
BWA - Customer Premise Equipment Installation

Installation Method – 08-0292

September 22, 2000

Issue Number: 3.1

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1.0 General Information

1.1 Description

Purpose: This method covers the procedures required for the installation of the Reunion Customer Premise Equipment (CPE).

Equipment: The CPE contains an indoor unit, the Network Interface Unit (NIU), and an outdoor unit, the Customer Transceiver (CTR). The NIU provides E1/T1 and 10 Base T interfaces to the Reunion System. The CTR provides the up and down conversion of IF and RF signals for the CPE site.

Application: This method is intended for initial installations and extension installations.

Service Impact: None.

1.2 Sequence

This is a stand-alone method.

1.3 Reason for Reissue

This method was edited and renewed. Method 08-0282, "CTR 2400 Installation" and Method 08-6002, "MMIC CTR Installation" were combined into this method (August 2000).

This is the initial release of this method.

2.0 Material Requirements

2.1 Required Documents

Installation Safety Manual (ISM) - can be located on the web at URL aralia.usa/safety/safety.html.

- Job Start Information Package (JSIP)
- Engineering Package

2.2 Tools

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

Figure 1 – Tools	
Tools	Description
K003041	Field Technician Tool Kit
K003069	Seismic Kit

2.3 Supplies

- Electrical Tape
- Cable Labels
- Tie Wraps 20"
- Lineman's Bag
- Safety Strap Harness with Ring
- 50' Rope
- Masking Tape
- Dust mask (if required)

2.4 Customer Supplied Equipment

- Cabinet Ground Cable
- Cabinet Power Connection
- Secured Antenna Mast

2.5 Emergency Contacts

For U.S. Wireless Market:

- Nortel Emergency Technical Assistance Service (ETAS)
972-BWA-ETAS (972-292-3827).
- Nortel Technical Assistance Center (TAC) - US
972-292-3827 (#3).

No other materials are required to perform this method.

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.

Read this method completely prior to attempting to handle or install the CPE.

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

Use caution when climbing on, around, or near equipment. Be aware of trip hazards as you walk or climb around the work environment.

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

All company tools, test equipment, etc. are 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 being worked on. This is important in the event of an accident so that power can quickly be cut.

3.2 Preparations

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

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

Check each package for any sign of physical damage. If damage is visible, immediately report to the Program Manager.

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, and notify the next level of support with any deficiencies.

Know exactly where to place the equipment before removing it from the package.

4.0 Procedure

4.1 Overview

This method covers the procedures to install the CPE cabinet, Backup Batteries, NIU, and CTR. The NIU provides the interface for E1/T1 and 10 Base T to the Reunion System. The NIU modulates these signals into a Quadrature Amplitude Modulation (QAM) signal onto an Intermediate Frequency (IF) carrier and sends it to the CTR. The CTR then up converts and amplifies the IF into Radio Frequency (RF) in the microwave range, sending it to the Network Node Equipment (NNE) Basestation Transceiver (BTR). Upon receiving the RF from the BTR, the CTR down converts and amplifies it to IF, sending it to the NIU. The NIU then demodulates the IF and QAM into the E1/T1 and 10 Base T signals.

**SHOCK:**

Disconnect all power when working on power supplies.

**Caution:**

Be aware of electrostatic sensitive devices (ESD) requirements when handling BWA equipment.

4.2 CPE Cabinet Installation

The following procedure covers the mounting of the CPE cabinet. Using the Engineering Package, determine which type of cabinet is to be installed. The cabinet is provided with floor mounting brackets and an anchor kit (NTN523CC or NTN523CD). The mounting of the brackets is optional. (Check with Program Management for instructions on this issue.)

**Danger:**

The cabinet weighs from 625 lbs to 905 lbs (284 kg to 411 kg). Use at least three people to move the cabinet. Wear protective footwear and gloves.

Procedure 1 – CPE Cabinet Installation (Page 1 of 4)		
Step	Action	Observation
1	Remove any packaging from around the cabinet.	Cabinet is now on rollers.
2	Remove the bolts securing the bottom of the cabinet to the wooden pallet. Note: Do not throw away any of the steel mounting brackets securing the cabinet to the pallet. These bars are used to install the Seismic cabinet.	
3	Check the interior of the cabinet for loose parts inside (small parts, bags, and boxes).	
4	Set these parts aside. <i>Do not</i> throw them away.	
5	Have the Program Manager coordinate with local customer representatives to discard the cabinet packing materials.	
6	Check for any obvious physical signs of damage to the cabinet. Any defects should be reported to the Program Manager before proceeding.	Dented or damaged panels, plates, screws, bolts, braces and supports.
7	Work with the customer representative to determine the proper location for the CPE cabinet in the equipment room.	CPE Cabinet placement conforms to the customer's site location plans. Notify the Program Manager if there are environmental hazards that could cause equipment damage (wind, water, falling objects and/or rodents or insects).
8	Confirm beforehand that the CPE cabinet doors will have adequate space to fully open. This is especially important prior to drilling or bolting the cabinet to the floor.	
9	When not bolting the cabinet to the floor, use an adjustable wrench and unscrew the leveling feet on the bottom of the cabinet. Place a level on the cabinet to ensure it is level, and adjust the feet until cabinet is level. If the cabinet is to be bolted to the floor, proceed to the next step.	

Procedure 1 – CPE Cabinet Installation (Page 2 of 4)		
Step	Action	Observation
10	The following steps will cover bolting the cabinet to the floor in a Zone 2 or Zone 4 application. Note: The minimum thickness of the concrete floor is 6.3" (160mm) for a Seismic cabinet (Zone 2), and 7.5" (190mm) for Seismic cabinet (Zone 4).	
11	Re-install the two heavy steel mounting brackets at the front and rear of the cabinet.	
12	Mark the front base reference line and the end base reference line on the floor using the tape measure, square, straight edge, and felt tip pin.	
13	Mark the location of the six anchor holes with a felt tip pin.	
14	Move the cabinet away from its intended position.	
15	Punch the centers of the hole markings using the hammer and center punch. Note: With a star tipped drill bit, a center hole is not required.	
16	For mounting the Seismic cabinet (Zone 2)(NTN523CC anchor kit), drill the anchor holes to the depth of 4.33" (110mm) using an 18mm drill bit. Note: For ease, mark the drill bit with masking tape for the depth.	
17	For mounting the Seismic cabinet (Zone 4)(NTN523CD anchor kit), go to step 24.	
18	Blow the debris from the hole and clean the area with the vacuum cleaner. Ensure the hole is free of debris.	
19	Roll the cabinet back into place, centering over the six holes.	

Procedure 1 – CPE Cabinet Installation (Page 3 of 4)		
Step	Action	Observation
20	Place the isolator pad between the floor and cabinet mounting plates. Note: If spacing between the floor and mounts is too tight, lower the leveling feet to increase the space.	
21	For Seismic (Zone 2)(NTN523CC anchor kit), use a hammer and tap the pre-assembled anchor with washers into the hole. Refer to Figure 2. Note: Do not expand the anchor by hand before tapping it into the hole. The top surface of the sleeve (bottom of washers) must be flush with the floor surface.	
22	Tighten the nut a little to seat the anchor firmly against the hole.	
23	Use a level and check the cabinet level. Insert shims either between the mounting plate and insulator pad, or between the insulator pad and floor to level the cabinet. Tighten the nut on the anchors with a torque of 40 ft-lbs. Ensure the cabinet is still level and insert shims as needed to level the cabinet.	
24	For mounting the Seismic cabinet (Zone 4)(NTN523CD anchor kit), drill the anchor holes to a depth of 4.92" (125mm) using a 22mm drill bit. Note: For ease, mark the drill bit with masking tape for the depth.	
25	Blow the debris from the hole and clean the area with the vacuum cleaner. Ensure the hole is free of debris.	
26	For Seismic (Zone 4)(NTN523CD anchor kit), insert the adhesive capsules completely into the holes. Note: Adhesive capsules are longer than the standard embedment and can protrude from the floor.	

Procedure 1 – CPE Cabinet Installation (Page 4 of 4)																
Step	Action	Observation														
27	Insert the square drive shaft into the recommended drill and attach the proper impact socket. The Hilti hammer drill must be set on rotary hammer, <i>not</i> rotation only.	Note: The multi meter can be used to take the temperature of the floor.														
28	Put the anchor in front of the hole. Allow the anchor to be driven until the top surface of the setting tool is flush with the floor surface. Do not press excessively hard on the anchor. Once the anchor is properly embedded, switch off the drill immediately to prevent excessive adhesive from spilling out of the hole.															
29	Let the adhesive cure. Follow this table for cure time. <table><tr><td>Floor Temp</td><td>Curing Time</td></tr><tr><td>40 C</td><td>20 min</td></tr><tr><td>20 C</td><td>20 min</td></tr><tr><td>10 C</td><td>30 min</td></tr><tr><td>0 C</td><td>1 hr</td></tr><tr><td>-5 C</td><td>5 hr</td></tr><tr><td>-15 C</td><td>24 hr</td></tr></table>		Floor Temp	Curing Time	40 C	20 min	20 C	20 min	10 C	30 min	0 C	1 hr	-5 C	5 hr	-15 C	24 hr
Floor Temp	Curing Time															
40 C	20 min															
20 C	20 min															
10 C	30 min															
0 C	1 hr															
-5 C	5 hr															
-15 C	24 hr															
30	Install the mounting brackets, insulator pad, cabinet, insulator washers, and bolts in the sequence shown in Figure 3.															
31	Use a level and check the cabinet level. Insert shims either between the mounting plate and insulator pad, or between the insulator pad and floor to level the cabinet. Using an allen key and a torque wrench, tighten the anchors to 29.4 ft-lbs. Ensure the cabinet is still level and insert shims as needed to level the cabinet.															
32	End of Procedure.															

Figure 2 – CPE Zone 2 Anchor

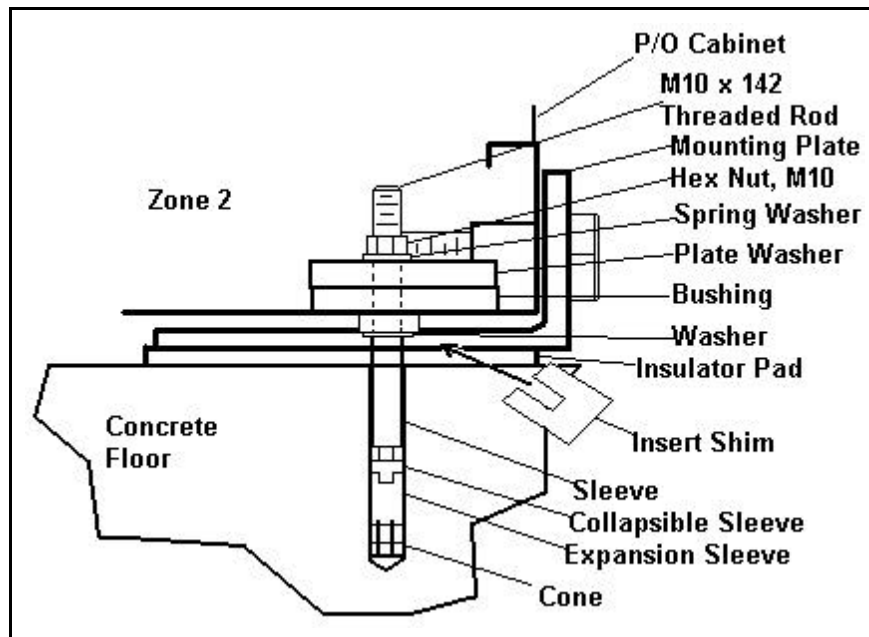
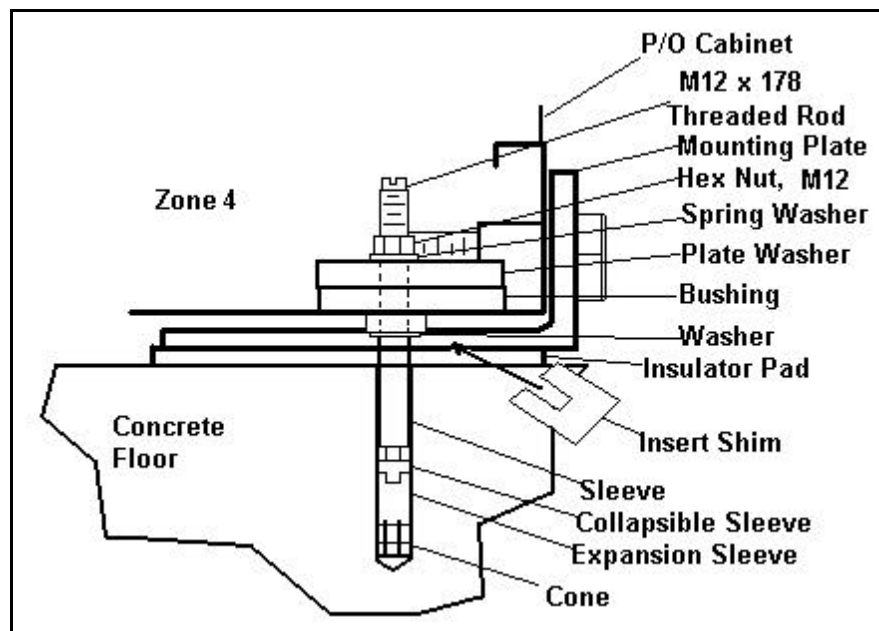


Figure 3 – CPE Zone 4 Anchor

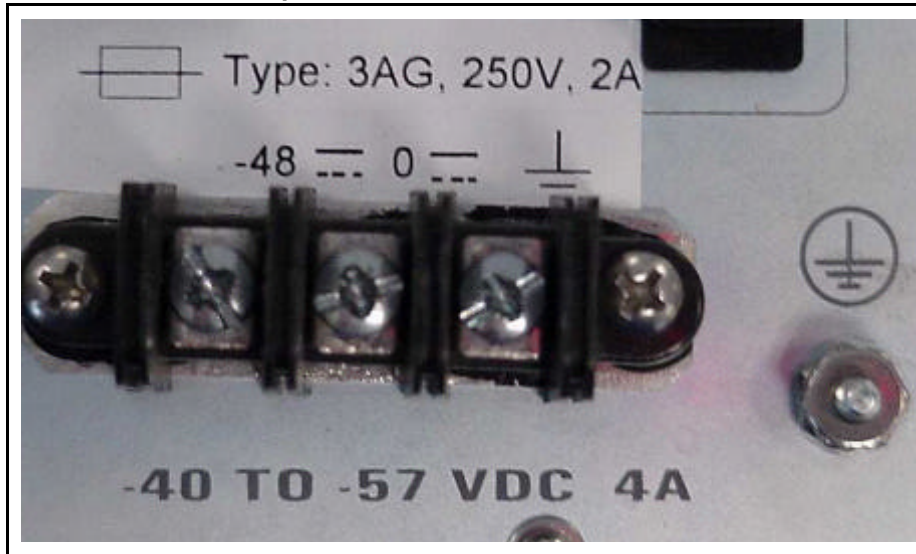


4.3 NIU Installation

The following procedure covers the installation of the NIU into the CPE cabinet. The NIU is typically installed into a 23" cabinet. However, it is flexible enough to not be installed in this manner. The installation may vary from site to site, and if there are concerns about the site (i.e. environmental, water, grounding etc.), contact the Program Manager.

Procedure 2 – NIU Installation (Page 1 of 2)		
Step	Action	Observation
1	The NIU installation may take place in a cabinet already in use for customer traffic via wireline. If the cabinet already has power applied to it, verify with the local customer the cabinet status. Verify the fuse and circuit breaker layout of the cabinet with local customer to eliminate service outages.	
2	If the cabinet is not inservice, ensure all fuses are removed and circuit breakers in the Helios, ac circuit breaker panel, and the dc battery shutoff switch are turned <i>OFF</i>. Note: If the cabinet is inservice and cannot be powered down, verify with the local customer the fuse layout to ensure proper fusing of the NIU. Typically, fuse #2 is for NIU#1, and fuse #8 is for NIU #2. Verify with the local customer that these fuses remain for the NIU(s) and remove them.	The cabinet has no power applied to it.
3	Remove the NIU from its box and inspect it for damage. Do not install damaged equipment. Using a #2 phillips screwdriver, remove the four screws on the sides of the NIU. There are two screws on each side at the front of the NIU that will need to be removed for the NIU to fit into the NIU mounting bracket.	The four screws are now removed.
4	Place the NIU into the shelf centered in the cabinet. Make sure the NIU is secured and the side vent holes match the vents in the NIU mounting bracket. The NIU connections will be at the back of the cabinet.	NIU is now inserted into the mounting bracket.
5	On the back of the NIU, remove the left (-48V) and center (0V) terminal screws from the dc terminal block.	The terminal screws are now removed. Refer to Figure 4.

Procedure 2 – NIU Installation (Page 2 of 2)		
Step	Action	Observation
6	Locate the NIU power wires in the cabinet. Note: There will be a pair of wires for each NIU shelf. Each wire will be insulated.	Note: Depending on the model of NIU being installed, it may be utilizing an ac power cord. Locate the ac power cord and connect to NIU as required. If the NIU is an ac model, go to step 8.
7	Carefully remove the insulation from one pair of wires. Verify with a multi meter that no dc is present on the wires.	
8	Locate and connect the white wire with a green strip (ground wire) to the ground post on the lower right hand corner on the back of the NIU. Be careful not to strip the bolt when putting the nut on. Note: There will be a ground wire for each NIU shelf.	Refer to Figure 4 for an illustration of the ground post.
9	Connect the white wire with the red stripe to the left terminal labeled -48 V on the back of the NIU. Note: If the NIU is an ac model, go to step 11.	Refer to Figure 4 for an illustration of the dc terminal.
10	Connect the white wire with no stripe to the center terminal labeled 0 V on the back of the NIU.	Refer to Figure 4 for an illustration of the dc terminal.
11	End of Procedure. NIU power up will be in Method 22-0295.	

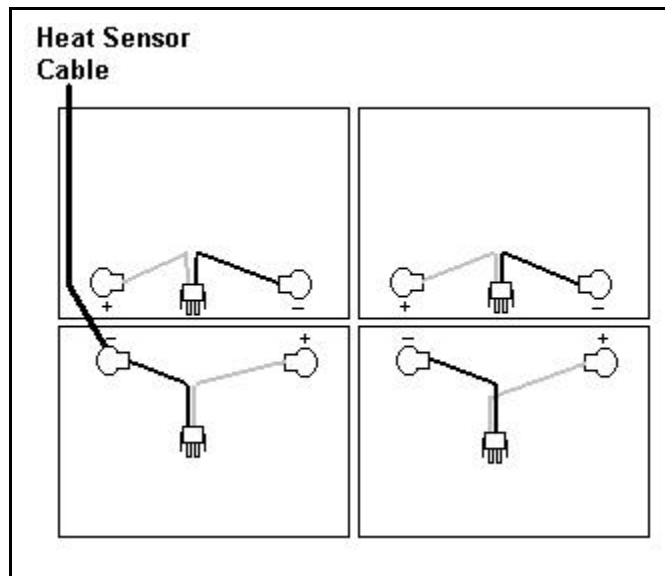
Figure 4 – NIU dc Terminal Strip

4.4 Backup Battery Installation

The following procedure covers the installation of the backup batteries inside the CPE cabinet and their cabling.

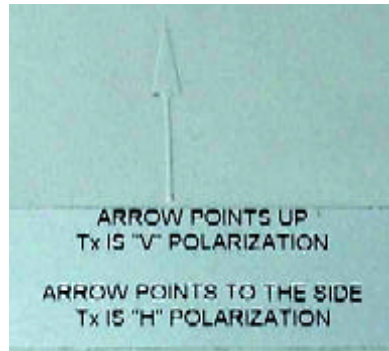
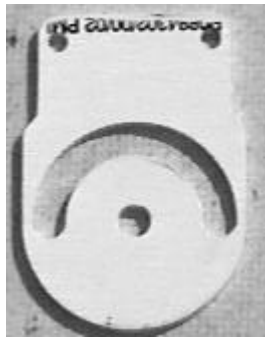
Procedure 3 – Backup Battery Installation (Page 1 of 2)		
Step	Action	Observation
1	Unpack and inspect the batteries for any damage. Do not install damaged equipment.	
2	Verify that the Battery Switch at the lower left corner of the cabinet is <i>OFF</i> (viewed from the front).	
3	Loosen the captive screws on each side of the bar across the front of the battery tray and remove the bar.	
4	Locate the wire harnesses for the battery cabling. Attach the harness labeled LR to the battery going in the Left Rear position.	
5	Attach the harness labeled RR to the battery going in the Right Rear position.	
6	Attach the harness labeled RF to the battery going in the Front Right position.	

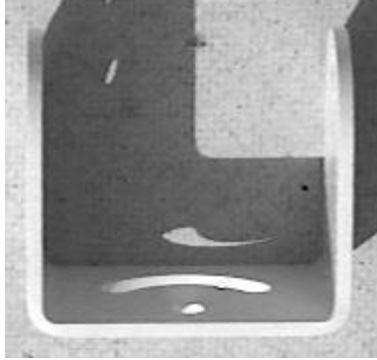
Procedure 3 – Backup Battery Installation (Page 2 of 2)		
Step	Action	Observation
7	Attach the harness labeled LF to the battery going in the Front Left position.	
8	Attach the harness cables together with the I/O cable. Measure the voltage on the I/O cable using a multi meter. The measured voltage should be around -51 V dc, depending on battery charge state.	
9	Place the batteries so they can be put into the battery tray without disconnecting the cables. Slide the two rear batteries into the tray, and place the front right battery into the tray. Note: The battery terminals will be toward the middle of the tray. Refer to Figure 5.	
10	Before placing the front left battery into the tray, the heat sensor cable needs to be secured under the negative terminal. Place the front left battery into the tray once the heat sensor cable is secure.	
11	Route the I/O cable so that it can be connected to the male connector at the back of the Battery Switch box. Connect the I/O cable to the male connector at the switch box. The female connector at the switch box will be connected to the battery cable coming from the rectifier (Helios).	
12	Install the bar across the front of the battery tray and secure with the two captive screws.	
13	End of procedure.	

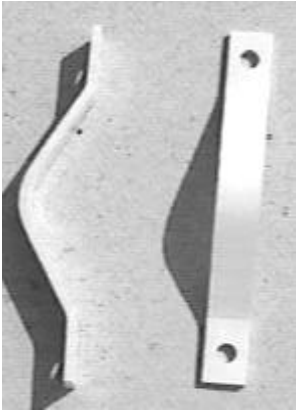
Figure 5 – Backup Battery Layout

4.5 CTR Installation PLUMB Mount

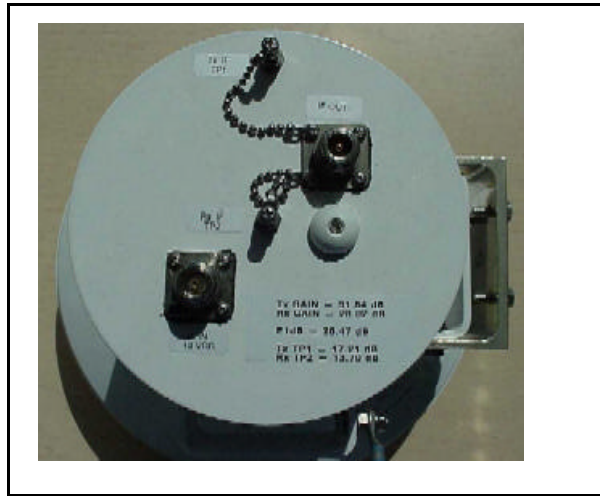
The following procedure covers the installation of the CTR with the PLUMB Mount. This mount can only be utilized with the PLUMB CTR. If the site uses an MMIC CTR, a Fine Adjust Mount will be used. For an MMIC or PLUMB CTR using the Fine Adjust Mount, go to subsection 4.4 "CTR Installation Fine Adjust Mount."

Procedure 4 – CTR Installation Plumb Mount (Page 1 of 4)		
Step	Action	Observation
1	Unpack the CTR and Mount and inspect for damage. Do not install damaged equipment. For ease of installation, the CTR and mount should be assembled on stable ground instead of on the mast.	
2	Verify the CTR TX polarity in the Engineering Package before installing the brackets to the CTR. Note: For Horizontal TX Polarity, look at the back of the CTR antenna. Place the arrow pointing to the right. Note: For Vertical TX Polarity, look at the back of the CTR antenna. Place the arrow pointing up.	PLUMB Polarization Label 
3	Use a 3/8" wrench and socket/ratchet to attach one Flat Tilt Bracket to one side of the CTR Chassis Bracket so the polarity is correct. Slide the two bolts in from the outside, through the Flat Tilt Bracket holes, and through the CTR Chassis Bracket. Place a washer and nut on each bolt, and tighten until firmly secured to the CTR Chassis Bracket. Note: There are two Flat Tilt Brackets. Repeat this step for the other flat tilt bracket to the opposite side of the CTR chassis bracket.	Flat Tilt Bracket 

Procedure 4 – CTR Installation Plumb Mount (Page 2 of 4)		
Step	Action	Observation
4	Use a 9/16" wrench and socket/ratchet to attach the U-Bracket to both of the Flat Tilt Brackets. Slide the U-Bracket between the two Flat Tilt Brackets. Insert each of the four bolts in from the outside and through the Flat Tilt Bracket holes. Place a washer and nut on each bolt until tight. Note: The nuts will only need to be snug until antenna alignment.	U-Bracket 
5	Once the mounting brackets are on the CTR, move to the antenna mast to mount the Arm bracket (Base). This will make it easier to install the CTR to the mast.	
6	Verify the Antenna Mast (pole) is secured before installation of the CTR 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.	

Procedure 4 – CTR Installation Plumb Mount (Page 3 of 4)		
Step	Action	Observation
7	Use a wrench and socket/ratchet to attach the Pole brackets to the Arm Bracket. Place the pole bracket on the backside of the antenna mast and the arm bracket on the other. Insert each of the four bolts through the pole bracket holes into the arm bracket holes. Place a washer and nut on each end of the bolts. Note: Using a wrench or socket/ratchet, tighten each nut firmly so the Arm Bracket assembly is secured to the Antenna Mast.	Arm Bracket  Pole Brackets 
8	Use adequate support to prevent personal injury or damage to equipment. Two technicians are required for the following step.	

Procedure 4 – CTR Installation Plumb Mount (Page 4 of 4)		
Step	Action	Observation
9	Once the Arm bracket (Base) is secured to the antenna mast, place the CTR on top of the Base and point the CTR in the general direction of the BTR(s). See the Engineering Package for azimuth information. With one technician holding the CTR, use a 9/16" wrench and socket/ratchet to attach the CTR to the Arm bracket (base). Slide the two bolts in from the top side, through the U-Bracket holes, and through the Arm bracket (base). Place a washer and nut on each bolt and tighten it so the CTR is secured but not overly tight.	
10	The CTR alignment is completed in Method 22-0295. The CTR will be secured after the alignment.	
11	End of Procedure.	

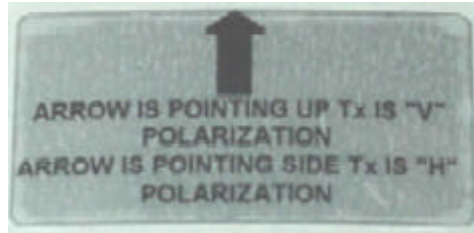
Figure 6 – Plumb CTR

4.6 CTR Installation Fine Adjust Mount

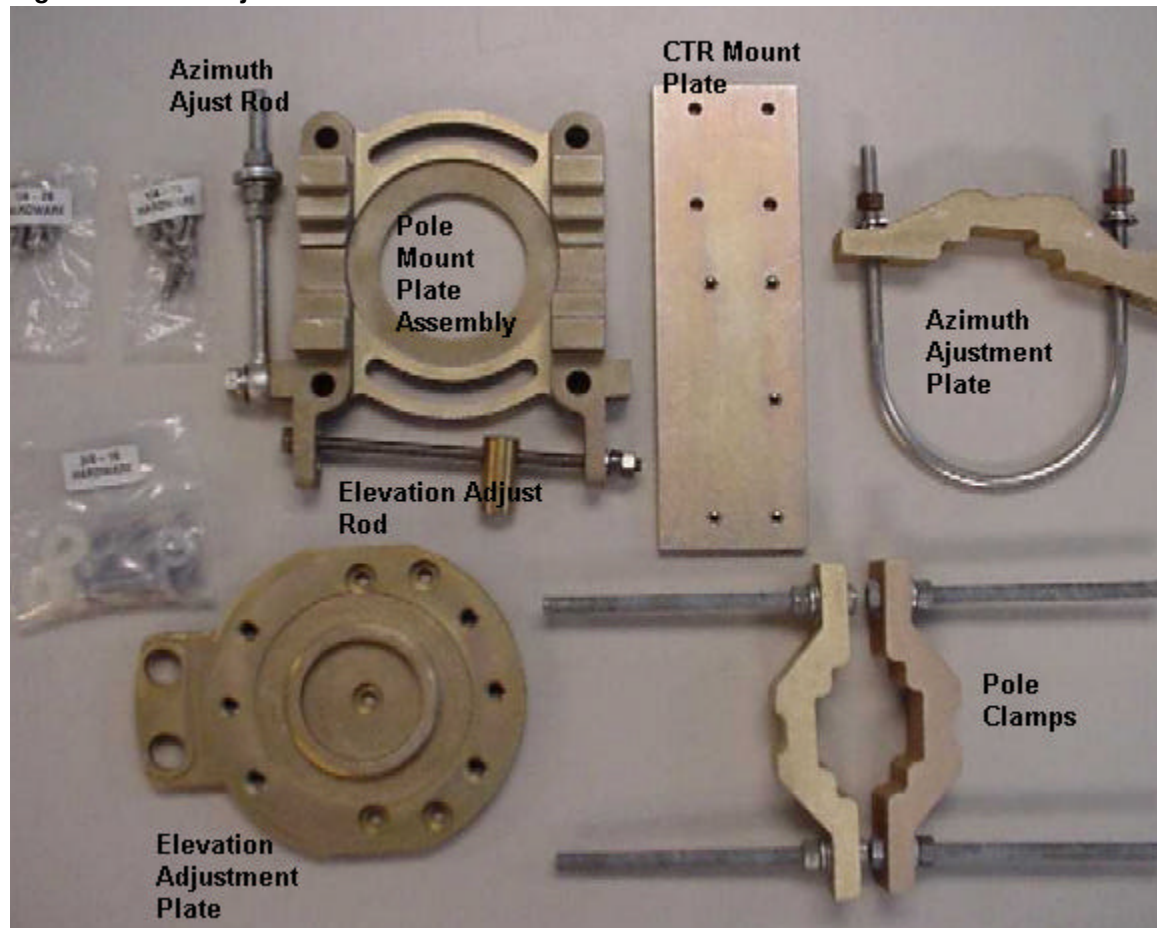
The following procedure covers the CTR Installation with the Fine Adjust Mount. This mount can be used with the PLUMB or MMIC CTR. To use the PLUMB CTR with this mount, an extra bracket (CPC# A0800471) must be attached to the CTR to allow it to bolt to the mount. Refer to Figure 7, "Fine Adjust Mount" for a view of the mount parts.

Procedure 5 – CTR Installation Fine Adjust Mount (Page 1 of 3)		
Step	Action	Observation
1	Unpack the CTR and Mount and inspect for damage. Do not install damaged equipment. For ease of installation, the CTR and mount should be assembled on stable ground instead of on the mast. Note: The MMIC CTR will have a protective cover for the radome. Do not touch the front of the radome; the oils from the skin can cause damage.	
2	Install the Azimuth adjustment plate to the antenna mast on the opposite side of the mast the CTR will be installed on. Using the U-bolt, split lock washer, flat washer and bronze nut, fully tighten the azimuth adjustment plate securely to the pole (15 ft-lb torque). <i>Parts:</i> U bolt bracket, (2) 3/8 x 16 bronze nuts, flat washers, split lock washers.	
3	Install the Pole mount plate assembly to the antenna mast so that it sits opposite the Azimuth adjustment plate assembly. Tighten the (2) pole clamp bars using the (4) 6.0" hex bolts, split lock washers, flat washers, and hex nuts. The elevation adjustment plate should fit snug to the pole. Note: 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. <i>Parts:</i> (4) 3/8 - 16 x 6.0" hex nut, 3/8 split lock washer, 3/8 flat washers.	

Procedure 5 – CTR Installation Fine Adjust Mount (Page 2 of 3)

Step	Action	Observation
4	Attach the CTR mounting plate to the elevation adjustment plate using (5) pan head screws and stainless steel split lock washers. With the proper torque (50 in-lb), fully tighten the mounting plate to the elevation adjustment plate. <i>Parts:</i> (5) 1/4-20 x 3/8 pan head screws and stainless steel split lock washers. Attach the mounting plate to the CTR housing using (4) pan head screws and stainless steel split lock washers. Fully tighten using the proper torque (50 in-lb). <i>Parts:</i> (4) 1/4-28 x 3/4 pan head screws and stainless steel split lock washers. Note: Verify the CTR TX polarization with the Engineering Package. If the TX polarization is horizontal, the arrow will point to the right (looking at CTR from the rear). If the TX polarization is vertical, the arrow will point up.	MMIC Polarization Label 
5	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. 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. 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. Tighten the (2) 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. <i>Parts:</i> (4) hex bolts, split lock washers, flat washers, nylon washers.	

Procedure 5 – CTR Installation Fine Adjust Mount (Page 3 of 3)		
Step	Action	Observation
6	Fine Azimuth adjustment instructions: <i>Clockwise:</i> 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 using the proper torque (15 ft-lb). <i>Counter Clockwise:</i> Adjust the azimuth rod by loosening the 3/8 hex nut on the outside of the adjustment rod, leaving no less than three threads 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 using the proper torque (15 ft-lb). Note: The fine azimuth adjustment allows for +/- 10 degrees.	
7	Fine elevation adjustment instructions: <i>Uptilt adjustment:</i> Rotate the elevation adjust rod counter clockwise to the desired position. Note: At this time, the (4) 3/8-16 hex bolts on the elevation adjustment plate will be fully tightened using the proper torque (15 ft-lb). <i>Downtilt adjustment:</i> Rotate the elevation adjust rod counter clockwise to the desired position. Note: At this time, the (4) 3/8-16 hex bolts on the elevation adjustment plate will be fully tightened using the proper torque (15 ft-lb). Note: The fine elevation adjustment allows for +/- 25 degrees.	
8	Before leaving the installation, check that all hardware on the mount and antenna are fully tightened. Inspection of the antenna should be performed at least once a year to check its condition and to ensure safe operation and maintenance. Note: Ensure the MMIC CTR protective radome cover is removed.	
9	End of Procedure.	

Figure 7 – Fine Adjust Mount

5.0 References

Document	Number	Title
Method	08-0282	"CTR 2400 Microwave Transceiver Installation"
Method	08-6002	"CTR MMIC Radio Installation"
Method	22-0295	"CPE Preparation and Power Up"
Method	P0915936	"TAS-PTM Radio Enclosure"

6.0 Appendices

Appendix A – Acronyms

BTR	Base Station Transceiver
CPE	Customer Premise Equipment
CTR	Customer Transceiver
ESD	Electrostatic Sensitive Device
ETAS	Emergency Technical Assistance Services
IF	Intermediate Frequency
ISM	Installation Safety Manual
JSIP	Job Start Information Package
NIU	Network Interface Unit
NNE	Network Node Equipment
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
TAC	Technical Assistance Center

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