RRS MAINTENANCE NOTE 01 (for Electronics Technicians)
Maintenance, Logistics, and Acquisition Division
W/OPS12: KC

SUBJECT : Radiosonde Replacement System (RRS) SPS - GPS Radome Antenna Initial Installation

PURPOSE : Provide instructions for initial installation of the SPS-GPS Radome Antenna by the TRS installation contractor.

EQUIPMENT AFFECTED : All sites scheduled for RRS systems in the CONUS, Alaskan, and Pacific regions.

PARTS REQUIRED : The installation kit will be supplied by National Logistics Support Center (NLSC) prior to scheduled Telemetry Receiver System (TRS) installation.

EQUIPMENT	ASN	MANUFACTURER
GPS – SPS Radome Installation Kit	J700-1A4	NWS

SPECIAL TOOLS REQUIRED : None

MODIFICATION PROCUREMENT : None

EFFECTIVITY : Upon Initial Installation of RRS TRS System

ESTIMATED TIME REQUIRED : Approximately 6 Hours

EFFECT ON OTHER INSTRUCTIONS : None

AUTHORIZATION : N/A

VERIFICATION STATEMENT : This maintenance note was tested the Sterling Research and Development Center, Sterling, VA.

REPORTING INSTRUCTIONS : Following initial installation by the TRS installation contractor, report the completed maintenance action using the Engineering Management Reporting System (EMRS) according to the instructions in NWS Instruction 30-2104, Maintenance Documentation, Part 4 and Appendix H. A sample EMRS report is provided as Attachment A.

TABLE OF CONTENTS

GENERAL:

This procedure provides the installation procedures for radome installation of the Radiosonde Replacement System (RRS) Signal Processing System (SPS) Global Position System (GPS) antenna and mounting bracket, antenna cable fasteners, and the antenna cable to the SPS.

PROCEDURE:

This procedure is intended for use by the Telemetry Receiver System (TRS) installation contractor and to provide information to National Weather Service site personnel involved with installation of the RRS. This procedure is to be carried out by two members of the installation contractor's staff. For follow-on work, TRS Manual NWS EHB 9-753 should be used to operate and maintain the radome GPS antenna.

NOTE: For the initial installation, NWS site personnel are responsible only for:

- Verifying installation kit contents;
- Monitoring the installation contractor's work; and
- EMRS reporting following completion of installation work.

1. Introduction

The installation of the GPS antenna in the radome should occur just prior to the installation of the TRS components. All necessary components associated with the installation of the radome GPS antenna are found in the **SPS Radome GPS Antenna Installation Kit**. This kit (ASN: J700-1A4) is available from the National Logistics Support Center (NLSC). This kit will arrive on site prior to the scheduled installation of the RRS TRS hardware suite.

Throughout this installation procedure, caution and warning icons will identify specific precautionary statements that will ensure a timely and accurate installation of the GPS Antenna while maintaining safety as priority within the radome .

2. SPS Radome GPS Antenna Installation Kit Contents

NOTE: Section 2 is to be performed by NWS site personnel.

After receipt, open the installation kit. An enclosed packing slip will describe the contents of the kit. A drawing showing the assembly of the GPS Antenna mounting bracket will also be enclosed. Remove the contents of the kit and examine the packing slip. Ensure the following items are included. If any items are missing, contact the NLSC (816-926-3990). Following verification of kit contents, re-pack and hold kit for the TRS installation contractor. The TRS installation contractor will use this kit to install the GPS radome antenna.

The contents of the kit include the following items:

- One GPS Antenna (ASN: J700-1A4A1).
- One GPS Antenna Mounting Bracket (white Delrin bars) – 2 pieces (J700-1A4MP1).
- One GPS Antenna Cable (18-inch, RG-58 RF cable) terminated with a TNC-Male and a Type N female connector respectively (ASN: J700-1A4W1).
- One GPS-to-SPS Antenna Cable (35-foot length of RG-213/U RF cable) with connectors. Cable un-terminated on one end (one right angle Type N male connector included for later attachment), with a Type N male connector attached to the cable on the other end (ASN: J700-1A4W2).
- One GPS Mounting Installation Kit (ASN: J700-1A4MP2) - a small plastic bag containing the following:
  - One ¾ -inch PVC pipe nipple and PVC retaining lock nut.
  - 10 Nylon Mounting Blocks (cable tie holders) and 15 six-inch tie wraps.
  - A dual tube of Five Minute Epoxy and three stir sticks.
  - Three six-inch applicator brushes.
  - Three sheets of 220 grit sand paper.
  - Two ¼ -inch – 20 x 2½ -inch stainless steel carriage bolts, each with one flat washer, one lock washer, and one wing nut (for GPS antenna mounting bracket).

3. Tools Required

The following tools are required to install the GPS Antenna within the Radome and are to be supplied by the TRS installation contractor:

- Safety Goggles or Glasses
- Hard Hat
- Extension cord
- 10 to 12-foot insulated step ladder
- 25-foot tape measure
- Duct tape
- Wire cutters
- Paper towels
- Pencil or marker

4. GPS Antenna and Mounting Bracket Installation

To install the GPS antenna and mounting bracket, perform the following steps:

1. Open the GPS – SPS Radome Installation Kit (ASN: J700-1A4). Assemble the GPS mounting Bracket as shown in Figure 1.

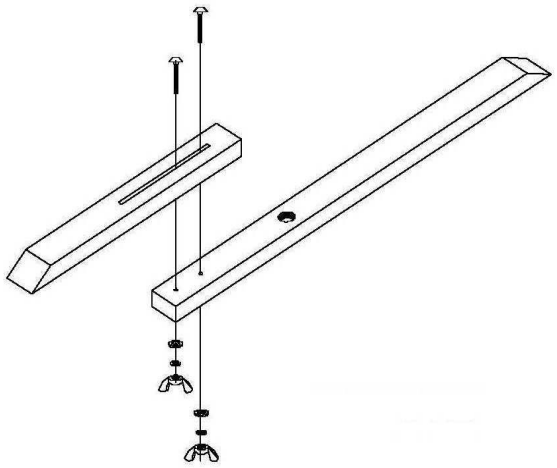

Figure 1 GPS Mounting Bracket Assembly (J700-1A4MP1)

2. Locate the 3/4-inch pipe nipple, feed the TNC-Male end of the 18-inch GPS Antenna Cable through one end of the pipe nipple, and attach this connector to the female connector of the GPS Antenna. Ensure this cable is attached to the GPS Antenna prior to mounting the antenna to the mounting bracket. See Figure 2.

Figure 2 GPS Antenna, Pipe Nipple, and Bracket

3. Thread the pipe nipple to the mounting threads on the underside of the GPS Antenna.
4. Locate the GPS Antenna Mounting Bracket and find the one-inch recessed round opening on the top side of the bracket (side opposite the wing nuts).
5. Place the Type N female end of the GPS Antenna Cable through this opening along with the pipe nipple, seating the underside of the GPS Antenna within the recessed surface on the mounting bracket and secure the threaded pipe nipple to the antenna mounting bracket using the PVC retaining nut.

CAUTION

Do not over tighten this nut as damage to the GPS Antenna may occur.

6. Loosen the two wing nuts on the underside of the antenna bracket just enough to allow the two halves of the mounting bracket to slide freely. This will allow the antenna mounting bracket to be positioned at the top of the radome, seating it onto the radome vent ledge.
7. Set the assembled GPS Antenna and GPS Antenna Mounting Bracket aside.

CAUTION

Persons working within the Radome shall wear hard hats.

8. Inside the radome, locate the windward face of the radome. This location is the side that faces toward the direction of the prevailing winds. This face of the radome will be used to attach the GPS-SPS RG-213/U Antenna Cable. Request field site personnel to assist in determining this windward direction. Mark this surface with a pencil for reference.
9. After determining the interior face of the radome facing the windward direction, orient the 12-foot step ladder between the windward face of the radome and the TRS Electronic Equipment enclosure or the Antenna Assembly, if already installed. See Figure 3.

*****WARNING*****

If the TRS pedestal has already been installed, coordinate with operations personnel to re-orient the face of the TRS receiving antenna so it points away from the windward location of the radome interior. Ensure the TRS is secured via approved Lockout/Tag-out procedures.

CAUTION

Safety regulations stipulate that personnel using step ladders must take note of their step height such that it allows the top step to rest just above the knees.

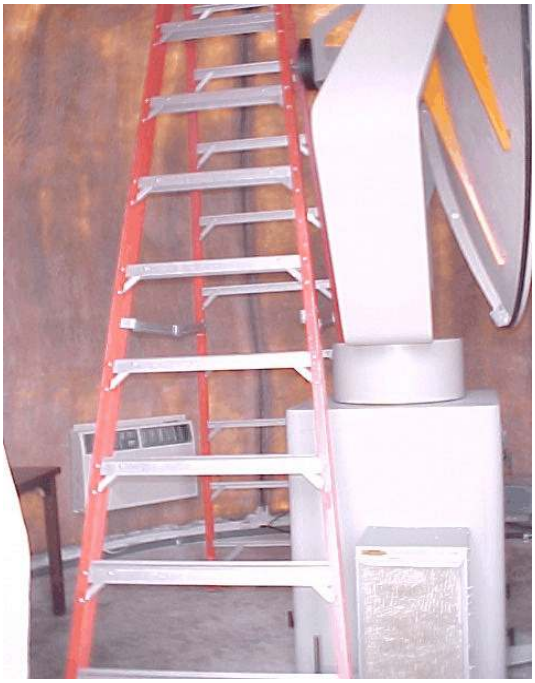

Figure 3 Insulated Step Ladder

*****WARNING*****

If the TRS pedestal has already been installed, make sure the step ladder does not touch the TRS electronic equipment cabinet or the TRS Antenna Assembly, as antenna components could be damaged. Do not stand on or place any components of this installation kit on any surface of the TRS Antenna assembly or electronic equipment cabinet.

10. Using the step ladder, place the assembled GPS Antenna Mounting Bracket and GPS Antenna on the top of radome ventilation cap ledge by sliding the two halves of the mounting bracket apart, noting the position of the GPS antenna near the approximate center of the ventilation opening.
11. Position the mounting bracket so the end of the lower half of the mounting bracket faces toward a seam on the windward side of the radome.

12. Be sure the beveled ends of the mounting bracket are securely placed on top of the ledge of the ventilation cap opening, setting the beveled edges firmly against the outer edges of the ventilation cap.
13. Once in position, secure the mounting bracket halves by finger tightening the two wing nuts at the bottom of the mounting bracket. The GPS Antenna and Cable will be positioned in the approximate center of the ventilation opening.

This completes the GPS Antenna and Mounting Bracket installation.

5. Installation of the GPS Antenna Cable Mounting Blocks

This section of the installation procedure will fasten the GPS Antenna Cable Mounting Blocks to the interior surface of the radome wall.

1. Using the tape measure, measure 2 inches outward from the top of the radome ventilation cap edge next to a seam and mark this location, using the lower edge of the antenna mounting bracket end as a reference towards the windward direction. This will mark the location of the first antenna cable mounting block. Measure a second mark approximately 12 inches down the seam from the initial mark.
2. Place consecutive marks 24 inch spacing along the windward line following the seam of a radome panel until you reach the inward bend of the radome (located approximately waist high from the bottom of the radome).
3. Make a 6 inch mark above and below the waist high inward bend. Continue to mark 24 inch spacing below the bottom mark and stop approximately 6 inches from the floor of the radome. This 6 inch spacing will allow the antenna cable to bend towards the TRS electronics enclosure to facilitate the follow-on installation of the Liquid Tight conduit. See Figures 4, 5, and 6.

Figure 4 Establish Bottom Mark

Figure 5 Initial Markings

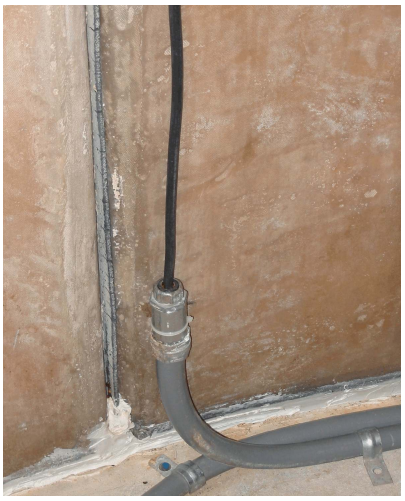

Figure 6 Liquid Tight Conduit

CAUTION

Always use eye protection when sanding using abrasives, especially when sanding overhead.

4. You should have made approximately 10 marks along a seam on the windward side of the radome.
5. Using the sand paper provided, sand an area approximately 2 square inches along side each mark. This will roughen the surface of the radome allowing for better adhesion of the epoxy. See Figure 7.

Figure 7 Lightly sand surface of Radome adjacent to marks.

6. With all marked locations sanded, use the sandpaper to roughen the underside of each antenna cable mounting block. Set them aside.
7. Duct tape will be used to hold the mounting blocks while the epoxy cures. Tear 4-6 inch lengths of duct tape and pre-position them where epoxy is to be applied to the sanded spots. Orient the tape vertically and stick the bottom half of each piece of tape just below the sanded spot.
8. Next, find the tube of 5-minute epoxy and the stir sticks. Tear a section of the cardboard flap off the cardboard container used in the shipment of the kit. This flap will be used as a mixing surface for the two-part epoxy.
9. Remove the cap to the two part epoxy dual container and set aside. The cap is located between the two epoxy tube plungers. The cap is keyed; note the flat side of the cap coincides with the flat end of the resin and hardener openings. Cut off the tips of the epoxy tubes.

NOTE: There may be air pockets in the tubes. After placing the cap on the open tube end, hold the dispenser upright (plungers at top) to allow the air bubble to reach above the resin and hardener materials. This will help to **ensure** equal amounts of resin and hardener are dispensed when depressing the plunger.

10. Place an equal amount of each epoxy compound, about the size of a quarter, on the cardboard. Place the cap on the epoxy. Thoroughly mix the two compounds together forming a uniform mixture. This mixture will generate heat as it cures. You will have approximately 5 minutes to work with the mixture.

CAUTION

Mix only small amounts of the epoxy as the mixture cures rapidly. Mix enough epoxy to fasten three to four antenna mounting blocks at a time.

*****WARNING*****

READ THE INSTRUCTIONS ON THE EPOXY CONTAINER. Do not get any of the epoxy compounds into the eyes and mouth, as the mixture is an irritant and very toxic. Wipe any epoxy off exposed skin as soon as possible using paper towels. Wash hands thoroughly when finished. Discard any unused materials.

11. Using one of the applicator brushes, liberally coat an area equal to the size of a quarter on a sanded area with the epoxy mixture. Press an antenna mounting block into the center of the mixture keeping the end slots horizontal to the floor. Press firmly allowing the epoxy to flow into the center hole of the mounting block and around the periphery of the block. See Figure 8.

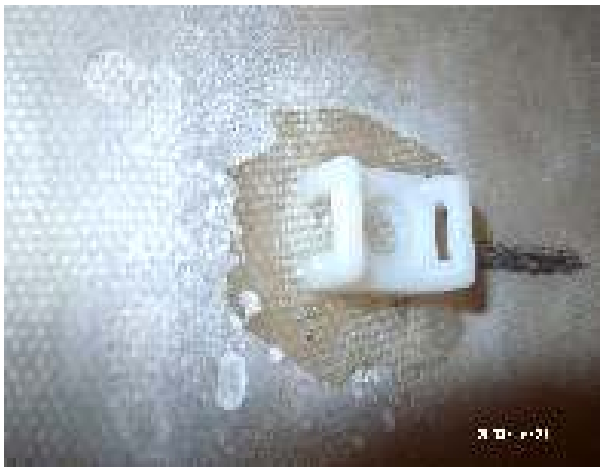

Figure 8 Epoxy must not fill end slots.

NOTE: Do not allow any epoxy to flow into the tie wrap slots at either end of the mounting block, as this will render the block useless.

12. As each block is pressed into place, rotate the piece of duct tape upward to hold the antenna mounting blocks to the surface of the radome wall while the epoxy hardens.

13. Repeat steps 8 through 12 until all marked locations have an antenna mounting block fastened to the windward interior wall of the radome. Use a new applicator brush for each new mixture of epoxy. See Figures 9 and 10.

Figure 9 Antenna mounting blocks should be placed at each of the sanded spots traversing down the windward side of the radome.

Figure 10 Duct tape covering antenna mounting blocks at the top of radome. The duct tape secures the blocks while the epoxy cures

14. 2 hours must be allowed for the epoxy to completely harden before removing duct tape and affixing cable.

This completes the installation of the GPS Antenna Cable Mounting Blocks to the interior surface of the radome wall.

6. Installation of the GPS-to-SPS Antenna Cable

This portion of the installation procedure will outline the steps necessary to fasten the GPS-to-SPS Antenna Cable to the mounting blocks.

CAUTION

Safety regulations stipulate that personnel using step ladders must take note of their step height such that it allows the top step to rest just above the knees.

1. Position the step ladder just below the top antenna mounting block near the ventilation cap at the top of the radome. If the TRS antenna and pedestal are installed at this time, carefully position the step ladder within the radome, avoiding the TRS antenna and electronic equipment cabinet. Make sure the TRS is de-energized and turn the antenna dish away from the step ladder.
2. Using the ladder, take two of the cable ties up to the top most cable mounting blocks and feed both cable ties through the end slots of the top most cable mounting block. Loosely secure the cable ties to form 2-inch loops. See Figures 11 and 12.

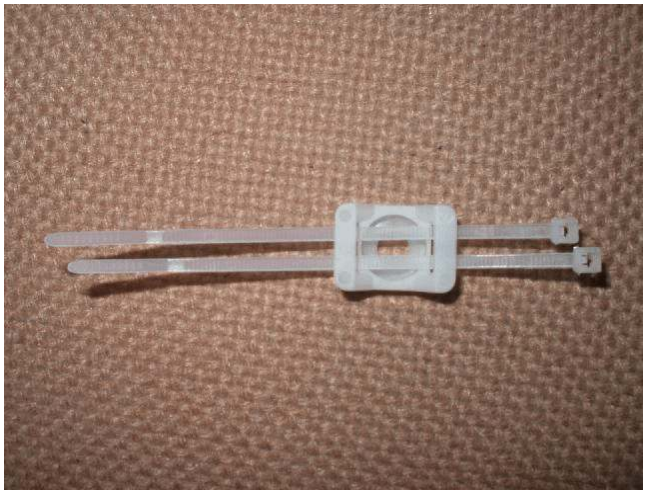

Figure 11 Top most mounting block with 2 cable ties

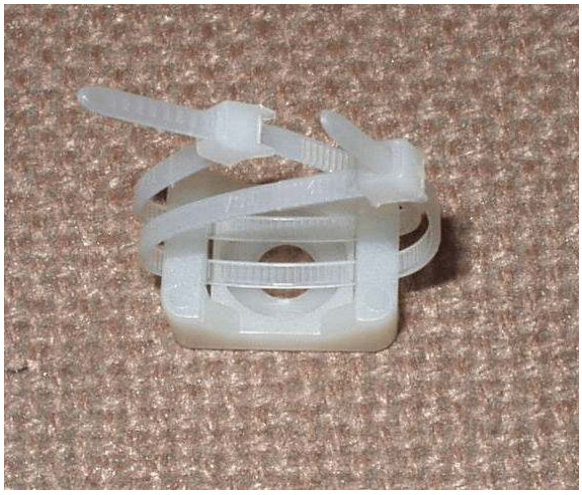

Figure 12 Top most mounting block with 2-inch loops

3. Re-position the ladder as necessary. Continue feeding one tie wrap through each mounting block and create a 2-inch loop with each tie wrap. Work outward and downward to subsequent mounting blocks. Use the remaining tie wraps, one per mounting block.

4. Uncoil and straighten out the 35-foot GPS-to-SPS Antenna Cable. Leave the Type N male connector end of the cable inside the radome. The unterminated end of the cable may be taken out of the radome exit to facilitate the straightening of the cable.
5. Starting at the radome floor, feed the cable with the Type N male connector end up through the 2-inch loops created by the tie wraps. Have a helper hand the cable up to the person on the ladder feeding the cable end through each of the tie wrap loops.
6. At the top of the radome ensure that the Type N male connector is 2 inches past the top most cable mounting block/tie wrap.
7. Fasten the Type N male connector end to the GPS antenna cable female connector end and hand tighten. Ensure sufficient slack to provide a 12 inch half loop in the 18 inch RG-58 GPS antenna cable. See Figure 13.

Figure 13 Connectors positioned after the top tie wrap. Cable half loop displayed.

8. After joining connectors, hold the RG-213 antenna cable against the top most mounting block and firmly cinch the top two cable ties. Using wire cutters, cut off the excess end of the two cable ties, leaving one-half inch extending beyond the cable tie keeper.

9. Re-position the ladder as necessary and continue to cinch the cable ties all the way to the radome floor. Using wire cutters, cut off the excess end of the cable ties, leaving one-half inch extending beyond the cable tie keeper. See Figure 14.

Figure 14 Installed cable next to a radome seam

This completes SPS - GPS Radome Antenna initial installation.

10. After completing cable installation, coil the remaining GPS-to-SPS Antenna Cable at the base of the radome shell. Secure the coil bundle with a piece of duct tape.
11. Tape the right angle Type N male connector to the cable coil for future installation on the cable during hookup to the TRS Interconnection Box when the TRS is installed.
12. Remove the step ladder and other tools from the radome. If the TRS antenna and pedestal are installed at this time, be careful to avoid the TRS antenna and electronic equipment cabinet.
13. After TRS installation, the TRS installation contractor will install the Liquid Tight conduit to run the GPS-to-SPS Antenna Cable to the TRS Interconnection Box and hookup the GPS cable in accordance with NWS EHB 9-753, Chapter 2.

? Signature Not Verified

Mark S. Paese

Digitally signed by Mark S. Paese
DN: cn=Mark S. Paese, o=DOC/NOAA/NWS, c=US
Date: 2004.04.28 12:18:09 -04'00'

Mark S. Paese

Director, Maintenance, Logistics, and Acquisition Division

Attachment A - Sample EMRS Report