PMR-2

(with CTCSS and scrambler functions)

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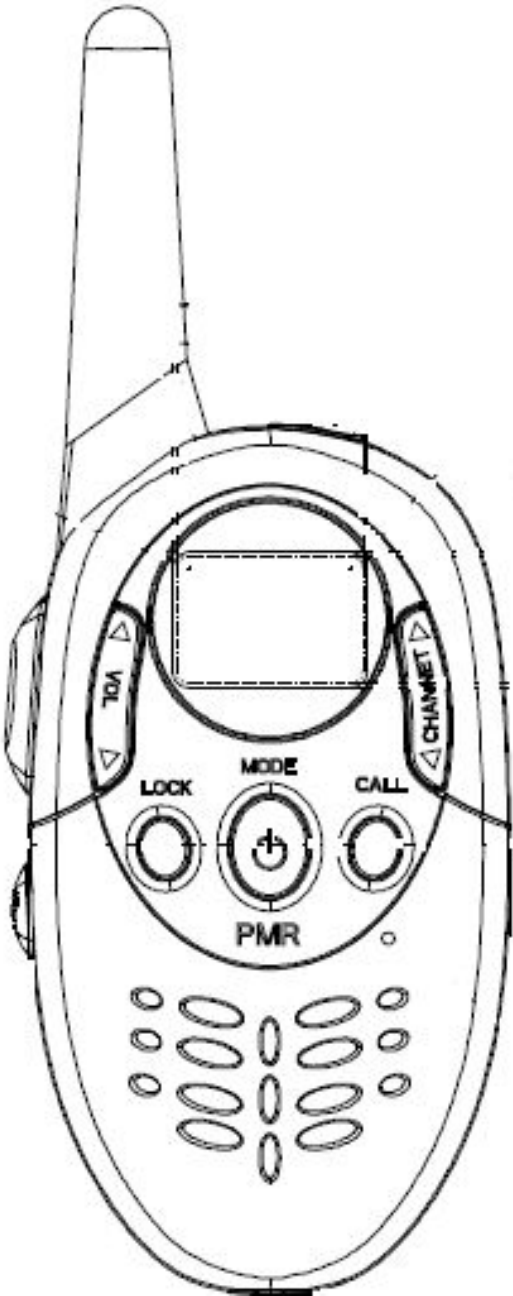
Catalog

1.0 Introduction

This document describes the feature operations specification for a Private Land Mobile Radio (PMR). The specifications are intended to match those outlined operation requirement and the Software design. It will become the Operation Manual before mass production.

2.0 Feature List

- UHF FM transmission
- Selectable 0.5W and 2W output power
- Up to 15km transmission range
- No license required
- High and Low output power selection
- 40 channels function
- 38 sub-code function
- Channel/CTCSS scan function
- VOX function (Off, 1, 2, 3, 4,5)
- Call tone melody – 5songs
- Electronics volume – 8 levels
- Automatic squelch function
- Low Battery indication
- Key lock function
- Key tone function
- Roger tone function (selectable on/off)
- Repeater function
- LCD back-light function
- Support external headset (earphone, microphone and external PTT key)
- Support rechargeable Lithium battery cell(Factory style)
- Support external AC-DC charger (optional)
- Belt clip function
- Power saver indication
- TX and RX icon
- Charging indication(icon flashing)
- Monitor function
- Dual watch function (DW)
- Stop watch function (>59'59'')

Keypad, Switch and LED Layout

LCD panel

- **TX**
  TX icon, light on in Transmission mode

-
  Rx icon, light on in Reception mode when correct channel and sub-code received

- **SC**
  SCAN icon, blinks in SCAN menu page

- **DW**
  Dual Watch icon, blinks in Dual Watch menu page

-
  Battery level indicators

-
  Numerical digits, displays Channel number

-
  Stop watch icon, light on in stop watch mode.

-
  Numerical digits, displays sub-code

-
  Music icon, light on in Call Tone Melody selection menu

- **⊩⊙**
  Key lock icon, light on when buttons are locked

- **((•))** **88**
  VOX icon and VOX level, light on in VOX selection menu and Standby mode when VOX function is enabled.

- **88**
  Numerical digits, displays the following information:
  Volume level;
  Call Tone melody number;
  Stop watch (seconds counter)

- **LO**
  Low power icon, light on in low power level mode

- **R**
  Roger tone icon

- **♀**
  Electricity power save icon

- **CTCSS**
  CTCSS sub-code icon

- **REP**
  REP Icon, displays REPEATER function

3.0 Unit Operation key

Button symbol	Description

Ө (Electronic Power ON/OFF) 📖 (MENU)	Power ON/OFF button (press & hold) Menu button Sub-code selection(CTC) Hi low Vox on/off Vox level Channel scanning Sub-code scanning Dual watch scanning Call tone melodies selection Roger tone setting Key tone setting Stop watch function
PTT	PTT – Push to Talk button
1. **M (Monitor)** **Back light**	Monitor button Turn on or off back light
2. ⛓️〇	Enter button and Repeater button Key lock button (press & hold)
3. **C (CALL)**	Call alert button
4. **Vol (UP)**	Volume Up button
5. **Vol (DOWN)**	Volume Down button
6. **CH (UP)**	Channel Up button
7. **CH (DOWN)**	Channel Down button

4.0 Operation

4.1 Turning the Unit On

Procedure	Description	LED	Audio signal	LCD
1. Ө (On / Off)	Press and Hold for 2 seconds.	Back-light LED lights on for 10 sec.	power beep tones	All lit
	After self-test			Standby mode display

- After Power On Reset and the EEPROM data is fresh, the System has the following default settings:

Description	Setting
Channel number	1
Sub-channel	00
Speaker volume	6
Call tone melody	1

Vox on/off	off
Vox sensitivity level	5
Keystrokes beeps	**on**
Roger beep	**on**
Stop Watch counter	00:00

4.2 Turning the Unit Off

Procedure	Description	Audio signal	LCD
☉ (On / Off)	Press and hold for 2 seconds in any mode	power beep tone	**All segments are Off**

4.3 Adjusting Speaker Volume

4.3.1 Adjusting Speaker Volume Up

Procedure	Description	Audio signal	LCD
Brief press once	The System enters to Volume setting mode.	Single beep tone	**"LE", then display the existing volume setting**
Press again	The Volume level is increased by 1 step.	Single beep tone	**"LE" display the existing volume setting**
Press & hold	The Volume level will be increased continuously up to the max Setting.	No beep tone	**"LE" display the existing volume setting**
	Volume setting reaches the max. Level.	Alert beep tones	**"LE" display the existing volume setting**

4.3.2 Adjust Speaker Volume Down

Procedure	Description	Audio signal	LCD
Brief press once	The System enters to Volume setting mode.	Single beep tone	**"LE" display the existing volume setting**
Press again	The Volume level is decreased by 1 step.	Single beep tone	**"LE" display the existing volume setting**
Press & hold	The Volume level will be decreased continuously up to the min. Setting.	No beep tone	**"LE" display the existing volume setting**
	Volume setting reaches the min. Level.	Alert beep tones	**"LE" display the existing volume setting**

4.3.3 Confirm Volume setting

Note: Only in standby mode can be changed volume After 1s will return standby mode.

4.3.4 Channel selecting

In Australia,
- Except in an emergency, the unit must not be operated on channels 5 and 35
- No voice transmissions are permitted on channels 22 and 23
- Channel 11 is the customary calling channel for establishing communication
- Channel 40 is the customary road vehicle channel

The factory default start up channel is channel 1 and sub-channel 00.
Before selecting a channel for transmitting, always listen on it and ensure it is not already being used. Always avoid selecting a busy channel when the unit keeps on receiving signal from unknown party. The icon   will be displayed.

Procedure	Description	Audio signal	LCD
1. / Press once	The channel number will be changed ascending or descending in one step. The preset sub-code will be shown.	A key tone	Current channel
2. / Press and hold	The channel number will be changed ascending or descending continuously. The preset sub-code will be shown.	No key tone	Current channel

4.4 Receiving radio signal

- The System is continuously in the receiving mode for 10 seconds after Power On and no any key pressing.
- After 10 seconds for the last key pressing, the System enters to the power saving mode. (i.e. the power saving timing is400ms Off, 400ms On.)

Description	Audio signal	LCD
A radio signal matches with the existing channel setting. but not sub-code setting	Muted	display
A radio signal matches with the existing channel and sub-code setting	Speaker is On	display

Note: If the System displays channel, it can still receive radio signal.

4.4.1 Have signal

Procedure	Description	Audio signal	LCD
❂ POWER&MENU	Press once And enter sub-code setting	Speaker is On and key tone	and sub-code flash
	Long pressed >2s System turns off	Off key tone	
M	PRESS once BACK LIGHT ON	Key tone	Standby **display**
	LONG PRESS <1S Enter monitor Speaker on		display
	LONG PRESS >5S enter auto MONITOR Speaker on	Two beeps	display
↵ ENTER &LOCK	1. Press once Return to STBY MODE	Speaker on and key tone	
	2. Long press >2s lock &unlock	Two beeps	If unit lock 🔑 icon will be displayed
/ CH	Change channel	Key tone	Display current channel
/ VOLUME	Change volume	Speak on and key tone	"LE" and volume level display

4.5 Transmission

Procedure	Description	LCD
PTT Press and hold	The System transmits radio signal continuously.	"TX" display
PTT Released	The System terminates the transmission.	Standby mode display

Note :

Press power key >2s can turn off unit, other keys are invalid while PTT being pressed

4.6 Sending call tone

Procedure	Description	LCD
C Press once	The System transmits a call tone signal in the	display

	existing Melody setting and then returns to Standby mode.	

Note:

Call tone can only be transmitted once (not more than 3 sec) in any 60 sec period. While C key is pressed, Press power key >2s can turn off system, other key are invalid

4.7 Monitoring radio signal (only in STBY mode)

Procedure	Description	Audio signal	LCD
M Press	Press once back light on or off	Key tone	STBY
	Press &hold>1s enter monitor only in standby mode	Speaker on	
	Long press >5s enter to auto monitor only in standby mode	Two beep tone And speaker on	

4.7.1 During AUTO Monitoring period (only in standby mode)

Procedure	Description	Audio signal	LCD
M PRESS once again	The System returns to standby mode. Back light on or off	Speaker is Muted	Standby Mode display
PTT Press and hold	The System enters into transmission mode. After transmission, return into auto monitor mode	Speaker is Muted	display
C Press once	The System enters into transmission mode. After transmission, return into auto monitor mode		display
🔒 Press	Once press invalid		
	Pressed >2s lock and unlock	Speaker on and two beeps	If unit locked 🔒icon will be displayed

/ VOL	Change volume level	Speaker on and key tone	"LE" and current volume level display
/ CH	Change channel Off auto monitor	Speaker off	Current channel and sub-code
📖 ☉	1 Off auto monitor 2 Enter setting sub-code mode	Turn off speaker and key tone	
	Press >2s turn off system		

4.8 Key lock function (in idle mode)`

Procedure	Description	Audio signal	LCD
🔒 Press once		invalid	Standby Mode display
🔒 Press and hold for 2s	Apart from C, Monitor and PTT button, all other buttons are locked. An alert tone will be heard when any one of these buttons is pressed.	Lock tone	🔒 icon display
🔒 Press and hold for 2s again	The System cancels the key lock function.	Lock tone	Standby Mode display

4.9 Back-light function

Procedure	Operation Mode	Back-light
1. ☉ Power ON	Standby mode	Light on for 10 sec
2. M Press once	Monitor	Light on for 10 sec

4.10   Accessing the Menu pages

4.10.1 Select sub-code

- CTCSS sub-code is inhibited on designated emergency channels 5and 35.

Procedure	Description	Audio signal	LCD
1. 📖 (MENU) Press once	The System enters to sub-code setting page.	A key tone	**CTCSS** Sub-code digits are

			flashing
2. / CH Press once	The sub-code number will be changed ascending or descending in one step. (CTC 00, 01 ~ 38)	A key tone	**CTCSS** Sub-code digits are flashing
3. / CH Press and hold	The sub-code number will be changed ascending or descending continuously. (CTC 00, 01 ~ 38)	No key tone	**CTCSS** Sub-code digits are not flashing
�🔑	Return to standby and save sub-code	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ VOL pressed	Invalid	Error tone	
PTT Press and hold	Return to standby with saving sub-code and into transmission mode.		**TX**
C Press once	Return to standby with saving and into transmission mode.		**TX**

4.10.2 Setting Hi Low power

Procedure	Description	Audio signal	LCD
4. 📖 Press once	The System enters to hi-low setting page.	A key tone	Current channel and flash HI or LO
5. / CH Press once	The hi low level will be changed	A key tone	Current channel and flash HI or LO
6. / CH Press and hold	The hi low level will be changed	No key tone	Current channel and HI or LO
↵	Return to standby and save	two beep (modified) A key tone	Standby mode

M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ Vol	Invalid	Error tone	
PTT Press and hold	Return to standby without saving and into transmission mode.		**TX**
C Press once	Return to standby and into transmission mode.		**TX**

Note   IF LOW **LO** icon will display

4.10.3 Setting VOX ON/OFF

Procedure	Description	Audio signal	LCD
7. 📖 Press once	The System enters to Vox ON/OFF setting page.	A key tone	(((●Icon on and digit flash Current vox status
8. / CH Press once	The VOX status will be changed ascending or descending in one step. (ON/OFF)	A key tone	(((●Icon on and digit flash current vox status
9. / CH Press and hold	The VOX status will be changed ascending or descending in one step. (ON/OFF)	No key tone	(((●Icon on and digit not flash
⊫○	Return to standby and save	two beep A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ VOL pressed	Invalid	Error tone	
PTT Press and	Return to standby without saving and		**TX**

hold	into transmission mode.		
C Press once	Return to standby and into transmission mode.		**TX**

4.10.4 Setting VOX sensitivity levels

Procedure	Description	Audio signal	LCD
10. 📖 Press once	The System enters to Vox level setting page.	A key tone	Icon on and digit flash Current vox level
11. / CH Press once	The VOX level will be changed ascending or descending in one step. (1, 2, 3, 4,5)	A key tone	Icon on and digit flash current vox level
12. / CH Press and hold	The VOX level will be changed ascending or descending in one step. (1, 2, 3, 4,5)	No key tone	Icon on and digit not flash
↵	Return to standby and save	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ VOL pressed	Invalid	Error tone	
PTT Press and hold	Return to standby without saving and into transmission mode.		**TX**
C Press once	Return to standby and into transmission mode.		**TX**

Note   If vox on ⦅⦆ icon will be displayed. Only in standby mode vox can be triggered

4.10.5 Scanning channels

Procedure	Description	Audio signal	LCD
13. 📖	The System enters to	A key tone	

Press once	scan channel setting page.		**SC**Icon on and channel digit flash, sub-code is 00.
14. / CH Press once	Start scan channel	A key tone	**SC**Icon on and digit not flash
15. / CH Press and hold	Start scan channel	No key tone	**SC**Icon on and digit not flash
↵	Return to standby and set channel to last scanned channel	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ Vol	Invalid	Error tone	
PTT Press and hold	Go to TX mode on last scanned channel		**TX**
C Press once	Go to TX mode on last scanned channel		**TX**

Note:

The sub-code (CTC) is always 00 during Channel scan. If any signal is received The unit locks on to that channel for 5s and is set to the last scanned channel.

4.10.6 Scanning sub-codes

Procedure	Description	Audio signal	LCD
16. 📖 Press once	The System enters to scan sub-code (CTC) setting page.	A key tone	**SC**Icon on and sub-code is flash
17. / CH Press once	Start scan sub-code (CTC)	A key tone	**SC**Icon on and sub-code is not flash
18. / CH Press and hold	Start scan sub-code (CTC)	No key tone	**SC**Icon on and sub-code not flash

	Return to standby and set channel to last scanned sub-code (CTC)	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ Vol	Invalid	Error tone	
PTT Press and hold	Go to TX mode on last scanned sub-code (CTC)		**TX**
C Press once	Go to TX mode on last scanned sub-code (CTC)		**TX**

Note:
The channel is always current during sub-code scan. If any signal is received The unit locks on to that channel for 5s and is set to the last scanned sub-code.

4.10.7 Dual Watch Scanning function

Procedure	Description	Audio signal	LCD
19. 📖 Press once	The System enters to Dual Watch Scanning channel setting page.	A key tone	**DW** Icon on and channel digit flash, sub-code is 00.
20. / CH Press once	Start scan channel	A key tone	**DW** Icon on and digit not flash
21. / CH Press and hold	Start scan channel	No key tone	**DW** Icon on and digit not flash
	Return to standby and set channel to last scanned channel	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ Vol	Invalid	Error tone	

PTT Press and hold	Go to TX mode on last scanned channel		**TX**	
C Press once	Go to TX mode on last scanned channel		**TX**	

4.10.8 Selecting Call Tone melodies

Procedure	Description	Audio signal	LCD
22. 📖 Press once	The System enters to Call tone setting page.	A key tone	C digit and Current call tone number flash
23. / CH Press once	The call will be changed ascending or descending in one step. (1, 2, 3, 4,5)	The System will play back the current Melody.	C digit and current call tone number flash
24. / CH Press and hold	The call will be changed ascending or descending in one step. (1, 2, 3, 4,5)	The System will play back the current Melody.	C digit and call tone number not flash
↵	Return to standby and save	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ VOL pressed	Invalid	Error tone	
PTT Press and hold	Return to standby without saving and into transmission mode.		**TX**
C Press once	Return to standby without saving and into transmission mode.		**TX**

4.10.9 Setting Roger tone mode

Procedure	Description	Audio signal	LCD
25. 📖 Press once	The System enters to Roger tone setting page.	A key tone	**R** icon ，Current roger tone state (on/off)flash
26. / CH Press once	The roger tone be changed on or off	The System will play back the roger tone if it is be turned on .	**R** icon ，Current roger tone state (on/off)flash
27. / CH Press and hold	The roger tone will be changed on or off	Off	**R** icon ，Current roger tone state (on/off) not flash
↵	Return to standby and save	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ VOL pressed	Invalid	Error tone	
PTT Press and hold	Return to standby without saving and into transmission mode.		**TX**
C Press once	Return to standby without saving and into transmission mode.		**TX**

Note:

If Roger tone is on, **R** icon will be displayed on standby mode.

4.10.10 Setting key tone mode

Procedure	Description	Audio signal	LCD
28. 📖 Press once	The System enters to key tone setting page.	A key tone	🎵 icon ，Current key tone state (on/off)flash

29. / CH Press once	The key tone be changed on or off	The System will play back the key tone if it is be turned on .	🎵icon , Current key tone state (on/off)flash
30. / CH Press and hold	The key tone will be changed on or off	Off	🎵icon , Current key tone state (on/off) not flash
↵	Return to standby and save	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ VOL pressed	Invalid	Error tone	
PTT Press and hold	Return to standby without saving and into transmission mode.		TX
C Press once	Return to standby without saving and into transmission mode.		TX

Note:

If key tone is on, 🎵 icon will be displayed on standby mode.
If key tone off, set volume to max or min will alarm(two beep).

4.10.11 Repeater Function

Only use this repeater function when a long distance communication via the local repeater facility is specifically required. Unless it is necessary, to avoid operation on locally used repeater input channels (channels 31 to 38) or locally used repeater receiving channels (channels 1 to 8) is recommended.

- Press ⊔O button one time to enter REPEATER mode, press ⊔O button one more time to release REPEATER function. During REPEATER on mode, display will show **REP** icon.

4.10.12 Enters into Stop-watch mode

Procedure	Description	Audio signal	LCD
📖 Press once	The System enters to Stop-watch setting page.	A key tone	⏱icon display,

			digit flash.
CH Press once	The Stop-watch will be started.	A key tone	⏱icon , Start count
CH Press	Once The Stop-watch will be stop.	A key tone	⏱icon , Start count
	Clear stop-watch when stop-watch stoped	A beep tone	
↵	Return to standby And clear stop-watch	two beep (modified) A key tone	Standby mode
M Press	Once press turn on back light for 10s	A key tone	
	Long press Invalid	Error tone	
/ VOL pressed	Invalid	Error tone	
PTT Press and hold	If stopwatch is start run Don't stop stop-watch. After tx, will be return stopwatch mode If stopwatch isn't start, the system will return to stdby		TX
C Press once	Return to standby and into transmission mode. If stopwatch is start run Don't stop stop-watch. After tx ,will be return stopwatch mode If stopwatch isn't start, the system will return to stdby		TX

Note:

If stopwatch isn't started, it can't receive any signal, and will return to standby after 10s.

If receive signal (the channel and ctc must be matched) when stop-watch start, the unit will be entered to standby mode and stop-watch will worked .After receive signal ,the unit will be returned to stop-watch .

5.0 Battery Low

State	Description	LCD

| Battery Low | Standby mode | "bA" is in large letters made from channel number indicator and "Lo" is in small letters made from CTCSS tone number indicator |
| | Tx mode | stdby |

When voltage<3.0V, the system will auto power off.

6.0 Charging

State	LCD
When start charging	flash

5.0 Channel and Sub-code

Channel and frequency table

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
1*	476.425	11	476.675	21	476.925	31*	477.175
2*	476.450	12	476.700	22	476.950	32*	477.200
3*	476.475	13	476.725	23	476.975	33*	477.225
4*	476.500	14	476.750	24	477.000	34*	477.250
5*#	# 476.525	15	476.775	25	477.025	35*#	477.275
6*	476.550	16	476.800	26	477.050	36*	477.300
7*	476.575	17	476.825	27	477.075	37*	477.325
8*	476.600	18	476.850	28	477.100	38*	477.350
9	476.625	19	476.875	29	477.125	39	477.375
10	476.650	20	476.900	30	477.150	40	477.400

Emergency calling for both simplex and duplex operation. Please do not use this channel in non-emergency

cases.

* These channels may also be used as repeater channels using 750kHz offset. Channels 1 to 8 inclusive are used for mobile reception and channels 31 to 38 for mobile transmission.

CTCSS table

Sub CH	Frequency (Hz)	Sub CH	Frequency (Hz)	Sub CH	Frequency (Hz)	Sub CH	Frequency (Hz)
1	67.0	11	97.4	21	136.5	31	192.8
2	71.9	12	100.0	22	141.3	32	203.5

3	74.4	13	103.5	23	146.2	33	210.7
4	77.0	14	107.2	24	151.4	34	218.1
5	79.7	15	110.9	25	156.7	35	225.7
6	82.5	16	114.8	26	162.2	36	233.6
7	85.4	17	118.8	27	167.9	37	241.8
8	88.5	18	123.0	28	173.8	38	250.3
9	91.5	19	127.3	29	179.9	00	NIL
10	94.8	20	131.8	30	186.2		