INSTALLATION AND SERVICE MANUAL

P35-60MO-C8-PS-VH

Continuous Duty VHF Power Amplifier

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1. GENERAL DESCRIPTION

1.1. INTRODUCTION

This manual contains installation and operating information for the Crescend High Power VHF Power Amplifier. The manual is organized into three sections as follows:

Section 1. General Description

Section 2. Installation

Section 3. Operating Information

1.2. PRODUCT DESCRIPTION

The Crescend Technologies High Power VHF RF power amplifier is designed for paging and other VHF applications that use a single carrier constant envelope waveform. The amplifier is designed to be powered from either an external +48 VDC source or an optional internal AC power supply. The amplifier covers the 150-174 MHz band without retuning. Amplifier specifications are shown in Table 1-1. There are four input ranges available as shown in Table 1-2. Closed loop power control is used to maintain a constant output power under varying voltage, signal input level, frequency and output load conditions. Several design features work to protect the amplifier under adverse conditions.

The amplifier is designed to fit into 5.25 inches (3RU) of vertical 19 inch rack space. The front panel includes LED indicators for monitoring status and alarm conditions. This information is also accessible via a monitor connector on the rear of the amplifier. The fan assembly draws ambient air in from the front and blows the air across the heat sink fins out the back of the amplifier.

- Notice: The manufacturer's rated output power of this equipment (see Table 1-1) is specified for single carrier operation using constant-envelope modulation. This equipment is NOT designed for multiple-carrier operation, nor is it intended to be used with non-constant envelope modulation waveforms.

Table 1-1. Amplifier Specifications

Specification	Value
Instantaneous Bandwidth	150-174MHz
Input Power	60-100W
Output Power	350W
Nominal Gain (@350W Output)	8.5dB
Input Impedance	50Ω
Output Impedance	50Ω

2. INSTALLATION

2.1 INSTALLATION INSTRUCTIONS

The amplifier is designed for installation in a rack that permits access to the rear of the unit for connection of RF and monitor/control cables, and DC power cables or AC line cord if the unit incorporates the internal AC power supply option. The amplifier must have a minimum of 3 inches of open space in front and to the rear of the chassis to allow adequate air flow and ventilation. If installed in a closed or multi-unit rack, the operating ambient temperature within the rack environment may be greater than the room ambient. The equipment installation must be compatible with the +60°C maximum temperature rating of the amplifier. Caution should be exercised when rack mounting the amplifier to avoid creation of a hazardous condition due to uneven mechanical loading. Avoid "top-heavy" or cantilever installations which may cause the equipment rack to become unbalanced. Consideration should be given to the connection of the equipment to the AC or DC supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Consideration of the appropriate current rating (10A for 110-125VAC operation, 20A for +48VDC operation) should be used in addressing this
concern. Caution should be exercised with supply connections which are not direct connections to the branch circuit (e.g. use of power outlet strips). Reliable grounding of rack-mounted equipment should always be maintained.

To install the amplifier proceed as follows:

1. Mount the amplifier in equipment rack and secure in place.
2. Connect a properly sized 50 ohm cable and load (antenna) to the RF OUT connector on rear of amplifier.
3. Connect the transceiver/exciter output to RF IN connector on rear of amplifier.
4. If monitoring of PA is desired, connect alarm cable to MONITOR connector on rear of amplifier module. See section 3 for more details about monitor pins.
5. Connect a ground cable to the rear panel stud of the amplifier. A UL Listed ground bonding conductor assembly is recommended, such as Harger p/n UBC61411/4KIT5, UBC61811/4KIT5, or UBC63211/4KIT5. These ground cable interfaces consists of Harger p/n 6-6R1 ring tongue lugs crimped to various lengths of Harger p/n 6XLPE133G/YS #6 AWG ground cable.
6. If the unit is the 48 VDC version, measure the DC output voltage of the external power supply. DC voltage should be +48 +/- 0.5VDC. Turn off DC voltage.
   NOTE:
   - Make sure power supply DC is well filtered and well behaved with minimal voltage overshoot.
   - Keep DC wires as short as possible (recommend no greater than 2 feet) to minimize inductance induced voltage transients.
   - Size DC Wires properly to handle the load current to minimize voltage drop during times of transmission when current draw is highest.

   WARNING: Turn off external primary DC power before connecting DC power cables.

7. Connect positive primary power wire (+48VDC) to terminal marked +48VDC and negative primary power wire to GND terminal next to it on rear of amplifier.
8. Check your work before applying DC voltage to the system. Make certain all connections are tight and the DC wires are going to the correct terminals.
9. If the unit has the optional internal AC power supply: Connect an unpowered AC cord to AC plug on rear of amplifier.
10. Refer to Section 2.2 for initial start-up procedures.

2.2 INITIAL STARTUP

To perform the initial start-up, proceed as follows:

1. Check to ensure that all input and output cables are properly connected and tightened.

Note: Use high quality coaxial cable and connectors. Properly install all connectors for reliability.

CAUTION: Before applying power, make sure that the input and output of the amplifier are properly terminated in 50 ohms. **Do not operate the amplifier without a load attached.** Refer to Table 1-1 for input power requirements. Excessive input power will damage the amplifier.

NOTE: The output coaxial cable between the amplifier and antenna must be 50 ohm cable and adequately sized to handle the rated power level with additional stresses from high VSWR taken into account. The shield of the 50 ohm coaxial cable must be connected to ground at the entrance of the building in which the equipment is installed. This should be done in accordance with applicable national electrical installation codes. In the U.S., this is required by Section 820.93 of the National Electrical Code, ANSI/NFPA 70.

2. Apply 48 VDC from your power supply or AC mains power (depending on whether amplifier has the optional internal AC power supply) to the amplifier with the supplied line cord. After a short delay, the fans will power on. Check that all four fans are running.

3. Visually check the indicators on the front of the amplifier and verify the following:
   a. The PWR ON indicator (green) is on.
   b. All other LED indicators (red and yellow) are off.

4. Set the external exciter power level so that it is within the specified input power range and apply the RF signal to the amplifier input port. The amplifier will deliver nominally 350W at the output connector. The green exciter drive status LED will illuminate when the RF drive is detected. This LED is meant to give the user a general indication that the exciter is active and is delivering output power when troubleshooting an alarm condition. However, it does not indicate that the minimum input power level has necessarily been reached.

5. Remove the RF input signal. The output power will drop to zero. Only the Power On indicator will be illuminated. Amplifier is ready for use.

3. OPERATING INFORMATION

3.1 INTRODUCTION

This section contains general amplifier operating information

3.2 STATUS INDICATORS AND MONITOR CONNECTOR

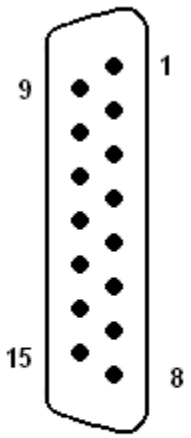
The amplifier status indicators and alarms are described in Tables 3-1 and 3-2.

Table 3-1. High Power VHF Amplifier Status LED Indicators

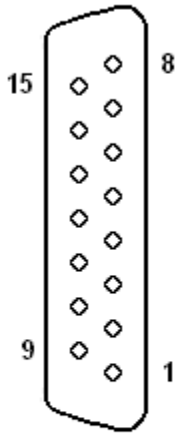
STATUS LED	FUNCTION
PWR ON	Green LED. Illumination indicates unit is on
EXCITER DRIVE	Green LED. Illumination indicates RF input power has been applied
HIGH TEMP	Red LED. Activates when the amplifier exceeds a safe operating temperature. Unit shuts down until safe operating temperature returns
HIGH VSWR	Red LED. Activates when load VSWR $\geq$ 3:1. Amplifier shuts down. LED remains illuminated until drive is reapplied after high VSWR load has been corrected
HIGH INPUT	Yellow LED. Illumination indicates RF input power exceeds safe ~125% of rated input power. LED remains illuminated until RF input removed
LOW OUTPUT	Yellow LED. Can activate when power drops due to low gain or minimum specified input level is not applied

Table 3-2. Monitor Connector Description

PIN NO	NAME	DESCRIPTION
1	POWER CTL	Output Power Level Control
2	LOW PWR	Alarm - Low Output Power
3	HI INPUT	Alarm - RF Input Power Above Maximum Rating
4	REV PWR	Reverse Power Voltage
5	GND	Ground Return
6	FORM C (NC)	Normally Closed Pin of Form C Relay
7	FORM C (COM)	Common Pin of Form C Relay
8	FORM C (NO)	Normally Open Pin of Form C Relay
9	RF DRIVE	Minimum RF Input Drive Indicator
10	HI TEMP	Alarm - High Temperature Amplifier Shutdown
11	HI VSWR	Alarm - High VSWR
12	FWD PWR	Forward Power Voltage
13	GND	Ground Return
14	GND	NOT FOR EXTERNAL CONNECTION - DO NOT USE
15	N.C.	



Male Plug
(Front View)
Amplifier Connector



Female Socket
(Front View)
Matching Interface

3.3 DETAILED STATUS INDICATOR AND MONITOR CONNECTOR INFORMATION

The detailed amplifier status indicators, alarm truth table and monitor connector information is described in detail in Tables 3-3 through 3-5.

Table 3-3. Amplifier Status Indicators

LED NAME	FUNCTION	INDICATION	CONDITION	RECOVERY
PWR ON	DC Power Up Indicator	Green Light	Power is turned on	Power source is active
		Off	Power is turned off	
EXCITER DRIVE	Minimum RF Input Power Indicator	Green Light	RF input power is at or above threshold. If no other alarms present, the amplifier is placed into transmit mode	Set RF input power above threshold
		Off	RF power on input is below an activation threshold. Amplifier is in stand-by mode	
HI TEMP	Alarm - High Temperature Amplifier Shutdown	Red Light	Alarm – Temperature has exceeded maximum operation threshold. The amplifier output is shutdown	To reset the alarm, it is necessary for the amplifier to cool to a temperature below the maximum safe operation threshold
		Off	Normal operation	
HI VSWR	Alarm - High VSWR at Amplifier Output	Red Light	Alarm $\geq$ 3:1VSWR on the amplifier output was detected. The amplifier output is shutdown	To reset the alarm, it is necessary to remove the high VSWR from the amplifier output and reapply RF input power (The LED will remain illuminated after RF input power is removed)
		Off	Normal operation	
HI INPUT	Alarm - RF Input Power Above Maximum Rating	Yellow Light	Alarm - RF power on input exceeds threshold level	Remove RF drive power from the amplifier input
		Off	Normal operation	
LOW OUTPUT	Alarm - Low Output Power	Yellow Light	Alarm – the analog control loop is open and unable to adjust the output power level	Alarm is turned off only when the analog control loop is closed. Check if drive level is within normal limits. If RF input is within range, and all other conditions are normal, this may indicate a potential PA failure
		Off	Normal operation	

Table 3-4. Alarm Truth Table

Alarm	LED Color	PA Shutdown (No Output)	Form C relay	Recovery
HI TEMP	Red	Yes	Active	Threshold (10°C hysteresis)
HI VSWR	Red	Yes	Active	Input Re-Key
HI INPUT	Yellow	No	Inactive	Input De-Key
LOW OUTPUT	Yellow	No	Active	Minimum Gain Threshold

Table 3-5. Monitor Connector Description

PIN NO	NAME	SIGNAL TYPE	DESCRIPTION	SIGNAL STATES	CONDITION	APPROPRIATE LOAD
1	POWER CTL	Analog Input	Output Power Level Control	Open	Maximum output power	
				0-10V	Adjusts output power setting	
9	RF DRIVE	Digital Output	Minimum RF Input Power Indicator	<0.8V	Minimum RF power on input is present. With no alarms amplifier is set into transmit mode	> 100 kOhm, < 100pF
				>3.3V	RF power on input is below an activation threshold. Amplifier is in stand by mode	
2	LOW PWR	Digital Output	Alarm - Low Output Power	<0.8V	Alarm – the analog control loop is open and unable to adjust the output power level. Alarm is turned off only when the analog control loop is closed. Check if drive level is within normal limits. If RF input is within range, and all other conditions are normal, this may indicate a potential PA failure.	> 100 kOhm, < 100pF
				>3.3V	Normal operation	
10	HI TEMP	Digital Output	Alarm - High Temperature Amplifier Shutdown	<0.8V	Alarm – Temperature has exceeded maximum operation threshold. The amplifier output is shutdown. To reset the alarm, it is necessary for the amplifier to cool to a temperature below the maximum safe operation threshold	> 100 kOhm, < 100pF
				>3.3V	Normal operation	
3	HI INPUT	Digital Output	Alarm - RF Input Power Above Maximum Rating	<0.8V	Alarm – Input drive power has exceeded maximum allowable level. To reset the alarm, it is necessary to remove drive power from the amplifier input.	> 100 kOhm, < 100pF
				>3.3V	Normal operation	
11	HI VSWR	Digital Output	Alarm - High VSWR Detected at Amplifier Output	<0.8V	Alarm – $\geq$ 3:1 VSWR on the amplifier output was detected. Amplifier output is shutdown. To reset the alarm, it is necessary to remove the high VSWR from the amplifier output and reapply RF input power (the alarm LED will remain illuminated after RF input power is removed)	> 100 kOhm, < 100pF
				>3.3V	Normal operation	
4	REV PWR	Analog Output	Reverse Power Voltage	0-10V	Uncalibrated analog voltage that is proportional to the reflected power on the amplifier output	> 100 kOhm, < 100pF
12	FWD PWR	Analog Output	Forward Power Voltage	0-10V	Uncalibrated analog voltage that is proportional to the forward power on the amplifier output	> 100 kOhm, < 100pF
5	GND				Ground return	
13	GND				Ground return	

Table 3-5. Monitor Connector Description (continued)

PIN NO	NAME	SIGNAL TYPE	DESCRIPTION	SIGNAL STATES	CONDITION	APPROPRIATE LOAD
6	FORM C (NC)		Normally Closed Pin of Form C Relay	Open	Normal operation	<60V, 150 mA max @ 20°C, Dry Closure
				Short to FORM C (COM)	Alarm – HI TEMP, HI VSWR, HI INPUT or LOW OUPUT	
14	GND (Do Not Use)				Ground level pin - there should be no external connection to this pin	
7	FORM C (COM)		Common pin of Form C Relay	Short to FORM C (NC)	Alarm – HI TEMP, HI VSWR, HI INPUT or LOW OUPUT	<60V, 150 mA max @ 20°C, Dry Closure
				Short to FORM C (NO)	Normal operation	
15	N.C.				No connection to this pin	
8	FORM C (NO)		Normally Open Pin of Form C Relay	Open	Alarm – HI TEMP, HI VSWR, HI INPUT or LOW OUPUT	<60V, 150 mA max @ 20°C, Dry Closure
				Short to FORM C (COM)	Normal operation	

4. TROUBLESHOOTING

4.1. INTRODUCTION

This section contains a list of potential problems and suggested actions to be taken. If the suggested corrective action does not eliminate the problem, please contact the Crescend factory for further instructions.

NOTE: Do not break the seals on equipment under warranty as this will void the warranty and associated conditions. Do not return equipment for warranty or repair service until obtaining an RMA and proper shipping instructions from the factory.

4.2. TROUBLESHOOTING

Refer to Table 4-1 for troubleshooting suggestions.

Table 4-1. Troubleshooting Guide

PWR ON	EXCITER DRIVE / RF DRIVE	OUTPUT POWER STATUS	FORM C RELAY POSITION	IRL	HI TEMP	HI VSWR	HI INPUT	LOW OUTPUT	OTHER SYMPTOMPS	POSSIBLE CAUSE	SUGGESTED ACTIONS
ON	ON	Full power	NO							Amplifier is in transmit mode.	1. No action is required.
ON	OFF	No power	NO							Amplifier remains in stand-by mode.	1. Apply RF input signal to amplifier.
										Input power is below activation threshold.	1. Verify exciter signal level.
ON	ON	Low or no power	NC					ON		Input power is above activation threshold but lower than minimum specified value.	1. Verify exciter signal level.
										Input signal frequency is out of amplifier operation band.	1. Verify exciter signal frequency.
										Amplifier failure.	1. Verify exciter signal frequency and level. 2. Obtain RMA to have amplifier checked at factory.
ON	ON	Full power	NO				ON			High power input signal level has been detected.	1. Turn off input drive. 2. Verify exciter signal level.
OFF	OFF	No power	NC							Fuse failure	1. Disconnect AC cord. 2. Check fuse and replace if necessary.
										No AC power is applied to amplifier.	1. Verify AC power source.
										Power Supply failure	1. Obtain RMA to have amplifier checked at factory.
OFF	OFF	No power	NC						Fans operate	Amplifier failure	1. Obtain RMA to have amplifier checked at factory.

PWR ON	EXCITER DRIVE / RF DRIVE	OUTPUT POWER STATUS	FORM C RELAY POSITION	IRL	HI TEMP	HI VSWR	HI INPUT	LOW OUTPUT	OTHER SYMPTOMPS	POSSIBLE CAUSE	SUGGESTED ACTIONS
ON									One or more inactive fans	Fan failure	1. Obtain RMA to have amplifier checked at factory.
ON	ON	No power	NC	<5dB	ON					Ambient temperature is above 60°C.	1. Turn off input drive. 2. Allow amplifier to cool. 3. Verify cabinet ventilation and room air temperature.
										Air circulation is blocked.	1. Turn off input drive. 2. Allow amplifier to cool. 3. Disconnect AC cord. 4. Clean air vents. 5. Remove any obstacles from air inlet and outlet.
ON	ON	No power	NC	<5dB	ON				One or more inactive fans	Fan failure	1. Turn off input drive. 2. Allow amplifier to cool. 3. Disconnect AC cord. 4. Try removing any obstacles from fan blades if present. 5. Obtain RMA to have amplifier checked at factory.
ON	ON	No power	NC	<5dB		ON				Output load VSWR is above 3:1.	1. Turn off input drive. 2. Check output connections and cables for integrity and tightness. 3. Check antenna, combiner, etc. for proper return loss.
ON	OFF	No power	NO			ON				Output load VSWR greater than 3:1 was detected before RF input signal was removed.	
ON	ON	Low power	NO							Low signal is applied to POWER CTL pin.	1. Remove any voltage or short attached to POWER CTL pin.

4.3. RETURN FOR SERVICE PROCEDURES

When returning products to Crescend, the following procedures will ensure optimum response.

4.3.1. OBTAINING AN RMA

A Return Material Authorization (RMA) number must be obtained prior to returning equipment to the factory for service. Please contact our Customer Service Department at 800-872-6233 to obtain this number. Failure to obtain this RMA number may result in considerable delays in receiving repair service.

4.3.2. REPACKAGING FOR SHIPMENT

To ensure safe shipment of the amplifier, it is recommended to use the packaging designed for the amplifier. The original packaging material is reusable. If it is not available, contact Crescend's Customer Service Department for packing materials and information.

5. MAINTENANCE

5.1 INTRODUCTION

This section contains periodic maintenance requirements for reliable amplifier operation.

5.2 PERIODIC MAINTENANCE

Periodic maintenance requirements are listed in Table 5-1. Table 5-1 also lists the intervals at which the tasks should be performed.

Table 5-1. Periodic Maintenance

TASK	INTERVAL	ACTION
Clean Air Vents/Check Fan	30 Days	Inspect and clean per paragraph 5-3. Verify fan is working properly.
Inspect Cables and Connectors and General Site Conditions	6 Months	Inspect signal and power cables for frayed insulation and proper attachment. Check RF connectors to make sure that they are tight. Inspect the lightning protection system and ground at the site.

5.3 CLEANING AIR INLETS/OUTLETS

The air inlets and outlets should be checked at least every 30 days and cleaned if necessary. If the equipment is operated in a severe dust environment, it should be checked and cleaned more frequently. If dust and dirt are allowed to accumulate, the cooling efficiency will be diminished. Using either compressed air or a brush with soft bristles, loosen and remove accumulated dust and dirt from the air inlet panels. Use caution when cleaning the fan inlets: remove power from the equipment and allow the fan blades to come to a complete stop before cleaning. Never insert objects into the spaces in the fan guard while the fan is operating.

Check that the fans are running smoothly. A slow running or noisy fan may indicate an imminent fan failure. Heat is one of the biggest factors in reducing the reliability of your amplifier. Make sure the fan has access to cool and clean airflow within its mounting rack or cabinet.

6. RF ENERGY EXPOSURE

6.1 RF ENERGY EXPOSURE AWARENESS, CONTROL INFORMATION, and OPERATIONAL INSTRUCTIONS for COMPLIANCE with FCC RF EXPOSURE LIMITS

NOTICE: This power amplifier product is intended for use in environments in which personnel have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This power amplifier is NOT authorized for use by the general population, consumer, or for use under conditions where unintended or accidental exposure may occur.

This power amplifier product generates electromagnetic energy in the radio frequency (RF) spectrum to provide communications between users over a distance. RF energy is one specific form of electromagnetic energy. Other forms include, but are not limited to, sunlight and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which when used improperly, can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health, and industry work with organizations to develop standards for safe exposure to RF energy. These standards provide recommended acceptable levels for personnel who may be exposed to RF energy. The RF exposure levels described therein include substantial margins of protection.

When properly installed and used, Crescend power amplifier products meet all government-established RF exposure levels. In addition, Crescend recommends specific operating instructions for users of its power amplifier products. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it.

Please refer to the following Web sites for more information on the nature of RF energy exposure and how to control your exposure to assure compliance with established RF exposure limits.

http://www.fcc.gov/oet/rfsafety/rf-faqs.html
http://www.osha.gov/SLTC/radiofrequencyradiation/index.html

Federal Communication Commission Regulations

The FCC rules require manufacturers to comply with the FCC RF energy exposure limits for communication devices before they can be marketed in the U.S. The FCC further requires users to be fully aware of and able to control their exposure to meet RF energy exposure limits. This document includes operating instructions and information required to control your RF exposure and to satisfy compliance requirements.

RF Exposure Compliance, Control Guidelines and Operating Instructions

To control exposure to yourself and others and to ensure compliance with the RF exposure limits, always adhere to the following guidelines.

• Crescend power amplifier products are intended for use in fixed communication locations (e.g. base station sites). The antenna installation must comply with the following requirements to ensure optimum performance and compliance with the RF energy exposure limits required by the FCC.

1) The antenna should be mounted outside the site building on a roof, tower, or other support structure such that its location is inaccessible to personnel within the Minimum Permissible Exposure radius (see below).

2) The licensee must undertake the responsibility to manage the site in accordance with the applicable regulatory requirements. This may include, but is not limited to, providing advisory notices to all personnel who may be exposed to RF energy in the vicinity of the antenna, restricting access to areas adjacent to the antenna, or ceasing use of the power amplifier when RF energy exposure safety cannot be guaranteed.

• When the power amplifier is operating, a front panel LED will be illuminated. The power amplifier will be generating measureable RF energy exposure when transmitting.

• The maximum permissible exposure (MPE) radius is unique to each base site installation and is based on several factors such as the transmitter power output level, antenna gain, feed line loss, etc. It is the responsibility of the licensee to determine the MPE for the base site installation.

1) For operation below 300 MHz, the maximum exposure limit is 0.2 mw/cm^2.

2) An example calculation of the MPE radius for a 350 Watt VHF transmitter installation having a 5 dBi gain antenna and 1dB of feedline loss is provided below:

$Po = 350000$ mWatts $f = 150 - 174$ MHz

$dBd = 2.85$ antenna gain in dBd

$G1 = dBd + 2.15$ gain in dBi $S = 0.2$ $\frac{mW}{cm^2}$

$G1 = 5$ dBi

$CL = 1.0$ dB coax loss

$G = G1 - CL$ effective antenna gain (dB)

$Gn = 10^{\frac{G}{10}}$

$Gn = 2.512$ gain (numeric)

$R = \sqrt{\frac{(Po \cdot Gn)}{4\pi \cdot S}}$ $R = 591.5$ distance (cm) required for compliance

$inches = \frac{R}{2.54}$ $inches = 232.9$

$feet = \frac{inches}{12}$ $feet = 19.4$

3) In instances where the effective antenna gain (antenna gain – feedline loss) differs from the example above, the MPE radius must be calculated by the licensee. The table below presents the results of calculations of the MPE radius for a 350 Watt VHF transmitter having various effective antenna gain values.

Effective Antenna Gain (dBi)	Minimum Safe Distance (meters)	Minimum Safe Distance (feet)
3.0	**5.27**	**17.29**
4.0	**5.92**	**19.42**
5.0	**6.64**	**21.78**
6.0	**7.45**	**24.44**
7.0	**8.35**	**27.39**
8.0	**9.37**	**30.74**
9.0	**10.52**	**34.51**
10.0	**11.80**	**38.71**

- Warning

Failure to observe the minimum safe distance radius may result in exposure to RF radiated energy in excess of the FCC Maximum Permissible Exposure (MPE) limit. The licensee is responsible for the safe operation of the base site and must ensure that the Maximum Permissible Exposure limits are observed at all times.

- Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

7. REVISION HISTORY

Table 7-1. Revision History

Revision	Description	Date	Author
O	Initial Release	09/13/2024	-
A	-	09/13/2024	-
B	Formatting Changes	05/28/2025	S. Hawkins