STANDARD

C178/C178S/C178A

VHF Band FM Transceiver

C478/C478S/C478A

UHF Band FM Transceiver

OWNER'S MANUAL

To Our Customers:
Be sure to carefully read this owner's manual prior to use and keep it for your reference.

MARANTZ JAPAN, INC.

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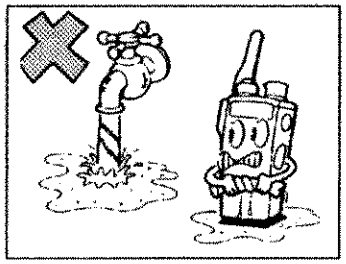
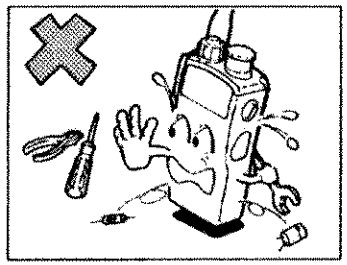
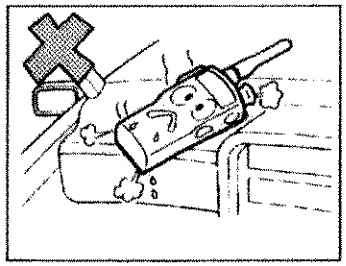
FOR CORRECT USE



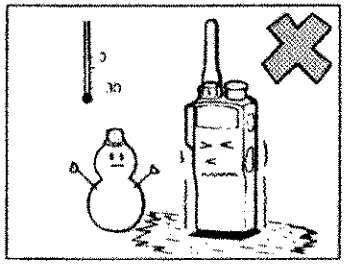
Avoid use in a wet or humid place.
In case that the radio is wet with water, wipe it off immediately with a dry cloth.



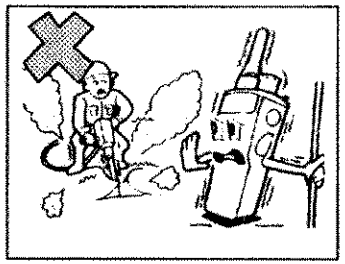
Never try to disassemble or remove the radio.
Both the coils and the trimmers have been adjusted to the optimal conditions.
Do not even touch these parts.



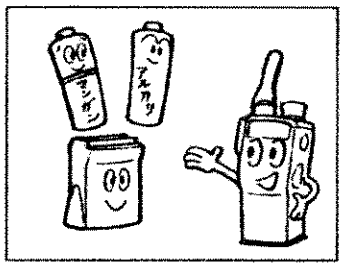
Do not expose the radio to a place subject to temperature increase such as a car dash board.



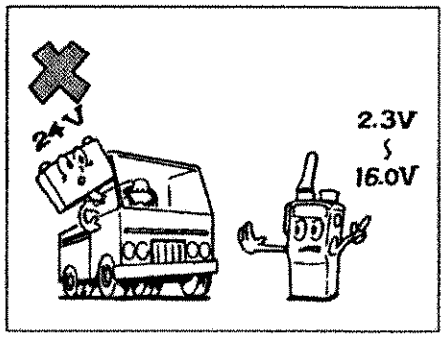
Never use this at a low temperature such as in a fridge.



Avoid using this in a place with extreme dust or vibration.



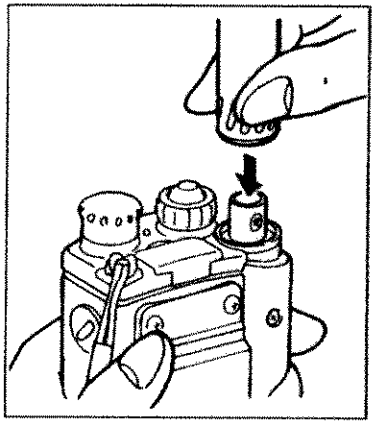
An applicable battery is either AA-size manganese/alkaline type or the nickel-cadmium type optionally available from us.
Never use any other batteries.



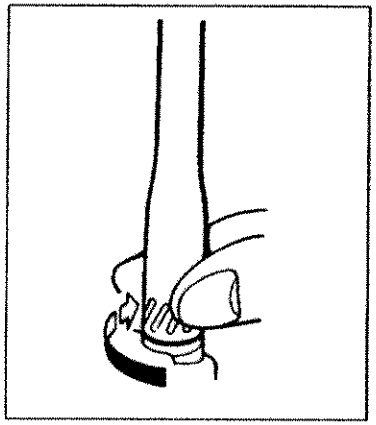
The warranted operating voltage is 2.3V ~ 16.0V.
Use the radio with this voltage.
Voltage outside this range may cause a damage.

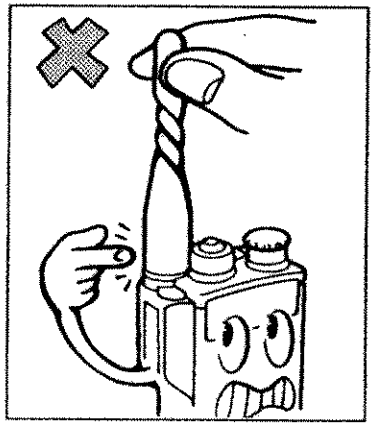
This radio uses a charging type lithium cell for memory storage.
You can charge the cell automatically by fitting the battery case on this radio. Charging requires approximately 10 hours. Neither VFO state nor clock function is stored unless the lithium cell is properly charged.

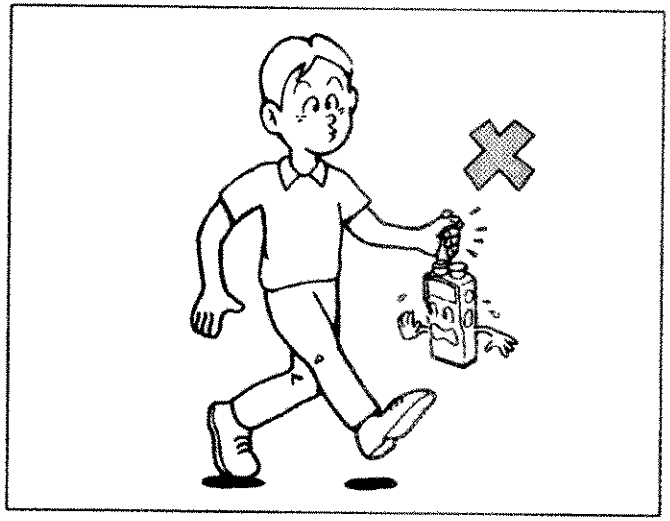
INSTALL ANTENNA



Insert an antenna into the antenna terminal of the radio as holding the antenna base part. Turn it clockwise.

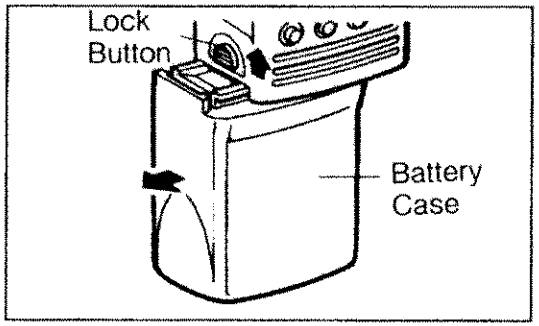




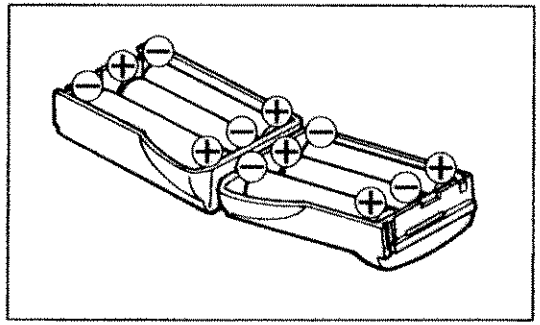


Do not carry this radio by holding the antenna. It may cause intermittent operation.

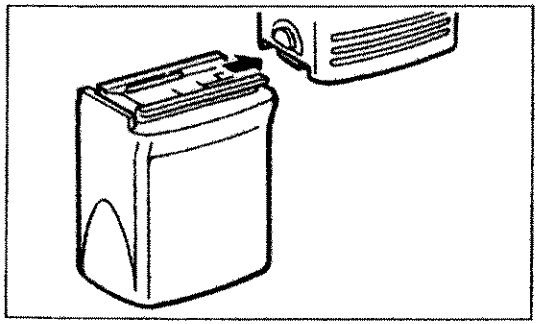
PLACE BATTERY



1 Hold down the lock button to release lock, pull out the battery case.



2 Open the battery case and place batteries inside.



3 Fit the battery case on the main body.

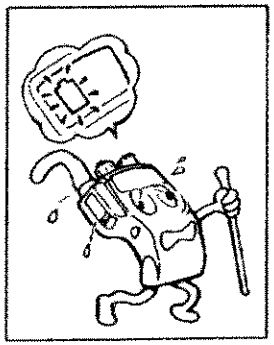
- On placing batteries, set them to the right polarity.
- Do not use old batteries together with new ones.
- Do not throw used batteries into fire, etc.
- Flashes of the entire part of a battery mark indicates voltage higher than the warranty voltage being applied.
  Performance of this device might have been damaged.

- A battery mark on the display section indicates the following:

Supply voltage is 10V ~ 16V.

Supply voltage is 4.5V ~ 9.9V.

Supply voltage is 2.2V ~ 4.4V.
When transmitting takes place with supply voltage lower than 3.5V, automatically sets to EL power.
We recommend you to replace batteries.



Supply voltage is 2.0V ~ 2.1V.
Change batteries.
With the key pushed, buzzer starts.

LEARNING BASICS

SUPPLY POWER 8
ADJUST SOUND VOLUME 8
ADJUST SQUELCH 9
RECEIVING 9
TRANSMITTING 10
NAME AND FUNCTION OF EACH SECTION 10
CHANGE FREQUENCY BAND 14
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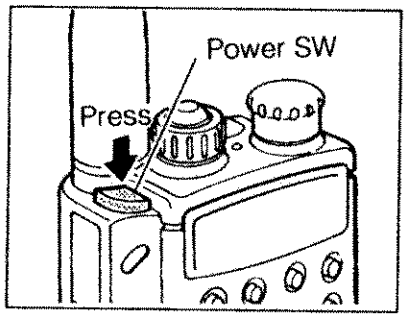
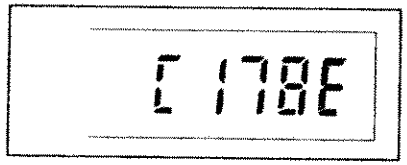
SUPPLY POWER



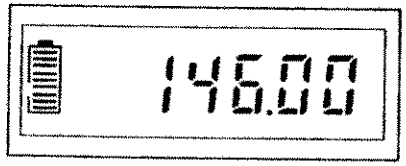
1 Press the power SW on the main body.



(With no memory unit, this indication does not appear.)

This indication varies with models as follows:

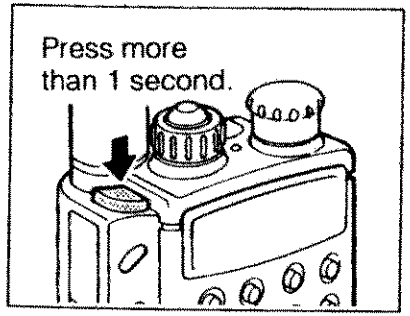
C178A; C178A C178S; C178S
C478 ; C478E C478S; C478S
C478A; C478A



2 Confirm indication on the display. Confirm "pip-puff-puff" sound.

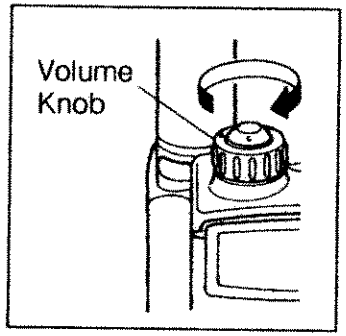
This orignal value varies with models as follows:

C178A; 146.00 C178S; 145.00
C478 ; 433.00 C478S; 433.00
C478A; 446.00

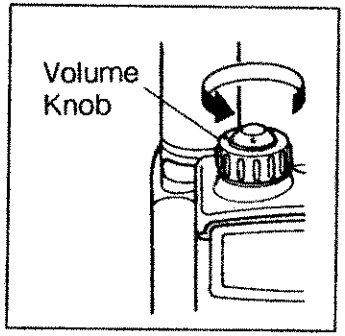


3 To cut power, press the power SW (on the main body) for more than 1 second.

ADJUST SOUND VOLUME



To increase volume, turn the volume knob clockwise (↷).



To reduce volume, turn the volume knob counterclockwise (↶).

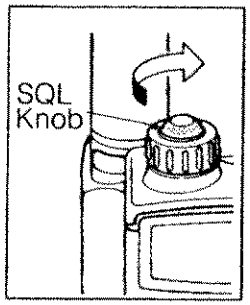
Sound volume low.
Especially, to use the head set after using the main speaker, reduce sound volume.

VFO STATE: State as of shipment and immediately after resetting are called VFO. While in this state, frequency can be changed with the rotary channel selector and the keyboard.

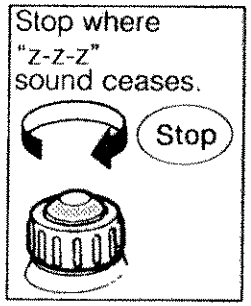
ADJUST SQUELCH

What Is Squelch ?

- "Z-z-z" sound is emitted when not in receiving of singals. Squelch eliminates this noise.



1 Slowly turn the SQL knob clockwise (↷).



1 Stop turning the knob when "z-z-z" sound has ceased.

- ◆ Squelch level, when increased, prevents weak signals from being received.
- ◆ With "z-z-z" sound is indicated as **"squelch-off"**.
- ◆ Without "z-z-z" sound through squelch operation is indicated as **"squelch-on"**.
- ◆ Through keyboard, Squelch-Off can be produced. (P 20)

RECEIVING

- When both radios are set to the same frequency, it is now possible to receive and transmit to each other. The following methods explain this frequency setting procedure.

— USING ROTARY CHANNEL SELECTOR —

(Referred to as Selector knob in this manual.)

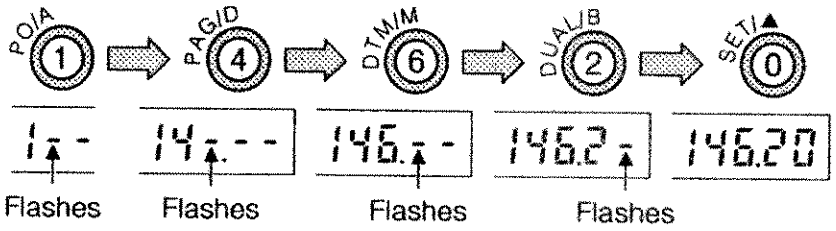
1 Set to VFO.

2 Frequency is increased with clockwise turning (↷).

3 Frequency is decreased with counter-clockwise turning (↶).

— USING KEYBOARD —

1 Set to VFO.
2 Input, starting with 100MHz digit.



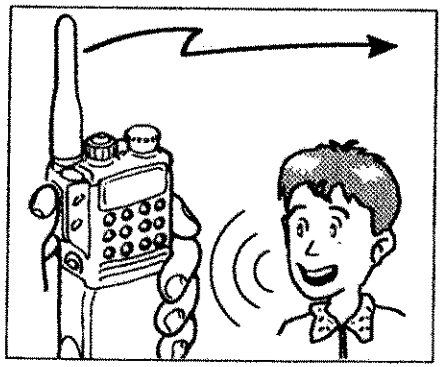
Using the Selector knob, turning the knob quickly, the frequency will change in large steps.

TRANSMITTING

- By setting the radio to the same frequency, you can communicate directly.

1 Set to VFO.

2 Set frequency to the same frequency as other party's.

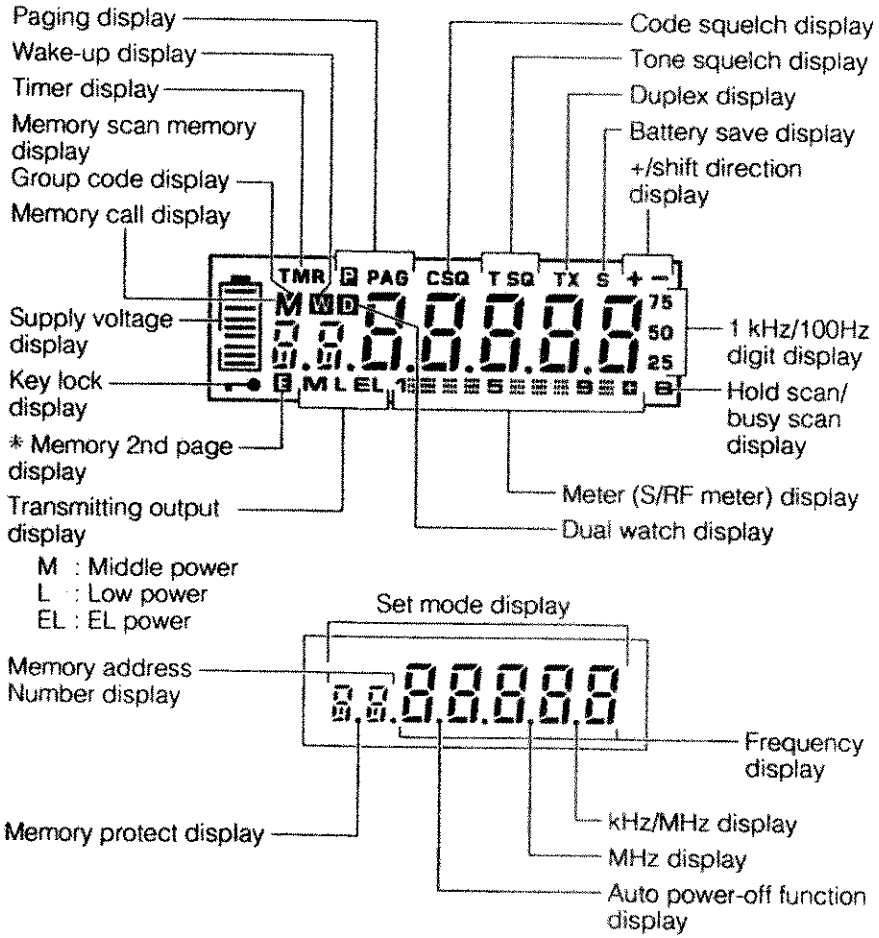


3 Hold down [PTT], speak into the microphone.

Make sure, before transmitting, that the frequency is clear.

NAME AND FUNCTION OF EACH SECTION

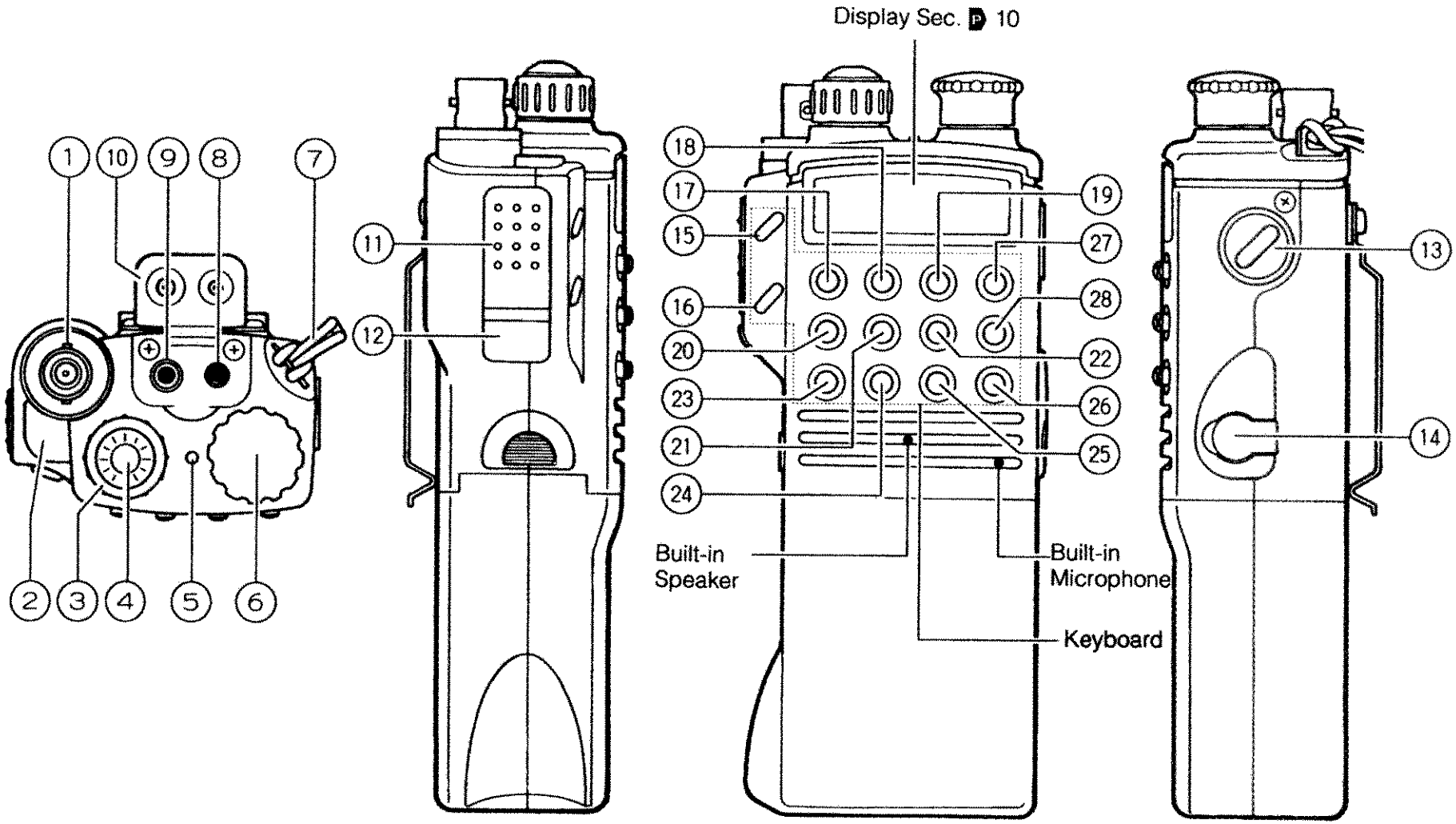
DISPLAY SECTION



* Page changeover is made available with Memory Unit CMU161 (Optional) being mounted.

TOP VIEW

FRONT/SIDE VIEWS



TOP/FRONT/SIDE SECTIONS

① Antenna Connecting Terminal (BNC)

② POWER
With this key pressed, power is supplied.

③ VOLUME
Turn this knob to adjust sound volume. (P 8)

④ SQL
Turn this knob to adjust squelch. (P 9)

⑤ TX BUSY
With PTT switch pressed, LED is red. (When LED is green, [SQL OFF] key is pressed or the SQL knob has been turned fully counterclockwise.)

⑥ Rotary Channel Selector
(Indicated as Selector in this manual.)
Turn this rotary channel selector to change frequency. (P 9)
You can change set details on conducting various settings.

⑦ Hand Strap

⑧ MIC
External microphone connecting terminal

⑨ SPK
External speaker connecting terminal

⑩ Waterproof Cap
Be sure to close this cap when not using the microphone terminal and the speaker terminal.

⑪ PTT
With this switch pressed, transmitting starts.

⑫ FUNC
With this key pressed, function mode is created, enabling setting of various special functions.

⑬ SQL OFF/LAMP
With this key pressed, Squelch Off is produced. With this key pressed while holding down [FUNC] key, the lamp lights up.

⑭ DC IN
External supply power connecting terminal
* Be sure to cut off power before plugging in/out an external supply power. Do not apply voltage exceeding 16V. It may cause intermittent operation.

FRONT OPERATION SECTION (KEYBOARD)

Symbols affixed to description of each key indicate the following:

F : Operate while holding down [FUNC] key.
[PT] : Operate while holding down [PTT] switch.
Those without any symbol indicate direct key operation.

⑮ SFT CALL
Recall of call frequency
F : Changing to Shift Mode
[PT] : Sending tone burst signals

⑯ ENT V/M
Changing the VFO and Memory Mode
F : Seting memory writing

⑰ 1 PO/A
Input of numeral 1
F : Changing transmit power
F : Inputting A for DTMF memory
[PT] : Sending DTMF signal 1

⑱ 2 DUAL/B
Input of numeral 2
F : Changing over to dual watch
F : Inputting B for DTMF memory
[PT] : Sending DTMF signal 2

⑲ 3 K.L/C
Input of numeral 3
F : Switching ON/OFF of key lock
F : Inputting C for DTMF memory
[PT] : Sending DTMF signal 3

⑳ 4 PAG/D
Input of numeral 4
F : Changing paging and code squelch
F : Inputting D for DTMF memory
[PT] : Sending DTMF signal 4

㉑ 5 CODE
Input of numeral 5
F : Setting paging code
[PT] : Sending DTMF signal 5

㉒ 6 DTM • M
Input of numeral 6
F : DTMF Memory Mode
[PT] : Sending DTMF signal 6

㉓ 7 CLOCK
Input of numeral 7
F : ON/OFF of clock function
[PT] : Sending DTMF signal 7

㉔ 8 RPT/▼
Input of numeral 8
F : ON/OFF of repeater function
[PT] : Sending DTMF signal 8

㉕ 9 REV/SB
Input of numeral 9
F : Inverting transmitting/receiving frequency for repeater operation
F : Changing scan type while in scanning
[PT] : Sending DTMF signal 9

㉖ 0 SET/▲
Input of numeral 0
F : Recall of Set Mode
(F indicates Set Mode in this manual.)
[PT] : Sending DTMF signal 0.

㉗ ∗ PS CL
Cancelling each function and operation
F : Starting and releasing scan
Input ∗ for DTMF memory.
[PT] : Sending DTMF signal ∗

㉘ # MS.M MS
Starting memory scan
F : Starting memory scan memory
Input # for DTMF memory.
[PT] : Sending DTMF signal #

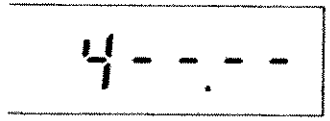
CHANGE FREQUENCY BAND

Model C178/S/A enables receiving in UHF band and transmitting in EL power.
Model C478/S/A enables receiving in VHF band and transmitting in EL power.

— Model C178/S/A —

1 Input 4 on the key board.

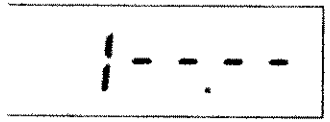
2 Confirm that 4----- is indicated on the display.
3 Input digits 10MHz, 1MHz, 100kHz, ···· from then on.



— Model C478/S/A —

1 Input 1 on the key board.

2 Confirm that 1----- is indicated on the display.
3 Input digits 10MHz, 1MHz, 100kHz, ···· from then on.



With input below 10MHz, frequencies (numerals) out of amateur band cannot be input.
To return it to the original state, input the frequency band for the model.

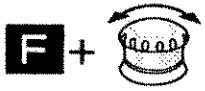
HOLD DISPLAY LAMPS LIGHTED

- A display lamp, even lighted, is put off in a fixed period of time with the key released. It can be, however, held lighted.

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set the display to LmP nor.

(nor: normal)



3 Change the display from nor to LoC by turning Selector knob while holding down [FUNC] key.

(LoC: Lock)

4 To return it to the original display, hold down [FUNC] key and press [0 SET/▲] key.

With this function in use, a lamp is held lighted even when display has returned to the original state.
To put off the lamp, change display from Loc to nor, using Procedure 3.

BEYOND BASICS

CHANGE FREQUENCY STEP 16
CHANGE FREQUENCY IN 100kHz/1MHz STEP 16
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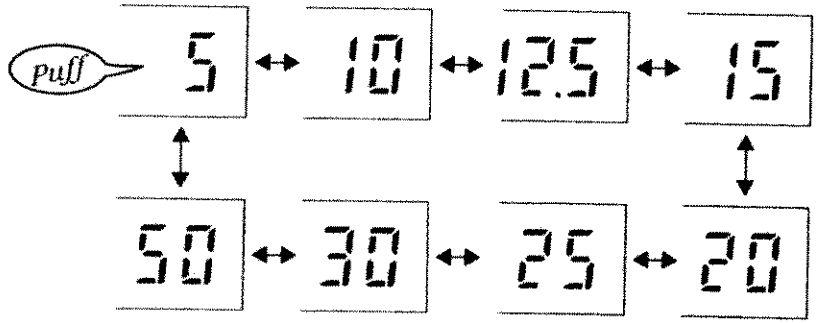
CHANGE FREQUENCY STEP

- In the original setting, with turning Selector knob, frequency is changed at 5kHz steps.The factory setting of each model is as follws: C178S, C478, C478S : 5kHz
  C178A, C478A : 10kHz

F + SET/▲ 0 **1** Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to St 10.

F + **3** Hold down [FUNC] key and turn Selector knob to change step frequency.



F + SET/▲ 0 **4** To end it, hold down [FUNC] key and press [0 SET/▲] key.

CHANGE FREQUENCY IN 100KHz/1MHz STEP

- You can change frequency steps either in 100kHz or 1MHz using Selector.

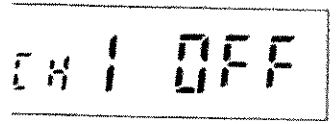
— TO CHANGE IN 100kHz —

F + **1** Hold down [FUNC] key and turn Selector knob.

— TO CHANGE IN 1MHz —

F + SET/▲ 0 **1** Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to CH1 OFF.



F + **3** Hold down [FUNC] key and turn Selector knob to set display to CH1 on.

F + SET/▲ 0 **4** To end it, hold down [FUNC] key and press [0 SET/▲] key.

5 Hold down [FUNC] key, turn Selector knob.

6 To return frequency step to 100kHz, change display from on to OFF using Procedure 3.

INPUT 1kHz DIGIT ON KEYBOARD

- You can input up to 1kHz using the keyboard.

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to inP1 OFF.

F +

3 Hold down [FUNC] key and turn Selector knob to change display from OFF to on.

F + SET/▲ 0

4 To return to the original display, hold down [FUNC] key and press [0 SET/▲] key.

In case that any frequency which this radio cannot deal with has been input, it is automatically corrected to an appropriate one.

USE CALL FREQUENCY

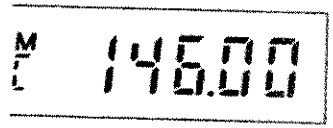
- The call frequency of each model (factory setting) is as follows:
  C178, C178A : 146.00 MHz
  C178S : 145.00 MHz
  C478, C478S : 433.00 MHz
  C478A : 446.00MHz

1 Set to VFO.

SFT CALL

2 Press [SFT CALL] key.

3 Confirm C on the display and the call frequency having been obtained.



SFT CALL

4 To return to VFO, press [SFT CALL] key.

CHANGEING THE CALLING FREQUENCY

- You can change the call frequency to a different frequency.

1 Set a new frequency in the VFO.

2 Hold down [FUNC] key and press [ENT V/M] key.

3 Press [SFT CALL] key.

4 Confirm M on the display and the call frequency having been obtained.

5 To return to VFO, press [SFT CALL] key.

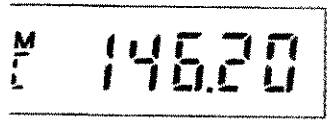
WRITE VARIOUS SETTING IN CALL FREQUENCY

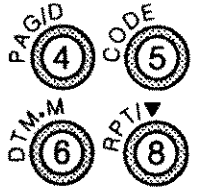
- You can write various settings in the call frequency. Settings availabe include ON/OFF of repeater/paging/code squelch/tone squelch, memory address of transmitting codes for paging/code squelch, internally stored frequency, tone squelch frequency, and offset frequency.

1 Set to VFO.

2 Press [SFT CALL] key.

3 Confirm C on the display and the call frequency.





4 Press the key for the appropriate setting.

Repeater Mode	(P 38)
Paging Mode	(P 54)
Code Squelch Mode	(P 57)
Tone Squelch Mode	(P 64)
Tone Encode Mode	(P 64)

5 To return to VFO, press [SFT CALL] key.

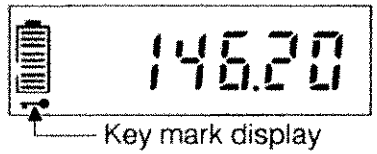
PREVENT ERRONEOUS OPERATION (KEY LOCK)

- You can lock keyboard. This is to prevent accidental pressing of a key, resulting in changed operation.

F + K.L/C 3

1 Hold down [FUNC] key and press [3 K.L/C] key.

2 Confirm the key mark indicated on the display.



F + K.L/C 3

3 To release this operation, hold down [FUNC] key and press [3 K.L/C] key.

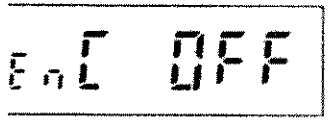
ENABLE USE OF SELECTOR EVEN IN KEY LOCK

- Selector operation is also disabled while in key lock. However, this can be changed.

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to EnC OFF.



F +

3 Hold down [FUNC] key and turn Selector knob to change display from OFF to on.

F + SET/▲ 0

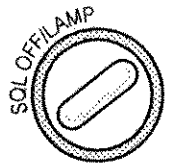
4 To return to the original display, hold down [FUNC] key and press [0 SET/▲] key.

To end this function, change display from on to OFF using Procedure 3.

CONTROL SQUELCH

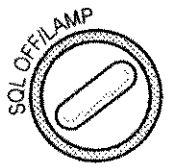
FOR SQUELCH OFF

- While squelch is functioning, with weak signals received, sound is either blocked or interrupted. Then, you can temporarily turn off squelch.



(Press)

1 To turn off squelch, press [SQL OFF/LAMP] key. **(Squelch Off)**



(Release)

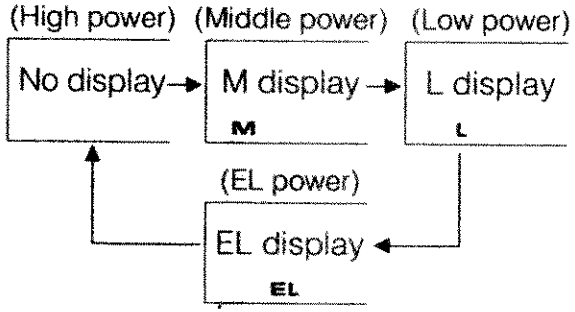
2 With [SQL OFF/LAMP] key released, squelch starts functioning. **(Squelch On)**

CHANGE TRANSMITTING POWER

- You can change transmitting power.

[F] + [1 PO/A]

1 Hold down [FUNC] key and press [1 PO/A] key. Each press changes display.



Relations between transmitting power and batteries are as follows:

Battery / Transmitting Power		CNB172	CNB171 CNB173	Dry Cells (×6)	Dry Cells (×2)
No Display (High Power)	C478/S/A	5.0W	2.0W	1.5W	–
	C178/S/A	5.0W	2.8W	2.0W	–
M (Middle Power)	C478/S/A	2.5W	2.0W	1.5W	–
	C178/S/A	2.5W	2.5W	2.0W	–
L (Low Power)	C478/S/A	0.35W	0.35W	0.35W	–
	C178/S/A	0.35W	0.35W	0.35W	–
EL (EL Power)	C478/S/A	50mW	50mW	50mW	20mW
	C178/S/A	50mW	50mW	50mW	20mW

MEMORY FUNCTION

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WHAT IS MEMORY FUNCTION ?

- You can store, in the memory unit, frequencies you use most frequently.
  This radio provides the memory unit in the standard specification. This memory unit can store frequencies of 40 different channels. By replacing this by the optionally available memory unit CMU161, you can store frequencies up to 200 channels.

- You can write Repeater Mode, Paging Mode, etc. in each frequency. For tone frequency and paging code, you can load different ones for each different memory.

- The following modes are loadable according to frequency:

Repeater Mode	(P 38)
Paging Mode	(P 54)
Code Squelch Mode	(P 57)
Tone Squelch Mode	(P 64)
Tone Encode Mode	(P 64)

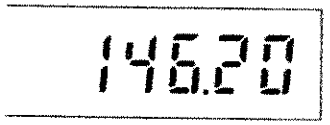
Different tone frequencies, paging codes, and shift frequencies can be stored in each separate memory.

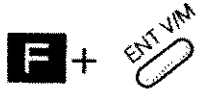
STORE MEMORY

- You can store, in memory, frequencies which are used most often.

EX: To store 146.20MHz in M01:

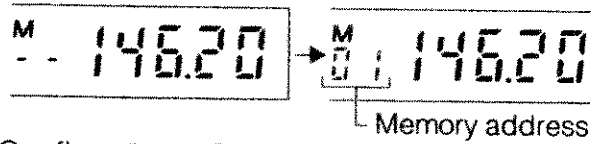
1 Set to VFO.
2 Get a frequency to be stored.





3 Hold down [FUNC] key and press [ENT V/M] key.

4 Input, on the keyboard, the memory address for the setting.



5 Confirm "peep" sound.
(With this, the frequency has been stored.)

6 Press [ENT V/M] key.
7 Confirm that VFO has been restored.

- Where M is lighted is called Memory Mode.
- With Procedure 3, frequencies cannot be changed until VFO is restored.
- To rewrite a frequency, follow the same procedure. A new frequency is
- In the VFO, frequencies can be changed through use of Selector knob or a keyboard.

RECALL A FREQUENCY FROM MEMORY

- You can recall memory which has been stored.

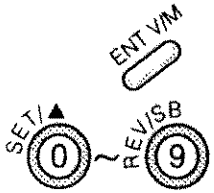
METHODS OF CALLING:
ⓐ Using Selector
ⓑ Using Keyboard

ⓐ Using Selector

Memory address/M01 frequency is displayed.

1 Set to VFO.
2 Press [ENT V/M] key.
3 Turn Selector knob and obtain the memory
4 address to be recalled.
To make VFO, press [ENT V/M] key.

ⓑ Using Keyboard



Memory address/M01 frequency is displayed.

1 Set to VFO.
2 Press [ENT V/M] key.
3 Input, on the keyboard, the memory address to be recalled.
4 To make VFO, press [ENT V/M] key.

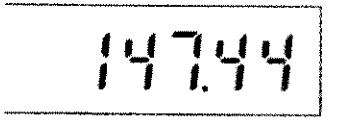
- ◆ When memory has been recalled, M sometimes starts to flashes. This is because no frequency has been stored in the memory address having been recalled. This state is identified as empty memory.
- ◆ Turn Selector knob while holding down [FUNC] key, you can change 10 digits of a memory address.

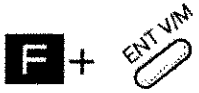
CHANGE MEMORY

- You can change stored memory into a different frequency.

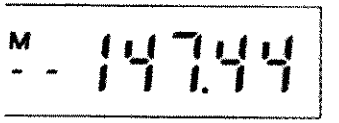
EX: To set M01 147.44MHz:

1 Set to VFO.
2 Get a frequency to be stored in memory.



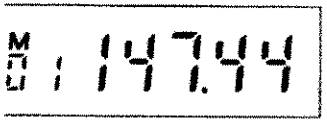


3 Hold down [FUNC] key and press [ENT V/M] key.



4 Input on the keyboard, Memory Address 01 for which you wish to make change.

5 Confirm "peep" sound. (A new frequency has been stored.)



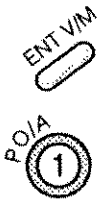
6 Press [ENT V/M] key.

7 Confirm that VFO has been restored.

No settings other than those for stored frequencies are changed.

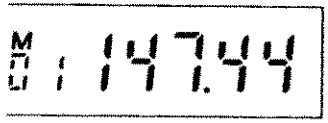
ERASE MEMORY

- You can erase stored memory.

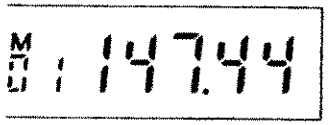


1 Set to VFO.
2 Press [ENT V/M] key.
3 Recall the memory address to be erased.

(Displayed)



4 Hold down [FUNC] key and press [ENT V/M] key.
5 Confirm CLr on the display.



6 Hold down [FUNC] key and press [ENT V/M] key. Confirm "peep" sound.
(With this, the frequency has been erased.)

7 Press [ENT V/M] key.
8 Confirm that VFO has been restored.

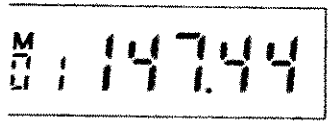
- Once Procedure 6 has been completed, erased memory cannot be recovered.
- To keep memory, press [*PS CL] key before performing Procedure 6.

TEMPORARILY CHANGE FREQUENCY OF MEMORY MODE (MEMORY SHIFT)

- Frequency having been recalled in Memory Mode can be temporarily changed.

1 Change to Memory Mode and by pressing [ENT V/M] key.

2 Display a memory address to be called out.



3 Hold down [FUNC] key and press [SFT CALL] key.
4 Confirm that the memory address flashes.

5 Change the frequency.

6 To return to the frequency in Memory Mode, press [*PS CL] key.

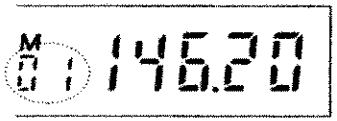
- The new frequency is stored with [ENT V/M] key being pressed together with [FUNC] key hold down in Procedure 5.
- No settings other than those of frequencies in memory are changed.

WRITE VARIOUS MODES INTO MEMORY FREQUENCY

- You can write various modes into a memory frequency having been stored.

1 Press [ENT V/M] key and change to Memory Mode.

2 Input, on the keyboard, a memory address to be set.



3 Set various modes.

EX:

(Paging Mode)

Setting Repeater Mode	(P 38)
Setting offset frequency	(P 40)
Setting tone frequency	(P 40)
Setting Paging Mode	(P 54)
Setting Code Squelch Mode	(P 57)
Setting Tone Squelch Mode	(P 64)
Setting Tone Encode Mode	(P 64)

4 Press [ENT V/M] key.

5 Confirm that VFO has been restored.

MAKE MEMORY UNCHANGEABLE (MEMORY PROTECT)

- This protects stored settings so that they are not changed or erased by mistake. This function is set for each memory.

1 Press [ENT V/M] key and change to Memory Mode.

2 Input, on the keyboard, a memory address to be protected.

3 Hold down [FUNC] key and press [0 SET/▲] key.

4 Turn Selector knob and set display to Pro OFF.

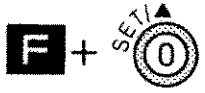
5 Holdig down [FUNC] key, turn Selector knob to change display from OFF to on.

6 Press [ENT V/M] key.

7 Confirm that VFO has been restored.

CHANGE OVER MEMORY PAGE

- Memory is expanded to 100 channels when the optionally memory unit CMU161 is in place. Also by using this function, 2-page format can be set in the memory unit.
  Using memory page changeover, you can also use 200 memory channels.



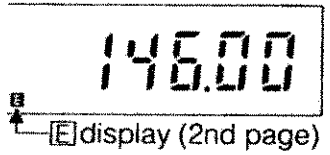
1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to PAGE 0.

3 Turn Selector knob while holding down [FUNC] key, confirm "pip-puff-puff" sound.

4 Returning to the original display, confirm E on the display.

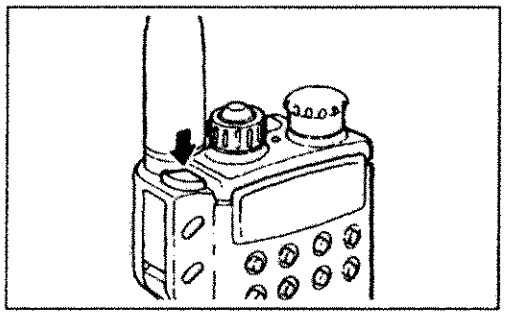
(E on the display indicates that 2nd page is in use.)



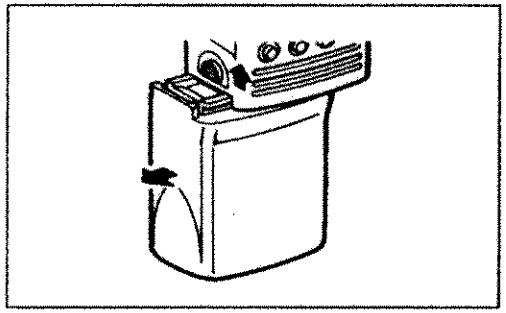
[E] display (2nd page)

To return to the original operation, follow Procedure 3.

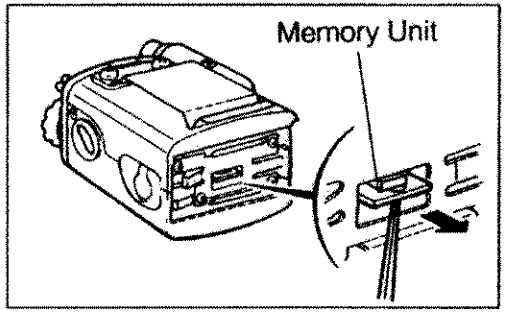
MOUNT MEMORY UNIT



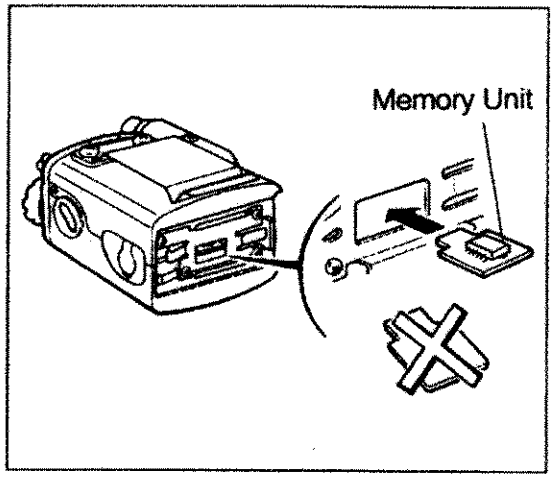
1 Turn off the power of the transceiver.



2 Take off the battery case.



3 Take out the memory unit located in the transceiver. Insert, the tip of tweezers into the round hole of the memory unit and pull it out.



4 Being careful to keep the right side of the memory unit, insert it straight into the connector.

- Be sure to fully insert the memory unit. If not, intermittent operation or trouble may be caused.
- The memory unit, if mounted incorrectly may damage the unit. Never fit it in a wrong way.

WHAT IS MEMORY UNIT ?

- In case that the memory unit which was not initialized for this radio has been fitted and power is supplied to it, warning sound "puff-puff-puff-puff-puff" is produced, followed by the display as below shoen:

Err: When a memory unit other than ours has been mounted:

- ◆ To erase stored memory, read "ALL RESET TO FACTORY SETTINGS" (P 50) and perform All Reset.
- ◆ When you don't want to erase stored memory, cut power and take out the memory unit.
- ◆ This radio is provided with memory unit protective function. This function, when supply voltage falls below 2.2V, stops storing of memory so that the memory unit is protected. While this function is working, the battery mark (▯) on the display flahses.

SCANNING

WHAT IS SCANNING FUNCTION ? 30
CHANGE SCAN TYPE 30
SCAN WITHIN 1MHz (1MHz SCAN) 31
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SCAN TONE FREQUENCY (TONE SQUELCH SCAN) 35

BEEP SOUND 36

WHAT IS SCANNING FUNCTION ?

- Scanning is the automatic search for signals.

This function, with the following 7 kinds, enables quick searching.

- **1MHz Scan** (P 31)
  Scanning takes place in 1MHz frequencies.
- **All Scan** (P 31)
  Scanning takes place in the entire band.
- **Program Scan** (P 32)
  Scanning takes place in the assigned range.
- **Memory Scan** (P 32)
  Scanning takes place in the frequencies stored in memory
- **Memory Scan Memory** (P 33)
  Scanning takes place in the assinged memory.
- **Block Memory Scan** (P 34)
  Memory is scanned by block. One block consists of 10 digits of memory address.
- **Tone Squelch Scan**
  Tone frequencies are scanned. Squelch opens when tone frequencies match.

Scan types include the following three:

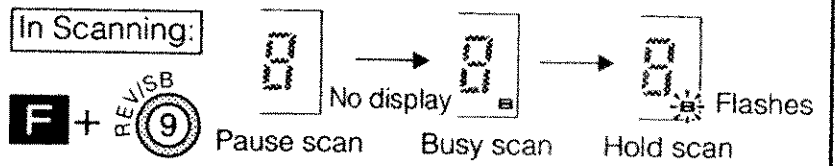
o **Pause Scan Type**
Scan stops with signals having been received. However, with signals even having been received, scanning is reinstated in about 5 seconds.

o **Busy Scan Type**
Scan stops while signals are being received. Without signals, scan is reinstated in about 2 seconds.

o **Hold Scan Type**
On receiving of signals, scan is suspended temporarily.
To reinstate scanning when signals have disappeared; press either [8 RPT/▼] or [0 SET/▲] key while holding down [FUNC] key, or turn Selector knob.

TO CHANGE SCAN TYPES

- Hold down [FUNC] key and press [9 REV/SB] key while in scanning.



✳ Prior to scanning, turn SQL knob till no "z-z-z" sound is heard.

SCAN WITHIN 1MHz (1MHz SCAN)

- Scanning takes place so that 1MHz of the marked frequency is not exceeded.

EX.

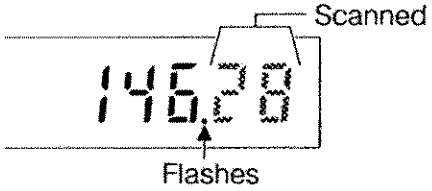
1 Set to VFO.

2 Choose the frequency to start scanning.

F + PS CL

3 Hold down [FUNC] key and press [*PS CL] key.

4 Confirm that 100 kHz or below has been scanned.



PS CL

5 To end, press [*PS CL] key.

SCAN ENTIRE BAND WIDTH (ALL SCAN)

- The entire band width is scanned.

1 Set to VFO.

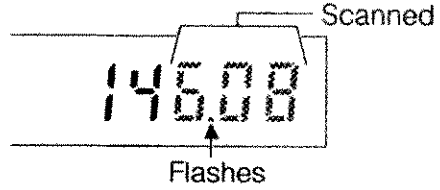
SFT CALL

2 Press [SFT CALL] key, confirm that a call frequency has been obtained.

F + PS CL

3 Hold down [FUNC] key and press [*PS CL] key.

4 Confirm that scanning is taking place.



PS CL

5 To end, press [*PS CL] key.

SCAN ASSIGNED REGION (PROGRAM SCAN)

- Using frequencies stored in memory, the frequency in which scanning starts and the frequency in which it ends are assigned.

1 Set to VFO.

2 Press [ENT V/M] key and change to Memory Mode.

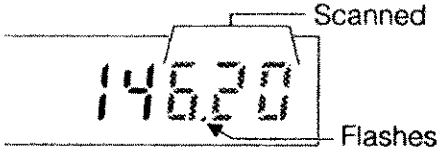
3 Using Selector knob or the keyboard, change the frequency to the scanning start.

4 Hold down [FUNC] key, and press [*PS CL] key.

5 Confirm that the memory address is set to "_ _".

6 Input, on the keyboard, the memory address of the frequency in which scanning ends.

7 Confirm that scanning starts.



8 To end, press [*PS CL] key.

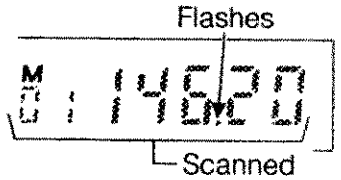
SCAN MEMORY FREQUENCY (MEMORY SCAN)

- All the frequencies stored in memory are scanned.

1 Set to VFO.

2 Press [# MS.M MS] key.

3 Confirm that scanning starts.



4 To end, press [*PS CL] key.

5 To return to the original VFO, press [ENT V/M] key.
To return to VFO with the frequency in display, press [*PS CL] key.

SCAN ASSIGNED MEMORY FREQUENCY (MEMORY SCAN MEMORY)

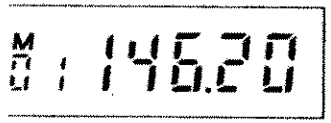
- The memory to be scanned is assigned and scannig is conducted.

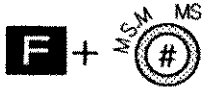
— PREPARATION PRIOR TO SCANNING —

1 Set to VFO.

2 Press [ENT V/M] key and change to Memory Mode.

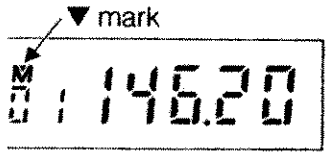
3 Using Selector knob or the keyboard, select a memory address to be scanned.





4 Hold down [FUNC] key and press [# MS.M MS] key.

5 Confirm ▼ displayed (assigned) above M.



6 6 To assign other memory, follow Procedures 3 ~ 5.

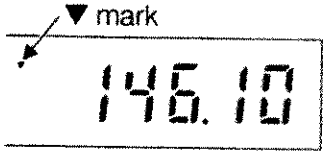
7 To end, press [ENT V/M] key.

TO SCAN:

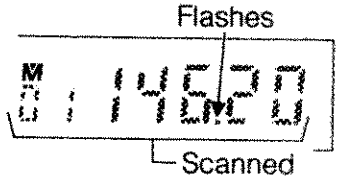
1 Set to VFO.

2 Hold down [FUNC] key and press [# MS.M MS] key.

3 Confirm ▼ displayed.



4 Press [# MS.M MS] key, start scanning.



5 To end, press [*PS CL] key.

6 To return to VFO, press [ENT V/M] key. To return to VFO with the displayed frequency, press [*PS CL] key.

7 To erase ▼, hold down [FUNC] key and press [# MS.M MS] key.

SCAN MEMORY FREQUENCY BY BLOCK (BLOCK MEMORY SCAN)

- Memory scanning is conducted within a block.
- One block consists of 10 digits of memory addresses.
- The relationship between block numbers and memory addresses are shown in the table below:
- Block Number 4 through 9 are used with Optional Memory Unit CMU161.

Block No	Memory Address No.
0	M00~M09
1	M10~M19
2	M20~M29
3	M30~M39
* 4	M40~M49
* 5	M50~M59
* 6	M60~M69
* 7	M70~M79
* 8	M80~M89
* 9	M90~M99

* indicates use of the optionally available memory unit, CMU161.

1 Set to VFO.

2 Press [# MS.M MS] key.

3 Confirm that memory scan starts.

4 Input, on the keyboard, a block number where scanning is to start.

5 To end, press [*PS CL] key.

6 To return to the original VFO, press [ENT V/M] key. To return to VFO with the displayed frequency, press [*PS CL] key.

When memories of an assigned block are empty, no memories will be scanned and a "boo" will sound. If it is during block memory scanning, it is changed into memory scanning.

SCAN ASSIGNED MEMORY FREQUENCY WITHIN BLOCK (BLOCK MEMORY SCAN MEMORY)

- Memory Scan Memory is scanned within a block.

TO SCAN:

1 Set to VFO.

F + # MS.M MS

2 Hold down [FUNC] key and press [# MS.M MS] key.

3 Confirm ▼ displayed.

MS.M MS

4 Press [# MS.M MS] key, start scanning.

0 SET/▲ ~ 9 REVISB

5 Input, on the keyboard, a block number where scanning is started.

* PS CL

6 To end, press [*PS CL] key.

ENT V/M, * PS CL

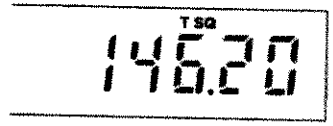
7 To return to the original VFO, press [ENT V/M] key. To return to VFO with the displayed frequency, press [*PS CL] key.

When memories of an assigned block are empty, no memories will be scanned and a "boo" will sound.

SCAN TONE FRQUENCY (TONE SQUELCH SCAN)

- Tone frequencies are scanned. Receiving frequencies are not changed.
- This scanning only includes busy scan. No change is made concerning a scanning type.
- This scanning requires the CTN170 (Opttional). (The CTN170 is mounted in the C178A, C478A.)

1 Set to VFO and confirm that tone squelch is working. (P 63)



F + 0 SET/▲

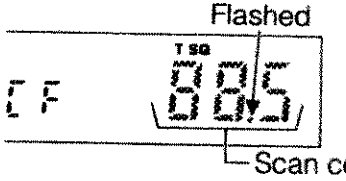
2 Hold down [FUNC] key and press [0 SET/▲] key.

3 Turn Selector knob and set display to CF88.5.

F + * PS CL

4 Hold down [FUNC] key and press [*PS CL] key.

5 Confirm that scanning starts.



* PS CL

6 To end, press [*PS CL] key.

BEEP SOUND

- Whether each key is operating correctly or not can be confirmed with beep sound.
- The following are examples of different beep sounds.

(Short high pitched beep)

- This sound indicates that each operating button is working properly.

(Long high pitched beep)

- This sound indicates that operation has completed properly.
  (EX: Upon completion of writing of frequencies in memory.)

(Short low pitched beep)

- This sound is emitted when operation is not proper or button operation is invalid.

(Repeated medium pitched beeps)

- This sound is emitted when a memory unit which has not been initialized for this radio is.

(Repeated high pitched beeps)

- This sound indicates that one minutes is left till Auto Power Off or Time Out Timer functions.
  This is the sound when receiving is made in Paging Mode or Wake-up.

(Repeated high pitched warbles)

- This is the sound when transmitting is made in Paging Mode.

(Short medium pitched beep)

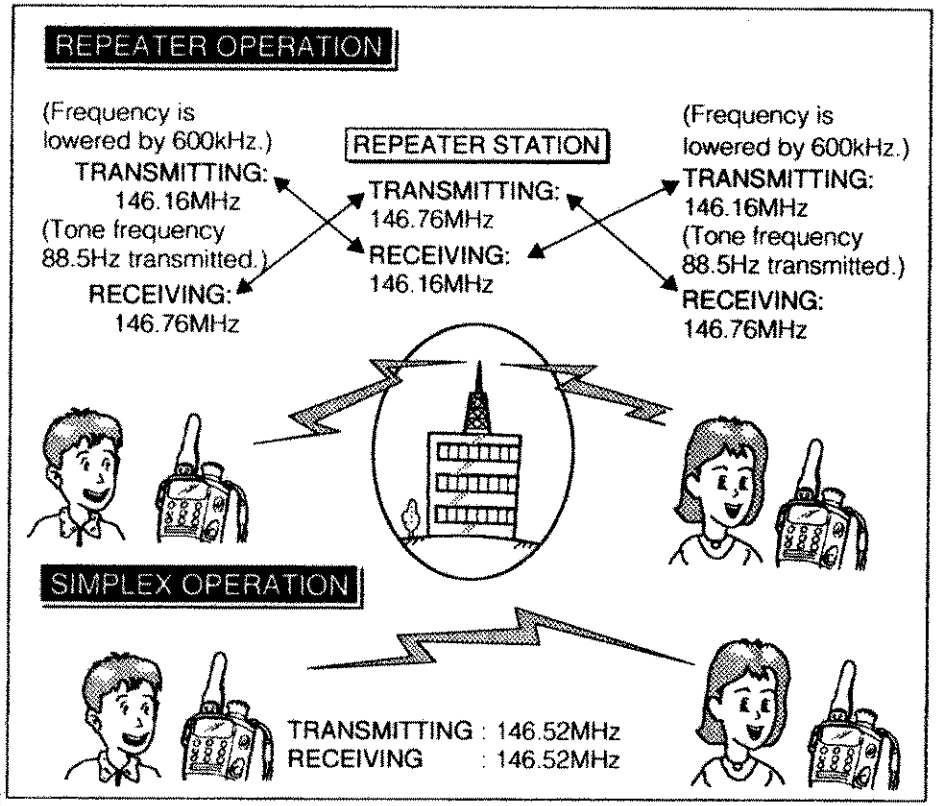
- This sound is emitted when function has been released or initial setting has been recovered.

USING REPEATER

REPEATER OPERATION 38
USE REPEATER WHICH REQUIRED 1750Hz TONE BURST 38
SET REPEATER MODE 39
REVERSE TRANSMITTING AND RECEIVING FREQUENCIES IN REPEATER OPERATION 39
CHANGE OFFSET FREQUENCY FOR REPEATER OPERATION 40
WHEN CONTINUOUS TONE IS REQUIRED FOR REPEATER OPERATION 40

REPEATER OPERATION

- Conducting communications through use of a repeater station (auto relay station) is called repeater operation.
- Through use of a repeater station, communication with distant places to which radio waves cannot reach directly is made available.
- Transmitting and receiving frequencies are diffrent in repeater operation. This difference in frequencies is called offset frequency. The offset frequency in the VHF band or UHF band, each of which can be set to a different frequency.



USE REPEATER WHICH REQUIRED 1750Hz TONE BURST

- This radio is equipped with a function that sends out tone burst signals to gain access to a repeater.

1 Set frequency to the repeater.

2 Set offset frequency.

3 Set Repeater Mode.

4 Press [PTT] (transmitting).

5 Press [SFT CALL] key. (While [SFT CALL] key is pressed, 1750Hz tone burst signal is transmitted.

(Release)

6 Release [PTT]. (Switched to receiving state.)

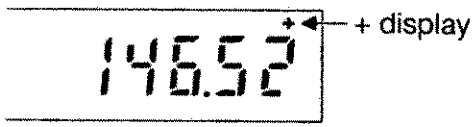
SET REPEATER MODE

1 Turn the Selector knob and set frequency to that of a repeater station.

F + RPT/▼ (8)

2 Hold down [FUNC] key and press [8 RPT/▼] key to display "–".
(Transmitting is made in a frequency which is lower by offset frequency.)

3 Hold down [FUNC] key and press [8 RPT/▼] key to display "+".
(Transmitting is made in a frequency which is higher by offset frequency.)



F + RPT/▼ (8)

4 Hold down [FUNC] key and press [8 RPT/▼] key once more and the "+" will disappear. This is now simplex.

If the offset frequency is out of the band, no transmitting is available. At this time, the display will show "OFF" indication.

REVERSE TRANSMITTING AND RECEIVING FREQUENCIES FOR REPEATER OPERATION

- This function is used when receiving a signal directly (a signal without intervening repeater station) from another station. In addition, when direct signals can be received, try communication is simplex mode.

1 Set the frequency to a repeater station.

F + REV/SB (9)

2 Hold down [FUNC] key and press [9 REV/SB] key.

3 Frequency on the display shows offset frequency lower. Also confirm "–" or "+" to flashes.

F + REV/SB (9)

4

To end reversing, hold down [FUNC] key and press [9 REV/SB] key.

CHANGE OFFSET FREQUENCY FOR REPEATER OPERATION

- This radio can set offset frequencies to any level.
- The range for setting is 0 ~ 39.995MHz.
- The offset frequency in the VHF band or UHF band, each of which can be set to a different frequency.

F + SET/▲ (0)

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn the Selector knob to OF 0.00 on the display.

Offset frequency 0.00MHz display

F + Selector knob

3 Hold down [FUNC] key and turn Selector knob and set the new offset frequency.

F + SET/▲ (0)

4 To end this function, hold down [FUNC] key and press [0 SET/▲] key.

Use the keyboard to input offset frequency starting at 1MHz.
The offset frequency was set as follows (when the radio was shipped from the factory):

C178A	VHF band	600kHz
C478A	UHF band	5MHz
C178/S	VHF band	0.0MHz
C478/S	UHF band	0.0MHz

WHEN CONTINUOUS TONE IS REQUIRED FOR REPEATER OPERATION

Set a tone frequency.

F + SET/▲ (0)

1 Hold down [FUNC] key and press [0 SET/▲] key.

Selector knob

2 Turn Selector knob to CF100.0 on the display.

F + Selector knob

3 Hold down [FUNC] key and turn Selector knob for a new tone frequency.

F + SET/▲ (0)

4 Hold down [FUNC] key and press [0 SET/▲] key.

Turn on the tone encoder.

F + SET/▲ (0)

1 Hold down [FUNC] key and press [0 SET/▲] key.

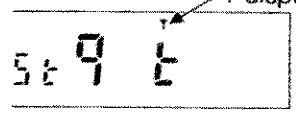
Selector knob

2 Turn Selector knob and set indication to tsq OFF.

F + Selector knob

3 Hold down [FUNC] key and turn Selector knob to display tone encode, change indication from OFF to T.

T display



Set Repeater Mode.

F + RPT/▼ (8)

1 Hold down [FUNC] key and press [0 SET/▲] key to display "–" or "+".

- For the C178, C178S, C478, and C478S, this function can be activated only the CTN170 mounted.
- The original values of the C178A and C478A are set to 88.5Hz.

ADDITIONAL FUNCTION

DUAL WATCH FUNCTION

USE MEMORY ADDRESS M00 FREQUENCY AND VFO FREQUENCY 42
USE FREQUENCY OTHER THAN MEMORY ADDRESS M00 FREQUENCY, AND VFO FREQUECY 42
USE CALL AND VFO FREQUENCY 43
USE VFO FREQUENCY WHILE IN MEMORY SCAN 43
CHANGE TIME FOR DUAL WATCH 44

OPERATE WITH TWO DIFFERENT FREQUENCIES (SEMI-DUPLEX) 44

RECEIVE WITH THE VFO AND TRANSMIT IN MEMORY ADDRESS M00 44
RECEIVE WITH THE VFO AND TRANSMIT OTHER THAN MEMORY ADDRESS M00 45
RECEIVE WITH THE VFO AND TRANSMIT USING THE CALL FREQUENCY 45

CLOCK OPERATION 46
DISPLAY PRESENT TIME 46
SET PRESENT TIME 46
TURN OFF POWER TO THE RADIO (OFF TIMER) 47
TURN ON POWER TO THE RADIO (ON TIMER) 47
RELEASE TIMER 47
PREVENT ERRONEOUS TRANSMITTING (PTT LOCK) 47
TURN OFF POWER AUTOMATICALLY (AUTO POWER OFF) 48
STOP TRANSMITTING AUTOMATICALLY (TIME OUT TIMER) 48
STOP BEEP DURING KEY OPERATION 49
REDUCE POP NOISE WHEN SQUELCH IS OPENED 49
BATTERY SAVE 49
VFO RESET TO FACTORY SETTINGS (VFO RESET) 50
ALL RESET TO FACTORY SETTINGS (ALL RESET) 50

DUAL WATCH FUNCTION

- VFO frequency and memory frequency are alternately received.

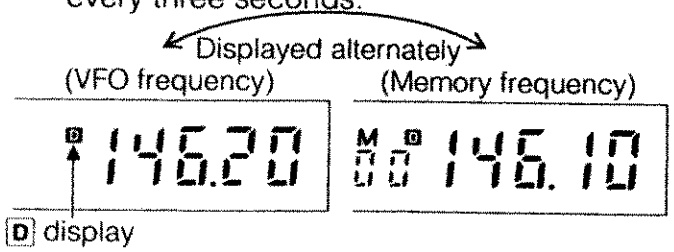
USE MEMORY ADDRESS M00 FREQUENCY AND VFO FREQUENCY

1 Set to VFO and set frequency for dual watch.

F + DUAL/B (2)

2 Hold down [FUNC] key and press [2 DUAL/B] key.

3 Confirm D on the display. Also confirm that memory frequency is received once every three seconds.



PS CL (*)

4 To end this function, press [*PS CL] key.

"Boo" sound, if produced while in Procedure 2, this indicates empty memory for M 00.

USE FREQUENCY OTHER THAN MEMORY ADDRESS M00 FREQUENCY, AND VFO FREQUENCY

1 Set to VFO and set frequency for dual watch.

ENT V/M

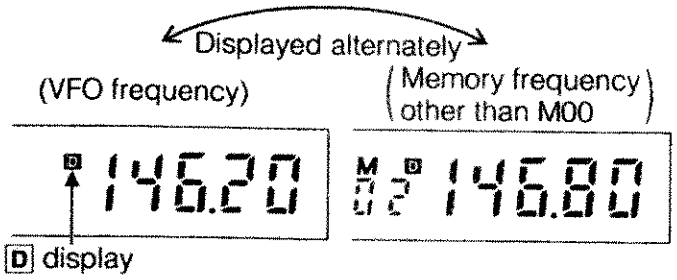
2 Press [ENT V/M] key to the Memory Mode.

3 Set a memory address for dual watch.

F + DUAL/B (2)

4 Hold down [FUNC] key and press [2 DUAL/B] key.

5 Confirm D on the display. Also confirm that memory frequency is received once every three seconds.



PS CL (*)

6 To end this function, press [*PS CL] key.

USE CALL AND VFO FREQUENCY

1 Set to VFO and set frequency for dual watch.

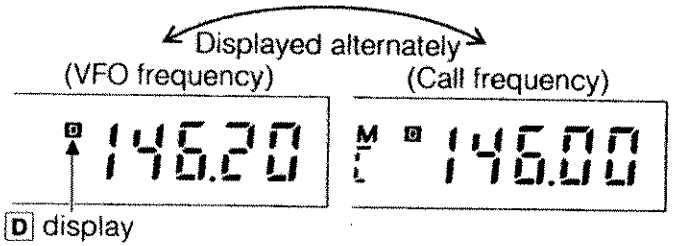
SFT CALL

2 Hold down [SFT CALL] key, call frequency appears.

F + DUAL/B (2)

3 Hold down [FUNC] key and press [2 DUAL/B] key.

4 Confirm D on the display. Also confirm that memory frequency is received once every three seconds.



PS CL (*)

5 To end this function, press [*PS CL] key.

USE VFO FREQUENCY WHILE IN MEMORY SCAN

F + M.S.M MS (#)

1 Set to VFO and set frequency for dual watch.

M.S.M MS (#)

2 Press [# M.S.M MS] key to start scanning.

F + DUAL/B (2)

3 Hold down [FUNC] key and press [2 DUAL/B] key.

4 Confirm D on the display. Also confirm that the memory frequency is received once every three seconds.

PS CL (*)

5 To end this function, press [*PS CL] key.

- This function is not available when the assigned memory address is empty.
- While receiving a signal in the memory, the scan will temporarily stop.
- Memory scan will continue while receiving a signal in the VFO.
- Intermittent receiving sound, if taking place, does not indicate any failure.

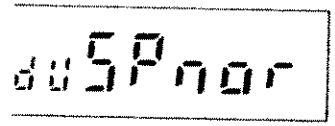
CHANGE TIME FOR DUAL WATCH

- During ordinary dual watch, receiving consists of 3 seconds on VFO side and 0.25 second on Memory side.
  This time periods can be changed to 0.6 second on VFO side and 0.6 second on Memory side.

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to dUSP nor.



F +

3 Hold down [FUNC] key and turn Selector knob to change display from nor to FSt.

F + SET/▲ 0

4 To return to the original display, hold down [FUNC] key and press [0 SET/▲] key.

To return to the initial time, use Procedure 3 to change display from FSt to nor.

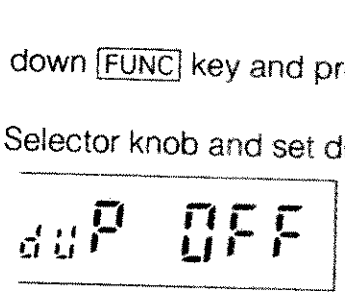
OPERATE WITH TWO DIFFERENT FREQUENCIES (SEMI-DUPLEX)

RECEIVE WITH THE VFO AND TRANSMIT IN MEMORY ADDRESS M00

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to dup OFF.



F +

3 Hold down [FUNC] key and turn Selector knob.

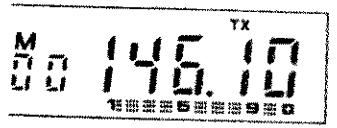
pip

4 Confirm that VFO frequency has been restored with "pip" sound. Also confirm that TX is displayed.

TX display

PTT ON

5 Confirm that, with [PTT] pressed, transmitting takes place in Memory Address M00.



Transmitted in M00 frequency.

PS CL *

6 To release this operation, press [*PS CL] key.

If M00 is an empty memory, a "boo" sound will be heard during Procedure 3, Semi-Duplex Mode is not obtainable.

RECEIVE WITH THE VFO AND TRANSMIT OTHER THAN MEMORY ADDRESS M00

1 Set to VFO.

2 Press [ENT V/M] key to Memory Mode.

3 In this operation, get a memory address for transmitting.

4 Hold down [FUNC] key and press [0 SET/▲] key.

5 Turn Selector knob to set display to dup OFF.

6 Hold down [FUNC] key and turn Selector knob.

7 Confirm that VFO frequency is restored with "pip" sound. Also confirm that TX is displayed.

8 Confirm that, with [PTT] pressed, transmitting takes place in the set memory address.

Transmitted in M02 frequency.

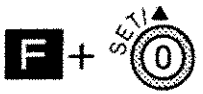
9 To release this operation, press [*PS CL] key.

If the memory called out is empty, with "boo" sound in Procedure 6, Semi-Duplex Mode is not obtainable.

RECEIVE WITH THE VFO AND TRANSMIT USING THE CALL FREQUENCY

1 Set to VFO.

2 Press [SFT CALL] key.

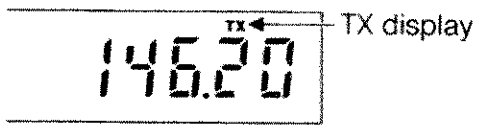


3 Hold down [FUNC] key and press [0 SET/▲] key.

4 Turn Selector knob and set display to dup OFF.

5 Hold down [FUNC] key and turn Selector knob.

6 Confirm that, with "pip" sound, VFO frequency is restored. Also confirm that TX is displayed.



7 Confirm that, with [PTT] pressed, transmitting takes place in the call frequency.

8 To release this operation, press [*PS CL] key.

CLOCK OPERATION

- This radio includes the following three clock functions:

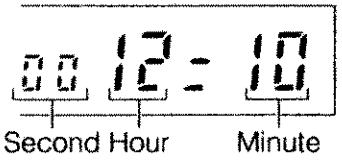
  Displays present time.
  Turn off power at set time. (Off-Timer)
  Turn on power at set time. (On-Timer)

DISPLAY PRESENT TIME

F + CLOCK (7)

1 Hold down [FUNC] key and press [7 CLOCK] key.

Clock display



F + CLOCK (7)

2 To return to the original display, hold down [FUNC] key and press [7 CLOCK] key.

Time is displayed in 24 hours. When time has not been set, 0000 = 00 flahses.

DISPLAY PRESENT TIME

F + CLOCK (7)

1 Hold down [FUNC] key and press [7 CLOCK] key.

2 Confirm that the present time is displayed. When time has not been set, confirm that 0000 = 00 flashes.

F + SET/▲ (0)

3 Hold down [FUNC] key and press [0 SET/▲] key.

4 Turn Selector knob and set display to tm 00 = 00.

5 Input the hour and minute in this order.

peep

6 With the last digit having been input, with "peep" sound, time has been set.

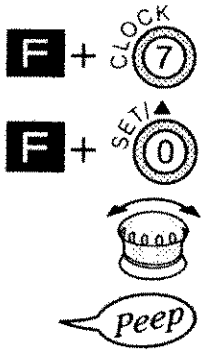
F + CLOCK (7)

7 To return to the original display, hold down [FUNC] key and press [7 CLOCK] key.

Having inputted last digit, the seconds are set to 00.

TURN OFF POWER TO THE RADIO (OFF TIMER)

- You turn off power at a set time.

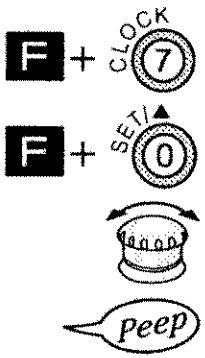


1 Hold down [FUNC] key and press [7 CLOCK] key and display the present time.
2 Hold down [FUNC] key and press [0 SET/▲] key.
3 Turn Selector knob and set display to OF 00=00.
4 Input the hour and minute in this order.
5 With the last digit having been completed, with "peep" sound, TMR is displayed.

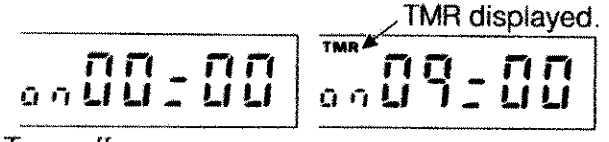
6 To return to the present time, press [*PS CL] key.

TURN ON POWER TO THE RADIO (ON TIMER)

- Even with power turned off, you can turn on power at a set time.

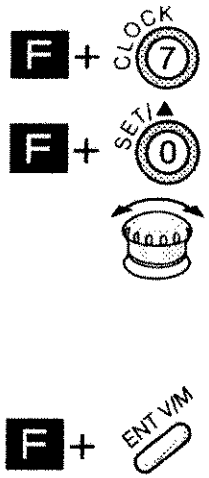


1 Hold down [FUNC] key and press [7 CLOCK] key and display the present time.
2 Hold down [FUNC] key and press [0 SET/▲] key.
3 Turn Selector knob and set display to on 00=00.
4 Input the hour and minute in this order.
5 With the last digit having been completed, with "peep" sound, TMR is displayed.



6 Turn off power.
7 Confirm that TMR is displayed.

RELEASE TIMER

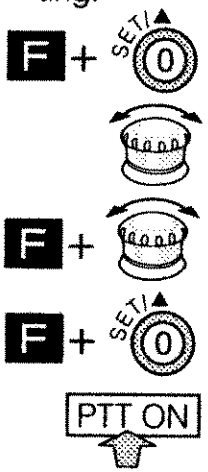


1 Hold down [FUNC] key and press [7 CLOCK] key and display the present time.
2 Hold down [FUNC] key and press [0 SET/▲] key.
3 Turn Selector knob and set ON TIMER or OFF TIMER.
4 Hold down [FUNC] key and press [ENT V/M] key.
5 Confirm that CLr is displayed.

6 Hold down [FUNC] key and press [ENT V/M] key.

PREVENT ERRONEOUS TRANSMITTING (PTT LOCK)

- You can lock PTT operation to prevent erroneous transmitting.



1 Hold down [FUNC] key and press [0 SET/▲] key.
2 Turn Selector knob and set display to PL OFF.

3 Hold down [FUNC] key and turn Selector knob, change display from OFF to on.
4 Hold down [FUNC] key and press [0 SET/▲] key.
5 Confirm that, with [PTT] pressed, "-PL-" is displayed.

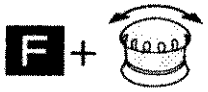
To release this operation, change display from on to OFF in Procedure 3.

TURN OFF POWER AUTOMATICALLY (AUTO POWER OFF)

- Power is automatically turned off when transmitting, receiving, or keyboard operation occurs for 31 minutes. One minute before power is turned off, "pip-pip-pip-pip-pip" sound is produced.

1 Hold down [FUNC] key and press [0 SET/▲] key.

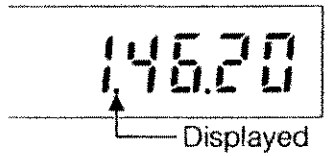
2 Turn Selector knob and set display to APO OFF.



3 Hold down [FUNC] key and turn Selector knob, change display from OFF to on.

4 Hold down [FUNC] key and press [0 SET/▲] key.

5 Confirm that the dot for Auto Power Off is indicated between 100MHz and 10MHz is indicated.



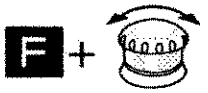
- To release this operation, change display from on to OFF in Procedure 3.
- This function should be used to conserve the battery.

STOP TRANSMITTING AUTOMATICALLY (TIME OUT TIMER)

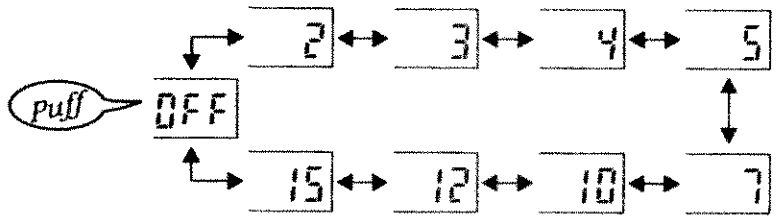
- With this function, transmitting is automatically stopped when transmitting state has exceeded a fixed period of time. This period can be adjusted. One minute before transmitting is stopped, "pip-pip-pip-pip-pip" sound is emitted.

1 Hold down [FUNC] key and press [0 SET/▲] key.

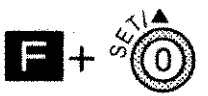
2 Turn Selector knob and set display to tot OFF.



3 Hold down [FUNC] key and turn Selector knob, change display from OFF to the time to be set.

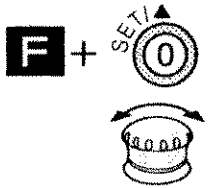


(Numerals indicate, available time in minutes,for transmitting.)



4 Hold down [FUNC] key and press [0 SET/▲] key.

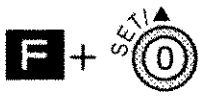
STOP BEEP DURING KEY OPERATION



1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to bZ on.

3 Hold down [FUNC] key and turn Selector knob, change display from on to OFF.



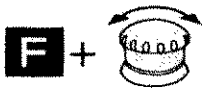
4 To return to the original display, hold down [FUNC] key and press [0 SET/▲] key.

To release this function, change display from OFF to on in Procedure 3.

REDUCE POP NOISE WHEN SQUELCH IS OPENED

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to mon OFF.



3 Hold down [FUNC] key and turn Selector knob, change display from OFF to on.

4 To return to the original display, hold down [FUNC] key and press [0 SET/▲] key.

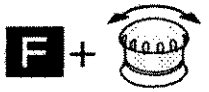
- To release this function, change display from on to OFF in Procedure 3.
- In this mode battery current is slightly higher.

BATTERY SAVE

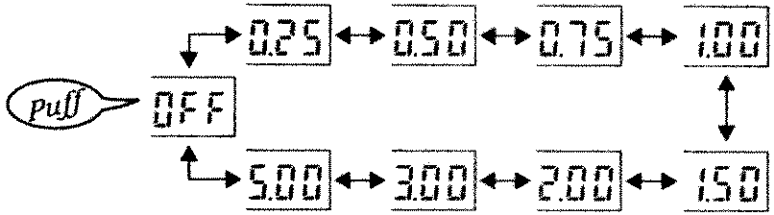
- Current consumption is reduced so that battery life is extended. Also, this saving time can be varied.

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to SA OFF.



3 Hold down [FUNC] key and turn Selector knob, change display from OFF to the time to be set.



(Numerals indicate, in seconds, the time for which current is saved.)

4 To return to the original display, hold down [FUNC] key and press [0 SET/▲] key.

5 Confirm that S is displayed.

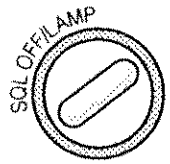
- With this function, the starting part of communication may be cut off.
- Using paging/code squelch, turn off this function.

VFO RESET TO FACTORY SETTINGS

- This function, when conducted, resets VFO to the original state. Memory content, however, is not erased.

PWR
(Turn off)

1 Turn off power.

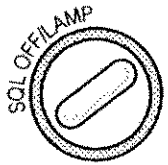


(Hold down)
+
PWR
(Press)

2 Hold down [SQL OFF/LAMP] and press the power button.

3 Confirm that all displays are lit.

(All displays lit up.)



(Release)

4 Release [SQL OFF/LAMP] key.

ALL RESET TO FACTORY SETTINGS

- This function, when conducted, completely restores the original setting. VFO and memory content are all erased.

F + 0 SET/▲

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to rES OFF.

F +

3 Hold down [FUNC] key and turn Selector knob, change display from OFF to on.

F + PWR

4 Hold down [FUNC] key and press the power button.

5 Confirm that, with "pip-puff-puff" sound, the orginal factory settings have been restored.

USING GROUP FUNCTION

WHAT IS PAGING ? 52
WHAT IS CODE SQUELCH ? 52
SET INDIVIDUAL CODE 53
DETERMINE CODE OF OTHER PARTY'S PAGING CODE SQUELCH 53
SET GROUP CODE 54
PERFORM PAGING IN TRANSMITTING 54
PAGING WHILE RECEIVING 55
PAGING WITH BEEPER 55
DELAY OUTGOING TIME OF PAGING 56
CHANGE NUMBER OF BEEP WHILE IN PAGING/WAKE-UP 56
CODE SQUELCH 57
WAKE-UP MODE 57
  SET 4-DIGIT SELF STATION CODE 57
  SET 4-DIGIT CODE FOR OTHER PARTY'S STATION 58
SELECT WAKE-UP CODE DIGIT 58
WAIT IN WAKE-UP 59
CALL IN WAKE-UP 59
USE DTMF 60
STORE DTMF CODE IN MEMORY 60
ERASE DTMF MEMORY 61
TRANSMIT DTMF CODE STORED IN MEMORY 62
CONFIRM DTMF CODE STORED IN MEMORY 62
CHANGE INTERVAL TIME OF DTMF CODE 63
USING TONE SQUELCH (CTN170) 63
CONDUCT TONE ENCODER/TONE SQUELCH 64
CHANGE FREQUENCY OF TONE SIGNALS 64
RECEIVE AM SIGNALS 65

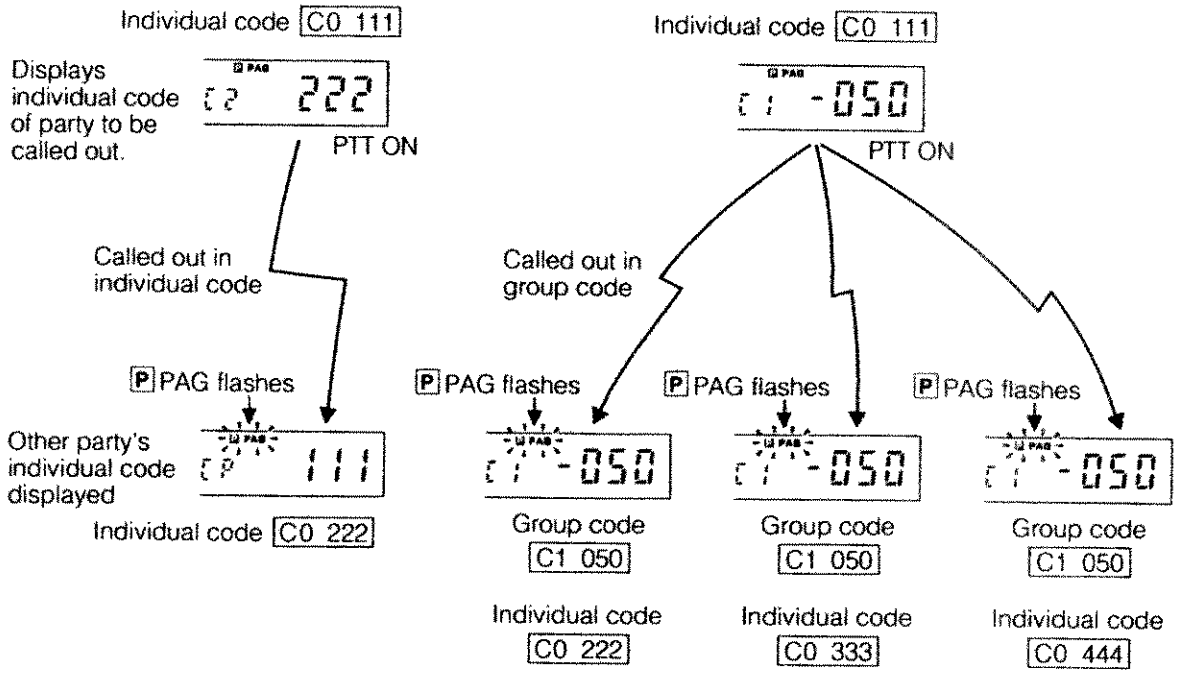
- With this radio, you can call out a specific person or a group. To do this, set the code of paging code and code squelch to the party to be called. This radio is also provided with wake-up function with which you can confirm that you have been called out even with power held Off.

WHAT IS CODE SQUELCH ?

- Setting the indication to the individual code of the other party, make a call. Then the code squelch of the party having been called out opens. As alarm is not produced, you can immediately start communicating.
- To call out as a group, make a calling using an appropriate group code. People thus called have their code squelch opened. As alarm is not produced, you can immediately start communicating.

WHAT IS PAGING ?

- Setting the indication to the individual code of the other party, make a call. The individual code of a person thus called out is displayed. At the same time, alarm is produced.
- To call a group, use Group code. The individual code of the group thus called out is displayed. Also at the same time, alarm is emitted.



SET INDIVIDUAL CODE

F + CODE (5)

1 Hold down [FUNC] key and press [5 CODE] key.

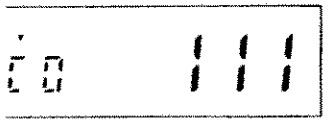
2 Turn Selector knob and set your own individual code memory.
(Set your own individual code to memory C0.)

SET/▲ (0) ~ REVISB (9)

3 Inputting with the keyboard, select a code starting at the 1st digit.

peep

4 With the 3rd digit having been selected, with "peep" sound, a code is set.



F + CODE (5)

5 To return to the original, hold down [FUNC] key and press [5 CODE] key.

DETERMINE CODE OF OTHER PARTY'S PAGING CODE SQUELCH

- Before calling out the other party, you need to determine the other party's code.

F + CODE (5)

1 Hold down [FUNC] key and press [5 CODE] key.

2 Turn Selector knob and set the other party's individual code.
(Set the other party's individual code memory in C1 to C8.)

SET/▲ (0) ~ REVISB (9)

3 Inputting with the keyboard, select a code starting at the 1st digit.

peep

4 With the 3rd digit having been selected, with "peep" sound, a code is set.

F + CODE (5)

5 To return to the original, hold down [FUNC] key and press [5 CODE] key.

SET GROUP CODE

F + CODE (5)

1 Hold down [FUNC] key and press [5 CODE] key.

2 Turn Selector knob and set display to the other party's code. (Set a group code in C1 to C8.)

F + MS.M MS (#)

3 Hold down [FUNC] key and press [# MS.M MS] key.

4 Confirm that ▼ is displayed above C. (With this, a group code is set.)

F + CODE (5)

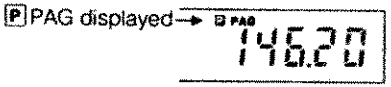
5 To return to the original state, hold down [FUNC] key and press [5 CODE] key.

PERFORM PAGING IN TRANSMITTING

F + PAG/D (4)

1 Hold down [FUNC] key and press [4 PAG/D] key.

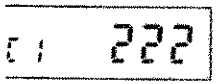
2 Confirm that [P]PAG is displayed.



F + CODE (5)

3 Hold down [FUNC] key and press [5 CODE] key.

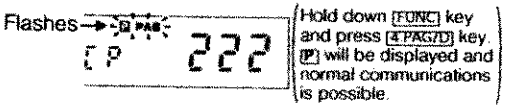
4 Turn Selector knob and set display to the other party's code.



PTT ON

5 Press [PTT] for transmitting.

6 Upon reply from the other party, with [P]PAG flashes, alarm sounds.



PTT ON

7 Press [PTT] to responds.

F + PAG/D (4) (Press twice.)

8 Hold down [FUNC] key and press [4 PAG/D] key twice.

9 From here on, same as the ordinary communication.

- To communicate with the same party once again, you need not set the other party's code. Therefore, you can skip Procedures 4 and 5.
- With [FUNC] key pressed, you can stop the alarm sound.

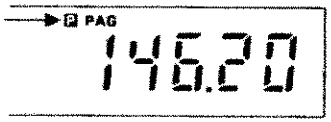
PAGING WHILE RECEIVING

F + PAG/D (4)

1 Hold down [FUNC] key and press [4 PAG/D] key.

2 Confirm that [P]PAG is displayed.

[P] PAG displayed → P PAG



3 When called, [P]PAG flashes and alarm is sounded.

Flashes → P PAG

PTT ON

4 Press [PTT] to respond.

F + PAG/D (4) (Press twice.)

5 Hold down [FUNC] key and press [4 PAG/D] key twice.

6 Nominal communications now has been established.

peep

- When callhng is made in a self station code, CP display is indicated.
- When calling is made in a group code, Cn display is indicated. n indicates a code number.
- With [FUNC] key pressed, you can stop the alarm sound.

PAGING WITH BEEPER

- You can hold squelch unopened even when receiving through paging. In other words, the other party's code is displayed and alarm is produced. (Other party's voice is not heard.)

F + SET/▲ (0)

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to PSq OFF.

F +

3 Hold down [FUNC] key, and turn Selector knob, change display from OFF to on.

F + SET/▲ (0)

4 To return to the original display, hold down [FUNC] key and press [0 SET/▲] key.

To return to the original setting, change the display from on to OFF in Procedure 3.

DELAY OUTGOING TIME OF PAGING

- In some cases, a repeater may require a longer delay time to pass a paging signal. In this case, the paging delay can be increased from 450 to 750 milli seconds.

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to dLy 450.

F +

3 Hold down [FUNC] key and turn Selector knob, change display from 450 to 750.

F + SET/▲ 0

4 To return to the original setting, hold down [FUNC] key and press [0 SET/▲] key.

To return to the original setting, change the display from 750 to 450 in Procedure 3.

CHANGE NUMBER OF BEEP WHILE IN PAGING/ WAKE-UP

- You can change number of times of beep emitted when called out in waiting in paging and wake-up. On shipment, beep is emitted five times, each "pip-pip-pip-pip-pip".

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to PAb 5.

F +

3 Hold down [FUNC] key and turn Selector knob, change display from 5 to 1.

F + SET/▲ 0

4 To return to the original setting, hold down [FUNC] key and press [0 SET/▲] key.

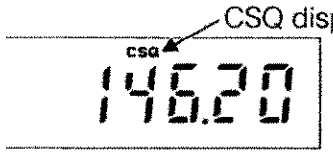
To return to the original setting, change the display from 1 to 5 in Procedure 3.

CODE SQUELCH

F + PAG/D (4) (Press twice.)

1 Hold down [FUNC] key and press [4 PAG/D] key twice, to display CSQ.

2 With [P]PAG displayed, hold down [FUNC] key and press [4 PAG/D] key once.



F + CODE (5)

3 Hold down [FUNC] key and press [5 CODE] key.

4 Turn Selector knob and call out the other party's code.

F + CODE (5)

5 To wait for the other party's transmission, hold down [FUNC] key and press [5 CODE] key.

PTT ON

6 To transmit, press [PTT].

To communicate with back and forth the same party, you need not set the code of the other party's station. Therefore, you can omit Procedures 3 and 4.

WAKE-UP MODE

- In the wake-up mode the current consumption is very low.
- In this operation, codes in 3 or 4 digits are usable. The 3-digit codes are usable together with paging and code squelch. For the 4-digit codes, neither self-station code nor a code of other party's station need not be set.
- Using the STANDARD C188series/C488series Handheld Tranceiver a 4 digit code can be used in the wake-up mode.

SET 4-DIGIT SELF STATION CODE

F + SET/▲ (0)

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to W0 0000.

SET/▲ (0) ~ REV/SB (9)

3 Input, on the keyboard, the station code.

F + SET/▲ (0)

4 To return to the original setting, hold down [FUNC] key and press [0 SET/▲] key.

SET 4-DIGIT CODE FOR OTHER PARTY'S STATION

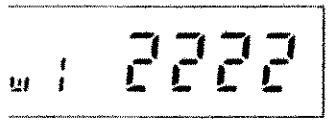
1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to W0 0000.

3 Hold down [FUNC] key and turn Selector knob, set display to W1 0000. Or, set it to W2 0000.

(Memory Addresses W1/W2 are exclusively for other party's use.)

4 Inputting with the keyboard, the code of the other party's station.



5 To return to the original setting, hold down [FUNC] key and press [0 SET/▲] key.

By setting a 4-digit code, you can use wake-up function of our Handheld Transceiver C188series/C488series.

SELECT WAKE-UP CODE DIGIT

- You can choose the digit of codes used in this operation to be either 3 digits or 4 digits.

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to WmodE 4.

3 Hold down [FUNC] key and turn Selector knob, choose a mode.
To use 4-digit codes, set it to 4.
To use 3-digit codes, set it to 3.

4 To return to the original setting, hold down [FUNC] key and press [0 SET/▲] key.

If the transmitted code digit does not match, the radio will not wake-up.

WAIT IN WAKE-UP

F + SET/▲ (0)

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to WUP OFF.

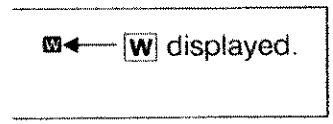
F +

3 Hold down [FUNC] key and turn Selector knob, change setting from OFF to either on or Pon.

(With on selected, when calling is made, "pip-pip-pip-pip-pip" sound is produced with the code of the called station displayed. With Pon selected, power is supplied together with "pip-puff-puff" sound.)

4 Turn off power.

5 Confirm that [W] is displayed.



- To change this function, turn on power and select OFF setting Procedure 3.
- When calling is made from Handheld Transceiver (C188series or C488series), a code in waiting is displayed.

CALL IN WAKE-UP

PREPARATION

1 Select a digit code for wake-up. (P 58)

2 Select a code for the other party's station.

F + CODE (5)

- For a 3-digit code, hold down [FUNC] key and press [5 CODE] key.
  Turn Selector knob and choose a code for the other party's station.

F + SET/▲ (0)

- For a 4-digit code, hold down [FUNC] key and press [0 SET/▲] key.
  Turn Selector knob and choose a code for the other party's station.

To set 3-digit code: (P 53)
To set 4-digit code: (P 58)

F + SET/▲ (0)

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set indication to WUP GO.

PTT ON

3 Press [PTT].

4 Confirm that a code is transmitted and the original display is restored.

USE DTMF

- With this radio, the following two methods are available for sending DTMF signals.

  Transmitting Method 1 : Hold down [PTT] button and press keyboard.

  Transmitting Method 2 : Store DTMF code in memory and transmit the code.

SEND OUT DTMF SIGNALS

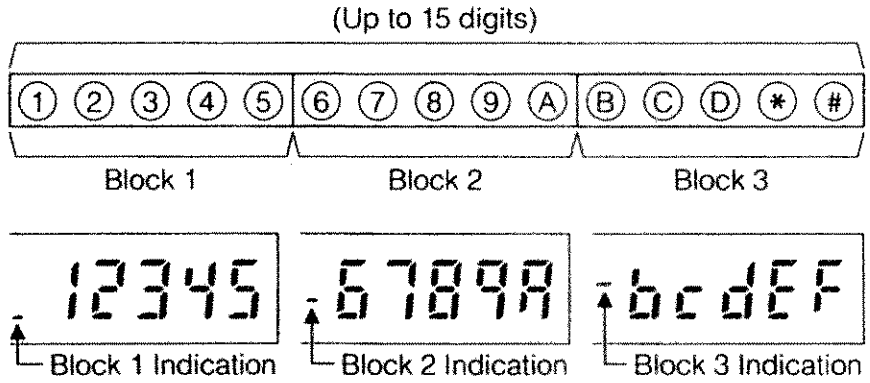
(Press each key.)

1 Hold down [PTT] button and press keyboard [0] through [9], [*], [#] keys.

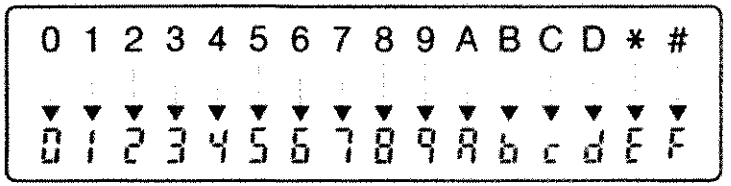
DTMF signals are sent out only while a key is pressed.

STORE DTMF CODE IN MEMORY

- A maximum of 15 digits of DTMF tones can be loaded into memory.
- These memories are 10 in total. Storing DTMF tones in memory, can be helpful.



- Codes to be stored in memory are 0 through 9, A through D, * and # . On the display, the codes are indicated as follows:



1 Set to VFO.

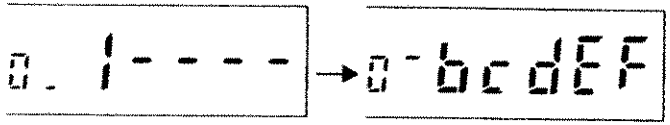
F + DTM·M (6)

2 Hold down [FUNC] key and press [6 DTM·M] key.

3 Turn Selector knob and set the number to be stored in memory. (Memory is set in 0 to 9.)

4 Confirm that display is ready for 1st digit to be input.

5 Using the keyboard, input codes for 1st through 15th digit.



F + DTM·M (6)

Press each of [0] through [9], [*], [#] keys. For [A] through [D], hold down [FUNC] key and press each of key.

6 To return to the original setting, hold down [FUNC] key and press [6 DTM·M] key.

When a code to be input is shorter than 15 digits, hold down [FUNC] key and press [ENT V/M] key. Then the codes up to that point are stored. Also, with the 15th digit having been input, the entire codes are automatically stored.

ERASE DTMF MEMORY

F + DTM·M (6)

1 Hold down [FUNC] key and press [6 DTM·M] key.

2 Turn Selector knob and set display to the memory to be erased. (Memory is set in 0 through 9.)

F + ENT V/M

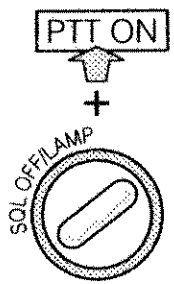
3 Hold down [FUNC] key and press [ENT V/M] key.

4 Confirm that CLr is displayed.

F + ENT V/M

5 Hold downkey [FUNC] and press [ENT V/M] key.

TRANSMIT DTMF CODE STORED IN MEMORY



1 Press [PTT] switch to start transmitting.

2 Holding transmitting, press [SQL OFF/LAMP] key.

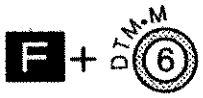
3 Confirm that frequency display disappears.

4 In Procedure 3, input, on the keyboard, the memory address in number which is holding the DTMF in memory.

5 Confirm that DTMF code is transmitted.

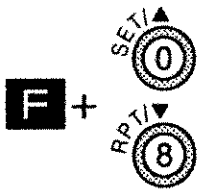
With [PTT] switch pressed, memories of different addresses can be sent out continuously. Further, following sending of DTMF codes, [*]/[#] codes can be sent out.

CONFIRM DTMF CODE STORED IN MEMORY

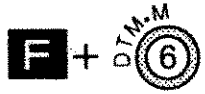


1 Hold down [FUNC] key and press [6 DTM·M] key.

2 Turn Selector knob and set the number stored in memory. (Memory is set in 0 through 9.)



3 Hold down [FUNC] key and press either [0 SET/▲] or [8 RPT/▼] key.



4 To return to the original setting, hold down [FUNC] key and press [6 DTM·M] key.

Content stored in memory can be confirmed by 5 digits each time.

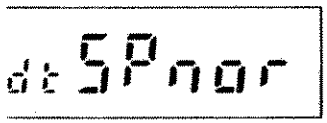
CHANGE INTERVAL TIME OF DTMF CODE

- In general, DTMF signals are sent in intervals each of 50 milli-seconds. This interval is changeable into 100 milli-seconds.
  When the distance to the other party is long, by setting the interval of outgoing time longer, you can obtain better rates in paging/code squelch recognition.

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to dtSP nor.



F + Selector knob

3 Hold down [FUNC] key and turn Selector knob, change display from nor to Lo.

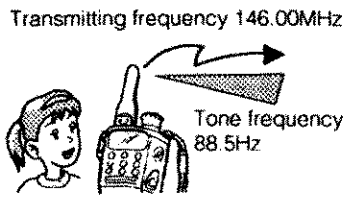
F + SET/▲ 0

4 To return to the original setting, hold down [FUNC] key and press [0 SET/▲] key.

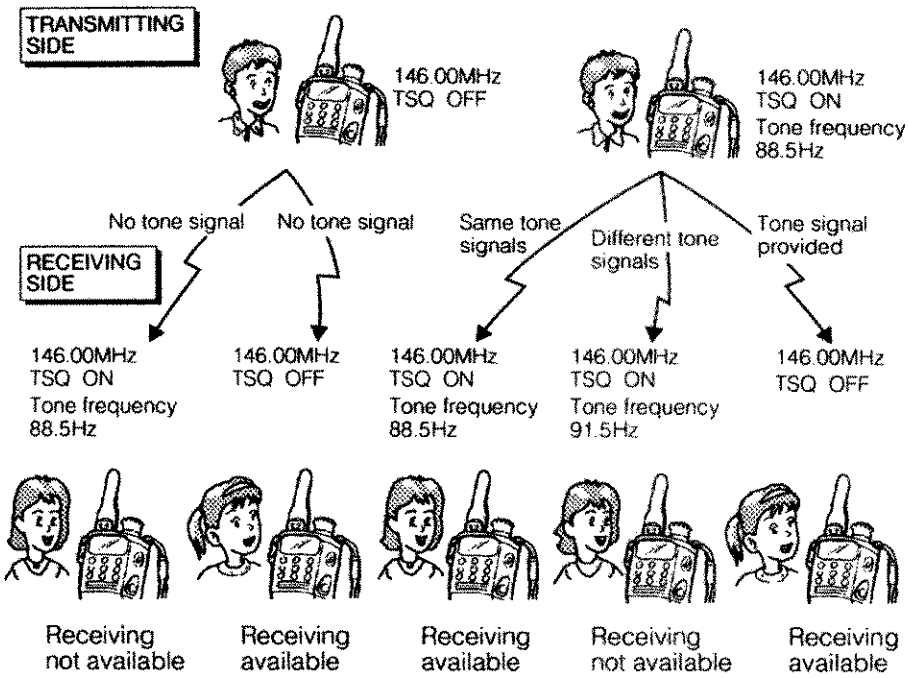
Return to the original time, set the display to nor in Procedure 3.

USING TONE SQUELCH (CTN170)

- When tone squelch is in operation, tone signals are simultaneously emitted on transmitting. With this, the tone encoder and the tone squelch are made useable.



- Tone encoder emits tone signals on transmitting.
- Tone squelch emits tone signals on transmitting. Further, when your tone signal is not the same as the other party's, no voice is sent out.



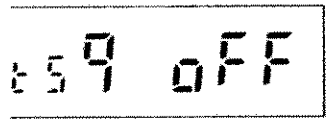
For the C178, C178S, C478, and C478S, this function can be activted only with the CTN170 mounted.

CONDUCT TONE ENCODER/TONE SQUELCH

F + SET/▲ 0

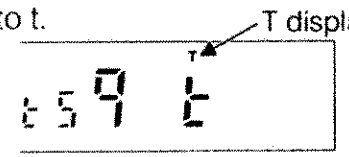
1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to tsq OFF.

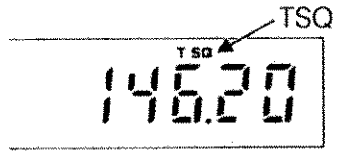


F +

3 Hold down [FUNC] key and turn Selector knob.
To conduct tone encoder, set display from OFF to t.



To conduct tone squelch, change display from OFF to tsq.
(Display changes like OFF → t → tsq →.)



F + SET/▲ 0

4 Hold down [FUNC] key and press [0 SET/▲] key.

5 Confirm that the display returns to the original state.
For tone encoder, T is displayed.
For tone squelch, TSQ is displayed.

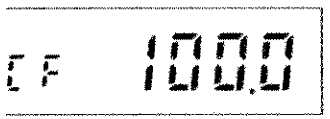
- To change this function, return the display to OFF in Procedure 4.
- For the C178, C178S, C478, and C478S, this function can be activted only with the CTN170 mounted.

CHANGE FREQUENCY OF TONE SIGNALS

F + SET/▲ 0

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to CF 100.0.



F +

3 Hold down [FUNC] key and turn Selector knob, set frequency to that of the tone signal.

F + SET/▲ 0

4 Hold down [FUNC] key and press [0 SET/▲] key.

Tone Signal Frequency (Hz)

67.0	69.3	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	Total 39 types		

The Factory setting (original value) of each model is as follws:

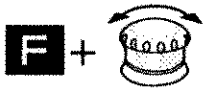
C178, C178S, C478, C478S: 100 Hz
C178A, C478A: 88.5 Hz

RECEIVE AM SIGNALS

- In the AM mode the tranceiver can be used to receive AM signals. Normally the FM mode is used, but the setting can be changed if desired. This function can be used with all frequency band.

1 Hold down [FUNC] key and press [0 SET/▲] key.

2 Turn Selector knob and set display to AM OFF.



3 Hold down [FUNC] key and turn Selector knob, change display from OFF to on.

4 To return to the original setting, hold down [FUNC] key and press [0 SET/▲] key.

◆ Transmitting is always FM, even if the AM mode has been enabled.

◆ To release this function, change the display from on to OFF in Procedure 3.

FOR YOUR REFERENCE

LIST OF SET MODE FUNCTIONS 68
BEFORE JUDGING IT AS FAILURE 69
OPTIONAL (SEPARATELY AVAILABLE) PRODUCTS 70
EXAMPLE OF TNC (PACKET CONTROLLER) CONNECTION 70
RATINGS 71
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LIST OF SET MODE FUNCTIONS

Reference Page	Function	Original Value
*1 16	Change frequency step.	5
*2 40	Change offset frequency for repeater operation.	0.00
*3 64	Change frequency of tone signals.	100.0
*3 64	Conduct tone encoder/tone squelch.	OFF
49	Battery save	OFF
44	Change time for dual watch.	SP nor
17	Inputs 1kHz digit on keyboard.	P 10FF
50	All reset to factory settings.	S OFF
63	Change interval time of DTMF code.	SP nor
55	Paging with beeper.	OFF
56	Delay outgoing time of paging.	450
56	Change number of beep while in paging/wake-up.	5

Reference Page	Function	Original Value
49	Stop off beep during key operation.	on
49	Reduces pop noise when squelch is opend.	OFF
14	Hold display lamps lighted.	P nor
19	Selector useable even in key lock.	OFF
26	Change over memory page • Only with CMU161 installed.	ED
25	Make memory unchangeable (Memory Protect)	OFF
47	Prevent erroneous transmitting (PTT lock)	OFF
48	Turn off power automatically (Auto Power Off)	OFF
48	Stop transmitting automatically (Time Out Timer)	OFF
58	Selects wake-up code digit.	odE 4
59	Call in wake-up.	P 60
59	Wait in wake-up.	P OFF

Reference Page	Function	Original Value
57	Wake-up mode.	0000
16	Changes frequency in 100kHz/1MHz step.	1 OFF
44	Operate with two different frequencies.	P OFF
65	Receivie AM signals.	OFF
*4 47	Turns on power to the radio. (On Timer)	00:00
*4 47	Turns off power to the radio. (Off Timer)	00:00
*4 46	Display present time.	00:00

*1 The original value of each model is as follows:
C178, C178S, C478, C478S: 5 kHz
C178A, C478A : 10 kHZ

*2 The original value of each model is as follows:
C178, C178S, C478, C478S: 0 MHz for both VHF and UHF bands
C178A, C478A : 600 kHz for VHF band
: 5 MHz for UHF band

*3 The indication is provided only with the CTN170 mounted

*4 Indicates state available only when clock function is used.

BEFORE JUDGING IT AS FAILURE

• Before judging it as a failure, please check to confirm the following:

Q: POWER NOT TURNED ON.
- **A1** Is the battery dead ?
- **A2** Is the memory unit fully inserted into the connector ?

Q: EVERY PRESS OF POWER SWITCH ON/OFF BRINGS BACK TO ORIGINAL STATE
- **A1** Is the memory unit mounted in correct manner ?
- **A2** Is the lithium cell for memory backup fully charged ? (Charging required about 10 hours.)

Q: NO SIGNALS RECEIVED.
- **A1** Is the sound volume to the fullest end counterclockwise (↶) ?
- **A2** Is the squelch volume to the fullest end clockwise (↷) ?
- **A3** Is either one of PAG, CSQ, and TSQ held ON ?

Q: ONLY STRONG SIGNALS RECEIVED.
- **A1** Has the antenna been properly connected ?
- **A2** Is the squelch volume to the fullest end clockwise (↷) ? Readjust the squelch control.

Q: WILL NOT TRANSMIT.
- **A1** Is repeater function held ON ? If "OFF" is displayed, the offset frequency is not correct. Confirm one more time.
- **A2** Is PTT lock function working ? With "-PL-" displayed, PTT lock function is working.

Q: TRANSMITTING AVAILABLE ONLY IN CALL FREQUENCY.
- **A1** Is repeater function held ON ?
- **A2** Is Semi-Duplex function working ? With "TX" displayed, the function is in effect.

Q: FREQUENCY NOT CHANGEABLE.
- **A1** Is key lock function working ? With 🔑 KEY mark displayed, release key lock function.

Q: FREQUENCY NOT STORED IN MEMORY.
- **A1** Is the memory unit actually mounted ?
- **A2** Is supply voltage appropriate ? If supply voltage is not sufficient, data protect function of the memory unit starts to function.
- **A3** Is memory protect held ON ?

Q: SEMI-DUPLEX NOT USEABLE.
- **A1** Is the memory unit in properly mounted state ?

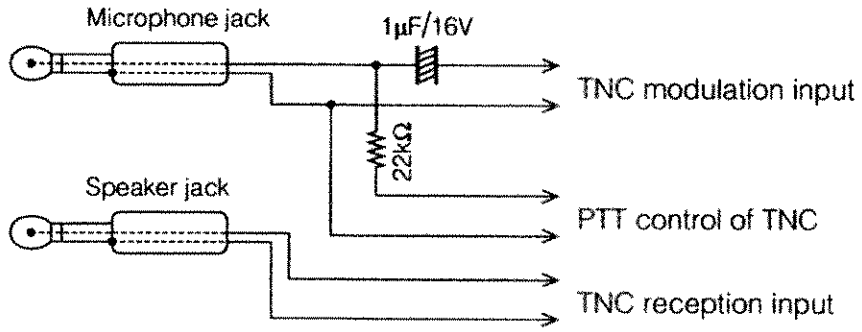
* If not, semi-duplex is effective only between call frequency and VFO.

Q: CAN ONLY TRANSMIT ON THE CALL FREQUENCY.
- **A1** Is the C indication visible on the display ? (Press the CALL key again to return to the dial frequency.)

OPTIONAL (SEPARATELY AVAILABLE) PRODUCTS

CBT171 ..... Battery Case (AA-size battery × 6)
CBT175 ..... Battery Case (AA-size battery × 2)
CNB171 ..... Standard-type Rechargeable Battery Pack
CNB172 ..... High Power Rechargeable Battery Pack
CNB173 ..... Long-Life Rechargeable Battery Pack
CLC171 ..... Soft Case (With CBT171/CNB171 mounted)
CLC172 ..... Soft Case (With CNB172/CNB173 mounted)
CLC175 ..... Soft Case (CNB175 mounted)
CTN170 ..... Tone Squelch Unit (Installed in C178A/C478A)
CMB112 ..... Mobile Bracket
CMU160 ..... Memory Unit (4kbit 40ch)
CMU161 ..... Memory Unit (16kbit 200ch)
CSA181 ..... Desk Top Charger (Rapid charging)
CWC150 ..... AC Charger (For CNB171/173)
CWC151 ..... AC Charger (For CNB172)
CMC150 ..... Mobile Charger (For CNB171/173)
CAW150 ..... Mobile Power Cable
CAW152 ..... Mobile Power Cable (With noise filter)
CAW151 ..... Power Calbe for Base Station
CHP150 ..... Head Set with VOX
CMB600 ..... Helmet Clip for CHP150
CHP111 ..... Head Set with PTT
CMP111 ..... Microphone & Speaker
CMP115 ..... Small-Sized Microphone & Speaker
CMP113 ..... Tiepin-Type Microphone/Earphone
CAX 03 ..... Bottom Cover
CLC555 ..... Handy Pochette (Green / Orange)

EXAMPLE OF TNC (PACKET CONTROLLER) CONNECTION



RATINGS

General Specifications

Frequency Range		144.000 ~ 147.995 MHz(C178)
		430.000 ~ 439.995 MHz(C478)
		144.000 ~ 145.995 MHz(C178S)
		430.000 ~ 449.995 MHz(C478S)
		144.000 ~ 147.995 MHz(C178A)
		438.000 ~ 449.995 MHz(C478A)
Wave Type		F3
Microphone Input Impedance		600Ω
Speaker Impedance		8Ω
Operating Voltage Range		DC2.8V ~ 16.0V (Using external supply terminal) DC2.3V ~ 15.0 (Using battery pack)
Rated Voltage		DC7.2V
Current Consumption (transmitted in 13.8V)	[Hi 5 W]	Approx. 1300mA (C478/S/A)
		Approx. 1000mA (C178/S/A)
	[Nid 2.5 W]	Approx. 950mA (C478/S/A)
		Approx. 800mA (C178/S/A)
Current Consumption (transmitted in 7.2V)	[Hi 2 W]	Approx. 950mA (C478/S/A)
		Approx. 900mA (C178/S/A)
	[Nid 2 W]	Approx. 950mA (C478/S/A)
		Approx. 900mA (C178/S/A)
Current Consumption (transmitted in 13.8/7.2V)	[Low 350 mW]	Approx. 440mA (C478/S/A)
		Approx. 400mA (C178/S/A)
Current Consumption (transmitted in 13.8/7.2V)	[EL 50 mW]	Approx. 100mA (C478/S/A)
	[EL 50 mW]	Approx. 70mA (C178/S/A)
Current Consumption (transmitted in 3V)	[EL 20 mW]	Approx. 75mA (C478/S/A)
	[EL 20 mW]	Approx. 60mA (C178/S/A)
Current Consumption (in waiting)		Approx. 35mA (C478/S/A)
		Approx. 30mA (C178/S/A)
Current Consumption (at SAVE 0.75 sec)		Approx. 15mA (C478/S/A)
		Approx. 14mA (C178/S/A)
At APO		Approx. 0.5mA (C478/S/A)
		Approx. 0.5mA (C178/S/A)
Dimensions of Main Body (Including batteries but not including projections)		47(W) x 120(H) x 33.5(D) mm (C178/S, C478/S)
(Including Ni-Cd battery but not including projections)		47(W) x 124(H) x 33.5(D) mm (C178A, C478A)
Weight (Including dry cells/antenna)		325g(C178/S, C478/S)
(Including Ni-Cd battery/antenna)		345g(C178A, C478A)

Reception Part

Reception System	Double Super Heterodyne system	
Intermediate Frequency	1st IF	21.8MHz(C478/S/A)
	1st IF	21.8MHz(C178/S/A)
	2nd IF	455kHz
Reception Sensitivity		-10 dB
S/N Ratio with Input of 0.5V		30dB or more
Squelch Open Sensitivity		-14 dB
Audio Output		200mW (8Ω/10% distortion)

Transmission Part

Transmission Output (Hi)		
Using CBT171		1.5W (C478/S/A)
		2.0W (C178/S/A)
Using CNB171/CNB173		2.0W (C478/S/A)
		2.8W (C178/S/A)
Using CNB172		5.0W (C478/S/A)
		5.0W (C178/S/A)
Transmission Output (Mid)		
Using CBT171		1.5W (C478/S/A)
		2.0W (C178/S/A)
Using CNB171/CNB173		2.0W (C478/S/A)
		2.5W (C178/S/A)
Using CNB172		2.5W (C478/S/A)
		2.5W (C178/S/A)
Transmission Output (Low)		0.35W (C478/S/A)
		0.35W (C178/S/A)
Transmission Output (EL)		
Using CBT171		Approx. 50mW (C478/S/A)
		Approx. 50mW (C178/S/A)
Using CNB171/CNB173		Approx. 50mW (C478/S/A)
		Approx. 50mW (C178/S/A)
Using CNB172		Approx. 50mW (C478/S/A)
		Approx. 50mW (C178/S/A)
Using CBT175		Approx. 20mW (C478/S/A)
		Approx. 20mW (C178/S/A)
Modulation System		Reactance modulation
Max. Frequency Deviation		±5kHz
Spurious Radiation Intensity		-60 dB or more
Built-in Microphone		Electret Condenser Microphone

- External appearance and ratings of this radio are subject to change for betterment without prior notice.

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