffs (7) on the MULTI-PORT Interface Connector. Tighten only until snug. Don't over tighten.
12. Set down the receiver and lift up one half of the clam-shell case (2). How you have the mounting platforms (13) inserted into the clam-shell case must agree with the way you're going to mount the receiver (from top or bottom). Be sure you have them seated the way you want them.
13. Place the front EMI shield (1) and the front panel (16) over the LED's (15).
14. Hold the front panel (16) with your finger as you lower it and the assembled chassis down into one side of the clam-shell case (2). Slide the front panel into the grooves of the case.
15. Install the other half of the clam-shell case (2). Match up the pins on one case with the receiving holes on the other before joining the two halves of the clam-shell case.
16. Replace the four case-mounting screws (1). Tighten only until snug. Don't over tighten.

RESETTING THE RECEIVER MEMORY

You may occasionally need to reset random access memory (RAM) in the receiver for one of the following reasons:

- You wish to verify that two-way communication is taking place.
- You may suspect that RAM is corrupted.

A cold start reset procedure erases the almanac, forcing all software settings to their default values. There will be a 15 minute delay before complete normal operation resumes, just as when the backup battery fails or when the circuit cards are separated from the chassis. For this reason, you may wish to try a warm start, or a tepid start before trying a cold start. Neither the warm start nor the tepid start will erase the almanac.

PROCEDURE

Follow the initialization steps in the Magnavox DGPS 12 Channel Operator's Manual to execute the Magnavox CDU program. Continue with these instructions after communications have been established between the PC and the receiver.

1. If the Main Menu is not presently displayed press the ESC key. Use the tab key to highlight the PC Modem Control field.
2. Select the PC MODEM CONTROL Menu with the enter key.
3. Key in the string: \$PMVXG,018,* (must be all upper case characters) where '*' is
 - W = Warm Start; saves the old almanac and re-acquires the satellites.
 - T = Tepid Start; saves the almanac but erases all other parameters.
 - C = Cold Start; erases the almanac and starts from the beginning. Re-acquires almanac in about 15 minutes.

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RESETTING THE SOLID STATE FUSE

The solid state fuse (thermal circuit breaker) is located in the power input housing on the RF/power supply CCA. To reset it, remove the power cord from the rear panel receptacle and replace it after 10 seconds. If the problem persists, or recurs repeatedly, remove power from the equipment and obtain service from your authorized Magnavox dealer.

TROUBLESHOOTING

The receiver traffic lights not only indicate operational status but also can aid you in identifying common problems. Use Table 6 to identify common problems and remedies.

Table 6. Troubleshooting Table

Status Indicators			Probable Cause	Recommended Action
Red	Yellow	Green		
OFF	OFF	OFF	Circuit breaker tripped or no power to unit.	Reset circuit breaker by toggling power switch ON/OFF positions.
OFF	ON	OFF	Not tracking satellites.	1) Check for proper antenna connection. 2) Verify clear visibility to skyline. 3) See below.
OFF	OFF	FLASHING	Tracking satellites but not navigating/computing corrections.	1) if in Search-the-Sky, wait for additional satellites to be acquired. 2) Check operator-entered elevation limit. 3) Check operator-entered DOP limit.

APPENDIX A

ELECTRICAL INTERFACES

INPUT:

Port 1 and 3 RS-232
Port 2 and 4 RS-422

OUTPUT:

Port 1 and 3 RS-232
Port 2 and 4 RS-422

BAUD RATE:

300 to 19200 baud all ports, selectable

OUTPUT DATA:

Position, speed vector (COG, SOG, Vn, Ve) GPS status, navigation data, time

DATA FORMATS:

NMEA-0183 - proprietary; RTCM 104; ASCII

PHYSICAL DATA - RECEIVER	
DIMENSIONS: Height Width Depth	45 millimeters (1.8 inches) 138 millimeters (5.4 inches) 177 millimeters (7.0 inches)
WEIGHT:	900 grams (2 pounds)

PHYSICAL DATA - ANTENNA	
DIMENSIONS: Height Diameter	190 millimeters (7.5 inches) 83 millimeters (3.3 inches)
WEIGHT (with cable):	1,134 Kilograms (2.5 pounds)
CABLE LENGTH:	15 meters (50 feet)

ENVIRONMENTAL DATA	
TEMPERATURE RANGE Operational Receiver: Antenna: Storage Receiver: Antenna:	-20° to +55°C (0° to +130°F) -40° to +70°C (-40° to +160°F) -40° to +85°C (-40° to +185°F) -40° to +85°C (-40° to +185°F)
HUMIDITY Receiver: Antenna:	95% 100%

POWER DATA	
POWER INPUT REQUIREMENTS:	10-32 Vdc, 4.8 watts average, 6 watts maximum
POWER OUTPUT: (to connected device)	12 Vdc ± 10%, 65 milliamps maximum
GROUNDING:	Chassis isolated from signal ground.

HOW ARE WE DOING?

PLEASE

HELP US TO HELP YOU AND OUR OTHER VALUED CUSTOMERS BY

sending us your evaluation of this manual. We need to know such things as:

- Is the manual complete, or do you need more (or less) information?
- Can you find the information you need easily?
- Is the information easy to understand, or could we be clearer?
- Are there any errors and, if so, where and what are they?

Be sure to reference the title and identification number of this manual:

**Magnavox DGPS 12 Channel
Installation and Service Manual R-7218**

and include your name, address and telephone number. We look forward to finding out how we can improve our information services.

All of your comments and suggestions become the property of Magnavox.
Please send them to:

**Magnavox Electronic Systems Company
West Coast Division
2829 Maricopa Street
Torrance, CA 90503
United States of America**

**Attn: Navigation & Positioning, Dept. 775
Technical Writing Supervisor**

or write your comments on the **READER COMMENT SHEET** on the next page and mail it to us.

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MAGNAVOX ELECTRONIC SYSTEMS COMPANY
WEST COAST DIVISION
2829 Maricopa Street
Torrance, CA 90503,
USA

Attn: Navigation & Positioning, Dept. 775
Technical Writing Supervisor

PROBLEM REPORT

<p>Describe Problem (How long have you had this problem and is it repeatable).</p>	<p>Part and Serial No.</p>
<p>What is connect to the control port (normally port 1)?</p>	<p>UTC Time/Date of Problem</p>
<p>What is connected to the raw data port (2)?</p>	<p>LAT/LON</p>
<p>Do you have high-power transmitting equipment, such as radar or SSB radios? What are the signal strengths of satellites under track?</p>	<p>Indicate GDOP, HDOP, and VDOP, if available.</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p>
<p>Are you using Magnavox PC control software for control of peripherals?</p> <p>If Yes, what version? _____</p>	<p>Show problem state of LEDs</p> <p>Red _____</p> <p>Green _____</p> <p>Yellow _____</p>
<p>Are you recording the raw data to disk?</p>	<p>Have you reset the system?</p> <p>Yes _____</p> <p>No _____</p> <p>Did it help?</p> <p>Yes _____ No _____</p>

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West Coast Division
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USA

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MX 9212 _____ MX 9112 _____ MX 9012R _____

SERIAL NUMBER: _____