RM4 HF Data Modem & ALE Controller

HF Modem & 2G ALE

The *RM4* is a high data rate HF data modem & ALE controller for standards-based naval and military data communications. The *RM4* is suitable for long distance point to point data links. The maximum data rate is 9600 bps. The *RM4 HF Data Modem & ALE Controller* is intended for installation into 19" rack systems.

Key Features & Benefits

- **High Data Rate Modem**
- **Up to 9600 bps in 3 kHz**
- **HF Modem & ALE controller in one unit**
- **ALE function is optional**
- **MIL-STD-188-141B App. A**
- **MIL-STD-188-110 A/B**
- **STANAG 4539 (QAM)**
- **STANAG 4285 (PSK)**
- **STANAG 4529 (NB PSK)**
- **STANAG 4415 (robust)**
- **STANAG 4481 (P/FSK)**
- **STANAG 5065 (MSK)**
- **STANAG 5066 compliant interface**
- **Synchronous DTE port for interfacing with high grade cryptographic equipment**
- **Ethernet Interface**

The optional *ALE* function is built-in and can be activated with the appropriate *RapidM* license key. For more information on these functions, please see the RM4 2G ALE product brochure.

The *RM4* is designed to operate in conjunction with an external **STANAG 5066** compliant ARQ server, for example *RapidM's* **RC66** Combat Communications Suite. A PC Configuration utility is provided for remote control.

Waveforms

MIL-STD-188-110 A/B, STANAG 4539, 4285, 4529, 4415, 4481 and 5065.

Adaptive equalization mitigates the effects of HF channel multi-path.

Convolutional encoding combined with soft-decision Viterbi decoding provides **forward error correction**. Cancellation of narrowband co-channel interference is accomplished via adaptive **tone excision** capable of eliminating up to four signals.

Modem Software Packs

The waveforms that are included in the *RM4* can be customised by choosing from four software packs. Please see the reverse page for more details.

Secure System

In a secure system, data is routed through a crypto unit and into the **synchronous DTE port** of the *RM4*. The modem Tx and Rx audio signals are fed to the HF radio. The radio is keyed by the *RM4*, while the unit monitors independent PTT activity on the radio.
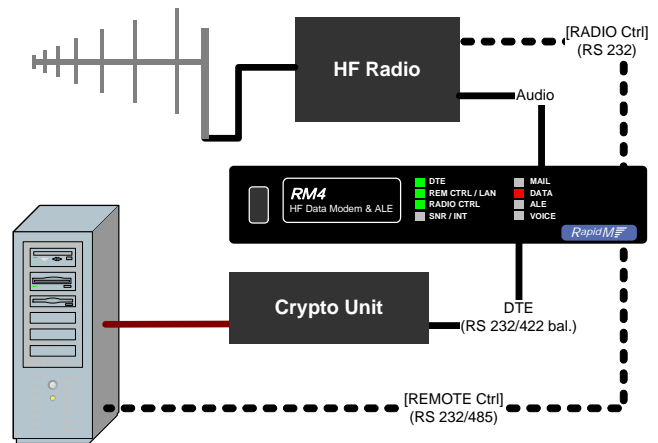

Fig1: Secure System Configuration with RM4 Unit

Optionally the radio can be controlled by the ALE radio control protocol embedded in the *RM4* (ALE brochure).

The unit supports split-site operation. Two radio control ports are available to support this option.

Fig2: RM4 Unit front panel

RapidM

STANDARD	CODING MODULATION		DATA RATES & CHARACTERISTICS	MILITARY MODEM SOFTWARE PACK		
				M2	M3	M4
MIL-STD-188-110B APPENDIX C	C	PSK/ QAM	3200, 4800, 6400, 8000, 9600 bps	•	-	•
	U		12800 bps	•	-	•
STANAG 4539	C	PSK/ QAM	75, 150, 300, 600, 1200, 2400, 3200, 4800, 6400, 8000, 9600 bps	•	-	•
	U		12800 bps	•	-	•
MIL-STD-188-110B	C	PSK/ QAM	75, 150, 300, 600, 1200, 2400, 3200, 4800, 6400, 8000, bps	•	-	•
MIL-STD-188-110A § 5.3	C	PSK	75, 150, 300, 600, 1200, 2400 bps	•	•	•
	U		4800 bps	•	•	•
STANAG 4415	C	PSK	*NATO robust*: 75 bps	•	•	•
STANAG 4285	C	PSK	75, 150, 300, 600, 1200, 2400 bps	•	•	-
	U		1200, 2400, 3600 bps	•	•	-
STANAG 4529	C	PSK	75, 150, 300, 600, 1200 bps	•	•	-
	U		600, 1200, 1800 bps	•	•	-
STANAG 4481 PSK	C	PSK	300 bps	•	•	-
STANAG 4481 FSK	U	FSK	*Single channel*: 75 bps	•	•	-
			Multi-channel: 75 bps selectable carrier	•	•	-
FSK VARIABLE	U	FSK	*Data Rates*: 50, 75, 100, 150, 200, 300, 400, 600, 1200 bps *Mark & Space Frequency*: 350 to 3000 Hz	•	•	-

GENERAL	
ALL WAVEFORMS	Carrier capture range ±200 Hz. Sync-on-Data
	Frequency tracking of up to 75 Hz changing at 3.5 Hz per second (triangular sweep)
BIT	Comprehensive BIT (Built-In-Test), Continuous error detection
PRESETS	20 Factory Presets, 10 Custom Presets
AGC CONTROL	Transceiver AGC control is necessary for optimum performance of QAM W/Fs
REMOTE CONTROL	All W/Fs and 2G ALE settings are remote controllable via Remote Control Port
AUTOBAUD	All PSK waveforms except for STANAG 4285 & 4529. Sync-on-Data capability.
TONE EXCISION	Narrowband Interference cancellation of up to 4 signals

SOFTWARE OPTION	CHARACTERISTICS
ALE 2G MIL-STD-188-141B APPENDIX A, B & FED-STD 1045 FED-STD 1049	Automatic Link Establishment 2nd Generation (2G ALE) *Occupancy Detection:* MS 110A/B, S 4539, S 4285, S 4415, S 4529, S 4481, FSK, 8-FSK, SSB Voice *Protocol:* Calling, AMD, DTM, *Excluding:* DBM, AQC-ALE • Link Quality Analysis (LQA) • Scanning (2 or 5 channels per second) • Selective Calling • Automatic Sounding • Automatic Hand-Off to Internal Modem The unit may already support a particular radio protocol. If not, the radio control protocol must be made available to *RapidM* for integration & testing.

INTERFACES	
DTE (DATA) PORT	RS-422 balanced, RS-423, RS-232 unbal., MIL-STD-188-114 compatible & EIA 530A compliant (DB25 connector) Half & Full Duplex operation, Sync, standard async and high-speed mode supported: • **Synchronous**: Data Rate: 50, 75, 100, 150, 200, 300, 400, 600, 1200, 1800, 2400, 3200, 3600, 4800, 6400, 8000, 9600 bps, Clock: Internal / Ext., data polarity: norm / inv. • **Asynchronous**: 75 to 115200 bps, Full Duplex, 5/6/7/8 bit data, 1, 2 stop bits, Flow ctrl: CTS/RTS, data polarity: norm / inv.
REMOTE CONTROL PORT	RS-485 Multi-drop, RS-232D (DE9 connector, male): Data Rate: 1200 to 115200 bps, 1 or 2 stop bits, 8 bit character lengths Flow Control CTS/RTS, Protocol: RM4 Control Protocol (proprietary)
ETHERNET	Data & Control, **10/100 Base T**, RJ 45 connector, embedded TCP/IP Stack, Protocol: RM4 Ctrl Protocol
F/PANEL	8 bi-colour status LED indicators on front panel: • DTE, REM Ctrl / LAN, RADIO Ctrl connection status • Mail (AMD), Modem & ALE, Voice (ALE voice call) activity status, Power indicator
RADIO CONTROL PORT	RS-232 (DE9 connector): 75 to 115200 bps, 1 or 2 stop bits, 7/8 bit character lengths. Supports for various radio control protocols are built-in. See the *RapidM* 2G ALE Product brochure for more details.
RADIO AUDIO PORT	Input Audio: 600 Ohm balanced, −20 to +15 dBm without adjustment Output Audio: Balanced, −40 to +10 dBm (PMP) adjustable into 600 ohm load Keyline: Open collector to ground (<45 volts, 50 mA) & non-polarized contact closure (<45 V, 200 mA)

INSTALLATION		ENVIRONMENTAL	
WEIGHT	1.7 kg (approx.)	TEMPERATURE	-30°C to +70°C (operating);
COLOUR	Black powder coat	HUMIDITY	0 to 90%, non-condensing
SIZE	41.1 x 212.7 x 159.0 mm (h x w x d), Front panel height : 44.1 mm	SHOCK	MIL-STD-810E Method 516.4, Procedure 1, Funct. (40G, 11 ms)
POWER	87 to 267 V AC, 47 to 440 Hz 6 to 36V DC	VIBRATION	MIL-STD-810E Meth. 514.4, Cat. 9, Shipboard
RACK MOUNTING	1 unit in ½ 19" Rack slot	EMC	MIL-STD 461-E
	2 units side-by-side on shelf	SAFETY	IEC/EN 60950

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