

mitec telecom inc.*Designers and manufacturers of telecom and wireless products*9000 Trans Canada,
Pointe-Claire, Quebec, Canada
H9R 5Z8**PRODUCT DOCUMENT**

Preliminary



Released

**REVISION RECORD**

Revision	ECN #	Description	Date	Approved
0	-	Preliminary release	03 Nov 09	P.Mousseau
1		Additional safety information regarding RF exposure. More detailed description of the MCPA architecture.	07 Dec 09	P.Mousseau
2		Combo D-SUB MCPA connector pin out added	09 Dec 09	P.Mousseau
3		Restricted Area notification (section 2.2)	14 Dec 09	P.Mousseau

CM Approval**TITLE****24W Remote Node MCPA Installation
Instructions****Author: P. Mousseau, ing.****DATE: 03 NOV 09****Technical Writer: n/a****DATE: 03 NOV 09**

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1.0 Scope

This package includes documentation for mitec's 24W Remote Node MCPA. It is intended to provide customer personnel with a comprehensive reference manual for installation and operation.

The package is structured as follows;

2.0 System Overview

2.1 General Description

2.2 Preparing for Installation

2.3 Safety Precautions

2.4 Warranty Information

3.0 System Installation

This section contains information for the connection of the various components of the 24W Remote Node MCPA, including system connections.

4.0 System Operation Test

This section describes the test to be carried out after installation to ensure proper operation.

2.0 System Overview

2.1 General Description

The 24W Remote Node MCPA is composed of an MCPA (Multi-Carrier Power Amplifier), a passive TX Filter, an AC Power Supply, two fans and a DCDC Converter board. It's main feature is to amplify one or more RF carriers in a range of 27.5 to 43.0dB.

Modules Description

The Power Supply converts the 110VAC to +28VDC to power up the MCPA and the DCDC Converter module.

The DCDC Converter module provides +24VDC to the fans and a +5VDC for the Controller module (not included in the Remote Node MCPA as shipped to the customer).

The MCPA's function is to amplify the input signal by 48dB. The MCPA is a linearized feed-forward amplifier with a pilot tone. There are two sections to the amplifier, the main amplifier and the error amplifier. The error amplifier is there to cancel part of the intermodulation products that are generated in the main amplifier whose function is to amplify the input signal to 24Watts. The pilot tone is used to monitor and cancel these intermodulation products. The cancellation is adaptive, meaning that a sample of the pilot tone is fed back to the main and error amplifier to adjust their phase and amplitude to maintain good cancellation of the intermodulation products over time and temperature.

The MCPA gain is controlled using an integrated digital attenuator, which has a range of 0 to 15.5dB. The MCPA also has over power and over temperature protection.

The TX Band Pass Filter is used to remove undesired the out of band spurious.

2.1.1 Abbreviations and Explanations

Table 1 - Abbreviations Table

Abbreviation	Explanation
BTS	Base Transceiver Station
DAS	Distributed Antenna System
MCPA	Multi-Carrier Power Amplifier
MHz	Megahertz
mm	millimeter
RN	Remote Node

2.2 Preparing for Installation

Before attempting to install or use the 24W Remote Node MCPA, we recommend that you first familiarize yourself by reading through this documentation package. Understanding the system operation will reduce the possibility of incorrect installation, thereby causing damage or injury to yourself or others.

The MCPA must be installed in accordance with the conditions and recommendations contained in the following sections. The HPA must be installed in a restricted location area accessible only to authorized personnel.

2.3 Safety Precautions

Carelessness or mishandling of the 24W Remote Node MCPA may damage the equipment causing serious injury to yourself or others. All installation activity must be carried out in compliance with the safety instructions supplied with the BTS and with local standard authority warnings and precautions..

Please adhere to the following:

WARNING!!

This equipment is designed for use with high power radio frequency (RF) radiating systems. Personnel must take precautions to minimize exposure to the RF fields by making sure that the output port is terminated (connected to an antenna OR attached to a >40W RF load) at all time when the amplifier is running. It is also highly recommended that the input port is terminated to protect the devices from accidental overdrive (oscillations), which could damage the amplifier.

WARNING!!

The equipment is designed for use with equipment that generates high voltages. Proper precautions must be taken when working with this equipment.

CAUTION!

To prevent damage to static sensitive devices, ESD (electrostatic discharge) precautions must be observed when handling or installing the modules or subassemblies of the 24W Remote Node MCPA.

Do not tamper with, or attempt to reconfigure, the cords or plugs supplied with the modules of the 24W Remote Node MCPA, as this can:

- ◆ *result in personal injury*
- ◆ *void the warranty*
- ◆ *cause damage to the units or related equipment*

2.4 Warranty Information

Mitec Telecom Inc. will warranty each product that it manufactures to be free from defects in materials and workmanship for a period of twelve (12) months.

Mitec's only obligation under this warranty is to, at its option, repair or replace any product or part thereof that is returned with transportation charges prepaid to **Mitec Telecom Inc.** by the original purchaser within one year after delivery to the original purchaser, and which, upon examination by **Mitec**, is determined to be defective or to have failed the normal service.

2.4.1 Equipment Damage or Loss

Mitec Telecom Inc. is not responsible for damage or loss of equipment during transit. For further information, contact the responsible transport carrier.

When declaring equipment as damaged during transit, preserve the original shipping cartons to facilitate inspection reporting.

2.4.2 Return of Equipment

All warranty returns must be authorized by the **Mitec Customer Service Department**, which will issue a Return Material Authorization (RMA) number. This is important for prompt, efficient handling of the returned equipment and of the associated complaint

When returning equipment to Mitec for repair or replacement:

1. Notify **Mitec Customer Service Department** of the equipment condition and obtain a Return Material Authorization (RMA) number and shipping instructions at:
 - a. Email: sales@mitectelecom.com
 - b. Telephone: (514)694-9000 ext. 2122
 - c. Fax: (514)694-3814
2. Identify, in writing, the condition of the equipment.
3. Include to the Part Number, Serial Number, Sales Order, Purchase Order and the date the equipment was received.
4. Mitec will pay for the cost of shipping the product to the customer after the repairs are completed.

3.0 System Installation

3.1 System Block Diagram

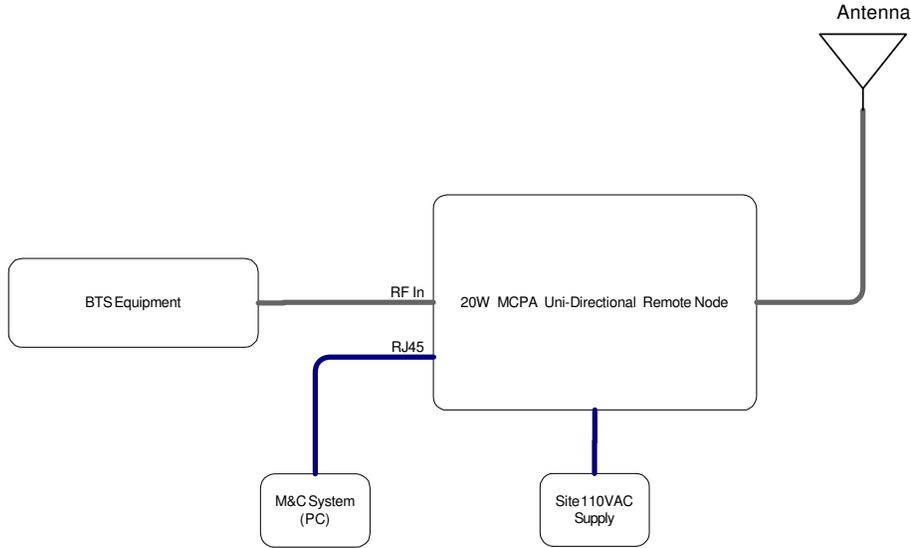


Figure 1 – System Block Diagram

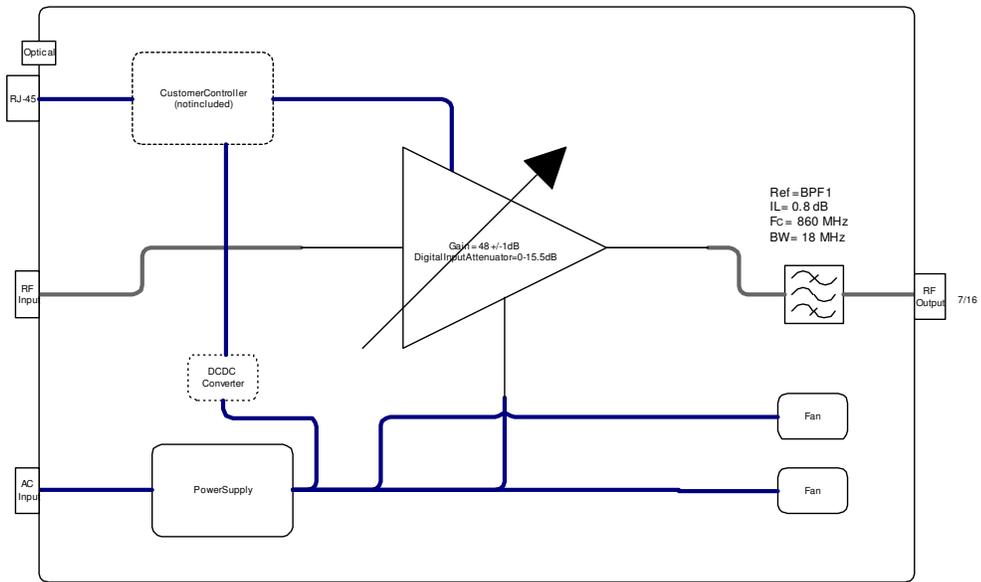


Figure 2 – 20W MCPA Remote Node Block Diagram

3.2 Installation Overview

The following section describes how to mount the 24W Remote Node MCPA. It can be wall mount or on a pole. Both methods are detailed below.

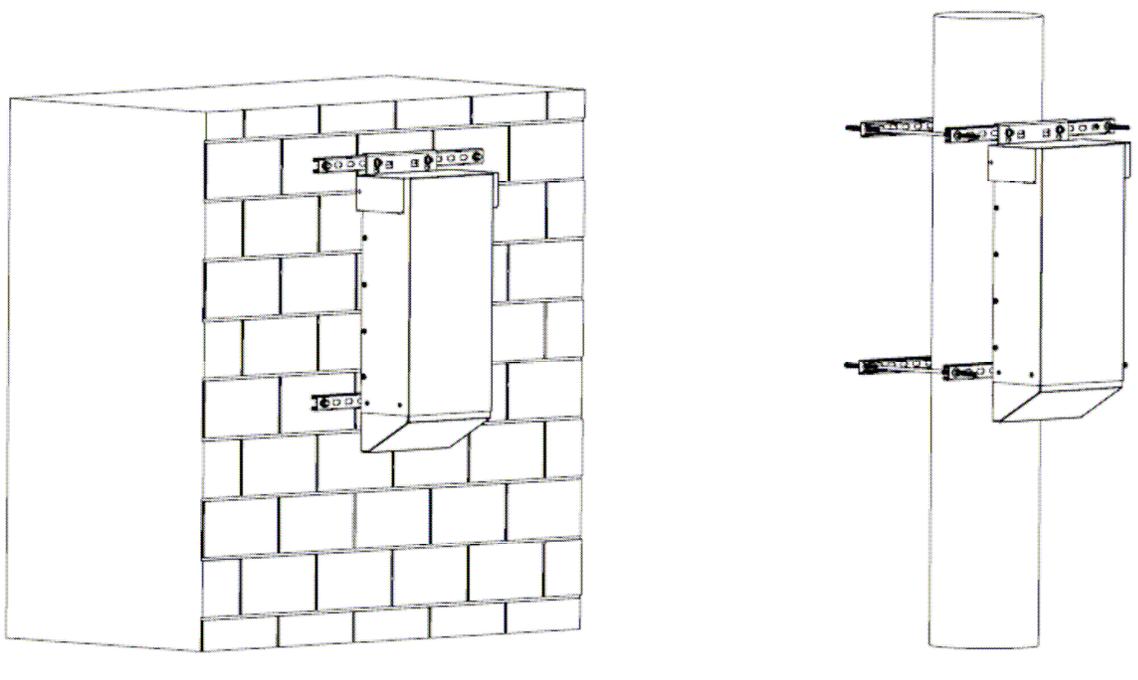


Figure 3 – Wall mount or pole mount installation

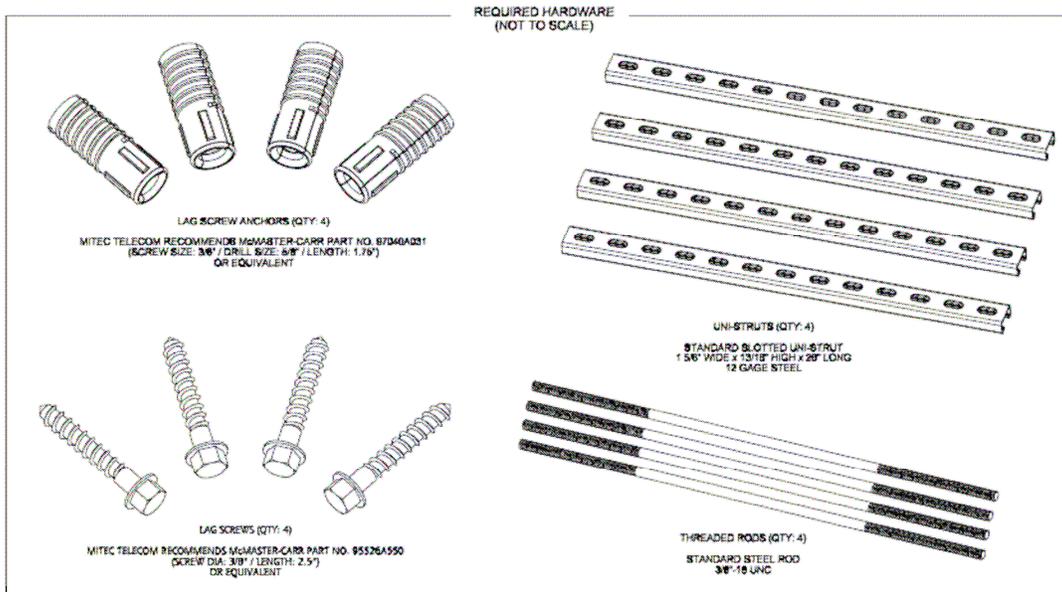


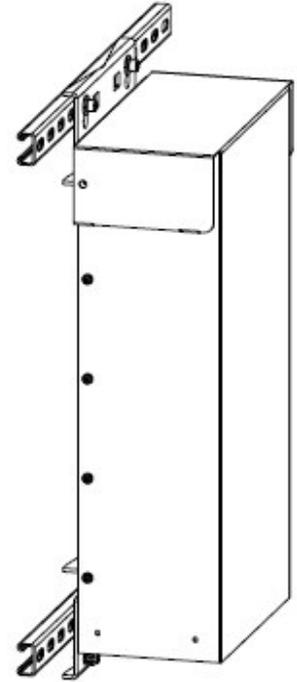
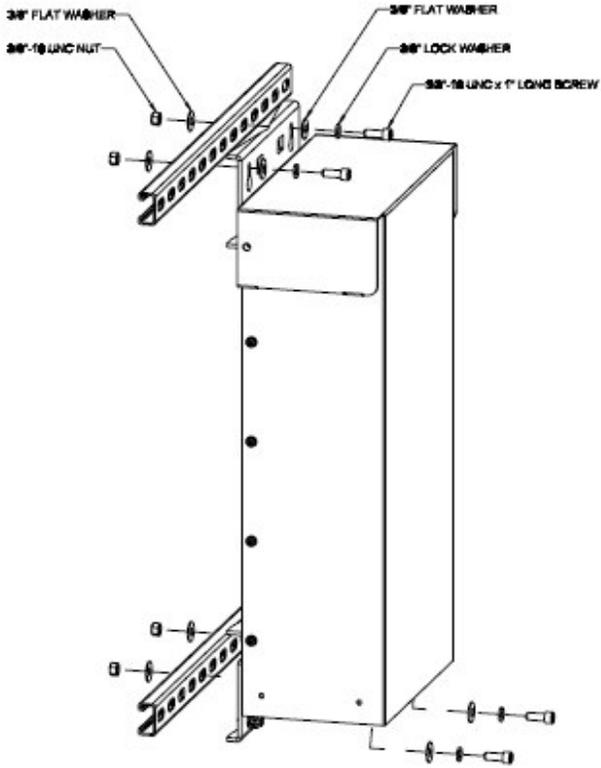
Figure 4 – Required Hardware

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PRELIMINARY

USING STANDARD 3/8" FASTENERS, SECURE UNI-STRUTS TO DAS UNIT.

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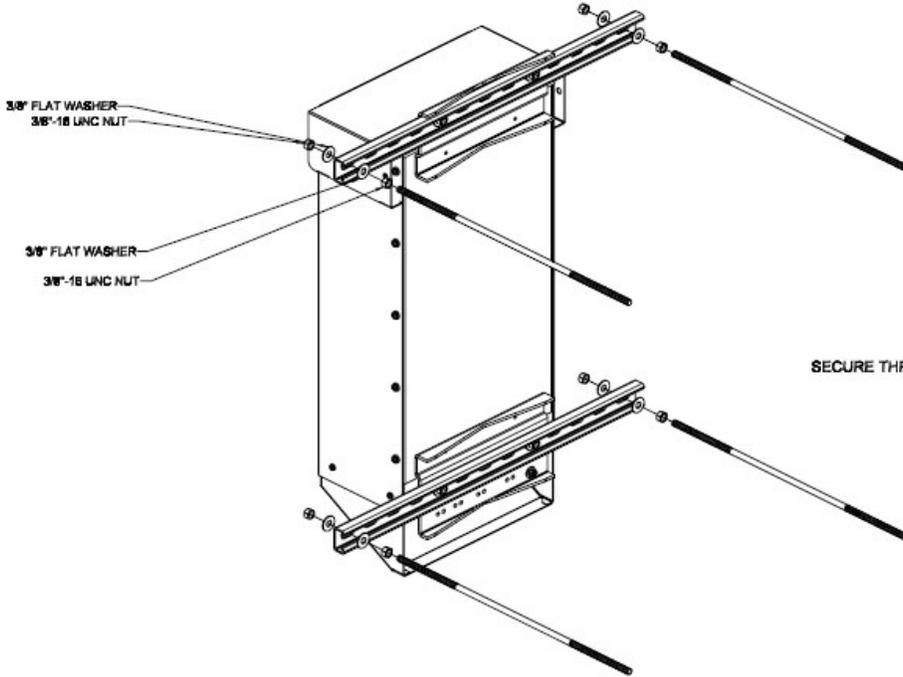
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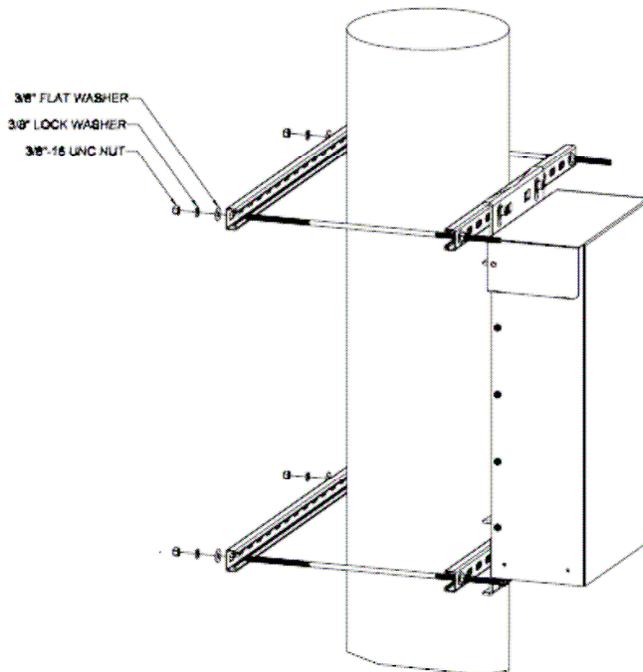
3.2.1 24W Remote Node MCPA Installation

The 24W Remote Node MCPA has been designed to be mounted on a flat wall surface or on a pole as close as possible to the associated antenna.

3.2.1.1 24W Remote Node MCPA Pole Mounting



STEP 1
USING STANDARD 3/8" FASTENERS,
SECURE THREADED RODS TO UNI-STRUTS MOUNTED ON DAS UNIT



STEP 2
PLACE DAS UNIT AGAINST POLE AT DESIRED HEIGHT AND
CLAMP IN PLACE BY ATTACHING 3/8" FASTENERS TO UNI-STRUTS

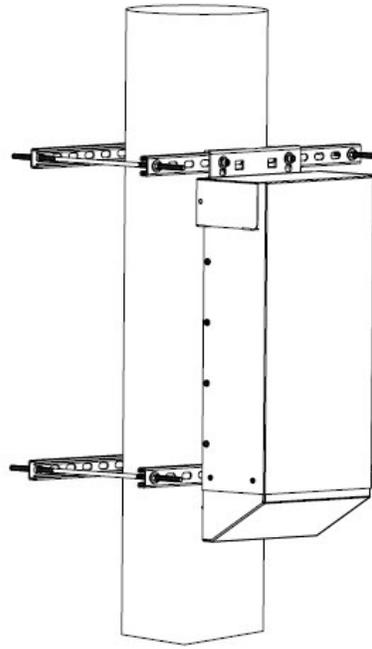
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- STEP 3**
- (I) ATTACH EXTERNAL CABLES (NOT SHOWN)
 - (II) REINSTALL DAS CABLE COVER

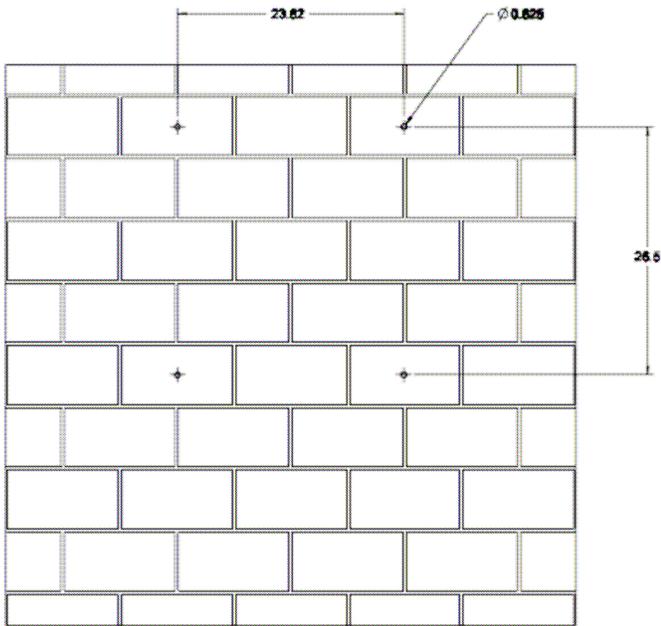


BREAKER INFORMATION AND FUSE RATING
BRANCH CIRCUIT PROTECTION IS THE RESPONSIBILITY
OF THE INSTALLER. BREAKER ALSO ACTS AS A
DISCONNECT DEVICE.

FOR BREAKER CIRCUIT PROTECTION, THE FOLLOWING
BREAKER SHOULD BE USED:
GE 15 AMP THQP TYPE (OR EQUIVALENT)

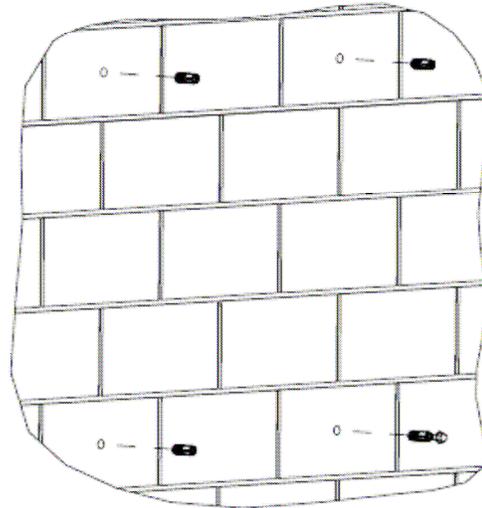
NOTE: F1 FUSE USED WITHIN DAS UNIT POWER SUPPLY IS
LITTLEFUSE 15 AMP 324P SERIES.

3.2.1.2 Optional 24W Remote Node MCPA Flat Wall Surface Mounting



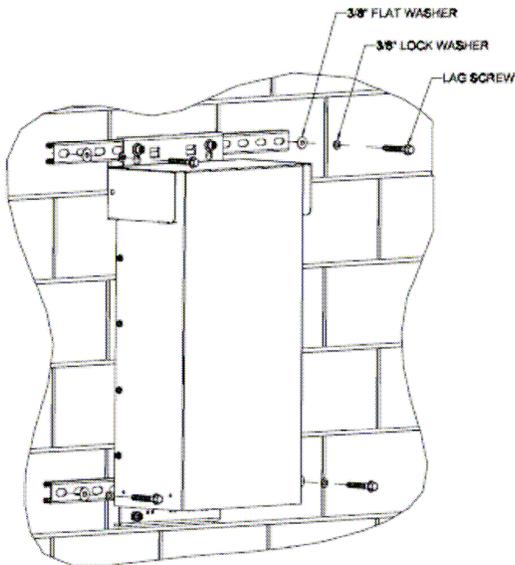
STEP 1

DRILL 4 $\varnothing 5/8"$ HOLES INTO WALL TO A DEPTH OF 1.75", AS DETAILED ABOVE



STEP 2

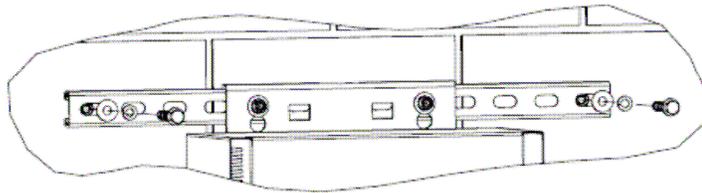
INSERT LAG SCREW ACHORS INTO DRILLED HOLES UNTIL FLUSH WITH WALL SURFACE



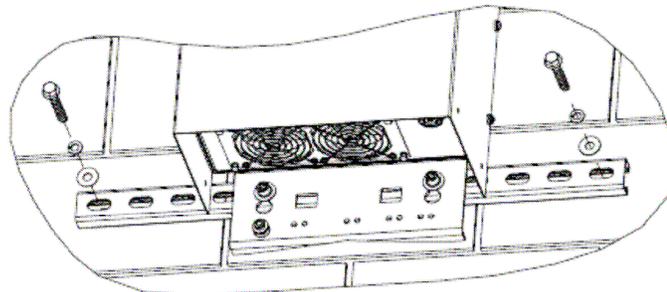
STEP 3

- (I) PLACE DAS UNIT AGAINST WALL, AS ORIENTED ABOVE
(ENSURE THAT CABLE COVER IS REMOVED BEFORE PLACING UNIT AGAINST WALL)
- (II) FASTEN UNIT TO WALL WITH LAG SCREWS PASSING THROUGH UNI-STRUTS.

TOP FASTENER DETAIL



BOTTOM FASTENER DETAIL



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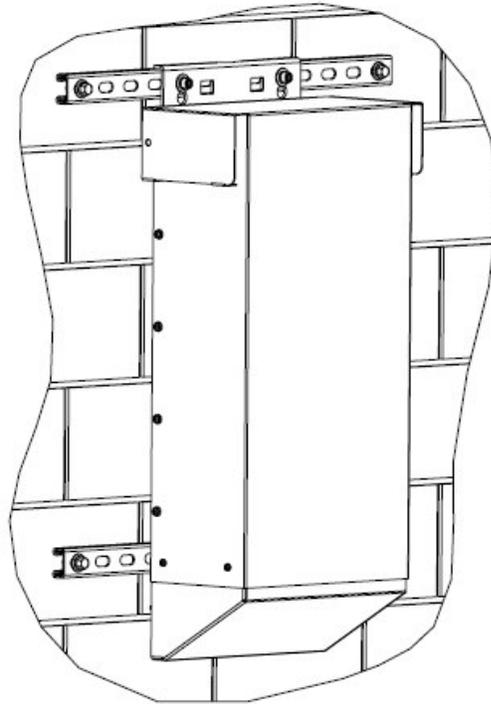
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- STEP 4**
- (I) ATTACH EXTERNAL CABLES**
 - (II) REINSTALL DAS CABLE COVER**

BREAKER INFORMATION AND FUSE RATING
BRANCH CIRCUIT PROTECTION IS THE RESPONSIBILITY OF THE INSTALLER. BREAKER ALSO ACTS AS A DISCONNECT DEVICE.

FOR BREAKER CIRCUIT PROTECTION, THE FOLLOWING BREAKER SHOULD BE USED:
GE 15 AMP THQP TYPE (OR EQUIVALENT)

NOTE: F1 FUSE USED WITHIN DAS UNIT POWER SUPPLY IS LITTLEFUSE 16 AMP 324P SERIES.



4.0 System Verification Test

The following test sequence should be carried out to make a quick functional test or verification of the unit. It is not intended to cover all system capabilities, but rather to confirm that the MCPA is 'healthy' and can deliver the expected RF power.

WARNING!!

The equipment is shipped without a controller (provided and integrated by the customer). In order to test the unit, a "jumper" has been soldered to short pin 1 and 15 of the MCPA DSUB 15 connector to enable the MCPA at power up.

Operator must make sure to connect the RF Output port to an Antenna or a 50W RF Load before applying AC Power to the unit.

Operator must make sure the RF input port is not left opened to avoid oscillation. The RF input cable (from the BTS) must be connected or the port terminated with a 50-Ohm adapter.

The following picture shows the recommended bench setup for the verification. The Signal Generator could be replaced by the BTS signal and the RF Load by the antenna and its cable. The output power could be measured by reading the dc voltage on pin 9 of the MCPA DSUB connector, but the recommended setup was defined such a way to avoid opening the unit. For that reason an external coupler is required.

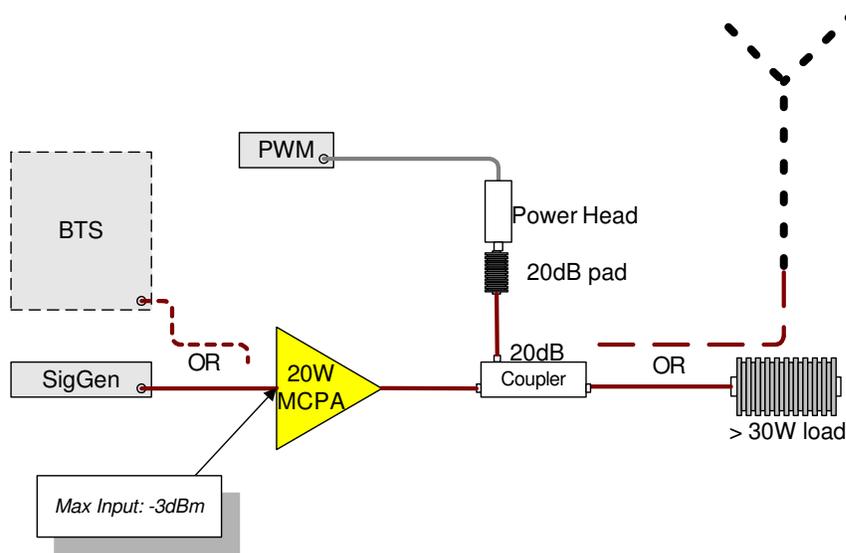


Figure 5 – Recommended Test Setup

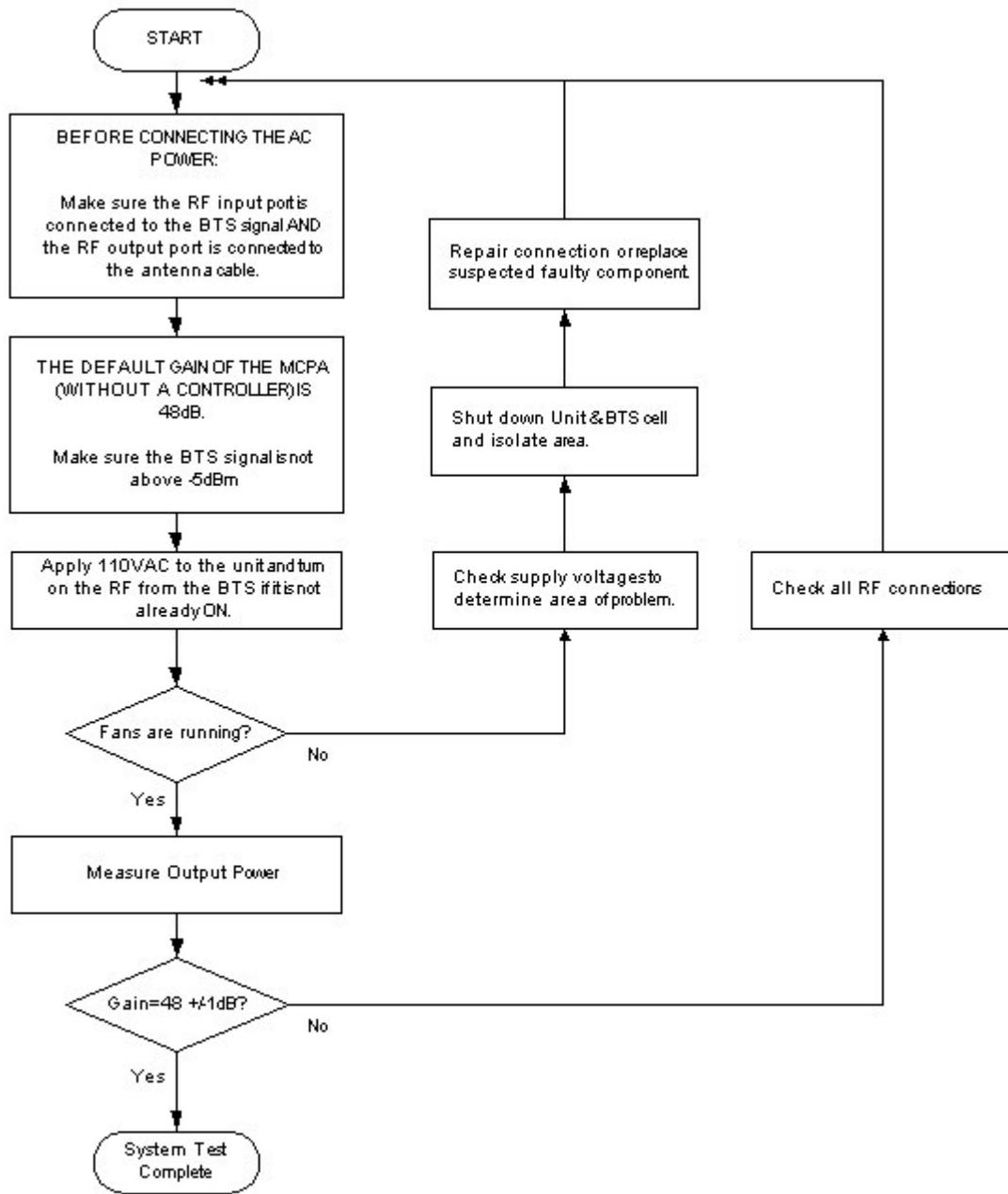


Figure 6 – System Verification Flow Chart

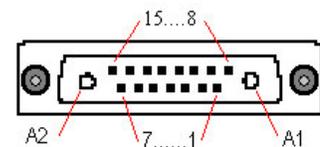
Appendix A MCPA Connector pin out

Pin	Name	Type	Active	Details	Notes
A1	+30 Vdc ground	Analog	-		
A2	+30 Vdc supply	Analog	-		
1	/ RF Power Enable	Digital Input	LOW	Pulled LOW: PA is turned ON Pulled HIGH: PA is turned OFF Tri-state: PA is turned OFF	
2	/ RF Enabled	Digital Output	LOW	Driven HIGH and PA is turned OFF if: <ul style="list-style-type: none"> Pin 1 is Tri-state or pulled HIGH or Temperature exceeds safe operating limit or Current exceeds max current rating or PA is protecting itself from damage or PA has been Shut Down or PA has otherwise failed 	2
3	Over Temperature	Digital Output	HIGH	Set HIGH if PA has exceeded safe operating temperature	3
4	VSWR Alarm	Digital Output	HIGH	Set HIGH if VSWR > 3:1	4
5	Low Gain Alarm	Digital Output	HIGH	Set HIGH if PA gain < 6 dB of the set gain	4
6	Over Drive & Shut Down	Digital Output	HIGH	Set HIGH if Pin > 6 dBm & Shut Down	3
7	Over Power & Shut Down	Digital Output	HIGH	Set HIGH if Pout > 46 dBm & Shut Down	3
8	Baseplate Temp Sense	Analog Output	-	$V_{out} = (10mV / ^\circ C) \times (Temp\ ^\circ C) + 500mV$	1
9	Forward RF Power Detector	Analog Output	-	Linear Analog Output with limits: 0.0V @ +25 dBm 2.5V @ +45 dBm	
10	0.5 dB Atten	Digital Input	LOW	Attenuates gain by 0.5 dB	2
11	1.0 dB Atten	Digital Input	LOW	Attenuates gain by 1.0 dB	2
12	2.0 dB Atten	Digital Input	LOW	Attenuates gain by 2.0 dB	2
13	4.0 dB Atten	Digital Input	LOW	Attenuates gain by 4.0 dB	2
14	8.0 dB Atten	Digital Input	LOW	Attenuates gain by 8.0 dB	2
15	Signal Ground		-		

Notes:

1. Recommended device: National LM50 (or equivalent)
2. Must have at least 5.0kΩ pull-up resistor to +3.3V
3. These alarms will turn off the PA. Once the alarm condition has been removed the PA will clear the alarm and resume normal operation
4. These alarms will not cease operation of the PA. Once the alarm condition has been removed the alarm will clear itself

15 PIN Combo-D Plug - Male



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Appendix B Fan Controller Board J3 connector pin out

The following information describes connector J3 on the Fan Controller board and its footprint has been added to clarify the exact pin out of the connector.

Fan[1 or 2]_Ctrl	-> 1 to turn off the fan [1 or 2]
Fan_Speed1	-> 1 to slow down fans speed
Fan_Speed2	-> 1 to slow down fans speed
Fan_Speed3	-> 1 to slow down fans speed
Fan_Speed4	-> 1 to slow down fans speed

*** **Only one** fan_Speedx signal must be used at a time.

