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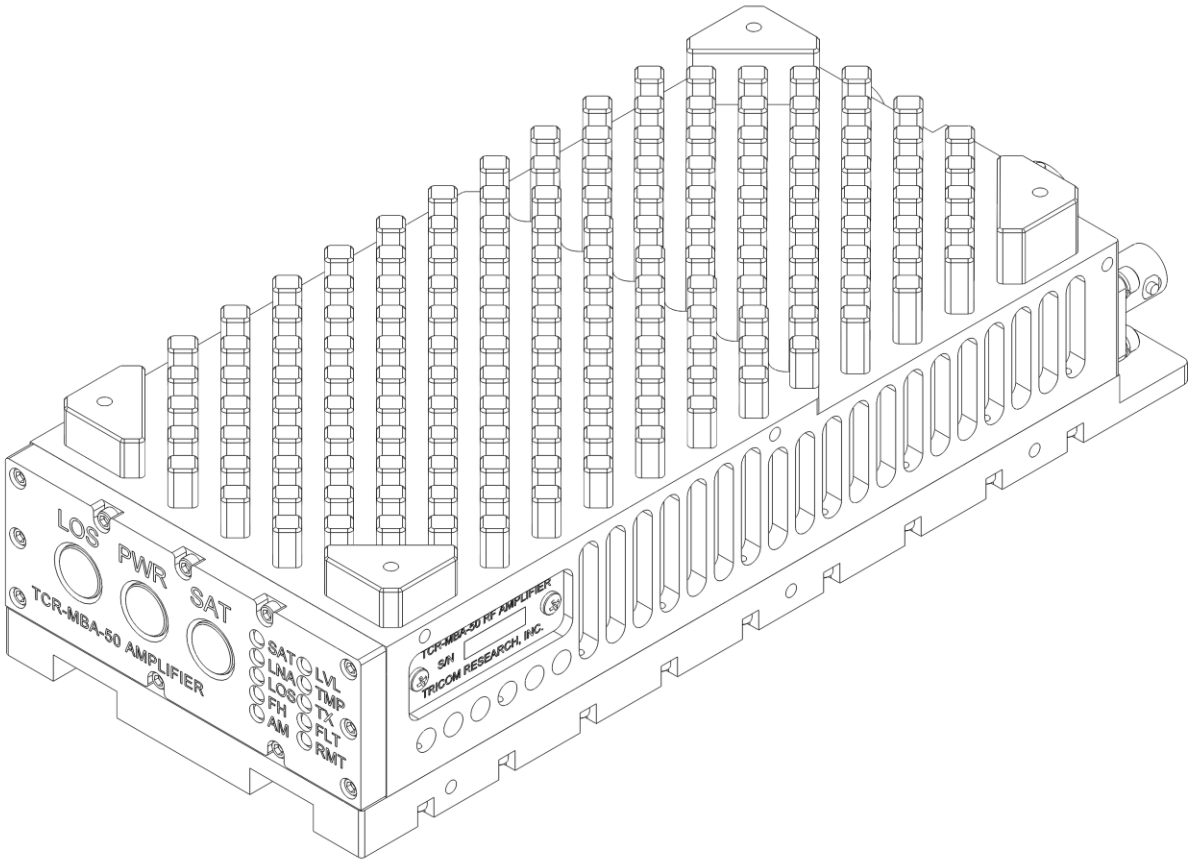
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OPERATOR'S MANUAL
TCR-MBA-50
MULTI-BAND RF AMPLIFIER



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TCR-MBA-50 OPERATOR'S MANUAL

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TABLE OF CONTENTS

1.0 INTRODUCTION
1.1 General Information....1
1.2 Abbreviations and Glossary....2
1.3 Equipment Description....3-6
1.4 Features....7
1.5 TCR-MBA-50 System....7
1.5.1 Amplifier Components....7
1.5.2 Power Cable....7
1.6 Specifications....8-9

2.0 OPERATION
2.1 General Information....11
2.2 Controls, Indicators, and Connectors....11-13
2.3 Operation....13
2.3.1 General Information....13
2.3.2 Equipment Set-up....13
2.3.3 Operating Procedures....13
2.3.3.1 Push Button Switch Operation....13-14

2.3.3.2 LNA Operation Precautions....14
2.3.3.3 Remote Control Operation....15
2.3.3.4 Out of Band Operation....15
2.3.3.5 Bypass Operation....15
2.3.3.6 Troubleshooting....15-16

3.0 INSTALLATION
3.1 General Information....17
3.2 Preparation for Use....17
3.3 Mounting Provisions....17
3.4 DC Input Power....19
3.5 RF Interconnections....19
3.6 Remote Control Interface....21
3.7 Remote Control Command Set....24

LIST OF TABLES

Table 1-1	Nominal Performance Specifications	8
Table 1-2	Interconnect Characteristics	10
Table 2-1	Mode Indicators	12
Table 2-2	Power Output Level Indicators	12
Table 2-3	Front Panel Controls	13
Table 2-4	I/O Connectors	13
Table 2-5	Troubleshooting Guide	16
Table 3-1	DC Input Power Connector Pinout	19
Table 3-2	DC Input Power Control Pin Functions	19
Table 3-3	Auxiliary Connector Interface Pinout	22
Table 3-4	Remote Control Command Set	24

LIST OF FIGURES

Figure 1-1	TCR-MBA-50 System Components	1
Figure 2-1	Amplifier Controls & Indicators	11
Figure 2-2	Amplifier Connections	11
Figure 3-1	TCR-MBA-50 Outline Drawing	18
Figure 3-2	Amplifier DC Input Connector	19
Figure 3-3	Commercial Vehicle DC Power Cable	20
Figure 3-4	Military Vehicle DC Power Cable	20
Figure 3-5	Military Battery DC Power Cable	20
Figure 3-6	Auxiliary Connector Pinout	21
Figure 3-7	USB Remote Control Cable	22
Figure 3-8	USB Remote Control Cable	23
Figure 3-9	RS-232 Remote Control Cable	23

Appendix A	MS Windows Serial Comm Port Reassignment	25

Note: The information contained herein is for reference only and does not constitute a warranty of performance.

1.0 INTRODUCTION

1.1 GENERAL INFORMATION

This manual provides operating instructions for the TCR-MBA-50 Multiband Amplifier shown in Figure 1-1. The TCR-MBA-50 is an amplifier/pre-amplifier designed to provide transmit and receive gain for the following modes of operation:

- Multiband line of sight (LOS FM and AM) 30~512 MHz communications
- SINCGARS frequency hopping 30~88 MHz operation
- HAVE QUICK frequency hopping 225~400 MHz
- UHF Tactical SATCOM (242~268 MHz receive and 292~318 MHz transmit) frequencies with Low Noise Amplifier (LNA) and Cosite suppression.

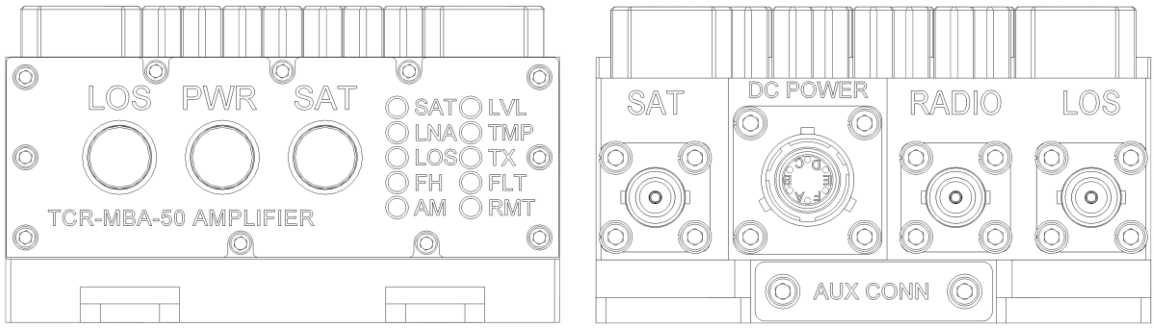


Figure 1-1. TCR-MBA-50 System Components

1.2 ABBREVIATIONS AND GLOSSARY

AGC	Automatic gain control
ALC	Automatic level control
AM	Amplitude modulation
ANT	Antenna
BPS	Bits per second
CT	Cipher text
CW	Continuous wave
COMSEC	Communications security
dB	Decibel
dBm	Decibel referenced to 1 milliwatt (0 dBm = 1 mW)
FM	Frequency modulation
Hz	Hertz
IW	Integrated Waveform
JITC	Joint Interoperability Test Center (DISA)
KHz	Kilohertz
LED	Light emitting diode
LNA	Low Noise Amplifier
LOS	Line of sight
MHz	Megahertz
mW	Milliwatt
PT	Plain text
PTT	Push to Talk
RCV	Receive
SATCOM	Satellite Communications
UHF	Ultra-high frequency
VDC	Volts, direct current
VSWR	Voltage standing wave ratio
W	Watt
XMT	Transmit

1.3 EQUIPMENT DESCRIPTION

The TCR-MBA-50 is a bi-directional half duplex RF Power Amplifier that provides transmit amplification for the 30-512 MHz FM/AM Line-of Sight (LOS), 30-88 MHz FM SINCGARS Frequency Hopping, 225-400 MHz AM HAVE QUICK Frequency Hopping, and the 292-318 MHz FM UHF Tactical SATCOM bands; it can also provide receive amplification for the 242-268 MHz receive FM UHF Tactical SATCOM band. It is suitable for, vehicular, airborne, or fixed-station applications and is compatible with most military and commercial radios operating in the 30-512 MHz frequency spectrum. The operation of the amplifier can be controlled via front panel switches or a USB or serial interface for remote control operation. The amplifier has a single power connection, an RF input port and two frequency specific output antenna ports. The LOS port is for frequency hopping and multiband Line of Site operation anywhere between 30 and 512 MHz. The SATCOM port is used with UHF SATCOM antennas.

1.3.1 USER SET MODES.

The following modes are available to the user with the push buttons or with the remote interface:

LOS MODE BUTTON
LOS FM
FREQUENCY HOP FM
LOS AM
FREQUENCY HOP AM

SAT MODE BUTTON
SATCOM LNA ON
SATCOM LNA OFF

The mode buttons determine which output antenna port is active. If the LOS button is pressed while the amplifier is in a SATCOM mode, the amplifier will return to the last used LOS mode. The next LOS button press will sequence to the next available LOS mode. The same is true for a SAT button press while in LOS mode. This way, a user may simply toggle between set SATCOM and LOS modes by alternately pressing the two mode control buttons, without having to fall all the way through the menu structure.

1.3.2 TRANSMIT POWER LEVELS.

The PA has two nominal RF output power levels for LOS, 25 and 50 Watts and 5 nominal RF output power levels for SATCOM, 10, 15, 25, 35 and 50 Watts to comply with MIL-STD-188-181b 2 dB RF output adjustments. These are nominal power levels only, as other restrictions, including input voltage, source current limitations, and input power levels may cause the PA to output less than the nominal levels. The nominal transmit power level is selected by the DC input mode as listed in Table 1-1, the user

power ON/OFF button on the front panel keypad and optionally by the remote control interface. The DC input pins, by indicating the maximum allowable current draw, will set the maximum allowable output power. The PWR button or the remote interface will then be able to select from the allowable output power levels.

a. Military Battery Mode (12 VDC nominal):

   25 Watts in LOS and 10, 15 or 25 Watts in SATCOM regardless of input voltage AND maximum current draw not to exceed 4.5 Amps.

b. Commercial Vehicle Mode (13.8 VDC nominal):

   25 Watts in LOS and 10, 15 or 25 Watts in SATCOM regardless of input voltage AND maximum current draw not to exceed 5.5 Amps.

c. Military Vehicle Mode (28 VDC nominal):

   25 or 50 Watts in LOS and 10, 15, 25, 35 or 50 Watts in SATCOM

d. Special Mode: Reserved.

1.3.3 POWER ON, INITITALIZATION AND MODE CHANGES.

A single pushbutton switch provides for power ON/OFF cycling, RF power level control and LED intensity control. Pressing the button momentarily (<2 seconds) will cycle through the different power levels as described in paragraph 1.3.2. Holding the button down will dim the LEDs in 4 steps at 1 second intervals before the PA shuts down; releasing the PWR button before the PA shuts down will set the LED intensity at one of the 4 levels (high, medium, medium low, low). The LOS and SATCOM mode buttons will cycle through the operational modes described in Section 1.3.1. Non-volatile memory will remember the last operational state and the PA will return to that state when power is restored. If the power is lost due to DC disconnection, the PA will be in the OFF state and will return to the last known mode when DC power is cycled back ON and the PWR button is pressed for 1-2 seconds. If power is shut off using the PWR button, disconnecting and restoring the DC power connection will have no effect; the PA will remain off until the PWR button is pressed for 1-2 seconds. If PIN E on the DC input power connector is tied to GROUND and DC power is removed and restored, the amplifier will automatically power ON into the last known mode. This may be used in installations where the front panel is not accessible and DC power is controlled remotely.

1.3.4 MODE OF OPERATION INDICATORS.

There are 10 front panel LED's used to indicate the different modes of operation and power amplifier operational status. Table 2-1 describes the LED operation for the different modes of operation and Table 2-2 describes the different power levels available for each mode of operation.

1.3.4.1 SATCOM MODE INDICATOR (SAT).

The SAT LED will turn on whenever one of two SATCOM modes is selected (SAT LNA ON, SAT LNA OFF).

1.3.4.2 LOW NOISE AMPLIFIER MODE INDICATOR (LNA).

The LNA LED will turn on whenever the SATCOM/LNA ON mode is selected (SAT LNA ON).

1.3.4.3 LINE OF SIGHT MODE INDICATOR (LOS).

The LOS LED will turn on whenever one of four LOS modes is selected (LOS FM, LOS FM Frequency Hopping, LOS AM, LOS AM Frequency Hopping).

1.3.4.4 FREQUENCY HOPPING MODE INDICATOR (FH).

The FH LED will turn on whenever one of two frequency hopping modes is selected (LOS FM Frequency Hopping, LOS AM Frequency Hopping).

1.3.4.5 AMPLITUDE MODULATION MODE INDICATOR (AM).

The AM LED will turn on whenever one of two amplitude modulation modes is selected (LOS AM, LOS AM Frequency Hopping).

1.3.4.6 RF INPUT LEVEL UNDER/OVER DRIVE (LVL).

The LVL LED indicates a condition where the amplifier is either under or over driven for a set power level. In the case where additional RF output from the radio is needed, the LVL LED will flash slowly (2 Hz). If the amplifier is being over driven the LVL LED will flash rapidly (5 Hz). The LVL LED may also flash rapidly in conjunction with a high temperature alarm, indicating that the RF output from the radio should be reduced. After the high temperature alarm has been released, the LVL LED may flash slowly, indicating that the RF output from the radio may then be increased.

Note: It is possible that some modulation formats not tested as of the current software release date may cause erratic indication on the LVL LED – please contact the factory if this occurs.

1.3.4.7 HIGH TEMPERATURE INDICATOR (TMP).

The TMP LED will flash whenever the PA's temperature exceeds its normal operating threshold.

1.3.4.8 TX STATUS INDICATOR (TX).

The TX LED will turn on during a good transmit condition. Depending on the duty cycle of some data transmission waveforms such as DAMA, the TX LED may flicker. This is due to the fast switching between transmit and receive and DOES NOT indicate a system malfunction.

1.3.4.9 FAULT STATUS INDICATORS (FLT).

The FLT LED will flash to indicate a fault condition, such as attempting to transmit at a frequency that is not valid in the selected mode.

1.3.4.10 REMOTE OPERATION STATUS INDICATOR (RMT).

The REMOTE LED will be on when the PA has received a **REMOTE ON** command from an external terminal and will stay on until the **REMOTE OFF** command has been received.

1.3.5 REMOTE CONTROL INTERFACE.

USB (+5, GND, D+ and D-) and RS-232 interfaces (GND, TXD and RXD only) will provide remote control of the amplifier's modes of operation and power levels. When a terminal has been connected to the remote interface, and the proper escape sequence has been sent by the terminal (refer to sections 3.5 and 3.6 for remote control operation) for remote, the PA will start communications with the terminal and will light the RMT LED on the front panel. At this point the user push buttons will become inactive, except to power the amplifier off. The PA will NOT detect the removal of the remote interface connection and will remain in remote control mode until the power is cycled OFF and back ON.

1.4 FEATURES

The TCR-MBA-50 has the following features:

- DAMA, DAMA IW and Special Communications modes of operation compatible
- Coverage from 30 to 512 MHz, including SINCGARS FM and HAVE QUICK AM Frequency Hopping compatibility
- Connections for both a SATCOM and an LOS antenna
- Pre-amplification of received RF signals from antennas connected to the SATCOM port
- Power amplification of transmit signals to 25 or 50 Watts in LOS and 10, 15, 25, 35 and 50 Watts in SATCOM modes
- Transmit and receive band filtering to suppress interference from co-located radios and amplifiers in SATCOM mode
- Amplifier front panel indication of system status

1.5 TCR-MBA-50 SYSTEM

The TCR-MBA-50 is pictured in Figure 1-1.

1.5.1 Amplifier Components

The Amplifier consists of several printed circuit assemblies, a filtering and switching network, and RF connectors housed in a water resistant aluminum housing. With normal care and maintenance, the assembly is highly resistant to corrosion from the elements. The RF connections to the RF input and SATCOM antenna are BNC female and the RF connection for the LOS antenna is BNC female. Power to operate the amplifier is applied via a cable connected to the 6 pin circular DC input connector.

1.5.2 Power Cable

A multi-conductor cable connects the amplifier with an external DC power source. A wiring diagram for the cable is shown in Section 3 of this manual. The DC power cable used with the legacy TCR-MBA-25 power amplifier may be used to power the TCR-MBA-50; however, the connection for the Auto Power ON Select (pin E grounded) may have to be added (refer to paragraph 2.3.3.1 PWR push button switch operation).

1.6 Specifications

The operating parameters, physical characteristics, and environmental specifications are shown in the following tables.

Table 1-1. Nominal Performance Specifications

TRANSMIT SECTION

SATCOM OPERATION

Frequency Range	292-318 MHz
Switching Speed	JITC DAMA and IW compatible
Modulation	FM or Phase modulation
RF Power Input	5 Watts (1-10 Watts typical)
RF Power Output	**BA-5590** (12.7 VDC 4.5 A max): 10, 15, 20 Watts **BB-2590** (15 VDC 4.5 A max): 10, 15, 25 Watts **Commercial Vehicle** (13.5 VDC 5.5 A max): 10, 15, 25 Watts **Military Vehicle** (28 VDC 6.5 A max): 10, 15, 25, 35, 50 Watts
Filtering	Cosite suppression

LOS OPERATION

Frequency Range	30-512 MHz with Automatic Frequency Detection
Modulation	AM, FM or Phase Modulation, AM/FM Frequency Hopping
Band Selection	Fully automatic
RF Power Input	5 Watts CW/PEP (1-10 Watts typical)
RF Power Output	**BA-5590** (12.7 VDC 4.5 A max): 20 Watts CW/PEP **BB-2590** (15 VDC 4.5 A max): 25 Watts CW/PEP **Commercial Vehicle** (13.5 VDC 5.5 A max): 25 W CW/PEP **Military Vehicle** (28 VDC 6.5 A max): 25, 50 W CW/PEP

Table 1-1. Nominal Performance Specifications (continued)

RECEIVE SECTION

SATCOM OPERATION

Frequency Range	242-268 MHz
Noise Figure	3.5 dB typical
Receive Gain	10 dB typical

LOS OPERATION

Frequency Range	30-512 MHz
Insertion Loss	<3.5 dB
VSWR	2.5:1 Max

ADDITIONAL SPECIFICATIONS

Radio Connector	BNC female (Optional TNC)
LOS Antenna Connector	BNC female (Optional TNC)
SAT Antenna Connector	BNC female (Optional TNC)
DC Connector	MS3112E10-6P
Auxiliary Connector	Optional RS-232 Cable (PN 77500-00390), Optional USB Cable (PN 77500-00391)
High Temperature	High Temperature Indication/Fold back
DC Off	Routes Radio signal to LOS port
Operating Temperature	-30 to +60 C
Cooling	Natural Convection
Dimensions	2” H x 3.5” W x 8.15” D
Weight	3.4 lbs

The information in section 1.6 is included for reference only and does not constitute a warranty of performance.

Table 1-2. Interconnect Characteristics

Connection	Signal/Pin	Connector Function
DC IN	DC power input	MS3112E10-6P (mating connector for cable use is MS3116F10-6S)
	PIN A	12-32 VDC Input
	PIN B	GND
	PIN C	Commercial Vehicle Select (12 V)
	PIN D	Military Vehicle Select (28 V)
	PIN E	Auto Power On Select
	PIN F	Reserved
RADIO	RF from radio	Type BNC female
LOS	To LOS Antenna	Type BNC female
SAT	To SATCOM Antenna	Type BNC female

2.0 OPERATION

2.1 General Information

This section provides information for operating the TCR-MBA-50.

WARNING

Electromagnetic radiation from the antenna can damage eyes and other body tissue when the system is transmitting. DO NOT stand directly in front of the antenna or in close proximity to the sides or back of the antenna when transmitting.

2.2 Controls, Indicators, and Connectors

The TCR-MBA-50 has three push button switches to control:

- Power ON/OFF, LED intensity and RF power level selection
- SAT Modes of Operation
- LOS Modes of Operation

There are also several status indicators on the amplifier's front panel as shown in Figure 2-1. The functions of these are specified in Tables 2-1, 2-2 and 2-3

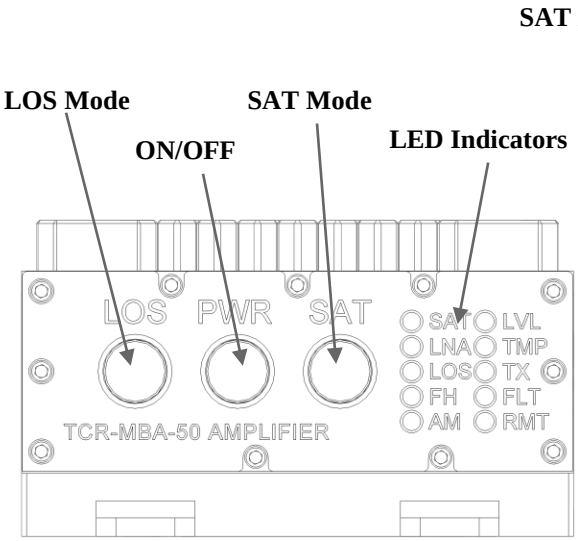


Figure 2-1. Amplifier Controls & Indicators

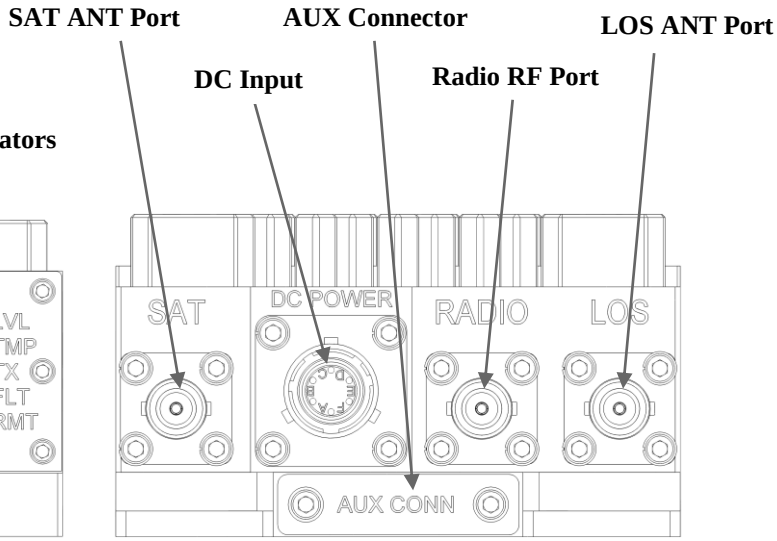


Figure 2-2. Amplifier Connections

Table 2-1. Mode Indicators

MODE OF OPERATION	LED				
LOS MODES	**SAT**	**LNA**	**LOS**	**FH**	**AM**
LOS FM			ON		
LOS FREQUENCY HOP FM (SINCGARS)			ON	ON	
LOS AM			ON		ON
LOS FREQUENCY HOP AM (HAVE QUICK)			ON	ON	ON
SATCOM MODES					
SATCOM LNA ON	ON	ON			
SATCOM LNA OFF	ON				

Table 2-2. Power Output Level Indicators

MODE OF OPERATION	LED				
	10 W	**15 W**	**25 W**	**35W**	**50W**
LOS MODES	**RMT**	**FLT**	**TX**	**TMP**	**LVL**
LOS FM/AM 25 Watts	ON	ON	ON		
LOS FM/AM 50 Watts **(Note 1)**	ON	ON	ON	ON	ON
FREQUENCY HOP FM/AM (SINCGARS/HAVE QUICK) 25 Watts	ON	ON	ON		
FREQUENCY HOP FM/AM (SINCGARS/HAVE QUICK) 50 Watts **(Note 1)**	ON	ON	ON	ON	ON
SATCOM MODES					
SATCOM LNA ON/OFF 10 Watts	ON				
SATCOM LNA ON/OFF 15 Watts	ON	ON			
SATCOM LNA ON/OFF 25 Watts	ON	ON	ON		
SATCOM LNA ON/OFF 35 Watts **(Note 1)**	ON	ON	ON	ON	
SATCOM LNA ON/OFF 50 Watts **(Note 1)**	ON	ON	ON	ON	ON

Note 1: The 35 and 50 Watt power levels are only available in military vehicle mode (pin D grounded on the DC input power connector with a 28 VDC source).

The modes of operation and power levels will cycle in the order indicated in Table 2-1 and Table 2-2 from top to bottom. The settings will cycle through in a loop, to select a different mode or power level, the mode or power switch must be pressed repeatedly until the next desired mode of operation or power level is selected. The power levels are selected by momentarily pressing the PWR button (refer to section 2.3.3). The LEDs for power indication will turn on and remain on as long as the RF output power is being adjusted and will revert back to their normal function 2 seconds after the desired power level is selected. The power level indication will also be on momentarily when the mode is changed between LOS, LOS Frequency Hop and SAT and at initial turn on of the amplifier.

Table 2-3. Front Panel Controls

CONTROLS	TYPE	FUNCTION
ON/OFF	Push Button Switch	Selects ON or OFF (Bypass) mode of operation, RF output power level (button press <2 seconds), LED intensity (button press >2 seconds but <6 seconds). After 6 seconds the PA shuts down.
LOS MODE	Push Button Switch	Selects the LOS modes of operation (refer to Table 2-1)
SAT MODE	Push Button Switch	Selects the SATCOM modes of operation (refer to Table 2-1)

Table 2-4 I/O Connectors

CONNECTIONS	TYPE	FUNCTION
SATCOM Antenna	BNC Type RF connector	Used to attach SATCOM Antenna
RADIO	BNC Type RF Connector	Used to attach to Transceiver
LOS Antenna	BNC Type RF Connector	Used to attach Line of Sight Antenna
DC Power input connection	Circular Mil connector	Used to apply DC power input to amplifier

2.3 Operation

2.3.1 General Information

The TCR-MBA-50 can be used for operation once it has been installed as described in Section 3.

2.3.2 Equipment Set-up

Refer to Paragraph 2.2 for the locations and functional description of the controls and indicators. Make sure that the TCR-MBA-50 has been installed according to the instructions provided in Section 3.

2.3.3 Operating Procedures

2.3.3.1 Push Button Switch Operation

In normal operation, the TCR-MBA-50 provides transmit power amplification for radios operating in the 30-512 MHz VHF and UHF bands. The mode switch provides selection for either the SATCOM or LOS modes and the PWR button selects the power levels (Refer to Table 2-1 and Table 2-2). RF output to the SATCOM or LOS antenna ports is automatically selected and determined by the mode selected.

PWR button - ON/OFF- To turn the amplifier ON, press and hold the PWR button for more than 1-2 seconds. The PA will turn ON and display the current power level for

approximately 3 seconds. The PWR button cycles the TCR-MBA-50 from power ON to power OFF Bypass mode. To switch the power amplifier back to the Power OFF Bypass mode press and hold the PWR button for more than 6 seconds (the LEDs will dim as the PWR button is pressed and held down). When in the Power OFF Bypass mode the RF is automatically routed to the LOS antenna port directly from the transceiver.
The Amplifier remembers the last state it was in when powered down.

If the auto power ON mode is selected by grounding pin E on the DC input power connector, the power to the PA can be turned ON or OFF by turning on or off the DC supply for remote operation. If the auto power ON mode is not enabled, removing the DC power will turn the power amplifier OFF but the PWR button must be used to turn the power amplifier back ON when external DC power is restored.

PWR button – RF Output Power Level Select - To select the desired RF output power level press the PWR button momentarily (< 2 seconds). The power will increase to the next power level from the previously set value on the first button press and will continue to the next allowable level (mode and DC voltage level dependent refer to Table 2-2) for each subsequent PWR button press until the desired level is reached. The LEDs for power level indication will revert back to their normal function approximately 2 seconds after the last button press.

PWR button – LED Intensity Level Select- Press and hold the PWR button for more than 2 seconds to select one of four available LED intensity levels (high, medium, medium low, low). As the button is held down for more than 2 seconds, the LED intensity will decrease to the next level; however, if the button is held down for more than 6 seconds the PA will shut down. To select an LED intensity level, simply release the PWR button when the desired brightness is displayed. If the external DC power is interrupted, the LED brightness will default to HIGH when power is restored and the PA is turned back on using the PWR button; however, shutting down and turning the PA back on using the PWR button will remember the last LED intensity level.

LOS Mode- Press the LOS mode button repeatedly to select the desired LOS mode (refer to Table 2-1) When any of the LOS modes is selected using the LOS mode button, RF is routed to the LOS RF port. Frequency hopping can be selected by cycling through the different modes of LOS operation using the LOS mode switch as described in Table 2-1.

SATCOM Mode- Press the SAT mode button repeatedly to select the desired SATCOM mode (refer to Table 2-1) When any of the SATCOM modes is selected using the SAT mode button, RF is routed to the SATCOM RF port. LNA operation can be selected by cycling through the different modes of SATCOM operation using the SAT mode switch as described in Table 2-1. The LNA option can be enabled to provide an average 10dB receive gain for use in disadvantaged installations where either Omni-directional SATCOM antennas are used or when there are long runs of RF cable loss to overcome.

2.3.3.2 LNA Operation Precautions

There may be an interoperability issue when operating certain radios with amplifiers that have a receive Low Noise Amplifier (LNA). Using the LNA ON setting with certain radios may cause intermittent squelch break on the radio. To resolve this possible issue, simply turn the LNA operation off via the front panel SAT push button switch by selecting SAT LNA OFF.

2.3.3.3 Remote Control Operation

The TCR-MBA-50 can be controlled remotely via a USB or asynchronous RS-232 interface (refer to section 3 for a functional description of these interfaces).

2.3.3.4 Out of band operation

Operating outside the frequency band for the selected mode of operation (30-88 MHz FM SINCGARS Frequency Hopping, 225-400 MHz AM HAVE QUICK Frequency Hopping, and 292-318 MHz UHF SATCOM) will cause the FLT light to flash. The amplifier will go into a "failsafe" LOS bypass mode. The fault will be cleared when the transmit signal is removed. The amplifier will then return to its previous operating mode. Operating on SATCOM frequencies while in the LOS mode with an antenna connected to the LOS port will not cause an alarm and it will operate properly, however, the amplifier will not comply with the timing requirements for DAMA operation.

2.3.3.5 Bypass Operation

When DC power is removed or when the AMP Bypass mode is selected (pressing the PWR button for more than 6 seconds) the radio port is directly connected to the LOS antenna port.

2.3.3.6 Troubleshooting

If the communications system seems to be operating improperly, check to make sure that the equipment is configured in accordance with Section 3. If the problem persists follow the instructions below.

Table 2-5. Troubleshooting Guide

SYMPTOM	PROBABLE CAUSE	SUGGESTED FIX
XMT light flashes (1 Hz) when transmitting	Incorrect operating frequency for selected mode.	Change mode or frequency for proper operation.
LVL light flashes slow (2 Hz)	Input RF is too low. Or	Increase input RF power until LVL LED is off.
	DC input voltage is too low for normal operation (typically 13.5 VDC for commercial vehicle operation and 22-28 VDC for military vehicle operation).	Increase DC input voltage to the proper level corresponding to the DC input power selected on the power connector. Verify that the proper DC power cable is being used.
LVL light flashes fast (5 Hz)	Input RF is too high.	Decrease input RF power to less than 10 Watts.
Low output power	Low input voltage or drive level.	Check DC voltage while transmitting and radio output power setting.
TMP light flashes	PA has exceeded its nominal operating temperature.	Provide additional airflow or reduce transmission time. **Note:** The PA will reduce the RF output power automatically to reduce the heat sink temperature. Output power will return to normal and the TMP light will extinguish once the PA reaches normal operating temperature.

3.0 INSTALLATION

3.1 General Information

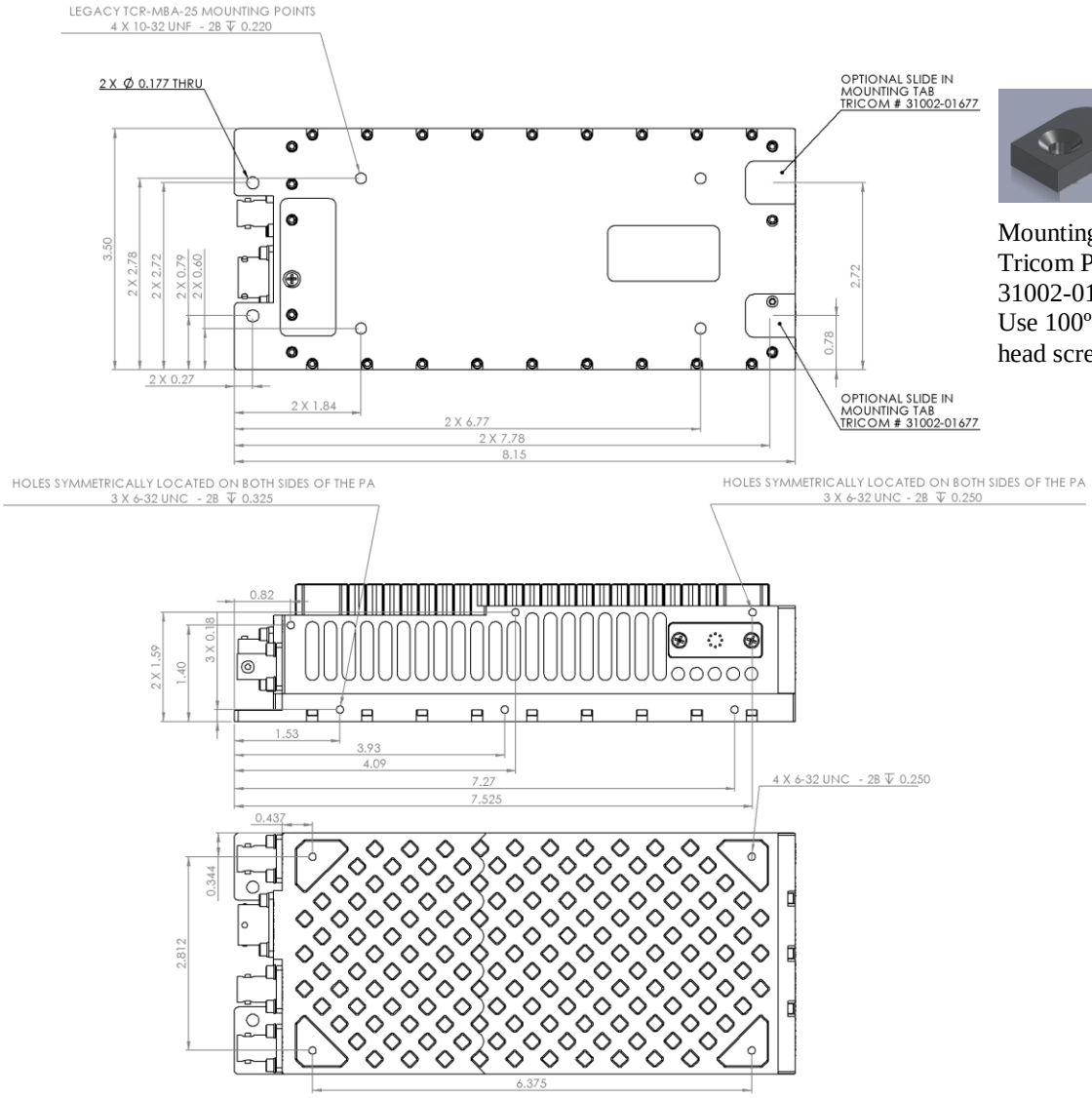
This section contains information necessary for preparing the TCR-MBA-50 for use.

3.2 Preparation for Use

After unpacking the system and inspecting for physical damage, select an appropriate location for the Amplifier. Although the Amplifier is weather-resistant, placing it in a location where it is protected from direct salt spray, rain, and sunlight will increase its service life. Make sure that adequate air flow is available to allow proper convection cooling.

3.3 Mounting Provisions.

The TCR-MBA-50 can be mounted using existing mounting holes for the TCR-MBA-25 power amplifier (refer to Figure 3-1). These holes accommodate #10-32 screws, which screw into tapped 10-32 X 0.220 deep holes on the amplifier. Ensure the proper length screw is used to prevent damage to the threaded holes on the amplifier.
The power amplifier can also be mounted by using two mounting tabs in the front and two mounting holes on flanges in the rear. The tabs must be mounted first using 100° #8 flat head screws. To mount the power amplifier, simply slide the two front slots on the front of the power amplifier onto the two tabs and secure the rear flanges with two #8 pan head screws. Other mounting points are included on the sides of the amplifier to accommodate a variety of mounting options.



Mounting Tab
Tricom Part #
31002-01677
Use 100º #8 flat
head screw

Figure 3-1 TCR-MBA-50 Outline Drawing

3.4 DC Input Power.

The DC input power connector is compatible with the TCR-MBA-25 power cables. Attach the DC power source to the DC IN connector located on the rear of the amplifier (See Fig 3-1 and Table 3-1 for connector pinout and location).

3.5 RF Interconnections.

Attach an RF cable from the transceiver to the Radio input Connector. Attach RF cables/antennas to either one or both of the antenna connections located on the rear of the amplifier.

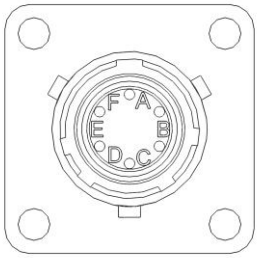


Figure 3-2 Amplifier DC input connector (MS3112E10-6P)

Table 3-1. DC Input Power Connector Pinout

Pin #	I/O	Connection
Pin A	I	12-32 VDC
Pin B	I	GND
Pin C	I	Commercial Vehicle Select
Pin D	I	Military Vehicle Select
Pin E	I	Auto Power ON Select
Pin F	I/O	Reserved

Table 3-2. DC Input Power Control Pin Functions

Pin C	Pin D	Description
OC	OC	Military Battery Mode (12 V nominal)
GND	OC	Commercial Vehicle Mode (13.8 V nominal)
OC	GND	Military Vehicle Mode (28 V nominal)
GND	GND	Reserved

OC = Open Circuit
GND = Ground

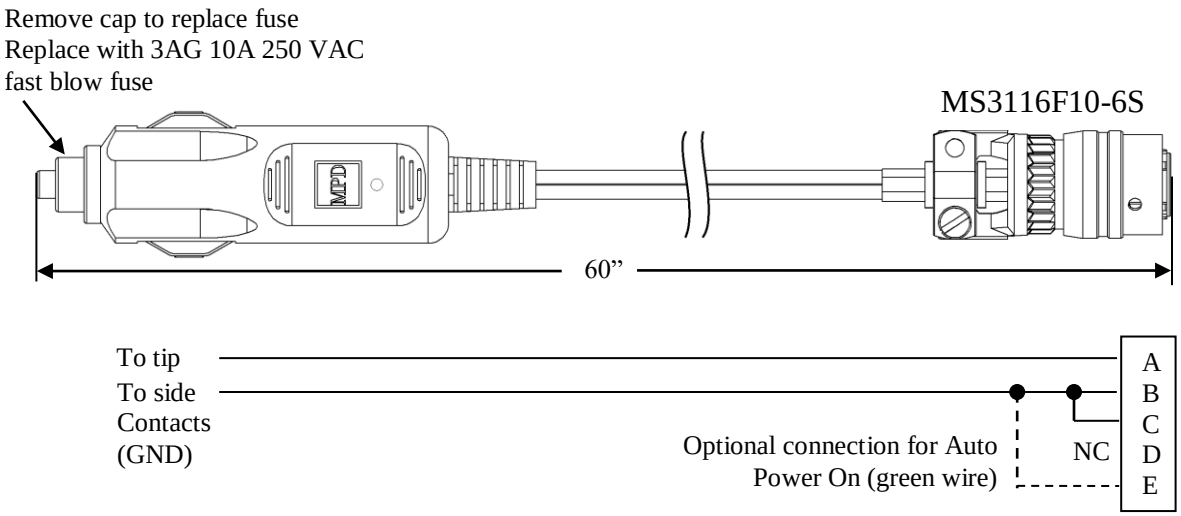


Figure 3-3 Commercial Vehicle DC Power Cable (part number 77500-00411)

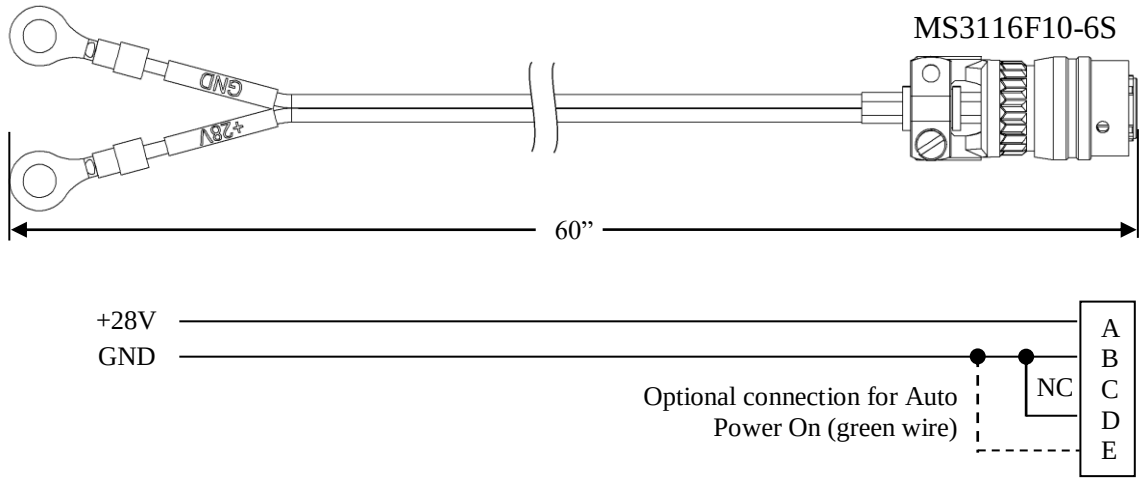


Figure 3-4 Military Vehicle DC Power Cable (part number 77500-00412)

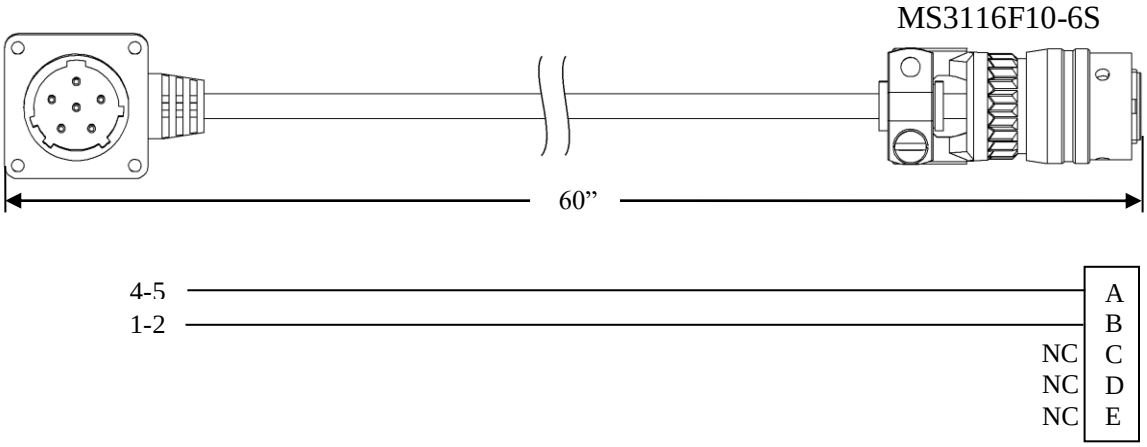


Figure 3-5 Military Battery DC Power Cable (part number 77500-00413)

3.6 Remote Control Interface.

The power amplifier can be controlled via a USB or RS-232 interface using a terminal emulator such as HyperTerminal. To connect the remote control interface cable, remove the dust cover labeled AUX CONN on the connector side of the power amplifier. The operating data parameters for RS-232 are 9600 bps, 8 bits, no parity, and 1 stop bit. To use the USB connection, follow the Windows instructions to install the appropriate USB driver for a virtual serial port. The USB driver can be downloaded from http://www.ftdichip.com/drivers/D2XX.htm.

CAUTION

The AUX CONN cover should be installed whenever the auxiliary port is not being used to maintain the environmental integrity of the PA and to prevent damage to the auxiliary connector contacts.

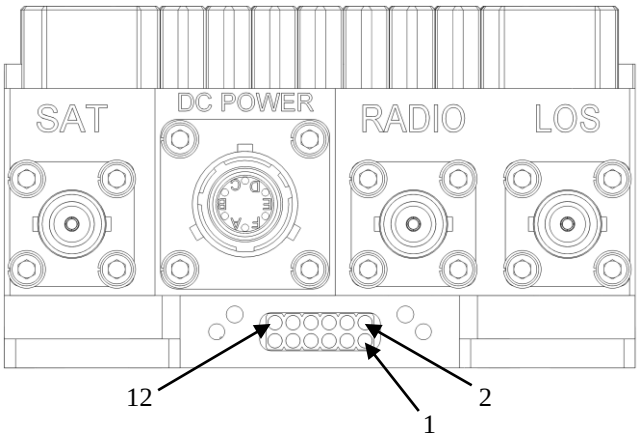


Figure 3-6 Auxiliary connector pinout (mating connector part number 77500-00421)

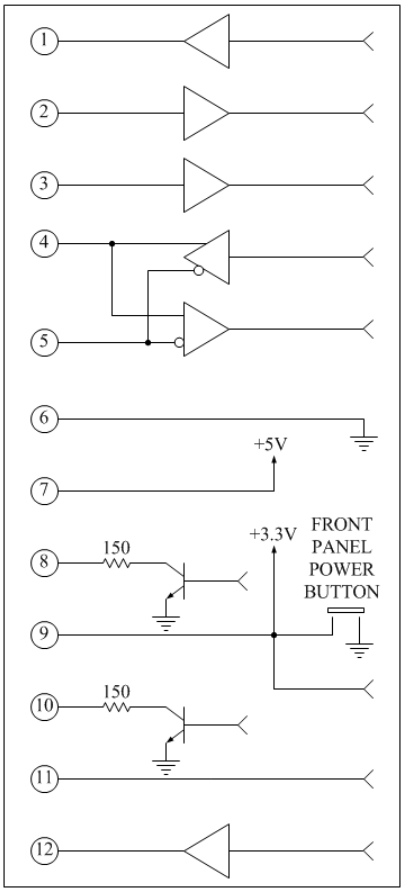


Figure 3-7 Auxiliary Connector Interface

Table 3-3. Auxiliary Connector Interface Pinout

Pin #	Connection
1	RS-232 RXD
2	RS-232 TXD
3	+5 USB
4	USB D+
5	USB D-
6	GND
7	+5 OUT @ 100 mA
8	MODE INDICATION LOW ON LOS OTHERWISE OC
9	REMOTE DC/RF POWER SWITCH - MOM CONTACT TO GND -DEBOUNCE RECOMMENDED
10	TX INDICATION LOW ON RCV OC ON TX
11	RESERVED
12	MODE INDICATION +3.3 LOGIC LEVELS - HIGH IN WB MODES OTHERWISE LOW

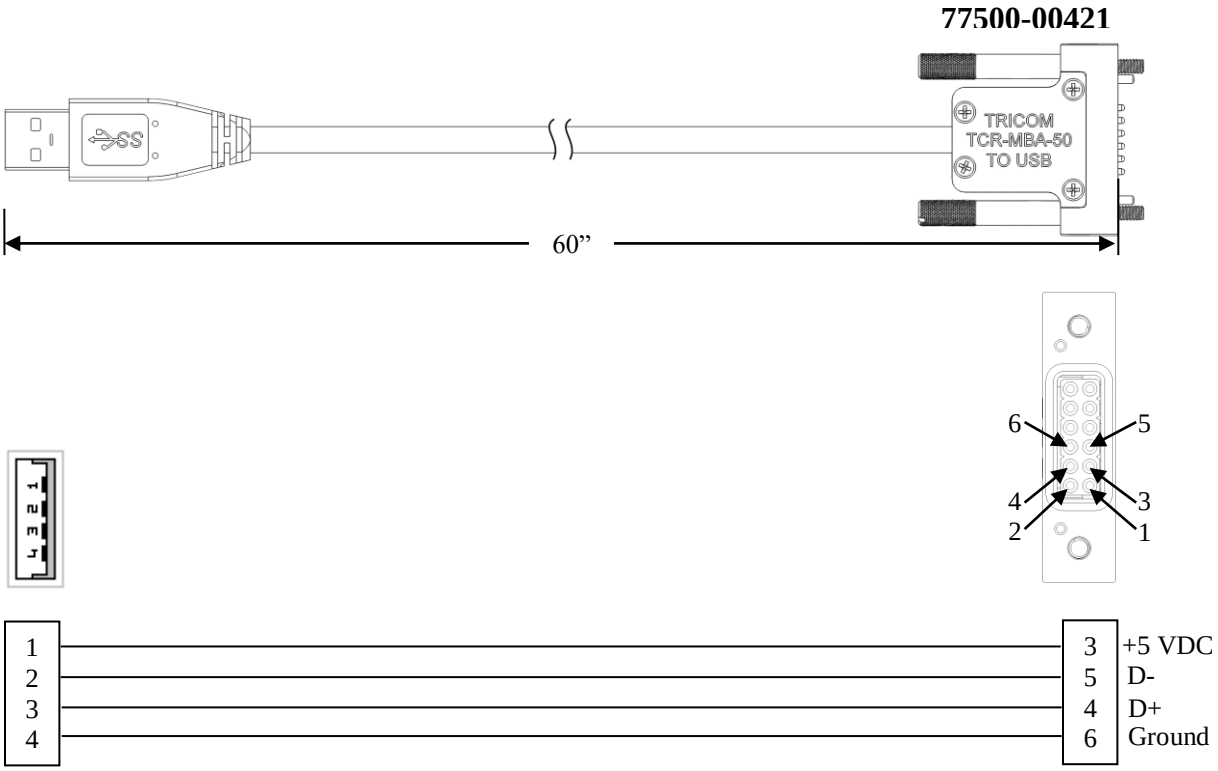


Figure 3-8 USB Remote Control Cable (part number 77500-00391)

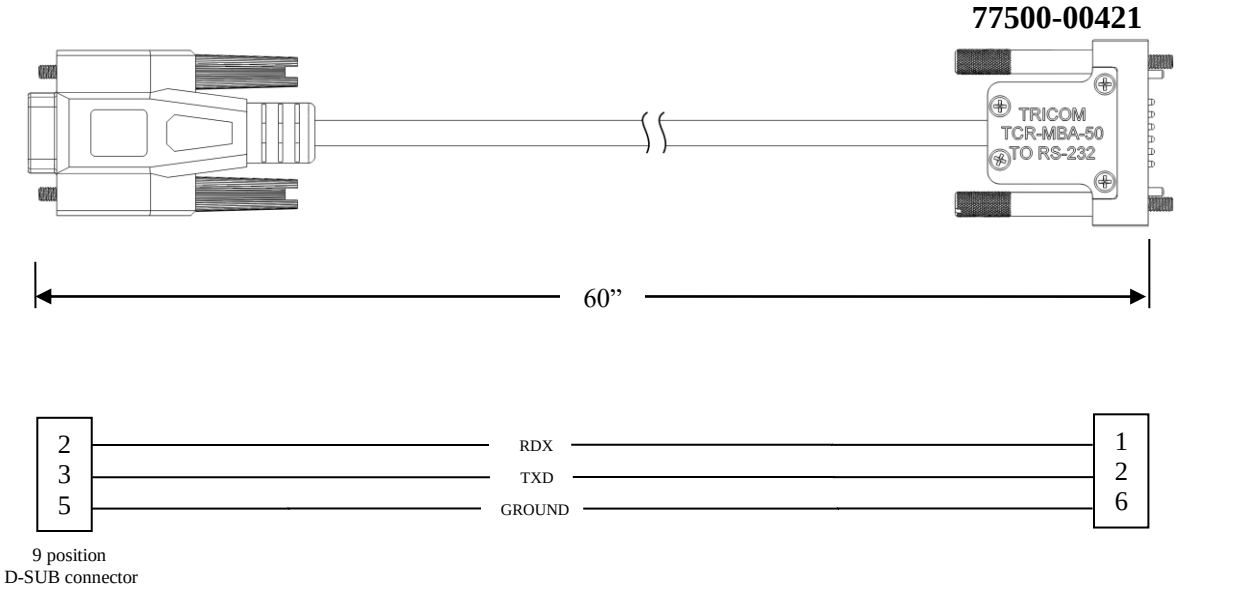


Figure 3-9 RS-232 Remote Control Cable (part number 77500-00390)

3.7 Remote Control Command Set.

Table 3-4 describes the command set for controlling the TCR-MBA-50 remotely. Each valid command is responded with an "ack" message; invalid commands due to incompatible operational parameters will be responded with a "nack" message and invalid commands due to syntax errors will be responded with an "unknown command" message.

Table 3-4 Remote Control Command Set

COMMAND	FUNCTION
remote on	Turns on remote control function on the PA (RMT light turns on, mode LOS and SAT mode switches are disabled)
remote off	Turns off remote control mode on the PA (RMT light turns off)
?	Displays command list
status	Displays current status of the PA (firmware versions, mode, power, temperature)
los fm	Selects LOS FM mode
los am	Selects LOS AM mode
los fm hop	Selects LOS SINCGARS mode
los am hop	Selects LOS HAVE QUICK mode
sat lna on	Selects SATCOM mode with LNA turned ON
sat lna off	Selects SATCOM mode with LNA turned OFF
power ##w	Selects the desired power level where ## is any allowable power level (10, 15, 25, 35, 50) for the selected mode of operation. Selecting a power level that is not allowed will return a nack message

APPENDIX A
MS Windows Serial Comm Port Reassignment

Issue: MS Windows automatically assigns comm ports to USB serial communications devices in a sequential order. This may create a problem if a remote control GUI for the TCR-MBA-50 only allows the use of specific comm ports. As an example, if the GUI only allows the use of COM1, COM2 or COM3 to interface to the PA via the USB interface and MS Windows automatically assigns COM12 to the USB serial port adapter embedded in the PA then the PC and the PA will not be able to communicate.

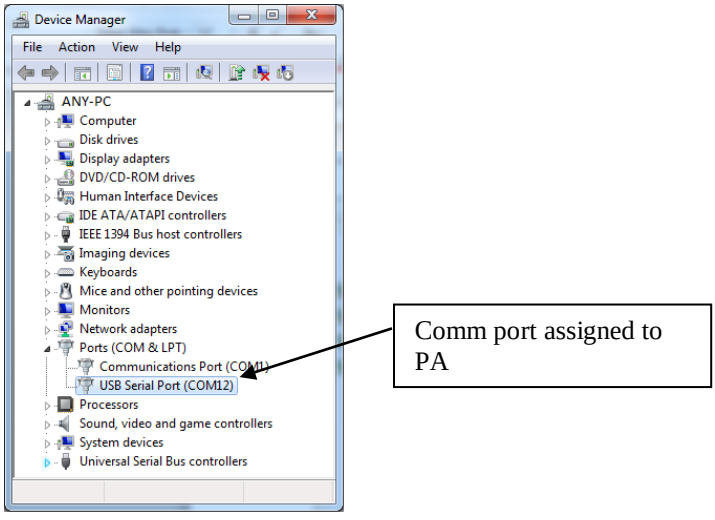
Solution: To resolve this issue, the user may reassign the comm port to the TCR-MBA-50's USB serial adapter port by going to the advanced comm port settings in the Device Manager's menu.

Comm port reassignment procedure:

1. Ensure that the USB driver for the USB to serial adapter in the PA is installed on the computer. The driver is loaded on the CD that ships with the PA or it can be downloaded from http://www.ftdichip.com/drivers/D2XX.htm.

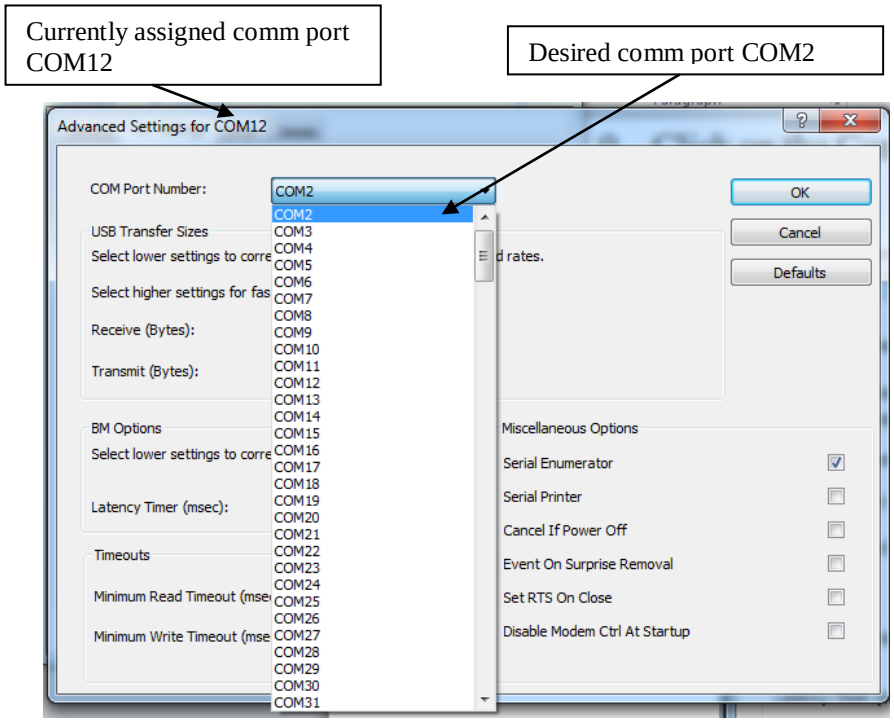
NOTE: The driver must be installed first before the PA is connected to the PC.

2. Ensure that the PA is turned OFF.
3. Connect the USB interface cable to the AUXILARY port on the PA and to any available USB port on the computer.
4. Turn ON the PA.
5. Open the **Device Manager** on the computer and expand the **Ports (COM & LPT)** list to view all enabled comm ports on the computer

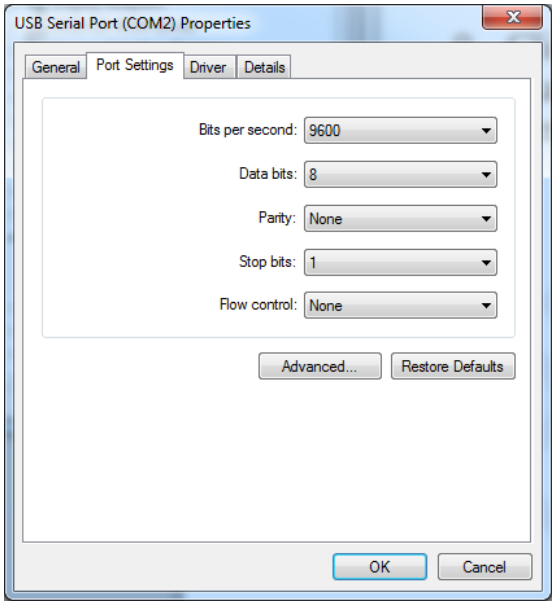


6. Double click on the **USB Serial Port** assigned to the TCR-MBA-50 (COM12 in this example) to view/change its settings.

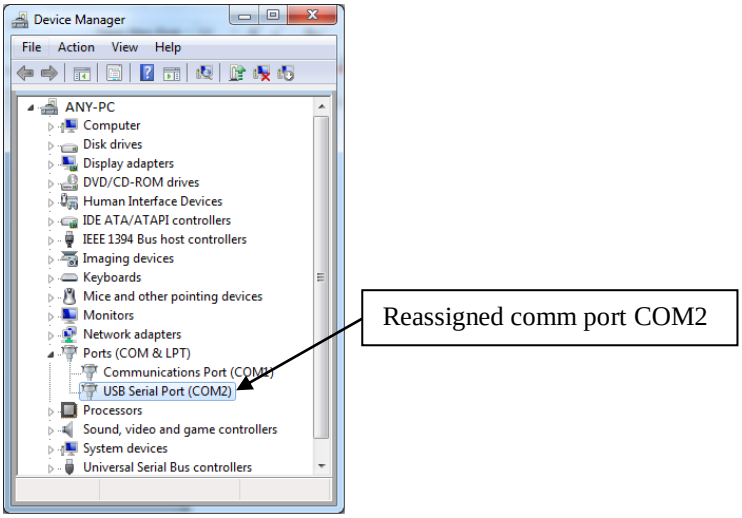
7. Click on the **Port Settings** tab and select **Advanced…**
8. Click on the **Comm Port Number:** drop down list and select the desired comm port.



9. Click OK on the advanced settings window and verify that the reassigned comm port settings are 9600 bps, 8 bits, no parity, 1 stop bit and no flow control.



10. Click OK on the **USB Serial Port Properties** (COM2 in this example) window to return to the Device Manager main window.
11. Verify that the desired comm port (COM2 in this example) is enabled.



12. Exit Device Manager.
13. Run the remote control utility being used to communicate with the TCR-MBA-50 and verify that the PC is communicating with the PA.

NOTE: Any communications terminal software such as HyperTerminal can be used to communicate with the PA. Windows 7 does not include the popular HyperTerminal software but there are several freeware communications terminal emulation utilities available for download on the internet such as PuTTY, which can be downloaded from http://www.putty.org/.

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