C112E

VHF Handy Transceiver

OWNER'S MANUAL

Thank you for purchasing the Model C112 VHF FM Handy Transceiver for the 144 MHz VHF band.
Our very strict quality control and inspection ensure that each transceiver unit leaves the factory in perfect condition. However, if your transceiver does not operate properly or if you feel any difficulty in operating it, please immediately contact the dealer you purchased your transceiver unit.
To obtain maximum performance and extended service life from the transceiver, please read these instructions carefully.
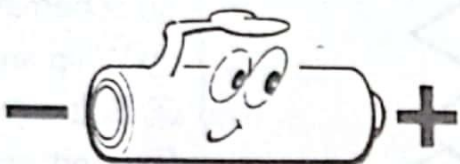
CONTENTS

PRIOR TO USAGE Prevent me from the following.

1. Be sure to observe the +/– polarity of batteries.

2. Do not touch cores or trimmers. They are aligned at best condition.
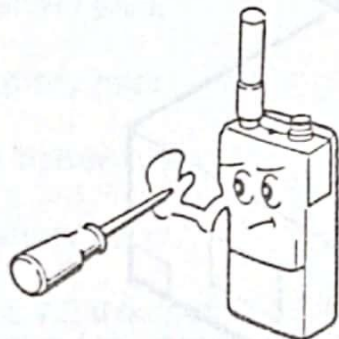
3. Keep out of high temperature, humidity and dust.
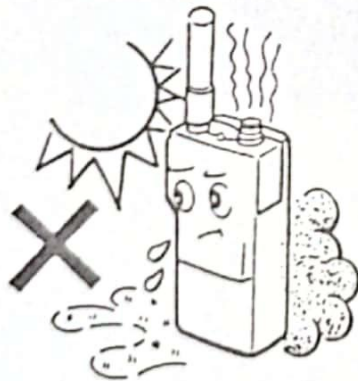
4. Do not use a 24 V battery.

Never.

24V

6~16 V
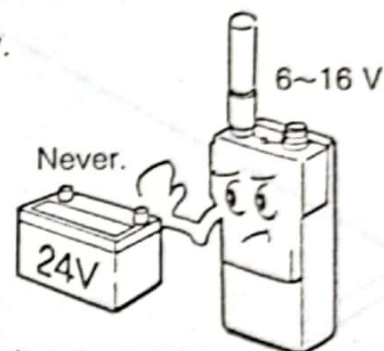
5. Do not use old and new batteries together.
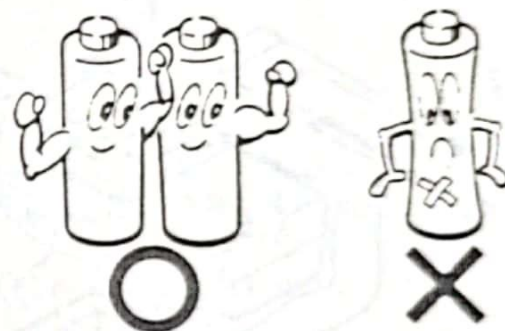
6. Do not dispose of batteries in fire.

Confirm that followings are included.
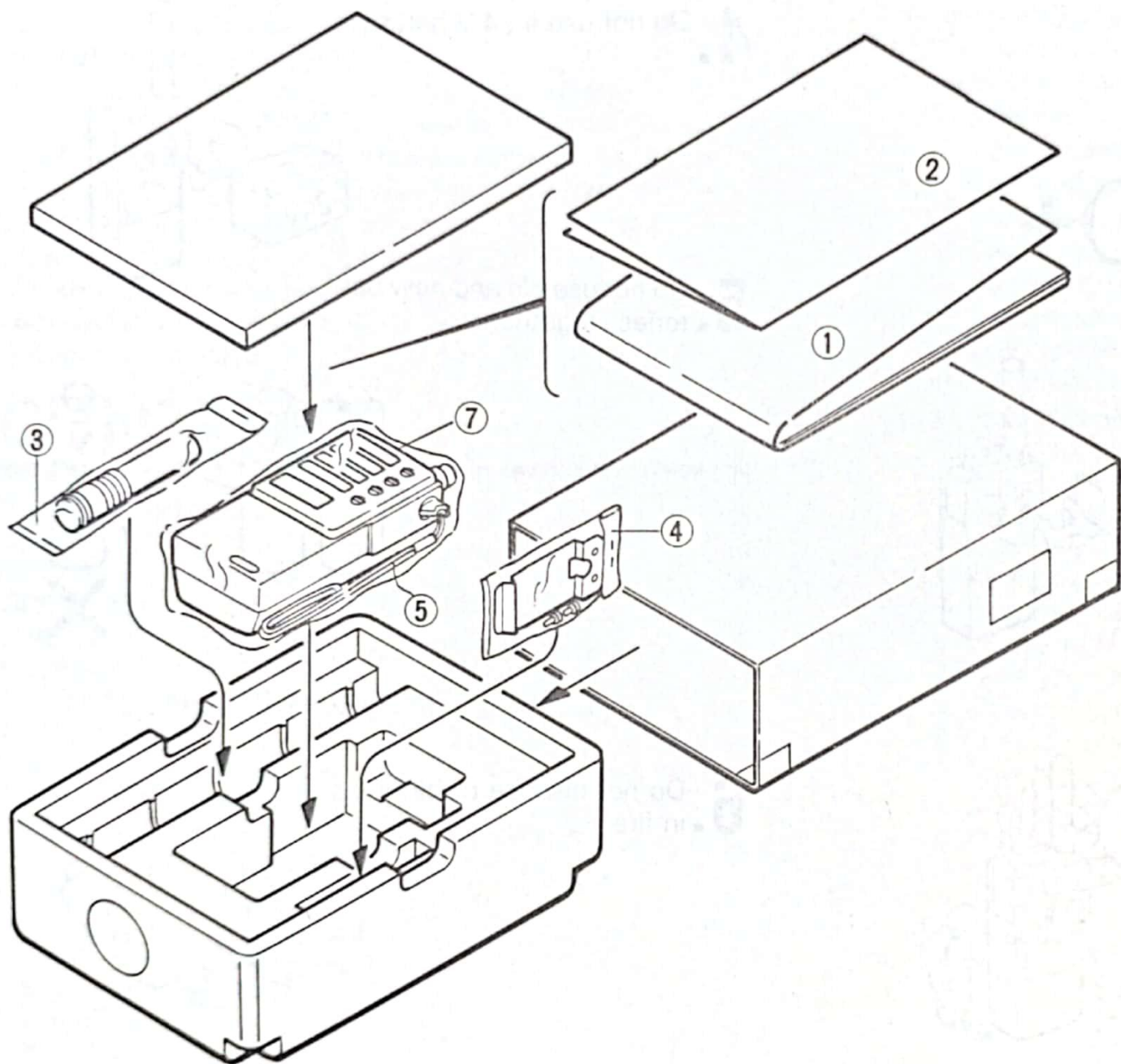
Supplied Accessories

1. Owner's Manual
2. Schematic diagram
3. Whip antenna
4. Belt clip
5. Hand strap (installed on the body)
6. Battery case (for six SUM-3/ R6/'AA'-size batteries)
7. Waterproof cap (installed on the body)

③ ⑦ ④ ⑤ ② ①

OPTIONAL ACCESSORIES

A variety of options are available to luxuriate the C112.
For correct use of these options, please read each owner's
manual carefully.

CKP412: Keypad

CTD412: DTMF unit (Touch-tone unit)

CTN412: CTCSS unit (Tone squelch unit)

CNB412: Compact rechargeable battery pack

CNB413: Standard rechargeable battery pack

CNB414: High-power rechargeable battery pack

CNB415: Long-life rechargeable battery pack

CWC150E : AC Charger (230 V input, 7.2 V output)
(for use with CNB412, CNB413, CNB415)

CWC151E : AC Charger (230 V input, 12 V output)
(for CNB414)

CSA150E : Desk Top Charger (Quick charger)

CCA412: Charge adapter

CMC150: Mobile charger (for CNB412, CNB413, CNB415)

CMB111: Mobile bracket

CLC412: Soft case

CMA412: Mobile adapter

CBT412: Battery case (for six SUM-3/R6/'AA'-size batteries)

CMP111: Microphone & speaker combination

CHP111: Headset with PTT switch

CMP112: Compact microphone & speaker combination

OPERATION OF CSA150E DESKTOP CHARGER

● How to use the CSA150E option

(1) The CSA150E can be used with several types of recharge-able battery packs by changing the partition plate position according to the model of rechargeable battery.
Before recharging the battery pack, refer to the table on the right and place the partition plate to the correct position for your rechargeable battery pack.

(2) Partition plate insertion position markings
[The positions for inserting the partition plate are marked with the alphabets.]
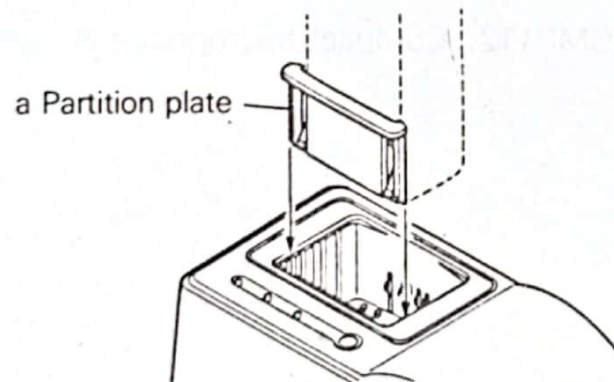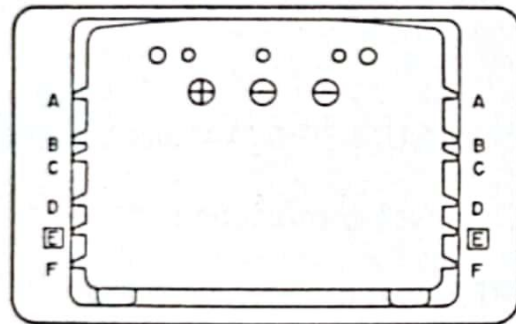
a Partition plate

Partition plate insertion position

a Battery Pack
b Unit Combination in Charging
c Battery pack alone
d With transceiver body (without CKP412 Keypad)
e With transceiver body (including CKP412 Keypad)

(3) Insert the battery pack section of C412 into the par-titioned socket of CSA150E, with the rear of battery pack (where there are charging terminals) facing backward as shown in the illustration.
The green LED charge indicator will light.

a Lights ON.
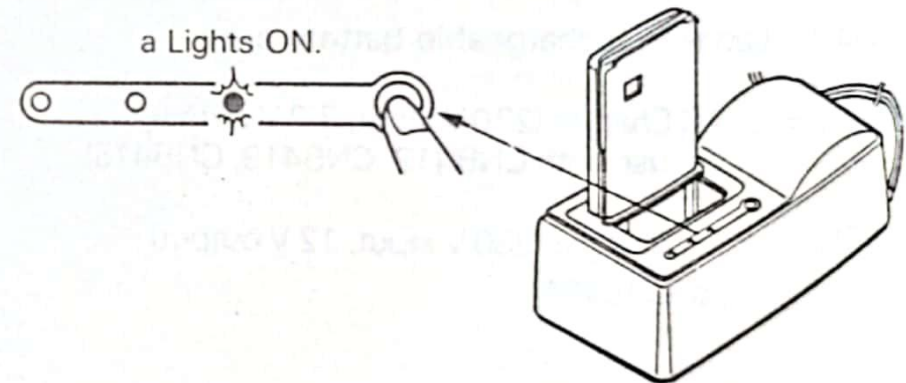
Caution
1) **When charging, be sure to switch the transceiver power OFF.**
2) **Do not operate the transceiver during charging, or malfunction will result.**

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FEATURES

Very compact, simple and heavy-duty design.

o The size is so compact that it can slip into a breast pocket: 110(H) × 53(W) × 25.5(D) mm when the CNB412 Compact rechargeable battery pack is installed, 110(H) × 53(W) × 32.5(D) mm when the standard battery case (for six SUM-3/R6/'AA'-size batteries) is used.

o Weight: 350 g (including 6 batteries and antenna).

Output power is switchable in 3 steps up to 5 W.

o The maximum output power attains more than 5 W (at 13.8 V) when the High-power rechargeable battery pack (CNB414, optional) or Mobile adapter (CMA412, optional) is installed. The output can be switched to 3 steps of Hi, Mid and Low, allowing the save the battery power according to the communication condition.

Simple operation with only 4 keys on the front panel.

o Even power can be switched ON/OFF by a touch of a key.

o 4 operations of power ON/OFF, CALL (Channel Call), MR (Memory Recall) and MS (Memory Scan) are available by one touch of a key. A function switch allows special operations including the repeater operation, memory writing and lamp ON/OFF.

o The Set mode allows to set the repeater offset frequency, CTCSS unit ON/OFF and channel step.

o In the Repeater mode, the CTCSS unit may also be used as the tone encoder. (CTN412 is installed.)

Auto squelch with simple operation.

o The auto squelch makes manual squelch adjustment unnecessary. (CTN412 is installed)

High-sensitivity design.

o Our traditional, approved design achieves a high sensitivity of −10 dBμ. (0.158μV)

Max. 20-channel memory.

o According to the applications, frequencies can be stored in two groups of memory each containing 10 channels.

o For each of 10 of the 20 channels, a repeater offset frequency and tone frequency can be stored in addition to the channel frequency.

One-touch unsquelching.

o Pressing the Squelch OFF switch once turns squelching off allowing to listen to weak signals. Pressing the Squelch OFF switch again turns squelching on.

o In the Repeater mode, reverse operation is automatically activated and squelching is turned off.

An optional tone squelch unit can be built into the unit.

Battery power-save design.

o The battery-save feature prolongs the battery life more than twice by reducing the current drain during receiver standby to as low as about 18 mA. The current may of course be turned off when not required for example in case of packet communication. The battery loss is also reduced by switch-

able output power to Hi (5 W), Mid (2.5 W) or Lo (0.3 W) according to the communication condition.

Busy/TX/battery indicator.

o The 2-color LED lights green during reception and red during transmission.
o The red lighting dims as the batteries are exhausted, thereby indicating the battery replacement timing.

Wide variety of full-feature options.

o The Keypad option (CKP412) turns the C412 into an ultra-multifunction unit with full-keyboard operation, and the DTMF unit option (CTD412) adds advanced paging and code squelch features.

Various upgrading features.

(1) Paging feature allows to identify the other party.
(2) Code squelch feature for individual calling.
(3) Duplex feature.
(4) Channel display feature.
The memory frequencies may be displayed as channel numbers from C-00 to C-19. By recalling them using the rotary encoder, simple operation based only on memory is possible.
(5) Auto-power OFF timer setting feature.
The off time may be set to up to 120 minutes in 10-minute steps. The initial value is 550 minutes.

(6) Battery save timer setting feature
The timer may be set to up to 9 seconds in 1-second steps. "0" turns the battery save feature off.
(7) Scanning.
The MHz band is pause-scanned.
(8) Lamp lock.
(9) Buzzer ON/OFF.
(10) Clock feature.
A 24-hour clock feature can be added. The clock is backed up even after the power is switched off.
(11) On-timer feature.
The transceiver can be switched on at the same time of every day, which is convenient for a fixed-time communication. Automatic ON/OFF of the transceiver is also possible by combining the auto-power OFF timer feature.

PREPARATIONS

1. Install the supplied antenna.
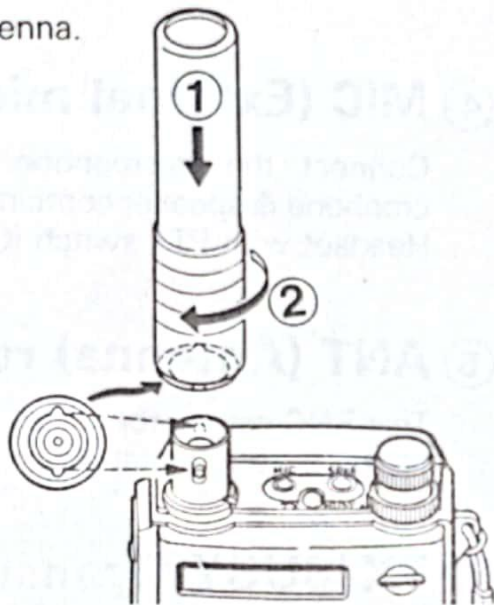
2. Remove the battery case from the main body.
1) Slide the lock button in the direction of the arrow.
2) Separate the battery case in the direction of the arrow.
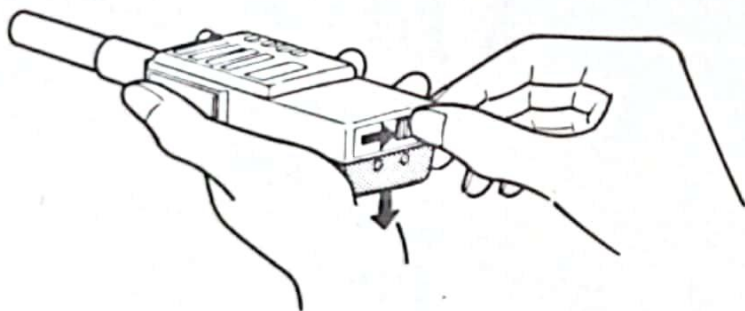
3. Open the battery case and load six SUM-3 (R6 or 'AA'-size) or LR6 batteries in it. First insert 3 batteries on the side of metal hardware shown below, then insert other 3 batteries. Be sure to observe the proper polarity.

a Metal hardware
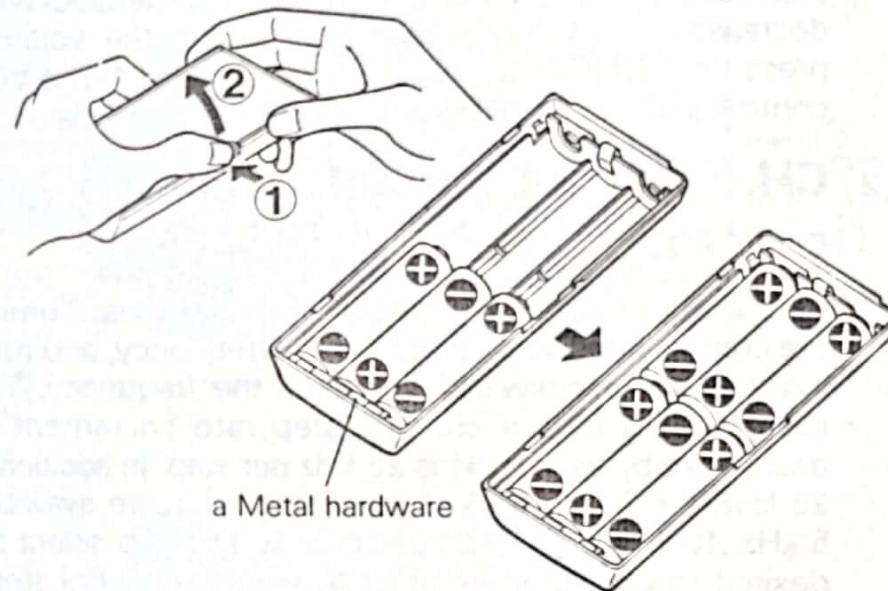
4. Mount the supplied belt clip using the 2 screws.
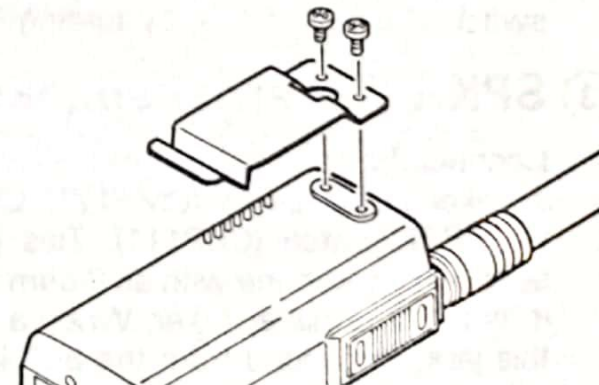
NOTE: The antenna design may differ on the product specifications.

5. After loading batteries, close the battery pack and install it on the C112 main body.

7. Set the frequency by turning the CH selector knob.

down   up

6. Press the power ON/OFF key to ON and adjust the sound volume by turning the VOL control.

up
down
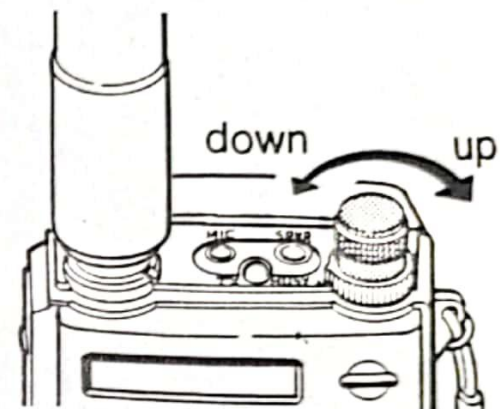
8. To transmit, press the PTT (Push-To-Talk) switch on the side of the transceiver. To receive, release the switch.

off on
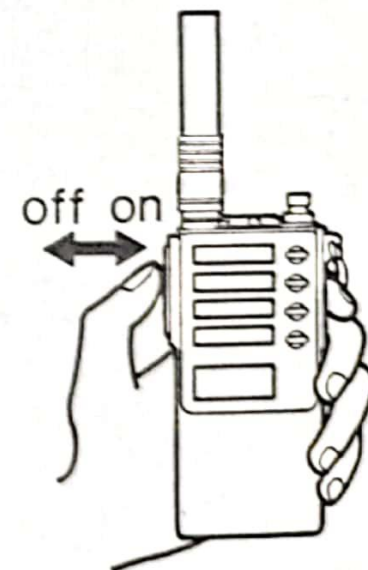
CONTROLS AND CONNECTORS
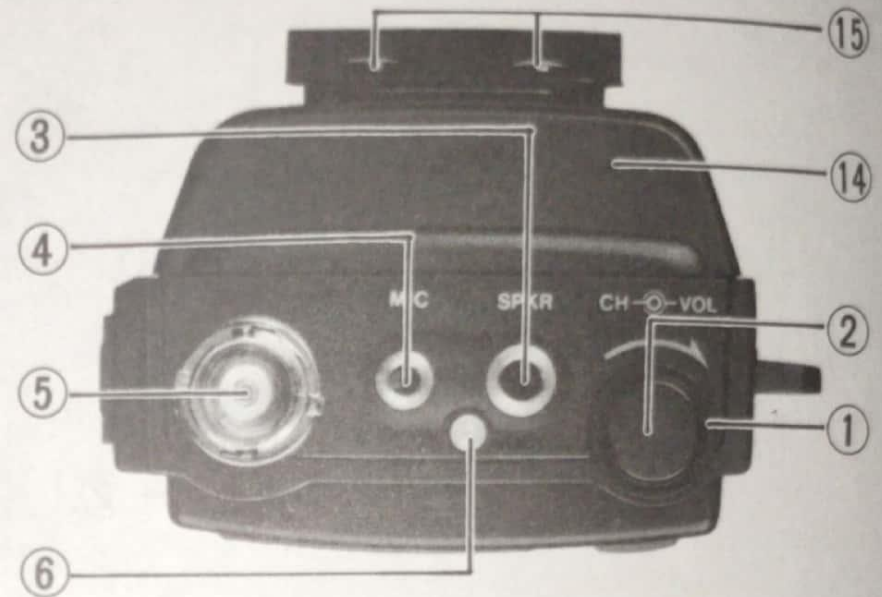
NOTE: Some parts shown in the picture may differ depeding on the product specifications.

Top Control Panel

① VOL (Volume) control

Sets the speaker volume. Turning the control clockwise increases the volume, and turning it counterclockwise decreases the volume. Before adjusting the volume, press the SQL OFF switch to turn squelch off. The VOL control also adjusts the volume of buzzer sounds.

② CH (Rotary Channel selector) control

Sets the transmitter and receiver frequencies. Turning the control clockwise increases the frequency, and turning it counterclockwise decreases the frequency. The initial setting of the channel step rate (increment or decrement by each click) is 25 kHz per step. In addition to 25 kHz, the following 5 channel step rates are available: 5 kHz, 10 kHz·12.5 kHz, 20 kHz or 50 kHz. (To select the desired channel step, refer to "Changing channel step" on page 35.) During transmission, the CH selector functions as the transmitter power switch, which can be switched to Hi- Mid-Lo by turning this control knob.

③ SPKR (External speaker) jack

Connect the speaker plug of the optional Microphone & speaker combination (CMP111, CMP112) or Headset with PTT switch (CHP111). This jack also accepts a speaker or earphone with an 8-ohm impedance for using it as the external speaker. When a plug is inserted into this jack, the sound from the built-in microphone is cut off.

④ MIC (External microphone) jack

Connect the microphone plug of the optional Microphone & speaker combination (CMP111, CMP112) or Headset with PTT switch (CHP111).

⑤ ANT (Antenna) receptacle

This BNC connector accepts the supplied helical antenna. Be sure to install the antenna securely.

⑥ TX/BUSY (Transmitter/Busy) indicator

The 2-color LED lights in red while signal is being transmitted, and in green when signal is being received. The red light will dim when the batteries are nearly exhausted.

Side Control Panel

⑦ FUNC (Function) switch

To perform special functions, hold down this switch and, without releasing the switch, press one of the operation keys.

⑧ PTT (Push-To-Talk) switch

Switches the transmitter and receiver operations. To put the transceiver in the transmitter mode, press this switch and, while holding the switch, talk into the microphone. To return it in the receiver mode, release this switch. If the optional Headset with PTT (CHP111) is used, press its PTT switch in place of this switch.

⑨ SQL OFF (Squelch off) switch

Press to unsquelch the receiver. As the C112 uses the auto-squelch system, it is not equipped with a Squelch control. Therefore, to check the squelch functioning, hold down this switch and listen to the sound from the speaker. When adjusting the speaker volume, press this switch to unsquelch the receiver beforehand.

⑩ Front operation keys

Ⓐ **ON/OFF/SET (Power ON/OFF, Set) key**
Press to turn the transceiver power ON/OFF, or to put it in the Set mode. To put the transceiver in the Set mode, hold down the FUNC switch and press this key.
The power switches OFF automatically when the batteries are exhausted.

Ⓑ **CALL/RPT (Call/Repeater) key**
Press for priority recalling of call frequency. Pressing this key while holding down the FUNC switch puts the transceiver in the Repeater mode.
If the CALL button is pressed while the PTT switch is held down, a 1750 Hz tone burst signal will be output. (C112E Only)

Ⓒ **MR/MW (Memory Recall/Memory Write) key**
Press to enter or cancel the Memory Recall mode in which memory frequencies are recalled. Pressing this key while holding down the FUNC switch puts the transceiver in the Memory Write mode, in which memory frequencies can be stored or changed.

Ⓓ **M.S/LAMP (Memory Scan/Lamp) key**
Press to activate memory scan or MHz scan, or to cancel the Scan mode. Pressing this key while holding down the FUNC switch lights the display illumination lamp. The lamp will be extinguished automatically in about 5 seconds.

Bottom Panel

⑪ Lock button

Locks the battery case. To remove the battery case, slide the button in the direction of the arrow on it.

⑫ Other

ⓐ **Speaker**

A dynamic speaker is built in. The speaker sound is cut off when an external speaker is connected.

ⓑ **Microphone**

A capacitor microphone is built in.
When transmitting, talk at 2 to 3 cm from the microphone.

⑬ Display

The display shows the following.
1. Frequency
2. Channel step rate (frequency step)
3. Special functions: PAG, C, SQ, DUP, F.L, TONE, SQL.
4. Memory address No.
5. Memory recalling
6. Scanning operation
7. Offset frequency
8. S meter and transmitter output
9. Tone frequency

⑭ Battery case

Accommodates six SUM-3 (R6 or 'AA'-size) dry cell batteries.

⑮ Belt clip mount holes

Insert two screws for mounting the supplied belt clip.

⑯ Waterproof cap

When an external microphone and speaker are not used, place the waterproof cap in their jacks.

OPERATION

Functions of Front Panel Keys

The operation keys on the front panel have the following functions. Proper operation is noticed by short high-beep sound, while improper operation is noticed by short low-beep sound.

Key	When pressed by itself	Combined with FUNC switch	In Set mode (combined with FUNC switch)
ON/OFF/SET	Power ON/OFF.	Sets Set mode.	Sets or cancels F.L.
CALL/RPT	Recalls calling frequency.	Sets/cancels Shift mode.	Recalls/cancels OFFSET and TONE.
MR/MW	Recalls/cancels memory frequency.	Writes/changes memory frequency.	Sets/cancels T.SQL. 1) Sets/cancel Shift operation and Encode mode. 2) When recalling Offet, recalls/cancels T.SQL-TONE
M.S/LAMP	Sets/cancels memory scan or MHz scan.	Turns display illumination ON-OFF. It is turned OFF automatically in approx. 5 sec. after ON.	Recalls/cancels frequency step rate.

Functions of Rotary CH Selector

	When pressed by itself	Combined with FUNC switch	During transmission
Normal	Varies frequency frequency in selected frequency steps.	Varies frequency in 1 MHz steps. (Can also be in 100 kHz steps when CKP412 is installed.)	Switches the transmitter output.
During Memory Recall	Recalls memory address No.	Recalls Group M or Group $\overline{M}$.	Switches the transmitter output.
During MHz Scan	Turning clockwise directs scanning toward higher frequencies, turning counter-clockwise directs it toward lower frequencies.	Turning clockwise directs scanning toward higher frequencies, turning counter-clockwise directs it toward lower frequencies.	
During Memory Scan	Turning clockwise directs scanning toward higher frequencies, turning counter-clockwise directs it toward lower frequencies.	Switches Group M and Group $\overline{M}$.	

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The proper operation, improper operations and special-function operations of transceiver are noticed by the following buzzer sounds.

1) Long high-beep: Notices proper completion of an operation or setting.

2) Short low-beep: Notices an invalid operation due to improper operation.

3) Short high-beep: Notices a valid key input operation.

4) Three short high-beeps (Beep-beep-beep): Generated by APO (Auto-Power OFF) operation.

5) Prr-prr-prr: Ringing sound generated when paging signal is received (when the CKP412 and CTD412 are installed).

The buzzer sounds are not generated while the VOL control is in the fully counterclockwise position.

Varying Transmission/ Reception Frequencies

Turning the Rotary CH selector clockwise (↷) increases the frequency upward, and turning it counterclockwise (↶) decreases the frequency downward.
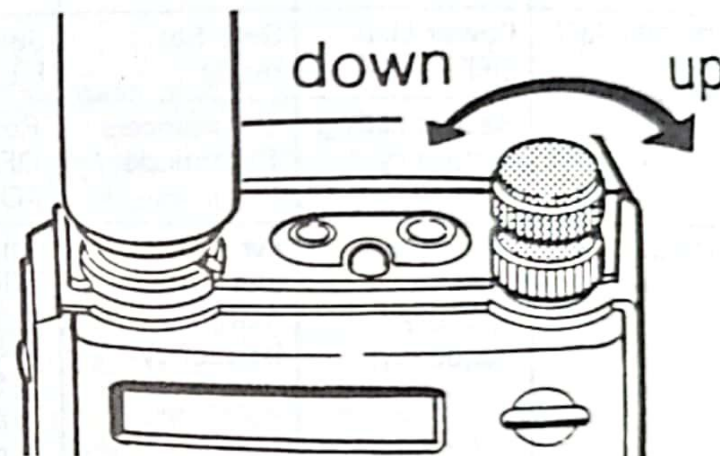
Advice

The amount of frequency varied by each click of CH selector is referred to as the channel step. The channel step rate of this transceiver can be set 5 kHz, 10 kHz 12.5 kHz, 20 kHz, 25 kHz or to 50 kHz. The initial setting at the factory is 25 kHz. For the procedure to change the channel step rate, please refer to "Changing channel step" on page 34. The Rotary CH selector is also used for other operations such as recalling memory address No. with the help of key operation, setting the offset frequency and setting the scanning direction.

2 Priority recalling of call frequency [CALL key]

To recall the call frequency, press the CALL/RPT key. When the CALL/RPT key is pressed, 145.00 MHz is recalled with priority.
If the CALL button is pressed while the PTT switch is held down, a 1750 Hz tone burst signal will be output. (C112E Only)

Procedure

1) Press the CALL/RPT key.
2) " c 43300 " is displayed.
3) Press the CALL/RPT key again.
4) The frequency before the CALL/RPT key was pressed is displayed.
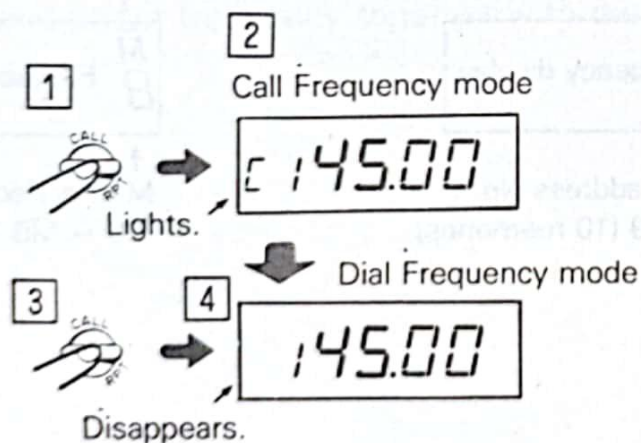
Note
The displayed " c 14500 " frequency cannot be varied by turning the Rotary CH selector.

Advice

The call frequency, which has been set to 145.00 MHz at the factory, can be changed to a desired frequency.

1

2

Call Frequency mode

CALL → c 145.00

Lights.

3

4

Dial Frequency mode

CALL → 145.00

Disappears.

Changing the Call Frequency

Example: To change call frequency to 145.50 MHz

Procedure

1) Press the CALL/RPT key.
2) Hold down the FUNC switch and press the MR/MW key. The displayed "C" will start blinking (indicating the Call Frequency Change mode).
3) Set the frequency to 145.50 MHz by turning the Rotary CH selector.
4) Hold down the FUNC switch and press the MR/MW key again. A long high-beep sound is generated indicating that calling frequency has been changed.

[1] C 145.00

Call Frequency Change mode
[2] C 145.00
Blinks.

[3] C 145.50
Blinks.

[4] C 145.50
Lights steadily.
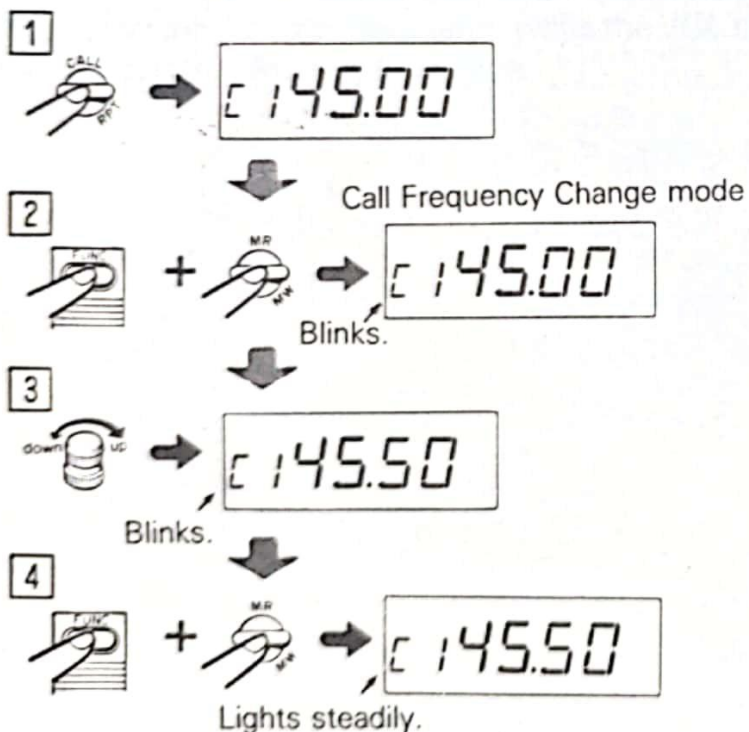
3 Storing Frequencies in Memory [MR/MW key]

Frequencies often use can be stored in the memory circuitry. The frequencies stored in the memory circuitry are called "memory frequencies". Up to 20 frequencies can be stored in memory. The memory frequencies can be recalled, changed or scanned as required. The location where each memory frequency is stored is referred to as "memory address No.". The memory address Nos. are divided separately in two groups; Group M consisting of M0, M1, M2, M3,...' M9; and Group $\overline{M}$ consisting of $\overline{M}$0, $\overline{M}$1, $\overline{M}$2, $\overline{M}$3,... $\overline{M}$9.

Group M

M8 Frequency display

↑
Memory address No.
M0 ~ M9 (10 memories)

Group $\overline{M}$

$\overline{M}$8 Frequency display

↑
Memory address No.
$\overline{M}$0 ~ $\overline{M}$9 (10 memories)
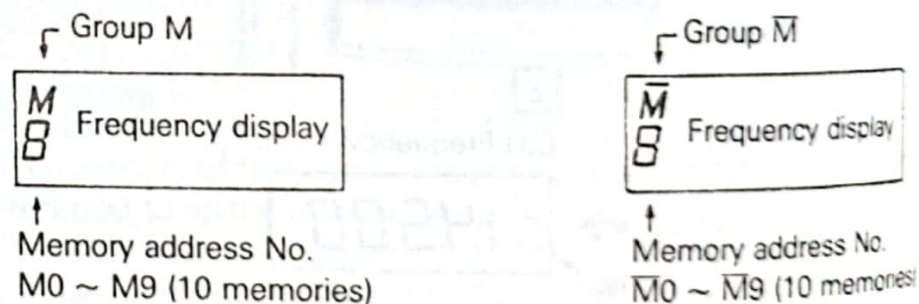
Example 1: To store 145.20 MHz in M1 of Group M

1) Set the displayed frequency to 145.20 MHz by turning the Rotary CH selector.
2) Press the MR/MW key.
3) A letter "M" and a number (X) below it appear on the display. " $\underset{x}{M}$ " blinks when there is no memory stored in it.
4) Set the memory address No. (X) to 1 by turning the Rotary CH selector.
5) Hold down the FUNC switch and press the MR/MW key. A long high-beep sound is generated indicating that the frequency has been stored in memory. Now, the blinking " $\underset{1}{M}$ " will remain lit steadily.
   The present status is called "Memory Recall mode".
6) When the MR/MW key is pressed again, the Memory Recall mode is exited and the display returns to the Dial Frequency mode.
   Try storing other frequencies in M2, M3, M4, M5, etc.

Advice

The memory address Nos. in Group M allow to store the tone frequency and offset frequency together with the memory frequency.

Advice

To store frequencies in $\overline{M}0$, $\overline{M}1$, $\overline{M}2$, $\overline{M}3$, ... $\overline{M}9$, set the group to $\overline{M}$ by turning the Rotary CH selector while holding down the FUNC switch, and set the address No. by turning the Rotary CH selector alone.

Note

" $\underset{x}{M}$ " **means any one of memory address Nos. 0 to 9.**

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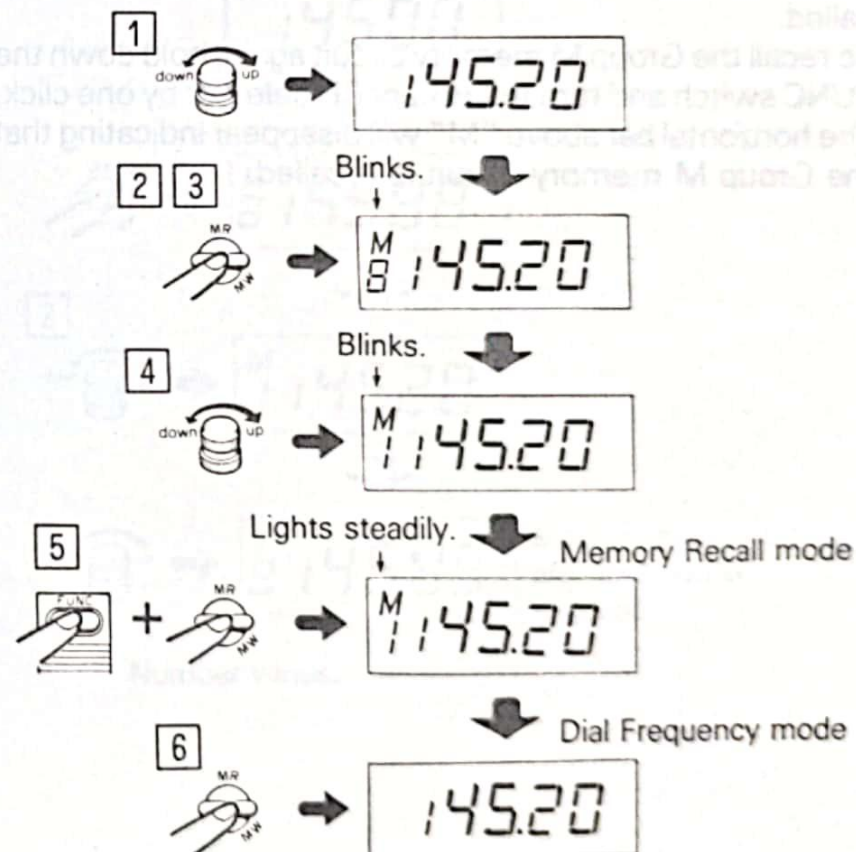
Example 2: To store frequency in M̄1 (Storing 145.20 MHz in M̄1 by switching Group M to Group M̄)

Procedure

1) Press the MR/MW key to enter the Memory Recall mode. "M" will blink or lights steadily.
2) Hold down the FUNC switch and turn the Rotary CH selector by one click. A horizontal bar will appear above "M" indicating that the Group M̄ memory circuit is recalled.
3) To recall the Group M memory circuit again, hold down the FUNC switch and turn the Rotary CH selector by one click. The horizontal bar above "M" will disappear indicating that the Group M memory circuit is recalled.

Frequency to be stored in memory

down up → 145.20

Blinks or lights steadily. Memory Recall mode

1 → M̄ 8 145.20

"−" appears above "M".

2 + down up → M̄ 8 145.20

Switching between M and M̄

Blinks or lights steadily. Group M Memory Recall mode

3 + down up → M 8

Frequencies stored in Group M appear again.

4 → 145.20 Dial Frequency mode
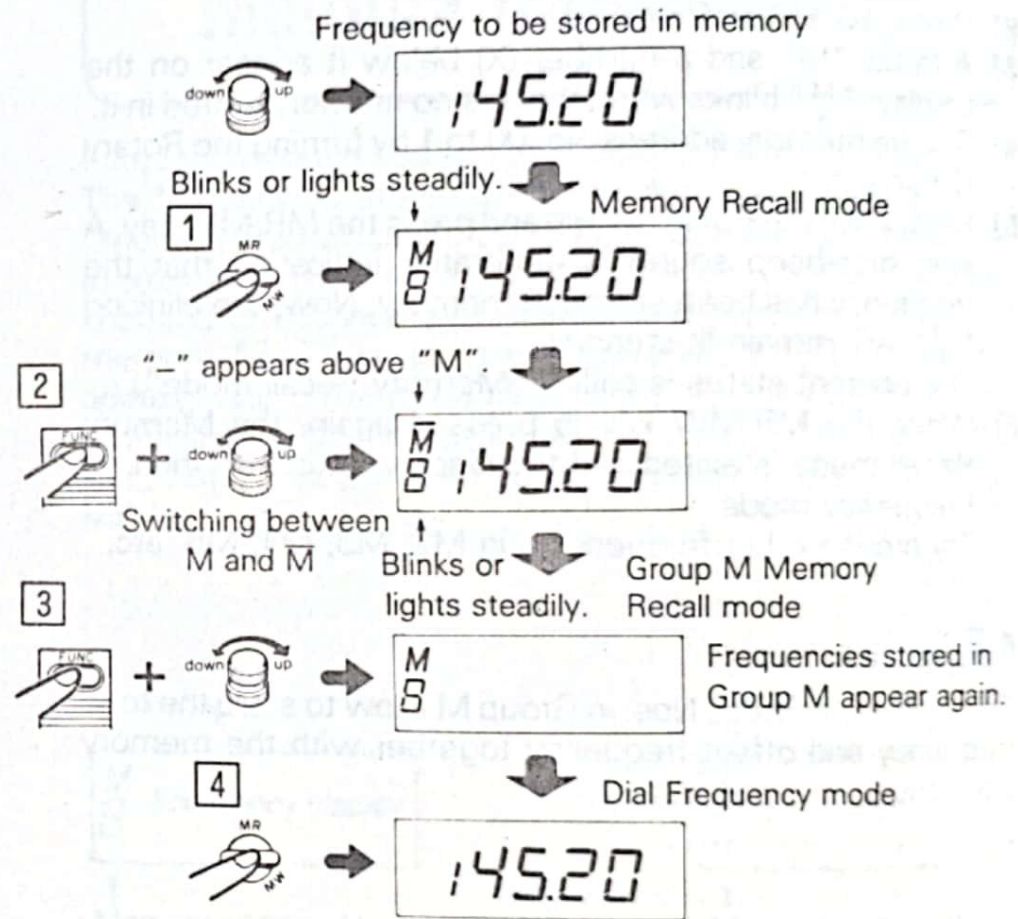
4 Recalling Memory Frequency [MR/MW key]

Example: To recall "M1"

Procedure

1) In the Dial Frequency mode, press the MR/MW key. "M" and the last memory address No. used will appear on the display. ("M" and the address No. will blink if no frequency is stored in it.)

2) Turn the Rotary CH selector to display number "1" below "M". The displayed frequency will change to that stored in "M1". By turning the Rotary CH selector, other memory address Nos. can be displayed in the same way.

Advice

o If you select a memory address No. that does not contain a memory frequency, " M_x " and the number below it will blink to indicate it, and the dial frequency will be displayed.

o The Rotary CH selector can recall only those memory frequencies that have been stored in memory address Nos. in Group M or $\overline{M}$.

1 Dial Frequency mode

145.00

$\overset{M}{8} 145.88$

2

$\overset{M}{1} 145.20$

$\overset{M}{8} 145.88$

Number varies.

Memory frequencies are displayed in sequence.

20

5 Changing Memory Frequency

To change a previously-stored memory frequency, use the following procedure. The stored frequencies can be changed as desired.

Example: To change the memory frequency stored in memory address No. M1 from 145.20 MHz to 145.04 MHz

Procedure

1) Press the MR/MW key to enter the Memory Recall mode, then display "M1" by turning the Rotary CH selector.
2) Hold down the FUNC switch and press the MR/MW key. Lighting "M" will start to blink, indicating the Memory Write mode.
3) Set the new frequency of 145.04 MHz by turning the Rotary CH selector.
4) Hold down the FUNC switch and press the MR/MW key. A long high-beep sound is generated indicating that the frequency has been changed. Now, the blinking "M" will remain lit steadily.
5) To return to the Dial Frequency mode, press the MR/MW key again.

1

$^M_1$ 145.20

Only M blinks.

2

$^M_1$ 145.20

Only M blinks.

3

$^M_1$ 145.04

Lights steadily.
Memory Recall mode

4

$^M_1$ 145.04

Dial Frequency mode

5

← Frequency displayed before recalling by 1
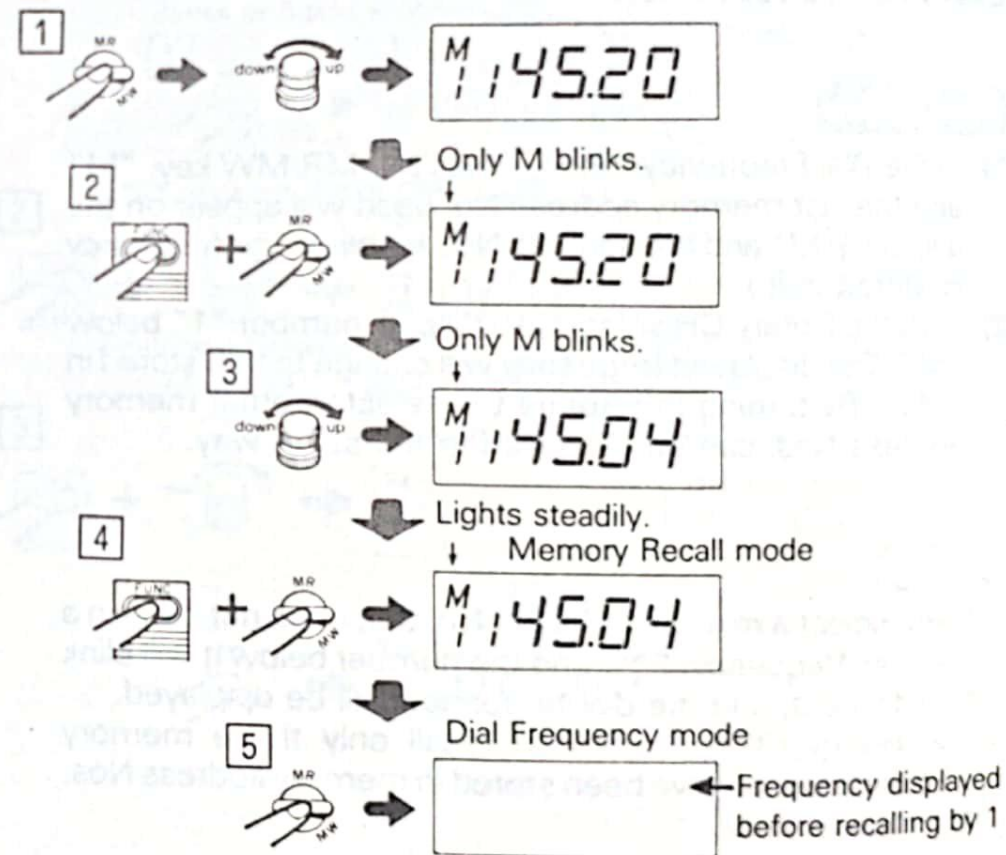
6 Deleting Memory Frequency

To delete a previously-stored memory frequency, use the following procedure.

Procedure

Example: To delete the memory frequency stored in memory address No. M1

1) Press the MR/MW key to enter the Memory Recall mode, then display the memory address No. to be deleted by turning the Rotary CH selector, and press the MR/MW key again to return to the Dial Frequency mode.
2) Press the MR/MW key to enter the Memory Recall mode again, and hold down the key without releasing it.
3) While holding the key down, press the PTT switch. A long high-beep sound will be generated, indicating that the memory frequency has been deleted. The blinking "M" and memory address No. will light steadily, and the frequency before the memory frequency was recalled will be displayed again.

1

down ⟳ up → M1 145.04

Blinks.

2

PTT on

MR/MW + → M1 145.00
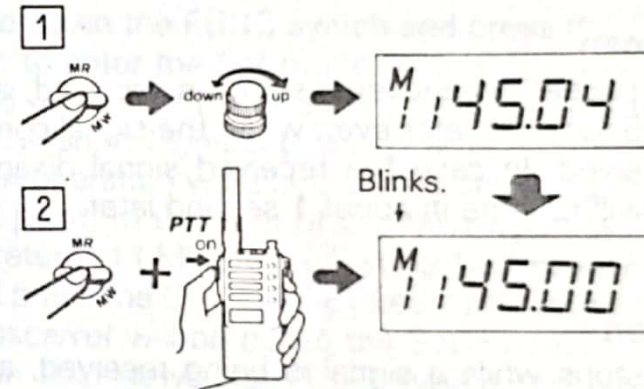
Do not release your finger from MR/MW.

7 Multifunction Scanning [M.S/LAMP key]

7.1 Scanning Modes

This transceiver offers a selection of two scanning modes; Pause Scan and Busy Scan.

• Pause Scan

Scanning pauses whenever a signal is received, and resumes in 5 seconds later even when the signal continues to be received. In case the received signal disappears, scanning will resume in about 1 second later.

• Busy Scan

Scanning stops while a signal is being received, and resumes in about 1 second after the signal disappears.
(The initial setting at the factory is Pause Scan.)

7.2 Switching between Pause Scan and Busy Scan

Procedure

1) After starting 1 MHz Scan, hold down the FUNC switch and press the MR/MW key. If a short high-beep sound is generated, the scanning mode is set to Pause Scan. If three consecutive short high-beep sounds (Beep-beep-beep) are generated, the scanning mode is set to Busy Scan.

7.3 Scanning Operations

This transceiver is capable of the following scanning operations.
(1) Dial-frequency scanning
   1) 1 MHz Scan: Scans within a desired 1 MHz.
   2) All Scan: Scans the whole of the bandwidth.
(2) Memory-frequency scanning
   1) All-Memory Scan: Scans both Groups M and $\overline{\text{M}}$.
   2) M-Memory Scan
   3) $\overline{\text{M}}$-Memory Scan

7.4 Scanning Operation Procedures

7.4.1 Dial-frequency scanning

1) 1 MHz Scan

This can be started by pressing the M.S/LAMP key for a relatively long period (more than 1 second) in the Dial Frequency mode. The MHz band to which the frequency being displayed belongs will be scanned. During scanning, the dot (decimal point) to the right of the MHz figure blinks.

Procedure

1) Enter the Dial Frequency mode.
2) Press the M.S/LAMP key for more than 1 second. Two short high-beep sounds will be produced, one at the moment the key is pressed and the other in about 1 second later, and scanning starts.

1 Dial Frequency mode

145.00

2

145.02

More than 1 sec.   Blinks.

1 MHz Scan
(145.00 ↑
↓ 145.98)
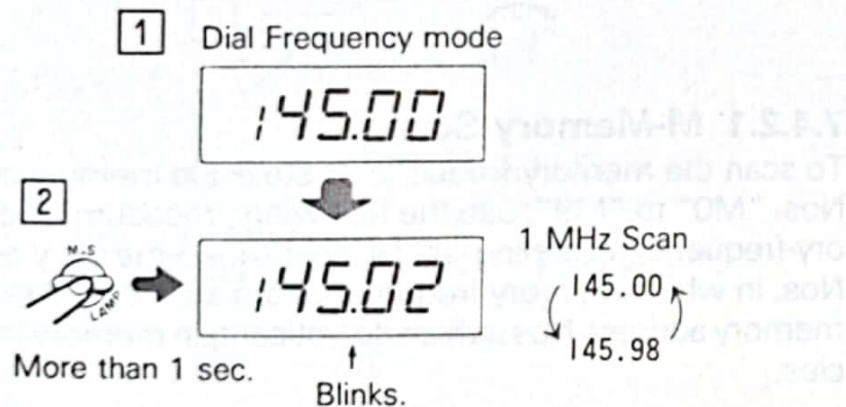
2) All Scan within the amateur band

To start All Scan, first start 1 MHz Scan, then enter the Set mode by pressing the ON/OFF/SET key while holding the FUNC switch down.

All Scan can be started by pressing the M.S/LAMP key while holding the FUNC switch down, and 1 MHz Scan can be resumed by repeating this operation again.

Procedure

1) Start 1 MHz Scan.
2) Hold down the FUNC switch and press the ON/OFF/SET key, to enter the Set mode.
3) Hold down the FUNC switch and press the M.S/LAMP key. A short high-beep sound will be generated, and All Scan operation will start. During scanning, the dot (decimal point) to the right of the MHz figure will blink.
4) To return to 1 MHz Scan, first hold down the FUNC switch and press the ON/OFF/SET key. "M" will appear, and the transceiver will be put to the Set mode.
5) Then hold down the FUNC switch and press the M.S/LAMP key. A short low-beep sound will be generated, and 1 MHz Scan will start again.
6) To cancel scanning, press the M.S/LAMP key. The transceiver will be put to the Dial Frequency mode.

24

1. During 1 MHz Scan

```
145.88
```

Lights. → Blinks.

2.

```
M 145.88
```

Blinks.

3.

```
145.88
```

Lights. → Blinks.

All Scan
144.00
↓
145.98
Short, high-beep

4.

```
M 145.88
```

Blinks.

5.

1 MHz
Scan mode

Short, low-beep

6.

Dial Frequency
mode
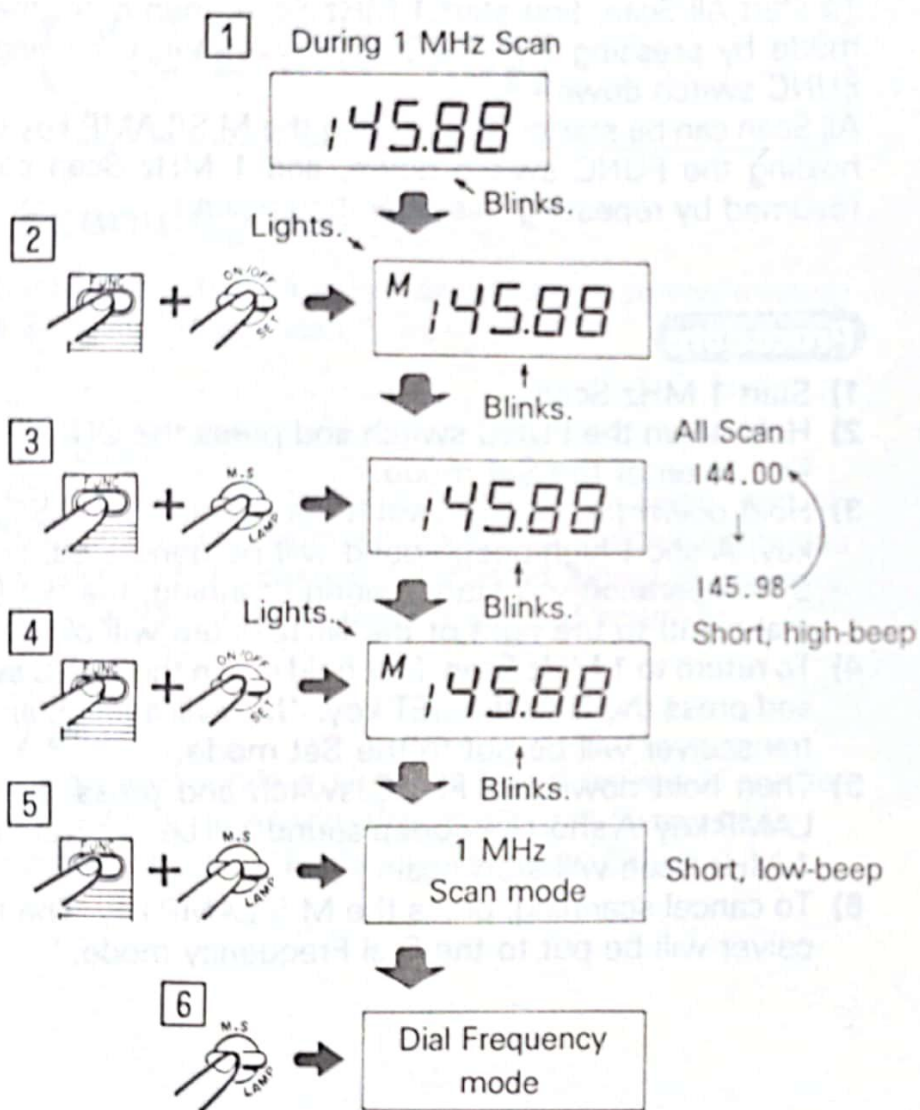
Advice

During scanning or pause of scanning, turning the Rotary CH selector clockwise directs the scanning to higher frequencies, and turning it counterclockwise directs the scanning to lower frequencies.

7.4.2 Memory-frequency scanning

Memory-frequency scanning scans the memory frequencies stored in the memory circuitry. This transceiver offers a versatile memory-frequency scanning feature, which allows to select the following scan operations.

1) All-Memory Scan for scanning all memory frequencies.
2) M or M̄-Memory Scan for scanning memory frequencies in a group.

7.4.2.1 M-Memory Scan

To scan the memory frequencies stored in memory address Nos. "M0" to "M9", use the following procedure. The Memory-frequency scanning scans only those memory address Nos. in which memory frequencies are stored, and skips the memory address Nos. which do not contain memory frequencies.

1) Press the M.S/LAMP key for an instant. Do not hold it, or 1 MHz Scan would start.
2) M-Memory Scan starts from the last memory address No. used. During scanning, the dot (decimal point) to the right of the MHz figure will blink, functioning as the scan indicator.
3) To start All-Memory Scan, hold down the FUNC switch and turn the Rotary CH selector by one click.
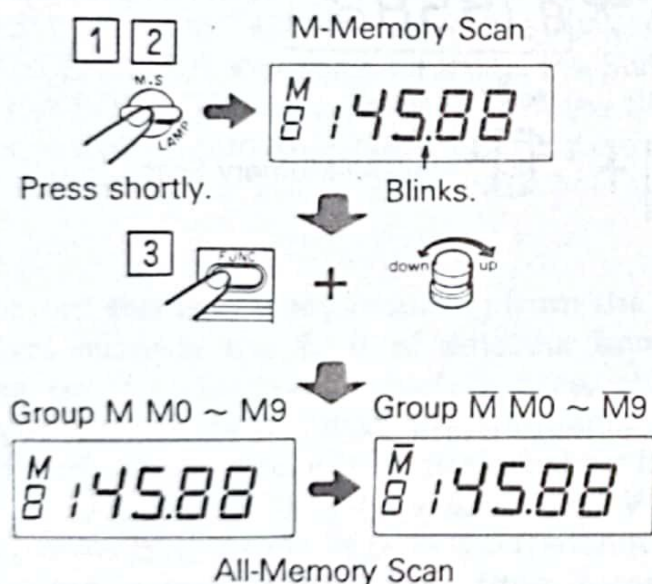
o When the FUNC switch is pressed during scanning, it pauses while the FUNC switch is held down.
o To return to M-Memory Scan or $\overline{M}$-Memory Scan from All-Memory Scan, press and hold down the FUNC switch during All-Memory Scan to pause scanning, then turn the Rotary CH selector by one click without releasing the FUNC switch. either Group M-Memory Scan or Group $\overline{M}$-Memory Scan will start.

M-Memory Scan

1 2

Press shortly.   Blinks.

3 +

Group M M0 ~ M9   Group $\overline{M}$ $\overline{M}$0 ~ $\overline{M}$9

All-Memory Scan

7.4.2.2 M̄-Memory Scan

To scan the memory frequencies stored in memory address Nos. "M̄0" to "M̄9", use the following procedure. The Memory-frequency scanning scans only those memory address Nos. in which memory frequencies are stored, and skips the memory address Nos. which do not contain memory frequencies.

Procedure

1) Recall a memory belonging to Group M̄.
2) Press the M.S/LAMP key for an instant. M̄-Memory Scan will start.
3) To start All-Memory Scan, hold down the FUNC switch and turn the Rotary CH selector by one click.
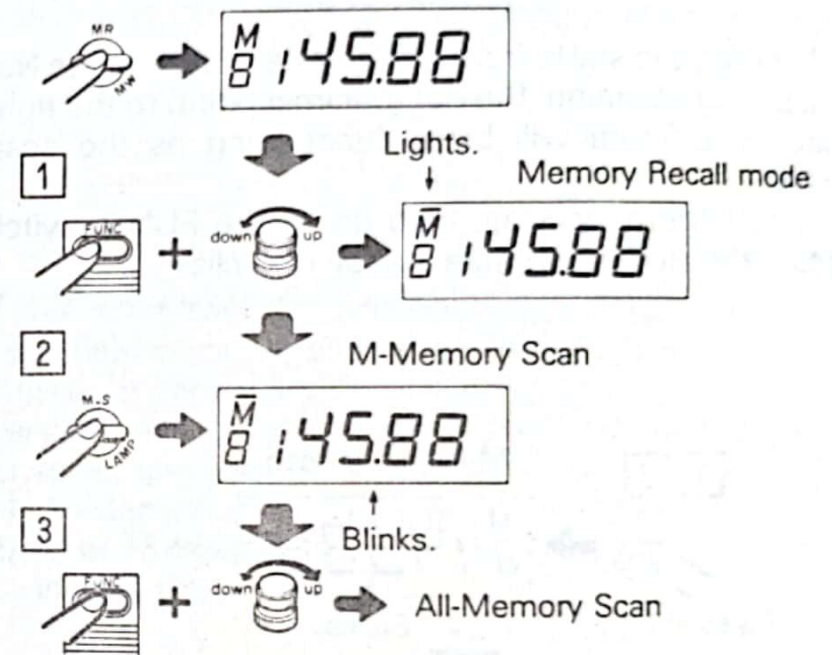
8 Shift operation [CALL/RPT key]

Procedure

1) Hold down the FUNC switch and press the CALL/RPT key.
2) Set the transceiver to the transmission frequency of the remote station by turning the Rotary CH selector.
3) When the PTT switch is pressed, the signal is transmitted at a frequency shifted by −600 kHz.
4) Hold down the FUNC switch and press the CALL/RPT key to switch the shift to "+". Hold down the FUNC switch and press the CALL/RPT key again to cancel the Shift mode.
5) When the SQL OFF switch is pressed in the Shift mode, the transmitter enters Reverse mode and squelching is turned OFF while the SQL OFF switch is hold down.

Notes

1. In the event the frequency resulting from the transmitter offset exceeds the limit of amateur band, "OFF" appears on the display. In such a case, change the displayed frequency so that the frequency resulting from the offset remains within the amateur band.

2. The SQL OFF switch has two functions. When it is pressed in he Shift mode, it puts the transmitter to the Reverse mode and, at the same time, turns squelch off.

1 144.88 ← Lights.

2 144.82 Lights.

3 PTT on 144.22MHz
The frequency offset by 1.6 MHz is transmitted together

4 144.82 Disappears.

4 144.82

5 144.82 → 144.22
Appears only while the switch is held down.
BUSY indicator
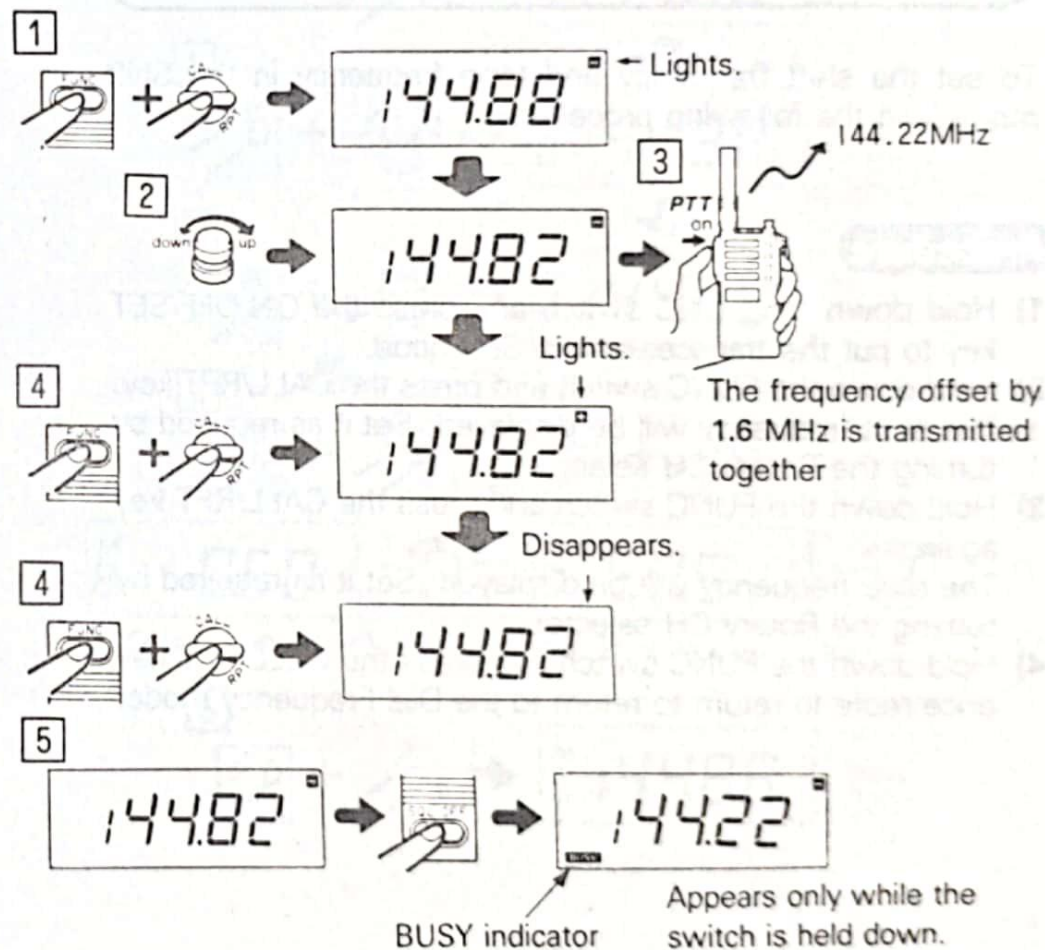
9 Changing Shift Frequency and Tone Frequency in Shift Mode

To set the shift frequency and tone frequency in the Shift mode, use the following procedure.

Procedure

1) Hold down the FUNC switch and press the ON/OFF/SET key to put the transceiver into Set mode.
2) Hold down the FUNC switch and press the CALL/RPT key. The shift frequency will be displayed: Set it as required by turning the Rotary CH selector.
3) Hold down the FUNC switch and press the CALL/RPT key again.
   The tone frequency will be diaplayed: Set it as required by turning the Rotary CH selector.
4) Hold down the FUNC switch and press the CALL/RPT key once more to return to return to the Dial Frequency mode.

Notes
1. **The tone frequency is not output unless the optional CTN412 is installed.**
2. **To carry out tone encoding using the CTN412, use the following procedure:**
   After entering the Shift mode ("−" or "+"), enter the Set mode (FUNC + ON/OFF/SET). Then, hold down the FUNC switch and press the MR/MW key. "TONE" will be displayed and the tone signal will be transmitted continuously at the frequency selected in ③.
3. **After entering the Set mode, (FUNC + ON/OFF/SET), hold down the FUNC switch and press the MR/MM key. "TONE" on the display will change to "TONE" + "SQL".**
4. **To cancel "TONE" + "SQL", first enter the Set mode (FUNC + ON/OFF/SET), then hold down the FUNC switch and press the MR/MW key.**

10 Writing Original Offset Frequency and Tone Frequency in Group M Memory Frequency

The tone frequency write operation is valid only when the CTN412 is installed.

Procedure

1) Recall a memory address No. in Group M.
2) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode.
3) Hold down the FUNC switch and press the CALL/RPT key. When the offset frequency is displayed, adjust it by turning the Rotary CH selector.
4) Hold down the FUNC switch and press the CALL/RPT key again. When the tone frequency is displayed, adjust it by turning the Rotary CH selector.
   *The memory address No. displayed in steps 3 and 4 indicates that the offset frequency or tone frequency is for exclusive use with that specific memory address No.
   *The tone frequency written here is used in repeater operation if that Group M memory address No. is RPT ("−" or "+"), and in tone squelch operation if it is tone squelch.

Offset frequency Varies.   Tone frequency Varies.

30
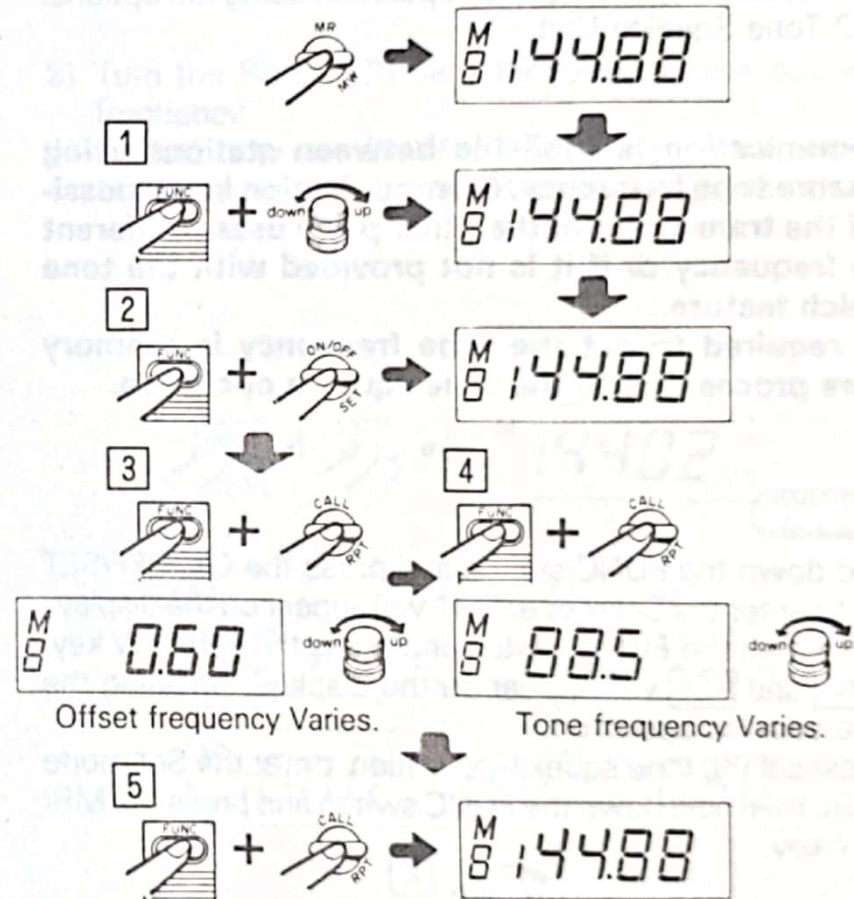
[11] Tone Squelch Control

Use this feature for tone squelch operation using the optional CTN412 Tone Squelch Unit.

Notes
- **Communication is available between stations using the same tone frequency. Communication is not possible if the transceiver of the other party uses a different tone frequency or if it is not provided with the tone squelch feature.**
- **It is required to set the tone frequency in memory before proceeding to the tone squelch operation.**

Procedure

1) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode. "M" will appear on the display.
2) Hold down the FUNC switch and press the MR/MW key. TONE and SQL will appear on the display, indicating the tone squelch operation.
3) To cancel the tone squelch operation, enter the Set mode again, then hold down the FUNC switch and press the MR/MW key.

31
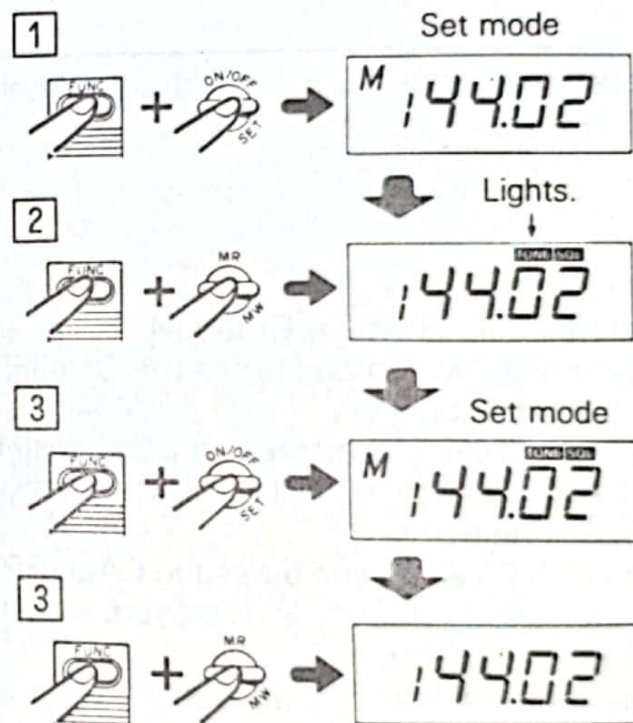
12 Recalling Tone Squelch Tone Frequency

The tone squelch operation is available only when the optional CTN412 Tone Squelch Unit is installed.

Use this feature when recalling the tone frequency.
The following 38 tone frequencies have been preset in the microprocessor memory. Select one of them and store in the memory circuitry.

Available tone frequencies (Unit: Hz)

67.0	71.9	74.4	77.0	79.7	82.5	85.4	88.5
91.5	94.8	97.4	100.0	103.5	107.2	110.9	114.8
118.8	123.0	127.3	131.8	136.5	141.3	146.2	151.4
156.7	162.2	167.9	173.8	179.9	186.2	192.8	203.5
210.7	218.1	225.7	233.6	241.8	250.3		

Procedure

1) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode. "M" will appear on the display.
2) Hold down the FUNC switch and press the CALL/RPT key once. The offset frequency will be displayed. Now hold down the FUNC switch and press the MR/MW key. The tone frequency for tone squelch operation will be display-ed. The displayed tone frequency is the initial setting of 88.5 Hz.

3) Turn the Rotary CH selector to select the desired tone frequency.
4) To return to the Dial Frequency mode, hold down the FUNC key and press the MR/MW key again.

Varies frequency.

32
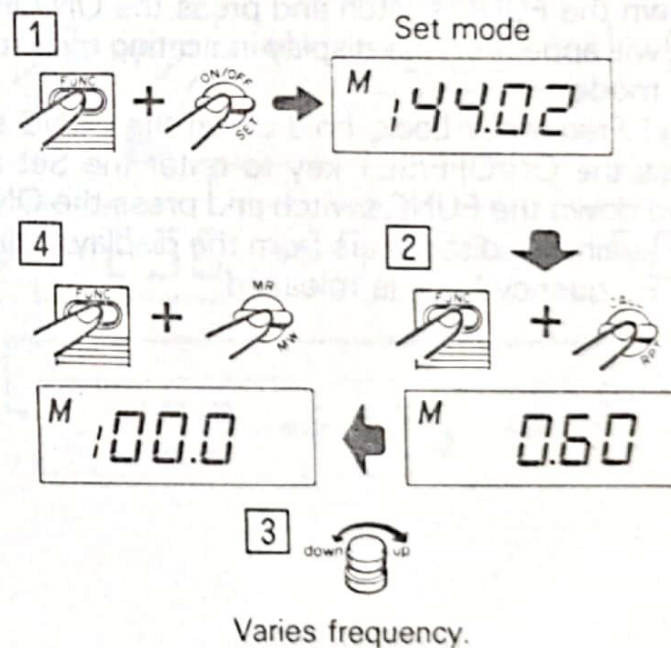
13 Frequency Lock

This feature locks the frequency and operation mode so that they are not changed by accidental mistake. The Frequency Lock also functions during scanning as well as during communication.

Procedure

1) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode. "M" will appear on the display.
2) Hold down the FUNC switch and press the ON/OFF/SET key. F.L will appear on the display indicating the Frequency Lock mode.
3) To cancel Frequency Lock, hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode, then hold down the FUNC switch and press the ON/OFF/SET key again. F.L disappears from the display, indicating that the Frequency Lock is released.

Set mode

1
+ → M 145.00

Lights.

2
+ → 145.00

Frequency does not vary.

Set mode

3
+ → M 145.00

Disappears.

3
+ → 145.00

33
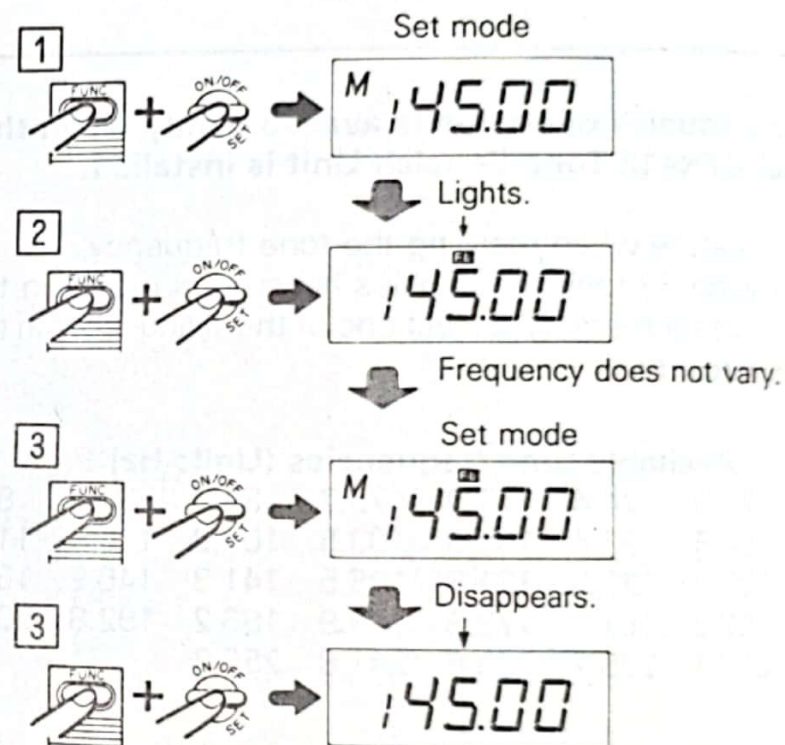
14 Changing Channel Step

The channel step rate of the transceiver can be changed in six ways according to the usage.

Procedure

1) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode.
2) Hold down the FUNC switch and press the M.S/LAMP key. The current channel step rate will be displayed.
3) Turn the Rotary CH selector to select the desired channel step rate.
4) Enter the Set mode again, then hold down the FUNC key and press the M.S/LAMP key again to return to the Dial Frequency mode.

Advice

o The channel step rate can be set to 5 kHz, 10 kHz, 12.5 kHz, 20 kHz, 25 kHz or 50 kHz.
o When the channel step rate is set to 5 kHz, 12.5 kHz or 25 kHz, the two digits below 10 kHz is shown in a small black box on the right side of the display.
o The initial setting of channel step rate at the factory is 25 kHz.

Set mode

1
FUNC + ON/OFF/SET → M 145.02

2
FUNC + M.S/LAMP → 25.0

3
down / up → 25.0 → 50.0 → 5.0

→ 10.0 → 12.5 → 20.0
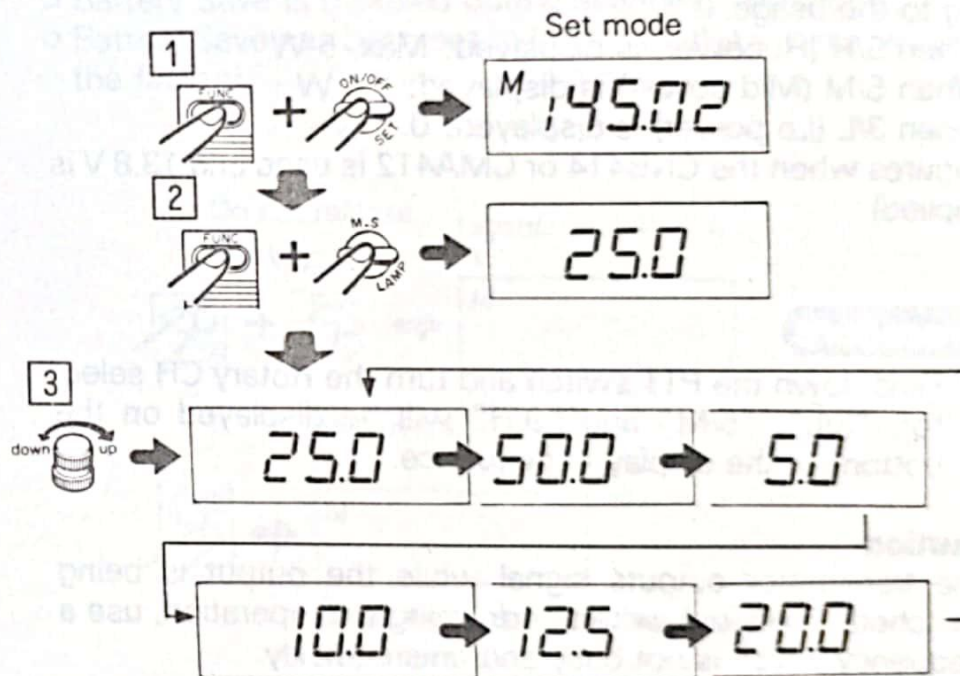
15 Switching Transmitter Output

Use this feature to change the transmitter output. The power output from the transmitter can be set in three ways according to the usage.

When 9/H (Hi power) is displayed: Max. 5 W
When 5/M (Mid power) is displayed: 2.5 W
When 3/L (Lo power) is displayed: 0.3 W
(Figures when the CNB414 or CMA412 is used and 13.8 V is applied)

Procedure

1) Hold down the PTT switch and turn the Rotary CH selector. "3/L", "5/M" and "9/H" will be displayed on the bottom of the display in sequence.

Caution

The transmitter outputs signal while the output is being switched. Therefore, when performing this operation, use a frequency which is not busy and finish quickly.
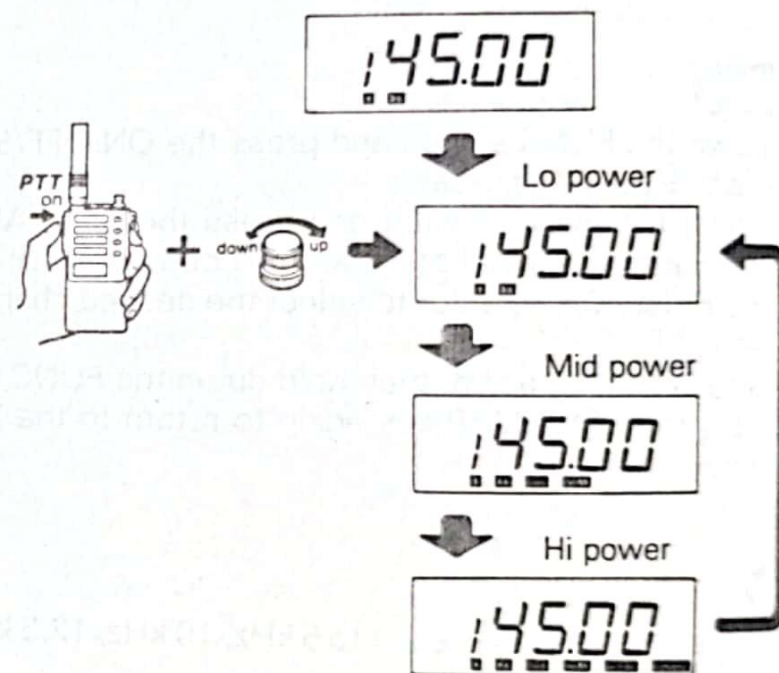
16 Battery Save

This feature allows to save power consumption required in reception standby. It is specially useful in case you have to wait signal reception for a long period of time. When Battery Save is activated, it operates at an interval of one second to turn on/off the reception standby, making it possible to extend the battery life more than twice compared to the case in which this feature is not used. The Battery Save feature can also be deactivated for the case of packet communication.

Advice

o The actual Battery Save operation starts in 5 seconds after a key is pressed, the Rotary CH selector is turned, or a signals ceases to be received.
o Battery Save is disabled during scanning operations.
o Battery Save has been set to ON when the transceiver left the factory.

Procedure

1) Hold down the FUNC switch and press the ON/OFF/SET key, then, release a finger from the FUNC switch without releasing the other finger from the ON/OFF/SET key, and press the SQL OFF switch while holding the ON/OFF/SET key down.

2) If a short high-beep sound is generated, Battery Save is deactivated. If a three high-beep sound (Prr-prr-prr) is generated, Battery Save is activated.

Do not release the key.   Lights.

Disappears.

Short high-beep: Battery Save OFF
Prr-prr-prr: Battery Save ON

17 Auto-Power OFF

This is another power-saving feature which prevents battery consumption in case you forget to turn the transceiver power off. If the transceiver power has been left ON for approx. 550 minutes, the AOP (Auto-Power OFF) turns the power OFF automatically.

18 Lithium Battery

The transceiver incorporates a built-in lithium battery which backs up the power to the microprocessor. This allows the memory contents to be maintained even when the power to the transceiver is not supplied or turned off. The service life of a lithium battery lasts about a few years, although it varies depending on the frequency of usage and operating conditions.

Advice

When the lithium battery is nearly exhausted, the frequency, etc., will not be displayed correctly when the power is turned ON. In this case, immediately replace the lithium battery.

Caution
o The lithium battery incorporated in the C112 has been designed to back up the power in the period the battery pack is removed for replacement. Therefore, do not leave the main body with the battery pack removed for a long period, or the lithium battery will be consumed quickly.
o The lithium battery incorporated in the C112 has been designed for exclusive use with this model. Therefore, when checking or replacing the lithium battery, be sure to contact your dealer or one of our service agents.
o Never dispose of a used battery in fire.

OPERATION WITH CKP412 KEYPAD

Key	When pressed by itself	Combined with FUNC switch	In Set mode (combined with FUNC switch)	During transmission (when CTD412 is installed)
PAG 1	Enters "1" when setting frequency, offset frequency, code and Save timer.	Sets/cancels PAG mode (when CTD412 is installed).	Sets number of ringing tones indicating call in paging mode to 7 or 1.	Enters touchtone "1".
C.SQL 2	Enters "2" when setting frequency, offset frequency, code and Save timer.	Sets/cancels code SQL mode (when CTD412 is installed).	—	Enters touchtone "2".
CODE 3	Enters "3" when setting frequency, offset frequency, code and Save timer.	Recalls or cancels code used in PAG code SQL mode (when CTD412 is installed).	Sets/cancels monitor feature. (Arbitrary setting for code address 1 to 5.)	Enters touchtone "3".
DUP 4	Enters "4" when setting frequency, offset frequency, code and Save timer.	Sets/cancels DUP mode.	—	Enters touchtone "4".
REV 5	Enters "5" when setting frequency, offset frequency, code and Save timer.	Sets unit to Reverse mode when pressed (mode is canceled when key is released). Valid only in Shift mode.	Enters touch-tone "5".	
100K 6	Enters "6" when setting frequency, offset frequency, code and Save timer.	Switches channel step rate between 1 MHz and 100 kHz.	—	Enters touchtone "6".

Key	When pressed by itself	Combined with FUNC switch	In Set mode (combined with FUNC switch)	During transmission (when CTD412 is installed)
APO.T 7	Enters "7" when setting frequency, offset frequency, code and Save timer.	Recalls or cancels APO timer. (Valid only when CH control is set upward.)	—	Enters touchtone "7".
SAVE.-T 8	Enters "8" when setting frequency, offset frequency, code and Save timer.	Recalls or cancels Save timer.	—	Enters touchtone "8".
F/CH 9	Enters "9" when setting frequency, offset frequency, code and Save timer.	Switches between frequency display and channel display.	—	Enters touchtone "9".
TIMER 0	Enters "0" when setting frequency, offset frequency, code and Save timer.	Recalls or cancels On timer set time.	Sets/cancels ON timer operation.	Enters touchtone "0".
CLOCK */▲	Increases frequency by 1 step. Increases it continuously when held down. When pressed in Memory Frequency mode, changes it to Dial Frequency mode and increases frequency by 1 step.	Recalls, cancels or sets present time in clock mode.	—	Enters touchtone "*".

Key	When pressed by itself	Combined with FUNC switch	In Set mode (combined with FUNC switch)	During transmission (when CTD412 is installed)
PWR #/▼	Decreases frequency by 1 step. Decreases it continuously when held down. When pressed in Memory Frequency mode, changes it to Dial Frequency mode and decreases frequency by 1 step.	Switches transmitter output power (in reception mode). Lo: 1 short, high beep Mid: 2 short, high beeps Hi: 3 short, high beeps	—	Enters touch-tone "#".
PTT.L A/F.L	Sets/cancels F.L.	Sets/cancels PTT Lock.	—	Enters touch-tone "A".
SFT.T B/SC	Starts/stops MHz Scan.	Recalls or cancels off-set frequency. Recalls special offset frequency when Group M̄ frequency is recalled. Recalls RPT tone frequency when offset frequency is recalled.	—	Enters touch-tone "B".

Key	When pressed by itself	Combined with FUNC switch	In Set mode (combined with FUNC switch)	During transmission (when CTD412 is installed)
T.SQL C/L.L	Turns lamp ON. Does not turn lamp OFF when pressed while lamp is ON.	Sets/cancels T.SQL. Sets/cancels Encode mode in RPT mode. Recalls tone squelch frequency when off-set frequency is recalled.	—	Enters touch-tone "C".
STEP D/BZ	Turns buzzer ON/OFF.	Recalls or cancels channel step rate.	—	Enters touch-tone "D".

1 Setting Frequency

When the CKP412 is installed, the frequency can be set with the numeric keys as well as with the Rotary CH selector.

1) Turn power ON by pressing the ON/OFF/SET key.
2) Press numeric keys to display the desired frequency.
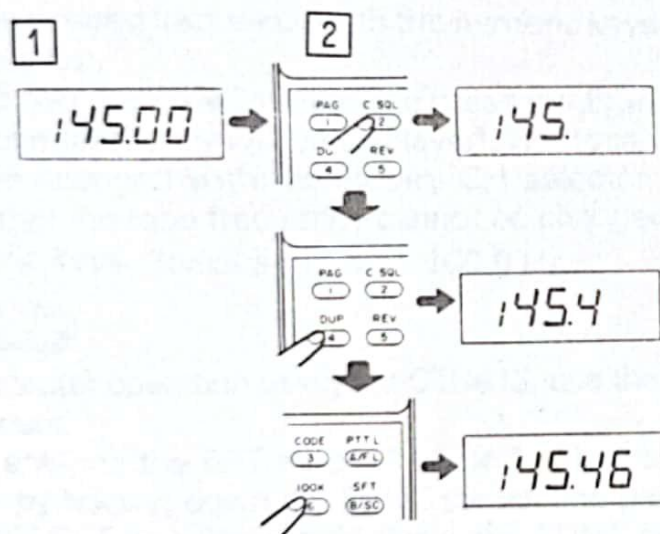
2 Storing Frequencies in Memory

1) Display the frequency to be stored in memory by pressing the numeric keys.
2) Press the MR/MW key.
   "M" and a memory address No. will be displayed.
3) Hold down the FUNC switch and press the MR/MW key. A short, high-beep sound is generated indicating that the frequency has been stored in memory.

Blinks.

Lights.

40
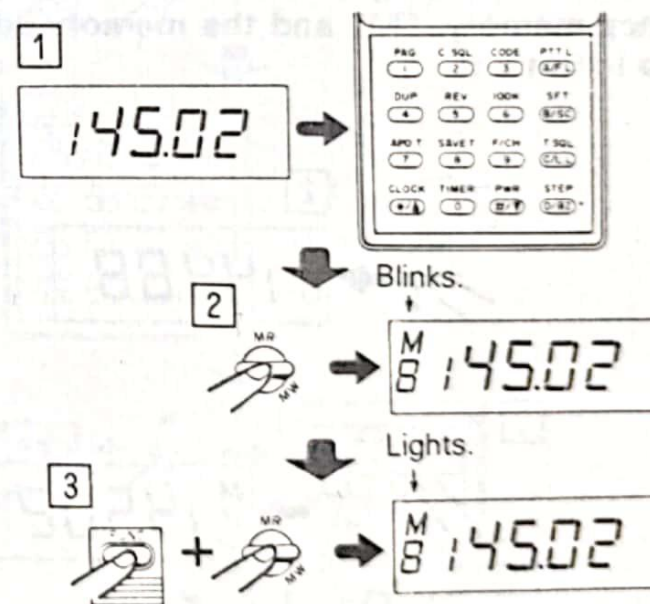
3 Recalling Memory Frequency

1) Press the MR/MW key.
2) "M" and a memory address No. will be displayed.
3) Enter the memory address No. to be recalled by pressing a numeric key. When a numeric key is pressed, the selected memory address No. will be displayed together with the frequency stored in it.

Note
If the recalled memory address No. does not contain frequency memory, "M" and the memory address No. blink to indicate it.
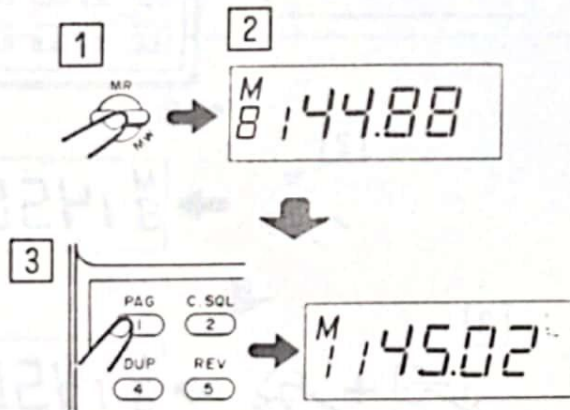
4 Changing Memory Frequency

The operation procedure is exactly the same as when the CKP412 is not installed.

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5 Changing Shift Frequency and Tone Frequency

Procedure

1) Hold down the FUNC switch and press the CALL/RPT key. "−" will be displayed.
2) Hold down the FUNC switch and press the B/SC/SFT key. The offset frequency will be displayed. The initial value has been set to 600 MHz at the factory.
3) Set the desired frequency with the numeric keys or Rotary CH selector.
4) Hold down the FUNC switch and press the B/SC/SFT key. The tone frequency will be displayed. The tone frequency can be changed with the Rotary CH selector.
   Note that the tone frequency cannot be changed with the numeric keys. Initial setting of 100.0 Hz.

Advice

For repeater operation using the CTN412, use the following procedure.
After entering the RPT mode ("+" or "−"), enter the Set mode by holding down the FUNC switch and pressing the ON/OFF/SET key. Then, hold donw the FUNC switch and press the MR/MW key. "TONE" will be displayed and repeater operation using the above-mentioned tone is initiated.

5) Hold down the FUNC switch and press the B/SC/SFT key again to enter the VFO mode.

Note
In the event the frequency resulting from the transmitter offset exceeds the limit of amateur band, "OFF" will be displayed. In such a case, change the displayed frequency so that the frequency resulting from the offset remains within the amateur band.

42
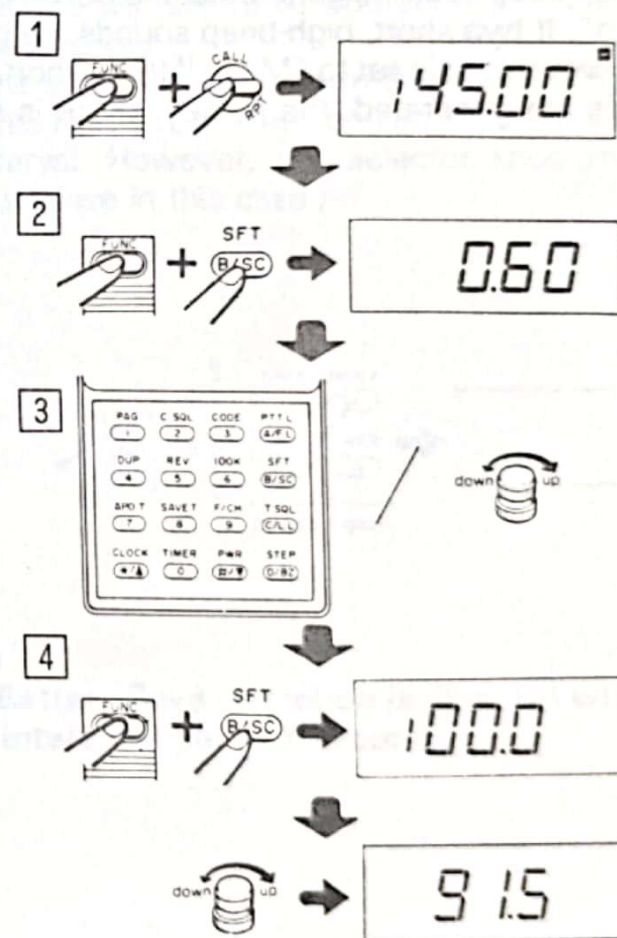
⑥ Changing Transmitter Output

Procedure

1) Hold down the FUNC switch and press the #/▼/PWR key. If a short, high-beep sound is generated, the power output is set to "Lo". If two short, high-beep sounds are generated, the power output is set to "Mid". If three short, high-beep sounds are generated, the power output is set to "Hi".

⑦ Changing Channel Step

The channel step rate of the transceiver can be changed by turning the Rotary CH selector.

Procedure

1) Hold down the FUNC switch and press the D/BZ/STEP key.
2) " 25 " (initial value) will be displayed. This figure is the channel step rate.
3) Turn the Rotary CH selector to select the desired channel step rate.

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1

2
2 5.0

3
25.0 → **50.0** → **5.0**
↓
10.0
↓
20.0   **12.5**
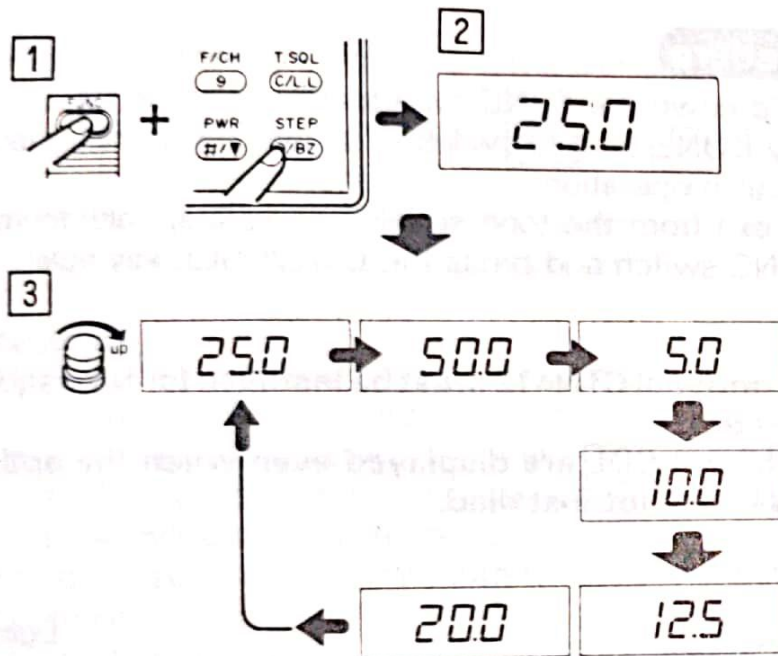
Turning counterclockwise
varies channel step rates in
decrementing order.

8 Battery Save

Procedure

1) Hold down the FUNC switch and press the 8/SAVE.T key.
2) The Battery Save operation interval is displayed.
   (The initial setting at the factory is 1 second.)
3) Set the Battery Save operation interval by pressing a numeric key.
   (The setting range is from 0 second to 9 seconds.)
   (The Rotary CH selector can also be used to set the interval. However, the selector knob must be turned clockwise in this case.)

1
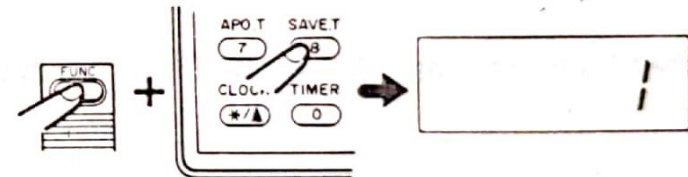
Note
The Battery Save operation is disabled when the operation interval is set to 0 second.

9 Frequency Lock

Procedure

1) Press the A/F.L/PTT.L key. "F.L" will be displayed. From now on, the frequency cannot be varied by the Rotary CH selector or numeric keys.
2) To deactivate Frequency Lock, press the same key again.

Lights.
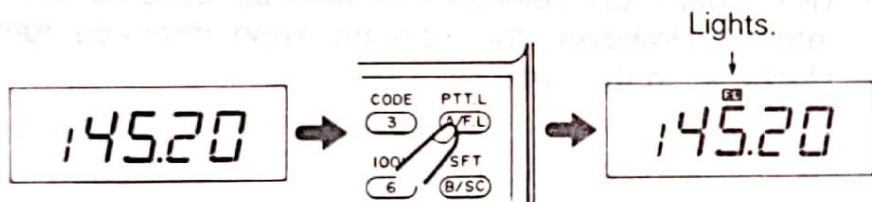
10 Tone Squelch Control

Procedure

1) Hold down the FUNC switch and press the C/L.L/T.SQL key. TONE and SQL will be displayed, indicating the tone squelch operation.
2) To exit from the tone squelch operation, hold down the FUNC switch and press the C/L.L/T.SQL key again.

Note
- **The optional CTN412 must be installed for tone squelch operation.**
- **TONE and SQL are displayed even when the optional CTN412 is not installed.**

Lights.

45
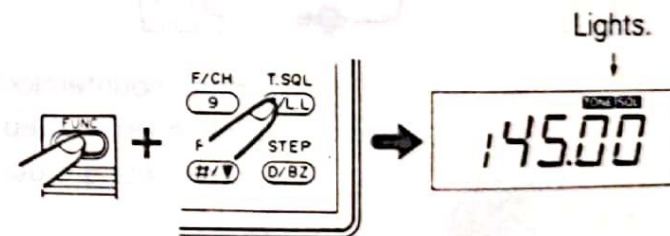
11 Setting Auto-Power OFF

The APO (Auto-Power OFF) timer turns OFF the transceiver power automatically in case it is left ON. The timer count does not start at the moment this feature is set, but starts from every moment the transceiver is left intact. If any key is operated or a signal is received during the timer count period, the timer count re-starts from that moment.

Procedure

1) Hold down the FUNC switch and press the 7/APO.T key.
2) "550" is displayed, indicating that the power will be turned OFF at the expiration of 550 minutes from now.
3) Turn the Rotary CH selector to set a new APO timer period. To set the new time, turn the Rotary CH selector clockwise.
4) At 1 minute before the power will be turned OFF, three short, high-beep sounds (Beep-beep-beep) is generated to indicate that the timer will expire soon.
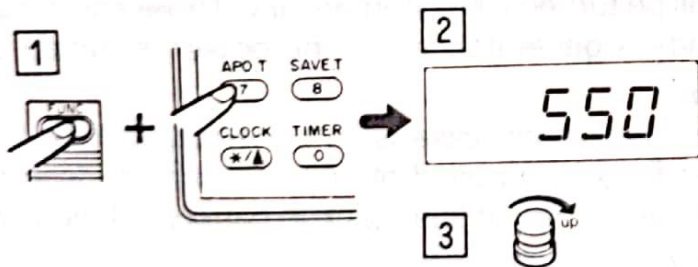
In 10-minute increments from 10 minutes to 120 minutes. The next step to 120 minutes is 550 minutes.

12 How to set the present time in order to use the On-Timer function

Procedure

To set the present time:
1) Hold down the FUNC switch and press the */▲/CLOCK key.
2) "0:00" will be displayed (current present time).
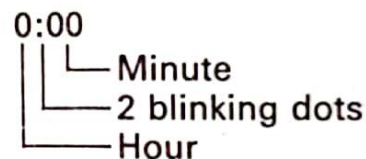
```
0:00
  └─ Minute
  └── 2 blinking dots
  └─── Hour
```

3) Hold down the FUNC switch and press the MR/MW key.

```
0:00
  |
  Light steadily.
```
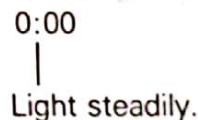
4) Hold down the FUNC switch and turn the Rotary CH selector to set the hour.
5) Turn the Rotary CH selector to set the minutes. To set time, turn the Rotary CH selector clockwise.

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6) Hold down the FUNC switch and press the */▲/CLOCK key. A long, high-beep sound will be generated and the clock will start. Correct time setting will be possible by performing this step at the same time as a time announcement.

7) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode. "M" will be displayed.

8) Hold down the FUNC switch and press the 0/TIMER key.

9) The upper dot which has been blinking lights steadily, indicating that the ON-timer feature is activated. Now, the clock counts the present time even after the power is turned OFF.

Advice

Steps 7 to 9 can be performed in other modes (in Dial Frequency mode, etc.).

Caution
Be sure to set the ON timer, otherwise the clock feature will be deactivated.

13 Automatic Power ON with ON Timer

Procedure

1) Hold down the FUNC switch and press the 0/TIMER key. "0:00" will be displayed (present time).

2) Hold down the FUNC switch and turn the Rotary CH selector to set the hour of ON time.

3) Turn the Rotary CH selector to set the minute. To set the hour and minute, turn the Rotary CH selector clockwise.

4) Hold down the FUNC switch and press the 0/TIMER key. The frequency will be displayed, and the ON time for turning the transceiver power on is set automatically.

5) Now activate the ON timer operation. Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode.

6) Hold down the FUNC switch and press the 0/TIMER key. The upper dot on the display, which has been blinking, lights steadily indicating that the ON timer is activated.

7) When the set ON time comes, the power of the transceiver will be turned ON automatically. Three short, high-beep sounds is generated when the power is turned ON.

Caution
1. When the battery case is to be removed from the transceiver for a long period of time, be sure to deactivate the ON timer, or the lithium backup battery will be consumed quickly.

2. If the dot on the upper part of the display is lit, On-Timer operation has already been set, and the clock continues to operate even after the power is switched OFF.

14 Duplex Operation

By installing the CKP412, the transceiver can operate in a semi-duplex operation by two frequencies.

Procedure

1) Store the frequencies for use in duplex operation in Group M and Group $\overline{M}$ (place them in the same memory address Nos. in different groups).
2) Put the transceiver in the Memory Recall mode, and display "M_x" or "$\overline{M}_x$".
   In this case, let us display "M_x".
3) Hold down the FUNC switch and press the 4/DUP key. "DUP" will be displayed indicating the duplex operation mode.
4) The frequency of "M_x" becomes the receiving frequency, and that of "$\overline{M}_x$" becomes the transmitting frequency when the PTT switch is pressed.

Advice

o To exchange the transmitting and receiving frequencies in the duplex operation mode, hold down the FUNC switch and turn the Rotary CH selector.
o When the Rotary CH selector is turned in the duple operation mode, only those memory address Nos. that can be used in duplex operation are displayed in sequence. It is also possible to recall a duplex memory address No. by pressing a numeric key.

Caution

Holding down the FUNC switch and pressing the 4/DUP key in the Dial Frequency mode does not activate duplex operation. When the recalled memory address No. does not contain a memory frequency, duplex operation cannot be activated.

15 Channel Display

This feature allows to change the memory frequency display to channel display. It is specially useful in local QSO operation. To display the channel No., hold down the FUNC switch and press the 9/F/CH key in the Memory Recall mode. The Channel Display mode will not be entered if no memory frequency has been stored in memory or if the memory is being changed. In the Channel Display mode, the DUPlex, PAGer and C.SQL operations are deactivated. The correspondence between the memory address Nos. and channel Nos. is as shown below. In the Channel Display mode, the channel Nos. can be changed in sequence by turning the Rotary CH selector. In this case, memory address Nos. which do not contain memory frequency are skipped. Also note that almost all keys are inoperative in the Channel Display mode.

M_0 : C-00 M_1 : C-01 M_2 : C-02 $\sim$ M_9 : C-09

$\overline{M}_0$: C-10 $\overline{M}_1$: C-11 $\sim$ $\overline{M}_9$: C-19

16 Pager Operation

This feature allows to call a specific station (Individual call) or to or call a group of stations simultaneously (Group call). The optional CTD412 must be installed for this operation.

Note
The optional Touch Tone Unit (CTD412) must be installed for operating the pager and code squelch features. Before operating the pager and code squelch features, it is required to store the individual code (3-digit) and group code (3-digit) of your local station in the transceiver memory. If the individual code and group code are not set, the pager feature and code squelch feature cannot be used.

When the pager feature is used, disable the battery saver feature.

Individual codes
A   001
B   002
C   003
D   004

100
Group code
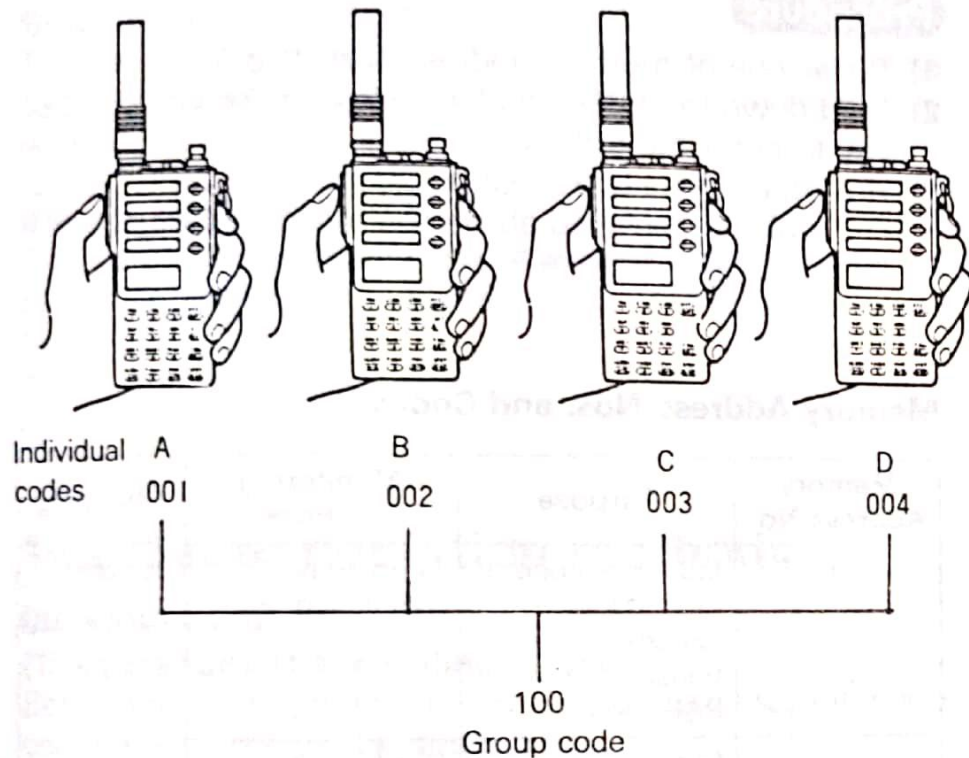
16.1 Preparation for Pager Operation

1) Install the optional CTD412 Touch Tone Unit on the C112 Transceiver.
2) Select an individual code and store it in memory.
3) Select a group code and store it in memory.

Caution

The pager operation is not available unless the individual code or group code is coincident. Therefore, it is important to assign the same group code to all members subject to paging.

(1) Storing individual code and group code in memory

The individual code and group code consist respectively of 3 digits. Select a 3 digits for each of them.

Procedure

Example: **Storing the individual code of your local station, "001", in memory address No. 0, and group code of your local station, "100", in memory address No. 2**

1) Hold down the FUNC switch and press the 3/CODE key.
2) The frequency display disappears, and "0̄ C00" is displayed in its place. The present status of the transceiver is called the Code Display mode.

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3) Now, turn the Rotary CH selector. The memory address Nos. will vary in sequence of 0, 1, 2, 3, 4, 5, P, 0 ... (The initial setting at the factory is "$\overline{0}$ C000".)
4) Turn the Rotary CH selector to display memory address No. 0, then press numeric keys "0", "0" and "1" in this order. When "1" is pressed, a long, high-beep sound is generated indicating that the individual code has been set.
5) Turn the Rotary CH selector to display memory address No. 2, then press numeric keys "1", "0" and "0" in this order. When the last "0" is pressed, a long, high-beep sound is generated indicating that the group code has been set.

o The 3 digits of individual code and group code consist of DTMF signals 0 to 9. The codes are generated by the CTD412.
o The monitoring feature can be activated for use in the pager operation. When a pager signal is received, the pager operation usually starts if the received codes are coincident with your codes. However, it is also possible to not to start the pager operation depending on the setting of the termination monitoring feature. As the termination monitoring has not been activated for the transceiver in the initial setting, pager operation occurs only when the code stored in memory address 0 is coincident with the received code.

For each of the memory address Nos. 1 to 5, the termination monitoring feature can be activated or deactivated individually.

Procedure

1) Recall one of memory address Nos. 1 to 5.
2) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode.
3) Hold down the FUNC switch and press the 3/CODE key. "−" will be displayed above the memory address No. if the monitoring feature is activated for it.

Memory Address Nos. and Codes

Memory Address No.	Purpose	Monitoring Feature	Changing
0	Individual code of local station (automatically transmitted in PAG mode).	Permanent monitoring	Possible
1	Group codes.	Can be set or canceled individually.	
2			
3			
4			
5			
P	Individual code of remote station	No-permanent monitoring	Impossible

Individual code of local station:
In pager operation, this is transmitted automatically after the group code, individual code or ID code of remote station.

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Group code:
This can be used as the ID code. The termination monitoring can be activated or deactivated individually for each memory address No.

Remote-office code:
The individual code of the remote station received during pager operation is automatically stored in memory address No. P.

16.2 Pager operation methods

Individual Call

(1) Operations at the calling party
Before proceeding to the following, the frequency for use in communication must be determined.
1) Store the individual code and group code of your local station in memory.
2) Set the individual code of the remote station to be called as follows. Hold down the FUNC switch and press the 3/CODE key. Turn the Rotary CH selector to display memory address No. 1, and enter the individual code of the remote station with the numeric keys.
3) Press the PTT switch momentarily to enter the Dial Frequency mode. (The transceiver can also be put to the Dial Frequency mode by holding down the FUNC switch and pressing the 3/CODE key.)
4) Hold down the FUNC switch and press the 1/PAG key. "PAG" will appear on the top of the display.

5) When the PTT switch is pressed, DTMF signals are transmitted automatically (their sounds are also generated). In the DTMF signals, the individual codes of the remote station and your local stations are transmitted in sequence.

X X X * X X X

Individual code of your local station

Individual code (or group code) of remote station

Note
If memory address No. 2 is selected in step 2), the pager calls the local station with the group code.

Advice

Once the DTMF signals start to be transmitted, the transmission continues until all DTMF signals have been transmitted, even after the PTT switch is released.

Group Call

(1) Operations at the calling party

Before proceeding to the following, the frequency for use in communication must be determined.

1) Set the group code of the stations to be called as follows. Hold down the FUNC switch and press the 3/CODE key. Turn the Rotary CH selector to display memory address No. 2, and enter the group code with the numeric keys.
2) Press the PTT switch momentarily to enter the Dial Frequency mode.
3) Hold down the FUNC switch and press the 1/PAG key to activate the pager feature. "PAG" will be displayed.
4) When the PTT switch is pressed, the group code and the individual code of your local station are transmitted in sequence.

(2) Operations at the receiving party

Before proceeding to the following, the frequency for use in communication must be determined.

1) Hold down the FUNC switch and press the 1/PAG key to activate the pager feature. "PAG" will be displayed.
2) Activate the monitoring feature for the memory address No. to be used.
3) When a received code is coincident with a code in memory for which the monitoring feature has been activated, 7 beep sounds (Prr-prr-prr...) are generated and "PAG" shown on the top of the display starts blinking. The frequency on the display disappears, and the individual code of the remote station will be displayed in place. "P CXXX" is displayed when your station is called with the individual code, and "2 C100" is displayed when your station is called with the group code. Before starting

communication with the calling station, hold down the FUNC switch and press the 1/PAG key twice to deactivate the pager operation.

Advice

o The beep sounds generated when the individual or group codes coincide can be muted in the middle by pressing the FUNC switch.
o While "PAG" is blinking on the receiver as a result of reception of pager signal, holding down the FUNC switch and pressing the 1/PAG key turns the blinking to steady lighting.
o In case the individual code of the remote station cannot be received completely due to interference or other reasons, "E" is displayed together with the previous code. In this case, the individual code of remote station set in memory address P is also the previously-used code, and that of the present remote station cannot be confirmed.
o It is also possible to generate only one beep sound when the codes coincide.

Procedure

1) Hold down the FUNC switch and press the ON/OFF/SET key to enter the Set mode.
2) Hold down the FUNC switch and press the 1/PAG key.

Caution

In the RPT mode (+ or −), the time required before the DTMF signals are transmitted is longer than usual. In this case, press the PTT switch for a relatively long period.

16.3 Communications with C5200/D, C500 and C420 DTMF-compatible models manufacturer by Standard

The C5200/D, C500 and C420 Transceivers can access the C112 but they are not capable of pager and code squelch operations.

Note
With the C5200/D, the optional CMP830D DTMF
Microphone must be used.
With the C500, the optional CTD500 DTMF Unit must
be used.
With the C420, the optional CTD120 DTMF Unit must
be used.

Example: Communication between C5200/D and C112

(1) On the C5200/D, replace the microphone with the optional CMP830D.
On the numeric keypad of the CMP830D, enter "100*001"

Caution
When entering characters "100*001", each key shall not be depressed for more than 1.5 second, and a key shall be pressed within less than 1.5 second after pressing the previous key.

(2) On the C112 Transceiver, the pager feature shall previously be activated so that "PAG" is displayed. When "C001" is displayed, a beep sound is generated, and "PAG" starts blinking. Before starting communication, hold down the FUNC switch and press the 1/PAG to deactivate the pager feature.

C5200/D
CMP830D

Enter "100*001"
on the keypad
of CMP830D.

Caution
Press keys within
1.5-second intervals.

☐☐☐ * ☐☐☐

"C001" is displayed. Hold down the FUNC switch and press the 1/PAG key to deactivate the pager, then start communication.

Individual code of local station ⑤

Group code stored in local station ③

Individual code of remote station, stored in local station ④

On the receiving party, "XCXXX" is displayed when called by ③, "PCXXX" is displayed when called by ④.

"X" is a numeric that varies according to situation.

16.4 Communication between C112 transceivers

Station A
Individual code: Address 0, 001
Group code: Address 2, 100
Frequency: 145.02 ——————— Decide as desired. ———————

Station B
Individual code: Address 0, 002
Group code: Address 2, 100
Frequency: 145.02

(1) Hold down the FUNC switch and press the 1/PAG key to activate PAG feature.

(2) Hold down the FUNC switch and press the 3/CODE key, and enter the individual code of Station B, "002", with the numeric keys.

(3) Press the PTT switch. The individual code of remote Station B and that of local Station A will be transmitted. ————————————→

(4) The pager buzzer beeps and the displayed ←———————— "PAG" blinks. The individual code of Station B, 002, is displayed as "PC002".

(5) Hold down the FUNC switch and press the 1/PAG key twice to deactivate the pager feature and start communication.

(1) Hold down the FUNC switch and press the 1/PAG key to activate PAG feature.

(2) The pager buzzer beeps, and the displayed "PAG" blinks. The individual code of Station A, "001" is displayed as "PC001".

(3) When the PTT switch is pressed, the individual code of remote Station A and that of local Station B are transmitted.

In step (4) for Station A or step (2) for Station B, if the individual code of remote station cannot be received due to a certain reason, the previously-used code is displayed as "PEXXX".

Station A

Individual code: Address 0, 001
Group code: Address 2, 100
Frequency: 145.04

Recall group code address 2 and press the PTT switch. Only stations to which the same group code are called.

Station B

Individual code: Address 0, 002
Group code: Address 2, 100
Frequency: 145.04

A call with the group code is indicated: 2 C100

Prr-prr-prr....

By turning the Rotary CH selector or pressing #/▲/PWR to display the address P content, the individual code of the station activating the group call can be identified.

Station C

Individual code: Address 0, 003
Group code: Address 2, 100
Frequency: 145.04

A call with the group code is indicated: 2 C100

By turning the Rotary CH selector or pressing #/▲/PWR to display the address P content, the individual code of the station activating the group call can be identified.

Prr-prr-prr.....

17 Code Squelch Operation

The code squelch feature enables the same operation as the squelch feature, except that only the group code is transmitted with the code squelch feature.

Caution
- The group code is transmitted for a period of about 300 ms. Therefore, it is recommended to breathe a moment between communications.
- In case of code squelch operations via a repeater station, press the PTT switch for longer period than usual. If the PTT switch is pressed just for a moment, the code may not be transmitted correctly.

TROUBLESHOOTING QUESTIONS & ANSWERS

Q: Frequency display is dim (gets dark).
A: When the batteries are nearly exhausted, the entire display becomes dim.
(The batteries are exhausted. Replace with new batteries.)

NOTE:
The power switches OFF automatically when the batteries are exhausted. If this occurs, replace the batteries and press the power switch to ON to resume operation.

Q: The unit returns to the initial status every time the power is switched OFF/ON.
A: Replace the lithium battery.
When the lithium battery for memory backup becomes weak, the contents of the memory circuit cannot be maintained.

Q: Cannot receive any signal.
A: Press the SQL OFF switch and check if sound is output from the speaker.
A: Check if the tone squelch has been activated.
(Deactivate the tone squelch operation.)
A: Check if the VOL control is turned fully counterclockwise.
(Turn the VOL control clockwise to optimize the volume.)
A: Check if the pager or code squelch feature has been activated.
(Deactivate the pager and code squelch operations.)

Q: Can only receive strong signals.
A: Check if the supplied antenna is installed correctly.
(Install the supplied antenna correctly.)

Q: Cannot transmit.
A: Check if the TX/BUSY indicator light is dim when the PTT switch is pressed.
(Replace the batteries.)

A: Check if "P.L" is displayed.
(Hold down the FUNC switch and press the A/F.L/PTT.L key to unlock the PTT lock.)

Q: Can only transmit with the call frequency.
A: Check if you pressed the CALL key.
(Press the CALL key again to return to the Dial Frequency mode.)

Q: Cannot transmit with the frequency being displayed.
A: Check if "DUP" is displayed.
(The transmitting frequency and receiving frequency are different in the duplex operation.)

Q: Cannot change the frequency.
A: Check if "F.L" is displayed.
(Press the A/F.L/PTT.L key to deactivate the Frequency Lock.)

Q: No beep sound is generated by the buzzer.
A: Check if the VOL control is turned fully counterclockwise.
(The buzzer volume varies according to the VOL control position. Turn the VOI control clockwise to optimize the volume.)
A: Check if the buzzer sound has been muted.
(Press the STEP/BZ key to cancel the buzzer muting.)

Q: Displayed content is not normal.
A: Remove the battery case once, then install it again while holding down the FUNC switch. This will reset the microprocessor.

Q: Power cannot be switched ON.
A: The power switches OFF automatically when the batteries are exhausted. Replace the batteries and press the power switch to ON to resume operation.

SPECIFICATIONS

GENERAL

Frequency Range .... 144.00 to 147.995 MHz
Modulation Type F3
Microphone Input Impedance .... 600 ohms
Speaker Impedance .... 8 ohms
Operating Voltage Range .... 5.5 to 16.0 V
Nominal Input Voltage .... 7.2 V

Current Drain

Transmission 13.8 V   Hi: approx. 1400 mA
                       Mid: approx. 1000 mA
         7.2 V   Hi: approx. 950 mA
                       Mid: approx. 750 mA
      13.8 V/7.2 V   Lo: approx. 450 mA
      Standby: approx. 43 mA
      Battery Save: approx. 18 mA

Dimensions .... 110(H) × 53(W) × 32.5(D) mm
    with battery case for 6 SUM-3 (R6, 'AA'-size) batteries.
                110(H) × 53(W) × 25.5(D) mm
                   when CNB412 is installed.

Weight .... 350 g (including antenna and batteries)

RECEIVER

Receiver Type .... Double-conversion super-heterodyne
Intermediate Frequencies
   1st IF .... 21.8 MHz
   2nd IF .... 455 kHz
Sensitivity (12 dB SINAD) .... −10 dB(0.158 mV)
S/N (at 0.5 µV input) .... 30 dB or more
Squelch Sensitivity .... −12 dB (0.125 µV)
Audio Output .... 400 mW (into 8-ohm, 10% distortion)

TRANSMITTER

RF Output
   Hi .... 2.0 W (with CBT412),
                             5 W (with CNB414),
              2.0 W (with CNB412/413/415)
   Mid .... 2.5 W (with CNB414)
         1 W (with CNB412/413/415 and CBT412)
   Lo .... 0.3 W
Modulation Type .... Reactance modulation
Maximum Frequency Deviation .... ±5 kHz
Spurious Ratio .... −60 dB or more
Built-in Microphone .... Electret capacitor microphone.

Improvement may result in changes in design and
specifications without notice.

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