

RCK1000

1 kW Power System

Owner's Guide

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Introduction

This manual covers the installation and operation of the MICOM RCK1000 1KW system. The MICOM RM125 or RM125R, part of the MICOM-3 line of HF-SSB radio sets, is used as exciter and controller to for the 1KW amplifier . The amplifier is powered by a separate power supply unit . The complete 1KW transceiver system is installed in a 19" rack.

1 KW System Description

The RCK1000, expands the MICOM-3 product line by offering higher transmit power (up to 1KW, PEP and average), and thus longer reach and improved communications under bad propagation conditions and/or strong interference.

The RCK1000 consists of three units placed in rack mounting: RM-125/RM-125R transceiver , 1KW RF linear power amplifier and an AC-powered PS unit. The equipment is well suited for base station applications, and can be directly connected to a wide range of broadband or tuned antennas, including whip, dipole, traveling wave, delta, and semi-delta antennas.

The 1KW amplifier is optimized for operation in conjunction with the RM125 or RM125R radio set as exciter and controller, using a dedicated communication interface and a flexible handshaking protocol (interface cable kit, option G156, for connecting the 1KW amplifier to the RM125/RM125R). The RM125/RM125R controls the 1KW amplifier operation, enables the operator to select the nominal transmit power, and the 1KW amplifier provides ALC feedback to adjust the RM125/RM125R drive power to the optimum level.

Caution

Before putting a new RCK1000 into operation, it is necessary to calibrate the system to obtain the correct transmit power (this calibration must also be performed after either the exciter, or the amplifier is replaced). Calibration instructions for the recommended exciter, RM125/RM125R, appear in the Publication 2072-09538-00, "Radio Service Software (RSS), User's Guide" for RSS version V3.0 or higher.

Protection circuits monitor the various operating conditions, and prevent damage to the 1KW system by taking appropriate action, in accordance with the detected problem.

The RCK1000 has several status indicators, and a front-panel LCD that enables the operator to monitor the operation of the subunits: active frequency , actual forward and reflected power (or VSWR), report problems such as the activation of protection circuits or technical malfunctions.

A serial RS-232 asynchronous interface can be used for maintenance and calibration, using any data communication terminal , and the micom radio programming application.

The 1KW amplifier is active only in the transmit mode: when not powered, in the receive mode, and also after the protection circuits are activated, the 1KW amplifier switches to the bypass mode, and directly connects the radio set to the antenna system.

Functional Description

RM-125/125R radio

RM-125/125R radio functions as an exciter in the RCK1000 system.

The RM125/RM125R radio set includes a standard MICOM-3 transceiver, with a 110/220 VAC, 50/60 Hz power supply contained in a compact chassis, suitable for installation in a 19" rack or desktop. Internal cooling fans allow for continuous-duty data transmission and operation over a wide temperature range. The radio set features four accessories connectors located on the rear panel to facilitate the connection of optional accessories.

The AC input voltage range (110/220VAC, 50/60Hz) is automatically switched allowing operation in the United States of America as well as in other countries. As a backup, the RM125/RM125R can also operate on 13.8 VDC power from an external lead-gel or lead-acid battery, which can be automatically charged by the internal AC power supply. When an external battery is connected, the RM125/RM125R can continue operating on battery power during an AC mains failure. This feature allow the RCK1000 system to continue working in lower transmit power, with the 1kw amplifier automatically bypassed , in case of power fail.

Features :

- Automatic Link Establishment per FED-1045 & MIL-STD-188-141B standards (JITC certified).
- Full interoperability with other manufacturers' radios complying with the same ALE standards.
- ISB (Independent Side Band) option (option G191).
- Remote control option (options G420, G422).
- 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.
- 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. The optional 2-wire remote control head (option G420) provides control at a distance of up to 5 km; the G422 6-wire option enables remote control over leased lines, optical fibers or microwave links, and thus the control range is virtually unlimited.

1 KW Amplifier

The 1KW amplifier consists of the following main functions:

- Linear RF power amplifier covering the HF band. The RF amplifier consists of 4 independent amplification modules, whose outputs are combined to obtain the required RF output power. The RF drive signal, applied to the RF IN connector, is amplified to the appropriate level, as selected on the RM125/RM125R.
- Harmonic filter. This is a low-pass filter whose purpose is to attenuate harmonics and other undesired signals at frequencies above the actual operating frequency, before the amplified output signal is applied to the RF OUT connector. The filter has 8 sub-bands: the filter that fits the operating frequency is automatically inserted in the transmit path. The required frequency information is received from the RM125/RM125R; in addition, the 1KW amplifier measures the actual frequency of the RF drive signal as part of its tuning process (if the frequency cannot be measured, the highest band is selected).
- Bypass circuits. These circuits automatically bypass the 1KW amplifier and establish a direct path between the RF IN and RF OUT connectors when power is not available, or a critical malfunction is detected.
- Control circuits. These circuits control 1KW amplifier operation, interface with the exciter/controller unit (RM125/RM125R), and take action to protect the amplifier when necessary.
- Cooling subsystem, includes internal fans that enable operation over a wide range of temperatures.
- Overdrive Protection

The input power is automatically adjusted by an automatic level control to achieve optimal operating conditions for the amplifier. However, if the input drive power exceeds about 80W the protection circuits prevent damage to the 1KW amplifier by bypassing it.

- High VSWR Protection

To obtain maximum forward power, the amplifier should be connected to a low VSWR antenna system. In case of excessive VSWR, for example, because of mismatch or damage to antenna system and/or feed cables, the ALC circuits prevent damage by reducing the transmit power to safe values.

However, in case of excessive mismatch (for example, short or open circuit), the protection circuits switch the 1KW amplifier to the bypass mode: in this case, the transceiver is directly connected to the antenna.

- Overheating Protection

Special circuits protect the 1KW amplifier against overheating. If the temperature is too high to enable full-power operation, the output power is automatically halved, until the temperature returns to normal. However, if the temperature exceeds the maximum allowed limit and damage may be caused, the protection circuits are activated and bypass the amplifier.

- Imbalance Protection

When a fault, power failure or other type of failure prevents normal operation of one or more of its internal amplification modules, the 1KW amplifier is automatically bypassed.

PS Unit

The PS unit is a custom design that includes 6 JWS-600-48 standard power supply modules manufactured by Lambda Inc. (see manufacturer's manual for complete information on these modules), contained in a compact chassis suitable for installation in 19" racks. The individual modules automatically share the load, without any special alignments. The assembled PS unit has been assigned a custom-design manufacturer number (YM-02-670B).

The PS unit operates on 110/220 VAC, 50/60 Hz. The AC input voltage range is automatically switched between 110 and 220 VAC, and therefore the equipment can be used in the United States of America as well as in other countries. Internal cooling fans enable operation over a wide range of temperatures. The PS unit includes two independent power supply subsystems, each providing +45V to two of the four amplification modules in the 1KW amplifier. Protection circuits monitor each output, and provide indications on front panel indicators in case the output voltages deviate by more than 25% from the nominal value; if an output voltage increases beyond the maximum limit, the corresponding power supply subsystem is turned off, to prevent damage to the 1KW amplifier.

RCK1000 Main Technical Characteristics

General	<i>Number of channels</i>	200
	<i>Transmission frequency range</i>	1.6 to 30 MHz
	<i>Emission modes</i>	J3E, H3E, R3E ,J2A, J2B, H2A, H2B, R2A, R2B
	<i>Transmit power (PEP and average)</i>	User-selectable levels <ul style="list-style-type: none"> • Max: 1000W • High: 800W • Medium: 500W • Low: 300W
	<i>Reception frequency range</i>	100 kHz to 30 MHz
	<i>Sensitivity (SINAD)</i>	0.5 uV for 10 dB SINAD
	<i>Audio bandwidth</i>	350 to 2700 Hz
	<i>Data bandwidth</i>	300 to 3300 Hz
	<i>Frequency stability</i>	0.6 ppm (0.1 ppm optional)
	<i>Frequency resolution</i>	10 Hz
	<i>Number of accessories connectors</i>	4
	<i>Operating Modes</i>	<ul style="list-style-type: none"> • Transmit mode (PTT controlled) • Bypass mode (input connector connected to output connector with 1KW amplifier not powered, in the receive mode, or after protection is activated) • Tuning (automatic detection of transmit signal frequency)

<i>Control and maintenance interfaces</i>	<ul style="list-style-type: none"> Serial RS-232 asynchronous maintenance ports
<i>drive power</i>	<ul style="list-style-type: none"> 40W nominal, maximum 80W Pilot tone for operating frequency detection: 5W
<i>Nominal input and output impedance</i>	50 Ω
<i>Intermodulation products</i>	Less than -25 dB below each tone
<i>Non-harmonic products</i>	Less than -60 dB
<i>Harmonics</i>	Less than -50 dB
<i>Carrier suppression(SSB-J3E)</i>	-50 dB/PEP
<i>Carrier level (AME-H3E)</i>	0 to -6 dB/PEP
<i>Load mismatch</i>	<ul style="list-style-type: none"> Full transmit power for VSWR up to 1.3:1 Reduced transmit power for higher VSWR Full protection against short/open circuit
<i>Overheating protection</i>	<ul style="list-style-type: none"> Reduced transmit power for high temperature Bypass in case of excessive temperature
<i>Power requirements</i>	<ul style="list-style-type: none"> Maximum 2000W in SSB mode Maximum 3500W in CW mode Forced air cooling
<i>Cooling</i>	
Dimensions	
<i>Height</i>	102 cm
<i>Width</i>	53.2 cm
<i>Depth</i>	60 cm
<i>Weight</i>	80 kg

PS Unit Main Characteristics	<i>Output voltage</i>	45 VDC nominal
PS Unit Main Characteristics	<i>Operating voltage</i>	110 /220 VAC, 50/60 Hz, with automatic switching
	<i>AC power requirements</i>	Maximum 5000W
	<i>Cooling</i>	Forced air cooling

Familiarization with RCK1000 Equipment

RM-125/125R

Equipment Versions

MICOM RM125

Transceiver for long range wireless voice, fax, data and email communications.

MICOM RM125R

Ruggedized transceiver with military handset and connectors, for applications requiring the utmost dependability and reliability.

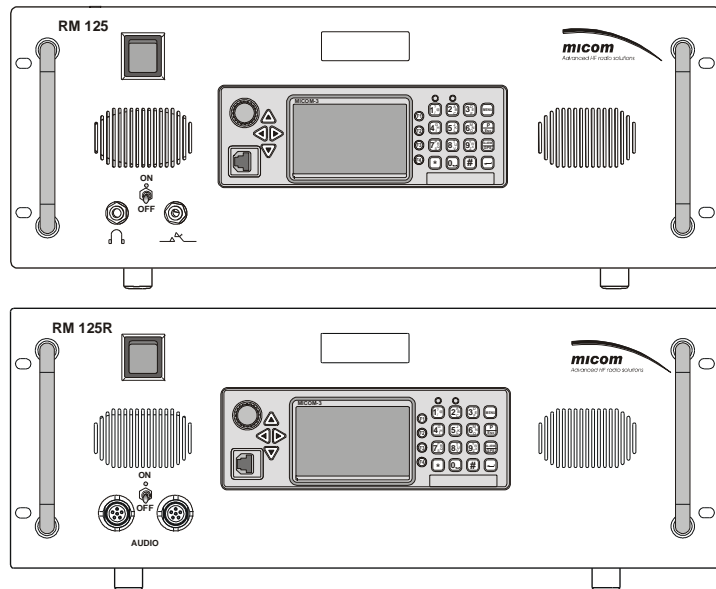


Figure -1. RM125/RM125R Front view

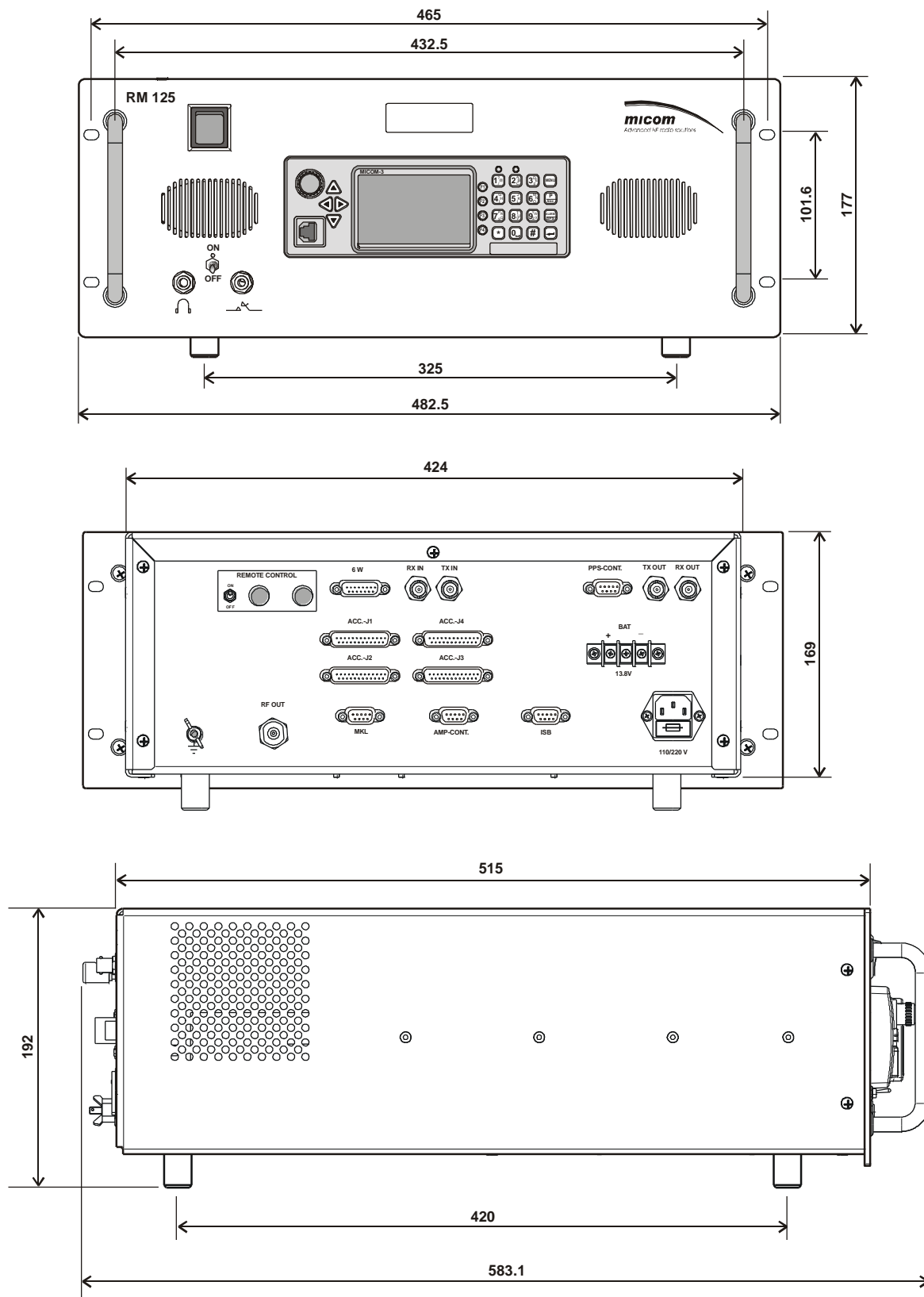


Figure -2. RM125/RM125R Dimensions

Connector data

AMP-CONT Connector

The AMP-CONT connector is a 9-pin D-type female connector used to connect to the high-power linear amplifier.

Microphone Connector

The microphone connector is located on the radio front panel. The same connector is also used for connection to the RSS or MRC. The following table lists the functions of the microphone connector pins.

Pin	Designation	Description
	SWA+	Power output to the microphone
		Serial control communication line (input) (connection to RSS or MRC)
	TXD	Serial control communication line (output) (connection to RSS or MRC)
4	GND	Ground line
5	MIC AUDIO	Input audio signals generated by the microphone (600 Ω impedance; 100 mV tone is required for full output power)
6	PTT MIC	Activates transmission by short circuit to ground
7	MONITOR	Mutes the speaker before transmission is enabled (short circuit momentarily to ground to disconnect the speaker)
8	AUDIO OUT	Receive audio output to earphone (600 Ω , 300 mVRMS)

RM-125R Audio Connectors

The audio connectors are located on the lower left part of the radio front panel. An external speaker and handset can be plugged into both connectors. The following table lists the functions of the audio connector pins.

Pin	Designation	Description
A	GND	Ground line
B	HANDSET AUDIO	Receive audio output (600 Ω) to earphone
C	PTT MIC	Activates transmission by short circuit to ground

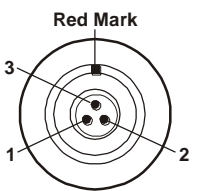
D	MIC AUDIO	Input audio signals generated by the microphone (600 Ω impedance; 6 mV tone is required for full output power)
E	AUDIO OUT	Receive audio output to external speaker
F	SWA+	Supply voltage output to microphone (13.8 VDC nominal)

Data Connector

The data connector is a circular 3-pin connector located on the rear panel. This connector is used to connect external equipment (for example, a PC running MicomNet) to the internal modem.

When your unit supports encryption, the connector is also used to load encryption keys from a PC running the MKL key loader software.

The following table lists the functions of the data connector pins.

Connector View	Pin	Designation	Description
	1	RXD	Data receive input (RS-232 levels) for connection to the transmit output (TXD) of external equipment
	2	TXD	Data transmit output (RS-232 levels) for connection to the receive input (RXD) of external equipment
	3	GND	Ground

Headphone Jack

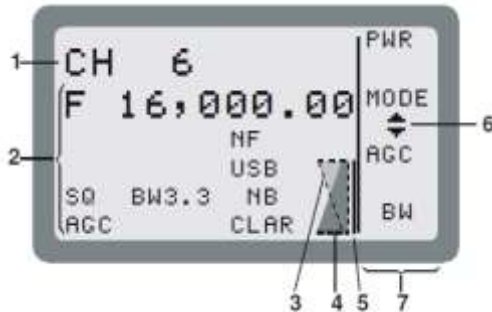
The headphone jack is a standard 1/4" audio jack.

Telegraphy (Morse) Jack

The telegraphy (Morse) jack is a standard 5.3 mm audio jack.

Display Functions

Display Organization



The following table lists the Display indications



No.	Designation	Description
1	Mode indicator	Indicates the current working mode (e.g., channel, frequency, ALE, etc.) or the action being performed (e.g., programming, testing, etc.)
2	Work area	Displays information on the current working mode, the main operating parameters, the active options, status, etc.
3	Transmit level indicator	In the transmit mode, displays the relative transmit power
4	Receive level indicator	In the receive mode, displays the relative received signal strength
5	Tx bar	Appears when the radio is transmitting
6	More options Icon	The presence of this icon indicates that more options can be displayed in the options area. When this icon appears, press the MORE key to see menu options
7	Options display area	Displays a list of options you can select, by pressing the corresponding key, in the current working mode

Mode and Function Indications

The following indications may appear in the work area of the LCD display.

Indication	Meaning
USB	Using upper sideband for transmission and reception
LSB	Using lower sideband for transmission and reception
ISB-U	Independent sideband (ISB) mode (option) is enabled, and the main sideband is USB
ISB-L	Independent sideband (ISB) mode (option) is enabled, and the main sideband is LSB
SQ	Squelch is active: the speaker is turned on only when the radio identifies speech, to prevent reception noise from being heard. For Micom-3R, the squelch function also effects the handset
MON	When using ALE, indicates that the speaker is normally off, and is automatically turned on when the link is established. For Micom-3R, the monitor function also effect the handset
AGC	Non-standard AGC mode (AGC off, or fast AGC) has been selected
BW	Non-standard bandwidth has been selected that is, any bandwidth except 2.7 kHz (the bandwidth appears next to the BW indicator, for example, 3.3 (3.3 kHz) in the screen shown above)
NB	Noise blanker is active
CLAR	Clarifier is active (you selected a frequency deviating from the nominal channel frequency)
NF	Notch filter is active

RF Level Indications

Indication	Meaning
 <p>Strong received signal</p> <p>Weak received signal</p>	Received RF signal strength indication, displayed when the radio is in the receive mode. The height provides a relative indication, which may fluctuate as a result of fading, etc.
 <ul style="list-style-type: none"> - Full transmit power - Relative transmit power - Low transmit power - Reflected power 	<p>Transmit bar, appears when the radio is switched to the transmit mode (for example, when the PTT is pressed). Its length indicates the maximum radio transmit power in the selected mode (MAX, HIGH, MED or LO). The triangle height indicates the instantaneous relative transmit output power, and therefore it fluctuates as a result of modulation.</p> <p>The relative reflected power is indicated by the base line: its length indicates the fraction of power reflected because of antenna VSWR (the length should be small relative to the total height of the transmit bar, which is proportional to the forward power)</p>

1KW Power amplifier

1KW PA Front panel

Figure identifies the items located on the front panel of the 1KW amplifier, and the following table explains their functions.

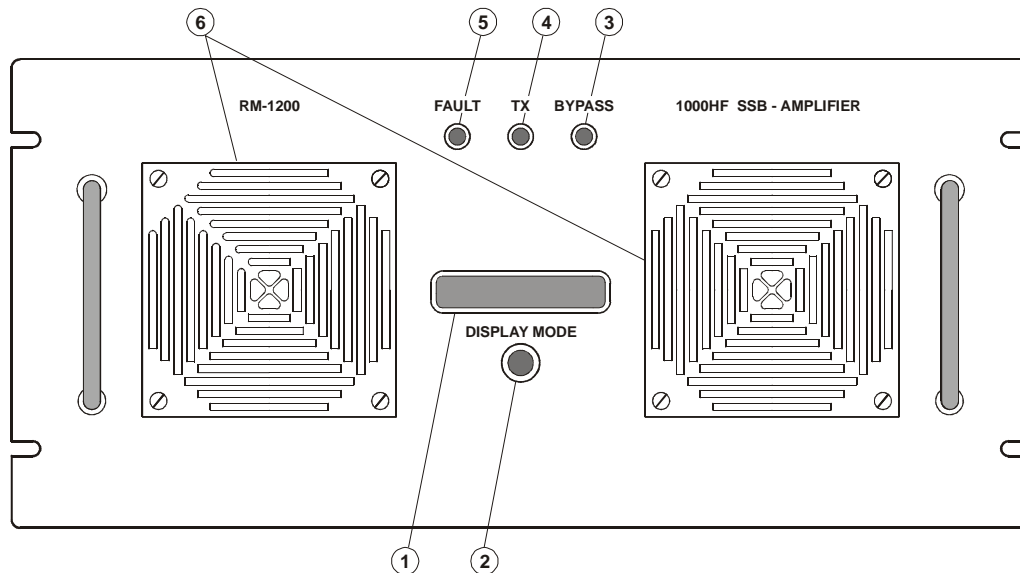


Figure 3. 1KW PA Front Panel

The following table lists the 1KW PA Front Panel Items:

Item	Description	Function
1	Display	LCD display. See the following section for displayed information
2	DISPLAY MODE push-button	Selects the type of information presented on the display
3	BYPASS indicator	Lights when the 1KW amplifier is in the bypass mode . The 1KW amplifier is bypassed when the radio is in the receive mode. It is also bypassed when it is not powered, or a fault or abnormal condition prevents its normal operation
4	TX indicator	Lights when the 1KW amplifier is switched to the transmit mode
5	FAULT indicator	Lights when a fault in the 1KW amplifier does not allow normal operation. In this case, the amplifier remains in the bypass mode until the fault is corrected. Flashes when an operational problem, for example, high temperature or excessive VSWR, activates the protection circuits and causes the amplifier to reduce its output power or temporarily switch to the bypass mode
6	Air intake vents	Intake vents for cooling air, with removable covers that provide access to the dust filters

1KW PA LCD Functions

The LCD is used to display information on the operational conditions of the 1KW amplifier, and status information. The LCD comprises 2 rows, and therefore it is necessary to split the information on four different display pages of 2 rows each.

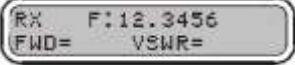

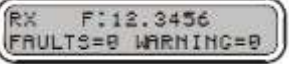
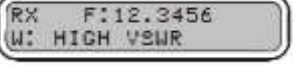
The first row of each page always presents two items:

- The current mode indicator, **RX** or **TX**
- The operating frequency, in MHz, as detected during the tuning process. The frequency is measured with a resolution of 10 kHz, and therefore, if you need to know the exact transmit frequency, always use the RM125/RM125R frequency display.

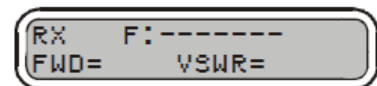
The information displayed in the second row changes with the specific page. To select a page, press the DISPLAY MODE push-button display as required (scrolling is cyclical). The selected page remains on display, until you select another page.

The information presented on each page is explained in the following table. The pages are presented in the order they appear when scrolling by means of the DISPLAY MODE push-button.

The following table lists the 1KW PA LCD Functions

No.	Typical Page	Function
1		Normal receive screen. When transmitting (TX), the second row displays the forward (FWD) power in watts, followed by the VSWR .
2		Alternative screen: when transmitting, displays the forward (FWD) and reflected (REV) power in watts.
3		Status screen (shown for receive – RX – mode). Displays the total number of faults and warnings detected in the unit. If either number is not 0, the FAULT indicator indicates the condition with the highest severity: <ul style="list-style-type: none"> • If the condition with the highest severity is a warning (FAULTS is 0, WARNING is not 0), the FAULT indicator flashes • If the condition with the highest severity is a fault (FAULTS is not 0), the FAULT indicator lights steadily
4		Fault (F) or warning (W) screen: displays the fault and /or warning detected in the unit.

Frequency appears only after successful tuning: before tuning, and also in case the tuning fails, no frequency is displayed. For example:



The forward and reflected power (or VSWR) values are automatically updated; fault and warning information is refreshed only after scrolling again to the same page.

Note *The displayed value may fluctuate, according to the actual power measured at the instant the display has been updated. As a result, in all the transmit modes except CW (which has a constant modulation envelope), the displayed value depends on the instantaneous modulation signal, and therefore may be lower than the selected nominal transmit power.*

Protection circuits are reset after the PTT is released, but may be activated again if condition persists.

The following table lists the 1kW PA Fault and Warning Messages

Type	Message	Meaning	Corrective Actions
Fault	AMP#1 AMP#2 AMP#3 AMP#4	The corresponding amplifier module does not operate, for example, because its supply line fuse is blown, or a fault in the module itself. 1KW amplifier is in the bypass mode and cannot transmit	Service is required
	RF IN OVERLOAD	Excessive drive power supplied to the RF IN input. 1KW amplifier is in the bypass mode and will not transmit until the condition is corrected	When using the amplifier with a driver other than RM125/RM125R, check the maximum transmit power of the driver unit. When using the RM125/RM125R, first check for proper connection of the control cable between the RM125/RM125R AMP-CONT connector and the 1KW amplifier EXCITER CONTROL connector. If problem persists, service is required (adjustment of operating conditions using the MONITOR program)
	PWR OUT LATCH	Technical problem related to the harmonic filter. 1KW amplifier is in the bypass mode and cannot transmit	Service is required
	TEMP OVERHEAT	Excessive internal temperature. 1KW amplifier is in the bypass mode and cannot transmit until it cools	Wait for the amplifier to cool. Check that the air intake vents and exhaust vents are free. If condition recurs, power down the amplifier and clean the dust filters (the filters are reached after removing the intake covers, which are fastened by four screws each)
Warning	PWR OUT REDUCED	Internal temperature is too high. 1KW amplifier transmits at reduced (half) power as long as problem persists	See TEMP OVERHEAT
	HIGH VSWR	Excessive reflected power. 1KW amplifier is in the bypass mode and will not transmit until the condition is corrected	Check the antenna feed cable, starting from the RF OUT connector, and up to the antenna. Also check that no damage is evident to the cables and to the antenna itself

The following table lists the 1KW PA Fault and Warning Messages (Cont.)

Type	Message	Meaning	Corrective Actions
Warning (Cont.)	INVALID FREQ	1KW amplifier could not determine the operating frequency. The frequency is measured by automatically causing the RM125/RM125R to transmit a low level (about 5W) pilot tone for a few seconds after each frequency change, and also whenever the ENT key of the RM125/RM125R is pressed	Check the cable connections between the RM125/RM125R and the 1KW amplifier. Repeat the frequency measurement process by pressing the ENT key of the RM125/RM125R and monitor the RM125/RM125R display: it should switch to the transmit mode for a few seconds, and its transmit display should include at least two bars

1KW PA Rear Panel

Figure identifies the items located on the rear panel of the 1KW amplifier, and the following table explains their functions.

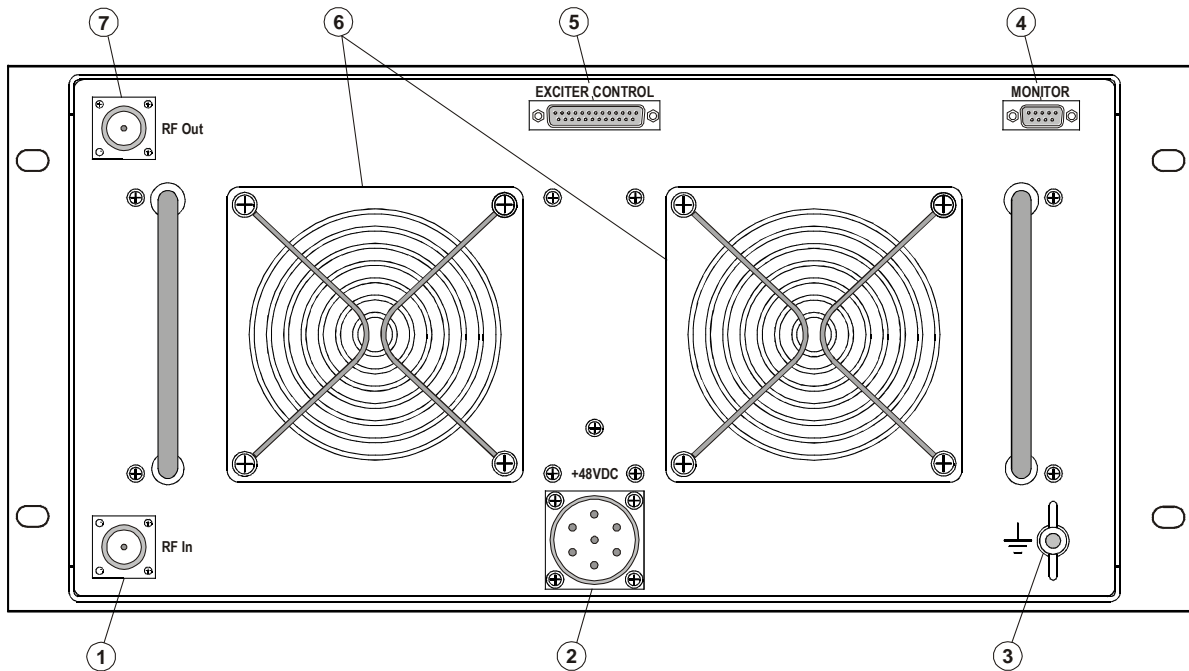


Figure 4. 1KW PA Rear Panel

Item	Description	Function
1	RF IN Connector	N-type connector for RF connection to the RM125/RM125R: <ul style="list-style-type: none"> In the receive or bypass mode, serves as output for receive signals In the transmit mode, serves as input for RF drive signals
2	+48VDC connector	7-pin circular connector for connection to DC power source
3	Grounding screw	Connection of ground to the 1KW amplifier

The following table lists the 1KW PA Rear Panel Items (Cont.)

Item	Description	Function
4	MONITOR connector	9-pin D-type female connector for connection to maintenance monitor (ASCII terminal or PC with terminal emulation program)
5	EXCITER CONTROL Connector	25-pin D-type female connector, contains the control interface that enables the RM125/RM125R to control the 1KW amplifier
6	Exhaust Vents	Cooling air exhaust vents
7	RF OUT Connector	N-type connector for RF connection to antenna system: <ul style="list-style-type: none"> In the receive or bypass mode, serves as input for receive signals In the transmit mode, serves as output for amplified RF signals

Power supply unit

PS Front Panel

Figure identifies the items located on the front panel of the PS unit, and the following table explains their functions.

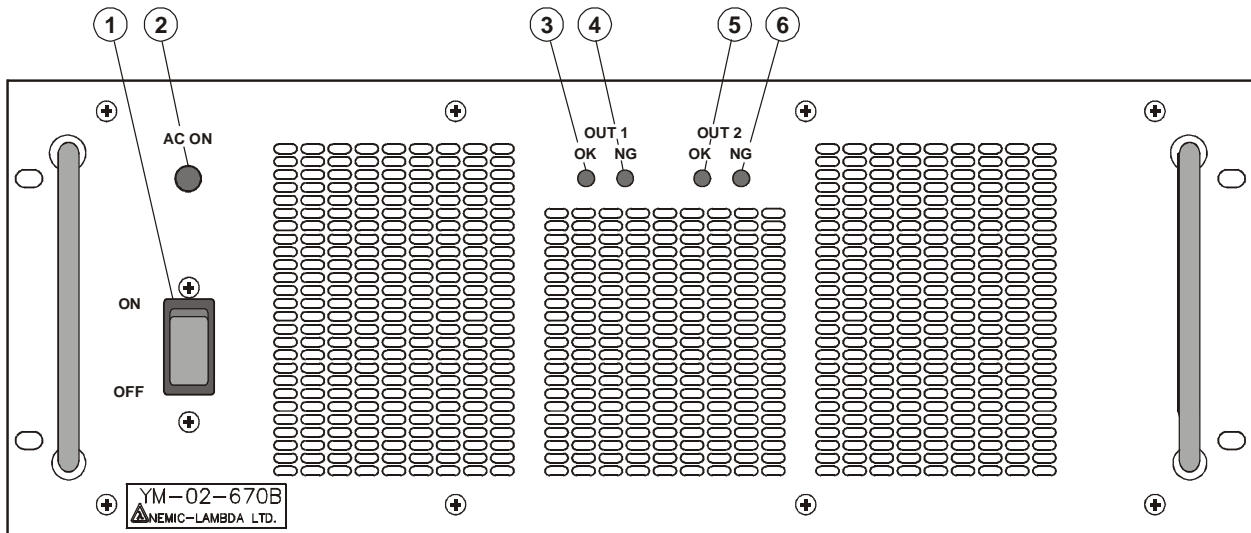


Figure 5. PS Front Panel

The following table lists the PS Front Panel Items

Item	Description	Function
1	ON/OFF switch	Turns the PS on
2	AC ON indicator	Lights when the PS unit is powered
3	OUT 1 OK indicator	Lights when the power supply subsystem 1 operates normally
4	OUT 1 NG indicator	Lights when the output voltage provided by power supply subsystem 1 is not within $\pm 25\%$ of its normal value. To protect the 1KW amplifier, the output voltage is automatically turned off in case it exceeds the maximum value. To attempt returning to normal operation, turn the PS off and then back on: if problem recurs, the PS unit must be serviced
5	OUT 2 OK indicator	Same as Item 3 for power supply subsystem 2
6	OUT 2 NG indicator	Same as Item 4 for power supply subsystem 2

PS Rear Panel

Figure identifies the items located on the front panel of the PS unit, and the following table explains their functions.

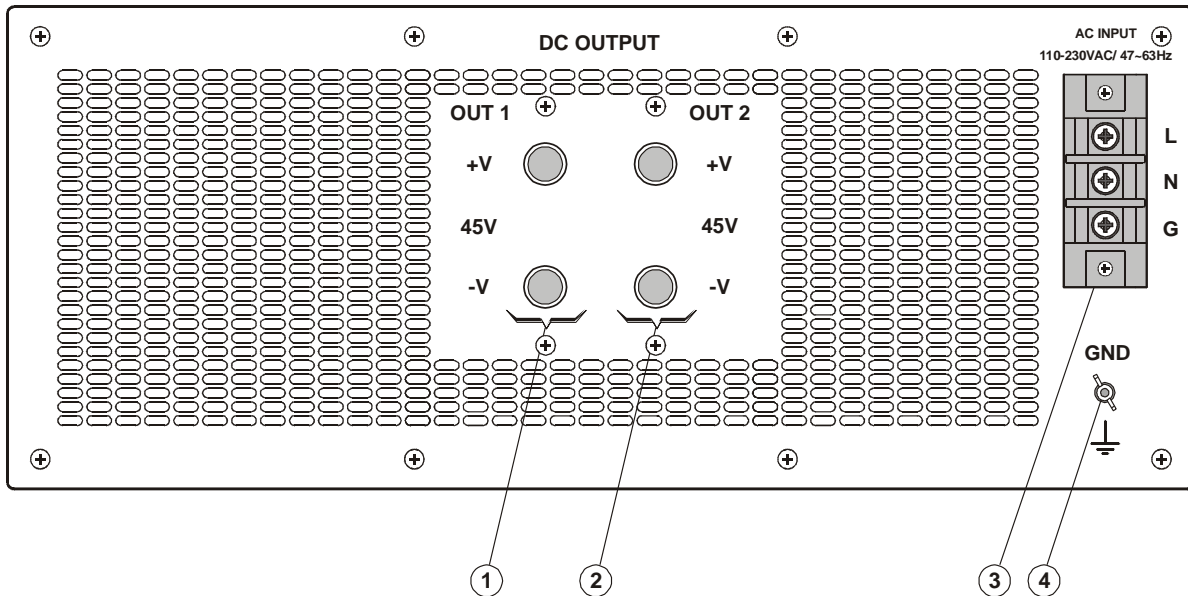


Figure 6. PS Rear Panel

The following table lists the PS Rear Panel Items

Item	Description	Function
1	OUT 1 +V, -V terminals	Output voltage terminals of power supply subsystem 1
2	OUT 2 +V, -V terminals	Output voltage terminals of power supply subsystem 2
3	AC INPUT strip	Terminal strip, covered by a protective cover, for connection to AC power source: <ul style="list-style-type: none">• L – line (phase) terminal• N – neutral terminal• G – ground terminal
4	Grounding screw	Connection of ground to the 1KW amplifier

RCK1000 Equipment Installation

Safety



Warning

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 1KW amplifier and/or the exciter (RM125/RM125R or equivalent) operates. 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 1KW amplifier and/or the exciter (RM125/RM125R or equivalent). Severe injury or death could result from failure to comply with the safety practices.



Warning

High AC voltage, capable of causing death or injury on contact, is present on the AC INPUT terminal strip at the rear panel of the PS unit when the unit is connected to a power source.



Caution

The RCK1000 units are a two-person lift. Make sure that help is available during the installation activities.

Caution

Before putting a new RCK1000 into operation, it is necessary to calibrate the system to obtain the correct transmit power (this calibration must also be performed after either the exciter, or the 1KW amplifier, is replaced). Calibration instructions for the recommended exciter, RM125/RM125R, appear in the Publication 2072-09538-00, "Radio Service Software (RSS), User's Guide" for RSS version V3.0 or higher.

Installation Planning Guidelines

This section provides the additional information necessary for planning the installation of the RCK1000 system .

Grounding

Failure to provide proper grounding to each system unit (RM125/RM125R, 1KW PA and PS unit, and to the optional PPS) and to the rack in which these units are installed will degrade system operation and cause RF voltage to be present on the equipment chassis. A possible serious hazard to personnel could result, as well as equipment malfunction.

Wide copper straps, as short as possible, must be used for grounding. These straps must be clamped or bonded to a common grounding point within the rack, which is connected to a reliable, low-resistance grounding system.

Power Requirements

The RCK1000 PS unit requires AC power at a nominal voltage of 110 or 220 VAC, 50/60 Hz. The PS unit will automatically select the appropriate voltage range.

The maximum AC power consumption during high-power transmission is up to 5 kW.

In addition to the circuit breaker or fuse protecting the supply line to the RM125/RM125R, a suitably rated circuit breaker or fuse must be used to protect the supply line of the PS unit, and enable disconnection of its supply voltage during installation and maintenance.

Cooling

RCK1000 units are cooled by internal fans. Air is taken in through the front panel vents, 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 each unit installed in the rack.

Installation Data

The RM125/RM125R, the optional Pre-Selector/Post-Selector (PPS) , the 1kW PA and the power supply , are intended for installation in the provided 19" rack. The interface cable kit for MICOM 1KW linear amplifier, option G156, is also intended for installation in the same rack.

Each equipment unit has front-mounted brackets for attachment. To provide convenient access during maintenance, each equipment unit is installed on slides capable of supporting the equipment weight.

The rack itself must be securely fastened to the floor, before starting the installation activities.

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.

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 customer's responsibility. If necessary, contact the 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 system.

Antenna Feed System

The antenna feed system comprises any cables, panels and matrices, and any accessories that carry HF signals between the RCK1000 and the antenna itself.

The high output power of the RCK1000 requires particular attention to the power rating of the antenna system, and to the use of a high-quality, low-loss feed cable. Appropriate safety measures must be taken to prevent people from touching the antenna, or even getting close to it.

All the 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 RCK1000. 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).

Preparations for Installation

Before starting the installation of an RCK1000, review the installation plan and make the following checks:

1. Check that the rack is securely fastened to the floor.
2. Check the mounting surfaces, and the rack mounting holes. Thoroughly clean the mounting surface and remove all paint, grease and dirt from the holes to provide a better grounding connection.
3. Check availability of AC power, and grounding arrangements.
4. Check antenna installation, in accordance with the antenna installation and operation manual.
5. Check the cable runs between the 1KW amplifier and the prescribed antenna, including the coaxial protector. Make sure that the cables are securely fastened, and do not show signs of external damage.
6. Make sure that you have the cable sets needed for the installation, which includes the amplifier cable set, and cables for connecting to the exciter unit (for example, use the cables in option G156 for connecting to the RM125/RM125R).

Installation Procedure

Note *All the information appearing in this section is presented for the Micom 1KW amplifier set and the RM125/RM125R as exciter.*

For more data on RM125/RM125R, refer to the "RM125/RM125R Owner's Guide", Publication 6888882V02.

Refer to Figure for a typical RCK1000 interconnection diagram .

1. Identify the installation position of each equipment unit in the rack.
2. Install each equipment unit in the prescribed installation position, fastening it by means of screws to the rack rails or to the drawer front.
3. Connect grounding straps from each grounding screw (located on the rear panels of the various units), to the prescribed cabinet's grounding bar.
4. Set all the power switches on all the equipment front panels to OFF (down position).



Caution

The 1KW PA unit does not have a power switch, and therefore it will start operating as soon as the RM125/RM125R is turned on, provided that the PS unit is already turned on.

5. Connect the RM125/RM125R unit as explained in its Owner's Guide, to AC or the relevant DC power connections.
6. Connect the coax from the RM125/RM125R RF OUT connector to the RF IN connector of the 1KW amplifier.
7. Connect the control cable between the RM125/RM125R AMP-CONT connector and the 1KW amplifier EXCITER CONTROL connector.
8. Connect the antenna feed cable to the RF OUT connector of the 1KW amplifier.
9. Connect the DC power cable between the 1KW amplifier +48VDC connector and the four DC OUTPUT terminals of the PS unit. Pay attention to correct connection of the two pairs of leads to the DC OUTPUT terminals, with respect to polarity and OUT pair.
10. Connect the three leads of the PS unit AC power cable to the AC INPUT terminal strip, in accordance with the functions of each lead. After making the connections, make sure that the protective cover of the terminal strip is properly installed.
11. Connect the other end of the AC power cable of the PS unit to the prescribed outlet on the power distribution box of the cabinet.

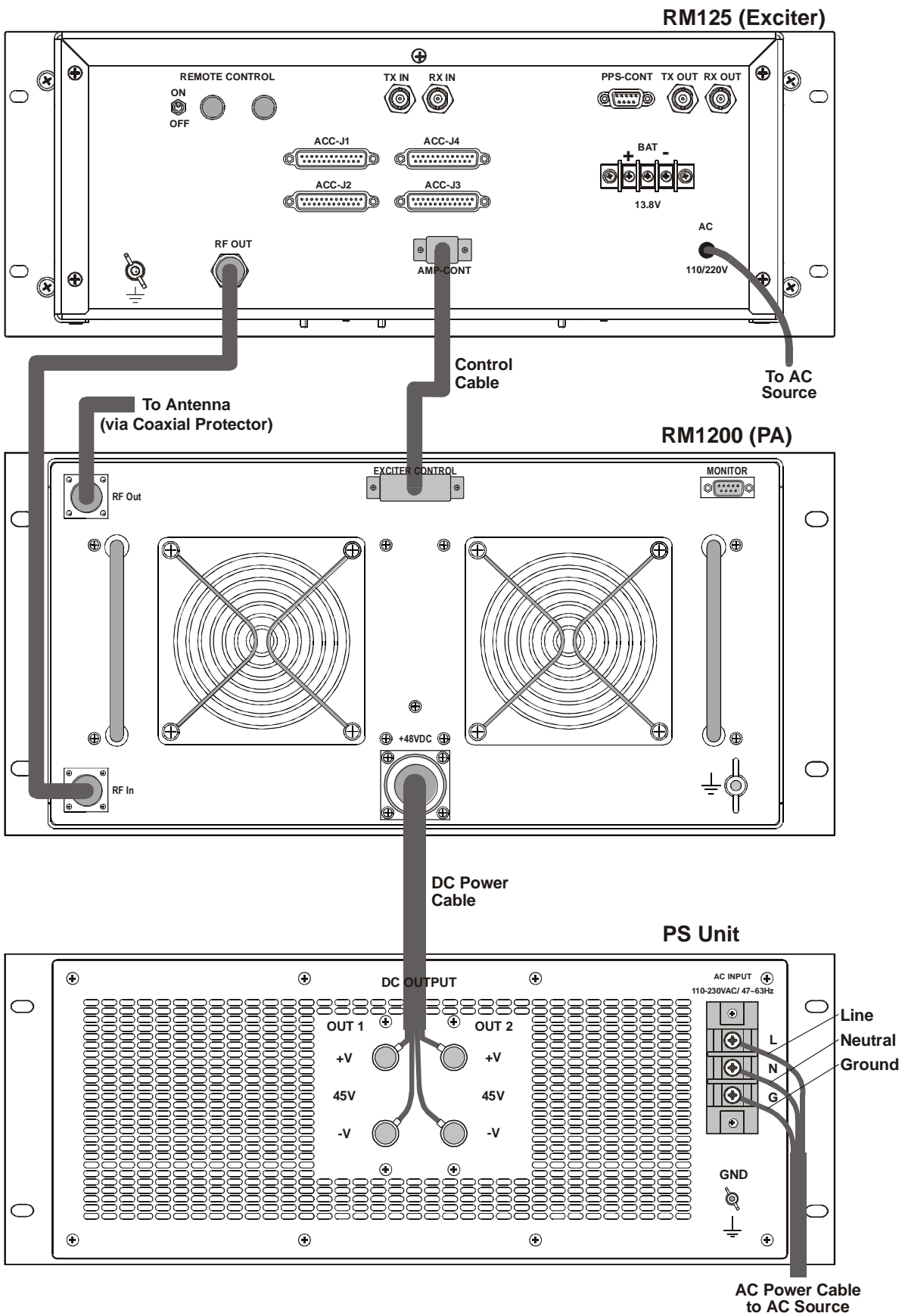


Figure 7. Typical RCK1000 System Connections

RCK1000 Operation

General

The following instructions present operating procedures of the system. More information is detailed in the "RM125/RM125R Owner's Guide", Publication 6888882V02, "Owner's Guide, MICOM-3F/3T/3R HF-SSB Transceivers", Publication 6886867J01, and the applicable MICOM-3 Supplements that cover optional features.

Preparations for Operation

1. Set the REMOTE CONTROL switch on the rear panel of the RM125/RM125R to the OFF (down) position.
2. For the RM125R, set the internal speaker switch to ON (up).

Calibration Procedure

The manufacturer calibrates new 1KW amplifier systems, to ensure that the RM125/RM125R transmit level matches the 1KW amplifier requirements at each of the four system transmit power levels (**LOW**, **MED**, **HIGH**, and **MAX**). However, after replacing the 1KW amplifier or the RM125/RM125R serving as its exciter, it is necessary to calibrate again the system.

Calibration instructions for a 1KW amplifier used in conjunction with the RM125/RM125R 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 Section 12.2: "Power Calibration" of the RSS User's Guide. Before carrying out the procedure, make sure to select the 1KW amplifier power word option on the window that is opened by selecting **Technician>Calibration**. The calibration must be performed for each transmit level. The nominal transmit levels are as follows:

- **LOW**: nominal transmit power of 300W.
- **MED**: nominal transmit power of 500W.
- **HIGH**: nominal transmit power of 800W.
- **MAX**: nominal transmit power of 1000W.

Exceeding the maximum rated power of the 1KW amplifier (1000 W) may damage the equipment, and therefore it is highly recommended to adjust the MAX transmit power to 900W (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.

Note *If no equipment capable of measuring the 1KW amplifier transmit power is available, it is possible to use the 1KW amplifier own display to determine the transmit power. Do not use this method, unless it is absolutely impossible to obtain appropriate test equipment.*

Equipment Turn-On

1. Apply power to the RM125/RM125R by setting its AC power switch to ON (up).
2. Set the AC power switch on the PS unit to ON, and monitor its indications. The expected indications, as well as what to do if a problem is detected, are described in the below table.
3. Turn the RM125/RM125R ON/OFF switch and volume control clockwise and adjust for a comfortable listening level.
4. The 1KW amplifier is also turned on. Monitor its power-up indications. The expected indications, as well as what to do if a problem is detected, are described in the below table.
5. Select the prescribed channel and operating mode of the RM125/RM125R. Make sure that the RM125/RM125R is programmed to use the 1KW amplifier (you should see **AMP** on the **PROG>RAD>OPTS>ACC** menu).

Power-up Indications

Unit	Expected Indication	What to do if not ...
PS Unit	AC ON indicator lights	Check that AC power is available, and that the PS unit is properly connected to the AC distribution panel
	OUT 1 and OUT 2 indicators light. NG 1 and NG2 indicators off	The PS unit requires service. Turn the PS unit off: do not attempt to continue using the 1KW amplifier until the problem is corrected. You can still transmit and receive using the RM125/RM125R (maximum transmit power – 125W) by selecting NONE on the PROG>RAD>OPTS>ACC menu.

	<p>All the front panel indicators flash together a few times as the unit performs its power-up initialization sequence, and then turn off</p>	<p>If the FAULT indicator lights, a fault has been detected in the 1KW amplifier (you may read the problem by means of its from panel LCD). Service the 1KW amplifier.</p> <p>However, you can still transmit and receive using the RM125/RM125R by selecting NONE on the PROG>RAD>OPTS>ACC menu.</p> <p>If the BYPASS indicator lights while in the transmit mode, make sure to select AMP on the RM125/RM125R PROG>RAD>OPTS>ACC menu.</p>
1KW PA	<p>The 1KW amplifier tunes to the RM125/RM125R operating frequency. After successful tuning, its front panel LCD displays the selected frequency</p>	<p>Check for proper connection of the RF and control cables between the RM125/RM125R (or other exciter unit you are using), and the 1KW amplifier.</p> <p>If tuning fails even after turning the equipment off and on again in the proper turn-on sequence described above, you are still able to transmit and receive using the RM125/RM125R by permanently bypassing the 1KW amplifier. For the RM125/RM125R, you bypass the 1KW amplifier by selecting NONE on the PROG>RAD>OPTS>ACC menu</p>
RM-125	<p>The display turns on and shows SELF TEST for a few seconds.</p>	<p>If the display is too dim, adjust its brightness using MENU > MORE > DIM > LEVEL. However, this change is temporary: the dimming level returns to the default setting (1) after 10 seconds. Each key pressing will extend the time-out interval by 10 seconds. If automatic dimming is enabled (DIM is YES), the display may turn off after a few seconds of inactivity. To cancel this feature, use MENU > MORE > PROG > RAD > PRMT > MORE > MORE > DIM to select NO for DIM.</p>
	<p>If the self-test procedure is successfully completed, the radio automatically resumes operation in the last used mode (CHAN, FREQ, ALE, or SCAN).</p>	<p>If a problem is detected during self-test, the display shows ERR and a code number, followed by a concise description of the error (if the description does not fit in one row, its parts alternate in the display). If the detected problem does not prevent using the radio, press EXIT to cancel the display and continue</p>

Operating Instructions

You are now ready to start using the radio set. For the additional operating procedures, you may use the information appearing in the "RM125/RM125R Owner's Guide", Publication 6888882V02, and in the "Owner's Guide, MICOM-3F/3T/3R HF-SSB Transceivers", Publication 6886867J01.

1. During reception, you will see the receive indications (**RX** and the operating frequency) on the 1KW amplifier LCD.

Note *The tune indications will appear whenever you change the operating frequency, and also whenever the **ENT** key of the RM125/RM125R is pressed. If the frequency cannot be identified, you will see an INVALID FREQ message, and it is not possible to transmit using the 1KW amplifier (the 1KW amplifier is bypassed).*

2. When you press the PTT to start a transmission, the TX indicator of the RM-125 and on the 1KW amplifier lights, and you will see the transmit indications (**TX** and the operating frequency) on the LCD.

The second row of the 1KW LCD displays the transmit power, and the VSWR.

Note *During normal transmission, the TX indicator lights, and the BYPASS and FAULT indicators are off.*

If the BYPASS and FAULT indicators light, the 1KW amplifier switched to the bypass mode because it either overheated to dangerous levels, or the antenna VSWR is too high, or because it could not identify the operating frequency. You can read the information displayed by the LCD to get additional details. In this case:

1. *If the operating frequency has not been identified, repeat the frequency measurement process by pressing the **ENT** key of the RM125/RM125R and monitor the amplifier LCD display: it should switch to the transmit mode for a few seconds, and its transmit display should include at least two bars.*
2. *Check that the amplifier cooling fans operate normally, and that nothing blocks the air intake and exhaust vents.*
3. *Check the antenna system and the feed cable for accidental disconnection or damage.*
4. *If problem persists after turning the equipment off and then on again in the proper sequence, service is needed.*

If the FAULT indicator flashes but the BYPASS indicator is off, the 1KW amplifier halved its transmit power because it overheated. In this case, take the steps described in Item 2 above.

Equipment Turn-Off

1. Turn the RM125/RM125R off: turn the front panel ON/OFF switch and volume control

fully counterclockwise, beyond the detent position. Now set its AC power switch to OFF.

Note *At this stage, the 1KW amplifier is also turned off.*

2. Turn the PS unit off by setting its ON/OFF switch to OFF.