



## RM8 Product Overview

The *RM8 Software Defined Modem & ALE* provides an implementation of MIL-STD-188-110C Appendix D, which specifies a new family of Wideband HF (WBHF) Waveforms. The WBHF waveforms occupy bandwidths from 3 kHz to 24 kHz in increments of 3 kHz, offering user data rates between 75 bps and 120 kbps.

The WBHF waveforms address the need for higher throughput needed to support IP based data and new high capacity applications such as video and Naval/Strategic situational awareness for command and control (C2).

The operation of the *RM8* is determined by the selection of a built-in modem software pack. RapidM offers a choice between HF, V/UHF and WBHF modem software packs that can be activated with the appropriate *RapidM* activation key.

The *RM8* WBHF data modem waveforms supports skywave operation up to 19k2 bps in 6 kHz and surface or groundwave operation up to 64 kbps in 12 kHz and 128 kbps in 24 kHz.

## Key Features

- ✦ Standards compliance – MIL-STD-188-110C App. D
- ✦ High Data Rate WBHF Data Modem
- ✦ WBHF Bandwidths – 3 to 24 kHz in 3kHz steps
- ✦ DTE port – EIA 530A Synchronous/Asynchronous
- ✦ Local configuration & control – Menu-driven
- ✦ GPS unit built-in & I/F – for ALE time (Link Prot.)
- ✦ Works with RC8 ARQ – datasheet available
- ✦ Works with RC66-WB ARQ – datasheet available

## WBHF Data Modem

The *RM8* WBHF data modem is intended for operation with WBHF radios with an audio bandwidth exceeding the traditional 3 (SSB) & 6 kHz (ISB) bandwidths. Data is transferred at rates of up to 120 kbps over WBHF radios supporting bandwidths up to 24 kHz. The *RM8* radio audio interface is via a 24 kHz baseband audio interface.

The added benefit of the WBHF family of waveforms is that different bandwidths can be selected to achieve different levels of communications service, e.g. robustness, latency and performance. For example, given a specific user data rate, it may be possible to select a wider bandwidth waveform that can provide the same throughput but requiring less SNR while at the same time providing more robustness to multipath and fading.

## Additional Features

- ✦ Surface / Groundwave Operation
  - ✦ Up to 120 kbps, in 24 kHz (256-QAM)
  - ✦ Up to 115.2 kbps, in 21 kHz (256-QAM)
  - ✦ Up to 90 kbps, in 18 kHz (256-QAM)
  - ✦ Up to 76.8 kbps, in 15 kHz (256-QAM)
  - ✦ Up to 64 kbps, in 12 kHz (256-QAM)
  - ✦ Up to 48 kbps, in 9 kHz (256-QAM)
  - ✦ Up to 32 kbps, in 6 kHz (256-QAM)
  - ✦ Up to 16 kbps, in 3 kHz (256-QAM)
- ✦ Skywave Operation
  - ✦ Up to 19k2 kbps, in 6 kHz (64-QAM)
  - ✦ Up to 9k6 kbps, in 3 kHz (64-QAM)
- ✦ Configuration and Control Protocols
  - ✦ RAP1/RIPC Protocol
  - ✦ STANAG 5066 (Annex E)

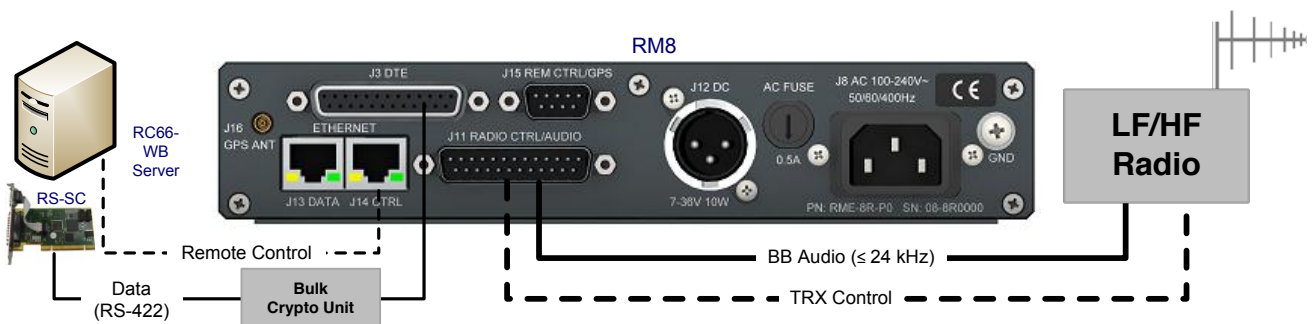


Figure 1: RM8 based Synchronous WBHF Data System

BANDWIDTH [BW]	DATA RATES [BPS], CODED		W1
24 kHz	GND Wave GND Wave	256-QAM: 120k, 64-QAM: 76k8 - 96k, 32-QAM: 64k, 16-QAM: 51k2 8-PSK: 38k4, 4-PSK: 25k6, 2-PSK: 1k2 - 12k8, Walsh: 600	•
21 kHz	GND Wave GND Wave	256-QAM: 115k2, 64-QAM: 57k6 - 76k8, 32-QAM: 48k, 16-QAM: 38k4 8-PSK: 28k8, 4-PSK: 19k2, 2-PSK: 600 - 9k6, Walsh: 300	•
18 kHz	GND Wave GND Wave	256-QAM: 90k, 64-QAM: 57k6 - 72k, 32-QAM: 48k, 16-QAM: 38k4 8-PSK: 28k8, 4-PSK: 19k2, 2-PSK: 1k2 - 9k6, Walsh: 600	•
15 kHz	GND Wave GND Wave	256-QAM: 76k8, 64-QAM: 48k - 57k6, 32-QAM: 40k, 16-QAM: 32k 8-PSK: 24k, 4-PSK: 16k, 2-PSK: 600 - 8k, Walsh: 300	•
12 kHz	GND Wave GND Wave	256-QAM: 64k, 64-QAM: 38k4 - 48k, 32-QAM: 32k, 16-QAM: 25k6 8-PSK: 19k2, 4-PSK: 12k8, 2-PSK: 600 - 6k4, Walsh: 300	•
9 kHz	GND Wave GND Wave	256-QAM: 48k, 64-QAM: 28k8 - 36k, 32-QAM: 24k, 16-QAM: 19k2 8-PSK: 14k4, 4-PSK: 9k6, 2-PSK: 600 - 4k8, Walsh: 300	•
6 kHz	GND Wave SKY Wave SKY Wave	256-QAM: 32k, 64-QAM: 24k 64-QAM: 19k2, 32-QAM: 16k, 16-QAM: 12k8 8-PSK: 9k6, 4-PSK: 6k4, 2-PSK: 300 - 3k2, Walsh: 150	•
3 kHz	GND Wave SKY Wave SKY Wave	256-QAM: 16k, 64-QAM: 12k 64-QAM: 9k6, 32-QAM: 8k, 16-QAM: 6k4 8-PSK: 4k8, 4-PSK: 3k2, 2-PSK: 150 - 1k6, Walsh: 75	•

GENERAL SPECIFICATIONS			
SIZE & WEIGHT	<ul style="list-style-type: none"> <li>Width: 212.2 mm</li> <li>Depth: 225.6 mm</li> </ul>	<ul style="list-style-type: none"> <li>Height: 41.1 mm (excl. front panel)</li> <li>Height: 44.1 mm (incl. front panel)</li> </ul>	<ul style="list-style-type: none"> <li>Weight: 2.2 kg</li> </ul>
ENVIRONMENTAL SPECIFICATIONS	Climatic	<ul style="list-style-type: none"> <li>Storage/Operation: -30 °C to +70 °C (MIL-STD-810F)</li> <li>Humidity: 90% non-condensing at 30 °C (MIL-STD-810F)</li> </ul>	
	Mechanical	<ul style="list-style-type: none"> <li>Vibration: Surface Ship, Marine Vehicles, Aircraft, Min. Integrity (MIL-STD-810F)</li> <li>Shock: 40 G, 11 ms (MIL-STD-810F)</li> </ul>	
	EMC	<ul style="list-style-type: none"> <li>MIL-STD-461E, CE Marking -Directives 73/23/EEC and 89/336/EEC</li> </ul>	
	MTBF	<ul style="list-style-type: none"> <li>&gt; 40,000 hours</li> </ul>	
INSTALLATION	Compact design: The unit occupies a width less than 1/2 of an 1U 19" rack slot		
PRESETS	Factory and Custom Presets		

INTERFACES	
DTE (DATA) PORT (DB25F)	RS-422 balanced, RS-423, RS-232 unbalanced., MIL-STD-188-114 (interoperable), EIA 530A compliant Half & Full Duplex operation, Synchronous, Standard and High-speed Async modes
REMOTE CONTROL/ GPS PORT (DE9M)	Remote Control Pins: RS-485 Multi-drop, RS-422 balanced or RS-232 Protocol: Control Protocol (RAP1 + RIPC, ASCII S5066 Annex E) External GPS Control Pins: RS-232 (nominally input) Data Rate: 300 to 19200 bps, 1/2 stop bits, 7/8 bit data. PPS line: RS 232/422 (NMEA) or TTL
GPS ANT. (MCX)	Built-in GPS receiver: Time reference for 2G ALE Linking protection (AL-2).
ETHERNET CTRL PORT (RJ45)	Remote Control: 10/100 Base-T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: Control Protocol (RAP1 + RIPC)
ETHERNET DATA PORT (RJ45)	IP Packet Data: 10/100 Base-T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: Raw IP packet data, requires 3G ALE.
LOCAL CONTROL	Local control via 32x202 pixel graphical LCD display and 16-key keypad. 3 bi-colour LED indicators Alphanumeric and digit keypad for fast data entry, 4-way navigation button
RADIO CONTROL & AUDIO PORTS (DB25M)	Radio Control Pins (2 channels): RS-232, up to 115200 bps, 1/2 stop bits, 7/8 bit data Supports for various radio control protocols are built-in. Input Audio (2 channels): 600 Ohm balanced, -20 to +10 dBm without adjustment (Up to 24 kHz) Output Audio (2 channels): Balanced, -40 to +10 dBm adjustable into 600 ohm load (Up to 24 kHz) Keyline: Non-polarized contact closure (<45 V, 200 mA). PTT Sense Input: Pull to ground to indicate external PTT. Aux Audio Pins: Connection of microphone for ALE voice calling Input Audio: 600 ohm balanced, -20 to +10 dBm without adjustment or MIC input (selectable) Output Audio: Balanced, -40 to +10 dBm adjustable into 600 ohm load
POWER SUPPLY	<b>Variant 1, AC Supply:</b> 90-264 VAC, 40-440 Hz, 2A; 100-370 VDC <b>Variant 2, AC + DC:</b> 90-264 VAC, 40-440 Hz, 2A; 100-370 VDC & 6-36 VDC MIL-STD 1275B protection

ORDERING INFORMATION	STOCK NUMBER AC SUPPLY	DESCRIPTION	STOCK NUMBER AC / DC SUPPLY	DESCRIPTION
RM8 (M1)	RME-8R-P1-M14.1	SDM: RM8 AC M1 (110C 3,6 110B-F)	RME-8D-P1-M14.1	SDM: RM8 A/DC M1 (110C(3,6) 110B-F)
RM8 (M2)	RME-8R-P1-M24.1	SDM: RM8 AC M2 (HF S4285, S4539)	RME-8D-P1-M24.1	SDM: RM8 A/DC M2 (HF S4285, S4539)
OTHER RM8 SOFTWARE OPTIONS		STOCK NUMBER	DESCRIPTION	
2G ALE (MIL-STD-188-141B)		RM8-SW-O-2G-1.8	SW MDL-2G ALE / MS 141B, App. A, B V1.8	
3G ALE (STANAG 4538) FLSU, xDL		RM8-SW-O-3A-3.5	SW MDL-3G ALE 4538 FLSU, xDL V3.5	
WBHF MODEM W1 (FEATURED S/W)		RM8-SW-O-W1-1.1	SW MDL-W1 WBHF B≤24kHz 120000 bps V1.1	

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