



M7 Data Radio Modem

Quick Start Guide

Raveon Technologies Corporation

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This is a quick-start guide to the RV-M7 series of M7 radio modems. It allows the user to quickly setup and use the M7 configuration, as received from the factory. Please carefully read the complete user manual to understand how best to configure the modem, as well as use its advanced features. The full user manual is available from Raveon Technologies at : http://www.raveontech.com/rv_m7.html

1. General Information

Blasting Caps and Blasting Areas: To avoid possible interference with blasting operations, turn off this radio or remove the DC power when you are near electrical blasting caps, in a blasting area, or in areas posted: “**Turn off two-way radio.**” Obey all signs and instructions.

Potentially Explosive Atmospheres

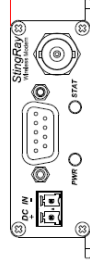
Turn off your radio prior to entering any area with a potentially explosive atmosphere. Do not install this product for use in areas with potentially explosive atmospheres. Do not remove, install, or charge batteries in such areas. Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death.

Note: The areas with potentially explosive atmospheres referred to above include fueling areas such as below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles, such as grain, dust or metal powders, and any other area where you would normally be advised to turn off your vehicle engine. Areas with potentially explosive atmospheres are often but not always posted.

2. Electrical Inputs and Outputs

The front panel of the M7 modem has these features:

1. RF connector
2. Status LED
3. Power LED (PWR)
4. 9-Pin Serial I/O connector
5. DC Power Jack



2.1. LEDs

Status LED (TX) This LED blinks red when the transmitter keys and is putting out RF power. It blinks green upon the reception of data or RF carrier.

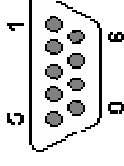
Power LED (PWR) This LED does a short blink, once every two seconds, indicating to the user that the power to the modem is ON and the modem is working. When the modem is in the command mode, this LED will blink on and off, once per second.

2.2. DC Power

DC power for the modem is connected to the 2-pin DC power input jack labeled **DC IN**. Use the supplied cable to connect the DC power. The **red wire is positive (+)** and the **black wire is negative (-)**. Its connection is optional, as the user may alternately apply power to Pin 9 and ground to pin 5 of the 9-pin I/O connector.

2.3. RS232/EIA232 Serial I/O Connector

The RS232 9-pin serial I/O connector is a female 9-pin D-subminiature connector having the following pins configuration. It is pinned out so that it may be plugged directly into a computer or PC's 9-pin COM port.



Front-view of DB-9 connector on modem (female)

Pin #	Name	Function
1	CD	Carrier detect
2	RxD	Receive data
3	TxD	Transmit data
4	DTR	Data terminal ready
5	GND	Ground connection
6	DSR	Data Set Ready
7	RTS	Request to send
8	CTS	Clear to send
9	Power	DC power (not Ring signal)

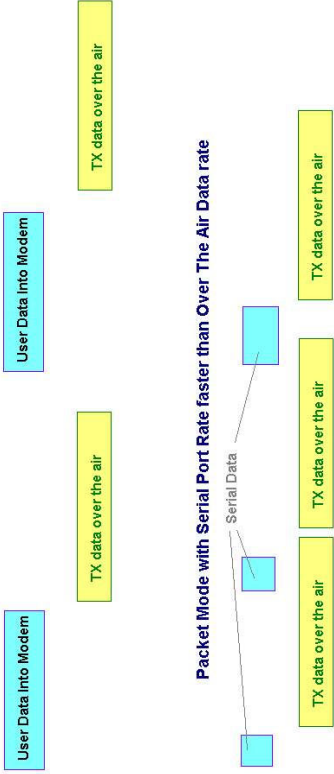
3. Using the M7 Modem

This section describes how to use the M7 in the Packet Mode of operation. See the M7 Technical Manual for an explanation of both the Packet and the Streaming mode. The Packet Mode is generally considered the easiest and most reliable operating mode.

Remember, that from the factory, all M7 modems are configured to simply work. Plug in power and connect to the serial port at 9600 baud, and the modems will communicate on the default

channel. Change the channel frequency to your specific frequency, and they will be ready to work on your channel.

Packet Mode with Serial Port Baud Rate = Over The Air Rate



3.1. Setup

1. Connect a 12 volt DC power source to the DC IN connection on the front of the modem.
2. Connect a good quality antenna, cut to the operating frequency, to the BNC connector on the front of the modem.
3. Connect a computer terminal, or PC computer running HyperTerminal, to the 9-pin I/O connector. The factory default serial ports settings are 9600 bps, 8 data bits, 1 stop, no parity.
4. Turn the modem on, and enter the "Programming Mode" by typing +++ into the modem. The Power LED will begin blinking at once-per-second.
5. Program the modem's operating frequency to your desired operating frequency. This is done with the **ATFX xxx.xxx** command.
6. Using the AT commands, change any of the default operating parameters that must be modified. From the factory, the modems are configured and shipped ready-to-use. Out of the box, they will communicate on the default radio channel using the factory defaults. In general, the parameters you may want to modify will be:

Limited One Year Warranty

If within one year from date of purchase, this product fails due to a defect in material or workmanship, Raveon Technologies, Incorporated will repair or replace it, at Raveon's sole discretion. This warranty is extended to the original consumer purchaser only and is not transferable.

This warranty does not apply to: (a) product damage caused by accident, dropping or abuse in handling, acts of God or any negligent use; (b) units which have been subject to unauthorized repair, opened, taken apart or otherwise modified; (c) units not used in accordance with instructions; (d) damages exceeding the cost of the product; (e) batteries; (f) the finish on any portion of the product, such as surface and/or weathering, as this is considered normal wear and tear; (g) transit damage, initial installation costs, removal costs, or reinstallation costs; (h) damage due to lightning, floods, fire, or earthquakes.

RAVEON TECHNOLOGIES INCORPORATED WILL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY MODIFIED TO EXIST ONLY AS CONTAINED IN THIS LIMITED WARRANTY, AND SHALL BE OF THE SAME DURATION AS THE WARRANTY PERIOD STATED ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS ON THE DURATION OF AN IMPLIED WARRANTY, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.
Warranty service is available by mailing postage prepaid to:

Raveon Technologies Corporation
2780 La Mirada Drive, Suite C
Vista, CA 92081

To obtain warranty service, include a copy of the original sales receipt or invoice showing the date, location, and price of purchase. Include a written description of the problem with the product, a phone number and name of person who may be contacted regarding the problem, and the address to where the product should be returned.

Products repaired under warranty will typically have their program memories erased and reset to factory default settings.

	time the repeater will re-send it.		
&C	Read Current Draw – Restore the factory default values. This command will not erase the calibration values. After this command executes, the modem will still be in the CONFIG mode.		none
&F	Restore Factory – Restore the factory default values. This command will not erase the calibration values. After this command executes, the modem will still be in the CONFIG mode.		none
&R	Antenna Tune – If this parameter is set to a number > 0, then the forward and reflected ADC readings will be sent out the serial port at the end of each transmission. Useful for tuning the antenna for minimum reflected signal. This operation continues for X seconds after this command is issued, where X is the parameter entered.	0 - 300	0

ATFX fff.ffff

Frequency for this channel. Set to your frequency.

ATBD x

Serial port baud rate. 0 = 1200 bps 1 = 2400
2 = 4800 3 = 9600 4 = 19200 5 = 38400 6 = 57600

ATMY xxxxx

The ID of this unit. Default is 1234.

ATDT xxxxx

The address of the unit this modem will talk to. Default is 1234.

ATBC x

Enable/disable busy channel lock-out. Default is off, 0. 1= No transmit on a busy channel.

7. Type ATSV to save your configuration changes to memory.
8. Connect your serial data device to the 9-pin connector on the front of the modem.

The radio is now ready to use. Any serial data going into the modem will be transmitted over the air, and any data received over the air will be sent out the serial port.

4. Installation

1. Secure the M7 modem using the four mounting holes on the side flanges of the unit.
2. Connect a DC power source to the DC IN connection on the front of the modem. Use the supplied cable, and connect the RED wire to +, and the black wire to – (ground). The black wire and the case of the M7 should be connected to earth ground.
3. Connect a good quality antenna, tuned to the operating frequency, to the RF connector on the front of the modem. Use a good antenna, and place it at as high-above obstructions as possible.
4. A separation distance of at least 20 centimeters must be maintained between the transmitter's radiating structures and the body of the user or nearby persons.
5. Connect the computer, terminal, controller, or other hardware device that will be using the M7 modem to its DB-9 serial I/O connector using a shielded cable. Secure it to the M7 with the two mounting screws on the sides of the DB-9 connector.

6. If the antenna is mounted out doors, us a lightning arrester in-line with the antenna, and properly ground the antenna and the M7 chassis to an earth ground.

5. User Serial Port Commands

5.1. Command Mode

The M7 modem may be put into a "Command Mode", by entering a sequence of three plus characters (+++). To keep the M7 modem from unintentionally entering the Command Mode because of the +++ pattern occurring in a stream of data entering the modem, there must be a pause in the data stream before the +++ as well as a pause after the +++ is sent. If either pause is missing, the modem will not enter the command mode.

ATDT ?. The modem will respond by listing a brief description of the command. To see a list of all commands, type **HELP**.

5.2. Exiting the Command Mode

There are three ways to exit the command mode. They are:

1. **ATSV** Issuing the **ATSV** command saves the current configuration to non-volatile memory, and then returns to the normal operation mode.
2. **ATCN** Issuing the **ATCN** command does not save the current configuration, but it does cause the modem to continue to operate.
3. **Time Out**. After a pre-set amount of time (60 seconds is the factory default time), the modem will automatically exit the Command Mode, and continue normal operation. Changes will not automatically be saved. This time-out duration may be set with the **ATCT** command.

SL	Serial Number – Reads and returns a unique serial number for this unit. Show – Display the configuration of the modem. This will return a page of ASCII characters, showing the main configuration parameters. Statistics – Same as the STAT command. See section 6 for explanation. Save – Save all the parameters to EEPROM. This command must be used if changed parameters are to be stored in non-volatile memory, and used next time the modem is powered up.	Read Only 1 - 999999999	unique
SH		none	None
ST		0-5	N/A
SV		none	None
TD	Transmit Random Data – When issued, the modem will begin sending random data. Entering a <CR> will terminate the transmission. Max Packet Size – Set the maximum number of bytes in an over-the-air packet. Read DC input Voltage – Returns the DC input voltage reading, in mV (12500 = 12.5VDC input). Firmware Version – Returns firmware version currently loaded on the module. Show or Configure the Repeat Table – Set the addresses that this unit will store-and-forward data to/from. n = 1, 2, 3, or 4 designating the entry in the table to show or edit. Enable/Disable Store and Forward Repeating – 0=disabled, 1 – enabled. Read/set repeater delay – Read or set the repeater delay. This is the time between receiving a data packet, and the	0 = Go back to normal 1 = Random 2 = Hop up/dn one channel 3 = Force PLL to fast 4 = TX all 0s 5 = TX all 1s 6 = Test Points ON 7 = Transmit CW 8 = Transmit 1010101...	
TT		1 - 512	240
VB		None	none
VR		Read Only, 3 characters	none
Xn		<i>Four parameters</i> aaaa bbbb cccc dddd where aaaa=Source Address bbbb = S.A. Mask cccc = Destination Address dddd = D.A. Mask	
XR		0 or 1	0 (Off)
XT			

5.3. Command Mode Commands

AT Command	Command Description	Parameters	Factory Default
AK	Enable/Disable ARQ – When ARQ is enabled, this modem will automatically send an ACK packet back to a modem that sends it data. 0=off, 1=on.	Range: 0 – 1	0 (no AKCs sent)
AS	Auto Status Report Interval – Sets the time between auto status reports. Time is in minutes. 0 means disabled.	Range: 0 – 56000 (min)	0 (Off)
AT	Silence AFTER Sequence - Sets period of silence after the command sequence characters in mS.	Range:0 – 1000 (mS)	500
BD	Baud Rate – Sets serial com port baud rate (bps). Over-the-air (throughput) baud rate is set with ATR2 command. If a PC's serial baud rate is set higher than the fixed over-the-air baud rate of the module, hardware handshaking may be required.	Range: 0 – 6 0 = 1200 bps 1 = 2400 2 = 4800 3 = 9600 4 = 19200 5 = 38400 6 = 57600 7 = 115.2k	3
BC	Busy Channel Lock Out – Enable/disable the BCL. If enabled, the modem will not transmit on a radio channel that is busy (has RF on ff). 0=OFF, 1=ON.	Range: 0-1	0
BT	Silence BEFORE Sequence – Sets period of silence before the command sequence character in mS.	Range: 0-1000 mS	500
CH	Configure Hardware Flow Control – Enable (1) or disable (0) flow control. When enabled, the modem will monitor the RTS line, and if it is negated, stop sending data out the serial port. If disabled, the modem will ignore the state of RTS, and always send out characters.	1 = Enable 0 = Disable	0
CN or O	Exit AT Command Mode – Exits module from AT Command Mode and returns it to Idle Mode. Parameters are not saved in EEPROM.	none	none

PO	Set/read the Power Output setting – This is the desired power output, in %. 100 means full power. Adjust the value to set the desired power level.	Range: -1000 – 1000	120**
R1	Select CD pin output signal – CD may be RF carrier detect, or modem data detect.	2 = Always assert CD 1 = Data CD 0 = RF CD	1
R2	Over-The-Air bit rate - This is the data rate the radio uses to send data over the air. All RF modems in the network must use the same over-the-air baud rate. Refer to section Error! Reference source not found. for information on how to set the OTA baud rate.	0 = 800 1 = 1200 5 = 9600 2L 2 = 2400 6 = 19200 4L 3 = 4800 7 = 5142 2L 4 = 8000 4L 8 = 9600 4L	3
R3	Serial Port time out – Number of mS of no activity before transmitting.	Range: 1 - 5000	20 (mS)
RB	Number of retries. If this modem does not get an ACK back when it sends data, this is the number of times it will re-transmit the packet and wait for an ACK. 0=disabled feature.	Range: 0-99	0 (ACKs are not used)
RF	RF Carrier Required – When enabled, there must be RF energy on the channel for the modem to output data. Streaming data mode only. 1=RF required. 0=ignore if energy when receiving.	Range: 0, 1	0 (no RF required)
RQ	Receiver Signal Level – Reads the Receiver Signal Strength this instant, and returns the level in dBm.	Range: -40 to – 140 (dBm) varies by model	-
RS	RSSI (Receive Signal Strength Indicator) – Returns the signal level of last received packet. The reading is in dBm.	No parameters. Returns a number : -40 to -140 (dBm) varies by model.	none
RV	Disable Remote Access – When enabled (set to a 0), the modem will respond to over-the-air RPR requests, Pings, and over-the-air commands. Default is OFF (1).	0= Remote Access on 1=Remote Access off	1
RV	Enable Remote Access – When set to a 1, the modem will respond to over-the-air RPR requests,Pings, and over-the-air commands. Default is OFF (0).	0= Remote Access off 1=Remote Access on	0

CT	Time Out from AT Command Mode – If no valid commands have been received within this time period (in milliseconds), modem returns to normal operation mode from Command mode. If the CONFIG button inside the M7 is pressed, this parameter will be automatically set to 60000.	Range: 100-60000ms	60000
DT	Destination Address to call – Sets address of the modem to send data to. Note, this parameter is entered in HEX format. Each digit may be a 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,or an F.	Range: 0-FFFF	1234
E	Echo – Character echo set on (E1) or off (E0). This applies to the Command Mode only.	Range: 0 , 1	0 (no echo)
F	Display frequencies – Display all of the frequencies programmed into all of the channel memories.		N/A
FT	Transmit Frequency – Program the transmit frequency for this channel. Enter in Hz or in MHz. The frequency will automatically be saved in non-volatile memory (flash) for this current channel number.	Range: See product data sheet. For MURS products, frequency cannot be changed.	See product data sheet.
FR	Receive Frequency – Program the receive frequency for this channel. Enter in Hz or MHz. The frequency will automatically be saved in non-volatile memory (flash) for this current channel number.	Range: See product data sheet. For MURS products, frequency cannot be changed.	See product data sheet.
FX	TX and RX Frequency – Program the receive and transmit frequency for this channel. Enter in Hz or MHz. Same as issuing an ATFR and an ATFT command. The frequency will automatically be saved in non-volatile memory (flash) for this current channel number.	Range: See product data sheet.	N/A
HS	Display History –Show the history of received data.	-	N/A
HP	Channel Number – Select separate channels to minimize interference between multiple sets of modules operating in the same vicinity.	Range: 1 - 6	1
IO	Configure the I/O The proper hardware option must be	Range: 0 - 5 0=RS232	0

	installed in the modem. All M7 modems support RS-232 mode.	1=Ethernet 2=RS485 dup. 3=RS485 simp. 4=RS422 5=GPS	
L	Enable/Disable the LEDs – 1 = LEDs always off. This reduces some power consumption. 0 = LED operate normally.	0 or 1	0
MA	Monitor Address – Configures the address that status transmissions are sent to. Only used if Auto Status is enabled. Each digit may be a 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,or F. Note: FF is interpreted as a group. See addressing section.	Range: 0000 - FFFF	FFFF
MK	Address Mask – Configures local and global address space. Each digit may be a 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,or F. In most applications, this is kept at FFFF.	Range: 0000 - FFFF	FFFF
MT	Protocol Select – The over-the-air communication protocol. 0=Packetized mode, 2=Streaming data.	Range: 0-2	0
MY	Unit Address – Configures the individual; address for this unit. Each digit may be a 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,or F. Note: FF is interpreted as a group. See addressing section.	Range: 0000 - FFFF	1234
NB	Parity – Selects parity format. Settings 0-4 transfer 8-bits over antenna port and generate the parity bit on the RF receiving side.	Range: 0 – 5 0 = none 1 = Odd 2 = Even 3 = Mark (1) 4 = Space (0)	0
NS	Stop Bits – Selects the number of stop bits.	Range: 1-2	1
PE	Packet Error Display – Shows statistics to compute packet-error rate. Displays Packets Per Minute (PPM) and a running total.	None (display PER) 1 = reset counters 2 = Stop PER display	None