

## INSTALLATION

---

### 2-1. INTRODUCTION

This section contains installation recommendations, unpacking, inspection, and installation instructions for the Multicarrier Cellular Amplifier System. Carefully read all material in this section prior to equipment unpacking or installation. Also read and review the operating procedures in Section 3 prior to installing the equipment. Section 3 contains applicable standards imposed by the Federal Communications Commission. It is important that the licensee perform these tasks correctly and in good faith. Carefully read Parts 73 and 74 of the FCC rules to determine how they apply to your installation. **DON'T TAKE CHANCES WITH YOUR LICENSE.**

### 2-2. ELECTRICAL SERVICE RECOMMENDATIONS

Powerwave Technologies recommends that proper AC line conditioning and surge suppression be provided on the primary AC input to the +27 Vdc power source. All electrical service should be installed in accordance with the National Electrical Code, any applicable state or local codes, and good engineering practice. Special consideration should be given to lightning protection of all systems in view of the vulnerability of most transmitter sites to lightning. Lightning arrestors are recommended in the service entrance. Straight, short ground runs are recommended. The electrical service must be well grounded.

Each amplifier system should have its own circuit breaker, so a failure in one does not shut off the whole installation. Circuit breakers should be thermal type, capable of handling the anticipated inrush current, in a load center with a master switch.

### 2-3. UNPACKING AND INSPECTION

This equipment has been operated, tested, and calibrated at the factory. Only in the event of severe shocks or other mistreatment should any substantial readjustment be required. Carefully open the containers and remove the subrack and amplifier modules. Retain all packing material that can be reassembled in the event that the unit must be returned to the factory.

#### CAUTION

Exercise care in handling equipment during inspection to prevent damage caused by rough or careless handling.

Visually inspect the amplifier subrack and modules for damage that may have occurred during shipment. Check for evidence of water damage, bent or warped chassis, loose screws or nuts, or extraneous packing material in connectors or fans. Inspect all connectors for bent connector pins. If the equipment is damaged, a claim should be filed with the carrier once the extent of any damage is assessed. We cannot stress too strongly the importance of IMMEDIATE careful inspection of the equipment and the subsequent IMMEDIATE filing of the necessary claims against the carrier if necessary. If possible, inspect the equipment in the presence of the delivery person. If the equipment is damaged, the carrier is your first area of recourse. If the equipment is damaged and must be returned to the factory, write or phone for a return authorization. Powerwave may not accept returns without a return authorization. Claims for loss or damage may not be withheld from any payment to Powerwave, nor may any payment due be withheld pending the outcome thereof. **WE CANNOT GUARANTEE THE FREIGHT CARRIER'S PERFORMANCE.**

## 2-4. INSTALLATION INSTRUCTIONS

The MCR20XX Series (NTL107AC) 23-inch subrack, which holds two amplifier modules, is designed for installation in a rack or cabinet that permits access to the rear of the amplifier system for connection of DC power, RF, and control and monitor cables. The location and function of the system interface connectors are shown in figures 2-1, 2-2, 2-3, and 2-4, and are described in tables 2-1, 2-2, 2-3, and 2-4. The plug-in amplifier module connectors are shown in figures 2-5 and 2-6, and are described in tables 2-5 and 2-6.

Table 2-1. MCR20XX Series Subrack Power, Monitor, Control, and Input/Output Connectors

NO.	NAME	FUNCTION
J1	SYSTEM ALARM Connector	9-Pin female D-Sub connector. Form C alarms. Refer to figure 2-2 and table 2-2 for individual pin signals.
J2	RF OUT Connector	Type N female coax connector. Output to antenna. Refer to table 1-2 for power output level of one or two amplifier module systems.
J3	+27V Connector	Two ¼-20 Studs, +27 Vdc power input, MCPA #1
J4	RTN connector	Two ¼-20 Studs, power return, MCPA #1
J5	+27V Connector	Two ¼-20 Studs, +27 Vdc power input, MCPA #2
J6	RTN	Two ¼-20 Studs, power return, MCPA #2
J7	RS485 Connector	9-Pin female D-Sub connector. RS-485/Addressing serial communication. Refer to figure 2-3 and table 2-3 for individual pin signals.
J8	MICRO-PROCESSOR INTERFACE Connector	9-Pin female D-Sub connector. RS-485 and RS-232 serial communication. Refer to figure 2-4 and table 2-4 for individual pin signals.
J9	RF INPUT Connector	SMA female coax connector. Refer to table 1-2 for power input level to amplifier module system.

To install the amplifier system proceed as follows:

1. Insert subrack in equipment rack or cabinet and secure in place with eight screws
2. Refer to figure 2-1 for the location of all subrack input/output connectors.
3. Connect antenna cable to J2 RF OUT type N connector on rear of subrack.

### **WARNING**

**Turn off external primary DC power before connecting DC power cables.**

4. Remove protective cover over power terminal studs; do not discard. Connect positive primary power for MCPA #1 (the upper amplifier) to J3 +27V studs and negative primary power (return) to J4 RTN studs. Connect positive primary power for MCPA #2 (the lower amplifier) to J5 +27V studs and negative primary power (return) to J6 RTN studs. Tighten all connections.

### **WARNING**

**Replace protective cover over power terminal studs. Failure to replace cover properly could result in personal injury and damage to equipment in the event of a short circuit.**

5. Connect transceiver or exciter output to J9 RF IN SMA-type connector on the rear of the subrack.

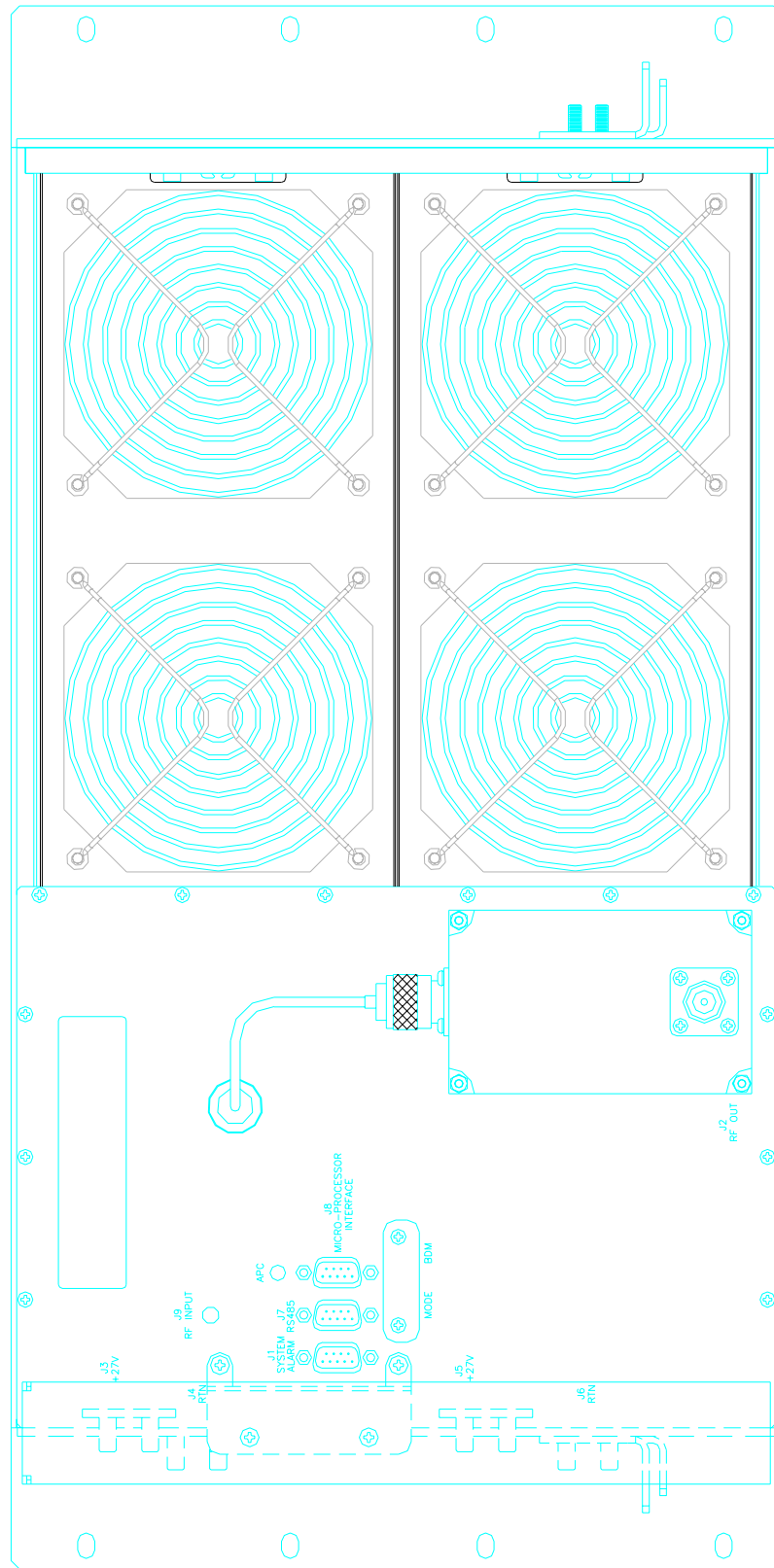


Figure 2-1. MCR20XX Series (NTL107AC)  
Subrack, Rear View

6. As required by the specific facility, one or more of the following cables should be connected:
  - Connect alarms monitor cable to J1 SYSTEM ALARM connector on rear of subrack (refer to figure 2-2 and table 2-2 for J1 SYSTEM ALARM connector definition).
  - Connect RS-485 control cable to J7 RS-485 connector on rear of subrack (refer to figure 2-3 and table 2-3 for J7 RS-485 connector definition).
  - Connect computer interface cable to J8 MICRO-PROCESSOR INTERFACE connector on rear of subrack (refer to figure 2-4 and table 2-4 for J8 MICRO-PROCESSOR INTERFACE definition).

**CAUTION**

**Verify that the power circuit breaker switches on the front panels of the amplifiers are in the right (OFF) position, and that the RF ON switches are in the down (Off) position.**

7. Install the plug-in amplifier modules in the slots of the subrack.
8. Check your work before applying DC voltage to the system. Make certain all connections are tight and correct.
9. Measure primary DC input voltage at the power distribution panel. DC input voltage should be +27 Vdc  $\pm$ 1.0 Vdc.
10. Refer to section 3 for initial turn-on and checkout procedures.

## 2-5. J1 SYSTEM ALARM CONNECTOR

The J1 SYSTEM ALARM connector on the rear of the MCR20XX Series (NTL107AC) subrack is a 9-pin female D-sub connector that permits monitoring various alarm signals for each amplifier in the subrack. Refer to figure 2-2 and table 2-2 for connector definition.

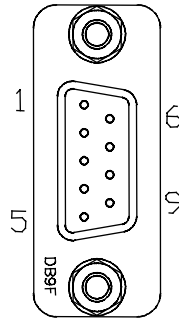


Figure 2-2. J1 SYSTEM ALARM Connector

Table 2-2. J1 SYSTEM ALARM Connector Definition

PIN	ALARM INDICATION	DESCRIPTION
1	Critical (MCPA 1 shuts down)	Under normal operation, pulled up to the 27-volt line through a 1000-ohm resistor. Opens when both fans fail or when the following alarms trigger for module #1: Over Pwr, High Temp, VSWR, DC Fail, Loop Fail, or Low Pwr.
2	Critical (MCPA 2 shuts down)	Under normal operation, pulled up to the 27-volt line through a 1000-ohm resistor. Opens when both fans fail or when the following alarms trigger for module #2: Over Pwr, High Temp, VSWR, DC Fail, Loop Fail, or Low Pwr.
3	Major 1 (any one of 4 fan fail on MCPA #1)	Under normal operation, pulled up to the 27-volt line through a 1000-ohm resistor.
4	Major 2 (any one of 4 fan fail on MCPA #2)	Under normal operation, pulled up to the 27-volt line through a 1000-ohm resistor.
5	Enable (Complete MCPA system shuts down)	Pulled to 27 volts through 630 ohms if one or more modules are active. If no modules are active, then pulled to ground through 1000 ohms.
6	APC	Under normal operation, pulled up to the 27-volt line through a 1000-ohm resistor.
7	No Connection	
8	No Connection	
9	Common Ground	

## 2-6. J7 RS485 CONNECTOR

The J7 RS485 connector on the rear of the MCR20XX Series (NTL107AC) subrack is a 9-pin female D-sub connector that permits serial interface with the MCPA system. Refer to figure 2-3 and table 2-3 for connector definition.

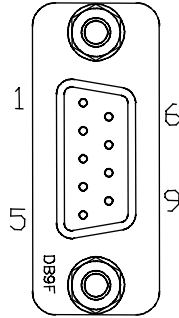


Figure 2-3. J7 RS485 Connector

Table 2-3. J7 RS485 Connector Definition

PIN	DESCRIPTION
1	RS-485 Rx+
2	Addr 0
3	Addr 1
4	RS-485 Rx-
5	Ground
6	RS-485 Tx-
7	RS-485 Tx+
8	Addr 2
9	Addr 3

## 2-7. J8 MICRO-PROCESSOR INTERFACE CONNECTOR

The J8 MICRO-PROCESSOR INTERFACE connector on the rear of the MCR20XX Series (NTL107AC) subrack is a 9-pin female D-sub connector that permits serial interface with the MCPA system. Refer to figure 2-4 and table 2-4 for connector definition. J8 will be used for the initialization process of this system.

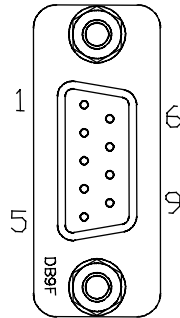


Figure 2-4. J8 MICRO-PROCESSOR INTERFACE Connector

Table 2-4. J8 MICRO-PROCESSOR INTERFACE Connector Definition

PIN	DESCRIPTION
1	RS-485 Rx+
2	RS-232 Rx
3	RS-232 Tx
4	RS-485 Rx-
5	Ground
6	RS-485 Tx-
7	RS-485 Tx+
8	Select
9	Ground

## 2-8. AMPLIFIER MODULE STATUS, ALARM, CONTROL, AND POWER CONNECTOR

Each amplifier in the subrack has a separate remote alarm and control connector which may be used by the host system to monitor and control the individual amplifier modules. The status, alarm, control, and power connections on the amplifier connector are made through a 21-pin male D-Sub combo connector (figure 2-5) and are listed and described in table 2-5.

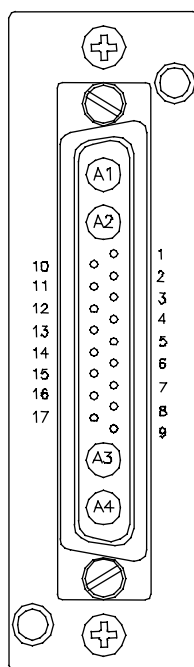


Figure 2-5. DC and Logic Connector [on Rear of G3X-800 Series (NTL107AA) Amplifier Module]

Table 2-5. Amplifier Module DC and Logic Connector Definition

PIN	FUNCTION	DESCRIPTION
A1	Power Input	+27 Vdc (Power Contact)
A2	Power Input	+27 Vdc (Power Contact)
A3	Ground	Ground (Power Contact)
A4	Ground	Ground (Power Contact)
1	RS485 +TxD	Serial Communication Data Out
2	RS485 +RxD	Serial Communication Data In
3	Service Loop	TTL input to Amp. Gnd. for special test mode (Note 1)
4	MCPA Disabled (Summary Fault)	TTL signal normally low indicates MCPA enabled. A high level indicates that the MCPA has been disabled. Over Power, Over Voltage takes one second to activate the signal.
5	Mod Addr 0	TTL input to Amp. Gnd. supplied by shelf to identify slot.
6	Mod Addr 1	TTL input to Amp. Gnd. supplied by shelf to identify slot.
7	TP1	TTL output. Future test point.
8	Manual Download	GND to download manually
9	DC on stat	TTL output. High indicates Amp is powered on.
10	RS485 –TxD	Serial Communication Data Out
11	RS485 –RxD	Serial Communication Data In
12	SCL7	No connection
13	SDA7	No connection
14	FP Disable Output	Output, GND if the front panel switch is in the OFF position; +5 volts indicates the front panel switch is in the ON position.
15	FP RST	Output, GND if the front panel switch is in the RESET position; +5 volts otherwise.
16	GND	Ground
17	Module Detect	Ground potential. Informs the subrack that an MCPA is plugged in.

Note 1: Service loop grounded allows the MCPA to be enabled or disabled by the front panel switch when not mounted in the shelf.



## 2-9. AMPLIFIER MODULE RF CONNECTOR

Each amplifier in the subrack has a separate RF connector which is used for RF signal input and output. The RF connections on the amplifier connector are made through a 2-pin female D-Sub combo connector (figure 2-6) and are listed and described in table 2-6.

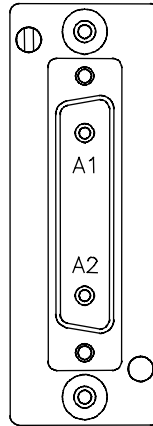


Figure 2-6. Amplifier RF Connector

Table 2-6. Amplifier RF Connector Definition

PIN	FUNCTION	DESCRIPTION
A1	RF Input	Coaxial Contact
A2	RF Output	Coaxial Contact