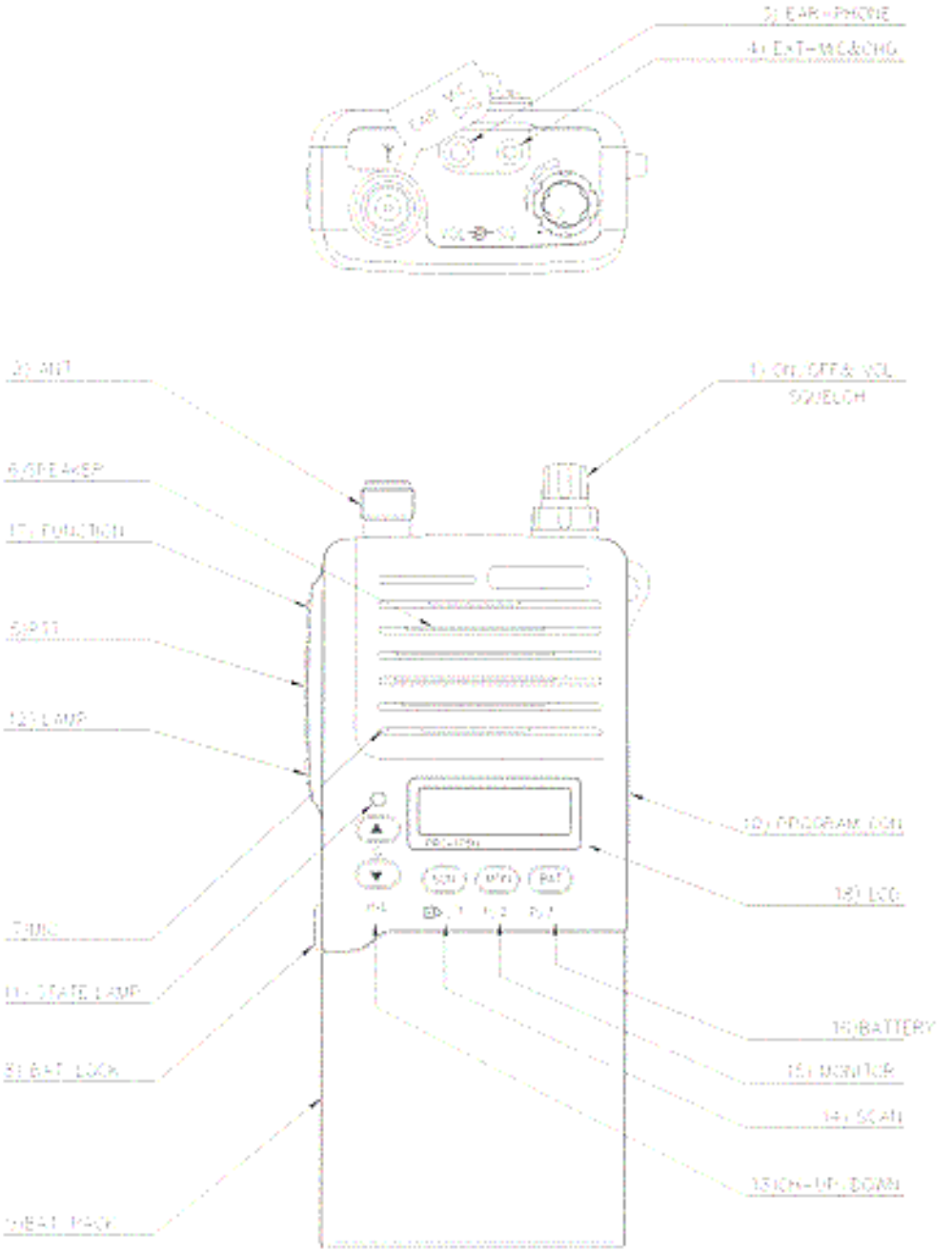
1.4 OPERATION

- External View



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1.4.1 FEATURE AND OPERATION

1) Power/Volume & Squelch Control Switch

Power On/Off and Volume control switch. As turning clockwise (CW) direction, power turns on, and continuous CW turning makes volume louder. Turning counter clockwise (CCW) direction makes volume weaker and power turns off when turning completely. In addition, lower switch is squelch sensitivity controller. As turning clockwise (CW) direction, there is lower noise, but requires higher input signal. So it is proposed that user turns squelch control switch at threshold point.

2) Antenna Connector

A connector for small helical antenna or external antenna.

3) Earphone Jack

A jack for earphone and external speaker.

Internal speaker will not operate when the earphone or external speaker is used.

4) External Mic and Charger Jack

External mic or charging terminal can be connected.

☞ CAUTION ⇒ Power switch must be turned off during charging the battery pack.

5) TX Switch

Changing switch between Tx and Rx mode. Must be pressed to transmit.

6) Speaker

High performance speaker with 8 ohm is employed.

7) MIC

Keep your mouth apart from the MIC properly and talk as usual voice strength on transmission.

8) Battery Lock

For detaching the battery pack from the main transceiver unit, push and hold up this lock and push battery pack to left.

9) Battery Pack

By using high capacity 7.5V battery pack, much longer operation is possible.

10) Programming Connector

For injecting frequencies, tone to prevent interference and other necessary information from PC or other radios. Turn the screw off and uncover. Then connect a programming cable for PC or a cloning cable for other radios.

11) Status Lamp

a) Red lamp Turns on in Tx and green in Rx.

b) At low battery, red lamp is blinking.

c) Yellow lamp light in transmitting DTMF.

d) When the programmed CTCSS/CDCSS is different from the received one, green lamp is blinking.

12) LCD lamp switch [LMP]

For LCD display On/Off, This lamp shall be turned off automatically in 5 seconds after turning on. If you want to turn on the lamp continuously, press and hold the switch for more than 2 seconds after turning the radio on.

13) Channel Switch for 5-Tone Memory Number[▲ ▼]

Switch for changing memory number. ▲ is for increment of channels and ▼ is for decrement. If pressed and held in more than 1 second, channel changes rapidly.

14) Scan Switch [SCN]

This switch is for entering into scan mode.

15) Monitor Switch [MON]

For On/Off of monitor feature, In monitor mode, signal can be received regardless of CTCSS/CDCSS squelch feature, which prevents interference. If you want to receive the white noise with disabling noise squelch function, press and hold this switch for more than 2 seconds. PC programmer can disable this feature.

16) Battery Status Display

By digital display, displays status of battery, using check the voltage of battery (E1~E5).

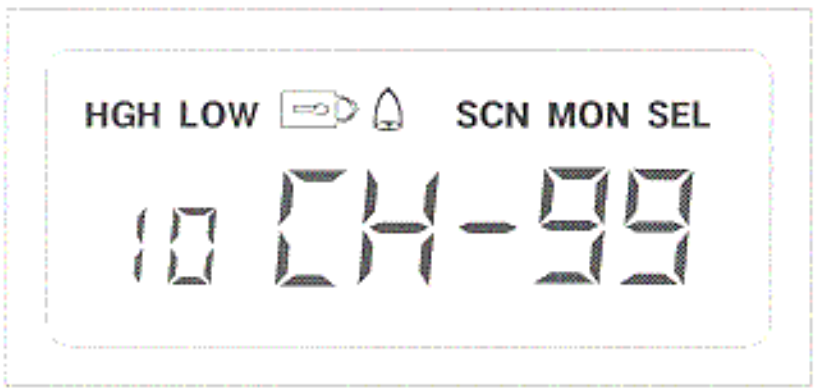
17) Function Key [FUN]

For operating additional functions, this key should be pressed and held until the other switches at the front panel are pressed. This key can be programmed to perform any of following function.

a)	Changing the group number	: FUN sw + ▲ [G]
b)	Switching High and Low RF output	: FUN sw + ▼ [H.L]
c)	Front Switch lock or unlock	: FUN sw + SCN sw[⊂⇦]
d)	Alarm On/Off	: FUN sw + MON sw[🔔]
e)	setting, changing and disabling password	: FUN sw + BAT sw[PSWD]

18) LCD display

The LCD window is optimized to provide rapid access to information and message concerning the progress of your call mode and the status of your radio.



. [HGH], [LOW]	: indicates either high or low RF output
. [⊂⇦]	: indicates front panel switch lock
. [🔔]	: indicates alarm ON/OFF
. SCN	: indicates scan mode
. MON	: indicates monitor mode
. CH-99	: indicates 99th channel is selected

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. UL-99	: indicates 99th channel is UnLocked
. OFF	: indicates error in power source
. PROG	: program mode
. CLON	: cloning mode
. = = ==	: indicates that cloning is in progress
. SUCCESS	: cloning is completed successfully
. ERROR	: indicates error in cloning progress
. EPERROR	: indicates error in memory (EEPROM)
. E1~E5	: indicates capacity of battery (E5 means full capacity, E1 means empty)
. 10	: indicates selection of 10th group

1.4.2 SPECIAL FEATURES

1) Scanning Channel

a) Press the scan switch, then LCD displays 'SCN' message and channel is increased. Scanning channel is only one of pre-defined channel.

b) Scan stops at channel has receiving signal. If there is not receiving signal at that channel, waiting for a minute, scanning feature operates continuously.

c) For scanning channel which has CTCSS data, it will halt scanning at channel has same CTCSS data. So scanning processing is slow at CTCSS channel because of identifying CTCSS data.

d) Press ▲ switch in order to scan continuously without receiving signal at certain channel. Press ▼ switch in order to remove channel temporarily from scanning list. Removed channel is recovered as quitting and entering the scan mode.

e) While scanning, transmitting channel is one of channel received last, prior channel and channel before scanning. User can select type of channel by PC programmer.

f) Scanning process at one priority channel per three normal channels.

g) Press 'SCN' switch to quit the scanning process. Then, LCD will not display 'SCN' message, and channel will be channel before scanning.

2) Group and channel

a) It will display as figure 1, and first two digits are number of group.

Figure 1. Group and channel display

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b) Group number is from 1 to 10 and pressing FUN and ▲ switch makes channel number high.

c) Number of channel must be in group concerned and from 1 to 99. So, As pressing ▲ ▼ switch, up and down the number of channel.

d) Each channel can have CTCSS tone.

3) Indicating capacity of battery

a) Indicate capacity of battery in digital display by means of calibrating voltage of battery (E1 ~ E5).

b) Press the BAT switch, then display as figure 2.

Figure 2. Display capacity of battery

4) Password feature

a) Each radio can have individual password, user can enable, change and disable password.

b) As setting password and turning on radio, there is requesting massage enter the password as figure 3

Figure 3. Display requesting password message

c) Enter the password using 'SCN' means 1, 'MON' means 2, and 'BAT' means 3 switches. But when entering wrong password 3 times, as figure 3, all of operations are denied.

Figure 4. Display all of operations are denied

d) User can set the password when all of password is not set, and pressing FUN + 'BAT' switch makes display as figure 5-1.

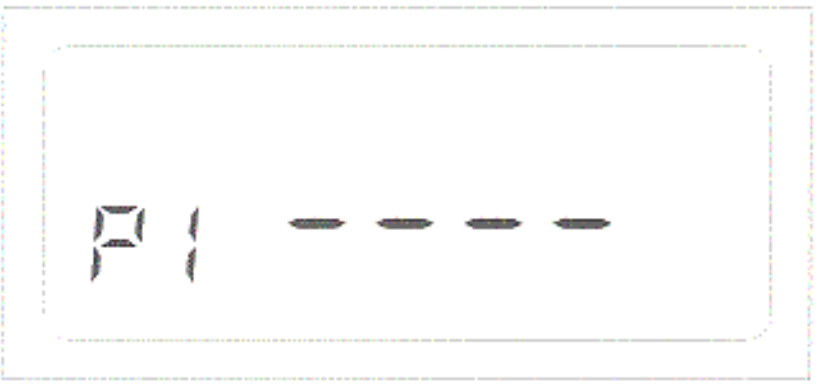

Figure 5-1. Display setting the password

After setting the 4-digit password using 'SCN' means 1, 'MON' means 2, and 'BAT' means 3 switches, ▲ switch makes store password. As displaying such as figure 5-2 on LCD, repeat preceding procedure to verify password. When two passwords are same, display figure 6-1, or not display figure 6-2.

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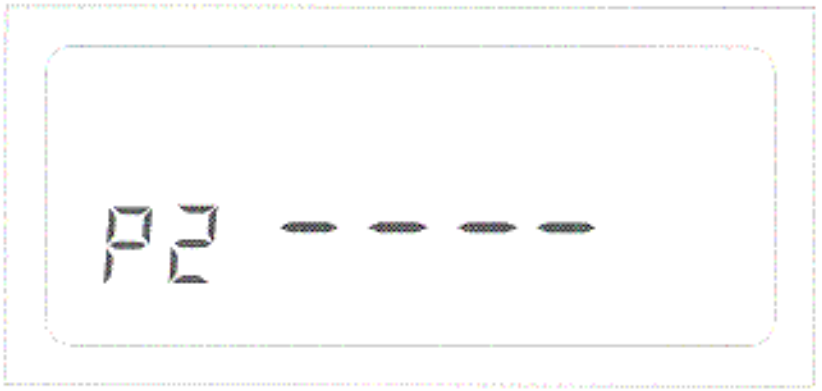

Figure 5-2. Display verifying the password

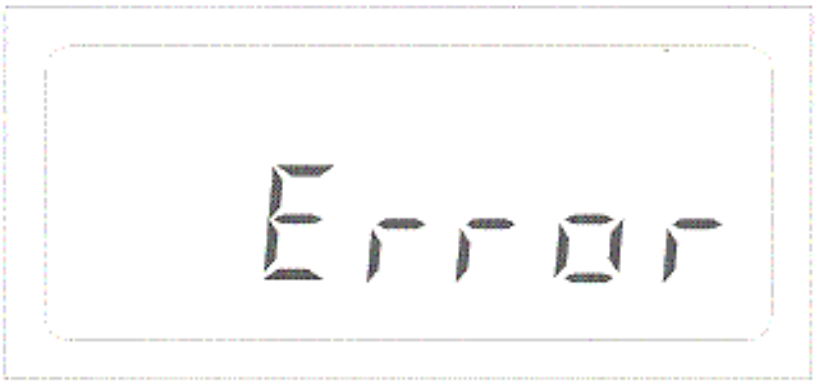

Figure 6-1. Display error message of setting password

Figure 6-2. Display success message of setting password

e) Changing and disabling password

As changing and disabling pre-defined password, pressing FUN + 'RAT' switch makes figure 3.

And enter the password, then pressing ▲ switch once makes changing password mode same as setting password mode. Or pressing ▲ switch twice makes disabling password.

5) Programming frequency and other data

a) Screw out a bolt in program connector and uncover the guide. Then connect the programming port in radio to PC by programming cable.

b) As pressing ▲ ▼ switch, turn on the radio. Then the radio would be programming mode and 'PROG' message displayed on LCD window.

c) Using PC programmer software, you can input frequencies and other data to the radio.

d) In order to quit programming mode, turn off the radio.

6) Cloning Between Radios

a) Screw out each bolt in programming connectors of both radios (one is for transmitting data and the other for receiving data) and uncover the each guide. Then, link between two radios by programming cable.

b) As pressing Tx switch, turn on the radio for transmitting data. Then you can hear two short tones. And it goes into cloning mode and the radio displays 'clon' on LCD windows.

c) As pressing ▲ ▼ switch, turn on the radio for receiving data. Then the radio would be programming mode and the radio displays 'PROG' on LCD windows

d) When pressing Tx switch of radio for transmitting data, cloning will start. During cloning, radio for transmitting displays ==== on LCD window. If cloning is completed successfully, radio for transmitting data displays SUCCESS message on LCD window. However, if certain error occurs during cloning, radio displays ERROR message.

e) Repeatedly, you can clon the transmit data to other radios. To quit cloning mode, turn off the radio.

7) Busy Channel Lock Out (BCLO)

During certain channel in engaged, BCLO makes other radios not to transmit in that channel. There are two types of CARRIER type and REPEATER type. In CARRIER type, transmitting is banned when receiving channel is in busy. Contrarily, in REPEATER type, though the receiving channel is in used, if the received CTCSS/CDCSS signals are same as the programmed those signals, it is possible to transmit. With PC programmer, you can select one of 2 types or ignore.

8) Power Saving Mode

If no received signal (receive stand-by) for pre-defined time, this radio goes into power saving mode. Time value can be programmable by PC programmer.

9) Transmit time out and penalty time

In order to prevent long-time transmission, transmit time out feature can be used. When time of transmission exceeds the limitation, the radio is automatically switched to receive mode. Further more, penalty time, which makes the radio not to transmit for pre-defined time period, can be applied. Transmit time out and penalty time can be programmable by PC programmer.

10) DTMF transmission

Whenever you press the TX button, your radio transmits its own number with 5 DTMF signals. This function can be programmed in PC.

1.4.3 EEPROM PROGRAM VARIABLES

In this section, there is explanation for variables set by PC programmer. For more information of programming, please refer to the PC programmer user's manual.

1) Channel frequency and step

You can set the frequencies or steps of the channel number from 1 to 99. Step value can be one of 4 step types (5K, 6.25K, 10K, 12.5K defined as channel).

2) Setting CTCSS

You can set CTCSS data in each channel. CTCSS has 37 EIA standard codes and a 97.4Hz code. Code data is referred to following frequency table.

Tone No.	Freq. (Hz)	Tone No.	Freq. (Hz)	Tone No.	Freq. (Hz)
C 00	No Tone	C 13	103.5	C 26	162.2
C 01	67.0	C 14	107.2	C 27	167.9
C 02	71.9	C 15	110.9	C 28	173.8
C 03	74.4	C 16	114.8	C 29	179.9
C 04	77.0	C 17	118.8	C 30	186.2
C 05	79.7	C 18	123.0	C 31	192.8
C 06	82.5	C 19	127.3	C 32	203.5
C 07	85.4	C 20	131.8	C 33	210.7
C 08	88.5	C 21	136.5	C 34	218.1
C 09	91.5	C 22	141.3	C 35	225.7
C 10	94.8	C 23	146.2	C 36	233.6
C 11	97.4	C 24	151.4	C 37	241.8
C 12	100.0	C 25	156.7	C 38	250.3

3) Scan

a) Add scan channels

It is possible that the scan channels at receive frequency stored in your radio are added only.

b) Priority channel

Define and set one of assigned channels for scanning.

c) Scan types

i . Carrier scan : whenever the radio has valid traffic, it will halt scanning and pause on the active channel.

ii . CTCSS scan : It will halt scanning and pause on the channel when programmed Rx signal is same as Tx tone (CTCSS) signal.

d) Scan timer

Carrier scan period can be defined from 50msec to 990msec by 10msec,and CTCSS scan period

can be defined from 200msec to 990msec by 10msec.

e) Transmitting channel while scanning

You can select transmitting channel while scanning between the channel received last and channel before scanning.

4) Transmit time out and Penalty time

a) Transmit time out

Can be set from 0(to disable feature) to 255 seconds in a second step.

b) Penalty time

Can be set from 0(to disable feature) to 255 seconds in a second step.

5) Time information of power saving mode

a) Transmit time out

Can be set from 0(to disable feature) to 255 seconds in a second step. When the radio does not receive any of signals for pre-defined time limitation, the radio goes into power saving mode and alternates ON and OFF of Rx power for saving power consumption.

b) Power-applying time

In power saving mode, power-applying time can be set from 10mS to 990mS in a 10mS step.

c) Power-cutoff time

In power saving mode, power-cutoff time can be set from 10mS to 990mS in a 10mS step.

6) DTMF ID information

a) Selection transmit mode for DTMF ID

You can select transmit mode for DTMF ID or not.

b) Setting DTMF ID

You can set 5-digit ID from 00000 to 20975.

c) LEAD-IN Delay time

This feature can be selected for transmitting and receiving exactly. This time is defined from 0mS 2550mS in a 10mS step.

d) DTMF time type

Can set the time of DTMF tone and pause time from 40mS to 3900mS in 1mS step.

7) Busy channel lock out(BCLO)

Can select one of Carrier type. Repeat type or not.

8) Monitor feature

Can select Monitor function or not.

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1.4.4 MCU PORT TABLE

Ref. NO.	Type	Circuit Sign	I/O	Status	Operation
1	VDD	VCC			MCU POWER
2	PE6	805CS	0	L	FX805 CHIP SELECT
3	PE5	PLL LE	0	R	PLL LATCH ENABLE (DATA LATCH IN RISING EDGE)
4	PE4	LCD LP	0	H	LCD LAMP ON
5	PE3	TX LP	0	L	TX LAMP ON
6	PE2	BUSY LP	0	H	RX LAMP ON
7	PE1	MIC MUT	0	H	MIC MUTE (MUTE IN RX, DTMF ID AND 5 TONE TRANSMISSION)
8	PE0	AMP MUT	0	H	AUDIO AMP MUTE
9	PD7	RX	0	H	RX POWER ON (REPEAT ON/OFF IN POWER SAVING MODE)
10	PD6	TX	0	H	TX POWER ON
11	PD5	RF OE	0	L	RF POWER ENABLE (ENABLE AFTER PLL LOCK IN TX)
12	PD4	RF PS	0	L	RF HIGH POWER SELECT (IN 'L', HIGH POWER OUTPUT)
13	VLCD3	VLCD3			LCD BIAS 3
14	VLCD2	VLCD2			LCD BIAS 2
15	VLCD1	VLCD1			LCD BIAS 1
16	VSS	VSS			GROUND
17	VPP				
18	XOSC1				
19	XOSC2				
20	/RESET	RESET			MCU RESET

Ref. NO.	Type	Circuit Sign	I/O	Status	Operation
21	OSC1	OSC1			CONNECT TO 4MHZ CRYSTAL
22	OSC2	OSC2			CONNECT TO 4MHZ CRYSTAL
23	PA0	DA0	0		D/A CONVERTER 0
24	PA1	DA1	0		D/A CONVERTER 1
25	PA2	DA2	0		D/A CONVERTER 2
26	PA3	DA3	0		D/A CONVERTER 3
27	PA4	PROG TXD	0		RS232C TXD
28	PA5	PROG RXD	I		RS232C RXD
29	PA6	PLL LD	I	L	PLL LOCK DETECT INPUT
30	PA7	FUNG S/W	I	L	FUNCTION SWITCH
31	PB0	PTT S/W	I	H	PTT SWITCH
32	PB1	UP S/W	I	L	CHANNEL UP SWITCH
33	PB2	DN S/W	I	L	CHANNEL DOWN SWITCH
34	PB3	LAMP S/W	I	L	LCD LAMP SWITCH
35	PB4	SQD	I	L	SQUELCH DETECT
36	PB5	SCAN S/W	I	L	SCAN SWITCH
37	PB6	MONI S/W	I	L	MONITOR SWITCH
38	PB7	CALL S/W	I	L	CALL SWITCH
39	SDI	SDI	I		SERIAL DATA INPUT (FX805/X25160)
40	SDO	SDO	O		SERIAL DATA OUTPUT (FX805/X25160/PLL)

Ref. NO.	Type	Circuit Sign	I/O	Status	Operation
41	SCK	SCK	0		SERIAL CLOCK OUTPUT (FX805/X25160/PLL)
42	TCAP	5TSI	I		
43	PC4	BAT CHK	I		
44	EVO	ALETOUT	0		ALERT TONE OUT
45	IRQ2	805INT	I	F	FX805 INTERRUPT
46	IRQ1	PCHK	I	F	POWER OFF INTERRUPT
47	VDD	A+			MCU POWER
48	BP3		0		LCD COMMON SEGMENT 3
49	BP2		0		LCD COMMON SEGMENT 2
50	BP1		0		LCD COMMON SEGMENT 1
51	BP0		0		LCD COMMON SEGMENT 0
52	FP0		0		LCD SEGMENT 0
53	FP1		0		LCD SEGMENT 1
54	FP2		0		LCD SEGMENT 2
55	FP3		0		LCD SEGMENT 3
56	FP4		0		LCD SEGMENT 4
57	FP5		0		LCD SEGMENT 5
58	FP6		0		LCD SEGMENT 6
59	FP7		0		LCD SEGMENT 7
60	VSS				GROUND

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Ref. NO.	Type	Circuit Sign	I/O	Status	Operation
61	FP 8		0		LCD SEGMENT 8
62	FP 9		0		LCD SEGMENT 9
63	FP 10		0		LCD SEGMENT 10
64	FP 11		0		LCD SEGMENT 11
65	FP 12		0		LCD SEGMENT 12
66	FP 13		0		LCD SEGMENT 13
67	FP 14		0		LCD SEGMENT 14
68	FP 15		0		LCD SEGMENT 15
69	FP 16		0		LCD SEGMENT 16
70	FP 17		0		LCD SEGMENT 17
71	FP 18		0		LCD SEGMENT 18
72	FP 19		0		LCD SEGMENT 19
73	FP 20		0		LCD SEGMENT 20
74	FP 21				
75	FP 22				
76	FP 23				
77	FP 24				
78	FP 25				
79	FP 26				
80	PE7	160CS	0	L	X25160 CHIP SELECT

1.4.5 OPERATION PROCEDURE

1) Remove the cover box and make sure equipment's configurations and external feature.
2) Check to charge the battery pack fully.
3) Screw and insert the small helical antenna in the top of your radio.
4) If the volume switch turn the clockwise direction (CW), turn on radio power.
5) Press and hold the monitor switch [MON] for 2 seconds. Then watch receive lamp lighting on.
6) Set the volume level as turning the switch CW or CCW. And set squelch volume switch turn to CW, until the white noise doesn't go off.
7) Press the monitor switch again.
8) Press and hold the PTT switch and make sure of hearing switch-on signal and lighting on the TX lamp.
9) Finally, check the empty channel and start the radio operation.

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