

FRS 3000-PK

SERVICE MANUAL

2-WAY RADIO, Base Station

OCTOBER 19, 2001

1. GENERAL

1.1 GENERAL

This equipment, FRS 3000-PK is called 2 way portable handheld radios. The frequency range is 462 ~ 467MHz, UHF operating Channels for international 2 way radio. Also it has a 38 CTCSS feature to get the clear communication without interference. FRS 3000-PK has 10 NOAA weather channel and weather alert feature.

1.2 CHARACTERISTIC

- a) All active device in this radio is composed of semiconductor and high density IC.
- b) To design this radio in compact and weight approximately 140g
- c) CPU of this equipment is H8/3802 from HITACHI
- d) It's power can operate by use of Adaptor

1.3 COMPOSITION

This radio is composed of following.

- a) Transceiver (W/Antenna)
- b) Belt clip

2. SPECIFICATION

2.1 GENERAL SPECIFICATIONS

- a) Frequency range : 462.5625 ~ 467.7125 MHz
- b) Output Impedance : 50 Ω Unbalanced
- c) Modulation Type : 9K0F3E
- d) Communication Mode : Half duplex
- e) Channel Capacity : 14 channel
- f) Channel Spacing : 12.5 KHz
- g) Power : 9.0V Adaptor
- h) Operating Temperature : -20°C ~ +60°C
- i) Dimension : 128(H) x 155(W) x 50(D)
- j) Weight : 140g

2.2 ELECTRICAL SPECIFICATION

a) TRANSMITTER

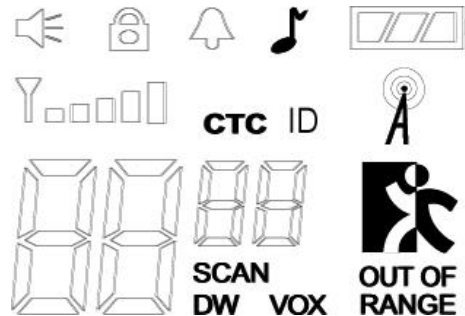
- 1) Output power : Max . 500mW
- 2) Frequency Stability : ± 2.5 ppm(-20°C ~ +60°C)
- 3) Modulation Method : FM
- 4) Oscillation Method : PLL SYNTHESIZER
- 5) Max. Frequency Deviation : $< \pm 2.5$ kHz (with tone)
- 6) Cooling Method : air-cooling Method
- 7) Spurious Emission : < -60 dB
- 8) FM Hum/Noise : > -40 dB(1kHz 60% modulation, w/CCITT)
- 9) Distortion : $< 5\%$ (1kHz 60% modulation)
- 10) Tx Audio Response : 6dB / OCT ± 3 dB Pre-Emphasis(300Hz ~ 3kHz)

b) RECEIVER

- 1) Receiver Method : Double Super Heterodyne
- 2) Receiver Sensitivity : $< 0.28\mu\text{V}$ (12dB SINAD) : > -118 dBm
- 3) Squelch Sensitivity : -120dBm ~ -130dBm(AUDIO On/Off Point)
- 4) Bandwidth : > 8 kHz (6dB ATT point)
- 5) Selectivity : < -60 dB (12.5kHz)
- 6) Local Frequency Stability : ± 2.5 ppm(-20°C ~ +60°C)
- 7) Spurious Response : > 45 dB
- 8) Audio output : 200mW (Internal 8 Ω load THD 10%)
- 9) Distortion : $< 5\%$ (1kHz 60% Modulation)
- 10) RxAudio Response : 6dB/OCT +1/-10dB De-Emphasis(300Hz~2.5kHz)
- 11) S/N Ratio : < 40 dB(1kHz 60% Modulation)
- 12) IF : 1'st IF --- 21.7MHz
2'nd IF --- 450kHz
- 13) Local Frequency : 1'st Local Frequency --- fc - 21.7MHz
2'nd Local Frequency --- 21.250MHz

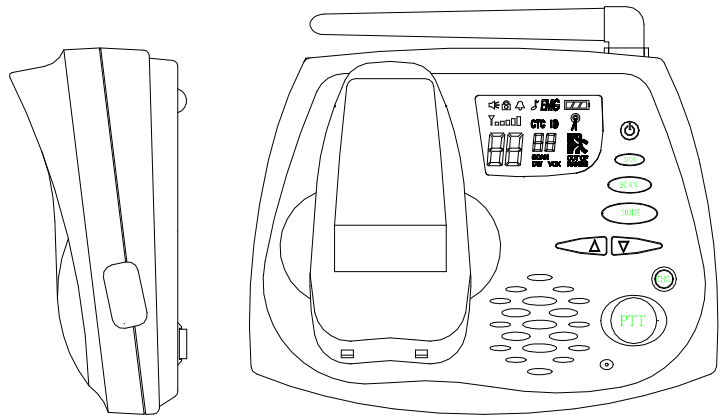
3. OPERATION

3.1 ICONS on LCD



- 1) Monitor indicator : Appears when the CTCSS isn't in use and squelch is open.
- 2) Key lock indicator : Indicates that the key lock function is in use.
- 3) Beep ON/OFF indicator : Appears while key tone is in use.
- 4) Roger On/Off indicator : Appears while Roger tone is in use.
- 5) Receive signal indicator : Appears when receiving signal or squelch noise is existing.
- 6) ID indicator : Appears when the ID function is in use.
- 7) Weather mode indicator : Icon will be on steady when in the weather band mode. The Icon will blink in every 2 seconds when in the FRS mode with the alert active.
- 8) Channel readout : Shows the current channel number.
- 9) CTCSS readout : Shows the operating CTCSS frequency or code.
- 10) SCAN indicator : Indicates that scan is enabled.
- 11) CTCSS indicator : Appears when the CTCSS function is in use.
- 12) Dual Watch indicator : Appears when the Dual Watch function is in use.
- 13) Out Of Range indicator : Appears when the Out Of Range function is in use.
- 14) VOX (Voice Activated Transmit) Indicator : Turning on the power while pressing PTT button activates VOX function.

3.2 Key Function



- 1) PTT switch : Push and hold to transmit ; release to receive.
- 2) Monitor : Press and hold this key for over 2 seconds to enable the receive CTCSS feature.
- 3) Up/Down key : In the stand-by mode, Pressing this button will increment or decrement the listening volume. When in function edit mode, this button will be used to adjust the unit.
- 4) Scan / Lock key : Push this key to momentarily to enable or disable the scan. Press and hold this key for over 2seconds to lock or unlock keypad.
- 5) Charger key : This base station is set up in charge protection mode to prevent Alkaline batteries in the handset from being charged by mistake. Once the charger key is pressed, this radio begins to charge the Ni-MH batteries in the handset. When the button is pressed once again, the batteries is not charged anymore.
- 6) Mode (Function) key : Push to select the following function setting mode.

Brief press mode : 1'st press – Channel ,
2'nd press – CTCSS,
3'rd press – VOX level,

4'th press – Dual Watch Channel,
5'th press – Roger On/Off,
6'th press – Beep On/Off,
7'th press – Out Of Range On/Off,
8'th press – ID,
9'th press – Alert On/Off,
10'th press – Call

Long press mode : The radio goes to weather radio.

- 8) Speaker / Microphone
- 9) External DC power jack : 9V DC adaptor should be used for power supply and charging the battery
- 10) HAND Chager Teminal : This is used for charging handset batteries.
- 11) LCD (Liquid Crystal Display)
- 12) Transmit / Receive indicator : When receiving an incoming signal, the LED indicator will light green, and while the PTT button is pressed, the LED will light red. These LED's are used for backlighting as well.

3.3 Function display



Monitor Indicator: Icon appears when the monitor button is pressed and the channel monitor function is activated.



Key Lock Indicator: Icon appears when the keypad is locked. This function disables keys such as channel up/down and mode.



Signal Strength Indicator: Icon appears when a signal is being received. The Icon consists of five bars to indicate the received signal level.



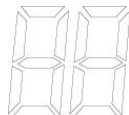
Beep Tone Indicator: Icon appears when beep tone confirmation tone is selected. Icon disappears when tone is off.



Roger Beep Tone On/Off Indicator: Icon appears when the roger beep tone is selected. Icon disappears when tone is off.



Battery Level Indicator: Icon indicates the battery charge level.



Large Segment Display: Indicates the channel number in use.

ID

Caller ID Indicator: Icon appears when caller ID function is turned on. Icon disappears when the function is off. This works with small segment display.

CTC

Coded Tone Controlled Squelch System(CTC) Indicator: Icon appears when the CTCSS tone function is active.



Small Segment Display: Displays CTCSS tone option in the channel from 00 to 38, and also displays the caller ID number(01-10) when caller ID function is

SCAN

Scan Indicator: This function allows users to scan a channel to search for a valid signal.

DW

Dual Watch mode Indicator: Icon appears when dual watch mode is active.

VOX

Voice Activated Transmission (VOX) Indicator: This function allows handsfree conversation. The Icon appears when the VOX mode is activated.



Out of Range Alarm Indicator: When this function is active, Icon blinks the receiving signal is getting weaker. The Icon stops blinking when the receiving signal comes back to the normal strength.



Weather Mode Indicator: Icon will be on steady when in the weather band mode. The icon will blink when in the GMRS mode with the alert active.

3.4 SETTING AND OPERATION

In order to communicate with other FRS units, both you and the receiving party must be on the same channel.
FRS 3000-PK has 14 channels indicated by the large digits on the LCD display panel. Before trying to transmit on the selected channel, you should press the Monitor Button to check the activity on that channel. If someone is already on the selected channel, you should try another channel that is clear

1) On/Off & Volume control Switch

Radio ON : Press the power button at least for 2 seconds. You will hear confirming melody to indicated the unit is on.

Radio OFF : Press the power button at least for 2 seconds.

Volume setting : Press up[*] or down[] button to adjust a level that is most comfortable for you while monitor is active.

2) Setting the Channel and Tone Code(CTCSS)

FRS 3000-PK has 14 main channels and 38 sub-channels.

* 14 Frequency channels

* 38 CTCSS Code (indicated by CTC icon on the LCD)

To select the channel

- * Turn the radio on.
- * Press MODE button once, [XX] digit will blink on the LCD. XX is a channel.
- * Press up[*] or down[▽]button to choose the channel.
- * Press the PTT button or MODE button to confirm.

To set the tone codes(CTCSS)

- * Press MODE button once more, [XX 00 up to 38] will appear and CTC icon and tone code digit will blink on the LCD. "00" means no CTCSS code.
- * Press up[*] or down[▽]button to choose the desired sub-channel to use.
- * Press the PTT button or MODE button to confirm.

NOTE : To communicate with other FRS units, they must be switched to the same channel and CTCSS sub-code. To communicate with other GMRS units that do not have sub-codes, switch your unit to the same channel with the sub-code set to OFF.

3) VOX (Voice Operated Switching)

This option enables you to have hands-free conversation. You do not have to operate the PTT button each time when you want to transmit.

You can also choose the VOX sensitivity so suit your environment of operation.

(Ex : noisy road, motor bike, factory etc.)

To Set the VOX mode

- * Press the MODE button until the [U oF Or XX] appears. XX is a vox level
- * VOX icon will be appeared on the LCD.

To Set the VOX level

- * Press the up[*]button or down [▽] button to set the VOX level from 1 to 5.
 - "oF" is disable the VOX function.
 - "01" is least sensitive.
 - "05" is most sensitive.
- * Press the PTT button or MODE button to confirm.

4) Setting the DW (dual watch)**To set the DW mode**

- * Press the MODE button until the [oF of 01 up to 15] and DW icon blink on the LCD.
- * DW icon will appear on the LCD.

To set the dual watch(DW) channel

- * Press the up[*]button or down [▽]button to choose the channel.
 - "oF" means no DW mode.
 - "01 up to 15" means the channel that is dual-watched.

* Press the PTT button or MODE button to confirm.

5) Roger tone

This feature will give the tone signal to other parties when transmitting finished (when PTT button is released.)

To activate or disable the Roger tone

* Press the Mode button until [**rb on** or **oF**] and the **roger** icon blink on the LCD.

* Press the up[*]button or down[]button.

* Press the PTT button or MODE button to confirm.

6) Beep tone

To set the beep tone

* Press the Mode button until [**bP on** or **oF**] and the **BELL** icon blink on the LCD.

* Press the up[*]button or down[] button.

* Press the PTT button or MODE button to confirm.

7) Setting Out of Range

To set the Out of Range

* Press the Mode button until [**ir on** or **oF**] and the **Out of Range** icon blink on the LCD.

* Press the up[*]button or down[]button.

* Press the PTT button or MODE button to confirm.

8) Setting ID code

To set the Caller ID

- Press the MODE button until the ID Icon and small segment display blinks.
- Then press the Up or Down button to select the desired ID number from 01 to 10. “**oF**” means no ID mode.
- Press the PTT button or Mode button momentarily to confirm the ID number.

** When a signal is received from the radio where the one Caller ID is selected, the radio that is receiving the signal displays the Caller ID number of the transmitting radio.

9) Weather alert setting

To set the Weather alert receiving mode

- * Press the **MODE** button until the [**AL on** or **oF**] blinks
- * Press the up[******]button or down [**□**]button to set the alert function.
- * While the alert is ON, **weather icon** will blink both in FRS and weather mode.
- * **Weather icon** will stop the blinking on the LCD when the alert is OFF.

** While the unit is FRS mode, if the alert signal is received, the unit will set to Weather Radio mode automatically and warning beep tone will generate.

** While the unit is in Weather mode, if the alert signal is received, the unit will generate the warning beep tone.

10) Call Ringer Selection Mode

This feature Provides 3 user selectable call ringer signal.

To set your favorite call ringer signal.

- * Press the **MODE** button until the [**C 01** or up to **03**] appears on the LCD.
- * Press the up[******]button or down [**□**]button to select the call melody type.
- * Press the **PTT** button to confirm.
- * To activate the call, click the “**PTT**” button twice quickly.

11) Transmitting

- * Press and hold the **PTT** button (The LED on the right lights red during transmission.)
- * Speak slowly and clearly
- * To Stop the transmission, release the **PTT** button.
- * if there are no more receiving signal for 5 seconds, the unit will go into power save mode.

12) Receiving

The Coding feature reduce the possibility of interference and provide enhanced Communication. You can only listen to a call that has correct matching code.

** Upon receiving a signal, the LED lights green. When radio is on CTCSS mode and then a signal that has different CTCSS code on the same channel is received, the LED blinks in green.

Important :

Before transmitting or receiving to the other parties

- * Correct channel is selected (1 to 14) and
- * Correct code is set (00 to 38)

13) Channel Scanning

This feature allows you to monitor all activated channels while scanning.

To activate the Scan

- * Press the **SCAN** button
- * Radio will begin scanning.
- * When in scan mode, the display will show each scanning channel.
- * After an activated channel is scanned and received signal and then if there is no more signal, the scan will resume automatically

** Once a channel has been scanned, pushing the monitor button makes the radio resume the scanning with the scanned channel skipped.

14) Call

- * Click the PTT button twice quickly.

15) Monitoring the Channel

It is used for listening the weak signal or to hear all activities on the channel by Manually overriding channel sub tone code setting.

To activate the monitor feature

- * Press and hold the **“MON”**(monitor) button for over two seconds.
- * When you hear the sound, release the **“MON”** button.
(The monitor icon will appear on the LCD.)

To disable the monitor feature

- * Press and hold the **“MON”**(monitor) button for over two seconds.
(The monitor icon will disappear on the LCD.)

16) Keypad Lock

The lock function is to avoid the accidental changes to channel with other radio settings. All buttons will be locked except the Power, PTT, Monitor, Charger and Volume UP/Down.

To lock the keypad

- * Press and hold the **“SCAN”** button for over two seconds.
- * Keypad will lock. (**LOCK** icon will appear on the LCD)

To disable the monitor feature

- * Press and hold the “**SCAN**” button for over two seconds.
- * Keypad will unlock. (**LOCK** icon will disappear on the LCD)