BWA - BTR Microwave Transceiver and RPE Installation

Installation Method - 08-0283

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NORTEL NETWORKS

Table of Contents

Illustrations

Tables

1.0 General Information

1.1 Description

Purpose: This method describes the handling and securing of the BTR Outdoor Microwave Transceiver. The BTR outdoor transceiver is a combined broadband transmitter and receiver deployed in Reunion's point-to-multipoint system.

Equipment: BTR basestation transceiver configured per customers requirements. (Transceiver is comprised of the following components: diplexer, power supply, mixers, dielectric resonance oscillator, isolator, bandpass filter, low noise amplifier, power amplifier, antenna)

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

RPE 9000 (Radio Power Extractor) The RPE 9000 is located close to the outdoor microwave radio. It provides 1:1 switching facility between the primary and the redundant microwave transceiver.

Application: This method is intended for initial installations.

Service Impact: None

1.2 Sequence

This is a stand-alone method. This method may be done in conjunction with Method 08-0289, "NNE Installation."

1.3 Reason for Reissue

Added information on how to use the BTR Alignment tool in section 4.6 procedure 3. (August 5, 1999)

Bringing the method to its final state. (Print All)

2.0 Material Requirements

2.1 Required Documents

Installation Safety Manual (ISM/IMO) - can be requested from the Regional Tool Facility.

2.2 Tools

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

Table 1 -Tools

U.S. Tools	Canadian Tools	WTSC Tools	Description
N/A	N/A	K001823	Wireless Installers Tool Kit
N/A	N/A	K002663	Nardalert Radiation Monitor
			6 inch crescent wrech
			Needle Nose Pliers
			Wire Cutters
			Wire Strippers
			# 0,1,2 Flat Tip Screw Drivers
			#0,1,2 Phillips Head Screw Drivers
			Slip-Joint Pliers
			7/16 Allen Head Wrench (11mm)
			5/16 Allen Head Wrench (8mm)
			3/16 Allen Head Wrench (4.5mm)
			3/32 Allen Head Wrench (2mm)
			1/2 inch socket with ratchet
			# 2 Phillips Head 90 Degree
			10’ Tape Measure
			LMR 400 Cable Stripper
			Battery Lug Crimper (Thomas & Betts)
			Magnetic Compass/ Inclinome-ter

2.3 Supplies

Lineman’s Bag

50’ Rope (optional)

First Aid Kit

(2) Cellular phones

N-Type (m) connectors

Electrical Tape

Rubber Tape

Black Tie Wraps 5, 10, 20"

Cable Labels

Heat Shrink Tubing

2.4 Customer Supplied Equipment

Secured Antenna Mast

Mast Ground

(4) Coax Cables for each sector ran from digital equipment to roof.

(1) 4 pair 8 pin cable for each sector ran from digital equipment to roof.

2.5 Emergency Contacts

For U.S. Wireless Market:

- Nortel Emergency Technical Assistance Service (ETAS) 972-BWA-ETAS (972-292-3827)

- Nortel Installation Technical Assistance Service (ITAS) - US - 972-292-3827

3.0 Precautions and Preparations

3.1 Precautions

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

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

On arrival at site, carefully move the equipment and materials to the installation area. Unpack the equipment in a dry area and ensure 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 your next level of support.

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

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

All company tools, test equipment, etc. is to be kept with the engineer responsible at all times except when securely locked in equipment rooms or transportation vehicle.

Locate the main power shut-off switch controlling the equipment you are working on. This important in the event of an accident, so you can quickly cut the power.

SHOCK: Disconnect all power when working on power supplies.

In an emergency (electrocution):

- shut the power off
- remove the person from equipment
- start CPR

- have someone call for emergency medical assistance

CAUTION/WARNING
Do Not Move in front of the antenna when the BTR is running.

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.

Prior to the installation of any equipment, inventory all materials by using the bill of materials (BOM).

1. Check each package for any sign of physical damage. If damage is visible, immediately report to your next level of support.
2. Open packing slip and make a copy of all inventory forms.
3. Check all contents against the order forms and packing slips to ensure that all components are received. Make notes of any missing parts or equipment, notify your next level of support with any deficiencies.
4. Know exactly where you are going to place the equipment, before removing them from the package.

   Carefully remove the equipment from the package, closely inspect all components for obvious signs of damage. If damage is visible, immediately report to your next level of support

4.0 Procedure

4.1 Overview

This method covers the procedures required for the handling and securing of the BTR Outdoor Microwave Transceiver and the RPE.

- Unpack equipment and verify that all the parts involved are included and in good condition.
- Observe installation site (roof location)
- Prepare BTR for installation (Mount antenna to radio)
- Mount the BTR to the Antenna Mast
- Mount the RPE to the Antenna Mast
- Mount the BTR amplifier assembly patch kit
- Align BTR

4.2 Unpacking the BTR

1. Check each package for any sign of physical damage. If damage is visible, immediately report to your next level of support.
2. Open packing slip and make a copy of all inventory forms.
3. 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.
4. Know exactly where you are going to place the equipment, before removing them from the package.
5. Carefully remove the equipment from the package, closely inspect all components for obvious signs of damage. If damage is visible, immediately report to the Project Manager
6. Record all serial numbers, PEC Codes, and location of where these components will be placed. EXAMPLE: Sector A, Primary BTR, Serial Number NNTM830012345, PEC Code NTVG11AB 02.,

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

	**NOTICE: The installation of the BTR must be done in a controlled environment.**

4.3 Observe Installation Site

	**CAUTION/WARNING** The BTR will be installed on the roof or side of a building. It is important to observe were 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 your surroundings for any hazards. It is important to keep a safe work environment, remember Safety first

4.4 Preparing the BTR for Installation

This procedure will cover the steps involved in preparing the BTR for installation.

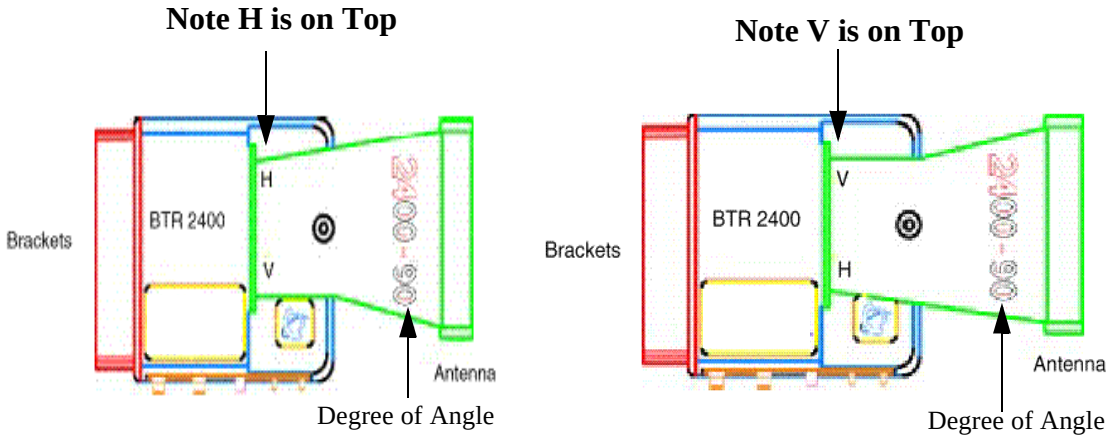
Procedure 1 - Prepare BTR for Installation

Step	Action	Observation
1	There are (2) BTR's per sector, one is the *Primary* and the other is the *Redundant* BTR. Mount the antenna's to the BTR's before you install the BTR's to the mast. The next steps will cover the procedure of installing the antenna.  Because it is important that you install the antenna's right, it should be done in an controlled environment on stable ground, not hanging from the mast.	

Procedure 1 - Prepare BTR for Installation (Cont'd)

Step	Action	Observation
2	Both BTR's must have the same antenna angle. Verify the antenna angle (15,30,45,60, or 90 degrees) is the proper angle designed for your site. It is engraved on the side of the antenna. If the angle does not match the designed site configuration found in the engineering package, do not proceed with this procedure. Contact the Project Manager. Note that the above listed angles are the only configurations supported at this time.	***Note:*** Refer to Figure 1.
3	Both the *Primary* and the *Redundant* BTR's will have the same TX polarity. Verify in the engineering package the TX polarity for each sector. Once you have verified the TX polarity make sure you install the antenna with that polarity on the top. You can see the polarity engraved on the antenna.	Refer to Figure 1 to see the polarity engraved on the antenna. H is for Horizontal and V is for Vertical. ***Note:*** Polarity reversal is accomplished by rotating the antenna 180 degrees.

Figure 1 - BTR Antenna Polarity

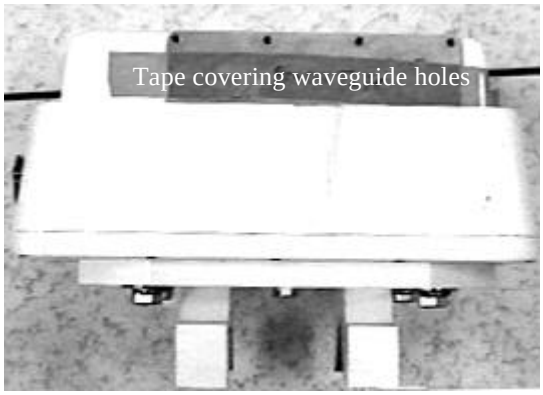


****To change polarity you must flip antenna 180 degrees****

Procedure 1 - Prepare BTR for Installation (Cont'd)

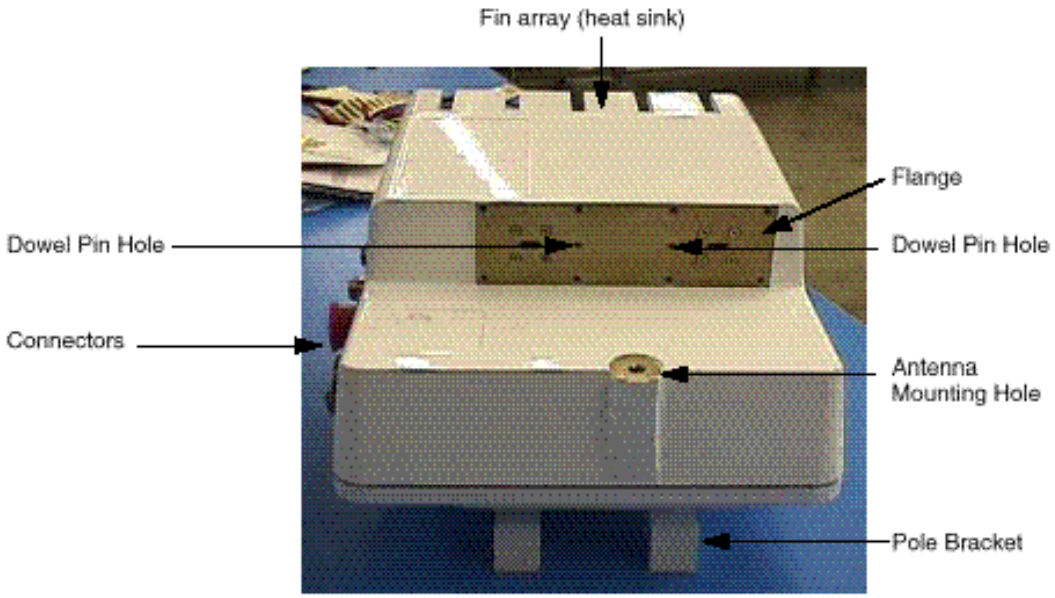
Step	Action	Observation
4	The BTR will have tape covering the waveguide holes so that nothing can get inside the radio. This tape will need to be removed before installing the antenna. ***Note:*** Place the BTR on solid ground to install the antenna.	Refer to Figure 2 ***Notice:*** Do Not Remove Tape until your ready to install antenna. Do not let any debris enter in the waveguide holes.

Figure 2 - Tape Covering Flange



5	Once tape is removed, place the antenna so that it fits into the flange on the BTR.	Refer to Figure 3 for flange. Refer to Figure 4 for antenna fitting flush.

Figure 3 - Antenna Placement on the BTR2400



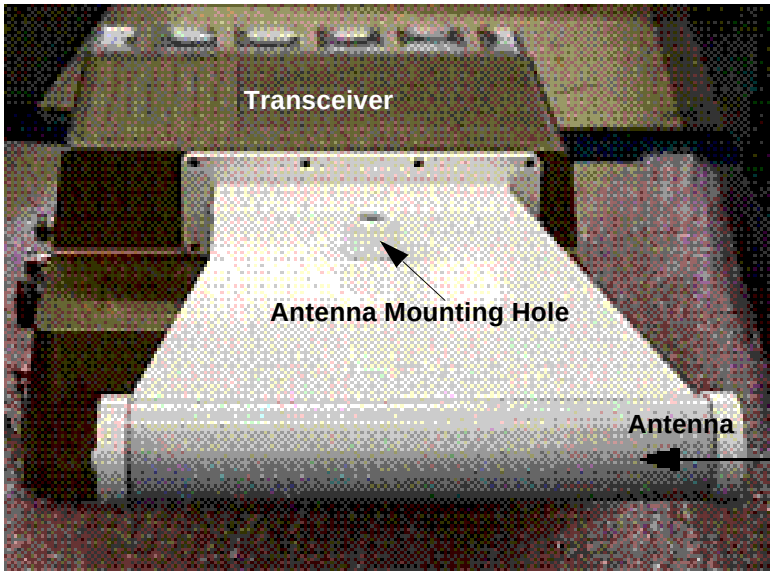
Procedure 1 - Prepare BTR for Installation (Cont'd)

Step	Action	Observation
6	The bottom of the Antenna fits flush to the BTR.	Refer to Figure 4 ***Notice:*** Do Not Pull on the O Ring Seal. It is attached to the antenna.

Figure 4 - Antenna bottom

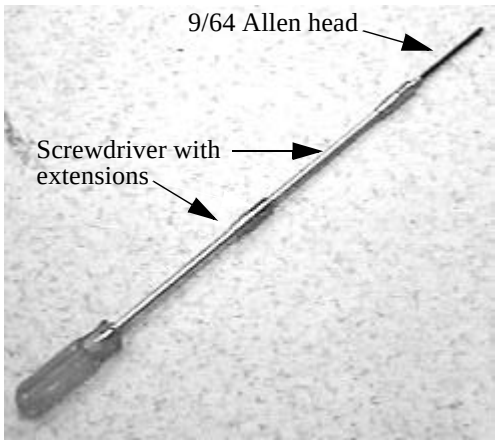
7	Carefully place the RFC antenna's flanged surface against the BTR waveguide mounting surface. Be sure to observe RFC antenna polarity.	Refer to Figure 5 The antenna is in position to be secured to the BTR.

Figure 5 - BTR with RFC antenna in position for mounting

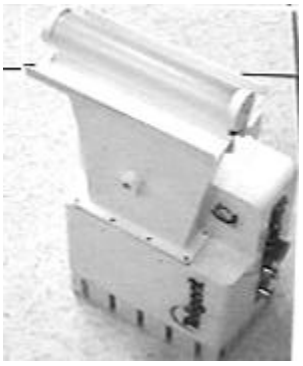
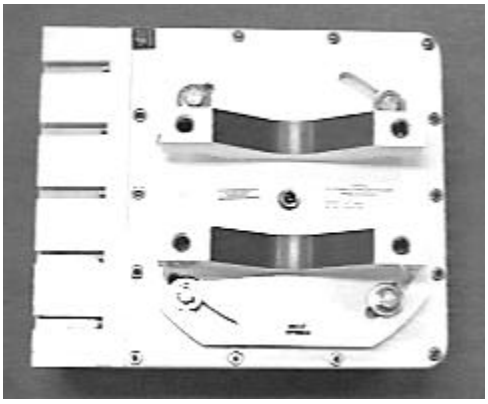


8	There will be (8) 9/64 allen head screws and (8) washers used to attach the antenna to the BTR.	Refer to Figure 6

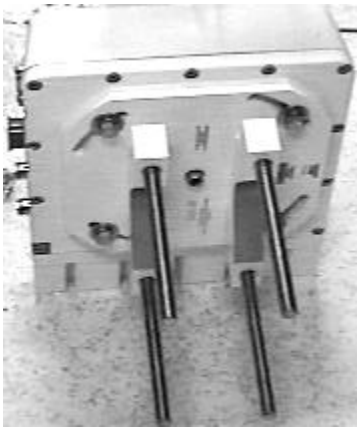
Figure 6 - 9/64 Allen head screws and washers

Procedure 1 - Prepare BTR for Installation (Cont'd)		
Step	**Action**	**Observation**
9	To mount the antenna to the BTR you'll need to use a 9/64 Allen head screwdriver with extensions.	Refer to Figure 7 The Allen head screwdriver should be about one foot long.
Figure 7 - Screwdriver with extensions  		
10	Insert each screw and loosely tighten until all screws are placed into the BTR. Then tighten each screw evenly until all the screws are tight.	The antenna is now secured to the BTR.
11	Once the antenna is mounted, verify that there are no gaps between the antenna and the BTR. ***Note:*** (If there are any gaps you need to take the antenna back off and go back to step 6.)	
12	Using the 1/2 inch bolt, lock washer and washer, place the bolt into the mounting hole on the side of the antenna.	
13	Now the antenna should fit flush and be secured to the BTR.	
14	Ensure that the RF reflectors are mounted parallel to the cylinder at the end of the antenna. ***Note:*** These RF reflectors may come assembled on the antenna from the factory. Ensure that it is in a parallel position to the cylinder.	Refer to Figure 8

Procedure 1 - Prepare BTR for Installation (Cont'd)

Step	Action	Observation
Figure 8 - The RF reflector is mounted parallel to the cylinder on the end of the antenna. 		
15	Now place the 7/16th's all thread bolts into the back of the BTR mounting brackets.	Refer to Figure 9 for bolts. Refer to Figure 10 for Back of BTR.
Figure 9 - Four 7/16th's All thread bolts 		
Figure 10 - 4 holes on the back of BTR 		
16	Make sure the bolts are hand tightened firmly. ***Note:*** Do not use tools to tighten. The threads may be damaged.	Refer to Figure 11 for bolts installed.

Procedure 1 - Prepare BTR for Installation (Cont'd)

Step	Action	Observation
Figure 11 - Back of BTR with All thread bolts. 		
17	Slide the U-Bracket on the bolts so the 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.	Refer to Figure 12 for U-Brackets
Figure 12 - U-Brackets 		
18	Place the washers and the 7/16th's nuts onto the bolts. ***Note:*** 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.	Washers and Nuts  

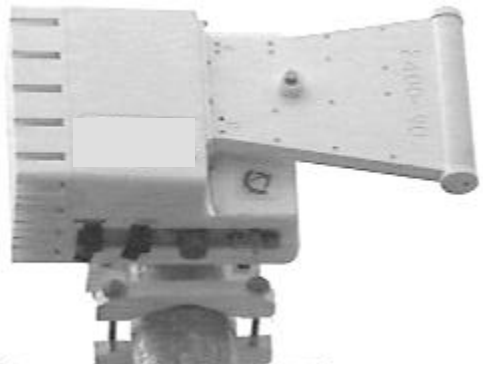
Procedure 1 - Prepare BTR for Installation (Cont'd)		
Step	**Action**	**Observation**
19	The BTR should now be ready for installation.	
20	End of Procedure	

4.5 Mounting the BTR to the Antenna Mast Using a Single Mount

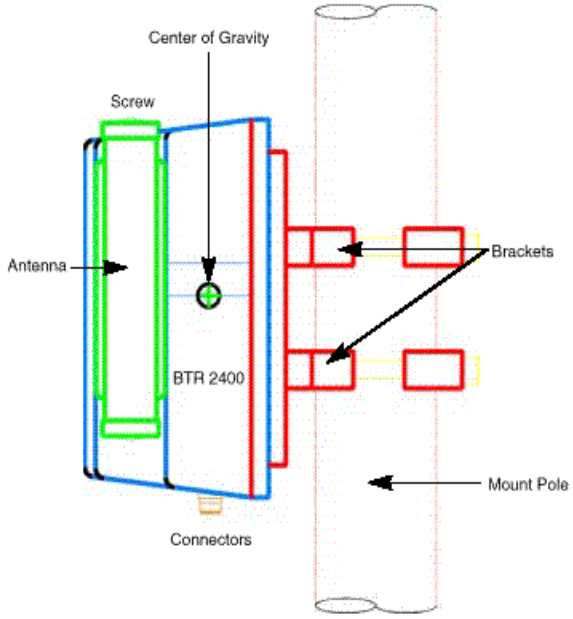
Use this procedure if the single mount is being used to install the BTR's. Goto procedure 3 if the dual mount is being used to install the BTR's.

NOTICE TECHNICAN: 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 Project Manager before you install. There are spacing measurements given in the engineering package for mounting the BTR's. YOU MUST USE THEM!!

Procedure 2 - Mounting the BTR to the Antenna Mast Using a Single Mount		
Step	**Action**	**Observation**
1	Verify that the Antenna Mast (pole) is secured before installation begins. ***Note:*** 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.	
2	Verify the proper directions at which the BTR's antenna will be facing. Install the BTR's so that the fin array (heat sink) is positioned away from external barriers to allow heat dissipation through natural convection and radiation. ***Note:*** If there are objects in the way, check with the Project Manager before installing the BTR.	This information should be located in the engineering package.

Procedure 2 - Mounting the BTR to the Antenna Mast Using a Single Mount		
Step	**Action**	**Observation**
3	Put yourself into position for installing the Primary BTR (Climb latter, mast...etc). **NOTICE:** Always have your partner there to observe your climb, Safety is important. Once you're in position, make sure you're secured to the mast.	
4	Remove the U-shaped brackets, so that the BTR can be mounted to the mast.	
5	Using a 7/16th wrench and ratchet/socket, mount the *Primary* BTR so that it flush with the top of the antenna mast. Slide the U-shaped brackets onto the all thread bolts, then slide a washer and nut on each all thread bolt. Tighten each nut firmly until the BTR is secure to the mast. **NOTICE:** Do not pull on the antenna at any time. Be very careful not to hit or drop the BTR on anything. Hoisting should be done with the help of your partner for the BTR is HEAVY.	BTR Mounted to the mast.  Refer to Figure 13 for a picture of mounting brackets on the pole.

Procedure 2 - Mounting the BTR to the Antenna Mast Using a Single Mount		
Step	**Action**	**Observation**
Figure 13 - Mounting the BTR to the Antenna Mast		
6	Repeat step 2 through 6 for each BTR	
7	End of Procedure	



4.6 Install the BTR(s) Using the Dual Mount

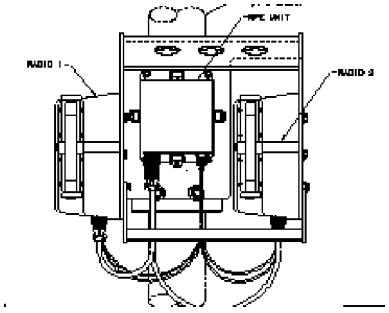
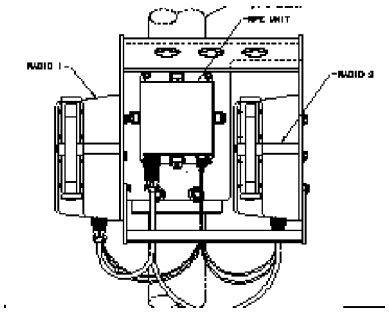
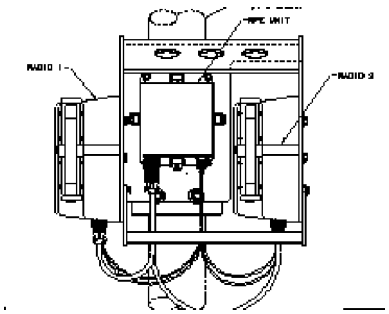
Perform the following procedure if the dual mount is being used to install the BTR's.

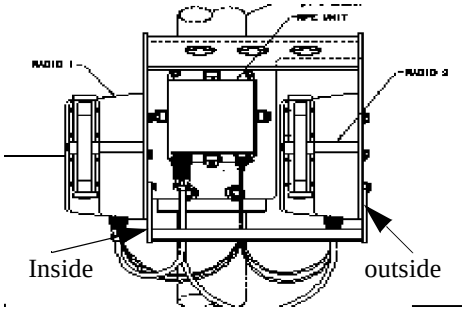
The new BTR(s) should be matched up as closely as possible to the current BTR(s) to minimize RF changes. For any questions check with RF Engineering for the best match of BTR(s).

This procedure will require two technician to perform.

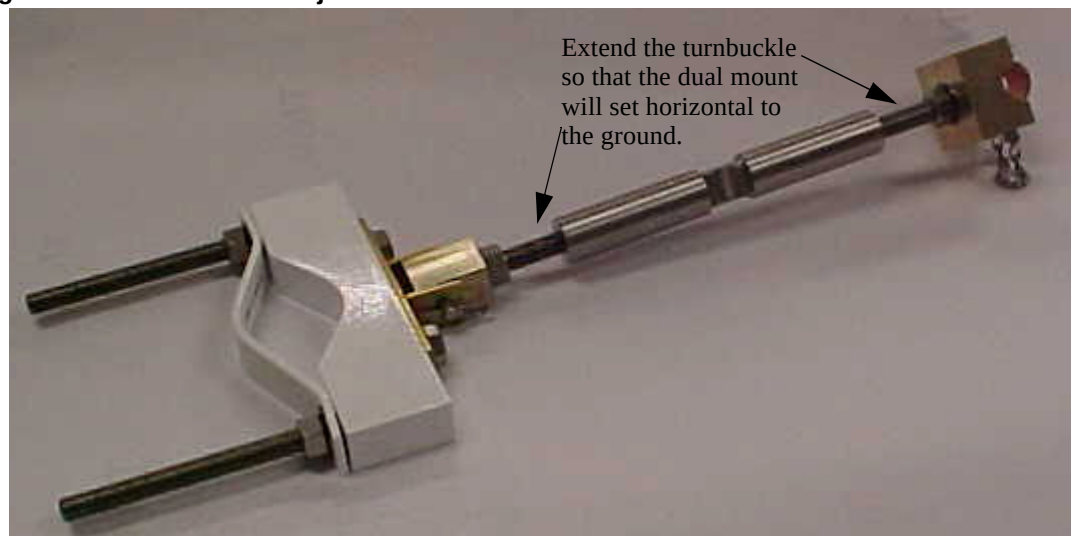
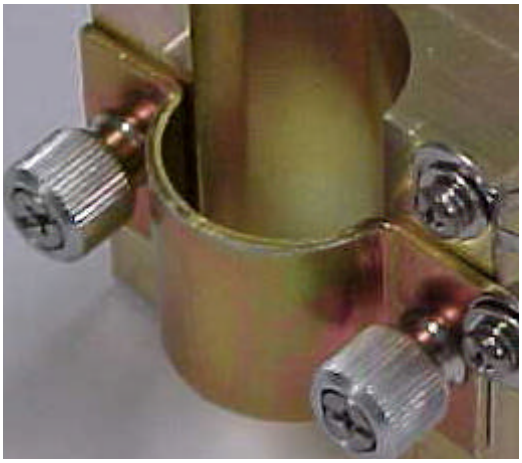
Procedure 3 - Install the BTR(s) Using the Dual Mount

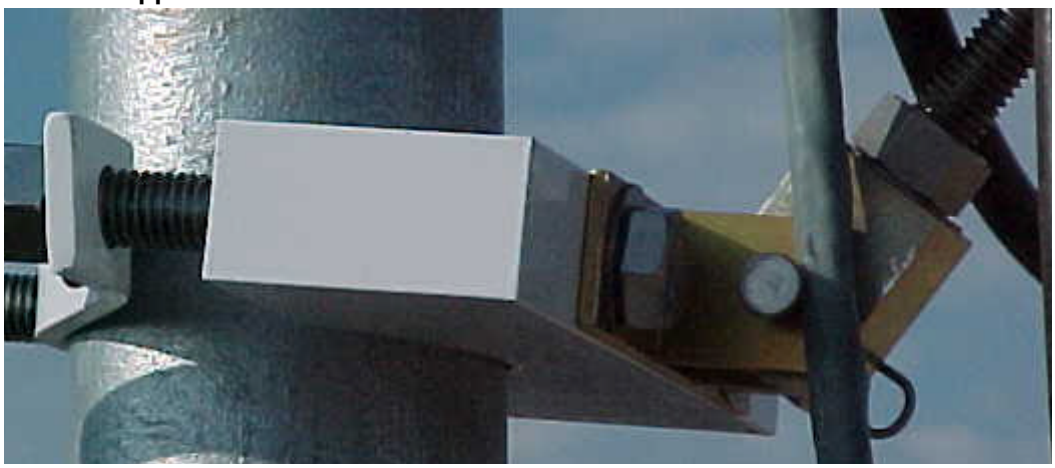
Step	Action	Observation
1	In order to install the BTR(s) to the dual mount antenna chassis. The mounting bracket on the back of the new BTR(s) will need to be removed.	
2	Remove the (5) screw holding the bracket onto the BTR and remove the bracket from the BTR.	
3	Place the screw back into the holes until the BTR(s) are ready to install on the dual mount.	
4	Repeat steps 2 and 3 until all the new BTR(s) have the bracket remove from the back.	
5	In order to install the RPE(s) to the dual mount antenna chassis. The mounting bracket on the back of the RPE(s) will need to be removed.	
6	Remove the (4) screw holding the brackets onto the RPE and remove the bracket from the RPE.	
7	Place the screw back into the holes until the RPE(s) are ready to install on the dual mount.	
8	Place the RPE so that the connectors will not get dust or dirt inside them. ***Note:*** Do not set the RPE on the connectors.	
9	Install the stabilizing collar to the antenna mast. Making sure it is secure because all the weight of the BTR's and RPE will be resting on this collar.	
10	Install the dual mount to the antenna mast above the stabilizing collar. ***Note:*** Remember that (2) 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.	Dual mount antenna bracket is secured to the antenna mast.
11	Find the RPE and the BTR(s) that will be installed for sector A then (B, C, and/or D).	
12	The RPE will need to be installed on the inside back panel of the dual mount.	
13	Remove the (4) screws from the RPE and place the RPE upto the back panel aligning the holes.	

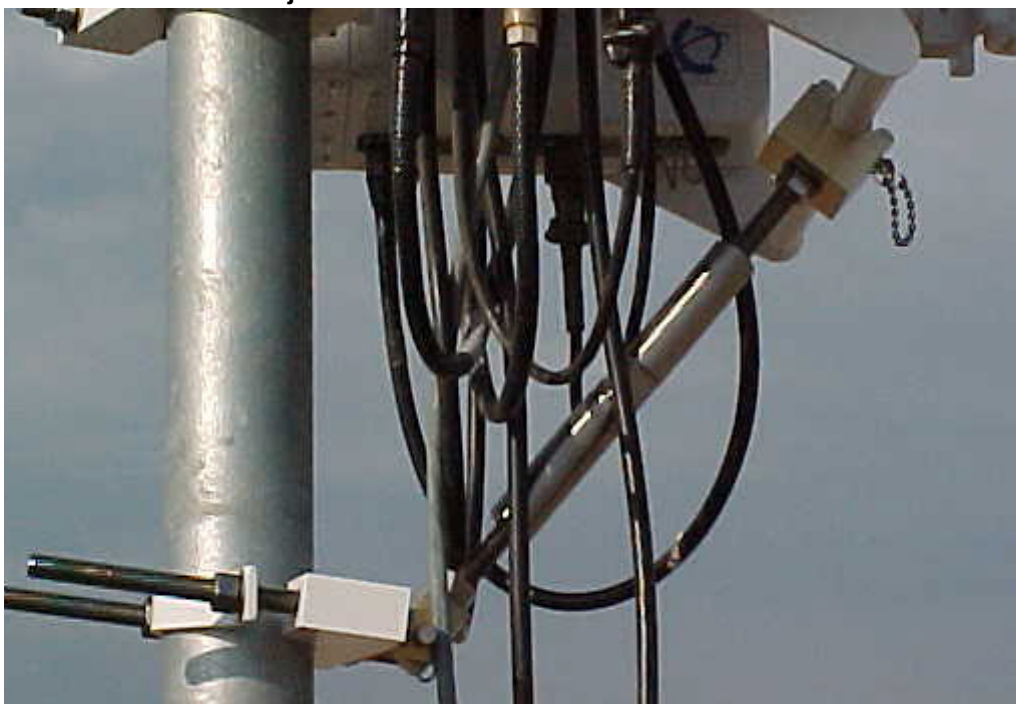
Procedure 3 - Install the BTR(s) Using the Dual Mount		
Step	**Action**	**Observation**
14	Place the (4) screws into the holes and secure RPE to the dual mount antenna bracket.	Picture showing the RPE installed at the back of the dual mount antenna bracket. 
15	The Primary BTR will be installed to the left and outside (as you look from the front of the dual mount) of the dual mount. Place the top (2) screws and the center screw in and secure the BTR to the dual mount. Leave the bottom (2) screws out until told to install.	Picture showing the Primary BTR installed to the left and outside the dual mount antenna bracket. 
16	The Redundant BTR will be installed to the right and inside (as you look from the front of the dual mount) of the dual mount. Place the top (2) screws and the center screw in and secure the BTR to the dual mount. Leave the bottom (2) screws out until told to install.	Picture showing the Redundant BTR installed to the right and inside the dual mount antenna bracket. 
17	The handle assembly will now need to be installed.	

Procedure 3 - Install the BTR(s) Using the Dual Mount		
Step	**Action**	**Observation**
18	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.	Picture showing the handle installed to the base. 
19	Align the (2) holes up on each side and secure the (4) screws for the handle assembly.	
20	Remove the center screw on the outside of the dual mount Redundant BTR. Apply a very thin coat of “No Ox” to the 6 AWG grounding lug and around the center hole. Install the grounding lug to the outside of the dual mount base assembly by placing the screw through the lug and securing the screw into the center hole.	
21	Apply a very thin coat of “No Ox” to the other end ground lug and ground bus bar. Install the ground wire to a ground bus bar.	
22	The vertical fine adjustment tool will now need to be put together. (Refer to Figure 14)	
23	Remove the hairpin and pin from the turnbuckle arm.	
24	Slide the end of the turnbuckle arm into the slot on the support bracket. Insert the pin into the hole and slide the hairpin into the pin in order to secure it.	
25	Place the all thread bolts into the support bracket until tight.	
26	Extend the turnbuckle so that it will allow the dual mount to set perfectly horizontal to the ground. Extended on both side both sides of the turnbuckle equally. (Refer to Figure 14)	

Procedure 3 - Install the BTR(s) Using the Dual Mount

Step	Action	Observation
	Figure 14 - Vertical Fine Adjustment Tool 	
27	Remove the thumb screws from the turnbuckle arm.	Thumb screws on the turnbuckle arm 
28	Place the U channel against the dual mount adjustment arm. Place the other side of the U channel over the adjustment arm and tighten down the thumb screws in order to secure that side to the dual mount. (Refer to Figure 15)	

Procedure 3 - Install the BTR(s) Using the Dual Mount		
Step	**Action**	**Observation**
Figure 15 - U channel secure to the Dual Mount Alignment Arm 		
29	Place the support bracket against the antenna mast and slide the U-bracket onto the all thread bolts. Using the a flat washer and nut secure the support bracket to the antenna mast. Make sure that this can support the weight of the dual mount once the radios are loosen. (Refer to Figure 16)	
Figure 16 - Support Bracket attached to the Antenna Mast 		
30	The Vertical Fine Adjustment tool should look like figure 17 once it is put together and installed on the antenna mast.	

Procedure 3 - Install the BTR(s) Using the Dual Mount		
Step	**Action**	**Observation**
Figure 17 - Vertical Fine Adjustment Tool Mounted to the Antenna Mast/Dual Mount 		
31	Loosen the bolts on the back of the BTR's so that the Vertical Alignment can be done. In order to adjust the vertical tilt up or down turn the turn-buckle in order to do so.	
32	The dual mount antenna assembly will now need to be aligned.	
33	End of Procedure.	

4.7 Alignment of BTR's Using the Alignment Tool

The alignment of an LMDS system is accomplished by aligning the BTR within a sector to an azimuth and elevation that defines RF coverage of that sector.

This alignment procedure can be done using either BTR mount.

Note: In the event this is an initial installation and there are no CPE (CTR's mounted) location. A technician will need to go 2 or more engineered CPE locations. Once there the technician will need to validate that there is an antenna mast to mount the CTR to. Then

the technician will need to place a white paper plate or balloon on that mast in order to align the BTR for that sector.

Procedure 4 - Alignment of BTR's Using the Alignment Tool		
Step	**Action**	**Observation**
1	The alignment tool must first be put together. Steps 2 through 9 cover the installation 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. (Figure 15 & 16)	
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 (2) 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. (Figure 15 & 16)	
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 (2) 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. (Figure 15 & 16)	
5	Attach the tilt protractor (E) to the tilt/azimuth bar (F) with (2) 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). (Figure 15 & 16)	

Procedure 4 - Alignment of BTR's Using the Alignment Tool (Cont'd)		
Step	**Action**	**Observation**
6	Slide the tilt/azimuth bar (F) on to the threaded rod so that the tilt protractor is sets 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 the the engraved mark on the right bracket (C). (Figure 15 & 16)	
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 thumb-screw, wingnut and washer. (Figure 14 & 15)	
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 (2) 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). (Figure 14 & 15)	The alignment tool is now installed and ready to be used to align the BTR's.
11	At the roof location the alignment tool mounts to the back of the BTR.	
12	Slide the alignment tool over the heat sink so that it fits flush, then tighten the long thumbscrew so that is secures the alignment tool to the BTR.	
13	**Infomation Note:** Azimuth and tilt of the BTR is set by using the relative position of one or more CPE's (two are suggested, since two units would not have common errors if we have bad survey data) to the BTR.	
14	Loosen the BTR's tilt and azimuth adjustment so that it can be adjusted for tilt and azimuth set-tings.	
15	Using the Engineering package look at the offset data sheet for the first CPE. Preset the azimuth and tilt offset for that CPE (pay attention to the sign of the offset).	

Procedure 4 - Alignment of BTR's Using the Alignment Tool (Cont'd)		
Step	**Action**	**Observation**
16	Adjust the BTR until the selected CPE is in the center of the crosshairs of the scope.	
17	Tighten the BTR tilt and azimuth adjustment clamps.	
18	Verify that the CPE is still in the crosshairs. If it is not redo steps 16 and 17.	
19	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.	
20	Tighten the tilt and azimuth adjustment bolts on the alignment tool.	
21	Read the azimuth and tile offset to the second CPE. If the measured tilt and azimuth offset is the same as predicted (+/- 0.5 degree) for both CPE's the setting of the BTR is considered GOOD. ***Note:*** If they are not, then one or the other (or both) of the CPE's have bad survey data (either lat/long or building height or both). To determine the CPE with the bad data, select a third CPE and follow steps 19 thru 21. The two CPE's that agree must be considered as correct, since the odds of having a common data error at two different CPE's are very small. At this point, the CPE with bad data should have its tilt and azimuth offsets measured (steps 19 thru 21) and the results recorded on the offset data sheet and advise the RF Engineer of this. If two of the three selected CPE's do not agree with predicted offset from the BTR, then the RF Engineer should be contacted for a solution. Those CPE with measured offsets that are different from the expected offsets must be highlighted for link budget corrections for the tilt and azimuth offsets.	

Procedure 4 - Alignment of BTR's Using the Alignment Tool (Cont'd)		
Step	**Action**	**Observation**
22	***Note:*** The alignment tool can also determine the initial setting of the BTR tilt or it can check an existing tilt setting of the BTR. To initially set the BTR tilt, preset the desired tilt angle using the offset protractor and adjust the BTR so that the scope platform is level. The BTR is now tilted (up or down) the required amount. To check an existing tilt, move the scope platform unitl it is level. Read the existing tilt from the tilt protractor.	
23	Repeat this procedure as necessary for all BTR's.	
24	End of Procedure.	

Figure 18 - Alignment Tool Parts

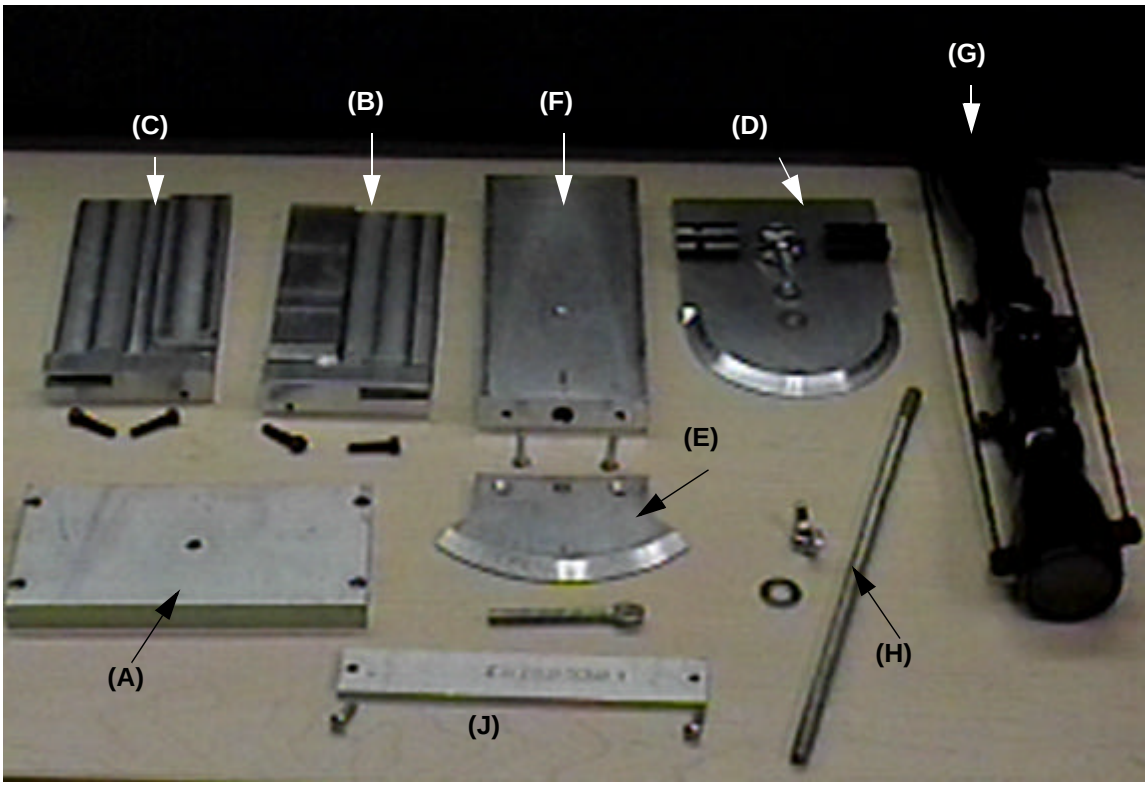


Figure 19 - BTR Alignment Tool Final Assembly

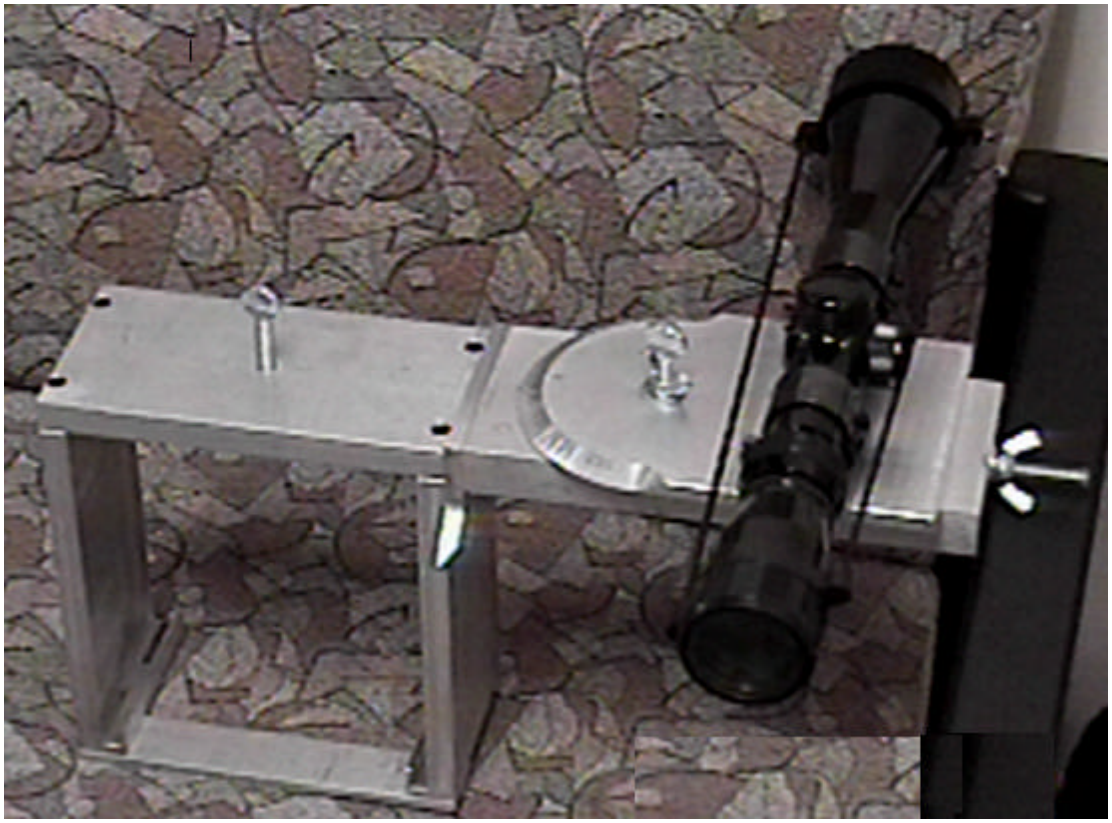
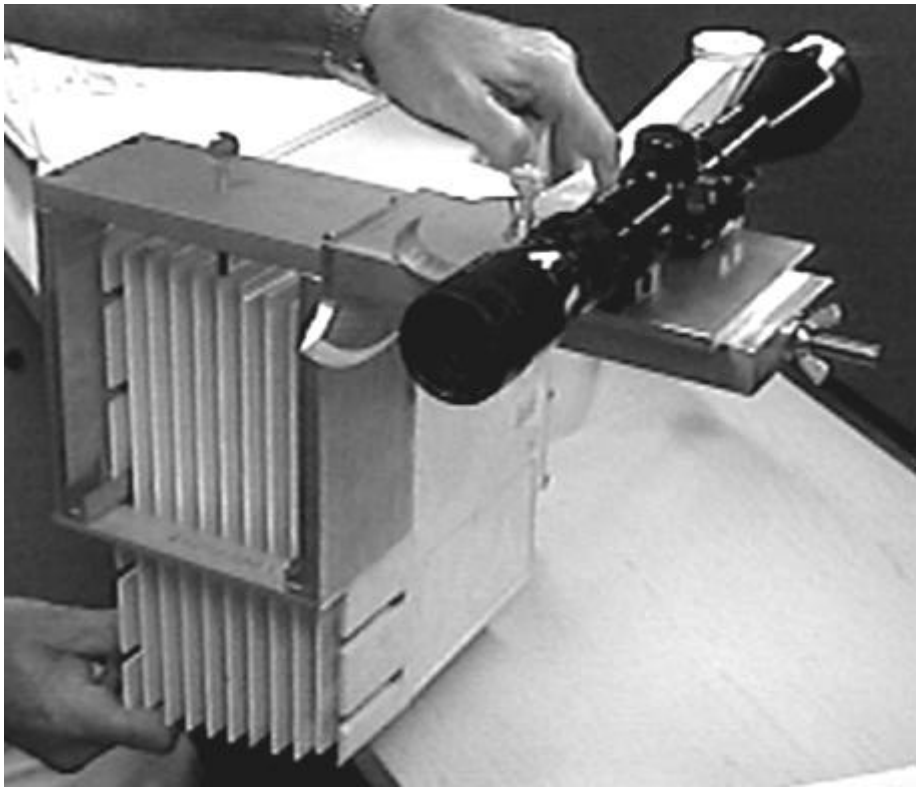


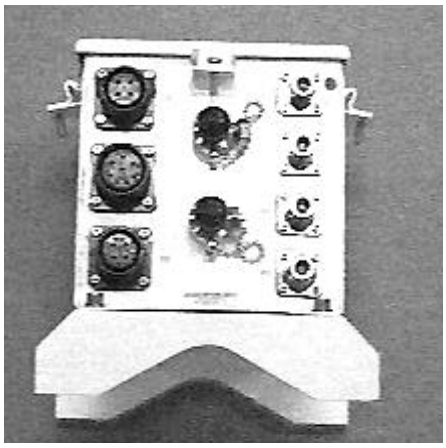
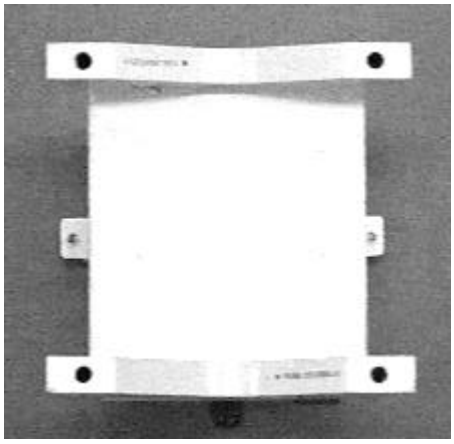
Figure 20 - BTR Alignment Tool Mounted on the BTR

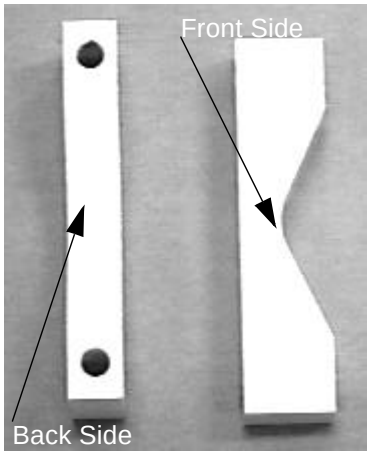
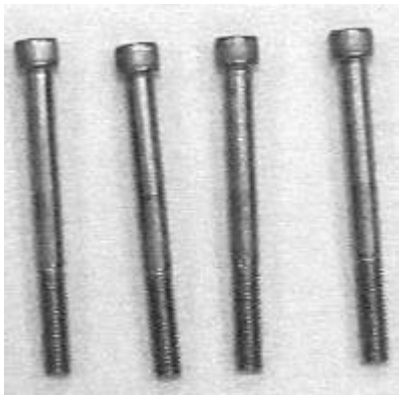


4.8 Install the RPE

This procedure will cover the installation of the RPE. This procedure

will need to be done if a single mount is beind used for the BTR's.

Procedure 5 - Install the RPE		
Step	**Action**	**Observation**
1	The next step is to mount the RPE chassis with the connectors facing down. Special Note: Check in the engineering package on placement of the RPE. The installation position may vary at each location.	Bottom of RPE 9000. 
2	This is the back side of the RPE that mounts to the antenna mast. The connectors must be facing the ground so that water will not collect inside. Place this side against the mast.	Back side of RPE 

Procedure 5 - Install the RPE (Cont'd)		
Step	**Action**	**Observation**
3	These are the U-brackets that hold the RPE on the other side of the antenna mast.	U-brackets 
4	Using the 5/16th Allen Head bolts. Place these 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 antenna mast. Tighten the bolts down so that the RPE is secured in position on the mast. ***Note:*** Because the antenna mast may vary in size, there should be two lengths of bolts. Use the appropriate bolts for the size mast being used.	5/16th bolts 
5	End of Procedure	

Note: Use the engineering package for all cross references of parts used.

5.0 Reference

Document	Number	Title
NTP	411-1333-200	BTR Outdoor Microwave Transceiver Installation and Operating Guide

6.0 Appendices

Appendix A - Acronyms

BTR	Base Station Transceiver
BWA	Broadband Wireless Access
CPR	Cardio Pulmonary Resuscitation
CTR	Customer Transceiver
DSS	Digital System Supervisor
ESD	Electrostatic Discharge
HP	Hewlett Packard
ISM	Installation Safety Manual
QAM	Quadrature Amplitude Modulation
RFC	Radio Frequency Cone Antenna
RPE	Radio Power Extractor
RSM	Redundancy Switching Matrix

Last Page