Charles Universal Broadband Enclosure
CUBE-SC3NN12HN5
General Description and Installation

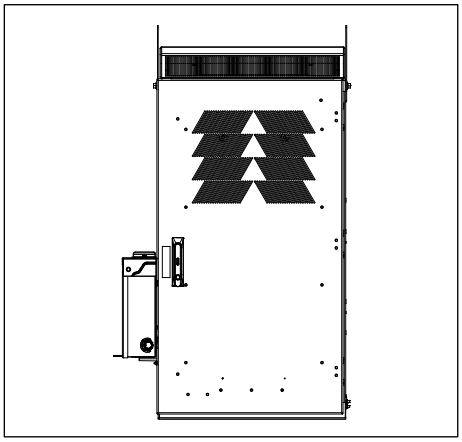

Figure 1 Front View of the CUBE

1. GENERAL INTRODUCTION

1.1. Document Purpose

This document provides general information for the CUBE-SC3NN12HN5 of the Charles Industries' Universal Broadband Enclosure (CUBE) product line. Figure 1 shows a closed front view of the enclosure.

-NOTE-

Hereafter, the Charles Universal Broadband Enclosure CUBE-SC3NN12HN5 will be referred to as the "CUBE."

1.2. Product Purpose

The CUBE consists of a protective enclosure for an integrated system of electronic components and equipment that can serve fiber and copper interfaces.

1.3. Product Mounting and Location

This enclosure is suitable for outside plant-type (OSP) locations and those that may require NEC compliance. The outdoor, weather-resistant CUBE is to be mounted on a concrete or composite pad. The installer connects the power, fiber, and copper connections. Detailed mounting and installation information is covered in Section 3.

2. PRODUCT DESCRIPTION

The CUBE consists of a single radio compartment that supports an Ericsson or a Samsung radio configuration, as well as two CommScope CBC1726T-4310 diplexers and two power supplies. All equipment is customer supplied. The CUBE includes an AC load center, an AC surge suppressor, and a direct air cooling system (DAC). See the lists below for each configuration.

Ericsson configuration:

- (2) Ericsson AC-08 OR (2) Ericsson 6302 power supplies
- (1) Ericsson 8863 dual band radio
- (1) Ericsson 4455 dual band radio
- (1) Ericsson FrontHaul 6585

Samsung configuration:

- (2) OmniOn 1.6kW power supplies
- (2) Samsung 320W dual band radios
- (1) Samsung CBRS radio

Figure 2 shows the CUBE dimensions. Figure 3 shows the main components of the CUBE.

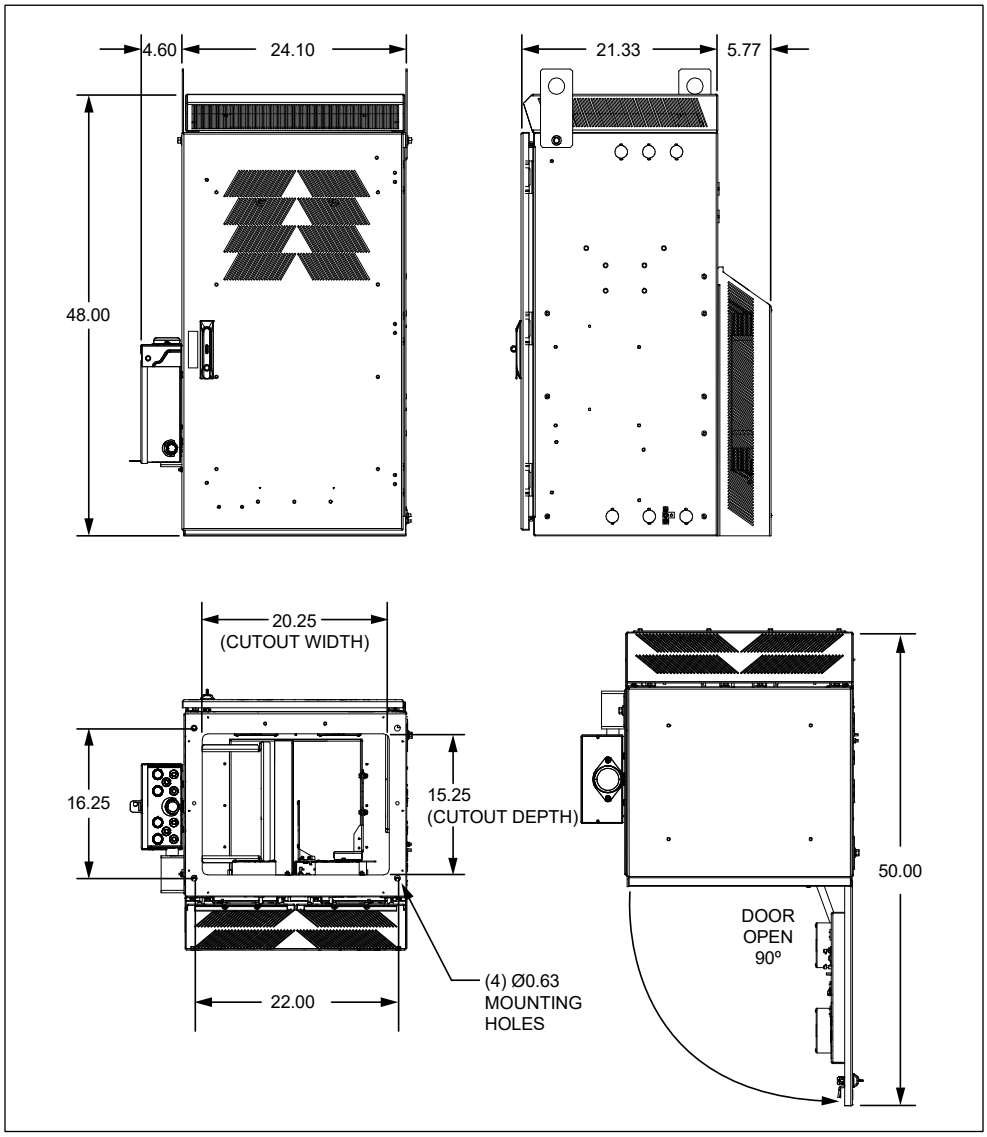

Figure 2 CUBE Dimensions (in inches)

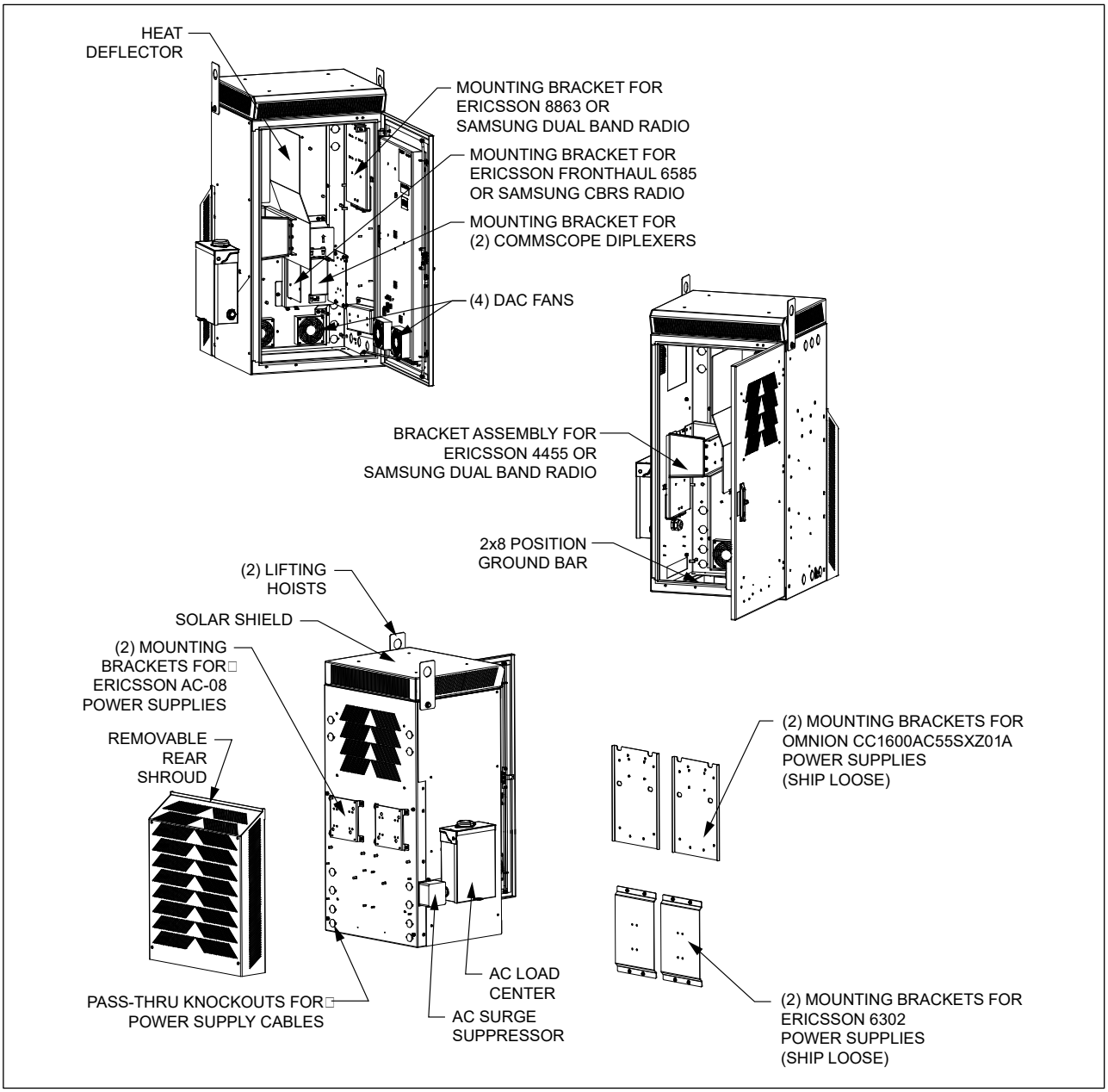

Figure 3 CUBE Components

3. INSTALLATION

3.1. Inspecting the Product

The CUBE is shipped mounted upright on a skid. Remove the bolts, unpack the unit, and dispose of the packaging material.

-INSPECTION NOTE-

Visually inspect the unit for damages prior to installation. If the equipment was damaged in transit, immediately report the extent of the damage to the transportation company.

3.2. Following and Using Safety Precautions

Read the following site and safety tips, cautions, and warnings, then proceed with the paragraphs that follow.

- For installation, follow all National Electrical Codes (NEC) ANSI/NFPA 70, local, environmental, workplace, and company codes, safety procedures, and practices.
- Minimum spacing between the accessories and components and the housing for ITE equipment shall be maintained for safe operation of the equipment when installed in accordance with NEC ANSI/NFPA 70.
- Read all instructions, warnings and cautions on the equipment and in the documentation shipped with the product.
- Always connect ground connections first.
- Do not place this product on weak or unstable surfaces which may allow the product to fall, resulting in potentially serious damage(s) to persons or product.
- Only authorized trained personnel shall install the CUBE.
- In windy conditions, be sure to engage the door latches to secure the door in a stationary position.

3.3. Obtaining Tools and Equipment

Obtain the following recommended or needed items for installing the CUBE.

- Sufficient length and quantities of fiber cable (or pigtails)
- Cable scoring, opening, and cutting tools for cable sheathing, shields, wrappings, strength members and buffer tubes
- Wire strippers
- Crimpers
- Cable, tube, wire, and fiber cleaning materials
- Protective and/or insulated work gloves
- Safety glasses
- Tape measure
- Marking utensil
- #6 ground wire or rod and earth ground materials
- Bond strap (optional, from cable bond clamp to bond post)
- Any exterior cable strain relief, per company practice
- Slotted, hex, and Phillips screwdrivers
- Torque wrench
- Assorted cable ties, clips, or fasteners (optional)
- Can wrench (216 type tool)
- Derrick for lifting
- Level

3.4. Preparing the Installation Site

Observe the following site preparation recommendations.

- Leave adequate horizontal and vertical space between multiple installations to allow for proper cable access, as well as enough room around the enclosure to open the door(s).
- The site must meet minimal personnel and equipment safety requirements.
- The distance from the cable entry point should be consistent with local installation practices.
- The pad must be able to support the weight of the CUBE.
- Run all fiber and copper facilities to the site.

3.5. Lifting the CUBE

See Table 1 for CUBE weight. Charles recommends the following procedure for lifting the CUBE.

3.5.1. Required Equipment

- One derrick (crane) capable of lifting the CUBE
- Spreader bar
- Two lifting slings or chains with each having a 2,500 lbs. capacity
- Connecting links to attach slings to the CUBE's lifting brackets
- 75-ft. long tagline rope

Insert the lifting sling connecting links securely through each of the lifting brackets as shown in Figure 4.

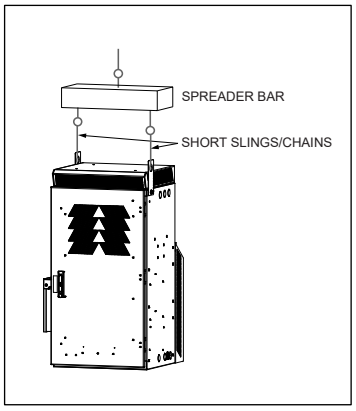

Figure 4 Lifting the CUBE

3.5.2. Warnings and Specific Safety Precautions

⚠	**WARNING**	**Improper hoisting equipment and unsafe lifting procedures can result in serious injury or death**

Observe the following local safety procedures when performing the tasks in this section.

- Keep the CUBE away from any power lines.
- Keep bystanders away from the work operations at all times.
- Only trained operators shall operate the crane for lifting and setting the CUBE.
- Do not suspend loads over people or equipment.
- All persons working with hoisting equipment shall wear standard safety gear according to local practices including safety helmets and steel-toed shoes.
- Do not operate the hoisting equipment until all stabilizers are extended and in firm contact with the ground or adequate support structure.
- Do not attempt to retract or extend the stabilizers while a load is suspended.

3.6. Mounting the CUBE

The CUBE can be mounted on a new or existing concrete or composite pad. Charles recommends the CPAD-S1EXXXXXXA composite pad. A gasket is provided for placing the CUBE on a pad. Should the gasket become damaged during installation, a replacement can be ordered under part number 39-000520-0. The gasket is not needed if mounting on a CPAD. Ensure that the unit is level.

3.6.1. Torque Requirements

Torque all hardware as shown below (unless otherwise noted). These values apply to SAE Grade 1 & 2 Low Carbon Steel, ASTM A307 Low Carbon Steel, and Stainless Steel Grade 18-8.

Thread Size	In-lbs	Ft-lbs
4-40	4±10%	
6-32	8±10%	
8-32	16±10%	
10-32	26±10%	
12-24	50±10%	
1/4-20/M6	60±5%	5±5%
5/16-18	125±5%	10.4±5%
3/8-16	180±5%	15.0±5%
1/2-13	500±2%	41.7±2%
5/8-11	1000±1%	83.3±1%

3.6.2. Constructing a New Pad

- Use only concrete for new pad construction. Do not use substitute materials since they lack the rigidity for CUBE placement.
- Observe local building practices for pad construction. Charles recommends that the pad should extend a minimum of 8" beyond the CUBE base on all sides.
- Use a minimum of 6" of sand or gravel as a base for the pad for leveling purposes.
- Figure 2 shows the required conduit openings and mounting hole dimensions for entering/mounting the bottom of the CUBE. Use these dimensions when designing the pad.

⚠	**WARNING**	**When pad mounting, the compression strength of the pad must be at least 4000 psi as determined by ASTM C39 test of compression strength of concrete cylinders.** **The slump of the concrete shall be 2" to 4" as determined by ASTM C143 test method.**

3.6.3. Mounting the CUBE on a Pad

Four customer supplied, corrosion resistant, 1/2”-13 hex head bolts with anchors are required for mounting the CUBE to the concrete pad. Use the following steps to mount the CUBE to a pad.

1. Layout, drill, and set the 1/2” anchors per manufacturer’s recommendations. The embedment depth is not to exceed 3.5”. Use the gasket as a mounting hole location template.
2. Clean any debris from the concrete pad.
3. Install the gasket by positioning it on the pad so that it is underneath the bottom of the CUBE when the cabinet is installed. Line up the gasket so that the cutouts are in proper position around the conduit opening and the bolt holes as shown in Figure 5.
4. Open the CUBE door to allow access to mounting holes.
5. Ensure that the CUBE is parallel to the pad surface as it is placed onto the pad and that it aligns with the holes in the pad and the gasket. Dress the cable/conduit so that it aligns with the CUBE openings as it is lowered onto the pad.
6. Place the CUBE on the pad. Loosen the slings so that all the weight is on the pad. Check that the CUBE is properly aligned.
7. Secure the CUBE to the pad using the 1/2”-13 hex head bolts. Tighten all bolts securely.
8. Once the CUBE is secured, remove the slings and tagline. Close the door.

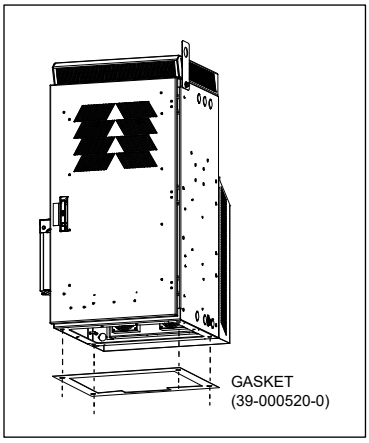

Figure 5 Gasket Installation

3.6.4. Mounting the CUBE on a CPAD

First, follow the instructions that ship with the CPAD to ensure that the CPAD is securely installed in the ground. Then proceed to mount the CUBE on the CPAD. Four customer supplied, corrosion resistant, 1/2”-13, 2” long fully threaded hex head bolts with flat and lock washers are required for mounting the CUBE to the CPAD. Use the following steps to mount the CUBE.

1. Clean any debris from the CPAD.
2. Open the CUBE door to allow access to mounting holes.
3. Ensure that the CUBE is parallel to the CPAD surface as it is placed onto the CPAD and that it aligns with the holes in the CPAD. Dress the cable/conduit so that it aligns with the CUBE openings as it is lowered onto the CPAD.
4. Place the CUBE on the CPAD. Loosen the slings so that all the weight is on the CPAD. Check that the CUBE is properly aligned and level.
5. Secure the CUBE to the CPAD using the 1/2”-13 hardware. Tighten all bolts securely.
6. Once the CUBE is secured, remove the slings and tagline. Close the CUBE door.

3.7. CUBE Wiring and Equipment

After the CUBE is properly mounted in the desired location, apply No-Ox where bus bar and other 2-hole lug connections will be made. Install ground and power connections. Always ground the equipment first, before making any other connections.

⚠	**WARNING**	**Perform all bonding and grounding connections prior to any electrical and communications connections.**

A basic electrical diagram is shown in Figure 6.

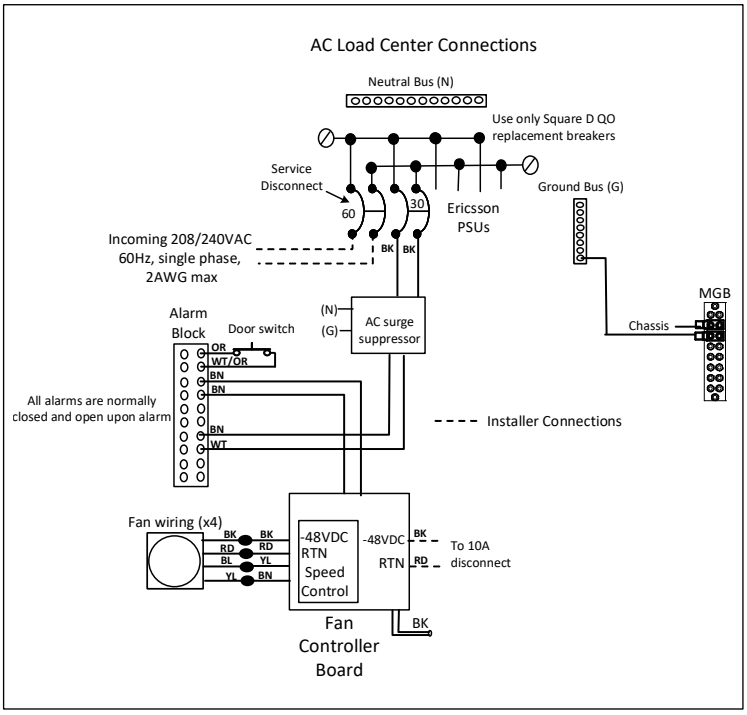

Figure 6 Electrical Diagram

3.7.1. Ground Connection

Use the 2x8 position ground bar provided in the CUBE for all grounding of internal equipment. Stack hardware as shown in Figure 7. An external ground lug is available on the right side of the CUBE for connecting a site ground wire.

3.7.2. AC Load Center

The incoming AC voltage is a single phase 208/240V at 60Hz and is connected to the 60A main circuit breaker in the AC load center. The maximum wire size is 2AWG. The installer connects the two hot (line) wires to the breaker, the neutral wire to the neutral bus and the ground wire to the ground bus. Use wire that is sized per National Electrical Code NFPA70 table 310.16.

3.7.3. DAC Operation

The DAC fans must be connected to a customer supplied 48VDC power supply. If the radio power supply has a spare port, then this can be used for the fans. If no port is available, then Charles offers the 96-SH5660FNKIT1 AC/DC power supply kit. This kit is ordered with the CUBE and is installed at the factory.

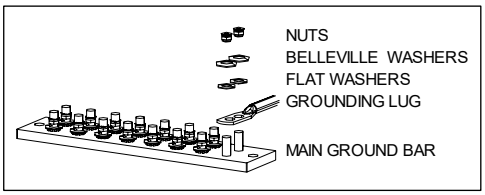

Figure 7
Ground Bar Hardware Stack

3.7.4. Fiber and Copper Entry

The CUBE has multiple Ø1.38” knockouts on the right side and on the rear panel (under the rear shroud) that accommodate Ø1.00” conduit fittings. A cutout on the bottom allows cable entry from the ground. See Figures 2 and 3 for knockout and cutout locations.

3.8. Equipment Mounting – Ericsson Configuration

3.8.1. Right Side: Ericsson 8863

Install the Ericsson 8863 radio onto the hanging bracket assembly on the right side of the CUBE. Figure 8 shows the hanging bracket assembly.

1. Loosen the securing screws and lift off the hanging brackets from the mounting plate.
2. Remove the radio mounting bracket from the hanging brackets. This bracket is only used for Samsung radios. Store or discard the mounting bracket per company practice.
3. Mount the radio onto the hanging brackets using customer supplied hardware.
4. Return the hanging brackets to the mounting plate and tighten the securing screws on the bottom.

3.8.2. Left Side: Ericsson 4455

The hanging bracket on the left side is similar to the one on the right, but it has a set of additional brackets that mount to the radio. Figure 9 shows the assembly.

1. Remove the hanging brackets from the mounting plate as described above.
2. Mount the 4455 radio onto the back side of the front-most plate on the assembly. This can be accomplished by either sliding the radio underneath the 4455 bracket OR by removing the front-most plate, attaching it to the 4455, and then replacing the plate on the bracket assembly.
3. Replace the hanging brackets on the mounting plate and tighten the securing screws.

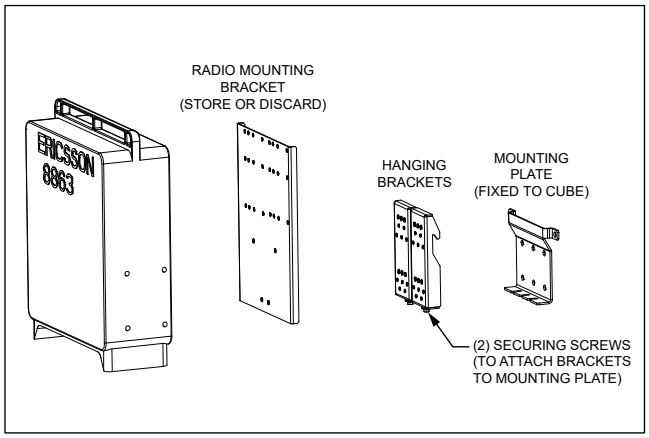

Figure 8 Right Side Hanging Brackets

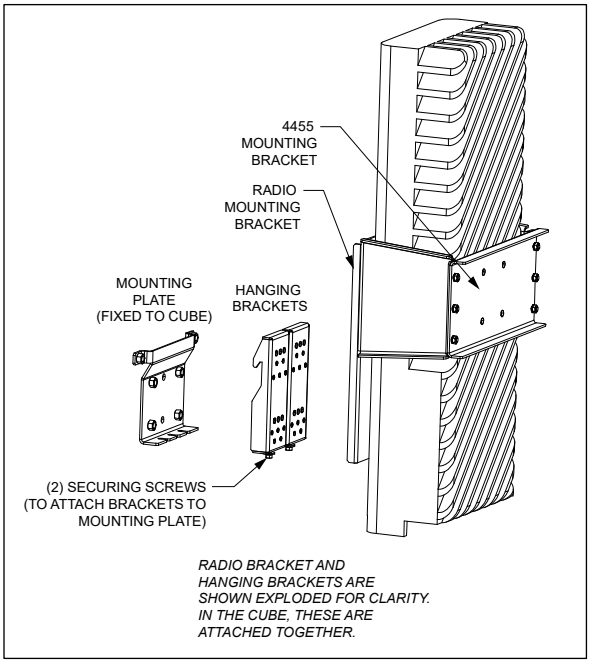

Figure 9 Left Side Hanging Brackets

3.8.3. Diplexers and FrontHaul 6585

The brackets for these internal components are hook-mounted on a shared back plate.

1. Remove the bracket by removing the screw near the bottom of the bracket and then lifting the bracket hooks off the holes in the back plate (Figure 10). Save the screws.
2. Mount the FrontHaul 6585 onto the right side of the forward leg of the 6585 mounting bracket.
3. Mount the diplexers on either side of the forward leg of the diplexer mounting bracket.
4. Replace both brackets onto the back plate and secure using the screws removed previously.

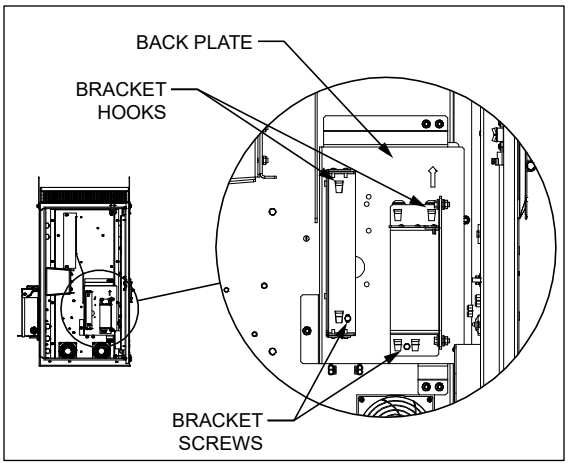

Figure 10 Hook Mounted Brackets

3.8.4. Power Supplies

The CUBE has three power supply options. Brackets for the AC-08 power supplies ship mounted on the back of the CUBE, underneath the removable rear shroud. Brackets for the 6302 power supplies ship loose with the CUBE. The OmniOn power supplies are only used with the Samsung radios, so store or discard those brackets per company practice.

To remove the rear shroud, first remove the four plugs from the mounting holes on the back (Figure 11). Save these plugs. Insert a long screwdriver through these holes and loosen the four mounting screws on the CUBE back panel. Do not remove these screws from the CUBE. The rear shroud has four mounting keyhole slots that rest on the mounting screws. Once the screws are loosened, lift the shroud off the CUBE. Set the shroud aside.

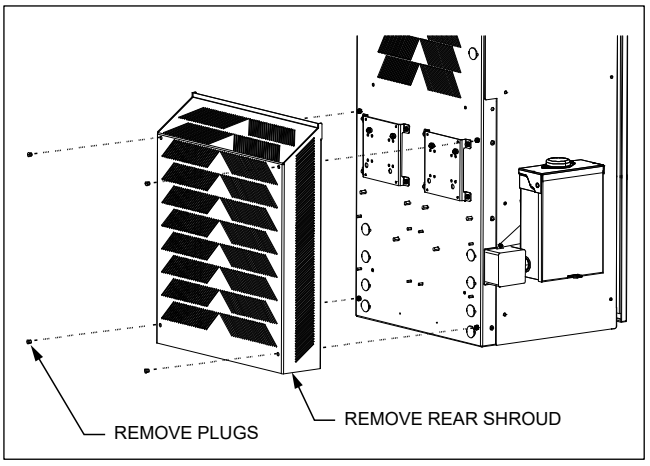

Figure 11 Remove Rear Shroud

AC-08

1. Remove the brackets by removing the 1/4-20 Keps nuts that hole them in place.
2. Use the power supply built-in screws to attach the power supplies to the brackets.
3. Mount the bracket/power supply assembly onto the back of the CUBE using the nuts removed previously (Figure 12).
4. Replace the shroud by hanging the keyhole slots on the four mounting screws. Use the long screwdriver through the shroud mounting holes to tighten the screws. Then replace the plugs removed previously.

6302

The 6302 brackets ship loose with the CUBE.

1. Remove the AC-08 brackets from the rear of the CUBE. Store or discard the brackets per company practice.
2. Locate the correct brackets for the 6302 power supplies (Figure 3).
3. Attach the power supplies to the brackets using customer supplied hardware.
4. Mount the bracket/power supply assembly onto the back of the CUBE using four 1/4-20 Philips screws with split washers and flat washers (Figure 12, hardware included with CUBE).
5. Replace the shroud by hanging the keyhole slots on the four mounting screws. Use the long screwdriver through the shroud mounting holes to tighten the screws. Then replace the plugs removed previously.

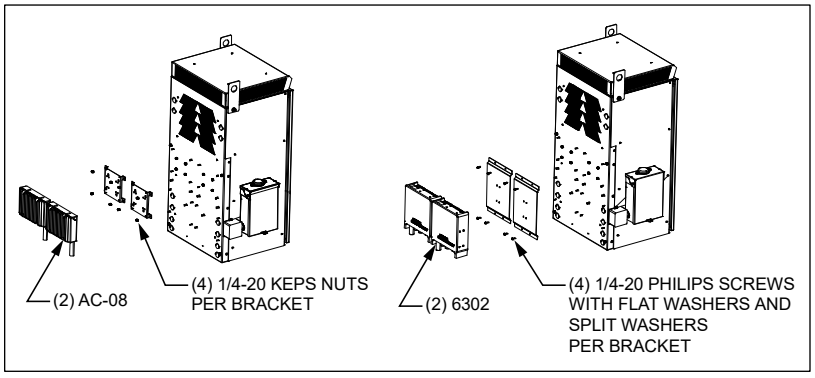

Figure 12 Power Supply Mounting

3.9. Equipment Mounting – Samsung Configuration

3.9.1. Remove Heat Deflector

The heat deflector is not used in the Samsung configuration. Remove the heat deflector by removing the two 3/8-16 nuts that hold it in place (Figure 13). Store or discard per company practice.

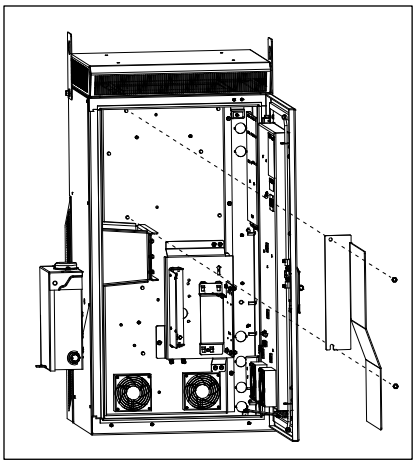

Figure 13 Remove Heat Deflector

3.9.2. Right Side: Samsung Dual Band

Install one Samsung dual band radio onto the hanging bracket assembly on the right side of the CUBE. Figure 14 shows the hanging bracket assembly.

1. Loosen the securing screws and lift off the hanging brackets from the mounting plate.
2. Mount the radio onto the radio mounting bracket using customer supplied hardware.
3. Return the hanging brackets to the mounting plate and tighten the securing screws on the bottom.

3.9.3. Left Side: Samsung Dual Band

1. Loosen the securing screws and lift off the hanging brackets from the mounting plate.
2. Detach the 4455 bracket assembly from the radio mounting bracket. Store or discard the bracket and hardware per company practice.
3. Mount the second Samsung dual band radio onto the radio mounting bracket using customer supplied hardware (Figure 15).
4. Return the hanging brackets to the mounting plate and tighten the securing screws on the bottom.

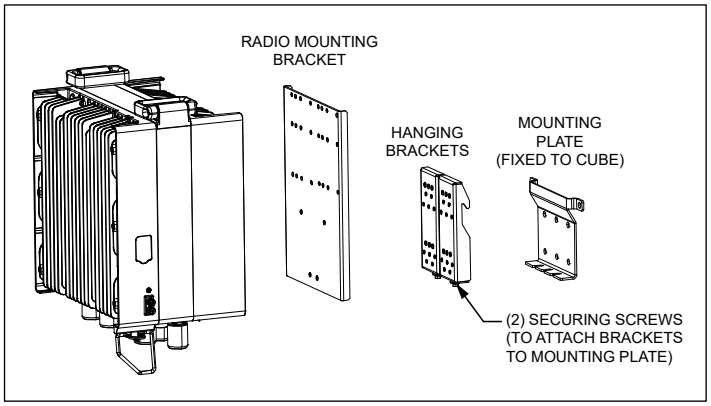

Figure 14
Right Side Samsung Dual Band Radio

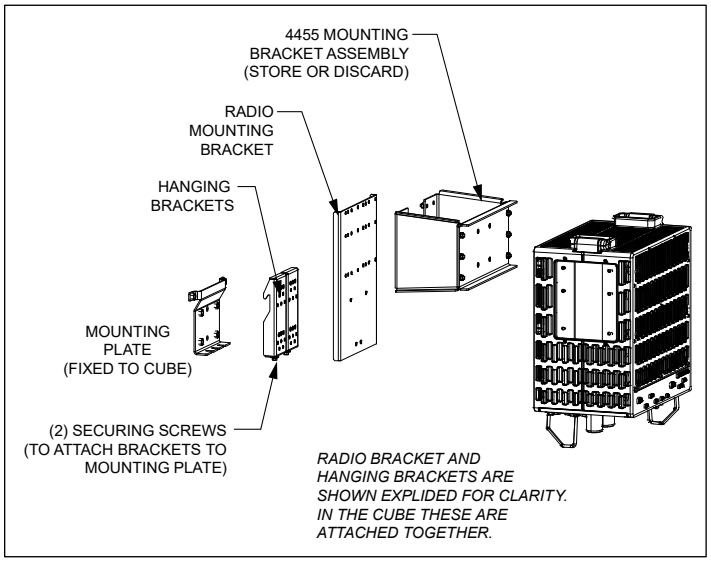

Figure 15
Left Side Samsung Dual Band Radio

3.9.4. Diplexers and CBRS

The brackets for these internal components are hook-mounted on a shared back plate.

1. Remove the bracket by removing the screw near the bottom of the bracket and then lifting the bracket hooks off the holes in the back plate (Figure 16). Save the screws.
2. Mount the CBRS onto the right side of the forward leg of the CBRS mounting bracket.
3. Mount the diplexers on either side of the forward leg of the diplexer mounting bracket.
4. Replace both brackets onto the back plate and secure using the screws removed previously.

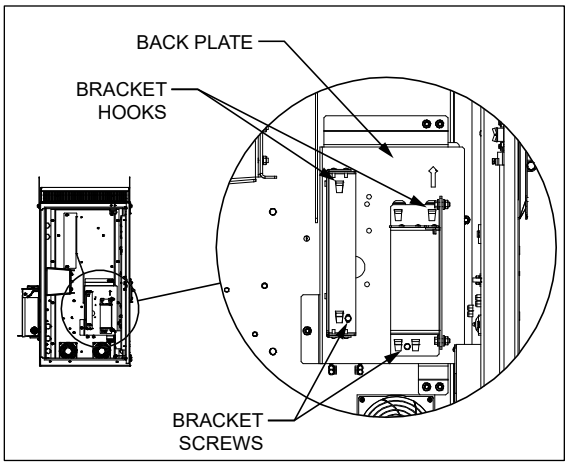

Figure 16 Hook Mounted Brackets

3.9.5. Power Supplies

The OmniOn power supply brackets ship loose with the CUBE.

1. Remove the AC-08 brackets from the rear of the CUBE. Store or discard the brackets per company practice.
2. Locate the correct brackets for the OmniOn power supplies (Figure 3).
3. Attach the power supplies to the brackets using customer supplied hardware.
4. Mount the bracket/power supply assembly onto the back of the CUBE using four 1/4-20 Philips screws with split washers and flat washers (Figure 17, hardware included with CUBE).
5. Replace the shroud by hanging the keyhole slots on the four mounting screws. Use the long screwdriver through the shroud mounting holes to tighten the screws. Then replace the plugs removed previously.

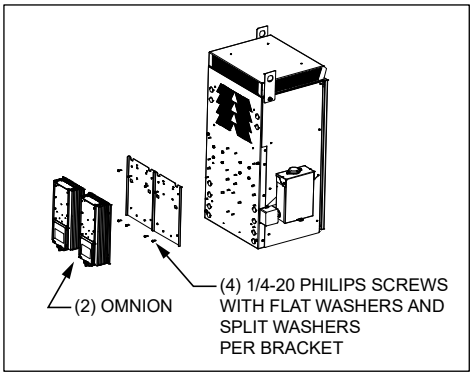

Figure 17 Power Supply Mounting

3.10. Complete Assemblies

Completed assemblies for each configuration are shown in Figures 18 and 19.

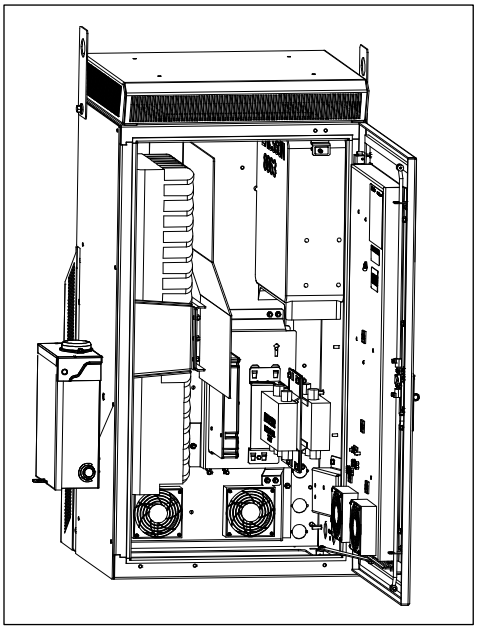

Figure 18
Ericsson Configuration

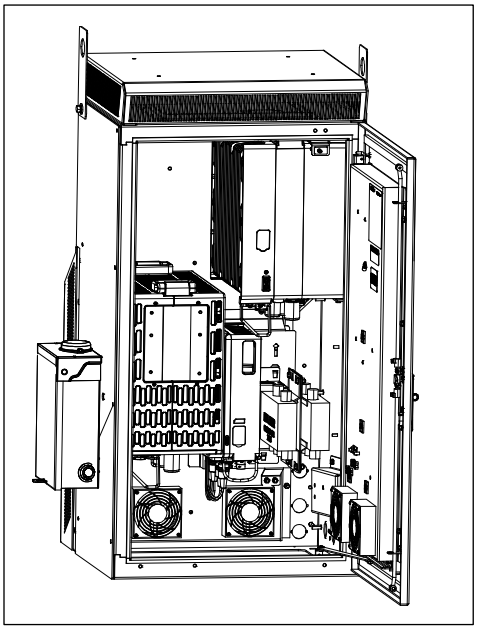

Figure 19
Samsung Configuration

3.11. Verifying the Installation

Verify that earth ground and all grounding and bonding is complete and functional. After verifying that all installer connections are secure and complete, apply voltage.

4. PERIODIC MAINTENANCE

In the event that the enclosure must be opened in freezing conditions, use a narrow, pointed metallic object such as a screwdriver or chisel, along with a non-metallic device like a rubber mallet, to remove excessive ice buildup around the door and locking mechanism. A commercial aerosol de-icer spray can be used to free up locks and latches if needed. Use protective gloves and safety glasses when applying de-icer sprays.

5. TECHNICAL ASSISTANCE AND REPAIR SERVICE

For questions on product repair or if technical assistance is required, contact Charles Technical Support.

847-806-8500
techserv@charlesindustries.com (email)
http://www.charlesindustries.com/techserv.htm

6. WARRANTY & CUSTOMER SERVICE

Charles Industries LLC offers a one-year warranty on the CUBE product. The Charles warranty is limited to the operation of the CUBE hardware as described in this documentation and does not cover equipment that may be integrated by a third party. The terms and conditions applicable to any specific sale of product shall be defined in the resulting sales contract. For questions on warranty or other customer service assistance, contact your Charles Customer Service Representative.

847-806-6300
mktserv@charlesindustries.com (email)
http://www.charlesindustries.com/main/telecom_sales_support.htm

7. SPECIFICATIONS

Physical	
Dimensions	48”Hx24”Wx25”D
Weight	Approx. 365 lbs. as shipped
Materials	0.125” aluminum
Color	Off-white
Electrical	
Bonding and Grounding	2x8 position ground bar inside cabinet
Cable Entry	See Figure 2 and section 3.7.4
Thermal	
DAC	(4) 48VDC, 243CFM, Delta PFB1248UHE-EP
Environmental	
Operating Temp. Range, Outside Enclosure	-40° to +115°F, -40° to 46°C
Operating Temp Range, Inside Enclosure	-40° to +131°F, -40° to 55°C
Humidity	0 to 95% (non-condensing)
Altitude	Up to 2,000 meters (6560 feet)
Kits and Replacement Parts	
Touch-up Paint	02-000290-0
216 Type Security Tool	07-002070-0
Replacement Gasket	39-000520-0
Shim Kit for Leveling	97-000010-0
Swing Handle	39-000148-0
2-Wire Door Alarm Switch	17-400314-0
Replacement DAC Fan	18-950454-0
Power Supply Kit	96-SH5660FNKIT1
CPAD Composite Mounting Pad	CPAD-S1EXXXXXA
Mounting Plinth Kit	97-002499-A

Table 1 CUBE Specifications