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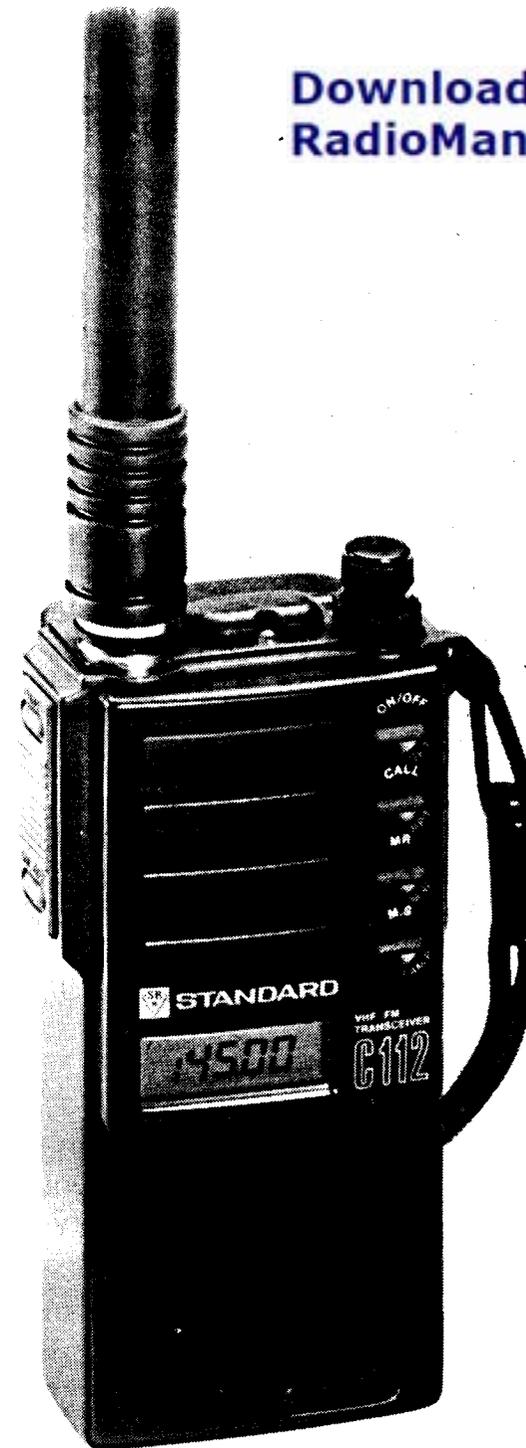
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# C112E

VHF Handy Transceiver

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# OWNER'S MANUAL



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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.

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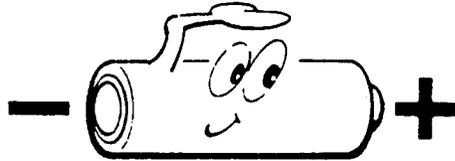
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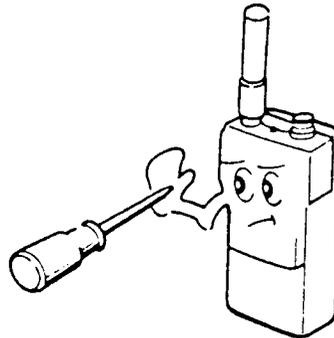
# PRIOR TO USAGE

Prevent me from the following.

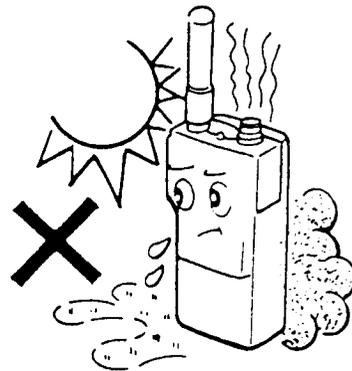
- 1.** Be sure to observe the +/- polarity of batteries.



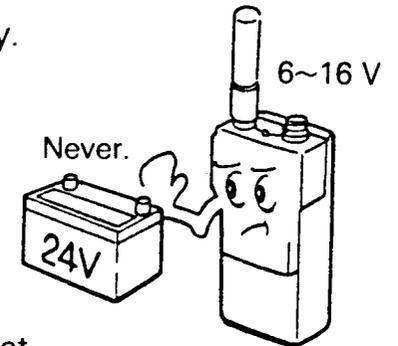
- 2.** Do not touch cores or trimmers. They are aligned at best condition.



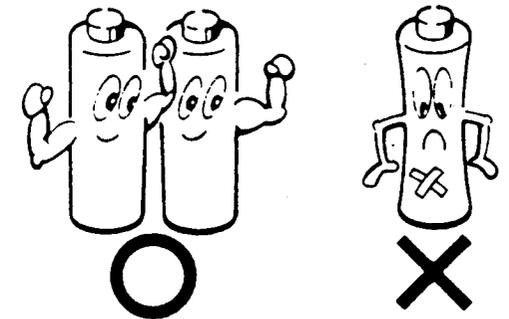
- 3.** Keep out of high temperature, humidity and dust.



- 4.** Do not use a 24 V battery.



- 5.** Do not use old and new batteries together.

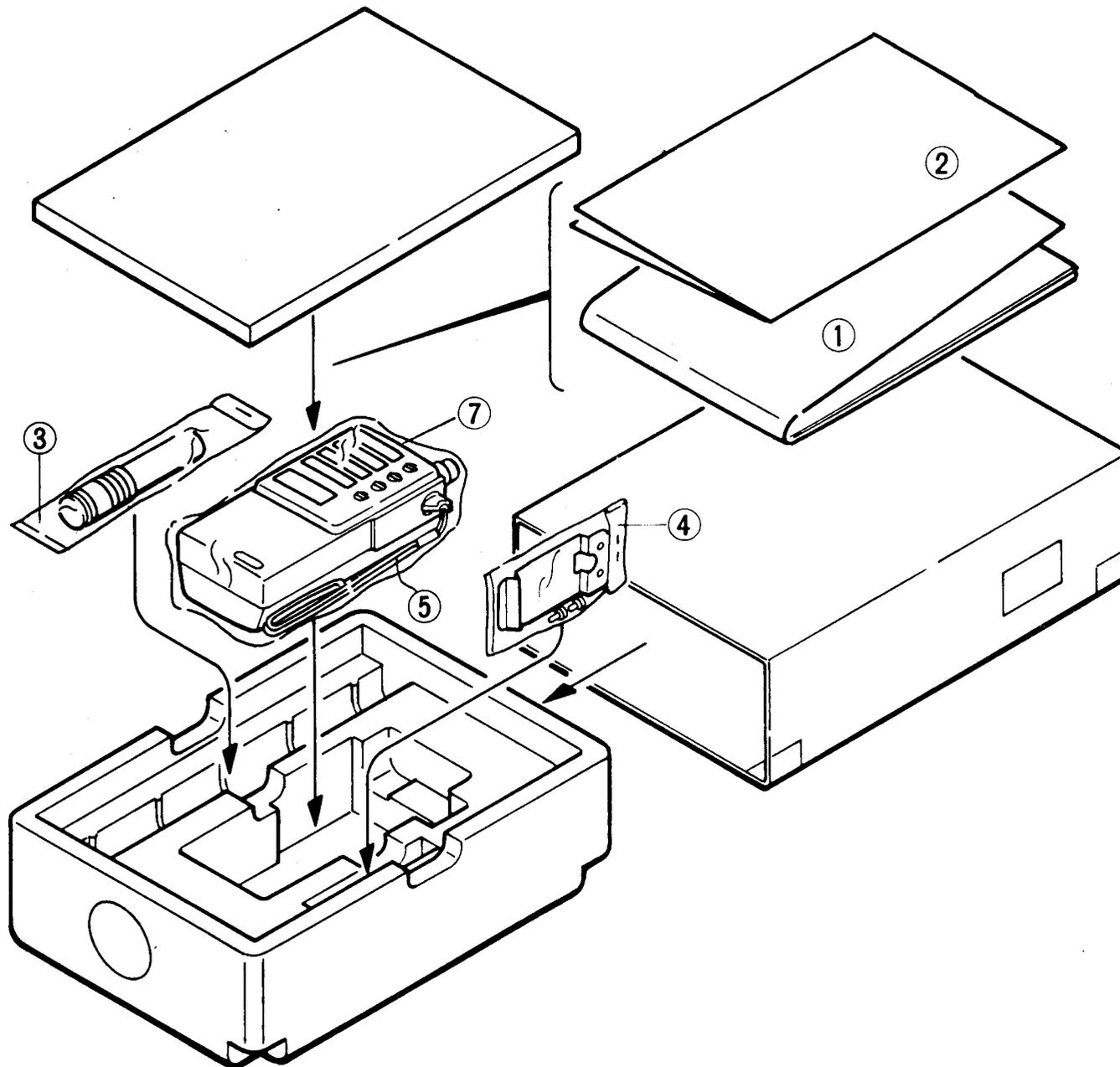


- 6.** Do not dispose of batteries in fire.



# UNPACKING

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)

# OPTIONAL ACCESSORIES

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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

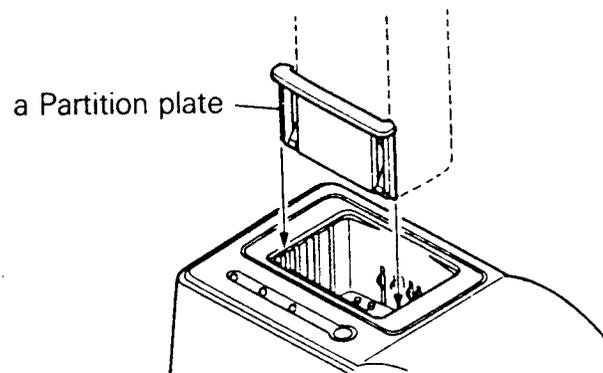
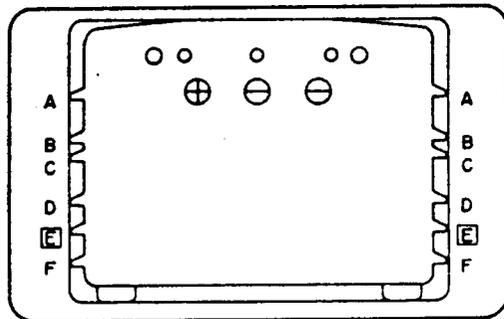
CMP112: Compact microphone & speaker combination

# OPERATION OF CSA150E DESKTOP CHARGER

(The CSA150E is optional.)

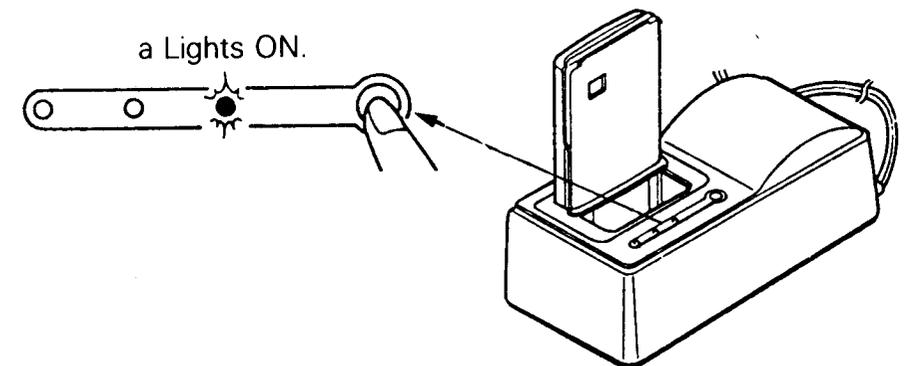
## ● How to use the CSA150E option

- (1) The CSA150E can be used with several types of rechargeable 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.]



## 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 partitioned 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.



## Caution

- 1) When charging, be sure to switch the transceiver power OFF.
- 2) Do not operate the transceiver during charging, or malfunction will result.

# FEATURES

## **Very compact, simple and heavy-duty design.**

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

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

- 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.**

- Even power can be switched ON/OFF by a touch of a key.
- 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.
- The Set mode allows to set the repeater offset frequency, CTCSS unit ON/OFF and channel step.
- In the Repeater mode, the CTCSS unit may also be used as the tone encoder. (CTN412 is installed.)

## **Auto squelch with simple operation.**

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

## **High-sensitivity design.**

- Our traditional, approved design achieves a high sensitivity of  $-10 \text{ dB}\mu$ . ( $0.158\mu\text{V}$ )

## **Max. 20-channel memory.**

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

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

- 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.**

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

### **Wide variety of full-feature options.**

- 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.

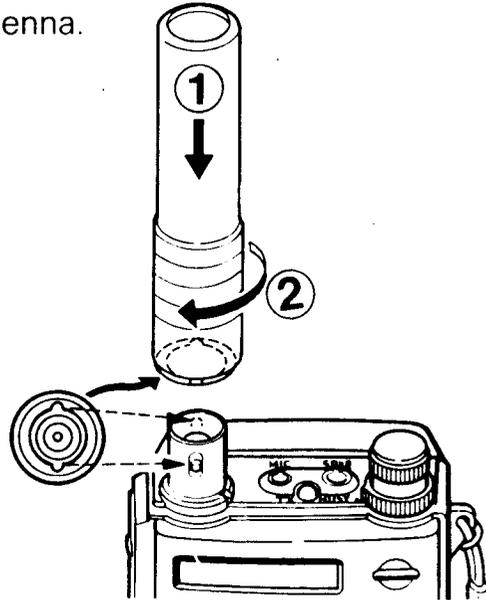
### **Various upgrading features.**

- (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.

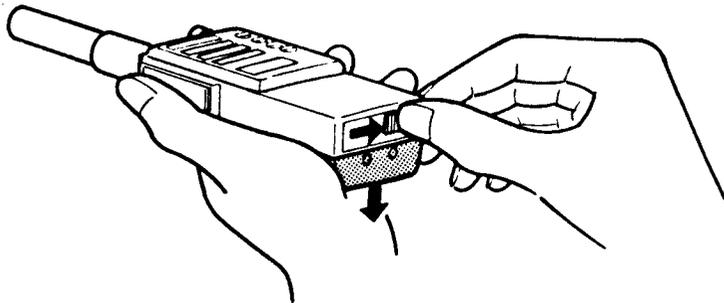
- (6) Battery save timer setting feature  
The timer may be set to up to 9 seconds in 1-second steps. "0" turns the battery save feature off.
- (7) Scanning.  
The MHz band is pause-scanned.
- (8) Lamp lock.
- (9) Buzzer ON/OFF.
- (10) Clock feature.  
A 24-hour clock feature can be added. The clock 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

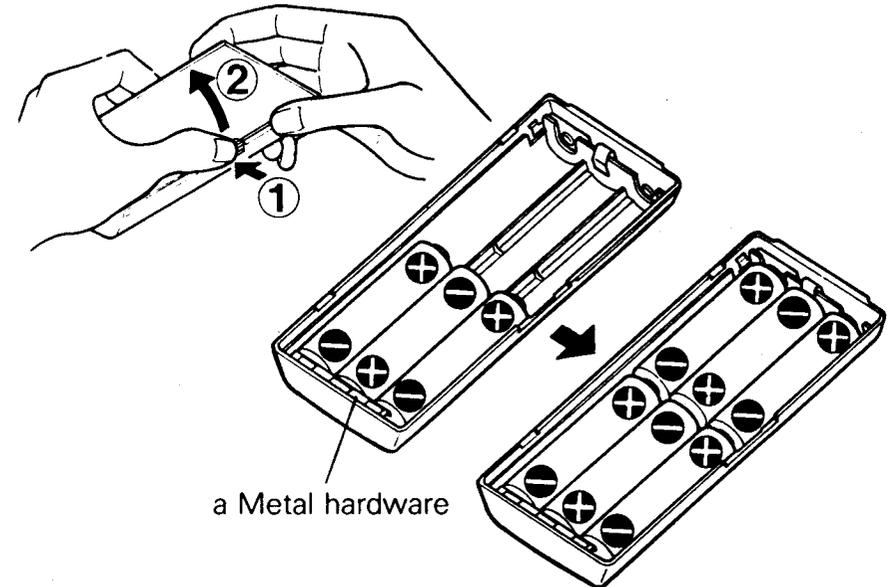
1. Install the supplied antenna.



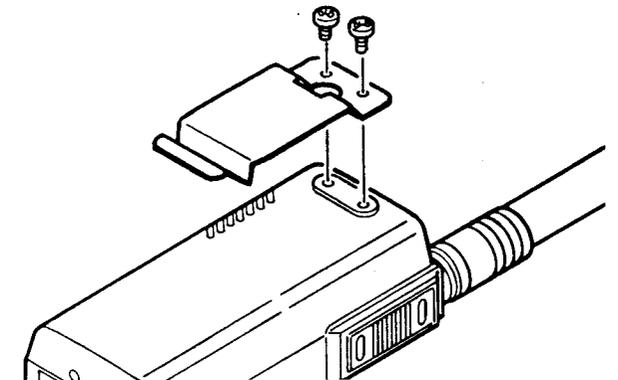
2. Remove the battery case from the main body.  
1) Slide the lock button in the direction of the arrow.  
2) Separate the battery case in the direction of the arrow.



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.

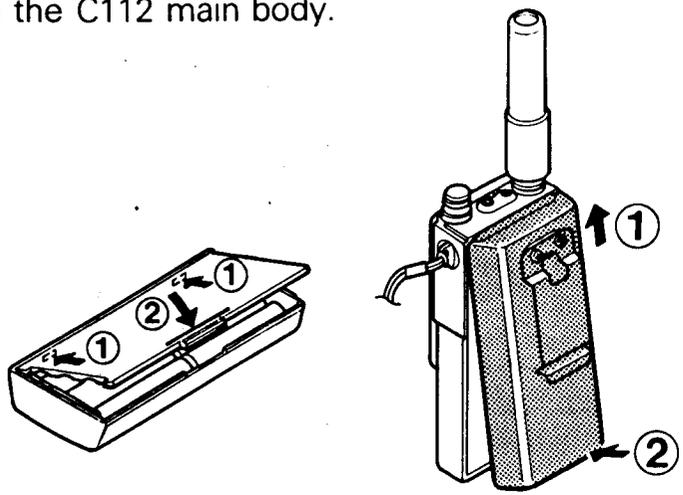


4. Mount the supplied belt clip using the 2 screws.

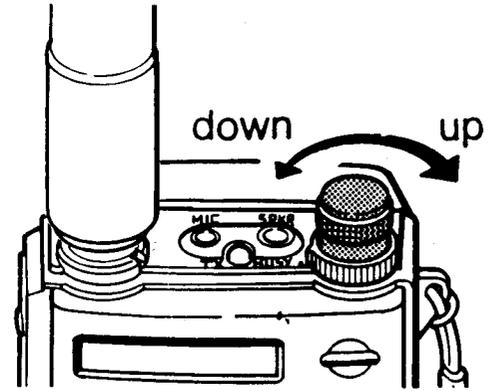


**NOTE:** The antenna design may differ on the product specifications.

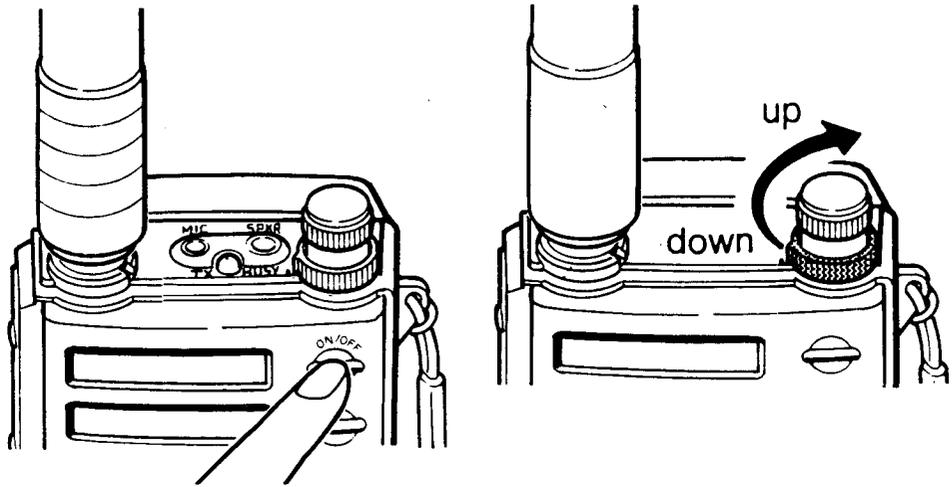
**5.** After loading batteries, close the battery pack and install it on the C112 main body.



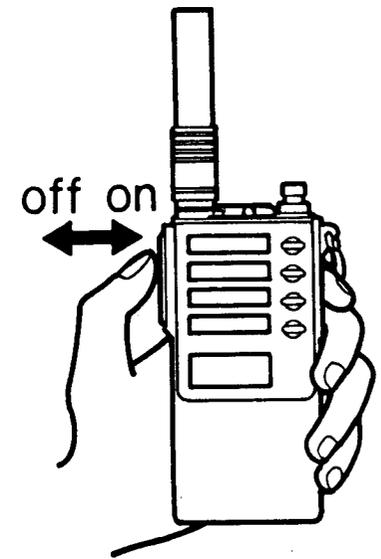
**7.** Set the frequency by turning the CH selector knob.



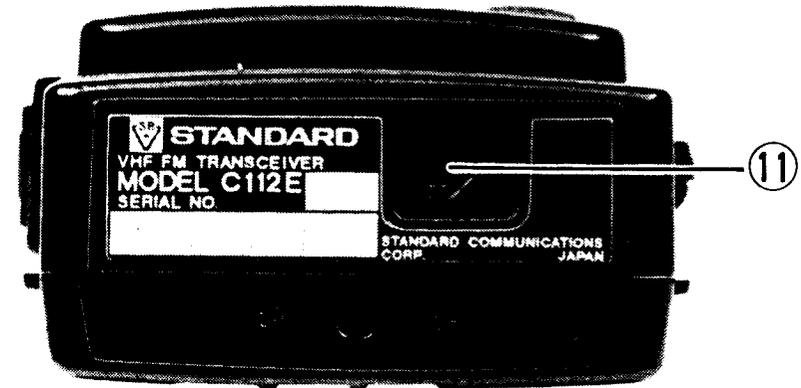
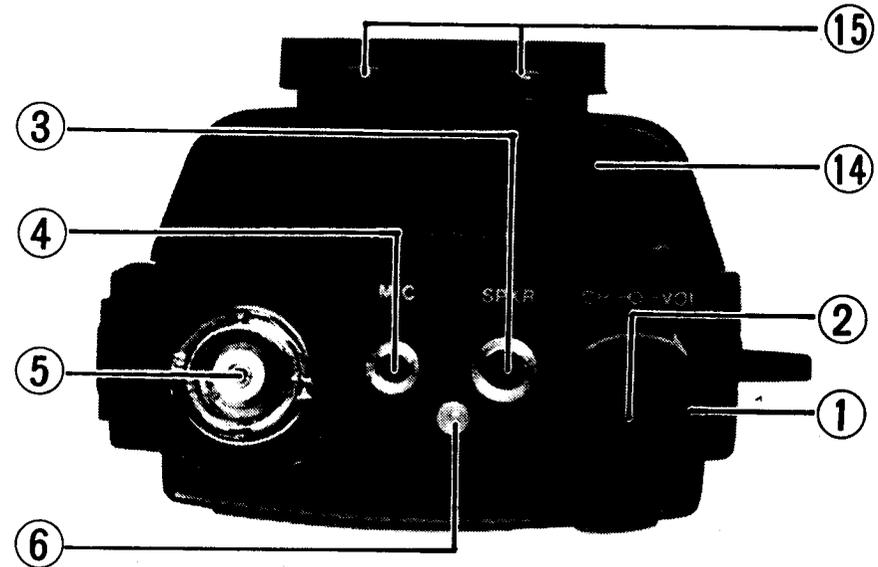
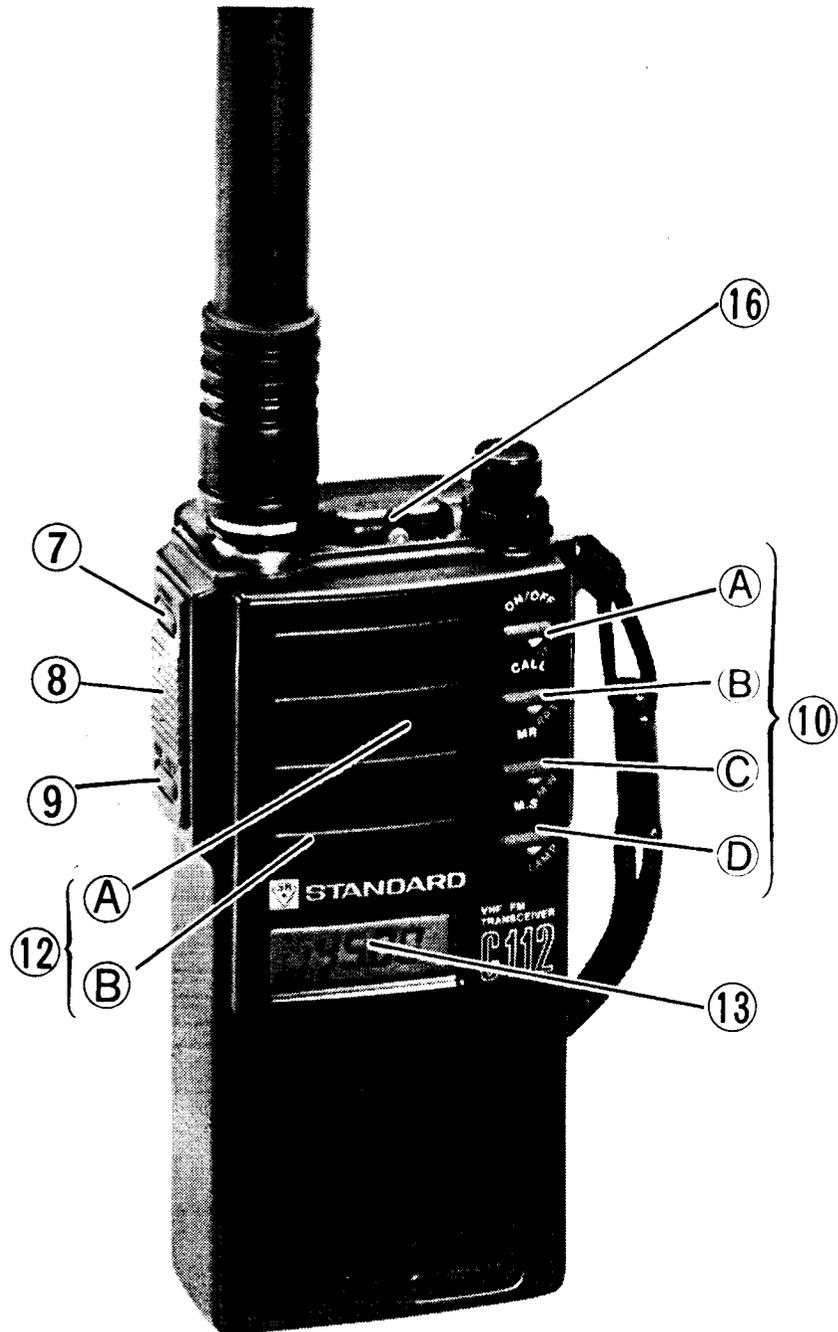
**6.** Press the power ON/OFF key to ON and adjust the sound volume by turning the VOL control.



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



# CONTROLS AND CONNECTORS



NOTE: Some parts shown in the picture may differ depending 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.SQ. 1) Sets/cancel Shift operation and Encode mode. 2) When recalling Offset, recalls/cancels T.SQ-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 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 $\bar{M}$ .	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 $\bar{M}$ .	

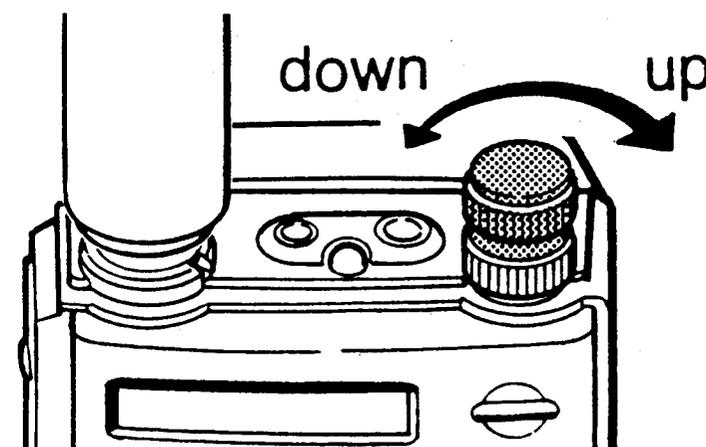
The proper operation, improper operations and special-function operations of transceiver are noticed by the following buzzer sounds.

- 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.

## 1 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.

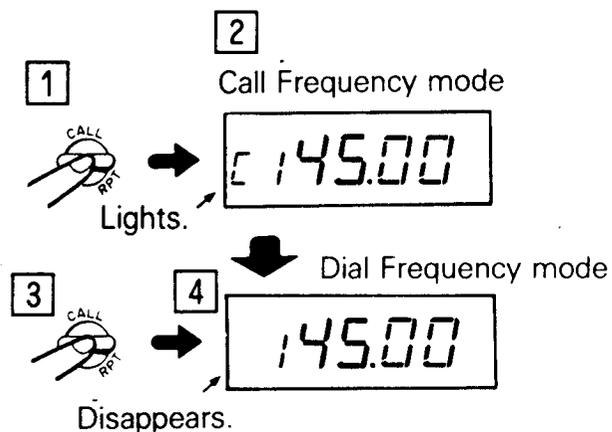
## 2 Priority recalling of call frequency [CALL key]

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) "c145.00" is displayed.
- 3) Press the CALL/RPT key again.
- 4) The frequency before the CALL/RPT key was pressed is displayed.



### Note

The displayed "c145.00" frequency cannot be varied by turning the Rotary CH selector.

### Advice

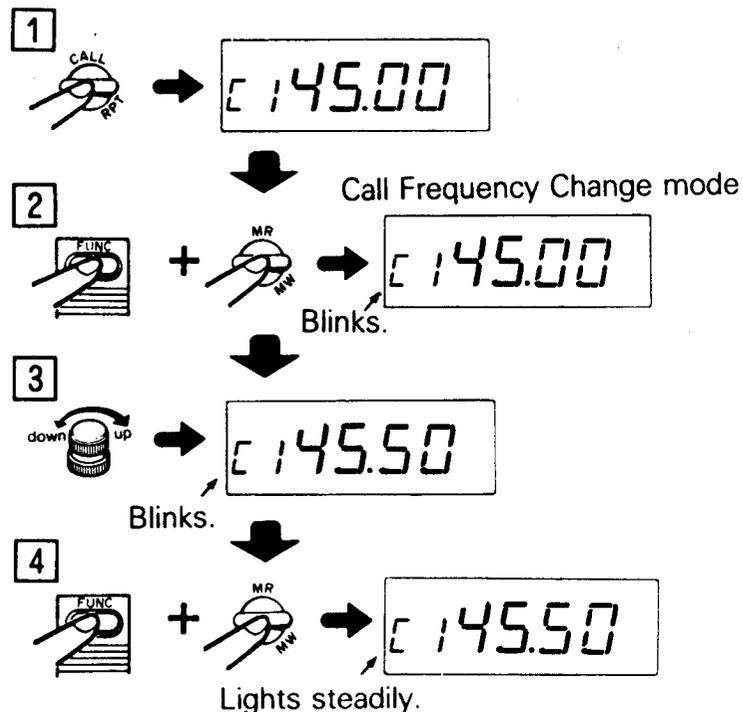
The call frequency, which has been set to 145.00 MHz at the factory, can be changed to a desired frequency.

## Changing the Call Frequency

**Example:** To change call frequency to 145.50 MHz

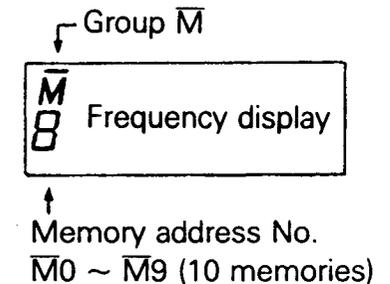
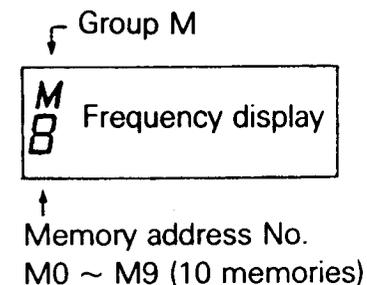
### Procedure

- 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.



## 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  $\bar{M}$  consisting of  $\bar{M}0$ ,  $\bar{M}1$ ,  $\bar{M}2$ ,  $\bar{M}3$ ,...  $\bar{M}9$ .



### 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. "M<sub>X</sub>" 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 "M<sub>1</sub>" 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

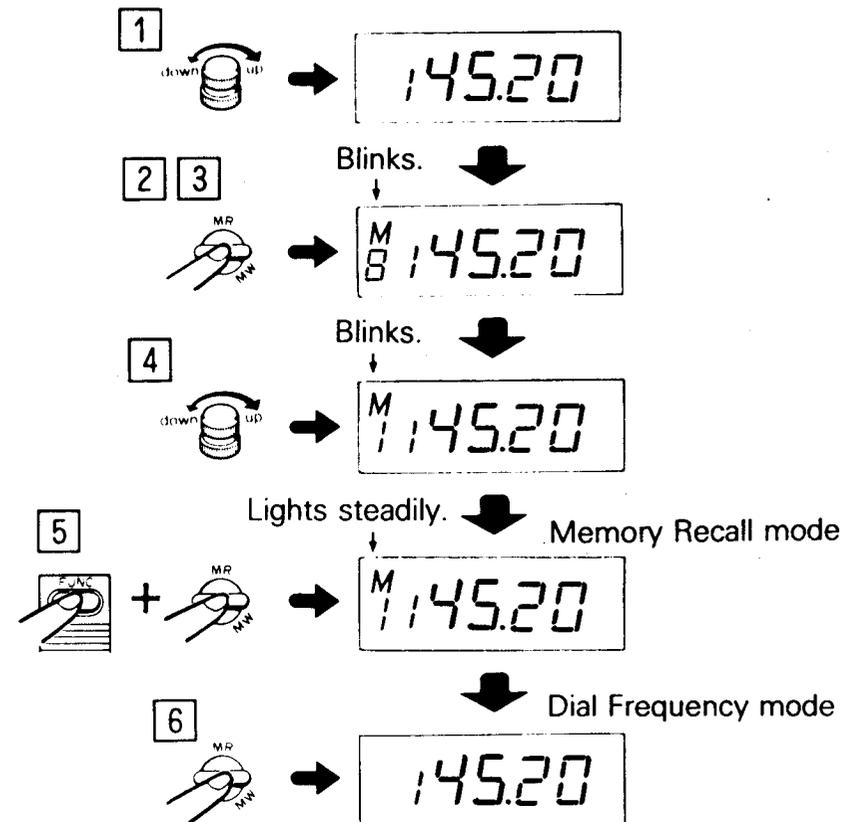
The memory address Nos. in Group M allow to store the tone frequency and offset frequency together with the memory frequency.

### Advice

To store frequencies in  $\bar{M}0, \bar{M}1, \bar{M}2, \bar{M}3, \dots, \bar{M}9$ , set the group to  $\bar{M}$  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

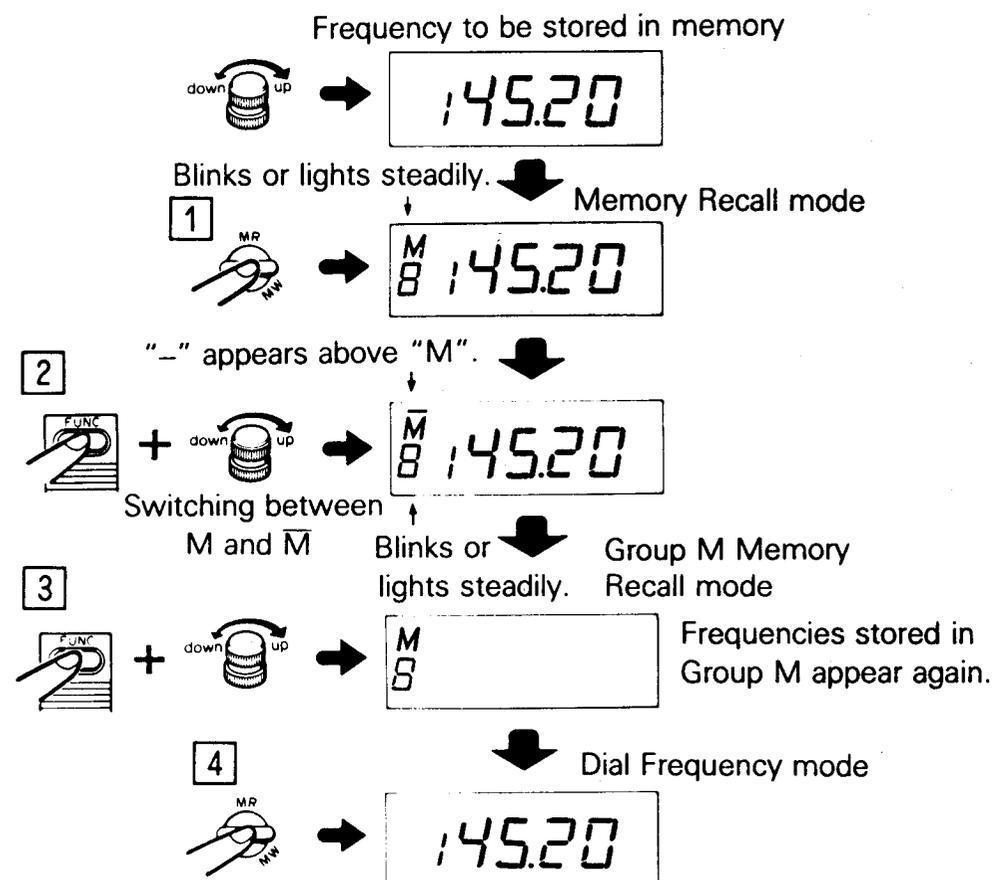
"M<sub>X</sub>" means any one of memory address Nos. 0 to 9.



**Example 2: To store frequency in  $\bar{M}1$  (Storing 145.20 MHz in  $\bar{M}1$  by switching Group M to Group  $\bar{M}$ )**

**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  $\bar{M}$  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.



## 4 Recalling Memory Frequency [MR/MW key]

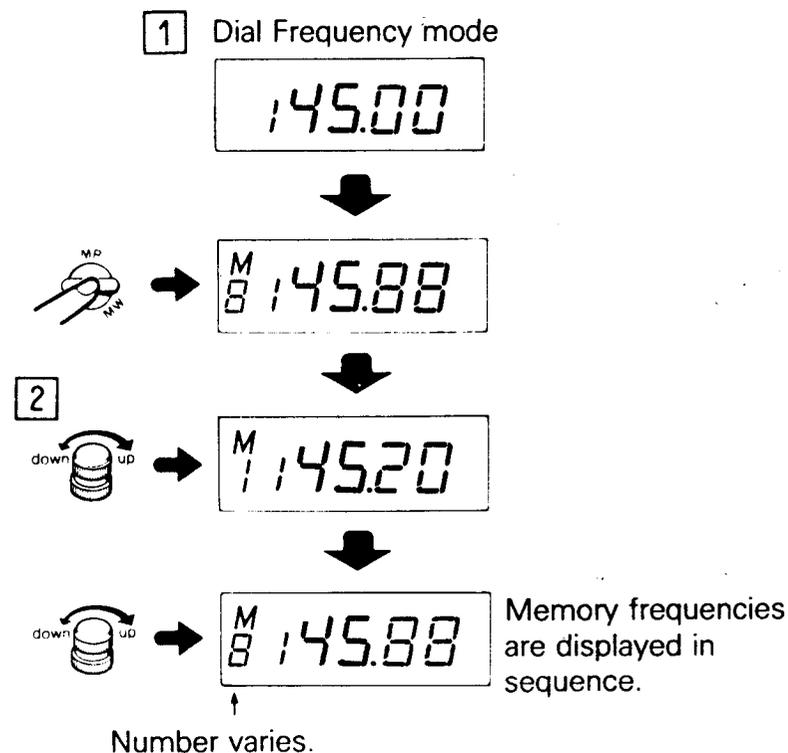
**Example: To recall "M1"**

### 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

- If you select a memory address No. that does not contain a memory frequency, "M<sub>x</sub>" and the number below it will blink to indicate it, and the dial frequency will be displayed.
- The Rotary CH selector can recall only those memory frequencies that have been stored in memory address Nos. in Group M or  $\bar{M}$ .



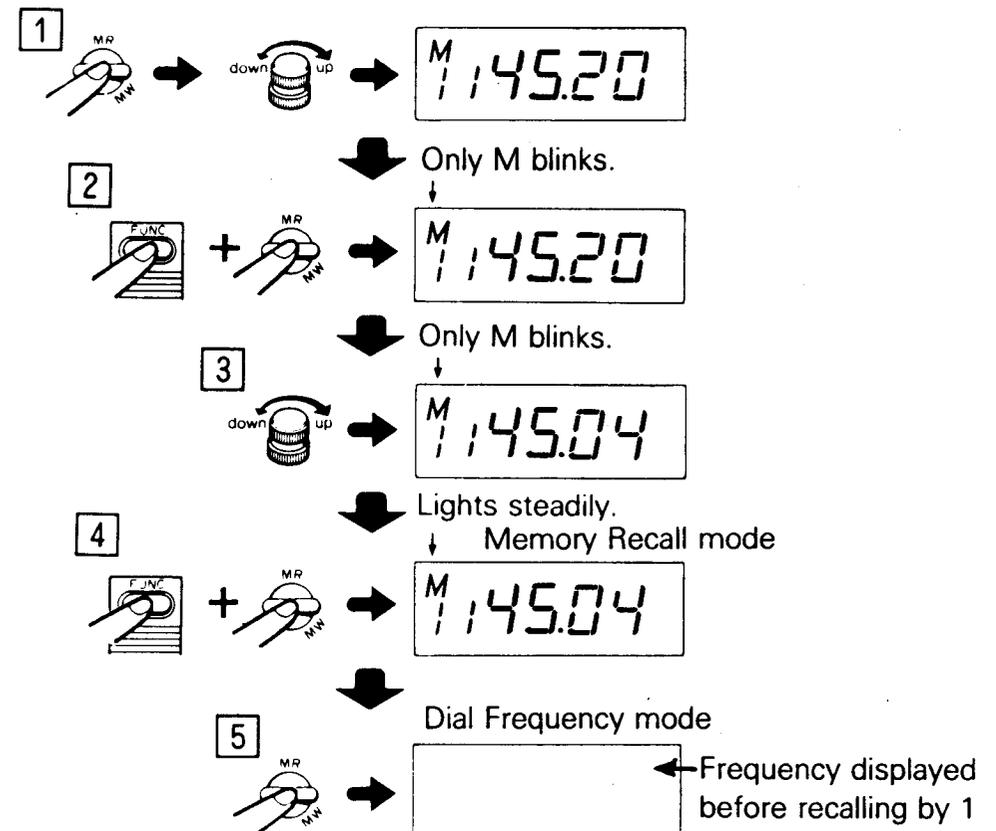
## 5 Changing Memory Frequency

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.



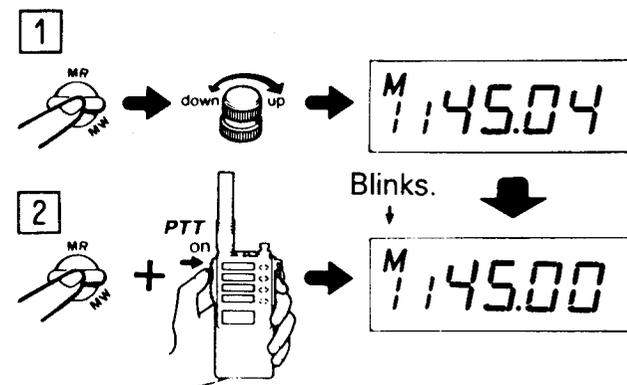
## 6 Deleting Memory Frequency

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.



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  $\bar{M}$ .
  - 2) M-Memory Scan
  - 3)  $\bar{M}$ -Memory Scan

## 7.4 Scanning Operation Procedures

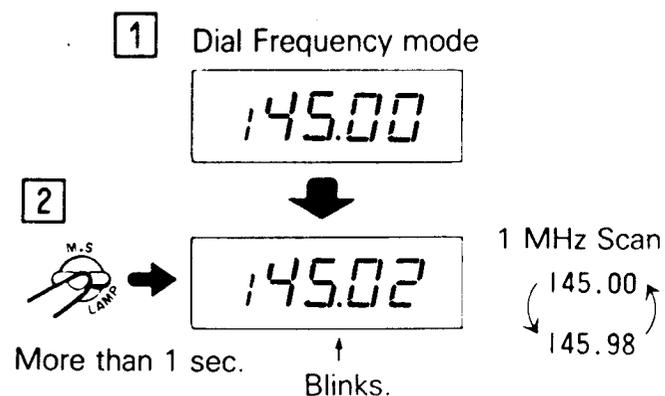
### 7.4.1 Dial-frequency scanning

#### 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.



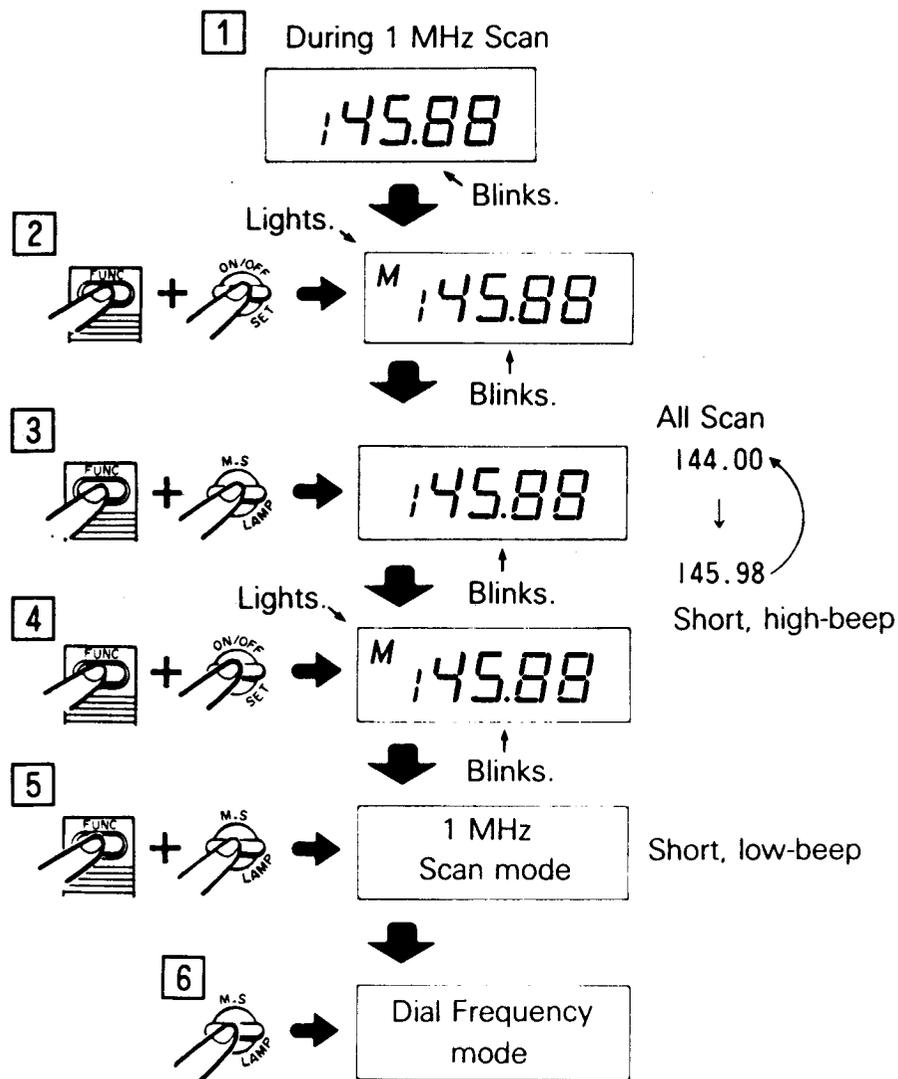
#### 2) All Scan within the amateur band

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.



## 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  $\bar{M}$ -Memory Scan for scanning memory frequencies in a group.

#### 7.4.2.1 M-Memory Scan

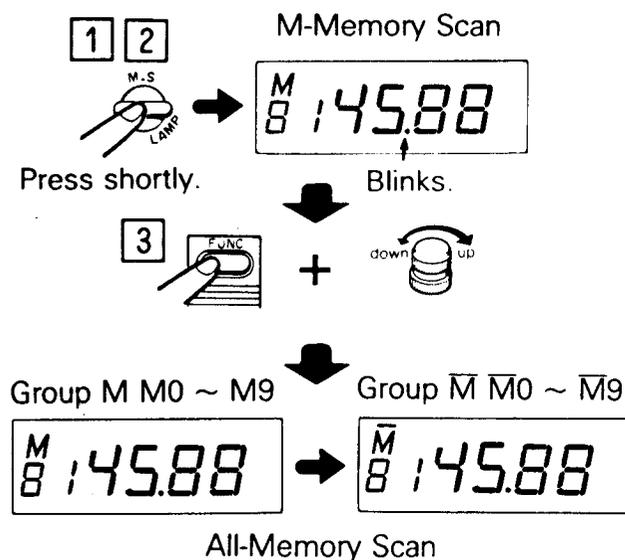
To scan the memory frequencies stored in memory address Nos. "M0" to "M9", use the following procedure. The Memory-frequency scanning scans only those memory address Nos. in which memory frequencies are stored, and skips the memory address Nos. which do not contain memory frequencies.

## Procedure

- 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.

## Advice

- When the FUNC switch is pressed during scanning, it pauses while the FUNC switch is held down.
- To return to M-Memory Scan or  $\bar{M}$ -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  $\bar{M}$ -Memory Scan will start.

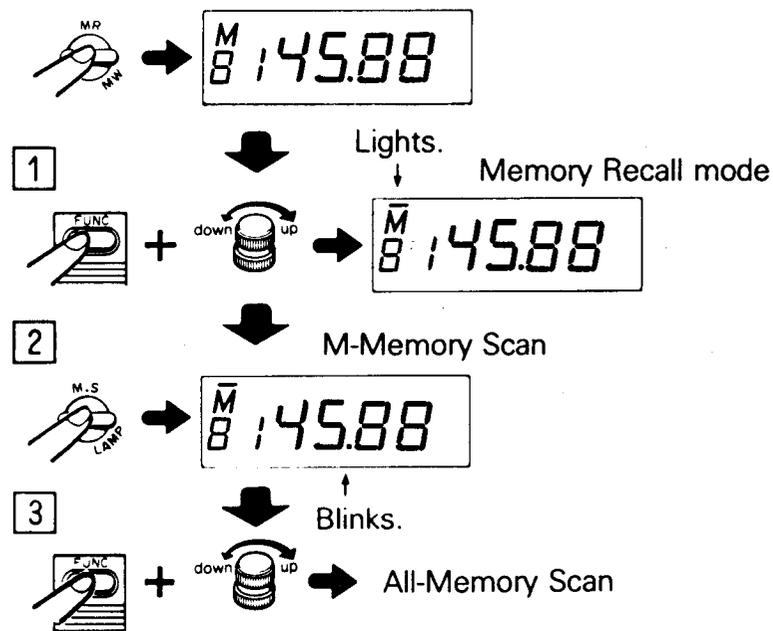


### 7.4.2.2 $\bar{M}$ -Memory Scan

To scan the memory frequencies stored in memory address Nos. " $\bar{M}0$ " to " $\bar{M}9$ ", 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  $\bar{M}$ .
- 2) Press the M.S/LAMP key for an instant.  $\bar{M}$ -Memory Scan will start.
- 3) To start All-Memory Scan, hold down the FUNC switch and turn the Rotary CH selector by one click.



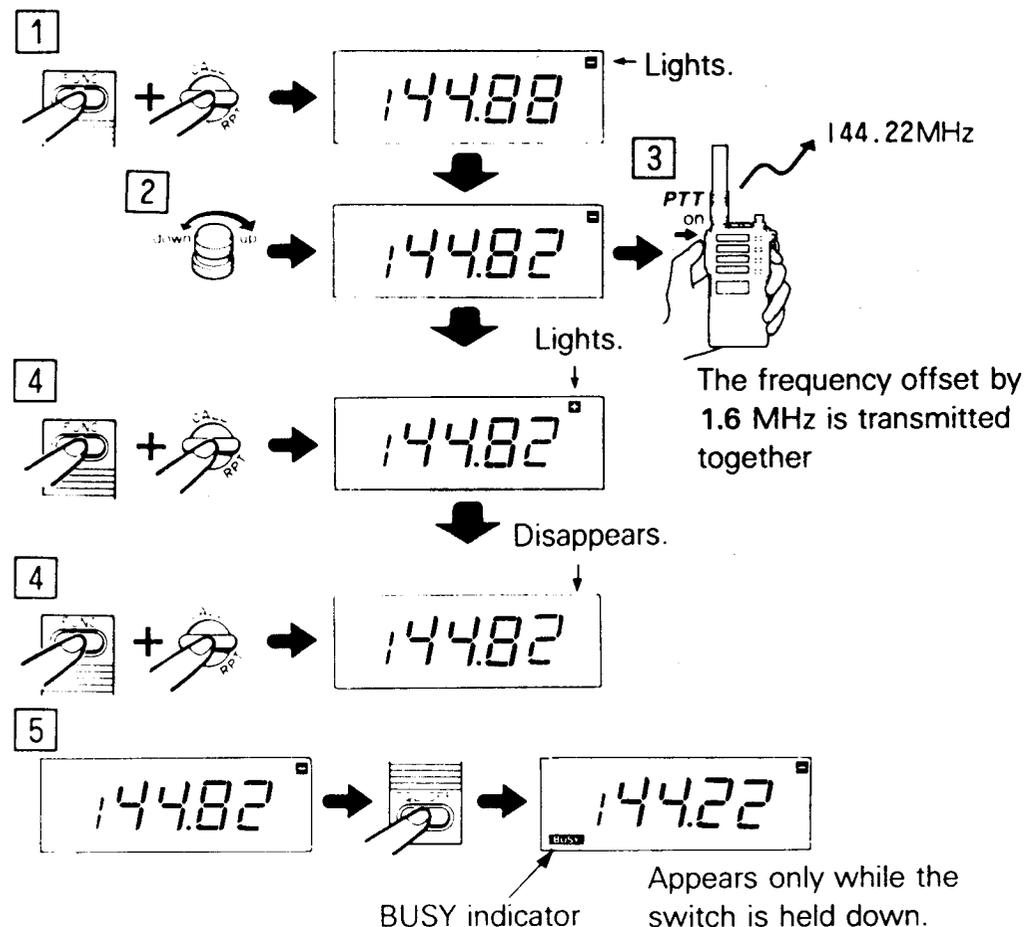
# 8 Shift operation [CALL/RPT key]

## 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 the Shift mode, it puts the transmitter to the Reverse mode and, at the same time, turns squelch off.



## 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 displayed: 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 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

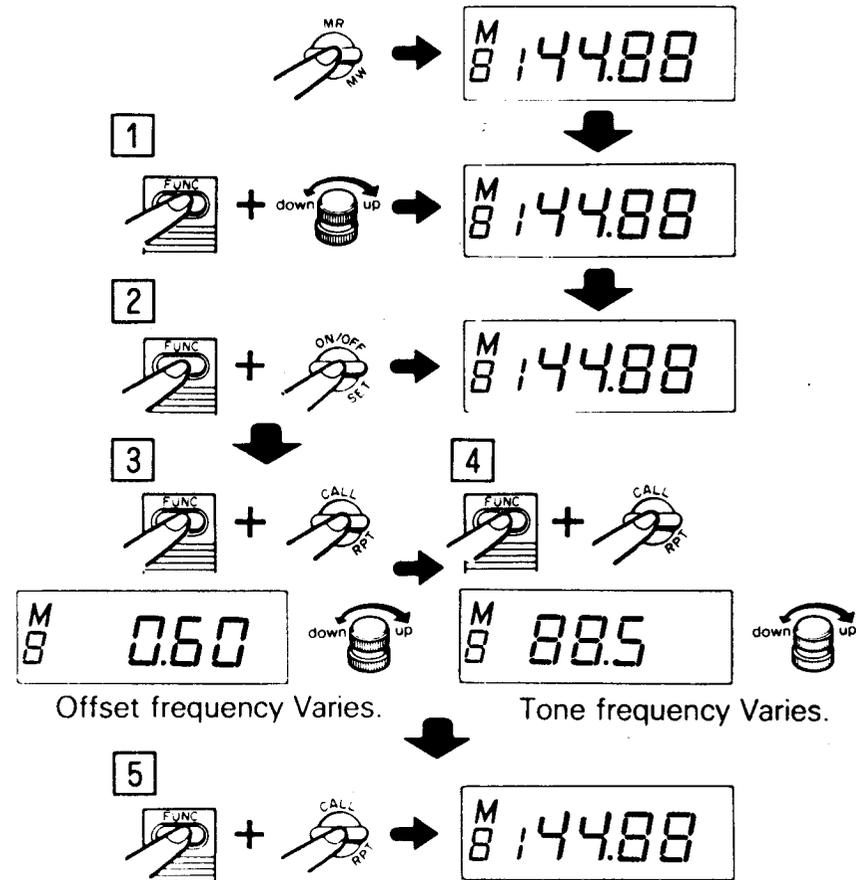
The tone frequency write operation is valid only when the CTN412 is installed.

## 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.



# 11 Tone Squelch Control

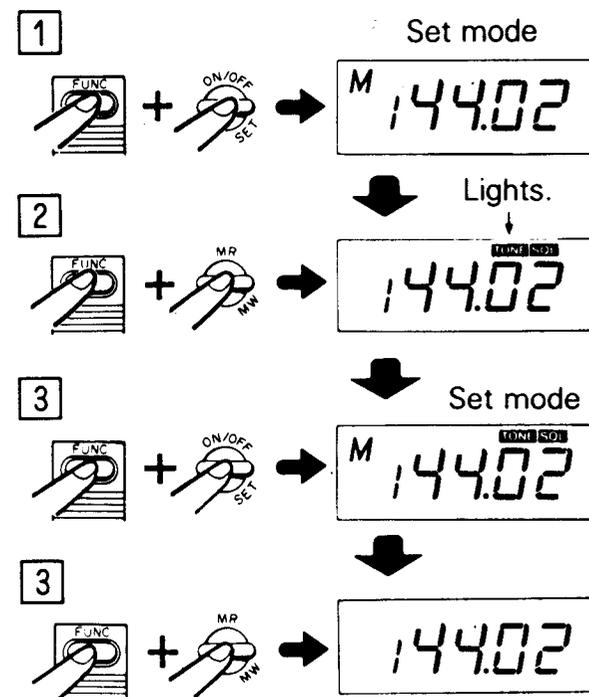
Use this feature for tone squelch operation using the optional CTN412 Tone Squelch Unit.

## 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.



## 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.

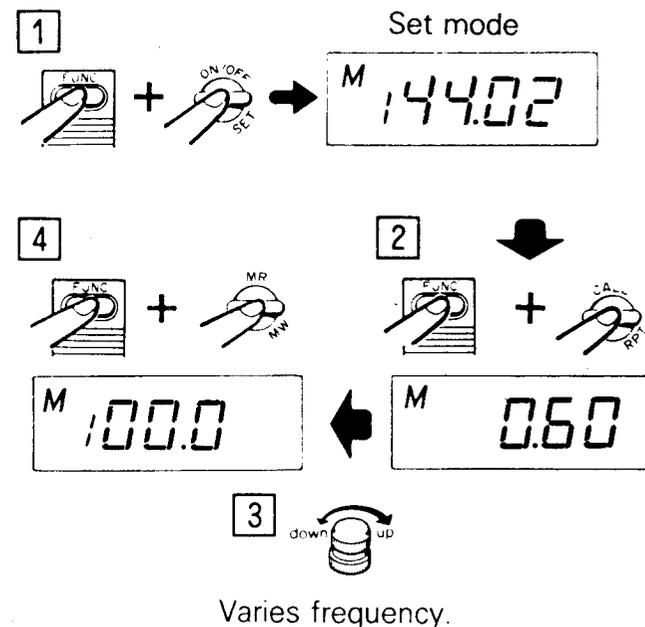
### Available tone frequencies (Unit: Hz)

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 displayed. 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.

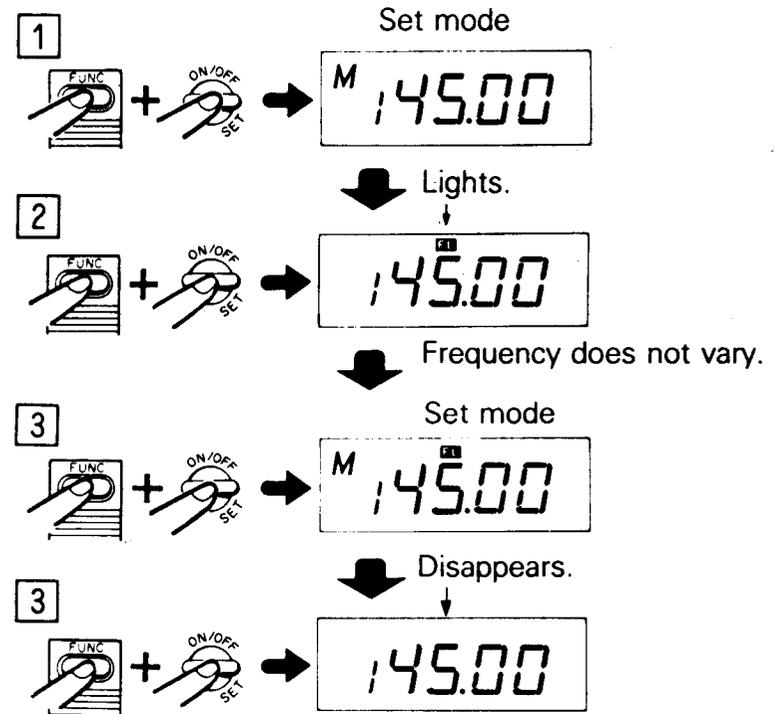


# 13 Frequency Lock

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.



## 14 Changing Channel Step

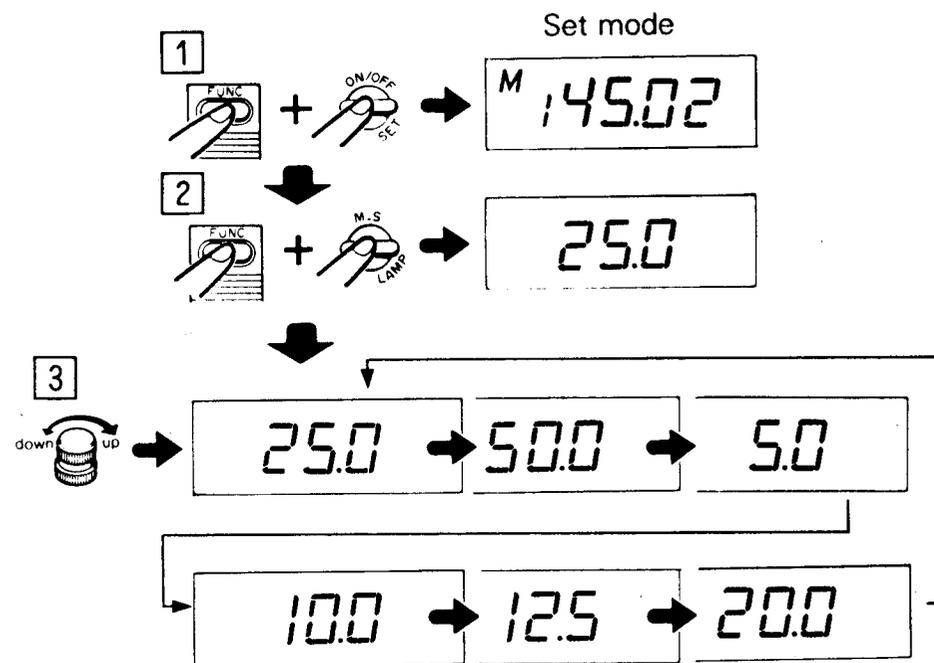
The channel step rate of the transceiver can be changed in six ways according to the usage.

### 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

- The channel step rate can be set to 5 kHz, 10 kHz, 12.5 kHz, 20 kHz, 25 kHz or 50 kHz.
- 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.
- The initial setting of channel step rate at the factory is 25 kHz.



## 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

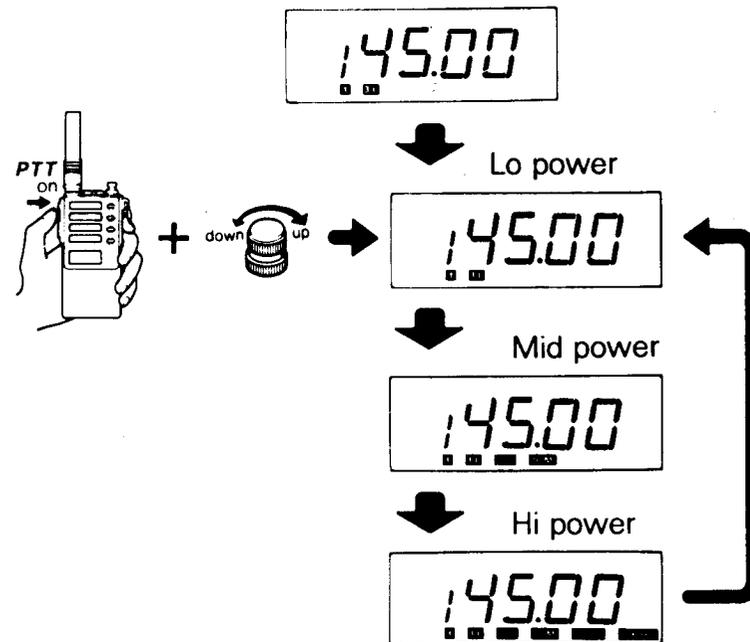
(Figures when the CNB414 or CMA412 is used and 13.8 V is applied)

### 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

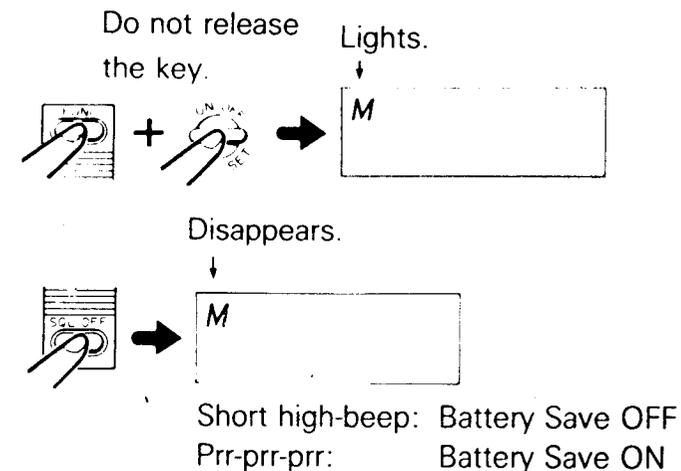
This feature allows to save power consumption required in reception standby. It is specially useful in case you have to wait signal reception for a long period of time. When Battery Save is activated, it operates at an interval of one second to turn on/off the reception standby, making it possible to 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.

### 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.

### Advice

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



## 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

- 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.
- 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.
- Never dispose of a used battery in fire.

# 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 VOL 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 micro-processor.

**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

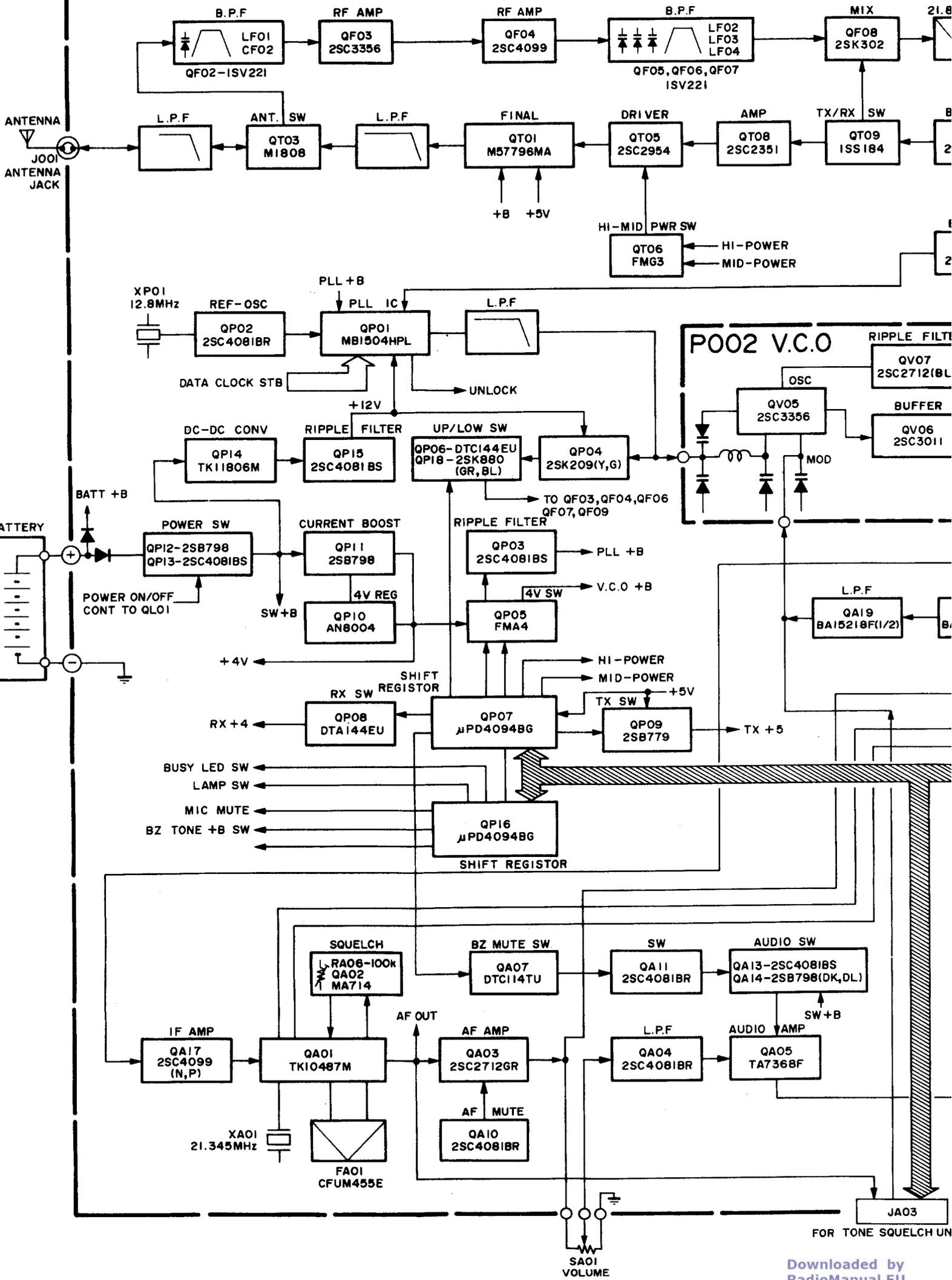
Receiver Type ..... Double-conversion super-heterodyne  
Intermediate Frequencies  
1st IF ..... 21.8 MHz  
2nd IF ..... 455 kHz  
Sensitivity (12 dB SINAD) ..... -10 dB (0.158 mV)  
S/N (at 0.5  $\mu$ V input) ..... 30 dB or more  
Squelch Sensitivity ..... -12 dB (0.125  $\mu$ V)  
Audio Output ..... 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 .....  $\pm 5$  kHz  
Spurious Ratio ..... -60 dB or more  
Built-in Microphone ..... Electret capacitor microphone.

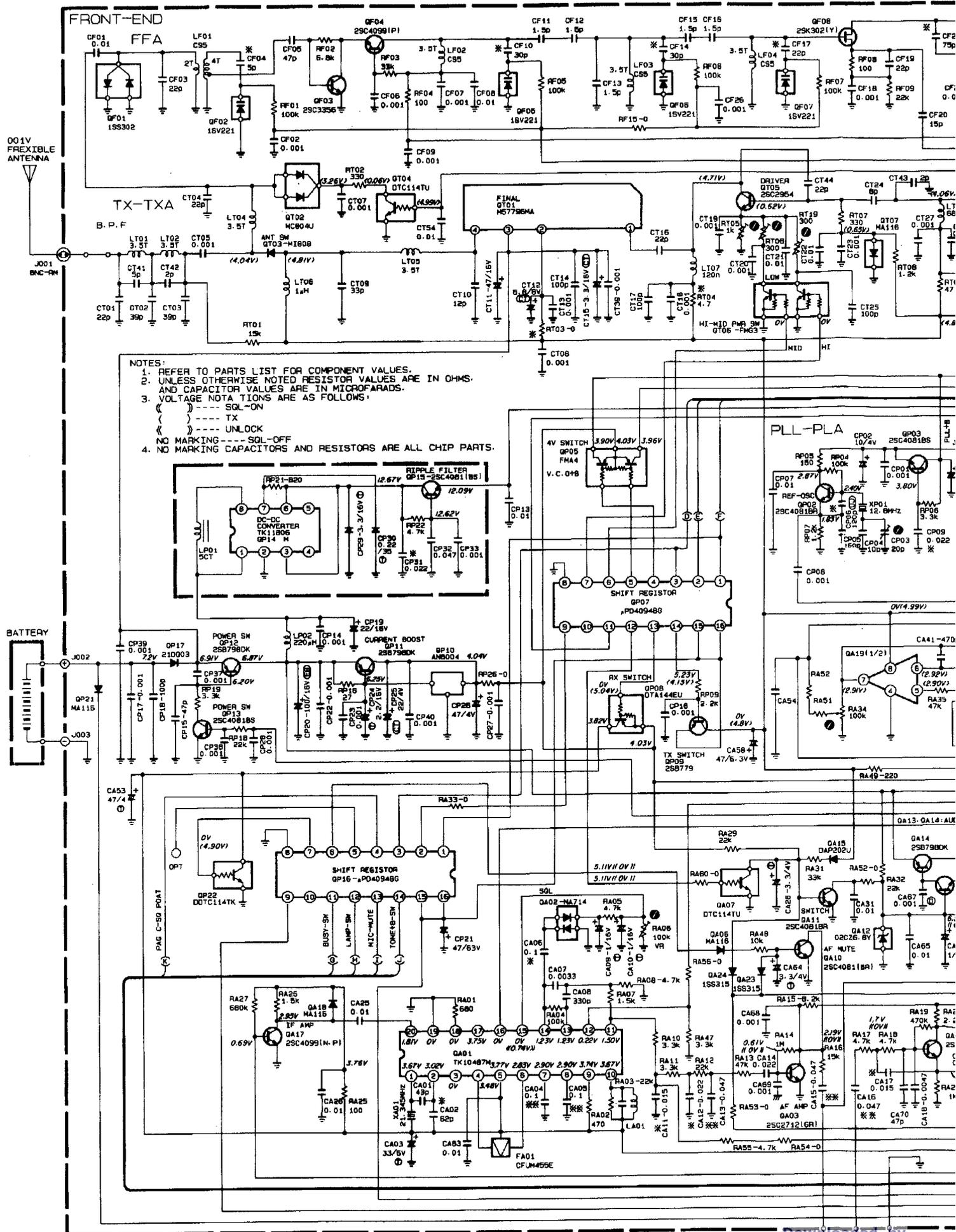
Improvement may result in changes in design and specifications without notice.

# POOL1



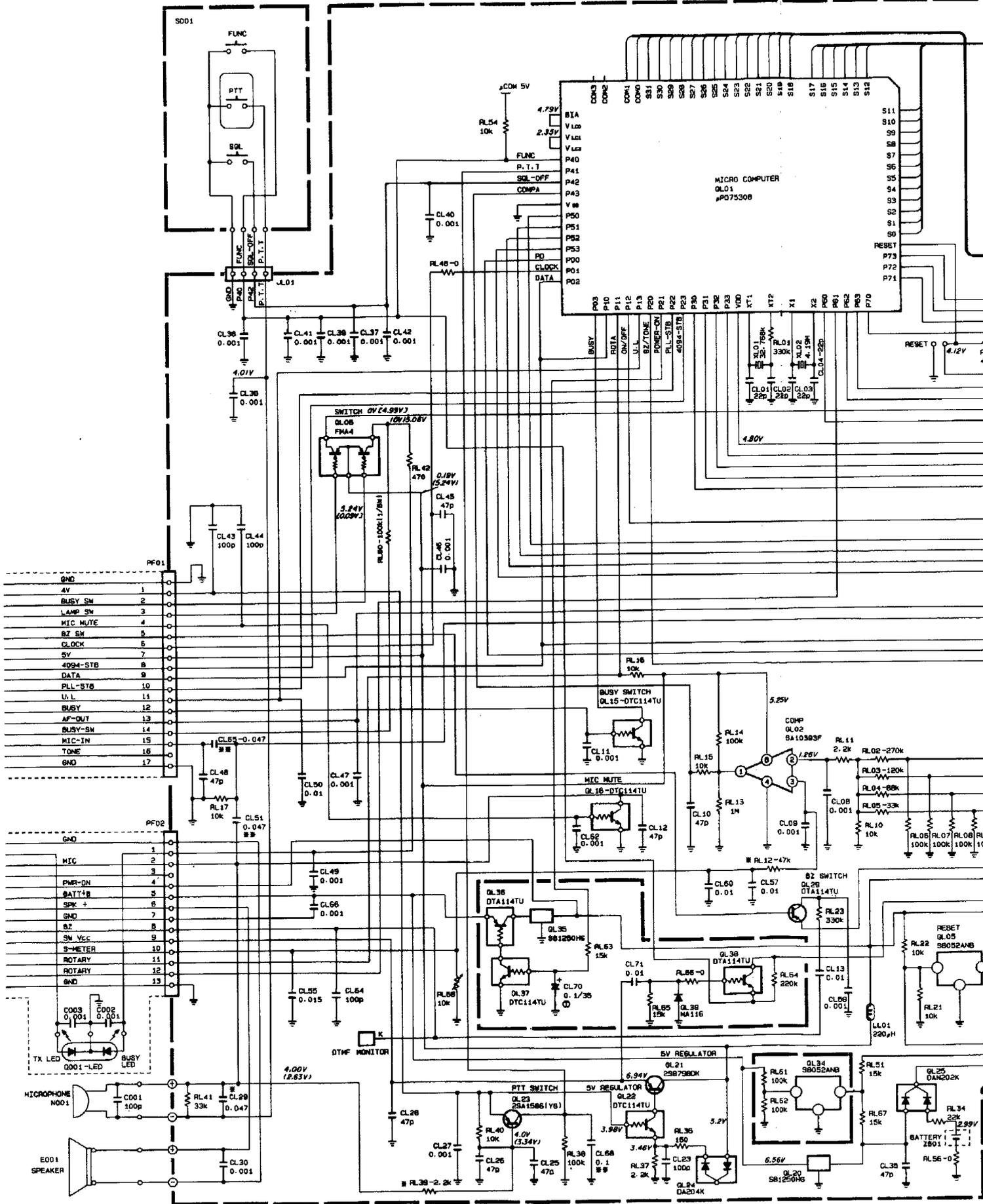


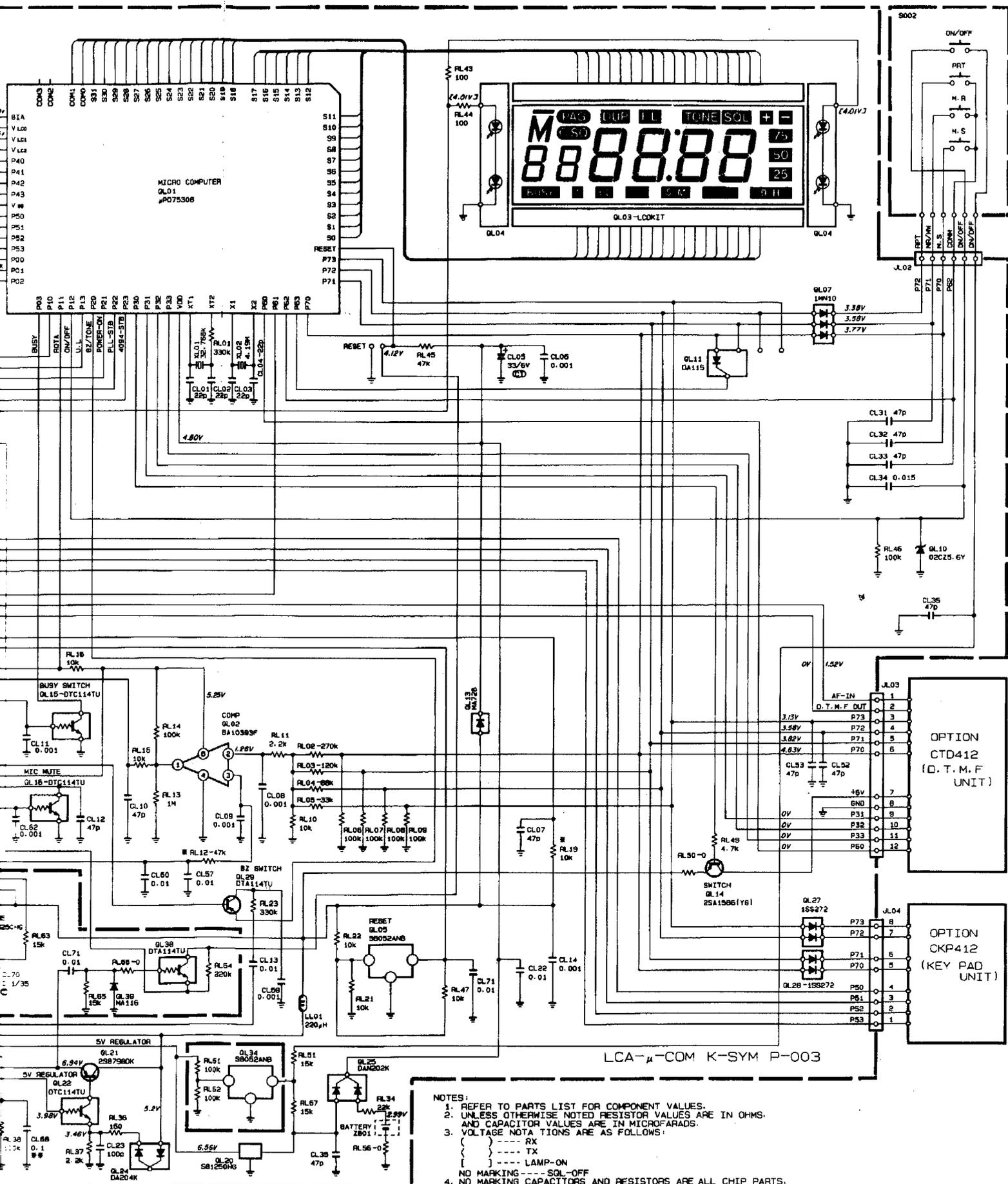
# SCHEMATIC DIAGRAM



- NOTES:
1. REFER TO PARTS LIST FOR COMPONENT VALUES.
  2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS, AND CAPACITOR VALUES ARE IN MICROFARADS.
  3. VOLTAGE NOTATIONS ARE AS FOLLOWS:  
 (---) SOL-OFF  
 (---) TX  
 (---) UNLOCK  
 NO MARKING --- SOL-OFF
  4. NO MARKING CAPACITORS AND RESISTORS ARE ALL CHIP PARTS.







- NOTES:
1. REFER TO PARTS LIST FOR COMPONENT VALUES.
  2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN MICROFARADS.
  3. VOLTAGE NOTATIONS ARE AS FOLLOWS:  
 { } --- RX  
 { } --- TX  
 { } --- LAMP-ON  
 NO MARKING --- SOL-OFF
  4. NO MARKING CAPACITORS AND RESISTORS ARE ALL CHIP PARTS.