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".

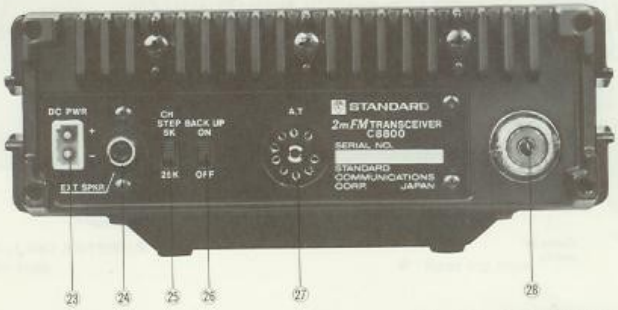
**⑲ R2 (Repeater-2) INDICATOR**
When this R2 indicator is lit, the transmission frequency is increased by 600 kHz with respect to the reception frequency. If transmission is tried at a frequency above 145.400 MHz, the transmitter output is shut down and the frequency readout displays "OFF".

**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

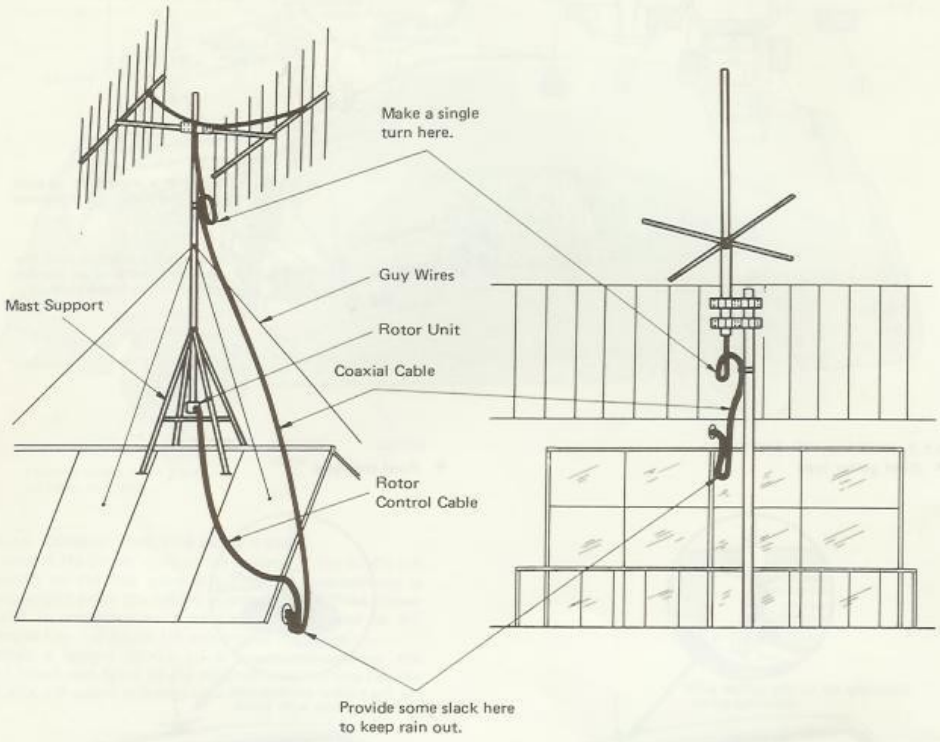
### 4.1.1 INSTALLING THE ANTENNA

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.

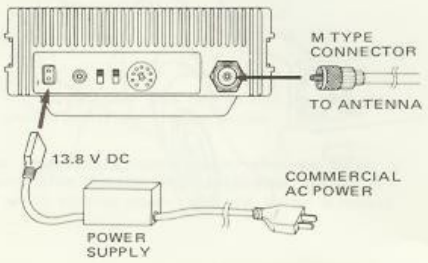
● Installation on the roof

● Installation on the veranda




### 4.1.2 POWER SUPPLY

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

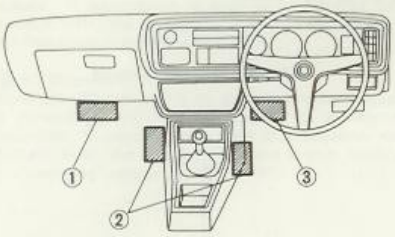


## 4.2 MOBIL TRANSCEIVER

### 4.2.1 INSTALLING THE TRANSCEIVER

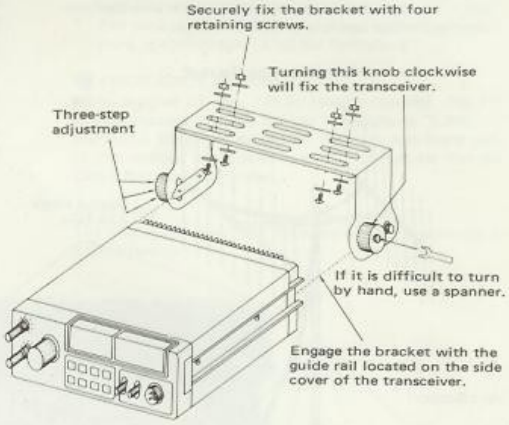
■ **Installation position**

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



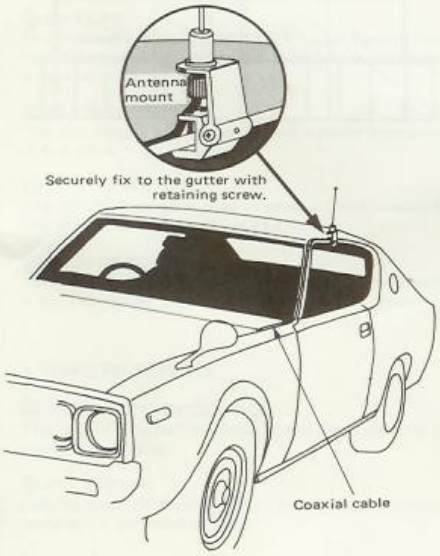

■ **Installing with bracket (provided)**

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

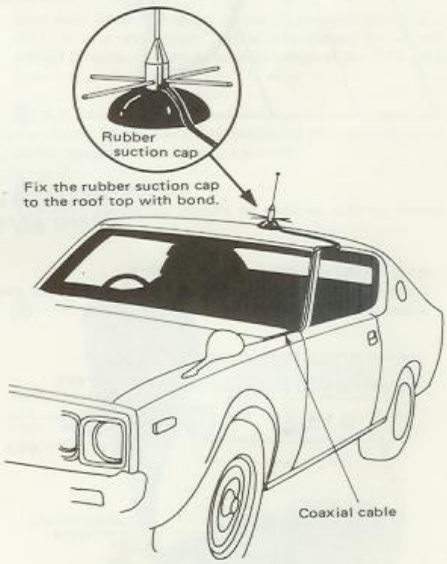



### 4.2.2 INSTALLING ANTENNA

■ **Roof gutter type**

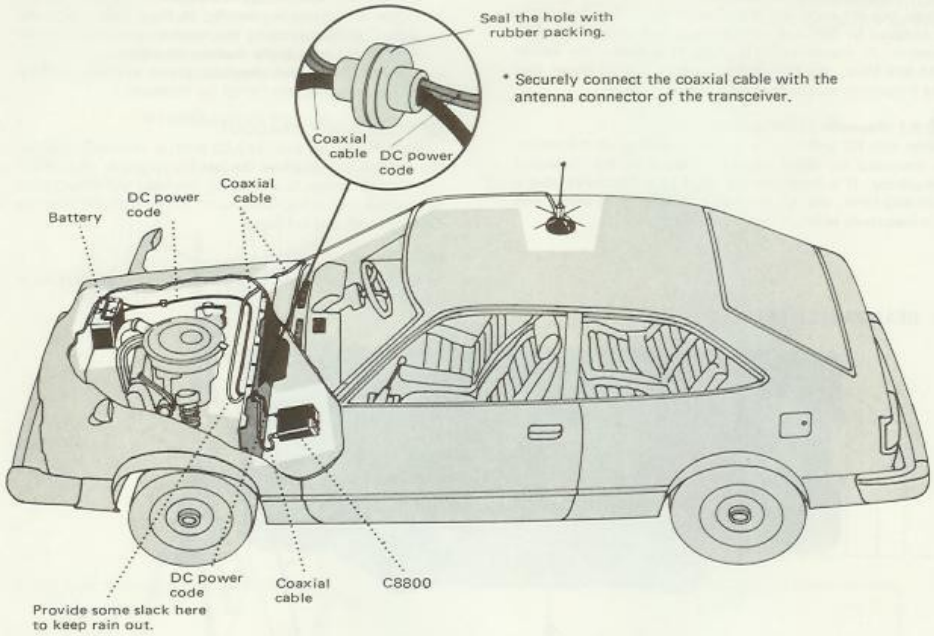



■ **Roof top type**



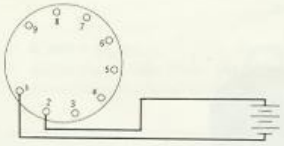
### 4.2.3 CONNECTING THE COAXIAL CABLE

■ **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.




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 |

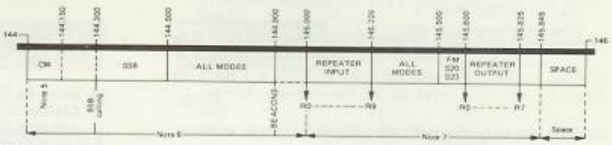



**Table 1. VHF Band Plans**

**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**

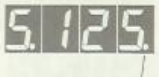
a. Press the [RCL] button to display the content of memory **M5**.

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.

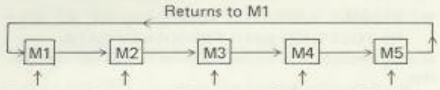
Lights up

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.




First depression — Second depression — Third depression — Fourth depression — Fifth depression

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.

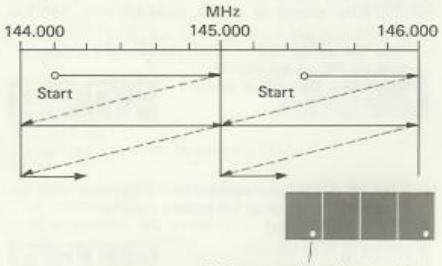
b. However, when the CALL key is depressed and 145.50c or 145.55c is displayed, the RCL function is ineffective. Press the CCL button to clear the CALL state and restore the RCL function.

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.

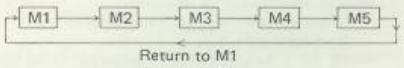
B. How to scan the five frequencies stored in the memory:

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

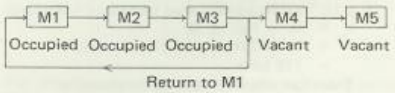
* When frequency data are stored in all the five memories:

Scan



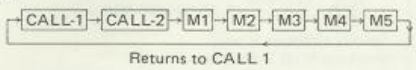

* When **M4** and **M5** are vacant:

Scan




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




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.

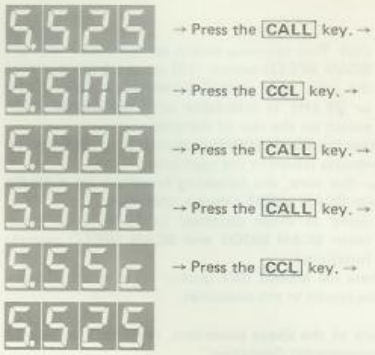
### (9) SELECTING CALL FREQUENCIES (145.50 MHz or 145.55 MHz)

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.

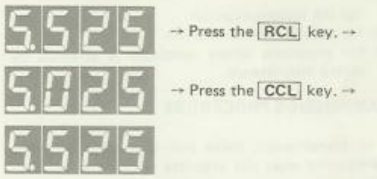

b. When a call channel is selected, all other key operations are ineffective except for the [MEMO] key or when the [CCL] key is depressed to reset the call function. When the call function is reset by depressing the [CCL] key, the channel frequency returns to the one displayed immediately before the [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:




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:




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

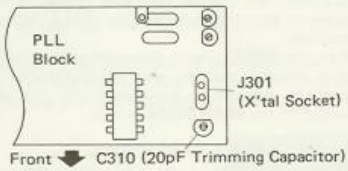
1. Prior to transmission, make sure that your transmission frequency does not interfere with other communications.
2. Select transmission power of **LOW** or **HI** with the **PWR** selector (4) on the front panel of the unit. For local communication, **LOW** is recommended.
3. Press the **PTT** (30) 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.)



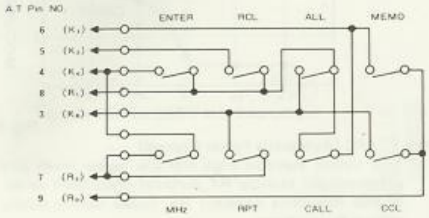

**NOTE:**
**When the transceiver is operated in the Repeater-3 mode, the transmission frequency is not displayed on the frequency readout. Exercise the utmost care at such times to avoid straying out of the amateur band.**

## 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.

# 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]

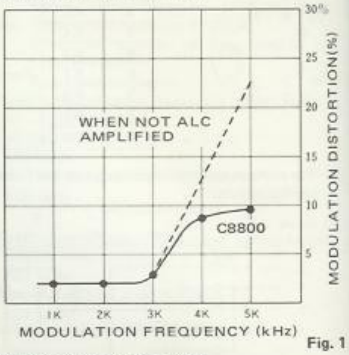



Fig. 1

### 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.

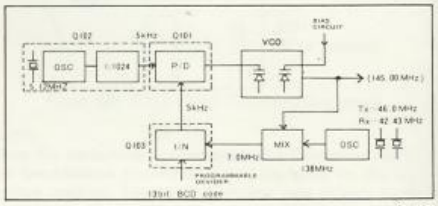



Fig. 2

### 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

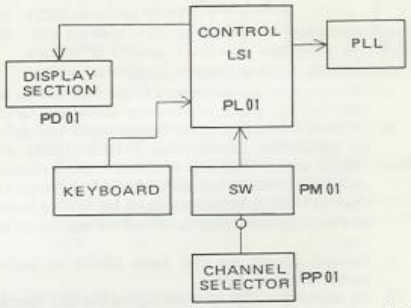



Fig. 3

- 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 |
| R1 | 0 | 1 | 0 | 0 |
| R2 | 0 | 0 | 1 | 0 |
| R3 | 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.

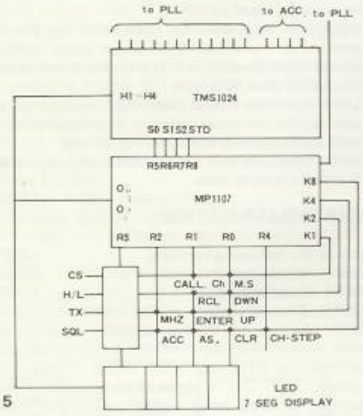



Fig. 5

* 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]

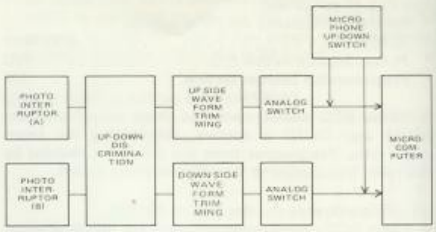



Fig. 6

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]

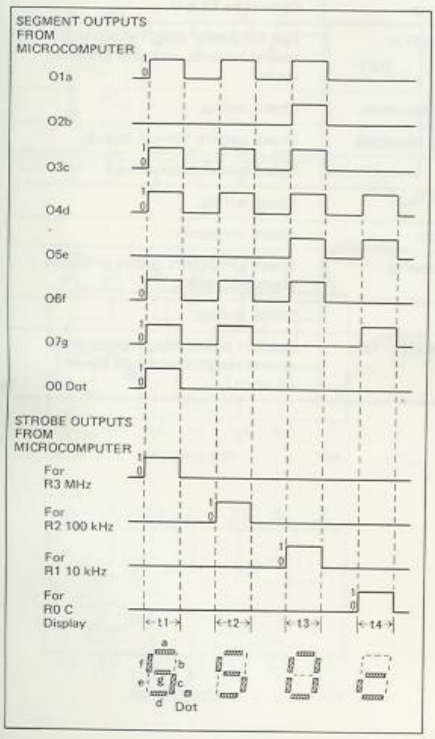



Fig.7

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).

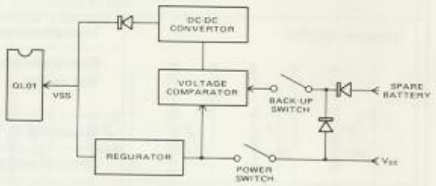



Fig. 8

(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.

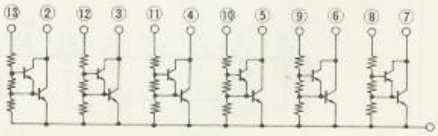



Fig. 9

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

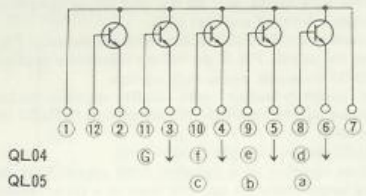



Fig. 10

(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.

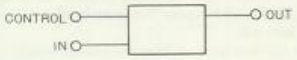
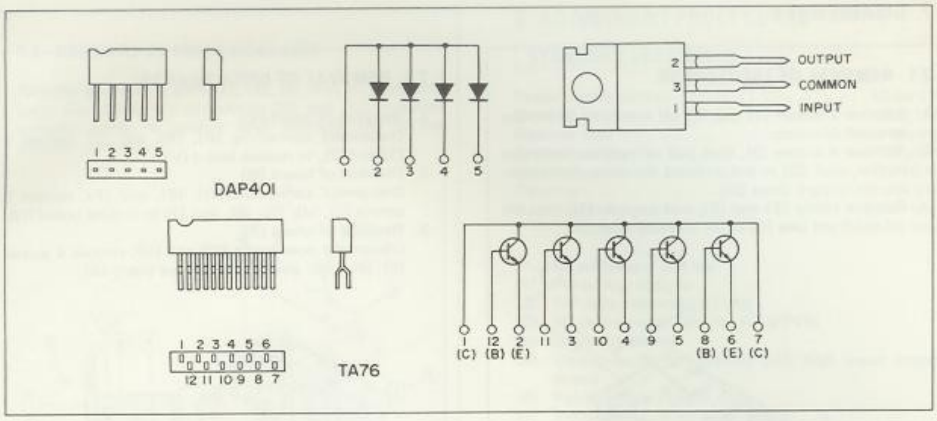
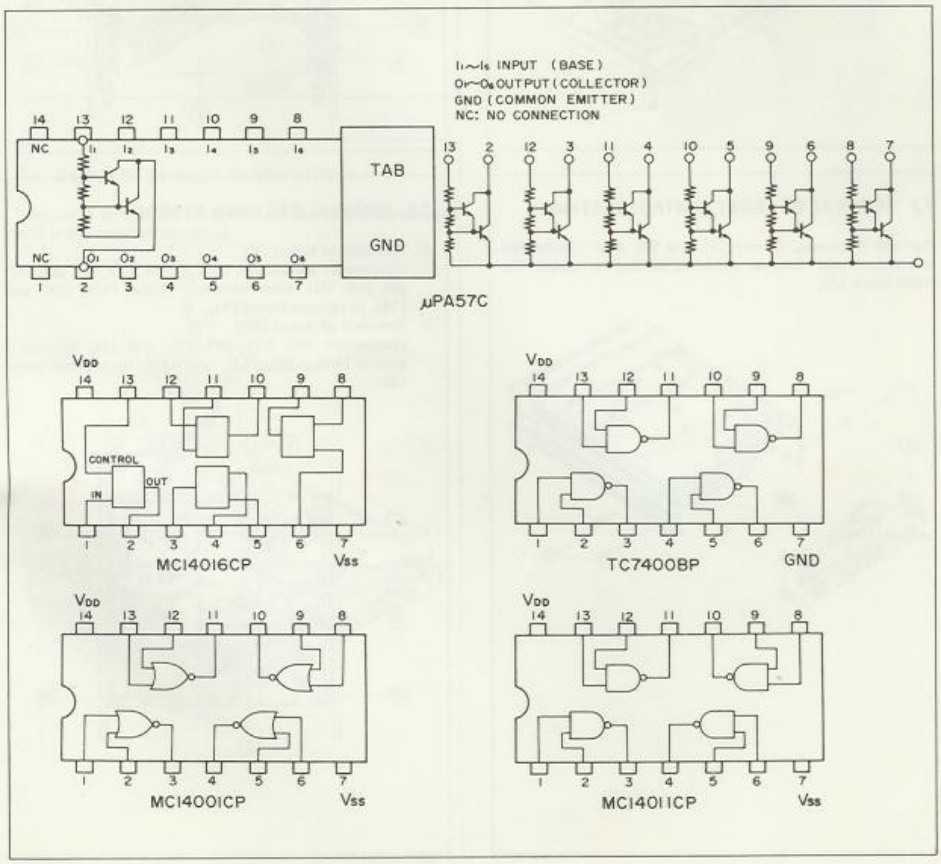



Fig. 11

### 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. |

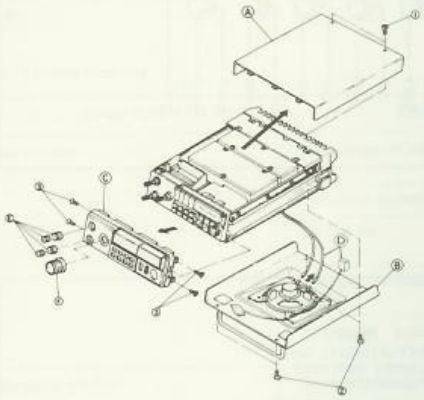

OUTPUT
COMMON
INPUT
1 2 3 4 5
DAP401
1 2 3 4 5
TA76
1 2 3 4 5 6
12 11 10 9 8 7
1 2 3 4 5 6 7 8 9 10 11 12 13
(C) (B) (E) (B) (E) (C)


I1~I6 INPUT (BASE)
O1~O6 OUTPUT (COLLECTOR)
GND (COMMON EMITTER)
NC: NO CONNECTION
14 13 12 11 10 9 8
NC I1 I2 I3 I4 I5 I6
TAB
GND
NC O1 O2 O3 O4 O5 O6
1 2 3 4 5 6 7
13 2 12 3 11 4 10 5 9 6 8 7
μPA57C
VDD
14 13 12 11 10 9 8
CONTROL
IN
OUT
1 2 3 4 5 6 7
MC14016CP
Vss
VDD
14 13 12 11 10 9 8
1 2 3 4 5 6 7
TC7400BP
GND
VDD
14 13 12 11 10 9 8
1 2 3 4 5 6 7
MC14001CP
Vss
VDD
14 13 12 11 10 9 8
1 2 3 4 5 6 7
MC14011CP
Vss

## 7. DISASSEMBLY

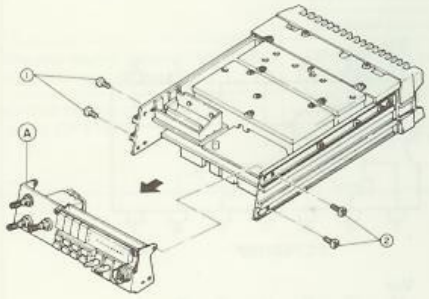
### 7.1 REMOVAL OF ESCUTCHEON

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.



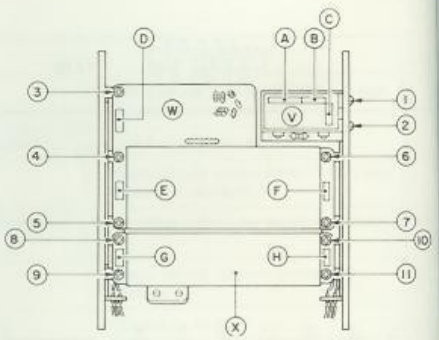
### 7.2 REMOVAL OF FRONT CONTROL SECTION

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



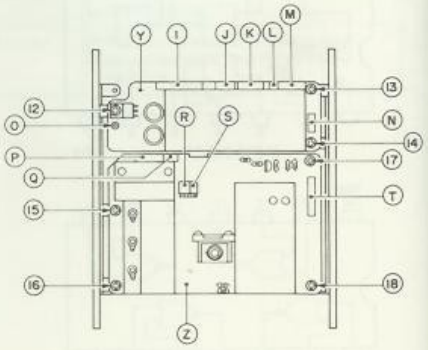
### 7.3 REMOVAL OF UPPER BOARDS

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).



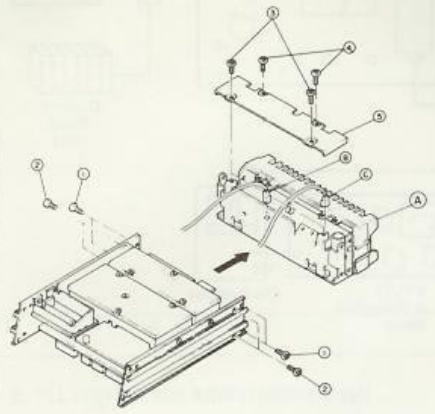
### 7.4 REMOVAL OF LOWER BOARDS

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).



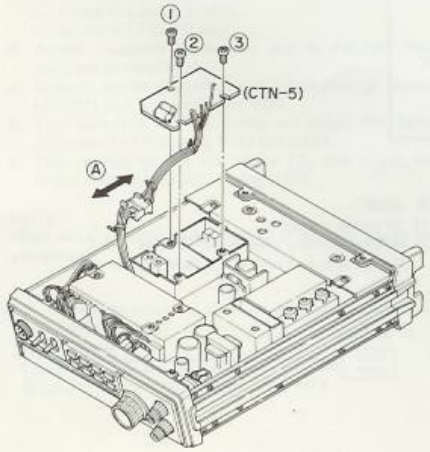
### 7.5 REMOVAL OF FINAL HEAT-SINK

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**

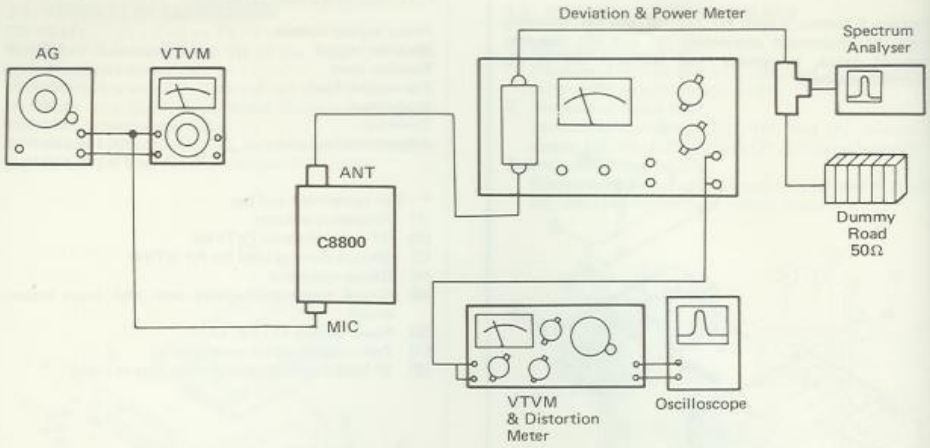
| | |
|---|---|
| Power supply voltage | 13.8V DC |
| Receiver output | 500 mW |
| Receiver load | 4 ohms |
| Transmitter load | 50 ohms |
| Modulation | 1,000 Hz |
| Deviation | ±3.5 kHz |
| Adjustment frequency | RX 145.500 MHz |
| | TX 145.480 MHz |

* **Test equipment and jigs**

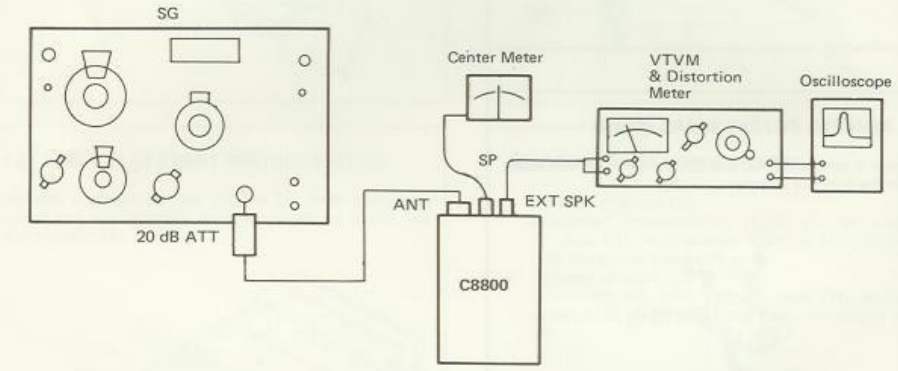
(1) Frequency counter
(2) RF millivoltmeter (VTVM)
(3) 50-ohm dummy load for RF VTVM
(4) Digital voltmeter
(5) Circuit tester (preferrably with high input impedances)
(6) Power supply (13.8V, 4A)
(7) Transmitting jig (or microphone)
(8) 2P Molex socket (coaxial with N type male)

## TRANSMITTING AND RECEIVING CONNECTIONS

■ TRANSMITTING




■ RECEIVING




### 8.1 PLL ADJUSTMENTS (P101)

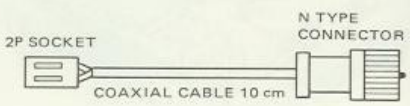
* When adjusting PLL and RX, keep PTT off unless otherwise specified.
* Adjust PLL before RX and TX.
* PLL section is thoroughly factory adjusted, so that these trimmers require no further adjustment.
* While PLL related adjustments are being carried out, leave socket J125 disconnected. Replace the socket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

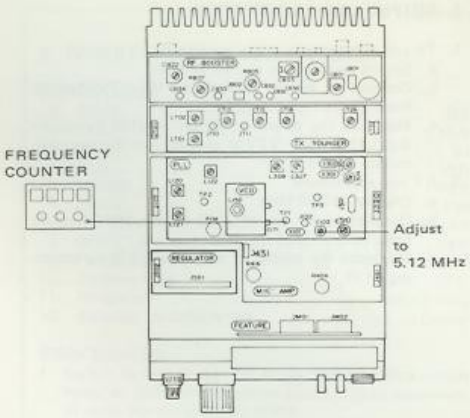
■ JIGS

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.

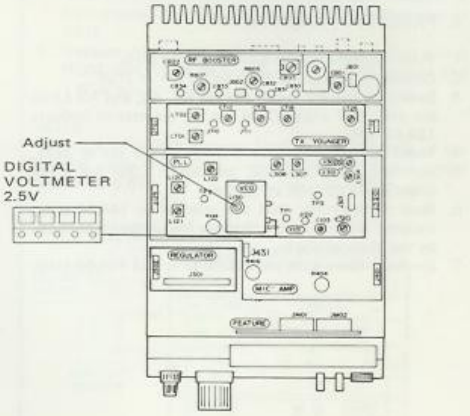



## 2. PLL SECTION VCO ADJUSTMENTS (P150)

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

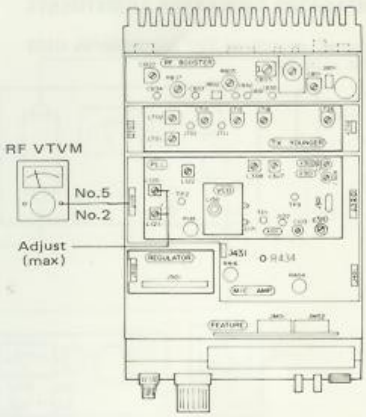
2. Adjust the above 3 coils as follows:
   a. Screw in L307 1.5 turns.
   b. Screw in L308 4.5 turns.
   c. Screw in L122 1.0 turn.
3. Adjust frequency display on unit to 145,000 MHz using the channel knob.
4. Connect digital voltmeter to the feed-through capacitor C171 that is mounted on VCO.
5. Then 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.**



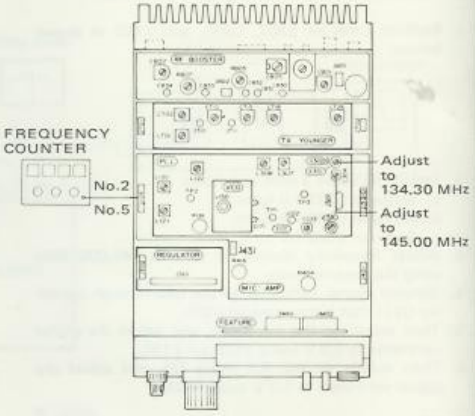
## 3. OUTPUT COIL ADJUSTMENTS

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

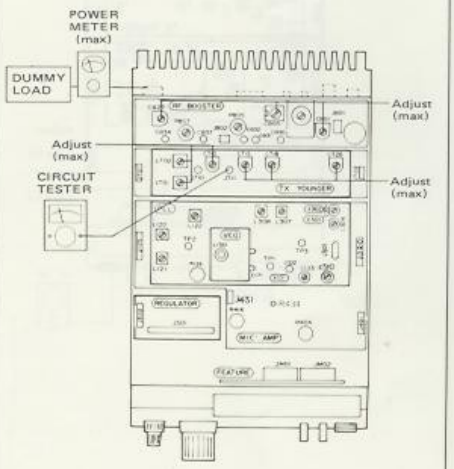
### 1. YOUNGER BOOSTER PWR ADJUSTMENTS

(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)

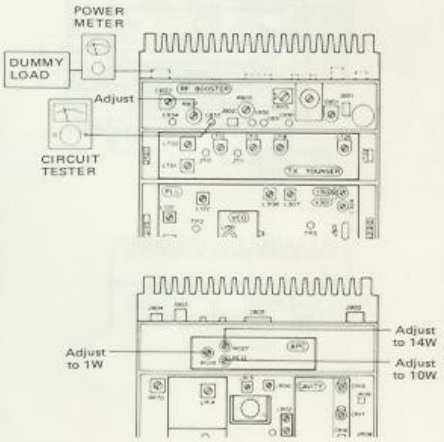
1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . .25 kHz
8. BUCK UP . . . . . .OFF
9. Power supply . . . . . .13.8 V
10. Dummy load. . . . . .50 Ω
11. Frequency . . . . . .145.48 MHz
12. External UP-DOWN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



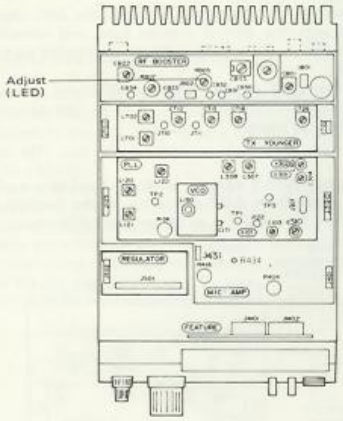
## 3. TX METER ADJUSTMENTS

(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).



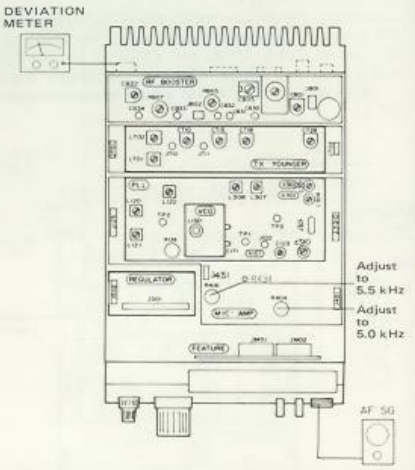

## 4. DEVIATION ADJUSTMENTS

(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.)



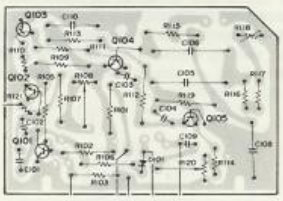
### 5. TONE UNIT & CTN-5 (tone oscillator for repeater drive) ADJUSTMENTS

(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.



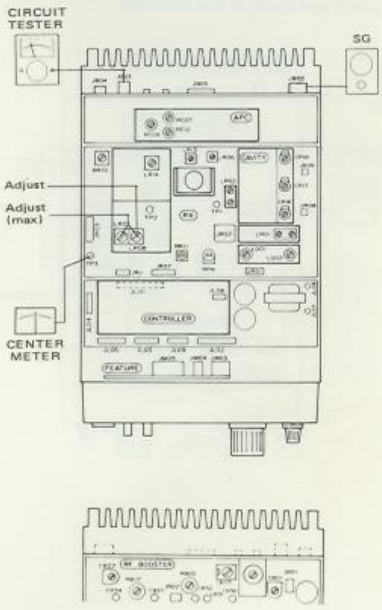
### 1. IF ADJUSTMENTS

(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.



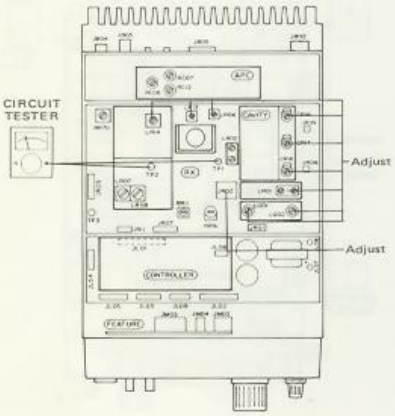
## 2. RF ADJUSTMENTS–PART 1

(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)

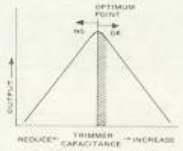
1. SENS. . . . . .DX
2. SQL. . . . . MIN
3. PWR . . . . . HI
4. VOL . . . . . MIN
5. MODE . . . . . FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . .13.8 V
10. Dummy load. . . . . 4 Ω
11. Frequency . . . . . 145.50 MHz
12. External Buck up SW.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

(PROCEDURES)

NOTE:

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

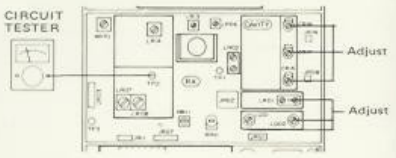
1. Connect a circuit tester to TP2 on the signal side.
2. After adjusting per RF adjustments – part 1, again adjust the cavity trimmers.
3. Turn CR16 and CR18 by approximately 1 mm in the direction of increasing trimmer capacitance.
4. By CR17, adjust to maximize the output at TP2, taking care to adjust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

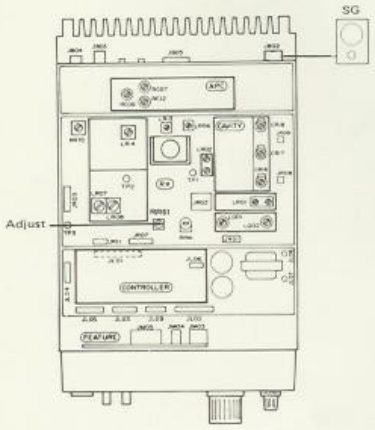
## 3. SQUELCH ADJUSTMENTS

(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.**

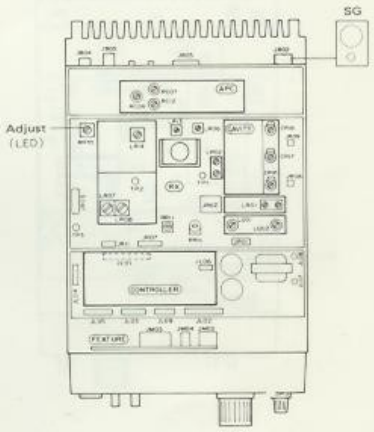
## 4. RX S METER ADJUSTMENTS

(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)**

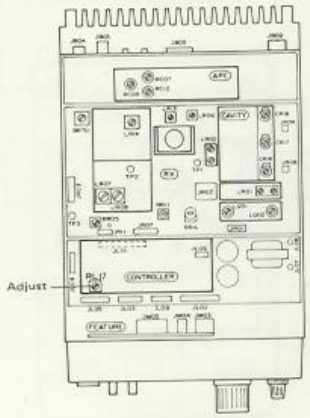
1. SENS. . . . . .DX
2. SQL. . . . . .MIN
3. PWR . . . . . .HI
4. VOL . . . . . .MIN
5. MODE . . . . . .FREE
6. SCAN. . . . . .LOW
7. CH STEP. . . . . 25 kHz
8. BUCK UP . . . . . .OFF
9. Power source . . . . . 9.5 V

**(PROCEDURES)**

1. Set power supply voltage at 9.5 V.

**NOTE:**
**Use reliable equipment to get exactly 9.5 V.**

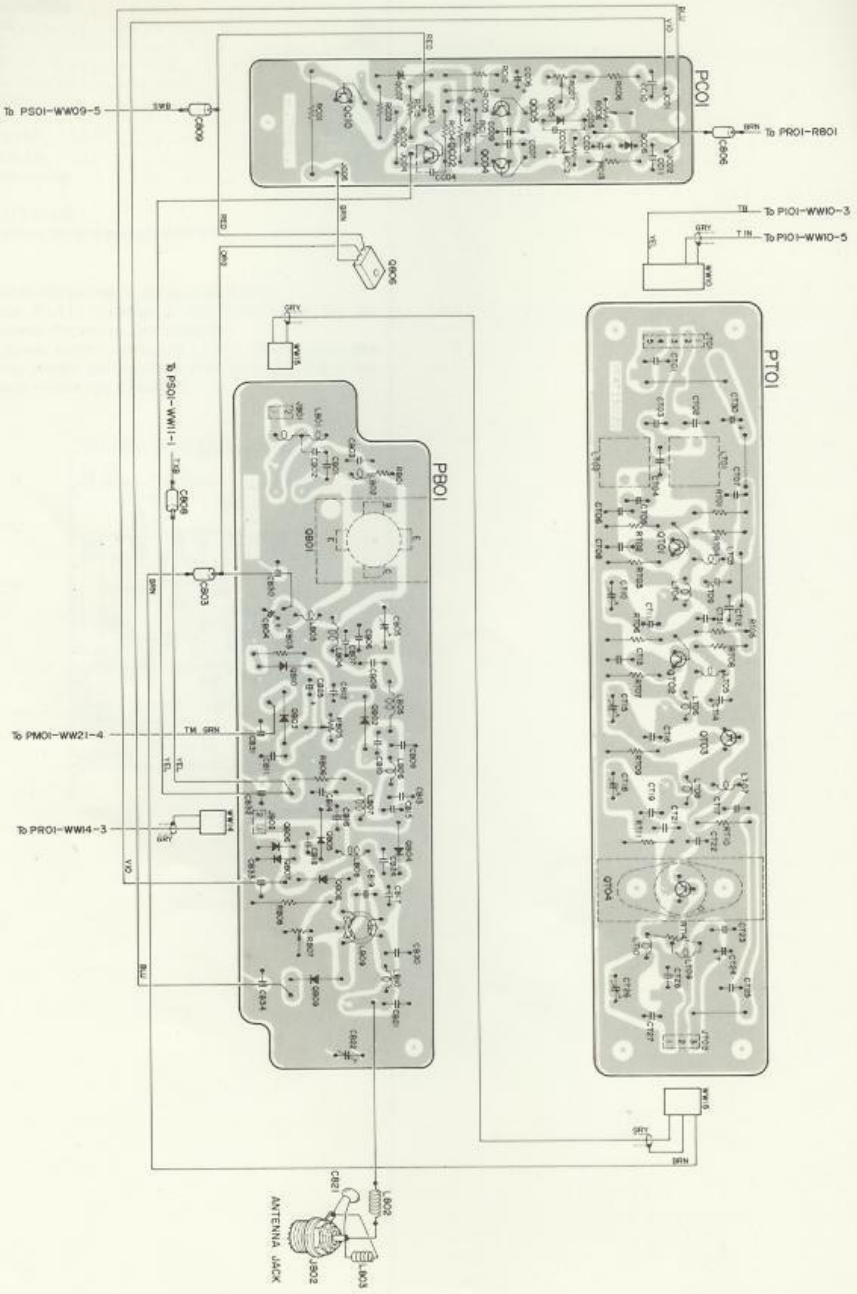
2. Adjust RL117 trimmer in the PL01 board for the frequency display to just disappear.
3. Set power supply voltage at 13.8 V. Then reduce this voltage slowly and confirm that as it hits 9.5 V frequency the display disappear.



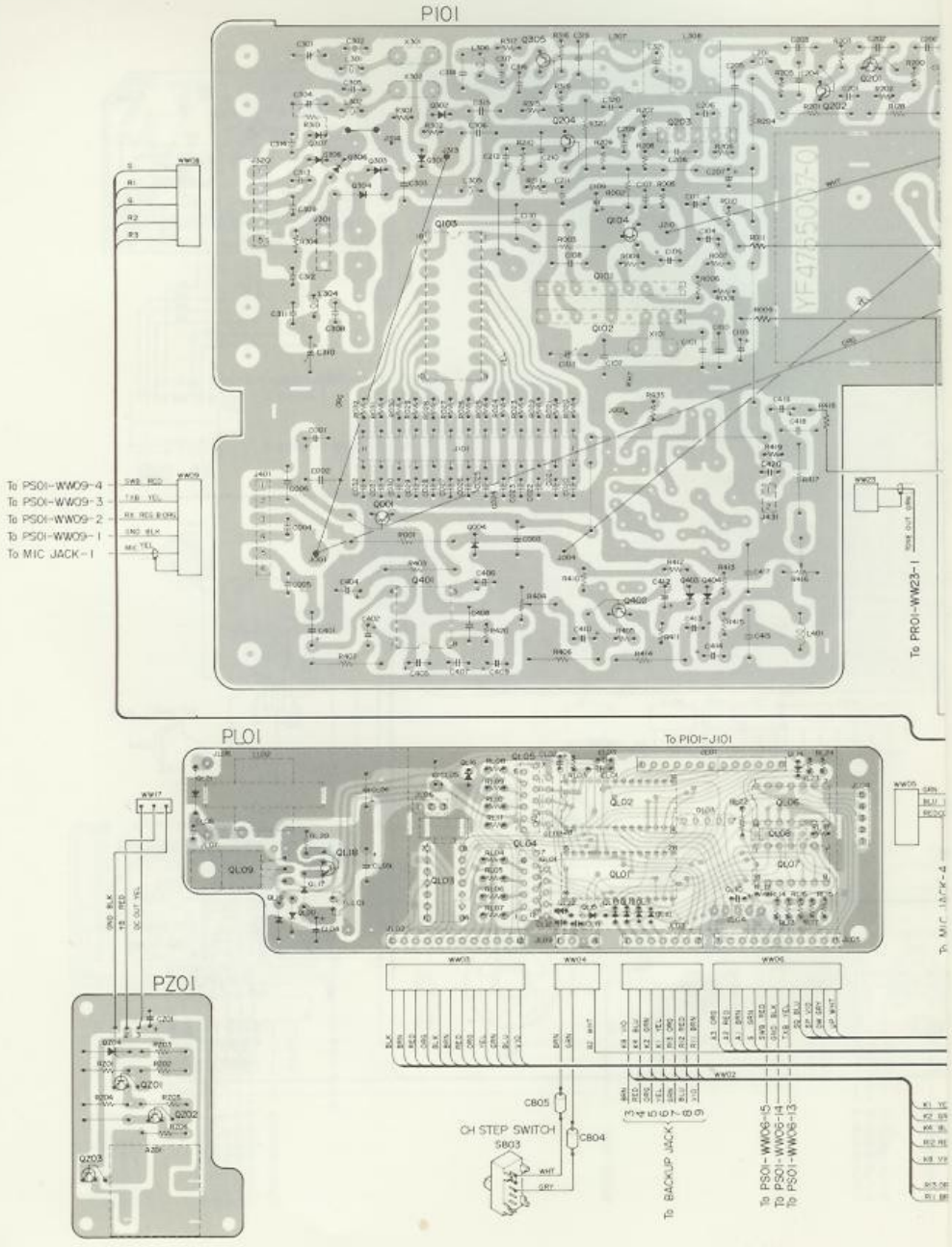
NOTE

## 9. WIRING DIAGRAM

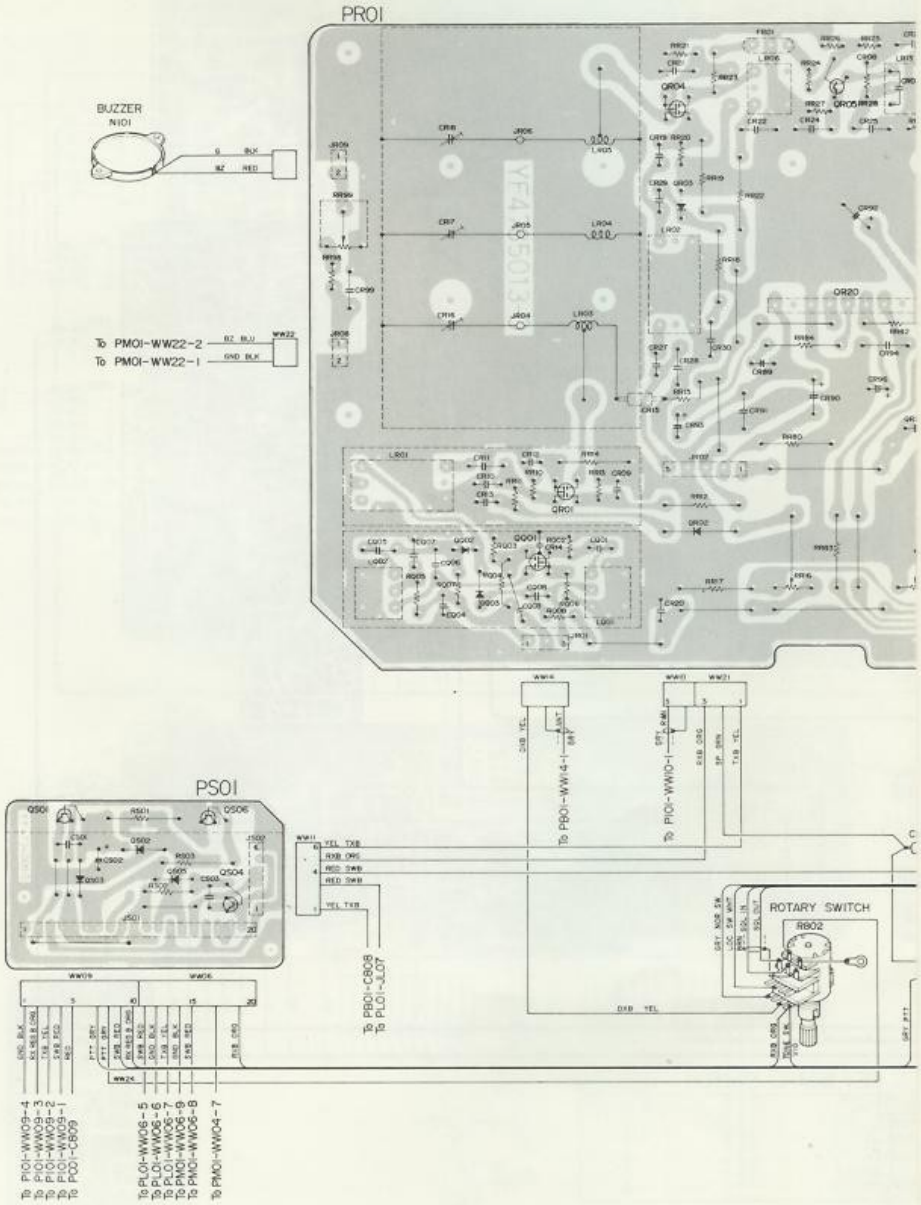
### 9.1 TX SECTION

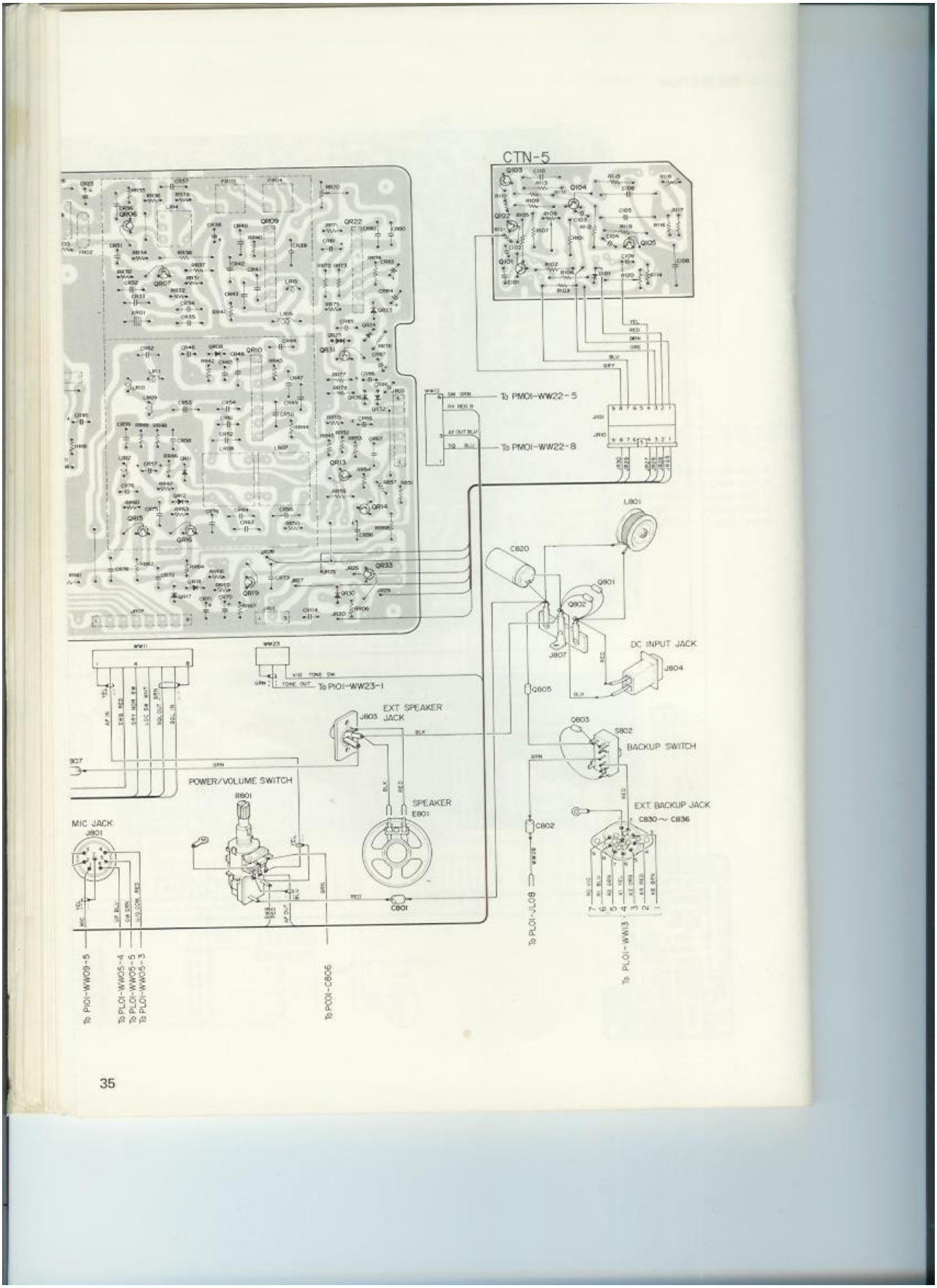


## 9.2 PLL SECTION



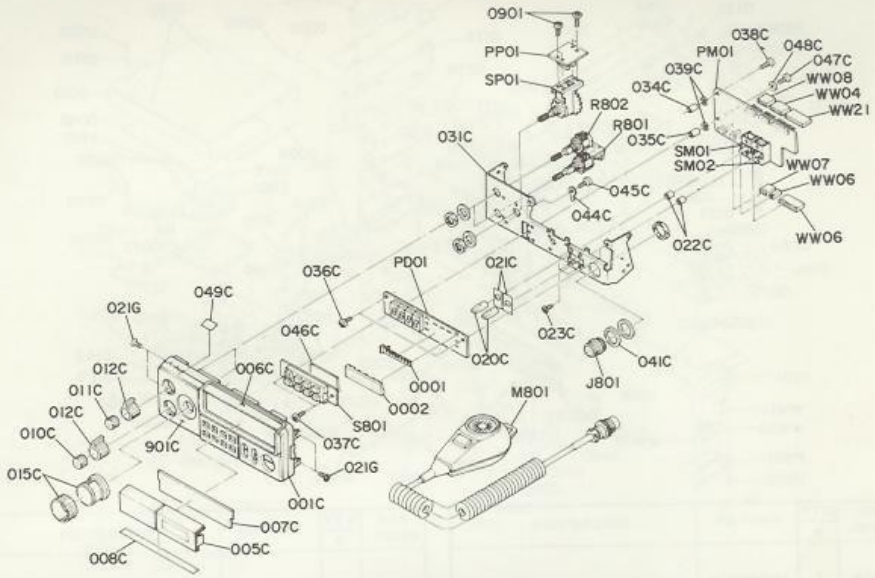
## 9.3 RX SECTION




CTN-5
To PM01-WW22-5
To PM01-WW22-8
To P101-WW23-1
EXT SPEAKER JACK
J803
POWER/VOLUME SWITCH
RB01
SPEAKER
E801
MIC JACK
J801
DC INPUT JACK
J804
BACKUP SWITCH
S802
EXT. BACKUP JACK
C830 ~ C836
L801
C820
Q901
Q902
J807
Q805
Q803
C802
C801
To P101-WW09-5
To P101-WW05-4
To P101-WW05-5
To P101-WW05-3
To P101-C806
To P101-JL08
To P101-WW13

## 10. EXPLODED VIEWS AND PARTS LISTS

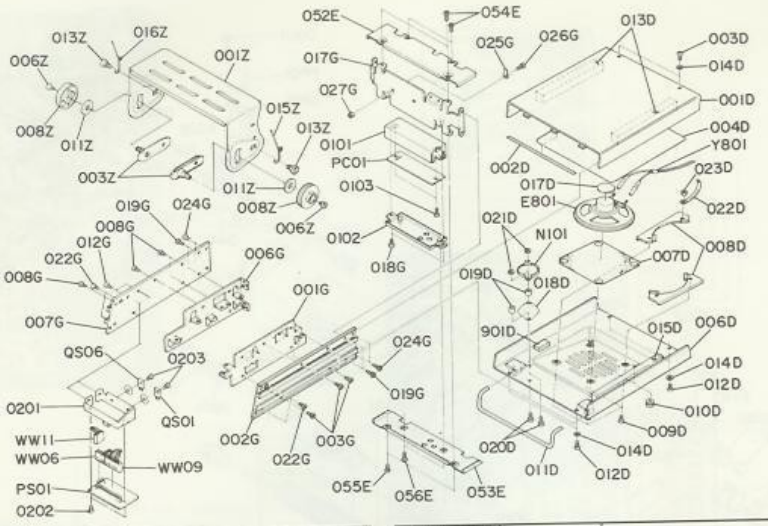
### 10.1 [P01-99] ESCUTCHEON RELATED




| 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 | 5104260480 | 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 | 5006260580 | Screw | 2.6 x 5 |
| 039C | 2 | 54042602N0 | Spring Washer | |
| 041C | 1 | 4656118010 | Spacer | |
| 044C | 1 | 62030049W0 | Lug | |
| 045C | 1 | 51100304B9 | B.H.M. Screw | B3 x 4 |
| 046C | 1 | 4723120050 | Insulator | |
| 047C | 1 | 51100208B0 | 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 | |

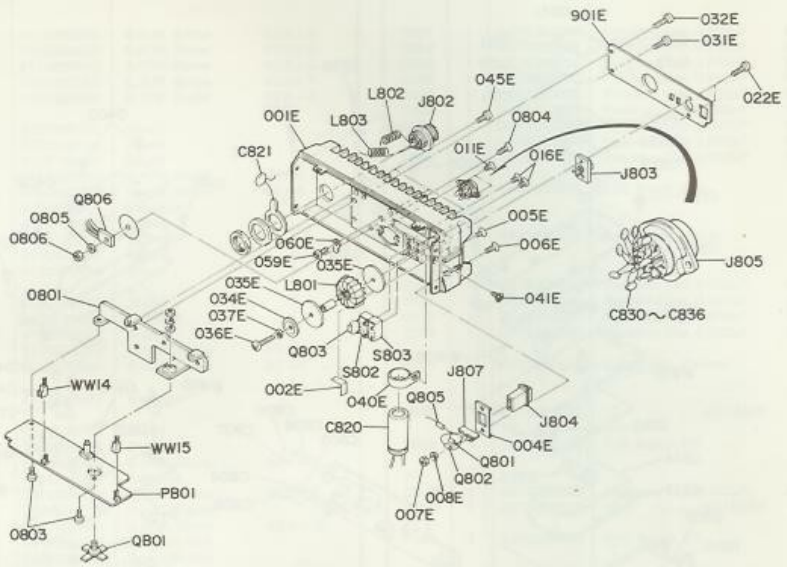
## 10.2 [P02-99] CHASSIS RELATED




| 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 | 5128260680 | 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 |

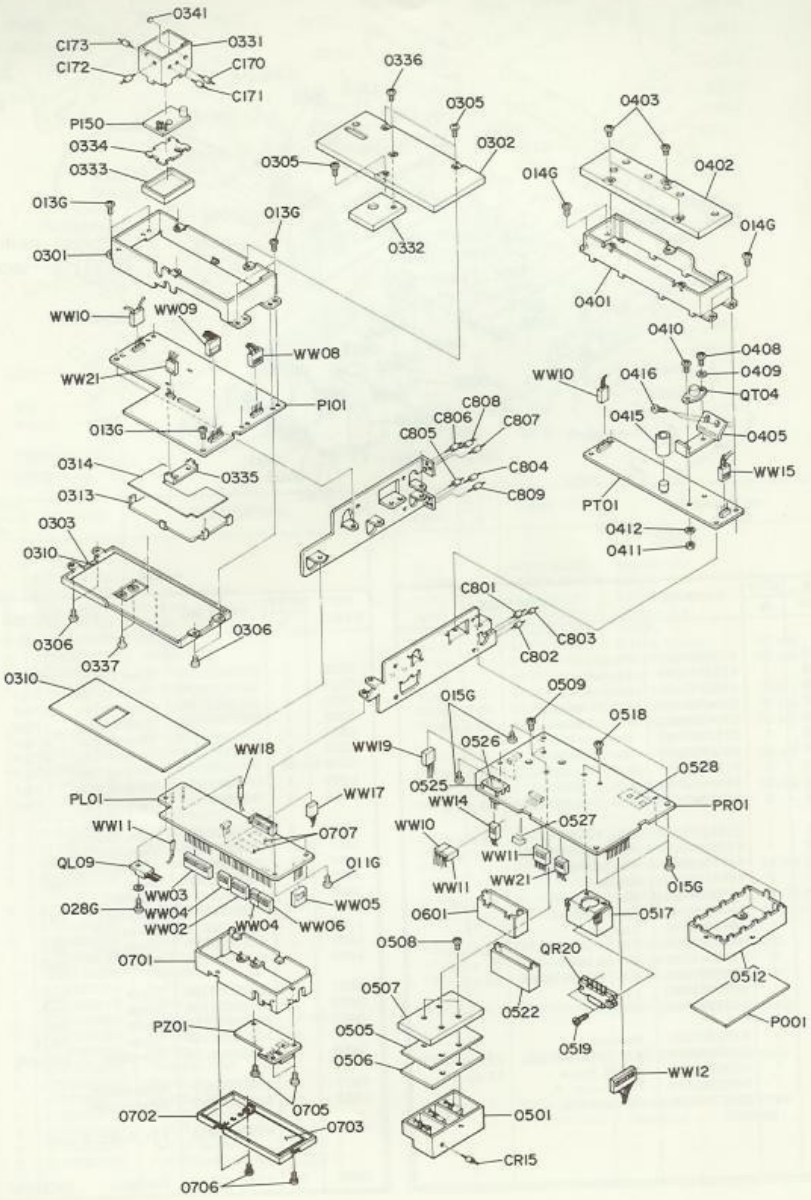
| REF. DESIG. | Q'TY N | PART NO. | DESCRIPTION | |
|---|---|---|---|---|
| 001G | 1 | 4723105020 | Chassis, (R) | |
| 002G | 1 | 4723051010 | Guide, (R) | |
| 003G | 4 | 51100304B9 | B.H.M. Screw | B3 x 4 |
| 006G | 1 | 4723105030 | Chassis, (L) | |
| 007G | 1 | 4723051020 | Guide, (L) | |
| 008G | 4 | 51100304B9 | B.H.M. Screw | B3 x 4 |
| 012G | 2 | 5110030589 | B.H.M. Screw | B3 x 5 |
| 017G | 1 | 4723126010 | Stay | |
| 018G | 2 | 51282605B0 | B.H. Tapped Screw | B2.6 x 5 |
| 019G | 4 | 51280306B0 | B.H. Tapped Screw | B3 x 6 |
| 022G | 4 | 51100305B9 | B.H.M. Screw | B3 x 5 |
| 024G | 4 | 51280306B0 | B.H. Tapped Screw | B3 x 6 |
| 025G | 1 | 62030039W0 | Lug | |
| 026G | 1 | 51102606B0 | B.H.M. Screw | B2.6 x 6 |
| 027G | 1 | 53112603B0 | Hexagon Nut | |
| 0101 | 1 | 4723109130 | Shield | |
| 0102 | 1 | 4723109140 | Shield | |
| 0103 | 2 | 51102605B0 | B.H.M. Screw | B2.6 x 5 |
| 0201 | 1 | 4723160030 | Bracket | |
| 0202 | 2 | 51102605B0 | B.H.M. Screw | B2.6 x 5 |
| 0203 | 2 | 51102606B0 | B.H.M. Screw | B2.6 x 6 |
| E801 | 1 | QK00801080 | Speaker | 1W 8Ω |
| N101 | 1 | QK00245010 | Buzzer | |
| Y801 | 1 | YB00150060 | 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 | HT70011100 | 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 | 5311260380 | 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 | 5128260680 | 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 | Slide Switch | | |
| PB01 | 1 | YF47230020 | P.W. Board, Booster | | |
| QB01 | 1 | HT321030A0 | Transistor | 2SC2103A | |


0341
C173
C172
0331
C170
C171
P150
0334
0333
013G
0301
WW10
WW09
WW08
WW21
P101
013G
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0332
013G
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014G
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0401
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0408
0409
WW10
0416
QT04
0415
0405
WW15
PT01
0412
0411
C808
C806
C807
C805
C804
C809
C801
C803
C802
015G
0509
0518
WW19
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PR01
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PL01
WW17
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0707
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0527
WW11
QL09
011G
WW11
WW21
015G
WW03
028G
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WW05
WW04
WW06
0601
0517
0508
QR20
0512
0701
0507
0522
P001
PZ01
0505
0506
0519
WW12
0705
0702
0703
0501
CR15
0706

| 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 | LO70280010 | 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 | HT312131B0 | 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 | HT700111O0 | Transistor JSP6009 |
| QS07 | 1 | HD20011050 | Diode 1S1555 |
| QS08 | 1 | HD20011050 | Diode 1S1555 |
| QS10 | 1 | HD20001210 | Diode 1S2473 |

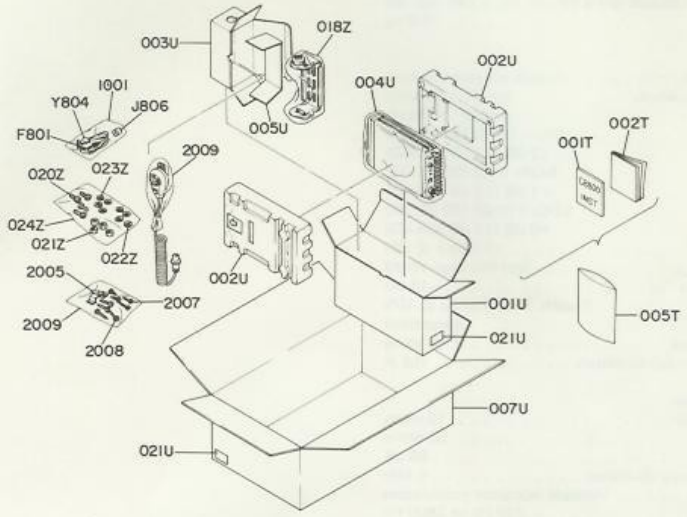
| REF. DESIG. | Q'TY N | PART NO. | DESCRIPTION |
|---|---|---|---|
| | | | **PR01-PLUGS** |
| JS01 | 1 | YP06002110 | Plug (20P) |
| JS02 | 1 | YP06000880 | Plug (6P) |
| | | | **PT01-TX YOUNGER CIRCUIT BOARD** |
| PT01 | 1 | YF47230120 | P.W. Board, TX Younger |
| | | | **PT01-CAPACITORS** |
| CT01 | 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 | HT323471O0 | Transistor 2SC2347 |
| QT02 | 1 | HT323471O0 | Transistor 2SC2347 |
| QT03 | 1 | HT309941O0 | 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. | Q'TY 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 | 52030520B9 | H. Head Bolt, P. H5 x 20 |
| 021Z | 4 | 53110503B9 | Hexagon Nut |
| 022Z | 4 | 54040502B0 | Spring Washer |
| 023Z | 4 | 5402050180 | Flat Washer, P. |
| 024Z | 1 | 9011010010 | Polyethy Bag |

| REF. DESIG. | Q'TY 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**

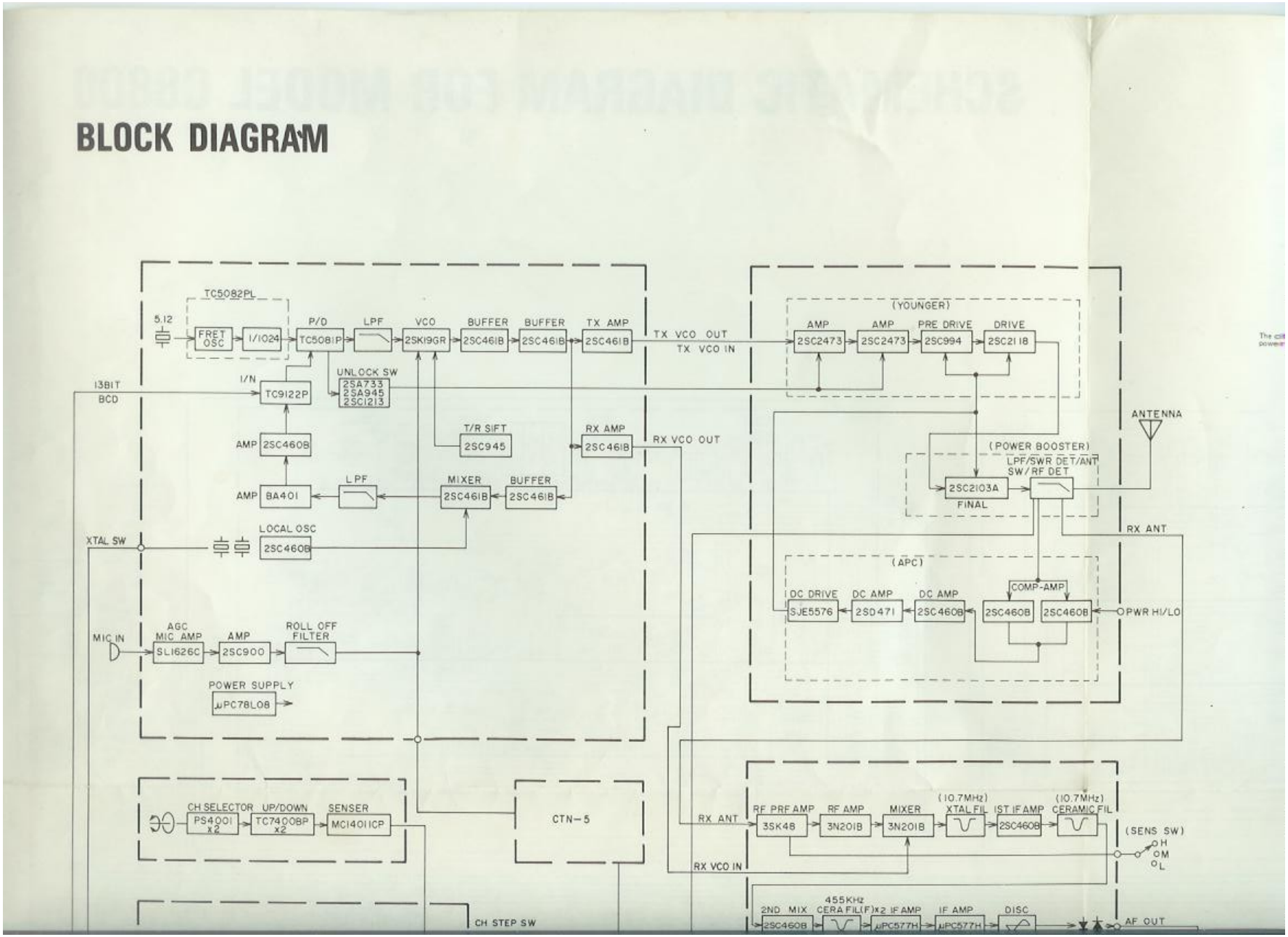
| | |
|---|---|
| Reception system | Double superheterodyne |
| Intermediate frequencies | 1st IF: 10.7 MHz<br>2nd IF: 455 kHz |
| Sensitivity | DX: –10 dB (20 dB QS)<br>–12 dB (12 dB SINAD)<br>NOR: 0 dB (20 dB QS)<br>–1 dB (12 dB SINAD)<br>LOC: +10 dB (20 dB QS)<br>+9 dB (12 dB SINAD) |
| Pass.bandwidth | ±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**

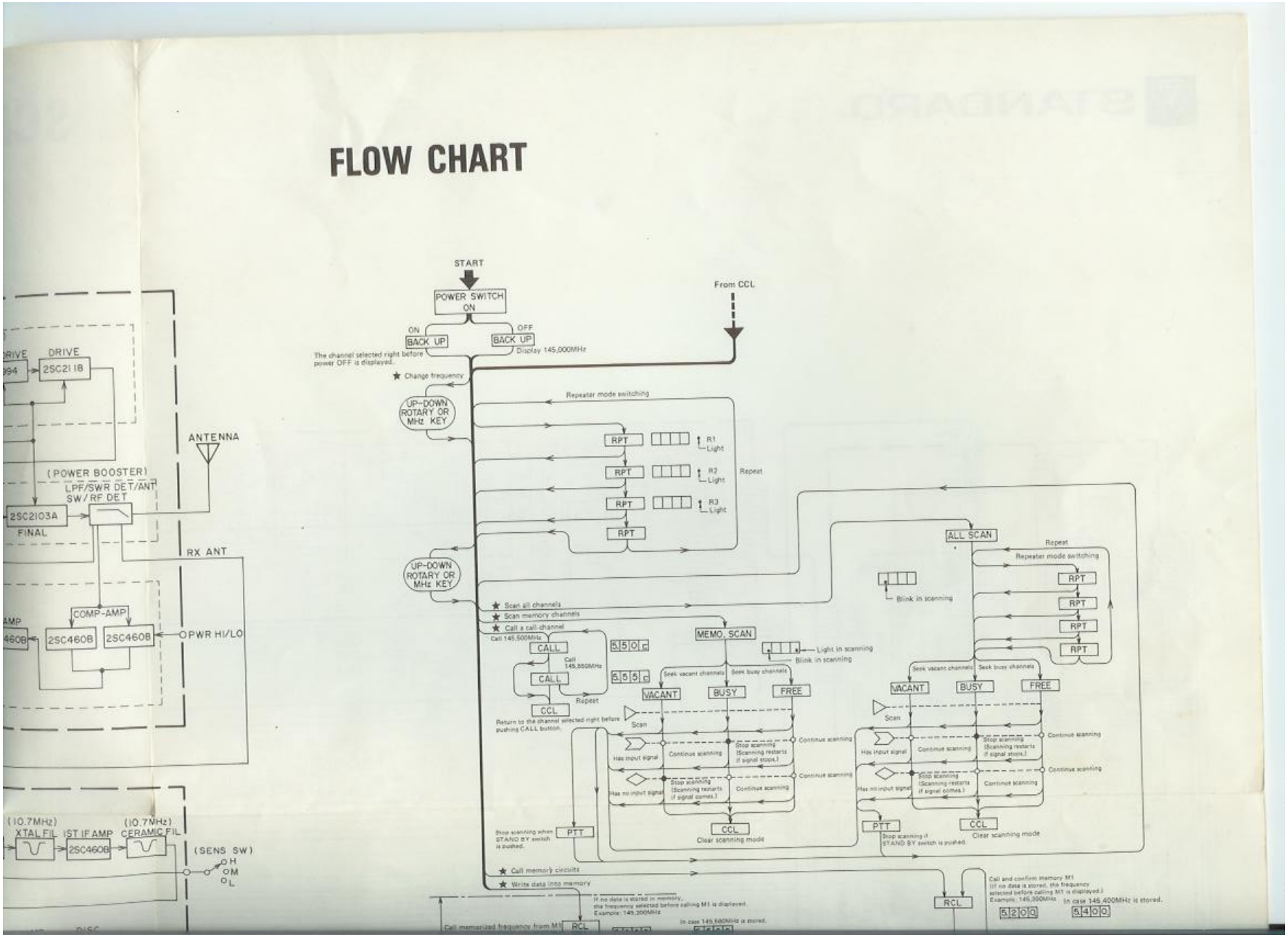
| | |
|---|---|
| Transmission power | 10 watts |
| Load impedance | 50 ohms |
| Spurious ratio | 65 dB |
| Maximum frequency deviation | 5 kHz |
| Modulation | Variable reactance modulation |
| AF response | 300 Hz to 3000 Hz |
| Current consumption in transmission (Hi) | 3.5 A |

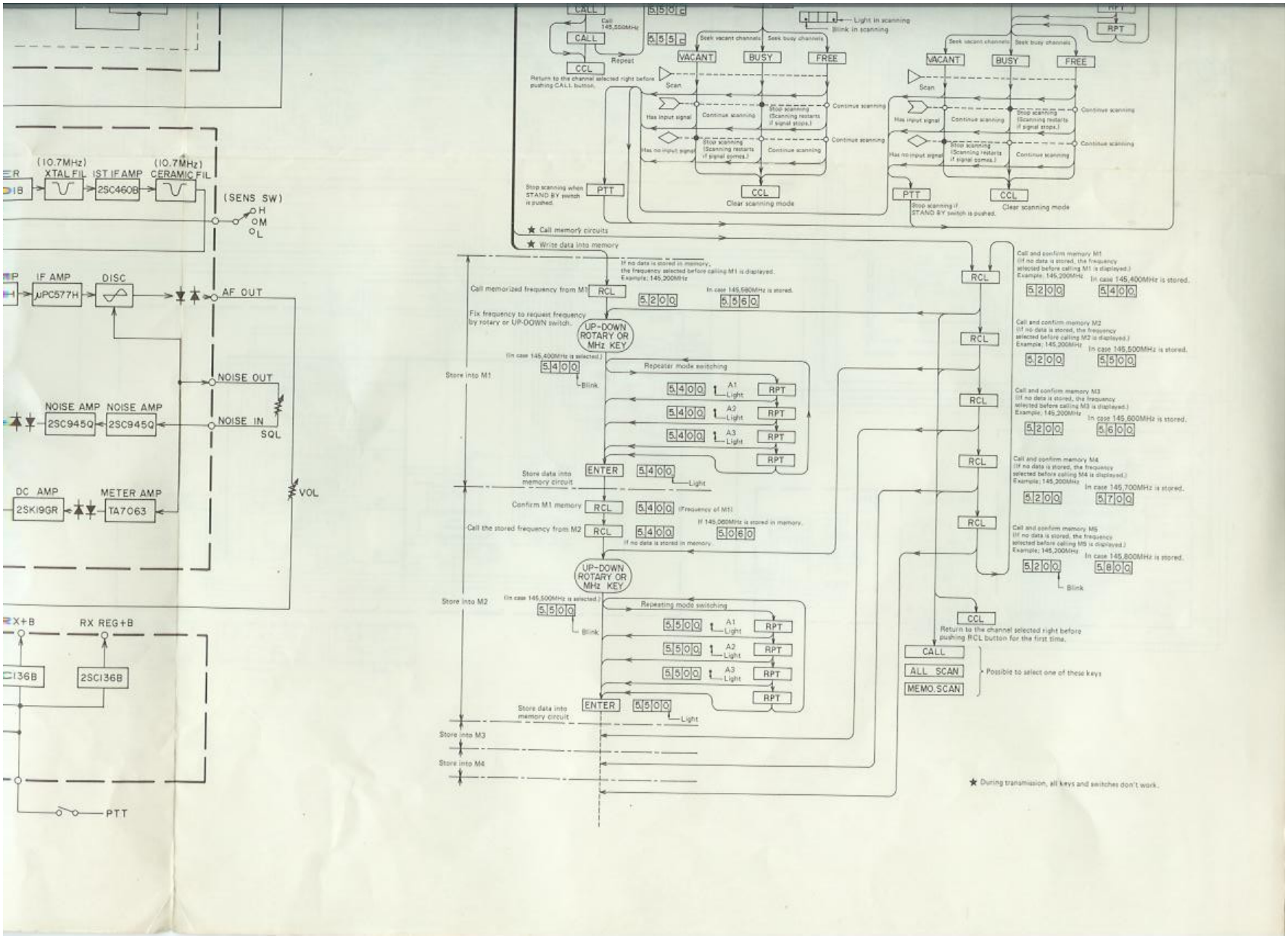
These specifications are a subject to change (in line with future improvements) without notice.

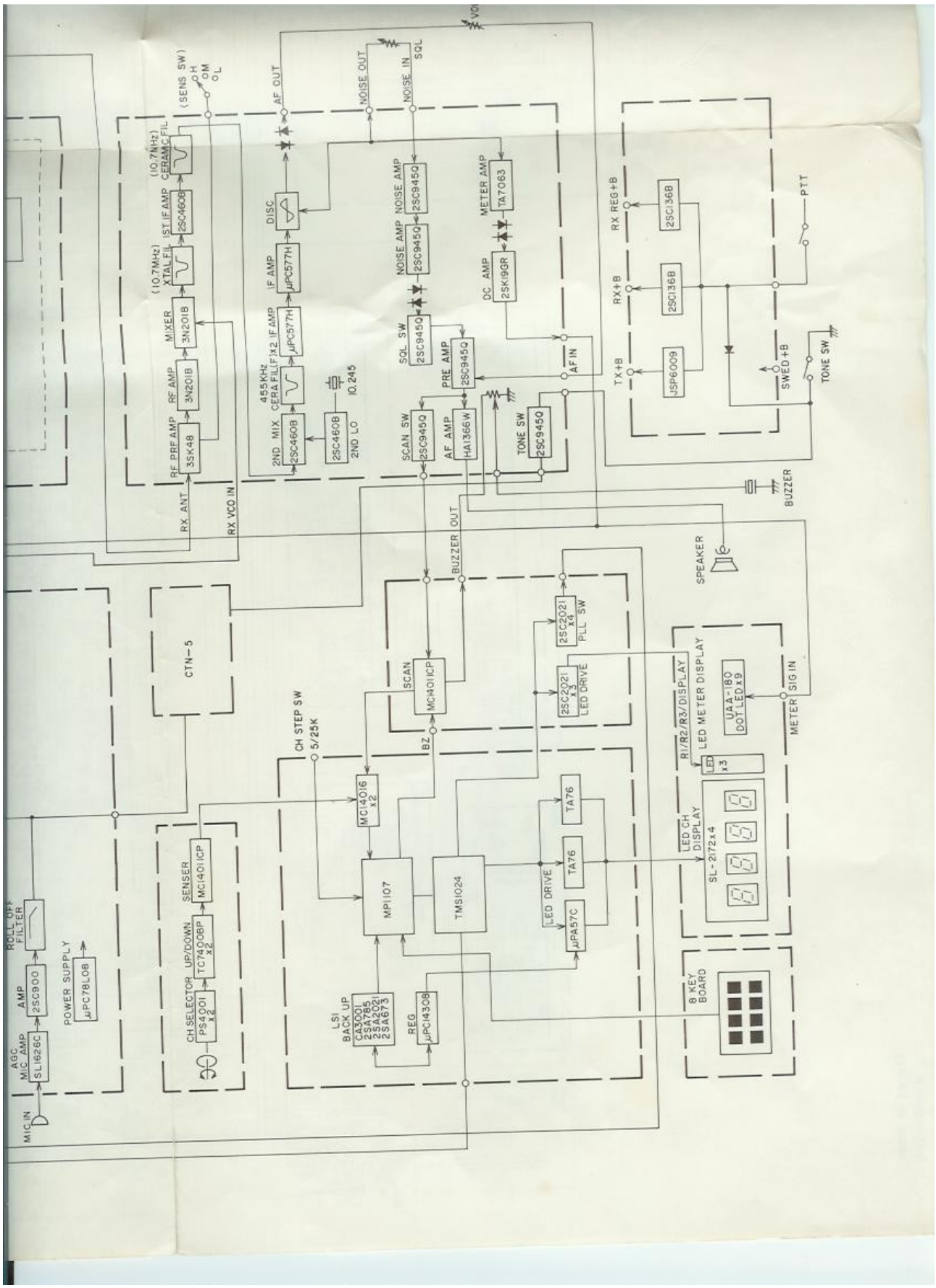
# BLOCK DIAGRAM



# FLOW CHART


START
POWER SWITCH ON
ON
OFF
BACK UP
BACK UP
Display 145,000MHz
The channel selected right before power OFF is displayed.
From CCL
★ Change frequency
UP-DOWN ROTARY OR MHz KEY
Repeater mode switching
RPT
R1 Light
R2 Light
R3 Light
Repeat
ALL SCAN
Blink in scanning
★ Scan all channels
★ Scan memory channels
★ Call a call-channel
Call 145.500MHz
CALL
5,5,0,0
Call 145.550MHz
5,5,5,0
MEMO. SCAN
Light in scanning
Seek vacant channels
Seek busy channels
VACANT
BUSY
FREE
Scan
Has input signal
Has no input signal
Continue scanning
Stop scanning (Scanning restarts if signal stops.)
Stop scanning (Scanning restarts if signal comes.)
CCL
Clear scanning mode
Return to the channel selected right before pushing CALL button.
PTT
Stop scanning when STAND BY switch is pushed.
Stop scanning if STAND BY switch is pushed.
★ Call memory circuits
★ Write data into memory
RCL
Call memorized frequency from M1
If no data is stored in memory, the frequency selected before calling M1 is displayed.
Example: 149.200MHz
In case 145.560MHz is stored.
Call and confirm memory M1 (If no data is stored, the frequency selected before calling M1 is displayed.)
Example: 145.200MHz
5,2,0,0
In case 145.400MHz is stored.
5,4,0,0
DRIVE
2SC2118
ANTENNA
(POWER BOOSTER)
LPF/SWR DET/ANT SW/RF DET
2SC2103A
FINAL
RX ANT
COMP-AMP
2SC460B
PWR HI/LO
(10.7MHz) XTAL FIL
1ST IF AMP
(10.7MHz) CERAMIC FIL
(SENS SW)
H
M
L


(10.7MHz) XTAL FIL
1ST IF AMP
2SC460B
(10.7MHz) CERAMIC FIL
(SENS SW)
H
M
L
IF AMP
DISC
μPC577H
AF OUT
NOISE OUT
NOISE AMP
NOISE AMP
2SC945Q
2SC945Q
NOISE IN
SQL
VOL
DC AMP
METER AMP
2SK19GR
TA7063
RX REG+B
2SC136B
2SC136B
PTT
CALL
CCL
VACANT
BUSY
FREE
RPT
Scan
Repeat
Light in scanning
Blink in scanning
Has input signal
Has no input signal
Continue scanning
Stop scanning (Scanning restarts if signal stops.)
Stop scanning (Scanning restarts if signal comes.)
Clear scanning mode
Stop scanning when STAND BY switch is pushed.
Stop scanning if STAND BY switch is pushed.
Call memory circuits
Write data into memory
RCL
Call memorized frequency from M1
Fix frequency to request frequency by rotary or UP-DOWN switch.
UP-DOWN ROTARY OR MHz KEY
Repeater mode switching
Store into M1
Store data into memory circuit
ENTER
Confirm M1 memory
Call the stored frequency from M2
Store into M2
Repeating mode switching
Store into M3
Store into M4
Call and confirm memory M1
Call and confirm memory M2
Call and confirm memory M3
Call and confirm memory M4
Call and confirm memory M5
Return to the channel selected right before pushing RCL button for the first time.
ALL SCAN
MEMO.SCAN
Possible to select one of these keys
★ During transmission, all keys and switches don't work.


MIC IN
AGC MIC AMP
SL1626C
AMP
2SC900
ROLL OFF FILTER
POWER SUPPLY
μPC78L08
CH SELECTOR
PS4001 x2
UP/DOWN
TC74006P x2
SENSER
MC14011CP
CTN-5
LSI BACK UP
CA3001
2SA785
2SA2021
2SA673
REG
μPC14308
MC14016 x2
CH STEP SW
5/25K
MPU107
TMS1024
LED DRIVE
TA76
TA76
μPA57C
SCAN
MC14011CP
BZ
BUZZER OUT
2SC2021 x4 PLL SW
2SC2021 x3 LED DRIVE
8 KEY BOARD
LED CH DISPLAY
SL-2172x4
R1/R2/R3/DISPLAY
LED x3
LED METER DISPLAY
UAA-180 DOT LED x9
METER SIG IN
SPEAKER
BUZZER
RX ANT
RF PRF AMP
3SK48
RF AMP
3N201B
MIXER
3N201B
(10.7MHz) XTAL FIL
1ST IF AMP
2SC460B
(10.7MHz) CERAMIC FIL
(SENS SW)
H
M
L
RX VCO IN
2ND MIX
2SC460B
455KHz CERA FIL
IF AMP
μPC577H
2ND IF AMP
μPC577H
2SC460B
2ND LO
10.245
DISC
AF OUT
NOISE OUT
NOISE IN
SQL
NOISE AMP
2SC945Q
NOISE AMP
2SC945Q
METER AMP
TA7063
DC AMP
2SK19GR
SQL SW
2SC945Q
PRE AMP
2SC945Q
SCAN SW
2SC945Q
AF AMP
HA1366W
TONE SW
2SC945Q
AFIN
RX REG+B
RX+B
TX+B
2SC136B
2SC136B
JSP6009
PTT
SWED+B
TONE SW

$\frac{1202}{6012.5} = 5.002$ = $\frac{1202}{144.0125 - 138.000}$

Mr T Jackson
Sunnyside
Reason Road
Stafford
ST17 9JT

$5.002 \times 1024$

IF = 5.122,130 MHz

~~+20~~ $5.002 \times 1200 = x$

$(5.002 \times 1200) + 138,000 = 144025$

$(144.0125 - 138,000) \div 5 = 1202.5$

145.0125

$(145012.5 - 138,000) \div 5 = 1402.5$

$(5.002 \times 1400) + 138,000 = 145028$

3 kHz @ 145.975
2.5 kHz @ 144.000