1.4.1 FEATURE AND OPERATION

1) Power/Volume 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.

2) Antenna Connector

A connector for small whip 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) Program 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 ID and 5-tone.

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 monitor On/Off. 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. This monitor feature can be disabled by PC programmer.

16) Call Switch [CAL]

Using for calling the other user in 5 tone call mode.

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) Switching High and Low RF output : FUN sw + ▼ [H.L]

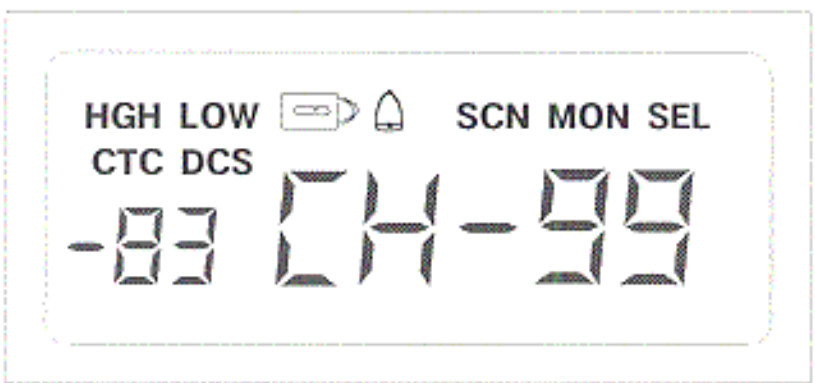
b) Front Switch lock or unlock : FUN sw + SCN sw[ ]

c) Alarm On/Off : FUN sw + MON sw[ ]

d) Switching to/from 5 tone call and general mode : FUN sw + CAL sw[#]

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

. [CTC], [DCS] :indicates the current channel using CTCSS or CDCSS

. [ ] :indicates front panel switch lock

. [ ] :indicates alarm ON/OFF

. SCN :indicates scan mode

. MON :indicates monitor mode

. SEL :indicates 5 tone call mode

. 83 :indicates channel number of CTCSS or CDCSS. This has 83 codes and that has 38 frequencies

. CH-99 :indicates 99th channel is selected

. UL	:indicates certain channel is UnLocked
. UNLOCK	:indicates UNLOCK in 5 tone call mode
. 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)
. SL-99	: program mode for scan list
. PR-99	: program mode for priority channel

1.4.2 SPECIAL FEATURES

1) To input frequencies 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.

2) 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.

3) 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.

4) 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.

5) Transmit time out and penalty time

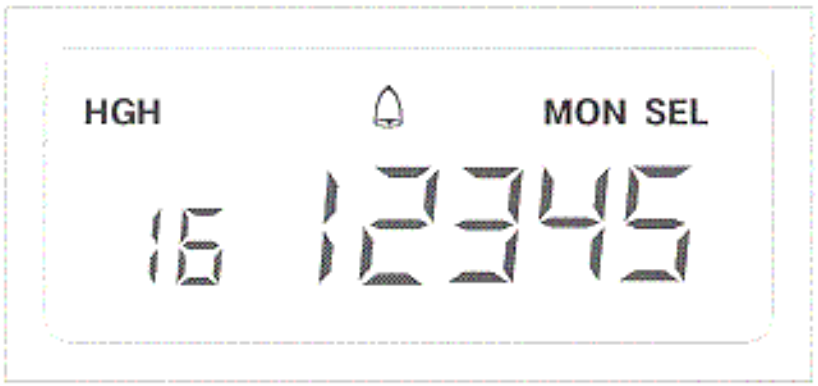
In order to prevent long-time transmission, transmit time out feature can be used. When time of transmission exceeds the limitation, the radio is automatically switched to receive mode. Further more, penalty time, which makes the radio not to transmit for pre-defined time period, can be applied. Transmit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

6) DTMF transmission

Whenever you press the TX button, your radio transmits its own number of 4 digits with DTMF signal. This function can be programmed by PC.

1.4.3 5 TONE CALL MODE

This is a mode to call party's identity by transmitting 5 kinds of tones in each digit. All PRC-400 radio have their own receive number and it is possible to call normal or group call. As Pressing function key(FUN), press call switch(CAL) at a time, then the radio can be 5 tone mode and LCD display like the following:



SEL indication at right top of LCD means 5 tone calling mode. Two digits number displayed in small font at left is memory number. 5 digits number in large font represents party's ID number included in the memory. Accordingly, the above example shows a calling number,'12345' and stored number,'16'. You can set and modify these numbers by PC programmer or front panel key.

1) Switch operations in 5 tone calling mode

. selecting memory number : ▲ ▼
. switching monitor : MON switch
. calling/stand-by : CAL switch
. memorize call number : SCN switch [#]

2) Switch operations in call number memory mode

. change number : ▲ ▼
. input changed number : MON switch [SET]
. quit memory mode : CAL switch [ESC]
. move prior digit : SCN switch [#]

3) Calling procedure

a) Select a stored party's ID number by using ▲ ▼ switch. Memory number without ID number is displayed '------' on LCD and then it is not possible to call.

b) Press monitor switch (MON) to go into the entry mode from stand-by mode. LCD display 'CAL' message.

c) After confirming whether the channel is empty or not, press call switch for transmitting. If pressing call switch at stand-by mode, audible alarm goes off and the radio goes into monitor mode.

d) When channel is linked, operate as same way as a conventional radio. After communication press call switch to go stand-by mode.

4) automatic reset

After switched to the entry mode, if there are no transmitting or receiving signals in a pre-defined time period, the radio is changed automatically to the stand-by mode. An audible alarm goes off for about 5 seconds before the end of that time. You can set time for limitation by PC programmer.

5) Busy channel lock out(BCLO)

Such as in the conventional mode, when certain channel is engaged, this feature restrains users from transmitting in that channel. User can select this feature by PC programmer.

6) ANI transmission for 5 tone

Whenever you press the TX switch, your radio transmits its ANI number of 5 digits. It is possible to select this feature or set ANI number by PC programmer.

7) Memorizing calling number procedure

a) Select the number of memory for being stored or modified by using ▲ ▼ switch.

b) When press the scan switch, first digit is blinking. Then select desired number by using ▲ ▼ switch. After '9', character 'A' means group.

c) When press the monitor switch [SET], second digit is blinking. The selection of desired number is as same as preceding method. Then press monitor switch. If some mistake occurs in prior digit, you can correct by scan switch [#].

d) When setting of 5 digit-number is done, the number is memorized in memory then calling number memory mode is complete.

e) In process of setting number, pressing CAL switch makes quitting calling number memory mode and displaying prior number.

8) Group calling

Character 'A' in calling number means group, and is representative of all number in 0~9 at that digit.

So,

1030A calls number from 10300 to 10309

103AA calls number from 10300 to 10399

A0305 calls 10 numbers, which have 0305 in the last 4 digits

(for example 00305,10305,20305...)

AA305 calls 100 numbers, which have 305 in the last 3 digits

(for example 00305,10305, 99305,...)

AAAAA calls all numbers (00000 ~ 99999)

1.4.4 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/CDCSS

You can set CTCSS or CDCSS data in each channel. CTCSS has 37 EIA standard codes and a 97.4Hz code. And CDCSS has 83 Motorola compatible codes. Especially in CDCSS, positive and negative codes can be selected. Each code is referred to following frequency and code table.

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

d) Scan timer

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

f) User's Definition of Scan list and Priority channel

This feature can be selected by switch operation on the front panel if wish.

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

These are two types of conventional and Kukjae type you can select. In conventional type, you can

set 4 digits by using 10 numbers (0~9) and 6 characters (A,B,C,D,*,#). And you can set 5 digits from 00000 to 20975 in Kukjae type.

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.

9) 5 tone selective calling

Can select 5 tone selective calling feature or not.

1.4.5 EEPROM VARIABLES IN 5 TONE CALLING MODE

1) Setting tone type

Besides 8 standard tones, you can set user-defined tone type.

2) Setting ID number

Can store party's ID number to memory number from 1 to 99. Also, user can store this memory region by switch of the radio.

3) Setting tone length

Length of all 5 tones can be set from 20ms to 1200ms in a 1mS step.

4) LEAD-IN DELAY time before 5 tone calling

Can be set from 0mS to 2550mS in a 10mS step.

5) 5 Tone ANI

Can select 5 Tone ANI mode or not. User can select between user's own receiving number and certain number.

6) LEAD-IN DELAY time before 5 tone ANI

This feature can be set from 0mS to 2550mS in a 10mS step.

7) Setting own receive number

Can be set own receive number of radio.

8) Busy channel lock out(BCLO)

When receive channel is engaged, user can inhibit from calling and transmitting.

9) Automatic reset

Can be set from 1mS to 255mS in 1mS step.

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1.4.6 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

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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	F	5-TONE SIGNAL INPUT
43	PC4	BAT CHK	I	L	LOW BATTERY CHECK
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

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1.4.7 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 whip 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.