STANDARD®

C8800

144MHz TRANSCEIVER

INSTRUCTIONS MANUAL

STANDARD COMMUNICATIONS CORP.

TABLE OF CONTENTS

We are confident that you will be entirely satisfied with your 144 MHz Transceiver Model C8800. Our very strict quality control and inspection ensure that each transceiver unit left the factory in perfect condition. If the unit is damaged or fails to operate properly, immediately contact your dealer.

To obtain the best performance and longest use from your transceiver, study these instructions carefully.

ACCESSORIES

* Hand microphone with freq. up-down control (MP-716)	1
* DC power cord	1
* Stand	1
* Mobile bracket	1
* Nine-pin plug	1
* Bracket mounting screw	1
* Operation handbook	1
* Schematic diagram	1

INSTRUCTION MANUAL SECTION

1. PRECAUTIONS

■ INSTALLATION PRECAUTIONS

1. Install your transceiver in a dry, dust-free and well-ventilated place. The unit should not be subjected to extremely high temperatures or humidity. It must not, under any circumstances, be exposed to direct sunlight.
2. Provide adequate space behind and under the unit for free circulation of air.
3. In a mobile installation, exercise special care to allow enough space behind the unit for adequate heat-dissipation from the heat sink. Take measures to ensure that the unit is not subjected to excessive vibration or shock during operation.

■ POWER SUPPLY

1. The C8800 is designed to operate on 13.8 volt DC or commercial AC power. Do not connect this unit to a 24 volt DC power supply (E.g., batteries used in large vehicles).
   The transceiver is equipped with an internal memory back-up system. For further details of the system, read paragraph 4.2.4.
2. When you wish to power your transceiver from a commercial AC outlet, use the operationally available power Supply Attachment.

■ ANTENNA

To obtain the best results from the C8800 Transceiver, use an antenna which has a proven performance. The SWR of your antenna should be adjusted to 1.5 or below. If SWR adjustment is inadequate, the transmission power may fail to reach the specified value.
If the antenna SWR is increased to more than 4 or 5, an internal protection circuit automatically operates to reduce transmission power and protect final transistors.

2. FEATURES

The C8800 Mobile Transceiver features innovative microcomputer-aided operations. The C8800's built-in microcomputer memorizes, thinks, and makes decisions for quick and correct channel control.
The microcomputer offers the following functions:

1. Capable of memorizing, or programming any five (5) frequencies (max.).
2. Scans up and down the five stored channel frequencies.
3. Scans up and down the five stored channels plus two call channels.
4. Scans up and down frequencies from 144.00 MHz through 145.995 MHz at a 5 kHz or 25 kHz interval.
5. Automatically searches for busy channels.
6. Automatically searches for vacant channels.
7. Two switchable scanning speeds are provided.
8. Two frequency-scanning intervals of 5 kHz and 25 kHz are provided.
9. A higher priority is given to the two call channels (145.50 MHz and 145.55 MHz).

SUPERIOR OPERABILITY AND MANY OTHER FEATURES

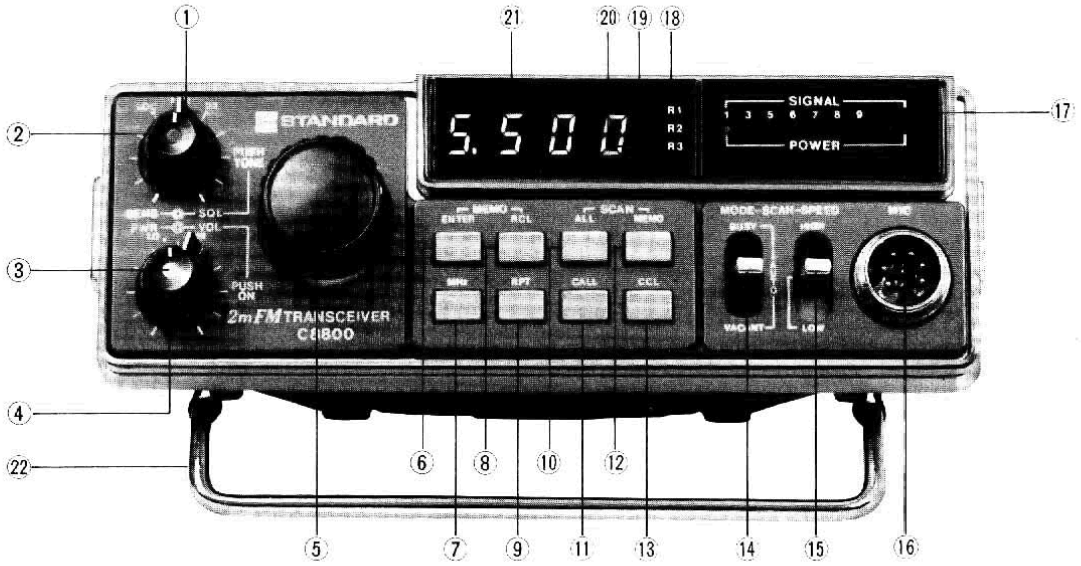
* **Memory back-up feature:**
  With this feature, pre-programmed channel frequencies are maintained in the memory even when the main power to the unit is switched OFF. If the supply voltage is abnormally low, an internal DC-to-DC converter initiates operation to maintain the back-up voltage at a constant level, to keep the stored frequency data intact.
* **400 channels selectable:**
  Up to 400 channels can be selected using the non-contact channel selector which has 24 steps per rotation (80 channels at 25 kHz interval, and 400 channels at 5 kHz interval).
* **Microphone with a frequency up-down control:**
  The attached hand microphone was a built-in frequency up-down control for easy and continuous channel selection.
* **Easy-to-operate, sloping control panel:**
  The C8800 is designed ergonomically and features a sloping control panel for ease of operating controls and a carefully thought out panel layout.

OTHER FEATURES

* A built-in receiver booster with three-stepped reception sensitivity control for DX operation.
* Built-in general call frequency of 145.50 MHz and mobile call frequency of 145.55 MHz available.
* A unique signal & power meter comprised of 9 LEDs.
* Easy-on-the-eyes, 4 digit green LED frequency readout.
* Superior intermodulation characteristic achieved with the introduction of the herical cavity.
* Large 8 cmφ built-in loudspeaker.
* A line-noise filter shuts out any noise on the AC power line.
* A single VCO serving for both reception and transmission.
* Transmission power switchable between 1 watt and 10 watts.
* The "direct" VCO circuit reduces generation of spurious noise.
* The APC (Auto Power Control) circuit protects final transistors from variations of antenna SWR or supply voltage.
* The mic-amplifier uses the VOGAD IC, which permits modulation of a high mean-modulation degree and low distortion.
* A piezo-electric buzzer for audible checking incorporated on keyboard and UP/DWN control operations.
* Built-in tone burst generator for repeater driving.
* Built-in frequency-shift circuit for repeater.

3. PANEL FEATURES

■ FRONT PANEL FEATURES



❶ SENS (Sensitivity) SELECTOR
The SENS selector is used for reception sensitivity selection (DX, NOR, and LOC positions). The DX position is for long-distance communication, the NOR position for middle-distance communication, and the LOC position for local communication.

❷ PUSH TONE/SQL (Squelch) CONTROL
This knob serves a dual purpose: squelch control and tone-burst switch. While this knob is depressed, the transmitter transmits a tone-burst signal for repeater driving (Tone frequency: 1750 Hz). The squelch control is used to eliminate white noise heard on FM reception channels when no signals is present. Normally, this control should be turned gradually clockwise until the white noise disappears.

❸ PUSH ON/VOL CONTROL
This knob also serves a dual purpose: power switch and volume control. A first depression of this knob turns the power to the unit ON, and the second depression turns it OFF. Clockwise rotation of this control increases output volume level.

❹ PWR SELECTOR
The PWR selector selects transmission power between 1 watt and 10 watts. The 1 W position of this switch will be found to be best for local communication.

❺ CHANNEL SELECTOR
Clockwise rotation of this selector increases channel frequency at either a 5 kHz or 25 kHz interval.

❻ MEMO ENTER BUTTON
Pressing this button stores the desired frequency data in the internal memory. The memory has a capacity for storing up to 5 frequencies.
Use the CHANNEL selector or the UP/DWN control on the microphone to preset the desired frequency before pressing this MEMO ENTER button.

❼ MHz BUTTON
A simple depression of this button switches the frequency band from 144 MHz to 145 MHz and vice versa.

❽ MEMO RCL BUTTON
Pressing this button recalls stored frequency data. Each depression of this button recalls stored frequencies sequentially from M1 through M5.

❾ RPT (Repeater) BUTTON
This key is used to select Simplex, Repeater-1, Repeater-2, or Repeater-3.

❿ SCAN ALL BUTTON
While this button is depressed, the entire 144 MHz or 145 MHz frequency band is scanned at a 5 kHz or 25 kHz interval.

⓫ CALL BUTTON
The CALL button gives priority in frequency selection to call frequencies 145.50 MHz and 145.55 MHz. The first depression of this button selects 145.50 MHz, and the second depression selects 145.55 MHz.

⓬ SCAN MEMO BUTTON
Pressing this button initiates scanning stored frequencies sequentially from M1 through M5. If the CALL key is depressed before this SCAN MEMO button is depressed, the CALL channel frequencies C1 and C2 (145.50 MHz and 145.50 MHz, respectively) can be added to the scanning sequence, thus establishing a new sequence C1 - C2 - M1 - M2 - M3 - M4 - M5.

⓭ CCL BUTTON
Pressing the CCL button resets operation mode to the initial state.

⓮ SCAN MODE SWITCH
This switch is used to search for busy or vacant channels during frequency scanning. The BUSY position of this switch initiates a search for busy channels, and the VACANT position a search for vacant channels.

⓯ SCAN SPEED SWITCH
This switch is used to select frequency scanning speeds:
HI position: 0.25 second per step
LOW position: 2.0 second per step

⓰ MIC JACK
The MIC jack accepts the attached hand microphone.

⑰ SIGNAL & POWER METER
This unique 9-LED meter indicates signal strength in the reception mode, and transmission power in the transmission mode.

⑱ R1 (Repeater-1) INDICATOR
When this R1 indicator is lit, the transmission frequency is reduced by 600 kHz with respect to the reception frequency. If transmission is tried at a frequency below 144.600 MHz, the transmitter output is shut down and the frequency readout displays "OFF".

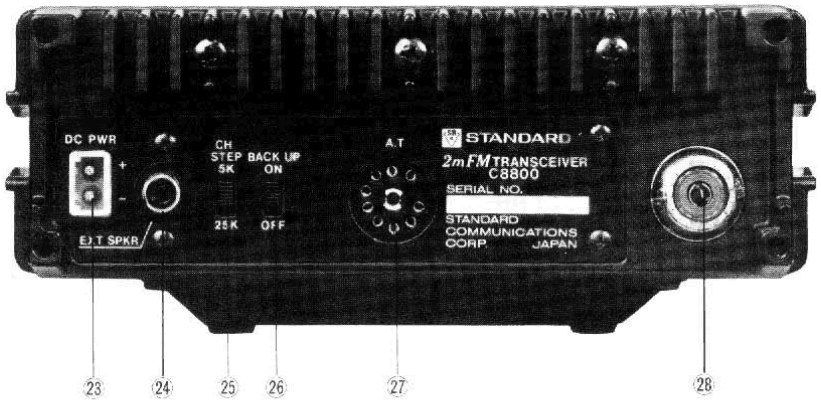
⑲ R2 (Repeater-2) INDICATOR
When this R2 indicator is lit, the transmission frequency is increased by 600 kHz with respect to the reception frequency. If transmission is tried at a frequency above 145.400 MHz, the transmitter output is shut down and the frequency readout displays "OFF".

⑳ R3 (Repeater-3)
* By providing an optional quartz crystal in the C8800's PLL circuit, transmission frequency can be shifted arbitrarily with reference to the readout frequency (received frequency). The shifted transmission frequency is, however, not displayed.
* When no crystal is provided in the circuit, the transmitter section remains inoperative while the receiver section operates at the readout frequency.
* For details of the required quartz crystal specifications, see paragraph "X'tal for Repeater-3".

㉑ FREQUENCY READOUT
When a signal of, say, 145.50 MHz is received, this frequency readout displays the last four digits as "5.500". If the CALL button is depressed, the least significant digit of the readout is replaced with "C" to indicate that the CALL function is activated.

㉒ STAND
The unit can be placed on the stand when it is operated as a fixed station.

■ REAR PANEL FEATURES



㉓ DC 13.8 V
This receptacle accepts a DC 13.8 V power supply. Connect the supplied connection cord with care to ensure the correct polarity.

㉔ EXT SPKR JACK
This jack accepts an external speaker with an impedance of 4~8 ohms.

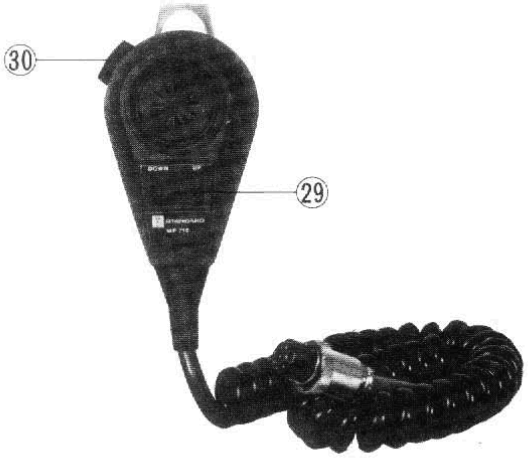
㉕ CH STEP SWITCH
The CH STEP switch is used to select a single frequency step interval of either 5 kHz or 25 kHz.

㉖ BACK-UP SWITCH
Activating this switch provides the internal memory with a back-up power supply to maintain stored frequency data even when the main power to the unit is switched OFF. If the transceiver unit is left unused for a long period of time, be sure to set this switch at the OFF position.

㉗ A.T. (Accessory Terminal)
For details of the pin configuration of this terminal, refer to the paragraph "Accessory Terminal".

㉘ ANT CONNECTOR
The ANT connector accepts an antenna with an impedance of 50 ohms.

■ HAND MICROPHONE



㉙ FREQ. UP-DOWN CONTROL
This control initiates continuous up and down scanning of channel frequencies.

㉚ PTT BUTTON
Pressing this PTT (Press-To-Talk) button puts the transceiver in the transmission mode.

4. INSTALLATION

4.1 FIXED STATION

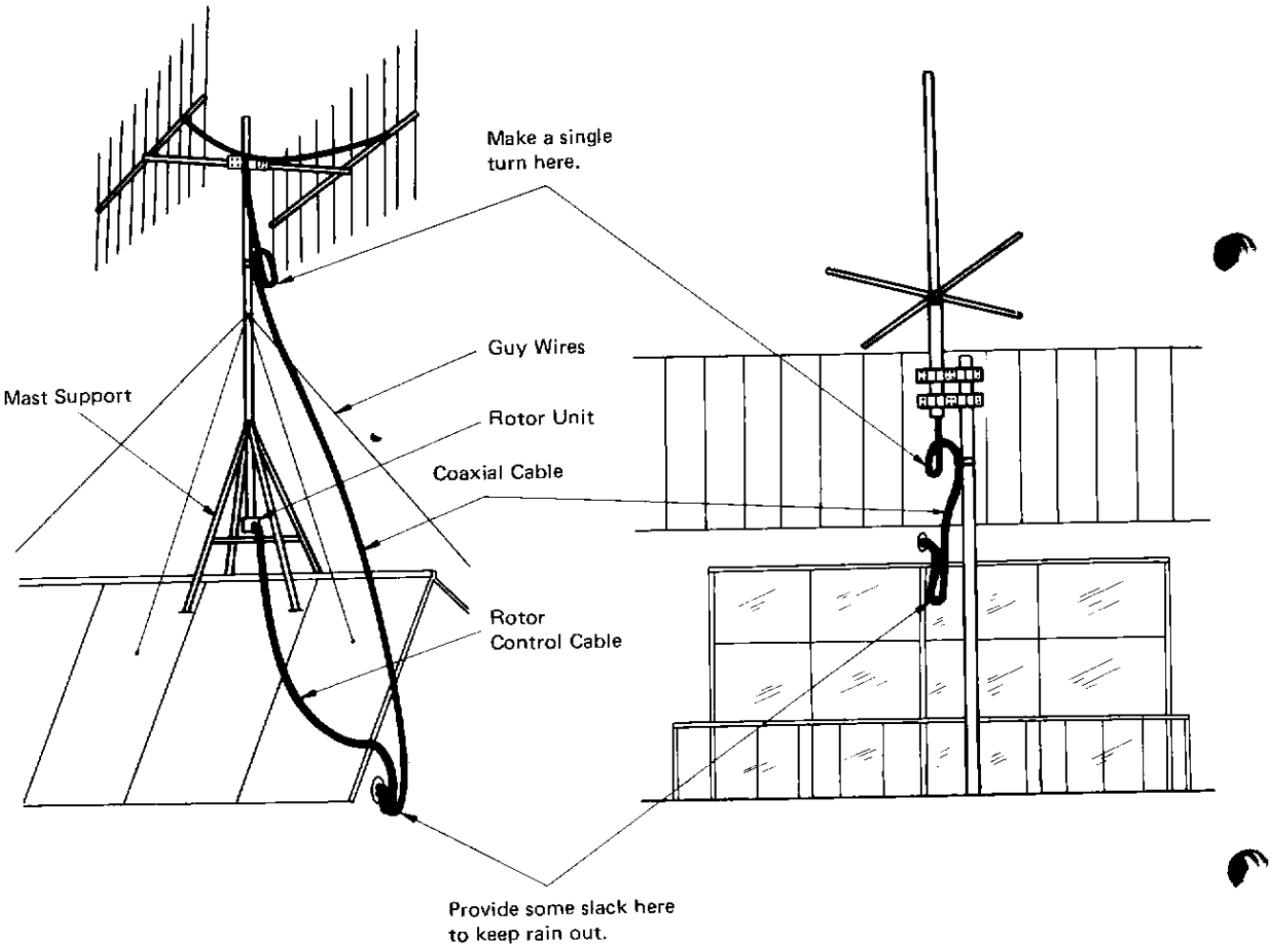
4.1.1 INSTALLING THE ANTENNA

The type and method of installation of the outdoor antenna you use will greatly affect transmission and reception performances of your transceiver. Carefully select an antenna which will provide the best performance, and adjust carefully after installation.

To prevent lead-in signal loss, use as short an antenna lead-in cable as possible. Recommended cable type is the 5D-2V for up to 10 meters, and the 8D-2V or 10D-2V for up to 30 meters.

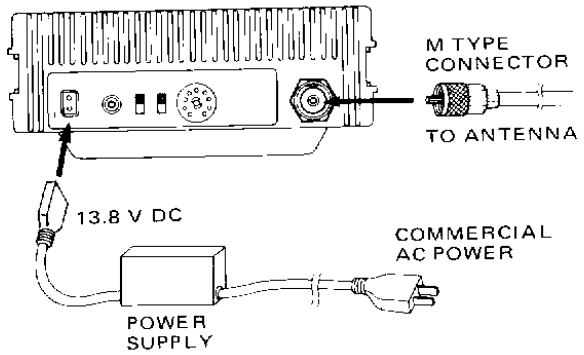
● **Installation on the roof**

● **Installation on the veranda**



4.1.2 POWER SUPPLY

When supplying power from the wall outlet, use the power supply unit (optional accessory).

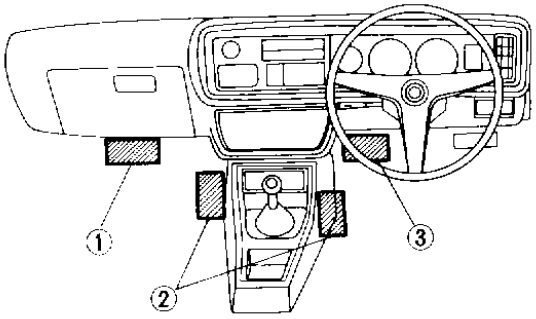


4.2 MOBIL TRANSCEIVER

4.2.1 INSTALLING THE TRANSCEIVER

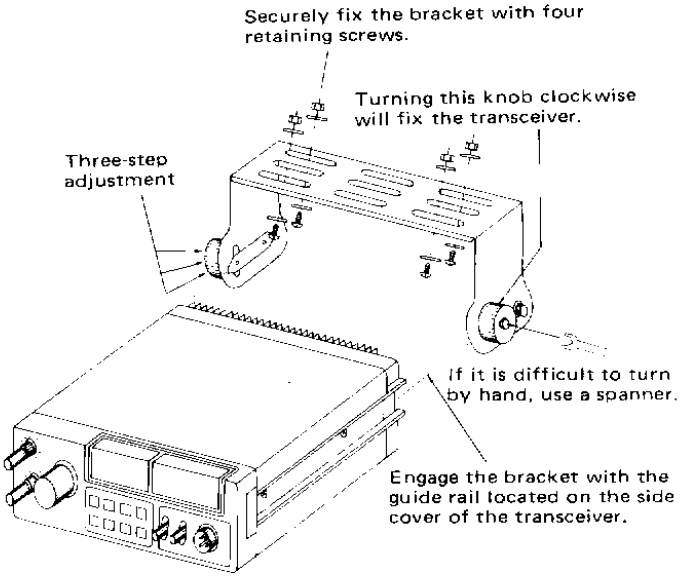
■ **Installation position**

① Below glove box
② Beside center console box
③ Below the dashboard



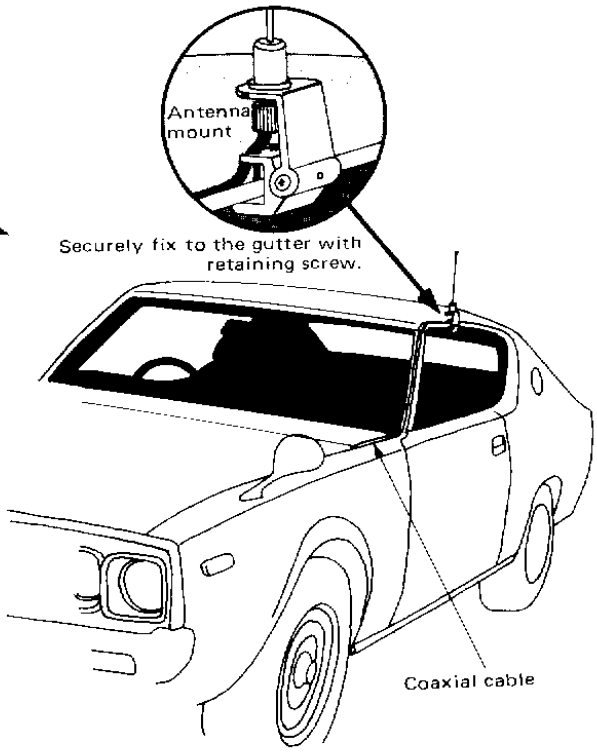
■ **Installing with bracket (provided)**

With the bracket, the reveiver can be positioned freely and the angle of the transceiver can be changed in three steps.

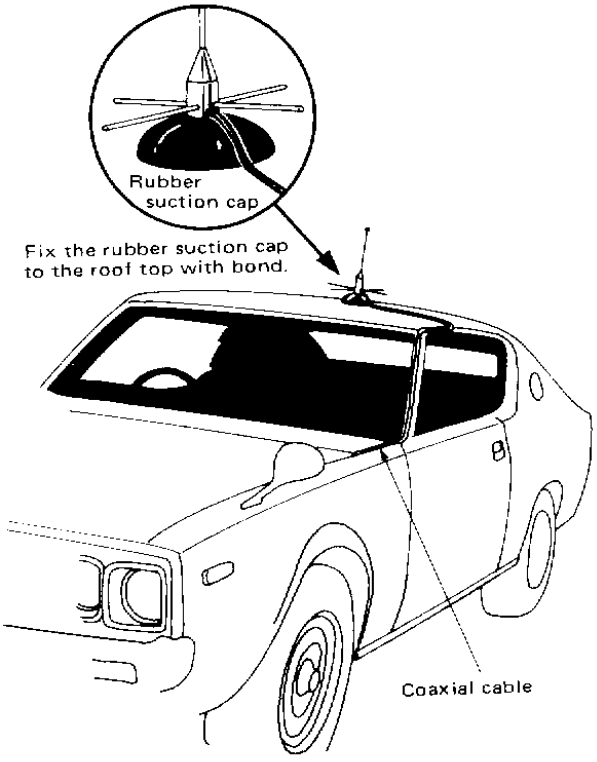


4.2.2 INSTALLING ANTENNA

■ **Roof gutter type**

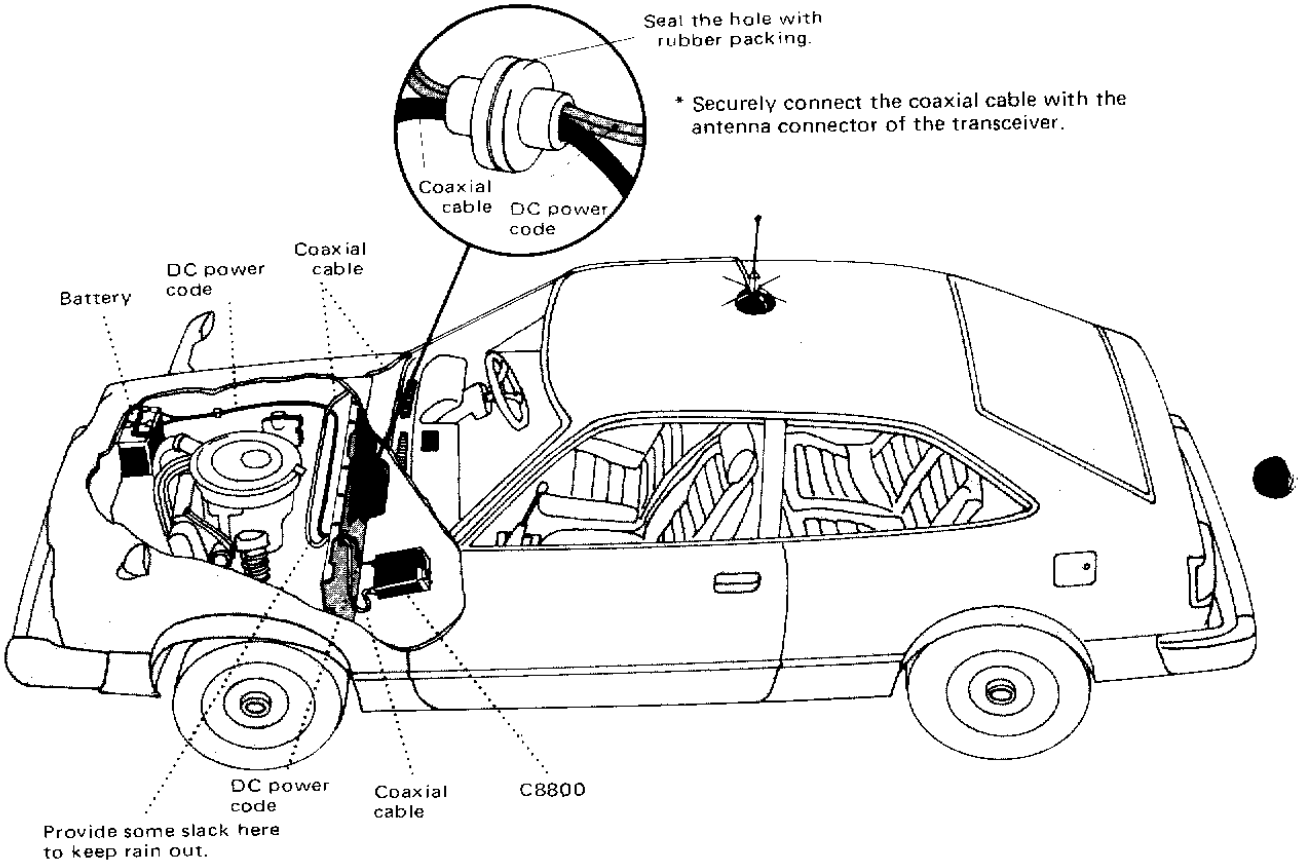


■ **Roof top type**



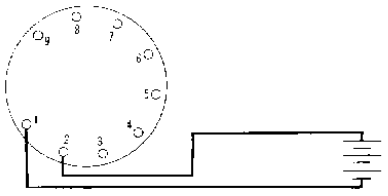
4.2.3 CONNECTING THE COAXIAL CABLE

■ **Routing through the bonnet**



4.2.4 CONNECTING THE POWER CODE

Connect the power code to the battery. If the BACK UP switch on the rear plate is turned ON, the memory is not erased when the C8800 is turned OFF. If the power cord is connected to a wire which is coupled to the engine key, the BACK UP switch does not function.
When a battery (9~15 V) is connected between the 1P (Gnd) and 2P(+) of the ACC terminal, turning ON the BACK UP switch will retain the memory.



Battery (9~15 V)

NOTE:
Fix the coaxial cable with tape so that the cable does not come in contact with the hot engine.

Some lines do not supply power when the starter is rotated. After checking with a multimeter, connect to a line which supplies power when the starter is rotated.

5. MICROCOMPUTER-AIDED OPERATION

The following section of the manual gives you a description of the microcomputer-aided operation of your transceiver unit in some detail.

5.1 PRECAUTIONS

The C8800 VHF Transceiver is capable of transmitting varied types radio waves. Use utmost care to avoid any trouble in comfort to your local regulations.

2m Band Plan (L.A.R.U. Region 1)

MHz	Allocation
144.000-144.010	E-M-E
144.050	CW calling
144.100	CW random ms
144.150	Upper limit CW exclusive
144.200	SSB random ms
144.300	SSB calling
144.500	SSTV calling
144.600	RTTY calling
144.700	FAX calling
144.900	Regional beacons centre
145.000-145.225	Repeater input - R0 to R9
145.300	RTTY (local)
145.500	Mobile calling
145.500 (S20), 145.525 (S21)	FM simplex
145.550 (S22), 145.575 (S23)	FM simplex
145.600-145.825	Repeater output or Output

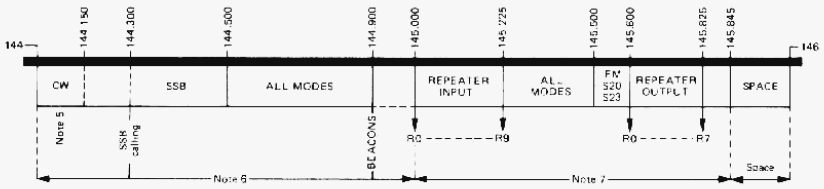


Table 1. VHF Band Plans

NOTES:

1. **Established simplex frequencies on repeater output channels may be retained.**
2. **The segment 145.250-145.500 MHz may be allocated, if desired, to FM channels.**
3. **No regional planning for beacons of erp less than 50 W.**
4. **Regional planning fg beacons of erp more than 50 W.**
5. **CW permitted over v-hole band, CW exclusive 144.0-144.150 MHz.**
6. **Channelized nets should not operate in this portion at any time.**
7. **Local traffic should operate above 145 MHz during contents and band openings.**

5.2 MICROCOMPUTER OPERATION

(1) SELECTING SCANNING INTERVALS

The desired frequency scanning of either 5 kHz/step or 25 kHz/step is selected with the STEP switch on the rear of the unit.

(2) PWR AND BACK-UP SWITCHES

a. When the power to the unit is turned ON, the internal microcomputer program first selects a channel frequency of 145.00 MHz.

b. When the unit is powered directly from your car battery, turning OFF the power to the unit with the BACK UP switch set to ON will cause the microcomputer to store the state immediately before the power is turned OFF, and when the power to the unit is again turned ON, the unit restores the state immediately before the power was turned OFF (the scanning condition is, however, not memorized).

(ex.) 1. When channel frequency is set to 145.525 MHz:

→ Power **OFF** →

Power **ON** → 

2. When channel frequency is set to 5.50c:

→ Power **OFF** →

Power **ON** → 

(3) FREQUENCY SELECTION

Channel frequencies can be selected with the **CHANNEL** selector on the front panel of the unit or with the **UP-DOWN** control on the Hand Microphone.

* **Channel selection using the UP-DOWN control on the mic:**

a. The Hand Microphone (MP-716) supplied with the C8800 Transceiver is equipped with a channel frequency **UP-DOWN** control. Pressing and holding the control switch in the **UP** or **DOWN** position scans the channels.

b. When the **UP-DOWN** switch is released, the channel scan stops at the frequency currently being received.

c. Holding the **UP-DOWN** control switch for less than 0.5 second shifts channel scan to the next channel where it stops.

d. While the **UP-DOWN** control switch is activated, all other key operations are desabled, except for the Press-To-Talk (PTT) button on the microphone which stops channel scanning.

e. When the [ALL], [MEMO], or [CALL] button is depressed, the **UP-DOWN** control switch is ineffective. While the transceiver is operating in the transmission mode, the **UP-DOWN** control switch is also ineffective.

(4) HOW TO PROGRAM CHANNEL FREQUENCIES

A. Initial frequency programming

The C8800 incorporates five memory units **M1, M2, M3, M4,** and **M5** each capable of storing up to one frequencies i.e. five frequencies in all. To store the desired frequency in each memory unit, follow the procedure given below:

Storing frequency data in memory M1

a. Press key [RCL] to recall the content of memory **M1**. (Before the key is pressed, the frequency readout will read "145.000 MHz".)
When memory is vacant:

Blinks

(The dot at bottom left of LSD will blink to indicate that memory **M1** is vacant).

b. Tune to the desired frequency by moving the **CHANNEL** selector on the front panel of the unit or the **UP-DOWN** control on the Hand Microphone. (E.g. 145.025 MHz)
The display will read:

Blinks

c. Pressing the [ENTER] key stores the frequency data in memory **M1**.

Lights up

d. Press the [RCL] key again to check the frequency data stored in memory **M1**.

Storing frequency data in memory M2

a. Pressing the [RCL] key again will display the content of memory **M2**.
When memory **M2** is vacant:

Blinks

b. Tune to the frequency to be stored in **M2** with the **CHANNEL** selector or **UP-DOWN** control. (E.g. 145.050 MHz).

Blinks

c. Press the [ENTER] button to store the frequency data in memory **M2**.

Lights up

d. Press the [RCL] key to check the frequency data stored in memory **M1**.

e. Press the [RCL] key again to check the frequency data stored in memory **M2**.

Storing frequency data in memory M3

a. Press the [RCL] button to display the content of memory **M3** to the frequency readout.
When memory **M3** is vacant:

Blinks

b. Tune to the frequency to be stored in **M3** with the **CHANNEL** selector or **UP-DOWN** control. (E.g. 145.075 MHz).

Blinks

c. Press the [ENTER] button to store the frequency data in memory **M3**.

Lights up

d. Press the [RCL] button to check the frequency data stored in memory **M1**.

e. Press the [RCL] button again to check the frequency data stored in memory **M2**.

f. Press the [RCL] button a third time to check the content of memory **M3**.

Storing frequency data in memory M4

a. Press the [RCL] button to display the content of memory **M4**.

Blinks

b. Tune to the desired frequency to be stored in **M4** by controlling the **CHANNEL** selector or **UP-DOWN** control. (E.g. 145.100 MHz)

Blinks

c. Press the [ENTER] button to store the frequency data in memory **M4**.

Lights up

d. Press the [RCL] button to check the content of **M1**.

e. Press the [RCL] button again to check the content of memory **M2**.

f. Press the [RCL] button once again to check the content of **M3**.

g. And finally press the [RCL] button a fourth time to check the content of **M4**.

Storing frequency data in memory M5

a. Press the [RCL] button to display the content of memory **M5**.

Blinks

b. Tune to the frequency to be stored in **M5** with the **CHANNEL** selector or **UP-DOWN** control. (E.g. 145.125 MHz)

Blinks

c. Press the [ENTER] button to store the frequency data in memory **M5**.

Lights up

d. Press the [RCL] button to check the content of memory **M1**.

e. Press the [RCL] button again to check the content of memory **M2**.

f. Press the [RCL] button once again to check the content of memory **M3**.

g. Press the [RCL] button once again to check the content of memory **M4**.

h. And finally press the [RCL] button a fifth time to check the content of memory **M5**.

(5) STORING REPEATER FUNCTIONS R1, R2, AND R3 TOGETHER WITH FREQUENCY DATA

Storing procedure is much the same as that for frequencies.

a. Press the [RCL] button to recall the content of **M1**. (This will display the **M1** content with the dot blinking.)
b. Tune to the desired frequency (the frequency will be displayed with the dot blinking).
c. Press the [RPT] button to select **R1**, **R2**, or **R3** (the memory content will be displayed with the dot blinking).
d. Press the [ENTER] button. This will store the selected repeater function in memory **M1** together with the preset frequency (the memory content will be displayed with dot lit up).
e. Press the [RCL] button to check the repeater function and frequency data stored in memory **M1** (the memory content will be displayed with the dot lit up).

Other repeater functions can be stored in memories **M2** through **M5** in the same way as described above.

(6) HOW TO CHANGE STORED FREQUENCIES

Frequencies stored in the memory can be easily replaced with other frequencies as described in the following example:

E.g. Changing the frequency stored in M2:
(This example shows a case where frequency data of 145.050 MHz stored in **M2** is replaced with 145.150 MHz.)

a. Press the [RCL] button twice to recall the content of memory **M2** on the display.
(When 145.050 MHz is stored:)

Lit up

b. Tune to the desired replacement frequency with the **CHANNEL** selector or **UP-DOWN** control.
(E.g. 145.150 MHz)

Blinks

c. Press the [ENTER] button. This will replace the old frequency data in **M2** with the new data of 145.150 MHz.

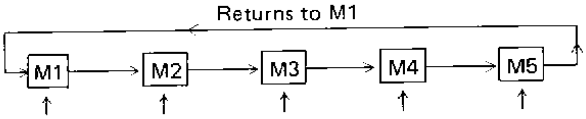
Lights up

d. Press the [RCL] button twice to check that the new data is actually stored in memory **M2**.

Lit up

(7) HOW TO RECALL STORED FREQUENCIES

a. Pressing the [RCL] button once to recall the content of memory **M1** on the readout. The number of times the [RCL] button is pressed corresponds to the number of the memory you wish to recall.



The sixth depression of the [RCL] button returns the recall sequence to **M1**.
The recall operation takes higher priority over **CHANNEL** selector and scanning operation.

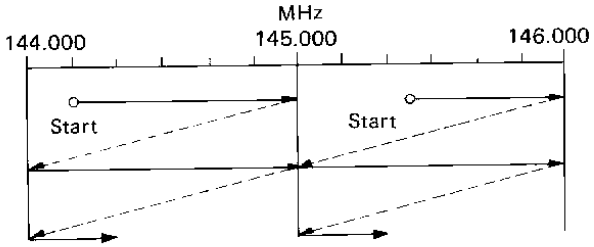
b. However, when the [CALL] key is depressed and [145.50c] or [145.55c] is displayed, the [RCL] function is ineffective. Press the [CCL] button to clear the [CALL] state and restore the [RCL] function.

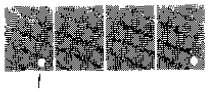
c. When memory content is recalled on the display by [RCL] operation, press the [CCL] button to clear the [RCL] function and bring back the data displayed before the [RCL] button was depressed.

(8) FREQUENCY SCANNING

A. How to scan the entire frequency band:
The channel frequency scanning modes include entire frequency band scanning and memory frequency scanning. There are three scan stop modes.

a. Scanning the entire 144 MHz or 145 MHz band:
Pressing the [ALL] button starts entire frequency band scanning. The frequency is scanned upward from an arbitrary starting frequency as illustrated below.



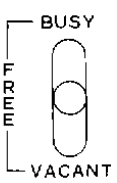


During scanning, this dot blinks at an interval of approx. 1 sec.

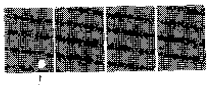
Scanning period

Channel / Switch position	25 kHz step (1 MHz) 40 channel	5 kHz step (1 MHz) 200 channel
Fast Scan	Approx. 10 sec.	Approx. 50 sec.
Slow Scan	Approx. 1 min. 20 sec.	Approx. 6 min. 40 sec.

b. To search for busy channels:
* Set the **MODE** switch on the front panel of the unit to the **BUSY** position.
* Adjust the **SQUELCH** control to eliminate FM noise.
* Scanning is stopped at the frequency at which a signal is present.



* Scanning is automatically restarted when the input signal disappears from what channel.



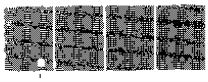
Blinks also when scanning is stopped

The above condition indicates that scanning is about to restart because there is no longer a signal on the channel.

* If the **PTT** button on the microphone is depressed once to put the transceiver into the transmission mode, scanning is not restarted when the found signal disappears.

Stops blinking

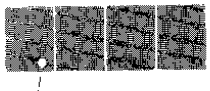
c. To search for vacant channels:
* Set the **MODE** selector on the front panel of the unit to the **VACANT** position.
* Adjust the **SQUELCH** control to eliminate FM noise.
* Scanning is automatically stopped at a frequency on which there is no signal.
* Scanning is restarted when a signal appears on the previously vacant channel.



Blinks also when scanning is stopped

The above condition indicates that scanning is about to be restarted because a signal has appeared on that channel.

* If the **PTT** button on the microphone is depressed to put the transceiver into the transmission mode, scanning is not restarted even if a signal is present on the channel.



Stops blinking

d. To scan continuously:
* Set the **SCAN MODE** switch to the **FREE** position.
* Adjust the **SQUELCH** control to eliminate FM interstation noise.
* Scanning will be started at an interval of 0.25 or 2.0 seconds regardless of the presence or absence of signals.

e. To suspend scanning operation:
* Press the [CCL] button on the front panel of the unit.
* Or press the **PTT** button on the microphone once to put the transceiver into the transmission mode.

B. How to scan the five frequencies stored in the memory:

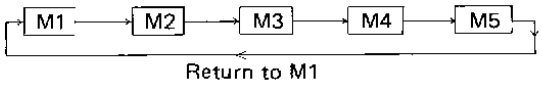
a. Press the [MEMO] button on the front panel of the unit. This will start scanning of frequencies sequentially the one stored in **M1** through to the one stored in **M5**.

Blinks during scanning

Memory scan indicator: lights during scanning

* When frequency data are stored in all the five memories:

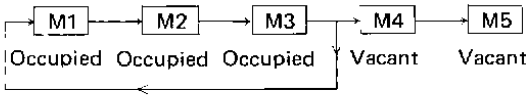
Scan



Return to M1

* When **M4** and **M5** are vacant:

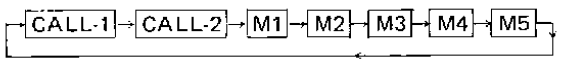
Scan



Return to M1

b. How to scan CALL frequencies together with memory frequencies:
Press the [CALL] button then the [MEMO] button. When all the memories are occupied, the scanning sequence is as shown in the following figure:

Scan



Returns to CALL 1

c. To search for a busy memory channel, or vacant memory channel, or perform continuous memory channel scanning, select the corresponding positions of the **SCAN MODE** switch on the front panel of the unit in the same way as for entire frequency band scanning.

(9) SELECTING CALL FREQUENCIES (145.50 MHz or 145.55 MHz)

a. A single depression of the [CALL] button selects call frequency 145.50 MHz, the one with the highest priority. Another depression of this button selects the other call frequency of 145.55 MHz. A third depression of the [CALL] button selects 145.50 MHz. Whenever the [CALL] button is depressed to select a call frequency, the call indication [c] is displayed after the frequency.

1st depression 

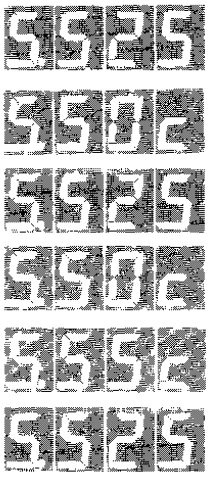
Call channel indication

2nd depression 

b. When a call channel is selected, all other key operations are ineffective except for the [MEMO] key or when the [CCL] key is depressed to reset the call function. When the call function is reset by depressing the [CCL] key, the channel frequency returns to the one displayed immediately before the [CALL] button was depressed.
When the [MEMO] key is depressed while a call channel is selected, memory and call frequencies are sequentially scanned in accordance with the selected position of the **SCAN MODE** switch.

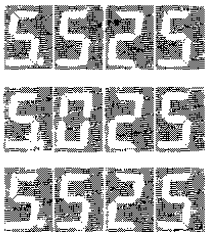
(10) OTHER USEFUL OPERATIONS

a. By using the [CALL] and [CCL] keys, the two call channels and one other channel can be easily obtained.
(**E.g.**): When a frequency of **145.525 MHz** is selected with the **CHANNEL** selector or **UP-DOWN** control:



→ Press the [CALL] key. →
→ Press the [CCL] key. →
→ Press the [CALL] key. →
→ Press the [CALL] key. →
→ Press the [CCL] key. →

b. By using the [RCL] and [CCL] keys, the frequency stored in memory **M1** and another frequency can be easily obtained.
(**E.g.**): When the frequency **145.025 MHz** is stored in M1 and another frequency (**145.525 MHz**) is selected with the **CHANNEL** selector or **UP-DOWN** control:



→ Press the [RCL] key. →
→ Press the [CCL] key. →

c. During [ALL] or [MEMO] scanning, pressing the **PTT** (Press-To-Talk) switch on the microphone suspends scanning. By utilizing this feature, scanning can be stopped just by momentarily pressing the **PTT** switch on the microphone when the desired frequency is reached or desired QSO station is found while scanning.
d. Step by step channel scanning can be made with the **UP-DOWN** control on the hand microphone.

5.3 RECEPTION PROCEDURE

1. Pressing the **PUSH ON/VOL** switch (3) on the front panel of the unit turns the power to the unit ON. When the memory is not backed up, the initial channel selection is always started at 145.00 MHz.
2. Adjust the **VOL** control (3) to a comfortable loudness level.
3. Set the **SENS** control (1) to a position which best suits object signal strength.
4. Adjust the **SQL** control (2) so that FM white noise disappears when there is no input signal received.
5. Select the desired frequency as follows:
   a. Select with the **CHANNEL** selector (5) on the front panel.
   b. Select with the **UP-DOWN** control (29) on the microphone.
   c. Press the **CALL** button to call on either 145.50 MHz or 145.55 MHz.
   d. Press the **SCAN ALL** button to scan all frequencies. At this time, the following functions are available with **SCAN MODE** switch operation:
      * **BUSY**: stops scanning at a busy channel.
      * **VACANT**: stops scanning at a vacant channel.
      * **FREE**: scans all frequencies to check band condi-

tion. Two scanning speeds are selectable with the **SCAN SPEED** switch (15) on the front panel of the unit. Also, scanning interval of either 5 kHz or 25 kHz is selectable with the **SCAN STEP** switch on the rear of the unit.

e. Press the **SCAN MEMO** button (12) to scan the frequencies stored in the memories.
At this time, the following functions are available with **SCAN MODE** selector operation:
* Same as those obtained in **SCAN ALL** mode (with **SCAN MODE** and **SCAN SPEED** selector functions).

f. Press the **MEMO RCL** button (8) to recall frequencies stored in the memories.

For details of the above procedure, refer back to section 2) "Microcomputer Operation".

6. The receiver section of the C8800 is designed for such ultra-high sensitivity that the reception in the DX position can be affected by intermodulation. To obtain maximum reception performance from your transceiver, select the optimum sensitivity with the **SENS** control from among the following three positions:
DX: for DX communication
NOR: for normal communication
LOC: for situations where reception is affected by severe interference.

5.4 TRANSMISSION PROCEDURE

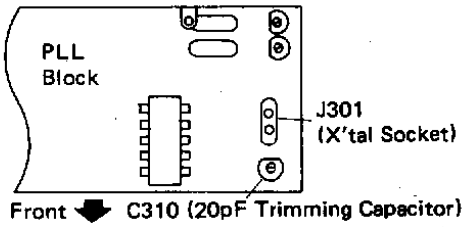
1. Prior to transmission, make sure that your transmission frequency does not interfere with other communications.
2. Select transmission power of **LOW** or **HI** with the **PWR** selector (4) on the front panel of the unit. For local communication, **LOW** is recommended.
3. Press the **PTT** (30) button on the Hand Microphone to put the transceiver into the transmission mode. Talk into the microphone from a distance of 5 to 10 cm.

5.5 DETERMINING X'TAL FREQUENCY FOR REPEATER-3

1. How to determine X'tal frequency:
The basic equation for PLL frequencies is:
$fc = freq \times N + f_L$
where fc: Lowest carrier frequency (144.00 MHz)
freq: Reference frequency (5 kHz)
N: Minimum number of Programable Divider (1200)
f_L: PLL local frequency
(E.g. 1): To shift transmission frequency 1 MHz higher:
$f_L = fc - fref \times N$
$= 145.00\ MHz - 5\ kHz \times 1200$
$= 139\ MHz$
Therefore, the desired X'tal frequency is:
$\frac{f_L}{3} = \frac{139\ MHz}{3} = 46.333333\ MHz$
(E.g. 2): To shift transmission frequency 1 MHz lower:
$f_L = 143.00\ MHz - 5\ kHz \times 1200$
$= 137\ MHz$
Therefore, the desired X'tal frequency is
$\frac{f_L}{3} = \frac{137\ MHz}{3} = 45.666666\ MHz$
2. Specifications of X'tals
Overtone X'tal Type 25U
For frequency deviations, see the following table.

Temperature	Frequency deviation
25°C	±20 PPM
−10°C ~ +50°C	±10 PPM

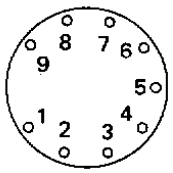
3. X'tal installation and adjustment
a. With the front panel of the unit facing forward, remove the top lid.
b. Now you will see a shielded box, which contains the PLL block, at the front of the unit. Remove the lid from the box.
c. The socket (J301) to accommodate the X'tal for Repeater-3 is located to the right of the PLL shielded box (see the following figure). Install the X'tal of the desired frequency into this socket (J301).
d. Next, adjust the frequency.
A frequency counter capable of covering the transmission frequency band (140 MHz band) is required for frequency adjustment.
First, set the **PWR** selector on the front of the unit to **LOW**, then make the necessary connections to allow transmission frequency counting.
Using the **CHANNEL** selector or **UP-DOWN** control, set the channel frequency to 145.00 MHz, then press the RPT key to select Repeater-3.
Put the transceiver into the transmission mode, and adjust the trimming capacitor (C310: 20 pF) so that the desired frequency shift is obtained in the frequency counter readout (E.g. The counter readout will be 146.00 MHz for upward shift of 1 MHz.)



NOTE:
When the transceiver is operated in the Repeater-3 mode, the transmission frequency is not displayed on the frequency readout. Exercise the utmost care at such times to avoid straying out of the amateur band.

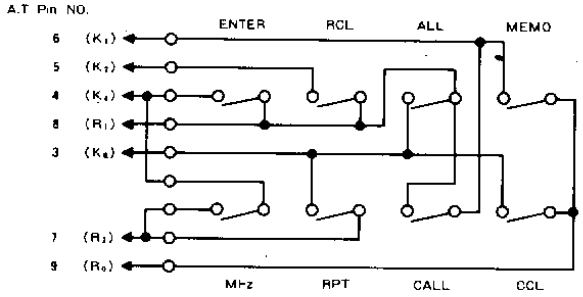
5.6 ACCESSORY TERMINALS

1. The pin configuration of the accessory terminal on the rear of the unit is as follows:



1	GND	
2	EXT BACK UP	
3	K8	For Key Board
4	K4	
5	K2	
6	K1	
7	R2	
8	R1	
9	R0	

2. For remote control keyboard, use the following circuit configuration:



5.7 ADJUSTING PIEZO-ELECTRIC BUZZER SOUND LEVEL

The piezo-electric buzzer is fixed on the bottom cover (speaker side). The sound adjustment variable resister is located adjacent to the piezo-electric buzzer connector. Remove four screws from the bottom cover, lift the cover, then adjust the sound level using a slot driver.

5.8 RESETTING THE MICROCOMPUTER

In the event of a malfunction, or when key operation is not effective, reset the microcomputer in the following way:

1. Turn the unit power switch and back-up switch located at the rear side, OFF. (The battery and power supply may be kept connected.)
2. After about 5 seconds, turn the power switch and the back-up switch, ON.

SERVICE MANUAL SECTION

6. FUNCTIONS

6.1 RECEIVER SECTION

* The reciever is a double conversion super-heterodyne device with the 1st IF at 10.7 MHz and the 2nd IF at 455 kHz.
* Incomming signals to the antenna terminals (J802) pass through an antenna switching circuit within the transmission booster (PB01) to JR01 of the RF pre amp (PR01).
* RF pre amp. outputs are MOS FET amplified in the RF main amp. (QR01).
* Sensitivity adjustments
  1. DX position: Employs 2-stage RF amplification, RF pre amp. (QQ01) and RF main amp. (QR01).
  2. NOR-LOC position: By means of 2 PIN diode switches (QQ02 and QQ03), RF pre amp. (QQ01) is deactivated and only RF main amp. functions.
  3. Sensitivity for each position is preset by application of positive voltages to the FET gate 1 of the RF main amp. (QR01).
* QR01 outputs pass through a 3-stage helical cavity and are fed to gate 1 of 1st mixer QR04 (MOS-FET). Local signals from PLL (PL01), board J125-1, are fed through LR02 to gate 2. (Local signals: 133.3~135.3 MHz)
* Signals converted to 10.7 MHz by QR04 pass through monolithic crystal filters (FR01 and FR05) thereby improving the set selectivity, intermodulation suppression, etc.
* Signals that have passed through the crystal filters are amplified by 1st IF amp. (QR05), and fed to 2nd mixer (QR06).
* QR07 is the 2nd local oscillator.
* 10.7 MHz fed to QR06 is converted for 2nd IF, 455 kHz, and is fed to ceramic filters (FR03 and FR04).
* Signals from the ceramic filters are amplified by QR09 and QR10, and then ratio detected. Detection outputs pass through the de-emphasis circuit, and are amplified by AF pre amp. (QR13).
* Signals amplified by QR13 and QR20 drive speakers.
* The squelch circuit amplifies QR10 outputs (noises). Its outputs, pass through a L-C filter circuit and amplified by a 2-stage noise amplifier comprising QR15 and QR16. These signals are then diode rectified to provide DC voltages.
* Diode rectified DC voltages are fed to the base of QR19.
* The QR19 collector is connected to the base of QR13 AF amp., to provide squelching functions. Also QR13 base currents are used to switch QR14 to provide scan control signals.

6.2 TRANSMITTER SECTION

* Signals from external microphones (MP716) amplified by Q401 and Q402, are rolled off above 3 kHz by a roll-off filter, and fed to C172 of the VCO circuit, to direct frequency module the VCO by reactance modulation.
* PLL board outputs are supplied to #2 pin of JT01 of the transmitter younger stage board (PT01).
* Signals supplied from the PLL board are amplified sequentially by QT01, QT02, QT03, and QT04, and via #1 pin of JT02 fed to #1 pin of JB01 of the TX booster (PB01).
* QT01 and QT02 operate under a 9 V line voltage, but +B of QT03 and QT04 are regulated by the APC circuit (JT02 #3 pin).
* Signals fed to #1 pin of JB01 are power amplified by QB01 to approximately 20 W.
* Signals amplified by QB01 pass through a 3-stage low bandpass filter to the antenna terminals.
* QB01 is regulated by the +B line voltage of the APC circuit, so that the high & low power outputs can be trimmer adjusted within the PC01 board.

[C8800 MODULATION DISTORTION]

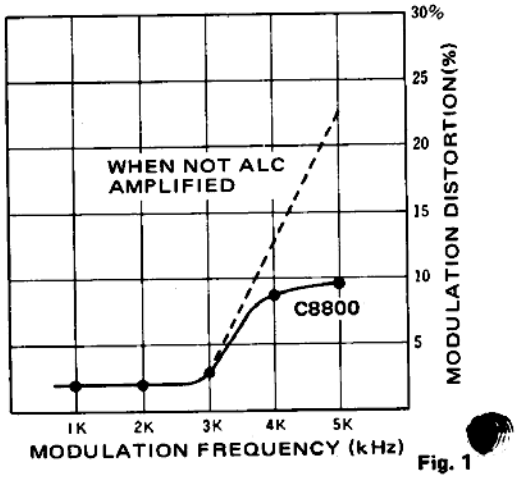


Fig. 1

6.2.1 APC (Automatic Power Control)

1. This circuit controls high and low power levels and automatically reduces RF outputs when SWR varies. It also maintains constant RF power during supply voltage fluctuations.
2. This APC board (PC01) is controlled by the DC voltage supplied by the SWR detector within booster board (PB01).
3. Progressive wave components are applied to QC03 and reflective wave components to QC04.
4. As each source for QC03 and QC04 is compulsorily biased, base voltage variations in QC03 and QC04 are more likely to be reflected on the collector side.
5. When, for instance, the supply voltage rises, or SWR deteriorates, the progressive or reflective wave level increases and reduces the QC03 and QC04 collector voltages.
6. When the QC03 and QC04 voltages are reduced, the QC02 emitter voltage decreases, and QC01 (transistor) approaches a cut off state. This causes a reduction in the Q806 emitter current.
7. Reduction in the Q806 emitter current limits the current in QT03 and QT04 in younger board (PT01) and QB01 of the booster, thereby reducing the RF power.

6.3 PLL SECTION

The PLL block used for C8800 has its PLL controlled by a 13-bit BCD code generated in the microcomputer section. In transmission mode it's outputs directly generate the frequencies required. In receiving mode, they generate frequencies 10.7 MHz below those required.

(Example) PLL circuit frequency relations in a 145.000 MHz transmission mode.

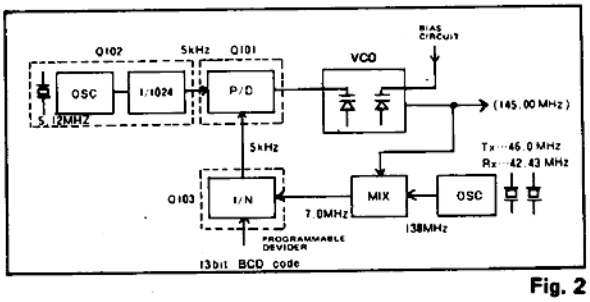


Fig. 2

6.3.1 PLL IC

This PLL IC comprises:

* Reference frequency oscillator section (Q102) . . . . . 5.12 MHz
* Phases detector circuit P/D. . . . . P/D
* Programmable counter section. . . . . I/N

A 13-bit BCD coded command from microcomputers (QL01 and QL02) is applied, determining the count down ratio. Frequencies from the mixer are devided by this ratio, and applied to the phase detector circuit.

(1) Programmable counter section (Q103)

A 13-bit BCD coded command from the microcomputer (QL02) is applied, determining the count down ratio. Frequencies from the mixer are divided by the ratio, and applied to the phase detector circuit.

DISPLAYED FREQ. (MHz)	Q103(TC9122P) PIN NO.													COUNT DOWN RATIO (N)
	15	14	13	12	11	10	9	8	7	6	5	4	3	
144.000	1	0	0	1	0	0	0	0	0	0	0	0	0	1200
144.005	1	0	0	1	0	0	0	0	0	0	0	0	1	1201
144.010	1	0	0	1	0	0	0	0	0	0	0	1	0	1202
144.015	1	0	0	1	0	0	0	0	0	0	1	1	1	1203
144.020	1	0	0	1	0	0	0	0	0	0	0	0	0	1204
⋮														⋮
144.100	1	0	0	1	0	0	0	1	0	0	0	0	0	1220
⋮														⋮
144.500	1	0	0	1	1	0	0	0	0	0	0	0	0	1300
⋮														⋮
145.000	1	0	1	0	0	0	0	0	0	0	0	0	0	1400
⋮														⋮
145.240	1	0	1	0	0	0	1	0	0	1	0	0	0	1448
⋮														⋮
145.500	1	0	1	0	1	0	0	0	0	0	0	0	0	1500
⋮														⋮
145.995	1	0	1	0	1	1	0	0	1	1	0	0	1	1599
N	1	5				9				9				

Count down ratio (N) computation formula:

(Desired frequency in kHz − 138,000 kHz) ÷ 5 = count down ratio

(Example) If 145.000 MHz is desired:

(145,000 − 138,000) ÷ 5 = 7,000

7,000 ÷ 5 = 1,400

(counter down ratio)

(2) Phase detector circuit (P/D cct.) (Q101)

1) Detects phase differences between 5 kHz which is 1/1,024 of the reference oscillator frequency (5.12 MHz), and the frequencies from programmable counter.
2) This circuit varies VCO circuits oscillating frequencies by obtaining detected signals from #3 pin, and converting them to DC voltages through an integrating circuit comprising C's and R's, and varying the voltages applied to varicaps (varactors).

6.3.2 VCO circuit (P150)

(1) Outputs from P/D cct. of Q101 PLL IC are converted to DC voltages via an integrating circuit comprising C's and R's.
(2) Variations in these DC voltages are fed to the Q151 varicap diodes, to alter varicap capacitances.
(3) By capacitance variations in varicap diodes, the VCO circuit oscillating frequencies are controlled.
(4) Depending on DC voltage variations, a maximum frequency variation of approximately 14 MHz can be provided.

6.3.3 Local oscillator section (local OSC)

(1) The local OSC section provides by overtone oscillation 127.3 MHz for RX and 138.0 MHz for TX.
(2) This signal is applied to the mixer section of Q202.

6.3.4 Mixer section (Mix, Q201 and Q202)

(1) Signals from VCO are picked up after passing through Q120 and Q121, and applied to the mixer section through Q201 the buffer amp.
(2) In the mixer section, signals from VCO and local OSC are mixed, providing signals of 6.0 to 7.995 MHz.

F(Vco) − F(local) = 6.0 ~ 7.995 MHz

(3) Signals from the mixer section, after passing through LPF, are amplified by Q203 and Q204 and applied to the 1/N circuit of PLL IC (Q103).
(4) PLL IC Unlock

Extracts lock and unlock signals from phase detector circuit.

6.3.5 Unlock switch circuit (UL, Q104)

Depending on PLL IC and UL output conditions, UL and lock modes are judged by Q104.

(1) Signals to be applied to 1/N circuit are frequency devided at a predetermined count down ratio, and signals thus devided are fed to the phase detector circuit via the 1/N circuit.
(2) Until reference signals and 1/N circuit signals coincide within the phase detector circuit, repeated controls are exercised within the Fig. 2 loop.
(3) When reference and 1/N circuit signals coincide, it is called a locked state.

6.4 CONTROLLER SECTION

Consists of the following sections:

PL01: Microcomputer section
PD01: Display section
PD01: Channel selector section (manual)
PM01: Control I/O decoder section

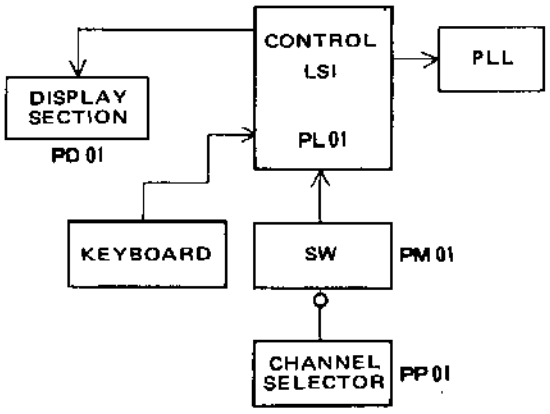


Fig. 3

* Re control LSIs QL01, and QL02

These MOS LSIs function with a power supply in a range of +8V to +10V. It is 9V in C8800.

6.4.1 To control external circuits, the following outputs are provided:

(1) PLL IC programmable counter drive

13-bit BCD coded outputs for driving programmable counter are provided at pins #7 ~ 18 of QL02 and #2 pin of QL01, a total of 13 terminals.

(2) 7-segment LED drive

Signals from pins #10 ~ 17 and #20 ~ 24 of QL01 drive a 4-digit 7-segment LED.

(3) Feature section for repeater mode selection
By punching RPT on keyboard, outputs as per Fig. 4 are provided at pins #19(A7), #20(B7), #21(C7), and #22(D7).

	A7	B7	C7	D7
S	1	0	0	0
R 1	0	1	0	0
R 2	0	0	1	0
R 3	0	0	0	1

Fig. 4

6.4.2 To operate LSIs, the following commands are applied to terminals indicated:

(1) Initial clear (INIT, pin #9)
When turning power on, a positive pulse is applied to pin #9 to clear all in LSIs.

(2) Matrix circuit (pins #21 (R0) ~ #24 (R3) and #5 (K1) ~ #8 (K8))
By using this matrix circuit, 16 key inputs are feasible.

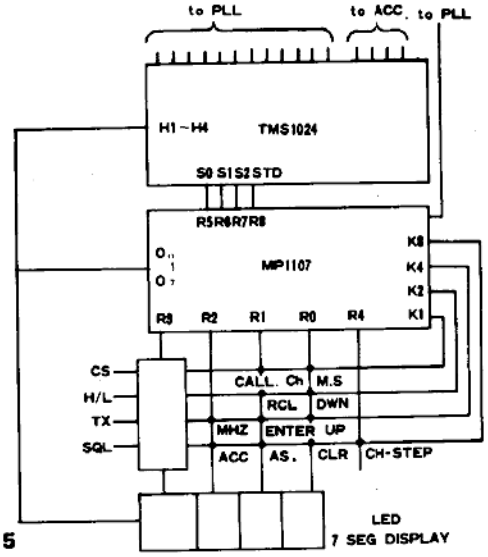


Fig. 5

* Selection by channel knob (manual)
- a. Channel selection commands to microcomputer are delivered by photo-interruptors QP01 and QP02.
- b. The two photointerruptor signals are so segregated by UP-DOWN discriminator circuits (QM03 and QM04) within PM01 as to divide channel number variations into UP key and DOWN key. When the channel knob is turned an equal number of pulses to the channel number variations are applied to UP key.
- c. Divided signals are fed from QM05 to analog switch QL06 via JM04.
- d. By applying a high level voltage to the #13 control terminal of QL06 for UP and #12 for DOWN, terminals R0 and K4 for UP, and R0 and K2 for DOWN, are short circuited through a resistance of approximately 260 ohms in value.
- e. In short, by segregating into UP and DOWN, the analog switch in QL06 is turned on, closing the matrix.

* Selection by microphone switch
- a. In UP-DOWN control by rotary switch, the analog switch is turned on and off by pulse.
- b. In UP-DOWN control by microphone switch, the analog switch is turned on and off by DC.
- c. UP-DOWN commands from microphone are applied to #5 and #6 of QL06.

[CHANNEL SELECTOR STRUCTURAL DIAGRAM]

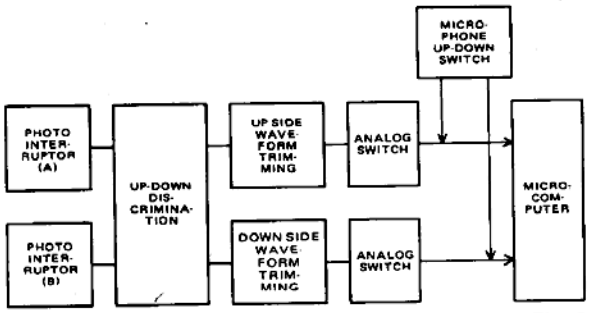


Fig. 6

1) Channel selection
Matrix circuits are closed between R0 and K2 for UP, and between R0 and K2 for DOWN.

2) Memory enter (MEMO-ENTER)
Matrix circuit between R1 and K4 is closed.
Its function is to memorize the frequency being displayed.

3) Memory recall (MEMO-RCL)
Matrix circuit between R1 and K2 is closed.
Its function is to recall the frequency in memory.

4) Scan all (SCAN-ALL)
Matrix circuit between R1 and K8 is closed.
Its function is to have scanning started from the channel displayed in the UP direction.

5) Scan memory (SCAN-MEMO)
Matrix circuit between R1 and K1 is closed.
Its function is to have the 5 channels in memory sequentially scanned.

6) Repeater (RPT)
Matrix circuit between R2 and K8 is closed.
Its function is to change A7 — D7 codes from S to R1 to R2 to R3 to S, in this sequence.

7) Call channel (CALL CH)
Matrix circuit between R1 and K1 is closed.
Its function is:
to call 145.50 at the initial switch on
to call 145.55 at the second switch on
to call 145.50 at the third switch on
and to repeat this process.

8) CCL
Matrix circuit between R0 and K8 is closed.
Its function is to cancel all of MEMO RCL, SCAN ALL, SCAN MEMO, and CALL CH.

9) MHz
Matrix circuit between R2 and K4 is closed.
Its function is to change just MHz order numerals.
Example: 145.025 to 144.025 to 145.025

10) Scan speed selection
- a. Matrix circuit between R3 and K2 is closed.
- b. By scan speed switch (SM02) on front panel, the analog switch of QL07 is turned on or off.
- c. When the analog switch is on, the scan speed is low: 0.5 channels per second.
- d. When the analog switch is off, the scan speed is high: 4 channels per second.

11) Scan mode selection (Busy, Auto, Vacant)
- a. In busy position, scanning stops when a signal is received.
- b. When a signal is received, low level is output from the QR14 collector.
- c. Low level from QR14 collector is applied to QM02 which inverts it and provides high level output.
- d. Output from QM02 is applied to the analog switch QL07 and QL07 closes the matrix circuit between R3 and K8.
- e. In vacant position, scanning ceases when no signal is received.

f. For no signal, high level output is provided on QR14 collector.
g. High level signals from the QR14 collector are applied to QM02, cycled twice, to provide high level output.
h. Output from QM02 is applied to analog switch QL07 and closes the matrix circuit between R3 and K8.

12) Re: control section in transmission mode
a. While transmitting the matrix circuit between R3 and K4 should be closed, nullifying all inputs, to insure no IC environmented variation.
b. Analog switch QL07 is turned on and off by transmission at +B.

13) Re: selection between 5 kHz and 25 kHz
a. Rear panel slide switch S803 selects:
S803 off = 5 kHz separation
C803 on = 25 kHz separation
b. Matrix circuit between O7 and K1 is closed.

14) Chip select switch (CS)
a. Matrix circuit between R3 and K1 is closed.
b. The chip select switch is ganged with the power switch.
c. Switching to +B turns analog switch QL107 on.
Analog switch on: Normal operation
Analog switch off: Stops controller functions and turns display off. However, the memory section continues to function.

[5.50C FIRING PRINCIPLE]

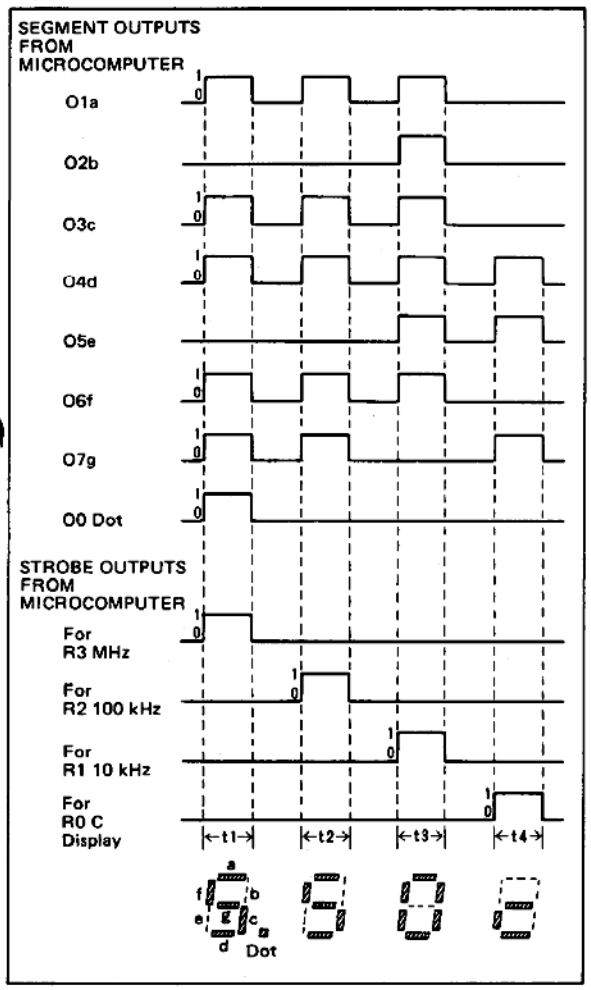


Fig.7

6.4.3 Display section

* LSI QL01 segment outputs are driven by segment drive IC's QL04 and QL05, and QL03 dynamically drives a 4-digit 7-segment LED.
* Levels when 145.50C is displayed are shown in Fig. 7.
* Per the above, Fig. 7 signals are repeatedly applied to O0-O7 terminals, firing each segment.
* In synchronization with QL01 segment outputs, strobe signals from R0—R3 are applied to QL02 (digit driver).
* QL02 displays 4 digits QD01-QD04.
* Close scrutiny of a dynamic drive reveals that digits are sequentially lit up, one digit at a time. However, due to fast cycles, all 4 digits appear to light up simultaneously.

6.4.4 Operation of CTN-5

The 1750 Hz tone signal is fed to Q101 emitter during transmission. This signal passes through the MIC input circuit and AF circuit, and is then fed to the modulator where it is modulated. The modulation degree can be adjusted with the output level control VR on CTN-5. In CW mode, Q101 is reverse biased, so the signal is not modulated.

6.4.5 Back-up unit

(1) With QZ04 (zener) as reference voltage, lowering of the base and emitter voltages in QZ01 turns QZ01 on.
(2) QZ01 is used to turn on QZ02, and QZ02, QZ03, thereby driving the DC-DC converter (AZ01).

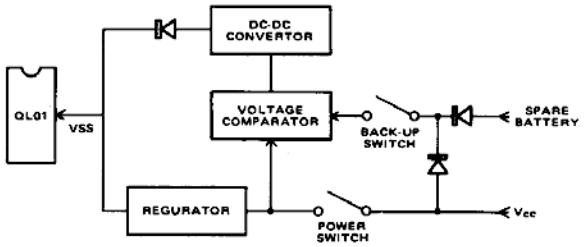


Fig. 8

(3) AZ01 provides 10 V.
(4) This back-up unit operates when the power supply voltage is around 11 V, and maintains the power supply for MEMO circuits of QL01 at 9 V until it is reduced to 3 V.

6.4.6 Controller peripheral circuits and functions

(1) QL03 (μPA47C) digit driver
* Digits are lit up and switched by strobe signals (R0—R3) from QL01, and controller IC.
* μPA57C is an integrated circuits of darlington connected NPN transistors and peripheral resistors.

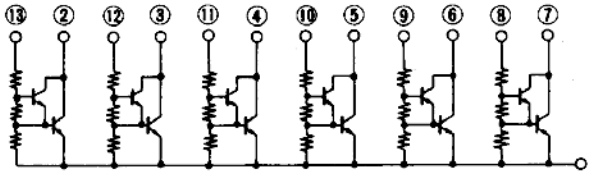


Fig. 9

(2) QL04 and QL05 (TA-76) segment drivers
These are ICs for driving LEDs.

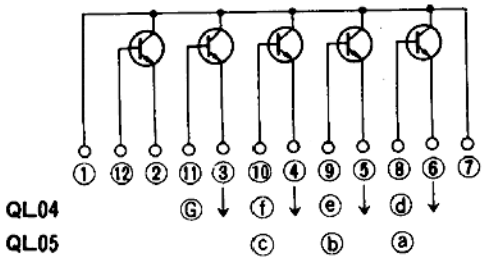


Fig. 10

(3) QL07 (14016CP)

* This IC is for analog switches, and in C8800 is used in QL06, QL07, QM01, and QM02.
* As shown below, when a high level signal is applied to CONTROL, IN and OUT turn on.

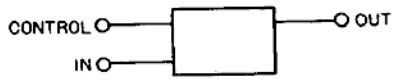
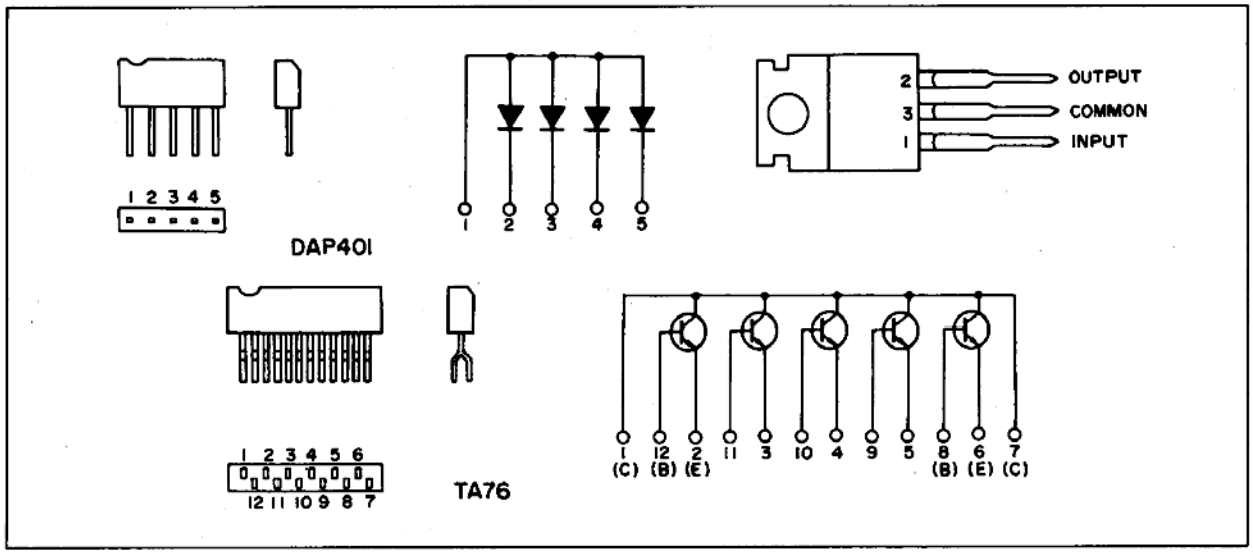
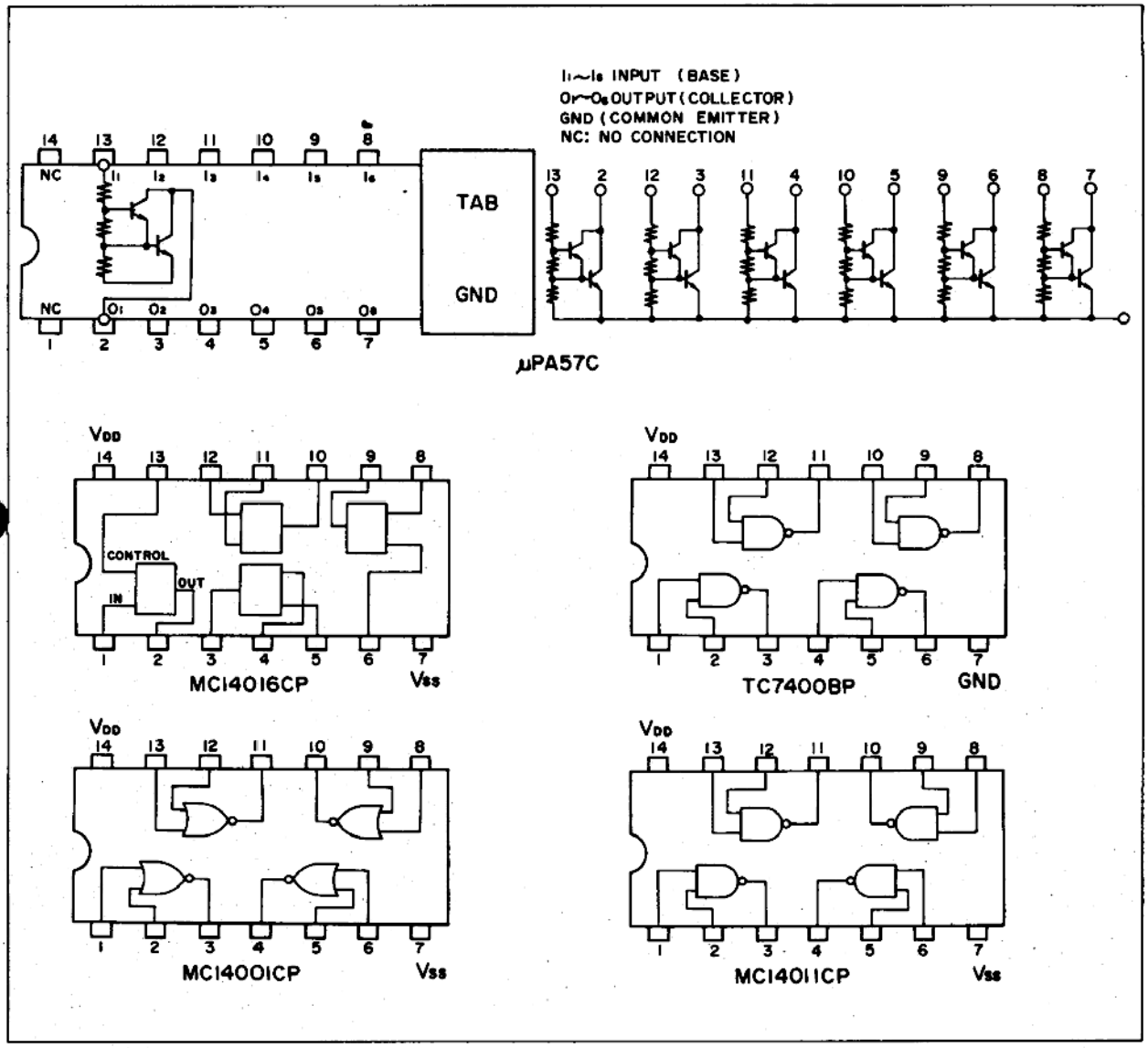


Fig. 11

6.4.7 Trouble shooting

SYMPTOM	CAUSE	REMEDY
No display	No voltage on each B line.	Check power supply circuit boad and connector contacts.
	LSI clock generator not oscillating.	Check circuit parameters
	CS not on.	Check power supply circuit board and connector contacts.
	No signal at output terminals to LED.	No voltage at +B for segment driver.
	Miswiring.	Check wiring, or poor connector contacts.
Irregular display	Low power supply voltage.	Correct to 13.8 V.
	Power switched on and off in fast cycles.	Pull out power plug, replace after several seconds, and turn power on again.
	Miswiring to individual segments.	Check wiring.
	Shorted pattern at LED terminals.	Check pattern (circuit board).
Punching keys do not provide proper functions	TX SW is on.	Check power supply block.
	Keyboard miswiring.	Check wiring.
	Connector poor contacts.	Check connector.
Channel display remains UP-DOWN and other keys do not work.	UP-DOWN has turned analog switch on.	Check UP-DOWN circuit in feature block and repair.
Display outside of band or wrong CH STEPS.	Miswiring.	Check wiring.
	Power switched on and off in fast cycles.	Pull out power plug, replace after several seconds, and turn power on again.

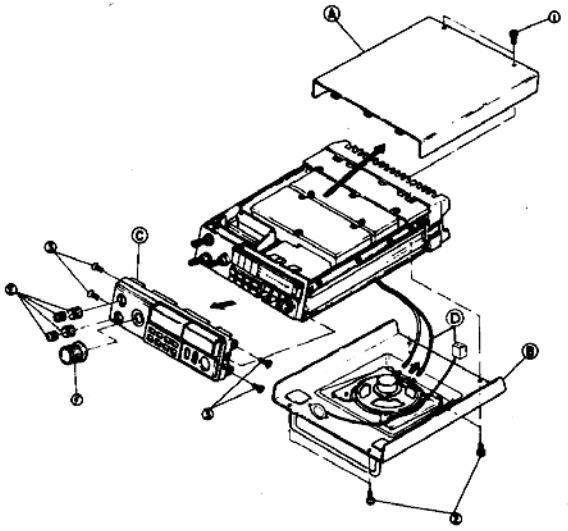

1 2 3 4 5
DAP401
2 OUTPUT
3 COMMON
1 INPUT
1 2 3 4 5
1 2 3 4 5 6
12 11 10 9 8 7
TA76
1 (C) 12 (B) 2 (E) 11 3 10 4 9 5 8 (B) 6 (E) 7 (C)


I1~I6 INPUT (BASE)
O1~O6 OUTPUT (COLLECTOR)
GND (COMMON EMITTER)
NC: NO CONNECTION
NC
TAB
GND
μPA57C
VDD
CONTROL
IN
OUT
MC14016CP
VSS
TC7400BP
GND
MC14001CP
MC14011CP

7. DISASSEMBLY

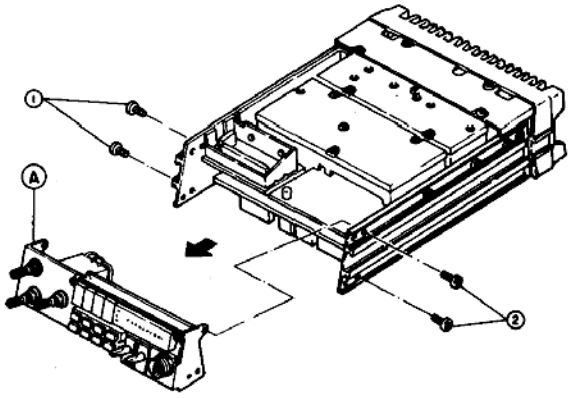
7.1 REMOVAL OF ESCUTCHEON

1. Remove 2 screws (1) and lift off top cover (A) in the arrowed direction.
2. Remove 4 screws (2), then pull off speaker jacks and buzzer cord (D) in the arrowed direction, for loosening the bottom cover (B).
3. Remove knobs (E) and (F), and 4 screws (3), then lift off the front case (C) in the arrowed direction.



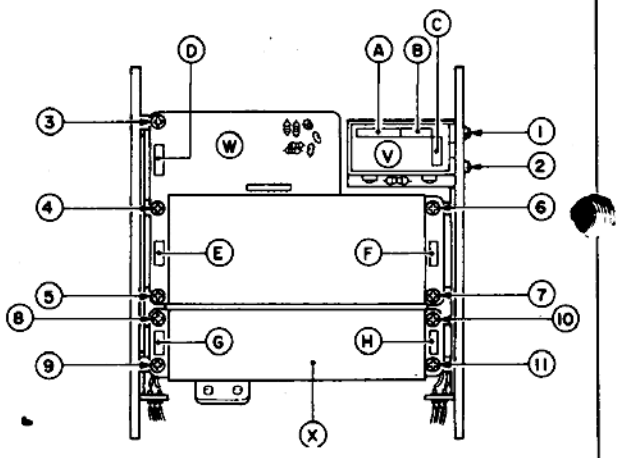
7.2 REMOVAL OF FRONT CONTROL SECTION

Remove 8 screws, 4 each (1) and (2), then disconnect connectors and desolder soldered joints, to loosen the front block (A).



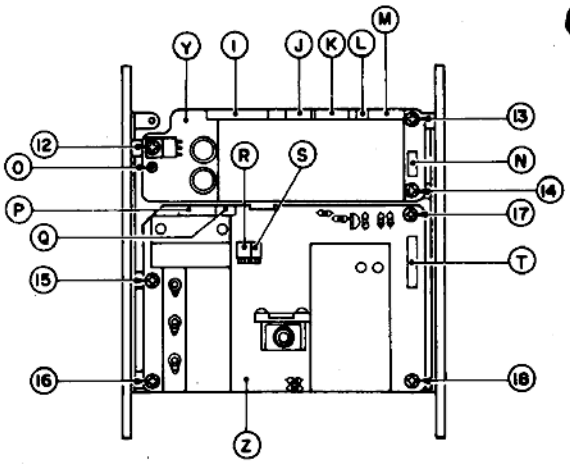
7.3 REMOVAL OF UPPER BOARDS

1. Removal of board (V)
   Disconnect connectors (A), (B), and (C), remove 2 (1) and (2), to remove board (V).
2. Removal of board (W)
   Disconnect connectors (D), (E), and (F), remove 5 screws (3), (4), (5), (6), and (7) to remove board (W).
3. Removal of board (X)
   Disconnect connectors (G) and (H), remove 4 screws (8), (9), (10), and (11) to remove board (X).



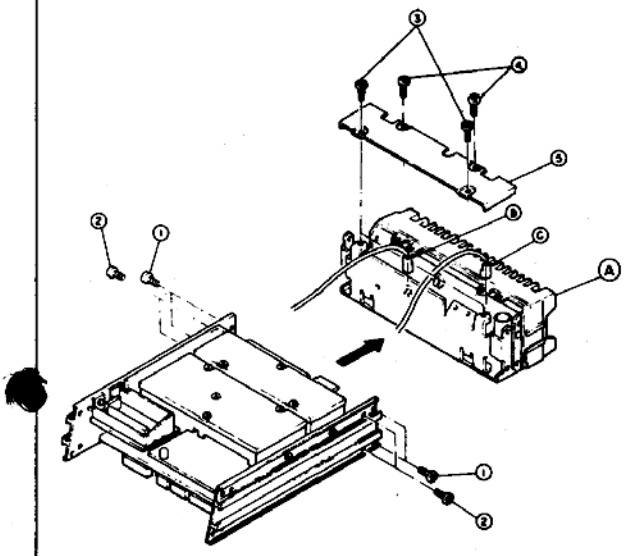
7.4 REMOVAL OF LOWER BOARDS

1. Removal of board (Y)
   Disconnect connectors (I), (J), (K), (L), (M), and (N), pin jack (O), then remove 3 screws (12), (13), and (14), to remove board (Y).
2. Removal of board (Z)
   Disconnect (P), (Q), (R), (S), and (T), remove 4 screws (15), (16), (17), and (18), to remove board (Z).



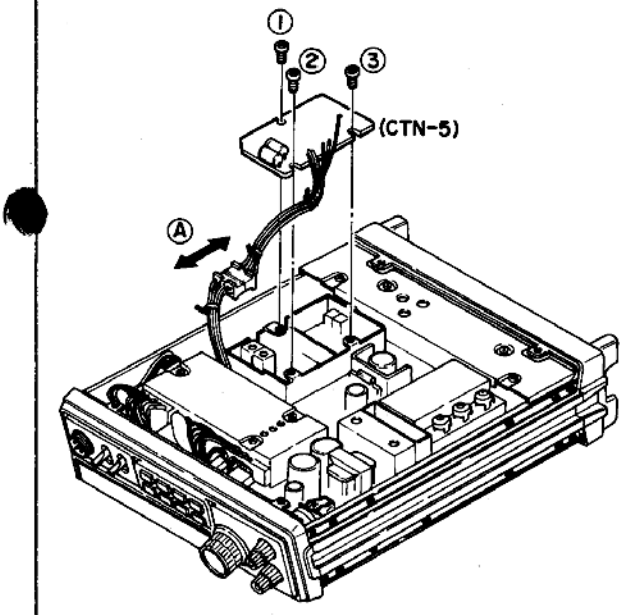
7.5 REMOVAL OF FINAL HEAT-SINK

Remove 8 screws, 2 each (1), (2), (3), and (4), shielding plate (5), disconnect connectors (B) and (C), desolder soldered joints, to remove final heat-sink (A) in the direction arrowed.



7.6 REMOVAL OF TONE BOARD (CTN-5)

Remove 3 screws (1), (2) and (3), then pull off connector (A) in the arrowed direction.



8. ADJUSTMENT PROCEDURES

STANDARD CONDITIONS

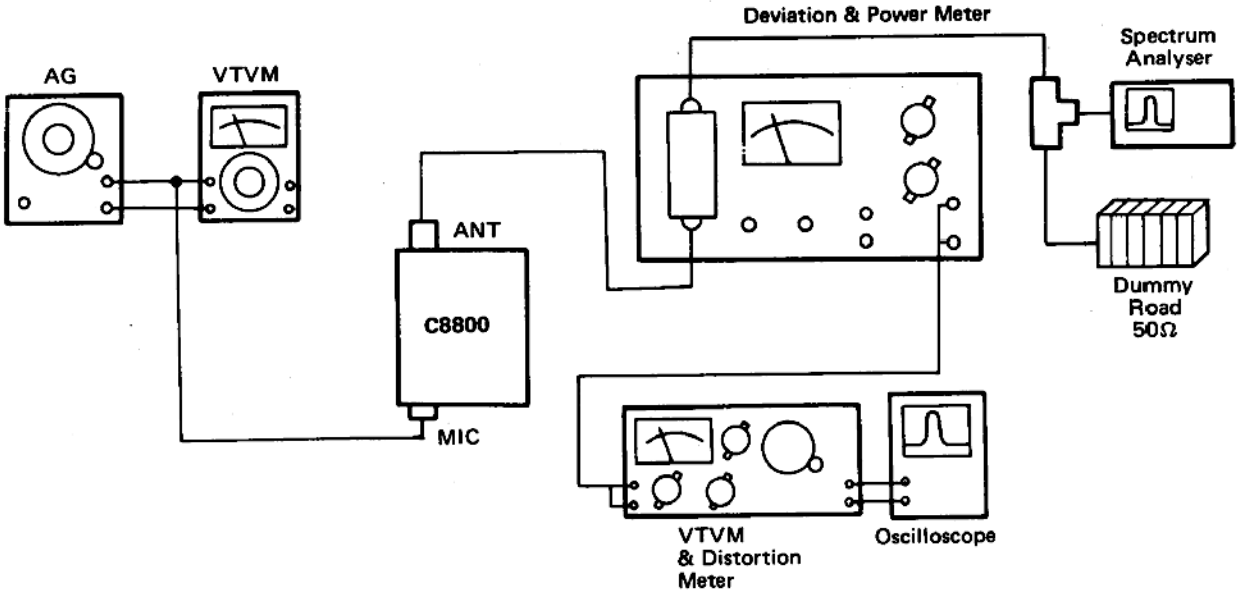
Power supply voltage	13.8V DC
Receiver output	500 mW
Receiver load	4 ohms
Transmitter load	50 ohms
Modulation	1,000 Hz
Deviation	±3.5 kHz
Adjustment frequency	RX 145.500 MHz
	TX 145.480 MHz

* **Test equipment and jigs**

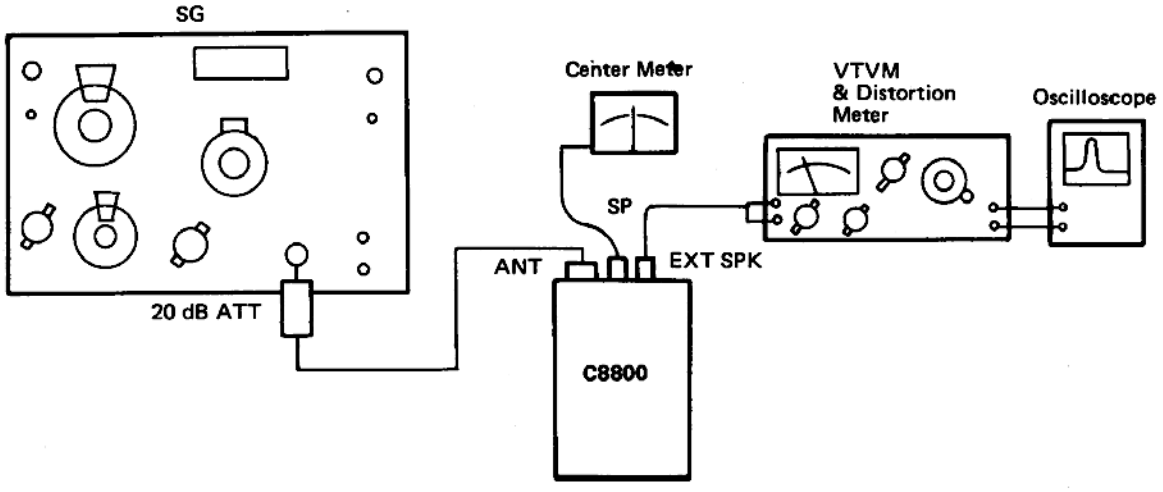
(1) Frequency counter
(2) RF millivoltmeter (VTVM)
(3) 50-ohm dummy load for RF VTVM
(4) Digital voltmeter
(5) Circuit tester (preferrably with high input impedances)
(6) Power supply (13.8V, 4A)
(7) Transmitting jig (or microphone)
(8) 2P Molex socket (coaxial with N type male)

TRANSMITTING AND RECEIVING CONNECTIONS

■ **TRANSMITTING**



■ **RECEIVING**



8.1 PLL ADJUSTMENTS (P101)

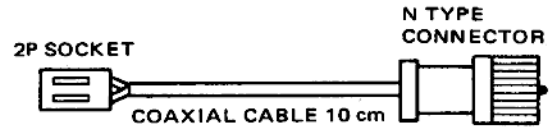
* When adjusting PLL and RX, keep PTT off unless otherwise specified.
* Adjust PLL before RX and TX.
* PLL section is thoroughly factory adjusted, so that these trimmers require no further adjustment.
* While PLL related adjustments are being carried out, leave socket J125 disconnected. Replace the socket after adjustments are completed.

■ **ADJUSTMENT CONDITIONS**

SENS	.DX
SQL	MIN
PWR	HI
VOL	MIN
MODE	FREE
SCAN	.LOW
CH STEP	25 kHz
BUCK UP	.OFF
POWER SUPPLY	.13.8 V

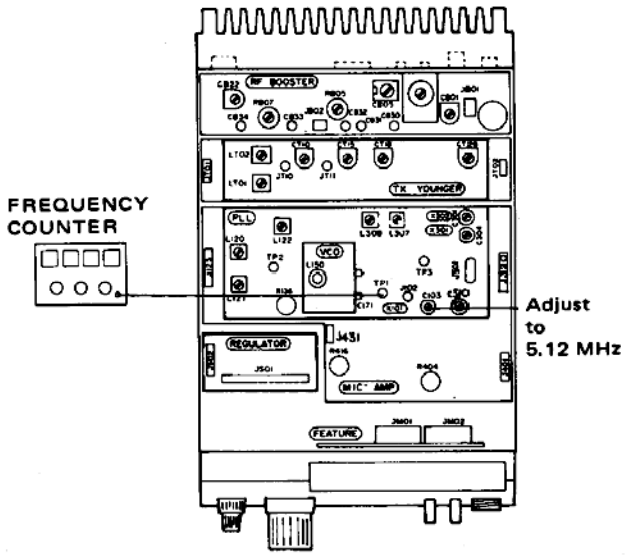
■ **JIGS**

1) 2P molex socket
2) 50-ohm dummy load for RF VTVM
   N type supplied with RF VTVM is to be used.



1. PLL COMPARATOR OSCILLATOR ADJUSTMENTS

Connect frequency counter to TP1 and adjust by C103 to 5.1200 MHz ±100 Hz.

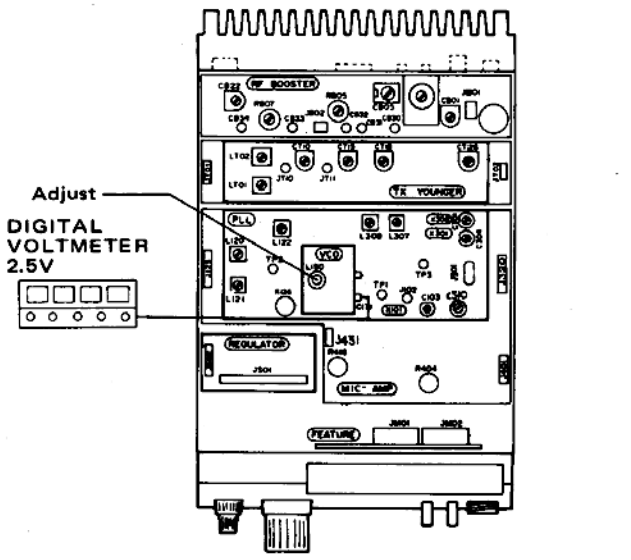


2. PLL SECTION VCO ADJUSTMENTS (P150)

1. Position cores of L307, L308, and L122 as shown below:

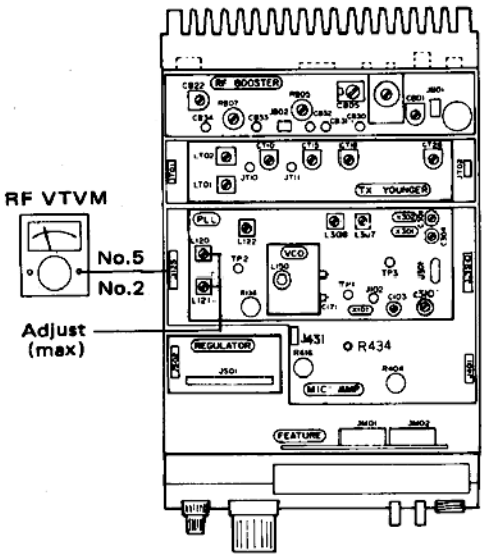
2. Adjust the above 3 coils as follows:
   a. Screw in L307 1.5 turns.
   b. Screw in L308 4.5 turns.
   c. Screw in L122 1.0 turn.
3. Adjust frequency display on unit to 145,000 MHz using the channel knob.
4. Connect digital voltmeter to the feed-through capacitor C171 that is mounted on VCO.
5. Then switch to the TX mode, and adjust the digital voltmeter to 3.0 V using VCO coil L150.
6. Then switch to the RX mode (S), and adjust the digital voltmeter to 3.0 V using R136.

NOTE:
When using a circuit tester, use 10 V range or above for adjustments.



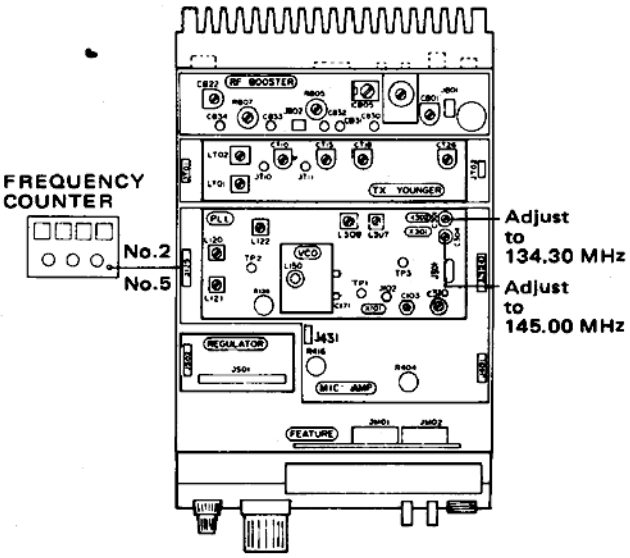
3. OUTPUT COIL ADJUSTMENTS

1. TX coil adjustment
   a. Set the unit display at 145.50 MHz.
   b. Connect to #5 pin of J125 an RF VTVM which has a 50-ohm load resistance.
   c. Maximize the output at #5 pin of J125 by adjusting L120. (RF VTVM should indicate approximately 0.3 V)
2. RX coil adjustment
   a. Display 145.50 MHz.
   b. Connect to #2 pin of J125 an RF VTVM which has a 50-ohm load resistance.
   c. Maximize the output at #2 pin of J125 by adjusting L121.



4. FREQUENCY ADJUSTMENTS

1. Turn channel knob to display 145.00 MHz.
2. Connect frequency counter to #2 pin of J125.
3. Switch to the RX mode (where A1, A2, and A3 LEDs are off), and adjust C304 for the counter to indicate 134.40 MHz.
4. Then connect frequency counter to #5 pin of J125.
5. Switch to the TX mode, and adjust C301 for a frequency 145.00 MHz at #5 pin.
6. Stop transmitting, shift the channel to 144.00 MHz, transmit and make sure that the frequency is indicated by the channel display.
7. Similarly make sure on 145.98 MHz and 145.50 MHz.



* The above completes PLL related adjustments, so that J125 socket can now be reconnected.

8.2 TX ADJUSTMENTS

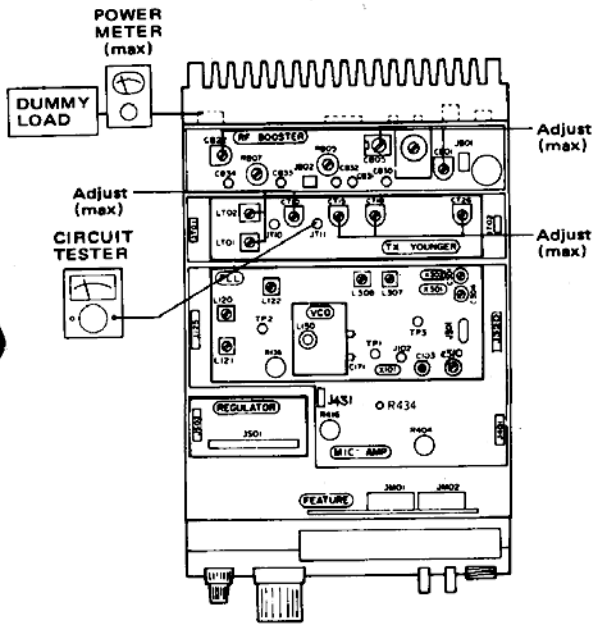
1. YOUNGER BOOSTER PWR ADJUSTMENTS

(CONDITIONS)

1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power supply . . . . . .13.8 V
10. Dummy load. . . . . .50 Ω
11. Frequency . . . . . 145.48 MHz
12. External UP-DOWN SW . . . . . .Center

(PROCEDURES)

1. Using the channel selector knob, adjust to 145.48 MHz.
2. Turn trimming resistors RC07, RC08, and RC12, of APC board to extreme left (minimum).
3. Maximize CB22 booster board capacitance.
4. Connect a tester to JT11 of the younger board.
5. Switch to TX mode, and adjust a few times to maximize voltages at LT01, LT02, and CT10. (Should be approximately 0.26 V)
6. Disconnect the circuit tester, and while watching the RF power meter, maximize RF power by adjusting a few times CT15, CT18, and CT26 of the younger board, and then CB01, CB05 of the booster board, in that sequence. (RF power should be approximately 18 W).



2. POWER PROTECTOR ADJUSTMENTS

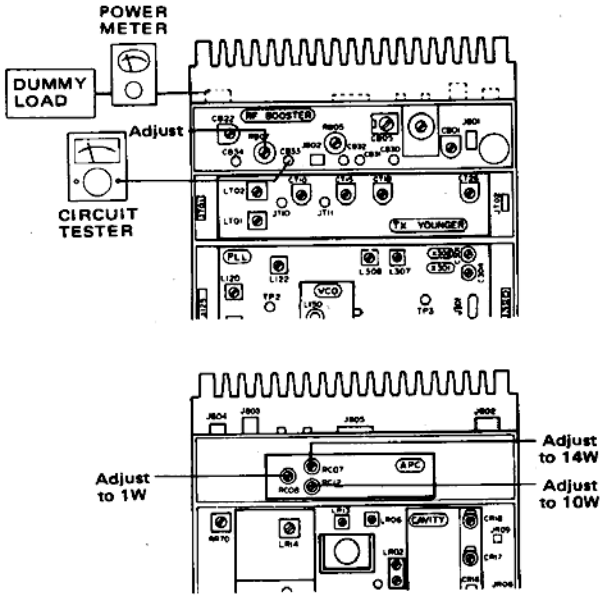
(CONDITIONS)

1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power supply . . . . . .13.8 V
10. Dummy load. . . . . .50 Ω
11. Frequency . . . . . 145.48 MHz
12. External UP-DOWN SW . . . . . .Center

(PROCEDURES)

1. Switch to high power TX mode, and connect a circuit tester to CB33 of the booster board. Adjust accurately to reach the dip point by RB07.
2. Switch to low power, and set the RF power at 1 W by adjusting RC07 of the APC board.
3. Switch to high power, and set the RF power at 14 W by adjusting RC08.
4. Switch to the RX mode. Replace the ANT dummy load with the SWR-5 dummy load, and transmit at high power. By adjusting RC12, set the RF power at 10 W.
5. Replace ANT dummy load with 50 ohms, and adjust RC07 and RC08 to obtain 14 W at high power and 1 W at low power.

NOTE:
When using SWR-5 dummy load, the total length of the coaxial cable from ANT connector to the dummy load should be 0.67 x λ/2 x η, or 69 cm and 1,038 cm.



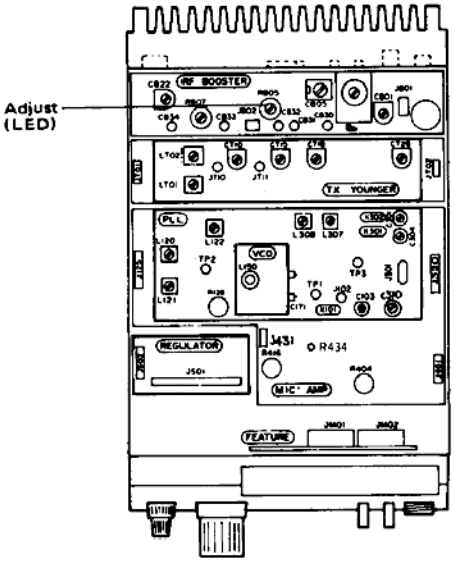
3. TX METER ADJUSTMENTS

(CONDITIONS)

1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power supply . . . . . .13.8 V
10. Dummy load. . . . . .50 Ω
11. Frequency . . . . . 145.48 MHz
12. External UP-DOWN SW . . . . . .Center

(PROCEDURES)

1. Switch to high power TX mode, and by adjusting RB05 of the booster board, set at the point where the 9th LED (the 3rd red) is turned off.
2. Switch to low power, and confirm that one of the first 4 LEDs turn on.
   (1st through 4th for low power, and 7th through 9th for high power is OK).



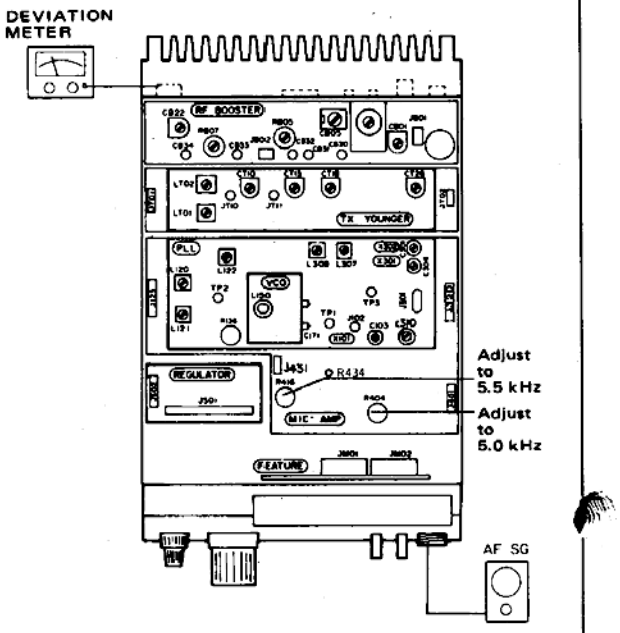
4. DEVIATION ADJUSTMENTS

(CONDITIONS)

1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . .13.8 V
10. Dummy load. . . . . .50 Ω
11. Frequency . . . . . 145.48 MHz
12. External UP-DOWN SW . . . . . .Center

(PROCEDURES)

1. Apply to the MIC input terminals a signal whose output at AG is approximately 1 kHz, 30 mV RMS. Then turn R404 of the PLL board to the extreme counter-clockwise position (maximum gain).
2. Switch to the TX mode, and by means of R416, set where the deviation is 5.5 kHz maximum.
3. Using R404, set for a deviation of 5.0 kHz maximum. (At 3.5 kHz dev, MIC sensitivity = 0.7 – 4 mV as measured in an open state.)



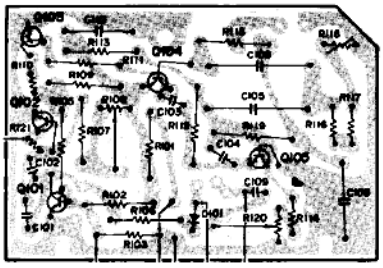
5. TONE UNIT & CTN-5 (tone oscillator for repeater drive) ADJUSTMENTS

(CONDITIONS)

1. MODE . . . . . .FM
2. Band . . . . . 144 MHz
3. VFO . . . . . 145 MHz
4. PWR . . . . . MAX
5. MIC input . . . . . None

(PROCEDURES)

1. Set the Push Tone Switch to ON (C8800 is set to transmit mode with signal modulated by CTN-5).
2. Turn R108 fully counterclockwise.
3. Adjust the modulation frequency to 1750 Hz by adjusting R118 on the P.W. board (the frequency counter indicates the output of the FM linear detector).
4. Adjust R120 on the P.W. board to obtain 3.5 kHz deviation.



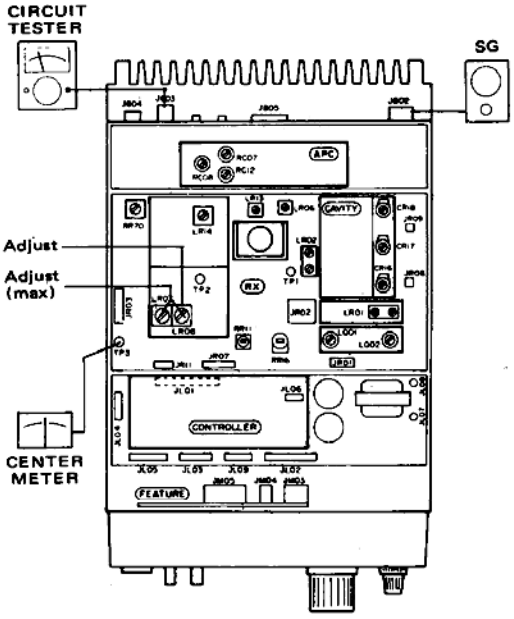
1. IF ADJUSTMENTS

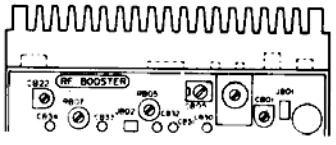
(CONDITIONS)

1. SENS. . . . . .DX
2. SQL. . . . . MIN
3. PWR . . . . . HI
4. VOL . . . . . MIN
5. MODE . . . . . FREE
6. SCAN. . . . . LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . OFF
9. Power source . . . . . 13.8 V
10. Dummy . . . . . 4 Ω
11. Frequency . . . . . 145.50 MHz
12. External Buck up SW. . . . . OFF

(PROCEDURES)

1. Set distortion meter or VTVM on a 1 V range, and maximize the noise level at SPK out by adjusting JR07 and LR08.
2. Connect center meter to TP3.
3. Apply a 60 dB unmodulated signal from SG.
4. Adjust LR08 for center meter to indicate ±0.





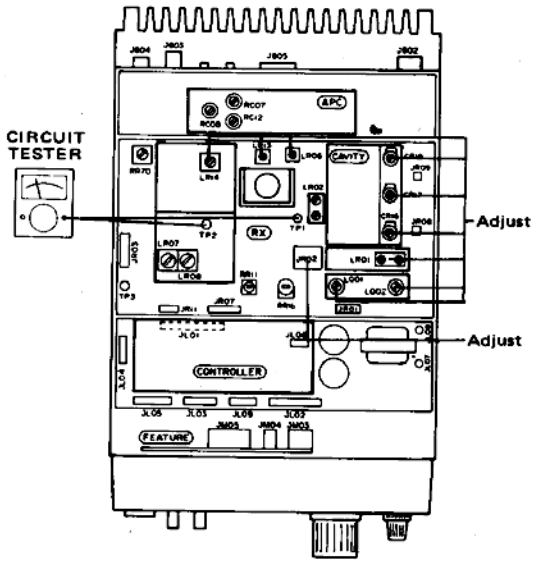
2. RF ADJUSTMENTS–PART 1

(CONDITIONS)

1. SENS . . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . .13.8 V
10. Dummy load. . . . . 4 Ω
11. Frequency . . . . . 145.50 MHz
12. External Buck up SW. . . . . .OFF

(PROCEDURES)

1. Connect a circuit tester to TP1 of RX PWB. Maximize the voltage at TP1 by adjusting LR02. (Repeat this procedure a few times.)
2. Connect a circuit tester to TP2, and apply a 60 dB unmodulated signal from SG. (A 0.1 V range.)
3. Repeat adjustment a few times to maximize voltages at LR14, LR13, LR06, CR18, CR17, CR16, LR01, LQ02, and LQ01, in that sequence.



RF ADJUSTMENTS – PART 2: CAVITY

(CONDITIONS)

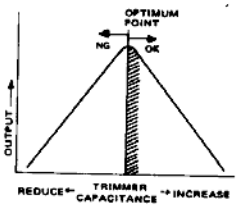
1. SENS . . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . .13.8 V
10. Dummy load. . . . . 4 Ω
11. Frequency . . . . . 145.50 MHz
12. External Buck up SW. . . . . .OFF

(PROCEDURES)

NOTE:

Do not conduct these adjustments except when trimmers are replaced, or similar.

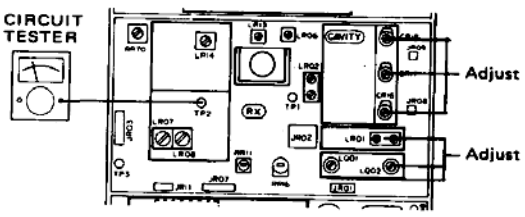
1. Connect a circuit tester to TP2 on the signal side.
2. After adjusting per RF adjustments – part 1, again adjust the cavity trimmers.
3. Turn CR16 and CR18 by approximately 1 mm in the direction of increasing trimmer capacitance.
4. By CR17, adjust to maximize the output at TP2, taking care to adjust to a point where, with output remaining at maximum, trimmer capacitances are slightly on the higher side.



NOTE:

Never adjust for trimmer capacitances to be the lower side of the optimum point.

5. Adjust CR16 and CR18 similarly to 4).
6. Adjust CR17 similarly to 4).
7. Adjust LQ01, LQ02, and LR01 again to maximize the TP2 output.
8. Repeat adjustments per 3) – 6).
9. Switch to normal, and adjust to 20 dB using RR16 and for 0 dB with QS.
10. Switch RX sensitivity selector to local, and confirm that 20 dB QS is now 5 – 15 dB.
11. Switch RX sensitivity selector to DX, and confirm that 20 dB QS is now above –7 dB.



NOTE:

The three trimmers in the RX cavity have been factory adjusted before shipment and no further adjustments are required. Never touch these trimmers.

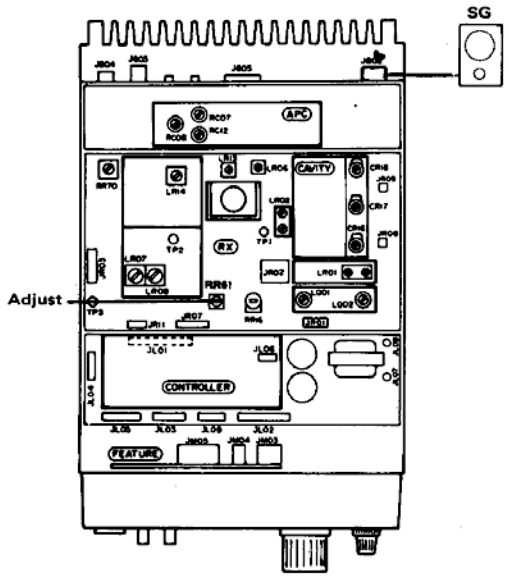
3. SQUELCH ADJUSTMENTS

(CONDITIONS)

1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . .13.8 V
10. Dummy load. . . . . 4 Ω
11. Frequency . . . . . 145.50 MHz
12. External Buck up SW. . . . . .OFF

(PROCEDURES)

1. Turn squelch volume control to the maximum.
2. Set SG for 1 kHz modulation at ±3.5 kHz deviation. Then set the SG attenuator to QS +5 dB.
3. While applying the above SG output, adjust RR61 for squelch to open.
4. Reduce the SG output for SQL to close, and reconfirm if it is accurately adjusted.
5. Then set SG for 2.5 kHz modulation at ±4 kHz deviation. Increase SG output and confirm that double squelch does not occur.



NOTE:
Increase the SG output to bring down the opening point of squelch. Although the closing point of squelch varies about 1~3 dB, tight squelch is obtained at the point at which the squelch opens with increased SG output.

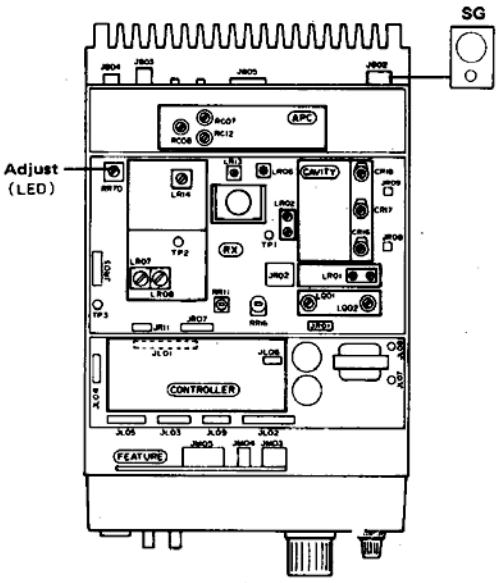
4. RX S METER ADJUSTMENTS

(CONDITIONS)

1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . .13.8 V
10. Dummy load. . . . . 4 Ω
11. Frequency . . . . . 145.50 MHz
12. External Buck up SW. . . . . .OFF

(PROCEDURES)

1. Set SG for no modulation −13 dB, and adjust RR70 for one of S meter LEDs to light up.
2. When varying SG output by SG attenuator, confirm that LEDs firing varies smoothly.
3. When one LED is fixed at −13 dB, turn RR70 to the extreme counterclockwise position, measure S meter sensitivity (the point where one LED lights up), and confirm that it is within −10 dB to −16 dB.



5. CHIP SWITCH ADJUSTMENTS

(CONDITIONS)

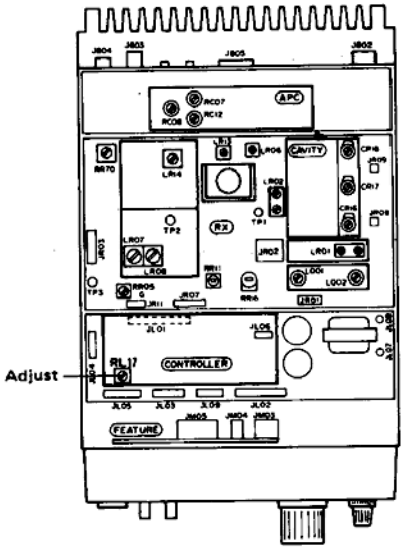
1. SENS. . . . . .DX
2. SQL. . . . . MIN
3. PWR . . . . . HI
4. VOL . . . . . MIN
5. MODE . . . . . FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . 9.5 V

(PROCEDURES)

1. Set power supply voltage at 9.5 V.

NOTE:
Use reliable equipment to get exactly 9.5 V.

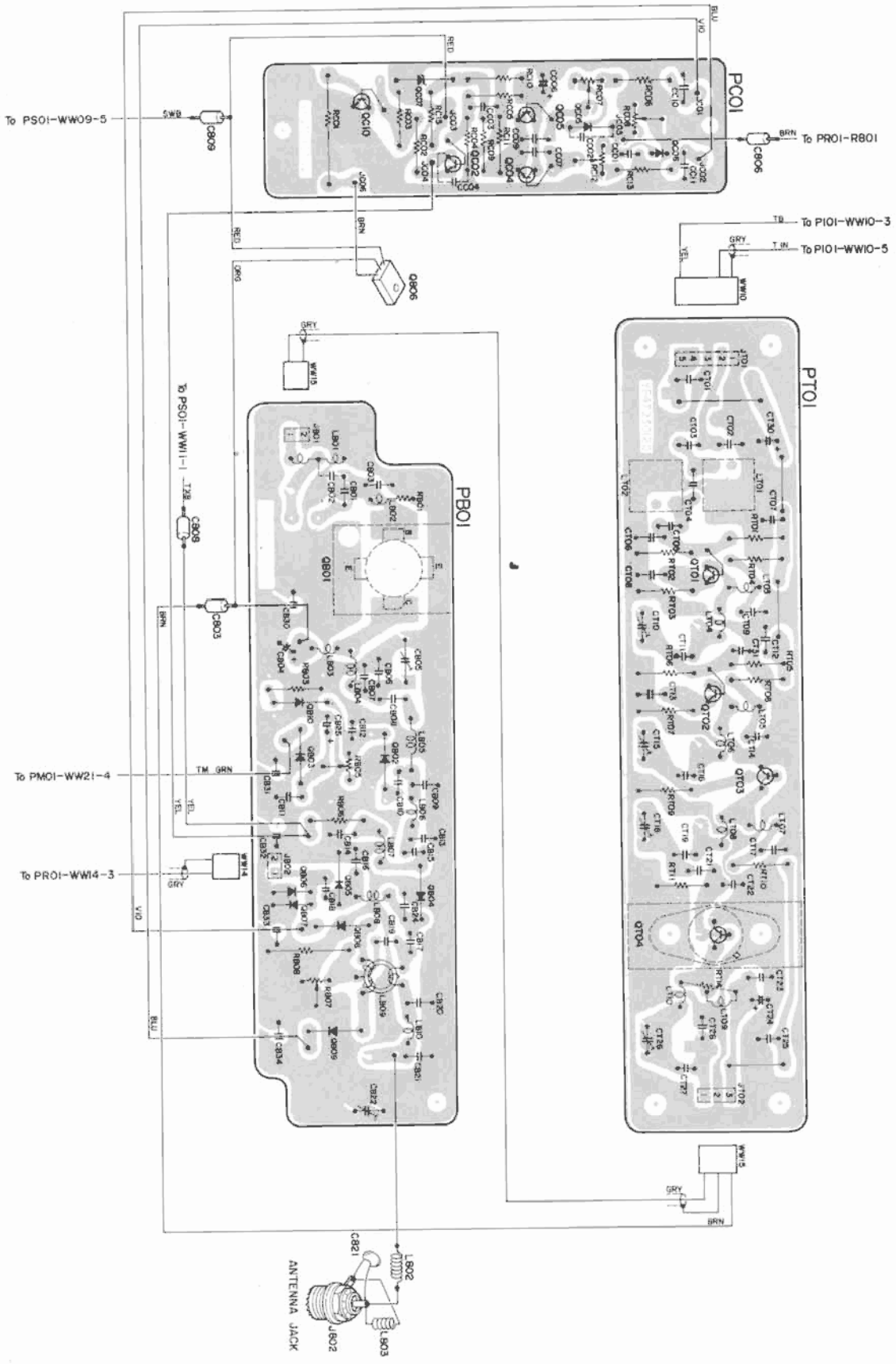
2. Adjust RL117 trimmer in the PL01 board for the frequency display to just disappear.
3. Set power supply voltage at 13.8 V. Then reduce this voltage slowly and confirm that as it hits 9.5 V frequency the display disappear.



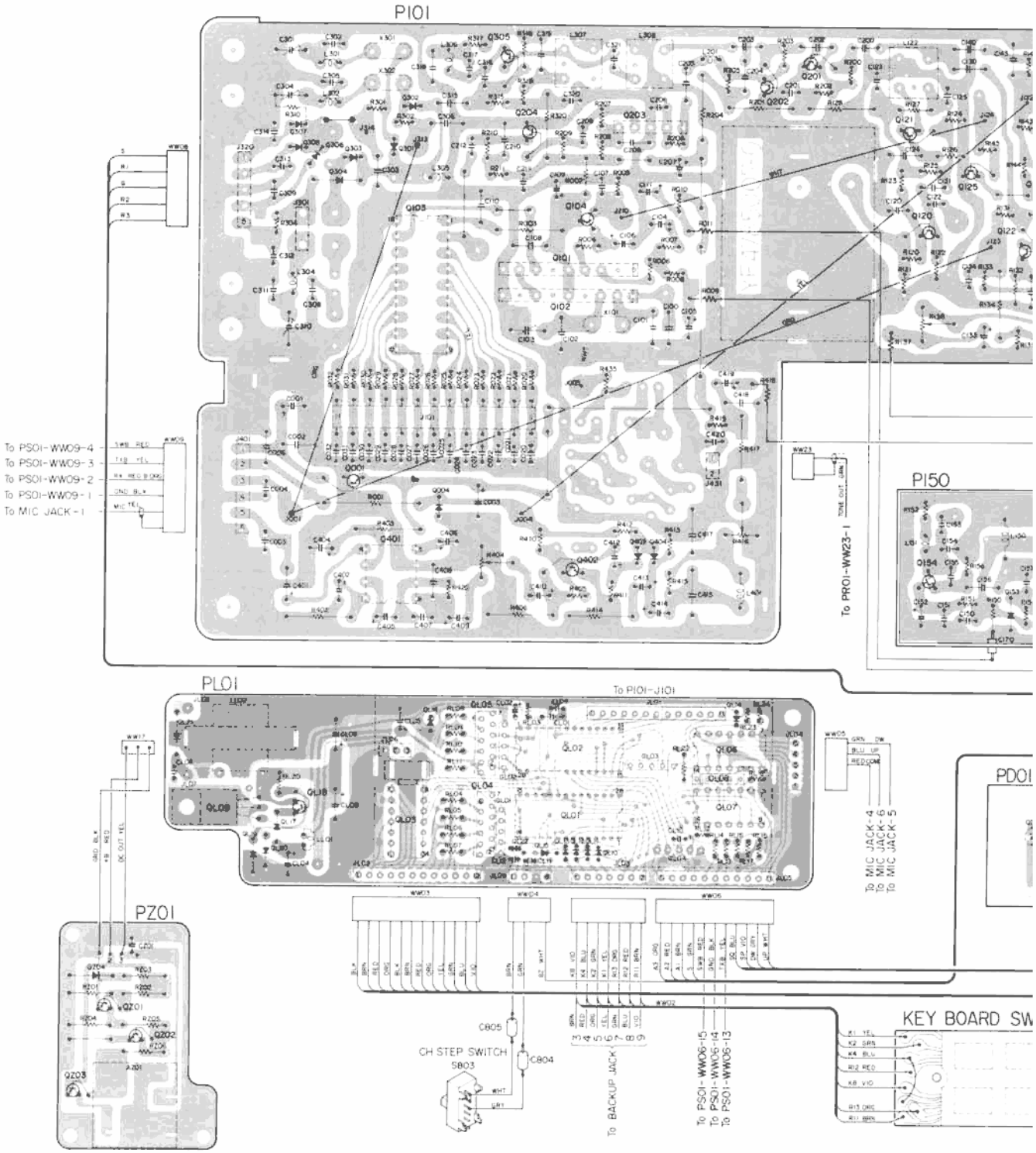
NOTE

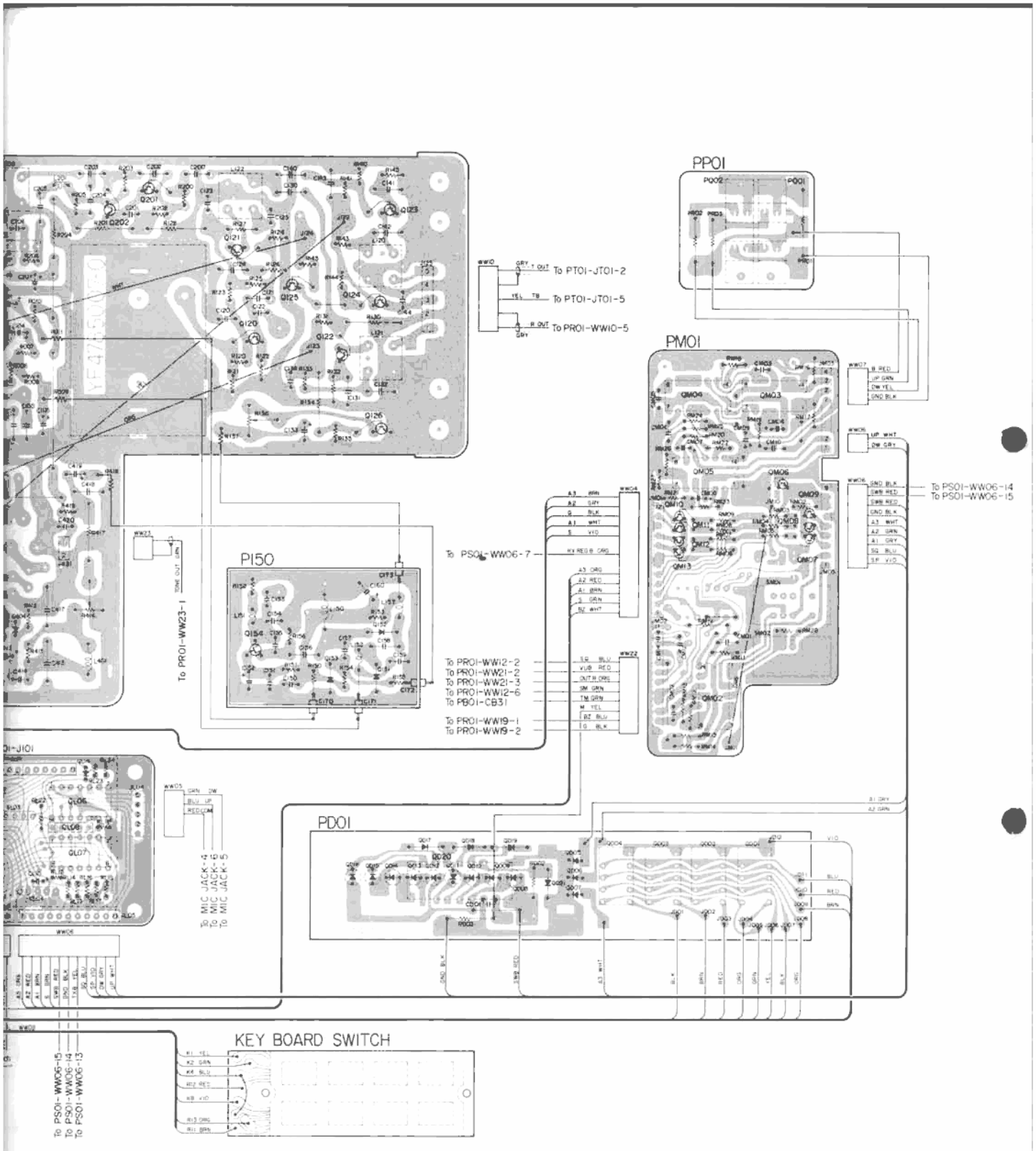
9. WIRING DIAGRAM

9.1 TX SECTION

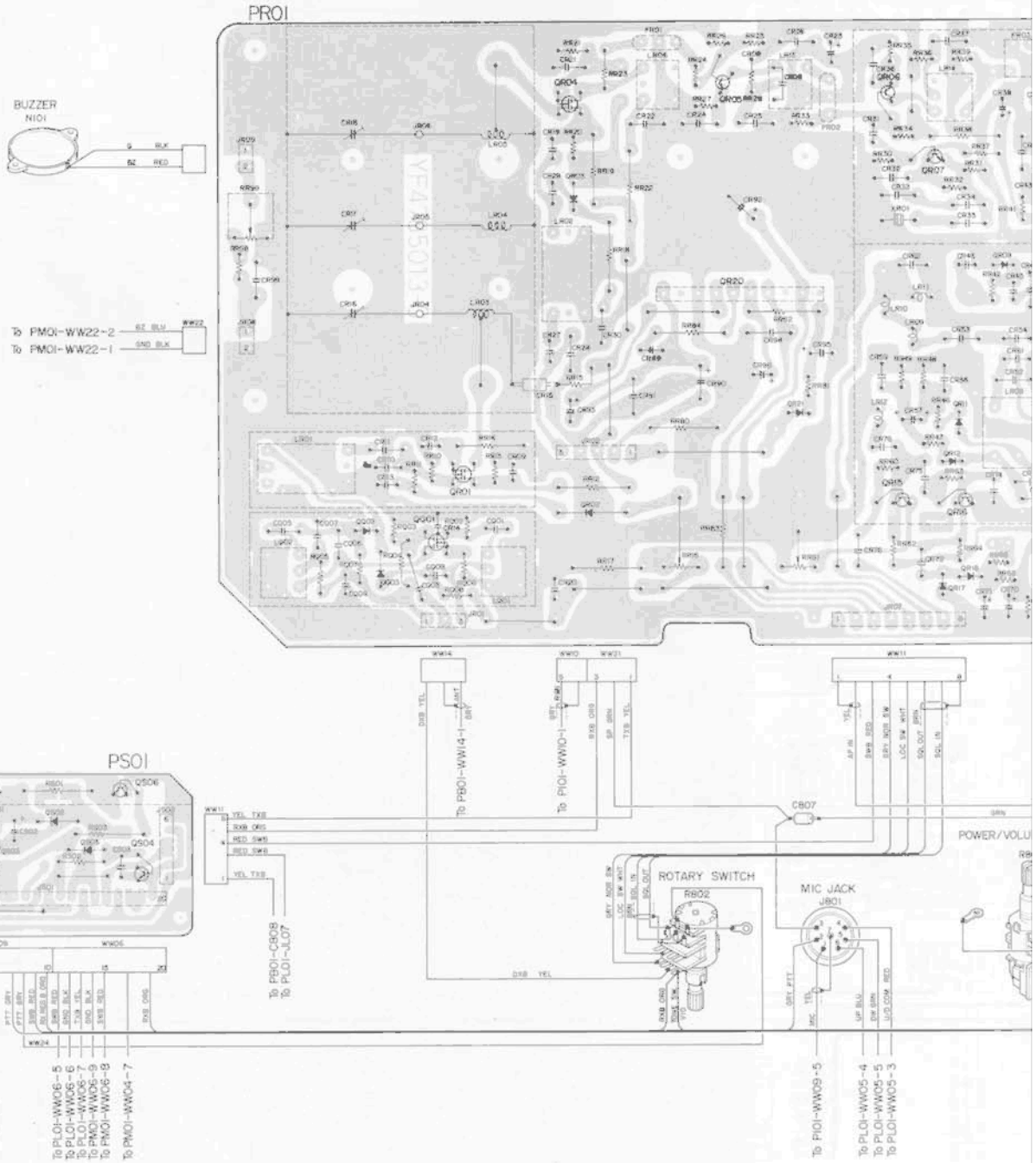


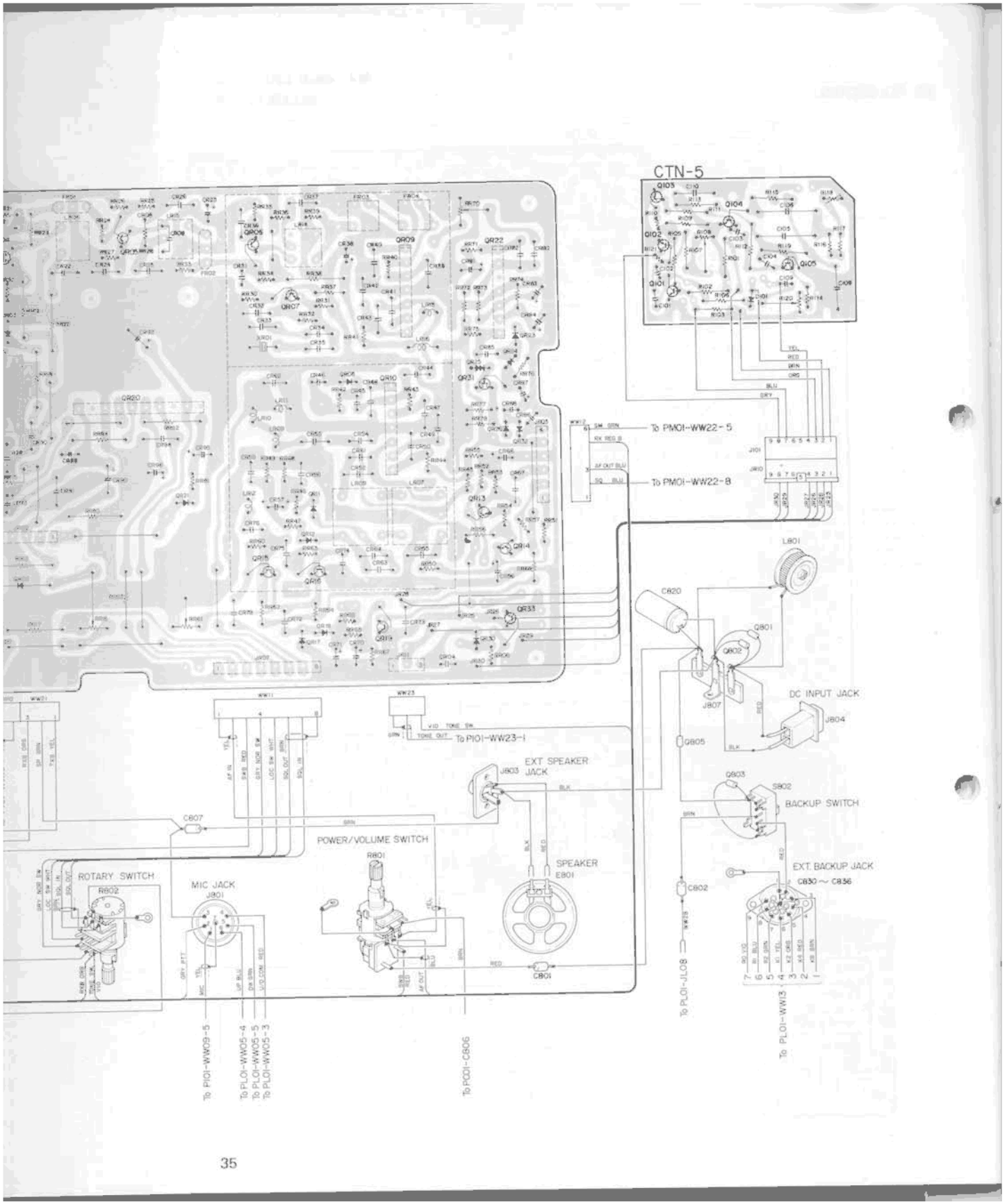
9.2 PLL SECTION




PP01
PM01
P150
PD01
KEY BOARD SWITCH
To PT01-JT01-2
To PT01-JT01-5
To PR01-WW10-5
To PS01-WW06-7
To PR01-WW23-1
To PR01-WW12-2
To PR01-WW21-2
To PR01-WW21-3
To PR01-WW12-6
To PB01-CB31
To PR01-WW19-1
To PR01-WW19-2
To PS01-WW06-14
To PS01-WW06-15
MIC JACK-14
MIC JACK-15
MIC JACK-13
To PS01-WW06-15
To PS01-WW06-14
To PS01-WW06-13

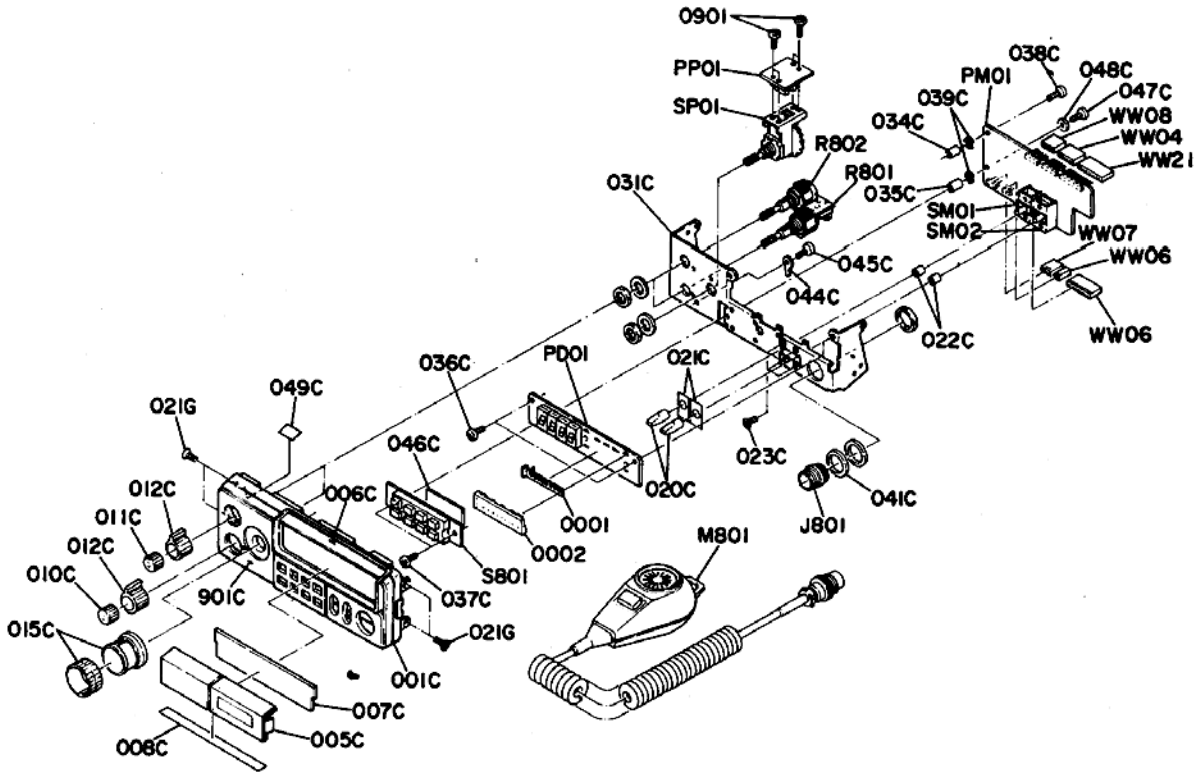
9.3 RX SECTION




CTN-5
To PM01-WW22-5
To PM01-WW22-8
To P101-WW23-1
EXT SPEAKER JACK
J803
DC INPUT JACK
J804
BACKUP SWITCH
S802
EXT. BACKUP JACK
C830 ~ C836
POWER/VOLUME SWITCH
R801
SPEAKER
E801
ROTARY SWITCH
R802
MIC JACK
J801
L801
Q801
Q802
Q803
Q805
C820
C807
C802
C801
To P101-WW09-5
To P101-WW05-4
To P101-WW05-5
To P101-WW05-3
To P001-C806
To PL01-JL08
To PL01-WW13

10. EXPLODED VIEWS AND PARTS LISTS

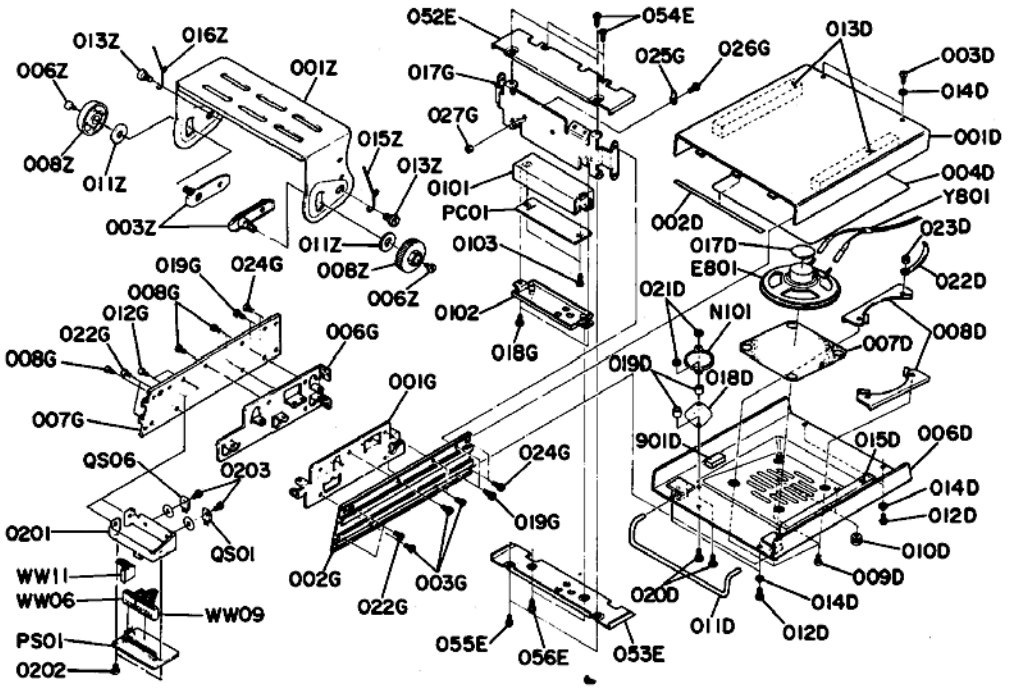
10.1 [P01-99] ESCUTCHEON RELATED



REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION	
A	1	4785064410	Front Case Assembly	
001C	1	4723064010	Front Case	
005C	1	4723158040	Window	
006C	1	4723303010	Mask	
007C	1	4723158020	Window	
008C	1	4723303020	Mask	
049C	1	4723120060	Insulator	
901C	1	4723063030	Escutcheon, Front Panel	
002C	1	59020604P0	Washer	
010C	1	4723154010	Knob, Volume	
011C	1	4723154020	Knob, SQL	
012C	2	4785154010	Knob, SENS/PWR	
015C	1	4723154500	Knob, Rotary	
020C	2	4723354010	Lever	
021C	2	4723118030	Spacer	
022C	2	4723118060	Spacer	
023C	2	51042604B0	F.H.M. Screw	F2.6 x 4
031C	1	4723105010	Chassis, Front	
034C	1	4723101010	Support	
035C	1	4723101030	Support	
036C	2	5110260580	B.H.M. Screw	B2.6 x 5
037C	2	4723114020	Stopper	
038C	1	50062605B0	Screw	2.6 x 5
039C	2	54042602N0	Spring Washer	
041C	1	4656118010	Spacer	
044C	1	62030049W0	Lug	
045C	1	5110030489	B.H.M. Screw	B3 x 4
046C	1	4723120050	Insulator	
047C	1	5110020880	B.H.M. Screw	B2 x 8
048C	1	59020605P0	Washer	

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION	
021G	4	51042605E0	F.H.M. Screw	F2.6 x 5
0901	4	5106030889	P.H.M. Screw	B3 x 8
M801	1	MP11000692	Microphone, MP716	
2001	1	4785303010	Mask	
2002	1	4785053010	Cover	
J801	1	YJ10001250	Jack, Mic (7P)	
R801	1	RD12030070	Variable Resistor, 20KΩ	
R802	1	BR12030010	Variable Resistor, 20KΩ	
S801	1	SK09080010	Keyboard Switch, (8 Key)	
PD01	1	YF47230050	P.W. Board, Display	
0001	1	4723118010	Spacer, LED	
0002	1	4723053010	Cover, LED	
PM01	1	YF47850080	P.W. Board, Feature	
SM01	1	SC02030102	Switch	
SM02	1	SC02020322	Switch	
PP01	1	YF47230102	P.W. Board, Rotary Switch	
SP01	1	SR24020010	Rotary Switch	

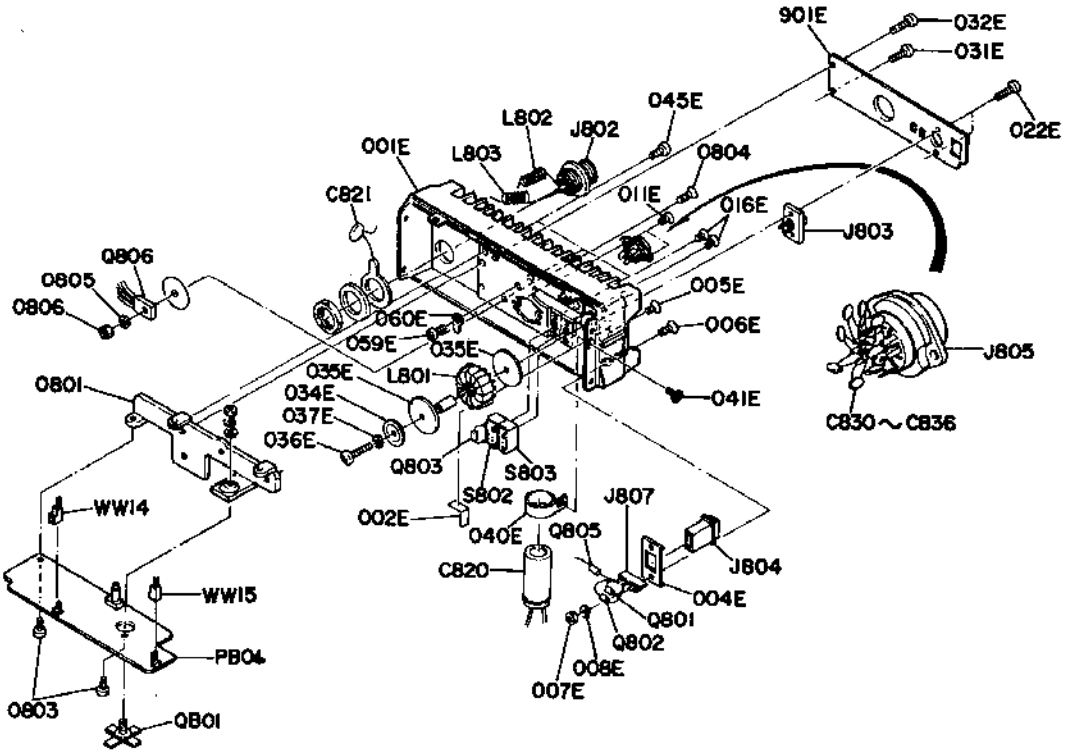
10.2 [P02-99] CHASSIS RELATED



REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
001Z	1	4723160020	Bracket
003Z	2	4723051510	Guide Assembly
006Z	2	4723114010	Stopper
008Z	2	4723154100	Knob
011Z	2	4723118050	Spacer
013Z	2	4723271010	Holder
015Z	1	4723115010	Spring
016Z	1	4723115020	Spring
001D	1	4723257010	Lid, Top Cover
002D	1	4723118090	Spacer
003D	2	51280306U0	B.H. Tapped Screw B3 x 6
004D	1	4785853020	Label, Adjust Point
006D	1	4723257040	Lid, Bottom Cover
007D	1	4723202010	Net, Speaker
008D	2	4723005010	Clamper
009D	4	51100305H0	B.H.M. Screw B3 x 5
010D	2	4656259030	Bushing
011D	1	4723057010	Leg
012D	4	51280306U0	B.H. Tapped Screw B3 x 6
013D	2	4723056020	Buffer
014D	6	54020301S0	Flat Washer, P.
015D	1	4723056020	Buffer
017D	1	4736120010	Insulator
018D	1	4724202010	Net
019D	2	4724055010	Collar
020D	2	5110020850	B.H.M. Screw B2 x 8
021D	2	5311020380	Hexagon Nut
022D	1	4220005020	Clamper
023D	1	5311030380	Hexag on Nut
901D	1	4785056020	Buffer Bottom Lid
052E	1	4723109210	Shield, Upper
053E	1	4723109220	Shield, Bottom
054E	4	51282606B0	B.H. Tapped Screw B2.6 x 6
055E	2	5110260380	B.H.M. Screw B2.6 x 3
056E	2	5153260680	P.H. Tapped Screw B2.6 x 6

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
001G	1	4723105020	Chassis, (R)
002G	1	4723051010	Guide, (R)
003G	4	5110030489	B.H.M. Screw B3 x 4
006G	1	4723105030	Chassis, (L)
007G	1	4723051020	Guide, (L)
008G	4	5110030489	B.H.M. Screw B3 x 4
012G	2	5110030589	B.H.M. Screw B3 x 5
017G	1	4723126010	Stay
018G	2	5128260580	B.H. Tapped Screw B2.6 x 5
019G	4	5128030680	B.H. Tapped Screw B3 x 6
022G	4	5110030589	B.H.M. Screw B3 x 5
024G	4	5128030680	B.H. Tapped Screw B3 x 6
025G	1	62030039W0	Lug
026G	1	5110260680	B.H.M. Screw B2.6 x 6
027G	1	5311260380	Hexagon Nut
0101	1	4723109130	Shield
0102	1	4723109140	Shield
0103	2	5110260580	B.H.M. Screw B2.6 x 5
0201	1	4723160030	Bracket
0202	2	5110260580	B.H.M. Screw B2.6 x 5
0203	2	5110260680	B.H.M. Screw B2.6 x 6
E801	1	QK00801080	Speaker 1W 8Ω
N101	1	QK0024501C	Buzzer
Y801	1	Y800150060	Connective Cord, Speaker
PC01	1	YF47230030	P.W. Board, Power Control
PS01	1	YF47240090	P.W. Board, Power Supply
QS01	1	HT31368180	Transistor 2SC1368-B
QS06	1	HT700111O0	Transistor JSP6009

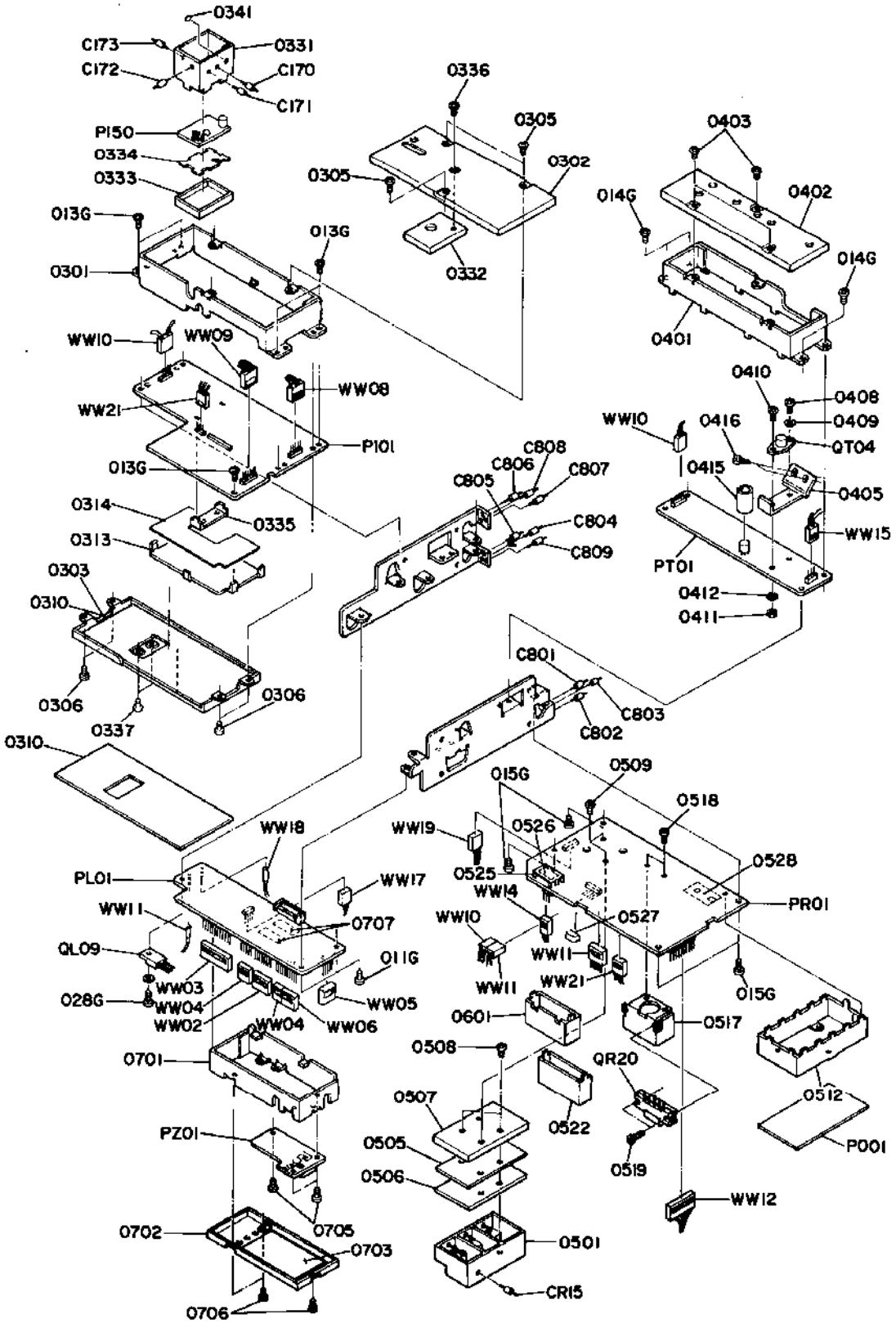
10.3 [P03-99] HEAT-SINK RELATED



REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION	
001E	1	4723267010	Heatsink	
002E	1	4723120040	Insulator	
004E	1	4723005020	Clamper	
005E	1	51042606E0	F.H.M. Screw	F2.6 x 6
006E	1	51042608E0	F.H.M. Screw	F2.6 x 8
007E	1	53112603B0	Hexagon Nut	
008E	1	54042602N0	Spring Washer	
011E	2	51342606P0	F.H. Tapped Screw	F2.6 x 6
016E	4	51041704E0	F.H.M. Screw	F1.7 x 4
022E	2	51282608U0	B.H. Tapped Screw	B2.6 x 8
031E	1	51282606U0	B.H. Tapped Screw	B2.6 x 6
032E	1	51282610U0	B.H. Tapped Screw	B2.6 x 10
034E	1	54110149A0	Flat Washer, L.	
035E	2	4618118040	Spacer	
036E	1	5110031689	B.H.M. Screw	B3 x 16
037E	1	54040302N0	Spring Washer	
040E	1	4656005010	Clamper	
041E	1	51042606E0	F.H.M. Screw	F2.6 x 6
045E	3	5110041859	B.H.M. Screw	B4 x 18
059E	1	5128030580	B.H. Tapped Screw	B3 x 5
060E	1	62030039W0	Lug	
901E	1	4723265040	Indicator	
0801	1	4723267020	Heatsink	
0803	2	51282606B0	B.H. Tapped Screw	B2.6 x 6
0804	1	51042615E0	F.H.M. Screw	F2.6 x 15
0805	1	54022601B0	Flat Washer, P.	
0806	1	5311260380	Hexagon Nut	

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION		
C820	1	EG22802510	Elect Cap.	2200μF	25V
C821	1	DD15200300	Ceramic Cap.	20pF	±5%
C830	1	DK16471300	Ceramic Cap.	470pF	±10%
C831	1	DK16471300	Ceramic Cap.	470pF	±10%
C832	1	DK16471300	Ceramic Cap.	470pF	±10%
C833	1	DK16471300	Ceramic Cap.	470pF	±10%
C834	1	DK16471300	Ceramic Cap.	470pF	±10%
C835	1	DK16471300	Ceramic Cap.	470pF	±10%
C836	1	DK16471300	Ceramic Cap.	470pF	±10%
J802	1	YJ10000780	Jack, Antenna		
J803	1	YT02010080	Terminal, SPK		
J804	1	YB00040010	Connecter, DC		
J805	1	YJ05000040	Jack,	(9P)	
J806	1	YP05000040	Plug (9P)		
J807	1	YL01030210	Terminal,	(3P)	
L801	1	LC21240010	Choke Coil		
L802	1	LC16000010	Choke Coil,	(5T)	
L803	1	LL22310100	Coil,	(10T)	
Q801	1	HD20001100	Diode	10D1	
Q802	1	HD20001100	Diode	10D1	
Q803	1	HD20023100	Diode	10E1	
Q805	1	HD20001100	Diode	10D1	
Q806	1	HT80053100	Transistor	SJE5576	
S802	1	SS02020430	Slide Switch		
S803	1	SS02020430	Silde Switch		
PB01	1	YF47230020	P.W. Board, Booster		
Q801	1	HT321030A0	Transistor	2SC2103A	

10.4 [M01-99] VARIOUS BOARDS AND COMMON PARTS



REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION	
011G	2	5110260580	B.H.M. Screw	B2.6 x 5
013G	5	5110260580	B.H.M. Screw	B2.6 x 5
014G	4	5110260580	B.H.M. Screw	B2.6 x 5
015G	4	5110260580	B.H.M. Screw	B2.6 x 5
028G	1	5110260880	B.H.M. Screw	B2.6 x 8
0301	1	4723109100	Shield	
0302	1	4723109110	Shield	
0303	1	4723109120	Shield	
0305	3	5110020580	B.H.M. Screw	B2 x 5
0306	4	5110020580	B.H.M. Screw	B2 x 5
0310	2	4723120010	Insulator	
0313	1	4785109010	Shield	
0314	1	4785120010	Insulator	
0331	1	4723109090	Shield	
0332	1	4723109160	Shield	
0333	1	4723109240	Shield	
0334	1	4723120020	Insulator	
0335	1	4723109250	Shield	
0336	1	5110020380	B.H.M. Screw	B2 x 3
0337	2	5110020380	B.H.M. Screw	B2 x 3
0341	1	4723120080	Insulator	
0401	1	4723109080	Shield	
0402	1	4723109170	Shield	
0403	3	5110020580	B.H.M. Screw	B2 x 5
0405	1	4618267050	Heatsink	
0408	1	5110260680	B.H.M. Screw	B2.6 x 6
0409	1	54042602N0	Spring Washer	
0410	1	5110261080	B.H.M. Screw	B2.6 x 10
0411	1	5311260380	Hexagon Nut	
0412	1	54042602N0	Spring Washer	
0415	1	4723267050	Heatsink	
0416	2	5128260680	B.H. Tapped Screw	B2.6 x 6
0501	1	4723064500	Cavity Case Assembly	
0505	1	4723109150	Shield	
0506	1	4723277010	Packing	
0507	1	4723257030	Lid, Cavity	
0508	2	5110020680	B.H.M. Screw	B2 x 6
0509	2	5110020880	B.H.M. Screw	B2 x 8
0512	1	4785109500	IF Shield Assembly	
0517	1	4723267030	Heatsink	
0518	2	5110260580	B.H.M. Screw	B2.6 x 5
0519	2	5110260880	B.H.M. Screw	B2.6 x 8
0527	1	4785056010	Buffer	
0522	1	4723109030	Shield, Frontend	
0601	1	4723109040	Shield, Pre Amp.	
0701	1	4723109190	Shield, Control	
0702	1	4723109200	Shield, Control	
0703	1	4723120030	Insulator	
0705	3	5110260580	B.H.M. Screw	B2.6 x 5
0706	3	5110020580	B.H.M. Screw	B2 x 5
0707	2	4785120020	Insulator	
0107	1	3730101020	Support	
0108	1	3730101020	Support	
0120	1	51100204E0	B.H.M. Screw	B2 x 4
0121	1	51100204E0	B.H.M. Screw	B2 x 4
0122	1	51100204E0	B.H.M. Screw	B2 x 4
0525	1	4724109080	Shield, RX	
0526	1	4724120010	Insulator, RX Shield	
0528	1	4785120030	Insulator, RX IF Coil Case	

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION	
C801	1	DC18202020	Feedthru Cap. 0.002μF	50V
C802	1	DC18202020	Feedthru Cap. 0.002μF	50V
C803	1	DC18202020	Feedthru Cap. 0.002μF	50V
C804	1	DC18202020	Feedthru Cap. 0.002μF	50V
C805	1	DC18202020	Feedthru Cap. 0.002μF	50V
C806	1	DC18202020	Feedthru Cap. 0.002μF	50V
C807	1	DC18202020	Feedthru Cap. 0.002μF	50V
C808	1	DC18202020	Feedthru Cap. 0.002μF	50V
C809	1	DC18202020	Feedthru Cap. 0.002μF	50V
P101	1	YF47850070	P.W. Board, PLL	
P150	1	YF47850010	P.W. Board, V.C.O.	
C170	1	DC18202020	Feedthru Cap. 0.002μF	50V
C171	1	DC18202020	Feedthru Cap. 0.002μF	50V
C172	1	DC18202020	Feedthru Cap. 0.002μF	50V
C173	1	DC18202020	Feedthru Cap. 0.002μF	50V
PL01	1	YF47850110	P.W. Board, Control	
QL09	1	HC10029060	IC	μPC14308
PR01	1	YF47850130	P.W. Board, RX	
CR15	1	DC18202020	Feedthru Cap. 0.002μF	50V
QR20	1	HC10031010	IC	HA1366W
PT01	1	YF47230120	P.W. Board, TX	
QT04	1	HT321180A0	Transistor	2SC2118
PZ01	1	YF47230042	P.W. Board, Back Up	

10.5 ELECTRICAL PARTS

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
P101	1	YF47850070	P.W. Board, PLL
			P101-CAPACITORS
C001	1	EA10702530	Elect 100μF 25V
C002	1	DK18103310	Ceramic 0.01μF
C003	1	EG33701620	Elect 330μF 16V
C004	1	DK16102300	Ceramic 0.001μF ±10%
C005	1	DK16471300	Ceramic 470pF ±10%
C006	1	DK16122300	Ceramic 0.0012μF ±10%
C020	1	DK16102300	Ceramic 0.001μF ±10%
C021	1	DK16102300	Ceramic 0.001μF ±10%
C022	1	DK16102300	Ceramic 0.001μF ±10%
C023	1	DK16102300	Ceramic 0.001μF ±10%
C024	1	DK16102300	Ceramic 0.001μF ±10%
C025	1	DK16102300	Ceramic 0.001μF ±10%
C026	1	DK16102300	Ceramic 0.001μF ±10%
C027	1	DK16102300	Ceramic 0.001μF ±10%
C028	1	DK16102300	Ceramic 0.001μF ±10%
C029	1	DK16102300	Ceramic 0.001μF ±10%
C030	1	DK16102300	Ceramic 0.001μF ±10%
C031	1	DK16102300	Ceramic 0.001μF ±10%
C032	1	DK16102300	Ceramic 0.001μF ±10%
C100	1	DD15300300	Ceramic 30pF ±5%
C101	1	DD15510300	Ceramic 51pF ±5%
C102	1	DD15150300	Ceramic 15pF ±5%
C103	1	CT12000090	Trimming 20pF
C104	1	EV10601060	Elect 10μF 10V
C105	1	EV10403560	Elect 0.1μF 35V
C106	1	EV47501060	Elect 4.7μF 10V
C107	1	DK16102300	Ceramic 0.001μF ±10%
C108	1	DS17104010	Semicon 0.1μF ±20%
C109	1	EA10701030	Elect 100μF 10V
C110	1	DS17683010	Semicon 0.068μF ±20%
C111	1	EA10701030	Elect 100μF 10V
C120	1	DK16102300	Ceramic 0.001μF ±10%
C121	1	DD15300330	Ceramic 30pF ±5%
C122	1	DD10010300	Ceramic 1pF ±0.25pF
C123	1	DK16102300	Ceramic 0.001μF ±10%
C124	1	DK16122300	Ceramic 0.0012μF ±10%
C125	1	DK16102300	Ceramic 0.001μF ±10%
C130	1	DD15300300	Ceramic 30pF ±5%
C131	1	DK16122300	Ceramic 0.0012μF ±10%
C132	1	DK16122300	Ceramic 0.0012μF ±10%
C133	1	EV22502560	Elect 2.2μF 25V
C134	1	DK16102300	Ceramic 0.001μF ±10%
C140	1	DD15300300	Ceramic 30pF ±5%
C141	1	DK16122300	Ceramic 0.0012μF ±10%
C142	1	DK16122300	Ceramic 0.0012μF ±10%
C143	1	DK16122300	Ceramic 0.0012μF ±10%
C144	1	DK16102300	Ceramic 0.001μF ±10%
C145	1	DK18102300	Ceramic 0.001μF 50V
C200	1	DD10030300	Ceramic 3pF ±0.25pF
C201	1	DK16102300	Ceramic 0.001μF ±10%
C202	1	DD10040300	Ceramic 4pF ±0.25pF
C203	1	DK16471300	Ceramic 470pF ±10%
C204	1	DK16122300	Ceramic 0.0012μF ±10%
C205	1	DD15101350	Ceramic 100pF ±5%
C206	1	DK16102300	Ceramic 0.001μF ±10%
C207	1	EA47601030	Elect 47μF 10V
C208	1	DK18103310	Ceramic 0.01μF
C209	1	DK16102300	Ceramic 0.001μF ±10%
C210	1	DK16122300	Ceramic 0.0012μF ±10%
C211	1	DK16102300	Ceramic 0.001μF ±10%
C212	1	DK16102300	Ceramic 0.001μF ±10%
C213	1	DD15470300	Ceramic 470pF

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
C301	1	CT12000090	Trimming 20pF
C302	1	DD10020350	Ceramic 2pF ±0.25pF
C303	1	DK16122300	Ceramic 0.0012μF ±10%
C304	1	CT12000090	Trimming 20pF
C305	1	DD10020350	Ceramic 2pF ±0.25pF
C306	1	DK16122300	Ceramic 0.0012μF ±10%
C309	1	DK16102300	Ceramic 0.001μF ±10%
C310	1	CT12000090	Trimming 20pF
C311	1	DD10020350	Ceramic 2pF ±0.25pF
C312	1	DK16102300	Ceramic 0.001μF ±10%
C313	1	DK16102300	Ceramic 0.001μF ±10%
C314	1	DK16102300	Ceramic 0.001μF ±10%
C315	1	DK16122300	Ceramic 0.0012μF ±10%
C316	1	DD15101050	Ceramic 100pF ±5%
C317	1	DD15620010	Ceramic 62pF ±5%
C318	1	DK18103310	Ceramic 0.01μF
C319	1	DK18103310	Ceramic 0.01μF
C320	1	DK16102300	Ceramic 0.001μF ±10%
C321	1	DD10010300	Ceramic 1pF ±0.25pF
C401	1	EV33403560	Elect 0.33μF 35V
C402	1	EV47600660	Elect 47μF 6.3V
C404	1	EA22701030	Elect 220μF 10V
C405	1	EV10502560	Elect 1μF 25V
C406	1	EV22601060	Elect 22μF 10V
C407	1	DS17222010	Semicon 0.0022μF ±20%
C408	1	DK18103310	Ceramic 0.01μF
C409	1	EV10502560	Elect 1μF 25V
C410	1	EV10403560	Elect 0.1μF 35V
C412	1	EA10601690	Elect 10μF 16V
C413	1	EA10601690	Elect 10μF 16V
C414	1	EV10502560	Elect 1μF 25V
C415	1	DF16683300	Film 0.068μF ±10%
C417	1	DF16683300	Film 0.068μF ±10%
C418	1	DF16103300	Film 0.01μF ±10%
C419	1	EV10601060	Elect 10μF 10V
C420	1	DK16102300	Ceramic 0.001μF ±10%
			P101-RESISTORS (All Resistors are ±5% and ¼W)
R001	1	GJ05680010	68Ω 1W
R002	1	GD05101140	100Ω
R003	1	GD05101140	100Ω
R004	1	GD05272140	2.7KΩ
R005	1	GD05222140	2.2KΩ
R006	1	GD05272140	2.7KΩ
R007	1	GD05271140	270Ω
R008	1	GD05682140	6.8KΩ
R009	1	GD05333140	33KΩ
R010	1	GD05101140	100Ω
R011	1	RC00000120	0Ω
R020	1	GD05682140	6.8KΩ
R021	1	GD05682140	6.8KΩ
R022	1	GD05682140	6.8KΩ
R023	1	GD05682140	6.8KΩ
R024	1	GD05682140	6.8KΩ
R025	1	GD05682140	6.8KΩ
R026	1	GD05682140	6.8KΩ
R027	1	GD05682140	6.8KΩ
R028	1	GD05682140	6.8KΩ

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
R029	1	GD05682140	6.8KΩ
R030	1	GD05682140	6.8KΩ
R031	1	GD05682140	6.8KΩ
R032	1	GD05682140	6.8KΩ
R120	1	GD05103140	10KΩ
R121	1	GD05103140	10KΩ
R122	1	GD05561140	560Ω
R123	1	GD05101140	100Ω
R124	1	GD05103140	10KΩ
R125	1	GD05153140	15KΩ
R126	1	GD05471140	470Ω
R127	1	GD05101140	100Ω
R128	1	GD05101140	100Ω
R130	1	GD05102140	1KΩ
R131	1	GD05472140	4.7KΩ
R132	1	GD05331140	330Ω
R133	1	GD05101140	100Ω
R134	1	GD05472140	4.7KΩ
R135	1	GD05102140	1KΩ
R136	1	RA04720050	4.7KΩ Trimming
R137	1	RC00000120	0Ω
R140	1	GD05102140	1KΩ
R141	1	GD05472140	4.7KΩ
R142	1	GD05331140	330Ω
R143	1	GD05101140	100Ω
R144	1	GD05561140	560Ω
R145	1	GD05333140	33KΩ
R200	1	GD05224140	220KΩ
R201	1	GD05101140	100Ω
R202	1	GD05561140	560Ω
R203	1	GD05154140	150KΩ
R204	1	GD05101140	100Ω
R205	1	GD05472140	4.7KΩ
R206	1	GD05272140	2.7KΩ
R207	1	GD05102140	1KΩ
R208	1	GD05101140	100Ω
R209	1	GD05154140	150KΩ
R210	1	GD05561140	560Ω
R211	1	GD05101140	100Ω
R301	1	GD05272140	2.7KΩ
R302	1	GD05272140	2.7KΩ
R304	1	GD05272140	2.7KΩ
R310	1	GD05272180	2.7KΩ 1/8W
R311	1	GD05272180	2.7KΩ 1/8W
R315	1	GD05182140	1.8KΩ
R316	1	GD05152140	1.5KΩ
R317	1	GD05471140	470Ω
R319	1	GD05101140	100Ω
R320	1	GD05101140	100Ω
R402	1	GD05105140	1MΩ
R403	1	GD05680140	68Ω
R404	1	RA02220100	2.2KΩ Trimming
R405	1	GD05223140	22KΩ
R406	1	GD05153140	15KΩ
R410	1	GD05222140	2.2KΩ

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
R411	1	GD05272140	2.7KΩ
R412	1	GD05272140	2.7KΩ
R413	1	GD05332140	3.3KΩ
R414	1	GD05561140	560Ω
R415	1	GD05562140	5.6KΩ
R416	1	RA01030070	10KΩ Trimming
R417	1	GD05272140	2.7KΩ
R418	1	RC00000120	0Ω
R419	1	GD05333140	33KΩ
R420	1	GD05472140	4.7KΩ
			P101-SEMICONDUCTORS
Q001	1	HC10022060	IC μPC78L08
Q004	1	HD30017090	Zener BZ-090
Q101	1	HC10046050	IC TC5081P
Q102	1	HC10023050	IC TC5082PL
Q103	1	HC10047050	IC TC9122P
Q104	1	HT107331R0	Transistor 2SA733(R)
Q120	1	HT304611B0	Transistor 2SC461(B)
Q121	1	HT304611B0	Transistor 2SC461(B)
Q122	1	HT304611B0	Transistor 2SC461(B)
Q123	1	HT304611B0	Transistor 2SC461(B)
Q124	1	HT312131B0	Transistor 2SC1213(B)
Q125	1	HT309451Q0	Transistor 2SC945(Q)
Q126	1	HT309451Q0	Transistor 2SC945(Q)
Q201	1	HT304611B0	Transistor 2SC461(B)
Q202	1	HT304611B0	Transistor 2SC461(B)
Q203	1	HC10017210	IC BA401
Q204	1	HT304601B0	Transistor 2SC460(B)
Q301	1	HD20011050	Diode 1S1555
Q302	1	HD20011050	Diode 1S1555
Q304	1	HD20011050	Diode 1S1555
Q305	1	HT304601B0	Transistor 2SC460(B)
Q306	1	HD20011050	Diode 1S1555
Q307	1	HD20011050	Diode 1S1555
Q308	1	HD20011050	Diode 1S1555
Q401	1	HC10001390	IC SL-1626C
Q402	1	HT309001F0	Transistor 2SC900(F)
Q403	1	HD20011050	Diode 1S1555
Q404	1	HD20011050	Diode 1S1555
			P101-MISCELLANEOUS
J101	1	YP06001540	Plug, Program
J125	1	YP06001200	Plug, PLL Output
J301	1	YJ03000050	Jack, X'tal Socket
J320	1	YP06001200	Plug, X'tal SW.
J401	1	YP06000880	Plug, Power In
J431	1	YP06001480	Plug, 5045-02A (CTN-5)

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
L120	1	LA70280010	Ant. Coil, TX PLL Out
L121	1	LA70280050	Ant. Coil, RX PLL Out
L122	1	LA70280050	Ant. Coil, VCO
L201	1	LC11530020	Choke Coil, 15μH
L202	1	LC12720020	Choke Coil, 2.7μH
L301	1	LC11020020	Choke Coil, 1μH
L302	1	LC11020020	Choke Coil, 1μH
L304	1	LC11020020	Choke Coil, 1μH
L305	1	LC13940010	Choke Coil, 390μH
L306	1	LC11020020	Choke Coil, 1μH
L307	1	LA70280050	Ant. Coil, PLL Local OSC
L308	1	LC70280010	OSC Coil, PLL Local OSC
L401	1	LC24760010	Choke Coil, 47mH
X101	1	XY40512002	Cristal 5.12MHz
X301	1	XB301010G2	Cristal 46.000MHz, TX
X302	1	XB301011G2	Cristal 42.433MHz, RX
			P150-VCO CIRCUIT BOARD
P150	1	YF47850010	P.W. Board, VCO
			P150-CAPACITORS
C150	1	DK16102300	Ceramic 0.001μF ±10%
C151	1	DK16102300	Ceramic 0.001μF ±10%
C152	1	EA10602530	Elect 10μF 25V
C153	1	DD10030300	Ceramic 3pF ±0.25pF
C154	1	DD11100300	Ceramic 10pF ±0.5pF
C155	1	DD11100300	Ceramic 10pF ±0.5pF
C156	1	DD15240300	Ceramic 24pF ±5%
C157	1	DD10010300	Ceramic 1pF ±0.25pF
C158	1	DD15390300	Ceramic 39pF ±5%
C159	1	DS17392010	Semicon 3900pF ±20%
C160	1	EV33601060	Elect 33μF 10V
C170	1	DC18202020	Feedthru 2000pF
C171	1	DC18202020	Feedthru 2000pF
C172	1	DC18202020	Feedthru 2000pF
C173	1	DC18202020	Feedthru 2000pF
			P150-RESISTORS (All Resistors are ±5% and ¼W)
R150	1	GD05101140	100Ω
R151	1	GD05101140	100Ω
R152	1	GD05101140	100Ω
R153	1	GD05222140	2.2KΩ
R154	1	GD05473140	47KΩ
R155	1	GD05103140	10KΩ
R156	1	GD05104140	100KΩ
			P150-SEMICONDUCTORS
Q151	1	HD40001060	Varicap 1SV50
Q152	1	HD40001060	Varicap 1SV50
Q153	1	HD40001060	Varicap 1SV50
Q154	1	HF200191B0	F.E.T. 2SK19TM(GR)
			P150-COILS
L150	1	LA12036060	Ant. Coil, VCO
L151	1	LC12720020	Choke Coil, 2.7μH
L152	1	LC11020020	Choke Coil, 1μH
L153	1	LC11020020	Choke Coil, 1μH

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
			PB01-BOOSTER CIRCUIT BOARD
PB01	1	YF47230020	P.W. Board, Booster
			PB01-CAPACITORS
CB01	1	CT11050010	Trimming 12pF
CB02	1	DD15510300	Ceramic 51pF ±5%
CB03	1	DD15150300	Ceramic 15pF ±5%
CB04	1	EG47503520	Elect 4.7μF 35V
CB05	1	CT11500010	Trimming 15pF
CB06	1	DD15180300	Ceramic 15pF ±5%
CB07	1	DD15200300	Ceramic 20pF ±5%
CB08	1	DD15150300	Ceramic 15pF ±5%
CB09	1	DD15150300	Ceramic 15pF ±5%
CB10	1	DD10005010	Ceramic 0.5pF ±0.25pF
CB11	1	DK16122300	Ceramic 0.0012μF ±10%
CB12	1	DK16102300	Ceramic 0.001μF ±10%
CB13	1	DD15300300	Ceramic 30pF ±5%
CB14	1	DK18103310	Ceramic 0.01μF +100% −0
CB15	1	DK16471300	Ceramic 470pF ±10%
CB16	1	DD15200300	Ceramic 20pF ±5%
CB17	1	DK16471300	Ceramic 470pF ±10%
CB18	1	DK16471300	Ceramic 470pF ±10%
CB19	1	DD10030300	Ceramic 3pF ±0.25pF
CB20	1	DD15300300	Ceramic 30pF ±5%
CB21	1	DD15200300	Ceramic 20pF ±5%
CB22	1	CT11050010	Trimming 12pF
CB24	1	DD15200300	Ceramic 20pF ±5%
CB25	1	EV33502560	Elect 3.3μF 25V
CB30	1	DC18202020	Feedthru 2000pF
CB31	1	DC18202020	Feedthru 2000pF
CB32	1	DC18202020	Feedthru 2000pF
CB33	1	DC18202020	Feedthru 2000pF
CB34	1	DC18202020	Feedthru 2000pF
			PB01-RESISTORS
RB01	1	GD05020140	2Ω ±5% ¼W
RB02	1	GD05331140	330Ω ±5% ¼W
RB03	1	GD05101140	100Ω ±5% ¼W
RB05	1	RA01040120	100KΩ Trimming
RB06	1	GD05331140	330Ω ±5% ¼W
RB07	1	RA01020150	1KΩ Trimming
RB08	1	GF05101120	100Ω ±5% ½W
RB09	1	RC00000140	0Ω
RB10	1	RC00000140	0Ω
RB11	1	RC00000140	0Ω
RB12	1	RC00000140	0Ω
RB13	1	RC00000140	0Ω
			PB01-SEMICONDUCTORS
QB01	1	HT321030A0	Transistor 2SC2103A
QB02	1	HD20011050	Diode 1S1555
QB03	1	HD10001050	Diode 1N60
QB04	1	HD20003200	Diode MI402
QB05	1	HD20001200	Diode MI301
QB06	1	HD20011050	Diode 1S1555
QB07	1	HD20011050	Diode 1S1555
QB08	1	HD10001050	Diode 1N60
QB09	1	HD10001050	Diode 1N60
QB10	1	HD30033090	Zener WZ-052

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
			PB01-MISCELLANEOUS
JB01	1	YP06001480	Plug (2P)
JB02	1	YP06001480	Plug (2P)
LB01	1	LM42830010	Twist Coil
LB02	1	LC12010012	Choke Coil (8T) 0.2μH
LB03	1	LC16000010	Choke Coil (5T)
LB04	1	LC12500020	Choke Coil (1T)
LB05	1	LK30802040	Coil (4T)
LB06	1	LC16000010	Choke Coil (5T)
LB07	1	LL26301050	Coil (8T)
LB08	1	LC11510012	Choke Coil (3T)
LB09	1	LF50080030	Ant. Coil
LB10	1	LC16000010	Choke Coil (5T)
			PC01-POWER CONTROL CIRCUIT BOARD
PC01	1	YF47230030	P.W. Board, Power Control
			PC01-CAPACITORS
CC01	1	DK16102300	Ceramic 0.001μF ±10%
CC02	1	DK16102300	Ceramic 0.001μF ±10%
CC03	1	DK16102300	Ceramic 0.001μF ±10%
CC04	1	DK16102300	Ceramic 0.001μF ±10%
CC05	1	DK16102300	Ceramic 0.001μF ±10%
CC06	1	EG47503520	Elect 4.7μF 35V
CC07	1	DK18103310	Ceramic 0.01μF +100% −0
CC09	1	DK18103310	Ceramic 0.01μF +100% −0
CC10	1	DK18103310	Ceramic 0.01μF +100% −0
CC11	1	DK18103310	Ceramic 0.01μF +100% −0
			PC01-RESISTORS (All Resistors are ±5% and ¼W)
RC01	1	GJ05121020	120Ω 2W
RC02	1	GD05151140	150Ω
RC03	1	GD05222140	2.2KΩ
RC04	1	GD05334140	330KΩ
RC05	1	GD05473140	47KΩ
RC06	1	GD05222140	2.2KΩ
RC07	1	RA02220100	2.2KΩ Trimming
RC08	1	RA05030110	47KΩ Trimming
RC09	1	GD05471140	470Ω
RC10	1	GD05104140	100KΩ
RC11	1	GD05100140	10Ω
RC12	1	RA05030110	47KΩ Trimming
RC13	1	GD05682140	6.8KΩ
RC15	1	GD05101140	100Ω
			PC01-SEMICONDUCTORS
QC01	1	HT404711L0	Transistor 2SD471
QC02	1	HT304601B0	Transistor 2SC460(B)
QC03	1	HT304601B0	Transistor 2SC460(B)
QC04	1	HT304601B0	Transistor 2SC460(B)
QC05	1	HD20001210	Diode 1S2473
QC06	1	HD20001210	Diode 1S2473
QC07	1	HD30017090	Zener BZ-090

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
			PD01-DISPLAY CIRCUIT BOARD
PD01	1	YF47230050	P.W. Board, Display
			PD01-CAPACITOR
CD01	1	DK16471300	Ceramic 470pF ±10%
			PD01-RESISTORS
RD02	1	GD05682180	6.8KΩ ±5% 1/8W
RD03	1	GD05123180	12KΩ ±5% 1/8W
			PD01-SEMICONDUCTORS
QD01	1	HI10006030	L.E.D. 75EG, Green
QD02	1	HI10006030	L.E.D. 75EG, Green
QD03	1	HI10006030	L.E.D. 75EG, Green
QD04	1	HI10006030	L.E.D. 75EG, Green
QD05	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD06	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD07	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD08	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD09	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD10	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD11	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD12	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD13	1	HI10002340	L.E.D. HP-5082-4150, Yellow
QD14	1	HI10003340	L.E.D. HP-5082-4100, Read
QD15	1	HI10003340	L.E.D. HP-5082-4100, Read
QD16	1	HI10003340	L.E.D. HP-5082-4100, Read
QD17	1	HD20001210	Diode 1S2473
QD18	1	HD20001210	Diode 1S2473
QD19	1	HD20001210	Diode 1S2473
QD20	1	HC10001380	IC UAA-180
QD21	1	HV00002060	Varistor VD1212
			PL01-CONTROL CIRCUIT BOARD
PL01	1	YF47850110	P.W. Board, Control
			CL01-CAPACITORS
CL01	1	DD15330300	Ceramic 33pF ±5%
CL02	1	EV22501660	Elect 2.2μF 16V
CL03	1	DK16102300	Ceramic 0.001μF ±10%
CL04	1	EA22701630	Elect 220μF 16V
CL05	1	EA33701030	Elect 330μF 10V
CL06	1	EG10801620	Elect 1000μF 16V
CL07	1	DK16471300	Ceramic 470pF ±10%
CL08	1	DK16471300	Ceramic 470pF ±10%
CL09	1	EG10801620	Elect 1000μF 16V
CL10	1	EV10503560	Elect 1μF 35V
CL11	1	DK16471300	Ceramic 470pF ±10%
CL12	1	DK16471300	Ceramic 470pF ±10%
			PL01-RESISTORS (All Resistors are ±5% and ¼W)
RL03	1	GD05473140	47KΩ
RL04	1	GU05330120	33Ω ½W
RL05	1	GU05330120	33Ω ½W
RL06	1	GU05330120	33Ω ½W
RL07	1	GU05330120	33Ω ½W
RL08	1	GU05330120	33Ω ½W
RL09	1	GU05330120	33Ω ½W
RL10	1	GU05330120	33Ω ½W
RL11	1	GU05330120	33Ω ½W
RL12	1	GD05562140	5.6KΩ

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
RL13	1	GD05223140	22KΩ
RL14	1	GD05333140	33KΩ
RL15	1	GD05185140	1.8MΩ
RL16	1	GD05333140	33KΩ
RL17	1	RA04730100	47KΩ Trimming
RL18	1	GD05333140	33KΩ
RL20	1	GD05471140	470Ω
RL22	1	GD05562140	5.6KΩ
RL23	1	GD05333140	33KΩ
RL24	1	GD05333140	33KΩ
GL01	1	BW10333010	33KΩx 4 10% R-Block
GL02	1	BW10333010	33KΩx 4 10% R-Block
GL03	1	BW10333010	33KΩx 4 10% R-Block
GL04	1	BW10333010	33KΩx 4 10% R-Block
			PL01-SEMICONDUCTORS
QL01	1	HC10003370	IC MP1107
QL02	1	HC10005370	IC TMS1024
QL03	1	HC10016060	IC μPA57C
QL04	1	HC10011210	IC TA76
QL05	1	HC10011210	IC TA76
QL06	1	HC10012170	IC MC14016
QL07	1	HC10012170	IC MC14016
QL08	1	HD20401210	Diode DAP401
QL09	1	HC10029060	IC μPC14308
QL10	1	HC20011050	Diode 1S1555
QL11	1	HC20011050	Diode 1S1555
QL12	1	HC20011050	Diode 1S1555
QL13	1	HC20011050	Diode 1S1555
QL14	1	HC20011050	Diode 1S1555
QL15	1	HC20011050	Diode 1S1555
QL16	1	HC20011050	Diode 1S1555
QL17	1	HC20011050	Diode 1S1555
QL18	1	HT31213B0	Transistor 2SC1213B
QL19	1	HD30060090	Zener XZ094
QL20	1	HD20011050	Diode 1S1555
QL21	1	HD20001100	Diode 10D-2
QL22	1	HD20011050	Diode 1S1555
			PL01-MISCELLANEOUS
JL01	1	YJ06002100	Jack (13P)
JL02	1	YP06001160	Plug (12P)
JL03	1	YP06001800	Plug (7P)
JL04	1	YP06001200	Plug (5P)
JL05	1	YP06001280	Plug (11P)
JL06	1	YP06000890	Plug (3P)
JL07	1	YP10002210	Plug (1P)
JL08	1	YP10002210	Plug (1P)
JL09	1	YP06001820	Plug (4P)
LL01	1	LC13940010	Choke Coil, 390μH
LL02	1	LC26550010	Choke Coil, 6.4mH
			PM01-FEATURE CONTROL CIRCUIT BOARD
PM01	1	YF47850080	P.W. Board, Feature Control
			PM01-CAPACITORS
CM01	1	DK18103310	Ceramic 0.01μF
CM02	1	DS17153010	Semicon 0.015μF ±20%
CM03	1	EV10403560	Elect 0.1μF 35V
CM04	1	EV10403560	Elect 0.1μF 35V
CM05	1	DD15101370	Ceramic 100pF ±5%

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
CM06	1	DD15101370	Ceramic 100pF ±5%
CM07	1	EV33502560	Elect 3.3μF 25V
CM08	1	EV33502560	Elect 3.3μF 25V
CM09	1	EV22601660	Elect 22μF 16V
CM10	1	DK18103310	Ceramic 0.01μF
CM15	1	EV10502560	Elect 1μF 25V
			PM01-RESISTORS (All Resistors are ±5% and 1/8W)
RM02	1	GD05102180	1KΩ
RM03	1	GD05103180	10KΩ
RM04	1	GD05103180	10KΩ
RM05	1	GD05103180	10KΩ
RM06	1	GD05473180	47KΩ
RM07	1	GD05473180	47KΩ
RM08	1	GD05473180	47KΩ
RM09	1	GD05473180	47KΩ
RM11	1	GD05223180	22KΩ
RM12	1	GD05103180	10KΩ
RM13	1	GD05822180	8.2KΩ
RM14	1	GD05103180	10KΩ
RM15	1	GD05473180	47KΩ
RM16	1	GD05333180	33KΩ
RM17	1	GD05333180	33KΩ
RM18	1	GD05102180	1KΩ
RM19	1	GD05102180	1KΩ
RM20	1	GD05392180	3.9KΩ
RM21	1	GD05392180	3.9KΩ
RM22	1	GD05682180	6.8KΩ
RM23	1	GD05682180	6.8KΩ
RM24	1	GD05392180	3.9KΩ
RM25	1	GD05392180	3.9KΩ
RM26	1	GD05562180	5.6KΩ
RM27	1	GD05562180	5.6KΩ
RM28	1	GD05222180	2.2KΩ
RM29	1	GD05682140	6.8KΩ ¼W
RM30	1	GD05222180	2.2KΩ
			PM01-SEMICONDUCTORS
QM02	1	HC10014170	IC MC14011BP
QM03	1	HC10021050	IC TC7400
QM04	1	HC10021050	IC TC7400
QM05	1	HC10014170	IC MC14011BP
QM06	1	HC10022060	IC μPC78L08
QM07	1	HT320211R2	Transistor 2SC2021
QM08	1	HT320211R2	Transistor 2SC2021
QM09	1	HT320211R2	Transistor 2SC2021
QM10	1	HT320211R2	Transistor 2SC2021
QM11	1	HT320211R2	Transistor 2SC2021
QM12	1	HT320211R2	Transistor 2SC2021
QM13	1	HT320211R2	Transistor 2SC2021
QM18	1	HD20011050	Diode 1S1555

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
			PM01-MISCELLANEOUS
JM01	1	YP06001770	Plug (12P) 3022-12B
JM02	1	YP06001780	Plug (11P) 3022-11B
JM03	1	YP06001790	Plug 3022-0-9B
JM04	1	YP06001220	Plug (2P) 3022-2B
JM05	1	YP06001790	Plug (9P) 3022-9B
SM01	1	SC02030102	Switch, 3 Position
SM02	1	SC02020322	Switch, 2 Position
			PP01-ROTARY SWITCH CIRCUIT BOARD
PP01	1	YF47230102	P.W. Board, Rotary Switch
RP01	1	GD05271140	Resistor 270Ω ±5% ¼W
RP02	1	GD05102140	Resistor 1KΩ ±5% ¼W
RP03	1	GD05102140	Resistor 1KΩ ±5% ¼W
QP01	1	HW10001060	Photo Unit PS4001
QP02	1	HW10001060	Photo Unit PS4001
SP01	1	SR24020010	Rotary Switch, 24 Position
			PR01-RX CIRCUIT BOARD
PR01	1	YF47850130	P.W. Board, RX
			PR01-CAPACITORS
CQ01	1	DK16471300	Ceramic 470pF ±10%
CQ02	1	DK16102300	Ceramic 0.001μF ±10%
CQ03	1	DK16102300	Ceramic 0.001μF ±10%
CQ04	1	DK16102300	Ceramic 0.001μF ±10%
CQ05	1	DD15200330	Ceramic 20pF ±5%
CQ06	1	DD15300330	Ceramic 30pF ±5%
CQ07	1	DK16102300	Ceramic 0.001μF ±10%
CQ08	1	DK16102300	Ceramic 0.001μF ±10%
CQ09	1	DK16102300	Ceramic 0.001μF ±10%
CR04	1	DK16102300	Ceramic 0.001μF ±10%
CR07	1	DD10005010	Ceramic 0.5pF 50V
CR08	1	DD10050330	Ceramic 5pF
CR09	1	DK16102300	Ceramic 0.001μF ±10%
CR10	1	DD11070330	Ceramic 7pF ±0.5pF
CR11	1	DD15240330	Ceramic 24pF ±5%
CR12	1	DK16102300	Ceramic 0.001μF ±10%
CR13	1	DK16102300	Ceramic 0.001μF ±10%
CR14	1	DK16102300	Ceramic 0.001μF ±10%
CR15	1	DC18202020	Feedthru 2000pF
CR16	1	CT10600030	Trimming 6pF
CR17	1	CT10600030	Trimming 6pF
CR18	1	CT10600030	Trimming 6pF
CR19	1	DD10050300	Ceramic 5pF ±0.25pF
CR20	1	DK16102300	Ceramic 0.001μF ±10%
CR21	1	DK16102300	Ceramic 0.001μF ±10%
CR22	1	DS17103010	Ceramic 0.01μF
CR23	1	EV10403560	Elect 0.1μF 35V
CR24	1	DS17103010	Semicon 0.01μF
CR25	1	DS17103010	Semicon 0.01μF
CR26	1	DS17103010	Semicon 0.01μF
CR27	1	DD15150330	Ceramic 15pF ±5%
CR28	1	DD15240330	Ceramic 24pF ±5%
CR29	1	DD10010300	Ceramic 1pF ±0.25pF

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
CR30	1	DK16122300	Ceramic 0.0012μF ±10%
CR31	1	DD10020300	Ceramic 2pF ±0.25pF
CR32	1	DK18103310	Ceramic 0.01μF
CR33	1	DD15820330	Ceramic 82pF ±5%
CR34	1	DD15201360	Ceramic 200pF ±5%
CR35	1	DD15360300	Ceramic 36pF ±5%
CR36	1	DS17683010	Semicon 0.068μF ±20%
CR37	1	DF16223300	Film 0.022μF ±10%
CR38	1	EA33601630	Elect 33μF 16V
CR39	1	DS17683010	Semicon 0.068μF ±20%
CR40	1	DS17683010	Semicon 0.068μF ±20%
CR41	1	DS17683010	Semicon 0.068μF ±20%
CR42	1	DS17683010	Semicon 0.068μF ±20%
CR43	1	DD15331360	Ceramic 330pF ±5%
CR44	1	DF16103300	Film 0.01μF ±10%
CR45	1	DK16221300	Ceramic 220pF ±10%
CR46	1	DK16102300	Ceramic 0.001μF ±10%
CR47	1	DS17683010	Semicon 0.068μF ±20%
CR48	1	DS17683010	Semicon 0.068μF ±20%
CR49	1	DS17683010	Semicon 0.068μF ±20%
CR50	1	DS17683010	Semicon 0.068μF ±20%
CR51	1	DS17473010	Semicon 0.047μF ±20%
CR52	1	DD15201360	Ceramic 200pF ±5%
CR53	1	DF16223300	Film 0.022μF ±10%
CR54	1	DF16103300	Film 0.01μF ±10%
CR55	1	DF16223300	Film 0.022μF ±10%
CR56	1	EV10403560	Elect 0.1μF 35V
CR57	1	EA10601690	Elect 10μF 16V
CR58	1	DF16472300	Film 0.0047μF ±10%
CR59	1	DF16472300	Film 0.0047μF ±10%
CR61	1	DD12100040	Ceramic 10pF ±1pF
CR62	1	DF16103300	Film 0.01μF ±10%
CR63	1	DD15331010	Ceramic 330pF ±5%
CR64	1	DD15201010	Ceramic 200pF ±5%
CR65	1	DF16103300	Film 0.01μF ±10%
CR66	1	EA22601090	Elect 22μF 10V
CR67	1	DF16223300	Film 0.022μF ±10%
CR68	1	DK16471300	Ceramic 470μF ±10%
CR70	1	EV33600660	Elect 33μF 6.3V
CR71	1	EV47501060	Elect 4.7μF 10V
CR72	1	DF16103300	Film 0.01μF ±10%
CR73	1	DF16223300	Film 0.022μF ±10%
CR74	1	DF16102300	Film 0.001μF ±10%
CR75	1	DF16223300	Film 0.022μF ±10%
CR76	1	DF16102300	Film 0.001μF ±10%
CR78	1	DF16223300	Film 0.022μF ±10%
CR80	1	DF16103300	Film 0.01μF ±10%
CR81	1	EA10601690	Elect 10μF 16V
CR82	1	DD15101350	Ceramic 100pF ±5%
CR83	1	EA10601690	Elect 10μF 16V
CR84	1	EA10601690	Elect 10μF 16V
CR85	1	DF16103300	Film 0.01μF ±10%
CR86	1	DK16102300	Ceramic 0.001μF ±10%
CR87	1	EV33502560	Elect 3.3μF
CR88	1	EV15600660	Elect 15μF 6.3V
CR89	1	EQ10601620	Elect 10μF 16V
CR90	1	EE22701650	Elect 220μF 16V
CR91	1	DS17104010	Semicon 0.1μF ±20%
CR92	1	EA22702590	Elect 220μF 25V
CR93	1	EA10701090	Elect 100μF 10V
CR94	1	DF16563300	Film 0.056μF ±10%
CR95	1	EA10505090	Elect 1μF 50V
CR96	1	EA33601690	Elect 33μF 16V
CR99	1	DF16333300	Film 0.033μF ±10%

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION	
			PR01-RESISTORS	
			(All Resistors are ±5% and ¼W)	
RQ02	1	GD05104140	100KΩ	
RQ03	1	GD05153140	15KΩ	
RQ04	1	GD05103140	10KΩ	
RQ05	1	GD05101140	100Ω	
RQ06	1	GD05470140	47Ω	
RQ07	1	GD05102140	1KΩ	
RQ08	1	GD05821140	820Ω	
RR06	1	GD05223140	22KΩ	
RR10	1	GD05104140	100KΩ	
RR11	1	GD05104140	100KΩ	
RR12	1	GD05683140	68KΩ	
RR13	1	GD05123140	12KΩ	
RR14	1	GD05101140	100Ω	
RR15	1	GD05101140	100Ω	
RR16	1	RA02030060	20KΩ	Trimming
RR17	1	GD05473140	47KΩ	
RR18	1	GD05562140	5.6KΩ	
RR19	1	GD05473140	47KΩ	
RR20	1	GD05562140	5.6KΩ	
RR21	1	GD05470140	47Ω	
RR22	1	GD05101140	100Ω	
RR23	1	GD05222140	2.2KΩ	
RR24	1	GD05222140	2.2KΩ	
RR25	1	GD05123140	12KΩ	
RR26	1	GD05472140	4.7KΩ	
RR27	1	GD05102140	1KΩ	
RR28	1	GD05101140	100Ω	
RR30	1	GD05222140	2.2KΩ	
RR31	1	GD05153140	15KΩ	
RR32	1	GD05153140	15KΩ	
RR33	1	GD05222140	2.2KΩ	
RR34	1	GD05153140	15KΩ	
RR35	1	GD05102140	1KΩ	
RR36	1	GD05101140	100Ω	
RR37	1	GD05101140	100Ω	
RR38	1	GD05101140	100Ω	
RR39	1	GD05152140	1.5KΩ	
RR40	1	GD05152140	1.5KΩ	
RR41	1	GD05101140	100Ω	
RR42	1	GD05562140	5.6KΩ	
RR43	1	GD05222140	2.2KΩ	
RR44	1	GD05101140	100Ω	
RR45	1	GD05152140	1.5KΩ	
RR46	1	GD05102140	1KΩ	
RR47	1	GD05102140	1KΩ	
RR48	1	GD05103140	10KΩ	
RR49	1	GD05103140	10KΩ	
RR50	1	GD05562140	5.6KΩ	
RR51	1	GD05333140	33KΩ	
RR52	1	GD05474140	470KΩ	
RR53	1	GD05102140	1KΩ	
RR54	1	GD05121140	120Ω	
RR55	1	GD05102140	1KΩ	

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION	
RR56	1	GD05472140	4.7KΩ	
RR57	1	GD05472140	4.7KΩ	
RR60	1	GD05473140	47KΩ	
RR61	1	RA01010080	100Ω	Trimming
RR62	1	GD05222140	2.2KΩ	
RR63	1	GD05473140	47KΩ	
RR64	1	GD05222140	2.2KΩ	
RR65	1	GD05472140	4.7KΩ	
RR66	1	GD05333140	33KΩ	
RR67	1	GD05153140	15KΩ	
RR68	1	GD05101140	100Ω	
RR70	1	RA04720090	4.7KΩ	Trimming
RR71	1	GD05393140	39KΩ	
RR72	1	GD05103140	10KΩ	
RR73	1	GD05104140	100KΩ	
RR74	1	GD05151140	150Ω	
RR75	1	GD05102140	1KΩ	
RR76	1	GD05333140	33KΩ	
RR77	1	GD05562140	5.6KΩ	
RR78	1	GD05102140	1.2KΩ	
RR80	1	GD05221140	220Ω	
RR81	1	GD05682140	6.8KΩ	
RR82	1	GD05562140	5.6KΩ	
RR83	1	GD05152140	1.5KΩ	
RR84	1	GD05103140	10KΩ	
RR98	1	GD05103140	10KΩ	
RR99	1	RA01040260	100KΩ	Trimming
			PR01-SEMICONDUCTORS	
QQ01	1	HF400481O0	F.E.T.	3SK48
QQ02	1	HD50001060	Diode	1SV77
QQ03	1	HD50001060	Diode	1SV77
QR01	1	HF900041A0	F.E.T.	3N201(B)
QR02	1	HD20011050	Diode	1S1555
QR03	1	HD10001050	Diode	1N60
QR04	1	HF900041A0	F.E.T.	3N201(B)
QR05	1	HT304601B0	Transistor	2SC460(B)
QR06	1	HT304601B0	Transistor	2SC460(B)
QR07	1	HT304601B0	Transistor	2SC460(B)
QR08	1	HD10001050	Diode	1N60
QR09	1	HC10023060	IC	μPC577H
QR10	1	HC10023060	IC	μPC577H
QR11	1	HD10001050	Diode	1N60
QR12	1	HD10001050	Diode	1N60
QR13	1	HT309451Q0	Transistor	2SC945(Q)
QR14	1	HT309451Q0	Transistor	2SC945(Q)
QR15	1	HT309451Q0	Transistor	2SC945(Q)
QR16	1	HT309451Q0	Transistor	2SC945(Q)
QR17	1	HD10001050	Diode	1N60
QR18	1	HD10001050	Diode	1N60
QR19	1	HT309451Q0	Transistor	2SC945(B)
QR20	1	HC10031010	IC	HA1366W
QR21	1	HD20011050	Diode	1S1555
QR22	1	HC10037050	IC	TA7063P
QR23	1	HD10001050	Diode	1N60
QR24	1	HD10001050	Diode	1N60
QR25	1	HV00002060	Varistor	VD1212
QR26	1	HD10001050	Diode	1N60
QR30	1	HD20011050	Diode	1S1555
QR31	1	HF200191B0	F.E.T.	2SK19TM(GR)
QR32	1	HD20011050	Diode	1S1555
AR33	1	HT107331R0	Transistor	2SA733(R)

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
			PR01-MISCELLANEOUS
FR01	1	XU410700M5	Crystal Filter, 10.7MHz
FR02	1	FF11070050	Ceramic Filter, SFE10.7MA
FR03	1	FG455304F0	Ceramic Filter, CFU455F
FR04	1	FG455304F0	Ceramic Filter, CFU455F
FR05	1	XU410700M5	Crystal Filter, 10.7MHz
JR01	1	YP06000890	Plug (3P) 3022-03A
JR02	1	YP06001470	Plug (5P) 3094-05A
JR03	1	YP06000880	Plug
JR04	1	YT09010030	Terminal
JR05	1	YT09010030	Terminal
JR06	1	YT09010030	Terminal
JR07	1	YP06001150	Plug (8P) 3022-08A
JR08	1	YP06001480	Plug (2P) 5045-02A
JR09	1	YP10002160	Plug (2P) 5045-02A
JR10	1	YJ10000520	Jack (CTN-5)
JR11	1	YP06000890	Plug (3P) 3022-03A
LQ01	1	LA70280020	Ant. Coil, RF Pre-Amp.
LQ02	1	LA70190060	Ant. Coil, RF Pre-Amp.
LR01	1	LA70260010	Ant. Coil, RF Amp.
LR02	1	LA70260020	Ant. Coil, Local
LR03	1	3648121020	Link, Cavity Coil
LR04	1	3648121020	Link, Cavity Coil
LR05	1	3648121020	Link, Cavity Coil
LR06	1	LI70038090	I.F.T. Coil, IF
LR07	1	LI10010450	I.F.T. Coil
LR08	1	LI10010460	I.F.T. Coil
LR09	1	LC13940010	Choke Coil, 390μH
LR10	1	LC13940010	Choke Coil, 390μH
LR11	1	LC13940010	Choke Coil, 390μH
LR12	1	LC11040010	Choke Coil, 100μH
LR13	1	LI70038090	I.F.T. Coil, IF
LR14	1	LI70030390	I.F.T. Coil, IF
LR15	1	LC13940010	Choke Coil, 390μH
LR16	1	LC11050040	Choke Coil, 1mH
XR01	1	XZ41024505	Crystal 10.245MHz
			PS01-POWER SUPPLY CIRCUIT BOARD
PS01	1	YF47240090	P.W. Board, Power Supply
			PS01-CAPACITORS
CS01	1	DK18103310	Ceramic 0.01μF +100% −0
CS02	1	EA22601690	Elect 22μF 16V
CS03	1	DK18103310	Ceramic 0.01μF +100% −0
CS04	1	DK18103310	Ceramic 0.01μF +100% −0
			PS01-RESISTORS
RS01	1	GJ05201010	200Ω ±5% 1W
RS02	1	GD05561140	560Ω ±5% ¼W
RS03	1	GJ05561010	560Ω ±5% 1W
			PS01-SEMICONDUCTORS
QS01	1	HT313681B0	Transistor 2SC1368(B)
QS02	1	HD30017090	Zener BZ090
QS03	1	HD20001210	Diode 1S2473
QS04	1	HT313681B0	Transistor 2SC1368(B)
QS05	1	HD20001210	Diode 1S2473
QS06	1	HT70011100	Transistor JSP6009
QS07	1	HD20011050	Diode 1S1555
QS08	1	HD20011050	Diode 1S1555
QS10	1	HD20001210	Diode 1S2473

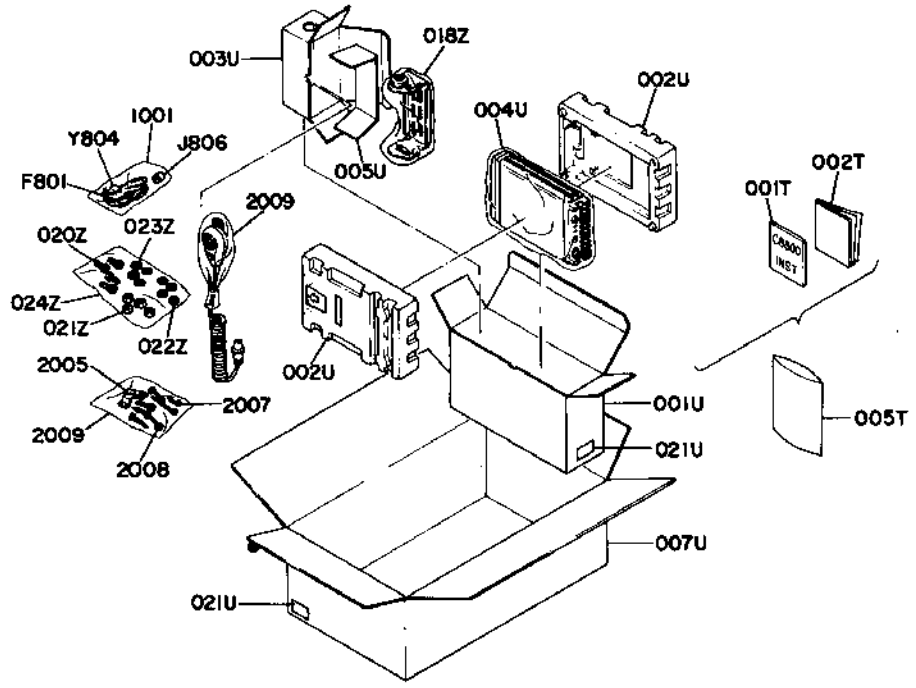
REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
			PR01-PLUGS
JS01	1	YP06002110	Plug (20P)
JS02	1	YP06000880	Plug (6P)
			PT01-TX YOUNGER CIRCUIT BOARD
PT01	1	YF47230120	P.W. Board, TX Younger
			PT01-CAPACITORS
CT01	1	DK18103310	Ceramic 0.01μF +100% −0
CT02	1	DD15680330	Ceramic 68pF ±5%
CT03	1	DD15200330	Ceramic 20pF ±5%
CT04	1	DD10015300	Ceramic 1.5pF ±0.25pF
CT05	1	DD15200330	Ceramic 20pF ±5%
CT06	1	DD15510330	Ceramic 51pF ±5%
CT07	1	DK18103310	Ceramic 0.01μF +100% −0
CT08	1	DK18103310	Ceramic 0.01μF +100% −0
CT09	1	DK18103310	Ceramic 0.01μF +100% −0
CT10	1	CT11050010	Trimming 12pF
CT11	1	DD10020300	Ceramic 2pF ±0.25pF
CT12	1	DK18103310	Ceramic 0.01μF +100% −0
CT13	1	DK18103310	Ceramic 0.01μF +100% −0
CT14	1	DK18103310	Ceramic 0.01μF +100% −0
CT15	1	CT11050010	Trimming 12pF
CT16	1	DD10020300	Ceramic 2pF ±0.25pF
CT17	1	DK18103310	Ceramic 0.01μF +100% −0
CT18	1	CT11050010	Trimming 12pF
CT19	1	DD10050300	Ceramic 5pF ±0.25pF
CT21	1	DD15820300	Ceramic 82pF ±5%
CT22	1	DD15200300	Ceramic 20pF ±5%
CT23	1	DK18103310	Ceramic 0.01μF +100% −0
CT24	1	EV47502560	Elect 4.7μF 25V
CT25	1	DK18103310	Ceramic 0.01μF +100% −0
CT26	1	CT11050010	Trimming 12pF
CT27	1	DD11100300	Ceramic 10pF ±0.5pF
CT28	1	DD15360300	Ceramic 36pF ±5%
CT30	1	EA10601690	Elect 10μF 16V
CT31	1	DD11100300	Ceramic 10pF ±0.5pF
			PT01-RESISTORS (All Resistors are ±5% and ¼W)
RT01	1	GD05562140	5.6KΩ
RT02	1	GD05102140	1KΩ
RT03	1	GD05680140	68Ω
RT04	1	GD05101140	100Ω
RT05	1	GD05472140	4.7KΩ
RT06	1	GD05561140	560Ω
RT07	1	GD05100140	10Ω
RT08	1	GD05680140	68Ω
RT09	1	GD05121140	120Ω
RT10	1	GD05100140	10Ω
RT11	1	GD05220140	22Ω
RT14	1	GD05561140	560Ω
			PT01-SEMICONDUCTORS
QT01	1	HT32347100	Transistor 2SC2347
QT02	1	HT32347100	Transistor 2SC2347
QT03	1	HT30994100	Transistor 2SC994
QT04	1	HT321180A0	Transistor 2SC2118

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
			PT01-MISCELLANEOUS
JT01	1	YP06001200	Plug (5P)
JT02	1	YP06000890	Plug (3P)
LT01	1	LW10188010	Doublar Coil, RF
LT02	1	LW10188010	Doublar Coil, RF
LT03	1	LC16000010	Choke Coil (5T)
LT04	1	LC16000010	Choke Coil (5T)
LT05	1	LC16000010	Choke Coil (5T)
LT06	1	LC16000010	Choke Coil (5T)
LT07	1	LC17000010	Choke Coil (4T)
LT08	1	LC16000010	Choke Coil (5T)
LT09	1	LC16000010	Choke Coil (5T)
LT10	1	LC16000010	Choke Coil (5T)
			PZ01-BACK-UP CIRCUIT BOARD
PZ01	1	YF47230040	P.W. Board, Back-up
			PZ01-CAPACITOR
CZ01	1	EA10601690	Elect 10μF 16V
			PZ01-RESISTORS (All Resistors are ±5% and ¼W)
RZ01	1	GD05392140	3.9KΩ
RZ02	1	GD05562140	5.6KΩ
RZ03	1	GD05272140	2.7KΩ
RZ04	1	GD05823140	82KΩ
RZ05	1	GD05823140	82KΩ
RZ06	1	GD05102140	1KΩ
			PZ01-SEMICONDUCTORS
QZ01	1	HT107861R0	Transistor 2SA786(R)
QZ02	1	HT320211R2	Transistor 2SC2021LN
QZ03	1	HT106731B0	Transistor 2SA673(B)
QZ04	1	HD30033090	Zener WZ052
AZ01	1	ZK47230010	Unit, K DC-DC Converter
			P100-CTN-5 CIRCUIT BOARD
P001	1	YD37790020	P.W. Board, CTN-5
			CAPACITORS
C101	1	EV47501660	Elect 4.7μF, 16V
C102	1	EV33601060	Elect 33μF, 10V
C103	1	DF17333010	Film 0.033μF ±20%
C104	1	DF66101010	Film 100pF ±10%
C105	1	DF64272010	Film 2700pF ±2%
C106	1	DF64272010	Film 2700pF ±2%
C107	1	DF65432010	Film 4300pF ±5%
C108	1	DF65242010	Film 2400pF ±5%
C109	1	EM10402510	Elect 0.1μF, 25V 25V
C110	1	EW10601010	Elect 10μF, 10V 10V
C111	1	DD15500010	Ceramic 50pF ±5%
C113	1	DK16471010	Ceramic 470pF ±10%
			RESISTORS
R101	1	RC10471140	470Ω ±10%, ¼W
R102	1	GD05682140	6.8KΩ ±5%, ¼W
R103	1	GD05103140	10KΩ ±5%, ¼W
R105	1	GD05103140	10KΩ ±5%, ¼W
R106	1	GD05183140	18KΩ ±5%, ¼W
R107	1	GD05223140	22KΩ ±5%, ¼W
R108	1	RA01040110	100KΩ Trimming
R109	1	GD05103140	10KΩ ±5%, ¼W
R110	1	GD05103180	10KΩ ±5%, 1/8W
R111	1	GD05272140	2.7KΩ ±5%, ¼W

REF. DESIG.	Q'TY N	PART NO.	DESCRIPTION
R112	1	GD05104140	100KΩ ±5%, ¼W
R113	1	GD05472140	4.7KΩ ±5%, ¼W
R114	1	GD05682180	6.8KΩ ±5%, 1/8W
R115	1	GD05473140	47KΩ ±5%, ¼W
R116	1	GD05392180	3.9KΩ ±5%, 1/8W
R117	1	GD05182180	1.8KΩ ±5%, 1/8W
R118	1	RA01030232	10KΩ Trimming
R119	1	GD05473140	47KΩ ±5%, ¼W
R120	1	RA01040110	100KΩ Trimming
R121	1	GD05272180	2.7KΩ ±5%, 1/8W
R122	1	GD05121180	120Ω ±5%, 1/8W
			MISCELLANEOUS
D101	1	HD20011050	Diode, 1S1555
J101	1	YP10001060	Plug
Q101	1	HT308281B0	Transistor, 2SC828(C)
Q102	1	HT308281B0	Transistor, 2SC828(C)
Q103	1	HT308281B0	Transistor, 2SC828(C)
Q104	1	HT308281B0	Transistor, 2SC828(C)
Q105	1	HT308281B0	Transistor, 2SC828(C)
WW02	1	YB01000102	Connective Cord
WW03	1	YB01000580	Connective Cord
WW04	1	YB01000420	Connective Cord
WW05	1	YB01000430	Connective Cord
WW06	1	YB01000440	Connective Cord
WW07	1	YB01000152	Connective Cord
WW09	1	YB01000460	Connective Cord
WW10	1	YB01000470	Connective Cord
WW11	1	YB01000480	Connective Cord
WW12	1	YB01000490	Connective Cord
WW13	1	YB01000500	Connective Cord
WW14	1	YB01000510	Connective Cord
WW15	1	YB01000230	Connective Cord
WW17	1	YB00050040	Connective Cord
WW18	1	YB01000590	Connective Cord
WW20	1	YB01000270	Connective Cord
WW22	1	YB01000540	Connective Cord
WW23	1	YB01000550	Connective Cord
WW24	1	YB01000560	Connective Cord

(W01-99)	Assembly and Wiring
(T01-99)	Adjustment
(X01-00)	Correction

10.6 PACKAGING



REF. DESIG.	QTY N	PART NO.	DESCRIPTION
001T	1	4785851010	Instructions
002T	1	4785856010	Circuit Diagram
005T	1	9013025010	Polyethy Bag
001U	1	4723801050	Packing Case
002U	2	4723809010	Cushion
003U	1	4723801020	Packing Case
004U	1	9013340010	Polyethy Bag
005U	1	4723803010	Partitioner
007U	1/5	4723805040	Master Carton
021U	3	9526019010	Serial No. Card
018Z	1	9011340010	Polyethy Bag
020Z	4	5203052089	H. Head Bolt, P. H5 x 20
021Z	4	5311050389	Hexagon Nut
022Z	4	5404050280	Spring Washer
023Z	4	5402050180	Flat Washer, P.
024Z	1	9011010010	Polyethy Bag

REF. DESIG.	QTY N	PART NO.	DESCRIPTION
1001	1	9010818010	Polyethy Bag
2005	1	4723155010	Hanger
2007	4	51400312X0	B.H. Tapped Screw B3 x 12
2008	4	51380330A0	P.H. Tapped Screw P3 x 30
2009	2	9010608010	Polyethy Bag
F801	1	FS10600010	Fuse 6A
Y804	1	YC01500022	A.C. Power Cord
J806	1	YP05000040	Plug, (9P)

11. TECHNICAL SPECIFICATIONS

General

Transmission/reception frequency band	144 MHz ~ 146 MHz
Type of emission	F3
Microphone input impedance	600 ohms
Speaker impedance	8 ohms
Supply voltage	13.8 volts DC
Dimensions	168 mm (W) x 58 mm (H) x 240 mm (D)
Weight	3.0 kg

Receiver section

Reception system	Double superheterodyne
Intermediate frequencies	1st IF: 10.7 MHz 2nd IF: 455 kHz
Sensitivity	DX: —10 dB (20 dB QS) —12 dB (12 dB SINAD) NOR: 0 dB (20 dB QS) —1 dB (12 dB SINAD) LOC: +10 dB (20 dB QS) +9 dB (12 dB SINAD)
Pass.bandwidth	±7 kHz (—6 dB)
Sensitivity	Not less than 70 dB
Squelch sensitivity	—15 dB
AF output	2 watts (into 8 ohms at 10% distortion)
AF load impedance	8 ohms
Non-signal current consumption	0.6 A

Transmitter section

Transmission power	10 watts
Load impedance	50 ohms
Spurious ratio	65 dB
Maximum frequency deviation	5 kHz
Modulation	Variable reactance modulation
AF response	300 Hz to 3000 Hz
Current consumption in transmission (Hi)	3.5 A

These specifications are a subject to change (in line with future improvements) without notice.