KENWOOD

UHF FM TRANSCEIVER

TH-405AT
TH-405A
TH-405E

VHF FM TRANSCEIVER

TH-205AT
TH-205A
TH-205E

INSTRUCTION MANUAL

©PRINTED IN JAPAN B50-8087-50(K, M, W, T, X)(T)
88/6 5 4 3 2 1 87/12 11 10 9 8 7 6 5 4 3 2

Thank you for purchasing the new transceiver.

IMPORTANT

Please read this instruction manual carefully before placing your transceiver in service.

This Instruction Manual covers the following models:

KENWOOD TH-405AT:	430/440 MHz FM transceiver with DTMF Pad.
KENWOOD TH-405A:	430/440 MHz FM transceiver without DTMF Pad.
KENWOOD TH-405E:	430 MHz FM transceiver with Tone.
KENWOOD TH-405E: (U.K. version)	430 MHz FM transceiver with Tone Burst.
KENWOOD TH-205AT:	144 MHz FM transceiver with DTMF Pad.
KENWOOD TH-205A:	144 MHz FM transceiver without DTMF Pad.
KENWOOD TH-205E:	144 MHz FM transceiver with Tone.
KENWOOD TH-205E: (U.K. version)	144 MHz FM transceiver with Tone Burst.

SAVE THIS INSTRUCTION MANUAL.

Under normal circumstances, the transceiver will operate in accordance with these operating instructions. The transceiver was preset at the factory and should only be readjusted by a qualified technician with proper test equipment.

Attempting service or alignment without factory authorization can void the transceiver's warranty.

CAUTION:

Long transmission or extended operation in the 5 watt mode might cause the rear of this transceiver to get warm. Do not place the transceiver where the heat sink (rear panel) might come in contact with plastic or vinyl surfaces.

CONTENTS

Illustrations show the TH-205AT.

SPECIFICATIONS

				TH-405AT/405A/405E	TH-205AT/205A/205E
GENERAL	FREQUENCY RANGE MHz		U.S.A.Version	TH-405AT/405A 440.000 ~ 449.995	TH-205AT/205A 144.000 ~ 147.995
			Others	TH-405AT/405A 430.000 ~ 439.995	TH-205AT/205A 144.000 ~ 147.995
			European and U.K. version	TH-405E 430.000 ~ 439.995	TH-205E 144.000 ~ 145.995
	MODE			F3 (FM)	
	OPERATING TEMPERATURE			−20°C ~ +50°C (−4°F ~ +122°F)	
	ANTENNA IMPEDANCE			50 Ω	
	POWER REQUIREMENT		BATTERY PACK	6.3 V~15 VDC (8.4 VDC nominal)	
			DC IN	7.2 V~16 VDC (13.8 VDC nominal)	
	CURRENT DRAIN	Hi TRANSMIT MODE 2.5 W (8.4 V)		Approx. 1.2 A	Approx. 1 A
		Hi TRANSMIT MODE 5 W (13.8 V)		Less than 2 A	Less than 1.7 A
		Low TRANSMIT MODE		Less than 0.9 A	Less than 0.7 A
		RECEIVE MODE WITH NO SIGNAL		Approx. 55 mA	Approx. 50 mA
		BATTERY SAVER MODE (At 1 : 2)		Approx. 20 mA	
	DIMENSIONS		W×H×D	67×173×37 (mm)	
			(PROJECTIONS INCLUDED)	70×181×40 (mm)	
	WEIGHT		With Ni-Cd battery and antenna	Approx. 540 g	Approx. 520 g
			With manganese battery and antenna	Approx. 520 g	Approx. 500 g
TRANSMITTER	OUTPUT POWER	Hi	13.8 VDC	5 W	
			with PB-1	5 W	
			with PB-2	2 W	2.5 W
			with PB-3, PB-4	1 W	1.5 W
		Low		Approx. 0.5 W	
	MODULATION			REACTANCE	
	MAXIMUM FREQUENCY DEVIATION			±5 kHz	
	SPURIOUS RADIATION			Less than −60 dB	
RECEIVER	CIRCUITRY			DOUBLE CONVERSION SUPERHETERODYNE	
	INTERMEDIATE FREQUENCY		1st IF	30.825 MHz	16.3 MHz
			2nd IF	455 kHz	
	SENSITIVITY		12 dB SINAD	Less than 0.25 μV	Less than 0.2 μV
	SQUELCH SENSITIVITY			Less than 0.16μV	
	SELECTIVITY		−6 dB	More than 12 kHz	
			−40 dB	Less than 28 kHz	
	AUDIO OUTPUT POWER (across 8 Ω load 10% distortion)			More than 350 mW	

NOTE: Circuit and ratings are subject to change without notice, due to development in technology.

ACCESSORIES

Unpack your transceiver carefully and confirm that it is supplied with the following accessories.

1 Antenna .....T90-0352-05.....1 ea.
2 Rubber cap.....B09-0307-04.....1 ea.
3 Belt Hook (U.S.A. version) .....J29-0417-04.....1 ea.
4 Machine Screw (U.S.A. version)..N35-3005-41.....2 ea.
5 Spring washer (U.S.A. version) ...N16-0030-41.....2 ea.
6 Ni-Cd Battery pack (PB-2) .....W09-0361-05.....1 ea.
or
AA Manganese/Alkaline Battery case.....A02-0728-03.....1 ea.
7 Battery charger (120 V).....W09-0315-15.....1 ea.
(U.S.A. version) or
Battery charger (220 V).....W09-0317-15.....1 ea.
(European version) or
Battery charger (240 V).....W09-0318-15.....1 ea.
(U.K. version) or
Battery charger (240 V).....W09-0319-15.....1 ea.
(Oceania version)
8 Instruction Manual.....B50-8087-XX.....1 copy
9 Warranty Card (U.S.A. version) .....1 ea.

BATTERY PACK

Installing the battery pack

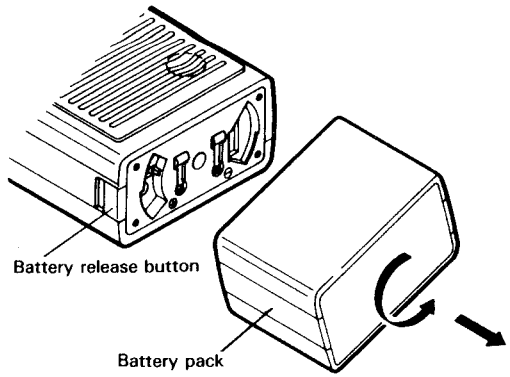
Match the concave part at the bottom of the radio to the covex part at the top of the battery pack.

Turn the battery pack clockwise until it clicks.

Be sure the pack and transceiver are locked together.

Removing

Pressing the battery release button, turn the battery pack counterclockwise.



Ni-Cd BATTERY PACK (PB-2)

NOTE:

This battery pack has not been charged at the factory in order to provide you with the greatest number of charge/discharge cycles. You must charge the battery before use. The battery pack will require several charge/discharge cycles before you can expect to see the maximum operating period between charges. If the battery will be stored for greater than 2 months it should be recharged before use.

RECHARGING THE BATTERY PACK

Insert the charge plug from the BC-2 into the receptacle on the rear of the battery pack. Then plug the BC-2 into the AC line. The LED on the BC-2 will illuminate to show that the pack is charging. The LED will remain on as long as the BC-2 is connected to the AC power source and the battery, indicating that the pack is still being charged. Therefore, do not forget to unplug the charger after approximately 15 hours. RECHARGING TIME: Approx. 15 Hours

NOTES:

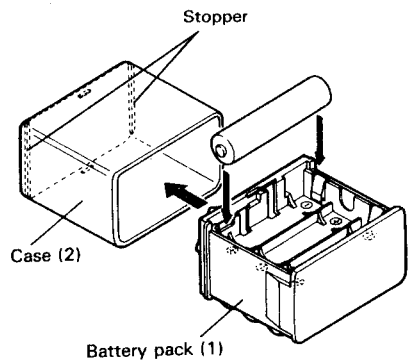
- Turn off the power switch before charging.
- Recharging should be done within an ambient temperature between 10°C~40°C (50°F~104°F). Recharging performed out of this range may not fully charge the battery.
- If you exceed the recommended charge period, the battery performance and its life may lessen.

MANGANESE or ALKALINE BATTERIES

Load SUM-3 × 6 manganese or alkaline batteries in series in the supplied battery case. (Be sure to observe the polarities.)

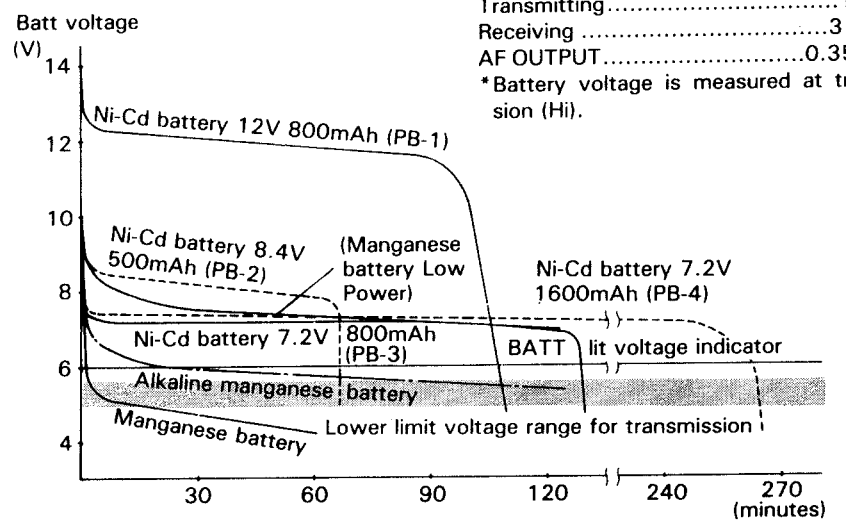
(We recommend use of high-perfomance manganese batteries.)

Battery pack (1) can be inserted into case (2) only in a specific direction. Check the shape (top and bottom) after moving the stopper on the rear side, then insert the battery correctly. Inserting the battery by force without checking the shape may damage the case.



OPERATING TIME

Transmitting.....1 minute
Receiving .....3 minutes
AF OUTPUT.....0.35 W/8 Ω
*Battery voltage is measured at transmission (Hi).



Manganese battery (except Alkaline manganese battery) is available for Low position.

Recharge the Ni-Cd battery pack immediately the BATT indicator comes on.

We recommend use of Ni-Cd battery pack for long transmission or extended operation.

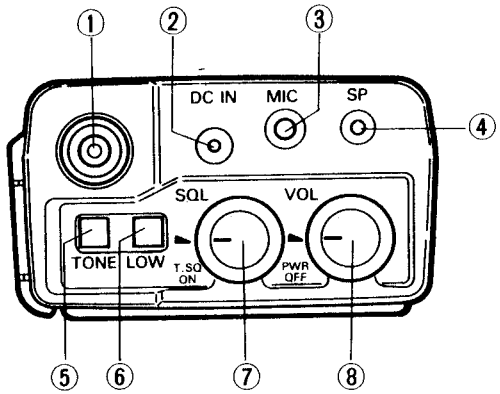
CONTROLS AND FUNCTIONS

① Antenna connector

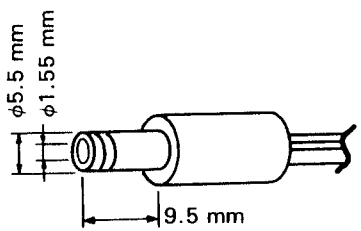
This jack is used to connect the supplied antenna. Twist to lock with the BNC connector.

② DC IN terminal

This terminal is used for an external power supply (7.2 ~ 16 V).
You should turn the power switch OFF when connecting this terminal. Pay attention to the polarity.



CAUTION:
As a precaution, do not remove the battery pack when an external power supply is used. Use the KENWOOD PG-2V or PG-3C optional cable for the connection.



③ External MIC jack

④ SP jack

This jack is used for an earphone or external speaker. The recommended impedance is 8 Ω nominal.

⑤ TONE switch

This switch is used to activate the sub-audible tone encoder.
European version: This switch is used to transmit a TONE signal. When this switch is pressed the repeater control signal of 1750 Hz is activated.

⑥ HI ▮ /LOW ▬ switch

This switch is used to select the transmit output power.

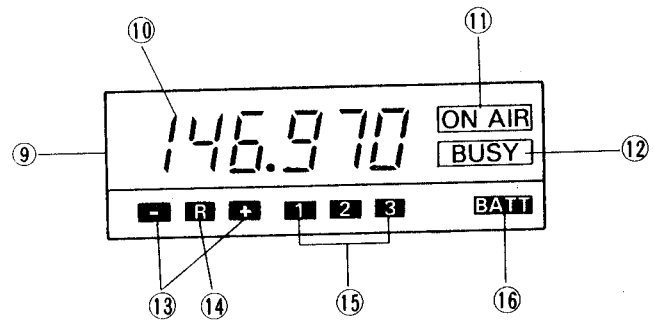
⑦ SQL control

The SQL control is used to eliminate noise during no signal periods. Normally, this control is adjusted clockwise until the noise just disappears and the BUSY indicator goes OFF (Threshold level). For scan operation, this control must be set to the threshold point. When an incoming signal is weak or unstable, readjust the squelch for optimum reception.

⑧ VOL control

Volume control with power ON/OFF switch.

⑨ LCD display



⑩ Frequency display

Displays the operating frequency.

⑪ ON AIR indicator

ON during transmit mode.

⑫ BUSY indicator

ON whenever the squelch opens during receive. ON all the time if the squelch control is rotated counterclockwise, and the T.SQ is off.

⑬ OFFSET symbol "–" "+"

Displays the selected offset, "–" for minus, "+" for plus, and no indicator for simplex.

⑭ REVERSE indicator "R"

ON whenever the REVERSE function is active.

⑮ Memory channel indicator

Indicates the selected memory channel 1 ~ 3.

⑯ BATT indicator

Lights when the battery voltage falls below the level for good communications. Recharge/replace the battery pack.

① MEMORY CHANNEL keys

These keys are used to select the desired memory channel.

② LAMP key

This key controls the lamp on the LCD display.

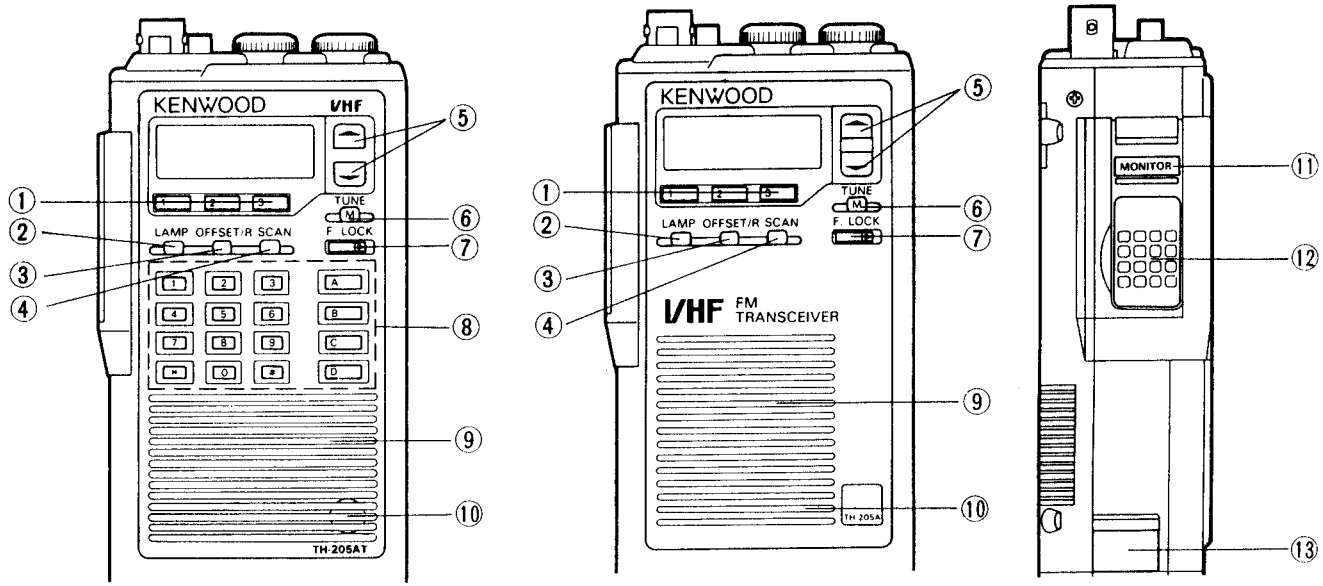
NOTE: When the LAMP is on battery drain will be accelerated. Do not use this feature unnecessarily.

③ OFFSET/R key

This key is used to select the desired transmitter offset for repeater operation. Each time the key is pressed, the mode cycles from +, to −, to simplex, and back to +.

R (REVERSE)

First press the [M] key and then [OFFSET/R] key to reverse the transmit/receive frequencies during repeater operation.



④ SCAN key

This key is used to initiate and release the SCAN.

⑤ UP/DOWN keys

These keys are used to select the operating frequency.

⑥ M (Memory enter) key

This key is used to enter a frequency into memory.

⑦ F. LOCK key

Turn this switch ON and the frequency will remain unchanged by keyboard operation except LAMP key.

⑧ DTMF KEY PAD (With the TH-405AT/205AT)

To operate DTMF key pad press the PTT switch and dial the desired number.

After the first number has been entered the transceiver will remain keyed for approximately 2 seconds, thus allowing the release of the PTT switch.

⑨ Speaker

⑩ Microphone

⑪ MONITOR key

Pressing this key will open squelch.

⑫ PTT (Push To Talk) switch

For transmission, press this switch and speak into the microphone.

⑬ RELEASE Button

Used to release the battery. Depress this button, and turn the battery counterclockwise.

OPERATION

■ RECEIVE

After power and antenna connections have been completed, set the switches as follows:

1. Turn the VOL control clockwise to turn on power. The frequency on the LCD display will show the transceiver is operating.
2. As the VOL control is turned clockwise, either background noise or a QSO will be heard.
3. To eliminate the no-signal noise turn the SQL control clockwise.
4. Enter the desired frequency using ▲ or ▼ key.

■ TRANSMIT

Precaution: Check the intended transmit frequency before operating to prevent interference with other stations.

1. Simply depress the PTT switch and the [ON AIR] indicator will light.
2. Speak into the microphone. Recommended talk distance to the microphone is approximately 2 inches (5 cm).

CAUTION:

Long transmission or extended operation in the 5 watt mode might cause the rear of this transceiver to get warm. Do not place the transceiver where the heat sink (rear panel) might come in contact with plastic or vinyl surfaces.

■ FREQUENCY SELECTION

UP

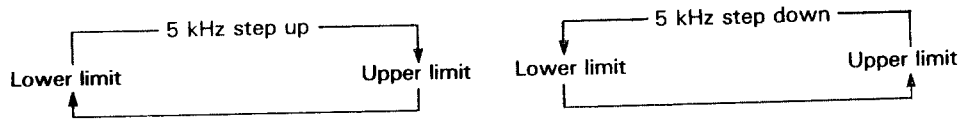
DOWN

A) Pressing either the ▲ or the ▼ key momentarily will cause the displayed frequency to change 5 kHz up or down, respectively.

B) Pressing the ▲ or the ▼ key for more than one second will cause to change up or down continuously until this key is released.

C) Holding the ▲ and the ▼ keys depressed will cause to change quite rapidly.

Repeating these operation shifts the displayed frequency as shown below.



■ REPEATER OPERATION

● Transmitter offsets

All amateur radio repeater utilize a separate receiver and transmitter section. The receiver frequency may be either above or below the transmitter frequency. The transceiver allows you to store the frequency and offset in memory, or you can select the offset from the keyboard.

To select the desired offset press the OFFSET/R key. Each time you press the key the radio will advance from one offset to the other, i.e. "+" to "−" to no offset or simplex.

TH-405AT/405A;	±5 MHz
TH-405E +;	−1.6 MHz
−;	−7.6 MHz
TH-405E U.K version;	±1.6 MHz
TH-205AT/205A/205E;	±600 kHz

● REVERSE Function

The REVERSE key has been provided to allow you to reverse the transmit and receive frequencies.

TH-405E/205E: Transmission is inhibited when the REVERSE key is engaged.

To use the REVERSE function first press the "M" key and then press the OFFSET/R key. The REVERSE indicator **R** will light in the display. To return to normal offsets press the "M" and OFFSET/R key again (with the TH-405AT/405A/205AT/205A). This function is useful to check the input frequency of the repeater so that you can determine if you are within SIMPLEX range.

● TONE Operation

Some repeaters require the use of a control signal to activate the repeater. Several versions are currently in use worldwide.

TH-405AT/405A/205AT/205A:

Use of subaudible tones is optional, so the TSU-3 is made available as an optional accessory. This unit provides for both Encode and Decode. The decode section allows for T.SQ operations. With this option you will only hear those stations that transmit the same subaudible tone. Other stations will not open the squelch of your radio. In the United States 37 standard tone frequencies are available.

TH-405E/205E:

In Europe a 1750 Hz tone is used in transmit. In the United Kingdom a 1750 Hz tone burst at the beginning of each transmission is used. Since use of these tones is required in the U.K. and in Europe the tone encoder is included as standard equipment.

The transceiver provides for all three tone types. To activate the appropriate tone signaling device depress the TONE switch on the top of the radio.

● Autopatch operations (with the TH-405AT/205AT)

Some repeaters offer a service known as AUTOPATCH. This allows you to dial a telephone number from your radio and carry out a telephone conversation, much like a car telephone, or cellular telephone. This function requires the use of a DTMF (Dual Tone Multi Frequency) pad. This is also known as a touch tone pad. It operates just like the touch tone pad on your home telephone. In addition to the normal 12 keys that are found on your telephone the transceiver also provides 4 additional keys A, B, C, and D. These keys are required by some repeater systems for various control functions. You should check with the control operator of your repeater to determine if their use is required. A chart is provided that lists the tones that are generated when you press each key.

To use the touch tone pad you should first key the radio using the PTT switch. Then simply press the numbers corresponding to the telephone number you want to dial. Some repeaters will require a special sequence of keys to activate the autopatch. Again you should check with the control operator of your repeater for this sequence.

After you have pressed the first number key the radio will remain keyed for approximately 2 seconds. This is done so you do not have to hold the PTT key depressed while dialing. The radio remains keyed after you press each number for this 2 second interval.

Audio tones (Hz)

Row \ Column	1209	1336	1477	1633
697	1	2	3	A
770	4	5	6	B
852	7	8	9	C
941	*	0	#	D

■ SCAN

For scan to operate properly, adjust the SQL control clockwise to silence noise.

Press the [▲] key and the [SCAN] key in this order increment the displayed frequency in 5 kHz step.

When a signal is present and squelch is open, scan is released.

To release scan mode press the [SCAN] key or the PTT switch.

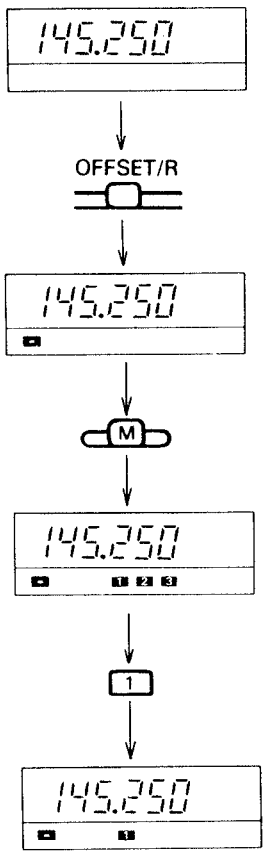
■ MEMORY ENTRY

Three memory channels have been provided in the transceiver for storing frequency and offset.

Press the [M] key and then the desired channel number (1, 2, or 3).

Example:

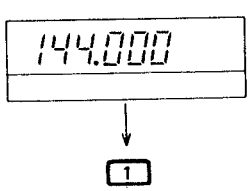
Store 145.250 MHz into memory channel 1 with a −600 offset.



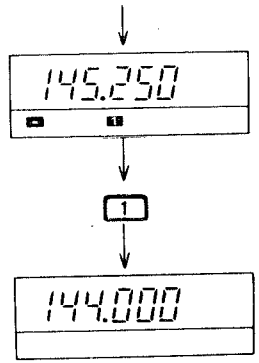
1. Select 145.250 using the UP/ DOWN keys.
2. Select −600 offset using the OFFSET/R key.
3. Press the [M] key.
4. Press the desired memory channel number within 5 seconds of pressing the [M] key, this will actually store the information into memory.

■ MEMORY RECALL

Simply press the desired memory channel key. For example the display is currently showing 144.000 MHz.



1. Press the "1" key.



2. The radio will switch to this frequency.

To return to the original operating frequency press the "1" key again.

■ MEMORY BACK-UP BATTERY

The transceiver includes a lithium back-up battery to retain memory in the microprocessor. When changing batteries, or if the Ni-Cd batteries should fully discharge, memory will always be retained.
If the display should begin to show erroneous information or numbers, the lithium battery needs replacement.
This should be performed by an authorized KENWOOD dealer since these components are easily damaged by static electricity.

■ AUTO BATTERY SAVER (ABS)

The Auto Battery Saver function is used to conserve battery power during reception and thus extend operating time. The function activates automatically 1 minute after the last key is pressed when squelch is closed.

When a signal is received, the function is automatically released.

MAINTENANCE

■ IN CASE OF DIFFICULTY

WHEN USING SUM-3/AA BATTERIES, ENSURE THE BATTERY POLARITY AND VOLTAGE IS CORRECT BEFORE PROCEEDING.

No sound from the speaker. No signal can be received.

1. Squelch is closed. Turn the SQL control counterclockwise.
2. T.SQ is activated. Turn the SQL control clockwise past the detent position.
3. PTT switch of microphone is pressed setting the unit in the transmit mode. Turn PTT switch off.

No control works.

LOCK is ON. Press F. LOCK key.

No output

1. Microphone jack is not fully plugged in. Insert the plug fully.
2. Poor antenna connection. Connect antenna securely.

Memory loss.

Backup battery voltage is low. Contact the authorized dealer.

All the indicators go out on the display.

Turn the power switch OFF and then ON.

■ SERVICE

Should it ever become necessary to return the equipment to your dealer or service center for repair, pack in its original box and packing, and include a full description of the problems involved. Also include your telephone number. You need not return accessory items unless directly related to the service problem.

Service note: **Dear OM, if you desire to correspond on a technical or operational problem, please make your note short, complete, and to the point. And PLEASE make it readable.**
Please list: Model and serial number.
The question or problem you are having.
When claiming warranty service, a photocopy of the bill of sale, or other proof of purchase showing the date of sale must accompany the radio.

OPTION

MICRO HEADPHONES
HS-7

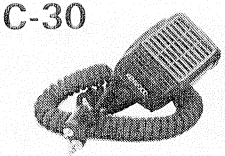
SWIVEL MOUNT
BH-5

MICRO HEADPHONE
HS-8

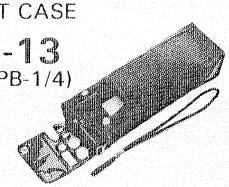
TELESCOPING ANTENNA
RA-3 (144 MHz)

MOBILE MOUNTING BRACKET
MB-4

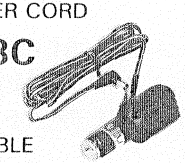
SPEAKER MICROPHONE
SMC-30



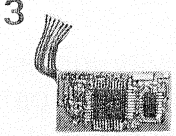
SOFT CASE
SC-13
(for PB-1/4)



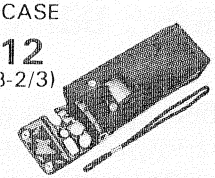
FILTERED CIGAR LIGHTER CORD
PG-3C



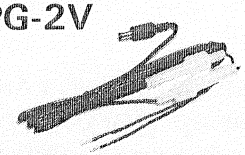
CTCSS UNIT
TSU-3



SOFT CASE
SC-12
(for PB-2/3)



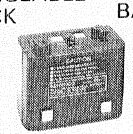
DC CABLE
PG-2V



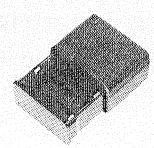
POWER SUPPLY

Ni-Cd RECHARGEABLE BATTERY PACK
PB-1
12V 800mAh

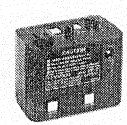
Ni-Cd RECHARGEABLE BATTERY PACK
PB-3
7.2V 800mAh



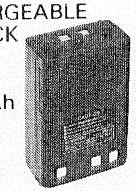
AA MANGANESE/ALKALINE BATTERY CASE
BT-5



Ni-Cd RECHARGEABEL BATTERY PACK
PB-2
8.4V 500mAh

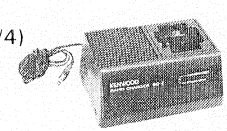


Ni-Cd RECHARGEABLE BATTERY PACK
PB-4
7.2V 1600mAh

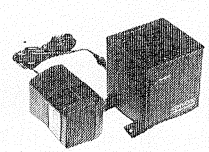


BATTERY CHARGER
BC-2
(for PB-2 only)

RAPID CHARGER
BC-7
(for PB-1/2/3/4)



COMPACT CHARGER
BC-8
(for PB-1/2/3/4)



NOTE: Some optional accessories may not be available in your areas.
Some cars may not be suitable to hook the MB-4 into the window.
HMC-1 vox headset cannot be used.

■ CTCSS UNIT (TSU-3)

Tone squelch (CTCSS) enables you to listen only for those stations that transmit the proper code frequency. The TSU-3 provides any one of 37 possible tones from 67.0 to 250.3 Hz.
To actuate the tone squelch function (decode), turn the Squelch control fully counterclockwise past the detent. Squelch will now open only when the radio receives the same subtone frequency.
To return to normal noise activated squelch turn the Squelch control clockwise past the detent.
To activate the transmit tone section of the TSU-3 the TONE switch on the top of the radio must be ON.
It is good operating practice to check the frequency of operation before transmitting. A MONITOR switch has been provided for this purpose when using the TONE SQUELCH function. Pressing this switch will open the squelch so you can check for activity.

● INSTALLATION

1. Remove the four phillips head screws from the rear panel of the radio.
2. Gently remove the front panel. The panel should be rotated away from the PTT switch side.
3. Install the tone squelch unit between the bottom of the set and the main circuit board as Fig. 1. The TSU-3 should be placed so that the DIP switch is visible thru the opening in the bottom of the case.
4. Attach the cable from the TSU-3 as Fig. 2. The cable should be routed under the ribbon cable that goes to the front panel.
5. Cut the jumper wire (JP2) as Fig. 3. (TH-405AT/405A/405E only)
6. Remove the backing from the foam cushion that was provided with the TSU-3 and attach the cushion to the edge of the TSU-3.
7. Reverse 1.

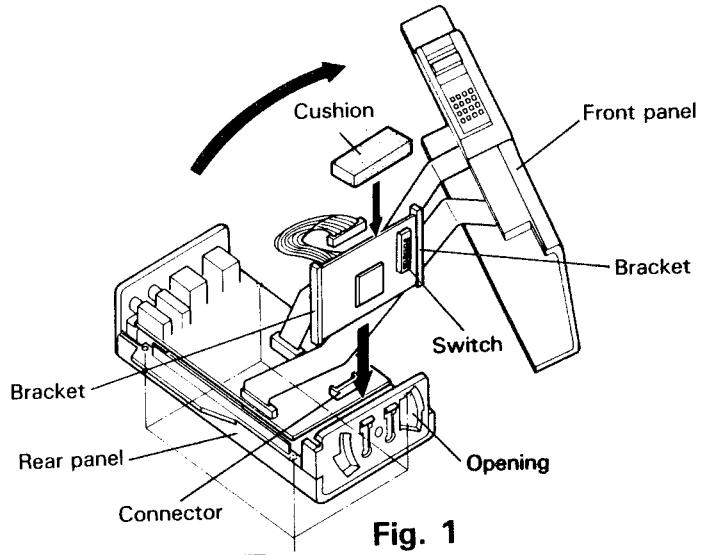


Fig. 1

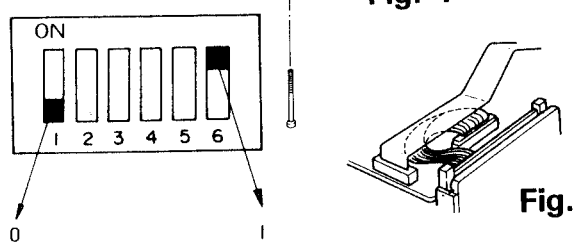


Fig. 2

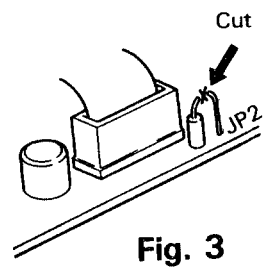


Fig. 3

Frequency code

	1	2	3	4	5	6
67.0Hz	0	1	0	0	0	1
71.9Hz	1	1	0	0	0	1
74.4Hz	0	0	1	0	0	1
77.0Hz	1	0	1	0	0	1
79.7Hz	0	1	1	0	0	1
82.5Hz	1	1	1	0	0	1
85.4Hz	0	0	0	1	0	1
88.5Hz	1	0	0	1	0	1
91.5Hz	0	1	0	1	0	1
94.8Hz	0	1	1	0	0	0
100.0Hz	1	1	1	0	0	0
103.5Hz	0	0	0	1	0	0
107.2Hz	1	0	0	1	0	0
110.9Hz	0	1	0	1	0	0
114.8Hz	1	1	0	1	0	0
118.8Hz	0	0	1	1	0	0
123.0Hz	1	0	1	1	0	0
127.3Hz	0	1	1	1	0	0
131.8Hz	1	1	1	1	0	0

	1	2	3	4	5	6
136.5Hz	0	0	0	0	1	0
141.3Hz	1	0	0	0	1	0
146.2Hz	0	1	0	0	1	0
151.4Hz	1	1	0	0	1	0
156.7Hz	0	0	1	0	1	0
162.2Hz	1	0	1	0	1	0
167.9Hz	0	1	1	0	1	0
173.8Hz	1	1	1	0	1	0
179.9Hz	0	0	0	1	1	0
186.2Hz	1	0	0	1	1	0
192.8Hz	0	1	0	1	1	0
203.5Hz	1	1	0	1	1	0
210.7Hz	0	0	1	1	1	0
218.1Hz	1	0	1	1	1	0
225.7Hz	0	1	1	1	1	0
233.6Hz	1	1	1	1	1	0
241.8Hz	0	0	0	0	0	1
250.3Hz	1	0	0	0	0	1