
BWA - BTR and RPE Installation

Installation Method - 08-0283

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The logo for Nortel Networks, featuring the word "NORTEL" in a bold, sans-serif font above the word "NETWORKS" in a similar font. The "O" in "NORTEL" is stylized with a circular graphic element.

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1.0 General Information

1.1 Description

Purpose: This method describes the handling and securing of the Outdoor Microwave Units to include a pair of Base Station Transceivers(BTR), Radio Power Extractor (RPE), antenna, and a dual or single mounting bracket. The BTR is a combined broadband transmitter and receiver deployed in Reunion's point-to-multipoint system.

Equipment: A pair of BTR's with antennas, RPE, fine adjustment single mount bracket, single mount bracket, and dual mount bracket.

The BTR is approved for installation in an environment with an expected temperature range of -40 Degrees to +50 Degrees Celsius.

The RPE is located close to the BTR. It provides 1:1 switching facility between the primary and the redundant BTR.

Application: This method is intended for initial installations and NNE Sector Extensions.

Service Impact: None

1.2 Sequence

This method is to be performed after Method 08-0289, "NNE Installation."

1.3 Reason for Reissue

Document was revitalized and edited for content (July 2000).

This is the initial release of this method.

2.0 Material Requirements

2.1 Required Documents

Installation Safety Manual (ISM) at URL - aralia/usa/safety/safety.html.

Engineering Package

JSIP

2.2 Tools

The tools listed in Figure 1 are required to perform this method.

Figure 1 – Tools	
Tools	Description
K003041	Field Technicians Tool Kit
K003068	STL Tool Kit

2.3 Supplies

50' rope (optional)

Antiseize

2.4 Customer Supplied Equipment

Secured Antenna Mast

Mast Ground

Coax Cables for each sector run from NNE cabinet to roof.

One 4 pair 8 pin cable for each sector run from NNE cabinet to roof.

2.5 Emergency Contacts

For U.S. Wireless Market:

- Nortel Emergency Technical Assistance Service (ETAS)
972-BWA-ETAS (972-292-3827)
- Nortel Networks Technical Assistance Center (TAC)
972-292-3827, option #3

3.0 Precautions and Preparations

3.1 Precautions

Observe the general safety precautions against personal injury and equipment damage outlined in the ISM at all times.

Note: Read this method completely prior to attempting to handle or install the BTR Transceiver or its mounting pedestal.

Any on-site problems, non-compliances with work orders or potential hazards should be reported immediately to the Program Manager.

When working on high buildings extra care must be taken to ensure that no debris, tools, or equipment are allowed to blow off or fall from the working area.

Locate the main power shut-off switch controlling the equipment. This is important in the event of an accident, so power can be quickly cut.

3.2 Preparations

Prior to starting the operations presented in this method, arrange all materials, tools, and test equipment at the work location so as to minimize fatigue and inconvenience.

On arrival at site, carefully move the equipment and materials to the installation area. Unpack the equipment in a dry area and ensure that all the required materials are present in accordance with the Packing List and that there are no signs of damage. Report any damage or shortage to the next level of support.



SHOCK:
Disconnect all power when working on power supplies.



CAUTION/WARNING:
Be aware of electrostatic discharge devices (ESD) requirements when handling BWA equipment.



CAUTION/WARNING:
Do not stand in front of a transmitting radio or antenna.



CAUTION/WARNING:
The BTR will be installed on the roof or side of a building. It is important to observe where the installation will take place. On the way to that location, pay close attention to any hazard spots (Things Hanging Down, Slippery or Wet Areas...etc.). Once at the installation location, observe the surroundings for any hazards.

4.0 Procedure

4.1 Overview

This method covers the procedures required for the handling and securing of the Outdoor Microwave Units. In this procedure I&C will be preparing the BTR(s) for installation. Then the BTR(s) will be mounted with the Fine Adjustment bracket, Single Mount bracket, or the Dual Mount bracket. In addition, the RPE will be installed. Finally, the BTR(s) will be aligned using the BTR Alignment Tool.

Note: There are several different options on mounting the BTR(s) and RPE. Verify in the Engineering Package which option will be used. If there is a special request made on mounting the BTR(s) and RPE, check with the Program Manager before installation. There are spacing measurements given in the Engineering Package for mounting the BTR(s). **They must be followed!**

4.2 Unpacking the BTR

- 1 Check each package for any sign of physical damage. If damage is visible, immediately report to the next level of support.
- 2 Check all contents against the Bill of Materials (BOM), order forms and packing slips to ensure that all components are received. Make notes of any missing parts or equipment.
- 3 Know exactly where to place the equipment, before removing it from the package.
- 4 Carefully remove the equipment from the package and closely inspect all components for obvious signs of damage. If damage is visible, immediately report to the Program Manager.
- 5 Inventory and baseline all serial numbers, PEC Codes, and location of where these components will be placed.

4.3 Preparing BTR for Installation

The following procedure covers the preparation required before installing the BTR. The antenna (feedhorn) will be mounted to the BTR before the BTR can be installed.

Procedure 1 – Preparing BTR for Installation (Page 1 of 2)		
Step	Action	Observation
1	<p>There are two BTR(s) per sector. One is the Primary and the other is the Redundant BTR.</p> <p>Mount the antennas to the BTR(s) before installing the BTR(s) to the mounting brackets. The next steps will cover the procedure of installing the antenna.</p> <p><i>Note:</i> Because it is important that installing the antennas is done right, it should be done in a controlled environment on stable ground, not hanging from the mast.</p>	

Procedure 1 – Preparing BTR for Installation (Page 2 of 2)		
Step	Action	Observation
2	Both BTR(s) must have the same antenna angle. Verify the antenna angle to the Engineering Package. It is engraved on the side of the antenna. Both the Primary and the Redundant BTR(s) MUST use the same TX polarity. Verify in the Engineering Package the TX polarity for each sector.	<i>Note:</i> If the angle does not match the Engineering package, do not proceed with this procedure. Contact the Program Manager. <i>Note:</i> Polarity is stamped onto the antenna. Refer to Figure 2.
3	Place the BTR on solid ground to install the antenna.	Refer to Figure 3 and Figure 4. <i>Note:</i> The BTR will have tape covering the waveguide holes so that debris can't get inside the radio. This tape will need to be removed before installing the antenna.
4	Carefully place the antenna's flanged surface against the BTR waveguide mounting surface. Be sure to observe antenna polarity, placing the TX polarity to the top of the BTR. Apply the supplied silicone Gel to O Ring Seal.	Refer to Figure 5. Refer to Figure 6. The antenna is in position to be secured to the BTR. <i>Note:</i> Do not pull on the O Ring Seal. It MUST stay attached to the antenna.
5	There will be eight 9/64 allen head screws and eight lock washers used to attach the antenna to the BTR.	
6	Insert each screw and loosely tighten until all screws are placed into the BTR . Then tighten each screw using the torque screwdriver (18-20 inch lbs.).	The antenna is now secured to the BTR housing.
7	Once the antenna is mounted, verify that there are no gaps between the antenna and the BTR.	<i>Note:</i> Verify Tx Polarity with the Engineering Package.
8	Using the 1/2 inch bolt, lock washer and washer, place the bolt into the mounting hole on the side of the antenna and tighten just so it is snug. Do not over tighten.	Refer to Figure 6. Now the antenna should fit flush to the housing and be secured to the BTR.
9	Attach the RF reflectors to the cylinder at the end of the antenna using two screws.	Refer to Figure 7.
10	End of Procedure.	

Figure 2 – BTR Antenna Polarity

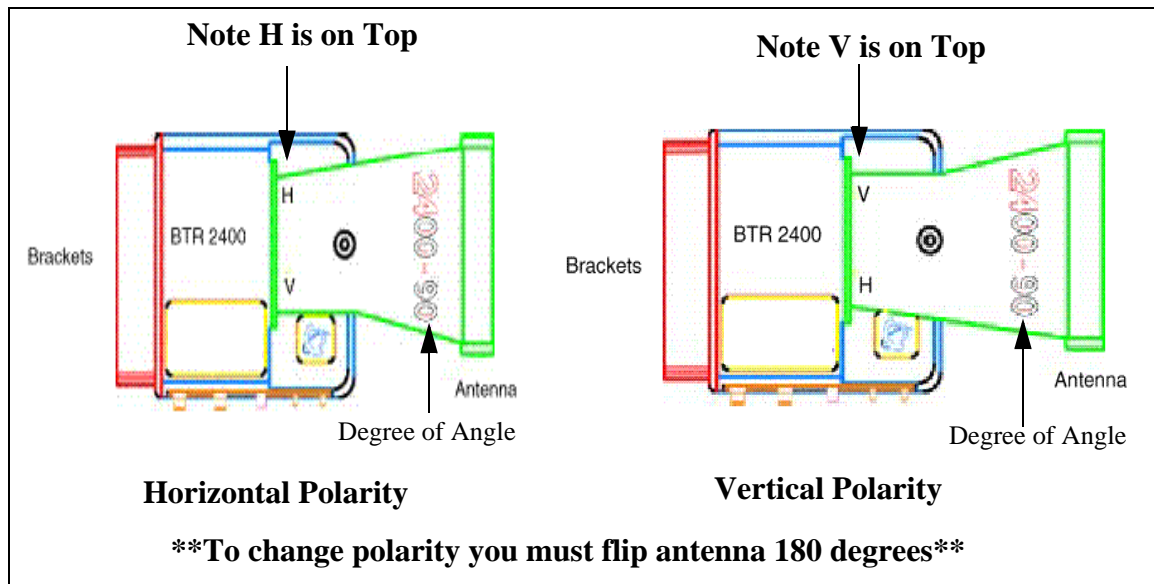


Figure 3 – Tape Covering Flange

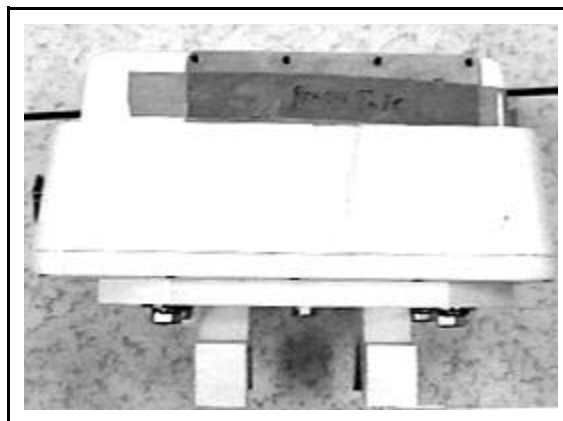


Figure 4 – Flange of BTR

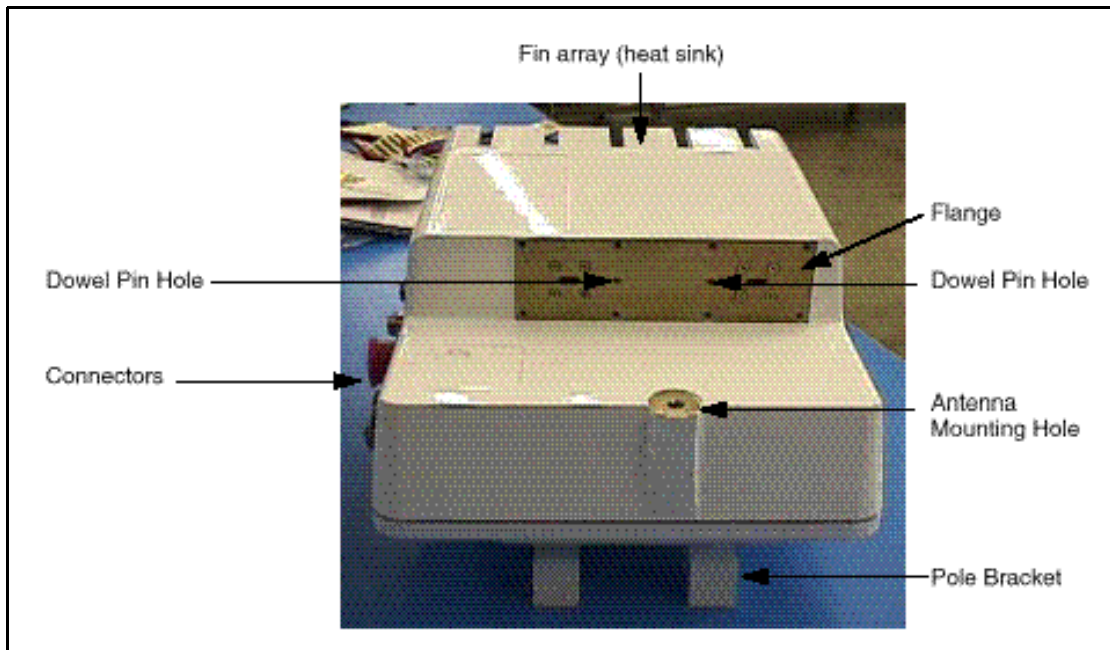


Figure 5 – Antenna Bottom

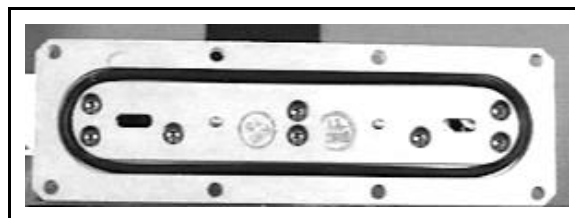


Figure 6 – BTR with Antenna in position

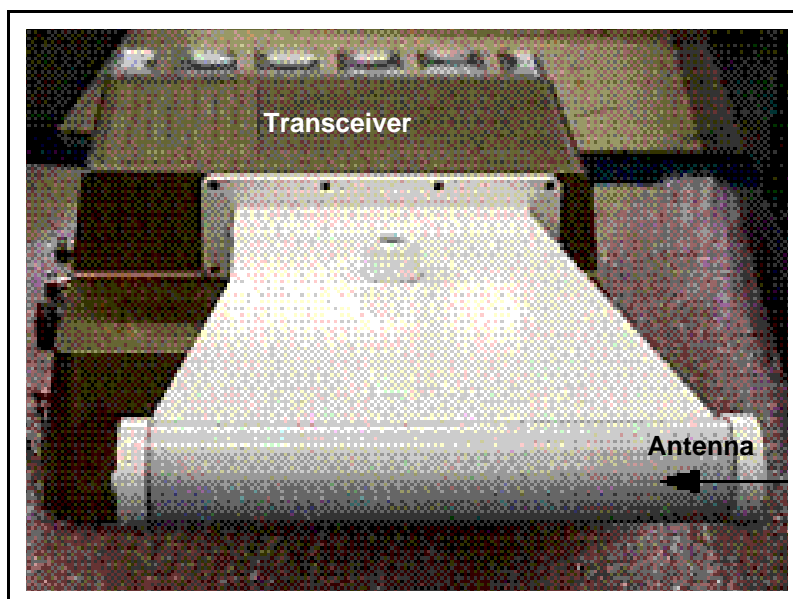
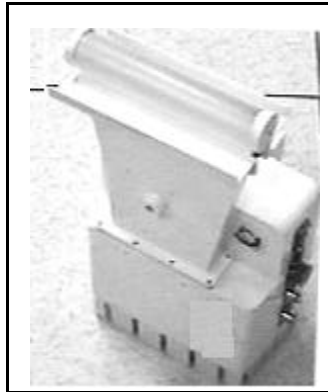


Figure 7 – RF Reflectors mounted to Antenna

4.4 Installation of a BTR using a Single Mount Fine Adjustment Bracket

The following procedure covers the assembly of the Single Mount Fine Adjustment Bracket.

This procedure will require two technicians to perform.

Procedure 2 – Installation of a BTR using a Fine Adjustment Bracket (Page 1 of 4)		
Step	Action	Observation
1	<p>Install the Azimuth adjustment plate to the mast opposite direction of the sector aligned to. Using the U-bolt, split lock washer, flat washer and bronze nut, fully tighten the azimuth adjustment plate securely to the pole.</p> <p>PARTS: U-bolt bracket, two 3/8 x 16 bronze nuts, flat washers, split lock washers.</p>	

Procedure 2 – Installation of a BTR using a Fine Adjustment Bracket (Page 2 of 4)		
Step	Action	Observation
2	<p>Install the Elevation adjustment plate to the mast so that it sits on the Azimuth adjustment plate assembly. Tighten the two pole clamp bars using the four 6.0" hex bolts, split lock washers, flat washers and hex nuts. The elevation adjustment plate will fit snug to the pole.</p> <p><i>Note:</i> The azimuth adjust rod is pre assembled when shipped from the factory. Remove the hex nut, split lock washer and flat washer. Slip the rod into the slot of the azimuth adjustment plate. Replace the hex nut, split lock washer and flat washer.</p> <p>PARTS: Four 3/8 - 16 x 6.0" hex nut, 3/8 split lock washer, 3/8 flat washers.</p>	
3	<p>Install elevation adjustment plate to the BTR antenna bracket.</p> <p>Attach the mounting plate to the elevation adjustment plate using five pan head screws and stainless steel split lock washers. Tighten the mounting plate to the elevation adjustment plate.</p> <p>PARTS: Five 1/4-20 x 3/8 pan head screws and stainless steel split lock washers.</p>	
4	<p>Attach mounting plate to the Reunion Radio housing using four pan head screws and stainless steel split lock washers. Tighten fully.</p> <p>PARTS: Four 1/4-28 x 3/4 pan head screws and stainless steel split lock washers.</p>	

Procedure 2 – Installation of a BTR using a Fine Adjustment Bracket (Page 3 of 4)		
Step	Action	Observation
5	<p>Insert elevation adjustment assembly to pole mount assembly. Align the large diameter hub on the elevation adjustment plate to the pole mount plate, inserting the brass rod into the desired elevation adjustment hole.</p> <p>In order to adjust the elevation of the antenna for maximum uptilt angle, position the round brass rod in the top hole of the elevation plate.</p> <p>In order to adjust the elevation of the antenna for maximum downtilt angle, position the round brass rod in the bottom hole of the elevation plate.</p> <p>Tighten the two 3/8 hex bolts, split lock washers, flat washers and nylon washers until the antenna is snug to the adjustment plate. Do not fully tighten at this time.</p> <p>PARTS: Four hex bolts, split lock washers, flat washers, nylon washers.</p>	
6	<p>Fine Azimuth adjustment instructions:</p> <p>CLOCKWISE: Adjust the azimuth rod by loosening the 3/8 hex nuts on the inside of the rod. The antenna will move clockwise around the pole by tightening the outer 3/8 hex nut. This can be done until the antenna is in the desired position. When this position is reached, fully tighten the inside hex nuts.</p> <p>COUNTER CLOCKWISE: Adjust the azimuth rod by loosening the 3/8 hex nut on the outside of the adjustment rod, leaving no less than three threads protruding from the end. The antenna will move in a counter clockwise movement around the pole by tightening the inside 3/8 hex nut until the antenna is in the desired position. When this position is reached, fully tighten the outside hex nuts.</p> <p>Note: The fine azimuth adjustment allows for +/- 10 degrees.</p>	

Procedure 2 – Installation of a BTR using a Fine Adjustment Bracket (Page 4 of 4)		
Step	Action	Observation
7	<p>Fine elevation adjustment instructions:</p> <p>UPTILT:</p> <p>Rotate the elevation adjust rod counter clockwise to the desired position.</p> <p><i>Note:</i> At this time the four 3/8-16 hex bolts on the elevation adjustment plate will be fully tightened using the proper torque.</p> <p>DOWNTILT:</p> <p>Rotate the elevation adjust rod counter clockwise to the desired position.</p> <p><i>Note:</i> At this time the four 3/8-16 hex bolts on the elevation adjustment plate will be fully tightened using the proper torque.</p> <p><i>Note:</i> The fine elevation adjustment allows for +/- 25 degrees.</p>	
8	<p>Before leaving the installation, check that all hardware on the mount and antenna are fully tightened.</p>	<p><i>Note:</i> Remove the bottom drain plug from the antenna to allow for drainage of moisture buildup. Make sure that the top drain plug remains in the antenna and is secure.</p>
9	<p>End of Procedure.</p>	

4.5 Installing the BTR(s) Using a Single Mount Bracket

The following procedure covers the assembly of the Single Mount bracket and BTR to the antenna mast.

This procedure will require two technicians to perform.

Procedure 3 – Installing the BTR(s) Using a Single Mount Bracket (Page 1 of 3)		
Step	Action	Observation
1	<p>Install the mounting bracket to the back of the BTR using the five screws provided.</p>	<p>Refer to Figure 8.</p>
2	<p>Now place the 7/16th all thread bolts into the back of the BTR mounting brackets.</p> <p>Apply Antiseize to bolt threads.</p>	<p>Refer to Figure 9.</p>

Procedure 3 – Installing the BTR(s) Using a Single Mount Bracket (Page 2 of 3)		
Step	Action	Observation
3	<p>Ensure the bolts are hand tightened firmly.</p> <p><i>Note:</i> Do not use tools to tighten. The threads may be damaged.</p>	Refer to Figure 9.
4	<p>Slide the U-Brackets on the bolts so that they match the U-Bracket on the back of the BTR. The U-shaped cutouts should face each other. The mast will be placed between the U-shaped cutouts.</p>	Refer to Figure 10.
5	<p>Place the washers and the 7/16th nuts onto the bolts.</p> <p><i>Note:</i> Do not tighten the nuts all the way down; this is only temporary. These will be removed to place on the antenna mast and then re-applied.</p>	
6	The BTR is ready for installation.	
7	<p>Verify the Antenna Mast (pole) is secured before installation begins.</p> <p><i>Note:</i> It is the customer's responsibility to ensure the roof and antenna mast are structurally adequate to meet all local, state and federal codes under maximum wind loading conditions.</p>	
8	<p>Verify the proper directions at which the BTR(s) antenna will be facing, making sure the fin array (heat sink) is positioned away from external barriers to allow heat dissipation through natural convection and radiation.</p> <p><i>Note:</i> If there are objects in the way, check with the Program Manager before installing the BTR.</p>	Refer to the Engineering Package for Azimuth.
9	<p>Get into position for installing the BTR.</p> <p>Observe ISM and BWA Fall Safety for climbing and high rise work areas.</p> <p><i>Note:</i> Do not pull on the antenna at any time. Be very careful not to hit or drop the BTR. Hoisting should be done by two technicians.</p>	

Procedure 3 – Installing the BTR(s) Using a Single Mount Bracket (Page 3 of 3)		
Step	Action	Observation
10	Remove the U-shaped brackets, so that the BTR can be mounted to the mast. Apply Antiseize to the area where the nuts will be.	
11	Slide the U-shaped brackets onto the all-thread bolts, then slide a washer and nut onto each all-thread bolt. Tighten each nut until the BTR is secured to the mast.	BTR Mounted to the mast. Refer to Figure 10 for a picture of mounting brackets on the pole. <i>Note:</i> Remove the bottom drain plug from the antenna to allow for drainage of moisture buildup. Make sure that the top drain plug remains in the antenna and is secure.
12	Repeat step 1 through 11 for each BTR.	
13	End of Procedure.	

Figure 8 – Mounting Bracket on back of BTR

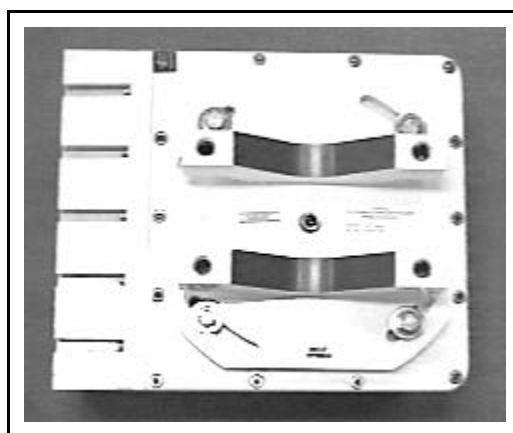


Figure 9 – Back of BTR with All thread bolts

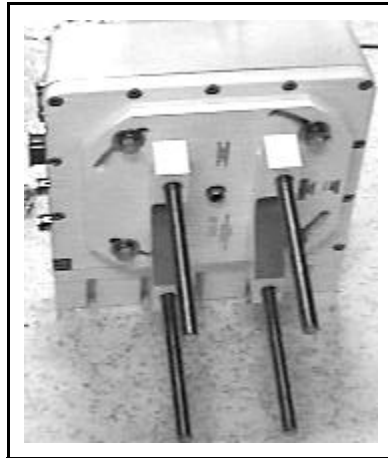


Figure 10 – U-Brackets

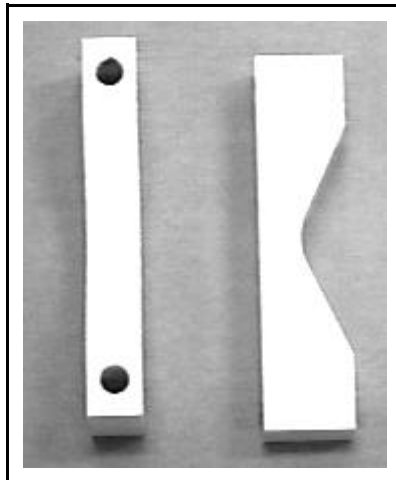
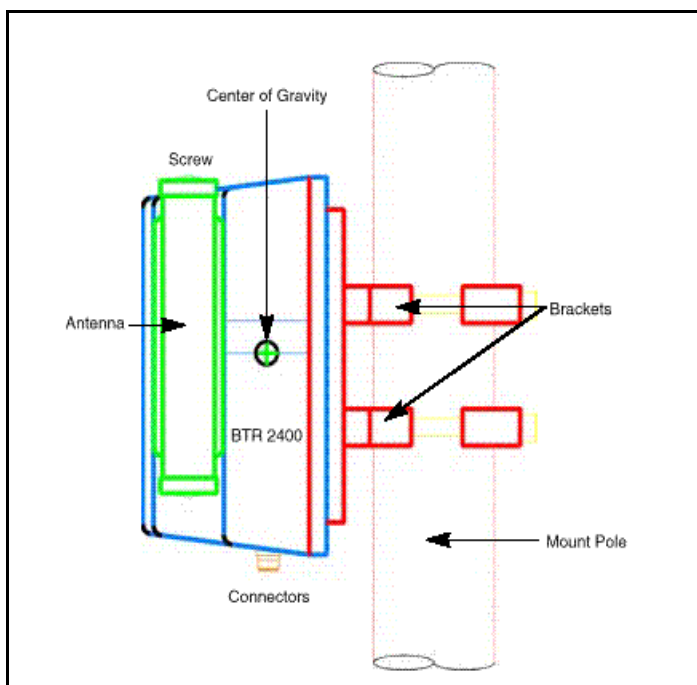
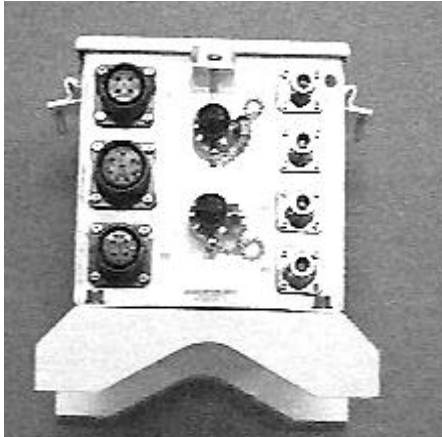



Figure 11 – Mounting BTR to the Antenna Mast



4.6 Install the RPE

This procedure will cover the installation of the RPE in a single BTR mount configuration..

Procedure 4 – Install the RPE (Page 1 of 2)		
Step	Action	Observation
1	<p>Attach RPE to the U-shape brackets with the four allen screws and lock washers.</p> <p><i>Note:</i> Check in the Engineering Package on placement of the RPE. The installation position may vary at each location.</p> <p><i>Note:</i> Be very careful not to hit the RPE connectors on anything. Hoisting/Installing should be done by two technicians.</p>	<p>Bottom of RPE.</p> 

Procedure 4 – Install the RPE (Page 2 of 2)		
Step	Action	Observation
2	<p>Put the RPE up to the mast, align the U-brackets and place the 5/16th Allen Head bolts through the back side of the U-bracket so that the bolts are supported by the bracket. Place the brackets up to the mast and proceed to install the RPE to the mast. Tighten the bolts down so that the RPE is secured in position on the mast.</p> <p><i>Note:</i> Because the mast may vary in size, there should be two lengths of bolts. Use the appropriate bolts for the size mast being used.</p>	<p>5/16th bolts:</p> 
3	End of Procedure.	


4.7 Installing the BTR(s) Using A Dual Mount Bracket.

The following procedure covers the assembly of the dual mount bracket and BTR(s) to the antenna mast.

This procedure will require two technicians to perform.

Procedure 5 – Installing the BTR(s) Using A Dual Mount Bracket (Page 1 of 3)		
Step	Action	Observation
1	<p>Install the U-brackets (P0887173) onto the back of the dual mount base assembly using the four 1/2" bolts, four 1/2" lock washers, and four 1/2" flat washers. Tighten bolts.</p> <p>Apply Antiseize.</p>	
2	<p>Screw two 1/2" by 6/14" long all threaded rods into each clamp.</p> <p>Apply Antiseize</p>	

Procedure 5 – Installing the BTR(s) Using A Dual Mount Bracket (Page 2 of 3)		
Step	Action	Observation
3	<p>The dual mount antenna bracket will need to be installed on the antenna mast before the RPE or the BTR(s) are installed to it. This will require two technicians to install.</p> <p><i>Note:</i> The dual mount antenna bracket weighs approximately 45 pounds. Be extremely careful not to drop it.</p>	
4	Carry the Dual Mount bracket and the Stabilizing Collar to the roof location where it will be installed.	
5	<p>Install the Stabilizing Collar to the antenna mast in order to provide support for the Dual Mount bracket, making sure it is secure.</p> <p>Apply Antiseize.</p>	
6	<p>Position the dual mount against the antenna mast with the all thread bolt straddling the pole. The dual mount bracket should be resting on the stabilizing collar. Place the saddle supports (P0890191) onto the all-thread bolts. Secure them with a flat washer, lock washer, and a hex head nut. Tighten them so that the dual mount is secure.</p> <p>Apply Antiseize where nuts will be tightened down to.</p> <p><i>Note:</i> Remember that two BTR(s) and a RPE will be mounted to the dual mount. Make sure the mount is secure before mounting the BTR(s) and the RPE.</p>	Dual mount antenna bracket is secured to the antenna mast.
7	Prepare the RPE and the BTR(s) that will be installed in the sectors.	

Procedure 5 – Installing the BTR(s) Using A Dual Mount Bracket (Page 3 of 3)		
Step	Action	Observation
8	<p>The Primary BTR will be installed to the left and outside (viewed from the front) of the dual mount. Place the top two screws and the center screw in and secure the BTR to the dual mount. Leave the bottom two screws out until told to install.</p> <p><i>Note:</i> Top and center screws are shorter than bottom screws.</p>	<p>The Primary BTR is installed to the left and outside the dual mount antenna bracket.</p> 
9	The RPE will be installed on the inside back panel of the dual mount.	
10	Place the RPE up to the back panel aligning the holes. Use the four screws to secure the RPE to the dual mount antenna bracket.	Refer to picture in step 8.
11	<p>The Redundant BTR will be installed to the right and inside (viewed from the front) of the dual mount. Place the top two screws and the center screw in and secure the BTR to the dual mount. Leave the bottom two screws out until told to install.</p> <p><i>Note:</i> Top and center screws are shorter than bottom screws.</p>	Refer to picture in step 8.
12	The handle assembly will now need to be installed.	
13	The handle assembly is mounted on the bottom side of the base mount. The left side of the handle mounts inside the base and the right side mounts on the outside of the base.	Refer to picture in step 8.
14	Align the two holes up on each side and secure the four screws for the handle assembly.	
15	Repeat this procedure for each dual mount base assembly being installed.	
16	End of Procedure.	

4.8 Alignment of BTR(s)

The line of sight alignment of the outdoor units is accomplished by aligning the BTR(s) to an azimuth and elevation that define RF coverage of that sector. The azimuth and elevation are located in the Engineering Package.

This alignment procedure can be done using either single or dual BTR mount configuration.

The following steps identify the procedure for aligning the BTR(s) to the proper azimuth that is stated in the Engineering Package. The fundamental aspect of this procedure is to align the BTR(s) using fixed reference points (i.e. CPE(s) or Landmarks) and their associated azimuth offset from the required pointing azimuth of the BTR(s). The required elevation/tilt angle will be set using an inclinometer.

Procedure 6 – Alignment of BTR(s) (Page 1 of 4)		
Step	Action	Observation
1	The alignment tool must first be put together. Steps 2 through 10 cover the assembly of the alignment tool.	
2	Attach the long threaded rod (H) into the side of the top bracket (A). The top bracket is the plate with the counter-sunk screw holes in the top.	Refer to Figure 12 & 13.
3	Hold the top bracket so that the threaded rod is facing to the right and the counter sunk holes are up. Attach the right side bracket (C) to the top bracket using two 6/32 X 5/8 allen head screws making sure the screws are flush with the top bracket when installed. The right side bracket should have the slots and the cut-down portion of the brackets facing away from you when it is installed onto the top bracket. You will also notice there is a straight mark engraved on the outside of the right bracket.	Refer to Figure 12 & 13.
4	Hold the top bracket so that the threaded rod is facing to the right. Attach the left side bracket (B) to the top bracket using two 6/32 X 5/8 allen head screws. The left side bracket should have the slots and the cut-down portion of the brackets facing away from you when it is installed onto the top bracket. There is no straight mark engraved on the outside of the left bracket.	Refer to Figure 12 & 13.

Procedure 6 – Alignment of BTR(s) (Page 2 of 4)		
Step	Action	Observation
5	Attach the tilt protractor (E) to the tilt/azimuth bar (F) with two 8/32 flat head screws. Hold the tilt/azimuth bar in your right hand so the engraved straight line is up and to your left. Place the tilt protractor (E) in your left hand so the number slots are facing towards the right. Using the flat head screws, secure the tile protractor to the end of the tilt/azimuth bar (F).	Refer to Figure 12 & 13.
6	Slide the tilt/azimuth bar (F) onto the threaded rod so that the tilt protractor is set flush against the right bracket (C). Secure the tilt/azimuth bar (F) with a wingnut and washer so that the 0 on the tilt protractor (E) is lined up with the engraved mark on the right bracket (C).	Refer to Figure 12 & 13.
7	Attach the azimuth protractor/scope platform (D) to the tilt/azimuth bar (F) with the protractor pointed to the engraved straight line on the tilt/azimuth bar (F). Secure the azimuth protractor/scope platform using the short 1/4-20 thumbscrew, wingnut and washer.	Refer to Figure 12 & 13.
8	The bottom support bracket (J) will now need to be attached to the right and left side brackets. Turn the alignment tool upside down, using the two small screws secure the support bracket on the bottom of the right and left side brackets.	
9	Set the BTR attachment bracket so that it is to the left and the azimuth protractor/scope platform to the right. Attach the riflescope on the scope mounts with the eyepiece towards you.	
10	Screw the long 1/4-20 thumbscrew into the threaded hole on the top bracket (A).	The alignment tool is now installed and ready to be used to align the BTR(s). Refer to Figure 12 & 13.
11	Loosen the BTR(s) tilt and azimuth adjustment so that it can be adjusted for tilt and azimuth settings.	

Procedure 6 – Alignment of BTR(s) (Page 3 of 4)		
Step	Action	Observation
12	Locate the "BTR Antenna Alignment Using Landmark" sheet within the Engineering Package. Preset the azimuth offset from 0 degrees on the alignment tool by rotating the scope plate to the left (if the azimuth offset is negative) or to the right (if the azimuth offset is positive) by the offset amount for the landmark that is being used.	<p>Azimuth is set.</p> <p>Note: Each increment on the azimuth plate is 1 degree.</p> <p>Note: Azimuth and tilt of the BTR is set by using the relative position of one or more landmarks (two are suggested, since two landmarks would not have common errors to the BTR).</p> <p>Refer to Figure 14.</p>
13	At the roof location, the alignment tool mounts to the back of the BTR.	
14	Slide the alignment tool over the heat sink so that it fits flush, then tighten the long thumbscrew so that it secures the alignment tool to the BTR.	Refer to Figure 15.
15	Adjust the BTR until the landmark point is in the center of the crosshairs of the scope.	
16	Now the Tilt will need to be set.	<p>Note: The proper BTR Tilt can be found in the Engineering Package.</p>
	<p>Note: The inclinometer has two scales on the device. The one on the left shows actual degrees, and the one on the right shows a percentage used in calculating distance to target. USE THE SCALE ON THE LEFT FOR BTR ALIGNMENT.</p>	
17	Place the inclinometer on the heat sink fins on the back of the BTR.	<p>Note: Do not place your eye up against the inclinometer. Look at the reading from 4 to 8 inches away from the inclinometers viewing window.</p>
	Take a reading with the inclinometer using the proper scale.	<p>Note: Line up the RED center indicator with the BLACK angle identifier in the viewing window of the inclinometer.</p>
18	Adjust the BTR as needed and snug the bolts on the BTR tilt adjustment clamps.	
19	Recheck the tilt, repeating steps 17 and 18.	
20	Tighten the BTR tilt and azimuth adjustment clamps.	

Procedure 6 – Alignment of BTR(s) (Page 4 of 4)		
Step	Action	Observation
21	Verify the landmark is still in the crosshairs. If it is not, redo steps 15 and 20.	
22	Loosen the azimuth and tilt adjustment on the alignment tool and rotate the scope to the center of the second selected CPE in the scope crosshairs.	
23	Tighten the tilt and azimuth adjustment bolts on the alignment tool.	
24	<p>Read the azimuth offset from 0 degrees to the second landmark (if available). If the measured azimuth offset matches the Engineering Package value, the alignment is complete.</p> <p><i>Note:</i> If they are not, then one or the other (or both) of the landmarks have bad survey data (either lat/long or building height or both). To determine the landmark with the bad data, select a third landmark and follow steps 15 thru 21. The two landmarks that agree must be considered as correct, since the odds of having a common data error at two different landmarks are very small. At this point, the landmark with bad data should have its tilt and azimuth offsets measured (steps 15 thru 21) and the results recorded on the offset data sheet and advise the RF Engineer of this. If two of the three selected landmarks do not agree with predicted offset from the BTR, then the RF Engineer should be contacted for a solution. The CPE with measured offsets that are different from the expected offsets must be highlighted for link budget corrections for the tilt and azimuth offsets.</p>	
25	Repeat this procedure as necessary for all BTRs.	
26	End of Procedure.	

Figure 12 – Alignment Tool Parts



Figure 13 – BTR Alignment Tool

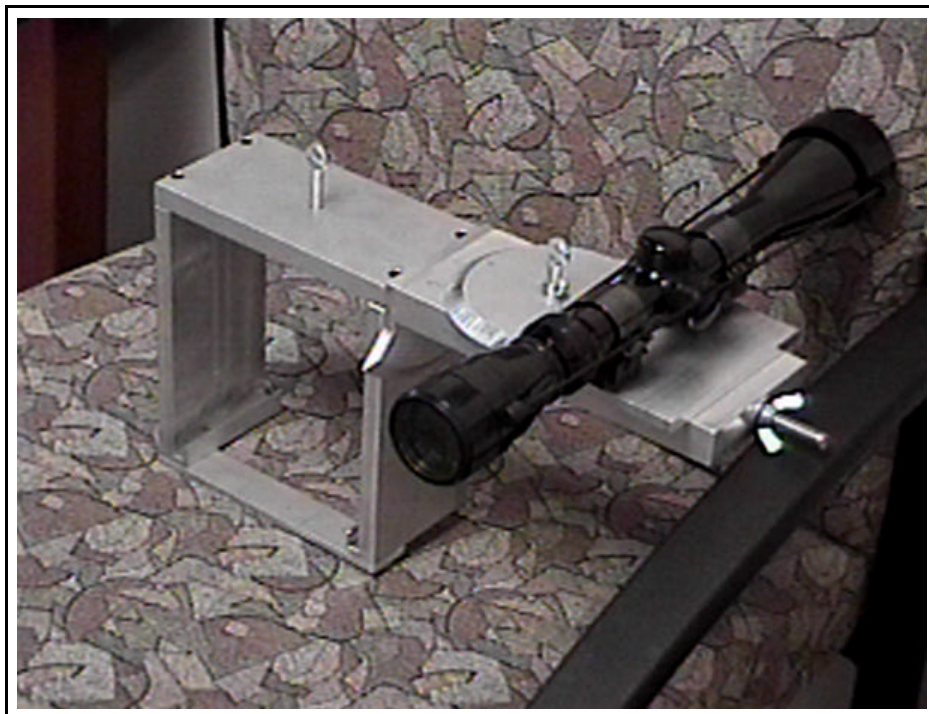


Figure 14 – Azimuth Plate

Example of the alignment tool set at a (-10) degree offset.

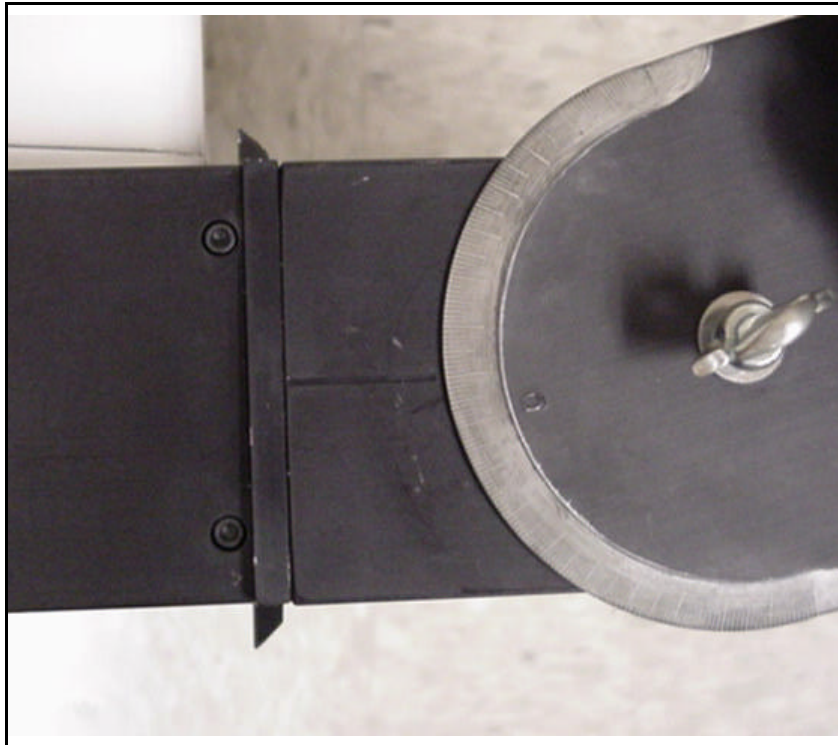
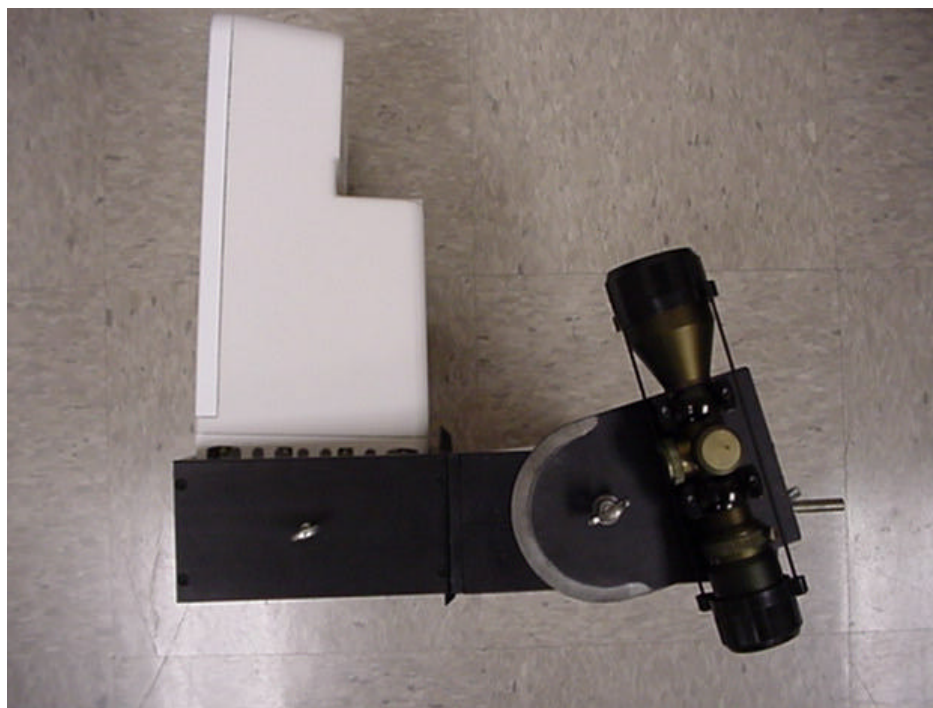


Figure 15 – Alignment Tool mounted to the BTR



5.0 References

There were no references used.

6.0 Appendices

Appendix A - Acronyms

BTR	Base Station Transceiver
BWA	Broadband Wireless Access
ESD	Electrostatic Sensitive Device
ETAS	Emergency Technical Assistance Services
ISM	Installation Safety Manual
JSIP	Job Start Information Package
NNE	Network Node Equipment
TAC	Technical Assistance Center

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