REALM™
COMMUNICATIONS

Preliminary

RMV/RMU Series
Field Programming Manual

P/N FLDPRGMANRM
Ref. # 0301-309XX-XXX

Rev. 05-05

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 Introduction

This manual contains information about field programming through the front keypad of the RELM Wireless RM Series Mobile radios. This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains service information and data for the equipment.

The following precautions are recommended for personal safety:

- DO NOT transmit until all RF connectors are secure and properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- Only qualified technicians should maintain this equipment.

1.2 Description

The RM series radios are self-contained FM Radios covering the frequency range of 136MHz to 174MHz for VHF and 430 MHz to 512 MHz for UHF. The radios are multi-channel and digitally synthesized using a single TCXO for frequency control. The RM series incorporate an EEPROM for the storage of channel frequency, CTCSS Tone, DCS Code, Two-Tone, and Dual Tone Multiple Frequency/Automatic Numeric Identifier (DTMF/ANI) encode information. Flash Memory is used to conveniently store and upgrade the operating system. Soft key switches can be programmed to control back light, Scan Add/Del, channel scan, DTMF store and send, repeater talk-around, hi/low transmit power as well as other useful operating functions. Status and channel information is displayed over a liquid crystal display. Connectors are provided at the rear of the unit for an external antenna, microphone, speaker, and other optional accessories.

1.3 Accessories

A wide variety of optional accessories are available for the RM Series radios. Contact your RELM Wireless dealer for complete information.

1.4 License Requirements

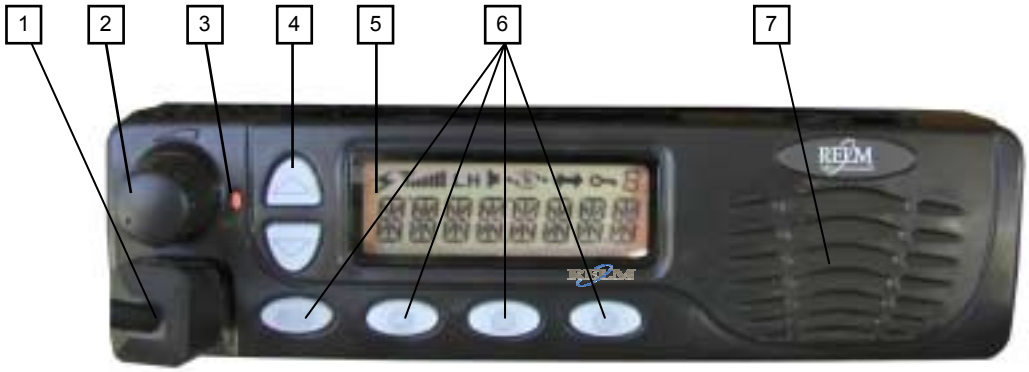
This equipment must be licensed by the Federal Communications Commission (FCC) before it may be used. Your RELM Wireless dealer can assist you in filing the appropriate application for the FCC, and will program each radio with your authorized frequencies and signaling codes.

1.5 Technical Assistance

If you need technical assistance, contact a RELM Communications service technician:

RELM Wireless Corporation
ATTN: Customer Service
7100 Technology Drive
West Melbourne, FL 32904
Phone: (800) 422-6281
FAX: (321) 953-7986
Email: service@RELM.com

1.6 Controls and Indicators



(1) MICROPHONE/ACCESSORY JACK

(2) ON-OFF/VOLUME KNOB

Rotate the volume control knob clockwise to turn the unit “on” and fully counter clockwise to turn the unit “off”. Increase or decrease volume by adjusting the volume control accordingly.

(3) LED INDICATOR

- Is red when transmitting
- Is green wnen receiving

(4) CHANNEL SELECT/SPECIAL FUNCTION KEYS

Used to select a channel and to adjust various parameters while in the Dealer program Mode.

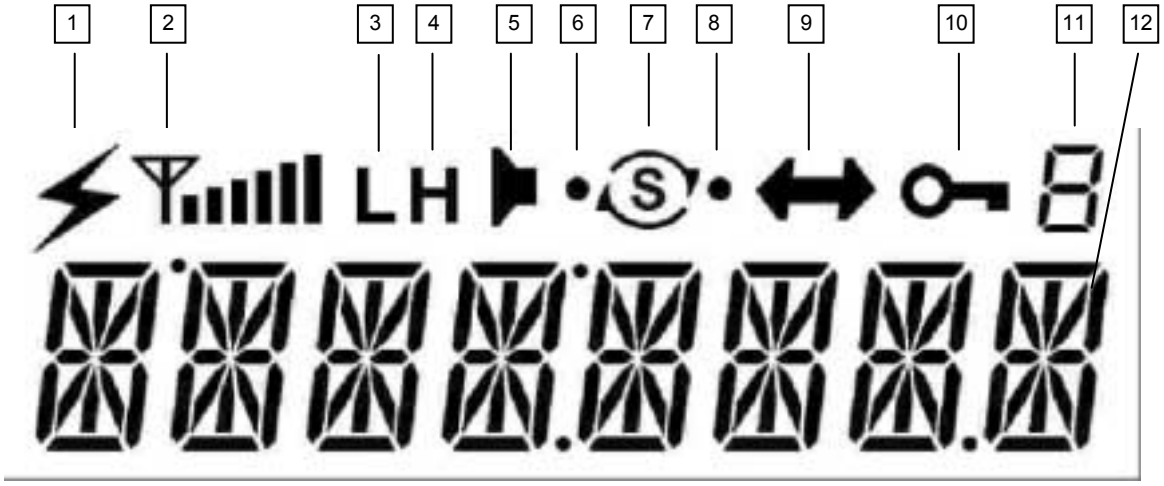
(5) LCD

Used to display channel and operation status.

(6) PROGRAMMABLE FUNCTION BUTTONS

(7) SPEAKER

1.7 LCD Icons



#	ICONS	Action
1	TX icon	TX
2	Signal	Indicate RX Signal Strength
3	L	Low TX Power Level
4	H	High TX Power Level
5	Speaker	Audio Un-mute (Monitor, RX)
6	Scan Left Dot	Priority Channel Stop
7	Scan Blinking	During Scan
8	Scan Right Dot	Home Channel Stop
9	TA	Talk Around Enable
10	Key lock	Key Lock Enable
11	8 Segment	Various Mode Indication
12	14 Segment Display	Displays frequency and channel label information

2 FIELD (KEYPAD) PROGRAMMING

2.1 Programming

You can program the RM series in two different ways.

A. Using the unit's keypad. See section 2.1.1.

B. With a computer, RESRM programming software, and a PCRM programming interface cable. Contact RELM Communications for the software and cable. See section 2.1.2.

2.1.1 Front Panel Programming

Using the unit's keypad, soft keys, and control knobs, the unit can be placed into one of two different programming modes. It is important to note that only RELM authorized dealers with qualified technicians are allowed to operate the RM series radios in the programming mode and to change any programming content. Figure 2.1 shows the different programming modes.

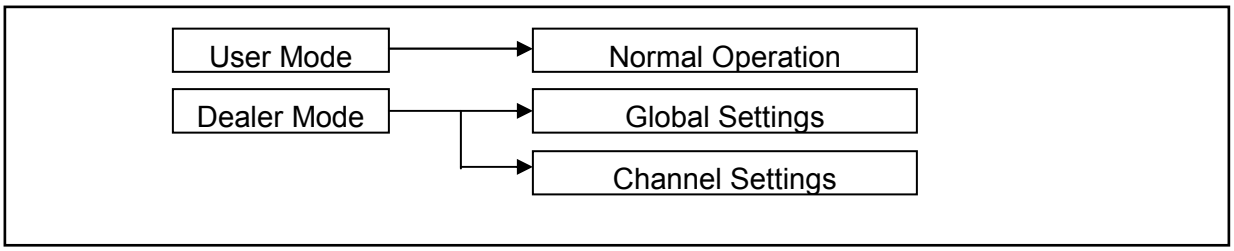


Figure 2.1 – Programming Modes

Table 2.1 shows the functions that can be set for each of the "Dealer Modes". The dealer sets the "global" functions and channel information in accordance to the customer's needs.

Mode	Function
GLOBAL SETTINGS The dealer sets the following functions ON/OFF according to the user's operating needs.	(1) Function Key [A] (2) Function Key [B] (3) Function Key [C] (4) Function Key [D] (5) DTMF (6) CTCSS 1 (7) CTCSS 2 (8) CTCSS 3 (9) Back Light (10) Back Light "On" Time (11) Default Display Time (12) Start-up Display (13) DTMF Volume (14) Mic. Level (15) Speaker Volume (16) Beep Volume (17) Back-up State
CHANNEL SETTINGS The dealer set the following functions ON/OFF according to the user's operating needs.	(1) RX Frequency Channel Steps (2) RX Frequency (3) Decode Code (Tone) (4) TX Frequency Channel Steps (5) TX Frequency (6) Encode Code (Tone) (7) TX Power (8) BCLO (Busy Channel Lockout) (9) Squelch Level (10) Encode DCS Signal Type (11) Decode DCS Signal Type

Table 2.1 – Dealer Modes

2.1.1.1 Dealer Mode – Global Settings

To place the unit into the "Dealer Mode" for editing the global settings, do the following:

1. Switch the unit "off".
2. While pressing and holding the [**C**] key, switch the power "on". The radio enters the dealer mode and "COMMON" appears on the display.
3. Press the [**A**] key to enter the global menu.

4. While in the global menu, press the [**A**] key scroll forward through the menu items or press the [**B**] key to scroll backwards through the menu items.

Table 2.2 shows the global settings that can be selected while in this mode. While in this mode, use the [▲] and [▼] keys to view the options for the global setting. To save the setting, press **[A]** or **[B]** before exiting Dealer Mode. When finished programming, cycle the power of the unit to exit "dealer" mode and start "user" mode.

Function No.	Function Name	Option (Factory defaults are highlighted)	Display Left Char. Right Char.	Remarks
1 - 4	Function[1] Keys "A", "B", "C", and "D"	No Function	PKYx NOP	No Operation.
		Monitor (Squelch)	PKYxMONS	When selected, it toggles the squelch "on" and "off".
		Monitor (Normal)	PKYxMONN	When selected, it will toggle to disable or enable the tone decoder.
		Time-Out-Timer	PKYx TOT	When selected, it will toggle the TOT function "on" or "off".
		Scan Group 1 (All)	PKYxSCN1	When the key is selected, it will toggle the scan function "on" or "off".
		N/A	PKYxSCN2	
		N/A	PKYxSCN3	
		N/A	PKYxSCN4	
		Add/Del From Scan List	PKYxSCSK	When selected, it will toggle the present channel "in" or "out" of the scan list.
		Talk Around	PKYx TA	When selected, it will toggle the Talk Around function "on" and "off".
		Decode Signal	PKYxDSIG	When selected, it will toggle the RX Decode function "on" or "off".
		Encode Signal	PKYxESIG	When selected, it will toggle the TX Encode function "on" or "off".
		Squelch Level	PKYx SQL	When selected, the [▲] and [▼] keys are used to adjust the squelch level.
		Band Width	PKYx BW	When selected, it will toggle the bandwidth mode between "wide" and "narrow".
		Key Lock	PKYxLOCK	When selected, it will toggle the lock function "on" or "off".
		Panel Display	PKYxDSPE	When selected, it toggles the display "on" or "off"
		Display Invert	PKYxDSPI	When selected, it toggles the channel or label information of the display to be "inverted" or "normal".
		Display Change	PKYxDSPA	When selected, it toggles between, channel number, channel label, and frequency.
		Emergency	PKYxEMER	When selected, the emergency signaling feature is executed.
		Silent Emergency	PKYxSEMR	When selected, the silent emergency signaling feature is executed.
		Busy Channel Lockout/Busy Tone Lockout	PKYxBCLO	If "BCLO" or "BTLO" is programmed on a channel and when this key is selected, it will toggle the busy channel feature "on" or "off".
		Horn Alert	PKYx HA	When selected, it will set the horn alert feature.
		Memory Channel 1	PKYxMCH1	When selected, it will toggle between "Memory Channel 1" and the selected channel.
		Memory Channel 2	PKYxMCH2	When selected, it will toggle between "Memory Channel 1" and the selected channel.
		TX Power	PKYxTPOW	When selected, it will toggle the TX Power between "High" and "Low".

[1] The "x" used in the display column for Function number 1 – 4 refers to "A", "B", "C", or "D" function key.

Function No.	Function Name	Option (Factory defaults are highlighted)	Display Left Char. Right Char.	Remarks
		Call 1	PKYxCAL1	When selected, it will send the preprogrammed DTMF Signal.
		Call 2	PKYxCAL2	When selected, it will send the preprogrammed DTMF Signal.
		Call 3	PKYxCAL3	When selected, it will send the preprogrammed DTMF Signal.
		Call 4	PKYxCAL4	When selected, it will send the preprogrammed DTMF Signal.
		Redial	PKYxRDAL	When selected, resends the DTMF tones.
		Trap	PKYATRAP	When selected, it suspends the operation of the radio until the power is re-cycled.
		Hook Alert	PKYAHKHA	When selected, it toggles the “Hook Alert” feature “on” or “off”.
		Two-Tone	PKYA2TON	When selected, it sends the 2-Tone sequence that has been set for that channel.
		External/Internal Mic	PKYA MIC	When selected, it toggles between the TX audio being routed through the front microphone jack or through the real accessory connector.
		Back Light	PKYABKLT	When selected, it toggles the back light “on” or “off”.
5	DTMF Speaker	Off	DTMF OFF	DTMF tones are not heard through the speaker.
		On	DTMF ON	DTMF tones are heard through the speaker.
6	User Tone 1	CTCSS Tones from 67.0 Hz to 254.1 Hz	CT1 xxxx	
7	User Tone 2	CTCSS Tones from 67.0 Hz to 254.1 Hz	CT1 xxxx	
8	User Tone 3	CTCSS Tones from 67.0 Hz to 254.1 Hz	CT1 xxxx	
9	Back Light with any Key	Key	BKLT KEY	Any key pressed will turn the back light “on” for the duration of the “back light timer” setting.
		On	BKLT ON	Back light is always “on”.
		Off	BKLT OFF	Back light is always “off”.
10	Back Light Timer	0s ~ 10s (1s steps)	BLTM 0	The duration that the back light is “on”.
			BLTM 3	
			BLTM 10	
11	Default Display Time	Off, 0s ~ 60s (10s steps)	DFTM OFF	“Default display” will not appear.
			DFTM 10	The “default” display will appear after the “default display time” has passed.
			DFTM 60	
12	Start-up Display	Off	STDP OFF	The “start-up display” label will not be displayed.
		On	STDP ON	The “start-up display” label will appear during boot-up and remain on until the channel is changed, a function button is pressed, or scan mode is active.
13	DTMV Volume	0 ~ 3, 1 incremental steps	DTVL 0	Sets the DTMF Volume level. The higher the number, the higher the level.
			DTVL 3	
14	Mic. Volume	1 ~ 8, 1 incremental steps	MCVL 0	
			MCVL 3	
			MCVL 8	
15	Speaker Volume	0 ~ 3, 1 incremental steps	SPVL 0	
			SPVL 3	
16	Beep Volume	0 ~ 3, 1 incremental steps	SPVL 0	Sets the beep volume level. The higher the number, the higher the level.
			SPVL 3	
17	Back-up State			

Table 2.2 – Dealer Mode Global Settings

2.1.1.2 Dealer Mode – Channel Settings

To place the unit into the "Dealer Mode" for editing the global settings, do the following:

5. Switch the unit "off".
6. While pressing and holding the [**C**] key, switch the power "on". The radio enters the dealer mode and "COMMON" appears on the display.
7. Press the [▲] or [▼] key to enter the "Channel" menu. Pressing the [▲] will start at the first programmed channel and pressing the [▼] will start at the last programmed channel.
8. While in the channel menu, press the [**A**] key scroll forward through the menu items or press the [**B**] key to scroll backwards through the menu items.

Table 2.3 shows the channel settings that can be selected while in this mode. While in this mode, use the [▲] and [▼] keys to view the options for the channel setting. To save the setting, press **[A]** or **[B]** before exiting Dealer Mode. When finished programming, cycle the power of the unit to exit "dealer" mode and start "user" mode.

Function No.	Function Name	Option (Factory defaults are highlighted)	Display Left Char. Right Char.	Remarks
1	RX Channel Steps	2.5 kHz (250) , 5.0 kHz (500), 6.25 kHz (625), 7.5 kHz (750), 10 kHz (1000), 12.5 kHz (1200), 15 kHz (1500), 20 kHz (2000), 25 kHz (2500)	RSTP 500	Sets the channel increment size for editing the frequency while in dealer mode.
2	RX Frequency	Frequencies from 136 – 148 MHz	R 1XXxxxx	Pressing the [D] key will toggle between edit mode of the most significant digits (XX), the edit mode of least significant digits (xxxx), and exiting the edit mode. When the digits are flashing (edit mode), use the [▲] or [▼] key to change the frequency. When the least significant digits (xxxx) are flashing, the increment change is determined by what is set in "RX Channel Steps".
3	RX Tone (Decode Signal)		DSIG OFF	No Tone.
		CTCSS Tones from 67.0 Hz to 254.1 Hz and CDCSS codes from 023 to 754.	DSIG 0670 ~ DSIG 754	Pressing the [▲] will start scrolling through the CTCSS frequencies as listed in Table 2.7 and then it will continue through the CDCSS codes as listed in Table 2.8.
4	TX Channel Steps	2.5 kHz (250) , 5.0 kHz (500), 6.25 kHz (625), 7.5 kHz (750), 10 kHz (1000), 12.5 kHz (1200), 15 kHz (1500), 20 kHz (2000), 25 kHz (2500)	TSTP 500	Sets the channel increment size for editing the frequency while in dealer mode.
5	TX Frequency	Frequencies from 136 – 148 MHz	T 1XXxxxx	Pressing the [D] key will toggle between edit mode of the most significant digits (XX), the edit mode of least significant digits (xxxx), and exiting the edit mode. When the digits are flashing (edit mode), use the [▲] or [▼] key to change the frequency. When the least significant digits are flashing, the increment change is determined by what is set in "TX Channel Steps".

Function No.	Function Name	Option (Factory defaults are highlighted)	Display Left Char. Right Char.	Remarks
6	TX Tone (Encode Signal)	No CTCSS nor CDCSS	ESIG OFF	No Tone.
		CTCSS Tones from 67.0 Hz to 254.1 Hz and CDCSS codes from 023 to 754.	ESIG 0670	Sets the encode signal. Pressing the [▲] will start scrolling through the CTCSS frequencies as listed in Table 2.4 and then it will continue through the CDCSS codes as listed in Table 2.5.
			~	
			ESIG 754	
7	TX Power	High Power Mode	TPOW HI	Sets the TX power level.
		Low Power Mode	TPOW LOW	
8	BCLO (Busy Channel Lockout)	No BCLO	BCLO OFF	Sets the BCLO Mode. If BCLO is selected, then the PTT is disabled when a receive signal is present with the incorrect decode signal.
		BCLO	BCLO BCL	
		BTL	BCLO BTL	
9	Squelch Level	Squelch Level = 0 to 16, 1 step increments	SQLV 0	Sets the squelch level. The higher the number, the tighter the squelch.
			SQLV 3	
			SQLV 16	
10	DCS Encode Signal Type	DCS Encode Normal (Not Inverted)	DCSE NOR	Sets the encode signal type. If “inverted” is selected, then the signal in inverted 180° from the “normal” setting.
		DCS Encode Inverted	DCSE INV	
11	DCS Decode Signal Type	DCS Decod Normal (Not Inverted)	DCSD NOR	Sets the decode signal type. If “inverted” is selected, then the signal in inverted 180° from the “normal” setting.
		DCS Decode Inverted	DCSD INV	
		DCS Decode signal is Normal or Inverted.	DCSD BOT	

Table 2.3 – Dealer Mode Channel Settings

CTCSS Tone Frequencies

The CTCSS Tone Frequencies shown in table 2.4 are all possible CTCSS frequencies that can be programmed into the RM Series radios. The CTCSS frequencies listed that are shaded are standard TIA/EIA-603-A frequencies.

No.	Frequency (Hz)	No.	Frequency (Hz)	No.	Frequency (Hz)	No.	Frequency (Hz)	No.	Frequency (Hz)
1	67.0	11	94.8	21	131.8	31	171.3	41	203.5
2	69.3	12	97.4	22	136.5	32	173.8	42	206.5
3	71.9	13	100.0	23	141.3	33	177.3	43	210.7
4	74.4	14	103.5	24	146.2	34	179.9	44	218.1
5	77.0	15	107.2	25	151.4	35	183.5	45	225.7
6	79.7	16	110.9	26	156.7	36	186.2	46	229.1
7	82.5	17	114.8	27	159.8	37	189.9	47	233.6
8	85.4	18	118.8	28	162.2	38	192.8	48	241.8
9	88.5	19	123.0	29	165.5	39	196.6	49	250.3
10	91.5	20	127.3	30	167.9	40	199.5	50	254.1

Table 2.7 – CTCSS Frequencies

DCS Codes

The CDCSS Codes shown in table 2.8 are all possible CDCSS Codes that can be programmed into the RM Series radios. The CDCSS Codes listed from 023 to 371 that are shaded are standard TIA/EIA-603-A frequencies.

023	071	143	225	266	356	452	532	703
025	072	145	226	271	364	454	546	712
026	073	152	243	274	365	455	565	723
031	074	155	244	306	371	462	606	731
032	114	156	245	311	411	464	612	732
036	115	162	246	315	412	465	624	734
043	116	165	251	325	413	466	627	743
047	122	172	252	331	423	503	631	754
051	125	174	255	332	431	506	632	
053	131	205	261	343	432	516	654	
054	132	212	263	346	445	523	662	
065	134	223	265	351	446	526	664	

Table 2.5 – CDCSS Codes

2.1.2 Programming by Computer

Programming a radio from a computer is not covered in this manual. Contact RELM Communications for the programming cable (PCRM) and software (RESRM).

RELM Wireless Corporation
7100 Technology Drive
West Melbourne, FL 32904
(800) 422-6281
(321) 953-7986
service@RELM.com