

# HF SINGLE SIDEBAND RADIOTELEPHONE

# IC-M700

# MAINTENANCE MANUAL



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## SECTION 1 SPECIFICATIONS

### GENERAL

#### Frequency Coverage:

Receive	1.6MHz ~ 23.9999MHz
Transmit	2.0MHz ~ 2.9999MHz
	4.0MHz ~ 4.9999MHz
	6.0MHz ~ 6.9999MHz
	8.0MHz ~ 8.9999MHz
	12.0MHz ~ 13.9999MHz
	16.0MHz ~ 17.9999MHz
	22.0MHz ~ 22.9999MHz

#### Frequency Control:

CPU based 100Hz step Digital PLL synthesizer.  
Independent Transmit-Receive Frequency Programmable on any band.

#### Frequency Readout:

6 digit 100Hz readout.

#### Frequency Stability:

Less than  $\pm 20$ Hz in the range of  $-30^{\circ}\text{C} \sim +60^{\circ}\text{C}$

#### Memory Channel Capacity:

48 Simplex or Semi-duplex Channels owner Programmable

#### Power Supply Requirements:

DC 13.6V  $\pm 15\%$  Negative ground  
Current drain 25A max.  
AC power supply is available for AC operation.

#### Current Drain:

Receiving;	Stand by	1.2A
	Max. audio output	1.6A
Transmitting;	Average voice	12A
	Two tones	19A

#### Antenna Impedance:

50 ohms Unbalanced

#### Weight:

7.2kg (15.8 lb)

#### Dimensions:

112(124)mm(H) x 287(297)mm(W) x 356(376)mm(D)

( ): Shows the dimensions including projections

### TRANSMITTER

#### Emission Modes:

A3J (J3E; USB and LSB)  
A3A (R3E; USB)  
A3H (H3E; USB)

#### RF Output Power:

150 Watts PEP.

#### Spurious Emissions:

-65dB

#### Carrier Suppression:

A3J (J3E) 40dB  
A3A (R3E) 16dB  $\pm 2$ dB  
A3A (H3E) 3 ~ 6dB

#### Unwanted Sideband:

-55dB

#### Microphone:

600 ohms with push-to-talk switch

### RECEIVER

#### Receiving System:

Double-conversion Superheterodyne

#### Receiving Modes:

A3J (J3E; USB and LSB)

A3 (A3E, H3E)

#### Intermediate Frequencies:

1st	70.4515MHz
2nd	9.0115MHz (A3J) 9.0100MHz (A3)

#### Sensitivity:

A3J (J3E) 12dB SINAD at  $-6\text{dB}\mu$  (0.5 $\mu\text{V}$ ) input

A3 (A3E) 12dB SINAD at 3dB $\mu$  (1.4 $\mu\text{V}$ ) input

#### Selectivity:

A3J (J3E) 2.3KHz/6dB, 4.2KHz/60dB

A3 (A3E) 6.0KHz/6dB, 20.0KHz/60dB

#### Spurious and Image Rejection:

70dB

#### Clarifier Range:

$\pm 150$ Hz

#### Audio Output:

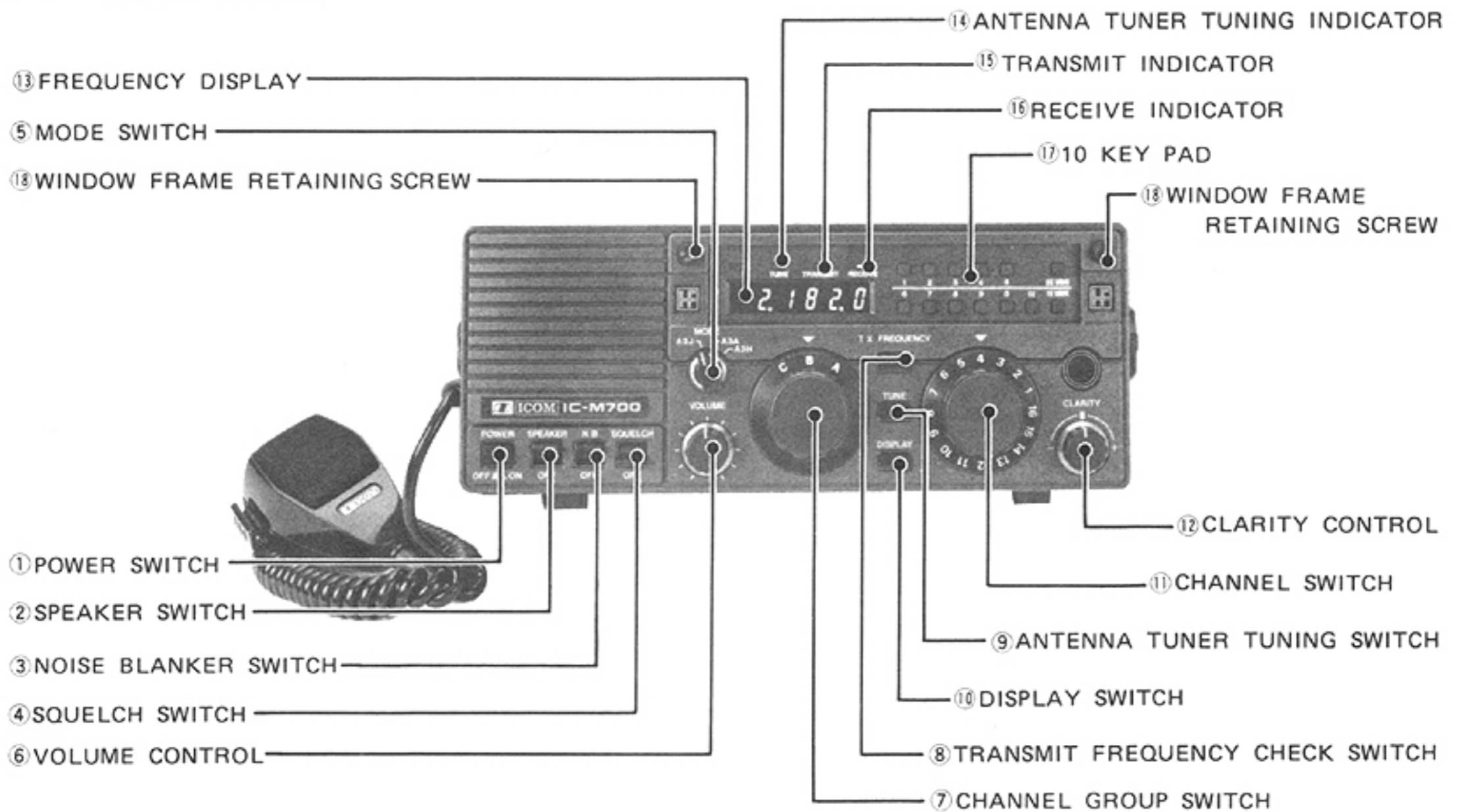
5 watts (4 ohms, 10% distortion)

#### AF Output Impedance:

2 - 8 ohms

## SECTION 2 OPERATING CONTROLS

### 2 - 1 FRONT PANEL



#### 1. POWER SWITCH

The POWER SWITCH is a push-lock type switch which controls the input DC power to the IC-M700. When the switch is pushed in and locked, power is supplied to the set. When the switch is pushed again and released, power is cut to all circuits except the PA unit.

#### 2. SPEAKER SWITCH

Switches the internal speaker ON and OFF. When connecting an external speaker to the external speaker jack, the external speaker will be actuated even if this switch is turned OFF.

#### 3. NOISE BLANKER SWITCH

Switches the noise blanker circuit ON and OFF. When the switch is turned ON (up position), pulse-type noises will be reduced to provide acceptable reception.

#### 4. SQUELCH SWITCH

Switches the squelch function ON and OFF. When the squelch is turned ON, the radio maintains silent until a human voice signal is received.

#### 5. MODE SWITCH

Selects the operation mode, one of A3J (J3E), A3A (R3E) and A3H (H3E). Turning this switch counterclockwise further from A3J position, selects A3J LSB mode.

#### 6. VOLUME CONTROL

Controls the audio output level in the receive mode. Clockwise rotation increases the level.

#### 7. CHANNEL GROUP SWITCH

Selects a channel group, one of A, B and C. Each group has 16 channels, and a channel can be selected by the CHANNEL SWITCH.

#### 8. TRANSMIT FREQUENCY CHECK SWITCH

While holding this switch, the receive frequency changes to the transmit frequency. Thus the transmit frequency may be checked.

#### 9. ANTENNA TUNER TUNING SWITCH

Starts tuning function of the automatic antenna tuner installed. By holding this switch, the radio is turned in the transmit mode and a low power signal is transmitted (this level can be adjusted by an internal control) to tune the antenna tuner. At this time, the ANTENNA TUNER TUNING INDICATOR is ON. When the tuning has been finished, the TUNING INDICATOR goes off and the radio returns to the receive mode.

#### 10. DISPLAY SWITCH

Turns all the display illuminations ON and OFF.

#### 11. CHANNEL SWITCH

Selects a channel, of 16 channels which has been selected by the CHANNEL GROUP SWITCH.

#### 12. CLARITY CONTROL

Shifts the receive frequency 150Hz (maximum) to either side of the displayed receive frequency. This allows clear reception for an off frequency signal. Rotating this control clockwise (+ side) raises the receive frequency and counterclockwise (- side) lowers the receive frequency.

### 13. FREQUENCY DISPLAY

Shows the operating frequency (receiving frequency or transmitting frequency) of the selected channel. The frequency indicated is the carrier frequency of each mode.

### 14. ANTENNA TUNER TUNING INDICATOR

Illuminates when the ANTENNA TUNER TUNING SWITCH is depressed and the antenna tuner is tuning automatically.

### 15. TRANSMIT INDICATOR

Illuminates when the radio is in the transmit mode.

### 16. RECEIVE INDICATOR

Illuminates when the squelch is opened in the receive mode.

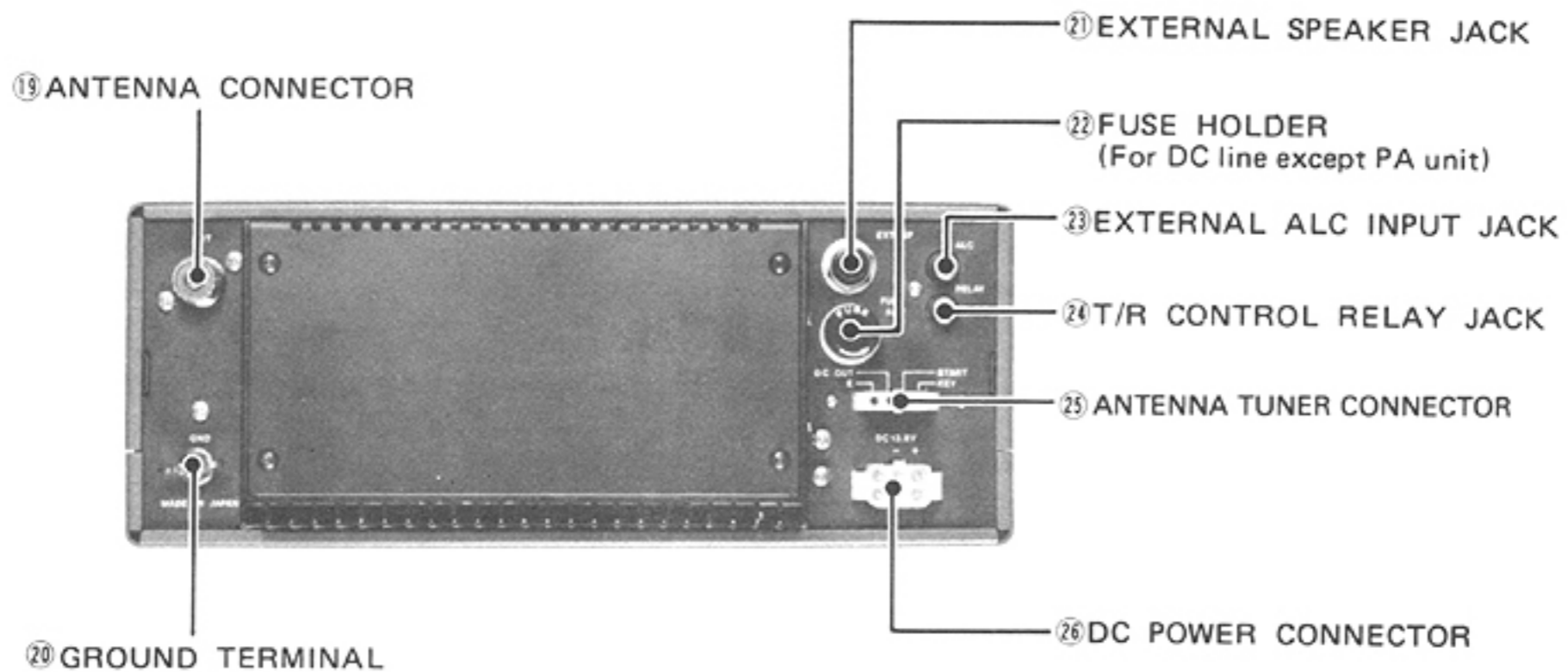
### 17. 10 KEY PAD

By pushing these keys, receive frequency and transmit frequency of each channel can be memorized.

### 18. WINDOW FRAME RETAINING SCREWS

By removing these screws, the window frame of the frequency display can be removed and this allows to push the keys of the 10 key pad.

## 2 - 2 REAR PANEL CONNECTIONS



### 19. ANTENNA CONNECTOR

This is used to connect an antenna to the radio. Its impedance is 50 ohms and connect with a PL-259 connector. When using a whip antenna or single wire antenna, use an antenna coupler (antenna tuner) for matching.

### 20. GROUND TERMINAL

To prevent electrical shock, interferences for other electronic equipment and other problems, be sure to ground the radio to good ground such as the engine block through the GROUND TERMINAL. For best results use as heavy a gauge wire or strap as possible and make the connection as short as possible.

### 21. EXTERNAL SPEAKER JACK

When an external speaker is used, connect it to this jack. Use a speaker with an impedance of 4 - 8 ohms. The external speaker is paralleled to the internal speaker and actuated even if the speaker switch is turned off. This jack can also be used as an AF output terminal for a FAX machine or tele-typewriter.

### 22. FUSE HOLDER

This holds a fuse for the DC circuits except the PA unit. If the fuse is blown, replace it with a new 5 Amp fuse. Open the fuse holder with a Philips head screwdriver.

### 23. EXTERNAL ALC INPUT JACK

This jack can be used for input terminal of external ALC (Auto Level Control) signal from a linear amplifier. The ALC voltage should be in 0V ~ -4V.

### 24. T/R CONTROL RELAY JACK

Controls Transmit/Receive for an external linear amplifier or other equipment. This relay can be used to switch 24V 1A DC. Don't exceed this limit.

### 25. ANTENNA TUNER CONNECTOR

This connector is for an automatic antenna tuner (antenna coupler), and puts out a start signal, inputs tuning signal and supplies 13.6V DC for the antenna tuner.

### 26. DC POWER CONNECTOR

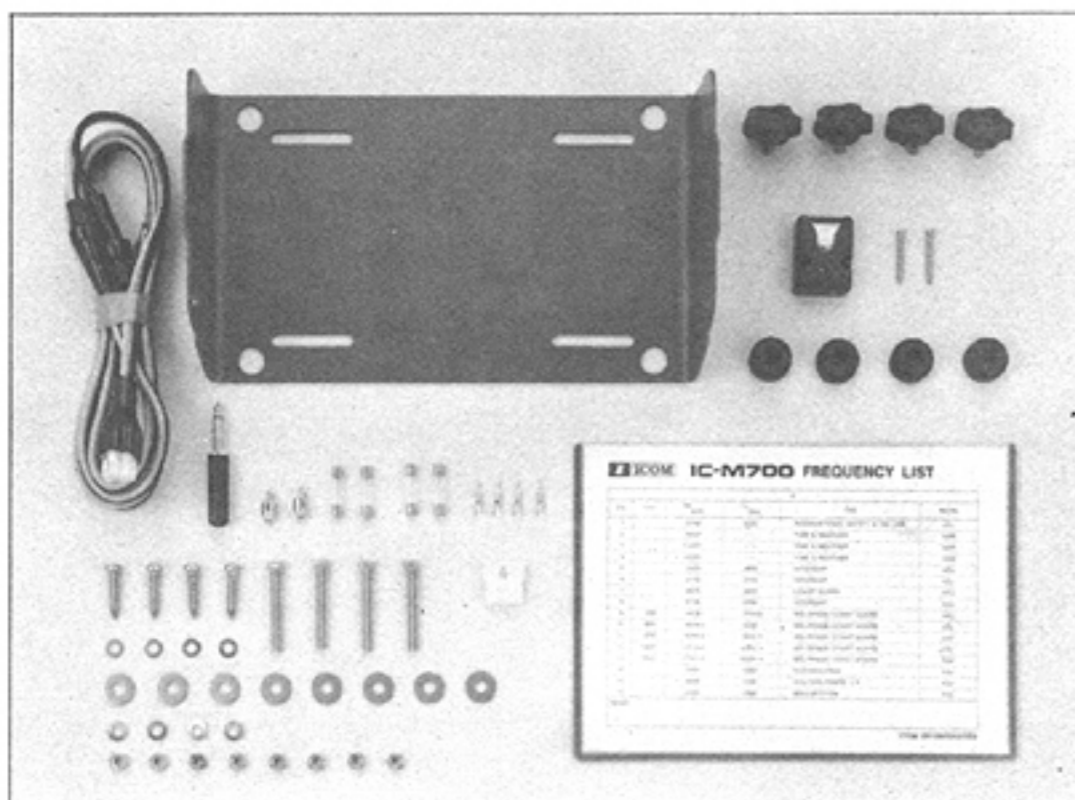
For connection of 13.6V DC power source.

## SECTION 3 INSTALLATION

BE SURE TO READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE OPERATION

### 3-1 UNPACKING

Carefully remove your transceiver from the packing carton and examine it for signs of shipping damage. Should any be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended you keep the shipping cartons. In the event storage, moving, or reshipment becomes necessary they will be handy. Accessory cables, plugs, etc., are packed with the transceiver. Make sure you have not overlooked anything.



1. Power Cord . . . . .	1
2. External Speaker Plug . . . . .	1
3. Pin Plugs . . . . .	2
4. Fuses (30A) . . . . .	2
5. Fuses (5A) . . . . .	2
6. Antenna Tuner Connector (with contact pins) . . . . .	1
7. Mounting Bracket . . . . .	1
8. Mounting Screw Knobs . . . . .	4
9. Flat Washers (M5) . . . . .	4
10. Bracket Fixing Screws (Tapping Screws) . . . . .	4
11. Bracket Fixing Screws (Hex Head Screws) . . . . .	4
12. Flat Washers (M6) . . . . .	8
13. Spring Washers (M6) . . . . .	4
14. Bracket Fixing Screw's Nuts (M6) . . . . .	8
15. Microphone Hanger . . . . .	1
16. Microphone Hanger Fixing Screws . . . . .	2
17. Frequency Chart (with Plastic Case) . . . . .	1
18. Rubber Cushion Feet . . . . .	4

### 3-2 PLANNING

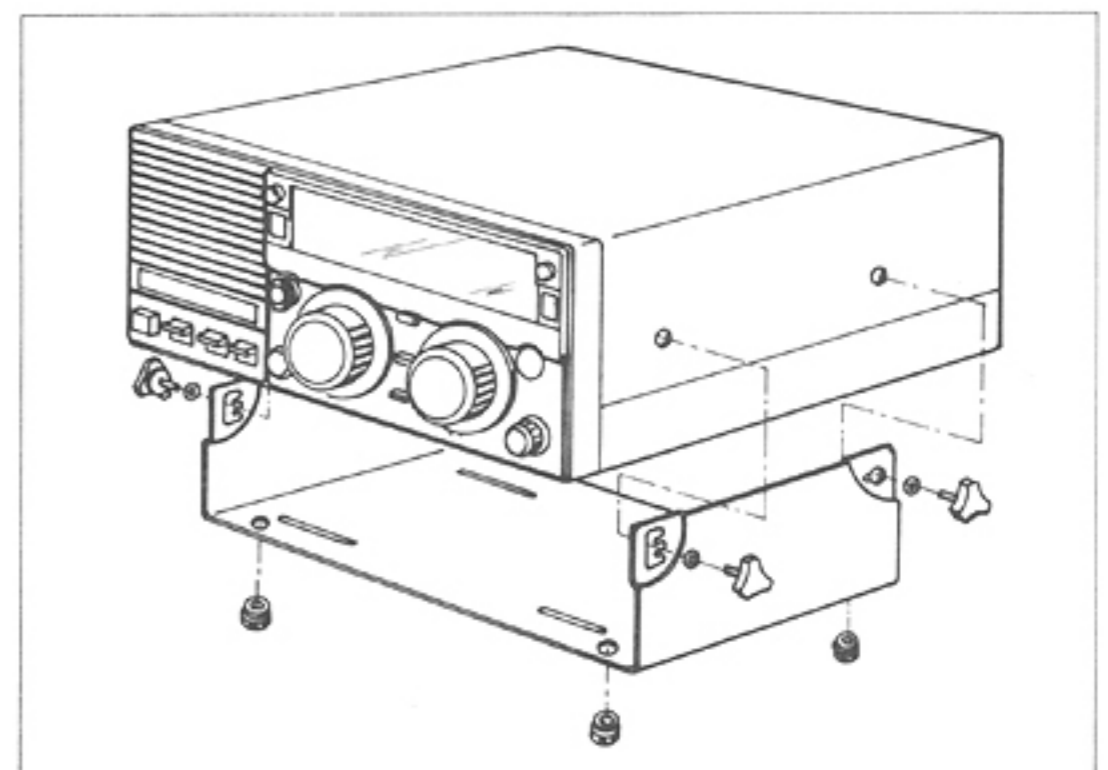
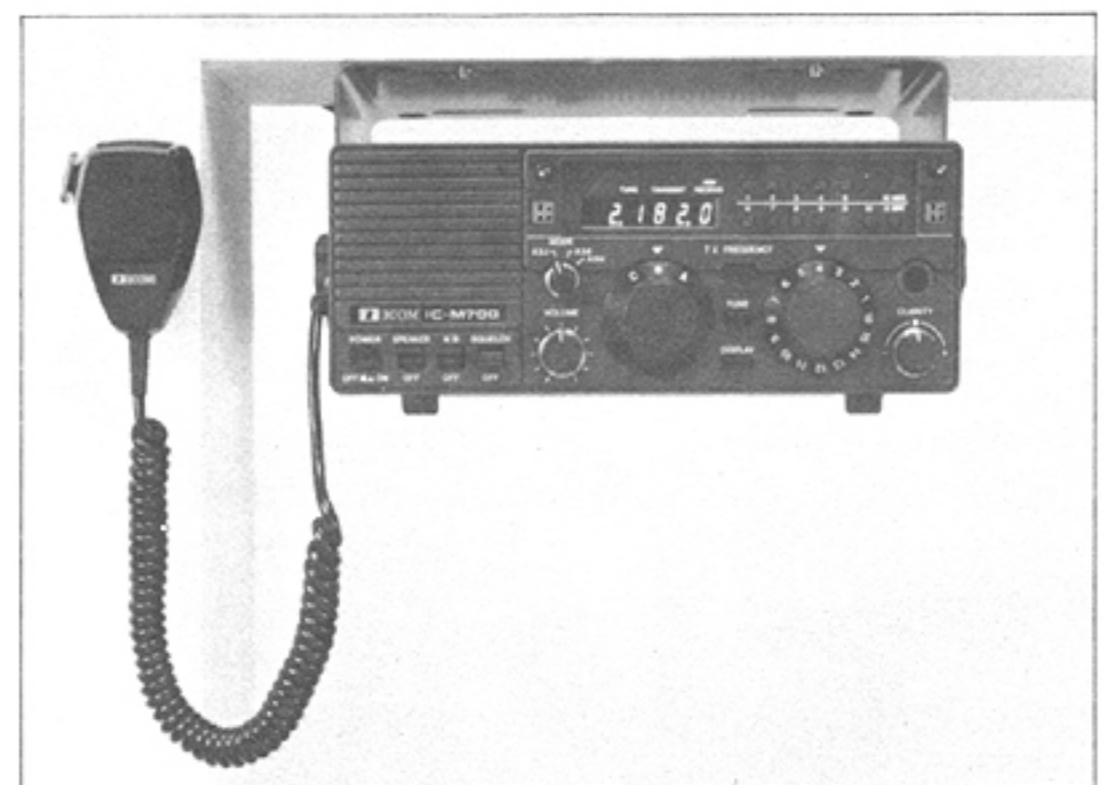
Select a location for your transceiver which will allow free access to the front controls, good air circulation and rear clearance for access to the fuse and cable connectors. Provide the best protection you can from direct rain or heavy seas.

Avoid long cable runs to the antenna and power source. At the same time, keep power and antenna cables as far as possible from electrical sources i.e. generators, alternators, electrical pumps, etc. Stay away from the magnetic compass with the cables, and avoid running the antenna cable near electronic instruments.

### 3-3 MOUNTING THE TRANSCEIVER

Your ICOM transceiver is supplied with a universal bracket which allows "over" or "under" mounting by placing the bracket where the unit is adequately supported when wave shock and vibration are considered.

The mounting hardware supplied will fit most installations, but should you need special mounting fasteners any good marine supply store will be able to assist you. As in any marine installation it is recommended that high quality marine fasteners be used. Try to avoid drilling new mounting holes in the bracket, as the balance of the set may be affected.



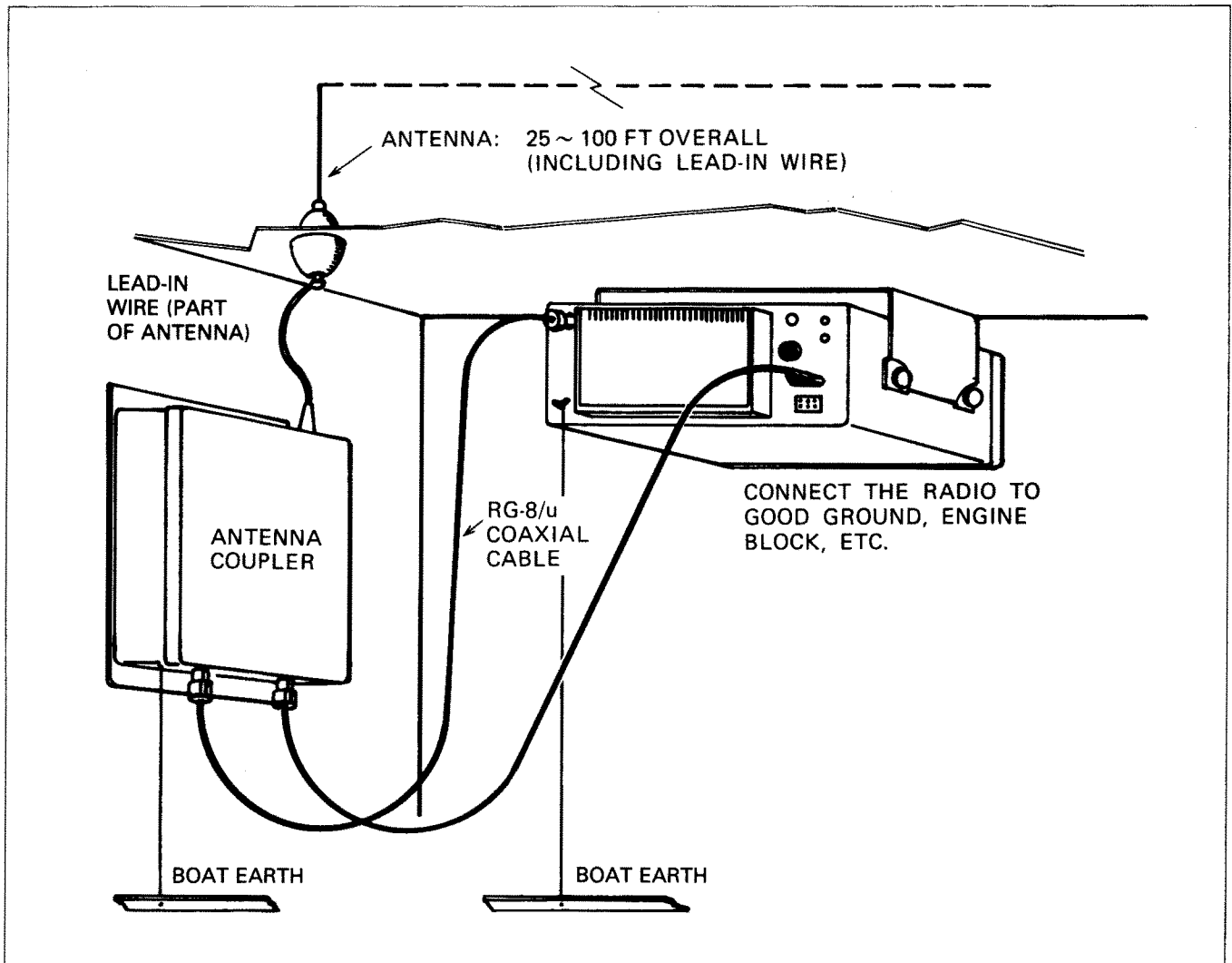
### 3 - 4 TYPICAL INSTALLATION

The following figure shows a typical installation. Any radio communications system operating with a whip antenna or long wire antenna (insulated back stay) must have an adequate ground connection, otherwise the overall efficiency of the radio installation is degraded especially at lower frequencies.

The 50 ohm output impedance of the transceiver makes it necessary to employ antennas of the trapped or externally matched type. The use of an antenna coupler in conjunc-

tion with a whip antenna or long wire antenna (insulated back stay) allows an efficient installation which will cover all HF marine bands. The transceiver was designed to easily interface with most existing antenna couplers for marine applications.

On wooden or fiberglass boats, the use of a copper ground plate as the ground portion of the keel on a sailboat will often perform adequately. The ground system must be joined to the antenna coupler with a heavy copper strap.



### 3 - 5 PRIMARY POWER

If at all possible, do not exceed the 10 feet length of the power cable supplied, if it is necessary to make a run over 10 feet use #6 cable, and more than 20 feet should not be used. Use a direct run to the power source. Connect the power cable to the DC power source with the RED lead to the positive terminal and the BLACK lead to the negative terminal. When hooking up the cable, solder all connections and insure that all connections are clean, tight and moisture free.

Be sure to leave a service margin in the power cable so that should the transceiver have to be removed from the bracket it can slide out without straining the cable.

### 3 - 6 EXTERNAL SPEAKER

The IC-M700 contains an internal speaker, and is also designed so that it can drive an external speaker from the external (EXT) speaker jack on the rear panel. Be sure the impedance of the external speaker is 4 - 8 ohms, and connect it with supplied 1/4 inch standard phone plug.

The external speaker is paralleled to the internal speaker and actuated even if the speaker switch on the front panel is turned off. Thus the external speaker jack can also be used as an AF output terminal for a FAX machine or tele-typewriter.

## SECTION 4 OPERATING INSTRUCTIONS

### 4 - 1 HOW TO TUNE

The following instructions are for tuning in any mode. Please read carefully and understand fully before turning ON your unit.

To select a channel which is memorized the desired operation frequency, first, select the group, A, B or C, including the desired channel with the CHANNEL GROUP SWITCH. Then, select the channel with the CHANNEL SWITCH.

#### 4 - 1 - 1 CHANNEL SELECTION

The frequencies shown in the following charts are memorized in the radio already.

Set operation mode to the desired one, A3J, A3A or A3H, if it differs.

BANK		A			
CH	ITU	RX KHz	TX KHz	USE	MODE
1		2182	2182	INTERNATIONAL SAFETY & CALLING	A3J
2		5000	—	TIME & WEATHER	A3H
3		10000	—	TIME & WEATHER	A3H
4		15000	—	TIME & WEATHER	A3H
5		2638	2638	INTERSHIP	A3J
6		2142	2142	INTERSHIP	A3J
7		2670	2670	COAST GUARD	A3J
8		2738	2738	INTERSHIP	A3J
9	424	4428.7	4134.3	MID RANGE/COAST GUARD	A3J
10	601	6506.4	6200	MID RANGE/COAST GUARD	A3J
11	816	8765.4	8241.5	MID RANGE/COAST GUARD	A3J
12	1205	13113.2	12342.4	MID RANGE/COAST GUARD	A3J
13	1625	17307.3	16534.4	MID RANGE/COAST GUARD	A3J
14		2450	2003	KLH/SAN FRAN.	A3J
15		2466	2382	KOU/SAN PEDRO CA	A3J
16		2450	2366	WOU/BOSTON	A3J

BANK		B				BANK		C			
CH	ITU	RX KHz	TX KHz	USE	MODE	CH	ITU	RX KHz	TX KHz	USE	MODE
1	401	4357.4	4063.0	KMI TELEPHONE	A3J	1	1609	17257.7	16484.8	WOM TELEPHONE	A3J
2	804	8728.2	8204.3	KMI TELEPHONE	A3J	2	2215	22639.4	22043.4	WOM TELEPHONE	A3J
3	809	8743.7	8219.8	KMI TELEPHONE	A3J	3	2216	22642.5	22046.5	WOM TELEPHONE	A3J
4	1201	13100.8	12330.0	KMI TELEPHONE	A3J	4	410	4385.3	4090.9	WOO TELEPHONE	A3J
5	1202	13103.9	12333.1	KMI TELEPHONE	A3J	5	411	4388.4	4094.0	WOO TELEPHONE	A3J
6	1602	17236.0	16463.1	KMI TELEPHONE	A3J	6	808	8740.6	8216.7	WOO TELEPHONE	A3J
7	1603	17239.1	16466.2	KMI TELEPHONE	A3J	7	811	8749.9	8226.0	WOO TELEPHONE	A3J
8	2214	22636.3	22040.3	KMI TELEPHONE	A3J	8	1203	13107.0	12336.2	WOO TELEPHONE	A3J
9	2223	22664.2	22068.2	KMI TELEPHONE	A3J	9	1210	13128.7	12357.9	WOO TELEPHONE	A3J
10	403	4363.6	4069.2	WOM TELEPHONE	A3J	10	1605	17245.3	16472.4	WOO TELEPHONE	A3J
11	412	4391.5	4097.1	WOM TELEPHONE	A3J	11	1620	17291.8	16518.9	WOO TELEPHONE	A3J
12	802	8722.0	8198.1	WOM TELEPHONE	A3J	12	2201	22596.0	22000.0	WOO TELEPHONE	A3J
13	805	8731.3	8207.4	WOM TELEPHONE	A3J	13	2205	22608.4	22012.4	WOO TELEPHONE	A3J
14	1206	13116.3	12345.5	WOM TELEPHONE	A3J	14		2482	2382	WOX/NEW YORK	A3J
15	1208	13122.5	12351.7	WOM TELEPHONE	A3J	15		2450	2366	WGB/NORFOLK	A3J
16	1601	17232.9	16460.0	WOM TELEPHONE	A3J	16		2442	2400	WDR/MIAMI	A3J

When a channel is selected, the memorized frequency is displayed on the FREQUENCY DISPLAY with 5 or 6 digits down to 100Hz digit. Since the 1MHz and 1KHz

decimal points are displayed, the frequency can be easily read. The frequency indicated is the carrier frequency of each mode.



**4 - 1 - 2 MEMORY WRITING (PROGRAMMING THE CHANNELS)**

When you wish to rewrite the frequency memorized in a channel or to write a new frequency into a channel, the following steps are taken.

1. Select the channel you wish to rewrite or to write a frequency with the CHANNEL GROUP SWITCH and CHANNEL SWITCH. The frequency memorized in the channel is displayed on the FREQUENCY DISPLAY (if no frequency has been memorized in the channel, only the MHz and KHz decimals are displayed).
2. Remove the WINDOW FRAME RETAINING SCREWS and WINDOW FRAME.
3. Set the desired frequency by pushing digit keys of the 10 KEY PAD representing the frequency desired, beginning with the 10MHz digit (or 1MHz digit depending on the desired frequency) and ending with the 100Hz digit.
4. If illegal digits or out of band frequency have been entered, the entered digits are canceled and the FREQUENCY DISPLAY will be blanked (only MHz and KHz decimals are displayed).
5. When wrong key has been pushed, push the "CE" key, the entered digits are canceled and the previous memorized frequency will be recalled.
6. When the entered digits are correct, push the "RX WRITE" key for receive frequency, or the "TX WRITE" key for transmit frequency. The entered frequency will be memorized into the selected memory channel.
7. When a transmit frequency has been memorized, the memorized transmit frequency is not shown on the FREQUENCY DISPLAY. To check the transmit frequency, push the TRANSMIT FREQUENCY CHECK SWITCH. While depressing the CHECK SWITCH, the memorized transmit frequency will be shown on the FREQUENCY DISPLAY.
8. Memorize not only the receive frequency, but also the transmit frequency, even if the both frequencies are the same.
9. If you wish to memorize only a receive frequency into a channel, enter "0" as the transmit frequency (push "0" key, then "TX WRITE" key).
10. Memorize frequencies into other channels with the same manner.

**FOR EXAMPLE:**

When memorizing the receive frequency at 12345.6KHz;

Push key	Display	
	12.3570	(Previous Frequency)
1	00.000.1	
2	00.001.2	
3	00.012.3	
4	00.123.4	
5	01234.5	
6	12.345.6	
<input type="checkbox"/> RX WRITE	12.345.6	(Memorized into the selected channel.)

When memorizing the transmit frequency at 13210.5KHz;

Push key	Display	
	12.3570	(Previous Frequency)
1	00.000.1	
3	00.001.3	
2	00.013.2	
1	00.132.1	
0	01321.0	
5	13.210.5	
<input type="checkbox"/> TX WRITE	12.345.6	(This shows the receive frequency.)

**NOTE:** 13210.5KHz has been memorized into the selected channel, but the FREQUENCY DISPLAY will show the receive frequency.

To check the memorized transmit frequency, push the TRANSMIT FREQUENCY CHECK SWITCH.

TX FREQUENCY

<input type="checkbox"/>	13.210.5
--------------------------	----------

## 4 - 2 RECEIVING

After connecting the power cable, an antenna, etc., set knobs and switches as follows:

POWER SWITCH	OFF (OUT)
SPEAKER SWITCH	ON (UP)
NOISE BLANKER SWITCH	OFF (DOWN)
SQUELCH SWITCH	OFF (DOWN)
VOLUME CONTROL	Fully Counterclockwise
MODE SWITCH	Desired Mode
CHANNEL GROUP SWITCH	Desired Group including channel desired
CHANNEL SWITCH	Desired Channel memorized frequency desired
DISPLAY SWITCH	ON (OUT)
CLARITY CONTROL	Center (12 o'clock) position

Now push the POWER SWITCH in. The FREQUENCY DISPLAY will show a receiving frequency and the RECEIVE INDICATOR will be illuminated.

The IC-M700 provides USB (upper sideband) signals in all modes. If you wish to operate on LSB (A3J), turn the MODE SWITCH further counterclockwise from the A3J position.

Slowly turn the VOLUME CONTROL clockwise to a comfortable level.

If squelch function is required to cut out noise when no signal is received, turn the SQUELCH SWITCH on (UP position), and the noise from the speaker stops and the RECEIVE INDICATOR goes off. The radio will now remain silent until an incoming signal (modulated with human voices) is received which opens the squelch and lights the RECEIVE INDICATOR. If the squelch is unstable due to the reception of weak signals or mobile stations, turn off the SQUELCH SWITCH.

When a receiving signal's frequency is slightly off the receiving frequency, adjust the CLARITY CONTROL so that the signal can be heard clearly.

When pulse type noise such as ignition noise is audible, set the NOISE BLANKER SWITCH to the ON (UP) position. The noise will be reduced to provide comfortable reception.

If you wish to cut off the internal speaker when using an external speaker or receiving a FAX or tele-typewriter signal, set the SPEAKER SWITCH to the OFF (DOWN) position.

## 4 - 3 TRANSMITTING

Before transmitting, listen in the receive mode to make sure your transmissin will not interfere with other communications. If the transmit frequency differs with the receive frequency, push the TRANSMIT FREQUENCY CHECK SWITCH, and the radio receives on the transmit frequency while the switch is depressed.

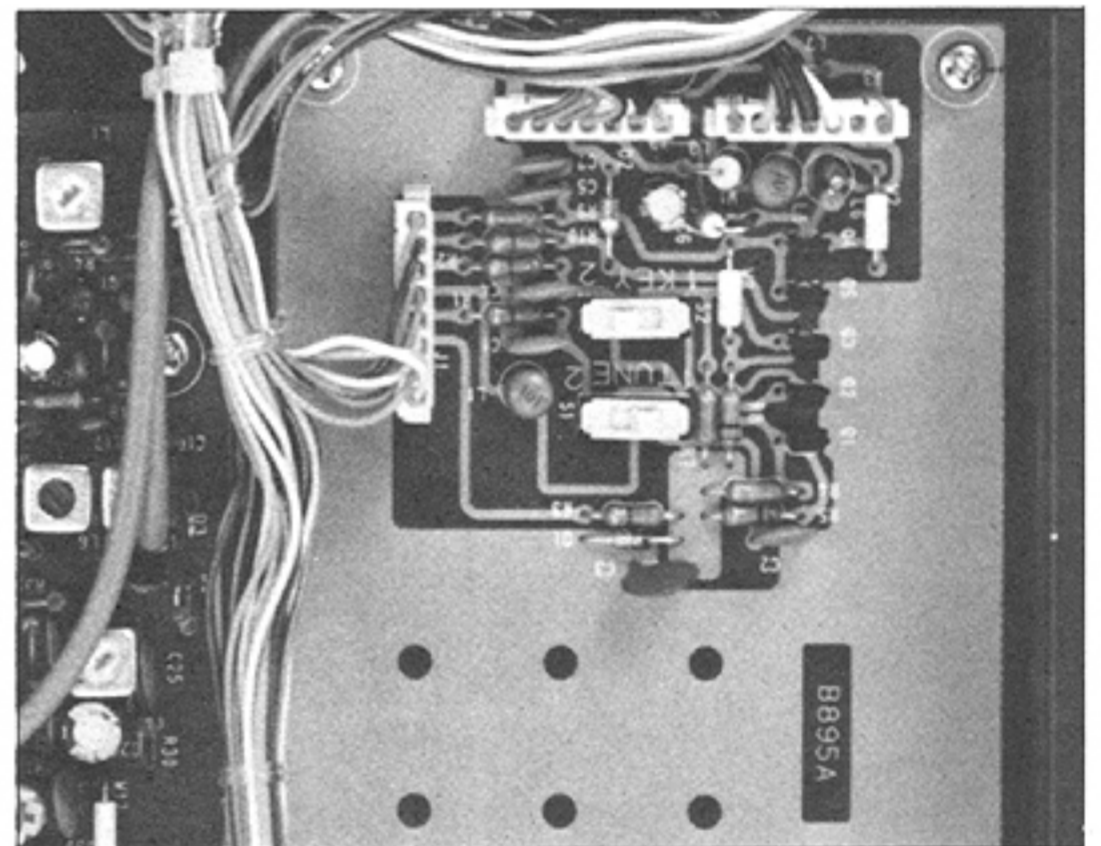
By depressing the PTT (push-to-talk) switch on the microphone, the radio is turned to the transmit mode and the TRANSMIT INDICATOR is illuminated. By speaking into the microphone, transmit signals will be transmitted.

To return to the receive mode, just release the microphone PTT switch.

## 4 - 4 ANTENNA TUNER (ANTENNA COUPLER)

The IC-M700 provides the antenna tuner connector which outputs and/or inputs control signals to control an automatic antenna tuner. The control signal levels can be selected by internal switches, thus most existing antenna tuners can be used.

When S1 (TUNE switch) on the MIC-C unit is set in the "1" position (indicated on the PC board), the "START" terminal of the ANTENNA TUNER CONNECTOR is usually grounded (0V), and by pushing the ANTENNA TUNER TUNING SWITCH, the START terminal supplies 8V DC through a 1K ohm resistor.



When S1 is set in the "2" position, the "START" terminal usually supplies about 8V DC through a 22K ohm resistor, and by pushing the TUNING SWITCH, the START terminal is grounded (0V) and sinks a current put out from the ANTENNA TUNER.

When S2 (KEY switch) on the MIC-C unit is set in the "1" position (indicated on the PC board), the "KEY" terminal of the ANTENNA TUNER CONNECTOR accepts a DC voltage (2V ~ 15V) which is put out from the ANTENNA TUNER, and the radio keeps the tuning function until the antenna tuner has finished the tuning and stops to put out the DC voltage.

When S2 is set in the "2" position, the "KEY" terminal usually supplies about 8V DC through a 22K ohm resistor, and by starting the TUNING function of the ANTENNA TUNER, the KEY terminal is grounded (0V) by the ANTENNA TUNER, and the radio keeps the tuning function until the antenna tuner has finished the tuning and stops to ground the KEY terminal.

When no antenna tuner is connected, the "TUNE" switch does not function.

#### **4 - 5 ALARM FUNCTION (OPTION)**

The ALARM UNIT will be supplied as an option. When the optional unit is installed, the international alarm signal can be automatically transmitted on 2182KHz by pushing the ALARM SWITCH (included with the ALARM UNIT and installed on the front panel).

##### **TO TEST THE ALARM FUNCTION**

When the radio is set in the receive mode, by just pushing the ALARM SWITCH, the operation frequency is set on 2182.0KHz and the mode is A3H (H3E), even if a different frequency and mode have been set previously, and international alarm signal tones can be heard from the speaker and the ALARM INDICATOR (located next to the ANTENNA TUNER TUNING INDICATOR on the front panel) is lit. The tones will be made for a period of 50 seconds.

To stop the tones, push the ALARM switch again.

To clear the alarm function and to return to the previous operation frequency and mode, push the TRANSMIT FREQUENCY CHECK switch.

##### **TO TRANSMIT THE ALARM SIGNALS**

**CAUTION:** Never transmit the alarm signals except when your ship is in distress.

Push the ALARM SWITCH while depressing the PTT (Push-To-Talk) switch on the microphone, and the operation frequency is set on 2182.0KHz and the mode is A3H (H3E), even if a different frequency and mode have been set previously, and international alarm signals are transmitted. At the same time, the signal tones can be heard from the speaker and the ALARM INDICATOR on the front panel is lit. The radio will be kept in the transmit mode, even if the PTT switch is released, during a period of 50 seconds.

When an antenna tuner is connected, first, the radio is set in the ANTENNA TUNING mode. After the tuner has been tuned on 2182KHz, the radio is turned in the transmit mode automatically and transmits the alarm signals.

After the period of 50 seconds, the radio returns to the receive mode, but the operation frequency and mode will be maintained 2182KHz and A3H (H3E) respectively.

To transmit distress messages, depress the PTT switch and talk into the microphone with normal and clear voices in the usual way.

To clear the alarm function and to return to the previous operation frequency and mode, push the TRANSMIT FREQUENCY CHECK switch.

## SECTION 5 CIRCUIT DESCRIPTION

### 5 - 1 RECEIVER CIRCUITS

#### 5 - 1 - 1 RF CIRCUITS

The received signal is passed from J606 through the 1.6MMHz high-pass filter consisting of L666 through L668 and C736 through C741. After the strong broadcast signals are removed, the signal passes the filter which is designed for the desired frequency. This filter is switched by D606 through D619 from among 6 band-pass filters and 1 low-pass filter.

These 7 filters are designed for the following bands:

1.6MHz ~ 3.0MHz	B1
3 MHz ~ 5 MHz	B2
5 MHz ~ 7 MHz	B3
7 MHz ~ 10 MHz	B4
10 MHz ~ 14 MHz	B5
14 MHz ~ 18 MHz	B6
18 MHz ~ 24 MHz	B7

Then the image interference is removed and the 1st and 2nd local oscillator frequencies leaking to the ANT terminal are suppressed by the low-pass filter consisting of L620, L621, C638 through C641, and C743. The signal is then fed to the 1st mixer.

The 1st mixer, featuring low noise and high dynamic range, consists of JFETs Q607 and Q608, and converts the receiving signal into the 1st IF frequency of 70.4515MHz. The 1st local oscillator frequency (70.4515MHz higher than the receiving frequency) from the PLL unit passes the high-pass filter, is amplified by Q609, has its harmonics removed by the low-pass filter, and is applied to the gates of Q607 and Q608.

The signal, converted to 70.4515MHz, passes monolithic crystal filter FI601-B, is amplified by Q606, passes a receive/transmit switching diode D604 and a monolithic crystal filter FI601-A, and is fed to the 2nd mixer.

The total passband of both FI601-A and FI601-B is 70.4515MHz  $\pm$  7.5KHz (-3dB). The AGC voltage is applied to the 2nd gate of Q606.

The 2nd mixer is a diode DBM (double balanced mixer), IC604 and is injected with the 2nd local oscillator frequency of 61.44MHz from the PLL unit. The 70.4515MHz IF frequency is converted to the 2nd IF frequency (9.0115 MHz) and is fed to the MAIN unit.

#### 5 - 1 - 2 9.0115MHz IF CIRCUIT

The signal, converted to 9.0115MHz by the 2nd mixer in the RF unit, is amplified by Q307 after the mixer's spurious components are removed by the double tuned circuit of L305 and L306.

FI301 (FL-30) and FI302 (FL-33) are crystal filters and their passbands are 2.3KHz/-6dB and 6KHz/-6dB, respectively. Q311 switches between these two filters so that FI301 is selected when the mode switch is set to J3E (A3J) or R3E (A3A) and FI302 is selected when the mode is H3E (A3H).

The 2nd IF signal, amplified by approx. 50dB by Q312 and Q313, is fed to the SSB detector IC302, the AM detector D327, and the AGC detector D323.

#### 5 - 1 - 3 DETECTION CIRCUIT

The J3E (A3J) and R3E (A3A) signals are mixed with the 9.013MHz carrier signal at IC302, converted to AF signals, and fed to the emitter follower Q316.

The H3E (A3H) signals are converted to an AF signal at the diode detector D327 and amplified at the buffer amplifier Q317 to match the output level in the SSB mode.

These outputs are fed to the volume control (on the front panel) and the audio controlled squelch circuit.

#### 5 - 1 - 4 NOISE BLANKER CIRCUIT

A portion of the 2nd IF signal from L305 is fed to the noise amplifier, Q301. This signal is amplified by approx. 80dB at Q301, Q302 and Q303, and then rectified by D301 and D302. Q304 is the AGC amplifier for the noise amplifiers and adjusts the gain of the noise amplifiers approx. 50dB. Q305 and Q306 switch on and off the balanced noise gate consisting of D304, D305, D306, and D307.

#### 5 - 1 - 5 AGC CIRCUIT

The voltage rectified by D323 is amplified by Q314 and controls the AGC voltage. The AGC time constant is set to the fast attack/slow release by R372, R373, C376, and C377. The AGC voltage is applied to the 2nd gate of the RF unit Q606, MAIN unit Q307, Q312, and Q313, and is capable of a gain control of 80dB or more.

#### 5 - 1 - 6 BFO CIRCUIT

The 9.013MHz carrier signal is generated by mixing a 10.24 MHz signal, the output of the highly stable PLL reference oscillator divided into 1/3, with a 1.227MHz signal. The 1.227MHz signal is obtained by dividing the oscillation frequency of X301 into 1/4 by CMOS IC312 to get an accurate frequency. For A3H reception, the dividing operation of IC312 is stopped to prevent beat reception.

The clarifier operates during receive by varying the bias voltage of D346 connected in series with X301. To remove the spurious signals of the carrier, the double balanced mixer IC304 is used to mix 10.24MHz and 1.227MHz, and a filter circuit is provided at the input of each frequency. A LPF and double tuned circuit is also provided for the 9.013 MHz output to prevent the generation of spurious signals.

### 5 - 1 - 7 AUDIO CONTROL LED SQUELCH CIRCUIT

A portion of the detector output signal enters the squelch circuit. The input signal is amplified by IC305 to the saturation level and a 3 through 5Hz component is detected by the F-V converter of IC306. IC307 is a full-wave rectifier circuit and rectifies the 3 through 5Hz signal into a DC voltage. IC308 is a switch circuit with hysteresis and becomes L (low) level during audio detection. The output of IC308 is connected to the base of Q329. The collector of Q329 switches the analog switch device IC309 and turns ON/OFF the AF signal. At the same time Q329 lights up the receive LED to indicate the squelch is opened.

### 5 - 1 - 8 AF POWER AMPLIFIER

IC310 is an audio power amplifier from which an output of 5W or more can be obtained. This IC has a low impedance output and has sufficient drive even if a 4 ohm speaker is externally connected in parallel with the built-in 4 ohm speaker.

## 5 - 2 TRANSMITTER CIRCUIT

### 5 - 2 - 1 BALANCED MODULATOR

Audio signals from the microphone are fed to the base of Q315 through the mic gain control R391 and amplified by Q315.

The amplified signals are fed to the double balanced modulator IC301 with the carrier signal the same as for the receiver detector.

### 5 - 2 - 2 9.0115MHz IF CIRCUIT

The DSB signal generated in the balanced modulator IC301 is fed into FI301 (in the reverse direction of the receive mode) and results in the SSB signal. During transmit, FI301 is selected regardless of the operating mode and an SSB signal is obtained. The carrier signal necessary for modes other than J3E (A3J) is combined in the linear amplifiers of Q308 and Q309, following FI301.

The transmitting IF signal is amplified to the rated output of -10dBm and then fed to the RF unit.

### 5 - 2 - 3 RF CIRCUITS

The 9MHz transmitting output from the MAIN unit is mixed with the 61.44MHz local oscillator signal at L611 through L612 and IC604, and converted to the 70.4515MHz IF signal. The spurious components are removed at the crystal filter FI601-A. The signal passes the transmit/receive switching diode D605 and attenuator R645 through R647, then enters the transmitting mixer.

The attenuator acts as a matching network between FI601-A and the mixer and improves the mixer's frequency characteristics.

The transmitting mixer of Q610 and Q611 is fed the local

oscillator signal which goes into the 2nd gate. To improve the frequency characteristics, the output has a resistive load of approximately 500 ohms so that the frequency characteristics are not affected at the output, and the signal is sent through the 25MHz low-pass filter of L629, L630 and C664 through C668, then fed to Q612.

The FET amplifier Q612 has an input impedance of 470 ohms to match the low-pass filter. The drain also has a resistive load. The 2nd gate of Q612 is applied with a control voltage for protection against overcurrents and high SWR, and to control output power.

The output of Q612 is amplified by Q613. To improve the frequency characteristics at Q613, the impedance between Q612 and Q613 is low impedance so input capacitance can be ignored. Further, to compensate the frequency characteristics at the output, C673 is added to the emitter.

The output of Q613, after passing the 1.6MHz high-pass filter, passes through the attenuator of R670 through R672 and is output to the PA unit. The attenuator acts as a buffer to the PA unit. This output is approximately +6dBm when the output is 150W.

To get stable operation, the transmitting circuits are supplied with T8V regulated power supply from the MAIN unit. The local oscillator frequency amplifier circuit also is supplied with an 8V regulated power supply from IC601.

### 5 - 2 - 4 PA PROTECTION CIRCUIT

The voltage of the 2nd gate of Q612 is lowered and the gain is reduced for lower power to protect the final transistors from a temperature rise caused by increased collector loss of the final transistors and overcurrent due to high SWR. This is accomplished by the circuit of IC603, Q605, and Q614.

IC603B is a differential amplifier and amplifies the potential difference generated at R871 (located in the PA unit) due to the current flowing through the PA. Q614 buffers the reflected wave voltage from the SWR detector circuit in the FILTER unit. If either or both voltages exceed the voltage determined by R614 and R681, the inverted amplifier IC603A begins amplification. Normally, the output voltage of IC603B is determined by R614 and R681 through R684. The voltage is lowered due to overcurrent or high SWR and the transmitting power is also lowered.

When the temperature rises, the voltage from J602 pin 4 (POL) turns Q605 on. The output voltage from IC603B is divided by R620 and R621 to lower the voltage and the power is lowered.

Further, when the antenna tuner is connected, the key signal turns Q603 off and Q604 on. The tuning power is set by the voltage divided by R620 and R619.

### 5 - 2 - 5 PA UNIT

This unit consists of 3 boards (PA, ANT SW, and connector) and the rear panel chassis to which they are attached.

The PA board is a linear amplifier with an output of 150W and amplifies the transmitting signal from the RF unit. The ANT SW board performs antenna switching for transmit/receive and has a protection circuit to prevent damage to the receiving unit caused by a strong input during receive when the output of an adjacent transmitter is induced by the antenna. The connector board and rear panel chassis holds the various boards and the wiring for the connectors mounted on the rear panel chassis.

### 5 - 2 - 6 PA CIRCUIT

The power amplifier is a 3-stage wide band linear amplifier and consists of a class A single amplifier for the input stage and class AB push-pull amplifiers for the driver and final stages. This unit produces an output of 150W PEP with an input of approximately 6dBm PEP. Further, each stage uses negative feedback and RC frequency compensation for a total gain variation of  $\pm 1.5$ dB or less (at an output of 55W).

### 5 - 2 - 7 BIAS CIRCUIT

Although the input stage has a fixed bias due to the class A operation, the driver and final stages have adjustable biases due to their class AB operation.

The bias of the driver stage is adjusted by varying the current flowing through D801 with R827. Further, D801 and Q803 are thermally coupled to minimize the variations of the idling current due to temperature changes.

The final stage is provided with emitter follower Q806 since the current flow is greater than in the driver stage. The bias of the final stage is adjusted by varying with R823 the current flowing through D802 and D804. D804 compensates for the voltage drop between the base and emitter of Q806. D802 and Q804 are thermally coupled with Q806 for stability.

### 5 - 2 - 8 THERMAL PROTECTION CIRCUIT

To prevent the final transistors (Q804, Q805) from excessive temperature rises and damage due to continuous transmitting, thermal switches S801 and S802 are thermally coupled to Q804 and Q805, respectively. When the temperature rises, the fan motor provided for the heat sink is turned on for forced air cooling. The fan motor has 4 speeds, transmit high speed, receive high speed, transmit low speed, and receive low speed.

S802 is a 50°C thermal switch and turns on the fan for low speed when Q805 reaches approximately 50°C. At this time, resistors R832 and R834 are connected in series within the motor. S801 is a 90°C thermal switch and turns on when Q804 reaches approximately 90°C. Then R831 is added in parallel to R832 and the motor voltage is

raised. Simultaneously, the POL voltage is supplied to the RF unit to lower the transmitting output by approximately half. Further, during transmit, Q807 shorts R834 to raise the motor voltage higher than during receive, thus increasing the fan speed.

### 5 - 2 - 9 ANTENNA SWITCHING CIRCUIT

Separate relays are used for antenna switching for transmit and receive. The receiving unit is connected to the antenna connector by RL852 and the transmitting unit by RL851. The antenna connector is provided with a surge absorber to prevent damage to the transmitting and receiving units due to high voltages such as induced lightning.

Further, if there is an input at the antenna connector of 1W or more during receive, its voltage is detected and the control voltage of RL852 is switched off by Q854 and Q853. The antenna is then disconnected from the RF unit to protect the receiving circuits.

A low-pass filter with a cutoff frequency of approximately 30MHz consisting of L851, L852, C852, and C854 is provided between the receive switching relay and the receiving input of the RF unit to reduce the incidental radiation from the antenna during receive.

### 5 - 2 - 10 FILTER UNIT

This unit is located between the PA unit and the antenna connector and suppresses the harmonics found in the transmitting output from the PA unit to -65dB or below. Chebyshev low-pass filters are used and 7 filters having different cutoff frequencies are switched depending on the transmitting frequency.

Filter switching is performed by driving the relay with the signal from the LOGIC unit.

At the output is an SWR detection circuit which uses a toroidal core. The detected traveling wave voltage is sent to the MAIN unit to control the ALC and the reflected wave voltage is sent to the RF unit as a control voltage for the protection circuit used to prevent an overload on the PA stage caused by a mismatched antenna.

### 5 - 2 - 11 ALC CIRCUIT

A peak ALC circuit is provided so that the transmit peak level does not exceed the rated output. The traveling-wave voltage detected from the FILTER unit is amplified at operational amplifier IC303 and compared with the reference voltage set by R463 to generate the ALC voltage. This ALC voltage is applied to the 1st gate of Q309 to control the output level of the SSB signal. The ALC voltage is also inverted and amplified by the same IC303 to light up the transmit LED.

Since the circuit for IC303 requires a negative power supply, the oscillator output from IC311 is rectified to produce a -4V.

## 5 - 2 - 12 POWER SUPPLY CIRCUIT

The power supply circuit consists of 11 transistors. Q318 eliminates the chattering of the PTT switch.

Transistors Q319, Q320, Q321, Q323, and Q325 switches REGs T8V and R8V on/off and controls the switching timing. Q319 also controls the linear standby relay. Q322 and Q324 clamps the line to 8V with REGs R8V and T8V, respectively. The 8V of REG Q328 is the reference for all voltages and is made especially stable. A constant current bias is applied to D334 and is obtained after being buffered by Q327. To prevent transmissions on frequencies other than the marine band, a control signal from the LOGIC unit is applied to Q318 and a circuit is provided so that the equipment does not transmit even if the PTT switch is pressed.

## 5 - 3 PLL CIRCUITS

This unit generates 2 oscillating outputs (first and second local oscillator signals) required by the RF unit and another oscillating output (third local oscillator signal) used to produce the BFO frequency within the MAIN unit. Among these, the first local oscillator is a frequency variable output in the 72 ~ 95MHz band and is generated by the PLL circuit having 2 locked loops. The second and third local oscillator outputs are fixed and are produced by multiplying or dividing the reference frequency signals.

The oscillating outputs produced within this unit are all determined by a single reference frequency. Adjusting this frequency corrects all the oscillating outputs.

### 5 - 3 - 1 REFERENCE OSCILLATOR CIRCUIT

The third overtone oscillator circuit of Q10 and X1 oscillates at 30.72MHz. Since this oscillation frequency determines the frequency within the PLL unit, high stability is required. A thermostatic oven is used for X1 and a stability of  $\pm 0.5\text{ppm}$  at  $-30^{\circ}\text{C} \sim +60^{\circ}\text{C}$  is obtained.

### 5 - 3 - 2 SECOND LOCAL OSCILLATOR OUTPUT

The output of the reference oscillator circuit is doubled at Q14, has its spurious components removed by the band pass filter of L3 ~ L5, and fed to the RF unit. The output is +3dBm/50 ohms at 61.44MHz.

### 5 - 3 - 3 THIRD LOCAL OSCILLATOR OUTPUT

The output of the reference oscillator circuit is divided by 3 at IC5 to obtain 10.24MHz. It is fed to the MAIN unit through emitter follower Q203.

### 5 - 3 - 4 FIRST LOCAL OSCILLATOR OUTPUT

The PLL circuit composed of 2 locked loops, a main loop and sub-loop are used. The sub-loop is used for the heterodyne signal within the main loop and the VCO output from the main loop is used for the first local oscillator output. The sub-loop causes VCO Q201 to oscillate at approximately 115 ~ 120MHz. This signal passes buffer amplifier Q202 and is locked by PLL ICs IC201 and IC202. The phase comparator frequency of this loop is 5KHz and varies

the dividing ratio of the programmable divider within IC201. A frequency variation of 5MHz in 50KHz steps is obtained. The locked VCO output passes through IC204 and IC203, is divided into 1/500 to a frequency of 230 ~ 240KHz. This is mixed by IC4 with the frequency of the reference oscillator circuit and is applied to IC3 within the main loop as a signal having a 10KHz variation in 100Hz steps within 30.95 ~ 30.96MHz.

The main loop switches 4 VCOs to oscillate at a frequency within 72.053MHz ~ 94.4529MHz, required by the first local oscillator. The lock is accomplished by the loop consisting of IC1, IC2, IC3, etc. The phase comparator frequency is 10KHz and varies the dividing ratio of the programmable divider within IC1 to vary the frequency in 10KHz steps. Further, mixer IC3 is provided within the loop. The signal obtained from the sub-loop having a frequency variable in 100Hz steps is used as a heterodyne signal. This covers the frequency variation in 100Hz steps required by the first local oscillator.

The comparator frequency for both the main and sub loops is produced by dividing the frequency of the reference oscillator circuit.

### 5 - 3 - 5 MUTE CIRCUIT

When the lock of the main or sub loop becomes "unlocked" or when the frequency is varied, the outputs of the first and second local oscillator are blocked to prevent transmitting or receiving on a frequency other than the desired one. The unlock signal output from IC1 and IC201 is given a suitable time constant by Q8 and Q9 and applied to Q24 and Q13 to stop the operation of the amplifiers in the first and second local oscillators, respectively, so that there are no outputs.

## 5 - 4 LOGIC CIRCUITS

All control of the receive and transmit frequencies of this equipment is performed by IC1005.

When the power is turned on, the signal from IC1008 (B) resets IC1005. The receiving and transmitting signal is fetched from the S input terminal and the frequency data stored in the RAM from the port F. (port H is for the control signal for the RAM) Next, IC1005 outputs, from port G, frequency data, PLL's N data (PLL control data), and switching data for the band pass filter and low-pass filter.

As a result of the data from port G and control signals D7 ~ D9, IC1006 outputs band switching data to P60 ~ P73 (Table 1), PLL control signals to P50 ~ P52, and mute signals for outside the marine bands to P40 ~ P41.

IC1007 buffers the outputs for the data from port G of IC1005 and the control signal from P52 of IC1006. IC1009 is the buffer for the low-pass filter switching relay. IC1008 (A) generates the mute signal output for frequencies outside 1600KHz to 23.99MHz.

**TABLE 1**

Port P	Band	B.P.F.	L.P.F.	VCO	Transmit Enable Band
P60	1.6000 ~ 2.9999MHz	B1	L1	V1	2.0000 ~ 2.9999MHz
P61	3.0000 ~ 4.9999MHz	B2	L2	V1	4.0000 ~ 4.9999MHz
P62	5.0000 ~ 6.9999MHz	B3	L3	V1	6.0000 ~ 6.9999MHz
P63	7.0000 ~ 9.9999MHz	B4	L4	V2	8.0000 ~ 8.9999MHz
P70	10.0000 ~ 11.9999MHz	B5	L5	V2	—————
P71	12.0000 ~ 13.9999MHz	B5	L5	V3	12.0000 ~ 13.9999MHz
P72	14.0000 ~ 17.9999MHz	B6	L6	V3	16.0000 ~ 17.9999MHz
P73	18.0000 ~ 23.9999MHz	B7	L7	V4	22.0000 ~ 22.9999MHz

The RAM can memorize 48 channels each for receive and transmit frequencies and can store them for 5 years by means of a lithium battery.

**5 - 5 CIRCUITS ON THE FRONT PANEL**

IC1203 is a latched driver used to drive the 7-segment LEDs (DS1201-DS1206) for frequency display with data from the RAM unit.

Because the LEDs are dynamically lit, the BCD-coded signal from IC1005 in the LOGIC unit is converted to 7-segment data and passes through buffer IC1201 to light up an LED digit.

The output of IC1204 is used as a key scan signal when writing frequency data.

The output from IC1202, Q1202, and Q1203 is used as a control signal to light the MHz and KHz decimal points for zero blanking of the 10MHz LED.

IC1205, Q1205, and Q1206 comprise the key input gate for the frequency data and is used to output key scan data from IC1204 to port F of IC1005 in the LOGIC. (IC1205 uses a 3-state gate since port F is used while switching the input and output.)

S1228 is used to disable the key input and a key cannot be input in the open state.

Q1219 and Q1213 checks for receive and transmit based on the signal from the MAIN unit and outputs to IC1005 in the LOGIC unit.

Q1208 to Q1212 buffer the signal for mode switch S1224 and outputs to the MAIN unit.

**5 - 6 CIRCUITS ON THE MIC UNIT**

This board receives the signal from the MIC connector. This board is selectable according to the type of MIC and antenna tuner.

J1303 is a connector for the MIC. The use of each pin is as follows.

1. AF AF output from the main board.
2. PTT PTT pin. Transmits when shorted with pin 3.
3. PTTE Ground pin for the PTT.
4. MIC MIC ground pin.
5. MIC MIC pin. When shipped from the factory, a DC voltage is applied but becomes input through a capacitor when W1301 is cut.
6. NC
7. AF Connected to the built-in speaker. When the speaker switch is turned-on while shorting pins 1 and 7, the built-in speaker is used.

**USE OF THE SWITCHES**

The 2 switches are for the antenna tuner which uses the output voltages from KEY (pin 1) and START (pin 2) of the tuner connector on the rear panel.

**S1 TUNE SWITCH**

1. Right side (as seen from the front): Normally, approximately 8V appears at the START pin. It is grounded when the tune switch on the front panel is depressed. (0V, sink)
2. Left side: Normally 0V. Approximately 8V appears at the START pin (internal resistance approximately 1K ohm) when the switch on the front panel is depressed.

**S2 KEY PIN SWITCH**

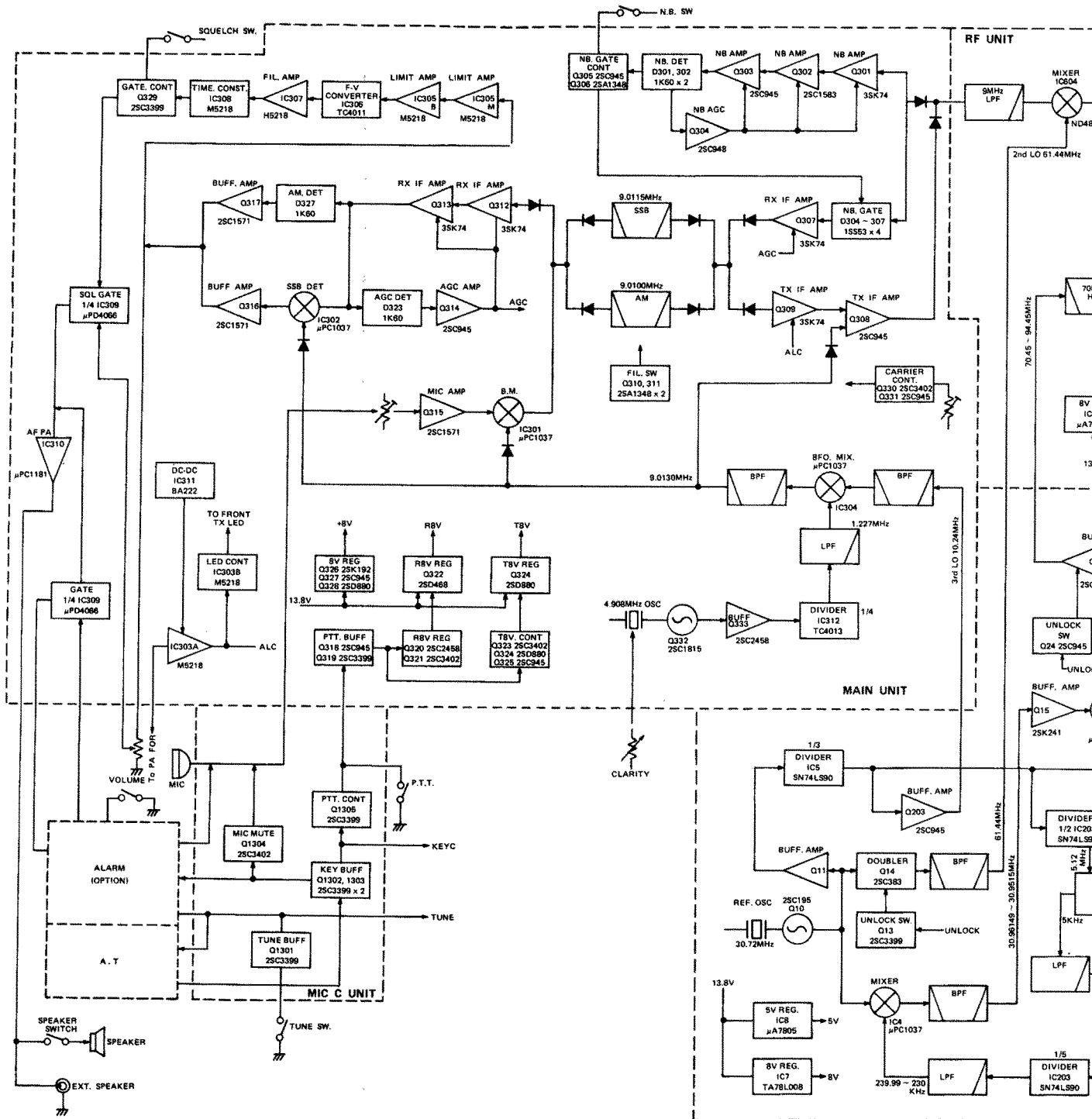
1. Right side: Tuning operation. The tuner sinks current. (approximately 0.4mA flows out) Normally open. (8V, 22K ohm)
2. Left side: Tuning operation. Voltage appears from the tuner side. (2 - 15V) Current: 50 - 400µA.

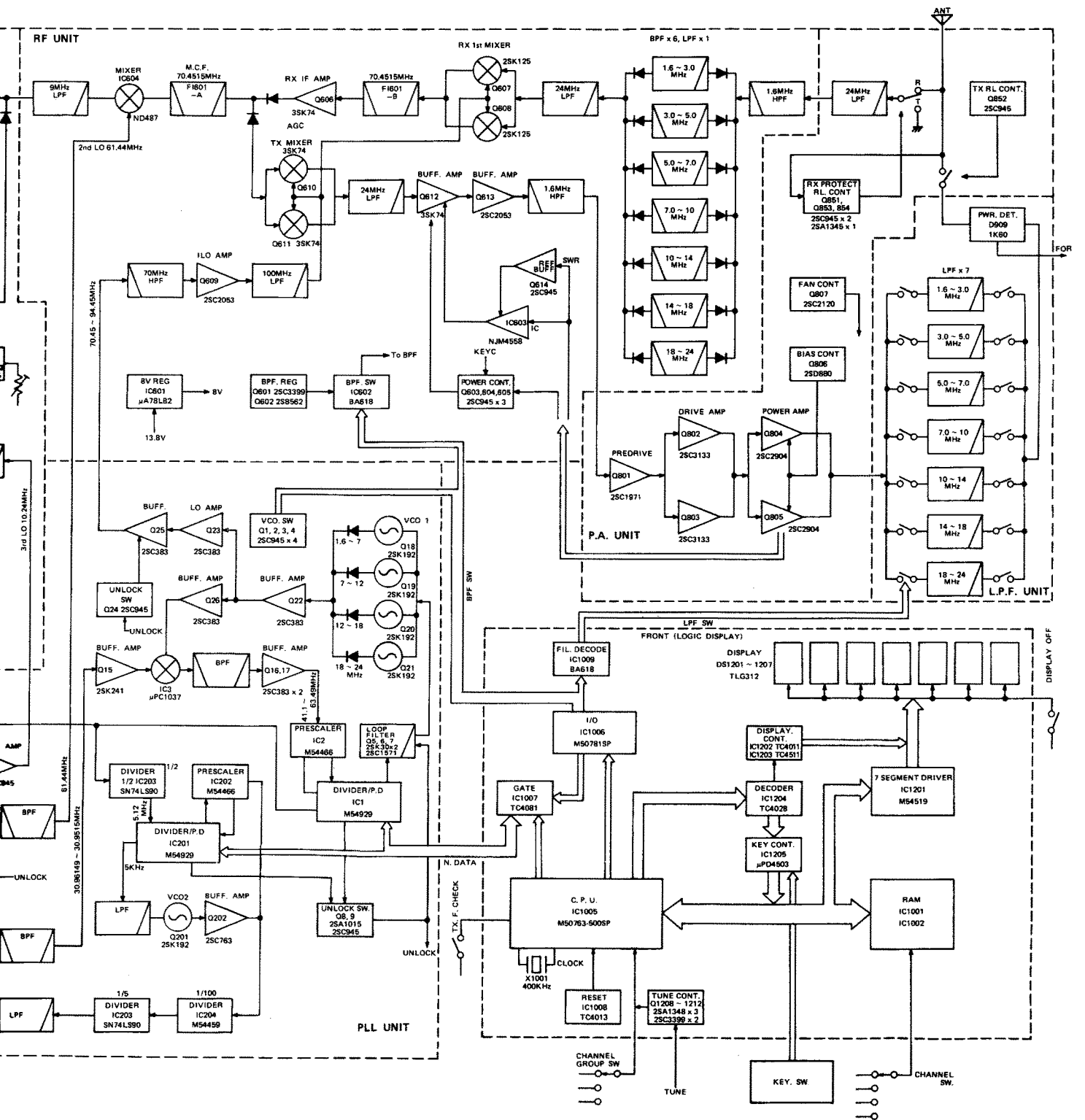
**5 - 7 OTHER CIRCUIT**

The rear panel chassis is mounted with the power input connector and other accessory connectors and serves to handle their wiring as well as those to each unit. Directly after the power connector is a reverse connection protection circuit of D872 and D873 which prevents damage to the equipment when the (+) and (-) terminals of the power cord have been inadvertently connected in reverse.



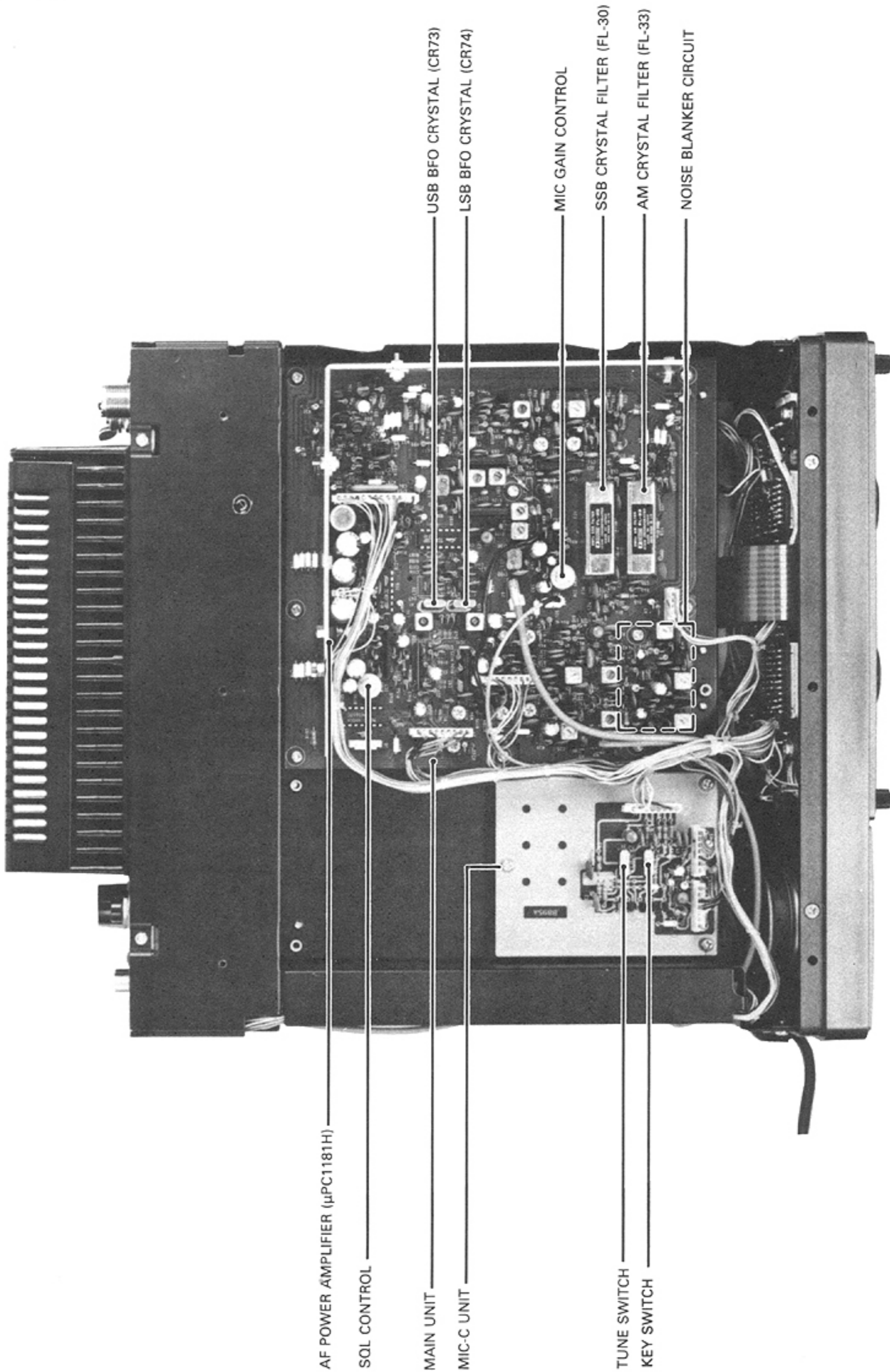
# SECTION 6 BLOCK DIAGRAM



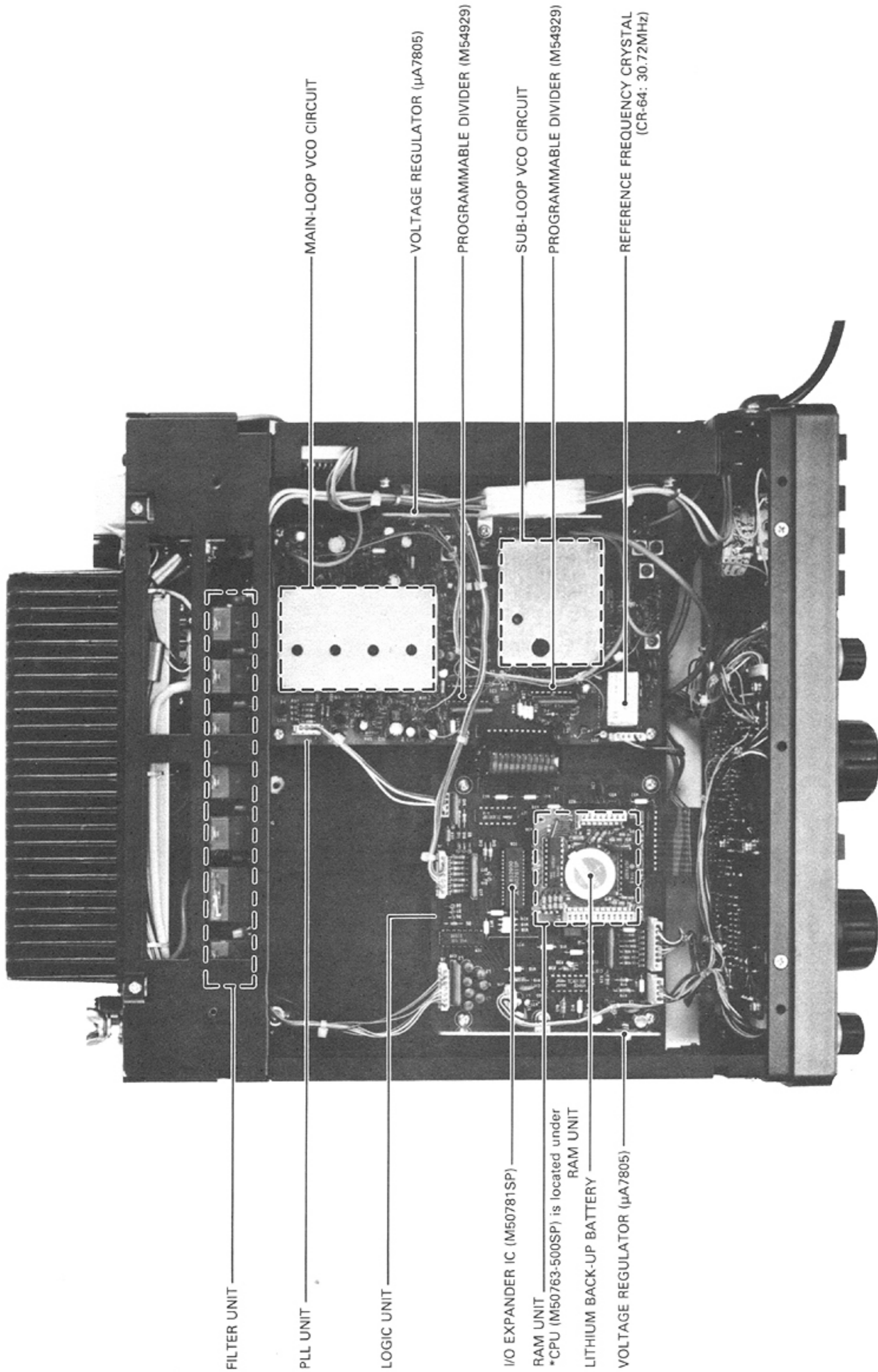


SECTION 7 INSIDE VIEWS

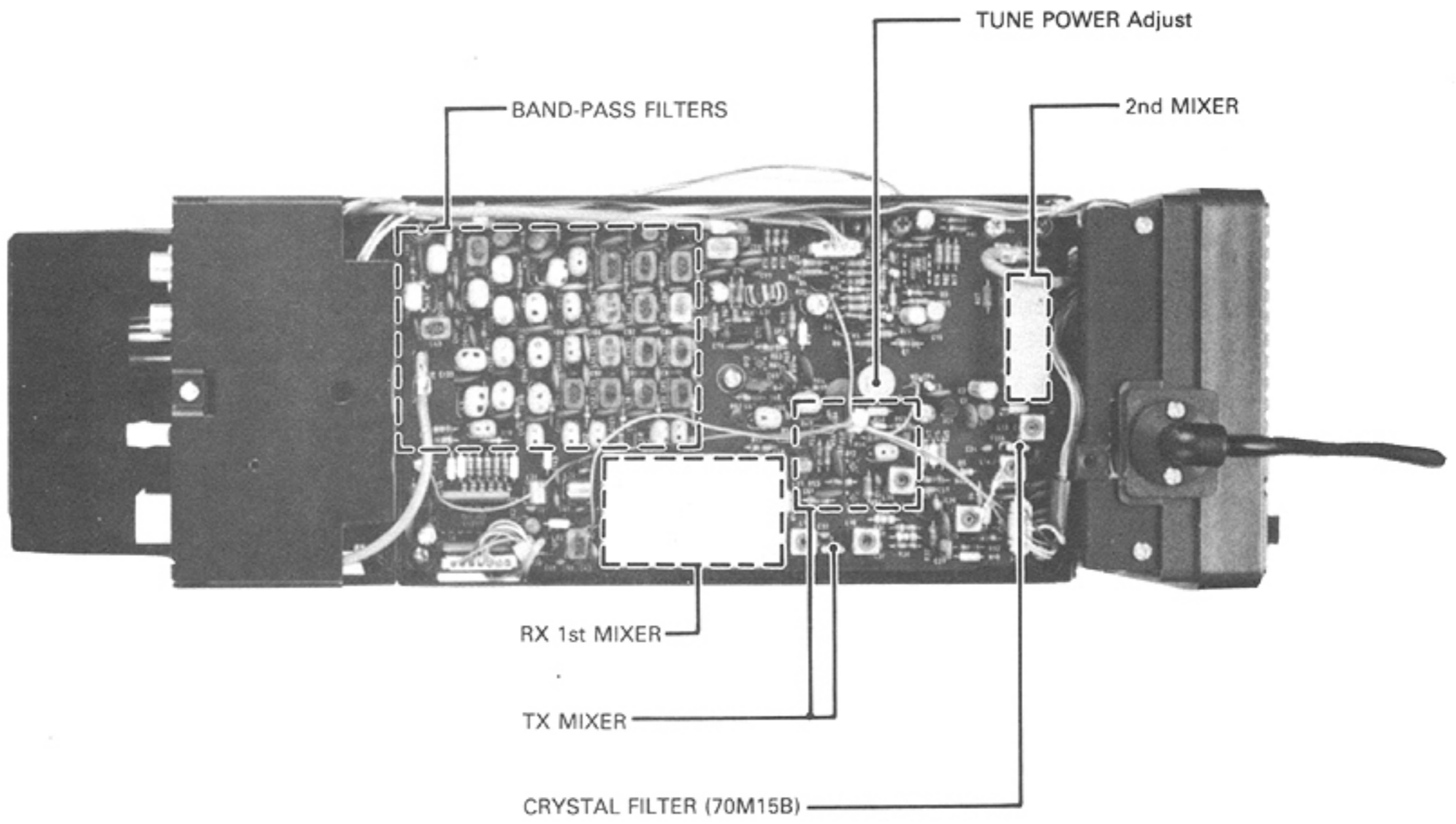
TOP VIEW



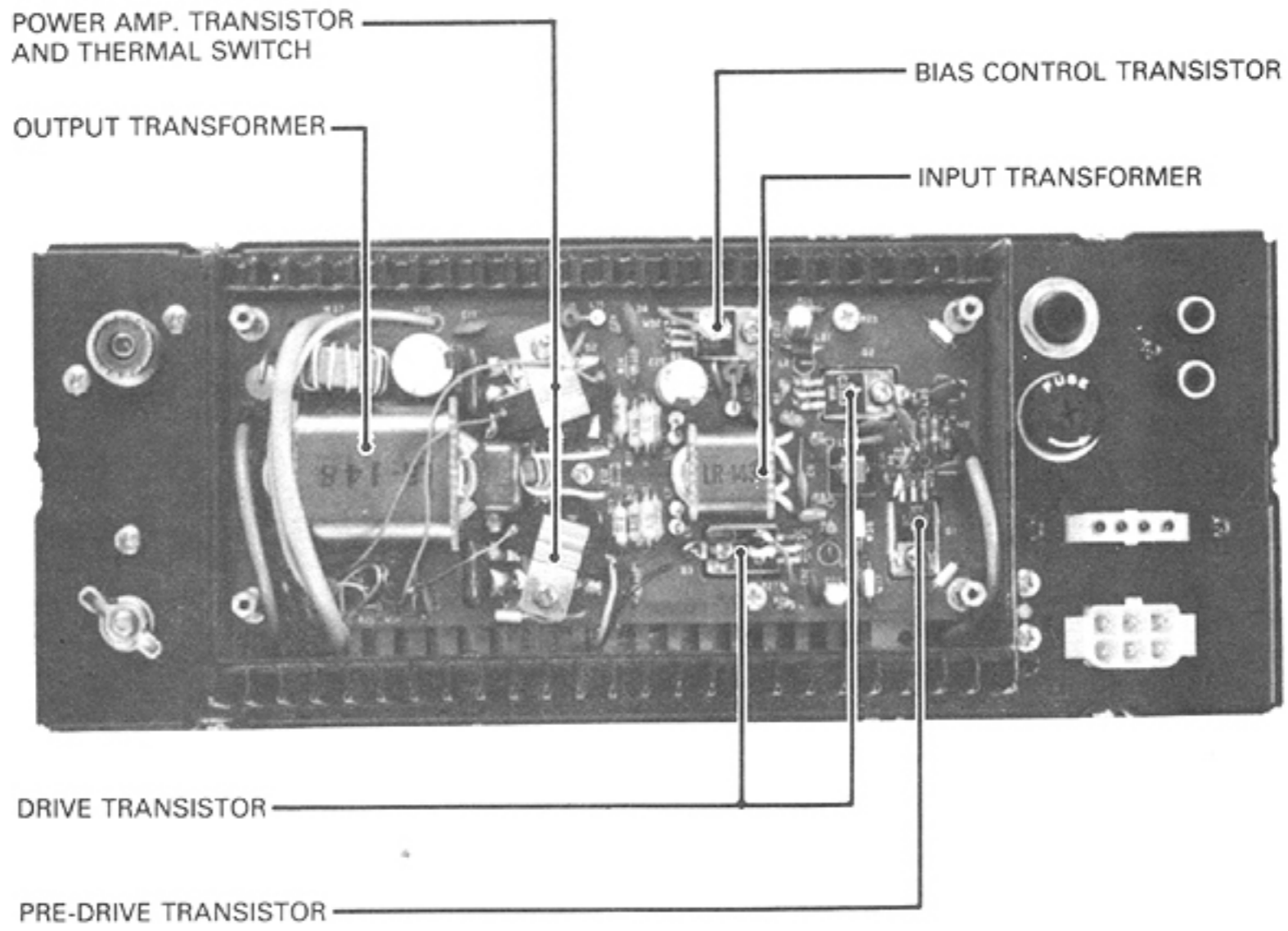
**BOTTOM VIEW**



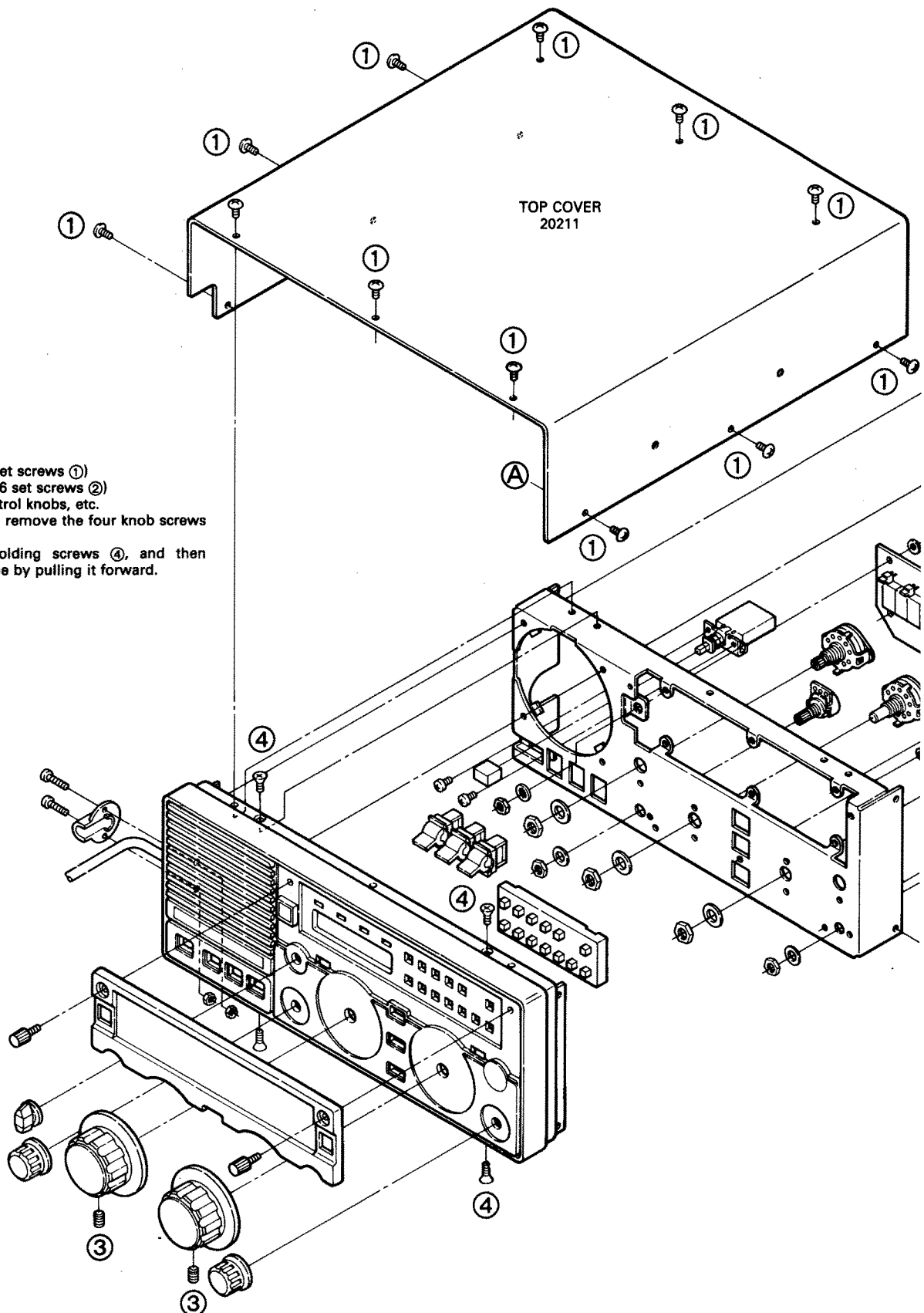
RF UNIT SIDE



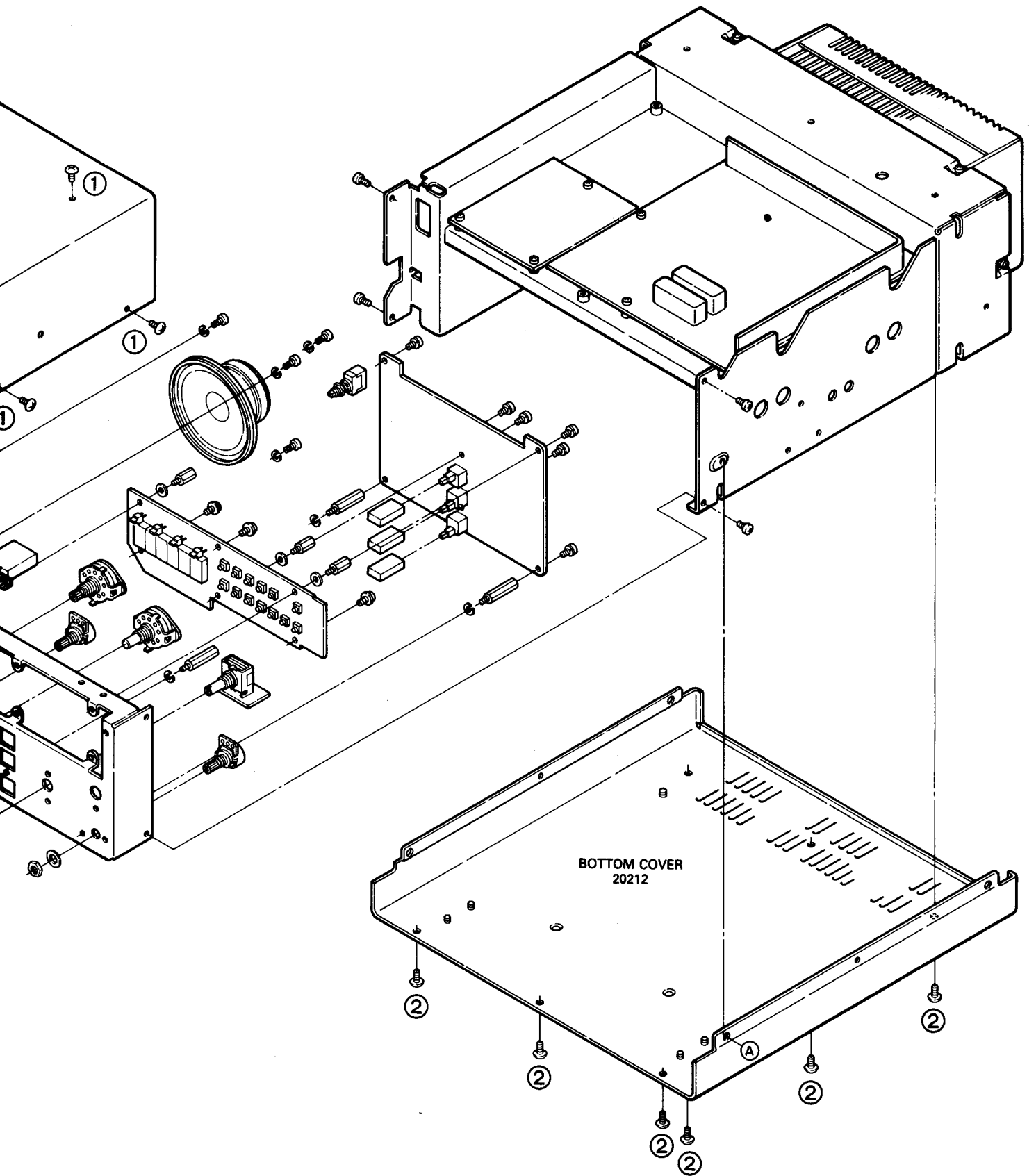
PA UNIT SIDE



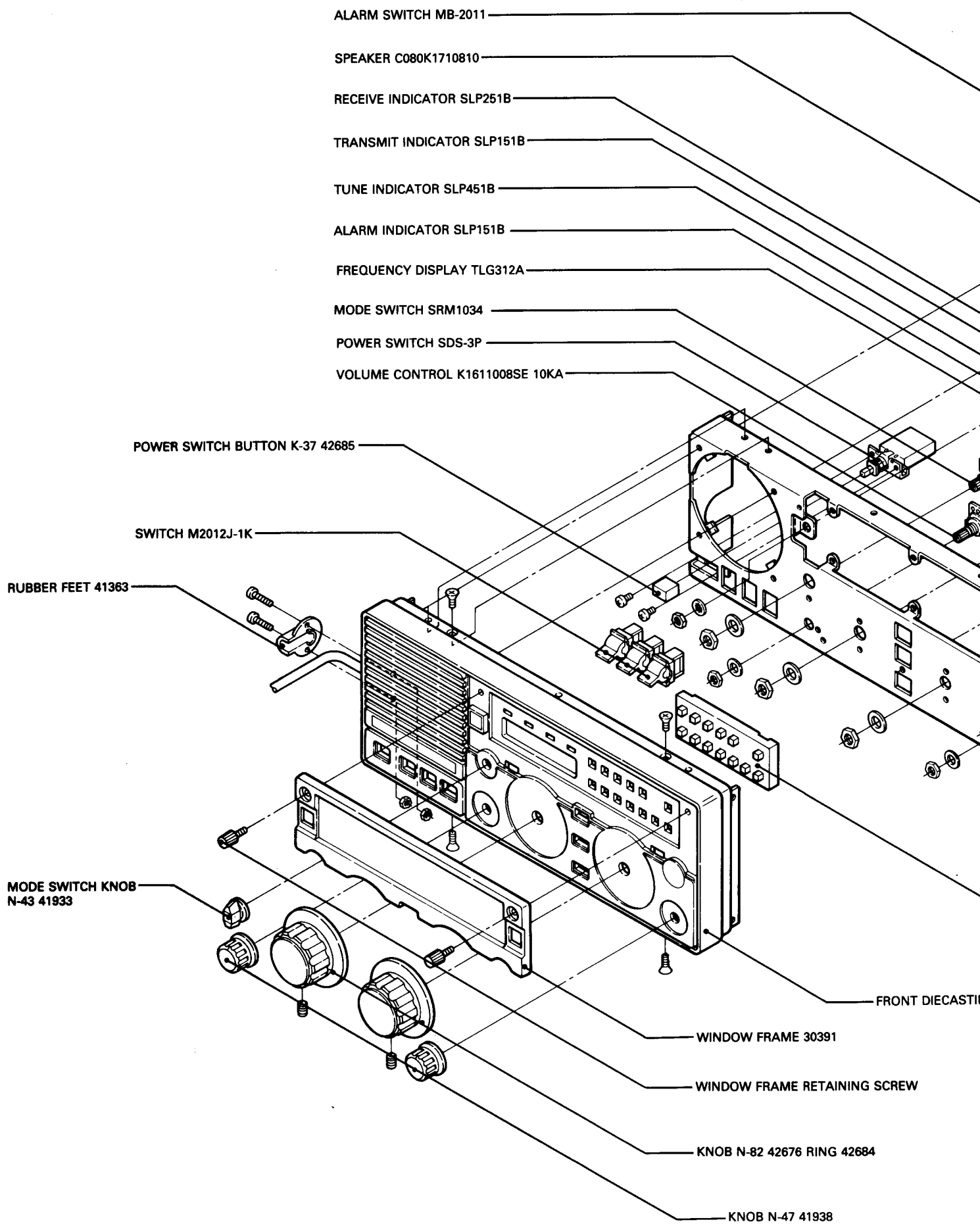
## SECTION 8 MECHANICAL PARTS AND DISASSEMBLY



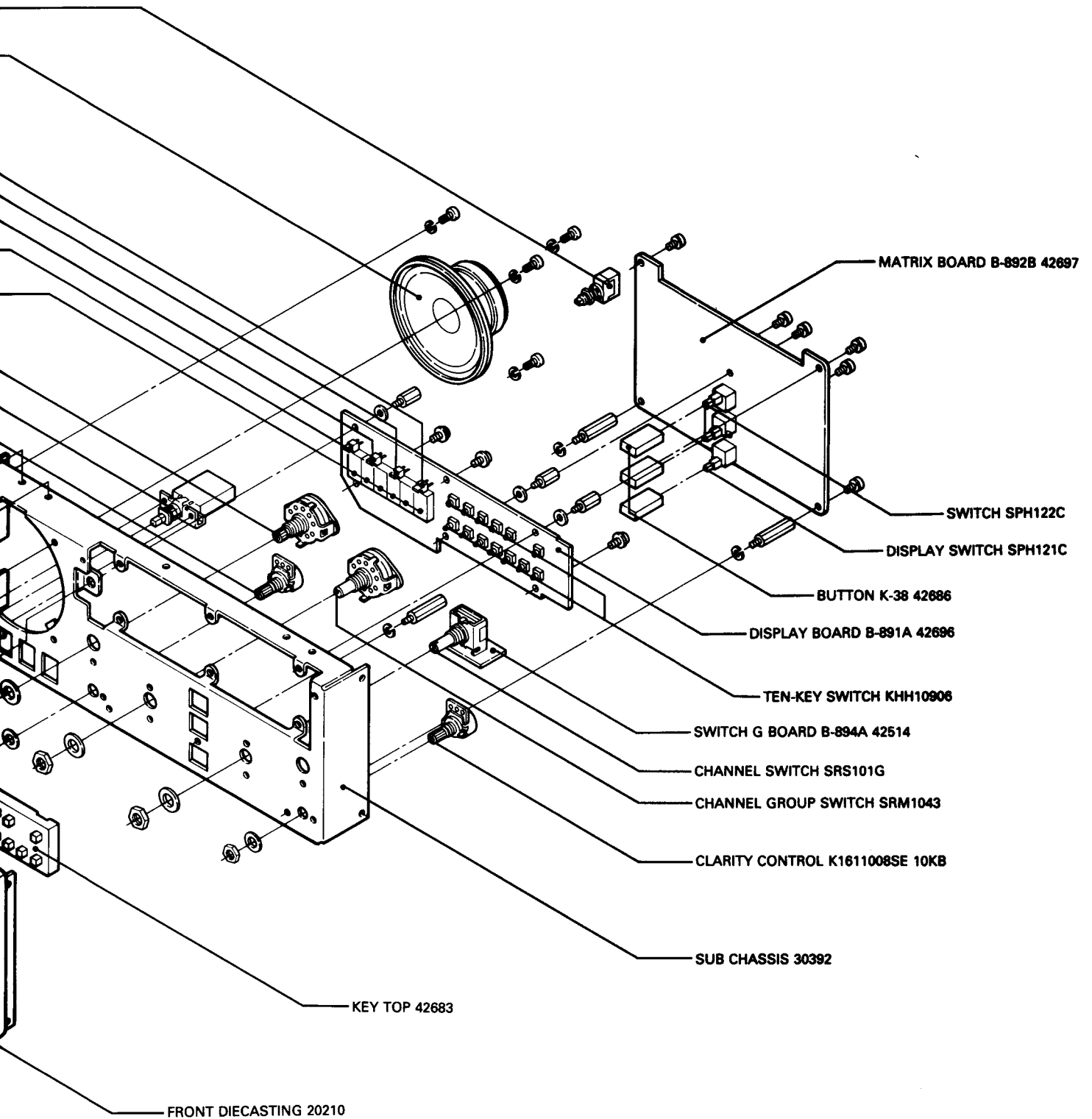
1. Remove the top cover. (12 set screws ①)
2. Remove the bottom cover. (6 set screws ②)
3. Remove the front panel control knobs, etc.  
(Use a hexagonal wrench to remove the four knob screws ③.)
4. Remove the four frame-holding screws ④, and then remove the front panel frame by pulling it forward.



# FRONT PANEL







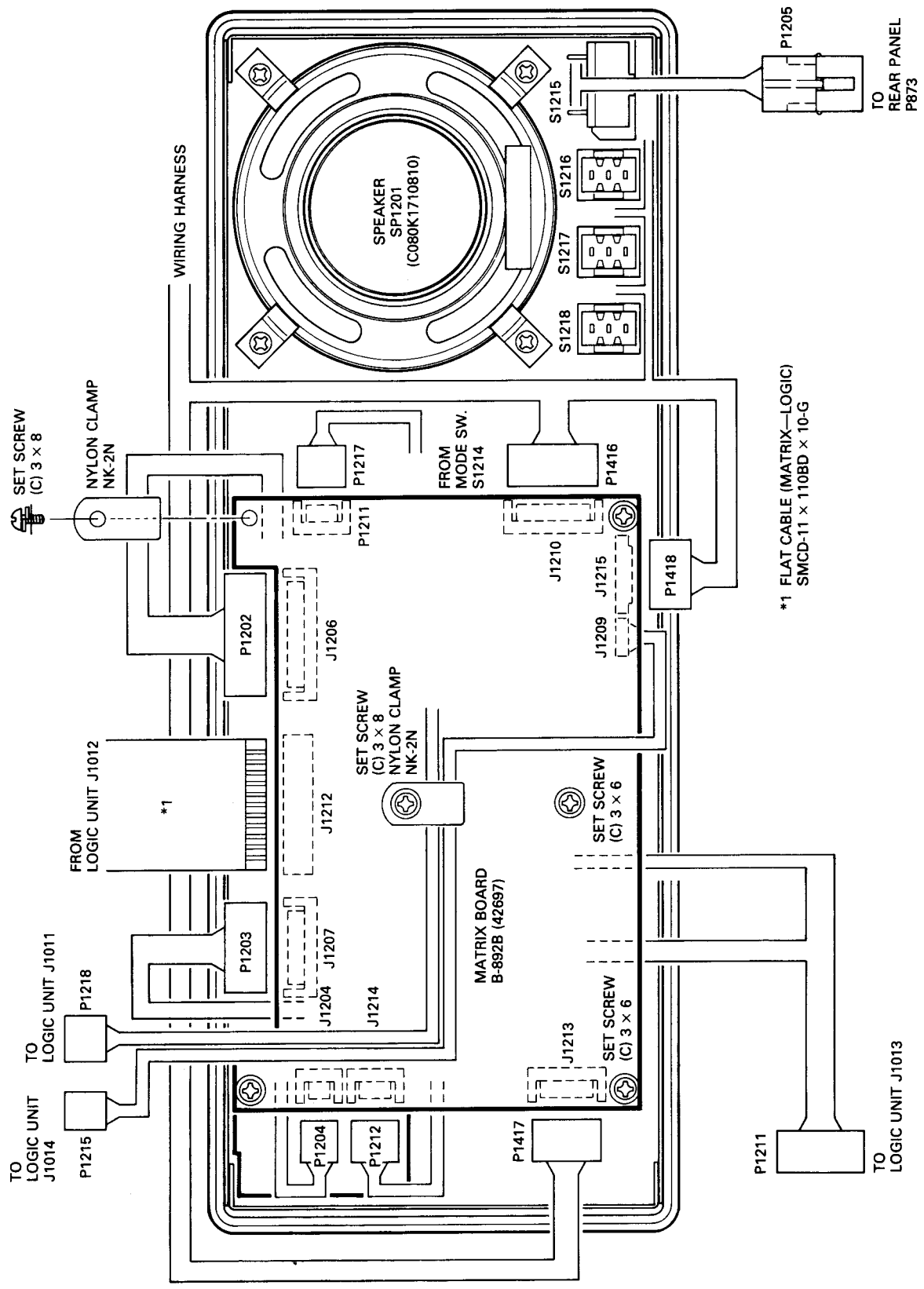
WINDOW FRAME 30391

WINDOW FRAME RETAINING SCREW

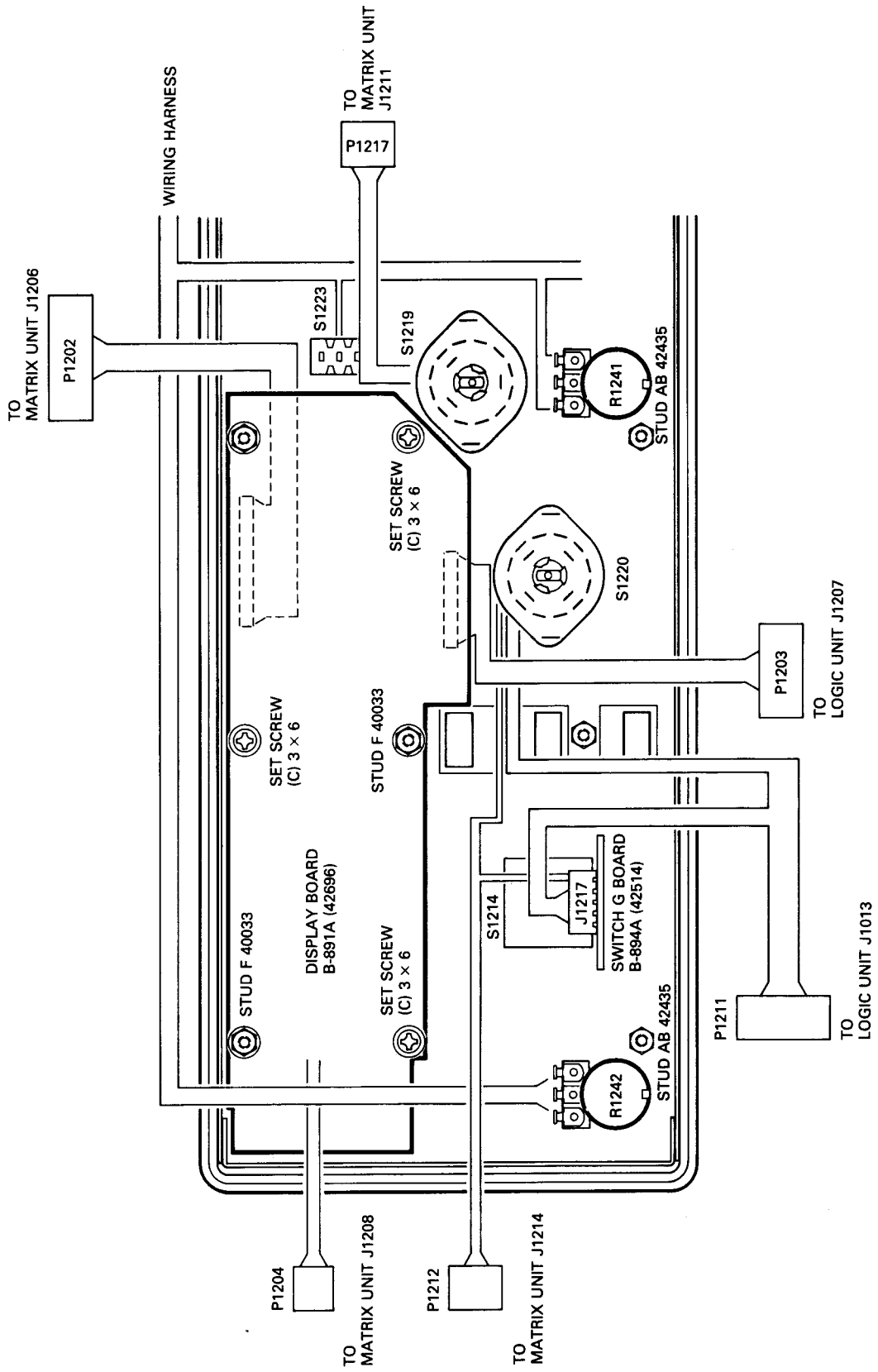
WINDOW FRAME N-82 42676 RING 42684

WINDOW FRAME KNOB N-47 41938

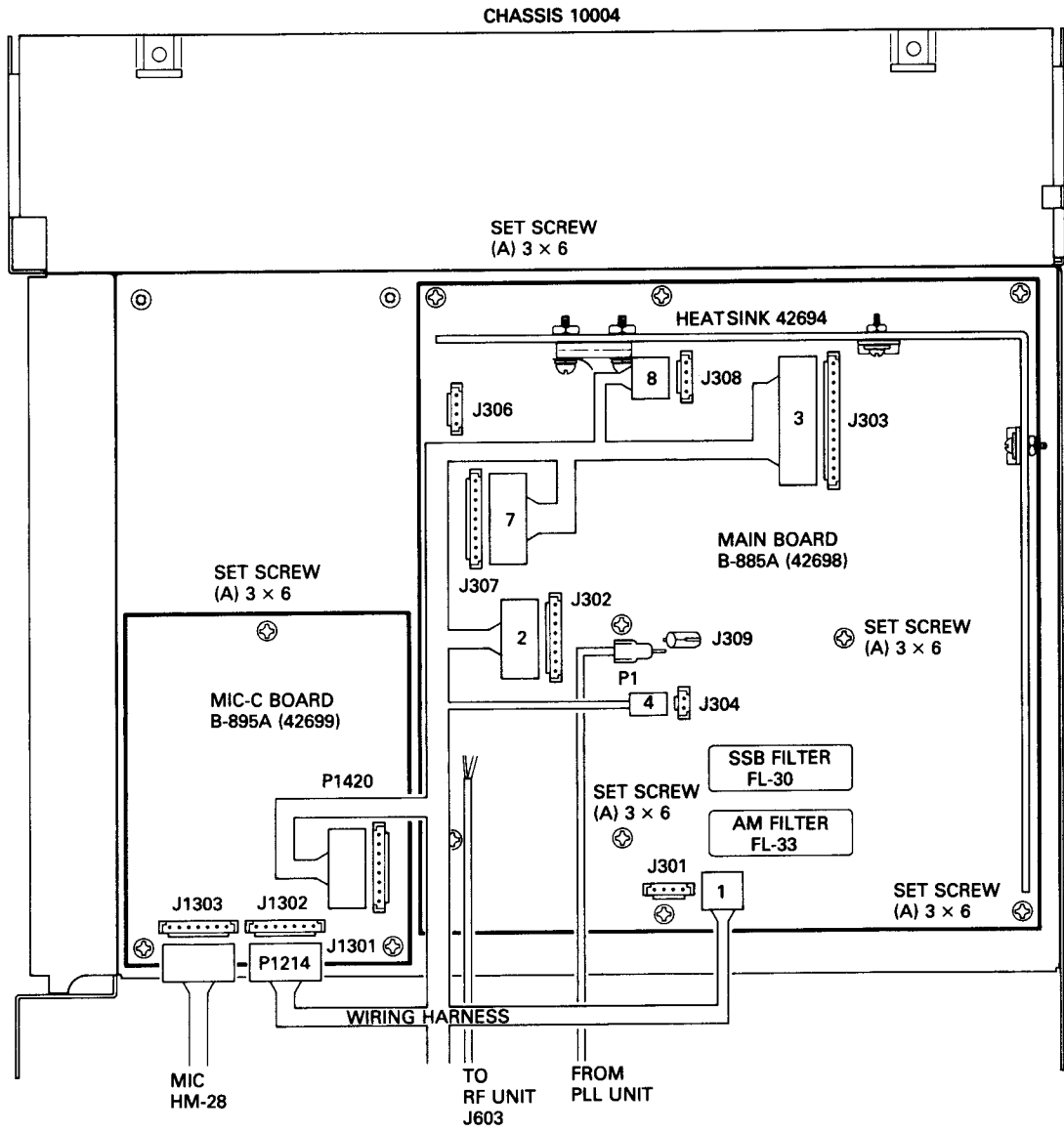
# FRONT PANEL CONNECTOR CONNECTIONS (1)



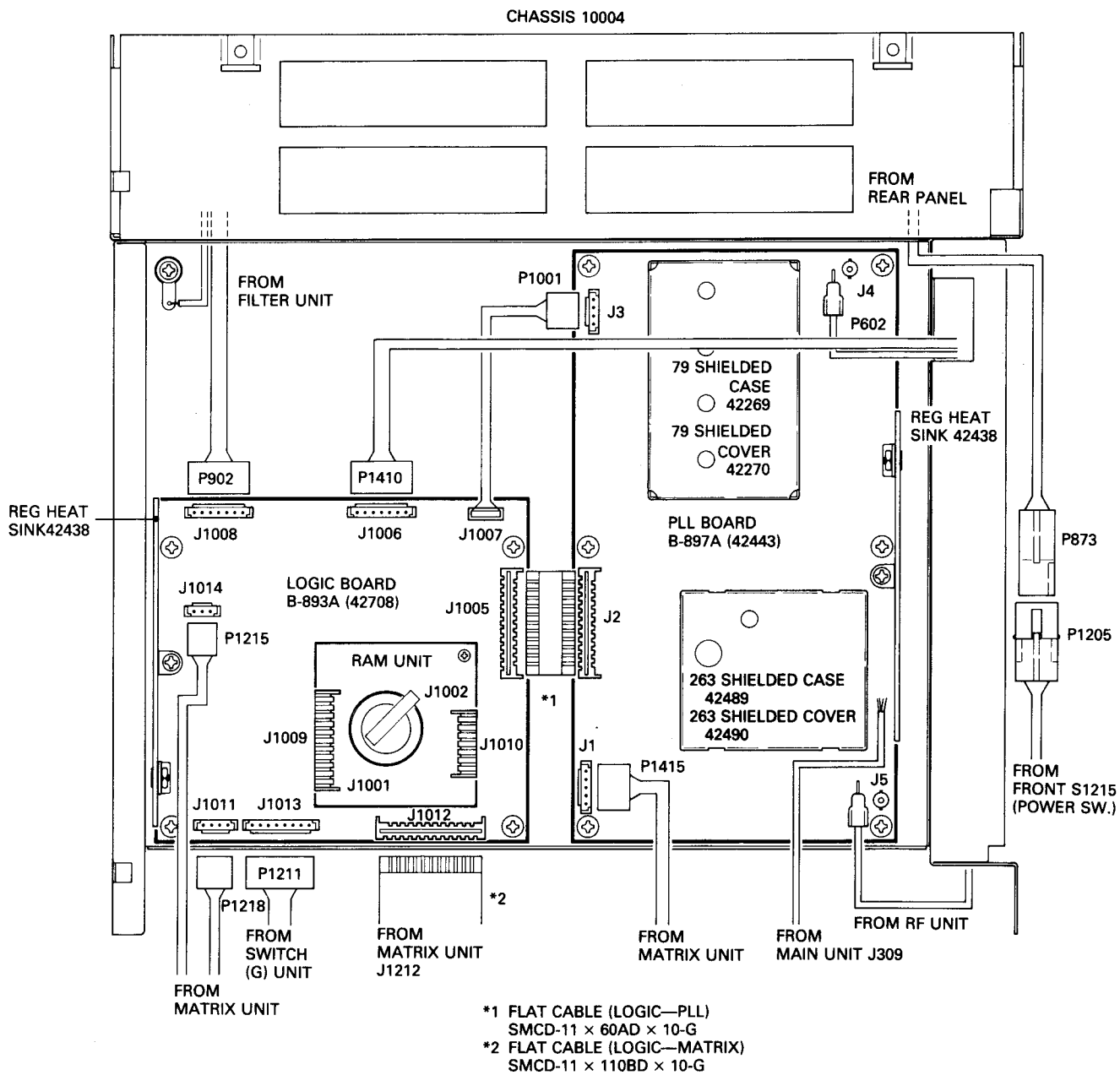
# FRONT PANEL CONNECTOR CONNECTIONS (2)



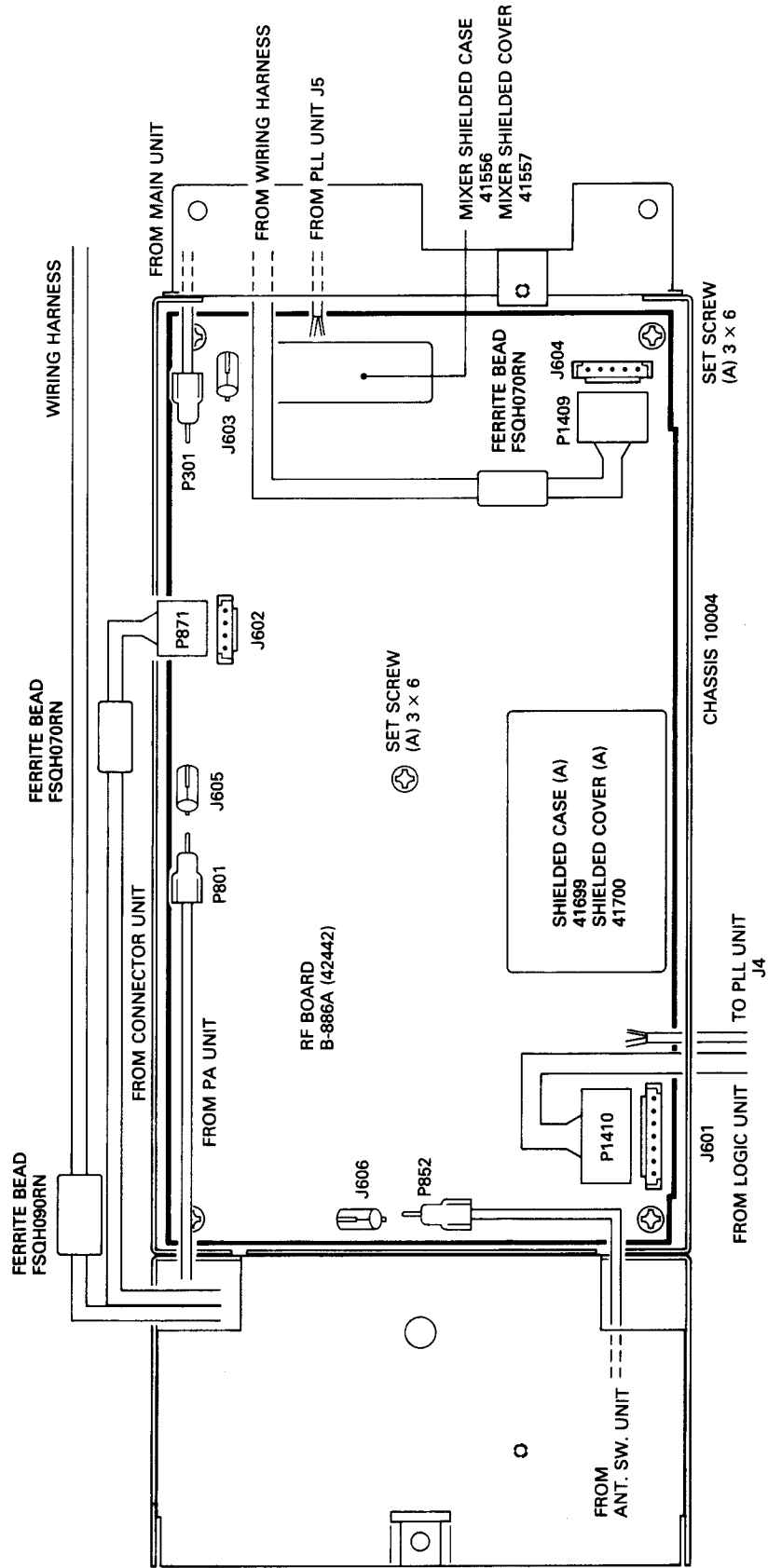
# MAIN UNIT SIDE CONNECTOR CONNECTIONS



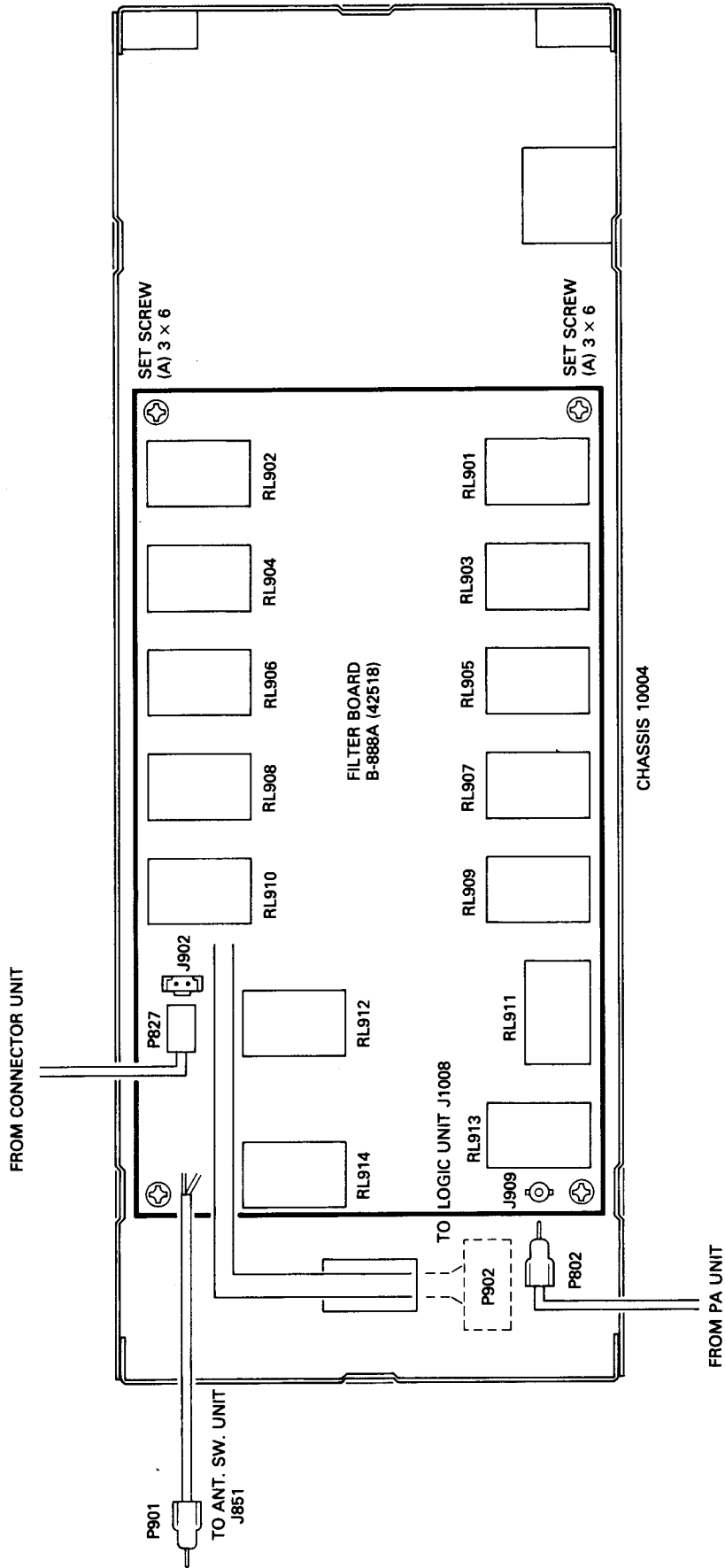
# LOGIC-PLL UNIT SIDE CONNECTOR CONNECTIONS



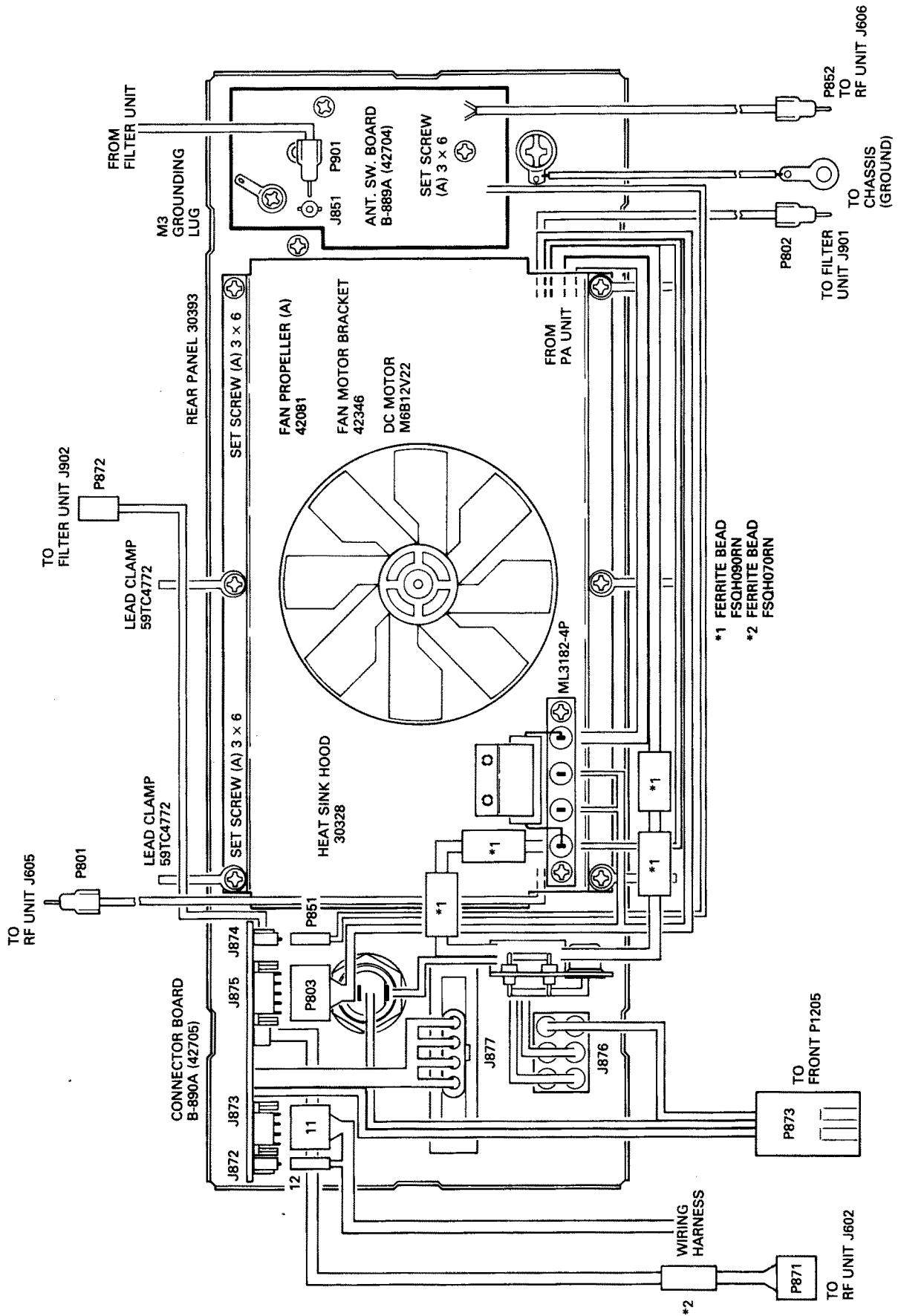
# RF UNIT SIDE CONNECTOR CONNECTIONS



# FILTER UNIT SIDE CONNECTOR CONNECTIONS

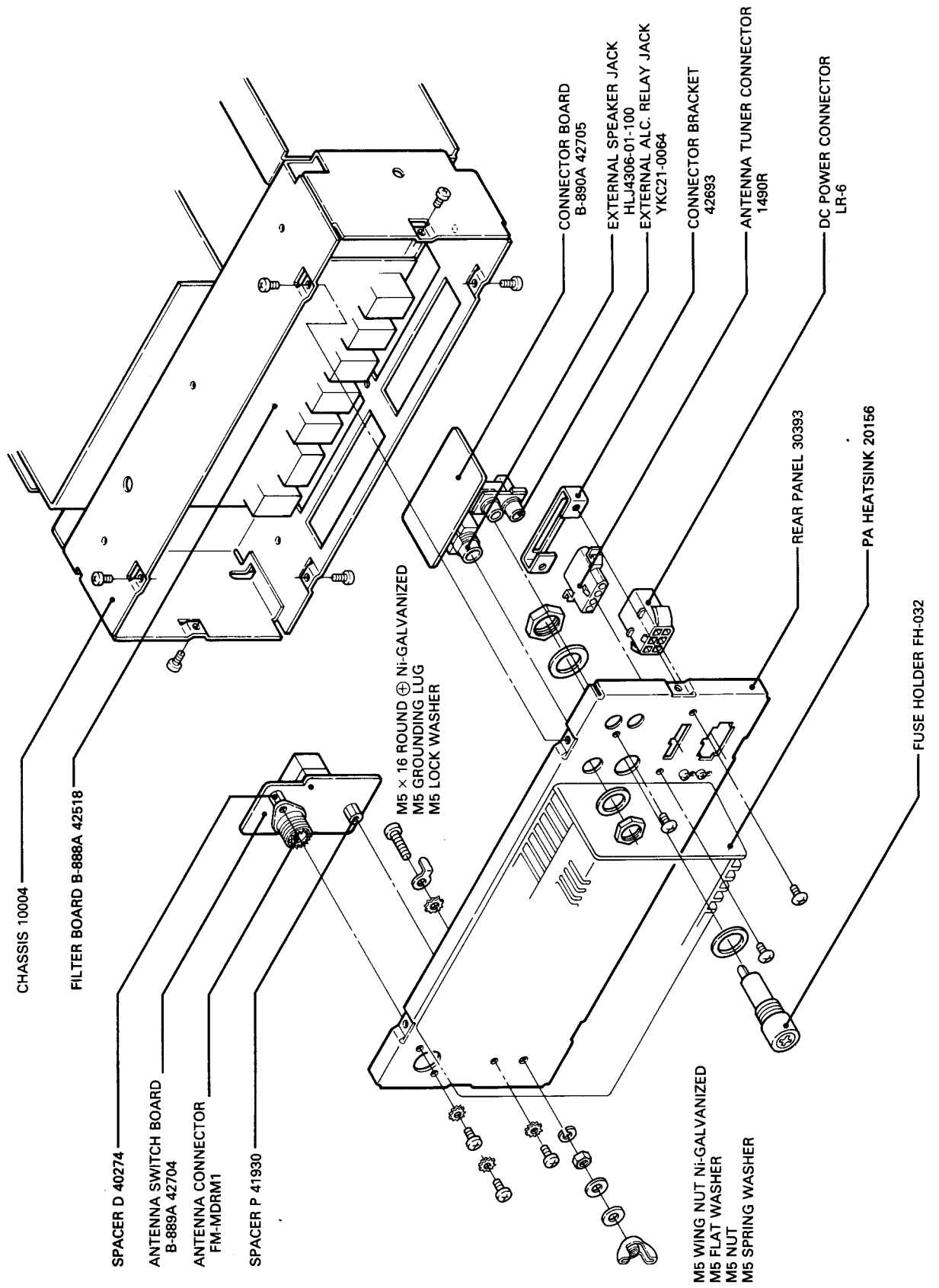


# REAR PANEL CONNECTOR CONNECTIONS





# REAR PANEL PARTS

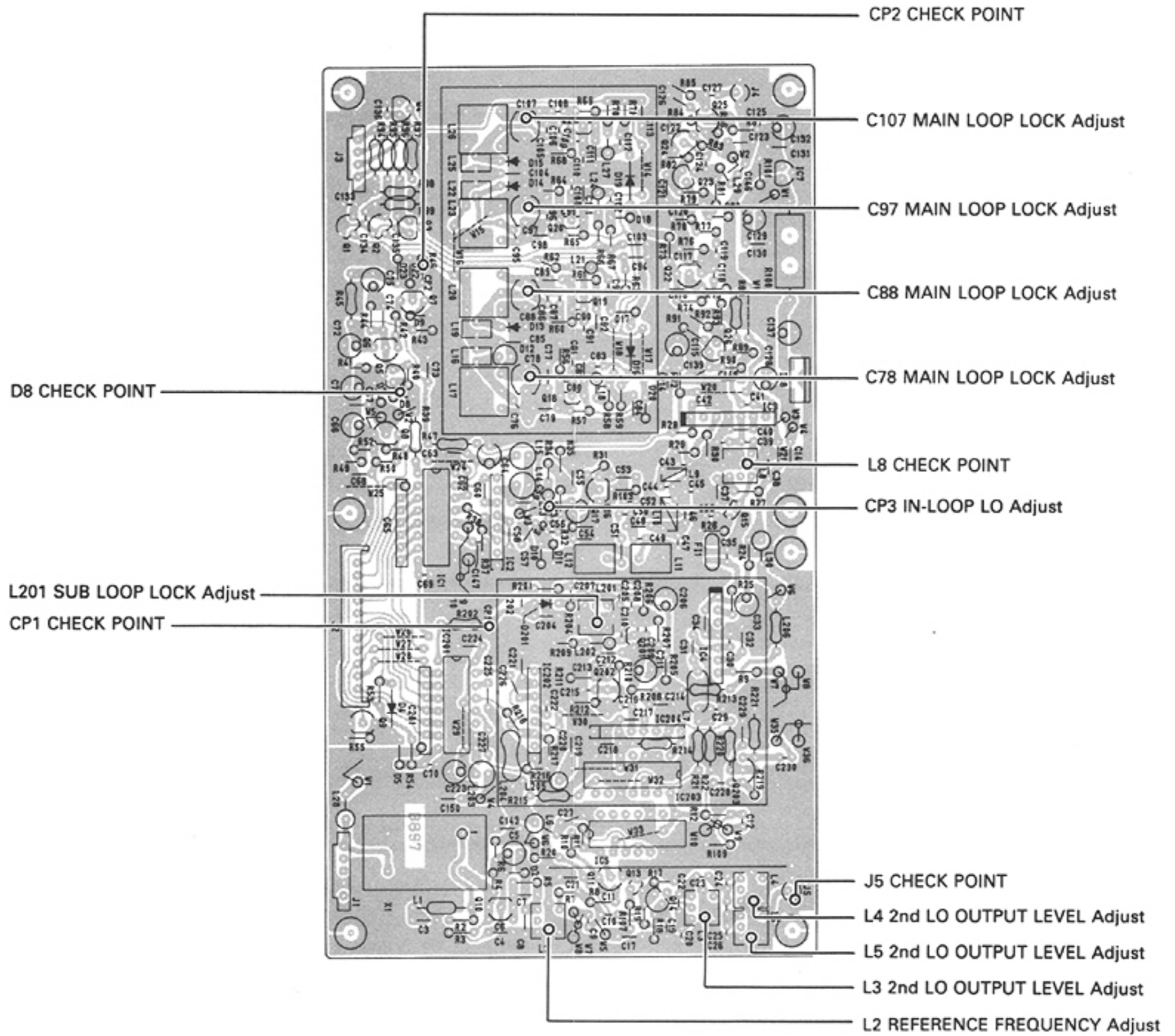


## SECTION 9 MAINTENANCE AND ADJUSTMENT

### 9 - 1 PLL ADJUSTMENT

INSTRUMENTS REQUIRED			CONNECTIONS			
(1) VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE           DC 13.6V ± 15% : CURRENT CAPACITY        30A or more (2) FREQUENCY COUNTER : FREQUENCY RANGE        0.1 ~ 90MHz : ACCURACY                   ± 1ppm or better : SENSITIVITY                100mV or better (3) RF VOLTMETER : FREQUENCY RANGE        0.1 ~ 80MHz : MEASURING RANGE         0.01 ~ 10V (4) OSCILLOSCOPE : FREQUENCY RANGE        DC ~ 20MHz : MEASURING RANGE         0.01 ~ 10V						
Adjustment	Adjustment conditions	Unit	Measurement location	Adjustment value	Unit	Adjustment point
IN-LOOP LO	1. • Display frequency: 6.9999MHz • MODE: Any	PLL	Connect the RF voltmeter to CP3 (L13).	Adjust to maximum output: 200 ~ 400mVrms	PLL	L8
	2. • Display frequency: 7.0000MHz • MODE: Any					
SUB LOOP LOCK VOLTAGE	1. • Display frequency: 6.9999MHz • MODE: Any	PLL	Connect the oscilloscope to CP1 (R202).	3V	PLL	L201
	2. • Display frequency: 6.9999MHz					
	3. • Display frequency: 6.9999MHz					
			Connect the oscilloscope to D8	2.5 ~ 2.8V		Confirming
MAIN LOOP LOCK VOLTAGE	1. • Display frequency: 6.9999MHz • MODE: Any	PLL	Connect the oscilloscope to CP2 (R46).	6.5V	PLL	C78
	2. • Display frequency: 11.9999MHz					
	3. • Display frequency: 17.9999MHz					
	4. • Display frequency: 23.9999MHz					
REFERENCE FREQUENCY	1. • Display frequency: Any • MODE: Any	PLL	Connect the frequency counter to J5.	61.440043MHz	PLL	L2
	Note: Adjust to the figure of 1Hz completely.					
2nd LO OUTPUT LEVEL	1. • Display frequency: Any • MODE: Any	PLL	Terminate J5 with a 50Ω resistor and connect the RF voltmeter there.	Adjust to maximum output: + 1 ~ 5dBm/50Ω	PLL	L3 ~ L5

# PLL UNIT

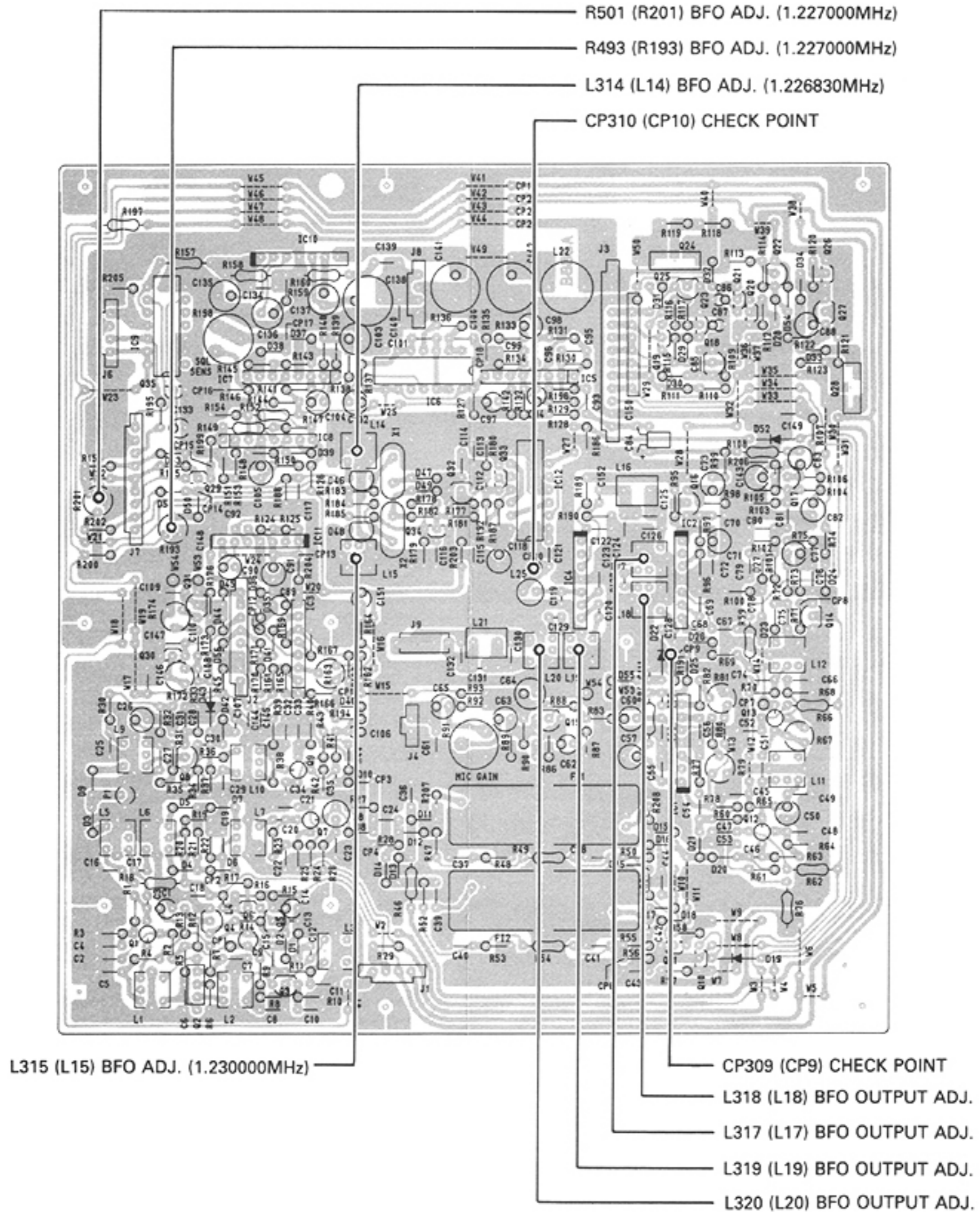


## 9 - 2 MAIN UNIT ADJUSTMENT

INSTRUMENTS REQUIRED	CONNECTIONS
(1) VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE                   DC 13.6V ± 15% : CURRENT CAPACITY                30A or more (2) FREQUENCY COUNTER : FREQUENCY RANGE                0.1 ~ 90MHz : ACCURACY                           ± 1ppm or better : SENSITIVITY                        100mV or better (3) RF VOLTMETER : FREQUENCY RANGE                0.1 ~ 80MHz : MEASURING RANGE                 0.01 ~ 10V	

Adjustment	Adjustment conditions	Unit	Measurement location	Adjustment value	Unit	Adjustment point
BFO FREQUENCY	1. ● Display frequency: Any ● MODE: A3J ● CLARITY: Fully counterclockwise	MAIN	Connect the frequency counter to CP310	1.226830MHz	MAIN	L314
	2. ● CLARITY: Center			1.227000MHz		R501
	3. ● CLARITY: Fully clockwise			1.227160MHz ~ 1.227240MHz		Confirming
	4. Set in TRANSMIT mode.			1.227000MHz		R493
	5. ● MODE: LSB (Left side of A3J)		Connect the frequency counter to CP309 (R491)	1.230000MHz		L315
	6. ● CLARITY: Center Repeat transmitting/receiving			9.01000MHz in transmitting/receiving		Confirming
	7. ● MODE: A3J Repeat transmitting/receiving			9.01300MHz in transmitting/receiving		
	8. ● MODE: A3A Repeat transmitting/receiving			9.01300MHz in transmitting/receiving		
	9. ● MODE: A3H Repeat transmitting/receiving			9.01300MHz No output in receiving		
	10. ● MODE: A3J Set in RECEIVE mode.			Connect the RF voltmeter to CP309 (R491)		Maximum output

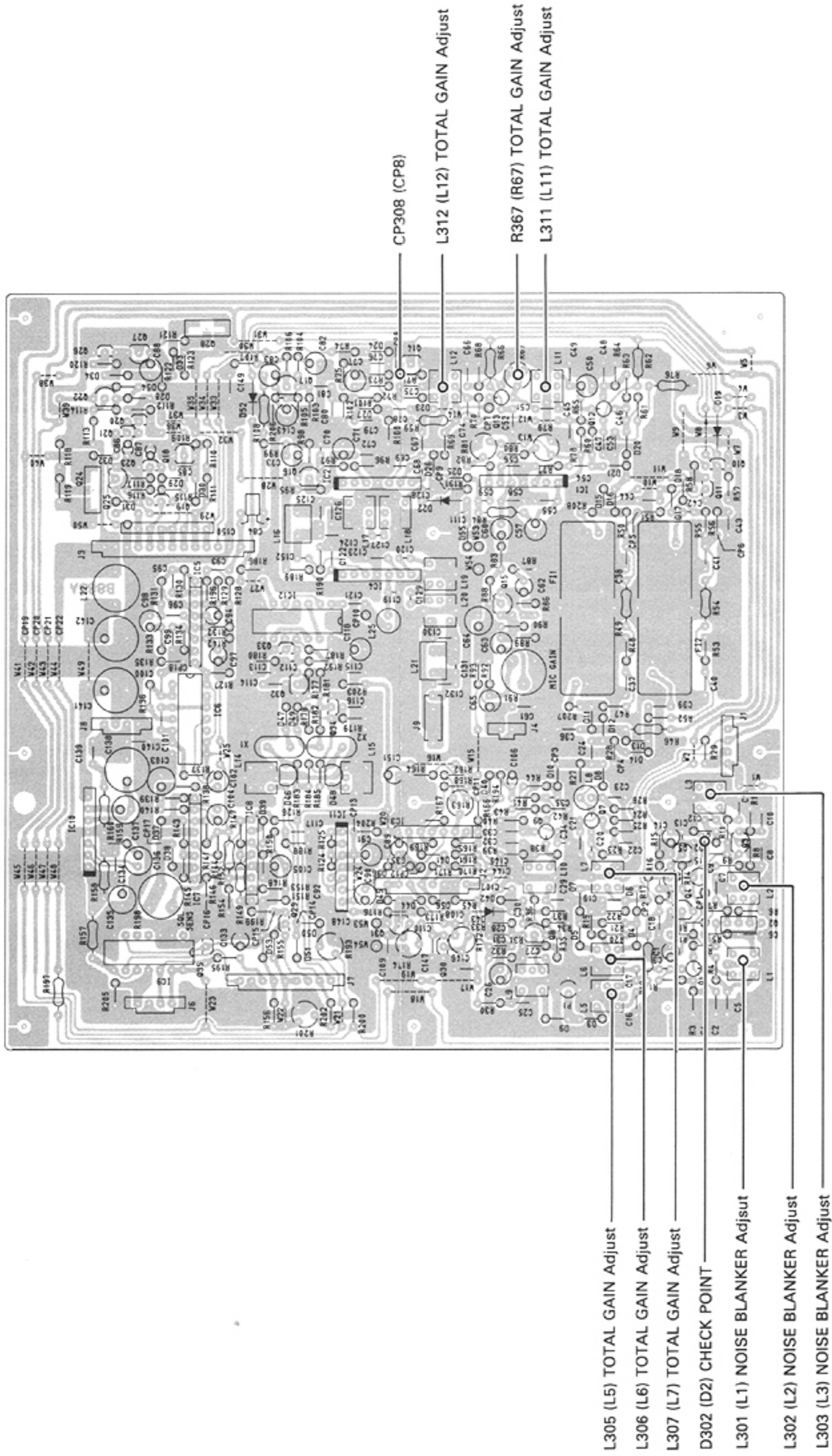
# MAIN UNIT



### 9 - 3 RECEIVER ADJUSTMENT

INSTRUMENTS REQUIRED			CONNECTIONS			
(1) VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE DC 13.6V ± 15% : CURRENT CAPACITY 30A or more (2) STANDARD SIGNAL GENERATOR (SSG) : FREQUENCY RANGE 0.1 ~ 40MHz : OUTPUT LEVEL -20 ~ +90dB (0dB = 1µV) (3) AC MILLIVOLTMETER : MEASURING RANGE 10mV ~ 3V (4) EXTERNAL SPEAKER : IMPEDANCE 8Ω (5) OSCILLOSCOPE : FREQUENCY RANGE DC ~ 20MHz : MEASURING RANGE 0.01 ~ 10V						
Adjustment	Adjustment conditions	Unit	Measurement location	Adjustment value	Unit	Adjustment point
TOTAL GAIN	1. <ul style="list-style-type: none"> <li>● Display frequency: 12MHz</li> <li>● MODE: A3J</li> <li>● SPEAKER: OFF</li> <li>● NB: ON</li> </ul> Connect CP308 (R371) to GND with a jumper wire to turn AGC OFF. Set the output level of the SSG to 0dBµ.	Rear panel	Connect the AC MILLIVOLT-METER to EXT. SPEAKER JACK	Adjust to maximum output.	MAIN	L305, L306 L307, L311 L312
	2. Disconnect the jumper wire between CP308 (R371) and GND. Set the output level of the SSG to approximate +50dBµ.			Adjust the audio level to 3V.	FRONT PANEL	VOLUME CONTROL
	3. Turn off the output of the SSG.			Adjust the noise level to 100mV.	MAIN	R367
NOISE BLANKER	1. <ul style="list-style-type: none"> <li>● Display frequency: 12MHz</li> <li>● MODE: A3J</li> <li>● NB: ON</li> </ul> Apply pulse noise (S1 or more on S meter) to the ANT connector.	MAIN	Connect the oscilloscope to D302.	Adjust to maximum noise waveform on the scope.	MAIN	L301 ~ L303

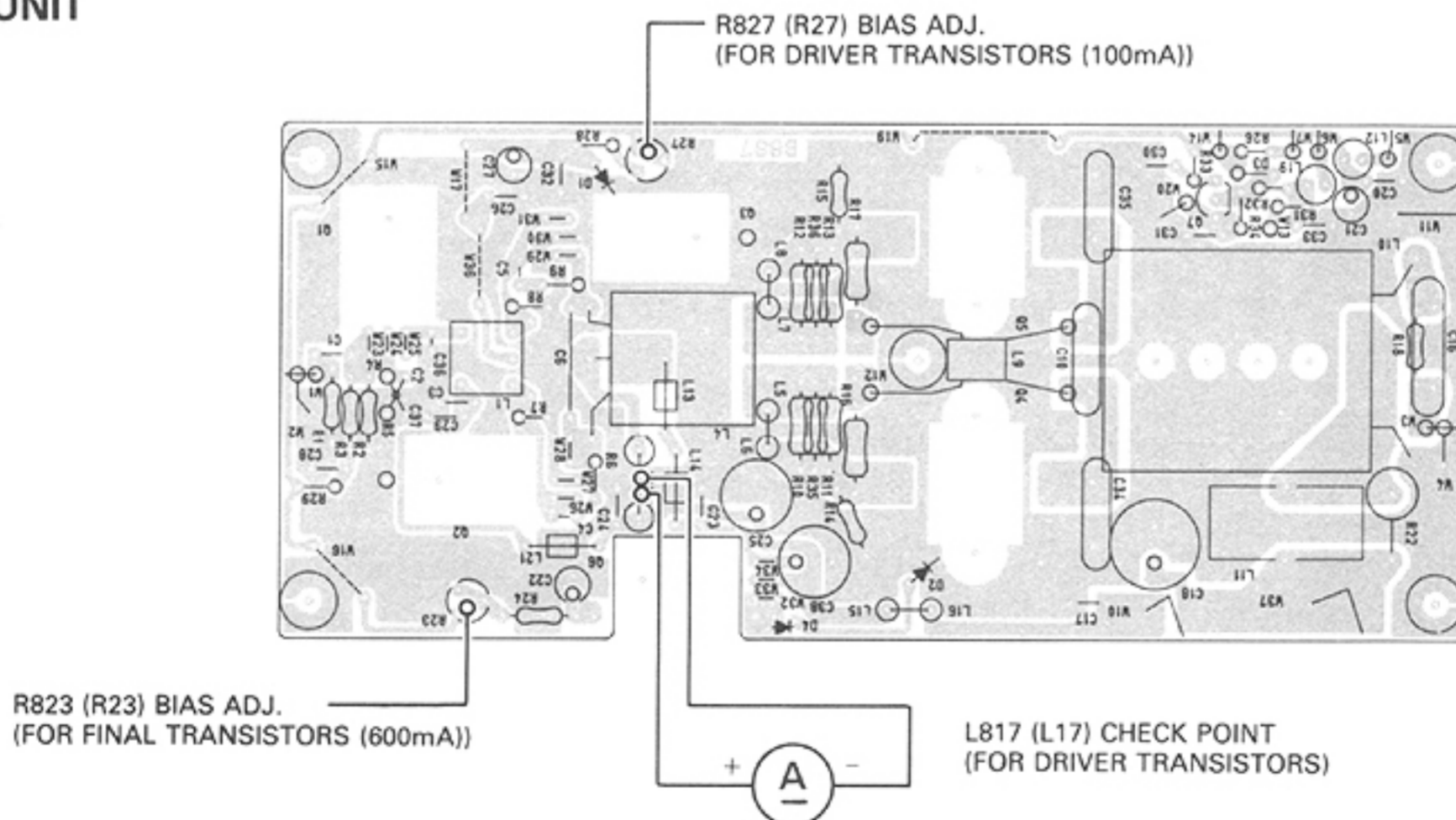
# MAIN UNIT



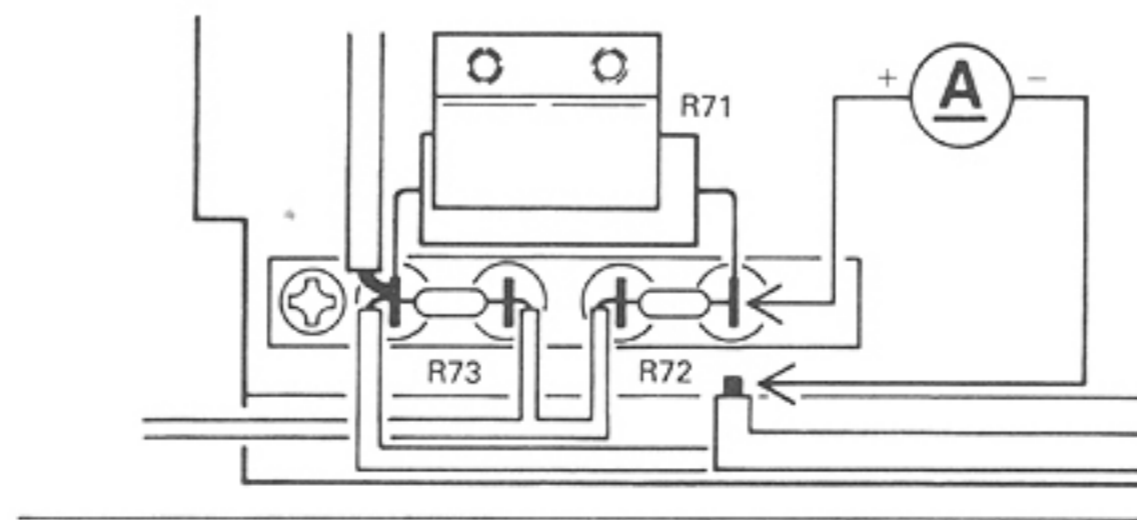
## 9 - 4 TRANSMITTER ADJUSTMENT

INSTRUMENTS REQUIRED			CONNECTIONS			
(1) VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE DC 13.6V ± 15% : CURRENT CAPACITY 30A (2) POWER METER (TERMINATED TYPE) : MEASURING RANGE 20 ~ 200W : FREQUENCY RANGE 1.6 ~ 25MHz : IMPEDANCE 50Ω : SWR 1.1 or better (3) AF GENERATOR (AG) : FREQUENCY RANGE 200 ~ 3000Hz : OUTPUT LEVEL 0 ~ 300mV (4) AC MILLIVOLTMETER : MEASURING RANGE 10mV ~ 3V						
Adjustment	Adjustment conditions	Unit	Measurement location	Adjustment value	Unit	Adjustment point
BIAS VOLTAGE (a) For driver transistors	1. ● Display frequency: 22MHz ● MODE: A3J ● R391 (MAIN unit): Fully counterclockwise Set in TRANSMIT mode.	PA	Desolder at the center at L817 (CP801) with 6 bead cores, and connect a DC ammeter there in series.	100mA	PA	R827
		Rear chassis	Desolder at CP871 (an intersection of R871 and R872) at W837, and connect a DC ammeter there in series.	600mA		R823
(b) For final transistors	2.					
Note: After adjustments of 1. and 2. set R391 of MAIN unit and measurement locations in original conditions.						

### PA UNIT



### REAR PANEL

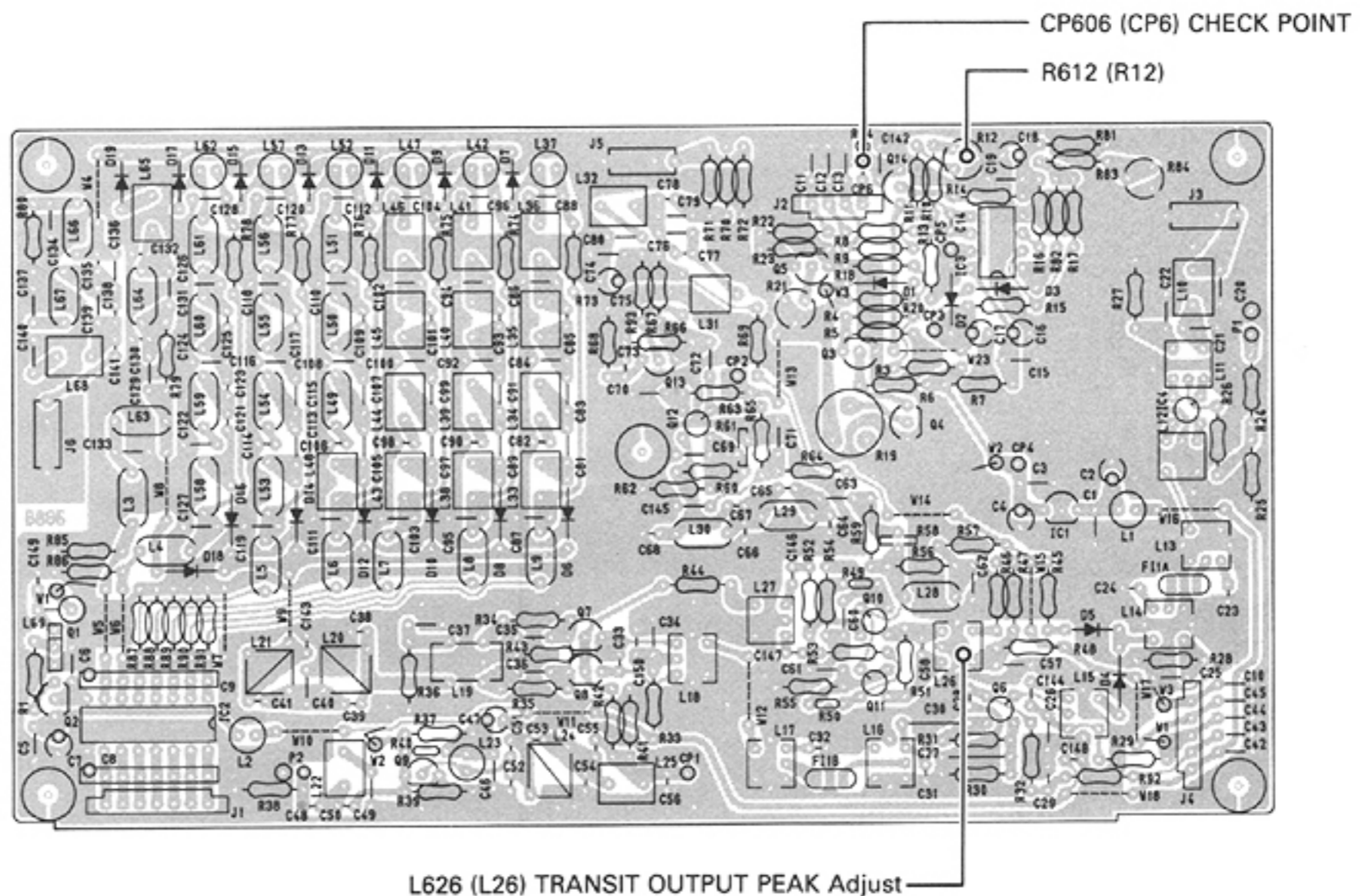




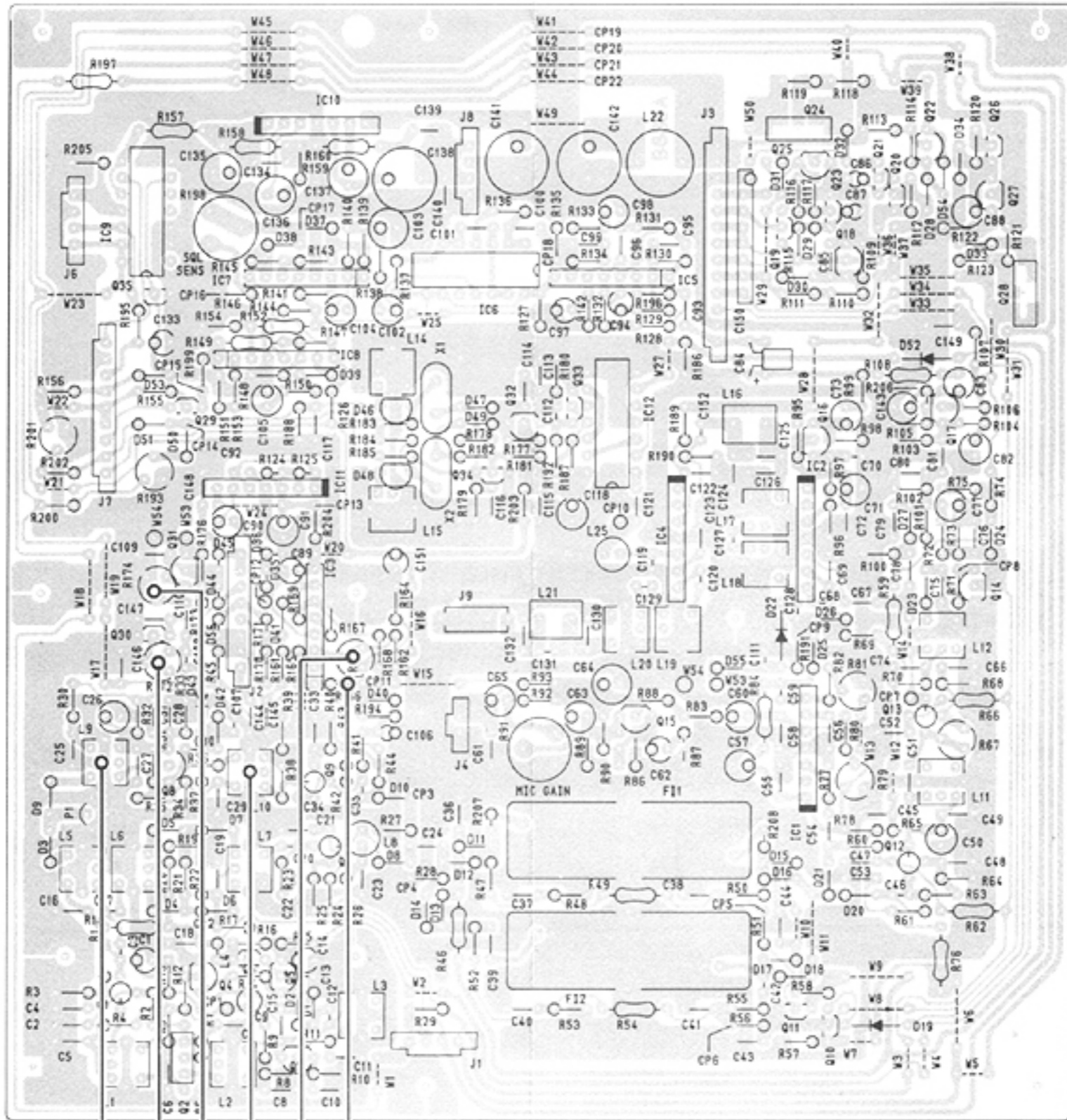
## 9 - 4 TRANSMITTER ADJUSTMENT (Continued)

Adjustment	Adjustment conditions	Unit	Measurement location	Adjustment value	Unit	Adjustment point
TRANSMIT OUTPUT	1. <ul style="list-style-type: none"> <li>● Display frequency: 22MHz</li> <li>● MODE: A3J</li> </ul> Set the frequency of the AG to 1.5KHz and the output level to get the TRANSMIT output of 20 ~ 30W.		Connect the RF POWER METER to the ANT connector.	Adjust to maximum output.	MAIN	L309, L310
	2. <ul style="list-style-type: none"> <li>● MODE: A3H</li> <li>● R612 (RF unit):</li> </ul> Fully clockwise Shunt CP606 (R694) of RF unit and CP311 (R466) of MAIN unit to the ground with a jumper wire respectively.				RF	L626
	3. Remove the jumper between CP606 (R694) of RF unit and ground.	RF	Connect DC voltmeter to CP606 (R694).	Adjust to minimum voltage.	FILTER	C936
Note: After adjustment, set R612 and CP311 (R466) in the original conditions.						
ALC	1. <ul style="list-style-type: none"> <li>● Display frequency: all bands</li> <li>● MODE: A3H</li> </ul> Set in TRANSMIT mode.		Connect the RF POWER METER to the ANT connector.	Adjust R474 to get 40 ~ 50W (carrier power).	MAIN	R474
	2. ● MODE: A3A			4 ~ 5W (carrier power)		R472
	3. <ul style="list-style-type: none"> <li>● Display frequency: 12MHz</li> <li>● MODE: A3J</li> </ul> Set the output of the AG to 1.5KHz/100mV.			135W		R463

## RF UNIT

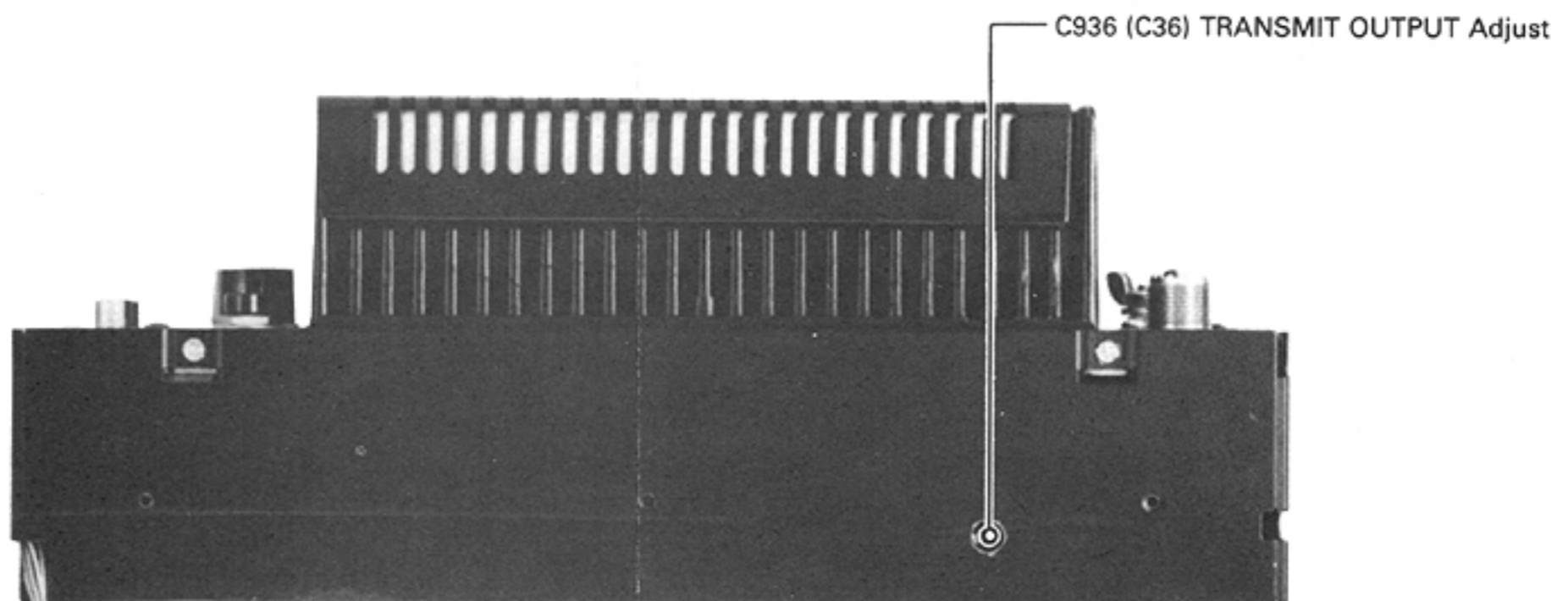


# MAIN UNIT



- CP311 (CP11)
- R463 (R613) ALC ADJUSTMENT
- L310 (L10) TRANSMIT OUTPUT Adjsut
- R474 (R174) ALC ADJUSTMENT
- R472 (R172) ALC ADJUSTMENT
- L309 (L9) TRANSMIT OUTPUT Adjust

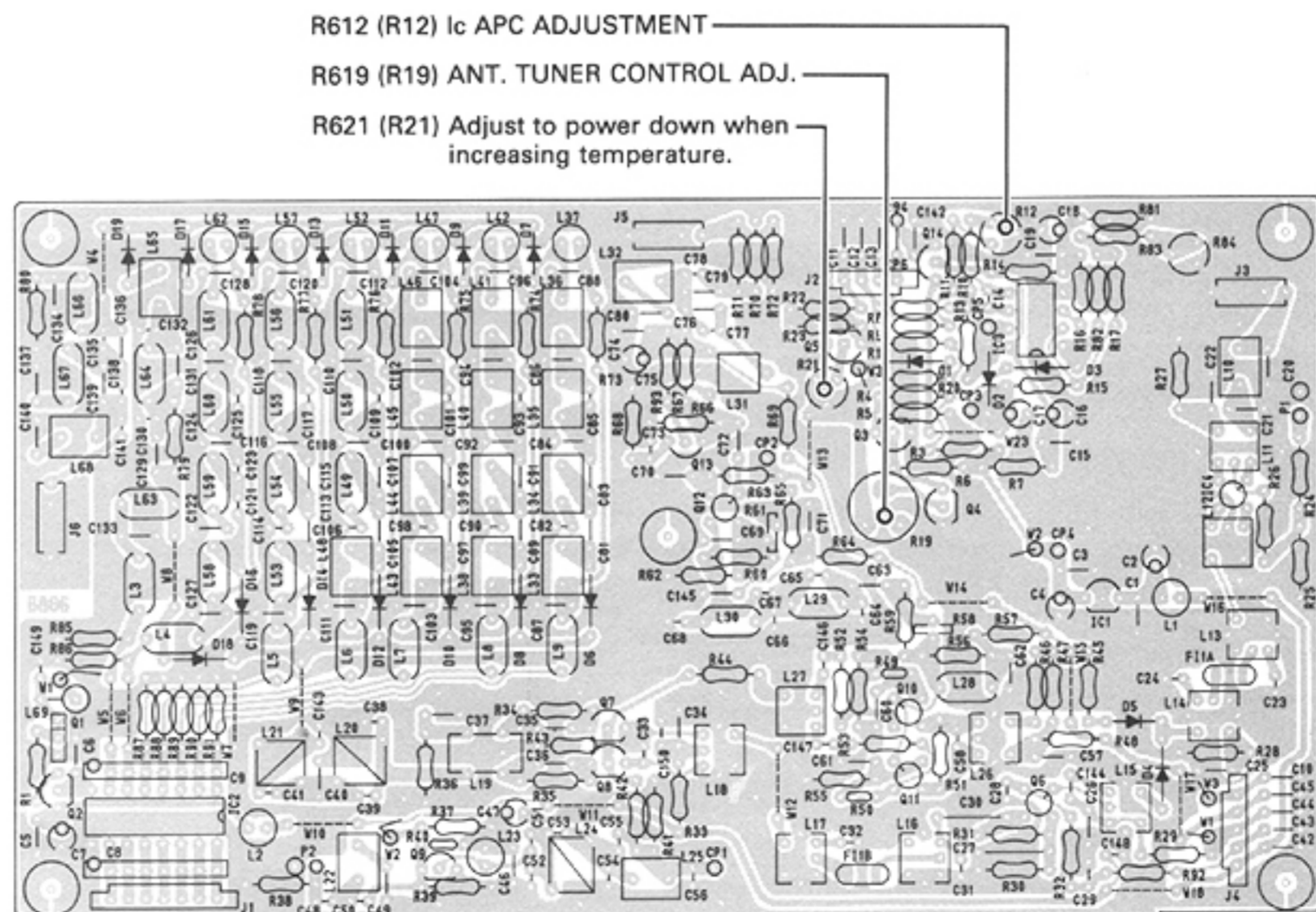
# FILTER UNIT



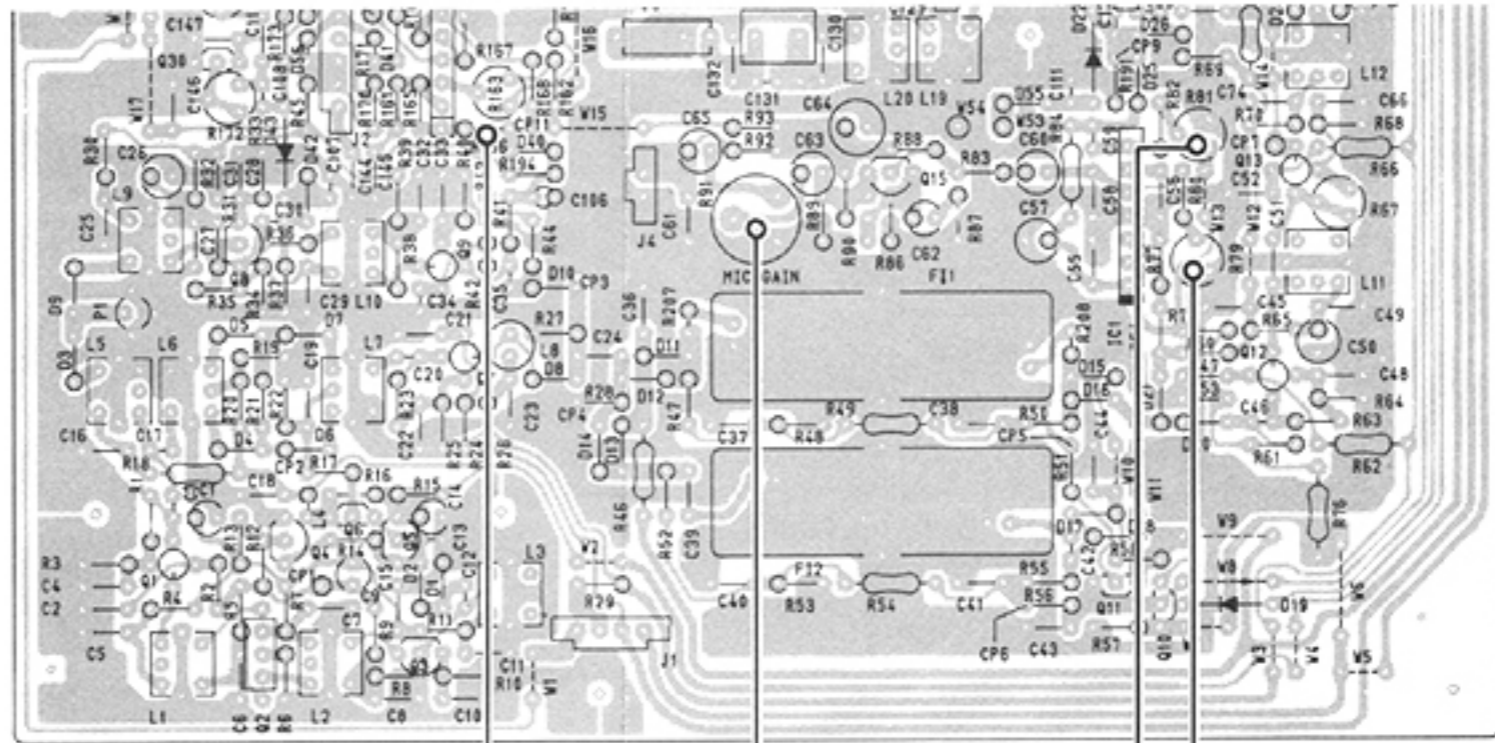
## 9 - 4 TRANSMITTER ADJUSTMENT (Continued)

Adjustment	Adjustment conditions	Unit	Measurement location	Adjustment value	Unit	Adjustment point
Ic APC	1. <ul style="list-style-type: none"> <li>● Display frequency: 22MHz</li> <li>● MODE: A3J</li> </ul> R612 (RF unit): Fully counterclockwise Shunt CP311 of MAIN unit to ground with a jumper wire. Set the output of AG to 1.5KHz/100mV.		Read the ammeter provided in the power supply, or connect an ammeter to the power cable in series.	29A	RF	R612
	Note: Adjust R612 turning gradually. After adjustment, remove the jumper wire between CP311 of MAIN unit and GND.					
Power down when increasing temperature.	1. <ul style="list-style-type: none"> <li>● Display frequency: 22MHz</li> <li>● MODE: A3H</li> </ul> Connect the both terminals of S801 of PA unit with a jumper wire and set in TRANSMIT mode.		Connect the RF POWER METER to the ANT connector.	3W	RF	L621
	Note: After adjustment, remove the jumper wire of S801.					
ANTENNA TUNER CONTROL	1. <ul style="list-style-type: none"> <li>● Display frequency: 12MHz</li> <li>● MODE: A3H</li> </ul> After confirming no MIC Input, connect D1302 cathode of MIC-C unit to GND with a jumper wire. And set in TRANSMIT mode.		Connect the RF POWER METER to the ANT commecter.	8 ~ 10W	RF	R619
	Note: Set the adjusting value to required input power of the ANTENNA TUNER being used.					
CARRIER SUPPRESSION	1. <ul style="list-style-type: none"> <li>● Display frequency: 22MHz</li> <li>● MODE: A3J</li> </ul> R391 (MAIN Unit): Fully counterclockwise Set in TRANSMIT mode.		Connect RF voltmeter or spectrum analyzer to the ANT connector	Adjust to minimum carrier output (-65dB or less)	MAIN	R379 R381
	Note: After completed the adjustment, make R391 in the original condition.					

## RF UNIT



# MAIN UNIT



CP311 (CP11)

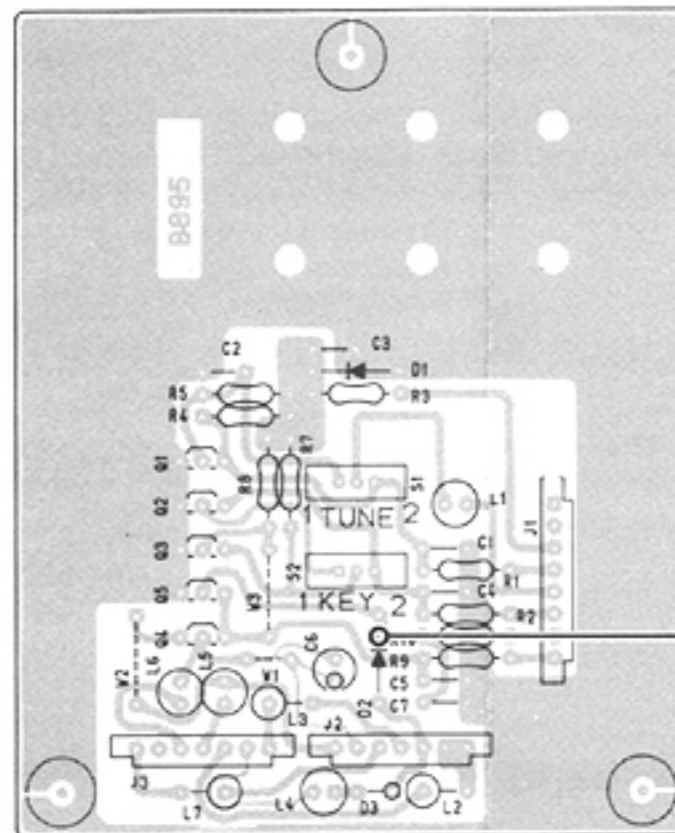
R391 (R91) RF GAIN CONTROL

Front part side

R379 (R79) Carrier suppression adjust

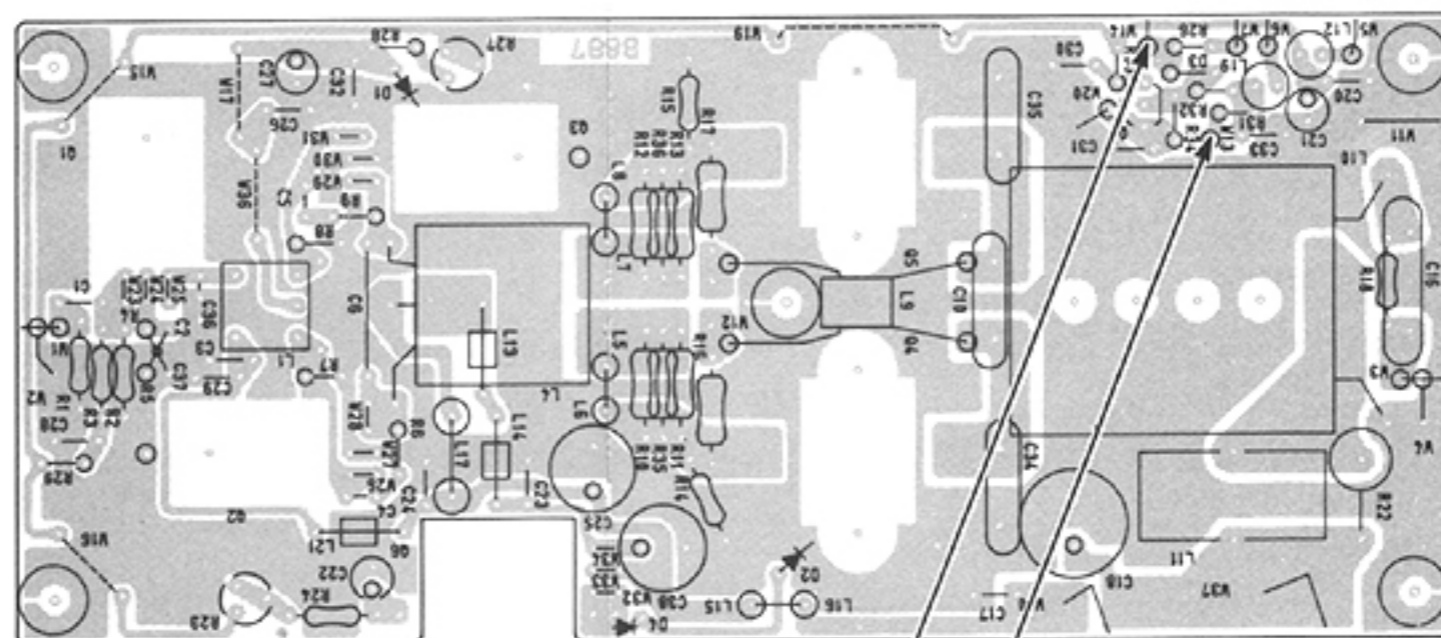
R381 (R81) Carrier suppression adjust

# MIC-C UNIT



D1302 (D2) Cathode

# PA UNIT



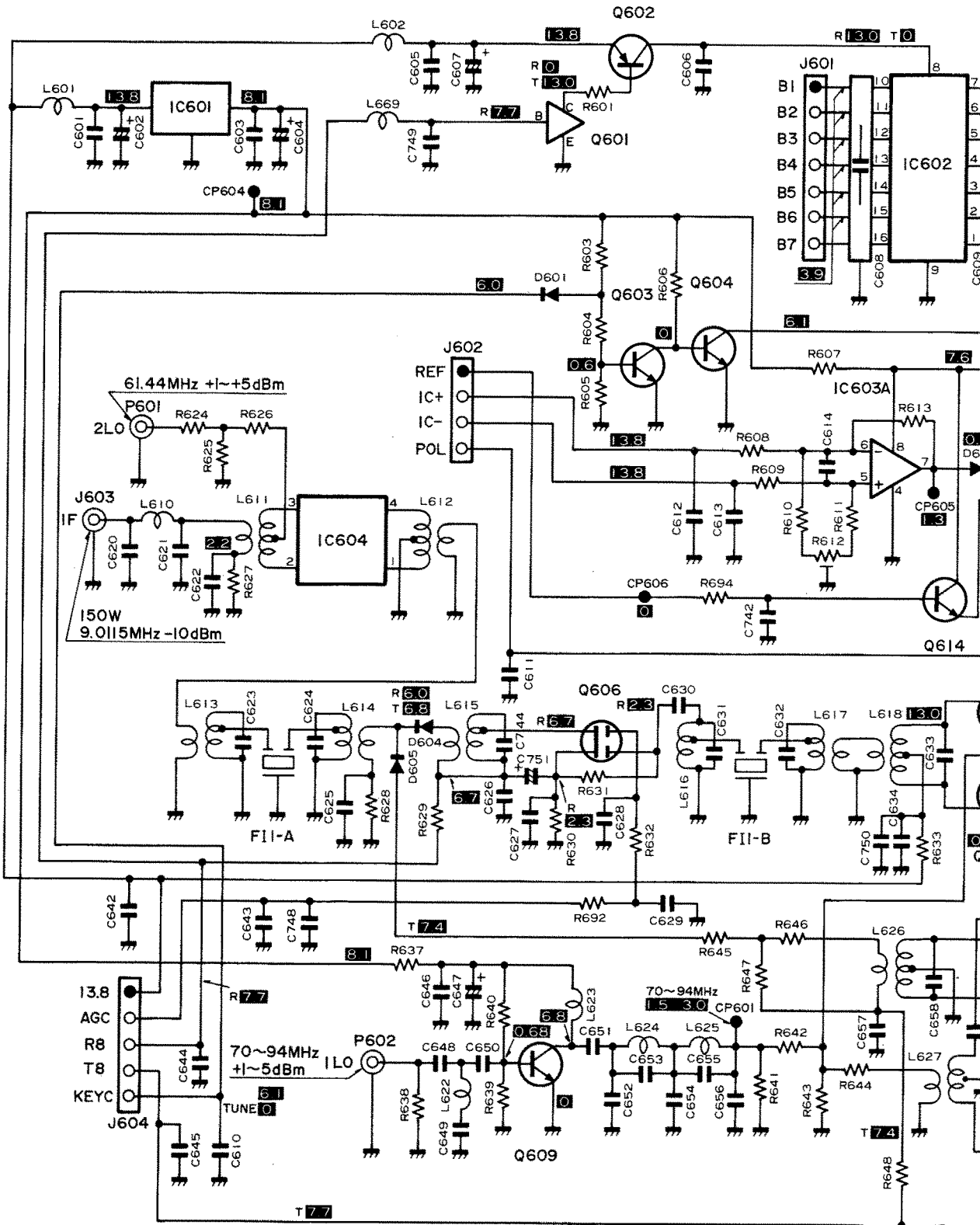
S801 (THERMAL SWITCH)

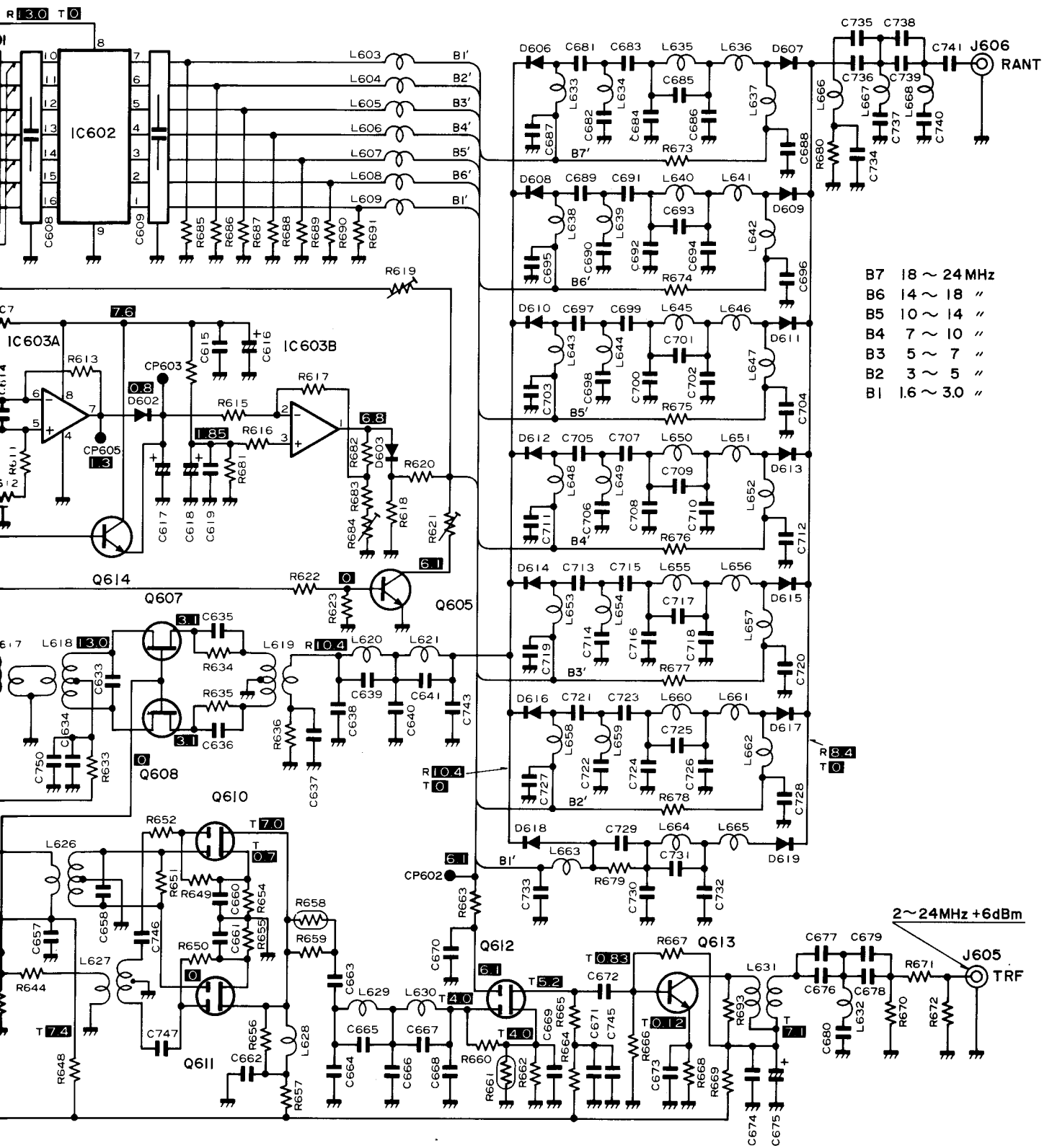
PUT-ON Q804 (Q4)



# SECTION 10 VOLTAGE (CIRCUIT) DIAGRAMS

## RF UNIT CIRCUIT AND VOLTAGE DIAGRAM

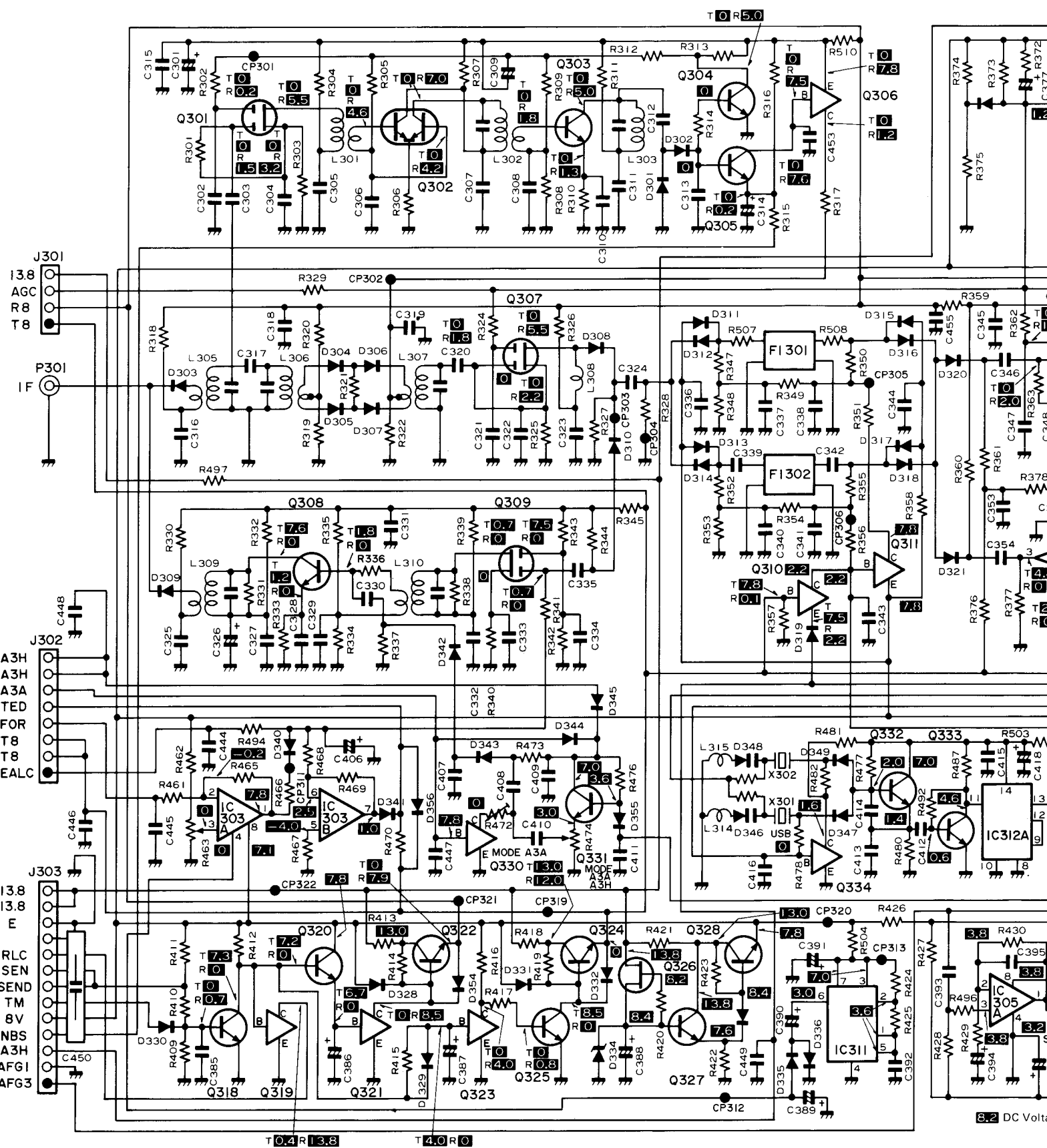


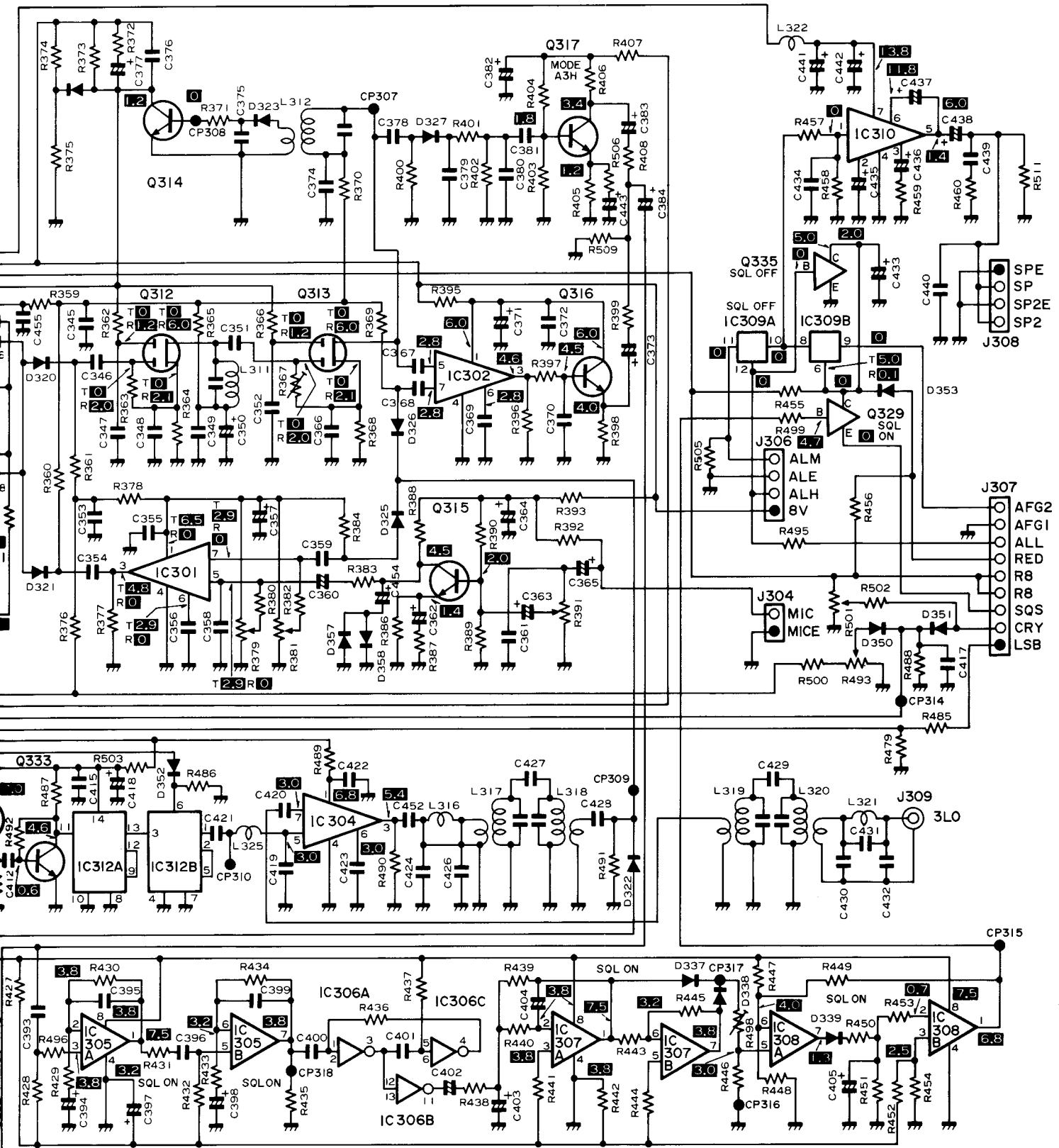


B7	18 ~ 24 MHz
B6	14 ~ 18 "
B5	10 ~ 14 "
B4	7 ~ 10 "
B3	5 ~ 7 "
B2	3 ~ 5 "
B1	1.6 ~ 3.0 "

2 ~ 24MHz +6dBm

# MAIN UNIT CIRCUIT AND VOLTAGE DIAGRAM

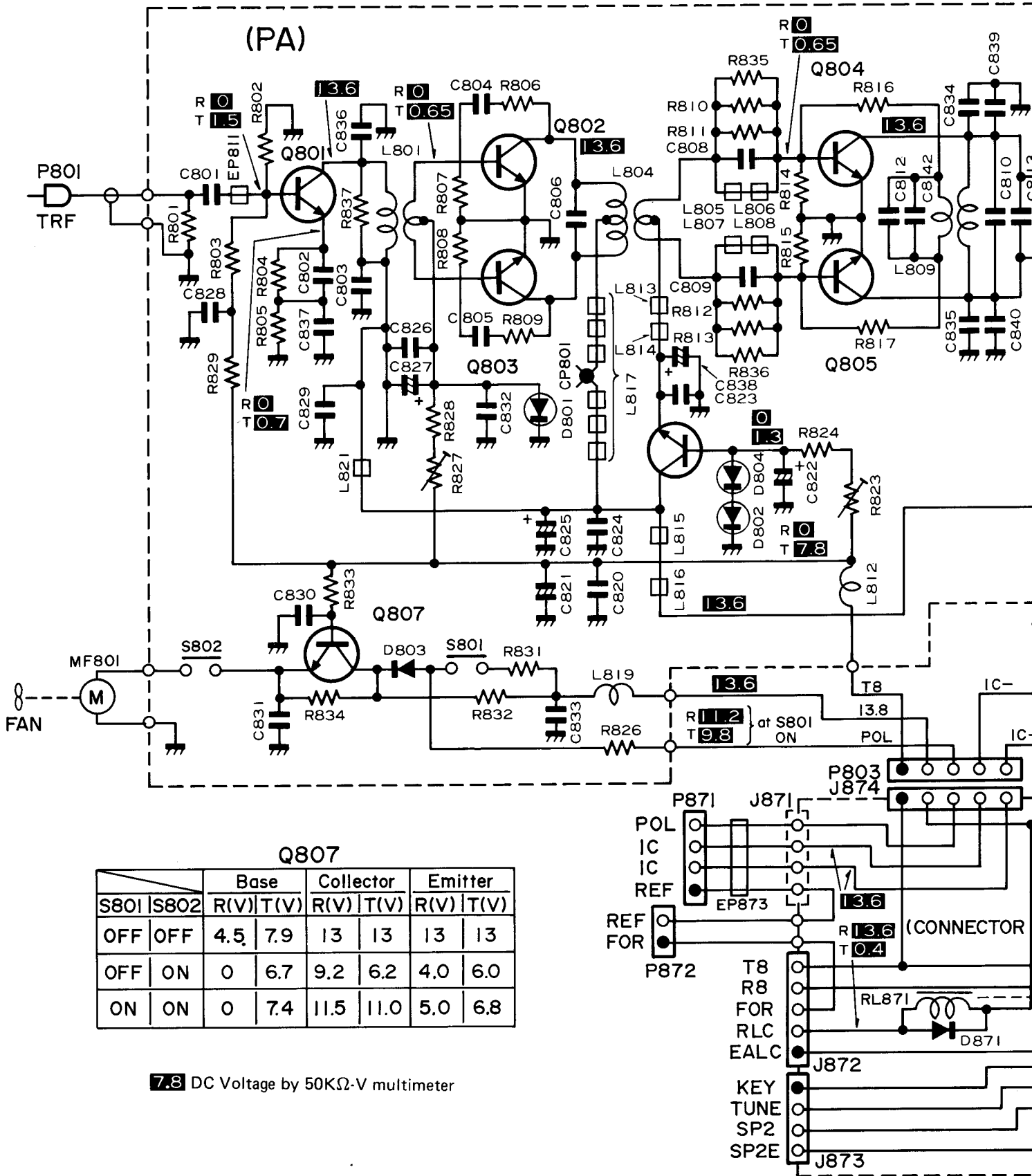




8.2 DC Voltage by 50KΩ-V multimeter



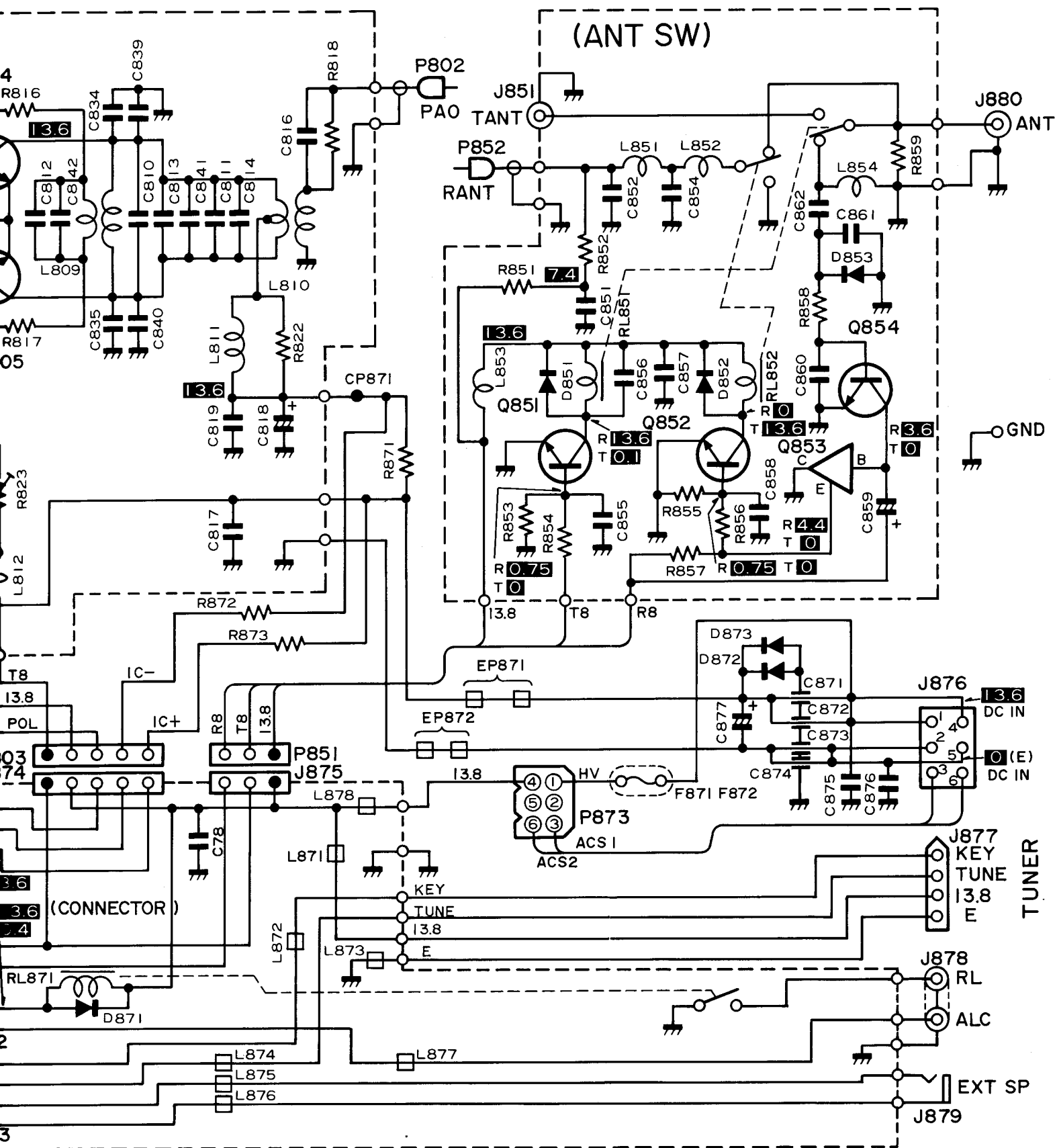
**PA UNIT CIRCUIT AND VOLTAGE DIAGRAM**



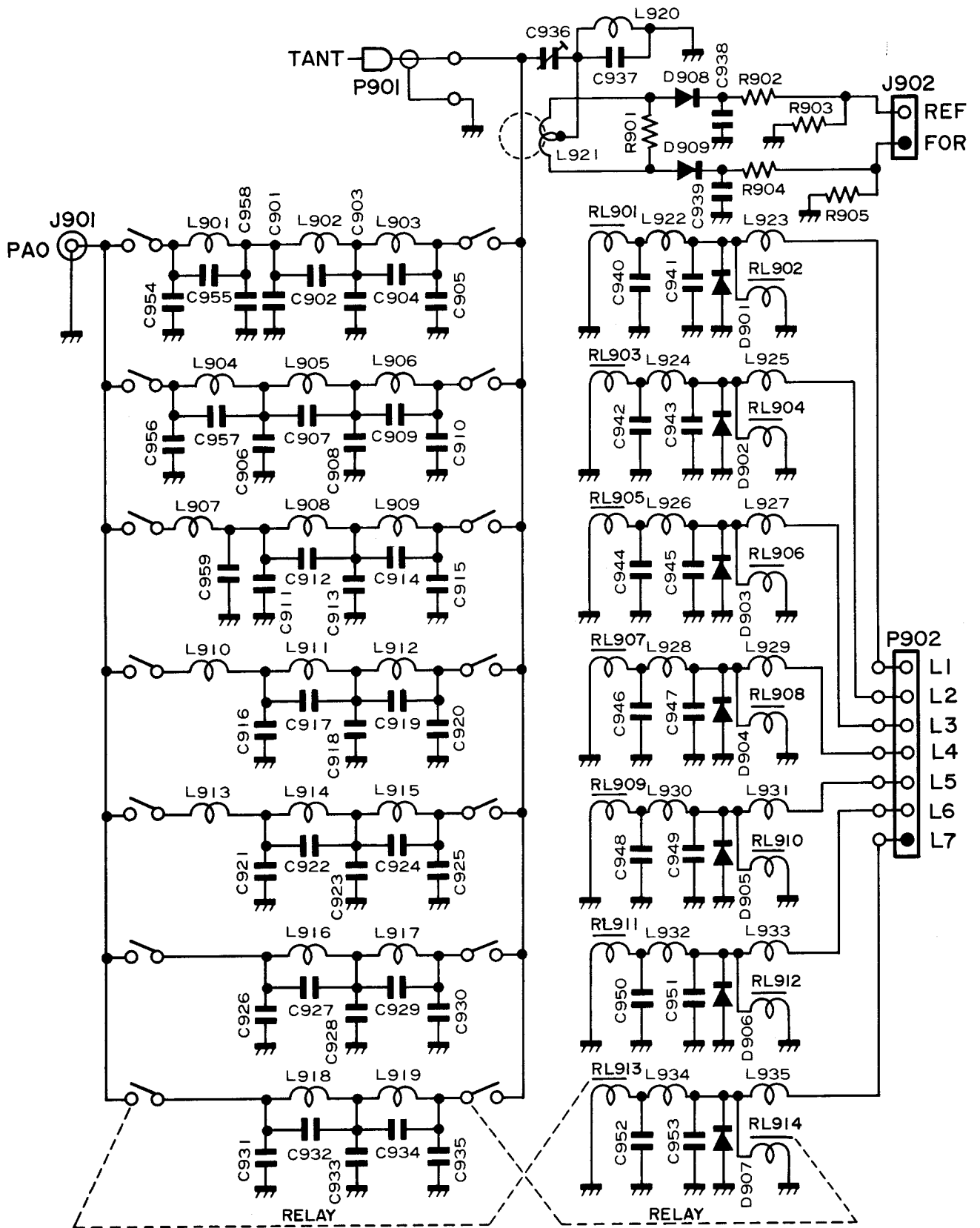
**Q807**

		Base		Collector		Emitter	
S801	S802	R(V)	T(V)	R(V)	T(V)	R(V)	T(V)
OFF	OFF	4.5	7.9	13	13	13	13
OFF	ON	0	6.7	9.2	6.2	4.0	6.0
ON	ON	0	7.4	11.5	11.0	5.0	6.8

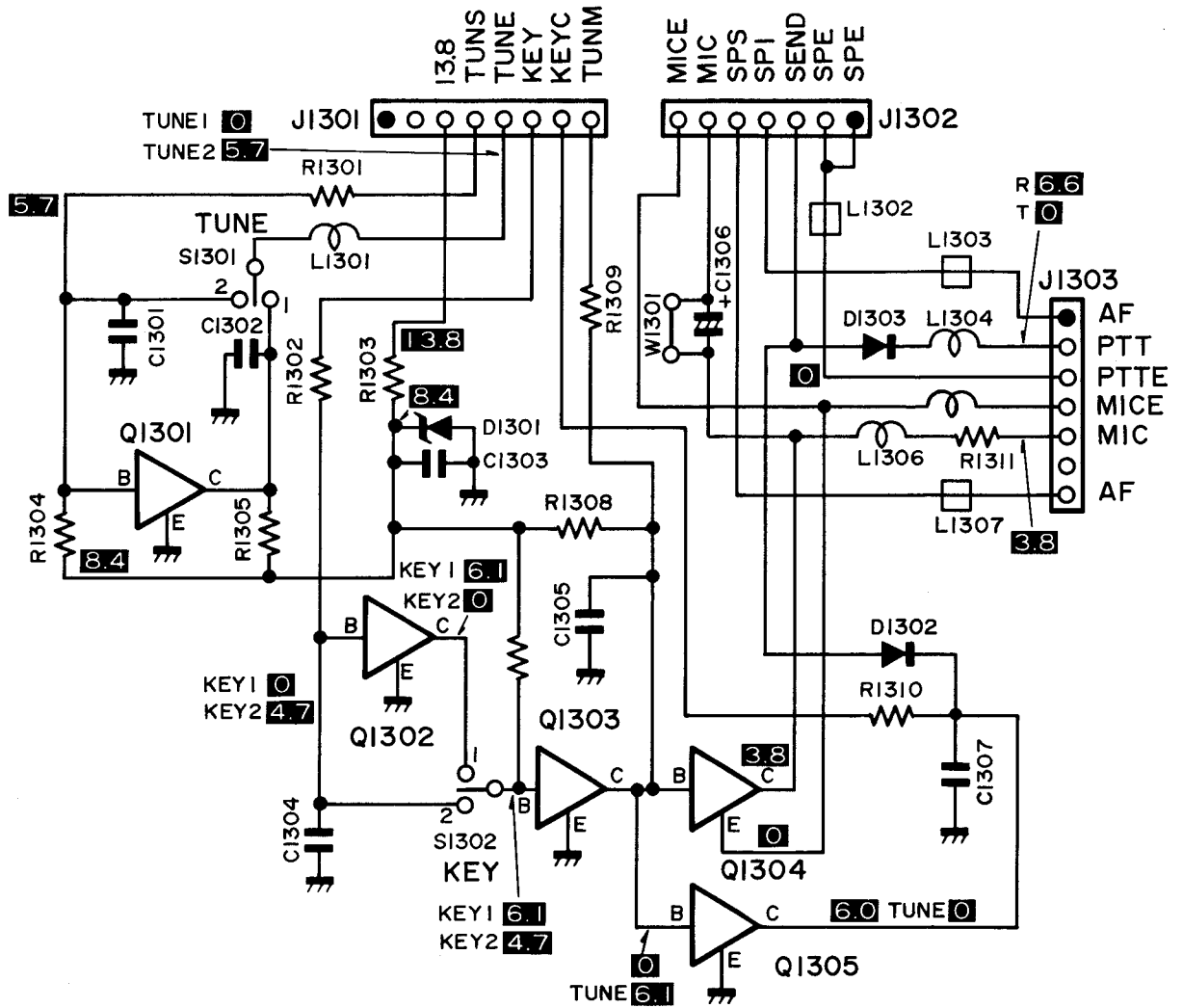
**7.8** DC Voltage by 50KΩ-V multimeter



# FILTER UNIT CIRCUIT DIAGRAM

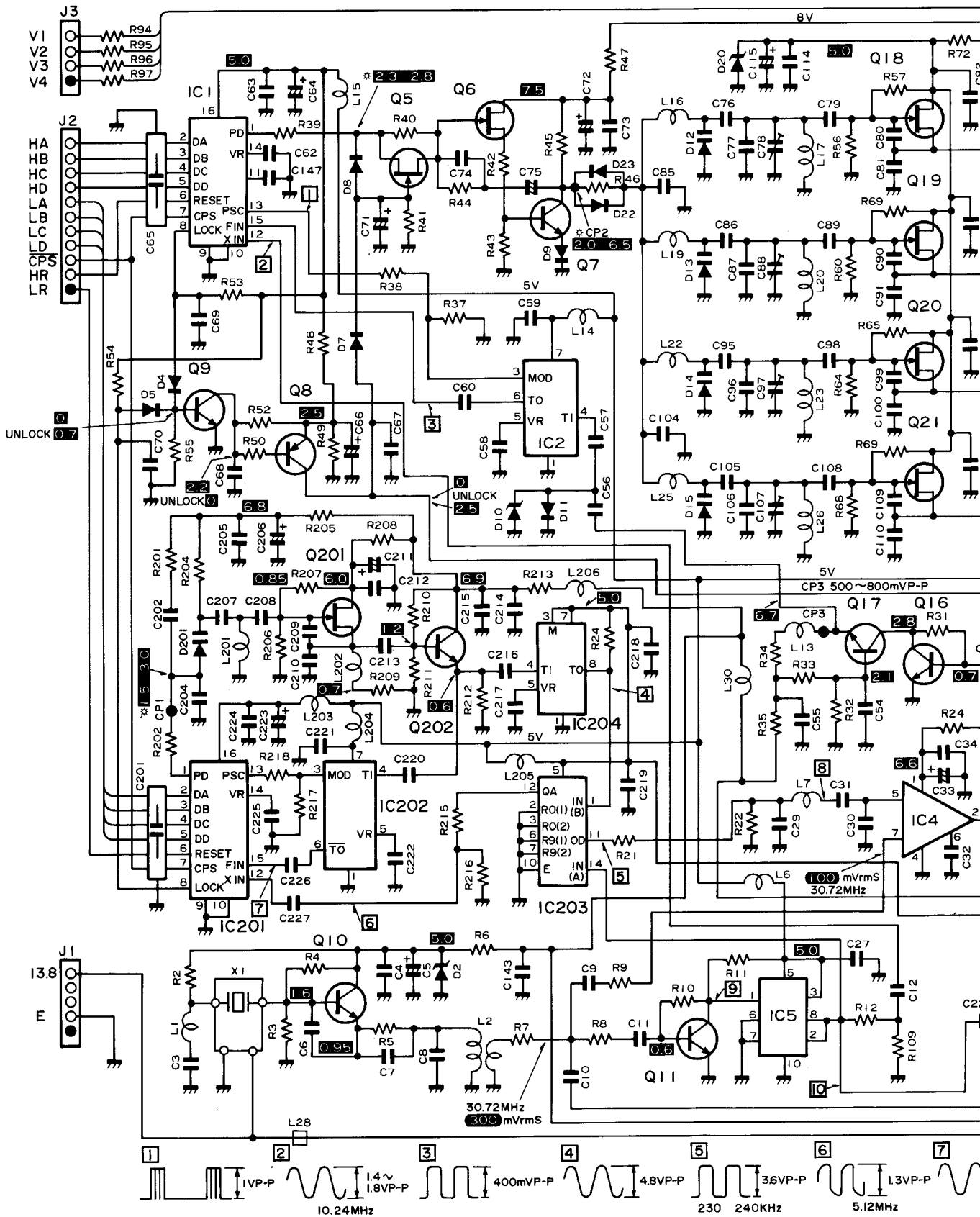


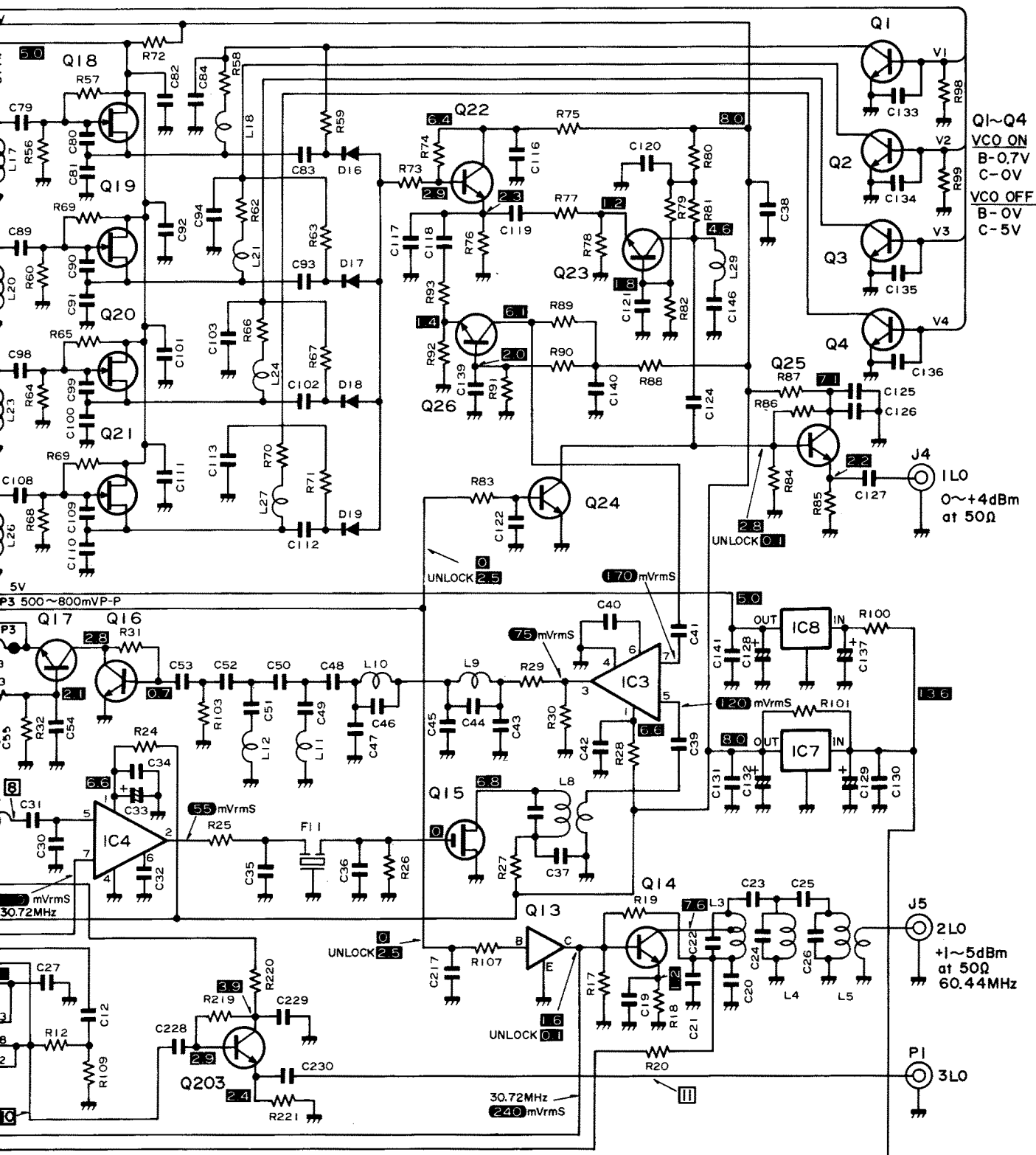
# MIC-C UNIT CIRCUIT AND VOLTAGE DIAGRAM



4.0 DC Voltage by 50KΩ-V multimeter

# PLL UNIT CIRCUIT AND VOLTAGE DIAGRAM

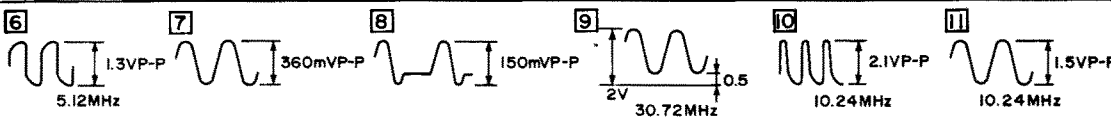




Q1~Q4  
 VCO ON  
 B-0.7V  
 C-0V  
 VCO OFF  
 B-0V  
 C-5V

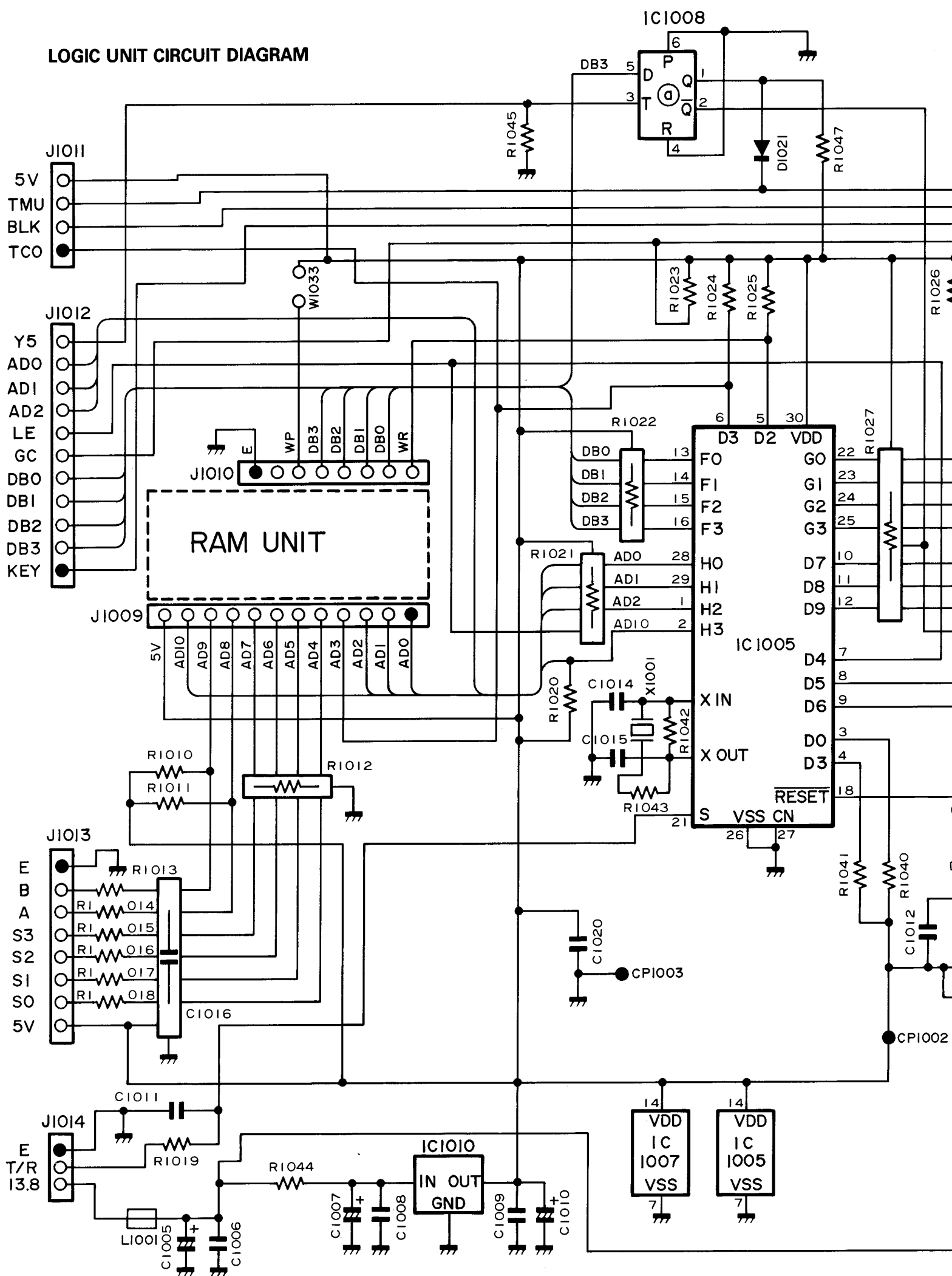
J4  
 ILO  
 0~+4dBm  
 at 50Ω

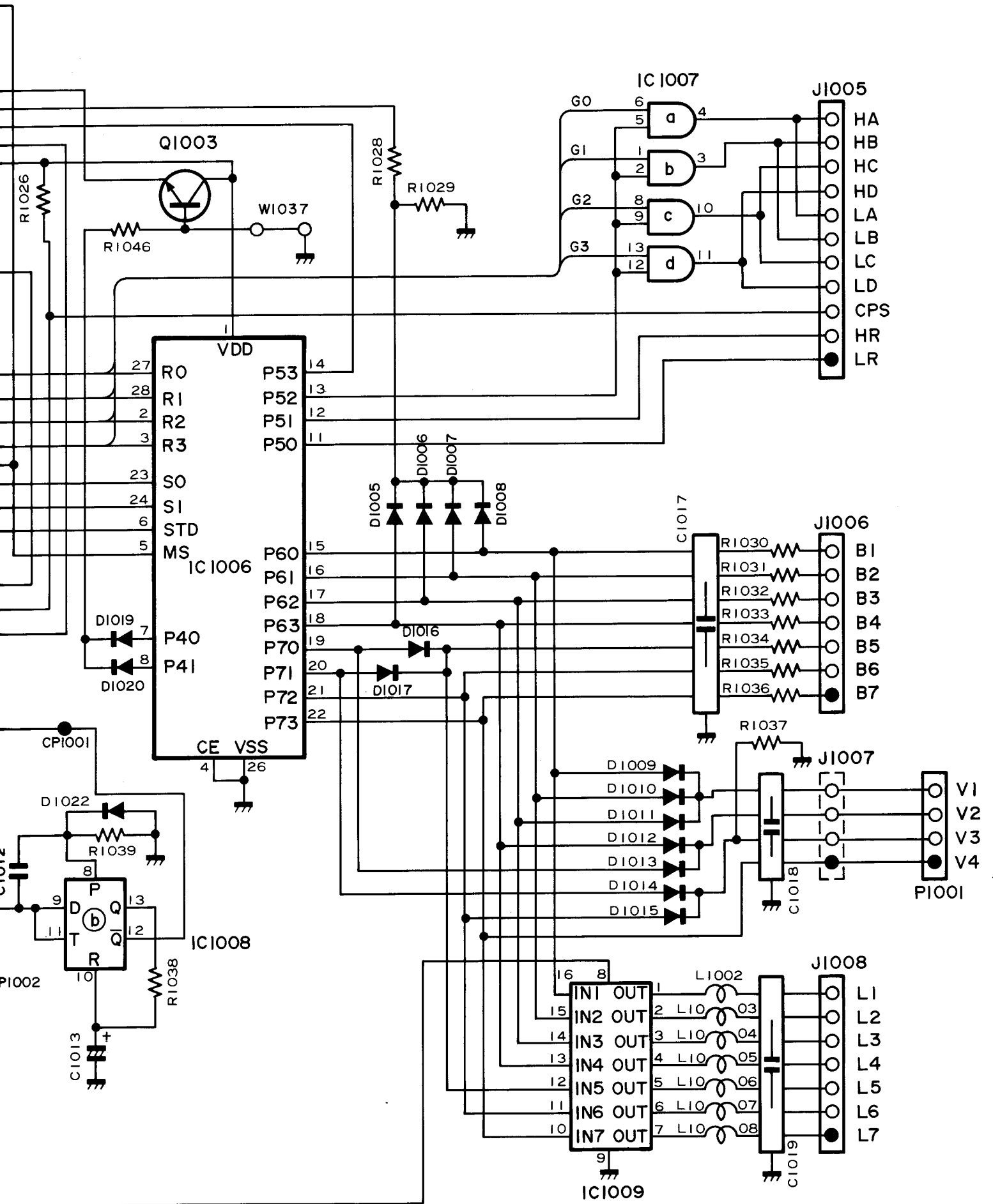
J5  
 2LO  
 +1~5dBm  
 at 50Ω  
 60.44MHz



8.4 DC Voltage by 50KΩ-V multimeter  
 \* 3.6 DC Voltage by high impedance meter  
 7.8 mV RF Voltage by RF millivolt meter

# LOGIC UNIT CIRCUIT DIAGRAM

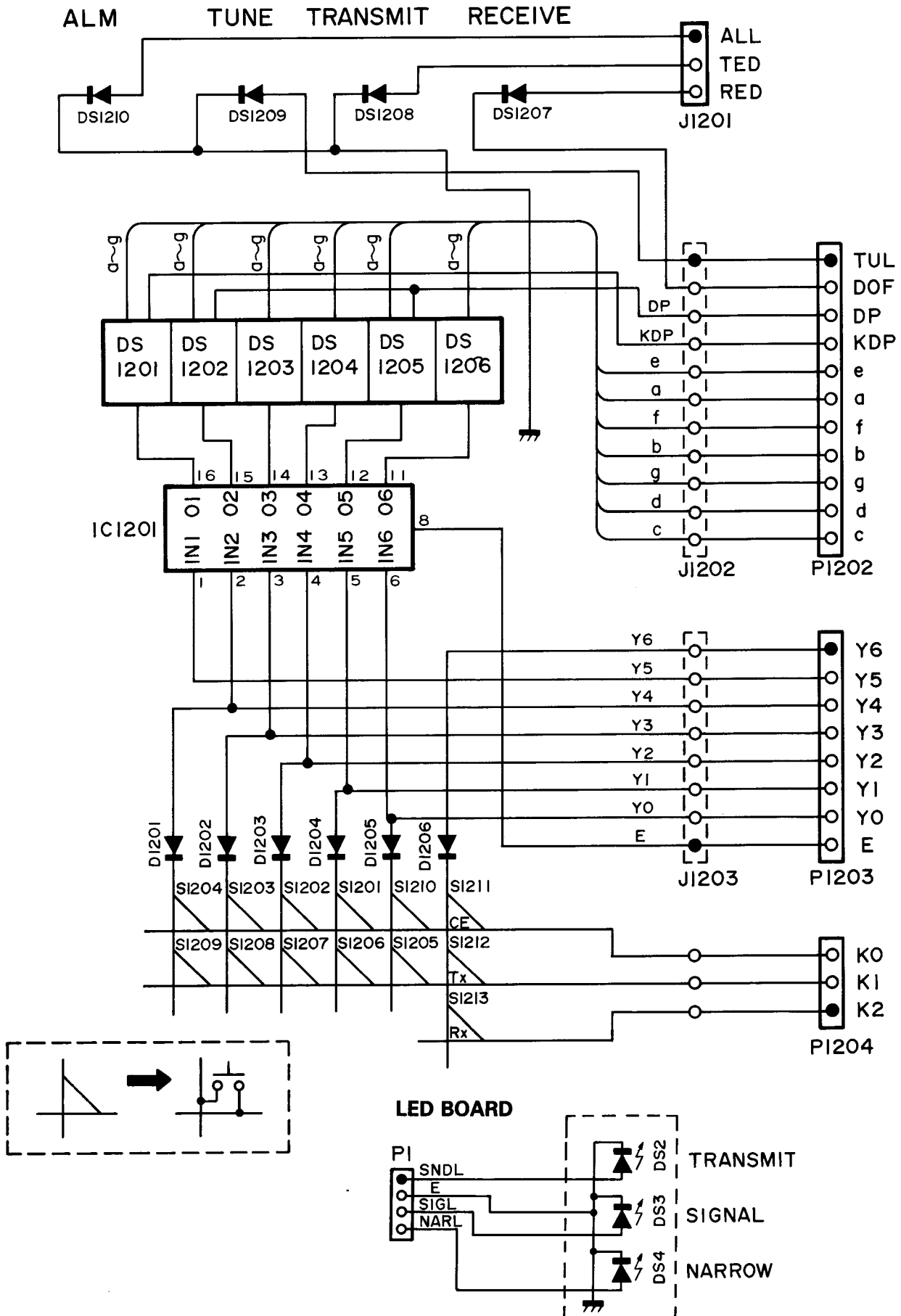


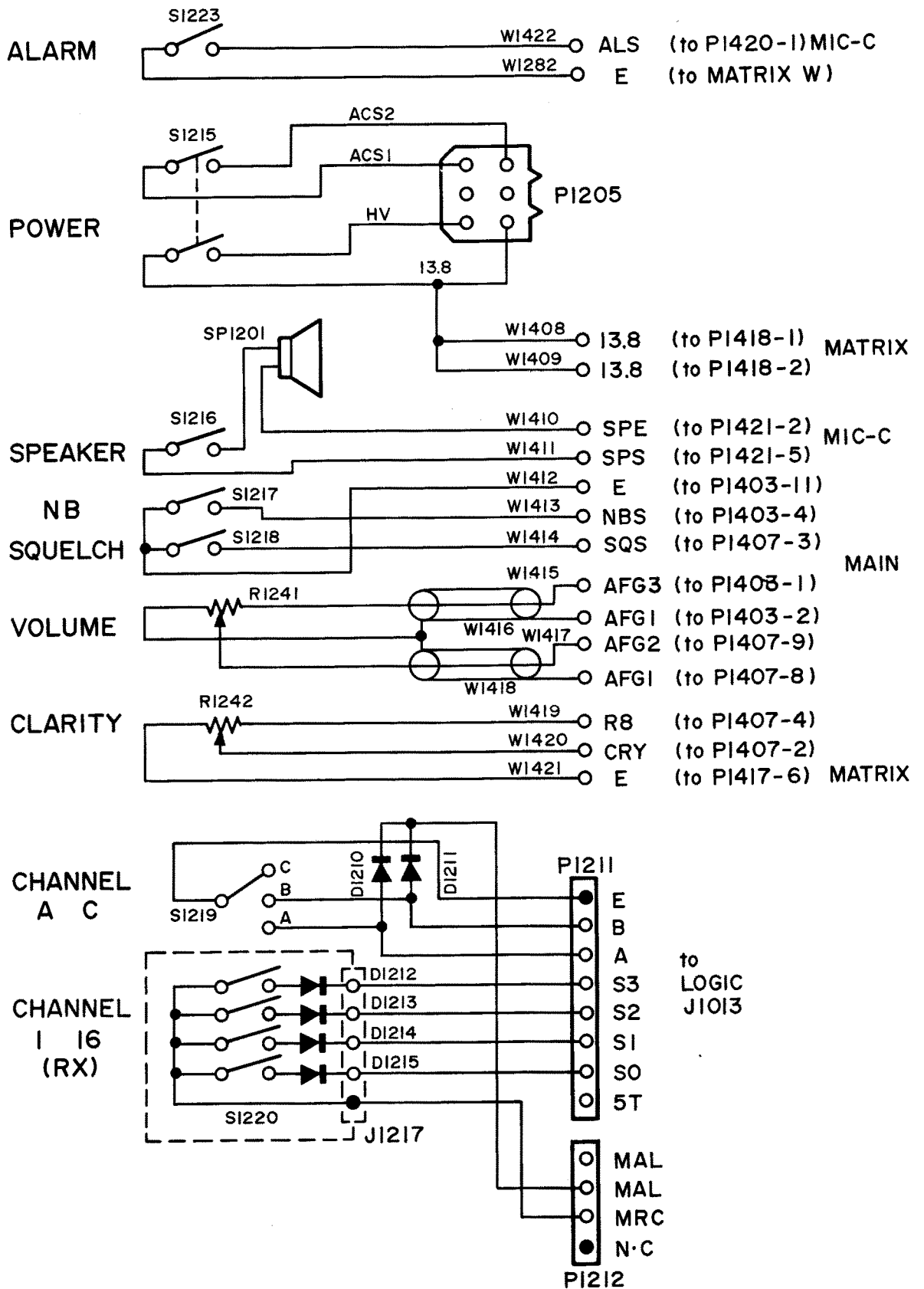




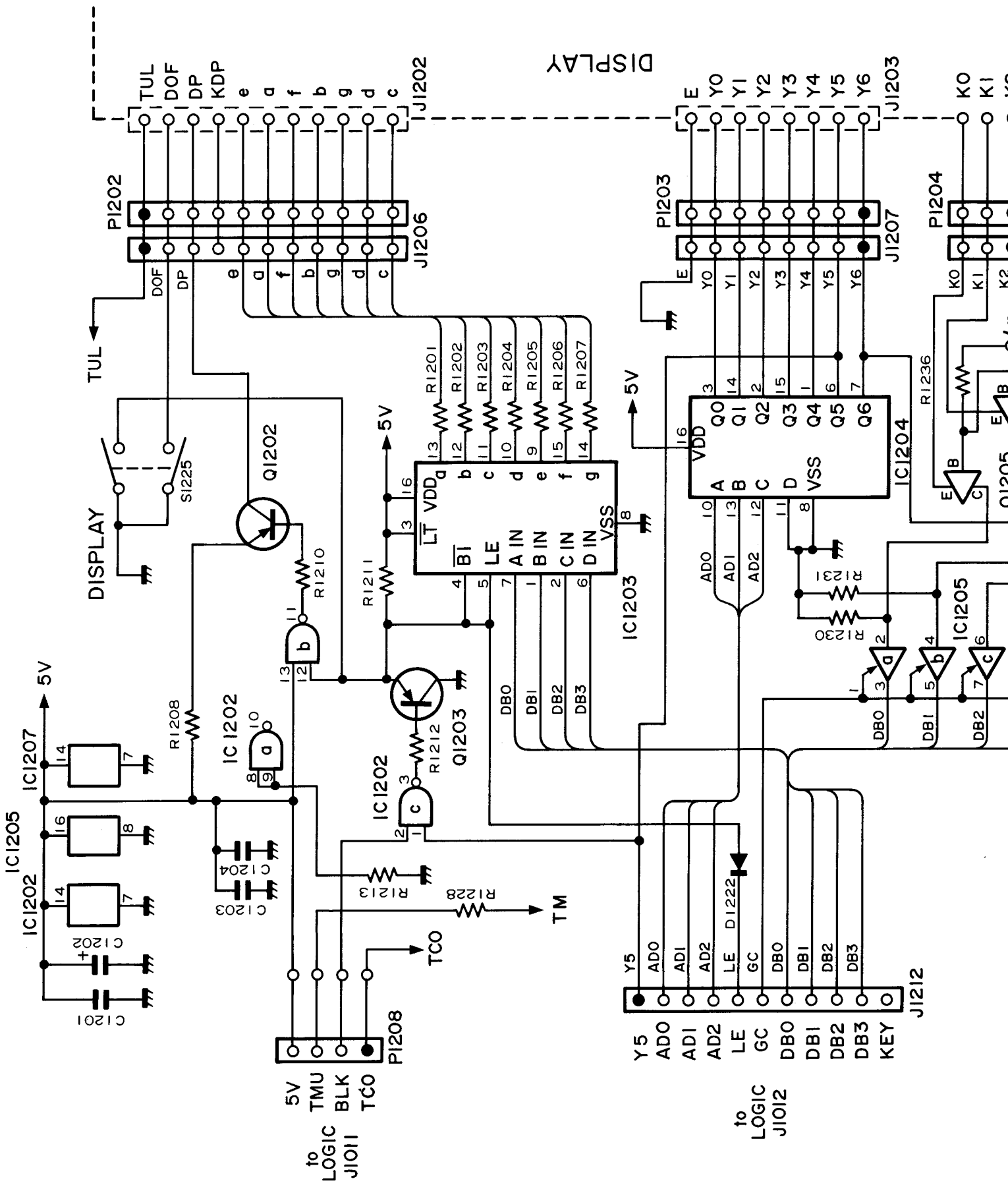
DISPLAY UNIT AND FRONT PANEL CIRCUIT DIAGRAM

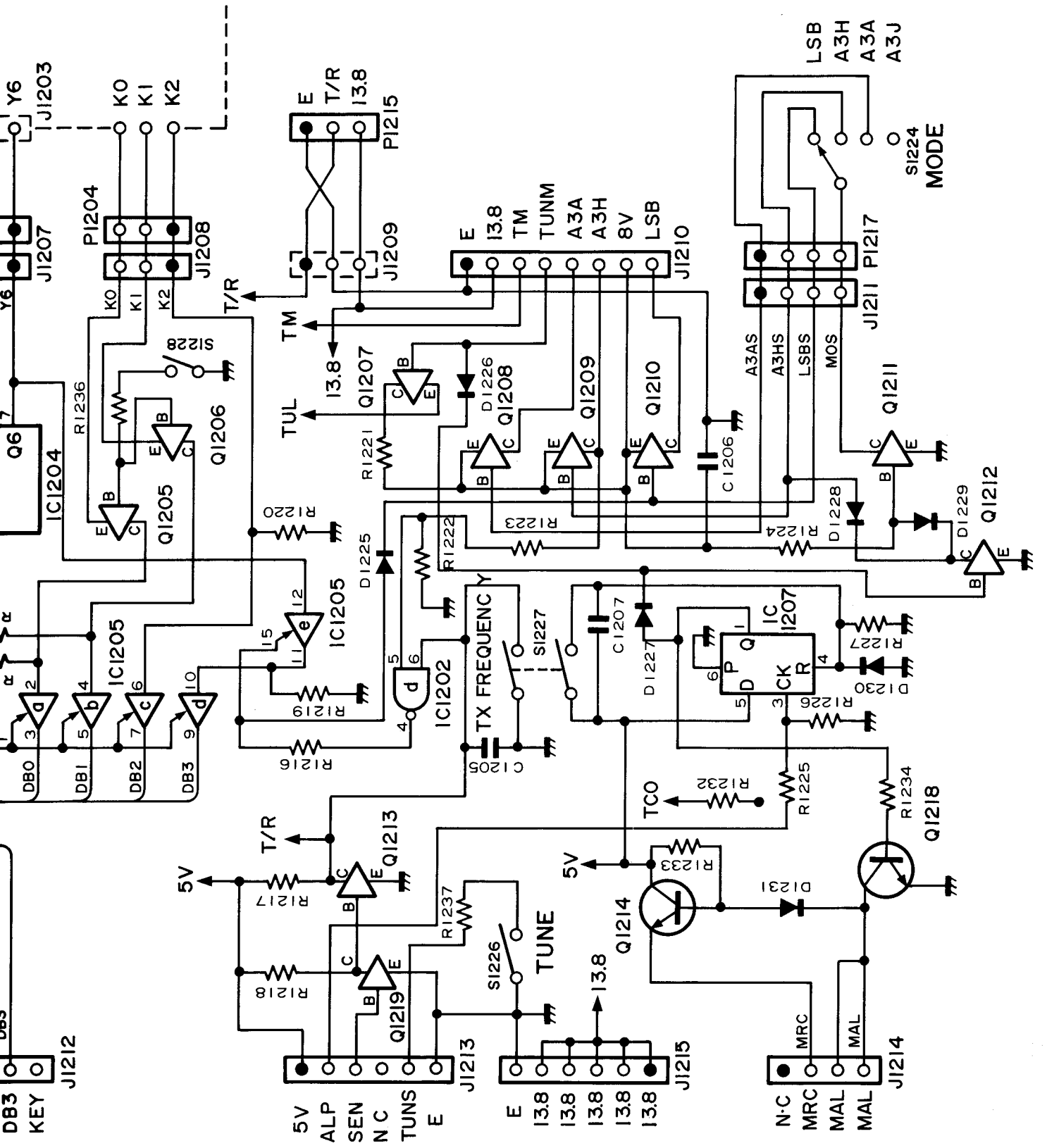
DISPLAY





# FRONT PANEL MATRIX CIRCUIT DIAGRAM

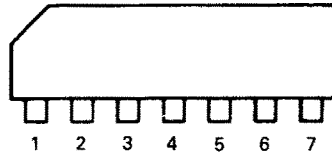




## SECTION 11 IC RATINGS

### μPC1037H (DOUBLE BALANCED MODULATOR)

#### PIN CONNECTION



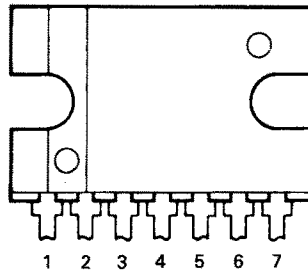
Terminal No.	Connection
1	V <sub>CC</sub>
2	Output 1
3	Output 2
4	GND
5	Signal Input
6	Bypass
7	Carrier Input

#### Maximum Ratings

Item	Symbol	Rating	Unit
Power supply voltage	V <sub>CC</sub>	9	V
Power dissipation	P <sub>D</sub>	270	mW
Operation temperature	T <sub>OPR</sub>	-30 ~ +65	°C
Storage temperature	T <sub>STG</sub>	-40 ~ +125	°C

### μPC1181H (AUDIO POWER AMPLIFIER)

#### PIN CONNECTION



#### Maximum Ratings

Item	Symbol	Rating	Unit
Peak power supply voltage (200 ms)	V <sub>CC(SURGE)</sub>	40	V
Power supply voltage (when no signal)	V <sub>CC1</sub>	25	V
Power supply voltage (during operation) *1	V <sub>CC2</sub>	18	V
Circuit current	I <sub>CC(PEAK)</sub>	4.5	A
Power dissipation	P <sub>D</sub>	12	W
Operation ambient temperature *2	T <sub>OPR</sub>	-30 ~ +75	°C
Storage temperature	T <sub>STG</sub>	-55 ~ +150	°C

\*1 \*2 Aluminum heat sink (100 × 100 × 1 mm)

TC4011BP (QUAD 2-INPUT POSITIVE NOR GATE)

TC4013BP (DUAL D-TYPE FLIP FLOP)

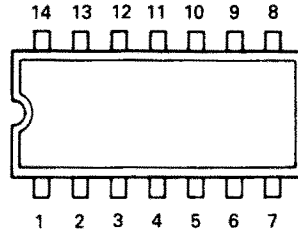
TC4028 (BCD TO DECIMAL DECODER)

TC4081 (QUAD 2-INPUT POSITIVE AND GATE)

μPD4066B (QUAD BILATERAL SWITCH)

M4019BP (QUADRUPLE AND-OR SELECT GATE)

**PIN CONNECTION**

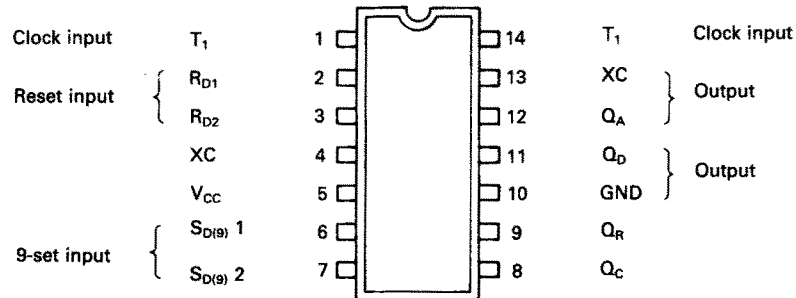


**Maximum Ratings**

Item	Symbol	Rating	Unit
Power supply voltage	$V_{DD}$	$V_{SS}-0.5 \sim V_{SS} + 20$	V
Input voltage	$V_{IN}$	$V_{SS}-0.5 \sim V_{DD} + 0.5$	V
Output voltage	$V_{OUT}$	$V_{SS}-0.5 \sim V_{DD} + 0.5$	V
Input current	$I_{IN}$	$\pm 10$	mA
Power dissipation	$P_D$	300	mW
Storage temperature	$T_{STG}$	$-65 \sim 150$	°C
Read temperature and time	$T_{SOL}$	$260^\circ\text{C} \cdot 10 \text{ sec.}$	

**SN74LS90N (DECODE COUNTER)**

**PIN CONNECTION**



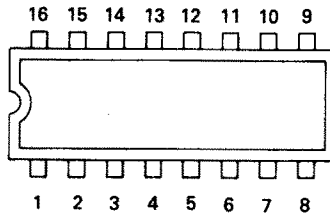
**Maximum Ratings**

Item	Symbol	Rating	Unit
Power supply voltage	$V_{CC}$	$-0.5 \sim +7$	V
Input voltage *1	$V_I$	$-0.5 \sim +5.5$	V
Input voltage *2	$V_I$	$-0.5 \sim +15$	
Output voltage *1	$V_O$	$-0.5 \sim V_{CC}$	V
Operation ambient temperature	$T_{OPR}$	$-20 \sim +75$	°C
Storage temperature	$T_{STG}$	$-65 \sim +150$	°C

\*1 Inputs  $T_1$  and  $T_2$   
 \*2 Inputs  $R_{D1}$ ,  $R_{D2}$ ,  $S_{D(9)1}$  and  $S_{D(9)2}$

## μPD4503 (HEX NON-INVERTING 3-STATE BUFFER)

### PIN CONNECTION

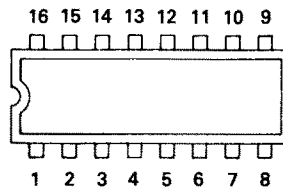


### Maximum Ratings

Item	Symbol	Rating	Unit
Power supply voltage	$V_{DD}$	-0.5 ~ +18	V
Input voltage	$V_{IN}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Input current	$I_{IN}$	10	mA
Output voltage	$V_{OUT}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Output current	$I_O$	25	mA
Power dissipation	$P_D$	200	mW
Storage temperature	$T_{STG}$	-65 ~ 150	°C

## TC4511BP (BCD TO 7-SEGMENT LATCH/DECODER/DRIVER)

### PIN CONNECTION



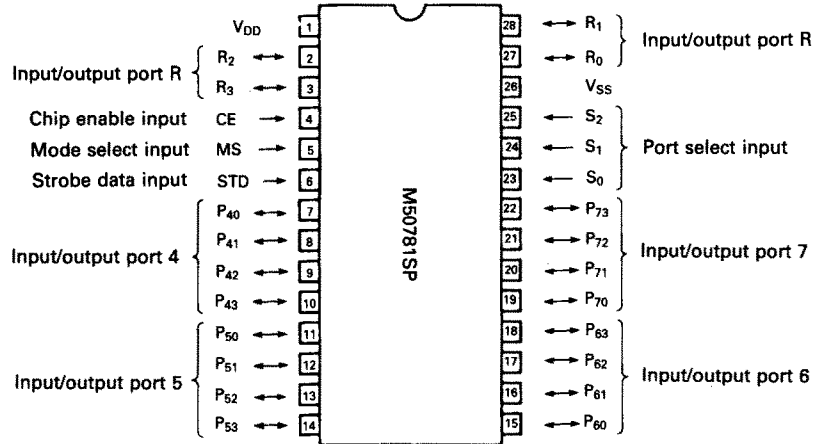
### Maximum Ratings

Item	Symbol	Rating	Unit
Power supply voltage	$V_{DD}$	$V_{SS} - 0.5 \sim V_{SS} + 20$	V
Input voltage	$V_{IN}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Output voltage	$V_{OUT}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Input current	$I_{IN}$	$\pm 10$	mA
Power dissipation	$P_D$	300	mW
Storage temperature	$T_{STG}$	-65 ~ 150	°C
Read temperature and time	$T_{SOL}$	260°C · 10 sec.	

\*1 When output is H

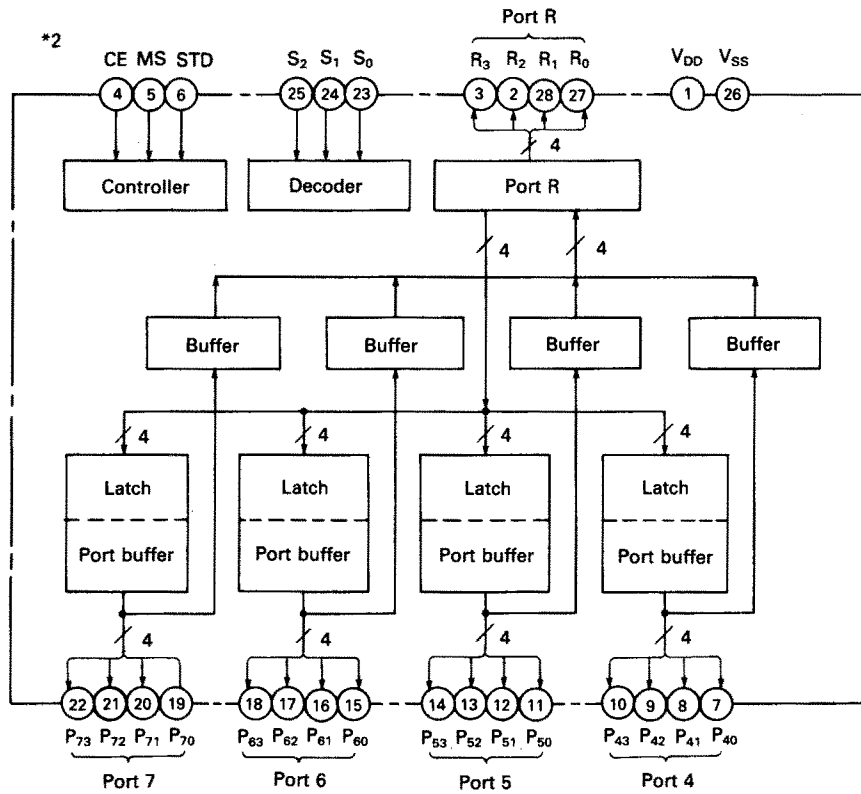
# M50781SP (INPUT/OUTPUT EXPANDER)

## PIN CONNECTION



## BLOCK DIAGRAM

M50781SP



## Maximum Ratings

Item	Symbol	Rating	Unit
Power supply voltage	$V_{DD}$	-0.3 ~ 18	V
Input voltage	$V_I$	$V_{SS} - 0.3 \sim V_{DD} + 0.3$	V
Output voltage *1	$V_O$	$V_{SS} - 0.3 \sim V_{DD} + 0.3$	V
Maximum power dissipation *2	$P_D$	600	mW
Operation ambient temperature	$T_{OPR}$	-10 ~ +70	°C
Storage temperature	$T_{STG}$	-40 ~ +125	°C

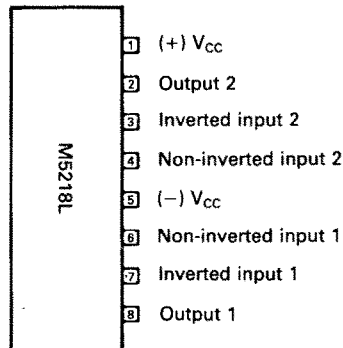
\*1 If  $V_{SS}$  terminal is standard

\*2  $T_a = 25^\circ\text{C}$



## M5218L (DUAL LOW-NOISE OPERATIONAL AMPLIFIER)

### PIN CONNECTION

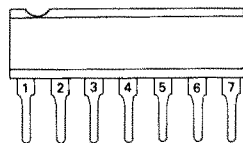


### Maximum Ratings (Ta = 25°C)

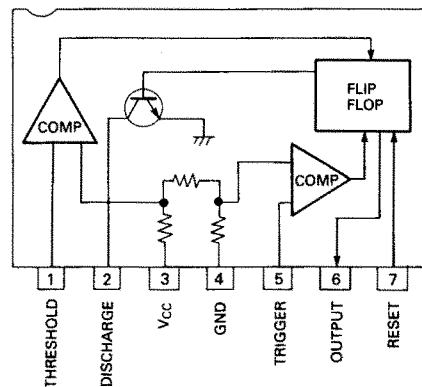
Item	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	$\pm 18$	V
Load current	$I_{LP}$	$\pm 50$	mA
Differential input voltage	$V_{id}$	$\pm 30$	V
In-phase input voltage	$V_{io}$	$\pm 15$	V
Power dissipation	$P_d$	800	mW
Operating temperature	$T_{opr}$	-20 ~ +75	°C
Storage temperature	$T_{stg}$	-55 ~ +125	°C

## BA222 (MONOLITHIC TIMER)

### PIN CONNECTION



### BLOCK DIAGRAM

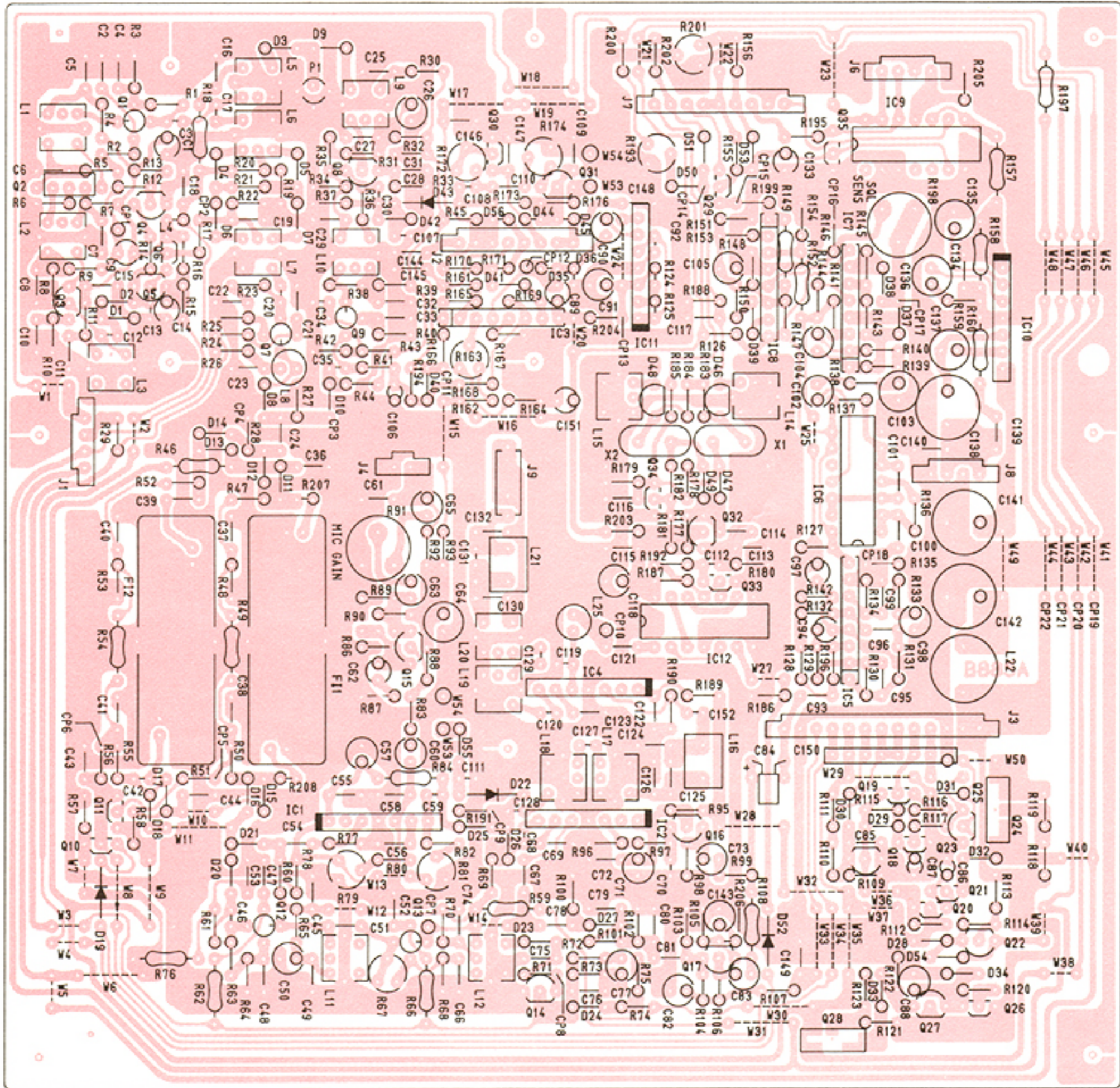


### Maximum Ratings

Item	Symbol	Rating	Unit
Power supply voltage	$V_{CC}$	18	V
Power dissipation	$P_D$	500	mW
Operation temperature	$T_{OPT}$	-10 ~ +75	°C
Storage temperature	$T_{STG}$	-55 ~ +125	°C

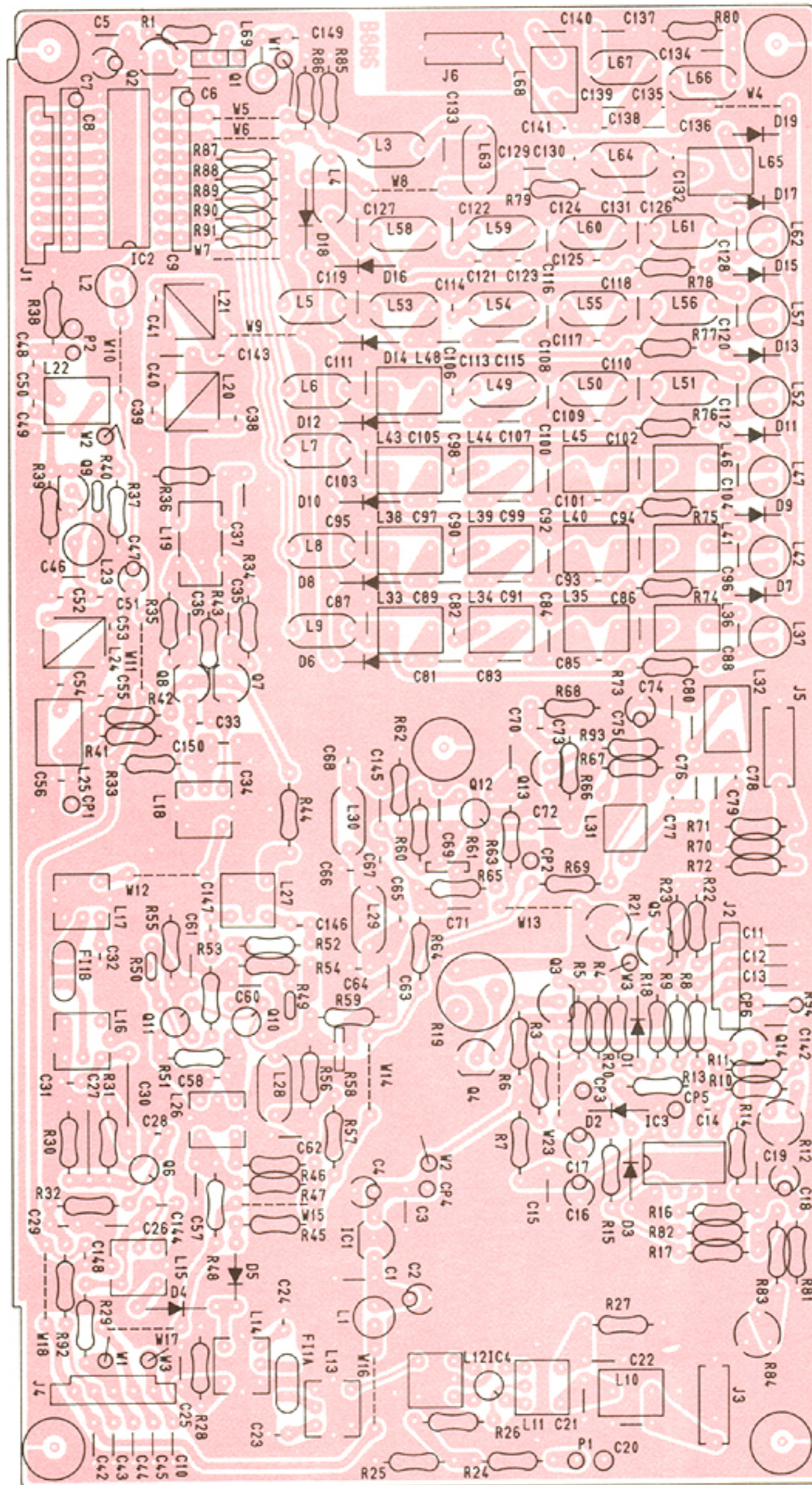
# SECTION 12 BOARD LAYOUT

## MAIN UNIT BOARD



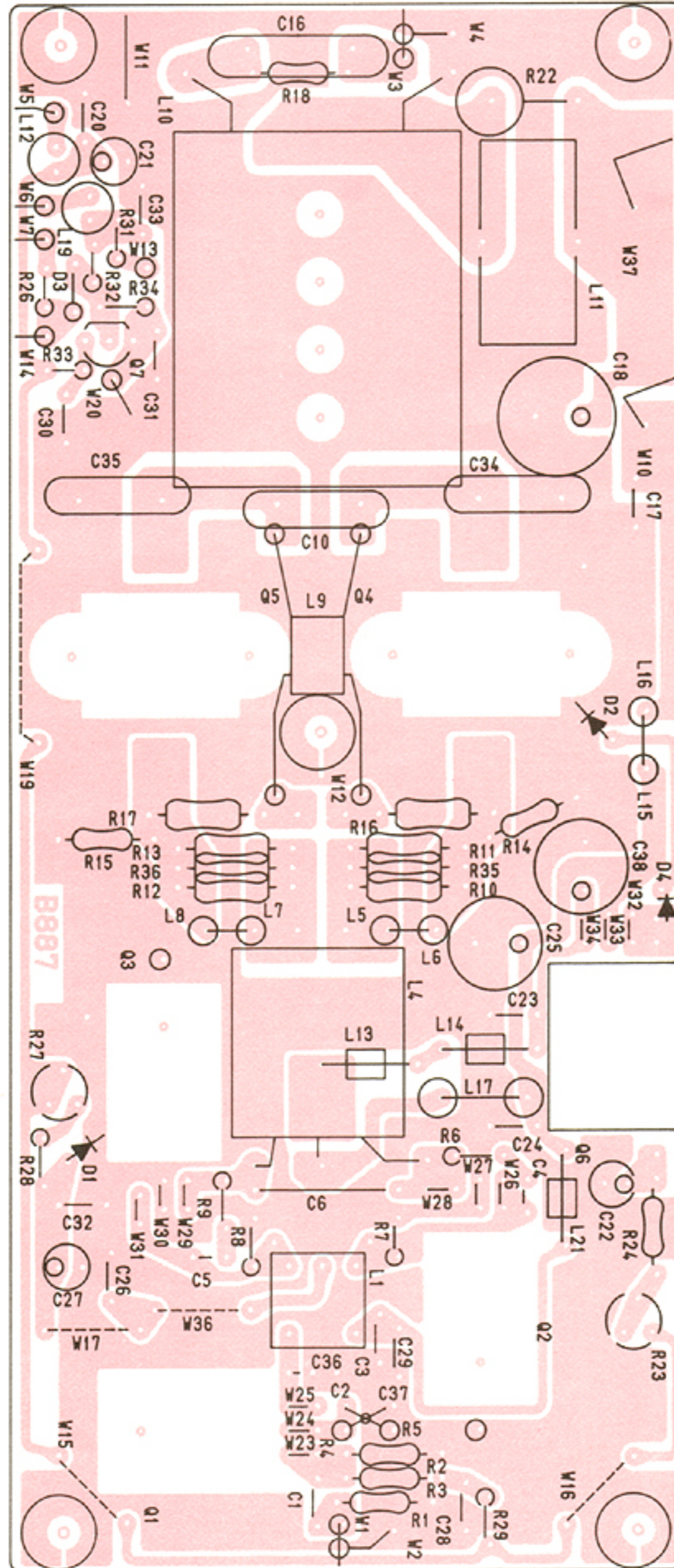
NOTE: Please add "300" to the indicated number on the board for actual part number respectively.

# RF UNIT BOARD



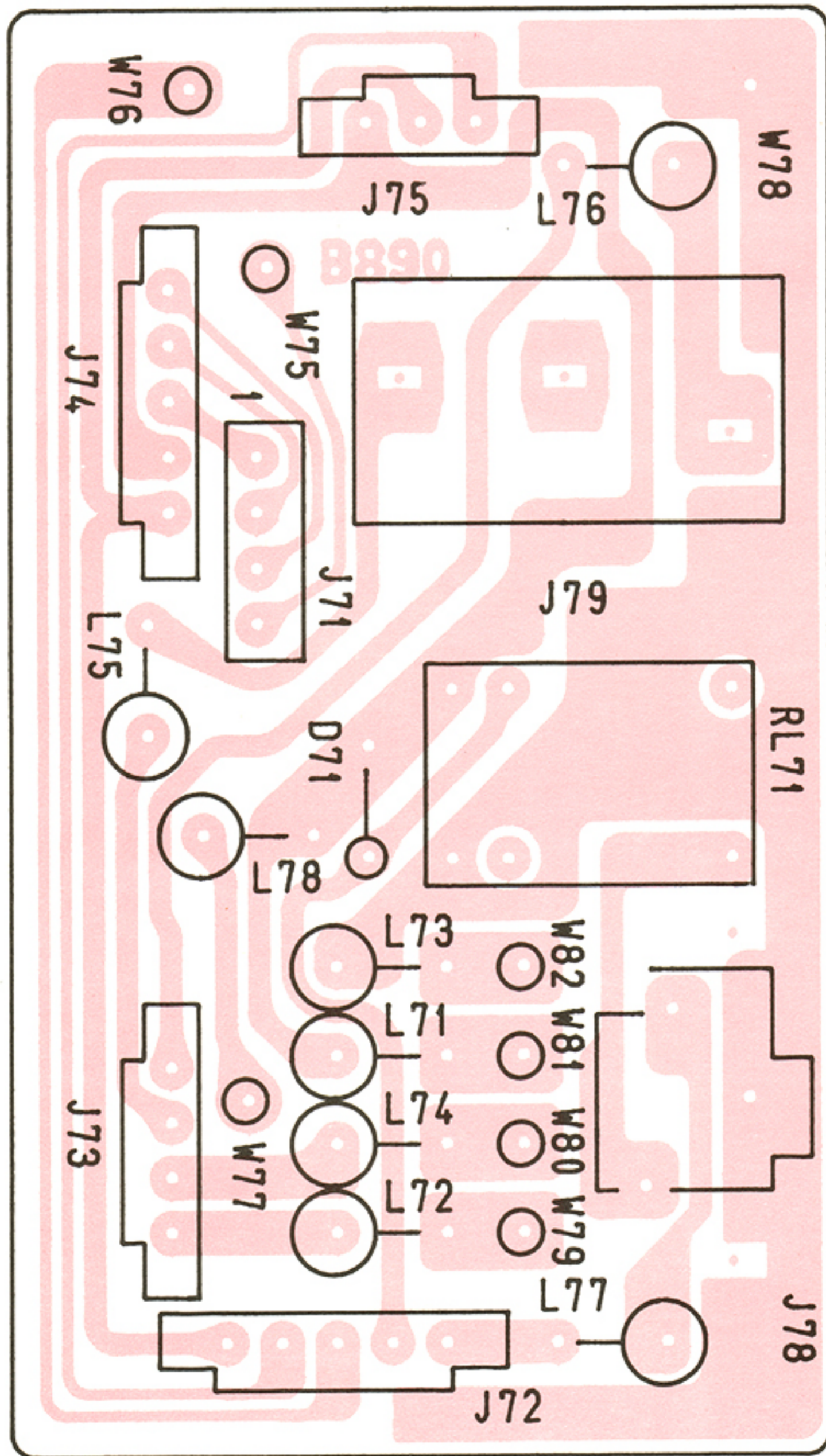
NOTE: Please add "600" to the indicated number on the board for actual part number respectively.

# PA UNIT BOARD



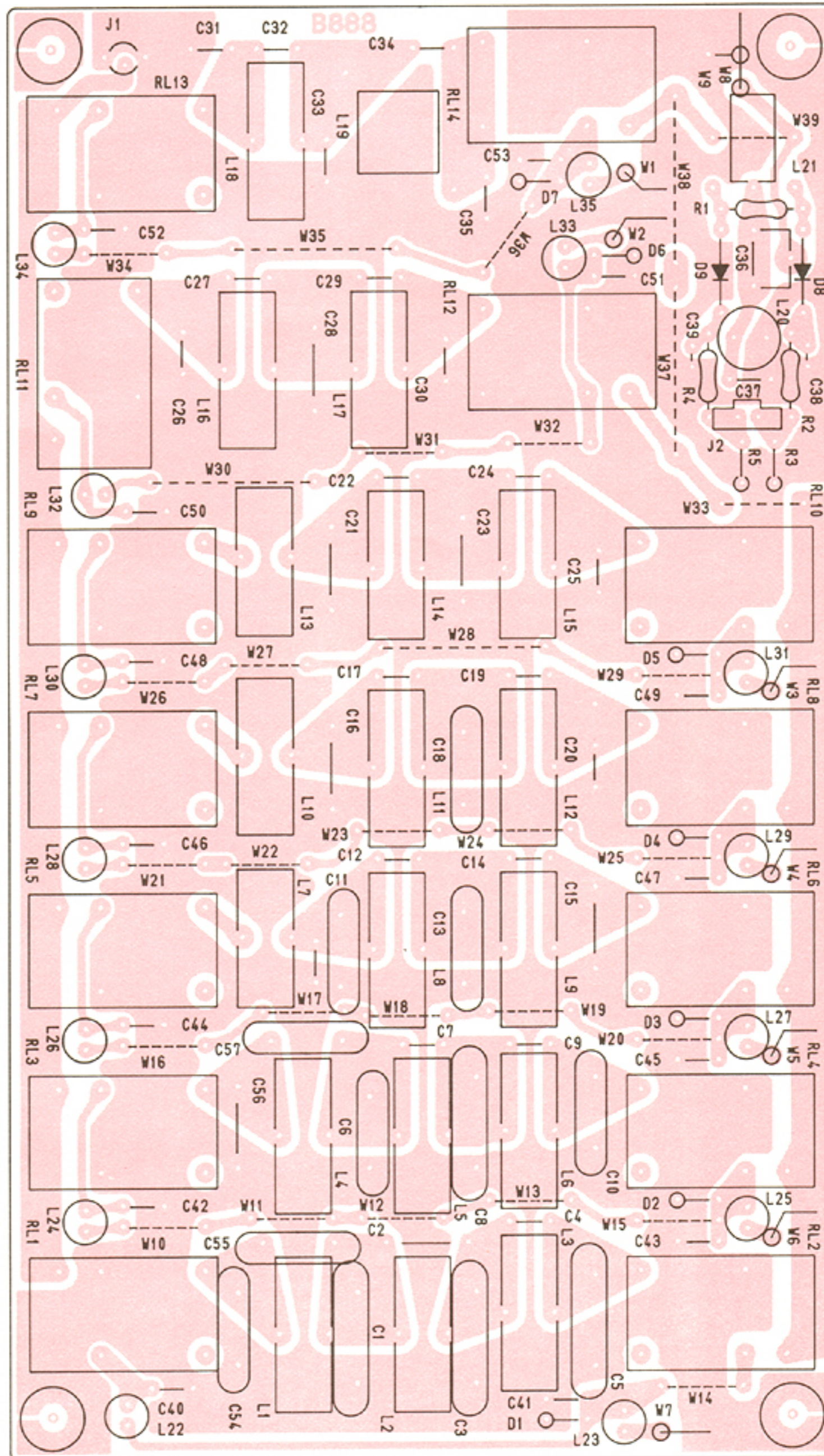
NOTE: Please add "800" to the indicated number on the board for actual part number respectively.

PA CONNECTOR BOARD



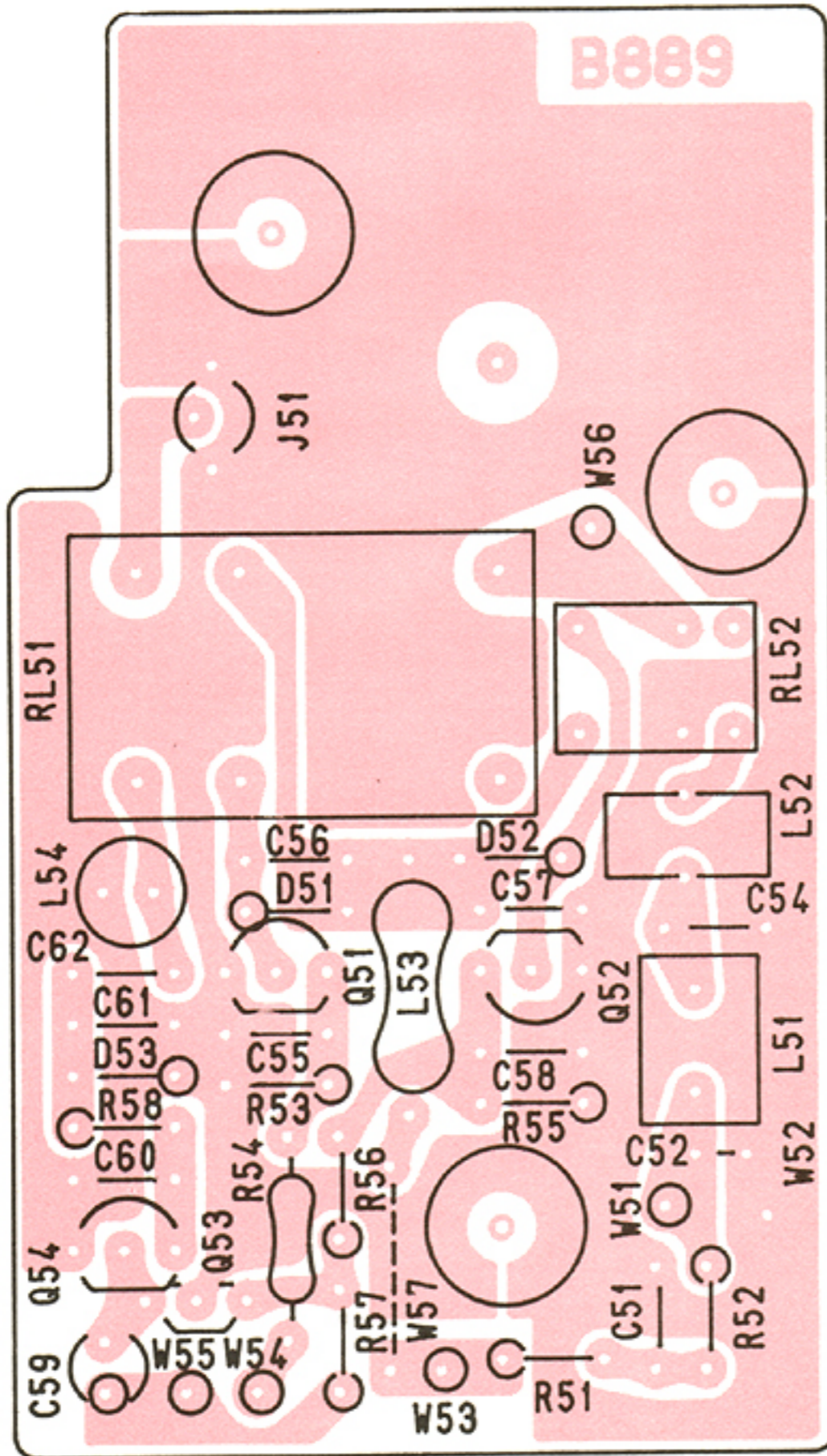
NOTE: Please add "800" to the indicated number on the board for actual part number respectively.

# FILTER UNIT BOARD



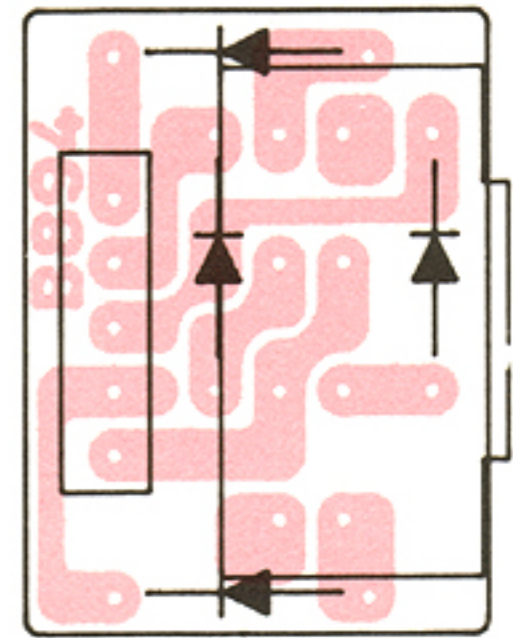
NOTE: Please add "900" to the indicated number on the board for actual part number respectively.

**ANTENNA SWITCH BOARD**



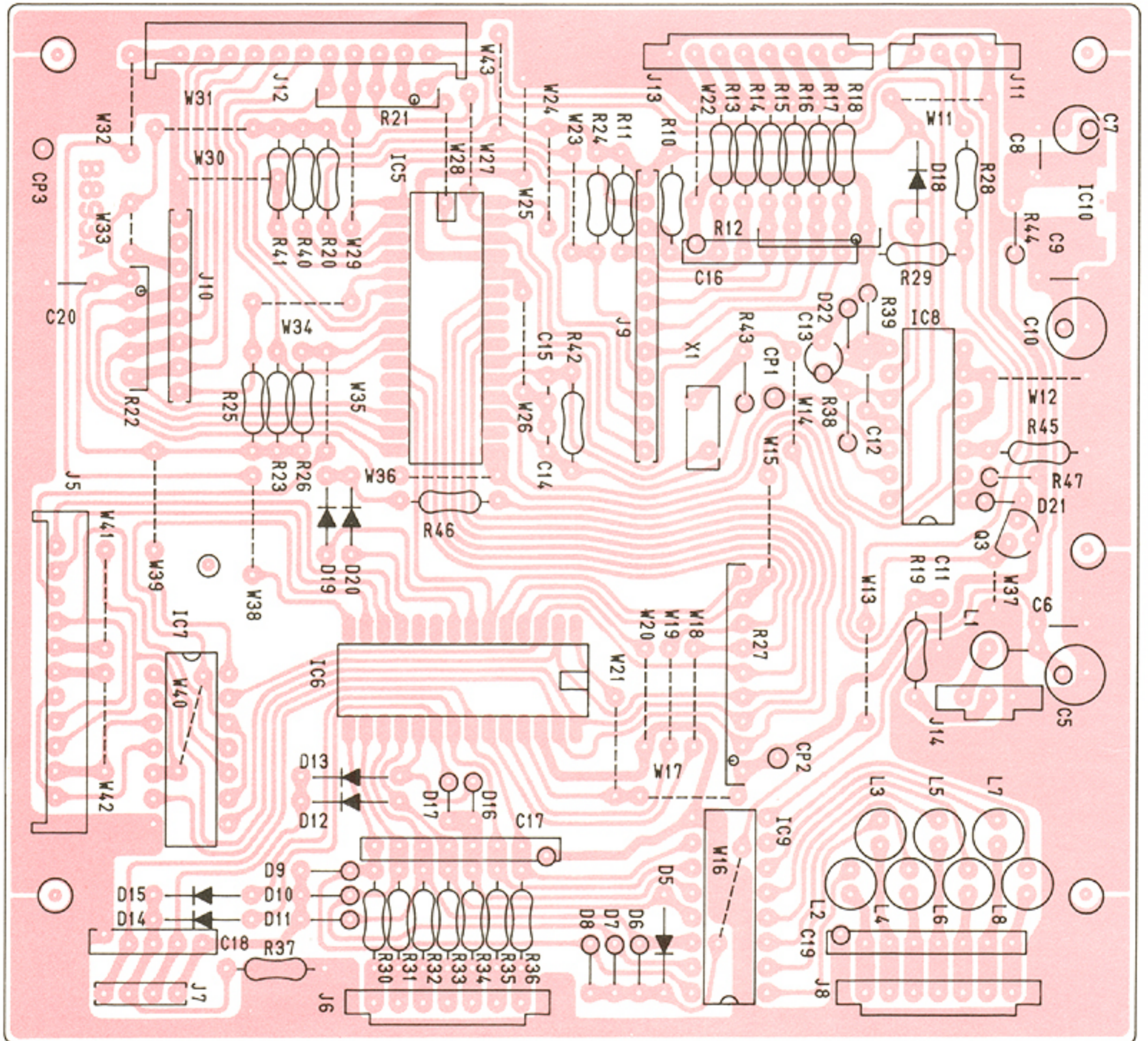
NOTE: Please add "800" to the indicated number on the board for actual part number respectively.

**CHANNELLING BOARD**



NOTE: Please add "1200" to the indicated number on the board for actual part number respectively.

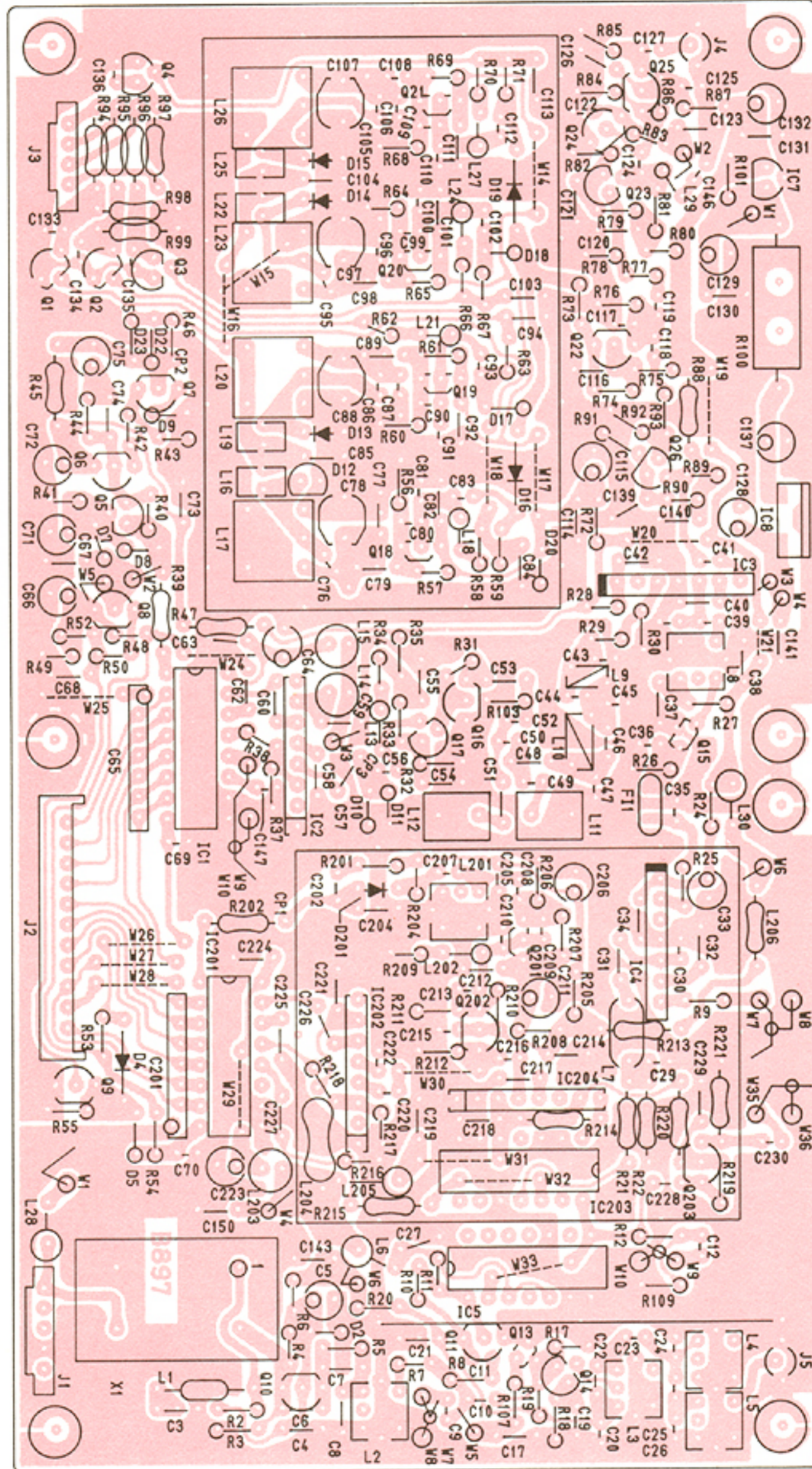
# LOGIC UNIT BOARD



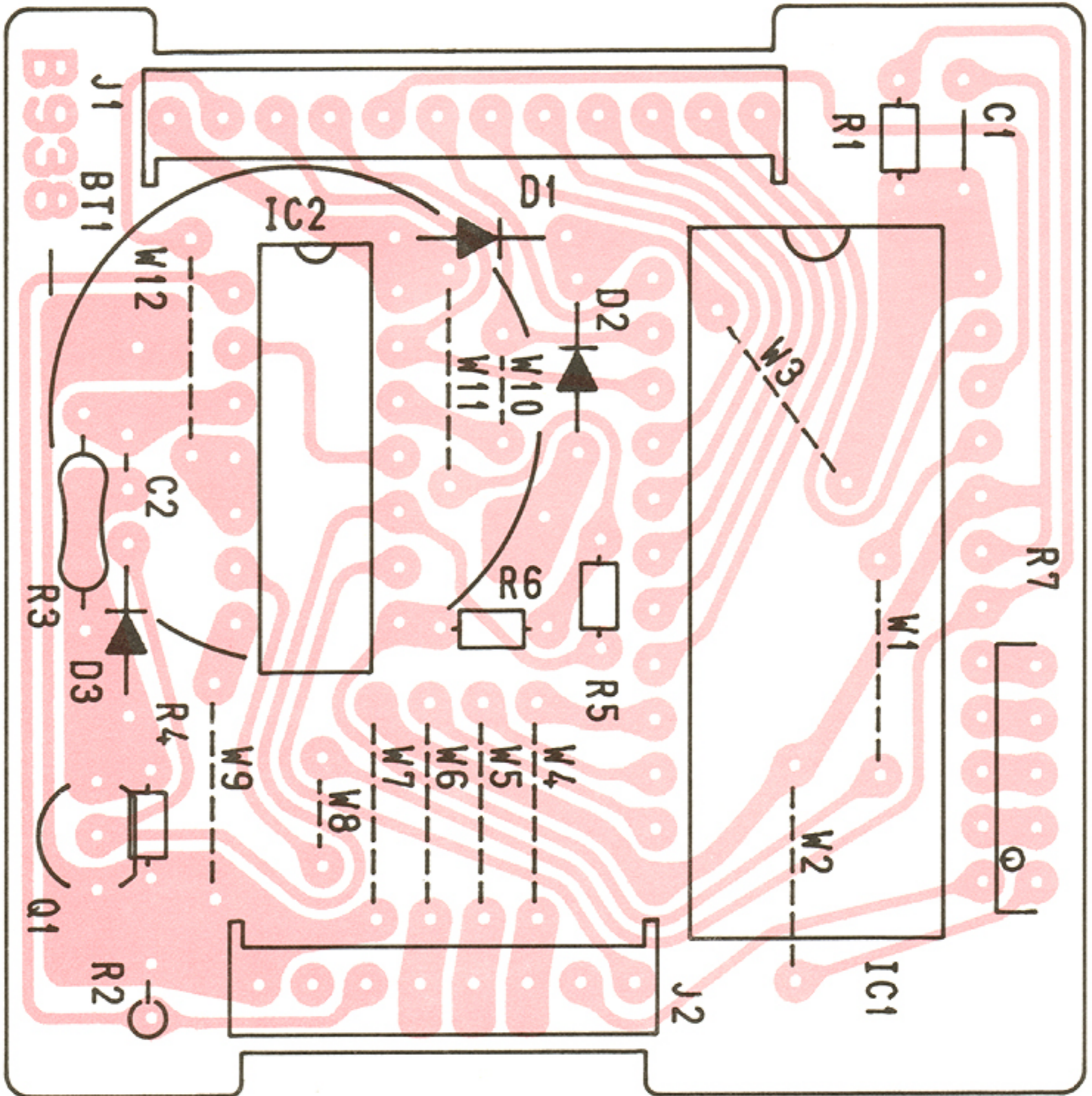
NOTE: Please add "1000" to the indicated number on the board for actual part number respectively.



# PLL UNIT BOARD

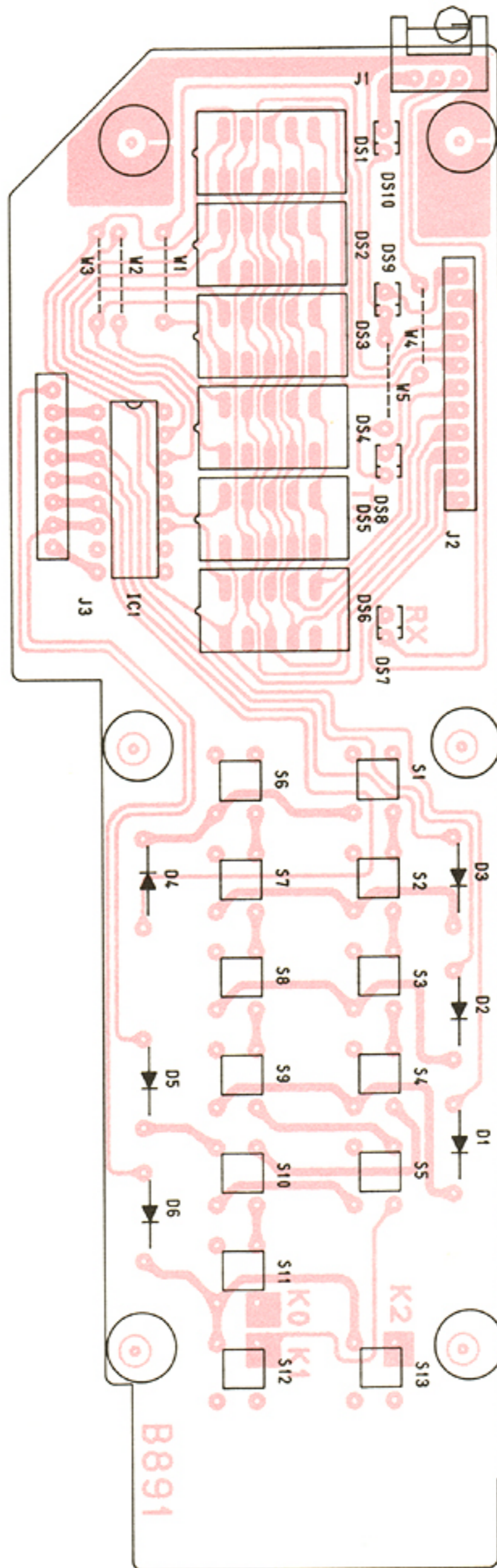


# RAM UNIT BOARD



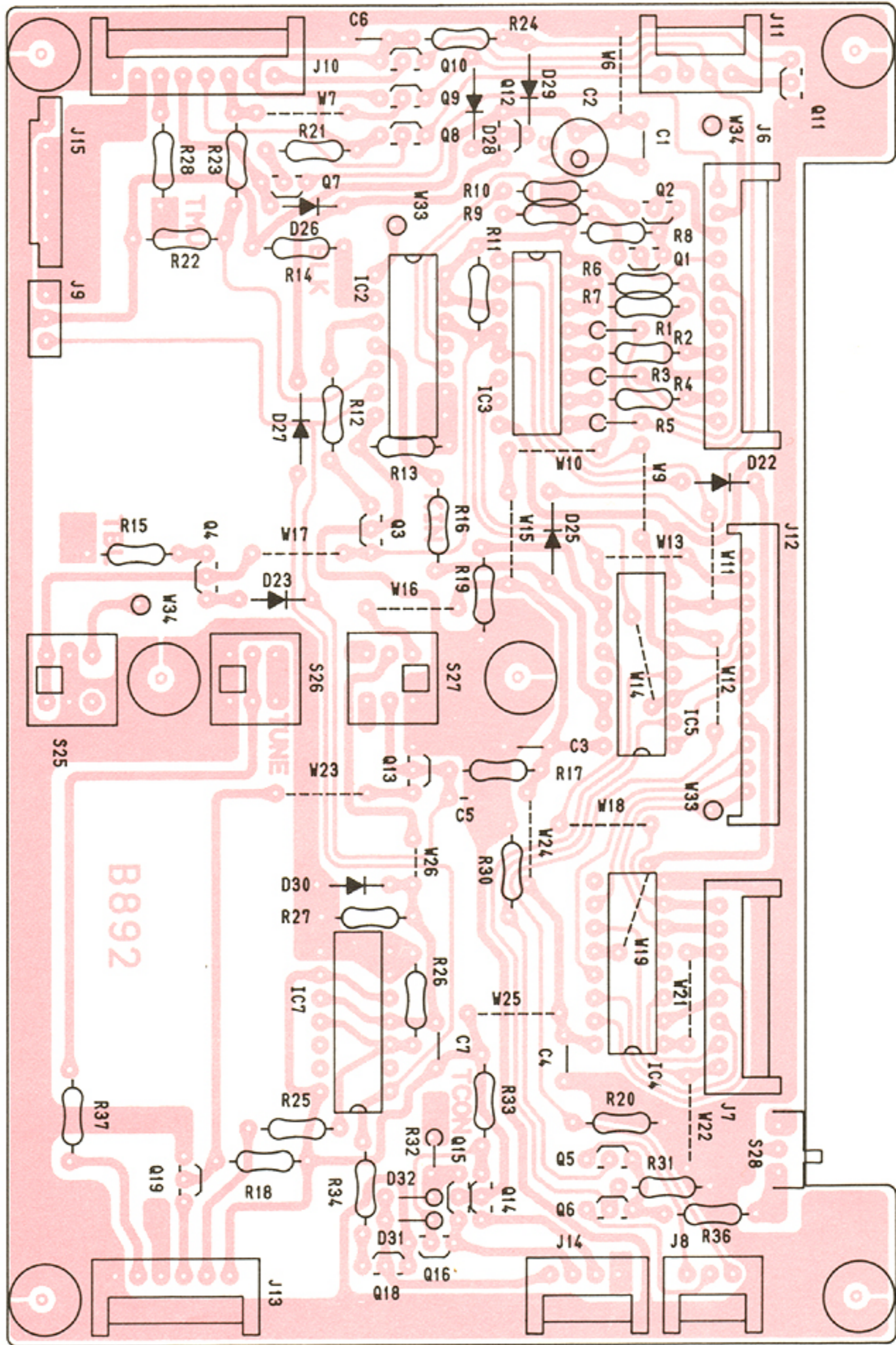
NOTE: Please add "1000" to the indicated number on the board for actual part number respectively.

# DISPLAY BOARD



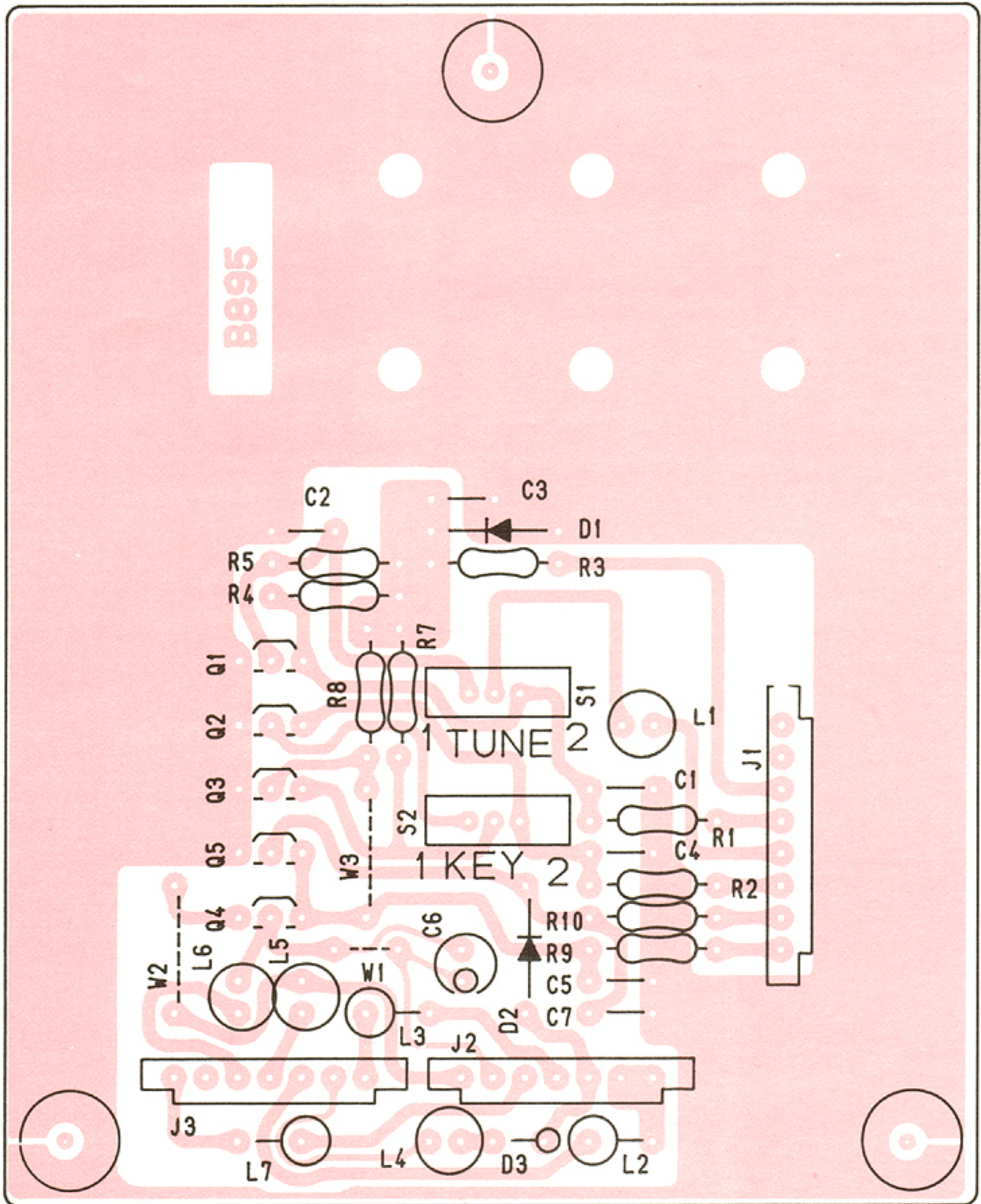
NOTE: Please add "1200" to the indicated number for actual part number respectively.

# MATRIX BOARD



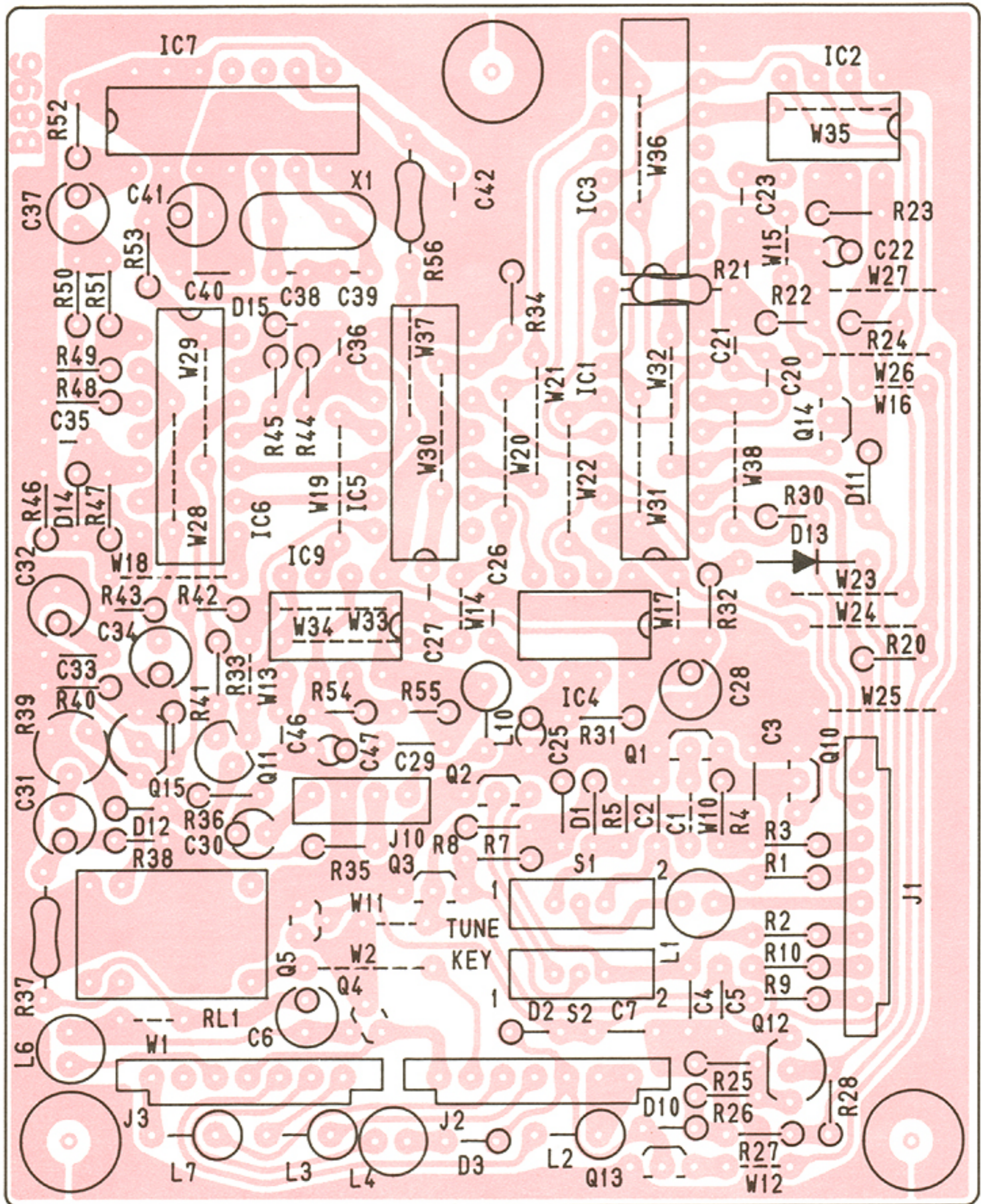
NOTE: Please add "1200" to the indicated number on the board for actual part number respectively.

MIC-C UNIT BOARD



NOTE: Please add "1300" to the indicated number on the board for actual part number respectively.

UT-20 ALARM UNIT (OPTION)



## SECTION 13 OPTION INSTALLATION

### 13-1 UT-20 ALARM UNIT

This gives installation instructions for the optional alarm unit, UT-20. Please read all instructions carefully before installation to get maximum performance and full value from the radio.

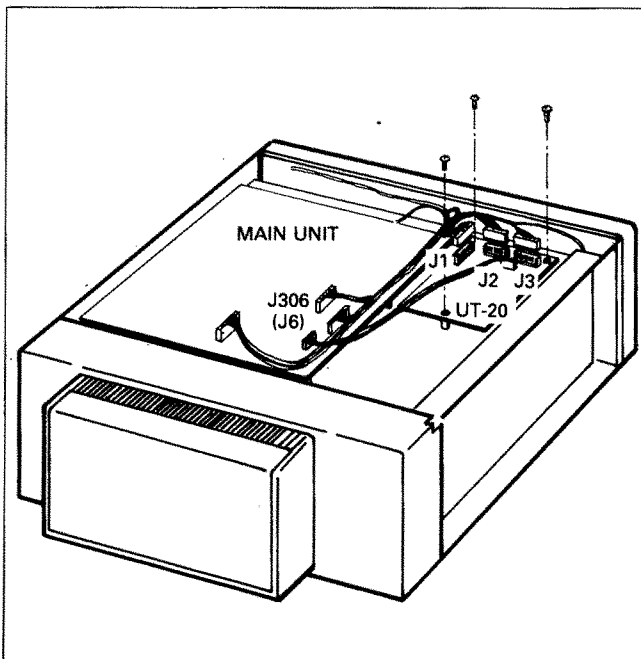
#### PREPARATION

Before performing any work on the radio, make sure that the power cord is unplugged from the radio.

Remove the top cover by unscrewing the six screws on the top, and the three screws on each side.

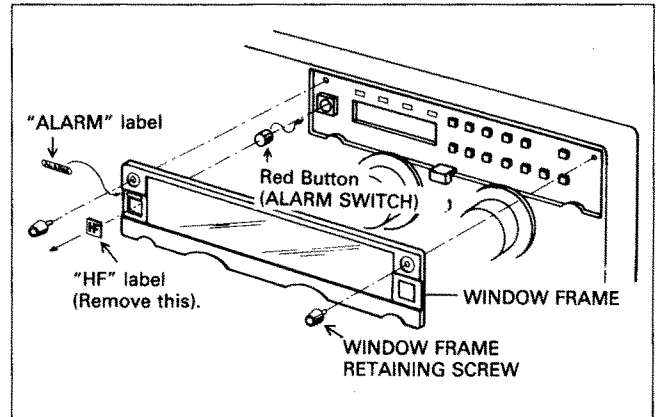
#### ASSEMBLY PROCEDURE

1. Unplug the connectors inserted to J1, J2 and J3 on the MIC-C unit.
2. Remove the MIC-C unit by unscrewing the three screws retaining the unit.
3. Install the optional unit UT-20 at the position where the MIC-C unit was installed previously.
4. Insert the connectors, which were connected to J1, J2 and J3 of the MIC-C unit previously, to J1, J2 and J3 of the UT-20 respectively.
5. Insert the 4-pin plug from the UT-20 to J306 (indicated as J6 on the board) of the MAIN unit.



6. Remove the WINDOW FRAME by unscrewing the WINDOW FRAME RETAINING SCREWS and the "HF" label located between the frequency display and speaker on the front panel.
7. You will find the shaft of the alarm switch there. Screw the supplied red button into this shaft.

8. Replace the WINDOW FRAME as before and attach the supplied "ALARM" label to the position just above the switch.



9. Turn R1339 (indicated as R39 on the board) of the UT-20 fully counterclockwise, and set the switches "TUNE" and "KEY" as before (the same positions as the MIC-C unit; refer to the instruction manual of the IC-M700). Please refer to the instruction manual of the IC-M700 for further detail.
10. Connect a dummy load or terminated power meter to the antenna connector on the rear panel. Push the alarm switch newly installed and adjust R1339 so that proper modulation is obtained.

**CAUTION:** Never transmit the alarm signals into an antenna when adjusting.

#### OPERATION

The international alarm signal can be automatically transmitted on 2182 KHz by pushing the ALARM SWITCH newly installed.

#### TO TEST THE ALARM FUNCTION

When the radio is set in the receive mode, by just pushing the ALARM SWITCH, the operation frequency is set on 2182.0 KHz and the mode is A3H (H3E), even if a different frequency and mode have been set previously, and international alarm signal tones can be heard from the speaker and the ALARM INDICATOR (located next to the ANTENNA TUNER TUNING INDICATOR on the front panel) is lit. The tones will be made for a period of 50 seconds.

To stop the tones, push the ALARM switch again.

To clear the alarm function and to return to the previous operation frequency and mode, push the TRANSMIT FREQUENCY CHECK switch.

#### TO TRANSMIT THE ALARM SIGNALS

**CAUTION:** Never transmit the alarm signals except when your ship is in distress.

Push the **ALARM SWITCH** while depressing the **PTT (Push-To-Talk)** switch on the microphone, and the operation frequency is set on 2182.0 KHz and the mode is A3H (H3E), even if a different frequency and mode have been set previously, and international alarm signals are transmitted. At the same time, the signal tones can be heard from the speaker and the **ALARM INDICATOR** on the front panel is lit. The radio will be kept in the transmit mode, even if the PTT switch is released, during a period of 50 seconds.

When an antenna tuner is connected, first, the radio is set in the **ANTENNA TUNING** mode. After the tuner has been tuned on 2182 KHz, the radio is turned in the transmit mode automatically and transmits the alarm signals.

After a period of 50 seconds, the radio returns to the receive mode, but the operation frequency and mode will be maintained 2182 KHz and A3H (H3E) respectively.

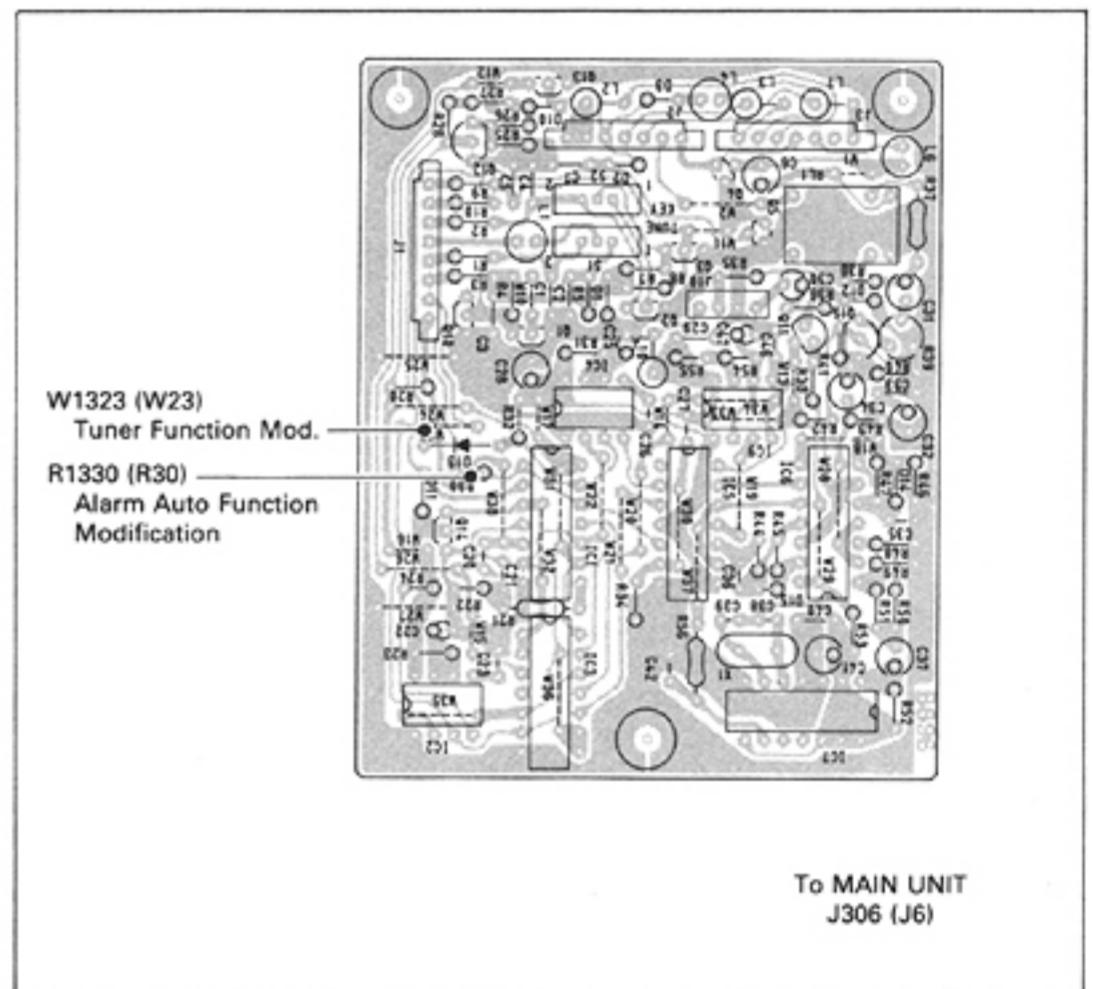
To transmit distress messages, depress the PTT switch and talk into the microphone with a normal and clear voice in a usual way.

To clear the alarm function and to return to the previous operation frequency and mode, push the **TRANSMIT FREQUENCY CHECK** switch.

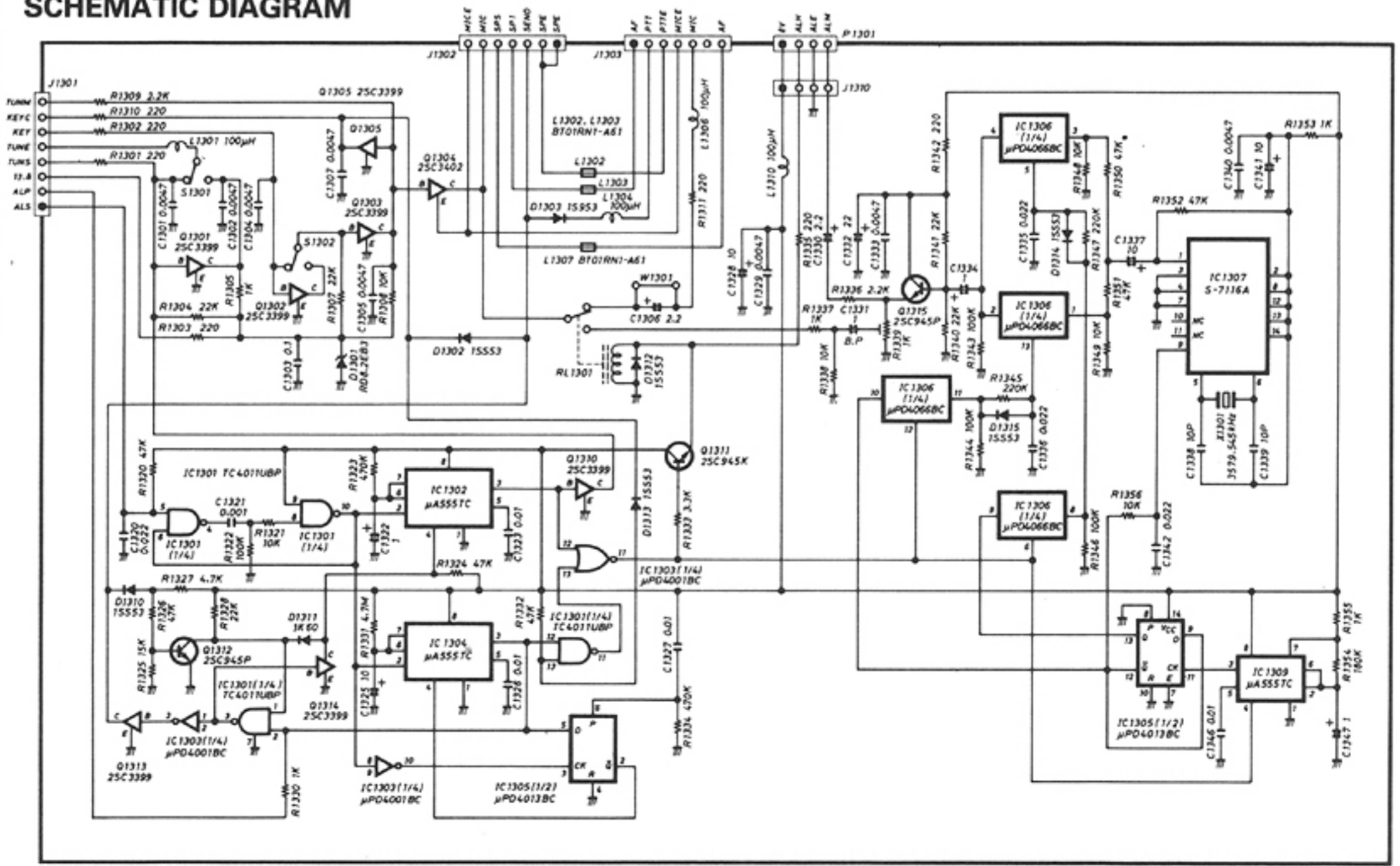
### MODIFICATIONS

By pushing the **ALARM SWITCH**, frequency and mode are set on 2182 KHz and A3H (H3E) automatically. If you would like to change the frequency and/or mode for the other ones, cut the lead of R1330 (indicated as R30 on the board) on the UT-20. The alarm signal will be transmitted on selected frequency and mode.

When an antenna tuner is connected, by pushing the **ALARM SWITCH**, first the tuner is tuned up then the alarm signal is transmitted. If you do not prefer this function, cut the lead of W1323 (indicated as W23 on the board) on the UT-20.



### SCHEMATIC DIAGRAM





## SECTION 14 PARTS LIST

PLL UNIT			PLL UNIT		
REF. NO.	DESCRIPTION	PART NO.	REF. NO.	DESCRIPTION	PART NO.
IC1	IC	M54929P	FI1	Crystal Filter	FL-69 (30M15A)
IC2	IC	M54466L	X1	Crystal	CR-64 (30.72MHz)
IC3	IC	μPC1037H	L1	Coil	LW-19
IC4	IC	μPC1037H	L2	Coil	LS-94
IC5	IC	SN74LS90N	L3	Coil	LS-114
IC7	IC	TA78L008AP	L4	Coil	LS-114
IC8	IC	μA7805	L5	Coil	LS-114
IC201	IC	M54929P	L6	Coil	LAL04NA102K
IC202	IC	M54466L	L7	Coil	EL0810SKI-101
IC203	IC	SN74LS90N	L8	Coil	LS-162
IC204	IC	M54459L	L9	Coil	LA-244
Q1	Transistor	2SC945P	L10	Coil	LA-254
Q2	Transistor	2SC945P	L11	Coil	LB4 R36
Q3	Transistor	2SC945P	L12	Coil	LB4 R23
Q4	Transistor	2SC945P	L13	Coil	LW-17
Q5	FET	2SK30AY	L14	Coil	FL5H101K
Q6	FET	2SK30AY	L15	Coil	FL5H101K
Q7	Transistor	2SC1571G	L16	Coil	LR-79
Q8	Transistor	2SA1015Y	L17	Coil	LB-135
Q9	Transistor	2SC945P	L18	Coil	LW-19
Q10	Transistor	2SC945R	L19	Coil	LR-79
Q11	Transistor	2SC383TM	L20	Coil	LB-135
Q13	Transistor	2SC3399	L21	Coil	LW-19
Q14	Transistor	2SC383TM	L22	Coil	LR-79
Q15	FET	2SK241Y	L23	Coil	LB-135
Q16	Transistor	2SC383TM	L24	Coil	LW-19
Q17	Transistor	2SC383TM	L25	Coil	LR-79
Q18	FET	2SK192AGR	L26	Coil	LB-135
Q19	FET	2SK192AGR	L27	Coil	LW-19
Q20	FET	2SK192AGR	L28	Coil	BT01RN1-A61
Q21	FET	2SK192AGR	L29	Coil	LAL03NAR56M
Q22	Transistor	2SC383TM	L30	Coil	LAL04NA101K
Q23	Transistor	2SC383TM	L201	Coil	LB-113
Q24	Transistor	2SC945P	L202	Coil	LW-19
Q25	Transistor	2SC383TM	L203	Coil	FL5H 101K
Q26	Transistor	2SC383TM	L204	Coil	LAL04NA101K
Q201	FET	2SK192AGR	L205	Coil	LAL04NA101K
Q202	Transistor	2SC763C	L206	Coil	LAL04NA101K
Q203	Transistor	2SC945P			
D2	Zener Diode	RD5.1EB2	R2	Resistor	2.2K ELR25
D4	Diode	1SS53	R3	Resistor	4.7K ELR25
D5	Diode	1SS53	R4	Resistor	10K ELR25
D7	Diode	1SS53	R5	Resistor	470 ELR25
D8	Diode	1SS53	R6	Resistor	220 ELR25
D9	Diode	1SS53	R7	Resistor	47 R25
D10	Diode	1SS53	R8	Resistor	47 ELR25
D11	Diode	1SS53	R9	Resistor	100 ELR25
D12	Varactor Diode	FC52M	R10	Resistor	15K ELR25
D13	Varactor Diode	1SV50E	R11	Resistor	1K R25
D14	Varactor Diode	1SV50E	R12	Resistor	470 ELR25
D15	Varactor Diode	1SV50E	R17	Resistor	10K ELR25
D16	Diode	1SS53	R18	Resistor	220 ELR25
D17	Diode	1SS53	R19	Resistor	22K ELR25
D18	Diode	1SS53	R20	Resistor	100 ELR25
D19	Diode	1SS53	R21	Resistor	8.2K R25
D20	Zener Diode	RD5.1EB2	R22	Resistor	1K R25
D22	Diode	1SS53	R24	Resistor	100 ELR25
D23	Diode	1SS53	R25	Resistor	100 ELR25
D201	Varactor Diode	1SV50E	R26	Resistor	470 ELR25

**PLL UNIT**

REF. NO.	DESCRIPTION	PART NO.
R27	Resistor	220 ELR25
R28	Resistor	100 ELR25
R29	Resistor	47 ELR25
R30	Resistor	3.3K ELR25
R31	Resistor	47K ELR25
R32	Resistor	10K ELR25
R33	Resistor	10K ELR25
R34	Resistor	220 ELR25
R35	Resistor	220 ELR25
R37	Resistor	2.7K ELR25
R38	Resistor	390 ELR25
R39	Resistor	1K R25
R40	Resistor	4.7K ELR25
R41	Resistor	1.8M ELR25
R42	Resistor	1K ELR25
R43	Resistor	1K ELR25
R44	Resistor	4.7K ELR25
R45	Resistor	1K R25
R46	Resistor	10K R25
R47	Resistor	100 R25
R48	Resistor	2.2K ELR25
R49	Resistor	2.2K ELR25
R50	Resistor	10K ELR25
R52	Resistor	27K ELR25
R53	Resistor	22K ELR25
R54	Resistor	22K ELR25
R55	Resistor	47K ELR25
R56	Resistor	100K ELR25
R57	Resistor	100K ELR25
R58	Resistor	150 ELR25
R59	Resistor	3.3K ELR25
R60	Resistor	100K ELR25
R61	Resistor	100K ELR25
R62	Resistor	150 ELR25
R63	Resistor	3.3K ELR25
R64	Resistor	100K ELR25
R65	Resistor	100K ELR25
R66	Resistor	150 ELR25
R67	Resistor	3.3K ELR25
R68	Resistor	100K ELR25
R69	Resistor	100K ELR25
R70	Resistor	150 ELR25
R71	Resistor	3.3K ELR25
R72	Resistor	180 ELR25
R73	Resistor	33 ELR25
R74	Resistor	4.7K ELR25
R75	Resistor	220 ELR25
R76	Resistor	330 ELR25
R77	Resistor	22 ELR25
R78	Resistor	220 ELR25
R79	Resistor	22K ELR25
R80	Resistor	100 ELR25
R81	Resistor	560 ELR25
R82	Resistor	10K ELR25
R83	Resistor	47K ELR25
R84	Resistor	10K ELR25
R85	Resistor	220 ELR25
R86	Resistor	10K ELR25
R87	Resistor	100 ELR25
R88	Resistor	100 R25
R89	Resistor	220 ELR25
R90	Resistor	22K ELR25
R91	Resistor	10K ELR25
R92	Resistor	470 ELR25

**PLL UNIT**

REF. NO.	DESCRIPTION	PART NO.
R93	Resistor	47 ELR25
R94	Resistor	10K R25
R95	Resistor	10K R25
R96	Resistor	10K R25
R97	Resistor	10K R25
R98	Resistor	47K R25
R99	Resistor	47K R25
R100	Resistor	SRW1P10-J
R101	Resistor	120 R50X
R103	Resistor	47 ELR25
R107	Resistor	47K ELR25
R109	Resistor	3.3K ELR25
R201	Resistor	33K ELR25
R202	Resistor	1K R25
R204	Resistor	33K ELR25
R205	Resistor	10K ELR25
R206	Resistor	470K ELR25
R207	Resistor	470K ELR25
R208	Resistor	180 ELR25
R209	Resistor	150 ELR25
R210	Resistor	5.6K ELR25
R211	Resistor	1.2K ELR25
R212	Resistor	330 ELR25
R213	Resistor	150 R25
R214	Resistor	4.7K R25
R215	Resistor	2.2K R25
R216	Resistor	2.7K ELR25
R217	Resistor	2.7K ELR25
R218	Resistor	390 ELR25
R219	Resistor	22K ELR25
R220	Resistor	220 R25
R221	Resistor	470 R25
C3	Ceramic	47P 50V CH
C4	Ceramic	0.0047 50V
C5	Electrolytic	10 16V
C6	Ceramic	82P 50V TH
C7	Ceramic	0.0047 50V
C8	Ceramic	82P 50V TH
C9	Ceramic	10P 50V
C10	Ceramic	68P 50V
C11	Ceramic	47P 50V
C12	Ceramic	100P 50V
C17	Ceramic	0.0047 50V
C19	Ceramic	0.001 50V
C20	Ceramic	0.001 50V
C21	Ceramic	0.0047 50V
C22	Ceramic	8P 50V
C23	Ceramic	1P 50V
C24	Ceramic	8P 50V
C25	Ceramic	1P 50V
C26	Ceramic	8P 50V
C27	Barrier Lay	0.047 25V
C29	Ceramic	470P 50V
C30	Ceramic	470P 50V
C31	Barrier Lay	0.1 16V
C32	Ceramic	0.0047 50V
C33	Electrolytic	47 10V
C34	Ceramic	0.0047 50V
C35	Ceramic	6P 50V
C36	Ceramic	6P 50V
C37	Ceramic	0.0047 50V
C38	Ceramic	0.0047 50V
C39	Ceramic	47P 50V

**PLL UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C40	Ceramic	0.0047	50V
C41	Ceramic	0.001	50V
C42	Ceramic	0.0047	50V
C43	Ceramic	43P	50V
C44	Ceramic	51P	50V
C45	Ceramic	82P	50V
C46	Ceramic	15P	50V
C47	Ceramic	62P	50V
C48	Ceramic	150P	50V
C49	Ceramic	120P	50V
C50	Ceramic	56P	50V
C51	Ceramic	330P	50V
C52	Ceramic	68P	50V
C53	Ceramic	150P	50V
C54	Ceramic	0.0047	50V
C55	Ceramic	0.0047	50V
C56	Ceramic	0.001	50V
C57	Ceramic	0.0047	50V
C58	Ceramic	0.0022	50V
C59	Ceramic	0.0047	50V
C60	Ceramic	0.0047	50V
C62	Ceramic	0.0047	50V
C63	Ceramic	0.0047	50V
C64	Electrolytic	47	10V
C65	Array	B7ZC0717-32N	
C66	Electrolytic	47	10V
C67	Barrier Lay	0.047	25V
C68	Barrier Lay	0.1	16V
C69	Ceramic	0.001	50V
C70	Ceramic	0.001	50V
C71	Electrolytic	1	50V
C72	Electrolytic	100	10V
C73	Ceramic	0.0047	50V
C74	Barrier Lay	0.047	25V
C75	Electrolytic	1	50V
C76	Ceramic	30P	50V
C77	Ceramic	30P	50V
C78	Trimmer	CTZ51C	
C79	Ceramic	47P	50V
C80	Ceramic	12P	50V
C81	Ceramic	12P	50V
C82	Ceramic	0.0047	50V
C83	Ceramic	1P	50V
C84	Ceramic	0.0047	50V
C85	Barrier Lay	0.047	25V
C86	Ceramic	51P	50V
C87	Ceramic	18P	50V
C88	Trimmer	CTZ51C	
C89	Ceramic	51P	50V
C90	Ceramic	12P	50V
C91	Ceramic	12P	50V
C92	Ceramic	0.0047	50V
C93	Ceramic	1P	50V
C94	Ceramic	0.0047	50V
C95	Ceramic	47P	50V
C96	Ceramic	15P	50V
C97	Trimmer	CTZ51A	
C98	Ceramic	47P	50V
C99	Ceramic	12P	50V
C100	Ceramic	8P	50V
C101	Ceramic	0.0047	50V
C102	Ceramic	1P	50V
C103	Ceramic	0.0047	50V
C104	Barrier Lay	0.047	25V
C105	Ceramic	39P	50V

**PLL UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C106	Ceramic	10P	50V
C107	Trimmer	CTZ51A	
C108	Ceramic	47P	50V
C109	Ceramic	12P	50V
C110	Ceramic	6P	50V
C111	Ceramic	0.0047	50V
C112	Ceramic	1P	50V
C113	Ceramic	0.0047	50V
C114	Barrier Lay	0.047	25V
C115	Electrolytic	100	10V
C116	Ceramic	0.0047	50V
C117	Ceramic	22P	50V
C118	Ceramic	22P	50V
C119	Ceramic	47P	50V
C120	Ceramic	0.0047	50V
C121	Ceramic	0.0047	50V
C122	Ceramic	0.001	50V
C124	Ceramic	47P	50V
C125	Ceramic	0.001	50V
C126	Ceramic	0.0047	50V
C127	Ceramic	47P	50V
C128	Electrolytic	47	10V
C129	Electrolytic	100	16V
C130	Ceramic	0.0047	50V
C131	Ceramic	0.0047	50V
C132	Electrolytic	47	10V
C133	Ceramic	0.001	50V
C134	Ceramic	0.001	50V
C135	Ceramic	0.001	50V
C136	Ceramic	0.001	50V
C137	Electrolytic	10	16V
C139	Ceramic	0.0047	50V
C140	Ceramic	0.0047	50V
C141	Ceramic	0.0047	50V
C143	Ceramic	0.0047	50V
C146	Ceramic	100P	50V
C147	Ceramic	5P	50V
C201	Array	B7ZC0717-32N	
C202	Mylar	0.01	50V
C204	Ceramic	0.0022	50V
C205	Ceramic	0.001	50V
C206	Electrolytic	47	10V
C207	Ceramic	39P	50V
C208	Ceramic	22P	50V
C209	Ceramic	4P	50V
C210	Ceramic	4P	50V
C211	Electrolytic	47	10V
C212	Ceramic	0.0022	50V
C213	Ceramic	1P	50V
C214	Ceramic	0.0047	50V
C215	Ceramic	0.001	50V
C216	Ceramic	47P	50V
C217	Ceramic	0.0022	50V
C218	Ceramic	0.0047	50V
C219	Barrier Lay	0.047	25V
C220	Ceramic	470P	50V
C221	Ceramic	0.0047	50V
C222	Ceramic	0.001	50V
C223	Electrolytic	47	10V
C224	Ceramic	0.0047	50V
C225	Ceramic	0.0047	50V
C226	Ceramic	0.0047	50V
C227	Ceramic	0.0047	50V
C228	Ceramic	330P	50V

**PLL UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C229	Barrier Lay	0.047	25V
C230	Ceramic	470P	50V
J1	Connector	TL25P-05-V1	
J2	Connector	5138-11CPB	
J3	Connector	TL25P-04-V1	
J4	Connector	TMP-J01X-V2	
J5	Connector	TMP-J01X-V2	
P1	Connector	(TMP-P01X-A1) W35	
B1	PC. Board	B-897 (42443)	
W14	Jumper	JPW-02A	
W16	Jumper	JPW-02A	
W17	Jumper	JPW-02A	
W18	Jumper	JPW-02A	
W19	Jumper	JPW-02A	
W20	Jumper	JPW-02A	
W21	Jumper	JPW-02H	
W24	Jumper	JPW-02A	
W25	Jumper	JPW-02A	
W26	Jumper	JPW-02A	
W27	Jumper	JPW-02A	
W28	Jumper	JPW-02A	
W30	Jumper	JPW-02A	
W37	Jumper	JPW-02A	

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.
IC301	IC	μPC1037H
IC302	IC	μPC1037H
IC303	IC	M5218L
IC304	IC	μPC1037H
IC305	IC	M5218L
IC306	IC	TC4011UBP
IC307	IC	M5218L
IC308	IC	M5218L
IC309	IC	μPD4066B
IC310	IC	μPC1181H
IC311	IC	BA222
IC312	IC	TC4013BP
Q301	FET	3SK74M
Q302	Transistor	2SC1583G
Q303	Transistor	2SC945P
Q304	Transistor	2SC945P
Q305	Transistor	2SC945P
Q306	Transistor	2SA1348
Q307	FET	3SK74M
Q308	Transistor	2SC945P
Q309	FET	3SK74M
Q310	Transistor	2SA1348
Q311	Transistor	2SA1348
Q312	FET	3SK74M
Q313	FET	3SK74M
Q314	Transistor	2SC945P
Q315	Transistor	2SC1571G
Q316	Transistor	2SC1571G
Q317	Transistor	2SC1571G
Q318	Transistor	2SC945P
Q319	Transistor	2SC3399

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.
Q320	Transistor	2SC2458GR
Q321	Transistor	2SC3402
Q322	Transistor	2SD468C
Q323	Transistor	2SC3402
Q324	Transistor	2SD880Y
Q325	Transistor	2SC945P
Q326	FET	2SK192AGR
Q327	Transistor	2SC945P
Q328	Transistor	2SD880Y
Q329	Transistor	2SC3402
Q330	Transistor	2SC3402
Q331	Transistor	2SC945P
Q332	Transistor	2SC1815Y
Q333	Transistor	2SC2458GR
Q334	Transistor	2SC3402
Q335	Transistor	2SC3399
D301	Diode	1K60
D302	Diode	1K60
D303	Diode	1SS53
D304	Diode	1SS53
D305	Diode	1SS53
D306	Diode	1SS53
D307	Diode	1SS53
D308	Diode	1SS53
D309	Diode	1SS53
D310	Diode	1SS53
D311	Diode	1SS53
D312	Diode	1SS53
D313	Diode	1SS53
D314	Diode	1SS53
D315	Diode	1SS53
D316	Diode	1SS53
D317	Diode	1SS53
D318	Diode	1SS53
D319	Diode	1S953
D320	Diode	1SS53
D321	Diode	1SS53
D322	Diode	1SS53
D323	Diode	1K60
D324	Diode	1SS53
D325	Diode	1SS53
D326	Diode	1SS53
D327	Diode	1K60
D328	Diode	1SS53
D329	Diode	1SS53
D330	Diode	1SS53
D331	Diode	1SS53
D332	Diode	1SS53
D333	Diode	1SS53
D334	Zener Diode	RD8.2EB3
D335	Diode	1SS53
D336	Diode	1SS53
D337	Diode	1SS53
D338	Diode	1SS53
D339	Diode	1SS53
D340	Diode	1SS53
D341	Diode	1SS53
D342	Diode	1SS53
D343	Diode	1SS53
D344	Diode	1SS53
D345	Diode	1SS53
D346	Varactor Diode	FC51M
D347	Diode	1SS53
D348	Varactor Diode	FC51M

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.
D349	Diode	1SS53
D350	Diode	1SS53
D351	Diode	1SS53
D352	Diode	1SS53
D353	Diode	1SS53
D354	Diode	1SS53
D355	Diode	1SS53
D356	Diode	1SS53
D357	Diode	1SS99
D358	Diode	1SS99
FI301	Crystal Filter	FL-30
FI302	Crystal Filter	FL-33
X301	Crystal	CR-73 (4.920MHz)
X302	Crystal	CR-74 (4.908MHz)
L301	Coil	LS-175
L302	Coil	LS-175
L303	Coil	LS-175
L305	Coil	LS-163
L306	Coil	LS-90A
L307	Coil	LS-90A
L308	Coil	FL5H 101K
L309	Coil	LS-175
L310	Coil	LS-175
L311	Coil	LS-175
L312	Coil	LS-137
L314	Coil	LS-267
L315	Coil	LS-267
L316	Coil	LB4 R50K
L317	Coil	LS-163
L318	Coil	LS-163
L319	Coil	LS-66A
L320	Coil	LS-66A
L321	Coil	LB4 R50K
L322	Coil	LW-15
L325	Coil	FL5H 101K
R301	Resistor	100K ELR25
R302	Resistor	1M ELR25
R303	Resistor	220 ELR25
R304	Resistor	100 ELR25
R305	Resistor	22K ELR25
R306	Resistor	1K ELR25
R307	Resistor	100 ELR25
R308	Resistor	100K ELR25
R309	Resistor	150K ELR25
R310	Resistor	1K R25
R311	Resistor	100 ELR25
R312	Resistor	6.8K ELR25
R313	Resistor	68K ELR25
R314	Resistor	47K ELR25
R315	Resistor	330 ELR25
R316	Resistor	10K ELR25
R317	Resistor	100 R25
R318	Resistor	4.7K R25
R319	Resistor	2.2K ELR25
R320	Resistor	2.2K ELR25
R321	Resistor	220 ELR25
R322	Resistor	1K ELR25
R323	Resistor	47K ELR25
R324	Resistor	2.2K ELR25
R325	Resistor	220 ELR25
R326	Resistor	220 ELR25

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.
R327	Resistor	10K ELR25
R328	Resistor	10K R25
R329	Resistor	1K ELR25
R330	Resistor	4.7K ELR25
R331	Resistor	47K ELR25
R332	Resistor	100 ELR25
R333	Resistor	1K ELR25
R334	Resistor	10K ELR25
R335	Resistor	33K ELR25
R336	Resistor	100 ELR25
R337	Resistor	2.2K ELR25
R338	Resistor	10K ELR25
R339	Resistor	100 ELR25
R340	Resistor	330 ELR25
R341	Resistor	47K ELR25
R342	Resistor	100K ELR25
R343	Resistor	100K ELR25
R344	Resistor	2.2K ELR25
R345	Resistor	10 ELR25
R346	Resistor	10K R25
R347	Resistor	1K ELR25
R348	Resistor	2.2K ELR25
R349	Resistor	100 R25
R350	Resistor	1K ELR25
R351	Resistor	100 R25
R352	Resistor	1K ELR25
R353	Resistor	2.2K ELR25
R354	Resistor	100 R25
R355	Resistor	1K ELR25
R356	Resistor	100 R25
R357	Resistor	4.7K ELR25
R358	Resistor	10K ELR25
R359	Resistor	22 R25
R360	Resistor	2.2K ELR25
R361	Resistor	2.2K ELR25
R362	Resistor	1K R25
R363	Resistor	10K ELR25
R364	Resistor	220 ELR25
R365	Resistor	100 ELR25
R366	Resistor	1K R25
R367	Trimmer	10K H0651A
R368	Resistor	100 ELR25
R369	Resistor	4.7K ELR25
R370	Resistor	47 ELR25
R371	Resistor	10K R25
R372	Resistor	2.2K ELR25
R373	Resistor	3.3M ELR25
R374	Resistor	10K ELR25
R375	Resistor	10K ELR25
R376	Resistor	47 R25
R377	Resistor	3.3K ELR25
R378	Resistor	47 ELR25
R379	Trimmer	10K H0651A
R380	Resistor	470K ELR25
R381	Trimmer	10K H0651A
R382	Resistor	470K ELR25
R383	Resistor	2.2K ELR25
R384	Resistor	4.7K R25
R386	Resistor	1.5K ELR25
R387	Resistor	10 ELR25
R388	Resistor	3.3K ELR25
R389	Resistor	47K ELR25
R390	Resistor	100K ELR25
R391	Trimmer	10K H1051C
R392	Resistor	3.3K ELR25

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.	
R393	Resistor	100	ELR25
R395	Resistor	100	ELR25
R396	Resistor	3.3K	ELR25
R397	Resistor	4.7K	ELR25
R398	Resistor	1K	ELR25
R399	Resistor	2.2K	ELR25
R400	Resistor	4.7K	ELR25
R401	Resistor	10K	ELR25
R402	Resistor	10K	ELR25
R403	Resistor	47K	ELR25
R404	Resistor	100K	ELR25
R405	Resistor	330	ELR25
R406	Resistor	1K	ELR25
R407	Resistor	220	ELR25
R408	Resistor	3.3K	R25
R409	Resistor	15K	ELR25
R410	Resistor	47K	ELR25
R411	Resistor	4.7K	ELR25
R412	Resistor	1K	ELR25
R413	Resistor	4.7	ELR25
R414	Resistor	1K	ELR25
R415	Resistor	10K	ELR25
R416	Resistor	2.2K	ELR25
R417	Resistor	2.2K	ELR25
R418	Resistor	4.7	ELR25
R419	Resistor	1K	ELR25
R420	Resistor	220	ELR25
R421	Resistor	4.7	ELR25
R422	Resistor	470	ELR25
R423	Resistor	470	ELR25
R424	Resistor	10K	R25
R425	Resistor	47K	R25
R426	Resistor	10	ELR25
R427	Resistor	470	ELR25
R428	Resistor	100K	ELR25
R429	Resistor	2.2K	ELR25
R430	Resistor	1M	ELR25
R431	Resistor	4.7K	ELR25
R432	Resistor	100K	ELR25
R433	Resistor	2.2K	ELR25
R434	Resistor	1M	ELR25
R435	Resistor	10K	R25
R436	Resistor	15K	ELR25
R437	Resistor	15K	ELR25
R438	Resistor	8.2K	ELR25
R439	Resistor	180K	ELR25
R440	Resistor	8.2K	ELR25
R441	Resistor	100K	ELR25
R442	Resistor	470	ELR25
R443	Resistor	10K	ELR25
R444	Resistor	10K	ELR25
R445	Resistor	10K	ELR25
R446	Resistor	22K	ELR25
R447	Resistor	10K	ELR25
R448	Resistor	10K	ELR25
R449	Resistor	33K	R25
R450	Resistor	1K	ELR25
R451	Resistor	470K	ELR25
R452	Resistor	47K	R25
R453	Resistor	100K	R25
R454	Resistor	100K	ELR25
R455	Resistor	47K	ELR25
R456	Resistor	470	ELR25
R457	Resistor	100	R25
R458	Resistor	4.7K	R25

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.	
R459	Resistor	68	R25
R460	Resistor	1	R25
R461	Resistor	3.3M	ELR25
R462	Resistor	100K	R10
R463	Trimmer	100K	H0651A
R465	Resistor	1M	ELR25
R466	Resistor	220	R25
R467	Resistor	470K	ELR25
R468	Resistor	220K	ELR25
R469	Resistor	3.3M	ELR25
R470	Resistor	10K	ELR25
R471	Resistor	1K	R25
R472	Trimmer	100	H0651A
R473	Resistor	10K	ELR25
R474	Trimmer	2.2K	H0621A
R476	Resistor	47K	ELR25
R477	Resistor	22K	ELR25
R478	Resistor	5.6K	ELR25
R479	Resistor	1K	ELR25
R480	Resistor	470	ELR25
R481	Resistor	47K	ELR25
R482	Resistor	6.8K	ELR25
R483	Resistor	10K	ELR25
R484	Resistor	10K	ELR25
R485	Resistor	100	ELR25
R486	Resistor	10K	ELR25
R487	Resistor	1K	ELR25
R488	Resistor	1M	ELR25
R489	Resistor	47	ELR25
R490	Resistor	1.5K	ELR25
R491	Resistor	2.2K	R25
R492	Resistor	470K	ELR25
R493	Trimmer	10K	H0621A
R494	Resistor	470	ELR25
R495	Resistor	1.5K	ELR25
R496	Resistor	4.7K	ELR25
R497	Resistor	2.2	R25
R498	Trimmer	10K	H1051C
R499	Resistor	22K	ELR25
R500	Resistor	4.7K	ELR25
R501	Trimmer	10K	H0651A
R502	Resistor	4.7K	ELR25
R503	Resistor	100	ELR25
R504	Resistor	150	R25
R505	Resistor	2.2K	ELR25
R506	Resistor	47	R10
R507	Resistor	100	ELR10
R508	Resistor	100	ELR10
R509	Resistor	1K	R25
R510	Resistor	100	ELR25
R511	Resistor	1K	R25
C301	Electrolytic	47	10V
C302	Barrier Lay	0.1	16V
C303	Ceramic	1P	50V
C304	Ceramic	0.0047	50V
C305	Ceramic	0.0047	50V
C306	Ceramic	0.0047	50V
C307	Ceramic	0.0047	50V
C308	Ceramic	0.0047	50V
C309	Electrolytic	4.7	25V
C310	Ceramic	0.0047	50V
C311	Ceramic	0.0047	50V
C312	Ceramic	0.001	50V
C313	Ceramic	470P	50V

BP

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C314	Electrolytic	10 16V	MS7
C315	Barrier Lay	0.047 25V	
C316	Ceramic	0.0047 50V	
C317	Ceramic	2P 50V	
C318	Ceramic	0.0047 50V	
C319	Ceramic	0.0047 50V	
C320	Ceramic	0.001 50V	
C321	Mylar	0.033 50V	
C322	Ceramic	0.0047 50V	
C323	Ceramic	0.0047 50V	
C324	Ceramic	0.0047 50V	
C325	Ceramic	0.0047 50V	
C326	Electrolytic	100 10V	
C327	Ceramic	0.0047 50V	
C328	Ceramic	0.0047 50V	
C329	Ceramic	0.0047 50V	
C330	Ceramic	100P 50V	
C331	Ceramic	0.0047 50V	
C332	Ceramic	0.0047 50V	
C333	Ceramic	0.0047 50V	
C334	Ceramic	0.001 50V	
C335	Ceramic	5P 50V	
C336	Ceramic	0.0047 50V	
C337	Ceramic	0.0047 50V	
C338	Ceramic	0.0047 50V	
C339	Ceramic	0.0047 50V	
C340	Ceramic	0.0047 50V	
C341	Ceramic	0.0047 50V	
C342	Ceramic	470P 50V	
C343	Ceramic	0.0047 50V	
C344	Ceramic	0.0047 50V	
C345	Ceramic	0.0047 50V	
C346	Ceramic	470P 50V	
C347	Mylar	0.01 50V	
C348	Ceramic	0.0047 50V	
C349	Ceramic	0.0047 50V	
C350	Electrolytic	47 10V	
C351	Ceramic	0.0047 50V	
C352	Mylar	0.01 50V	
C353	Ceramic	0.0047 50V	
C354	Ceramic	220P 50V	
C355	Ceramic	0.0047 50V	
C356	Barrier Lay	0.1 16V	
C357	Electrolytic	22 10V	
C358	Ceramic	0.0047 50V	
C359	Ceramic	100P 50V	
C360	Electrolytic	0.47 50V	BP
C361	Barrier Lay	0.047 25V	
C362	Electrolytic	10 16V	
C363	Electrolytic	0.47 50V	
C364	Electrolytic	100 10V	
C365	Electrolytic	2.2 50V	
C366	Ceramic	0.0047 50V	
C367	Ceramic	22P 50V	
C368	Ceramic	0.001 50V	
C369	Ceramic	0.0047 50V	
C370	Ceramic	0.001 50V	
C371	Electrolytic	4.7 50V	
C372	Ceramic	0.0047 50V	
C373	Electrolytic	2.2 50V	
C374	Ceramic	0.0047 50V	
C375	Ceramic	330P 50V	
C376	Barrier Lay	0.1 16V	
C377	Tantalum	1 16V	
C378	Ceramic	150P 50V	

**MAIN UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C379	Ceramic	0.0047 50V	
C380	Ceramic	0.0047 50V	
C381	Barrier Lay	0.1 16V	
C382	Electrolytic	47 10V	
C383	Electrolytic	2.2 50V	
C384	Electrolytic	0.47 50V	
C385	Barrier Lay	0.047 25V	
C386	Tantalum	0.47 35V	
C387	Tantalum	2.2 16V	
C388	Electrolytic	1 50V	
C389	Electrolytic	47 10V	
C390	Electrolytic	10 16V	
C391	Electrolytic	100 10V	
C392	Mylar	0.001 50V	
C393	Mylar	0.0047 50V	
C394	Electrolytic	1 50V	MS7
C395	Ceramic	220P 50V	
C396	Mylar	0.0047 50V	
C397	Electrolytic	10 16V	
C398	Electrolytic	1 50V	
C399	Ceramic	220P 50V	
C400	Mylar	0.01 50V	
C401	Mylar	0.01 50V	
C402	Electrolytic	4.7 25V	BP
C403	Electrolytic	4.7 50V	
C404	Electrolytic	0.47 50V	BP
C405	Electrolytic	4.7 50V	
C406	Tantalum	0.68 25V	
C407	Ceramic	100P 50V	
C408	Ceramic	470P 50V	
C409	Ceramic	0.0047 50V	
C410	Ceramic	150P 50V	
C411	Ceramic	47P 50V	
C412	Ceramic	47P 50V	
C413	Ceramic	200P 50V	XL
C414	Ceramic	200P 50V	XL
C415	Ceramic	0.0047 50V	
C416	Ceramic	0.0047 50V	
C417	Ceramic	0.0047 50V	
C418	Electrolytic	22 10V	
C419	Ceramic	0.001 50V	
C420	Ceramic	470P 50V	
C421	Ceramic	0.0047 50V	
C422	Ceramic	0.0047 50V	
C423	Ceramic	0.0047 50V	
C424	Ceramic	DD109SL471J50V2	
C425	Ceramic	51P 50V	
C426	Ceramic	DD109SL471J50V2	
C427	Ceramic	3P 50V	
C428	Ceramic	470P 50V	
C429	Ceramic	10P 50V	
C430	Ceramic	DD108SL391J50V2	
C431	Ceramic	22P 50V	
C432	Ceramic	DD108SL391J50V2	
C433	Barrier Lay	0.047 25V	
C434	Barrier Lay	0.1 16V	
C435	Electrolytic	47 16V	
C436	Electrolytic	220 10V	
C437	Electrolytic	47 16V	
C438	Electrolytic	470 16V	
C439	Mylar	0.1 50V	
C440	Ceramic	0.0047 50V	
C441	Electrolytic	470 16V	
C442	Electrolytic	470 16V	
C443	Electrolytic	10 16V	MS7

### MAIN UNIT

REF. NO.	DESCRIPTION	PART NO.	
C444	Ceramic	0.0047 50V	
C445	Ceramic	220P 50V	
C446	Ceramic	0.0047 50V	
C447	Ceramic	0.0047 50V	
C448	Ceramic	0.0047 50V	
C449	Ceramic	0.0047 50V	
C450	Array	B8ZC0111-32N	
C451	Electrolytic	100 10V	
C452	Ceramic	0.001 50V	
C453	Mylar	0.01 50V	
C454	Electrolytic	10 16V	RC2
C455	Barrier Lay	0.047 25V	
J301	Connector	TL25P-04-V1	
J302	Connector	TL25P-08-V1	
J303	Connector	TL25P-13-V1	
J304	Connector	TL25P-02-V1	
J306	Connector	TL25P-04-V1	
J307	Connector	TL25P-09-V1	
J308	Connector	TL25P-04-V1	
J309	Connector	TMP-J01X-A2	
P301	Connector	(TMP-P01X-A1) W355	
B301	PC. Board	B-885A	
W301	Jumper	JPW-02H	
W302	Jumper	JPW-02H	
W305	Jumper	JPW-02H	
W306	Jumper	JPW-02A	
W307	Jumper	JPW-02H	
W308	Jumper	JPW-02A	
W309	Jumper	JPW-02A	
W310	Jumper	JPW-02H	
W311	Jumper	JPW-02A	
W312	Jumper	JPW-02H	
W313	Jumper	JPW-02H	
W315	Jumper	JPW-02A	
W316	Jumper	JPW-02A	
W317	Jumper	JPW-02A	
W318	Jumper	JPW-02A	
W319	Jumper	JPW-02A	
W320	Jumper	JPW-02H	
W321	Jumper	JPW-02H	
W322	Jumper	JPW-02H	
W323	Jumper	JPW-02A	
W325	Jumper	JPW-02H	
W327	Jumper	JPW-02H	
W328	Jumper	JPW-02A	
W329	Jumper	JPW-02A	
W330	Jumper	JPW-02A	
W331	Jumper	JPW-02A	
W332	Jumper	JPW-02A	
W333	Jumper	JPW-02A	
W334	Jumper	JPW-02A	
W335	Jumper	JPW-02A	
W338	Jumper	JPW-02H	
W340	Jumper	JPW-02H	
W341	Jumper	JPW-02A	
W342	Jumper	JPW-02A	
W343	Jumper	JPW-02A	
W344	Jumper	JPW-02A	
W345	Jumper	JPW-02A	
W346	Jumper	JPW-02A	

### MAIN UNIT

REF. NO.	DESCRIPTION	PART NO.
W347	Jumper	JPW-02A
W348	Jumper	JPW-02A
W349	Jumper	JPW-02A
W350	Jumper	JPW-02H

### RF UNIT

REF. NO.	DESCRIPTION	PART NO.
IC601	IC	μA78L82AWC
IC602	IC	BA618
IC603	IC	NJM4558D
IC604	IC	ND487C1-3R
Q601	Transistor	2SC3399
Q602	Transistor	2SB562
Q603	Transistor	2SC945Q
Q604	Transistor	2SC945Q
Q605	Transistor	2SC945Q
Q606	FET	3SK74M
Q607	FET	2SK125
Q608	FET	2SK125
Q609	Transistor	2SC2053
Q610	FET	3SK74K
Q611	FET	3SK74K
Q612	FET	3SK74M
Q613	Transistor	2SC2053
Q614	Transistor	2SC945P
D601	Diode	1SS53
D602	Diode	1SS53
D603	Diode	1SS53
D604	Diode	1SS53
D605	Diode	1SS53
D606	Diode	1SS53
D607	Diode	1SS53
D608	Diode	1SS53
D609	Diode	1SS53
D610	Diode	1SS53
D611	Diode	1SS53
D612	Diode	1SS53
D613	Diode	1SS53
D614	Diode	1SS53
D615	Diode	1SS53
D616	Diode	1SS53
D617	Diode	1SS53
D618	Diode	1SS53
D619	Diode	1SS53
FI601	Crystal Filter	FL-64 (70M15B)
L601	Coil	FL5H 102K
L602	Coil	FL5H 102K
L603	Coil	EL0810SKI-102K
L604	Coil	EL0810SKI-101K
L605	Coil	EL0810SKI-101K
L606	Coil	EL0810SKI-101K
L607	Coil	EL0810SKI-101K
L608	Coil	EL0810SKI-101K
L609	Coil	EL0810SKI-101K
L610	Coil	LB4 R83K
L611	Coil	LR-116
L612	Coil	LR-116



**RF UNIT**

REF. NO.	DESCRIPTION	PART NO.	
L613	Coil	LS-254	
L614	Coil	LS-254	
L615	Coil	LS-114	
L616	Coil	LS-254	
L617	Coil	LS-254	
L618	Coil	LS-198	
L619	Coil	LR-129	
L620	Coil	LA-258	
L621	Coil	LA-257	
L622	Coil	LB4 R15K	
L623	Coil	FL4H 100K	
L624	Coil	LA-267	
L625	Coil	LB4 R30K	
L626	Coil	LS-198	
L627	Coil	LR-145	
L628	Coil	EL0810SKI-101K	
L629	Coil	EL0810SKI-3R3K	
L630	Coil	EL0810SKI-2R7K	
L631	Coil	LR-20	
L632	Coil	LB4 6R2J	
L633	Coil	LB4 R41K	
L634	Coil	LB4 R41K	
L635	Coil	LB4 R45K	
L636	Coil	LB4 R50K	
L637	Coil	FL5H 101K	
L638	Coil	LB4 R45K	
L639	Coil	LB4 R50K	
L640	Coil	LB4 R54K	
L641	Coil	LB4 R65K	
L642	Coil	FL5H 101K	
L643	Coil	LB4 R65K	
L644	Coil	LB4 R70K	
L645	Coil	LB4 R70K	
L646	Coil	LB4 R83K	
L647	Coil	FL5H 101K	
L648	Coil	LB4 R83K	
L649	Coil	EL0810SKI-1R0K	
L650	Coil	EL0810SKI-1R0K	
L651	Coil	EL0810SKI-1R0K	
L652	Coil	FL5H 101K	
L653	Coil	EL0810SKI-1R2K	
L654	Coil	EL0810SKI-1R5K	
L655	Coil	EL0810SKI-1R5K	
L656	Coil	EL0810SKI-1R5K	
L657	Coil	FL5H 101K	
L658	Coil	EL0810SKI-1R8K	
L659	Coil	EL0810SKI-2R2K	
L660	Coil	EL0810SKI-2R2K	
L661	Coil	EL0810SKI-2R2K	
L662	Coil	FL5H 101K	
L663	Coil	EL0810SKI-102K	
L664	Coil	EL0810SKI-3R3K	
L665	Coil	LB4 4R3J	
L666	Coil	EL0810SKI-3R9K	
L667	Coil	EL0810SKI-3R9K	
L668	Coil	LB4 4R3J	
L669	Coil	BTO1RN1-A61	
R601	Resistor	1K	R25
R603	Resistor	15K	R25
R604	Resistor	47K	R25
R605	Resistor	15K	R25
R606	Resistor	22K	R25
R607	Resistor	100	R25
R608	Resistor	68K	R25

**RF UNIT**

REF. NO.	DESCRIPTION	PART NO.	
R609	Resistor	68K	R25
R610	Resistor	39K	R25
R611	Resistor	39K	R25
R612	Trimmer	3.3K	H0621A
R613	Resistor	1M	R25
R614	Resistor	6.8K	R25
R615	Resistor	220K	R25
R616	Resistor	220K	R25
R617	Resistor	330K	R25
R618	Resistor	10K	R25
R619	Trimmer	10K	H1051A
R620	Resistor	2.2K	R25
R621	Trimmer	10K	H0651A
R622	Resistor	47K	R25
R623	Resistor	15K	R25
R624	Resistor	8.2	R25
R625	Resistor	150	R25
R626	Resistor	8.2	R25
R627	Resistor	2.2K	R25
R628	Resistor	4.7K	R25
R629	Resistor	100	R25
R630	Resistor	270	R25
R631	Resistor	3.9K	R25
R632	Resistor	10K	R25
R633	Resistor	47	R25
R634	Resistor	470	R25
R635	Resistor	470	R25
R636	Resistor	560	R25
R637	Resistor	47	R25
R638	Resistor	100	R25
R639	Resistor	680	R25
R640	Resistor	4.7K	R10
R641	Resistor	680	R25
R642	Resistor	33	R25
R643	Resistor	220	R25
R644	Resistor	33	R25
R645	Resistor	5.6	R25
R646	Resistor	5.6	R25
R647	Resistor	220	R25
R648	Resistor	100	R25
R649	Resistor	100K	R10
R650	Resistor	100K	R10
R651	Resistor	10K	R25
R652	Resistor	68	R25
R653	Resistor	68	R25
R654	Resistor	220	R25
R655	Resistor	220	R25
R656	Resistor	390	R25
R657	Resistor	100	R25
R658	Thermistor	23D29	
R659	Resistor	390	R25
R660	Resistor	470	R25
R661	Thermistor	33D28	
R662	Resistor	560	R25
R663	Resistor	1K	R25
R664	Resistor	100	R25
R665	Resistor	39	R25
R666	Resistor	820	R25
R667	Resistor	4.7K	R25
R668	Resistor	4.7	R25
R669	Resistor	22	R25
R670	Resistor	470	R25
R671	Resistor	12	R25
R672	Resistor	470	R25
R673	Resistor	100	R25

**RF UNIT**

REF. NO.	DESCRIPTION	PART NO.	
R674	Resistor	100	R25
R675	Resistor	100	R25
R676	Resistor	100	R25
R677	Resistor	100	R25
R678	Resistor	100	R25
R679	Resistor	100	R25
R680	Resistor	470	R25
R681	Resistor	2.2K	R25
R682	Resistor	33K	R25
R683	Resistor	12K	R25
R684	Trimmer	10K	H0651A
R685	Resistor	10K	R25
R686	Resistor	10K	R25
R687	Resistor	10K	R25
R688	Resistor	10K	R25
R689	Resistor	10K	R25
R690	Resistor	10K	R25
R691	Resistor	10K	R25
R692	Resistor	1M	R25
R693	Resistor	220	R25
R694	Resistor	100K	R25
C601	Ceramic	0.0047	50V
C602	Electrolytic	4.7	50V
C603	Ceramic	0.0047	50V
C604	Electrolytic	10	16V
C605	Ceramic	0.0047	50V
C606	Barrier Lay	0.047	25V
C607	Electrolytic	4.7	50V
C608	Array	B8ZC0111N-32N	
C609	Array	B8ZC0111N-32N	
C610	Barrier Lay	0.047	25V
C611	Barrier Lay	0.047	25V
C612	Ceramic	0.0047	50V
C613	Ceramic	0.0047	50V
C614	Ceramic	100P	50V
C615	Ceramic	0.0047	50V
C616	Electrolytic	10	16V
C617	Electrolytic	4.7	50V
C618	Electrolytic	10	16V
C619	Ceramic	0.0047	50V
C620	Barrier Lay	RAU06SA	681K
C621	Barrier Lay	RAU06SA	681K
C622	Ceramic	0.0047	50V
C623	Ceramic	8P	50V
C624	Ceramic	8P	50V
C625	Ceramic	0.0047	50V
C626	Ceramic	0.0047	50V
C627	Cylinder	UP125X472M	
C628	Ceramic	0.001	50V
C629	Mylar	0.01	50V
C630	Cylinder	UP125B102K	
C631	Ceramic	3P	50V
C632	Ceramic	8P	50V
C633	Ceramic	8P	50V
C634	Barrier Lay	0.1	16V
C635	Barrier Lay	0.1	16V
C636	Barrier Lay	0.1	16V
C637	Barrier Lay	0.1	16V
C638	Ceramic	100P	50V
C639	Ceramic	10P	50V
C640	Ceramic	150P	50V
C641	Ceramic	30P	50V
C642	Barrier Lay	0.047	25V
C643	Ceramic	0.0047	50V

**RF UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C644	Barrier Lay	0.047	25V
C645	Barrier Lay	0.047	25V
C646	Ceramic	0.0047	50V
C647	Electrolytic	2.2	50V
C648	Ceramic	39P	50V
C649	Ceramic	220P	50V
C650	Ceramic	39P	50V
C651	Ceramic	0.001	50V
C652	Ceramic	3P	50V
C653	Ceramic	5P	50V
C654	Ceramic	15P	50V
C655	Ceramic	1.5P	50V
C656	Ceramic	3P	50V
C657	Ceramic	0.0047	50V
C658	Ceramic	3P	50V
C660	Barrier Lay	0.1	16V
C661	Barrier Lay	0.1	16V
C662	Barrier Lay	0.1	16V
C663	Barrier Lay	0.047	25V
C664	Ceramic	5P	50V
C665	Ceramic	1.5P	50V
C666	Ceramic	22P	50V
C667	Ceramic	4P	50V
C668	Ceramic	5P	50V
C669	Barrier Lay	0.1	16V
C670	Ceramic	0.0047	50V
C671	Barrier Lay	0.1	16V
C672	Barrier Lay	0.1	16V
C673	Barrier Lay	UAT04V	122K
C674	Ceramic	0.0047	50V
C675	Electrolytic	2.2	50V
C676	Ceramic	330P	50V
C677	Barrier Lay	UAT04V	222K
C678	Barrier Lay	UAT04V	222K
C679	Ceramic	330P	50V
C680	Barrier Lay	UAT06V	822K
C681	Ceramic	150P	50V
C682	Barrier Lay	UAT04V	122K
C683	Ceramic	200P	50V
C684	Ceramic	180P	50V
C685	Ceramic	24P	50V
C686	Ceramic	200P	50V
C687	Barrier Lay	0.047	25V
C688	Barrier Lay	0.047	25V
C689	Ceramic	180P	50V
C690	Barrier Lay	UAT04	V152K
C691	Ceramic	270P	50V
C692	Ceramic	220P	50V
C693	Ceramic	39P	50V
C694	Ceramic	300P	50V
C695	Barrier Lay	0.047	25V
C696	Barrier Lay	0.047	25V
C697	Ceramic	270P	50V
C698	Barrier Lay	UAT04V	222K
C699	Ceramic	330P	50V
C700	Ceramic	300P	50V
C701	Ceramic	47P	50V
C702	Ceramic	390P	50V
C703	Barrier Lay	0.047	25V
C704	Barrier Lay	0.047	25V
C705	Ceramic	330P	50V
C706	Barrier Lay	UAT05V	272K
C707	Ceramic	DD109SL471J50V2	
C708	Ceramic	330P	50V
C709	Ceramic	56P	50V

**RF UNIT**

REF. NO.	DESCRIPTION	PART NO.
C710	Ceramic	DD109SL471J50V2
C711	Barrier Lay	0.047 25V
C712	Barrier Lay	0.047 25V
C713	Ceramic	DD109SL471J50V2
C714	Barrier Lay	UAT05V 392K
C715	Barrier Lay	RAU06SA 681K
C716	Ceramic	DD109SL471J50V2
C717	Ceramic	100P 50V
C718	Barrier Lay	RAU06SA 561K
C719	Barrier Lay	0.047 25V
C720	Barrier Lay	0.047 25V
C721	Barrier Lay	UAT04V 102K
C722	Barrier Lay	UAT06V 682K
C723	Barrier Lay	UAT04V 152K
C724	Barrier Lay	RAU06SA 561K
C725	Ceramic	120P 50V
C726	Barrier Lay	RAU08SA 821K
C727	Barrier Lay	0.047 25V
C728	Barrier Lay	0.047 25V
C729	Barrier Lay	0.1 16V
C730	Barrier Lay	UAT04V 152K
C731	Ceramic	220P 50V
C732	Barrier Lay	UAT04V 152K
C733	Barrier Lay	0.1 16V
C734	Barrier Lay	0.1 16V
C735	Barrier Lay	UAT04V 152K
C736	Ceramic	180P 50V
C737	Barrier Lay	UAT05V 472K
C738	Barrier Lay	UAT04V 122K
C739	Ceramic	220P 50V
C740	Barrier Lay	UAT06V 103K
C741	Barrier Lay	UAT04V 182K
C742	Ceramic	220P 50V
C743	Ceramic	120P 50V
C744	Ceramic	6P 50V
C745	Ceramic	0.0022 50V
C746	Ceramic	0.001 50V
C747	Ceramic	0.001 50V
C748	Ceramic	0.001 50V
C749	Ceramic	0.001 50V
C750	Ceramic	0.001 50V
C751	Electrolytic	22 10V
J601	Connector	TL25P-07-V1
J602	Connector	TL25P-04-V1
J603	Connector	TMP-J01X-A2
J604	Connector	TL25P-05-V1
J605	Connector	TMP-J01X-A2
J606	Connector	TMP-J01X-A2
P601	Connector	(TMP-P01X-A1) W619
P602	Connector	(TMP-P01X-A1) W621
B601	PC. Board	B-886A (42442)
W604	Jumper	JPW-02A
W605	Jumper	JPW-02A
W606	Jumper	JPW-02A
W607	Jumper	JPW-02A
W608	Jumper	JPW-02A
W609	Jumper	JPW-02A
W610	Jumper	JPW-02A
W611	Jumper	JPW-02A
W612	Jumper	JPW-02A

**RF UNIT**

REF. NO.	DESCRIPTION	PART NO.
W613	Jumper	JPW-02A
W614	Jumper	JPW-02A
W615	Jumper	JPW-02A
W616	Jumper	JPW-02A
W617	Jumper	JPW-02A
W618	Jumper	JPW-02A
W623	Jumper	JPW-02A

**PA UNIT**

REF. NO.	DESCRIPTION	PART NO.
Q801	Transistor	2SC1971
Q802	Transistor	2SC3133
Q803	Transistor	2SC3133
Q804	Transistor	2SC2904
Q805	Transistor	2SC2904
Q806	Transistor	2SD880Y
Q807	Transistor	2SC2120
Q851	Transistor	2SC945P
Q852	Transistor	2SC945P
Q853	Transistor	2SA1345
Q854	Transistor	2SC945P
D801	Varistor	MV5
D802	Varistor	MV5
D803	Diode	1N4002
D804	Varistor	MV5
D851	Diode	1N4002
D852	Diode	1N4002
D853	Diode	1K60
D871	Diode	1N4002
D872	Diode	15CD11
D873	Diode	15CD11
L801	Coil	LR-142
L804	Coil	LR-143
L805	Coil	BT01RN1-A61
L806	Coil	BT01RN1-A61
L807	Coil	BT01RN1-A61
L808	Coil	BT01RN1-A61
L809	Coil	LR-83
L810	Coil	LR-148
L811	Coil	LR-146
L812	Coil	FL5H 100K
L813	Coil	BT01RN1-A61
L814	Coil	BT01RN1-A61
L815	Coil	BT01RN1-A61
L816	Coil	FSQH050RN
L817	Coil	FSQH050RN
L819	Coil	FL5H 101K
L821	Coil	BT01RN1-A61
L851	Coil	LB4 R36K
L852	Coil	LR-151
L853	Coil	LAL04NA 101K
L854	Coil	FL5H 102K
L871	Coil	BT01RN1-A61
L872	Coil	BT01RN1-A61
L873	Coil	BT01RN1-A61
L874	Coil	BT01RN1-A61
L875	Coil	BT01RN1-A61

**PA UNIT**

REF. NO.	DESCRIPTION	PART NO.	
L876	Coil	BT01RN1-A61	
L877	Coil	BT01RN1-A61	
L878	Coil	BT01RN1-A61	
R801	Resistor	8.2	R25
R802	Resistor	180	R25
R803	Resistor	470	R25
R804	Resistor	3.3	R25
R805	Resistor	2.7	R25
R806	Resistor	100	R50X
R807	Resistor	47	ELR25
R808	Resistor	47	ELR25
R809	Resistor	100	R50X
R810	Resistor	RSS1B3.3-J	
R811	Resistor	RSS1B3.3-J	
R812	Resistor	RSS1B3.3-J	
R813	Resistor	RSS1B3.3-J	
R814	Resistor	10	R50X
R815	Resistor	10	R50X
R816	Resistor	RSS1B2.2-J	
R817	Resistor	RSS1B2.2-J	
R818	Resistor	33K	R25
R822	Resistor	4.7	R2J
R823	Trimmer	470	H0651A
R824	Resistor	150	R25
R826	Resistor	10K	ELR25
R827	Trimmer	100	H0651A
R828	Resistor	68	R50X
R829	Resistor	10	ELR25
R831	Resistor	22	ELR25
R832	Resistor	100	R50X
R833	Resistor	2.2K	ELR25
R834	Resistor	120	R50X
R835	Resistor	RSS1B3.3-J	
R836	Resistor	RSS1B3.3-J	
R837	Resistor	180	R25
R851	Resistor	4.7K	ELR25
R852	Resistor	5.6K	ELR25
R853	Resistor	4.7K	ELR25
R854	Resistor	4.7K	R25
R855	Resistor	22K	ELR25
R856	Resistor	22K	ELR25
R857	Resistor	33K	ELR25
R858	Resistor	22K	ELR25
R859	Surge Absorber	DSA301	
R871	Resistor	SQ5L	0.012-J
R872	Resistor	1K	R25
R873	Resistor	1K	R25
C801	Ceramic	0.0047	50V
C802	Ceramic	470P	50V
C803	Barrier Lay	0.1	16V
C804	Mylar	0.01	50V
C805	Mylar	0.01	50V
C806	Ceramic	510P	50V SL
C808	Monolithic	GR44CH682K	50V
C809	Monolithic	GR44CH682K	50V
C810	Dip Mica	DM20C102J51CR	
C811	Monolithic	GR43CH471K	50V
C812	Monolithic	GR43CH471K	50V
C813	Monolithic	GR44CH102K	50V
C814	Dip Mica	DM20C152J51CR	
C816	Dip Mica	DM20C472J51CR	
C817	Barrier Lay	0.047	25V
C818	Electrolytic	1000	16V MS16

**PA UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C819	Monolithic	GR44Y5V684Z	25V
C820	Barrier Lay	0.047	25V
C821	Electrolytic	47	10V
C822	Electrolytic	10	16V
C823	Barrier Lay	0.047	25V
C824	Barrier Lay	0.047	25V
C825	Electrolytic	470	16V
C826	Barrier Lay	0.047	25V
C827	Electrolytic	10	16V
C828	Barrier Lay	0.047	25V
C829	Ceramic	0.0047	50V
C830	Barrier Lay	0.047	25V
C831	Barrier Lay	0.1	16V
C832	Barrier Lay	0.047	25V
C833	Barrier Lay	0.047	25V
C834		330P	500V SL
C835		330P	500V SL
C836	Ceramic	33P	50V CH
C837	Ceramic	0.0047	50V
C838	Electrolytic	1000	6.3V
C839	Electrolytic	GR43CH471K	50V
C840	Electrolytic	GR43CH471K	50V
C841	Electrolytic	GR44CH102K	50V
C842	Electrolytic	470P	50V SL
C851	Ceramic	0.0047	50V
C852	Ceramic	100P	50V
C854	Ceramic	150P	50V
C855	Ceramic	0.0047	50V
C856	Ceramic	0.0047	50V
C857	Barrier Lay	0.1	16V
C858	Ceramic	0.0047	50V
C859	Electrolytic	2.2	50V MS7
C860	Barrier Lay	0.047	25V
C861	Ceramic	33P	500V
C862	Ceramic	10P	500V
C871	Feed Through	TF318-452E102GMV	
C872	Feed Through	TF318-452E102GMV	
C873	Feed Through	TF318-452E102GMV	
C874	Feed Through	TF318-452E102GMV	
C875	Barrier Lay	0.047	25V
C876	Barrier Lay	0.047	25V
C877	Electrolytic	2200	16V
C878	Ceramic	0.0047	50V
RL851	Relay	FBR311D012	
RL852	Relay	FBR22D12-P	
RL871	Relay	FBR211BD012-M	
J851	Connector	TMP-J01X-V2	
J871	Connector	TLB-P04H-B1	
J872	Connector	TL25P-05-V1	
J873	Connector	TL25P-04-V1	
J874	Connector	TL25P-05-V1	
J875	Connector	TL25P-03-V1	
J876	Connector	LR-6	
J877	Connector	1490R	
J878	Connector	YKC21-0046	
J879	Connector	HLJ4306-01-100	
J880	Connector	FM-MDR MI	
P801	Connector	(TMP-P01X-A1)	W801
P802	Connector	(TMP-P01X-A1)	W803
P803	Connector	TL25H-05H-B1	
P851	Connector	TL25H-03H-B1	
P852	Connector	(TMP-P01X-A1)	W851

**PA UNIT**

REF. NO.	DESCRIPTION	PART NO.
P871	Connector	TL25H-04H-B1
P872	Connector	TL25H-02H-B1
P873	Connector	1261R3
F871	Fuse Holder	FH-032
F872	Fuse	5A
S801	Thermal Switch	OHD-90M
S802	Thermal Switch	OHD-50M
MF801	DC Motor	M6B 12U22
B801	PC. Board	B-887A (42447) (PA)
B802	PC. Board	B-889A (42704) (ANT. SW)
B803	PC. Board	B-890A (42705) (CONNECT.)
EP811	Bead Core	DL20P2.6-3-1.2
EP871	Bead Core	FSQH090RN
EP872	Bead Core	FSQH090RN
EP873	Bead Core	FSQH070RN
W815	Jumper	JPW-02A
W816	Jumper	JPW-02A
W817	Jumper	JPW-02A
W819	Jumper	JPW-02A
W820	Jumper	JPW-02A
W836	Jumper	JPW-02A
W838	Jumper	JPW-02A
W856	Jumper	JPW-02A
W857	Jumper	JPW-02A
W878	Jumper	JPW-02A

**FILTER UNIT**

REF. NO.	DESCRIPTION	PART NO.
D901	Diode	1N4002
D902	Diode	1N4002
D903	Diode	1N4002
D904	Diode	1N4002
D905	Diode	1N4002
D906	Diode	1N4002
D907	Diode	1N4002
D908	Diode	1K60
D909	Diode	1K60
L901	Coil	LR-138
L902	Coil	LR-150
L903	Coil	LR-150
L904	Coil	LR-141
L905	Coil	LR-138
L906	Coil	LR-138
L907	Coil	LR-140
L908	Coil	LR-149
L909	Coil	LR-149
L910	Coil	LR-53
L911	Coil	LR-140
L912	Coil	LR-140
L913	Coil	LR-54
L914	Coil	LR-91
L915	Coil	LR-91
L916	Coil	LR-54
L917	Coil	LR-55

**FILTER UNIT**

REF. NO.	DESCRIPTION	PART NO.
L918	Coil	LR-56
L919	Coil	LA-168
L920	Coil	L6 222
L921	Coil	LR-22A
L922	Coil	FL5H 101K
L923	Coil	FL5H 101K
L924	Coil	FL5H 101K
L925	Coil	FL5H 101K
L926	Coil	FL5H 101K
L927	Coil	FL5H 101K
L928	Coil	FL5H 101K
L929	Coil	FL5H 101K
L930	Coil	FL5H 100K
L931	Coil	FL5H 100K
L932	Coil	FL5H 100K
L933	Coil	FL5H 100K
L934	Coil	FL5H 100K
L935	Coil	FL5H 100K
R901	Resistor	68 R50X
R902	Resistor	22K R25
R903	Resistor	100K ELR25
R904	Resistor	22K R25
R905	Resistor	47K ELR25
C901	Dip Mica	DM20C122J51CR
C902	Ceramic	300P 500V SL
C903	Dip Mica	DM20C152J51CR
C904	Ceramic	180P 500V SL
C905	Dip Mica	DM20C102J51CR
C906	Dip Mica	DM19C821J51CR
C907	Ceramic	200P 500V SL
C908	Dip Mica	DM20C102J51CR
C909	Ceramic	68P 500V SL
C910	Dip Mica	DM19C561J51CR
C911	Dip Mica	DM19C561J51CR
C912	Ceramic	120P 500V SL
C913	Dip Mica	DM19C681J51CR
C914	Ceramic	68P 500V SL
C915	Ceramic	330P 500V SL
C916	Ceramic	330P 500V SL
C917	Ceramic	100P 500V SL
C918	Dip Mica	DM19C391J51CR
C919	Ceramic	56P 500V SL
C920	Ceramic	220P 500V SL
C921	Ceramic	300P 500V SL
C922	Ceramic	68P 500V SL
C923	Dip Mica	DM19C391J51CR
C924	Ceramic	39P 500V SL
C925	Ceramic	180P 500V SL
C926	Ceramic	150P 500V SL
C927	Ceramic	27P 500V SL
C928	Ceramic	270P 500V SL
C929	Ceramic	39P 500V SL
C930	Ceramic	100P 500V SL
C931	Ceramic	100P 500V SL
C932	Ceramic	10P 500V SL
C933	Ceramic	220P 500V SL
C934	Ceramic	47P 500V SL
C935	Ceramic	100P 500V SL
C936	Trimmer	ECV-1ZW20X40
C937	Ceramic	220P 50V
C938	Ceramic	100P 50V
C939	Ceramic	100P 50V
C940	Barrier Lay	0.047 25V

**FILTER UNIT**

REF. NO.	DESCRIPTION	PART NO.	
C941	Barrier Lay	0.047	25V
C942	Barrier Lay	0.047	25V
C943	Barrier Lay	0.047	25V
C944	Barrier Lay	0.047	25V
C945	Barrier Lay	0.047	25V
C946	Barrier Lay	0.047	25V
C947	Barrier Lay	0.047	25V
C948	Ceramic	0.0047	50V
C949	Ceramic	0.0047	50V
C950	Ceramic	0.0047	50V
C951	Ceramic	0.0047	50V
C952	Ceramic	0.0047	50V
C953	Ceramic	0.0047	50V
C954	Dip Mica	DM19C561J51CR	
C955	Dip Mica	DM19C821J51CR	
C956	Ceramic	330P	500V SL
C957	Dip Mica	DM19C391J51CR	
C958	Ceramic	150P	500V SL
C959	Ceramic	39P	500V SL
RL901	Relay	FBR313D012-22	
RL902	Relay	FBR313D012-22	
RL903	Relay	FBR313D012-22	
RL904	Relay	FBR313D012-22	
RL905	Relay	FBR313D012-22	
RL906	Relay	FBR313D012-22	
RL907	Relay	FBR313D012-22	
RL908	Relay	FBR313D012-22	
RL909	Relay	FBR313D012-22	
RL910	Relay	FBR313D012-22	
RL911	Relay	FBR313D012-22	
RL912	Relay	FBR313D012-22	
RL913	Relay	FBR313D012-22	
RL914	Relay	FBR313D012-22	
J901	Connector	TMP-J01X-V2	
J902	Connector	TL25P-02-V1	
P901	Connector	(TMP-P01X-A1) W908	
P902	Connector	TL25H-07-B1	
B901	PC. Board	B-888A	
W910	Jumper	JPW-02A	
W911	Jumper	JPW-02A	
W912	Jumper	JPW-02A	
W913	Jumper	JPW-02A	
W914	Jumper	JPW-02A	
W915	Jumper	JPW-02A	
W916	Jumper	JPW-02A	
W917	Jumper	JPW-02A	
W918	Jumper	JPW-02A	
W919	Jumper	JPW-02A	
W920	Jumper	JPW-02A	
W921	Jumper	JPW-02A	
W922	Jumper	JPW-02A	
W923	Jumper	JPW-02A	
W924	Jumper	JPW-02A	
W925	Jumper	JPW-02A	
W926	Jumper	JPW-02A	
W927	Jumper	JPW-02A	
W928	Jumper	JPW-02A	
W929	Jumper	JPW-02A	
W930	Jumper	JPW-02A	
W931	Jumper	JPW-02A	

**FILTER UNIT**

REF. NO.	DESCRIPTION	PART NO.
W932	Jumper	JPW-02A
W934	Jumper	JPW-02A
W935	Jumper	JPW-02A
W936	Jumper	JPW-02H
W939	Jumper	JPW-02A

**LOGIC UNIT**

REF. NO.	DESCRIPTION	PART NO.	
IC1005	IC	M50763-500SP	
IC1006	IC	M50781SP	
IC1007	IC	TC4081	
IC1008	IC	TC4013	
IC1009	IC	BA618	
IC1010	IC	μA7805	
Q1003	Transistor	2SC945P	
D1005	Diode	1S953	
D1006	Diode	1S953	
D1007	Diode	1S953	
D1008	Diode	1S953	
D1009	Diode	1SS53	
D1010	Diode	1SS53	
D1011	Diode	1SS53	
D1012	Diode	1SS53	
D1013	Diode	1SS53	
D1014	Diode	1SS53	
D1015	Diode	1SS53	
D1016	Diode	1SS53	
D1017	Diode	1SS53	
D1019	Diode	1SS53	
D1020	Diode	1SS53	
D1021	Diode	1SS53	
D1022	Diode	1S953	
X1001	Ceralock	CSB400A	
L1001	Coil	BT01RN1-A61	
L1002	Coil	FL5H 101K	
L1003	Coil	FL5H 101K	
L1004	Coil	FL5H 101K	
L1005	Coil	FL5H 101K	
L1006	Coil	FL5H 101K	
L1007	Coil	FL5H 101K	
L1008	Coil	FL5H 101K	
R1010	Resistor	47K	R25
R1011	Resistor	47K	R25
R1012	Array	473	RM-4
R1013	Resistor	1.5	R25
R1014	Resistor	1.5	R25
R1015	Resistor	1K	R25
R1016	Resistor	1K	R25
R1017	Resistor	1K	R25
R1018	Resistor	1K	R25
R1019	Resistor	1K	R25
R1020	Resistor	10K	R25
R1021	Array	103	RM-4
R1022	Array	103	RM-4
R1023	Resistor	10K	R25

## LOGIC UNIT

REF. NO.	DESCRIPTION	PART NO.	
R1024	Resistor	10K	R25
R1025	Resistor	10K	R25
R1026	Resistor	10K	R25
R1027	Array	473	RM-8
R1028	Resistor	47K	R25
R1029	Resistor	560K	R25
R1030	Resistor	1K	R25
R1031	Resistor	1K	R25
R1032	Resistor	1K	R25
R1033	Resistor	1K	R25
R1034	Resistor	1K	R25
R1035	Resistor	1K	R25
R1036	Resistor	1K	R25
R1037	Resistor	47K	R25
R1038	Resistor	100K	ELR25
R1039	Resistor	680K	ELR25
R1040	Resistor	1K	R25
R1041	Resistor	1K	R25
R1042	Resistor	1M	R25
R1043	Resistor	2.7K	R25
R1044	Resistor	10	R50X
R1045	Resistor	560K	R25
R1046	Resistor	47K	R25
R1047	Resistor	15K	ELR25

C1005	Electrolytic	47	16V
C1006	Ceramic	0.0047	50V
C1007	Electrolytic	47	16V
C1008	Ceramic	0.0047	50V
C1009	Barrier Lay	0.1	16V
C1010	Electrolytic	100	10V
C1011	Ceramic	0.0047	50V
C1012	Barrier Lay	0.047	50V
C1013	Tantalum	1	16V
C1014	Ceramic	120P	50V
C1015	Ceramic	120P	50V
C1016	Array	B7ZC0717-32N	
C1017	Array	B8ZC0111-32N	
C1018	Array	B5RC0124-32N	
C1019	Array	B8ZC0111-32N	
C1020	Barrier Lay	0.1	16V

J1005	Connector	5138-11CPB	
J1006	Connector	TL25P-07-V1	
J1007	Connector	TLB-P04H-B1	
J1008	Connector	TL25P-07-V1	
J1009	Connector	3022-12B	
J1010	Connector	3022-08B	
J1011	Connector	TL25P-04-V1	
J1012	Connector	5138-11CPB	
J1013	Connector	TL25P-08-V1	
J1014	Connector	TL25P-03-V1	

P1001	Connector	TL25H-04-B1	
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B1001	PC. Board	B-893A (42708)	
B1003	Ram Unit	EX-314-12	

W1011	Jumper	JPW-02A	
W1012	Jumper	JPW-02A	
W1013	Jumper	JPW-02A	
W1014	Jumper	JPW-02A	
W1015	Jumper	JPW-02A	
W1017	Jumper	JPW-02A	
W1018	Jumper	JPW-02A	

## LOGIC UNIT

REF. NO.	DESCRIPTION	PART NO.
W1019	Jumper	JPW-02A
W1020	Jumper	JPW-02A
W1021	Jumper	JPW-02A
W1022	Jumper	JPW-02A
W1023	Jumper	JPW-02A
W1024	Jumper	JPW-02A
W1025	Jumper	JPW-02A
W1026	Jumper	JPW-02A
W1029	Jumper	JPW-02A
W1031	Jumper	JPW-02A
W1032	Jumper	JPW-02A
W1034	Jumper	JPW-02A
W1035	Jumper	JPW-02A
W1036	Jumper	JPW-02A
W1037	Jumper	JPW-02H
W1038	Jumper	JPW-02A
W1039	Jumper	JPW-02A
W1041	Jumper	JPW-02A
W1042	Jumper	JPW-02A
W1043	Jumper	JPW-02A

## FRONT UNIT

REF. NO.	DESCRIPTION	PART NO.
IC1201	IC	M54519P
IC1202	IC	TC4011
IC1203	IC	TC4511BP
IC1204	IC	TC4028
IC1205	IC	μPD4503
IC1207	IC	TC4013
Q1202	Transistor	2SA1048Y
Q1203	Transistor	2SA1048Y
Q1205	Transistor	2SA1345
Q1206	Transistor	2SA1345
Q1207	Transistor	2SC3399
Q1208	Transistor	2SA1348
Q1209	Transistor	2SA1348
Q1210	Transistor	2SA1348
Q1211	Transistor	2SC3399
Q1212	Transistor	2SC3399
Q1213	Transistor	2SC3399
Q1214	Transistor	2SC2458Y
Q1218	Transistor	2SC2458Y
Q1219	Transistor	2SC3399
D1201	Diode	1S953
D1202	Diode	1S953
D1203	Diode	1S953
D1204	Diode	1S953
D1205	Diode	1S953
D1206	Diode	1S953
D1210	Diode	1S953
D1211	Diode	1S953
D1212	Diode	1SS53
D1213	Diode	1SS53
D1214	Diode	1SS53
D1215	Diode	1SS53
D1222	Diode	1S953
D1225	Diode	1SS53

**FRONT UNIT**

REF. NO.	DESCRIPTION	PART NO.	
D1226	Diode	1SS53	
D1227	Diode	1SS53	
D1228	Diode	1SS53	
D1229	Diode	1SS53	
D1230	Diode	1SS53	
D1231	Diode	1S953	
R1201	Resistor	27	ELR25
R1202	Resistor	27	R25
R1203	Resistor	27	ELR25
R1204	Resistor	27	R25
R1205	Resistor	27	ELR25
R1206	Resistor	27	R25
R1207	Resistor	27	R25
R1208	Resistor	27	R25
R1210	Resistor	33K	R25
R1211	Resistor	47K	R25
R1212	Resistor	47K	R25
R1213	Resistor	470K	R25
R1216	Resistor	33K	R25
R1217	Resistor	4.7K	R25
R1218	Resistor	10K	R25
R1219	Resistor	150K	R25
R1220	Resistor	150K	R25
R1221	Resistor	1.2K	R25
R1222	Resistor	47K	R25
R1223	Resistor	33K	R25
R1224	Resistor	10K	R25
R1225	Resistor	33K	R25
R1226	Resistor	47K	R25
R1227	Resistor	470K	R25
R1228	Resistor	4.7K	R25
R1230	Resistor	470K	R25
R1231	Resistor	470K	R25
R1232	Resistor	47K	R25
R1233	Resistor	33K	R25
R1234	Resistor	47K	R25
R1236	Resistor	10	R25
R1237	Resistor	10	R25
R1241	Variable Resistor	10KA	K1611008SE
R1242	Variable Resistor	10KB	K1611008SE
C1201	Ceramic	0.0047	50V
C1202	Electrolytic	100	10V MS7
C1203	Barrier Lay	0.1	16V
C1204	Barrier Lay	0.1	16V
C1205	Ceramic	0.001	50V
C1206	Ceramic	0.0047	50V
C1207	Barrier Lay	0.047	25V
J1201	Connector	TL25P-03-L1	
J1202	Connector	TLB-P11H-B1	
J1203	Connector	TLB-P08H-B1	
J1206	Connector	TL25P-11-L1	
J1207	Connector	TL25P-08-L1	
J1208	Connector	TL25P-03-L1	
J1209	Connector	TLB-P03H-B1	
J1210	Connector	TL25P-08-L1	
J1211	Connector	TL25P-04-L1	
J1212	Connector	5138-11APB	
J1213	Connector	TL25P-06-L1	
J1214	Connector	TL25P-04-L1	
J1215	Connector	TL25P-06-V1	
J1217	Connector	TLB-P05H-B1	

**FRONT UNIT**

REF. NO.	DESCRIPTION	PART NO.
P1202	Connector	TL25H-11-B1
P1203	Connector	TL25H-08-B1
P1204	Connector	TL25H-03-B1
P1205	Connector	1261P1
P1211	Connector	TL25H-08-B1
P1212	Connector	TL25H-04-B1
P1215	Connector	TL25H-03-B1
P1217	Connector	TL25H-04-B1
P1218	Connector	TL25H-04-B1
DS1201	LED	TLG312A (10M)
DS1202	LED	TLG312A (1M)
DS1203	LED	TLG312A (100K)
DS1204	LED	TLG312A (10K)
DS1205	LED	TLG312A (1K)
DS1206	LED	TLG312A (100Hz)
DS1207	LED	SLP251B (RECEIVE)
DS1208	LED	SLP151B (TRANSMIT)
DS1209	LED	SLP451B (TUNE)
DS1210	LED	SLP151B (ALARM)
S1201	Switch	KHH10906 (TEN KEY 1)
S1202	Switch	KHH10906 (TEN KEY 2)
S1203	Switch	KHH10906 (TEN KEY 3)
S1204	Switch	KHH10906 (TEN KEY 4)
S1205	Switch	KHH10906 (TEN KEY 5)
S1206	Switch	KHH10906 (TEN KEY 6)
S1207	Switch	KHH10906 (TEN KEY 7)
S1208	Switch	KHH10906 (TEN KEY 8)
S1209	Switch	KHH10906 (TEN KEY 9)
S1210	Switch	KHH10906 (TEN KEY 0)
S1211	Switch	KHH10906 (TEN KEY CE)
S1212	Switch	KHH10906 (TEN KEY TX)
S1213	Switch	KHH10906 (TEN KEY RX)
S1215	Switch	SDS-3P (POWER)
S1216	Switch	M2012J-1K (SPEAKER)
S1217	Switch	M2012J-1K (N-B)
S1218	Switch	M2012J-1K (SQUELCH)
S1219	Switch	SRM1043 (L=20mm) (CH A-B-C)
S1220	Switch	SRS101G (CH)
S1223	Switch	MB-2011 (ALARM)
S1224	Switch	SRM1034 (L=15mm) (MODE)
S1225	Switch	SPH121C (DISPLAY)
S1226	Switch	SPH122C (TUNE)
S1227	Switch	SPH122C (TX FREQ.)
S1228	Switch	SSS212 TYPEB
SP1201	Speaker	C080K1710810
B1201	PC. Board	B-892B (42697)
B1202	PC. Board	B-891A (42696)
B1203	PC. Board	B-894A (42514)
W1201	Jumper	JPW-02A
W1202	Jumper	JPW-02A
W1203	Jumper	JPW-02A
W1204	Jumper	JPW-02A
W1205	Jumper	JPW-02A
W1206	Jumper	JPW-02A
W1207	Jumper	JPW-02A
W1209	Jumper	JPW-02A
W1210	Jumper	JPW-02A
W1211	Jumper	JPW-02A
W1212	Jumper	JPW-02A



**FRONT UNIT**

REF. NO.	DESCRIPTION	PART NO.
W1213	Jumper	JPW-02A
W1215	Jumper	JPW-02A
W1216	Jumper	JPW-02A
W1217	Jumper	JPW-02A
W1218	Jumper	JPW-02A
W1221	Jumper	JPW-02A
W1222	Jumper	JPW-02A
W1223	Jumper	JPW-02A
W1224	Jumper	JPW-02A
W1225	Jumper	JPW-02A
W1226	Jumper	JPW-02H
W1281	Jumper	JPW-02A
W1282	Jumper	JPW-02A

**MIC-C UNIT**

REF. NO.	DESCRIPTION	PART NO.
Q1301	Transistor	2SC3399
Q1302	Transistor	2SC3399
Q1303	Transistor	2SC3399
Q1304	Transistor	2SC3402
Q1305	Transistor	2SC3399
D1301	Zener	RD8.2EB3
D1302	Diode	1S553
D1303	Diode	1S953
L1301	Coil	FL5H 101K
L1302	Coil	BT01RN1-A61
L1303	Coil	BT01RN1-A61
L1304	Coil	FL5H 101K
L1306	Coil	LAL03NA101K
L1307	Coil	BT01RN1-A61
R1301	Resistor	220 R25
R1302	Resistor	220 R25
R1303	Resistor	220 R25
R1304	Resistor	22K R25
R1305	Resistor	1K R25
R1306	***	
R1307	Resistor	22K R25
R1308	Resistor	3.3K R25
R1309	Resistor	2.2K R25
R1310	Resistor	220 R25
R1311	Resistor	220 R25
C1301	Ceramic	0.0047 50V
C1302	Ceramic	0.0047 50V
C1303	Barrier Lay	0.1 16V
C1304	Ceramic	0.0047 50V
C1305	Ceramic	0.0047 50V
C1306	Electrolytic	2.2 50V
C1307	Ceramic	0.0047 50V
J1301	Connector	TL25P-08-V1
J1302	Connector	TL25P-07-V1
J1303	Connector	TL25P-07-V1
S1301	Switch	SSS312 (L=4)
S1302	Switch	SSS312 (L=4)

**MIC-C UNIT**

REF. NO.	DESCRIPTION	PART NO.
B1301	PC. Board	B-895A
W1301	Jumper	JPW-02H
W1302	Jumper	JPW-02A
W1303	Jumper	JPW-02A

**EF UNIT**

REF. NO.	DESCRIPTION	PART NO.
MC1	Microphone	HM-28
EP1401	Bead Core	FSQH070RN
EP1402	Bead Core	FSQH090RN
P1401	Connector	TL25H-04-B1
P1402	Connector	TL25H-08-B1
P1403	Connector	TL25H-13-B1
P1404	Connector	TL25H-02-B1
P1407	Connector	TL25H-09-B1
P1408	Connector	TL25H-04-B1
P1409	Connector	TL25H-05-B1
P1410	Connector	TL25H-07-B1
P1411	Connector	TL25H-04-B1
P1412	Connector	TL25H-05-B1
P1414	Connector	TL25H-07-B1
P1415	Connector	TL25H-05-B1
P1416	Connector	TL25H-08-B1
P1417	Connector	TL25H-06-B1
P1418	Connector	TL25H-06-B1
P1419	Connector	TL25H-03-B1
P1420	Connector	TL25H-08-B1
P1421	Connector	TL25H-07-B1



# DIAGRAM

(LOGIC ~ RF) (MAIN ~ RF) (MIC ~ RF) (MIC ~ MAIN) (MATRIX ~ MAIN) (DISPLAY ~ MAIN)

## MAIN UNIT

### NOISE BLANKER

### AGC

### RX IF AMP

### RX IF AMP

### MOD

### 1/4 DIVIDER

### CARRIER

### ALC

### SEND

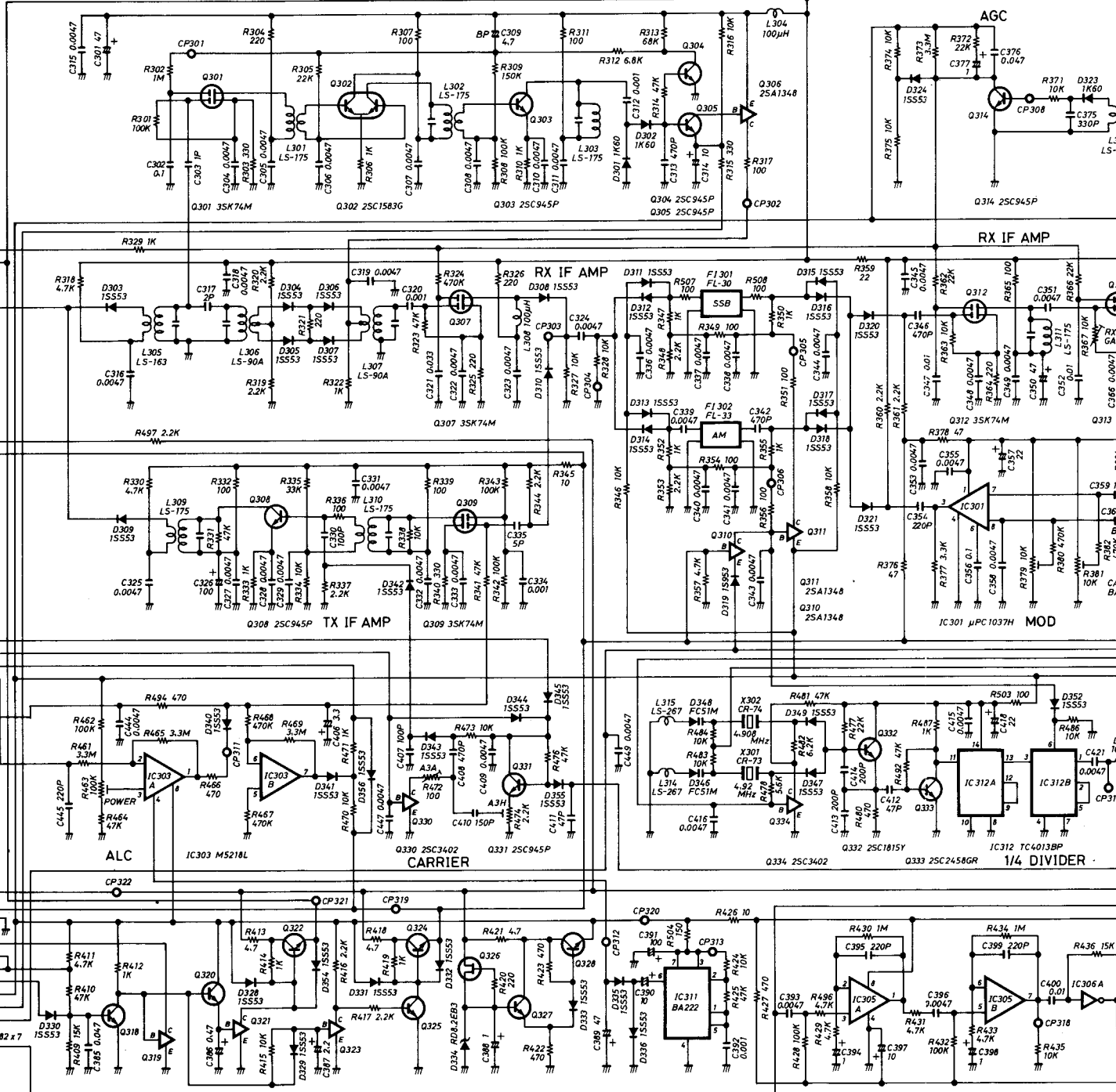
### RX 8V

### TX 8V

### 8V

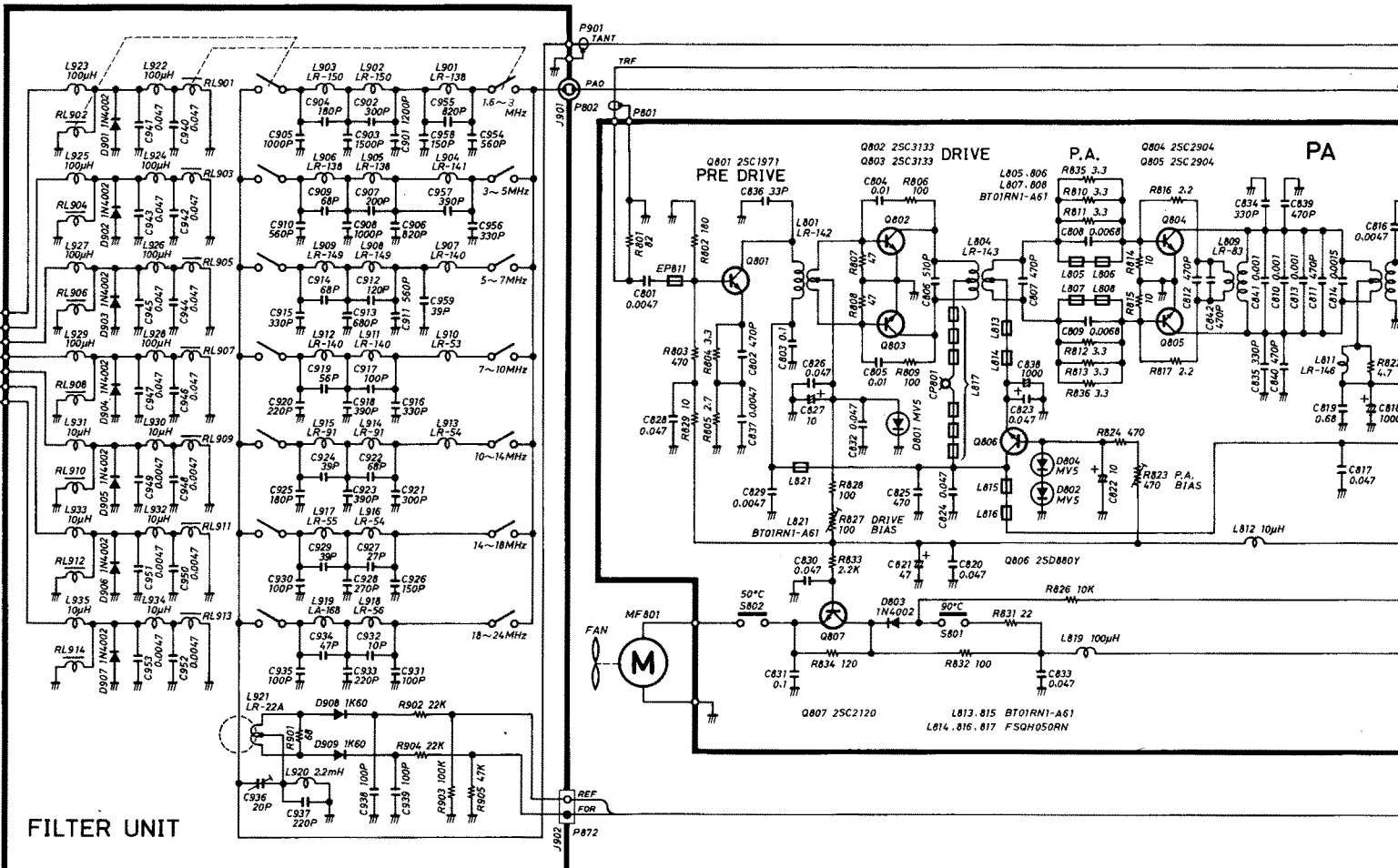
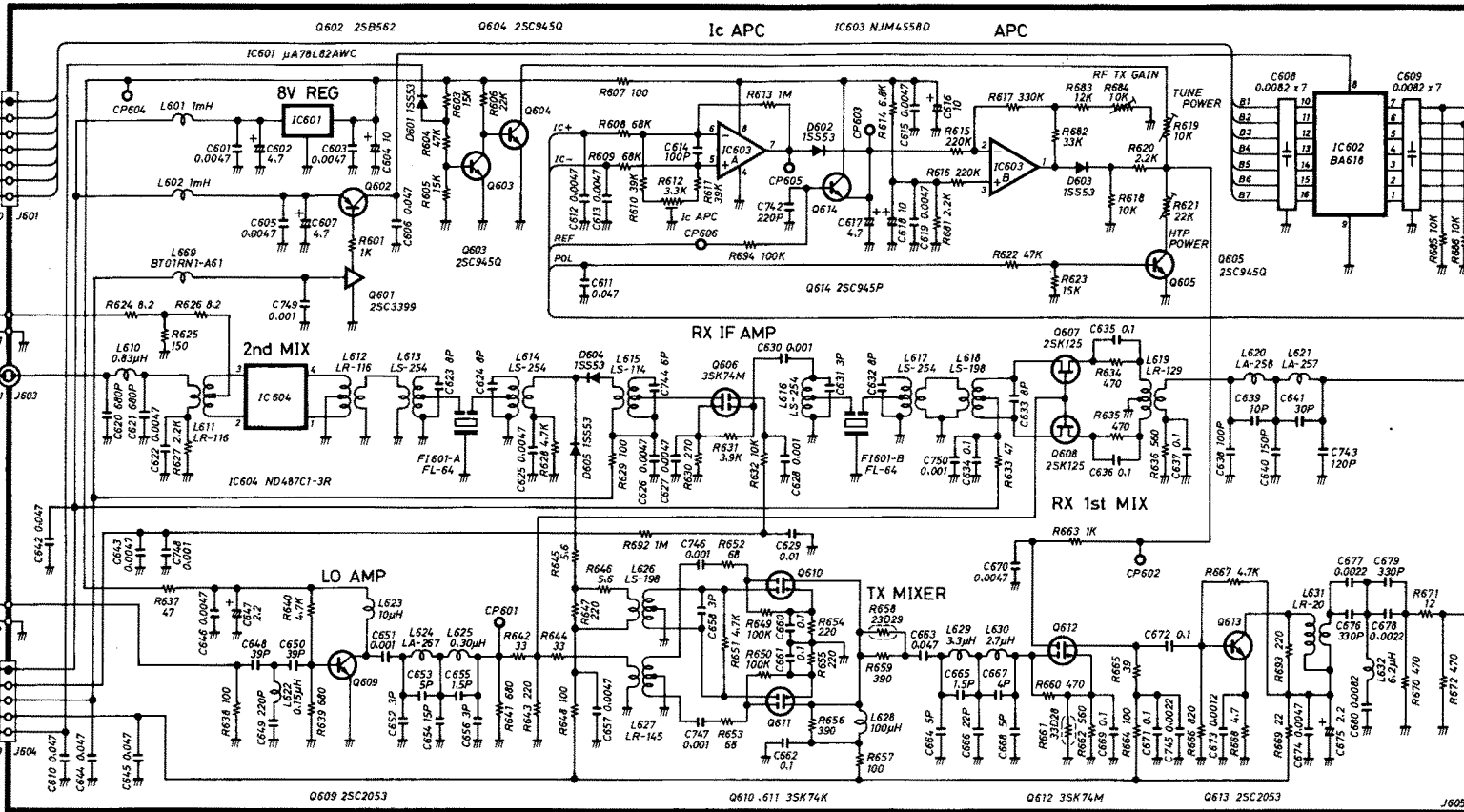
### DC-DC -5V

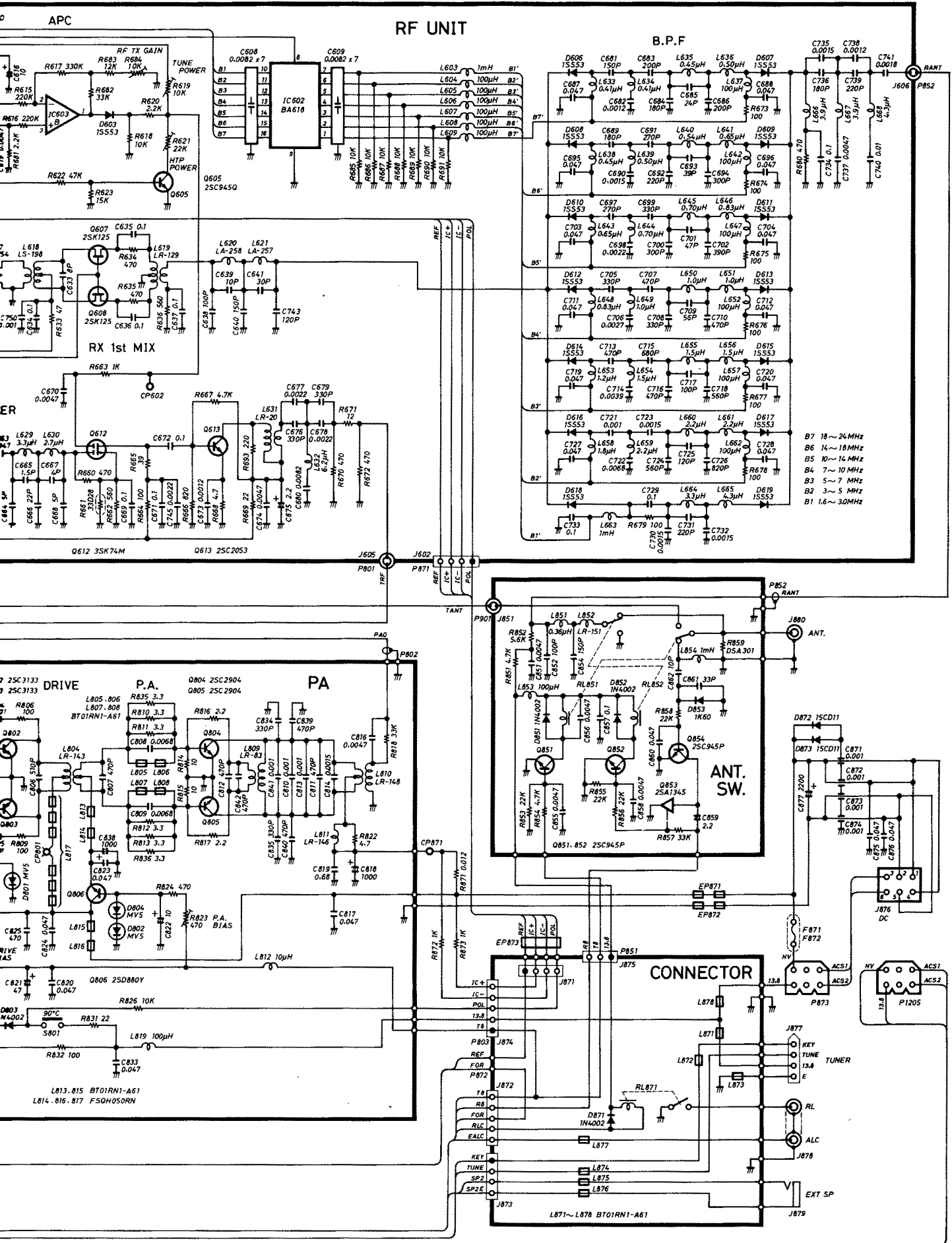
### SQUELCH



- Q318 25C945P
- Q320 25C2458GR
- Q322 25D468C
- Q324 25D880Y
- Q326 25K192AGR
- Q328 25D880Y
- Q319 25C3399
- Q321 25C3402
- Q323 25C3402
- Q325 25C945P
- Q327 25C945P
- Q312 25C945P
- Q308 25C945P
- Q309 35K74M
- Q310 25A134B
- Q311 25A134B
- Q313 35K74M
- Q314 25C945P
- Q315 330
- Q316 100K
- Q317 100
- Q318 25C945P
- Q319 25C3399
- Q320 25C3402
- Q321 25C3402
- Q322 25C945P
- Q323 25C945P
- Q324 25D880Y
- Q325 25C945P
- Q326 25K192AGR
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- Q661 15K
- Q6







APC

RF UNIT

B.P.F

- B7 18~24MHz
- B6 14~18MHz
- B5 10~14MHz
- B4 7~10MHz
- B3 5~7MHz
- B2 3~5MHz
- B1 1.6~30MHz

DRIVE

P.A.

PA

ANT. SW.

CONNECTOR

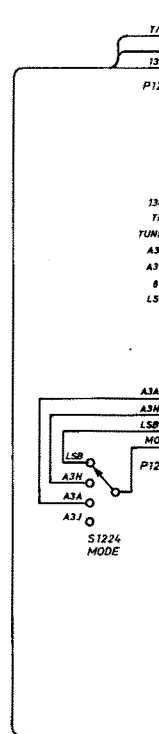
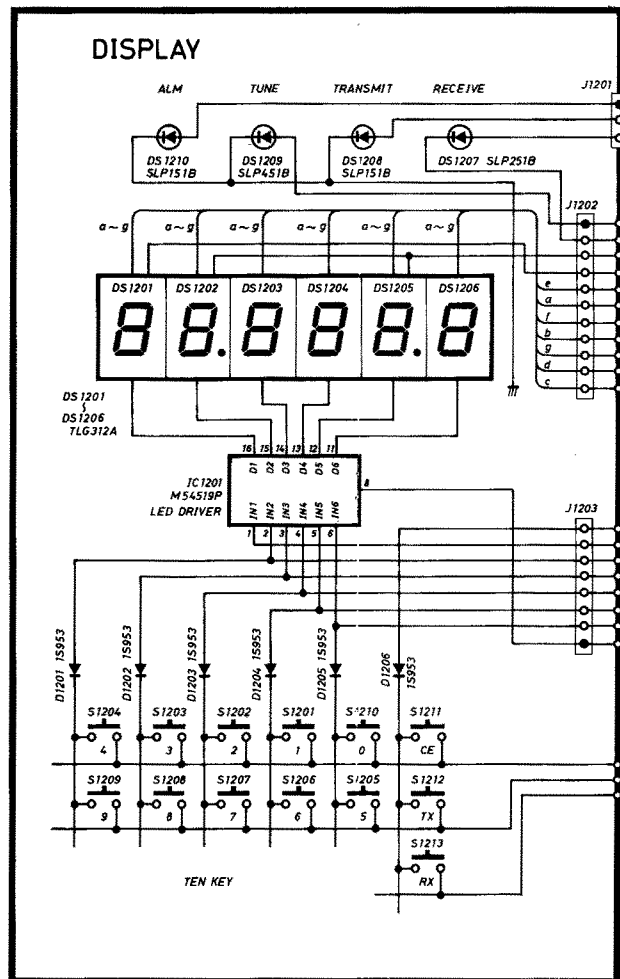
L813, 815 BT01RN1-A61  
L814, 816, 817 F50H050RN

KEY  
TUNE  
SP2  
EXT SP

KEY  
TUNE  
13.8  
E

RL  
ALC

J879









# PLL UNIT

