

WayWORD

Mobile Data Terminal and GPS Tracking System Technical and User Manual

Proposal for
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Version A3



Mobile Data Terminal

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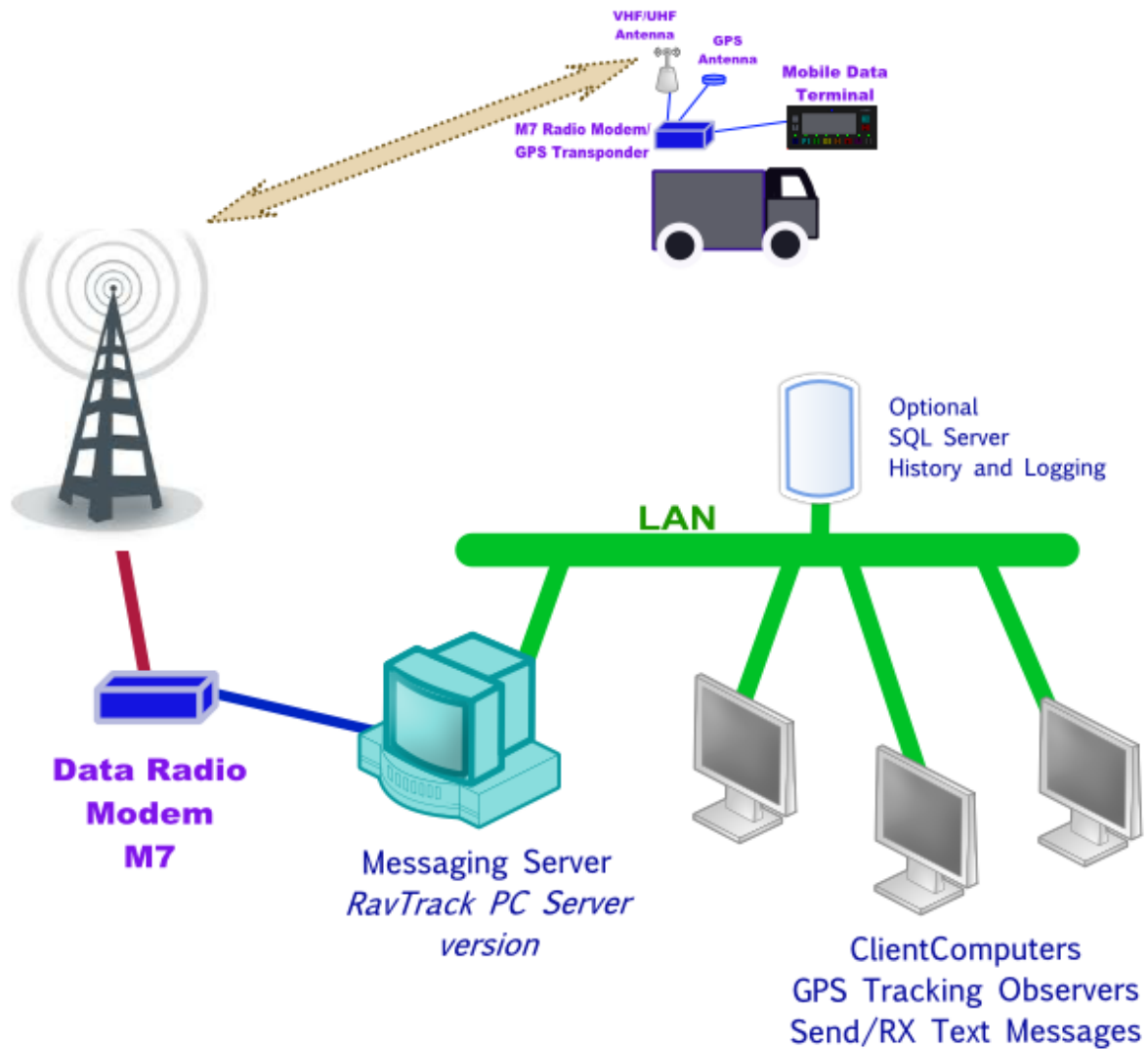
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1 Overview

1.1 General

This manual describes the features and options of the **WayWORD** RV-DT-8R Mobile Data Terminal (MDT). It also includes a section describing how the MDT's features are utilized within Raveon's RavTrack PC GPS tracking and messaging application.



2 *WayWORD* Mobile Data Terminal

The *WayWORD* is optimized for GPS tracking and two-way data communications with vehicle operators.

With 8 pre-defined status buttons, operators can quickly relay their status to a control center. Users may add custom captions on the label area on the bracket below the status buttons.



In summary, the *WayWORD* has these features:

- 192 X 64 pixel graphics LCD capable of 4 lines of 24 characters each.
- 8 buttons to automatically report pre-set statuses.
- 2 more buttons to allow data entry of digits 0-9 and two-digit event codes.
- The LCD will display any text message that is sent to the radio modem it is connected to.
- A simple code entry mode for the user to enter a two-digit event code. The code is sent over the air, and can be displayed in *RavTrack PC*.
- Mount bracket for connecting a RAM mount with 1" ball.
- RFID reader option. If the RFID reader option is ordered with the MDT, it can read an RFID key fob. If the operator holds an RFID tag near the RFID side of the MDT, it will read the RFID tag number and transmit the number over the air.



3 Operating The *WayWORD*

3.1 Receiving Text Messages

When a new text message is received the blue “NEW” led above the message window will illuminate. The operator may press the ✓ or X button to respond to the message. If one of these two buttons is pressed the NEW led will turn off and the ✓ or X response message is sent back to the radio modem that sent the text message. The *WayWORD* will support displaying messages up to 96 characters.

3.2 Sending one-button status messages

Pressing one of the 8 status buttons will toggle the state of the particular status.



If the state is not active and the button pressed, the state is set to active, and the green led above the status button will illuminate. If the state was active, then pressing the button will de-activate it and the green LED above the button will turn off.

When the radio modem that is connected to the *WayWORD* transmits its GPS position and status, the status of the 8 status buttons is transmitted every time.

3.3 Sending two-digit event codes

Pressing and holding any one of the numeric buttons for more than one second will put the MDT into the two-digit event entry mode. The LCD will display the message “Enter the second digit” and the corresponding LED will flash. The operator has 5 seconds to press another numeric button to enter the second digit of the status code.

When the operator is done entering the two-button event code, the ✓ check button should be pressed to send the code over the wireless link.

3.4 Operator ID

To identify the operator of the **WayWORD** or the vehicle it is in, the **WayWORD** has a Radio Frequency ID (RFID) tag reader that can read common RFID tags and key FOBs.

When the operator holds the RFID key fob near the RFID reader, the text display on the MDT will display "ID TAG READ xxxxxxxx" where xxxxxxxx is the ID code of the RFID tag read.

Upon reading a valid tag, the **WayWORD** will send the RFID code that was just read to the LCD for confirmation. Once confirmed, it will then be sent over the air.

4 System Setup and Configuration

4.1 GPS Tracking Systems

Reporting Interval is programmed into the radio modem. Refer to the technical manual of the radio modem to learn how to configure it for GPS status and position reports.

4.2 Messaging Only Systems without GPS tracking

The **WayWORD** can be used in systems that do not utilize GPS tracking. Raveon's data radio modems will work well with this type of system. All MDT features work the same as they do when used with or without GPS tracking.

5 Text Messaging Protocol

Text messages are sent to the **WayWORD** over-the-air from base stations or even other MDTs. The **WayWORD** itself is a serial communication device, compatible with Raveon data radio modems, but the **WayWORD** may also be used with other modems or communication systems.

Each Raveon radio has a unique ID in it, so text messages can be sent to specific IDs or to the preset group-ID for multi-cast messaging.

All of the technical aspects of text messaging are handled by the **WayWORD** and the *RavTrack PC* application. Text protocol information is included here for users who want to write their own text messaging application.

5.1 ASCII Codes

5.1.1 Text

Text is sent over the air as ASCII characters:

33	!	34	"	35	#	36	\$	37	%	38	&
39	'	40	(	41	)	42	*	43	+	44	,
45	-	46	.	47	/	48	0	49	1	50	2
51	3	52	4	53	5	54	6	55	7	56	8
57	9	58	:	59	;	60	<	61	=	62	>
63	?	64	@	65	A	66	B	67	C	68	D
69	E	70	F	71	G	72	H	73	I	74	J
75	K	76	L	77	M	78	N	79	O	80	P
81	Q	82	R	83	S	84	T	85	U	86	V
87	W	88	X	89	Y	90	Z	91	[	92	\
93	]	94	^	95	_	96	`	97	a	98	b
99	c	100	d	101	e	102	f	103	g	104	h
105	i	106	j	107	k	108	l	109	m	110	n
111	o	112	p	113	q	114	r	115	s	116	t
117	u	118	v	119	w	120	x	121	y	122	z
123	{	124	|	125	}	126	~	161	i		
162	¢	163	£	164	¤	165	¥	166	¦	167	§
168	¨	169	©	170	ª	171	«	172	¬	173	
174	®	175	¯	176	°	177	±	178	²	179	³
180	´	181	µ	182	¶	183	·	184	¸	185	¹
186	º	187	»	188	¼	189	½	190	¾	191	¿
192	À	193	Á	194	Â	195	Ã	196	Ä	197	Å
198	Æ	199	Ç	200	È	201	É	202	Ê	203	Ë
204	Ì	205	Í	206	Î	207	Ï	208	Ð	209	Ñ
210	Ò	211	Ó	212	Ô	213	Õ	214	Ö	215	×
216	Ø	217	Ù	218	Ú	219	Û	220	Ü	221	Ý
222	Þ	223	ß	224	à	225	á	226	â	227	ã
228	ä	229	å	230	æ	231	ç	232	è	233	é
234	ê	235	ë	236	ì	237	í	238	î	239	ï
240	ð	241	ñ	242	ò	243	ó	244	ô	245	õ
246	ö	247	÷	248	ø	249	ù	250	ú	251	û
252	ü	253	ý	254	þ						

5.1.2 Control Characters

ASCII control characters are:

0	NULL	1	
2		3	
4		5	
6		7	
8	Backspace	9	
10	Line Feed	11	
12		13	Return
14		15	
16		17	DC1
18	DC2	19	DC3
20	DC4	21	
22		23	
24		25	
26		27	ESC Escape
28		29	GS Group Separator
30	RS Record Separator	31	
32		33	

5.1.3 Parameters

To send information over the serial communications link to/from the *WayWORD*, Raveon utilizes the Group Separator character to enable binary data and various parameters to be communicated. Parameters start with the Group Separator (ASCII 29/0x1D), followed by one ASCII character designating the parameter type, and then the parameter. The end of parameter is the last byte, or a GS indicating another group is coming.

Parameter Codes

Dir	Code	ASCII	Meaning	Supported (DT8)
O	A	65	Message acknowledged with ✓.	YES
I	B	66	Beep. Beep the beeper if the MDT supports audible beeping.	NO
N/A	C	67	Status codes. Following two ASCII hex characters are the current 8-bits of the status bits.	NO
N/A	D	68	NULL – No Use Yet	NO
O	E	69	Two-digit event code. Following two ASCII characters are the event code.	YES
I	F	70	Flash the MDT text display for x seconds. The following ASCII decimal characters specifies how many seconds to flash the display for.	NO
O	N	78	Message response X.	YES
O	a	65	RFID read one tag; following is the ASCII decimal RFID code.	YES
I/O	R	82	Reset/clear multiple status bits. Following ASCII characters are the ASCII hex representation of the bits to clear (not set).	NO
I/O	S	83	Set specific status bits. Following ASCII characters are the ASCII hex representation of the bits to set (not clear).	NO
I/O	T	84	Set the state of specific status bits. Following ASCII characters are the ASCII hex representation of the state the output bits should be set to.	NO

After all groups of parameters are sent, the last character in the group of parameters should be a ASCII 30/0x1E RS record separator character.

For example to send the text Hello World followed by flashing the text screen for two seconds, the ASCII sequence of characters would be:

H e l l o <SP> W o r l d <GS> F 2 <RS>

5.1.4 End of Message

The <RS> character is interpreted as the end of the message. If a message is coming into the MDT, and it pauses for more than 20mS, then the **WayWORD** will assume the message has ended.

5.2 Status Button Messaging

A WMX will use a control byte (0x44) to transmit status to the radio. The command SETBITS will be used to specify the bit pattern of all the status bits in the form of:

SETBITS XXXX[cr]

Where:

XXXX is the bit representation of all status bits.

[cr] is a character return

BITS:

0-3: External Digital Input Bits From MDT

4-7: Digital Output Bits From MDT

8-15: Status Bits 1-8 of MDTInputs and Outputs

5.3 Text message Format

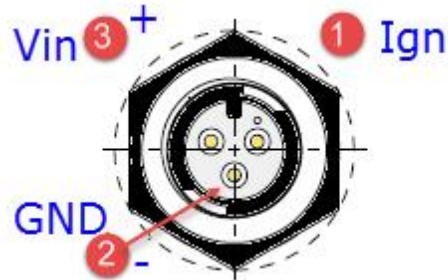
All text entering the **WayWORD** will be displayed as a message on the text display of the MDT. To put the phrase **Hello World** onto the display, simply send the phrase **Hello World** to the display using a radio modem or its RS232 serial port.

But, the **WayWORD** has many additional advance features that you may utilize if you properly format the text to put on the display.

6 Inputs and Outputs

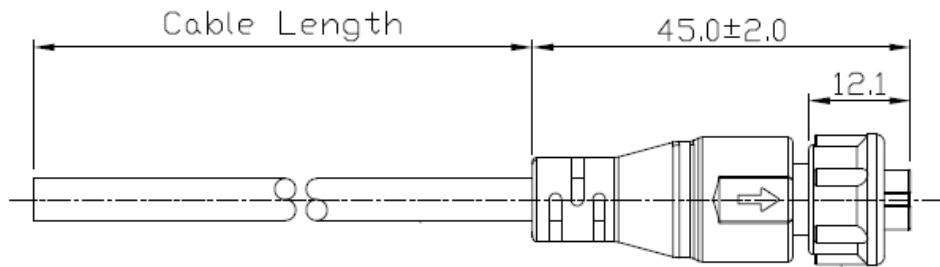
6.1 DC Power

The MDT operates off of 10-28V DC input. A 3-pin DC input connector must be connected to DC power for the MDT to operate. Front view of the connector on the MDT.



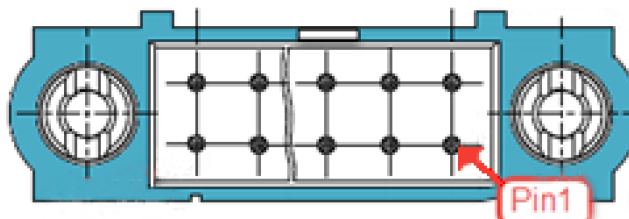
The Vin voltage must be between 10 and 28V DC input. Connect the GND wire to the chassis or battery ground. Battery ground (- wire) is usually best.

The power cable is a three-pin black PVC sealec cable custom made for the MDT. It is Raveon part number

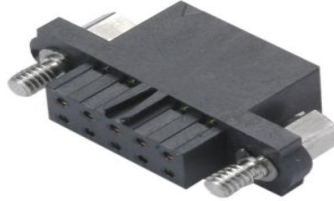


6.2 Digital Inputs and Outputs

A 12-Pin Harwin M80-5101242 Datamate connector is located on the top to connect various I/O options to the **WayWORD**.



The mate to the connector is a Harwin J-Tek fema DIL cable connector part number M80-4601242.



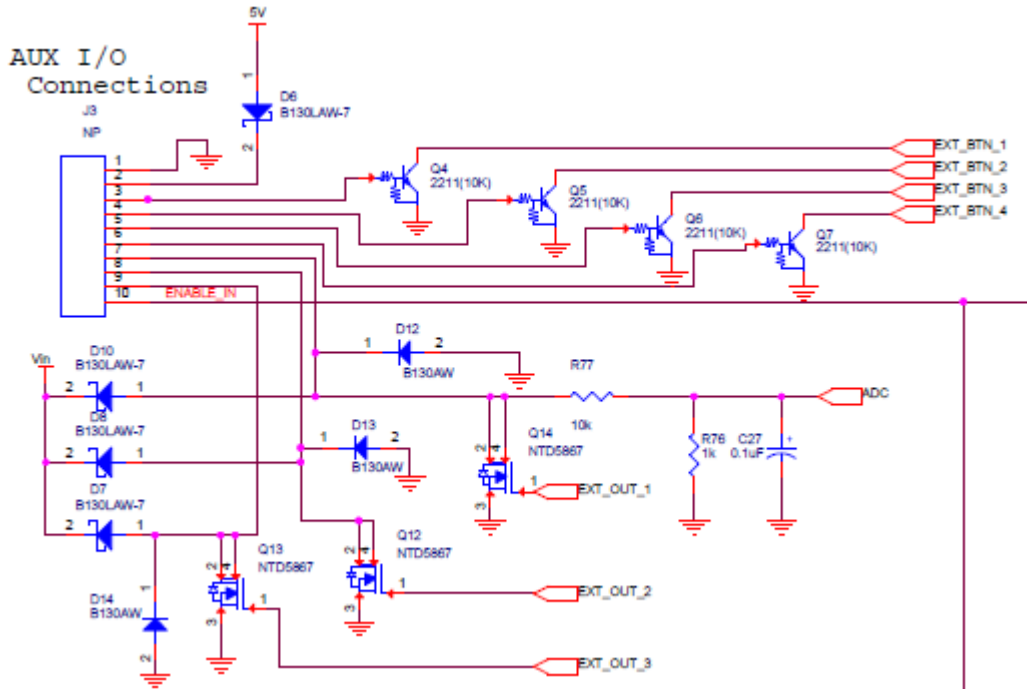
6.2.1 Pin-out:

The following table lists the pin-functions on the I/O connector.

Pin	Function	Connections to Monitoring Camera	Wire Color	
1	Ground	Ground	Black	Black
2	5V out		Brown	Brown
3	IN 1 (bit 9 in \$PRAVE)		Orange	Orange
4	IN 2 (bit 10 in \$PRAVE)		Yellow	Yellow
5	IN 3 (bit 11 in \$PRAVE)	Fatigue Detect	Green	Green
6	IN 4 (bit 12 in \$PRAVE)	Eye Detect Input	Blue	Blue
7	Out 1		Purple	Purple
8	Out 2		Grey	Grey
9	Out 3		White	White
10	MDT Enable IN		Pink	Pink
11			Creame	Creame
12	DC Out	DCV output to camera. Same voltage as DC input.	Red	Red

6.3 Connector Wiring

For those interested in how the I/O connector is wired inside the **WayWORD** to the microcontroller of the **WayWORD**, below is a schematic diagram of the connections.



6.4 RS232 Serial Interface

An RS232 serial port on the MDT connects to a radio modem. Typically that radio modem will communicate with a base station.

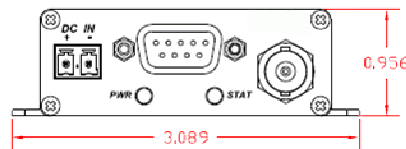
7 Radio Modems

The **WayWORD** connects to a radio modem that is used to send and receive its data. Raveon has a number of modems ideal for **WayWORD** data communications:

7.1 RV-M7 Series GPS Transponders

This transponder is available in either the UHF frequency band or VHF band. The M7-GX has 4 connectors:

- 1) GPS antenna connector
- 2) RF I/O antenna connector
- 3) DC power in
- 4) Digital inputs (RS-232).



At a programmable interval, the M7 transmits a short, compressed, and encrypted message with its position (long/lat), as well as other radio and vehicle data.

7.2 RV-M7-VB-WX weatherproof transponders

Raveon's M7 WX series of weatherproof data radio modems are a high-speed FCC compliant data radio designed for telemetry, wireless data, GPS, and remote control applications. Housed in an IP65 rated enclosure, the M7 WX is a rugged and economical UHF or VHF GPS transponder.



For more information, visit here: <http://www.ravtrack.com/rv-m7-weatherproof-gps-transponder>

These transponders operate off of 10-15VDC.

8 RavTrack PC

8.1 Client Workstations

Anywhere on a TCP/IP network, workstations running RavTrack PC or other AVL software can access the SQL server; monitor the position of the vehicles, run reports, and set alarms and alerts.

8.2 RavTrack PC MDT Features:

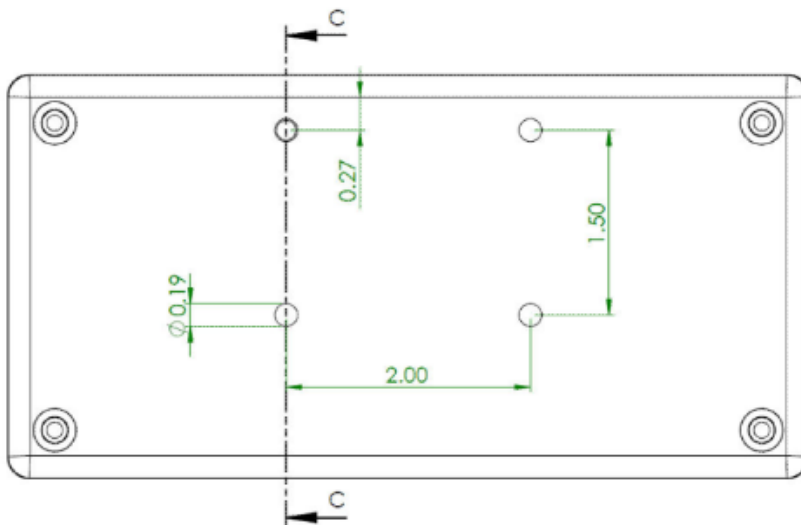
The following is a list of features Raveon has incorporated into *RavTrack PC* for use with the MDT and also enhance its functionality for construction and mining applications.

- A. A moving POI to count loads and vehicles entering a geo-referenced location.
- B. Sending text messages to the MDT in vehicles.
- C. Log operation status codes into a database as activated by driver via buttons on MDT.
- D. Assign phrases to each individual status code.
- E. Create alert rules based on the above activities.
- F. Log the RFID into the SQL database of the person in the vehicle.
- G. Validate whether a particular RFID is allowed to be in the vehicle, and output an enable/disable electrical signal that could be used to disable the vehicle.
- H. Add a report that lists which drivers are in which vehicles and what activities were activated/logged by driver and vehicle.

9 Mounting

Holes in the back of the MDT allow the use of RAM brand mounts. RAM makes a large number of mounting devices for most any vehicle and situation.

One the back of the MDT are 4 mounting holes designed to line-up with the RAM model number: RAP-B-202U-225.



SECTION C-C