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# **MICOM RM500/RM500R**

## **500W HF-SSB Rack-Mount Continuous Duty Transceivers**

### **Owner's Guide**

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# **MICOM RM500/RM500R**

## **500W HF-SSB Rack-Mount Continuous Duty Transceivers**

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## HOW TO USE THIS MANUAL

If you want to learn about the RM-500/RM-500R HF-SSB transceiver:

- Read Chapter 1 and locate the required general information.

If you need to operate the RM-500/RM-500R transceiver, proceed as follows:

- Read Chapter 2 and 3 and locate the desired operation procedure and follow its instructions.

If you need to review maintenance procedures, proceed as follows:

- Read Chapters 4 and view their associated figures and tables.

Relevant figures and tables are referenced under the paragraph title in the manual, to direct the reader to figures and/or tables which provide a better understanding of the text.

If this manual is updated in the future, all updated pages must be properly placed in the manual, and all old pages must be removed and destroyed.

## LIST OF ABBREVIATIONS

AC	Alternating Current	MTBF	Mean Time between Failures
ACC	Accessories	PC	Personal Computer
AES	Advanced Encryption Standard	RF	Radio Frequency
ALE	Automatic Link Establishment	RSS	Really Simple Syndication
AMD	Automatic Message Display	Rx	Receiver
ATU	Antenna Tuner Unit	SPKR	Speaker
BNC	Bayonet Neill Connector	SQ	Squelch
CW	Continues Wave/ Carrier Wave	SSB	Single Side Band
DC	Direct Current	STD	Standard
DSP	Digital Signal Processor	TDM	Time Division Multiplexer
EXT	Exit	Tx	Transmitter
GND	Ground	UBS	Upper Side Band
HMI	Human-Machine Interface	VAC	Voltage Alternating Current
ISB	Independent Side Band	VDC	Voltage Direct Current
LCD	Liquid Crystal Display	VSWR	Voltage Standing Wave Ratio
LSB	Lower Side Band		
MKL	MICOM Key Louder		



## **FOREWORD**

### **ARRANGEMENT OF THIS MANUAL**

The manual contains three chapters listed below, with a brief description of each.

#### **CHAPTER 1 - GENERAL DESCRIPTION**

This chapter provides a description of the RM-500/RM-500R HF-SSB transceiver including purpose and use and technical characteristics.

#### **CHAPTER 2 - HMI**

This chapter provides a detailed description of RM-500/RM-500R HF-SSB transceiver.

#### **CHAPTER 3 - INSTALLATION PROCEDURE**

This chapter provides step-by-step instructions for RM-500/RM-500R HF-SSB transceiver installation procedure.

#### **CHAPTER 4 - USER GUIDE**

This chapter provides general guidelines for performing RM-500/RM-500R HF-SSB transceiver maintenance.

**WARNINGS, CAUTIONS AND NOTES**

The following notations are used when it becomes necessary to place special emphasis on procedures, or call the operator's attention to precautionary measures.

**WARNING**

An operating procedure, practice and so forth, which if not followed correctly, could result in personnel injury or loss of life.

**CAUTION**

An operating procedure, practice and so forth, which if not followed correctly, could result in damage to, or destruction of equipment.

**NOTE**

An operating procedure, condition and so forth, which special attention should be paid.

**CHAPTER 1**  
**GENERAL DESCRIPTION**

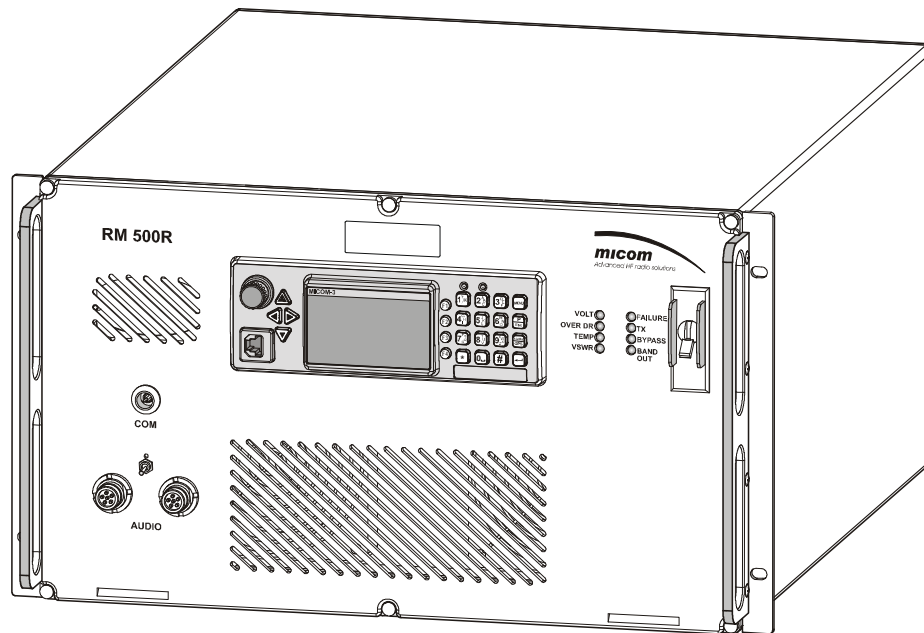


## 1.1 INTRODUCTION

The MICOM RM500 (ordering option G160) and RM500R (ordering option G179) are 500W HF SSB rack-mount continuous duty transceivers, part of the MICOM 3 line of HF SSB radio sets. This manual covers the installation and operation of the RM500/RM500R transceivers. The manual covers only procedures specific to the RM500 and RM500R; the other procedures, which are common to the whole MICOM 3 product line, are described in Publication 6886867J01, "Owner's Guide, MICOM 3E/3T/3R HF-SSB Transceivers". Optional features applicable to your radio set can be found in MICOM-3 Supplements.

## 1.2 GENERAL DESCRIPTION

The MICOM RM500 and RM500R are 500W HF SSB continuous duty radio sets. Figure 1 shows a general view of a typical 500W transceiver (the RM500R).



**Figure 1-1. RM500R, General View**

RM500 and RM500R expand the MICOM 3 product line by offering higher transmit power and thus longer reach, and improved communications under bad propagation conditions and/or strong interference.

RM500 and RM500R can be equipped with the ISB option (option G191), described in Publication 6888882V01, which enables MICOM-3 radio sets to simultaneously communicate on both the upper sideband (USB) and the lower sideband (LSB) of the selected channel (RF carrier frequency). Moreover, when transmitting data, the internal MICOM-3 modem enables using the whole bandwidth of the two sidebands (more than 6

## General Description

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kHz) to transmit the data stream. Therefore, the maximum available data rate is doubled (19200 bps instead of 9600 bps).

Digital encryption, supported when the vocoder option is installed, provides privacy for sensitive applications. The encryption keys are loaded by means of the MKL Key Loader. An RM500 or RM500R radio set consists of a standard MICOM 3 transceiver tightly integrated with a 500W RF power amplifier and a 110/220 VAC, 50/60 Hz AC-powered power supply, all contained within a compact chassis suitable for installation in 19 in. racks and shelves.

The AC input voltage range (110 and 220 VAC) is automatically switched, allowing operation in the United States of America as well as in other countries. Internal cooling fans allow for continuous-duty data transmission and operation over a wide temperatures range. The radio set features four accessories connectors located on the rear panel to facilitate the connection of optional accessories.

For operation in multiple-transmitter or split sites, the RM500 and RM500R can be ordered with an interface for the Pre-Selector/Post-Selector (PPS) (option G65).

### NOTE

The G65 option does not include the Pre-Selector/Post-Selector (PPS) unit, which must be separately ordered.

The RM500/RM500R are very well suited for base station applications, and also support remote control, using option G422AA (refer to Publication 2072-09682-00 for details) RM500 and RM500R can be directly connected to a wide range of broadband or tuned antennas, including whip, dipole, traveling wave, delta, and semi-delta antennas. To obtain maximum forward power, a low VSWR antenna system should be used; however, in case of excessive VSWR, protection circuits prevent damage by reducing the transmit power to safe values. Thus, the RM500 and RM500R will always attempt to transmit at the maximum safe power, even in case of mismatch.

Special circuits protect the RM500 and RM500R against overheating and various types of malfunctions. In case a critical problem is detected, the protection circuits are activated and bypass the internal 500W power amplifier: in this case, the MICOM 3 transceiver is directly connected to the antenna. This enables normal reception, as well as transmission, albeit at the lower power levels (up to 125W) the MICOM 3 transceiver can provide. Front panel indicators indicate the type of problem that has been detected, to help the operator correct it.

Because the RM500 and RM500R are part of the MICOM 3 line, they have similar capabilities, characteristics and operational procedures as MICOM 3, thereby enabling personnel familiar with the operation of MICOM 3 equipment to start using the RM500/RM500R with minimal training.

### 1.3 **EQUIPMENT VERSIONS**

- MICOM RM500  
Transceiver for long range wireless voice, fax, data and email communications.
- MICOM RM500R  
Ruggedized transceiver with military handset and connectors, for applications requiring the utmost dependability and reliability.

### 1.4 **MAIN FEATURES**

- Automatic Link Establishment per FED-1045 & MIL-STD-188-141B (JITC certified).
- Full interoperability with other manufacturers' radios complying with the same ALE standards.
- ISB (Independent Side Band) option (option G191).
- Remote control option (option G422AA).

#### 1.4.1 **VOICE THAT'S LOUD & CLEAR**

- A built-in voice quality system utilizes proprietary algorithms to filter out background noises, giving users exceptional communication clarity.
- Selectable bandwidth allows fine tuning for optimal voice and data communications.
- Voice-activated digital squelch.

#### 1.4.2 **USER-FRIENDLY**

- New control head features a large LCD, full-dot matrix digital display and an enhanced keypad for programming and set-up.
- Multiple language display available.
- Transceiver can be controlled using PC and programming application.
- Remote control configuration, allows the transceiver to be operated from a remote location (at a distance of up to 5 km) using the optional 2-wire remote control head.

## General Description

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### 1.4.3 YEARS OF TROUBLE-FREE COMMUNICATIONS

- Upgrading to future technologies is easily performed by installing new software into the transceiver's DSP unit.
- Easily replaceable digital components ensure cost-effective maintenance.
- Very high MTBF, as with all MICOM radios.
- Unique Built-In self Test Equipment (BITE) provides exceptional dependability.
- Protection circuits enable transmission at maximum safe power

### 1.4.4 COMPREHENSIVE COMMUNICATION AND NETWORKING SERVICES

- Office-quality communication services integrating fax, e-mail and data.
- Multi-Net feature, allows ALE communication on multiple nets simultaneously.
- AMD (Automatic Message Display) for sending and receiving text messages.

### 1.4.5 A PROVEN FAMILY OF RADIO PRODUCTS

- RM500 and RM500R are members of the MICOM transceiver family of fixed and mobile stations, covering the long-range wireless communication needs of thousands of organizations worldwide.



**1.5 MAJOR ACCESSORIES AND OPTIONS**

- HF modems (contact manufacturer for information)
- Secure voice and data (contact manufacturer for information)
- Vocoder
- CCIR automatic link establishment protocol
- Global call option
- QuickCall adaptive multiple networking option
- Automatic telephone interconnect, FLN2824
- Antenna system
- Pre/Post-Selector (PPS) Interface, option G65
- FM to HF repeater, FDN6123
- ATU, F2265
- Antennas and grounding kit, TRN6295.

**1.6 PERFORMANCE SPECIFICATIONS**

**1.6.1 MAIN TECHNICAL CHARACTERISTICS**

This section presents the main technical characteristics of the RM500 and RM500R. For a complete listing of the performance specifications for the MICOM 3, refer to Publication 6886867J01, “Owner’s Guide, MICOM 3E/3T/3R HF-SSB Transceivers”, and to the applicable MICOM 3 Supplements that cover the optional features available on your radio set.

<b>Models</b>	RM500	M91AMN0KV5-K (option G160)	
	RM500R	M95AMN0KV5-K (option G179)	
<b>General</b>	Number of channels	200	
	Transmission frequency range	1.6 to 30 MHz	
	Transmit power (PEP and average)	User-selectable levels:	
		Max:	500 W
High:		400 W	
Medium:		250 W	
	Low:	200 W	

## General Description

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	Reception frequency range	100 kHz to 30 MHz
	Sensitivity (SINAD)	0.3 $\mu$ V for 10 dB SINAD
	Audio bandwidth	350 to 2700 Hz
	Data bandwidth	300 to 3300 Hz
	Frequency stability	0.6 ppm (0.1 ppm optional)
	Frequency resolution	10 Hz
	Number of accessories connectors	4 (see Table 1-1)
	Operating voltage	110 /220 VAC, 50/60 Hz, with automatic switching
	Power requirements	Max. 2000W
	Operating temperature range	-10°C to +60°C/14°F to +140°F
	Humidity	Up to 95% relative humidity @ 50°C/122°F
<b>Dimensions</b>	Height	290 mm/11.42 inch
	Width	480 mm/18.9 inch
	Depth	550 mm/21.7 inch
	Weight	32 kg/70.6 lbs

### 1.6.2 CONNECTOR DATA

#### 1.6.2.1 Accessories Connectors

The functions of the pins in the 25-pin accessories connectors, ACC-J1 to ACC-J4, are listed in Table 1. The connectors include PTT and CW control lines, audio and baseband lines for external equipment, auxiliary power output, serial RS-232 asynchronous data interfaces, and additional dedicated handshaking and control lines. The functions supported by the serial data interfaces are determined by the RM500/RM500R software.

Table 1-1. 25 Pin Accessories Connector, Pin Functions

Pin	Designation	Description
1	SPKR-	Differential output to the external 8Ω, 8W speaker
2	EXT RX1 OUT-	Differential receive output (– line) of main sideband (0 dBm, 600Ω; not affected by the volume control, nor by the squelch)
3	SPKR+	Differential output to the external 8Ω, 8W speaker
4	EXT RX1 AUDIO+	Differential receive audio output (0 dBm, 600Ω; not controlled by volume, but affected by squelch)
5	EXT RX1 AUDIO-	
6	EXT TX1 IN+	Differential transmit input (600Ω input impedance; 0 dBm is required for full power)
7	EXT TX1 IN-	
8	PTT IN VOICE	Transmission command (short to ground) for voice signals ( <i>Note 1</i> )
9	PTT IN DATA	Transmission command (short to ground) for data signals ( <i>Note 1</i> )
10	PTT IN CW	Transmission command (short to ground) for CW (Morse) signals
11	SW A+	Primary DC voltage current limited output (max 1A)
12	DSI/KW C C	BDM – Data serial in/external RF amplifier channel change
13	KW ON/OFF	External RF amplifier power on/off output
14	EXT RX1 OUT+	Differential receive output (+ line) of main sideband (0 dBm, 600Ω; not affected by the volume control, nor by the squelch)
15	RXA	Receive input (point-to-point protocol to host/HLC)
16	TXA	Transmit output (point-to-point protocol to host/HLC)
17	EX RESET	External RESET input (for BDM)
18	GND	Ground
19	KW PTT	PTT output to external RF amplifier
20	EXT ALARM	External alarm output (open collector, pulled to ground when external alarm is activated)
21	VPP	Flash programming voltage, input to BDM

**General Description**

**Table 1-1. 25 Pin Accessories Connector, Pin Functions (Continued)**

Pin	Designation	Description
22	DSC/KW_ALC	BDM – Data serial clock/external RF amplifier ALC
23	SQ GATE	Squelch open/closed indication output
24	DSO/FAN ON/OFF	BDM – Data serial out/Fan control
25	FREEZE/KW TU	BDM – Freeze/external RF amplifier tune

**NOTE**

For RM500/RM500R with the ISB option, these lines activate transmission for both the main and secondary sidebands.

**1.6.2.2 ISB Connector**

The ISB connector is a 9 pin D type female connector installed only on RM500/RM500R with the ISB option, G191 (the ISB option is covered by the Independent Sideband (ISB) Option for MICOM 3 HF SSB Transceivers, Publication 6888882V01). This connector contains the transmit and receive lines for the secondary sideband. Table 2 lists the functions of the pins in the ISB connector.

**Table 1-2. ISB Connector, Pin Functions**

Pin	Designation	Description
1	EXT RX2 OUT+	Differential receive output of secondary sideband (0 dBm, 600Ω; not affected by the volume control, nor by the squelch)
2	EXT RX2 OUT-	
3	GND	Ground
4, 5	-	Not used
6	EXT TX2 IN+	Differential transmit input of secondary sideband (600Ω input impedance; 0 dBm is required for maximum power)
7	EXT TX2 IN-	
8, 9	-	Not used

**1.6.2.3 MKL Connector**

The MKL connector is a 9 pin D type female connector used to connect the MKL Key Loader. This connector is installed when the radio set is equipped with the internal AES encryption option. If you need connection details, contact the manufacturer, or your local representative.

**1.6.2.4 PPS-CONT Connector**

The PPS-CONT connector is a 9 pin D type female connector used to connect to a Pre/Post Selector (PPS) unit. This connector is installed only when the radio set is equipped with the PPS interface option (option G65). If you need connection details, contact the manufacturer, or your local representative.

**1.6.2.5 TUNER CONTROL Connector**

The TUNER CONTROL connector is a 9 pin D type female connector used to connect to an external automatic antenna tuner. If you need connection details, contact the manufacturer, or your local representative.

## General Description

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### 1.7 RM500/RM500R MAIN OPTIONS

- PC control and programming software package
- ALE DTM/DBM
- PPS interface
- Interface for VP-116 voice privacy device
- 2-wire remote control head

#### 1.7.1 MAIN ORDERING OPTIONS

G424 (FVN4841)	Add	PC control and programming software package
S809 (FLN2515)	Enhanced	Interface cable kit for CW key & headphones
G112	Enhanced	High frequency stability option (0.1 ppm)
G849	Add	Interface option for external voice privacy device (VP-116)
G419	Enhanced	USB COM port for connecting external keyboard
G423	Add	ALE DTM/DBM (data transfer message/data block message)
S308 (FLN2517)	Add	Interface cable kit for phone patch
G561 (FLN2530)	Add	Interface cable for MICOM link unit
G65	Add	Interface for Pre/Post Selector for co-site or split-site application
G420	Add	2-wire remote control head (up to 5 km)
G422AA	Add	6-wire remote control head

## **CHAPTER 2**

### **HMI**





## 2.1 FAMILIARIZATION WITH EQUIPMENT

### 2.2 RM500 FRONT PANEL

The front panel of the RM500 includes a standard MICOM 3 control panel, and the additional items identified in Figure 2-2.

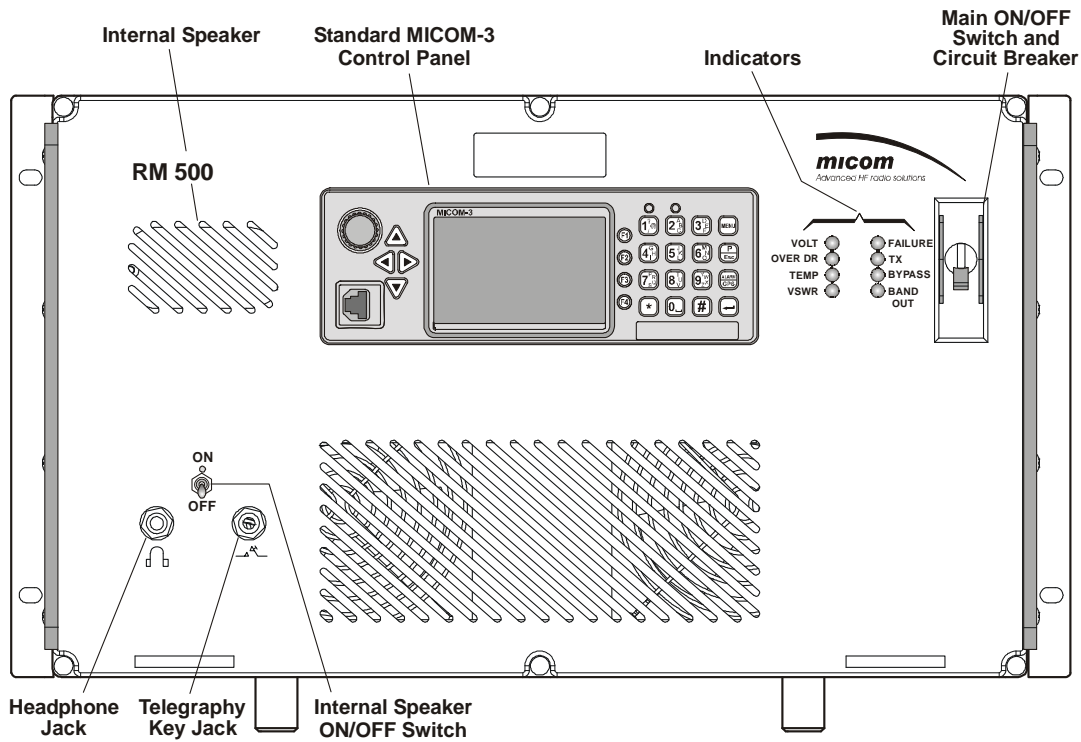
For a description of the MICOM 3 control panel, refer to Publication 6886867J01, "Owner's Guide, MICOM 3E/3T/3R HF-SSB Transceivers"; for indicator functions, refer to Table 2-2

**Table 2-1. RM500 Front Panel Indicators**

Indicator	Function
VOLT	Power supply fault indicator: lights when an internal supply voltage is out of limits. In this case, the 500W amplifier section cannot operate
OVER DR	Input overload indicator: lights when the RF drive power supplied to the 500W amplifier is too high. The 500W amplifier section is bypassed
TEMP	<p>Amplifier overheat indicator: lights when the internal temperature is too high. Usually, this occurs when the air intake or exhaust vents are accidentally obstructed, prolonged exposure to direct sun radiation, or excessive ambient temperatures.</p> <p>If the FAILURE indicator flashes while TEMP lights but BYPASS is off, the 500W amplifier continues transmitting at half power</p> <p>If the FAILURE and BYPASS indicators light together with TEMP, the 500W amplifier has switched to the bypass mode</p>
VSWR	Excessive VSWR indicator: lights when the 500W amplifier is in the transmit mode to indicate that the antenna VSWR exceeds the maximum allowed. This may be caused by a disconnected feed cable, an improperly installed or incorrectly tuned antenna, or as a result of damage to the antenna or to its feed cable
FAILURE	<p>PA failure indicator:</p> <p>Lights when a critical fault in the 500W amplifier section prevents its operation. In this case, BYPASS also lights, to indicate that the 500W amplifier is bypassed</p> <p>Flashes when an operational problem, for example, high temperature, excessive drive power or excessive VSWR activates the corresponding protection circuits</p>
TX	Transmission mode indicator: lights when the 500W amplifier operates in the transmit mode
BYPASS	Bypass mode indicator: lights when the 500W amplifier is bypassed. The amplifier is normally bypassed when the radio is in the receive mode. It is also bypassed when a fault or abnormal condition prevents its normal operation

**Table 2-1. RM500 Front Panel Indicators (Continued)**

Indicator	Function
BAND OUT	Out-of-band input signal frequency: lights when the output filter of the 500W amplifier (used to reduce harmonics radiated by the radio set), cannot be tuned to the input signal frequency. In this case, the highest filter band is selected to attempt continued operation



**Figure 2-1. RM500 Front Panel**

2.3 **RM500R FRONT PANEL**

The front panel of the RM500R is shown in Figure 2-3. Refer to Table 2-2 for indicator functions.

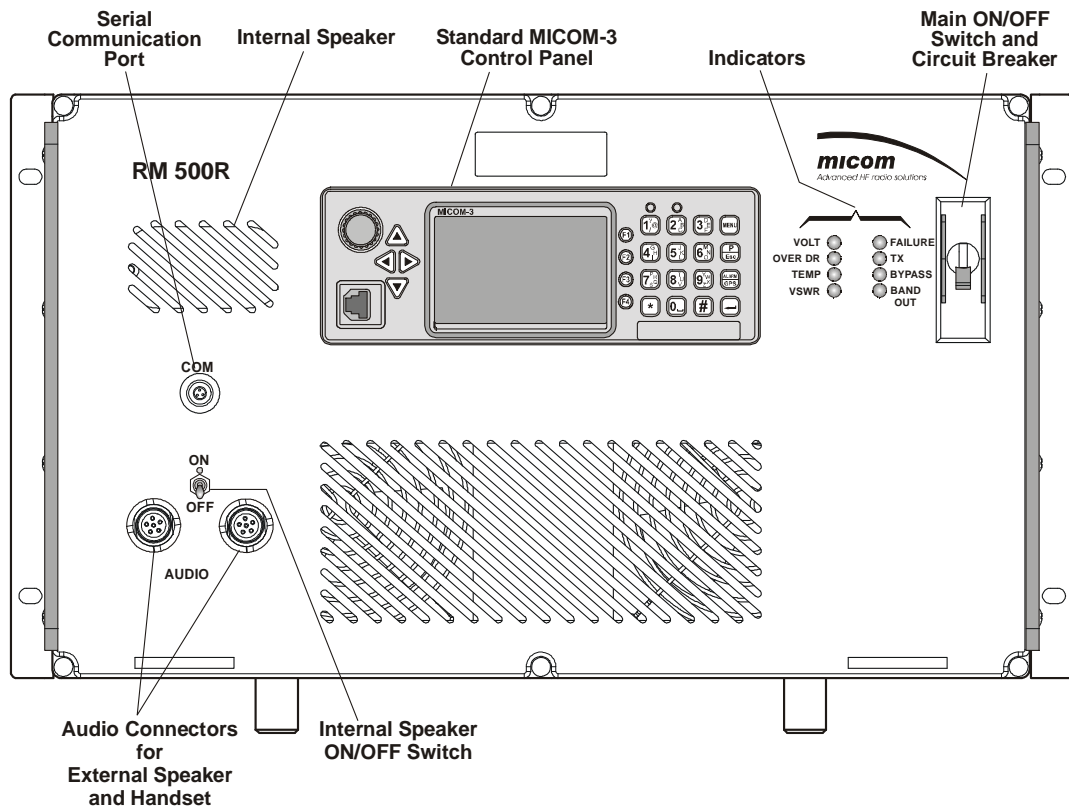
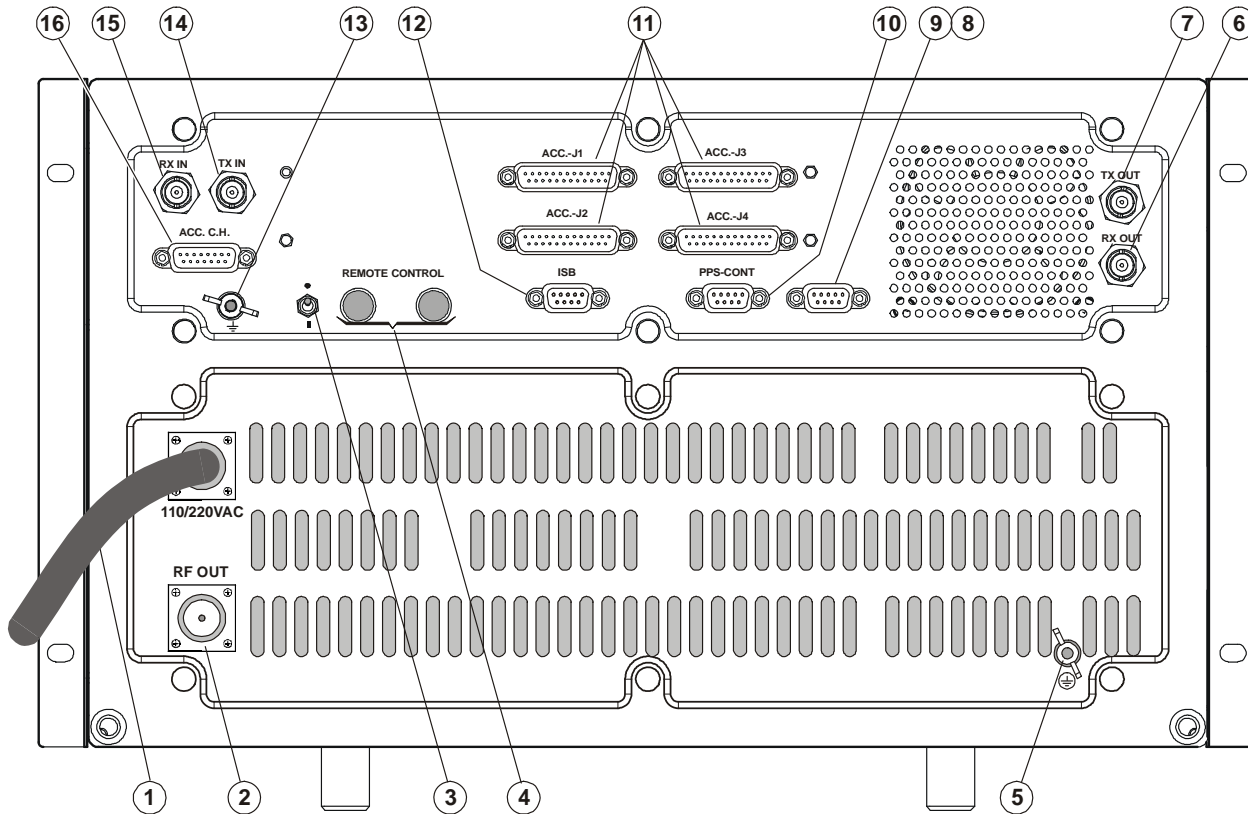


Figure 2-2. RM500R Front Panel

2.4 **RM500/RM500R REAR PANEL**

Figure 4 shows the rear panel of the RM500 and RM500R. The functions of the various items are explained in Table 4.



**Figure 2-3. RM500/RM500R Rear Panel**

**Table 2-2. RM500/RM500R Rear Panel Items**

Item	Description	Function
1	AC Power Cable	Connection to AC power source
2	RF OUT Connector	UHF connector for connection of feed cable to antenna. Serves as the radio set RF input in the receive mode, and as the RF output in the transmit mode
3	REMOTE CONTROL Switch	Enables/disables remote control by the optional 2-wire control head
4	REMOTE CONTROL Terminals	Connection of 2-wire line to optional 2-wire control head

**Table 2-2. RM500/RM500R Rear Panel Items (Continued)**

<b>Item</b>	<b>Description</b>	<b>Function</b>
5	Grounding Screw	Connection of ground to the 500W power amplifier section
6	RX OUT Connector	BNC RF output connector, for connection of unfiltered RF receive signal to the optional pre/post-selector (PPS) (optional)
7	TX OUT Connector	BNC RF output connector, for connection of unfiltered RF transmit signal to the optional pre/post-selector (PPS) (optional)
8	MKL/DATA Connector	Optional 9-pin D-type female connector, for connecting to an MKL Key Loader
9	TUNER CONTROL Connector	Optional 9-pin D-type female connector, for connecting to an optional external antenna tuner unit
10	PPS CONTROL Connector	Connection of control signals to the optional pre/post-selector (PPS) (optional)
11	ACC-J1 to ACC-J4 Connectors	Four 25-pin D-type male connectors, for connection to external accessories, for example, voice privacy devices, modems, vocoders, etc. (see Table 2-1 for pin-out)
12	ISB Connector	Optional 9-pin D-type female connector, for connecting to the additional lines used for the ISB option
13	Grounding Screw	Connection of ground to the transceiver section
14	TX IN Connector	BNC RF input connector, for connection of filtered RF transmit signal from the optional pre/post-selector (PPS) (optional)
15	RX IN Connector	BNC RF input connector, for connection of filtered RF receive signal from the optional pre/post-selector (PPS) (optional)
16	ACC. C.H. Connector	Optional 15-pin D-type female connector, for connecting to the 6-wire Control Head (option G422AA)

**NOTE**

Items 8, 9, 10, 12 are installed only when the radio set is equipped with the corresponding option.



**CHAPTER 3**  
**INSTALLATION PROCEDURE**





**WARNING**

For general operating and installation safety information, see Publication 6886867J01, “Owner’s Guide, MICOM 3E/3T/3R HF-SSB Transceivers”.

During installation work, strictly observe the applicable safety precautions and local regulations. Do not work on the antenna system during lightning storms.

**WARNING**

Proper grounding is essential for your safety, and for good communication performance.

Do not touch the antenna and the RF connectors while the radio set is in operation. During transmission, high RF voltages appear at the RF connectors, the antenna cables, and on the antenna itself. These voltages may cause severe injury or death on contact.

Make sure the antenna is not located near high-voltage lines.

All personnel must be familiar with the applicable safety requirements before attempting to install or operate the RM500/RM500R. Severe injury or death could result from failure to comply with the safety practices.

**CAUTION**

The RM500/RM500R is a two-person lift. Make sure that help is available during the installation activities.

**CAUTION**

Before putting a new RM500/RM500R into operation, it is necessary to calibrate the system to obtain the correct transmit power. Calibration instructions for RM500/RM500R appear in Publication 2072-09538-00, “Radio Service Software (RSS), User’s Guide” for RSS version V3.0 or higher.

## Installation Procedure

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### 3.1 INSTALLATION PLANNING GUIDELINES

This section provides information necessary for planning the installation of RM500/RM500R radio set.

### 3.2 GROUNDING

Failure to provide proper grounding will degrade system operation and cause RF voltage to be present on the equipment chassis. A serious hazard to personnel or equipment could result.

Wide copper straps, as short as possible, must be used for grounding. These straps must be clamped or bonded to a reliable, low-resistance grounding system.

### 3.3 POWER REQUIREMENTS

The RM500/RM500R requires AC power at a nominal voltage of 110 or 220 VAC, 50/60 Hz. The RM500/RM500R will automatically select the appropriate voltage range. The AC power consumption during high-power transmission is up to 2 kW.

A suitably rated circuit breaker must be used to protect the supply line to the RM500/RM500R. It must also enable disconnection of supply voltage during installation and maintenance.

### 3.4 COOLING

RM500/RM500R units are cooled by two internal fans. Air is taken in through the front panel vent, and discharged toward the rear. Therefore, make sure that sufficient free space is available around the equipment to enable free air flow.

Do not stack equipment units: leave at least 1U free above and below the RM500/RM500R.

### 3.5 INSTALLATION DATA

The RM500/RM500R are intended for installation in 19 in. racks. The equipment has front-mounted brackets for attachment. To provide convenient access during maintenance, the RM500/RM500R may be installed in a sliding drawer or on slides capable of supporting the equipment weight.

Make sure that sufficient rack space is available for installation of optional items if necessary, for example, the 1U high PreSelector/PostSelector (PPS).

The rack must be connected to a reliable, low-resistance grounding system.

Sufficient front and rear clearance is required to permit convenient access to front and rear panels, as well as for removal and installation of equipment units, connection of cables, and maintenance.

### **3.6 ANTENNA SYSTEM**

Antenna systems are selected in accordance with the specific communication requirements of each customer: many HF antenna types are available, each providing different radiation characteristics to meet different communication requirements. Therefore, the selection and installation of an antenna system is the customer's responsibility. If necessary, contact manufacturer or your local representative for additional information.

The antenna system must provide a matched termination at the operating frequency, and must be capable of handling the maximum power output of the RM500/RM500R.

#### **3.6.1 ANTENNA FEED SYSTEM**

The antenna feed system comprises any cables, panels and matrices, and any accessories that carry HF signals between the RM500/RM500R and the antenna itself.

All antenna feed system components, and in particular the feed cable, must have low loss and be capable of carrying the maximum power output of the RM500/RM500R. Remember that any power loss along the cable is signal loss!

To protect yourself and the radio equipment against lightning strokes and accidental contact of antenna and/or feed cable with high voltage lines, a properly grounded coaxial protector must be installed at the point of entry of the feed cable into the building or communication shelter. The recommended protector type is IS-B50LN-C0 by PolyPhaser Corp. (also available from the manufacturer, as Cat. No. 2072 09128-00).

### **3.7 PREPARATIONS FOR INSTALLATION**

Before starting the installation of a new RM500/RM500R, review the installation plan and make the following checks:

- a. Identify the prescribed location of the equipment in the rack or cabinet, and check the mounting surface, and the mounting holes. Thoroughly clean the mounting surface and remove all paint, grease and dirt from the holes to provide a better grounding connection.
- b. Check availability of AC power, and grounding arrangements.
- c. Check antenna installation, in accordance with the antenna installation and operation manual.
- d. Check the cable runs between the RM500/RM500R and the prescribed antenna, including the coaxial protector. Make sure that the cables are securely fastened, and do not show signs of external damage.

**NOTE**

Before installing the RM500/RM500R on slides, make sure you are familiar with the procedures needed to install slides in the rack/cabinet, and safely install heavy equipment on the slides.

**3.7.1 INSTALLATION PROCEDURE – BASIC RADIO**

- a. Identify the installation position of the RM500/RM500R in the rack.
- b. Install the RM500/RM500R in the prescribed installation position, fastening it by means of four screws to the rack rails or to the drawer front.
- c. Connect grounding straps from each of the two RM500/RM500R grounding screws (located on its rear panel), to the prescribed cabinet's grounding bar.
- d. Set the power switch on the RM500/RM500R front panel to OFF (down position).
- e. Connect cables to the unit as follows:
  - ◆ Connect the RM500/RM500R AC power cable to the prescribed outlet on the power distribution box of the cabinet.
  - ◆ Connect the antenna feed cable to the RF OUT connector of the RM500/RM500R.
  - ◆ When an external device is used, connect the prescribed cable to the accessories connector of the RM500/RM500R that supports the corresponding device.
- f. Connect audio accessories to the front panel connectors.

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## 3.8 INSTALLATION PROCEDURE – RADIO WITH PPS OPTION

### 3.8.1 PPS FUNCTIONS

The optional Preselector/Postselector, PPS-100 (referred to as PPS in this manual), permits operation of collocated receivers and transmitters on frequencies separated by as little as 10%. The PPS operating frequency range is 1.60 to 29.99 MHz. To use the PPS, order the RM500/RM500R with option G65. The connections between an RM500/RM500R with option G65 and the PPS are shown in Figure 5.

When the G65 option is installed, the PPS is controlled by the RM500/RM500R through a serial port, and is automatically inserted by the RM500/RM500R in the signal path in accordance with the operating mode:

- In the receive mode, the PPS functions as a preselector, providing an additional front end selectivity stage for the receive path of the RM500/RM500R. This reduces the receiver desensitization and overload that would normally occur in the presence of strong adjacent RF transmissions.
- In the transmit mode, the PPS is used as a post selector. It attenuates spurious signals and broadband noise in the driver transmit signal before it reaches the internal 500W power amplifier, thereby reducing interference to neighbouring receivers.

In both modes, the PPS automatically tracks the RM500/RM500R operating frequency. Rapid tuning makes the PPS suitable for Automatic Link Establishment (ALE) or Adaptive Applications.

During self-test, the PPS automatically switches to the bypass mode: in this mode, RF signals pass directly through the PPS, without filtering, and therefore the PPS does not interfere with system operation. The PPS also switches to the bypass mode when the RM500/RM500R frequency is outside the PPS operating range, 1.60 to 29.99 MHz.

In case excessive RF power is applied to the PPS, the PPS enters the RF overload protection mode: in this mode, the PPS antenna port is disconnected, and the internal antenna input is short-circuited to ground. This also protects the RM500/RM500R internal transceiver against overload.

The PPS is housed in a 1U high (1.75 in.) case intended for 19 in. rack mounting. Standard operation is from 115/230 VAC, 50/60 Hz, and can also be powered from 12 or 24 VDC DC sources.

#### 3.8.1.1 PPS Installation Procedure

#### NOTE

The following procedure assumes that the basic RM500/RM500R unit has already been installed, as previously explained (page 16).

**Installation Procedure**

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- a. Identify the installation position of the PPS in the rack, and the position of the RM500/RM500R to which it will be connected.
- b. Install the PPS in the prescribed installation position, fastening it by means of four screws to the rack rails or to the drawer front.
- c. Connect a grounding strap from the PPS unit grounding screw to the prescribed cabinet's grounding bar.
- d. Set the power switches on the RM500/RM500R and PPS front panels to OFF (down position).
- e. Connect the PPS AC power cable to the prescribed outlet on the power distribution box of the cabinet.
- f. Refer to Figure 5 and connect cables between RM500/RM500R and the PPS as follows:

<b>RM500/RM500R Connector</b>	<b>PPS Connector</b>
PPS CONTROL	SERIAL I/O
RX IN	ANTENNA
TX IN	EXEC OUT
TX OUT	PA IN
RX OUT	RADIO

This completes the installation of the PPS.

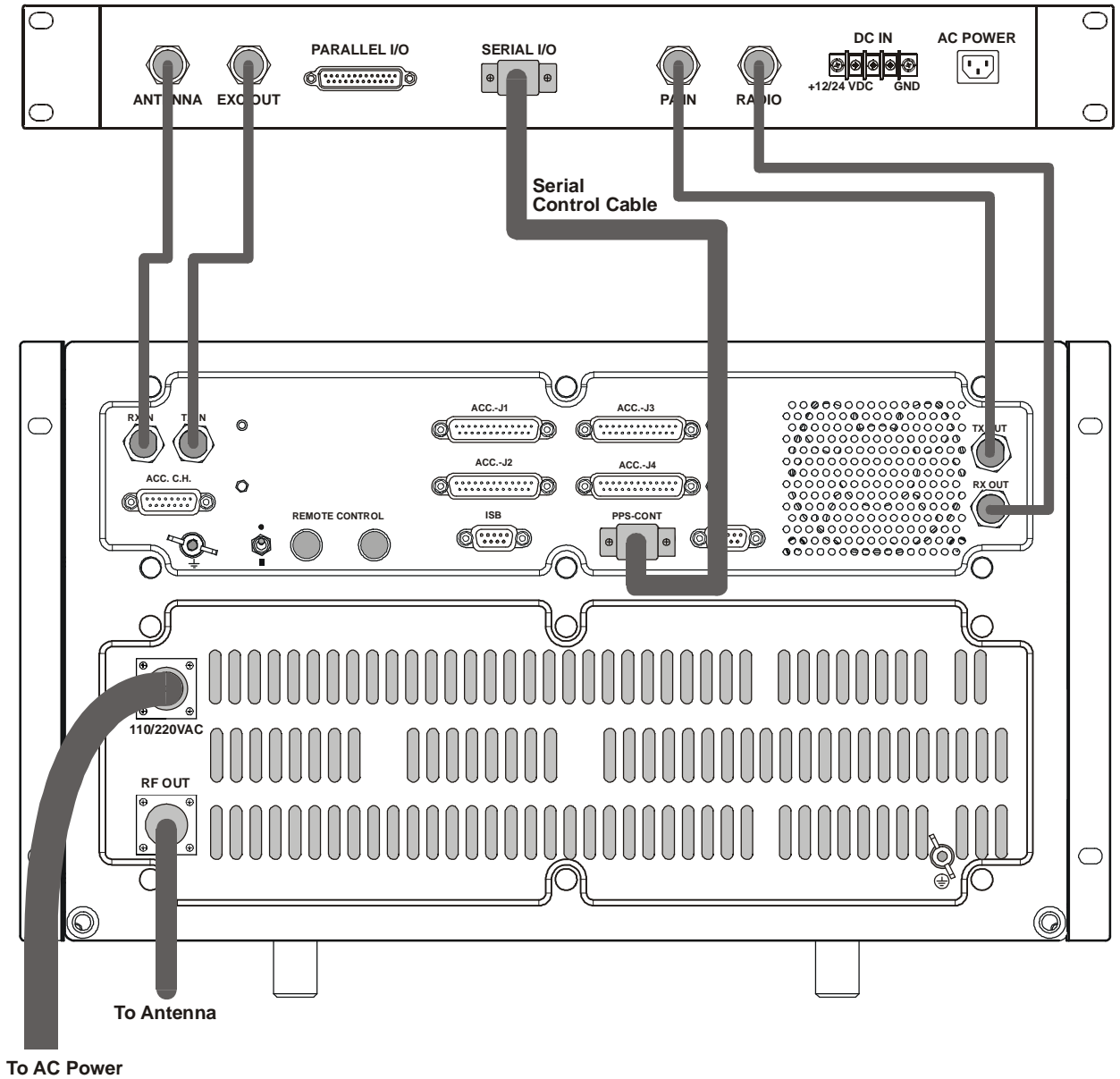


Figure 3-1. Connections to Optional PPS





**CHAPTER 4**  
**USER GUIDE**



## 4.1 **GENERAL**

The following instructions present operating procedures specific to the RM500 and RM500R. It is assumed that the operator is familiar with the common MICOM 3 operating procedures; if necessary, refer to Publication 6886867J01, “Owner’s Guide, MICOM 3E/3T/3R HF-SSB Transceivers”, and to the applicable MICOM 3 Supplements that cover optional features.

## 4.2 **PREPARATIONS FOR OPERATION**

- a. Set the REMOTE CONTROL switch on the rear panel of the RM500/RM500R to the OFF (down) position.
- b. For the RM500R, set the internal speaker switch to ON (up).

## 4.3 **CALIBRATION PROCEDURE**

The manufacturer calibrates new RM500/RM500R sets, to ensure that the transmit level matches the specifications at each of the four transmit power levels (LOW, MED, HIGH, and MAX). However, after repairing an RM500/RM500R, it is necessary to calibrate again the radio set.

Calibration instructions for the RM500/RM500R are given in “Chapter 12: Technician Mode” of Publication 2072-09538-00, “Radio Service Software (RSS) V3.0, User’s Guide” (previously Publication 68P02953C05-O).

The calibration procedure is described in para. 12.2: “Power Calibration” of the RSS User’s Guide. Before carrying out the procedure, make sure to select the 1 kW amplifier power word option on the window that is opened by selecting Technician>Calibration (this selection also applies to the internal 500W power amplifier of RM500/RM500R). The calibration must be performed for each transmit level. The nominal transmit levels are as follows:

- LOW: nominal transmit power of 200W.
- MED: nominal transmit power of 300W.
- HIGH: nominal transmit power of 400W.
- MAX: nominal transmit power of 500W.

Exceeding the maximum rated power of the RM500/RM500R (500 W) may damage the equipment, and therefore it is highly recommended to adjust the MAX transmit power to 450W (that is, 0.5 dB below the rated maximum).

This is a precaution that takes into consideration the accuracy of the equipment used to measure the output power.

#### 4.4 **OPERATING INSTRUCTIONS**

- a. Turn the radio on by setting its main switch to ON (up).
- b. Adjust the volume control to a comfortable listening level.
- c. You are now ready to start using the RM500/RM500R. For operating procedures, you may use the information appearing in Publication 6886867J01, "Owner's Guide, MICOM 3E/3T/3R HF-SSB Transceivers".
- d. To turn the radio off, set its main switch to OFF (down).

#### 4.5 **BYPASSING THE 500W AMPLIFIER SECTION**

The internal 500W amplifier section of the RM500/RM500R can be permanently bypassed. In this case, you can still transmit at a power of up to 125W using the capabilities of the MICOM 3 transceiver which is part of the RM500/RM500R.

You can bypass the 500W amplifier section in case the full transmit power of the RM500/RM500R is not needed (for example, good communication conditions), to save power (the maximum power consumption then decreases to approx. 500W), or when a technical problem in the 500W amplifier section prevents its operation.

To bypass the 500W amplifier section, select NONE on the PROG>RAD>OPTS>ACC menu.