

**ICOM**

**SERVICE  
MANUAL**

VHF TRANSCEIVER

**IC-V210T**

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## INTRODUCTION

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This service manual describes the latest information for the **IC-V210T** VHF TRANSCEIVER at the time of publication.

To upgrade quality, all electrical and mechanical parts and internal circuits are subject to change without notice or obligation.

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## DANGER

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**NEVER** connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. This will ruin the transceiver.

**DO NOT** expose the transceiver to rain, snow or any liquids.

**DO NOT** reverse the polarities of the power supply when connecting the transceiver.

**DO NOT** apply an RF signal of more than 20 dBm (100 mW) to the antenna connector. This could damage the transceiver's front end.



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## ORDERING PARTS

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Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

### <SAMPLE ORDER>

1110002220 IC    μPB585G    IC-V210T MAIN UNIT    5 pieces  
8810003840 Screw    BiH M3×6 ZK SUS    IC-V210T Top cover    10 pieces

Addresses are provided on the inside back cover for your convenience.

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## REPAIR NOTE

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1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB~50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

## VERSIONS

VERSION NUMBER	DESTINATION	SYMBOL	FREQUENCY RANGE	OUTPUT POWER	CHANNEL SPACING	5-TONE IC
#01	General	GEN	136~160 MHz	25 W	12.5 kHz	SC-1084
#02	General	GEN-1	136~160 MHz	25 W	25 kHz	SC-1084
#03	General	GEN-2	156~174 MHz	25 W	12.5 kHz	SC-1084
#04	General	GEN-3	156~174 MHz	25 W	25 kHz	SC-1084
#05	General	GEN-4	136~144 MHz	10 W	12.5 kHz	SC-1084
#06	General	GEN-5	136~144 MHz	10 W	25 kHz	SC-1084
#07	General	GEN-6	146~174 MHz	10 W	12.5 kHz	SC-1084
#08	General	GEN-7	146~174 MHz	10 W	25 kHz	SC-1084
#09	United Kingdom	UK	146~174 MHz	10 W	12.5 kHz	SC-1093
#10	Spain	ESP	156~168 MHz	25 W	25 kHz	SC-1084
#11	Greek	GRE	148~160 MHz	25 W	12.5 kHz	SC-1084
#12	Greek	GRE-1	156~174 MHz	25 W	12.5 kHz	SC-1084
#13	Sweden	SWE	146~174 MHz	10 W	25 kHz	SC-1084
#14	Sweden	SWE-1	148~160 MHz	25 W	25 kHz	SC-1084
#15	Sweden	SWE-2	156~174 MHz	25 W	25 kHz	SC-1084
#16	Italy	ITA	146~174 MHz	10 W	12.5 kHz	SC-1084
#17	Italy	ITA-1	146~174 MHz	10 W	25 kHz	SC-1084
#18	Holland	HOL	146~174 MHz	10 W	20 kHz	SC-1084
#19	France	FRA	146~174 MHz	10 W	12.5 kHz	SC-1093
#20	France	FRA-1	156~168 MHz	25 W	25 kHz	SC-1093
#21	United Kingdom	UK-1	156~174 MHz	25 W	12.5 kHz	SC-1093

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# SECTION 1 SPECIFICATIONS

## GENERAL

- Frequency coverage : 136~174 MHz  
Ask your Icom Dealer about the permitted frequency range in your area.
- Type of emission : 16K0F3E (#02, #04, #06, #08, #10, #13, #14, #15, #17, #20)  
14K0F3E (#18)  
8K50F3E (#01, #03, #05, #07, #09, #11, #12, #16, #19, #21)
- Antenna impedance : 50  $\Omega$  unbalanced
- Usable temperature range :  $-25^{\circ}\text{C}\sim+55^{\circ}\text{C}$  ( $-13^{\circ}\text{F}\sim+131^{\circ}\text{F}$ )
- Frequency stability :  $\pm 1.5$  kHz ( $-25^{\circ}\text{C}\sim+55^{\circ}\text{C}$ )
- Power supply requirement : 13.8 V DC  $\pm 15\%$  (negative ground)
- Current drain (at 13.8 V DC) :
 

Transmit	10 W versions	4 A
	25 W versions	7 A
Receive	Squelched	700 mA
	Max. audio output	1.2 A
- Dimensions : 140 (W)  $\times$  50 (H)  $\times$  182 (D) mm  
5.5 (W)  $\times$  2.0 (H)  $\times$  7.2 (D) in  
(Projections not included)
- Weight : 1.5 kg
- 5-Tone system : CCIR, DAPL, DZVEI, EEA, EIA, and ZVEI

## TRANSMITTER

- Output power : 10 W (10 W versions)  
25 W (25 W versions)
- Modulation system : Variable reactance frequency modulation
- Max. frequency deviation :  $\pm 5$  kHz (#02, #04, #06, #08, #10, #13, #14, #15, #17, #20)  
 $\pm 4$  kHz (#18)  
 $\pm 2.5$  kHz (#01, #03, #05, #07, #09, #11, #12, #16, #19, #21)
- Spurious emissions :  $-76$  dB
- Harmonic emissions :  $-76$  dB
- Audio response :  $+1$  dB,  $-3$  dB of  $+6$  dB/octave from 300 Hz to 3000 Hz
- Microphone impedance : 600  $\Omega$

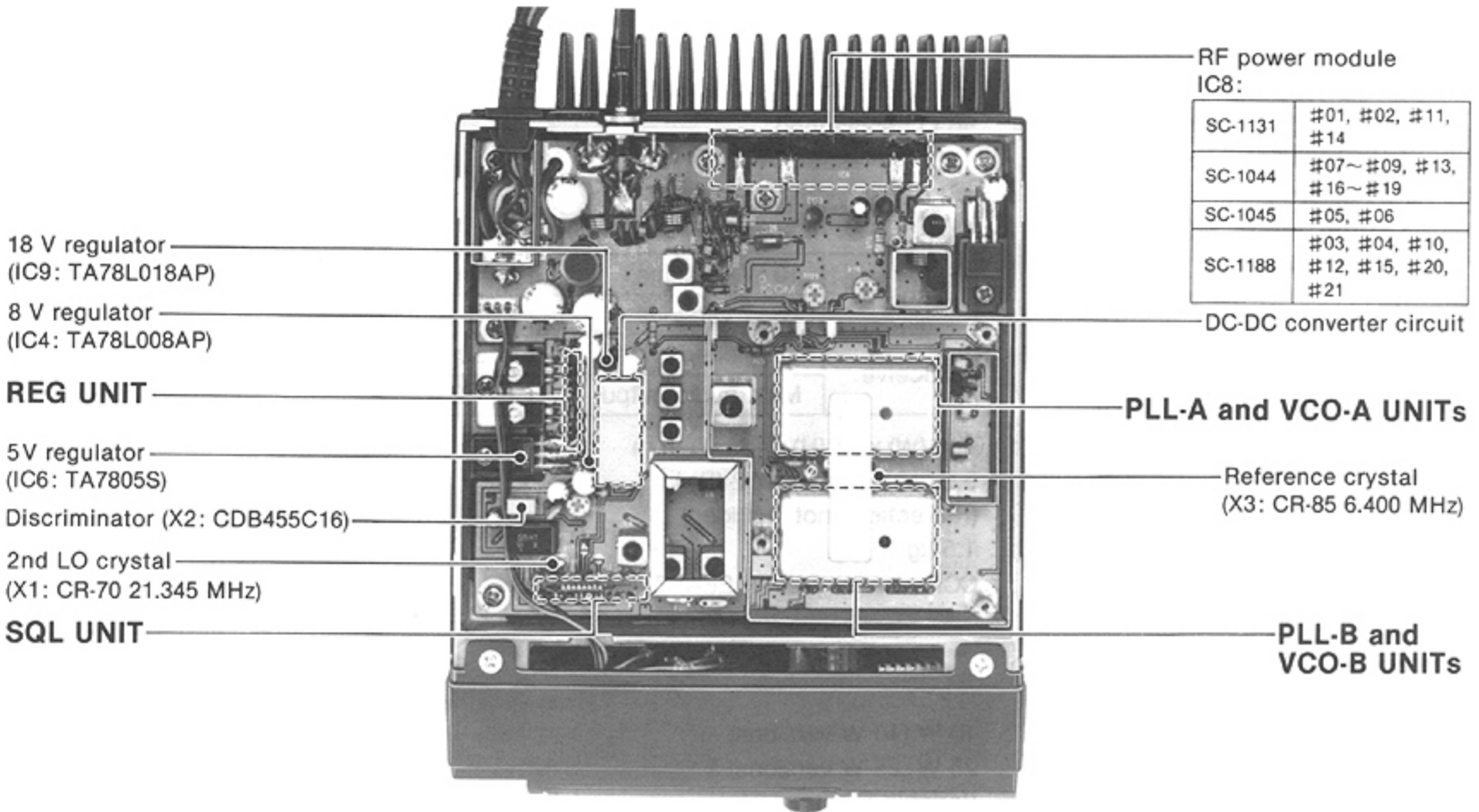
## RECEIVER

- Sensitivity : 0.35  $\mu\text{V}$  for 12 dB SINAD
- Intermediate frequency : 1st 21.8 MHz  
2nd 455 kHz
- Squelch sensitivity : 0.3  $\mu\text{V}$   
(Threshold level)
- Adjacent channel selectivity :  $-70$  dB
- Intermodulation rejection :  $-70$  dB
- Spurious response rejection :  $-70$  dB
- Audio response :  $+1$  dB,  $-3$  dB of  $-6$  dB/octave from 300 Hz to 3000 Hz
- Audio output impedance : 4  $\Omega$
- Audio output power : 3 W at 10 % distortion with a 4  $\Omega$  load

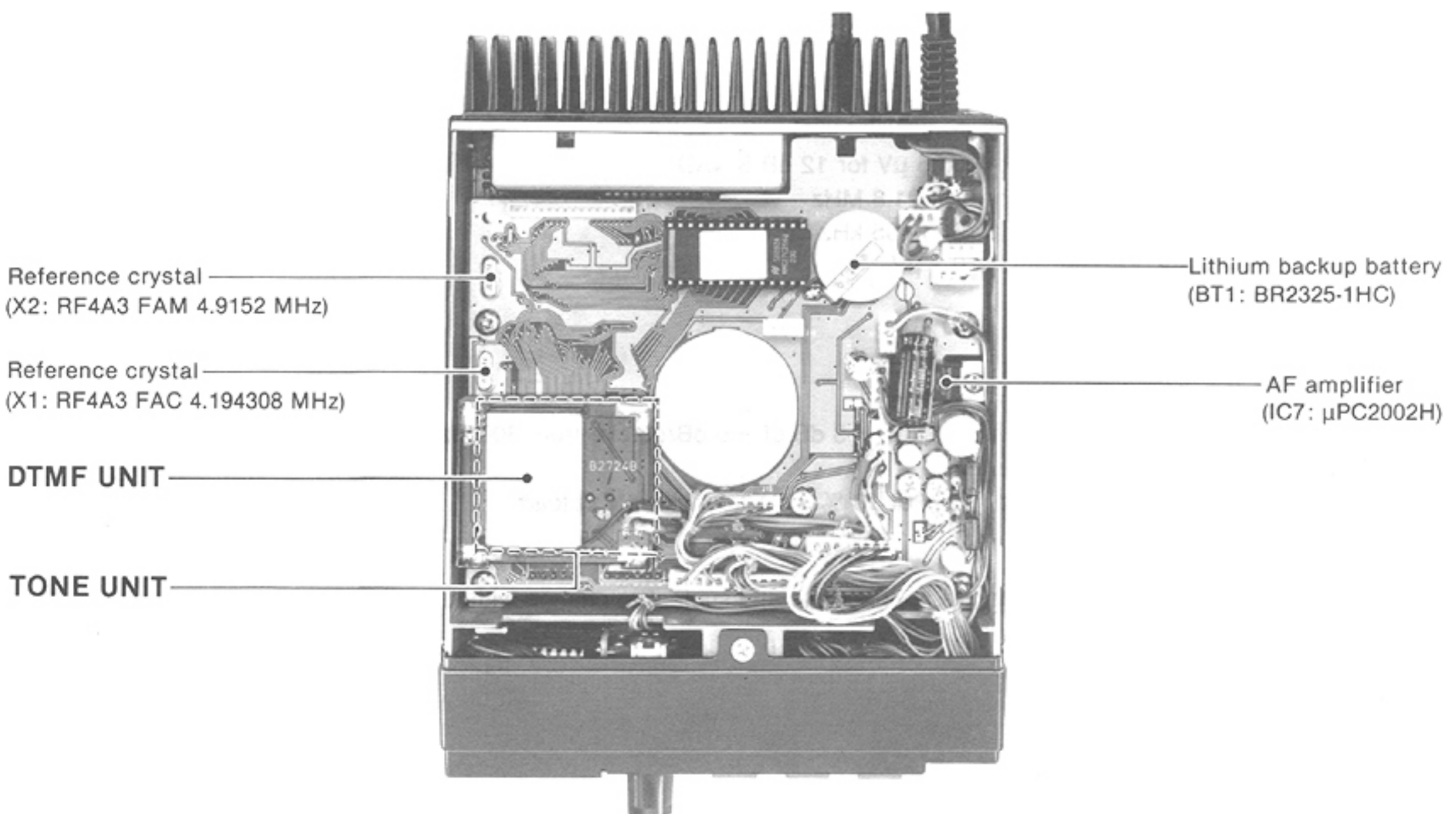
All stated specifications are approximate and subject to change without notice or obligation.

## SECTION 2 INSIDE VIEWS

### • MAIN UNIT



### • LOGIC UNIT



## SECTION 3 CIRCUIT DESCRIPTION

### 3-1 RECEIVER CIRCUITS

#### 3-1-1 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

The antenna switching circuit functions as a low-pass filter while receiving and as a resonator circuit while transmitting.

Received signals enter the MAIN UNIT from the antenna connector through a low-pass filter consisting of L27~L29, C103, C107~C113 and C208. They are then applied to an antenna switching circuit consisting of D28, D32, D33 and other components.

#### 3-1-2 RF CIRCUIT (MAIN UNIT)

The RF circuit amplifies signals within the range of frequency coverage and filters out out-of-band signals. Then, a 1st mixer circuit converts the received signal to a fixed frequency of the 1st IF signal using a PLL output frequency.

Signals from the antenna switching circuit pass through a 2-stage bandpass filter consisting of D1~D4, L1, L2, C2, C3 and C168 and are amplified at Q1. Signals then pass through a 3-stage bandpass filter consisting of D5~D10, L3~L5, C8, C9, C169 and C170. They are then applied to the 1st mixer circuit consisting of Q2, Q3, L6 and other components for conversion to a 21.8 MHz 1st IF signal. A local oscillator signal (output from the PLL-A unit) which is buffer amplified at Q8 passes through a 2-stage bandpass filter consisting of L21, L22 and C161~C163 and is applied to L6.

#### 3-1-3 IF CIRCUIT (MAIN UNIT)

The 1st IF circuit amplifies a signal which is converted in a 1st mixer circuit. Then, a 2nd mixer circuit converts a 1st IF signal to the 2nd IF signal. A double-conversion superheterodyne system improves the image rejection ratio and obtains stable receiver gain.

#### • RF, IF CIRCUIT

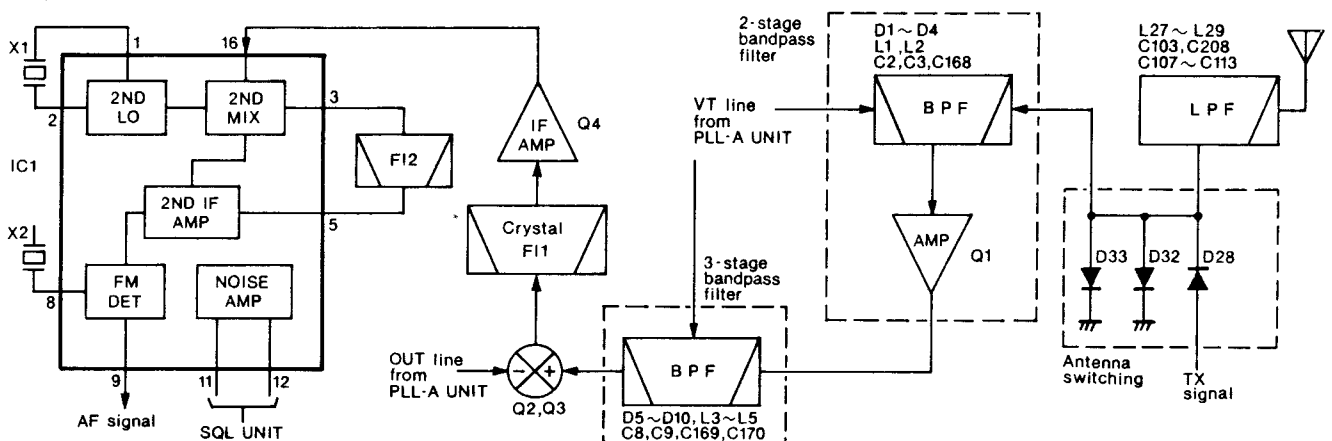


Fig. 1

The 1st IF signal from L7 passes through a pair of crystal filters, F11, to suppress out-of-band signals and unwanted heterodyned frequency signals. After passing through the filter, the 1st IF signal is amplified at IF amplifier Q4 and is applied to IC1 (pin 16) through L9.

IC1 contains the 2nd LO circuit, 2nd mixer circuit, limiter amplifier circuit, squelch trigger circuit and quadrature detector circuit. The 2nd LO circuit, including X1, generates a 21.345 MHz 2nd LO signal which is used at the 2nd mixer section of IC1.

The 1st IF signal from Q4 which is applied to IC1 (pin 16) is mixed with the 2nd LO signal for converting the 1st IF signal to a 455 kHz 2nd IF signal.

The 2nd IF signal output from pin 3 passes through a high-quality ceramic filter (F12) to suppress unwanted heterodyned frequency signals. The signal is amplified at the limiter amplifier section circuit (IC1, pin 5) and applied to the quadrature detector circuit (IC1, pin 8 and a ceramic resonator, X2) to demodulate the 2nd IF signal to AF signals.

#### 3-1-4 AF CIRCUIT (LOGIC UNIT)

The AF circuit de-emphasizes demodulated signals with  $-6$  dB/oct. and power amplifies the signals to drive a speaker. The AF circuit includes a mute circuit to mute the signals with a noise squelch and a tone squelch.

AF signals output from IC1 (pin 9) pass through a de-emphasis circuit (R182, C81) and are amplified at IC6a. Then, these signals are applied to the squelch switch (Q22, Q24) and CTCSS circuits. The de-emphasis circuit is an integrator circuit which has 6 dB/oct. frequency characteristics. The 2-stage squelch switch reduces voice leakage. IC6b is a high-pass filter to attenuate CTCSS tones and IC5 is a low-pass filter to protect CTCSS tones from voice malfunctions.

Signals output from Q22 pass through the [VOL] control and are then amplified at power amplifier IC7 to drive the speaker.

### 3-1-5 SQUELCH CIRCUIT (MAIN UNIT)

The squelch circuit cuts out AF signals when no RF signals are being received. By detecting noise components in the AF signals, the squelch circuit turns the AF power amplifier OFF.

Some signals from IC1 (pin 9) are applied to pin 10 (attached to the active filter of IC1) where noise components of 20 kHz or more are collected. The noise signals pass through the squelch level setting volume control (R110) and are then applied to IC1a on the SQL UNIT. The signal amplified at IC1a is converted to a digital signal at the comparator (IC1b) and is then applied to IC2.

IC2 is a newly designed squelch IC with a squelch detector and AF control circuit; thus, it can control squelch by itself. IC2 outputs a squelch open/close signal and AF mute ON/OFF signal to the CPU.

## 3-2 TRANSMITTER CIRCUITS

### 3-2-1 MICROPHONE AMPLIFIER CIRCUIT

The microphone amplifier circuit amplifies audio signals with +6 dB/octave pre-emphasis from the microphone to a level needed at the modulation circuit.

AF signals from the microphone are amplified at IC1a and pass through the pre-emphasis circuit which has +6 dB/octave frequency characteristics in the 300~3000 Hz frequency range. Then, the signals pass through the splatter filter (IC2) which eliminates signal components greater than 3 kHz. The signals are then applied to the VCO-B circuit (Q1) on the VCO-B UNIT as FM modulation signals.

### 3-2-2 DRIVER AMPLIFIER CIRCUIT (MAIN UNIT)

The driver amplifier circuit amplifies the VCO oscillating signal to a level needed at the power amplifier.

The oscillated signal from the VCO-B circuit is buffer amplified at Q2 on the VCO-B UNIT and is pass through the PLL-B UNIT and then applied to the prescaler (IC2). The signal from IC2 passes through the 3-stage low pass filter consisting of L15~L17 and C178~C182. This is then amplified to 300 mW for drive power by the driver amplifiers (Q9~Q12).

### 3-2-3 POWER AMPLIFIER CIRCUIT (MAIN UNIT)

The power amplifier circuit amplifies the driver signal to an output power level.

An amplified signal at Q12 is power amplified at IC8 to obtain more than 25 W (or 10 W depending on versions) of RF output power.

The output power from IC8 passes through an antenna switching circuit and a low-pass filter before being applied to the antenna connector.

### 3-2-4 APC CIRCUIT (MAIN UNIT)

The APC circuit stabilizes RF output power even when changing the supplied voltage.

The output power from IC8 is detected by D30 and D31 and is converted to DC voltage. The voltage is then applied to inverting amplifier IC7 to control the input current of Q12 and IC8 (pin 2) using Q14 and Q15.

When low output power is selected, the signal from the CPU is applied to Q19 to control the input current of IC8 (pin 2) by controlling the offset value of IC7 (pin 3) with R109.

#### • DRIVER AMPLIFIER CIRCUIT

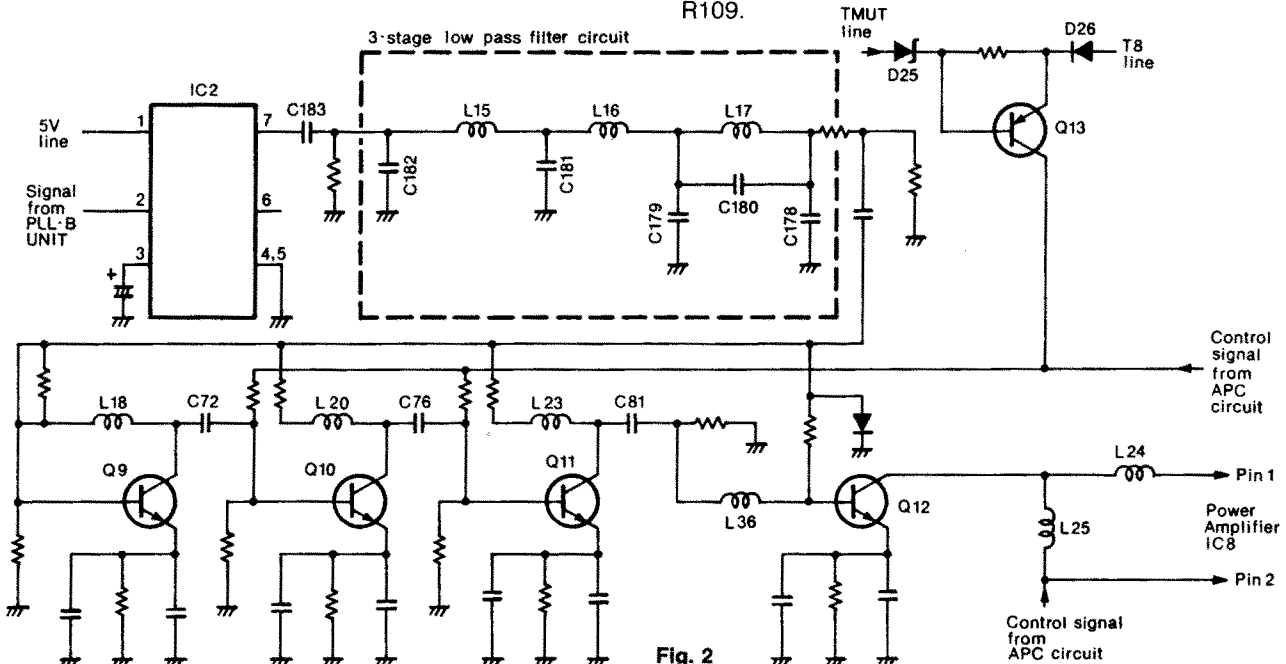


Fig. 2

### 3-3 PLL CIRCUITS

#### 3-3-1 GENERAL DESCRIPTION

This transceiver is equipped with 2 PLLs (PLL-A for the receiver and PLL-B for the transmitter) to facilitate high speed changing from receive to transmit.

$$RX Nt = \frac{(RX \text{ frequency}) - (21.8 \text{ MHz})}{(RX \text{ reference frequency})}$$

$$TX Nt = \frac{(TX \text{ frequency}) \times 4}{(TX \text{ reference frequency})}$$

RX Nt: Receive N-data

TX Nt: Transmit N-data

RX reference frequency = 5 kHz or 6.25 kHz

TX reference frequency = 20 kHz or 25 kHz

#### 3-3-2 REFERENCE OSCILLATOR CIRCUIT (MAIN UNIT)

The reference frequency (6.4 MHz) is produced by Q17 and X3. The frequency is applied to both the PLL-A and PLL-B circuits.

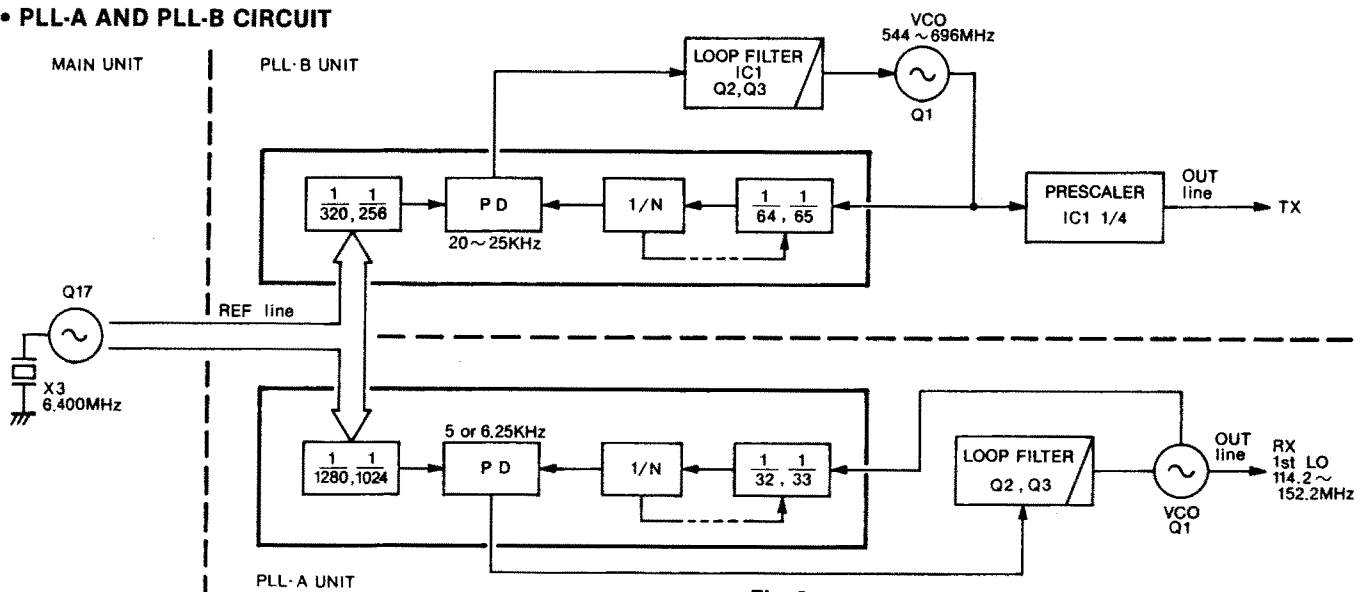
#### 3-3-3 RECEIVER VCO CIRCUIT (VCO-A UNIT)

The VCO-A circuit forms a Colpitts oscillator circuit consisting of Q1, D1, D2, L3 and C2~C5 and oscillates from 114.2 MHz to 152.2 MHz. Oscillation is controlled by D1 and D2 with voltage from the PLL-A UNIT. The oscillated signals are amplified at Q2 and are then divided by R11 and R12 on the PLL-A UNIT. One of the divided signals is applied to IC1 (pin 8).

#### 3-3-4 RECEIVER PLL CIRCUIT (PLL-A UNIT)

The prescaler in IC1 detects a phase of the divided VCO frequency and a reference frequency. The ratio of the dividing frequency is determined with N-data from the CPU. The reference frequency after dividing (5 kHz or 6.25 kHz) is set by the displayed frequency.

#### • PLL-A AND PLL-B CIRCUIT



The phase detected signal output from IC1 (pins 15 and 16) is applied to the charge pump consisting of Q4 and Q5 and is then applied to an active loop filter consisting of Q2 and Q3. The signal is converted to DC voltage at the charge pump and loop filter to lock the PLL. When transmitting, T8 is applied to D1 on the PLL-A UNIT to cut off the PLL-A output.

When the PLL is unlocked, the UNL signal is sent from IC1 (pin 7) to Q20 on the MAIN UNIT.

#### 3-3-5 TRANSMITTER VCO CIRCUIT (VCO-B UNIT)

The VCO-B circuit forms a Colpitts oscillator circuit consisting of Q1, D1~D4, C2, C5, C6, C18 and oscillates from 544 MHz to 696 MHz. Oscillation is controlled by D1~D4 with voltage from the PLL-B UNIT. Modulation is directly performed on VCO-B using the varicap (D5). The oscillated signals are amplified at Q2 and are then divided by R11 and R12. One of the divided signals is applied to IC1 (pin 8) on the PLL-B UNIT.

#### 3-3-6 TRANSMITTER PLL CIRCUIT (PLL-B UNIT)

The prescaler in IC1 detects a phase of the divided VCO frequency and a reference frequency. The ratio of the dividing frequency is determined by N-data from the CPU. The reference frequency after dividing (20 kHz or 25 kHz) is set by the displayed frequency.

The phase detected signal output from IC1 (pins 15 and 16) is applied to the charge pump consisting of Q5 and Q6 and is then applied to an active loop filter consisting of Q2 and Q3. The signal is converted to DC voltage at the charge pump and loop filter to lock the PLL. R8 is applied to D1 on the PLL-B UNIT to cut off the PLL-B output.

IC2 is used for swift lockup time and shortens R9 when the PLL is unlocked. When the PLL is unlocked, the UNL signal is sent from IC1 (pin 7) to Q20 on the MAIN UNIT.

Fig. 3

### 3-3-7 T/R CONTROL (REG UNIT)

High-speed voltage changing on the T8 and R8 lines is made possible by the T/R control circuit consisting of Q1~Q3, D1 and D2.

When changing from transmit to receive, the TXV terminal becomes "LOW", and the remaining voltage is rapidly led from the T8 line by D24 on the MAIN UNIT.

When changing from receive to transmit, the RXV terminal becomes "LOW", and the remaining voltage is rapidly led from the R8 line by D23 on the MAIN UNIT.

### 3-3-8 DC-DC CONVERTER (MAIN UNIT)

IC5 is a DC-DC converter which converts 5 V DC to 22 V DC and IC9 is a regulator which converts 22 V DC to a stable 18 V DC. This 18 V DC obtains lock voltages for the PLL circuit and a voltage range of 1~18 V DC for bandpass tuning operation of the RF circuit.

### 3-3-9 VOLTAGE LINES (MAIN UNIT)

HV	External power from the DC power connector.
13.8	13.8 V DC from the [VOL] switch.
5V	Common 5 V converted from the 13.8 V line at IC6.
8V	Common 8 V converted from the 13.8 V line at IC4.
T8	Transmit 8 V converted from the 13.8 V line at Q16.
R8	Receive 8 V converted from the 13.8 V line at Q5.

## 3-4 LOGIC CIRCUIT

The LOGIC circuit section consists of an 8-bit CPU, EPROM, 64K-byte CMOS RAM and CTCSS encoder/decoder. A 5-TONE encoder/decoder unit is equipped on the LOGIC UNIT.

### 3-4-1 KEY MATRIX FOR CPU INPUT

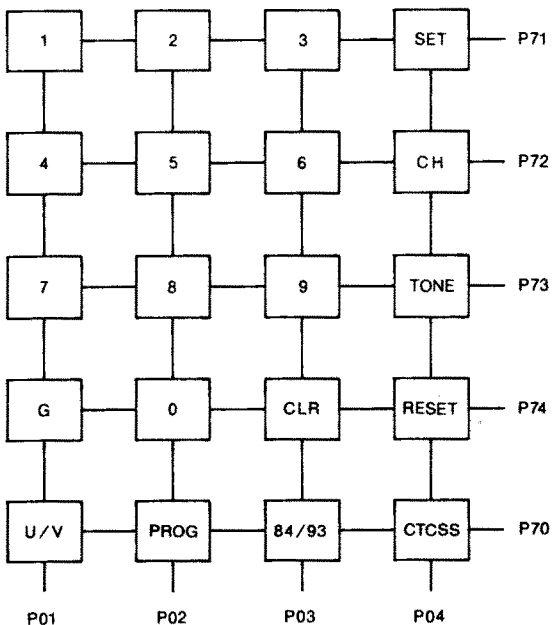


Fig. 4

## 3-4-2 PORT DESCRIPTIONS (LOGIC UNIT)

### • IC11 (CPU)

PORT NAME	PIN NUMBER	DESCRIPTION									
CSTB [P62]	3	Outputs strobe signals for CTCSS.									
TSTB [P61]	4	Outputs strobe signals for TX PLL.									
RSTB [P60]	5	Outputs strobe signals for RX PLL.									
INT1 [P21]	29	Inputs 5-tone data when the port becomes "HIGH."									
HANG [P22]	30	Detects the microphone hanger condition. "L": When the microphone is on the hanger. "H": When the microphone is not on the hanger.									
SCAN [P24]	32	Input port for the [SCAN] switch. "L": When the scan starts or stops. "H": When the scan function is deactivated. Input port for the cloning switch when the cloning mode is selected.									
SQLS [P25]	33	Input port for the squelch signal.									
UNLK [P26]	34	Input port for the PLL unlock signal.									
BUSY [P27]	35	Input port for the "BUSY" signal from the LCD driver.									
SEND [P30]	36	Input port for T/R switching. "L": When transmitting. "H": When receiving. Input port for the receive signal when cloning mode is selected.									
MMUT [P31]	37	Output port for microphone muting. "L": When this function is deactivated. "H": When this function is activated. Outputs the cloning data when cloning mode is selected.									
CK [P32]	38	Outputs a clock signal for PLL, CTCSS and LCD.									
SO [P33]	39	Outputs a data signal for PLL, CTCSS and LCD.									
CALL [P75]	44	Input port for the [CALL] switch. "L": When transmitting. "H": When receiving. Input port for the function switch when SET mode is selected.									
S0~S3 [P34~P37]	50~53	I/O ports for 5-tone data.									
DIM	54	Outputs an LCD brightness signal. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Pin 54 J2, Pin 1</td> <td>"L"</td> <td>"H"</td> </tr> <tr> <td>"L"</td> <td>Bright</td> <td>Dark</td> </tr> <tr> <td>"H"</td> <td>Dark</td> <td>Bright</td> </tr> </table>	Pin 54 J2, Pin 1	"L"	"H"	"L"	Bright	Dark	"H"	Dark	Bright
Pin 54 J2, Pin 1	"L"	"H"									
"L"	Bright	Dark									
"H"	Dark	Bright									
C/D [P05]	59	Outputs a data/command designation signal for the LCD driver.									
CS1, CS2 [P06, P07]	60, 61	Output LCD chip selecting signals.									

• IC11 (CPU)

PORT NAME	PIN NUMBER	DESCRIPTION
DOUT [P67]	62	Input port for the CTCSS tone decoded signal. "L": When this function is deactivated. "H": When decoding a CTCSS tone.
BEEP [P66]	63	Outputs a beep tone signal.
WR [P65]	64	Outputs a RAM writing signal.

• IC12 (I/O expander)

PORT NAME	PIN NUMBER	DESCRIPTION
H/L	4	Output port for output power condition. "L": When high power is selected. "H": When low power is selected.
EXC	5	The port becomes "HIGH" when the received 5-tone code matches the programmed 5-tone code.
TMUT	6	Output port for the transmit muting signal which mutes RF power. "L": When this function is deactivated. "H": When this function is activated.
RMUT	7	Output port for the receive muting signal which mutes audio power. "L": When this function is deactivated. "H": When this function is activated.
TO1, TO2	12, 11	Outputs a selecting signal for a 5-tone system.
5STB	13	Outputs strobe signals for a 5-tone IC.
T/R	14	Outputs the 5-tone control signal. "L": When encoding. "H": When decoding.

### 3-5 5-TONE CIRCUITS

#### 3-5-1 5-TONE IC

IC1\* is gate-array IC consisting of a 5-tone encoder/decoder, data selector for controlling the CPU, a serial-parallel converter and a divider and inverter for resetting. The following I/O ports are equipped.

\*IC1

SC-1093 for the U.K. and France versions  
SC-1084 for all other versions.

PORT NAME	PIN NUMBER	DESCRIPTION
IO0~IO3	61~64	I/O ports for the 5-tone encoder/decoder data.
CON1	60	Output/Input control port for the IO0~IO3.
RX	59	Control port which activates either the encoder or decoder.
TO1, TO2	44, 45	Ports which change the 5-tone system. (see below)
ST1	57	Port for a 5-tone encoder strobe signal.
EC, EC0~EC2	40~43	Output ports for the encoder/decoder.

PORT NAME	PIN NUMBER	DESCRIPTION
DS	21	Input port for the decoder signal.
ST3	8	Port for a decoder strobe signal.
IN1, IN2	9, 11	Input ports for an inverter.
OUT1, OUT2	10, 12	Output ports for an inverter.
KO3	22	Output port for 560 kHz.
OSC1, OSC2	34, 35	Ports for a crystal oscillator.

The 5-tone system depends on the transceiver version and signals from the CPU, V1 (TO1) and V2 (TO2) as follows:

V1	V2	SC-1084	SC-1093
L	L	EIA	DZVEI
H	L	CCIR	CCIR
L	H	EEA	EEA
H	H	ZVEI	DAPL

IC2 is an audio filter which can distinguish regular signals from those with noise interference.

#### 3-5-2 5-TONE TRANSMISSION

The data from IC1 is converted from digital to analog at R1~R6 to produce a 5-tone signal. The 5-tone signal is amplified at IC3 and then applied to VCO-B.

#### 3-5-3 5-TONE FREQUENCY TABLE

5-TONE CODE	EIA	CCIR	EEA	ZVEI	DZVEI	DAPL
0	600	1981	1981	2400	2200	1981
1	741	1124	1124	1060	970	1124
2	882	1197	1197	1160	1060	1197
3	1023	1275	1275	1270	1160	1275
4	1164	1358	1358	1400	1270	1358
5	1305	1446	1446	1530	1400	1446
6	1446	1540	1540	1670	1530	1540
7	1587	1640	1640	1830	1670	1640
8	1728	1747	1747	2000	1830	1747
9	1869	1860	1860	2200	2000	1860
A=Group	2151	2400	1055	2800	885	2400
B	2433	930	930	810	810	2548
C	2010	2247	2247	970	2600	2247
D	2292	991	991	886	2800	770
E=Repeat	459	2110	2110	2600	2400	2110
F	No tone	No tone	No tone	No tone	No tone	No tone

# SECTION 4 MECHANICAL PARTS AND DISASSEMBLY

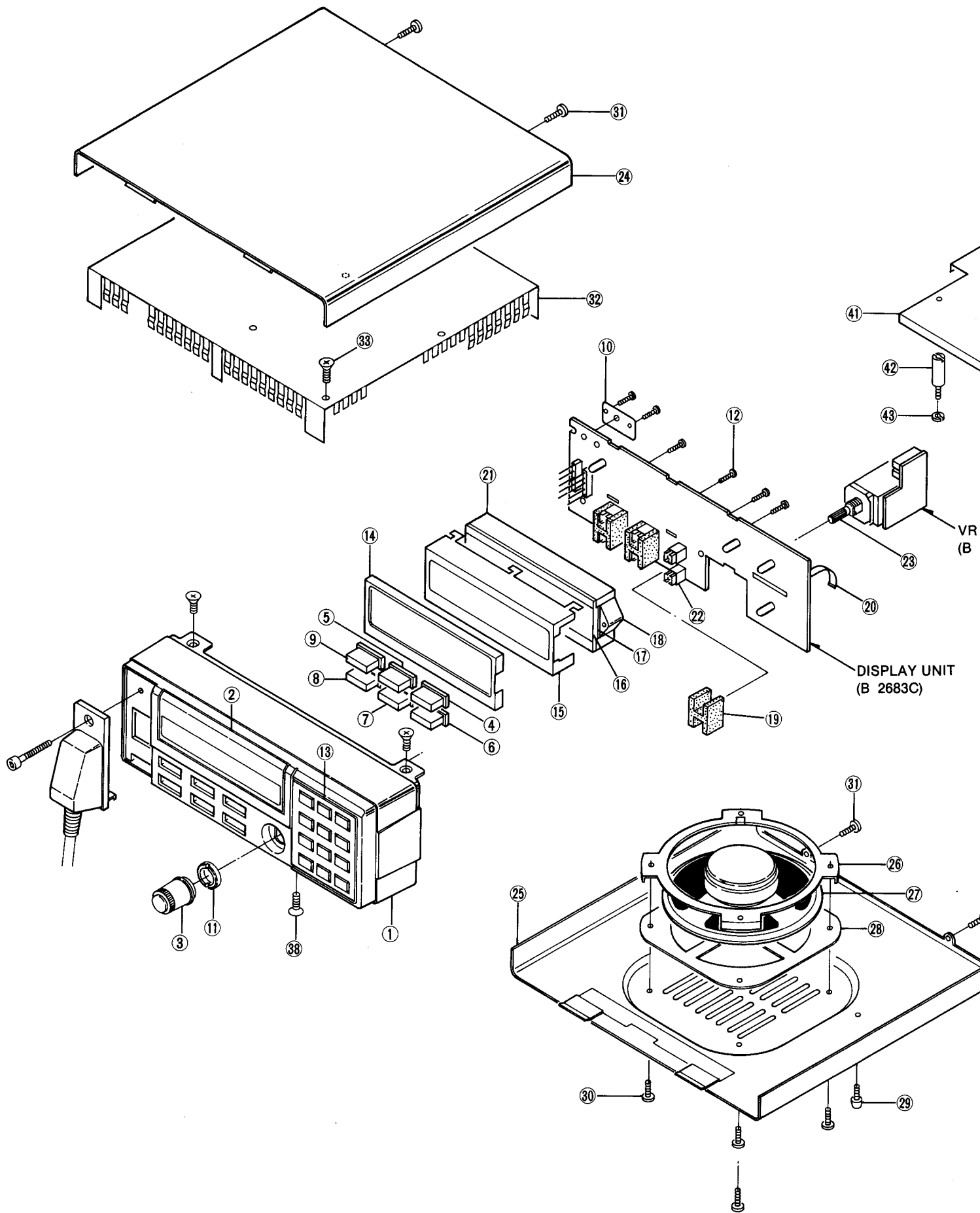
## 4-1 FRONT PANEL AND CHASSIS PARTS

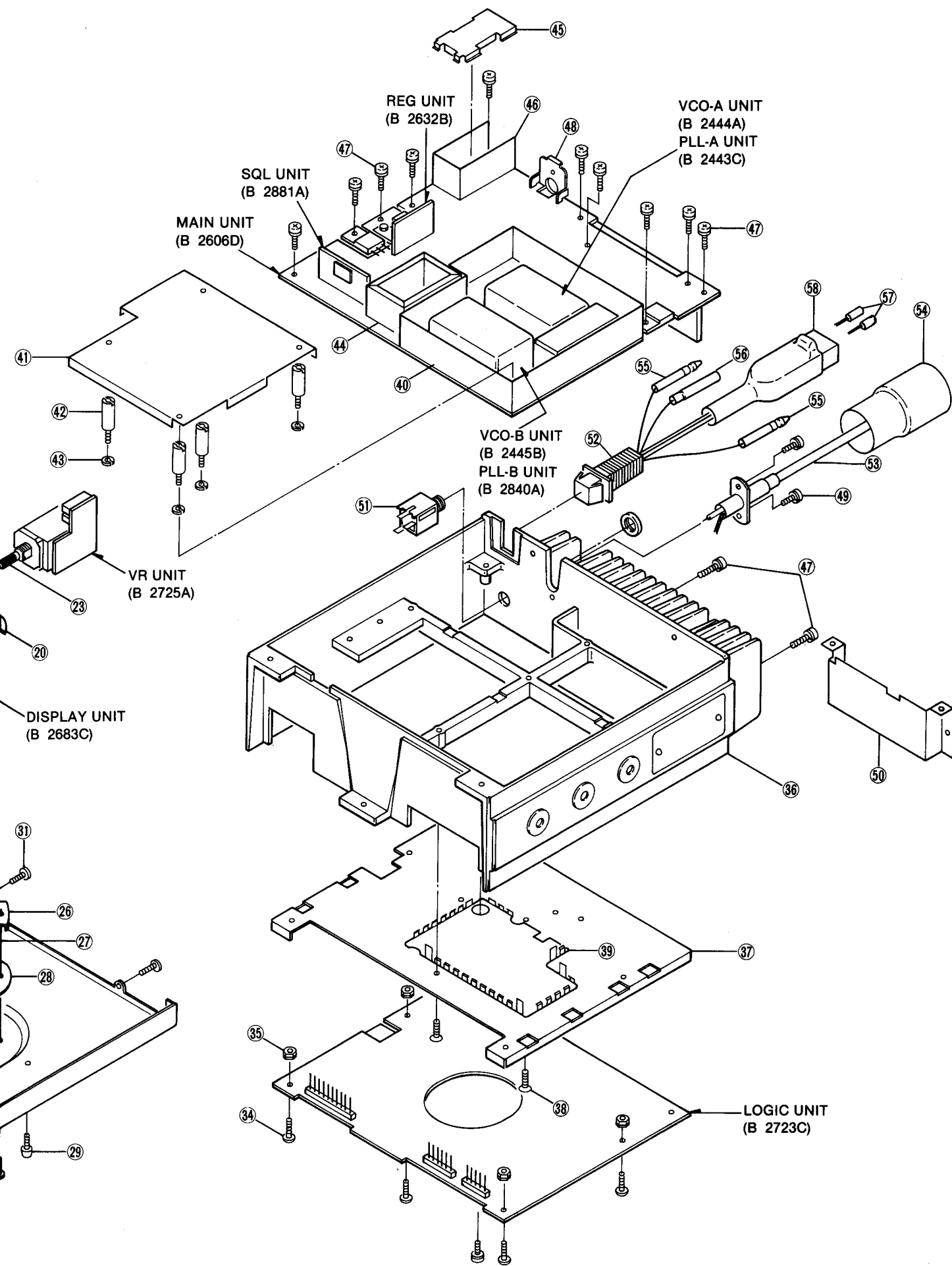
LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8210005910	331 Front panel (C)	1
②	8310020450	331 Window panel (A)	1
③	8610003370	Knob N115 [VOL]	1
④	8610006720	Button K50 (P)-2 [TONE]	1
⑤	8610006710	Button K50 (Q)-2 [SCAN]	1
⑥	8610006730	Button K50 (R)-2 [CH]	1
⑦	8610006740	Button K50 (S)-2 [SET]	1
⑧	8610006750	Button K50 (T)-2 [RESET]	1
⑨	8610006760	Button K50 (U)-2 [CALL]	1
⑩	8930010860	331 Microphone base plate	1
⑪	8830000050	VR nut (B)	1
⑫	8810001000	Screw PH B0 M2×6	6
⑬	8010010130	Keyboard (C)	1
⑭	8930010430	331 LCD cover	1
⑮	8930018950	863 LCD holder	1
⑯	5030000580	LCD LD-BU5031E-1	1
⑰	8930018980	863 LCD filter	1
⑱	8930018960	863 Reflector	1
⑲	8930010440	331 SW seat	3
⑳	8930017190	Grounding spring (F)	1
㉑	8930018970	LCD contact SRCN-863-W	2
㉒	2260000861	Switch SKHQFB015B [CALL], [RESET], etc.	6
㉓	7210001280	Variable resistor EVK-QVB 315 A14 [VOL]	1
㉔	8110004200	622 Top cover (A)	1
㉕	8110004210	Bottom cover (F)	1
㉖	8930006390	Speaker plate	1
㉗	2510000200	Speaker 66F09N-7 4 Ω	1
㉘	8930004950	57 Speaker spacer (incl.net)	1
㉙	8810000560	Polyester screw PH M4×6	1
㉚	8810003840	Screw BiH M3×8 ZK SUS	4
㉛	8810002960	Screw BiH M3×6 ZK SUS	4
㉜	8110003811	855 Shield case cover-1	1
㉝	8810002120	Screw FH M2.6×6	4
㉞	8810003750	Icom screw C9	4
㉟	8930006080	Screw spacer-C	4
㊱	8010010460	452 Chassis (C)-1	1
㊲	8010009610	Chassis spacer (A)-1	1
㊳	8810002170	Screw FH M3×6	5
㊴	8510006770	331 Antenna shield plate	1
㊵	8510006340	MAIN shield case	1
㊶	8510006352	MAIN shield case cover-2	1
㊷	8930018280	Standoff (A)	4
㊸	8850000420	Spring washer M3 NI	4
㊹	8510004470	331 VCO case	1
㊺	8510006730	DC shield case cover	1
㊻	8510006740	DC shield case	1
㊼	8810003160	Setscrew A M3×6	12
㊽	8930017490	Cable stopper	1
㊾	8810003140	Setscrew A M2.6×8	2
㊿	8930006470	Module plate	1
①	6450000420	Connector HSJ0780-01-010 [EXT SP]	1
②	8900002780	DC cable OPC-274 (incl. ⑤⑨, ⑥⑨, ⑦⑨, ⑧⑨)	1
③	8900001050	Antenna cable OPC-103	1
④	6950000040	M-type cap (black)	1
⑤	6510009110	Pin SGM-51-4	2
⑥	6510008830	Pin SGF-41-4	1
⑦	6510005150	Pin LLM61T-2.0	2
⑧	6510013250	Connector LR-02F-1V	1

**Screw abbreviations**

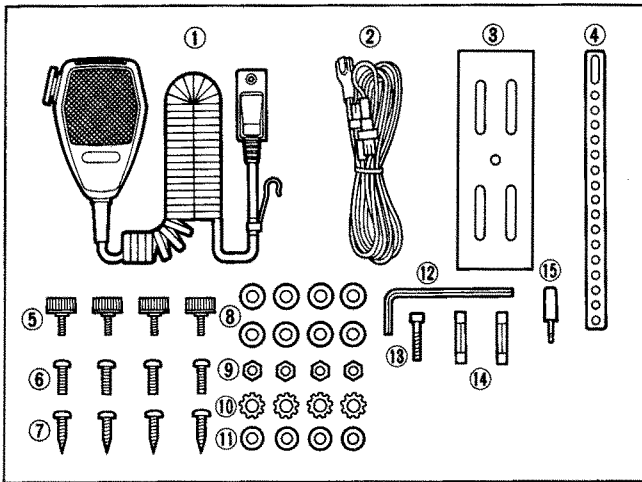
BiH: Binding head    B0: Self-tapping    FH: Flat head    NI: Nickel  
 PH: Pan head    ZK: Black







## 4-2 ACCESSORIES



LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	Optional product	Microphone EM-63	1
②	Optional product	DC power cable OPC-044A	1
③	8010004060	Mounting bracket	1
④	8010004050	Mounting support plate (B) ZK	1
⑤	8820000461	Mounting bolt (B)-1 M4 × 8 ZK	4
⑥	8810000700	Screw PH M5 × 20 SUS	4
⑦	8810000950	Screw PH A M5 × 16	4
⑧	8850000150	Flat washer M5 NI BS	8
⑨	8830000120	Nut M5	4
⑩	8850000590	Star washer M5	4
⑪	8850000140	Flat washer M4 NI BS	4
⑫	8860000540	Allen key wrench 3M/M	1
⑬	8820000510	Allen head screw M3 × 18 ZK	1
⑭	5210000070	Fuse FGB 10A	2
⑮	5610000020	AP313 3.5φ CS plug	1

**Screw abbreviations**      BS: Brass    NI: Nickel  
 PH: Pan head      ZK: Black

# SECTION 5 PARTS LIST

## [TONE UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140000640	IC	SC1084 (#01 #02 #03 #04 #05 #06 #07 #08 #10 #11 #12 #13 #14 #15 #16 #17 #18)
	1140000840	IC	SC1093 (#09 #19 #20 #21)
IC2	1140000620	IC	FX102LG
IC3	1110002210	IC	TA75358CF (TP1)
Q1	1590000480	Transistor	RN2402 (TE85R)
Q2	1590000420	Transistor	RN1404 (TE85R)
Q3	1590000420	Transistor	RN1404 (TE85R)
X1	6050003450	Crystal	RF-4A3 FAG NKD (4.480000M)
L2	6200000070	Coil	LQN 2A R15K
R1	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R2	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R3	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R4	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R5	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R6	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R7	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R8	7030003630	Resistor	ERJ3GEYJ 393 V (39 kΩ)
R9	7030003610	Resistor	ERJ3GEYJ 273 V (27 kΩ)
R10	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R11	7030003610	Resistor	ERJ3GEYJ 273 V (27 kΩ)
R12	7030003700	Resistor	ERJ3GEYJ 154 V (150 kΩ)
R13	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R14	7030003630	Resistor	ERJ3GEYJ 393 V (39 kΩ)
R15	7030003630	Resistor	ERJ3GEYJ 393 V (39 kΩ)
R16	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R18	7030003490	Resistor	ERJ3GEYJ 272 V (2.7 kΩ)
R19	7030003490	Resistor	ERJ3GEYJ 272 V (2.7 kΩ)
R21	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R22	7030003690	Resistor	ERJ3GEYJ 124 V (120 kΩ)
R23	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R24	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R25	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R26	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R27	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R28	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R29	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R30	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R31	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R32	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R33	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R34	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R35	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R36	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R37	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
C1	4030006680	Ceramic	C1608 SL 1H 300J-T-A
C2	4030006610	Ceramic	C1608 SL 1H 100D-T-A
C3	4030008630	Ceramic	C1608 JF 1C 104Z-T-A
C5	4030008630	Ceramic	C1608 JF 1C 104Z-T-A
C6	4550002890	Tantalum	TESVA 1A 225M1-8L
C7	4030006870	Ceramic	C1608 JB 1H 222K-T-A
C8	4550002890	Tantalum	TESVA 1A 225M1-8L
C9	4550000270	Tantalum	TESVA 1E 474M1-8L
C10	4030006900	Ceramic	C1608 JB 1E 103K-T-A
C11	4030006860	Ceramic	C1608 JB 1H 102K-T-A

## [TONE UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C12	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C13	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C14	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
C15	4030006880	Ceramic	C1608 JB 1H 472K-T-A
C16	4030006900	Ceramic	C1608 JB 1E 103K-T-A
C18	4030006760	Ceramic	C1608 SL 1H 121J-T-A
C19	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C20	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C21	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C22	4030008630	Ceramic	C1608 JF 1C 104Z-T-A
C23	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C24	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C25	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C26	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C27	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C28	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C29	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C30	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C31	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C32	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C33	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C34	4030006880	Ceramic	C1608 JB 1H 472K-T-A
C35	4030006710	Ceramic	C1608 SL 1H 470J-T-A
EP1	0910027363	P.C. Board	B 2724C (TONE)

## [VR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7210001280	Variable Resistor	EVK-QVB 315 A14 (10KA) [VOL]
EP1	0910027161	P.C. Board	B 2725A (VR)
EP2	6910000630	Bead core	FSOH070RN

## [DTMF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130004230	IC	LC7366M
IC2	1130000830	IC	μPD4094BG-T1
Q1	1530001950	Transistor	2SC2712-GR (TE85R)

[DTMF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1750000070	Diode	1SS226 (TE85R)
X1	6050006020	Crystal	CR-288
R1	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R2	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R3	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R4	7030003590	Resistor	ERJ3GEYJ 183 V (18 kΩ)
R5	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R6	7030003500	Resistor	ERJ3GEYJ 332 V (3.3 kΩ)
R8	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
C1	4550002890	Tantalum	TESVA 1A 225M1-8L
C2	4550000460	Tantalum	TESVA 1C 105M1-8L
C3	4550000460	Tantalum	TESVA 1C 105M1-8L
C5	4030005110	Ceramic	C2012 JB 1E 473K-T-A
C6	4030008630	Ceramic	C1608 JF 1C 104Z-T-A
C8	4030006630	Ceramic	C1608 SL 1H 150J-T-A
C10	4030008630	Ceramic	C1608 JF 1C 104Z-T-A
EP1	0910029791	P.C. Board	B 3025A (DTMF)

[DISPLAY UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R15	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
C1	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C2	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C3	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C4	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C6	4030008500	Ceramic	ECWV1E103JS9
C10	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C12	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C13	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C14	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C15	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C16	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C17	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C18	4030004720	Ceramic	C2012 JB 1H 102K-T-A
DS1	5030000580	LCD	LD-BU5031E-1 (E-5168-1)
DS2	5080000130	LED	HRS-7219A-G40
DS3	5080000130	LED	HRS-7219A-G40
DS4	5080000130	LED	HRS-7219A-G40
DS5	5080000130	LED	HRS-7219A-G40
S1	2260000861	Switch	SKHQFB015B [RESET]
S2	2260000861	Switch	SKHQFB015B [CALL]
S3	2260000861	Switch	SKHQFB015B [TONE]
S4	2260000861	Switch	SKHQFB015B [CH]
S5	2260000861	Switch	SKHQFB015B [SCAN]
S6	2260000861	Switch	SKHQFB015B [SET]
EP1	0910026663	P.C. Board	B 2683C (DISPLAY)
EP2	8930018970	LCD contact strip	SRCN-863-W

[DISPLAY UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130004930	IC	μPD7225GB-3B7
IC2	1130004930	IC	μPD7225GB-3B7
Q1	1530000160	Transistor	2SC2712-Y (TE85RTEM)
D1	1750000050	Diode	1SS193 (TE85R)
D2	1750000050	Diode	1SS193 (TE85R)
D3	1750000050	Diode	1SS193 (TE85R)
D4	1750000050	Diode	1SS193 (TE85R)
D5	1730002150	Zener	02CZ6.8-X (TE85R)
D6	1730002150	Zener	02CZ6.8-X (TE85R)
D7	1730002150	Zener	02CZ6.8-X (TE85R)
D8	1730002150	Zener	02CZ6.8-X (TE85R)
D9	1730002150	Zener	02CZ6.8-X (TE85R)
D10	1730002150	Zener	02CZ6.8-X (TE85R)
D11	1730002150	Zener	02CZ6.8-X (TE85R)
R1	7030000450	Resistor	MCR10EZHZ 3.9 kΩ (392)
R2	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R3	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R4	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R5	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R6	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R7	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R8	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R9	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R10	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R11	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R12	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R13	7030000450	Resistor	MCR10EZHZ 3.9 kΩ (392)
R14	7510000370	Thermistor	DTN-T2031152LS (T)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110000960	IC	NJM4558M (T1)
IC2	1110000960	IC	NJM4558M (T1)
IC3	1130003830	IC	TC7S04F (TE85R)
IC4	1130001830	IC	MN6520
IC5	1110002210	IC	TA75358CF (TP1)
IC6	1110002210	IC	TA75358CF (TP1)
IC7	1110000210	IC	μPC2002H
IC8	1130004950	IC	SC-1133 (NMC27C256BQ200)
IC9	1130004900	IC	MC74HC37F
IC10	1130004910	IC	TC5564AFL-15 (TP1)
IC11	1140001480	IC	μPD78213GC-AB8
IC12	1130000830	IC	μPD4094BG-T1
IC13	1130000830	IC	μPD4094BG-T1
IC14	1130005230	IC	TC74HCU04AF
IC15	1110001550	IC	S-8054ALB-LM-T1
IC16	1130003710	IC	TC4S71F (TE85R)
Q1	1590000420	Transistor	RN1404 (TE85R)
Q2	1510000110	Transistor	2SA1162-Y (TE85R)
Q3	1510000110	Transistor	2SA1162-Y (TE85R)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q4	1590000420	Transistor	RN1404 (TE85R)
Q5	1590000460	Transistor	RN1402 (TE85R)
Q6	1590000480	Transistor	RN2402 (TE85R)
Q7	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q8	1510000110	Transistor	2SA1162-Y (TE85R)
Q9	1590000420	Transistor	RN1404 (TE85R)
Q10	1590000460	Transistor	RN1402 (TE85R)
Q11	1590000460	Transistor	RN1402 (TE85R)
Q12	1510000370	Transistor	2SA1359-Y
Q13	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q14	1590000460	Transistor	RN1402 (TE85R)
Q15	1590000420	Transistor	RN1404 (TE85R)
Q16	1530001950	Transistor	2SC2712-GR (TE85R)
Q17	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q18	1590000480	Transistor	RN2402 (TE85R)
Q19	1590000420	Transistor	RN1404 (TE85R)
Q20	1540000300	Transistor	2SD1286 K
Q22	1590000380	FET	2SJ106-Y (TE85R)
Q23	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q24	1590000380	FET	2SJ106-Y (TE85R)
Q25	1510000370	Transistor	2SA1359-Y
Q26	1590000410	Transistor	RN2404 (TE85R)
Q27	1590000420	Transistor	RN1404 (TE85R)
Q28	1590000460	Transistor	RN1402 (TE85R)
D1	1750000050	Diode	1SS193 (TE85R)
D2	1750000050	Diode	1SS193 (TE85R)
D3	1750000050	Diode	1SS193 (TE85R)
D6	1750000060	Diode	1SS196 (TE85R)
D7	1750000040	Diode	1SS190 (TE85R)
D8	1750000010	Diode	1SS181 (TE85R)
D10	1750000020	Diode	1SS184 (TE85R)
D11	1730000070	Zener	RD3.9E B2
D12	1750000020	Diode	1SS184 (TE85R)
D14	1750000010	Diode	1SS181 (TE85R)
D16	1750000050	Diode	1SS193 (TE85R)
D17	1750000050	Diode	1SS193 (TE85R)
D18	1750000050	Diode	1SS193 (TE85R) (#01 #02 #03 #04 #05 #06 #07 #08 #10 #11 #12 #13 #14 #15 #16 #17 #18)
	1750000020	Diode	1SS184 (TE85R) (#09 #19 #20 #21)
D21	1750000050	Diode	1SS193 (TE85R)
D22	1750000040	Diode	1SS190 (TE85R)
X1	6050003110	Crystal	RF-4A3 FAC NKD (4.194304M)
X2	6050007450	Crystal	RF-4A3 FAM NKD (4.9152M)
L1	6200000970	Coil	NL 322522T-100K
L2	6200000970	Coil	NL 322522T-100K
L3	6180000960	Coil	LAL 03NA 102K
R1	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R2	7310003200	Trimmer	EVN-2ACA00 B14 (103)
R3	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R4	7310000810	Trimmer	RH0651CS5J10A (474)
R5	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R6	7030000490	Resistor	MCR10EZHZ 8.2 kΩ (822)
R7	7030000700	Resistor	MCR10EZHZ 470 kΩ (474)
R8	7310000740	Trimmer	RH0651CS3J2KA (472)
R9	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R10	7030000650	Resistor	MCR10EZHZ 180 kΩ (184)
R11	7030000630	Resistor	MCR10EZHZ 120 kΩ (124)
R12	7030000570	Resistor	MCR10EZHZ 39 kΩ (393)
R13	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R14	7310000810	Trimmer	RH0651CS5J10A (474)
R15	7030000530	Resistor	MCR10EZHZ 18 kΩ (183)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R16	7310000740	Trimmer	RH0651CS3J2KA (472)
R17	7030000570	Resistor	MCR10EZHZ 39 kΩ (393)
R18	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R19	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R20	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R21	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R22	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R23	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R24	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R25	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R26	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332)
R30	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R31	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R32	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R33	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R34	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R35	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R36	7030000480	Resistor	MCR10EZHZ 6.8 kΩ (682)
R37	7030000430	Resistor	MCR10EZHZ 2.7 kΩ (272)
R38	7030000480	Resistor	MCR10EZHZ 6.8 kΩ (682)
R39	7070000350	Resistor	CRH100X R-02J 200 Ω (201)
R40	7070000350	Resistor	CRH100X R-02J 200 Ω (201)
R41	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R42	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R43	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R44	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R45	7030000530	Resistor	MCR10EZHZ 18 kΩ (183)
R46	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R47	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
R48	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R49	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R50	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R51	7030000660	Resistor	MCR10EZHZ 220 kΩ (224)
R52	7030000660	Resistor	MCR10EZHZ 220 kΩ (224)
R53	7030000660	Resistor	MCR10EZHZ 220 kΩ (224)
R54	7030000670	Resistor	MCR10EZHZ 270 kΩ (274)
R55	7030000660	Resistor	MCR10EZHZ 220 kΩ (224)
R56	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R57	7030000660	Resistor	MCR10EZHZ 220 kΩ (224)
R58	7030000650	Resistor	MCR10EZHZ 180 kΩ (184)
R59	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R60	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R61	7030000490	Resistor	MCR10EZHZ 8.2 kΩ (822)
R62	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R63	7030000610	Resistor	MCR10EZHZ 82 kΩ (823)
R64	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R65	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R66	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R67	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R68	7030000740	Resistor	MCR10EZHZ 1 MΩ (105)
R69	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R70	7030000490	Resistor	MCR10EZHZ 8.2 kΩ (822)
R71	7030000710	Resistor	MCR10EZHZ 560 kΩ (564)
R72	7030000550	Resistor	MCR10EZHZ 27 kΩ (273)
R73	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R74	7030000490	Resistor	MCR10EZHZ 8.2 kΩ (822)
R75	7030000570	Resistor	MCR10EZHZ 39 kΩ (393)
R76	7310003240	Trimmer	EVN-2ACA00 B23 (202)
R77	7030000020	Resistor	MCR10EZHZ 1 Ω (010)
R78	7030000330	Resistor	MCR10EZHZ 390 Ω (391)
R79	7030000060	Resistor	MCR10EZHZ 2.2 Ω (2R2)
R80	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R81	7310003210	Trimmer	EVN-2ACA00 B54 (503)
R82	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R83	7030000740	Resistor	MCR10EZHZ 1 MΩ (105)
R84	7030000740	Resistor	MCR10EZHZ 1 MΩ (105)
R85	7030000740	Resistor	MCR10EZHZ 1 MΩ (105)
R86	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R87	7030000730	Resistor	MCR10EZHZ 820 kΩ (824)
R88	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R89	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R90	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R91	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R92	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R93	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
R94	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R95	7030000640	Resistor MCR10EZHZ 150 kΩ (154)
R96	7030000510	Resistor MCR10EZHZ 12 kΩ (123)
R97	7030000720	Resistor MCR10EZHZ 680 kΩ (684)
R98	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R99	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R100	7030000660	Resistor MCR10EZHZ 220 kΩ (224)
R101	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R102	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R103	7030000560	Resistor MCR10EZHZ 33 kΩ (333)
R104	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R105	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R106	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R107	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R108	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R109	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R110	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R111	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R112	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R113	7030000420	Resistor MCR10EZHZ 2.2 kΩ (222)
R127	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R128	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R129	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R130	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R131	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R132	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R133	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R134	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R135	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R137	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R138	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R139	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R140	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R141	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R142	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R143	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R144	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R145	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R146	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R147	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R148	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R149	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R150	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R151	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R152	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R153	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R154	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R155	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R156	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R157	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R158	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R159	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R160	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R161	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R162	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R163	7030000580	Resistor MCR10EZHZ 47 kΩ (473)
R164	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R165	7030000500	Resistor MCR10EZHZ 10 kΩ (103)
R166	7030000500	Resistor MCR10EZHZ 10 kΩ (103)
R167	7030000420	Resistor MCR10EZHZ 2.2 kΩ (222)
R168	7030000500	Resistor MCR10EZHZ 10 kΩ (103)
R169	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R170	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R171	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R172	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R173	7030000580	Resistor MCR10EZHZ 47 kΩ (473)
R174	7030000580	Resistor MCR10EZHZ 47 kΩ (473)
R175	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R176	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R177	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R178	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R179	7030000590	Resistor MCR10EZHZ 56 kΩ (563)
R180	7030000700	Resistor MCR10EZHZ 470 kΩ (474)
R181	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R182	7030000540	Resistor MCR10EZHZ 22 kΩ (223)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
R183	7030000500	Resistor MCR10EZHZ 10 kΩ (103)
	7030000460	Resistor MCR10EZHZ 4.7 kΩ (472)
		(#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
		(#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
R184	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
R186	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R187	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R188	7030000380	Resistor MCR10EZHZ 1 kΩ (102)
R189	7030000620	Resistor MCR10EZHZ 100 kΩ (104)
C2	4550000280	Tantalum TESVB2 1A 475M-8L
C3	4550000450	Tantalum TESVC 1C 106M-12L
C4	4550000530	Tantalum TESVA 1V 104M1-8L
C5	4550000280	Tantalum TESVB2 1A 475M-8L
C6	4550000280	Tantalum TESVB2 1A 475M-8L
C7	4030004730	Ceramic C2012 JB 1H 222K-T-A
C8	4030008760	Ceramic C2012 X7R 1C 104K-T-A
C9	4030004720	Ceramic C2012 JB 1H 102K-T-A
C10	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C11	4030004750	Ceramic C2012 JB 1H 103K-T-A
C12	4030004720	Ceramic C2012 JB 1H 102K-T-A
C13	4030001030	Ceramic GRM40 CH 151J 50P T
		(#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
	4030001010	Ceramic GRM40 CH 101J 50P T
		(#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
C14	4550000460	Tantalum TESVA 1C 105M1-8L
C17	4030004470	Ceramic C2012 SL 1H 100D-T-A
C19	4030004720	Ceramic C2012 JB 1H 102K-T-A
C20	4030004570	Ceramic C2012 SL 1H 470J-T-A
C21	4030004720	Ceramic C2012 JB 1H 102K-T-A
C22	4030004570	Ceramic C2012 SL 1H 470J-T-A
C23	4550002720	Tantalum TESVD2 0J 476M-12 L
C24	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C25	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C26	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C27	4030004490	Ceramic C2012 SL 1H 150J-T-A
C28	4030004500	Ceramic C2012 SL 1H 180J-T-A
C29	4030004750	Ceramic C2012 JB 1H 103K-T-A
C30	4030005090	Ceramic C2012 JB 1H 223K-T-A
C31	4030004710	Ceramic C2012 JB 1H 471K-T-A
C32	4550000280	Tantalum TESVB2 1A 475M-8L
C33	4030003320	Ceramic GRM40 F 333Z 50PT
C34	4030004670	Ceramic C2012 SL 1H 271J-T-A
C35	4550000270	Tantalum TESVA 1E 474M1-8L
C36	4550000550	Tantalum TESVA 1V 224M1-8L
C37	4550000270	Tantalum TESVA 1E 474M1-8L
C38	4550000460	Tantalum TESVA 1C 105M1-8L
C39	4030004750	Ceramic C2012 JB 1H 103K-T-A
C40	4030004720	Ceramic C2012 JB 1H 102K-T-A
C41	4030004750	Ceramic C2012 JB 1H 103K-T-A
C42	4030004750	Ceramic C2012 JB 1H 103K-T-A
C43	4550000550	Tantalum TESVA 1V 224M1-8L
C44	4550002890	Tantalum TESVA 1A 225M1-8L
C45	4550000270	Tantalum TESVA 1E 474M1-8L
C46	4030006450	Ceramic C2012 JF 1H 103Z-T-A
C47	4510002380	Electrolytic 16 SS 470 μF (10X12.5)
C48	4510004550	Electrolytic 16 YXB 1000 μF
C49	4030008760	Ceramic C2012 X7R 1C 104K-T-A
C50	4550000870	Tantalum TESVD 1A 336M-12L
C51	4030006450	Ceramic C2012 JF 1H 103Z-T-A
C52	4550000280	Tantalum TESVB2 1A 475M-8L
C53	4030004720	Ceramic C2012 JB 1H 102K-T-A
C54	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C55	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C56	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C57	4030004540	Ceramic C2012 SL 1H 300J-T-A
C58	4030004450	Ceramic C2012 SL 1H 080D-T-A
C59	4030004760	Ceramic C2012 JF 1E 104Z-T-A

**[LOGIC UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
C60	4030004660	Ceramic	C2012 SL 1H 221J-T-A
C61	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C62	4550000270	Tantalum	TESVA 1E 474M1-8L
C63	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C64	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C65	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C66	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C67	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C69	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C70	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C71	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C72	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C73	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C74	4030008760	Ceramic	C2012 X7R 1C 104K-T-A
C75	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C76	4550000850	Tantalum	TESVC 1A 156M-12L
C77	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C78	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C79	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C80	4550000530	Tantalum	TESVA 1V 104M1-8L
C81	4550000530	Tantalum	TESVA 1V 104M1-8L
C82	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C83	4510002740	Electrolytic	10 SS 220 µF
S1	2220000360	Switch	ESD-1111212
BT1	3020000040	Lithium Battery	BR2325-1HC
EP1	0910027353	P.C. Board	B 2723C (LOGIC)

**[MAIN UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110002200	IC	MC3372MR
IC2	1110002220	IC	µPB585G
IC4	1180000030	IC	TA78L008AP
IC5	1110000900	IC	TL499ACP
IC6	1110002020	IC	TA7805S
IC7	1110002210	IC	TA75358CF (TP1)
IC8	1150000360	IC	SC1044 (#07 #08 #09 #13 #16 #17 #18 #19)
	1150000370	IC	SC1045 (#05 #06)
	1150000930	IC	SC1131 (#01 #02 #11 #14)
	1150001040	IC	SC1188 (#03 #04 #10 #12 #15 #20 #21)
IC9	1180000660	IC	TA78L018AP
Q1	1560000430	FET	2SK302-GR (TE85R)
Q2	1530000370	Transistor	2SC3356-T2B
Q3	1530000370	Transistor	2SC3356-T2B
Q4	1560000430	FET	2SK302-GR (TE85R)
Q5	1530002590	Transistor	2SC3422-Y
Q6	1530002050	Transistor	2SC3661-TA
Q7	1530002050	Transistor	2SC3661-TA
Q8	1530002020	Transistor	2SC3770-3-TA
Q9	1530002030	Transistor	2SC3772-3-TA
Q10	1530002030	Transistor	2SC3772-3-TA
Q11	1530000530	Transistor	2SC2407
Q12	1530000810	Transistor	2SC2053

**[MAIN UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
Q13	1510000110	Transistor	2SA1162-Y (TE85R)
Q14	1520000220	Transistor	2SB1019-Y
Q15	1530001950	Transistor	2SC2712-GR (TE85R)
Q16	1530002590	Transistor	2SC3422-Y
Q17	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q19	1590000420	Transistor	RN1404 (TE85R)
Q20	1510000110	Transistor	2SA1162-Y (TE85R)
D1	1720000260	Varicap	1SV214 (TPH2)
D2	1720000260	Varicap	1SV214 (TPH2)
D3	1720000260	Varicap	1SV214 (TPH2)
D4	1720000260	Varicap	1SV214 (TPH2)
D5	1720000260	Varicap	1SV214 (TPH2)
D6	1720000260	Varicap	1SV214 (TPH2)
D7	1720000260	Varicap	1SV214 (TPH2)
D8	1720000260	Varicap	1SV214 (TPH2)
D9	1720000260	Varicap	1SV214 (TPH2)
D10	1720000260	Varicap	1SV214 (TPH2)
D11	1790000490	Diode	HSM88AS-TR
D12	1750000020	Diode	1SS184 (TE85R)
D13	1730000730	Zener	RD6.2M-T2B2
D18	1720000310	Varicap	1SV128 (TE85R)
D19	1750000050	Diode	1SS193 (TE85R)
D20	1750000010	Diode	1SS181 (TE85R)
D21	1750000210	Diode	1SV237 (TE85R)
D22	1750000050	Diode	1SS193 (TE85R)
D23	1750000050	Diode	1SS193 (TE85R)
D24	1750000050	Diode	1SS193 (TE85R)
D25	1730000010	Zener	RD4.7M-T2B3
D26	1750000050	Diode	1SS193 (TE85R)
D27	1750000160	Diode	DA114 T107
D28	1710000290	Diode	MI308
D30	1790000490	Diode	HSM88AS-TR
D31	1790000490	Diode	HSM88AS-TR
D32	1710000290	Diode	MI308
D33	1710000290	Diode	MI308
D34	1710000040	Diode	1S953
D35	1710000010	Diode	15CD11
D36	1720000220	Varicap	1SV166-T2B
D41	1730000520	Zener	RD20E B2
X1	6050002000	Crystal	CR-70
X2	6070000090	Discriminator	CDB455C16
X3	6050002150	Crystal	CR-85
F11	2010000200	Filter	21M15B3 (FL-42) (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
	2010001020	Filter	21M7B2 (FL-125) (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
F12	2020000120	Ceramic	CFW455E (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
	2020000150	Ceramic	CFW455HT (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
L1	6150003020	Coil	LS-315
L2	6150003020	Coil	LS-315
L3	6150002800	Coil	LS-296
L4	6150002780	Coil	LS-295
L5	6150002780	Coil	LS-295
L6	6140000930	Coil	LR-116
L7	6150002950	Coil	LS-304
L8	6150002730	Coil	LS-298
L9	6150002720	Coil	LS-297
L10	6200000140	Coil	LQH 3N 1R0M
L11	6200000140	Coil	LQH 3N 1R0M



[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
L12	6180000960	Coil	LAL 03NA 102K
L13	6110001540	Coil	LA-234
	6110001550	Coil	(#05 #06) LA-235 (#01 #02 #03 #04 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21)
L14	6200000020	Coil	LQH 3N 101K-S
L15	6200000770	Coil	LQN 2A 68NM
L16	6200000770	Coil	LQN 2A 68NM
L17	6200000110	Coil	LQN 2A 33NM
L18	6110001570	Coil	LA-237
L19	6110001650	Coil	LA-248
L20	6110001560	Coil	LA-236
L21	6200000760	Coil	LQN 2A 56NM
L22	6200000110	Coil	LQN 2A 33NM
L23	6110001550	Coil	LA-235
L24	6110001680	Coil	LA-254
L25	6110001680	Coil	LA-254
L26	6170000180	Coil	LW-19
L27	6110001590	Coil	LA-242 (#05 #06 #07 #08 #09 #13 #16 #17 #18 #19)
	6110001670	Coil	LA-253 (#01 #02 #03 #04 #10 #11 #12 #14 #15 #20 #21)
L28	6110001600	Coil	LA-243 (#01 #02 #03 #04 #10 #11 #12 #14 #15 #20 #21)
	6110001670	Coil	LA-253 (#05 #06 #07 #08 #09 #13 #16 #17 #18 #19)
L29	6110001670	Coil	LA-253
L30	6170000150	Coil	LW-16
L31	6180001440	Coil	RFC S4 101K
L34	6180001120	Coil	FL 5H 101K
L36	6110001610	Coil	LA-244
L37	6110001540	Coil	LA-234
L38	6110001540	Coil	LA-234
R1	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
R2	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
R3	7030000170	Resistor	MCR10EZHZ 18 Ω (180)
R4	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332)
R5	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R6	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
R7	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
R8	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
R9	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R10	7030000530	Resistor	MCR10EZHZ 18 kΩ (183)
R11	7030000320	Resistor	MCR10EZHZ 330 Ω (331)
R12	7030000320	Resistor	MCR10EZHZ 330 Ω (331)
R13	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R14	7030000210	Resistor	MCR10EZHZ 39 Ω (390)
R15	7030000210	Resistor	MCR10EZHZ 39 Ω (390)
R16	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R17	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R18	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R19	7030000700	Resistor	MCR10EZHZ 470 kΩ (474)
R20	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R21	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R22	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R23	7030000220	Resistor	MCR10EZHZ 47 Ω (470)
R24	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R26	7030000400	Resistor	MCR10EZHZ 1.5 kΩ (152) (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222) (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R27	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R28	7030000410	Resistor	MCR10EZHZ 1.8 kΩ (182) (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332) (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
R29	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R31	7510000530	Thermistor	ERT-D2FHL103S
R32	7030000590	Resistor	MCR10EZHZ 56 kΩ (563) (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
	7030000660	Resistor	MCR10EZHZ 220 kΩ (224) (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
R34	7030000530	Resistor	MCR10EZHZ 18 kΩ (183)
R35	7030000610	Resistor	MCR10EZHZ 82 kΩ (823)
R36	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R40	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R41	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R42	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R43	7030000270	Resistor	MCR10EZHZ 120 Ω (121)
R44	7030000270	Resistor	MCR10EZHZ 120 Ω (121)
R45	7010001000	Resistor	R25XJ 56 Ω
R46	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R47	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332)
R48	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R49	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R50	7030000170	Resistor	MCR10EZHZ 18 Ω (180)
R51	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R52	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R54	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R55	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332)
R56	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R57	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R58	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R59	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R60	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R61	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R62	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R63	7030000520	Resistor	MCR10EZHZ 15 kΩ (153)
R64	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R65	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R66	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R67	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R68	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R69	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R70	7010004660	Resistor	R50XJ 15 Ω
R72	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R73	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R74	7010004090	Resistor	R20J 150 Ω (#03 #04 #10 #12 #15 #20 #21) R20J 470 Ω (#2 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19)
	7010004150	Resistor	MCR10EZHZ 33 kΩ (333)
R75	7030000560	Resistor	MCR10EZHZ 100 kΩ (104)
R76	7030000620	Resistor	MCR10EZHZ 15 kΩ (153)
R77	7030000520	Resistor	MCR10EZHZ 33 kΩ (333)
R78	7030000560	Resistor	MCR10EZHZ 33 kΩ (333)
R79	7310000790	Timmer	RH0651C15J1UA (104)
R80	7030000560	Resistor	MCR10EZHZ 33 kΩ (333)
R81	7030000560	Resistor	MCR10EZHZ 33 kΩ (333)
R82	7510000090	Thermistor	ERT-D2FGL202S
R83	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R84	7510000090	Thermistor	ERT-D2FGL202S
R85	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R86	7030000520	Resistor	MCR10EZHZ 15 kΩ (153)
R87	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R88	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R89	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R90	7030000260	Resistor	MCR10EZHZ 100 Ω (101)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R92	7030000350	Resistor	MCR10EZHJ 560 Ω (561)
R93	7030000620	Resistor	MCR10EZHJ 100 kΩ (104)
R94	7030000470	Resistor	MCR10EZHJ 5.6 kΩ (562)
R95	7010004260	Resistor	R20J 3.9 kΩ
R96	7010004260	Resistor	R20J 3.9 kΩ
R97	7030000300	Resistor	MCR10EZHJ 220 Ω (221) (#01 #02 #03 #04 #10 #11 #12 #14 #15 #20 #21)
	7030000350	Resistor	MCR10EZHJ 560 Ω (561) (#05 #06 #07 #08 #09 #13 #16 #17 #18 #19)
R98	7030000300	Resistor	MCR10EZHJ 220 Ω (221) (#01 #02 #03 #04 #10 #11 #12 #14 #15 #20 #21)
	7030000350	Resistor	MCR10EZHJ 560 Ω (561) (#05 #06 #07 #08 #09 #13 #16 #17 #18 #19)
R99	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R100	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R101	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R102	7030000280	Resistor	MCR10EZHJ 150 Ω (151)
R103	7030000620	Resistor	MCR10EZHJ 100 kΩ (104)
R104	7010000050	Resistor	ELR25J 2.2 Ω
R105	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R106	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R107	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)
R108	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)
R109	7310000760	Trimmer	RH0651CJ4J01A (223)
R110	7310000740	Trimmer	RH0651CS3J2KA (472)
R111	7030000470	Resistor	MCR10EZHJ 5.6 kΩ (562)
R112	7030000470	Resistor	MCR10EZHJ 5.6 kΩ (562)
R113	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R114	7030000390	Resistor	MCR10EZHJ 1.2 kΩ (122)
R115	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R116	7030000350	Resistor	MCR10EZHJ 560 Ω (561) (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
	7030000390	Resistor	MCR10EZHJ 1.2 kΩ (122) (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
R117	7030000500	Resistor	MCR10EZHJ 10 kΩ (103)
R118	7030000300	Resistor	MCR10EZHJ 220 Ω (221)
R119	7030000340	Resistor	MCR10EZHJ 470 Ω (471) (#05 #06 #07 #08 #09 #13 #16 #17 #18 #19)
R120	7030000310	Resistor	MCR10EZHJ 270 Ω (271)
R121	7030000170	Resistor	MCR10EZHJ 18 Ω (180)
R122	7030000310	Resistor	MCR10EZHJ 270 Ω (271)
R123	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)
R124	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R125	7030000620	Resistor	MCR10EZHJ 100 kΩ (104)
R126	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R127	7010000990	Resistor	R25XJ 47 Ω
R128	7030000540	Resistor	MCR10EZHJ 22 kΩ (223)
R134	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R135	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R137	7030000300	Resistor	MCR10EZHJ 220 Ω (221)
C1	4030004450	Ceramic	C2012 SL 1H 080D-T-A (#03 #04 #10 #12 #15 #20 #21)
	4030004480	Ceramic	C2012 SL 1H 120J-T-A (#07 #08 #09 #13 #16 #17 #18 #19)
	4030004720	Ceramic	C2012 JB 1H 102K-T-A (#01 #02 #05 #06 #11 #14)
C2	4030004420	Ceramic	C2012 SL 1H 050C-T-A
C3	4030004370	Ceramic	C2012 SL 1H 0R5C-T-A
C4	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C6	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C8	4030004390	Ceramic	C2012 SL 1H 020C-T-A
C9	4030004400	Ceramic	C2012 SL 1H 030C-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C14	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C15	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C16	4030004400	Ceramic	C2012 SL 1H 030C-T-A
C17	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C18	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C19	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C20	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C21	4030004440	Ceramic	C2012 SL 1H 070D-T-A (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
	4030004490	Ceramic	C2012 SL 1H 150J-T-A (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
C22	4030004600	Ceramic	C2012 SL 1H 820J-T-A
C23	4030004590	Ceramic	C2012 SL 1H 680J-T-A
C24	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C25	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C26	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C27	4030004620	Ceramic	C2012 SL 1H 121J-T-A
C28	4030004590	Ceramic	C2012 SL 1H 680J-T-A
C29	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C30	4030004600	Ceramic	C2012 SL 1H 820J-T-A (#01 #03 #05 #07 #09 #11 #12 #16 #19 #21)
	4030004610	Ceramic	C2012 SL 1H 101J-T-A (#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20)
C31	4550000530	Tantalum	TESVA 1V 104M1-8L
C32	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C33	4510001100	Electrolytic	16 MS7 10 μF
C35	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C37	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C38	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C39	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C40	4550000270	Tantalum	TESVA 1E 474M1-8L
C43	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C44	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C46	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C47	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C48	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C49	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C50	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C51	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C52	4550000450	Tantalum	TESVC 1C 106M-12L
C53	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C54	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C55	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C56	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C57	4550000450	Tantalum	TESVC 1C 106M-12L
C58	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C59	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C60	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C61	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C62	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C63	4030004480	Ceramic	C2012 SL 1H 120J-T-A
C64	4030004750	Ceramic	C2012 JB 1H 103K-T-A
C65	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C67	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C68	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C69	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C70	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C71	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C72	4030004500	Ceramic	C2012 SL 1H 180J-T-A
C73	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C74	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C75	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C76	4030004490	Ceramic	C2012 SL 1H 150J-T-A
C78	4030004720	Ceramic	C2012 JB 1H 102K-T-A

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
C79	4030004710	Ceramic C2012 JB 1H 471K-T-A
C80	4030004720	Ceramic C2012 JB 1H 102K-T-A
C81	4030004450	Ceramic C2012 SL 1H 080D-T-A
C82	4030004380	Ceramic C2012 SL 1H 010C-T-A (#01 #02 #05 #06 #11 #14 #07 #08 #09 #13 #16 #17 #18 #19)
C83	4030004720	Ceramic C2012 JB 1H 102K-T-A
C84	4030004720	Ceramic C2012 JB 1H 102K-T-A
C86	4030004710	Ceramic C2012 JB 1H 471K-T-A
C87	4030004710	Ceramic C2012 JB 1H 471K-T-A
C88	4030004720	Ceramic C2012 JB 1H 102K-T-A
C89	4030004710	Ceramic C2012 JB 1H 471K-T-A
C90	4030004720	Ceramic C2012 JB 1H 102K-T-A
C91	4030004720	Ceramic C2012 JB 1H 102K-T-A
C92	4010003850	Ceramic DD06 SL 080D 500V (#01 #02 #03 #04 #10 #11 #12 #14 #15 #20 #21)
	4010003860	Ceramic DD06 SL 100D 500V (#05 #06 #07 #08 #09 #13 #16 #17 #18 #19)
C93	4030004710	Ceramic C2012 JB 1H 471K-T-A
C94	4030004720	Ceramic C2012 JB 1H 102K-T-A
C95	4030004720	Ceramic C2012 JB 1H 102K-T-A
C96	4030004710	Ceramic C2012 JB 1H 471K-T-A
C97	4510003040	Electrolytic 16 SS 100 µF
C98	4030004710	Ceramic C2012 JB 1H 471K-T-A
C99	4030004720	Ceramic C2012 JB 1H 102K-T-A
C100	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C101	4010004120	Ceramic DD07 B 102K 500V
C102	4030004710	Ceramic C2012 JB 1H 471K-T-A
C103	4010003810	Ceramic DD06 SL 040C 500V
C104	4010004120	Ceramic DD07 B 102K 500V
C105	4010003900	Ceramic DD06 SL 200K 500V
C106	4010003880	Ceramic DD06 SL 150K 500V
C107	4010003800	Ceramic DD06 SL 030C 500V (#03 #04 #10 #12 #15 #20 #21)
	4010003820	Ceramic DD06 SL 050C 500V (#01 #02 #11 #14)
	4010003890	Ceramic DD06 SL 180K 500V (#05 #06 #07 #08 #09 #13 #16 #17 #18 #19)
C108	4010003900	Ceramic DD06 SL 200K 500V (#03 #04 #05 #06 #07 #08 #09 #10 #12 #13 #15 #16 #17 #18 #19 #20 #21)
	4010003920	Ceramic DD06 SL 240K 500V (#01 #02 #11 #14)
C109	4010003820	Ceramic DD06 SL 050C 500V (#07 #08 #09 #10 #13 #16 #17 #18 #19)
	4010003850	Ceramic DD06 SL 080D 500V (#03 #04 #11 #12 #14 #15 #20 #21)
	4010003860	Ceramic DD06 SL 100D 500V (#01 #02 #05 #06)
C110	4010003870	Ceramic DD06 SL 120K 500V
C111	4010003780	Ceramic DD06 SL 010C 500V (#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19)
C112	4010003840	Ceramic DD06 SL 070D 500V (#03 #04 #10 #12 #15 #20 #21)
	4010003870	Ceramic DD06 SL 120K 500V (#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19)
C113	4010003820	Ceramic DD06 SL 050C 500V (#03 #04 #10 #12 #15 #20 #21)
C114	4550000260	Tantalum DN 1V 100M

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
C115	4030004720	Ceramic C2012 JB 1H 102K-T-A
C116	4030004720	Ceramic C2012 JB 1H 102K-T-A
C117	4510004530	Electrolytic 25 MV 4R7 NPDW
C118	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C119	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C120	4510002380	Electrolytic 16 SS 470 µF (10X12.5)
C121	4030004740	Ceramic C2012 JB 1H 472K-T-A
C122	4510002380	Electrolytic 16 SS 470 µF (10X12.5)
C123	4510002380	Electrolytic 16 SS 470 µF (10X12.5)
C124	4510002640	Electrolytic 25 SS 47 µF
C125	4550000450	Tantalum TESVC 1C 106M-12L
C126	4030006450	Ceramic C2012 JF 1H 103Z-T-A
C127	4010003870	Ceramic DD06 SL 120K 500V (#01 #02 #03 #04 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21)
	4010003890	Ceramic DD06 SL 180K 500V (#05 #06)
C128	4010003870	Ceramic DD06 SL 120K 500V (#01 #02 #03 #04 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21)
	4010003890	Ceramic DD06 SL 180K 500V (#05 #06)
C129	4030006450	Ceramic C2012 JF 1H 103Z-T-A
C130	4030000850	Ceramic GRM40 CH 040C 50P T
C131	4030004720	Ceramic C2012 JB 1H 102K-T-A
C132	4030004610	Ceramic C2012 SL 1H 101J-T-A
C133	4030004660	Ceramic C2012 SL 1H 221J-T-A
C134	4030004720	Ceramic C2012 JB 1H 102K-T-A
C135	4030006450	Ceramic C2012 JF 1H 103Z-T-A
C137	4030003580	Ceramic GRM40 CH 270J 50P T
C138	4610000780	Trimmer CV38D 2001
C141	4550000530	Tantalum TESVA 1V 104M1-8L
C144	4030004720	Ceramic C2012 JB 1H 102K-T-A
C145	4550002770	Tantalum TESVD2 1C 226M-12 L
C146	4510002730	Electrolytic 10 SS 100 µF
C148	4510003040	Electrolytic 16 SS 100 µF
C151	4510002630	Electrolytic 50 SS 47 µF
C152	4030004720	Ceramic C2012 JB 1H 102K-T-A
C153	4030004720	Ceramic C2012 JB 1H 102K-T-A
C154	4510002870	Electrolytic 25 SS 100 µF
C155	4030004710	Ceramic C2012 JB 1H 471K-T-A
C156	4030004720	Ceramic C2012 JB 1H 102K-T-A
C157	4030004470	Ceramic C2012 SL 1H 100D-T-A (#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19)
C161	4030004520	Ceramic C2012 SL 1H 220J-T-A
C162	4030004520	Ceramic C2012 SL 1H 220J-T-A
C163	4030004520	Ceramic C2012 SL 1H 220J-T-A
C166	4030004720	Ceramic C2012 JB 1H 102K-T-A
C167	4030004720	Ceramic C2012 JB 1H 102K-T-A
C168	4030003170	Ceramic GRM40 SL 0R75C 50 PT
C169	4030004380	Ceramic C2012 SL 1H 010C-T-A
C170	4030004370	Ceramic C2012 SL 1H 0R5C-T-A
C171	4030004720	Ceramic C2012 JB 1H 102K-T-A
C172	4030004760	Ceramic C2012 JF 1E 104Z-T-A
C173	4550000260	Tantalum DN 1V 100M
C174	4010003910	Ceramic DD06 SL 220K 500V
C177	4030004720	Ceramic C2012 JB 1H 102K-T-A
C178	4030004500	Ceramic C2012 SL 1H 180J-T-A
C179	4030004560	Ceramic C2012 SL 1H 390J-T-A
C180	4030004480	Ceramic C2012 SL 1H 120J-T-A
C181	4030004520	Ceramic C2012 SL 1H 220J-T-A
C182	4030004490	Ceramic C2012 SL 1H 150J-T-A
C183	4030004720	Ceramic C2012 JB 1H 102K-T-A
C184	4030004720	Ceramic C2012 JB 1H 102K-T-A
C187	4550002890	Tantalum TESVA 1A 225M1-8L
C188	4030004720	Ceramic C2012 JB 1H 102K-T-A
C189	4030004720	Ceramic C2012 JB 1H 102K-T-A
C190	4030004720	Ceramic C2012 JB 1H 102K-T-A
C191	4030004720	Ceramic C2012 JB 1H 102K-T-A

**[MAIN UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
C192	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C193	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C194	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C195	4030004740	Ceramic	C2012 JB 1H 472K-T-A
C196	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C197	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C203	4030004430	Ceramic	C2012 SL 1H 060D-T-A
C204	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C205	4030004470	Ceramic	C2012 SL 1H 100D-T-A
C206	4030004470	Ceramic	C2012 SL 1H 100D-T-A
C207	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C208	4010003870	Ceramic	DD06 SL 120K 500V
C209	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C210	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C211	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
CP1	6510003100	Check Point	RT01T-1.3B
CP2	6510003100	Check Point	RT01T-1.3B
EP1	0910026214	P.C. Board	B 2606D (MAIN)
EP3	6910000970	Lead Frame	DL 2OP 2.6-3-1.2H
EP4	6910000970	Lead Frame	DL 2OP 2.6-3-1.2H

**[REG UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q2	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q3	1590000420	Transistor	RN1404 (TE85R)
D1	1750000050	Diode	1SS193 (TE85R)
D2	1750000050	Diode	1SS193 (TE85R)
R1	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R2	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R3	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R4	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
C1	4550000270	Tantalum	TESVA 1E 474M1-8L
C2	4550000270	Tantalum	TESVA 1E 474M1-8L
EP1	0910026142	P.C. Board	B 2632B (PLL B)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

**[SQL UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110002490	IC	M5218FP-73A
IC2	1140001660	IC	μPD7554AG-511
R1	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R2	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R3	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R4	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R5	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R6	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R7	7030003690	Resistor	ERJ3GEYJ 124 V (120 kΩ)
R8	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R9	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R10	7030003540	Resistor	ERJ3GEYJ 682 V (6.8 kΩ)
R11	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R12	7030003650	Resistor	ERJ3GEYJ 563 V (56 kΩ)
R13	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R14	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R15	7030003670	Resistor	ERJ3GEYJ 823 V (82 kΩ)
C1	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C2	4550000420	Tantalum	TESVA 1A 105M1-8L
C3	4550003030	Tantalum	TEMSVA 0J 475M-8L
C4	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
C5	4030008630	Ceramic	C1608 JF 1C 104Z-T-A
C6	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
EP1	0910028441	P.C. Board	B 2881A (SQL)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

**[PLL A UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140001310	IC	MB1504PF-G-BND
Q1	1560000360	FET	2SK209-Y (TE85R)
Q2	1560000360	FET	2SK209-Y (TE85R)
Q3	1530001950	Transistor	2SC2712-GR (TE85R)
Q4	1510000620	Transistor	2SA1576 T107 S
Q5	1530002280	Transistor	2SC4081 T107 S
D1	1720000310	Varicap	1SV128 (TE85R)
L1	6200000780	Coil	LQH 3N 100K
L2	6200000910	Coil	LQN 2A 82NM
R1	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R2	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R3	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R4	7030000470	Resistor	MCR10EZHZ 5.6 kΩ (562)
R5	7030000220	Resistor	MCR10EZHZ 47 Ω (470)
R6	7030000350	Resistor	MCR10EZHZ 560 Ω (561)
R7	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R8	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R9	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R10	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R11	7030000160	Resistor	MCR10EZHZ 15 Ω (150)
R12	7030000160	Resistor	MCR10EZHZ 15 Ω (150)
R13	7030000450	Resistor	MCR10EZHZ 3.9 kΩ (392)
R14	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R15	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R16	7030000550	Resistor	MCR10EZHZ 27 kΩ (273)
R17	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R18	7030000230	Resistor	MCR10EZHZ 56 Ω (560)
C1	4030006450	Ceramic	C2012 JF 1H 103Z-T-A

[PLL A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C2	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C3	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C4	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C5	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C6	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C7	4550000280	Tantalum	TESVB2 1A 475M-8L
C8	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C9	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C10	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C12	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C14	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C15	4030004500	Ceramic	C2012 SL 1H 180J-T-A
C16	4030004500	Ceramic	C2012 SL 1H 180J-T-A
C17	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C18	4550000460	Tantalum	TESVA 1C 105M1-8L
EP1	0910025173	P.C. Board	B 2443C (PLL A)

[VCO A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1560000430	FET	2SK302-GR (TE85R)
Q2	1530002030	Transistor	2SC3772-3TA
D1	1720000220	Varicap	1SV166-T2B
D2	1720000220	Varicap	1SV166-T2B
L1	6200000750	Coil	LQH 3N 4R7M
L2	6200000880	Coil	NL 322522T-4R7M
L3	6130002310	Coil	LB-253
L4	6200000880	Coil	NL 322522T-4R7M
L5	6200000750	Coil	LQH 3N 4R7M
L6	6200000260	Coil	LQN 2A R10K
L7	6200000140	Coil	LQH 3N 1R0M
R1	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R2	7030000320	Resistor	MCR10EZHZ 330 Ω (331)
R3	7030000470	Resistor	MCR10EZHZ 5.6 kΩ (562)
R4	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R5	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R6	7030000340	Resistor	MCR10EZHZ 470 Ω (471)
R7	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R8	7030000160	Resistor	MCR10EZHZ 15 Ω (150)
R9	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
C1	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C2	4030000960	Ceramic	GRM40 CH 390J 50P T
C3	4030003580	Ceramic	GRM40 CH 270J 50P T
C4	4030002560	Ceramic	GRM40 UJ 030C 50P T
C5	4030002560	Ceramic	GRM40 UJ 030C 50P T
C6	4030004370	Ceramic	C2012 SL 1H 0R5C-T-A
C7	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C8	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C9	4550003110	Tantalum	TEMSVC 1A 226M-12 L
C10	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A

[VCO A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C12	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C14	4030004500	Ceramic	C2012 SL 1H 180J-T-A
C15	4030004720	Ceramic	C2012 JB 1H 102K-T-A
EP1	0910025161	P.C. Board	B 2444A (VCO A)

[PLL B UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140001280	IC	MB1501PF-G-BND
IC2	1130004200	IC	TC4S66F (TE85R)
Q1	1560000360	FET	2SK209-Y (TE85R)
Q2	1560000360	FET	2SK209-Y (TE85R)
Q3	1530001950	Transistor	2SC2712-GR (TE85R)
Q4	1590000410	Transistor	RN2404 (TE85R)
Q5	1510000620	Transistor	2SA1576 T107 S
Q6	1530002280	Transistor	2SC4081 T107 S
D1	1720000310	Varicap	1SV128 (TE85R)
D2	1750000050	Diode	1SS193 (TE85R)
L1	6200000780	Coil	LQH 3N 100K
L2	6200000720	Coil	LQN 2A 10NM
R1	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R2	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R3	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R4	7030000430	Resistor	MCR10EZHZ 2.7 kΩ (272)
R5	7030000490	Resistor	MCR10EZHZ 8.2 kΩ (822)
R6	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R7	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R8	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R9	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R10	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R11	7030000160	Resistor	MCR10EZHZ 15 Ω (150)
R12	7030000020	Resistor	MCR10EZHZ 1 Ω (010)
R13	7030000450	Resistor	MCR10EZHZ 3.9 kΩ (392)
R14	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R15	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R16	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R17	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R18	7030000550	Resistor	MCR10EZHZ 27 kΩ (273)
R19	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
C1	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C2	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C3	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C4	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C5	4550000280	Tantalum	TESVB2 1A 475M-8L
C6	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C7	4550000280	Tantalum	TESVB2 1A 475M-8L
C8	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C9	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C10	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A

**[PLL B UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
C12	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C15	4030004420	Ceramic	C2012 SL 1H 050C-T-A
C16	4030004420	Ceramic	C2012 SL 1H 050C-T-A
C17	4550000280	Tantalum	TESVB2 1A 475M-8L
C18	4550000460	Tantalum	TESVA 1C 105M1-8L
EP1	0910028381	P.C. Board	B 2840A (PLL B)

**[VCO B UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
C16	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C17	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C18	4030000830	Ceramic	GRM40 CK 020C 50P T
EP1	0910025272	P.C. Board	B 2445B (VCO B)

**[VCO B UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530000370	Transistor	2SC3356-T2B
Q2	1530002030	Transistor	2SC3772-3-TA
D1	1720000320	Varicap	1T32-T8-V
D2	1720000320	Varicap	1T32-T8-V
D3	1720000320	Varicap	1T32-T8-V
D4	1720000320	Varicap	1T32-T8-V
D5	1720000320	Varicap	1T32-T8-V
L1	6200000140	Coil	LQH 3N 1R0M
L2	6200000140	Coil	LQH 3N 1R0M
L3	6200000130	Coil	LQN 2A 47NM
L4	6200000140	Coil	LQH 3N 1R0M
R1	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R2	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R3	7030000180	Resistor	MCR10EZHZ 22 Ω (220)
R4	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R5	7030000180	Resistor	MCR10EZHZ 22 Ω (220)
R6	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R7	7030000680	Resistor	MCR10EZHZ 330 kΩ (334)
R8	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R9	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R10	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332)
R11	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R12	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R13	7030000180	Resistor	MCR10EZHZ 22 Ω (220)
R14	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R15	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R16	7030000160	Resistor	MCR10EZHZ 15 Ω (150)
C1	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C2	4030000990	Ceramic	GRM40 CH 680J 50P T
C3	4030000820	Ceramic	GRM40 CK 010C 50P T
C4	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C5	4030002560	Ceramic	GRM40 UJ 030C 50P T
C6	4030002560	Ceramic	GRM40 UJ 030C 50P T
C7	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C8	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C9	4550003110	Tantalum	TEMSVC 1A 226M-12 L
C10	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C11	4030004370	Ceramic	C2012 SL 1H 0R5C-T-A
C12	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C13	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C14	4030004470	Ceramic	C2012 SL 1H 100D-T-A
C15	4030004720	Ceramic	C2012 JB 1H 102K-T-A

**[CHASSIS UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
C1	4010000520	Ceramic	DD108B 472K 50V

**[ACC UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
F1	5210000070	Fuse	FGB 10A

# SECTION 6 ADJUSTMENT PROCEDURES

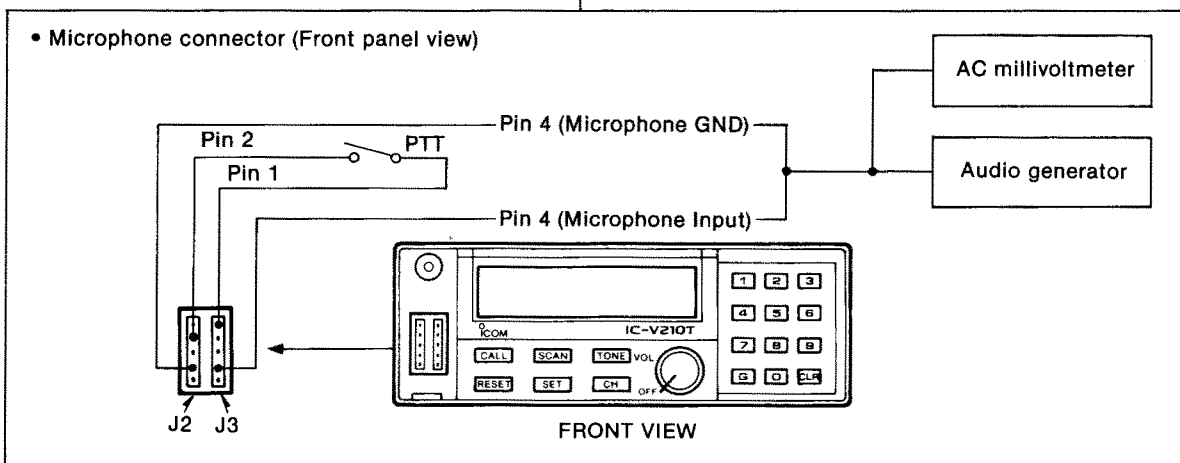
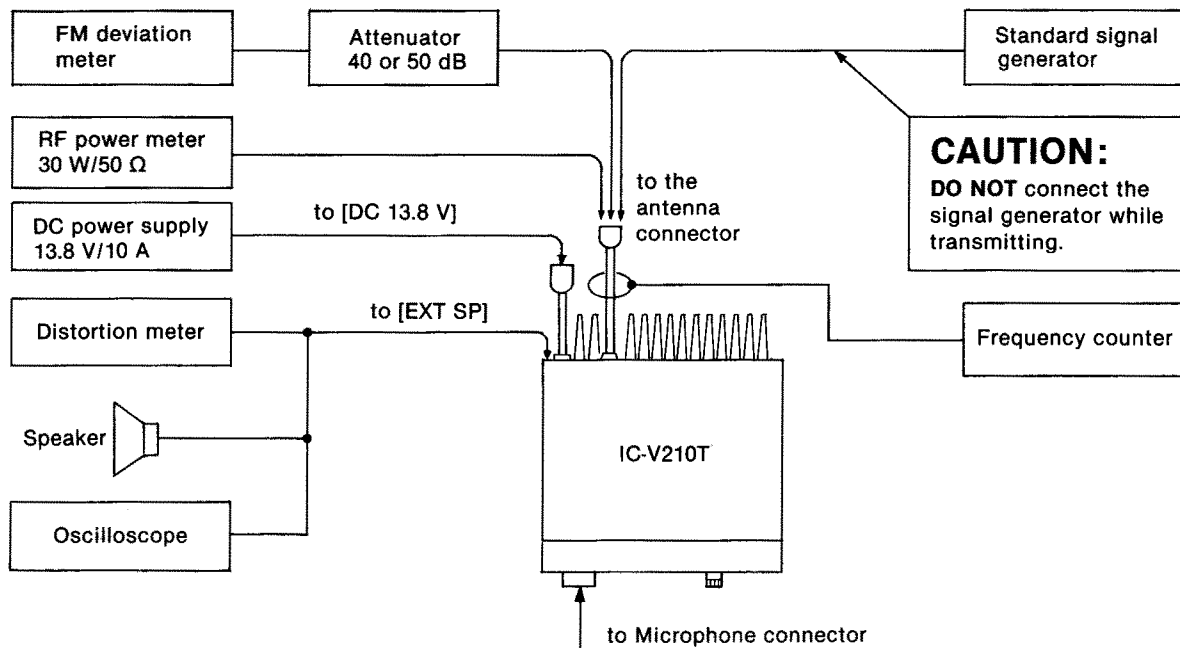
## 6-1 PREPARATION BEFORE SERVICING

### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 13.8 V DC Current capacity : 10 A or more	Audio generator	Frequency range : 300~3000 Hz Output level : 1~100 mV
RF power meter (terminated type)	Measuring range : 1~30 W Frequency range : 130~180 MHz Impedance : 50 Ω SWR : Less than 1.2:1	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
Frequency counter	Frequency range : 0.1~180 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	AC millivoltmeter	Measuring range : 2~200 mV
		Oscilloscope	Frequency range : DC~20 MHz Measuring range : 0.01~10 V
Distortion meter	Frequency range : 1 kHz ± 10 Hz Measuring range : 1~100 %	DC voltmeter	Input impedance : 50 kΩ/DC or better
Standard signal generator (SSG)	Frequency range : 0.1~180 MHz Output level : -127~-17 dBm (0.1 μV~32 mV)	FM deviation meter	Frequency minimum : 180 MHz Measuring range : 0~±5 kHz
		External speaker	Impedance : 4 Ω

CP: Check point

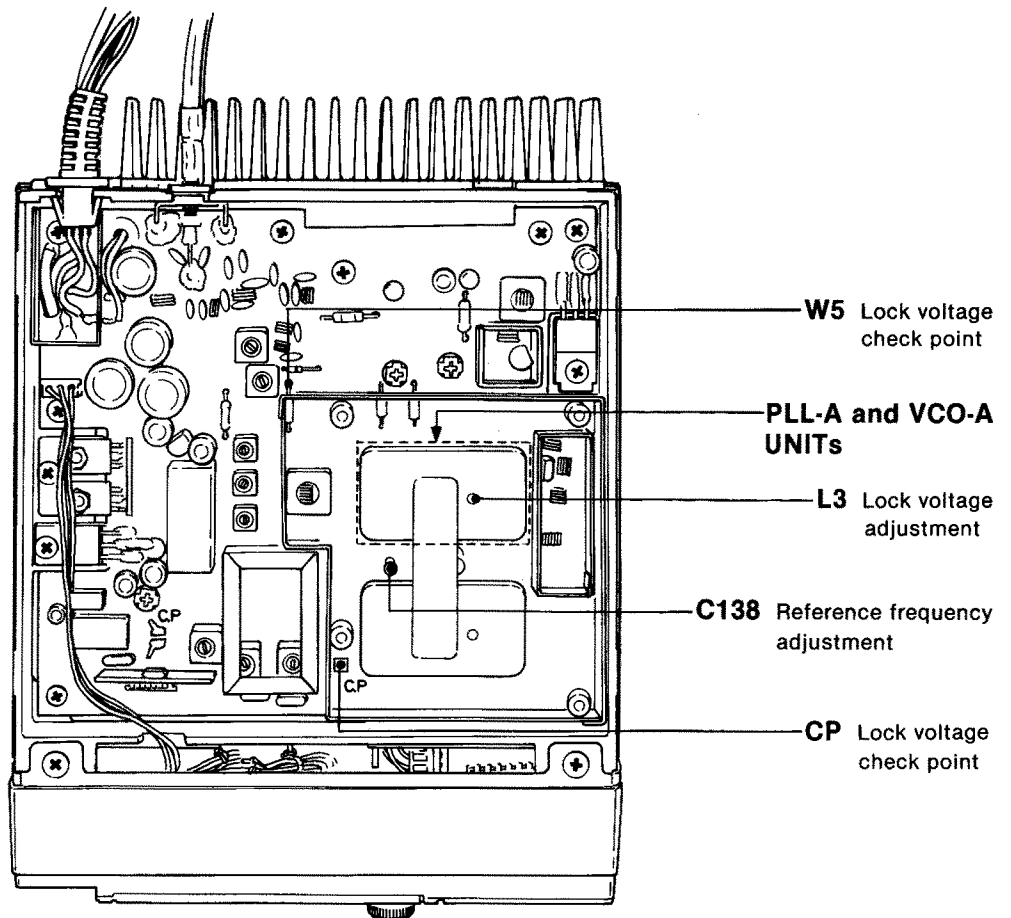
### ■ CONNECTION



## 6-2 PLL ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> <li>• Select any channel.</li> <li>• Connect the RF power meter or a 50 <math>\Omega</math> dummy load to the antenna connector.</li> <li>• Transmitting</li> </ul>	Rear panel	Loosely couple the frequency counter to the antenna connector.	Same frequency as the programmed one. To check the programmed frequency, use the EX-704.	MAIN	C138
LOCK VOLTAGE	NOTE: Lock voltage affects the C/N ratio. If you adjust the lock voltage, set the frequency with the EX-704.					
	1 <ul style="list-style-type: none"> <li>• Operating frequency: 136.0000 MHz (#01, #02, #05, #06)</li> <li>• 150.0000 MHz (All other versions)</li> <li>• Receiving</li> </ul>	MAIN	Connect the DC voltmeter to W5.	1.5 V (#01, #02, #05, #06) 5.0 V (All other versions)	VCO-A	L3
	2	After adjustment, fix the L3 in place with paraffin.				
	3 <ul style="list-style-type: none"> <li>• Select any channel.</li> <li>• Connect the RF power meter or a 50 <math>\Omega</math> dummy load to the antenna connector.</li> <li>• Transmitting</li> </ul>	MAIN	Connect the DC voltmeter to CP.	1~16 V		Verify

### • MAIN UNIT



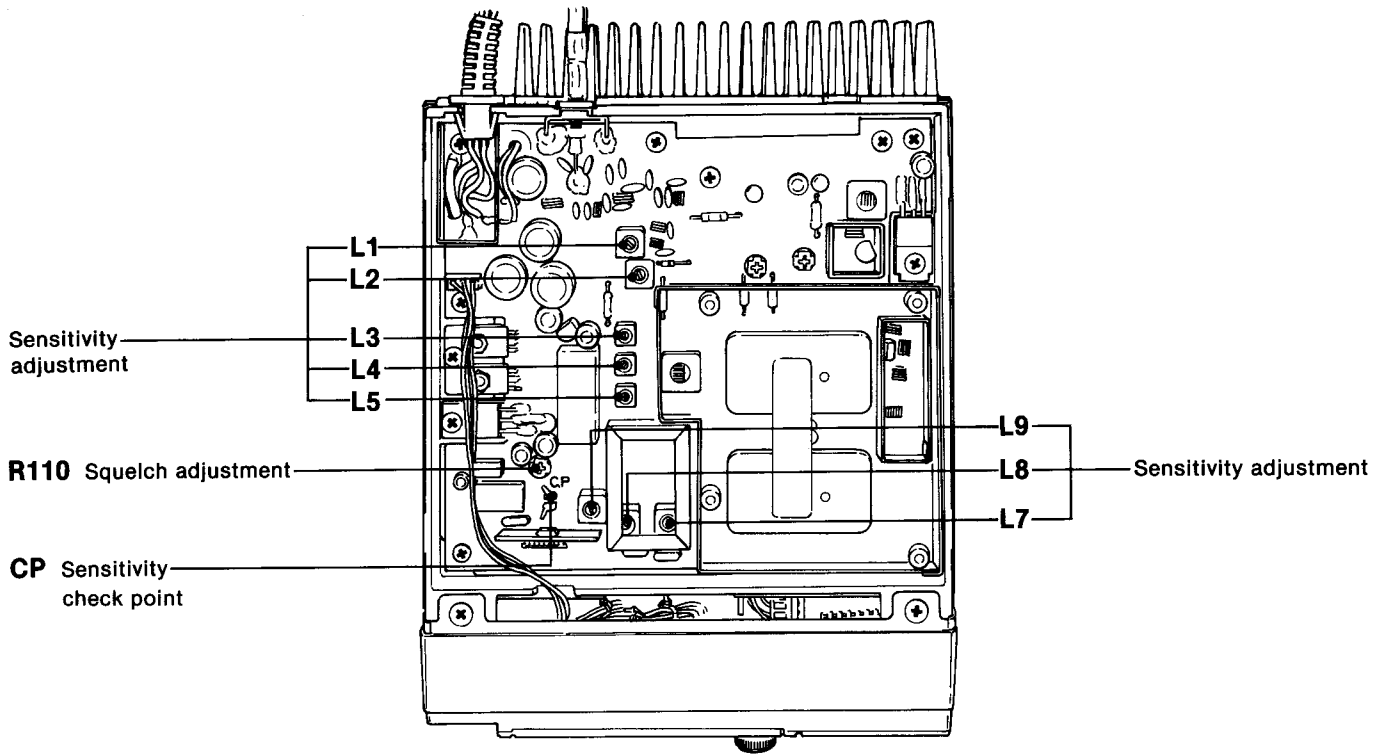


## 6-3 RECEIVER ADJUSTMENT

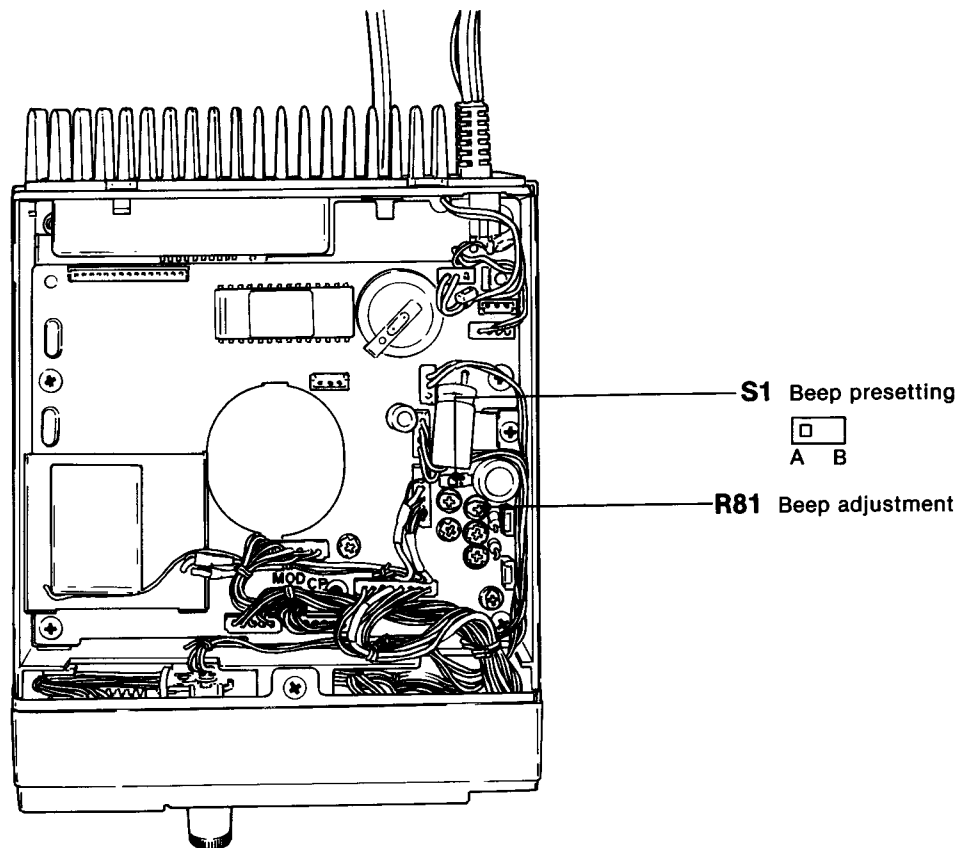
ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT		
		UNIT	LOCATION		UNIT	ADJUST	
SENSITIVITY	NOTE: When the sensitivity is less than $0.35 \mu\text{V}$ (12 dB SINAD) on every channel, the following sensitivity adjustment is not necessary. Skip to squelch adjustment below. This transceiver automatically sends an answer back code when the 5-tone code for you is received. Be careful when connecting the SSG to the antenna connector.						
	1	<ul style="list-style-type: none"> <li>Select any channel.</li> <li>Connect the SSG to the antenna connector and set as:                Level : <math>10 \mu\text{V}^*</math> (<math>-87 \text{ dBm}</math>)                Modulation: 1 kHz                Deviation : <math>\pm 3.5 \text{ kHz}</math>                (#02, #04, #06,                #08, #10, #13,                #14, #15, #17,                #20  <math>\pm 2.8 \text{ kHz}</math> (#18)  <math>\pm 1.75 \text{ kHz}</math>                (All other versions)</li> <li>[RESET] switch: ON</li> <li>[VOL] control: PULL</li> <li>Receiving</li> </ul>	MAIN	Connect the DC voltmeter to CP.	Maximum level	MAIN	Adjust in sequence L1, L2, L3, L4, L5, L7, L8, L9
	2	<ul style="list-style-type: none"> <li>Set the SSG as:                Level : <math>32 \mu\text{V}^*</math> (<math>-77 \text{ dBm}</math>)</li> </ul>	Rear panel	Connect the distortion meter to the [EXT SP] jack with a $4 \Omega$ load.	Minimum distortion level		Adjust in sequence L7, L8
	3	<ul style="list-style-type: none"> <li>Set the SSG as:                Level : <math>0.35 \mu\text{V}^*</math> (<math>-116 \text{ dBm}</math>)</li> </ul>					Adjust in sequence L1, L2, L3, L4, L5
SQUELCH	NOTE: Before squelch adjustment, be sure that the sensitivity on every channel is less than $0.35 \mu\text{V}$ (12 dB SINAD).						
	1	<ul style="list-style-type: none"> <li>Select any channel.</li> <li>Connect the SSG to the antenna connector.</li> <li>[RESET] switch: ON</li> <li>[VOL] control: PULL</li> <li>Receiving</li> </ul>	MAIN	Connect the distortion meter to the [EXT SP] jack with a $4 \Omega$ load.	8 dB SINAD (40 % distortion)		SSG level
	2	<ul style="list-style-type: none"> <li>[VOL] control: PUSH</li> </ul>	Bottom cover	Speaker	Squelch closes.	MAIN	R110
	3	<ul style="list-style-type: none"> <li>Adjust SSG's level so that SINAD level becomes 12 dB (20 % distortion).</li> </ul>			Squelch opens.		Verify
BEEP	1	<ul style="list-style-type: none"> <li>Select any channel.</li> <li>[RESET] switch: ON</li> <li>[VOL] control: Center</li> <li>S1: A side</li> <li>Receiving</li> </ul>	Rear panel	Connect the oscilloscope to the [EXT SP] jack with a $4 \Omega$ load.	1.5 Vp-p	LOGIC	R81
	2	<ul style="list-style-type: none"> <li>S1: B side</li> </ul>	Bottom cover	Speaker	Verify that the level of the beep sound is adjustable.	Front panel	[VOL] control
	NOTE: Reset S1 to the step 1 position after the above verification.						

\*This output level of the standard signal generator (SSG) is indicated as SSG's open circuit.

• MAIN UNIT



• LOGIC UNIT

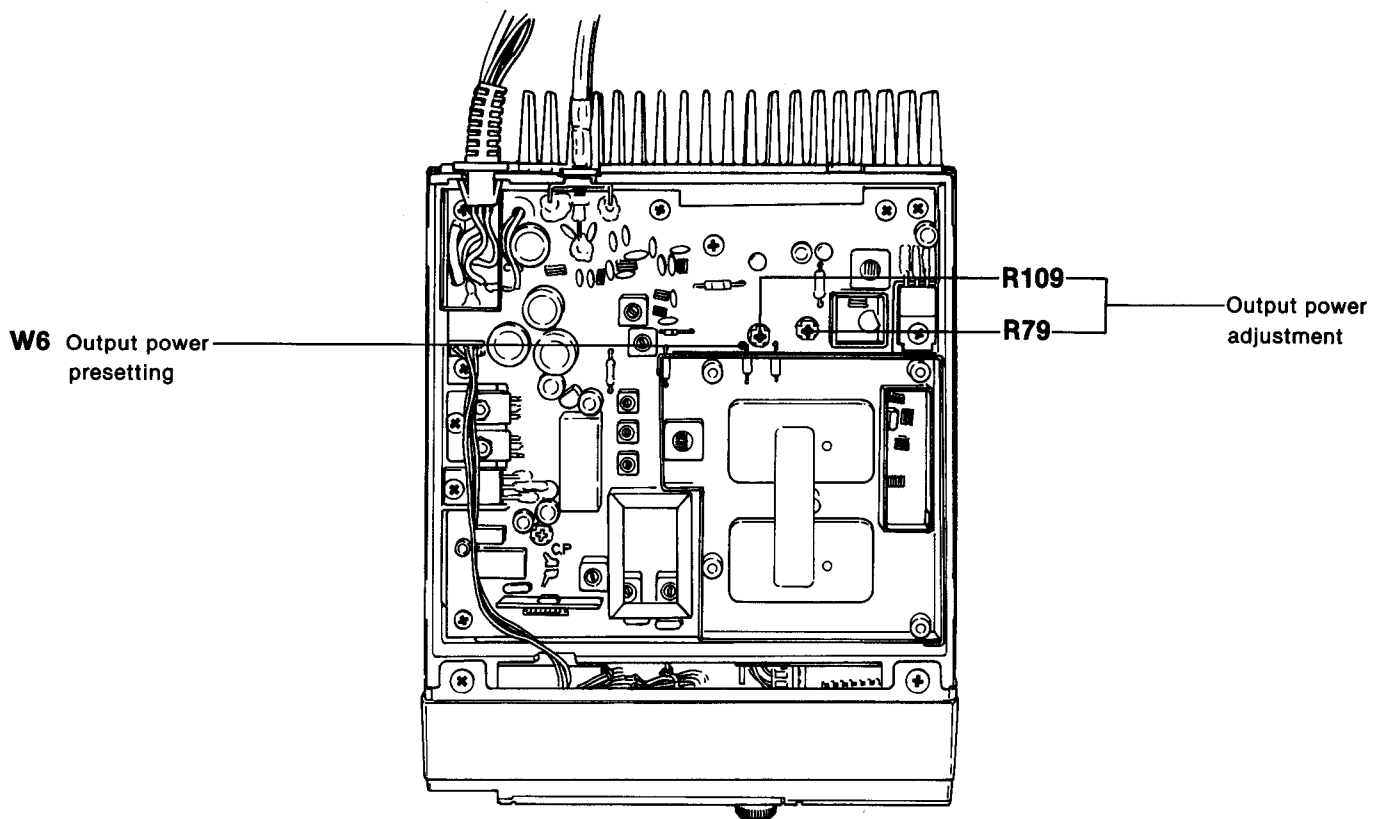


## 6-4 TRANSMITTER ADJUSTMENT

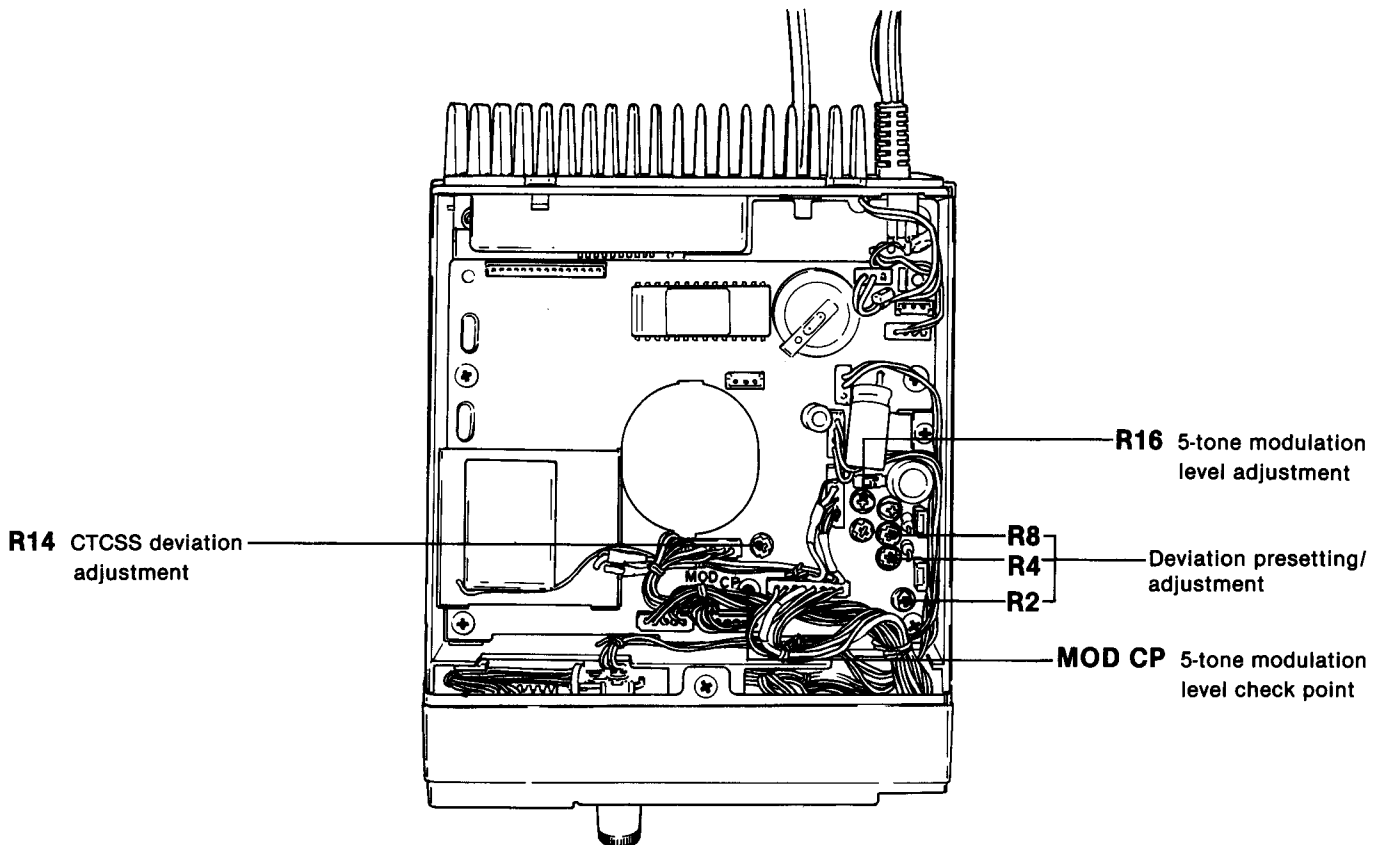
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1	<ul style="list-style-type: none"> <li>Select any high-power channel.</li> <li>Transmitting</li> </ul>	Rear panel	Connect the RF power meter to the antenna connector.	10W (10W version) 25W (25W version)	MAIN	R79
	2	<ul style="list-style-type: none"> <li>Apply 5 V DC to W6.</li> </ul>			1 W (10 W version) 2.5 W (25 W version)		R109
DEVIATION	1	<ul style="list-style-type: none"> <li>Select any channel.</li> <li>Connect the audio generator to the microphone connector* with an AC millivoltmeter and set as: Level : 50 mV Modulation : 1.0 kHz</li> <li>Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2</li> <li>Transmitting</li> </ul>	Rear panel	Connect the FM deviation meter to the antenna connector via the attenuator.	Preset to the center.	LOGIC	R2, R4, R8
	2				Maximum deviation level		R4
	3				$\pm 4.3$ kHz (#02, #04, #06, #08, #10, #13, #14, #15, #17, #20 $\pm 3.5$ kHz (#18) $\pm 2.1$ kHz (All other versions)		R8
	4	<ul style="list-style-type: none"> <li>Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : P and -P</li> </ul>			Symmetrical deviation level		R2
	5	<ul style="list-style-type: none"> <li>Set the audio generator as: Level : 5.0 mV Modulation : 1.0 kHz</li> </ul>			$\pm 3.0$ kHz (#02, #04, #06, #08, #10, #13, #14, #15, #17, #20 $\pm 2.4$ kHz (#18) $\pm 1.5$ kHz (All other versions)		R4
	6	Repeat steps 3~5 several times for precision.					
CTCSS DEVIATION	1	<ul style="list-style-type: none"> <li>Select a tone encoder programmed channel (88.5 Hz).</li> <li>Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2</li> <li>Apply no signal to the microphone connector.</li> <li>Transmitting</li> </ul>	Rear panel	Connect the FM deviation meter to the antenna connector via the attenuator.	$\pm 0.5$ kHz (#02, #04, #06, #08, #10, #13, #14, #15, #17, #20 $\pm 0.4$ kHz (#18) $\pm 0.3$ kHz (All other versions)	LOGIC	R14
5-TONE MODULATION LEVEL	1	<ul style="list-style-type: none"> <li>Select a 5-tone programmed channel.</li> <li>Connect the audio generator to the microphone connector* with an AC millivoltmeter and set as: Level : 5.0 mV Modulation : 1.0 kHz</li> <li>Transmitting</li> </ul>	LOGIC	Connect the oscilloscope to MOD CP.			Verify
	2	<ul style="list-style-type: none"> <li>Apply no signal to the microphone connector.</li> <li>[CALL] switch: ON</li> </ul>			Same level as above.	LOGIC	R16

\* See p. 6-1 for connection.

• MAIN UNIT



• LOGIC UNIT

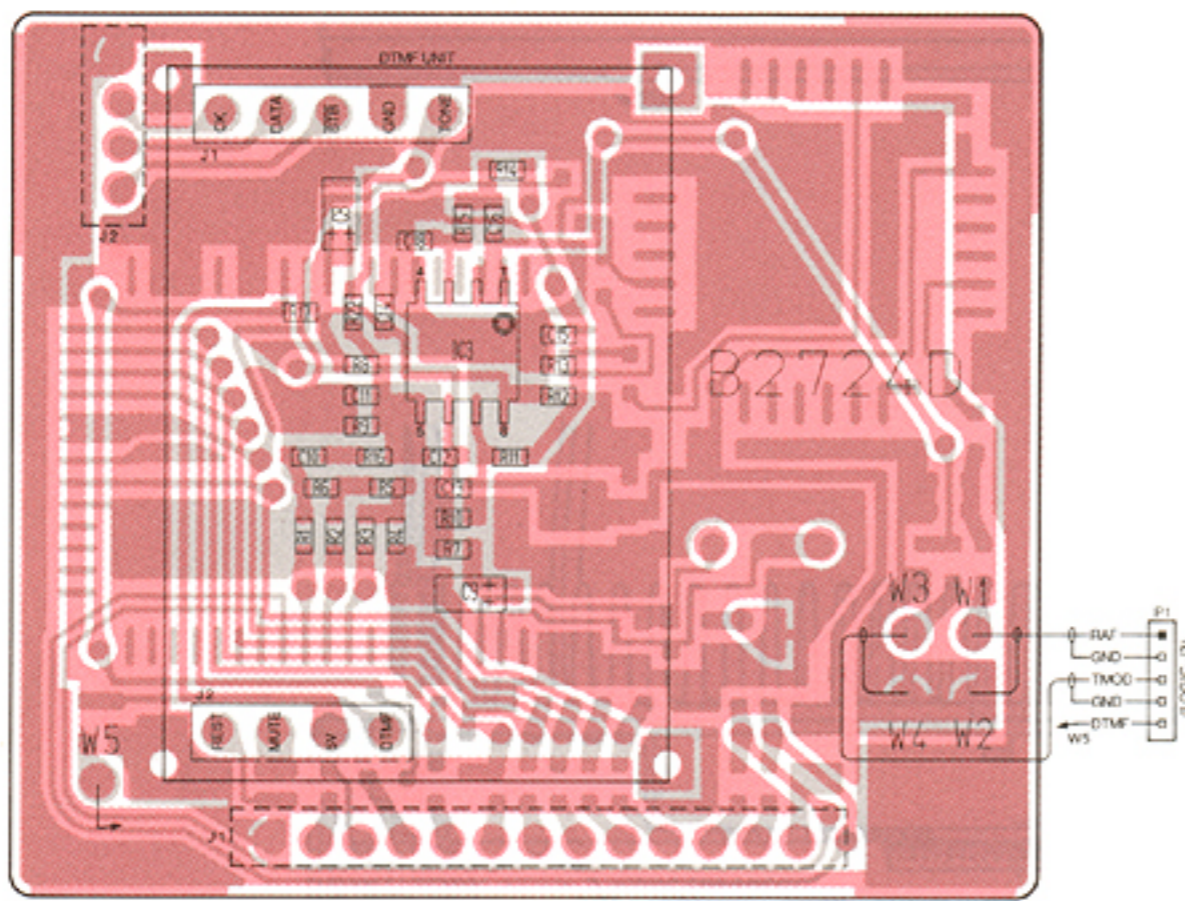
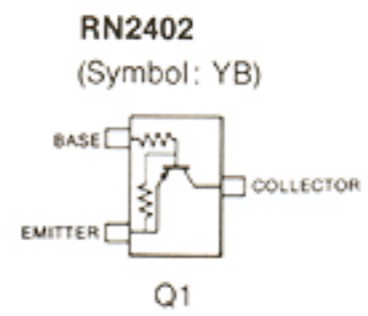
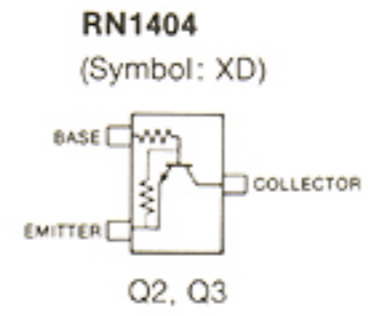
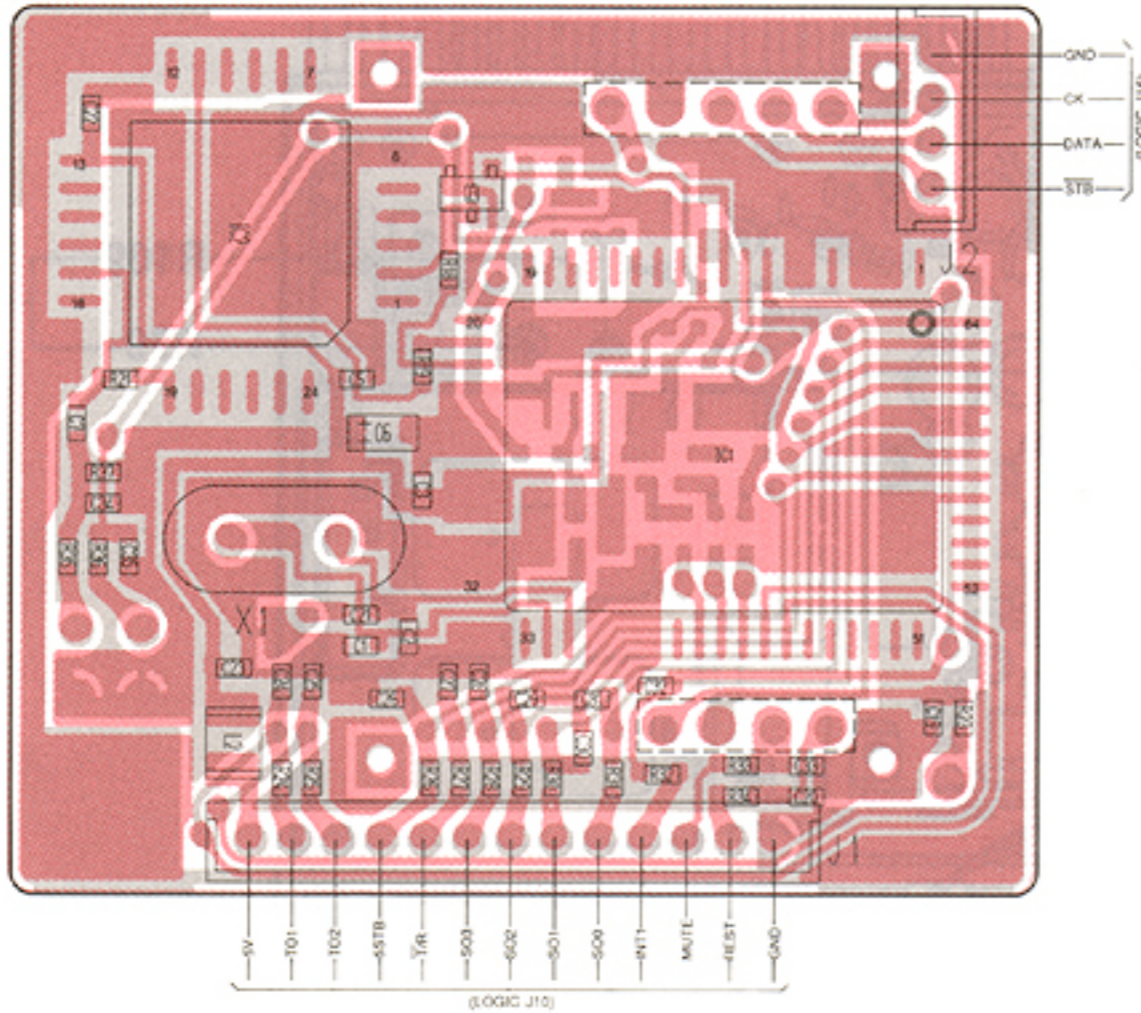




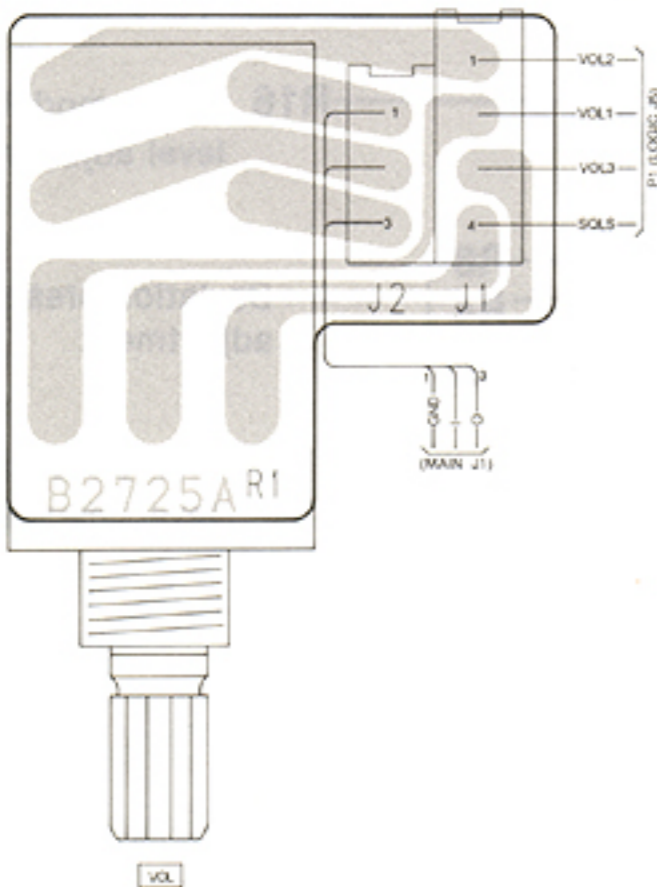
# SECTION 7 BOARD LAYOUTS

## 7-1 SUBORDINATE LOGIC UNITS

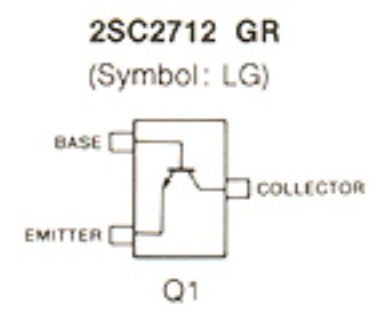
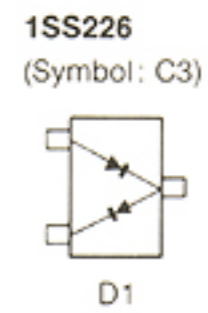
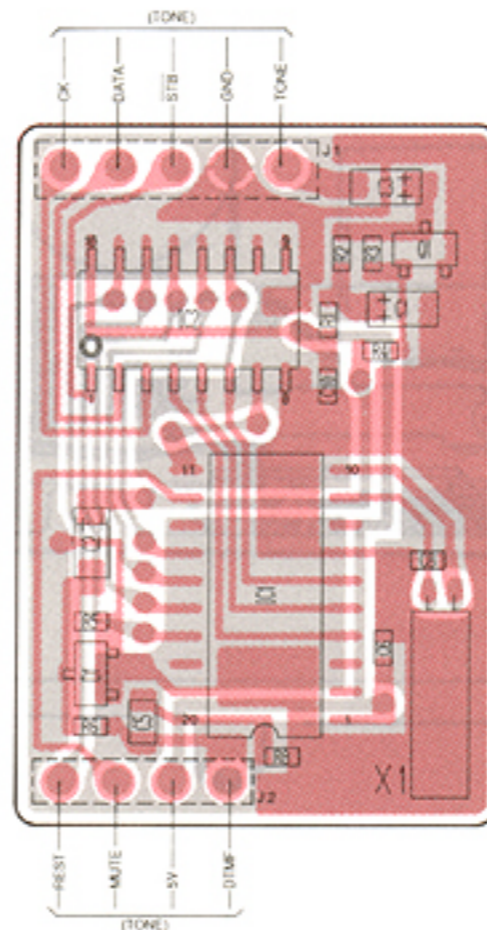
### • TONE UNIT



### • VR UNIT



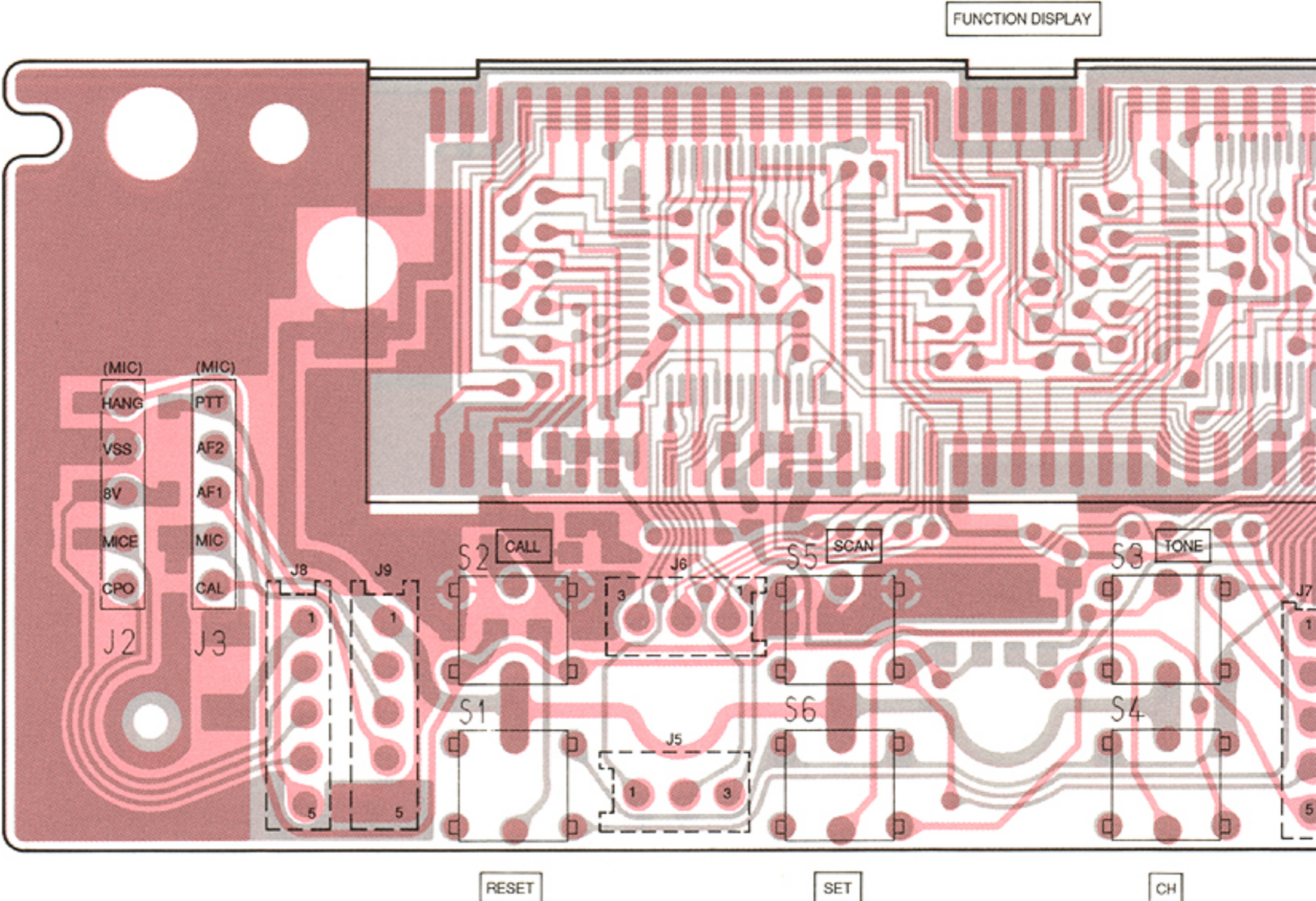
### • DTMF UNIT





# 7-2 DISPLAY UNIT

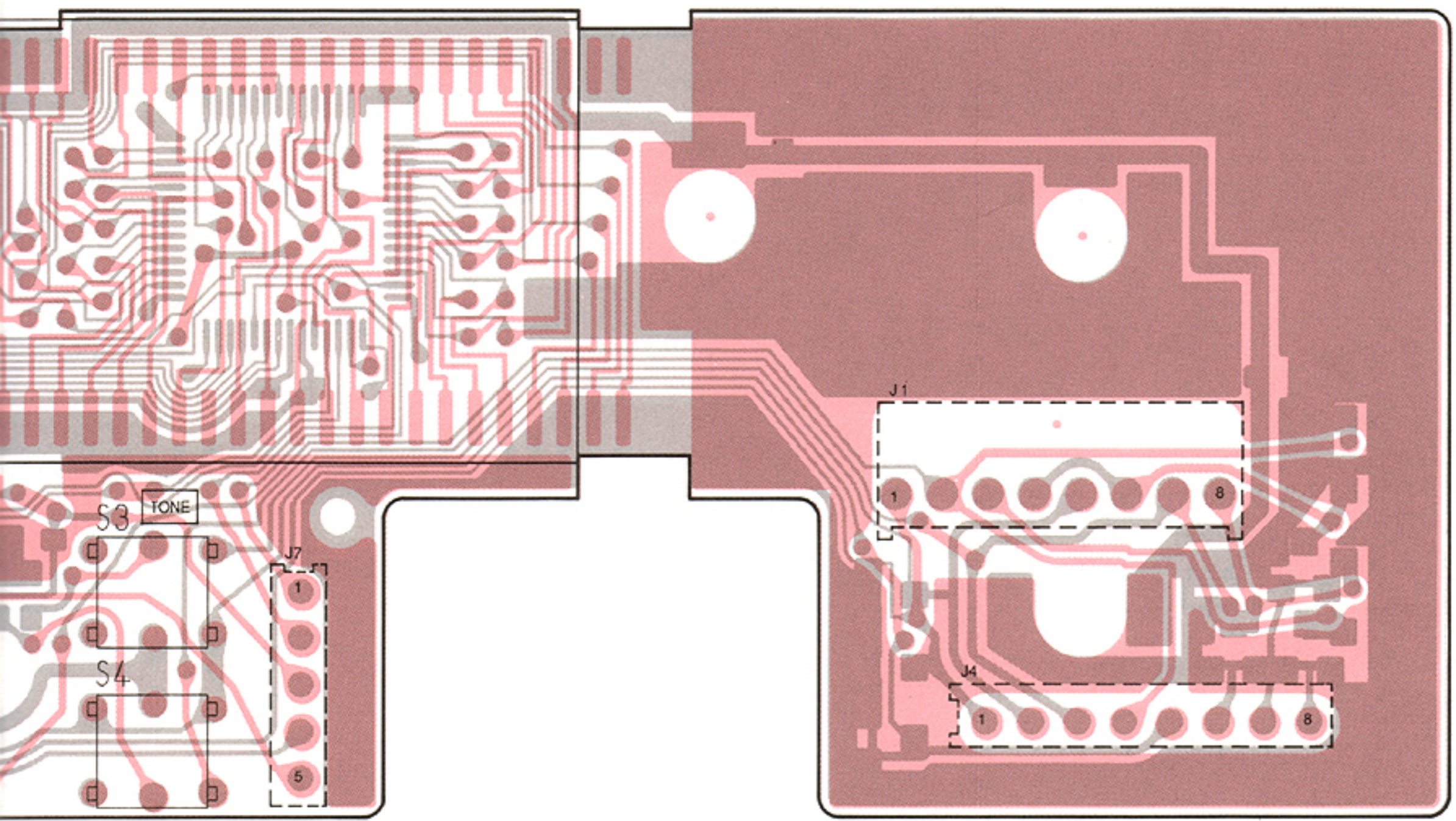
## • DISPLAY UNIT (TOP VIEW)





The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

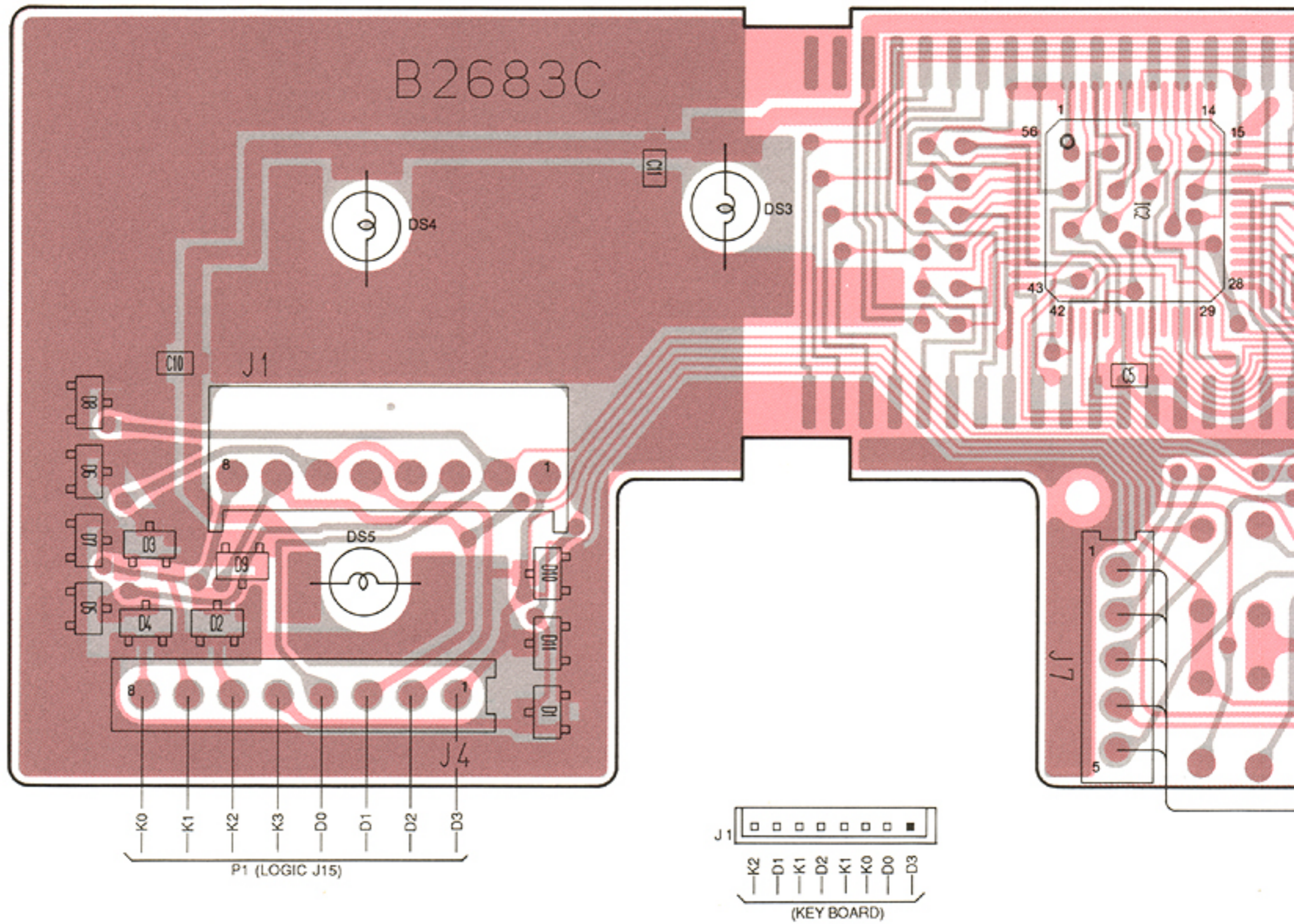
IN DISPLAY



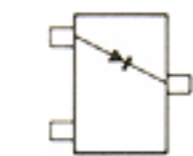
CH



• DISPLAY UNIT (BOTTOM VIEW)

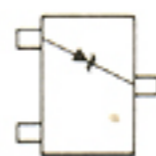


**1SS193**  
(Symbol: F3)



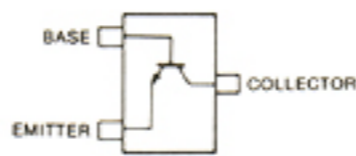
D1, D2, D3, D4

**02CZ6.8-X**  
(Symbol: 6.8X)



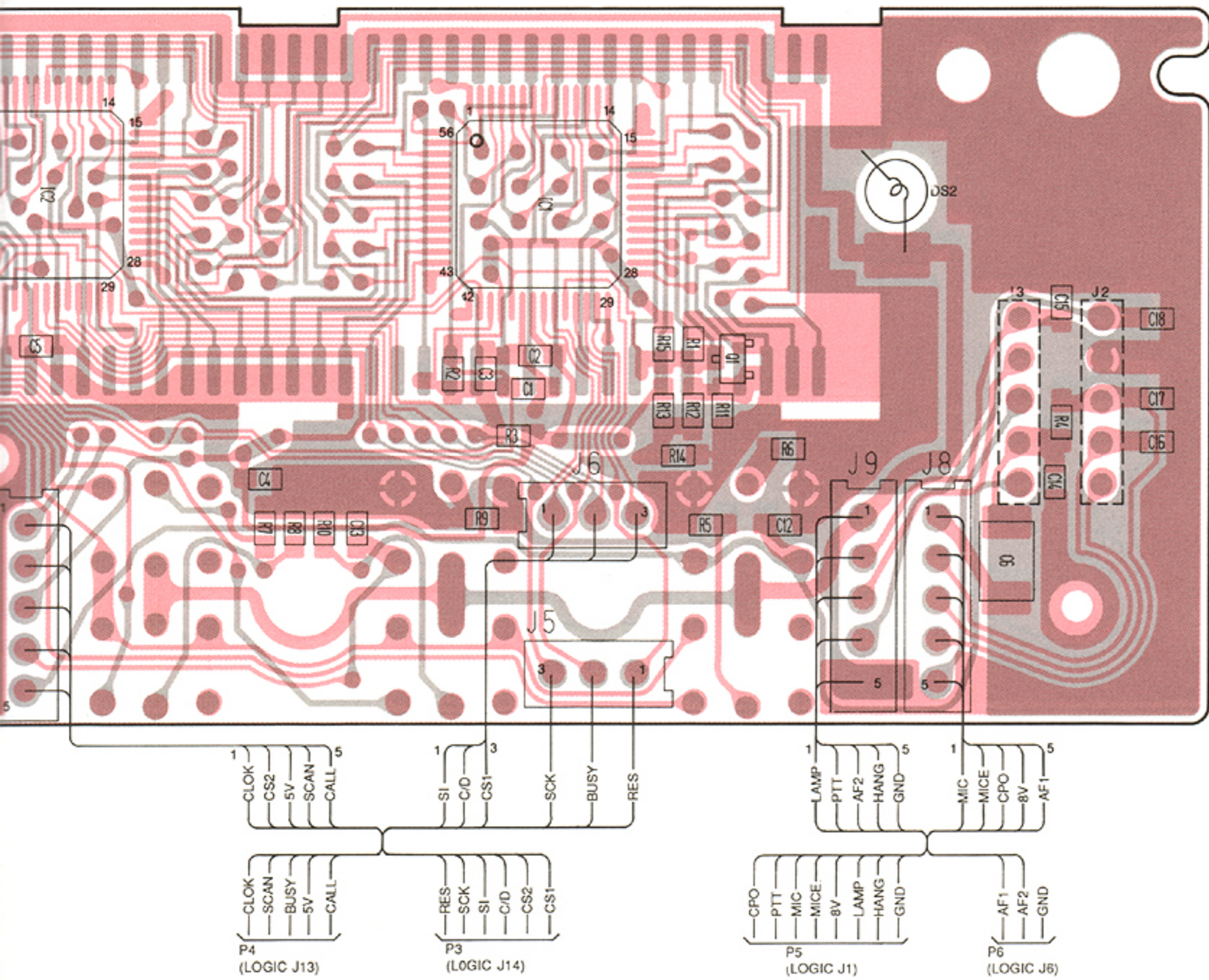
D5, D6, D7, D8,  
D9, D10, D11

**2SC2712 Y**  
(Symbol: LY)



Q1

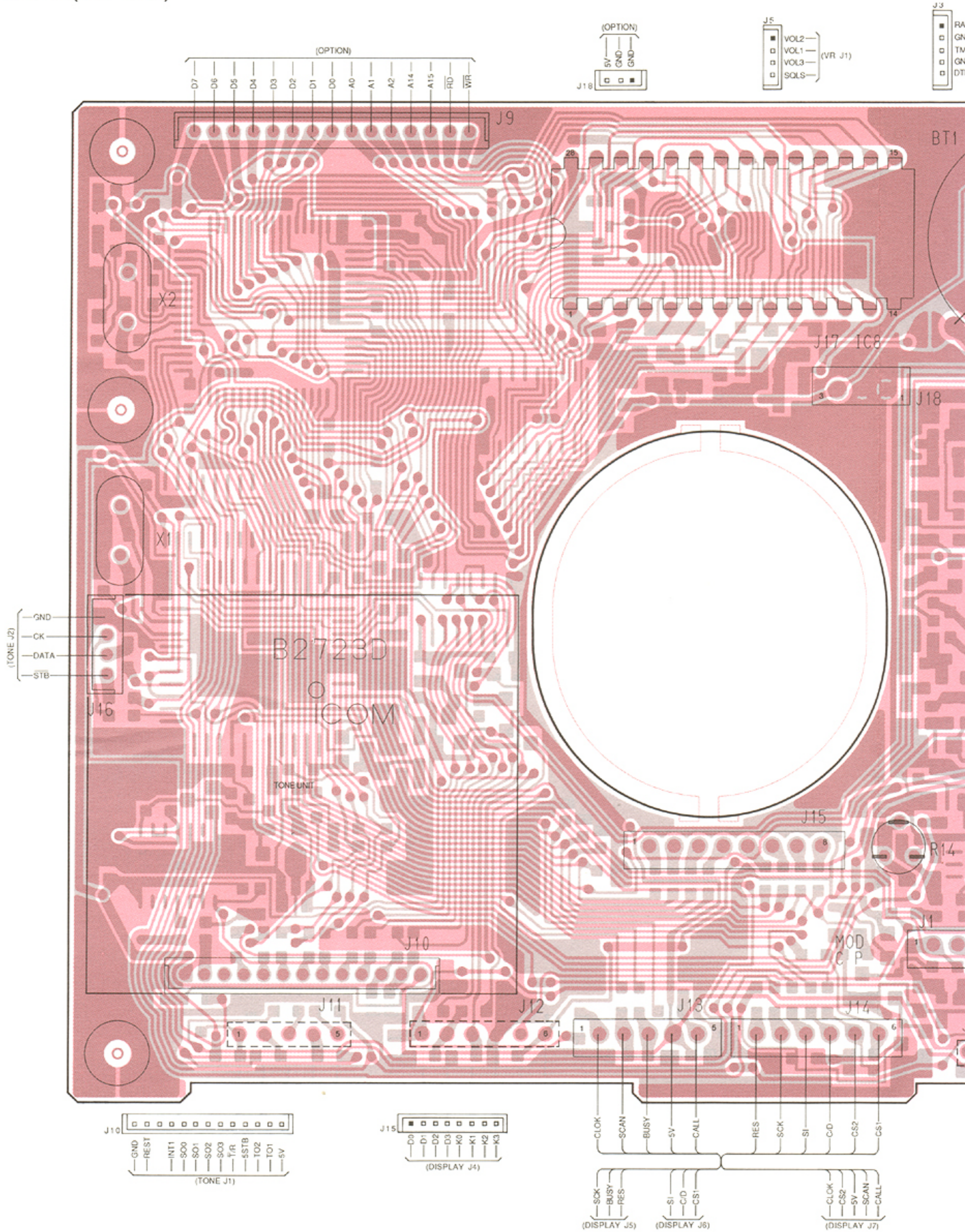






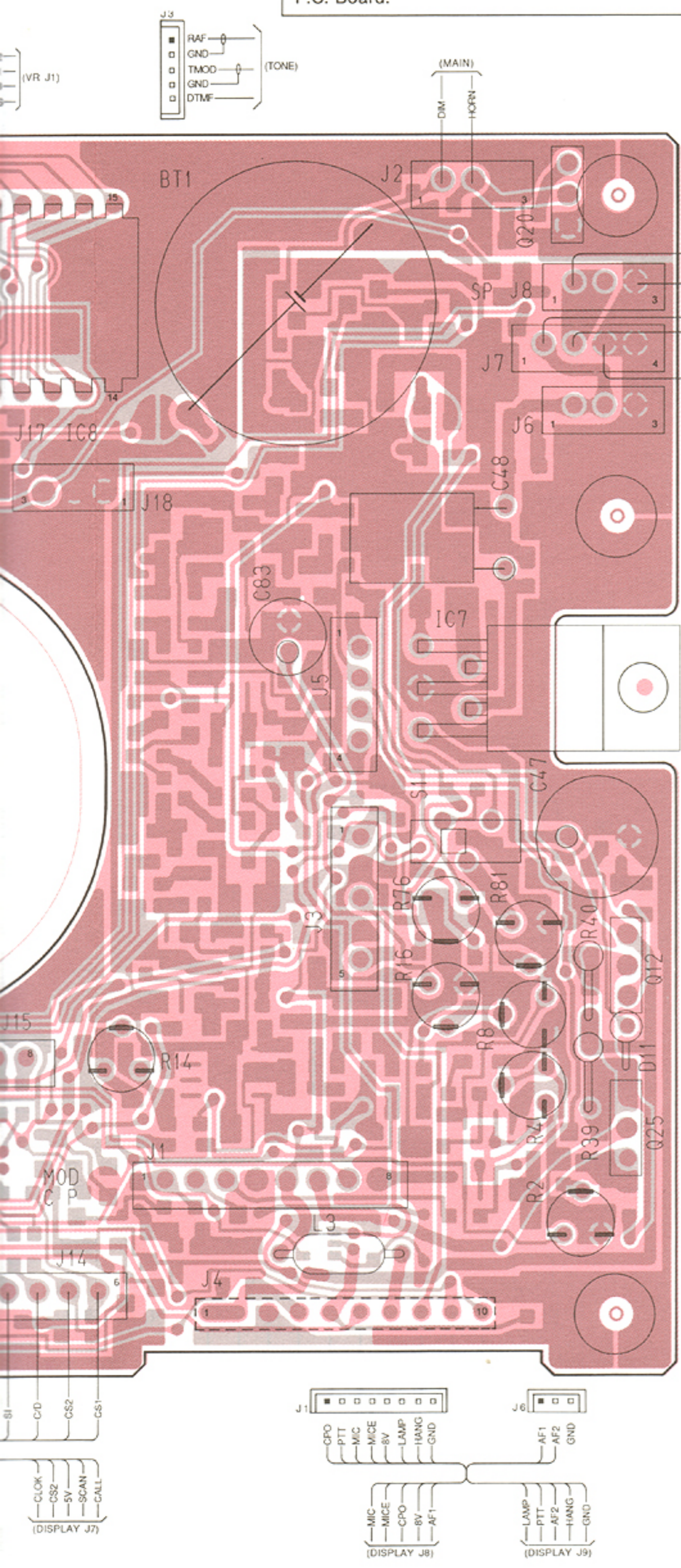
# 7-3 LOGIC UNIT

## • LOGIC UNIT (TOP VIEW)

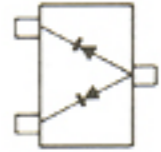




The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

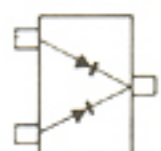


**1SS181**  
(Symbol: A3)



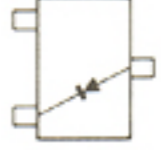
D8, D14

**1SS184**  
(Symbol: B3)



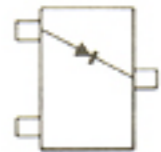
D10, D12,  
D18 (#09, #19, #20, #21)

**1SS190**  
(Symbol: E3)



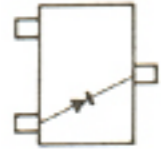
D7, D22

**1SS193**  
(Symbol: F3)



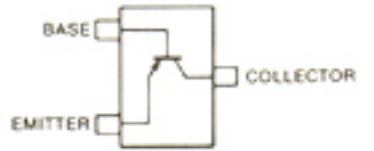
D1, D2, D3, D16, D17, D21,  
D18 (#01, #02, #03, #04, #05,  
#06, #07, #08, #10, #11, #12,  
#13, #14, #15, #16, #17, #18)

**1SS196**  
(Symbol: G3)



D6

**2SA1162 Y**  
(Symbol: SY)



Q2, Q3, Q8

**2SA1359 Y**



Q12, Q25



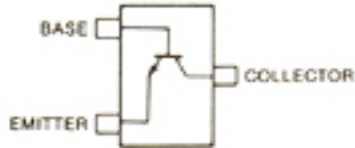
• LOGIC UNIT (BOTTOM VIEW)

**2SC2712 GR**

(Symbol: LG)

**2SC2712 Y**

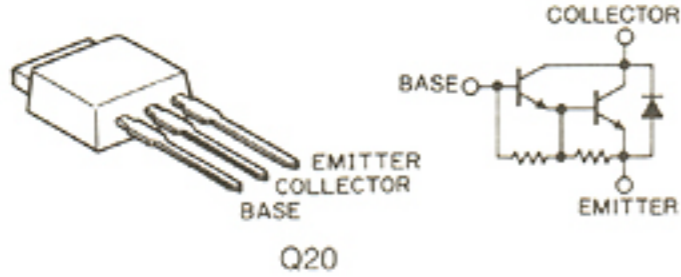
(Symbol: LY)



**2SC2712 GR: Q16**

**2SC2712 Y: Q7, Q13, Q17, Q23**

**2SD1286 K**



**Q20**

**2SJ106 Y**

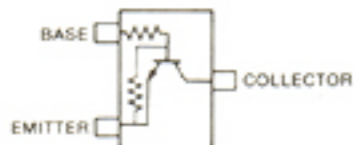
(Symbol: VY)



**Q22, Q24**

**RN1402**

(Symbol: XB)

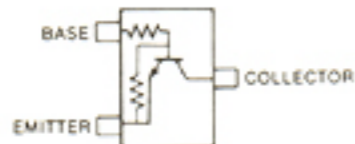


**Q5, Q10, Q11,**

**Q14, Q28**

**RN1404**

(Symbol: XD)

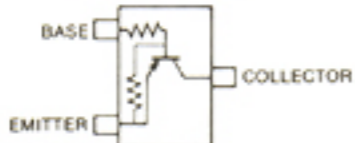


**Q1, Q4, Q9,**

**Q15, Q19, Q27**

**RN2402**

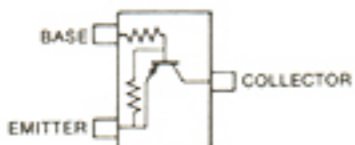
(Symbol: YB)



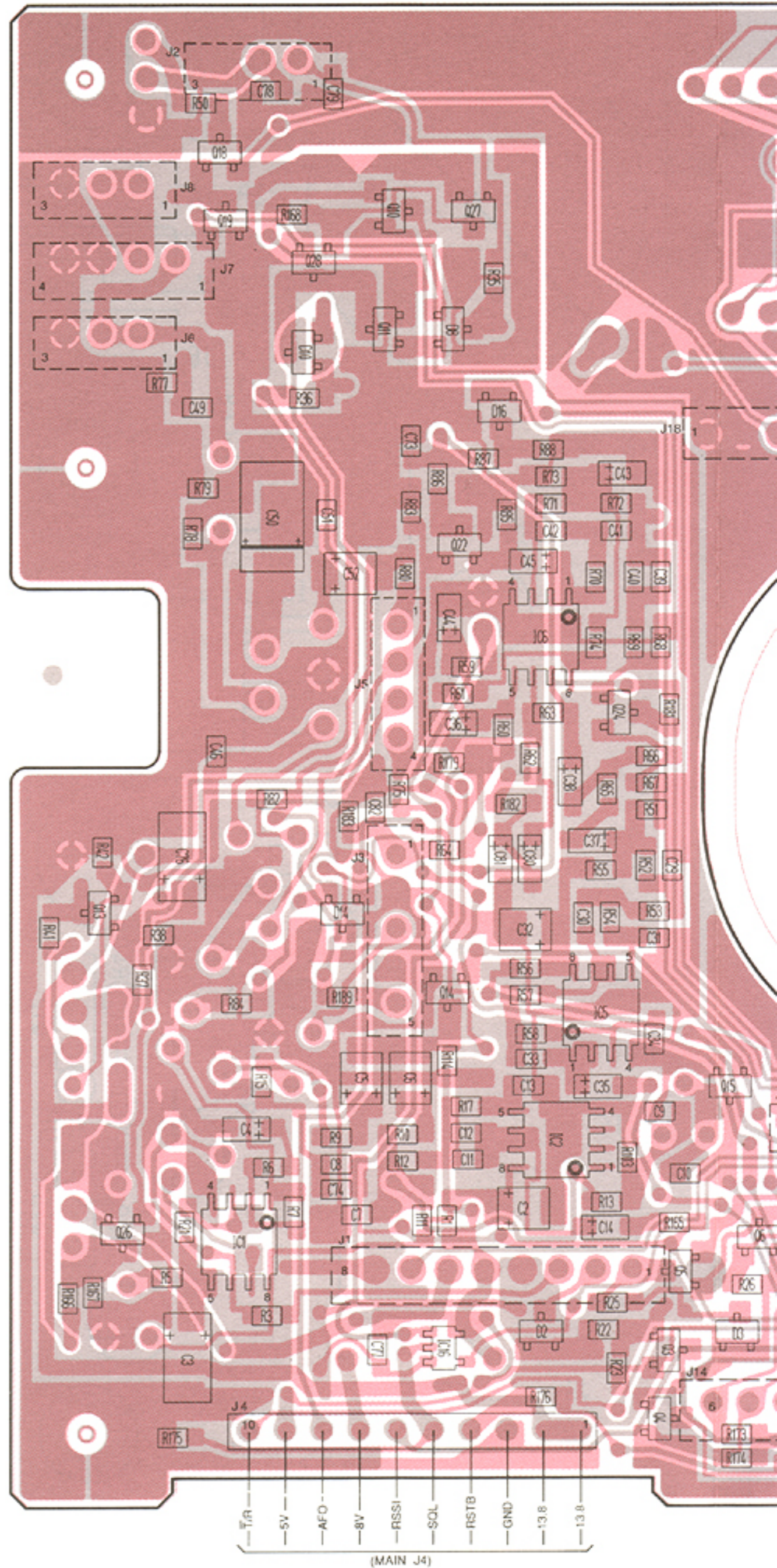
**Q6, Q18**

**RN2404**

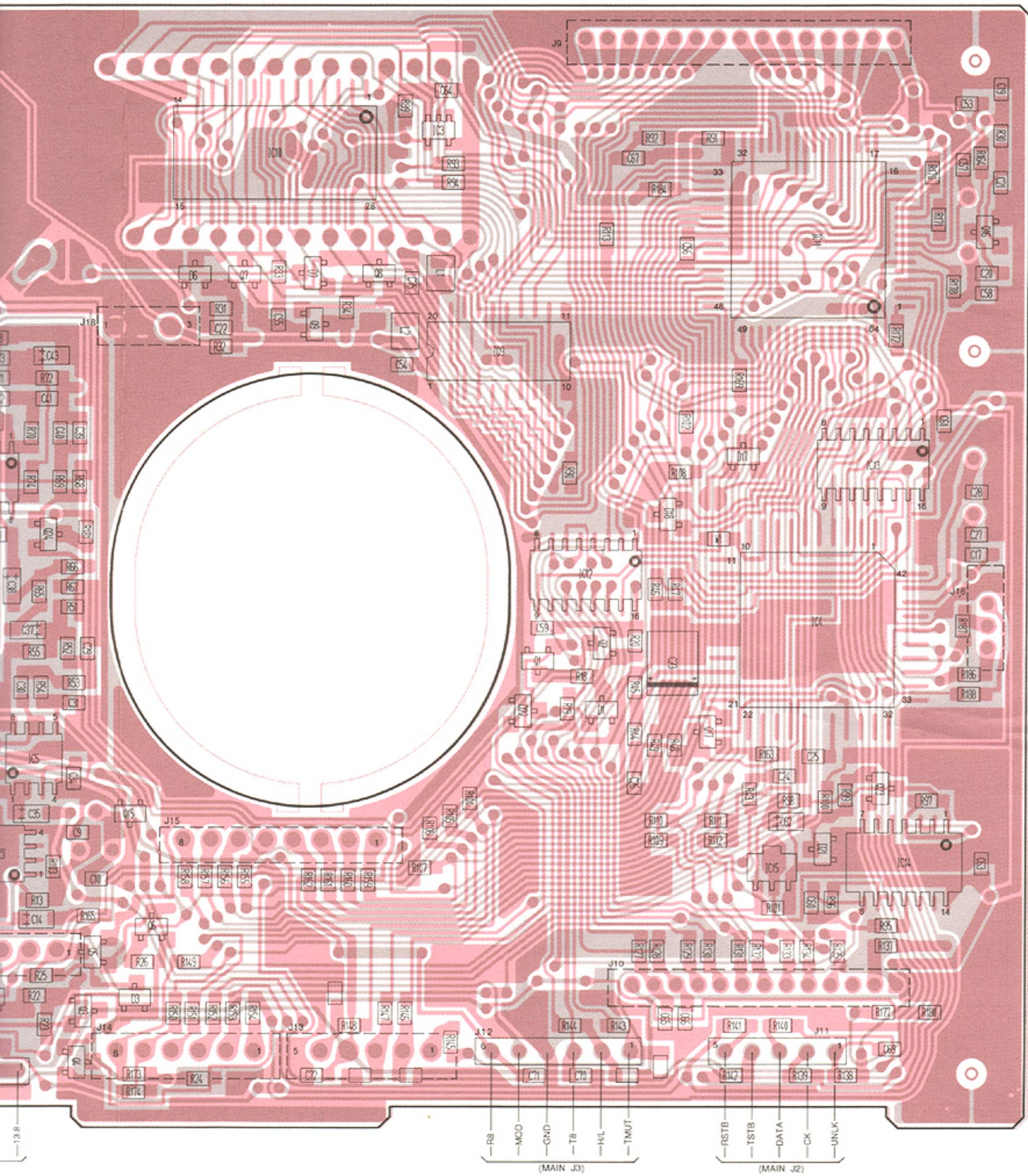
(Symbol: YD)



**Q26**





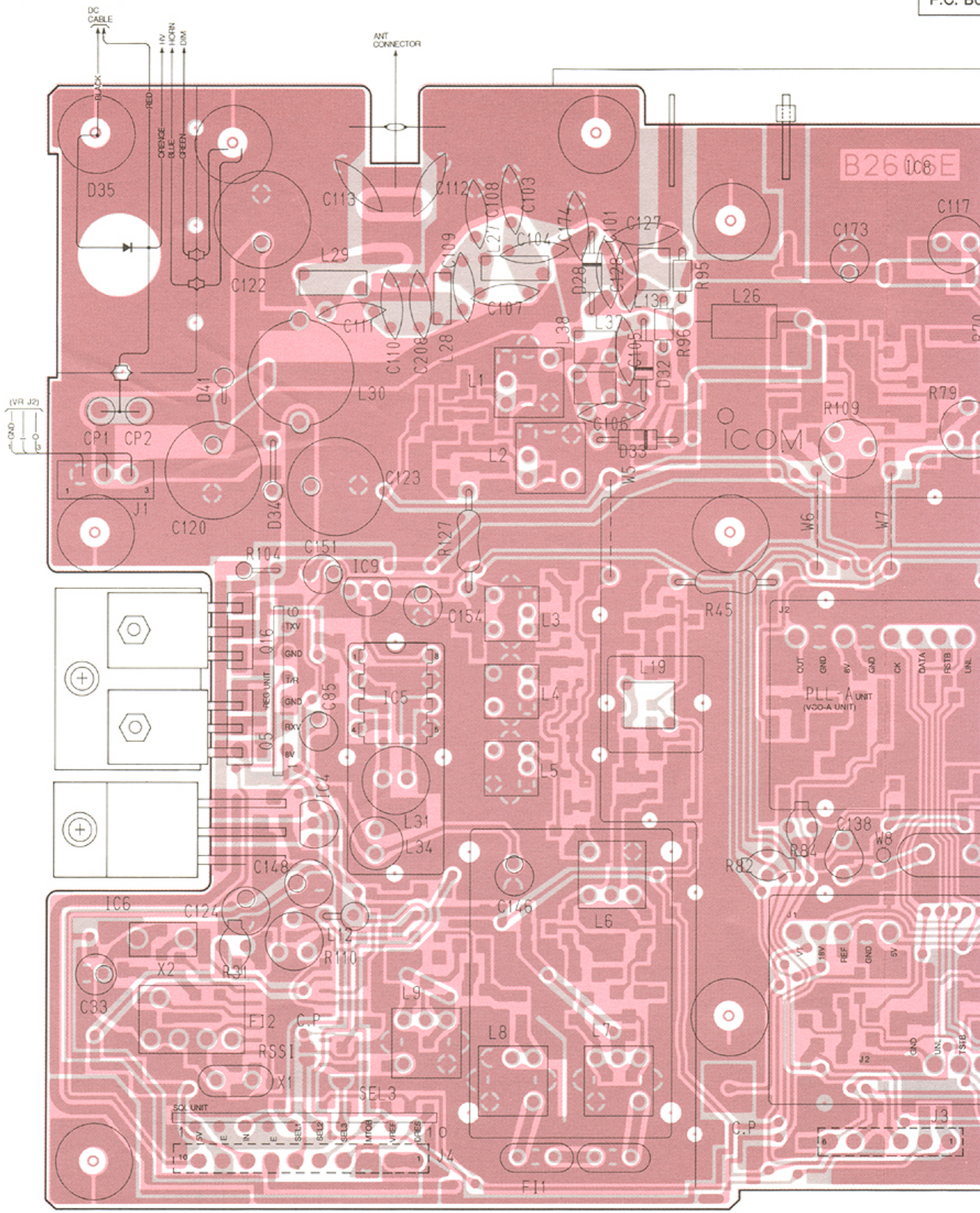




# 7-4 MAIN UNIT

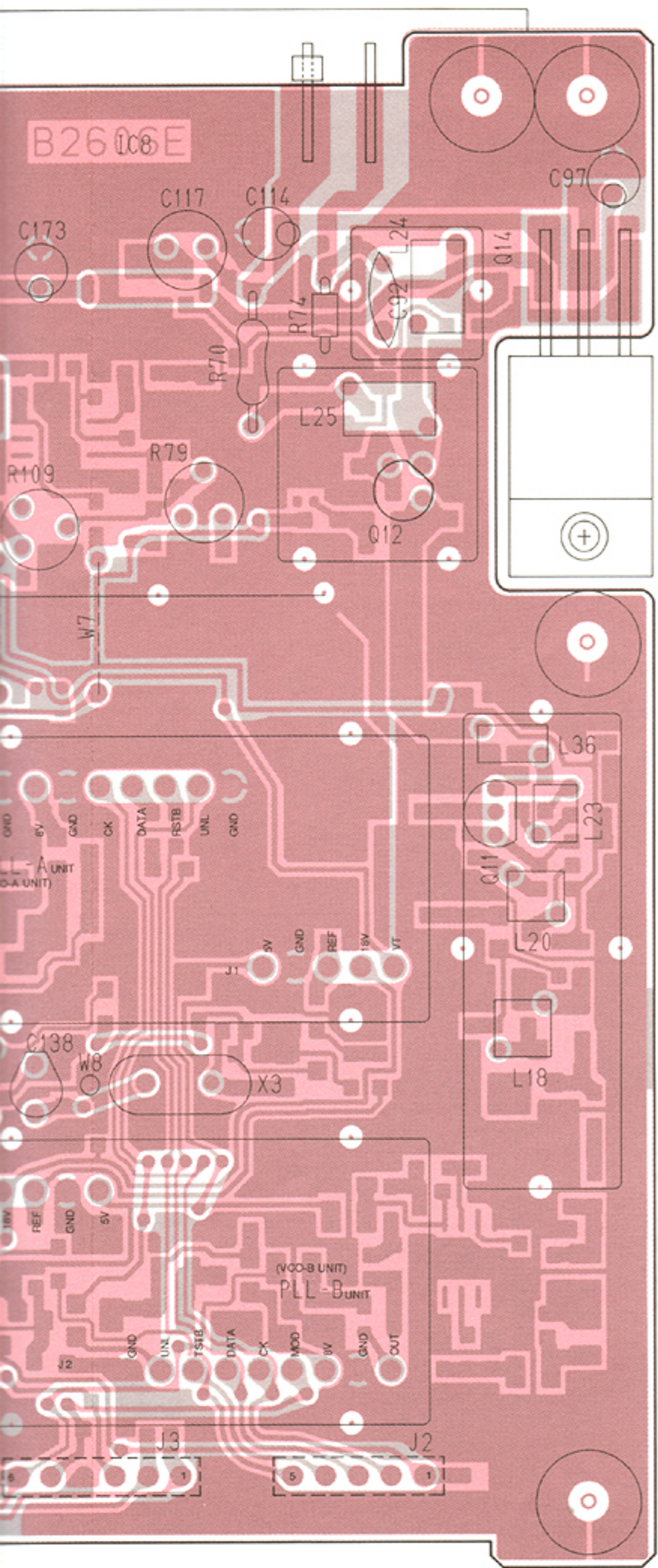
## • MAIN UNIT (TOP VIEW)

The cover of the unit is P.C. Board

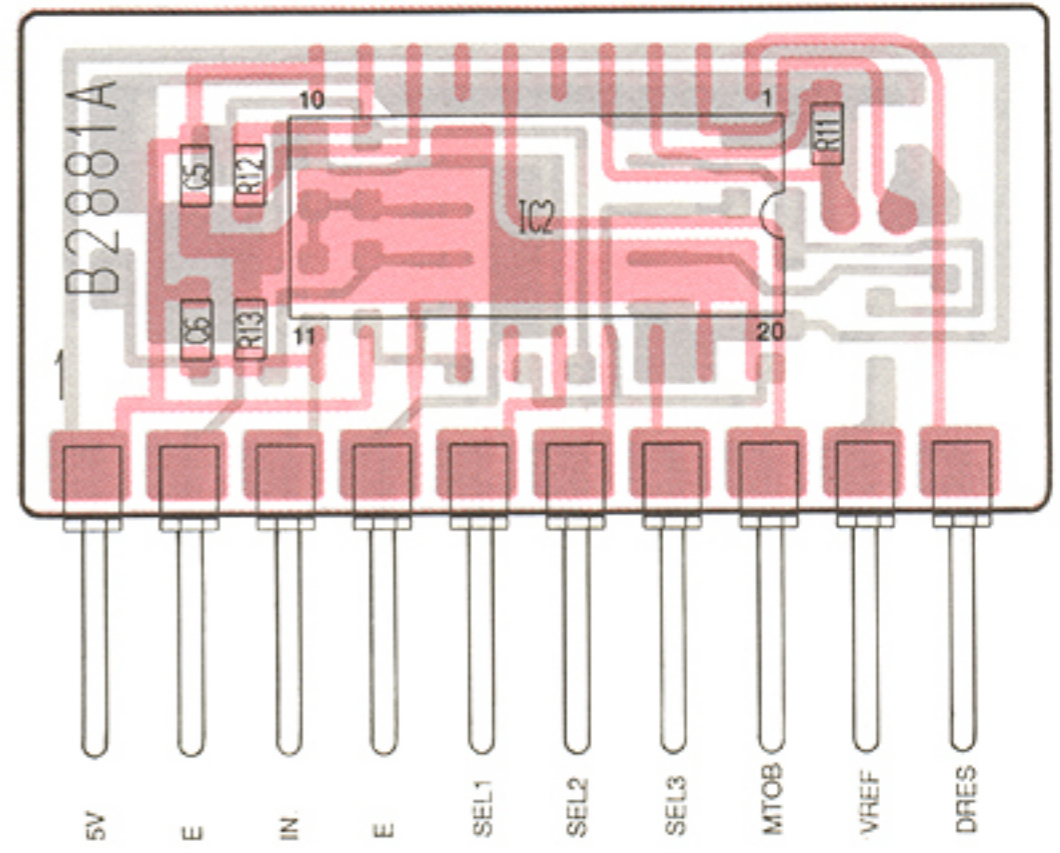




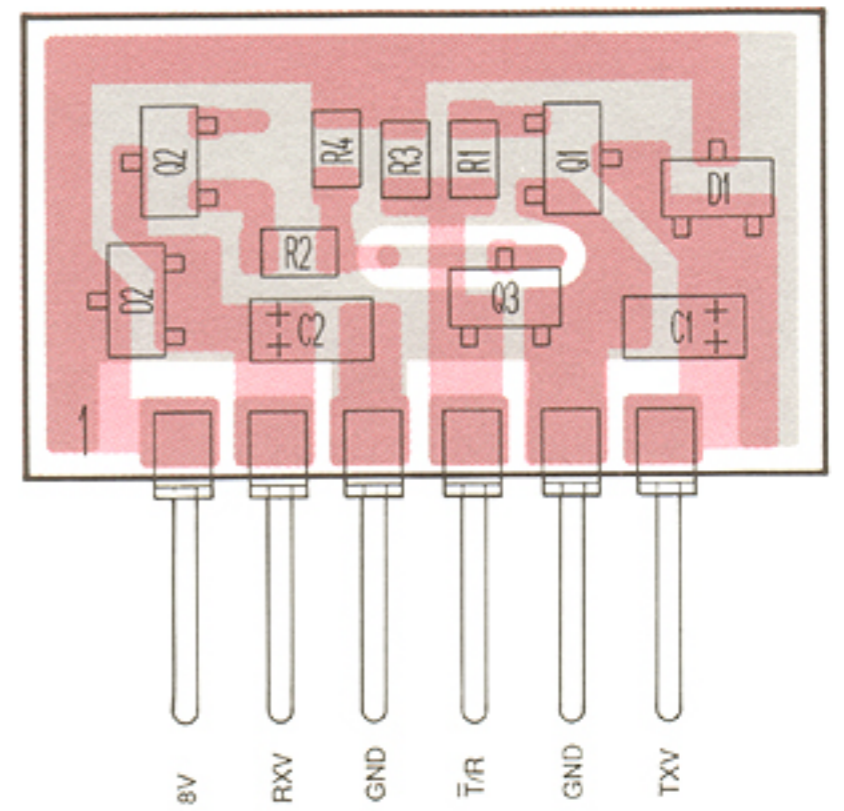
The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.



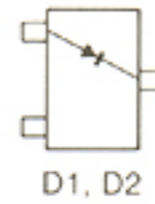
• SQL UNIT



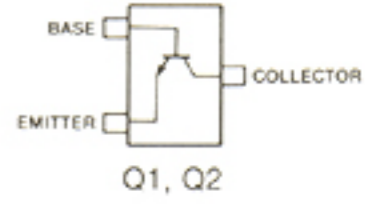
• REG UNIT



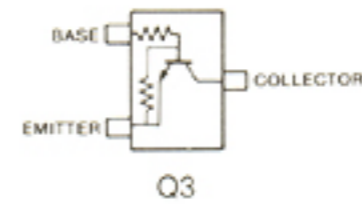
**1SS193**  
(Symbol: F3)



**S2C2712 Y**  
(Symbol: LY)

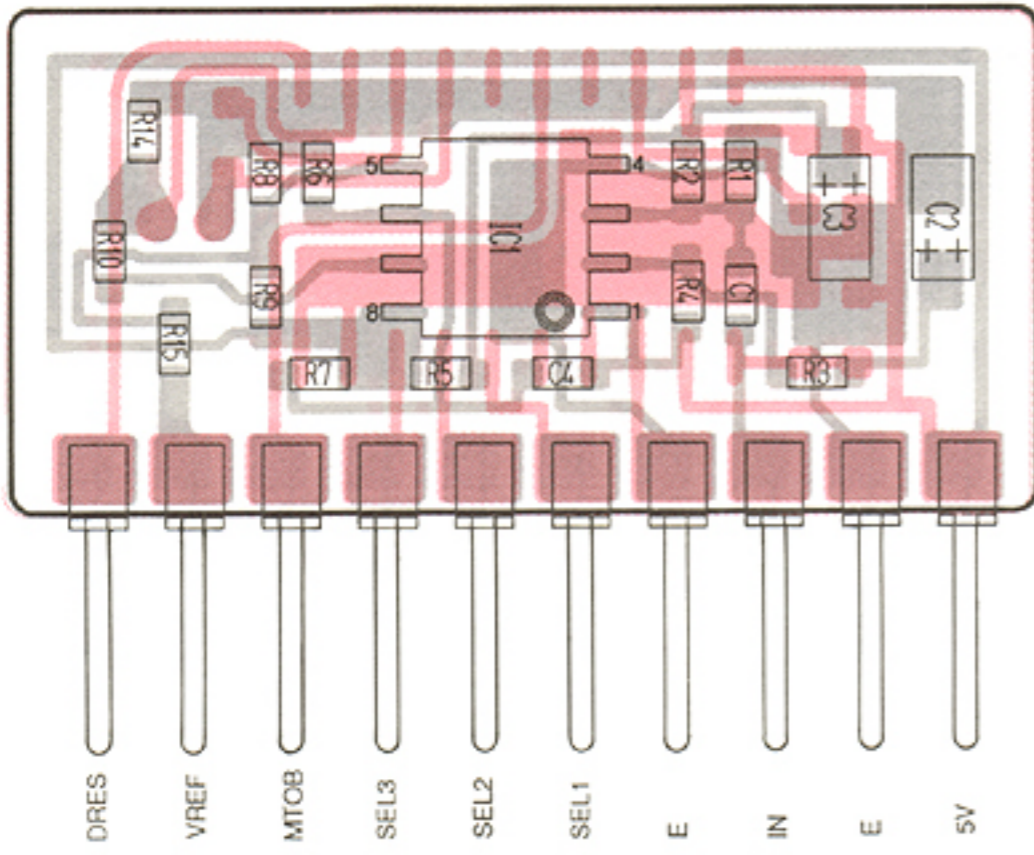


**RN1404**  
(Symbol: XD)

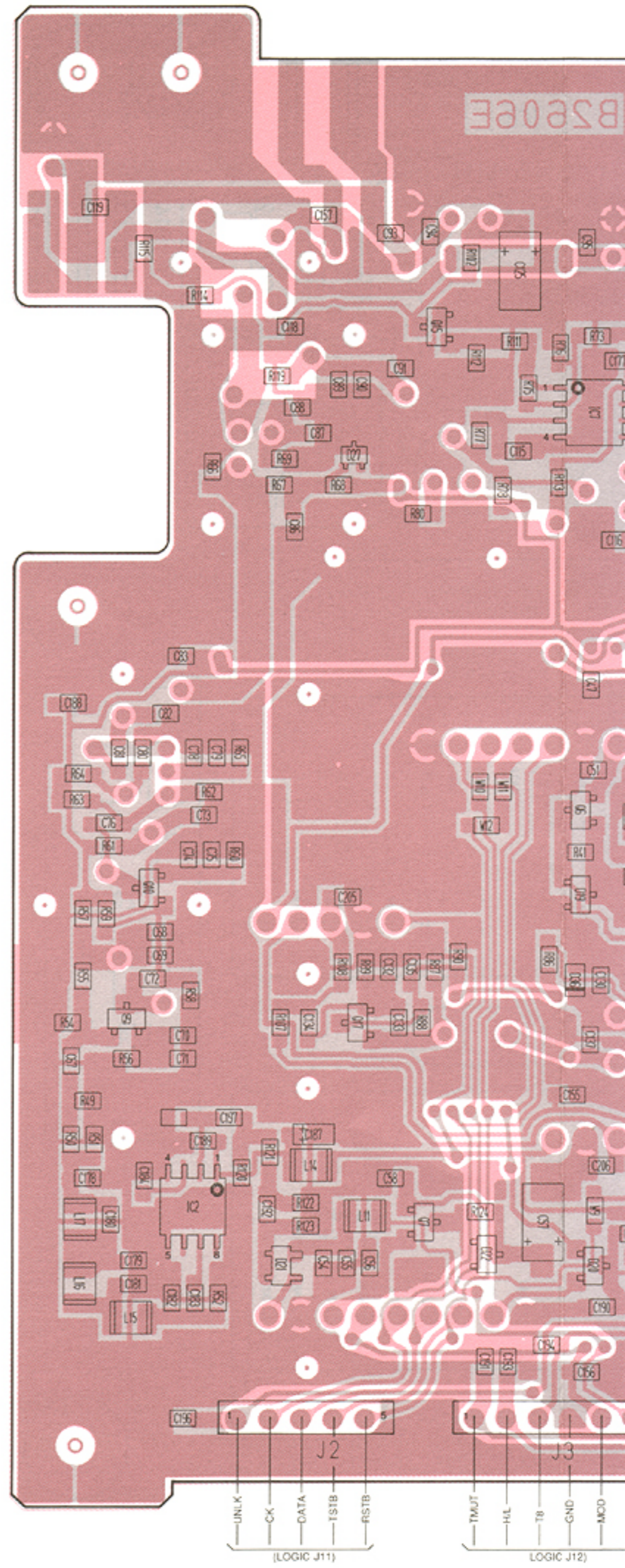




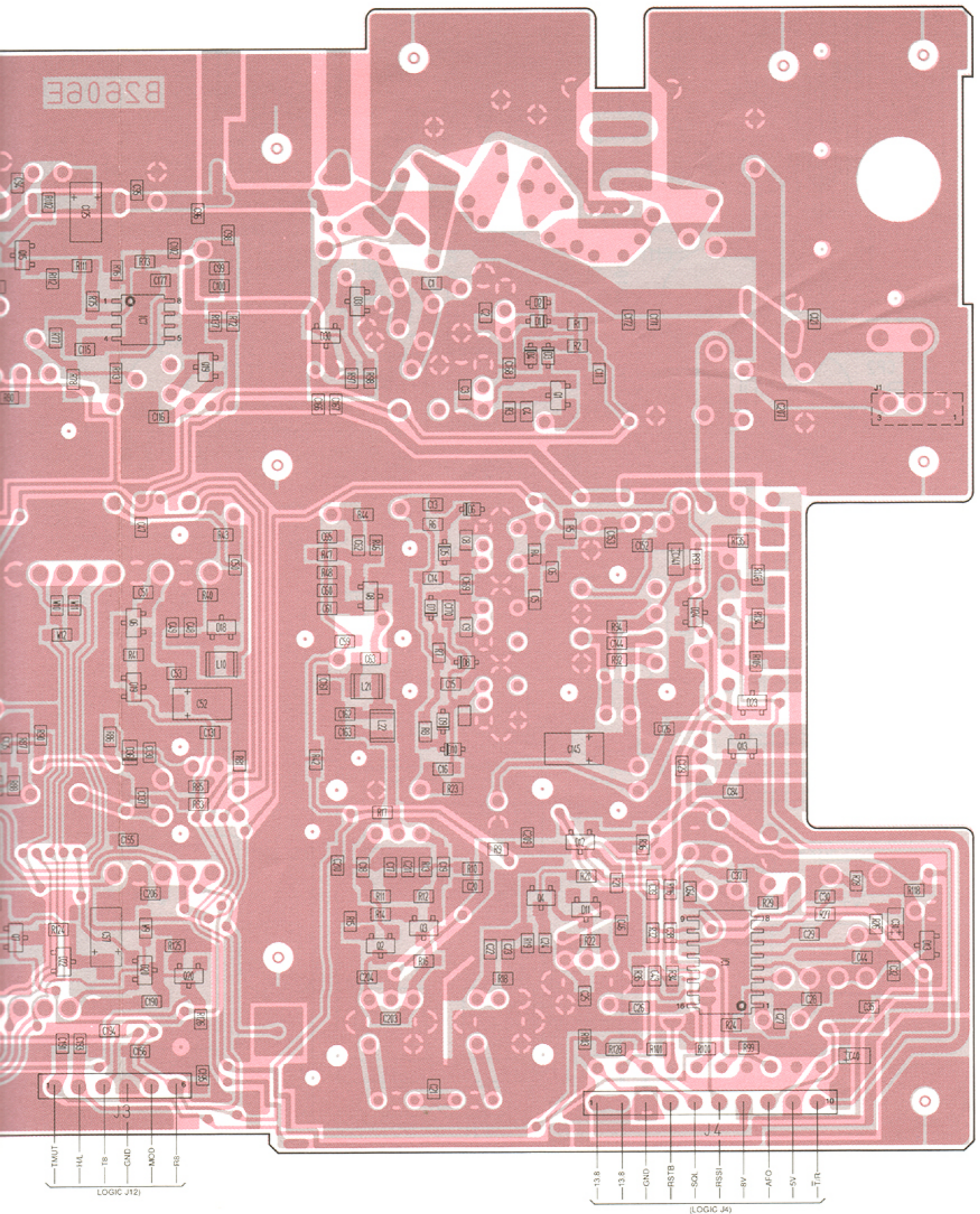
• SQL UNIT



• MAIN UNIT (BOTTOM VIEW)



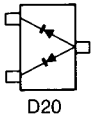




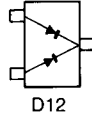


• MAIN UNIT

**1SS181**  
(Symbol: A3)



**1SS184**  
(Symbol: B3)



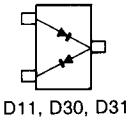
**1SS193**  
(Symbol: F3)



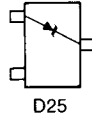
**DA114**  
(Symbol: AV)



**HSM88AS**  
(Symbol: C1)



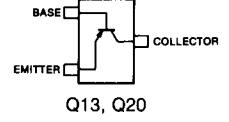
**RD4.7M B3**  
(Symbol: 473)



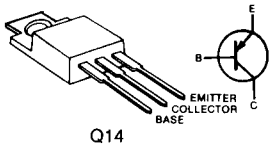
**RD6.2M B2**  
(Symbol: 622)



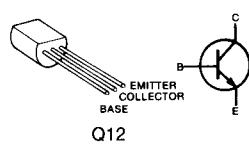
**2SA1162 Y**  
(Symbol: SY)



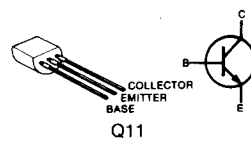
**2SB1019-Y**



**2SC2053**

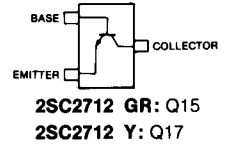


**2SC2407**

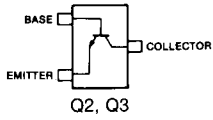


**2SC2712 GR**  
(Symbol: LG)

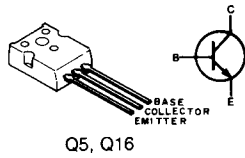
**2SC2712 Y**  
(Symbol: LY)



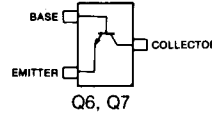
**2SC3356**  
(Symbol: R22)



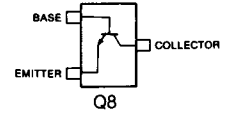
**2SC3422 Y**



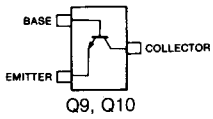
**2SC3661 TA**  
(Symbol: CP)



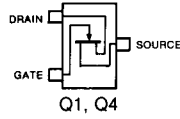
**2SC3770 3**  
(Symbol: JY3)



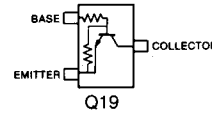
**2SC3772 3**  
(Symbol: LY3)



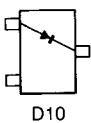
**2SK302 GR**  
(Symbol: TG)



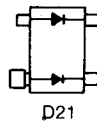
**RN1404**  
(Symbol: XD)



**1SV128**  
(Symbol: BB)

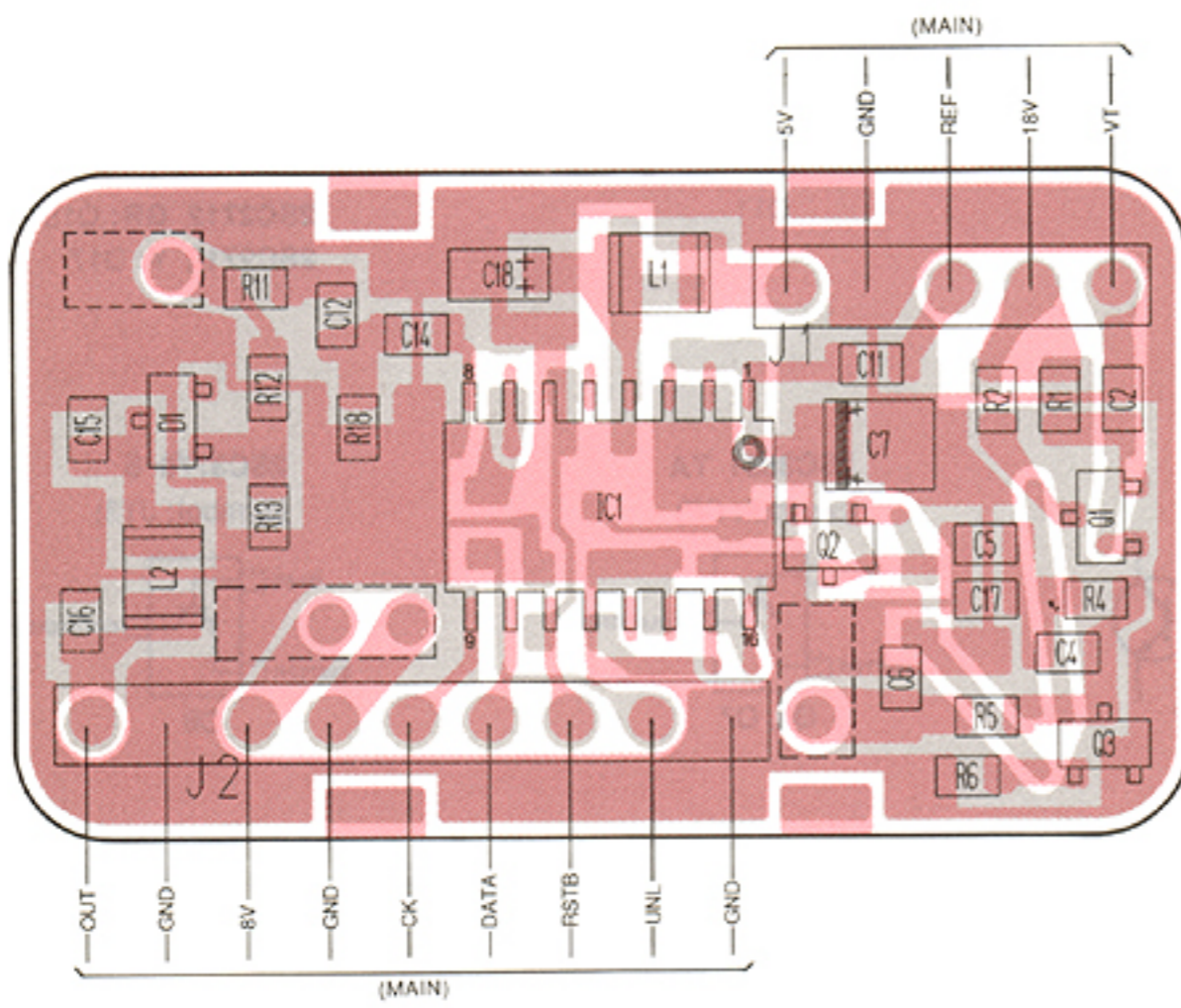
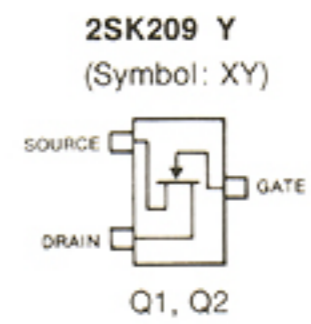
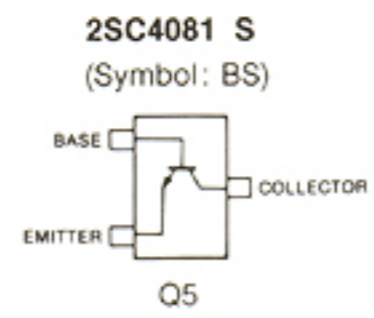
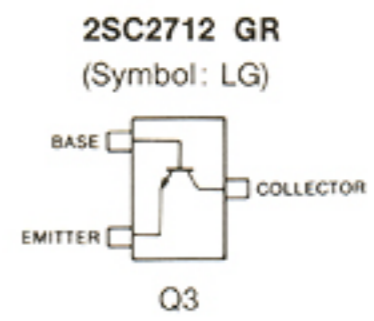
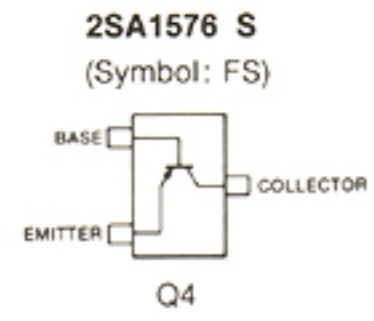
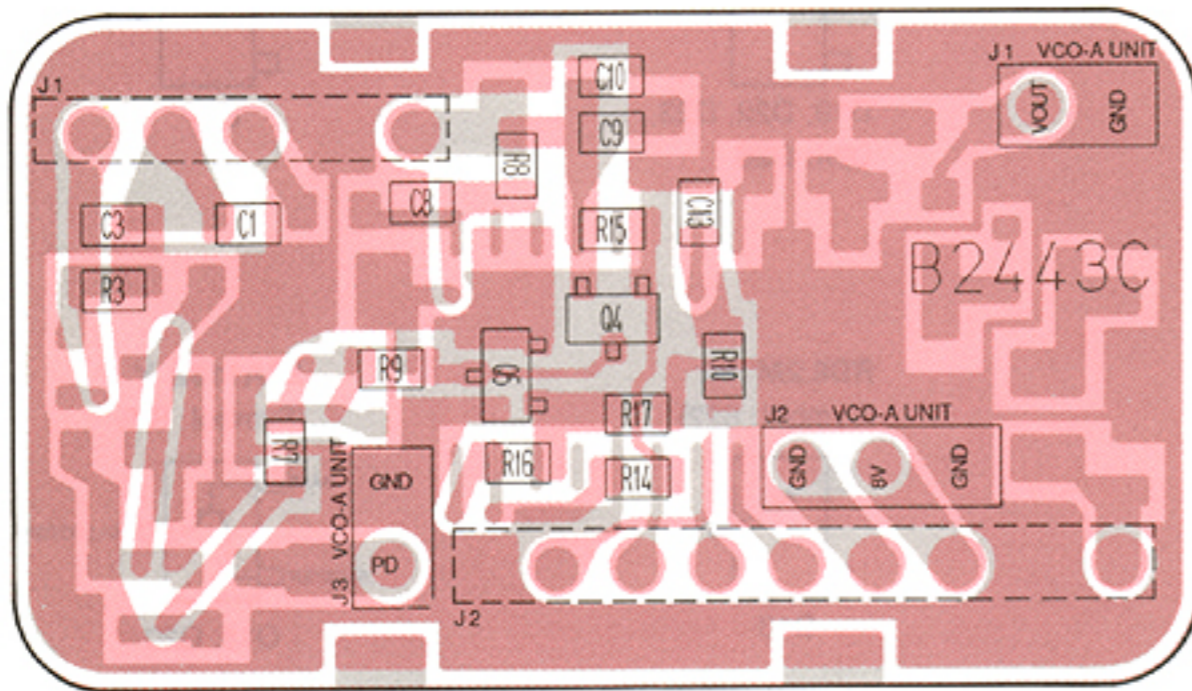


**1SV237**  
(Symbol: BB)

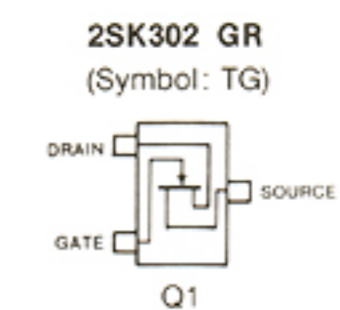
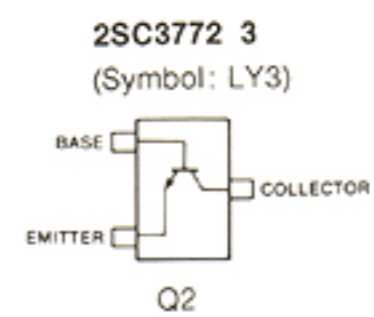
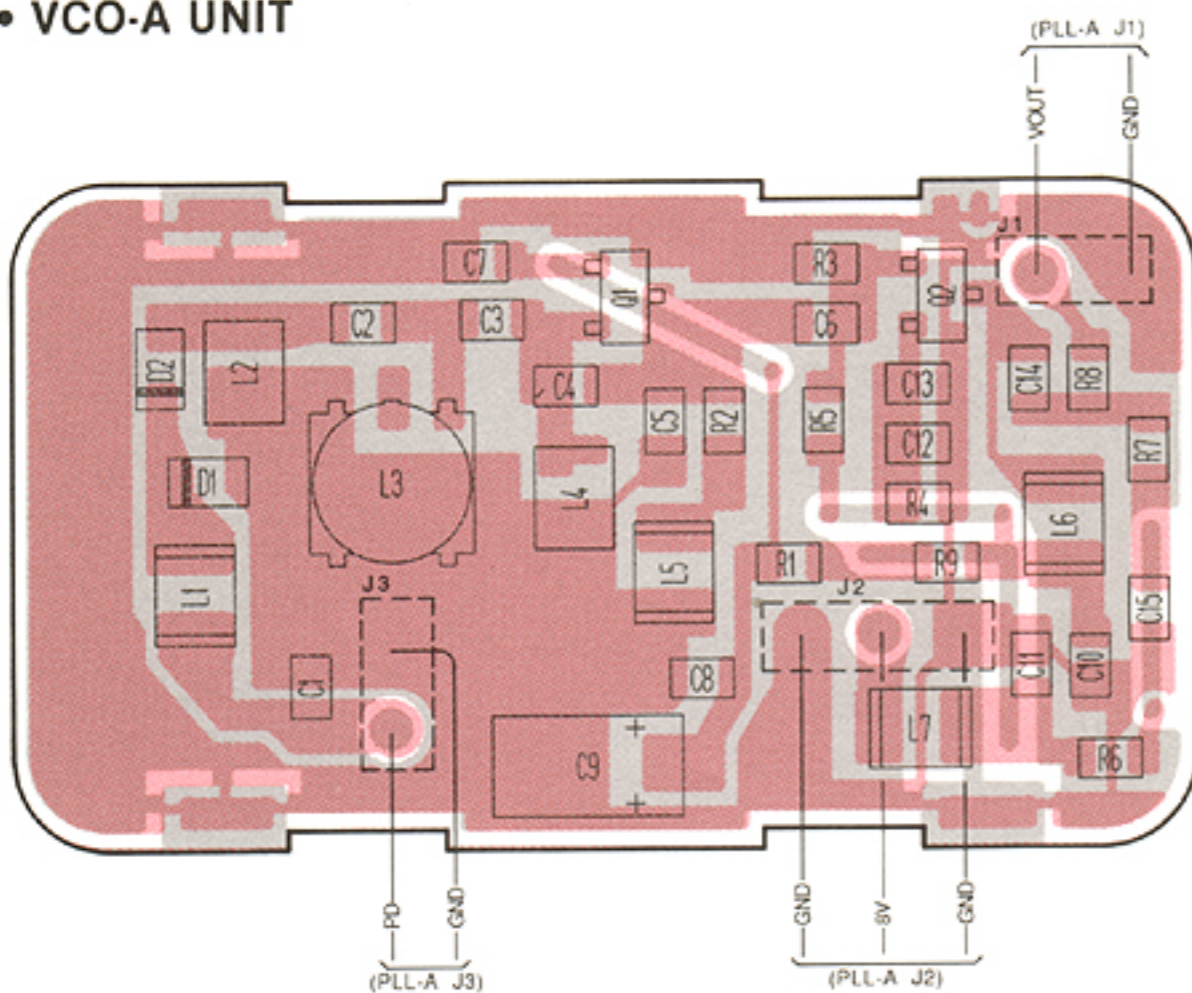


# 7-5 SUBORDINATE MAIN UNITS

## • PLL-A UNIT

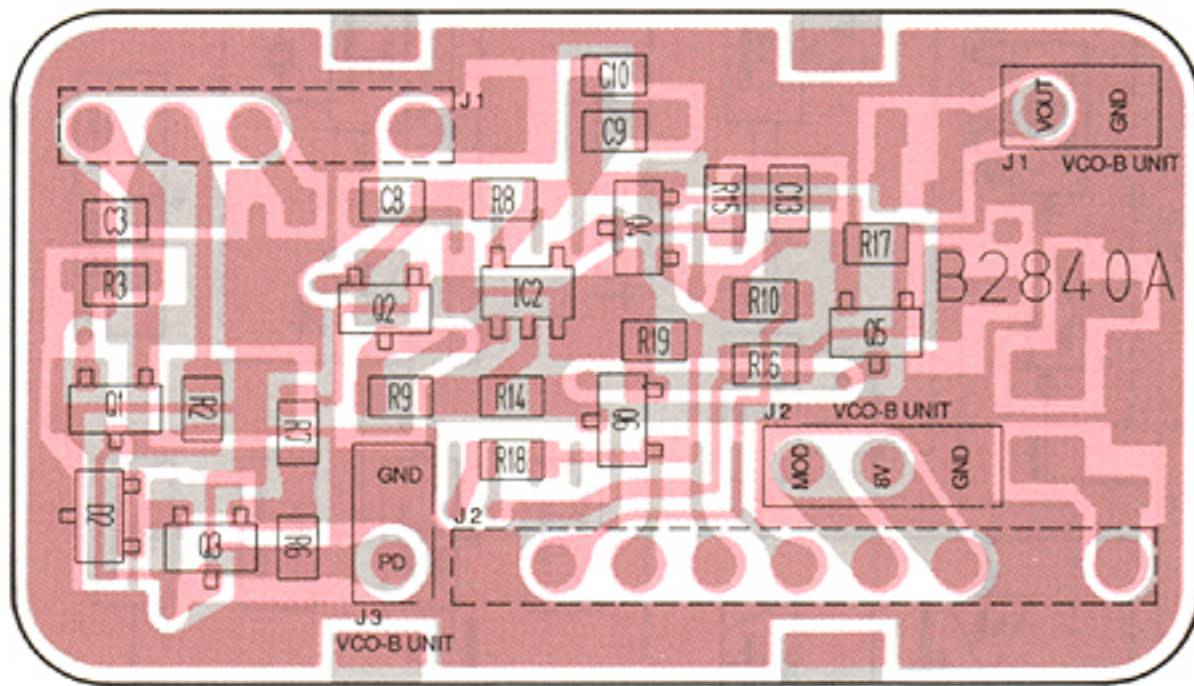
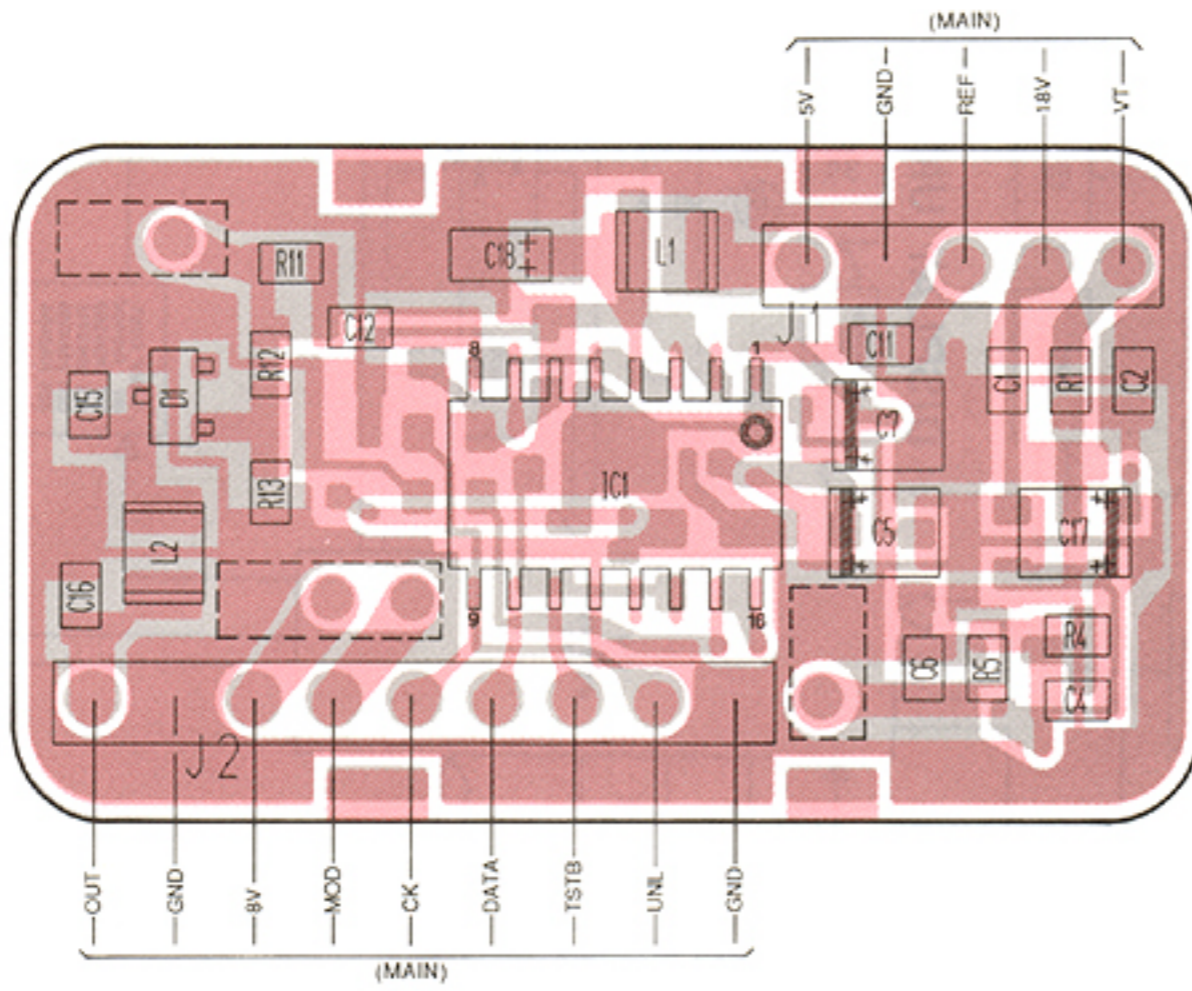


## • VCO-A UNIT

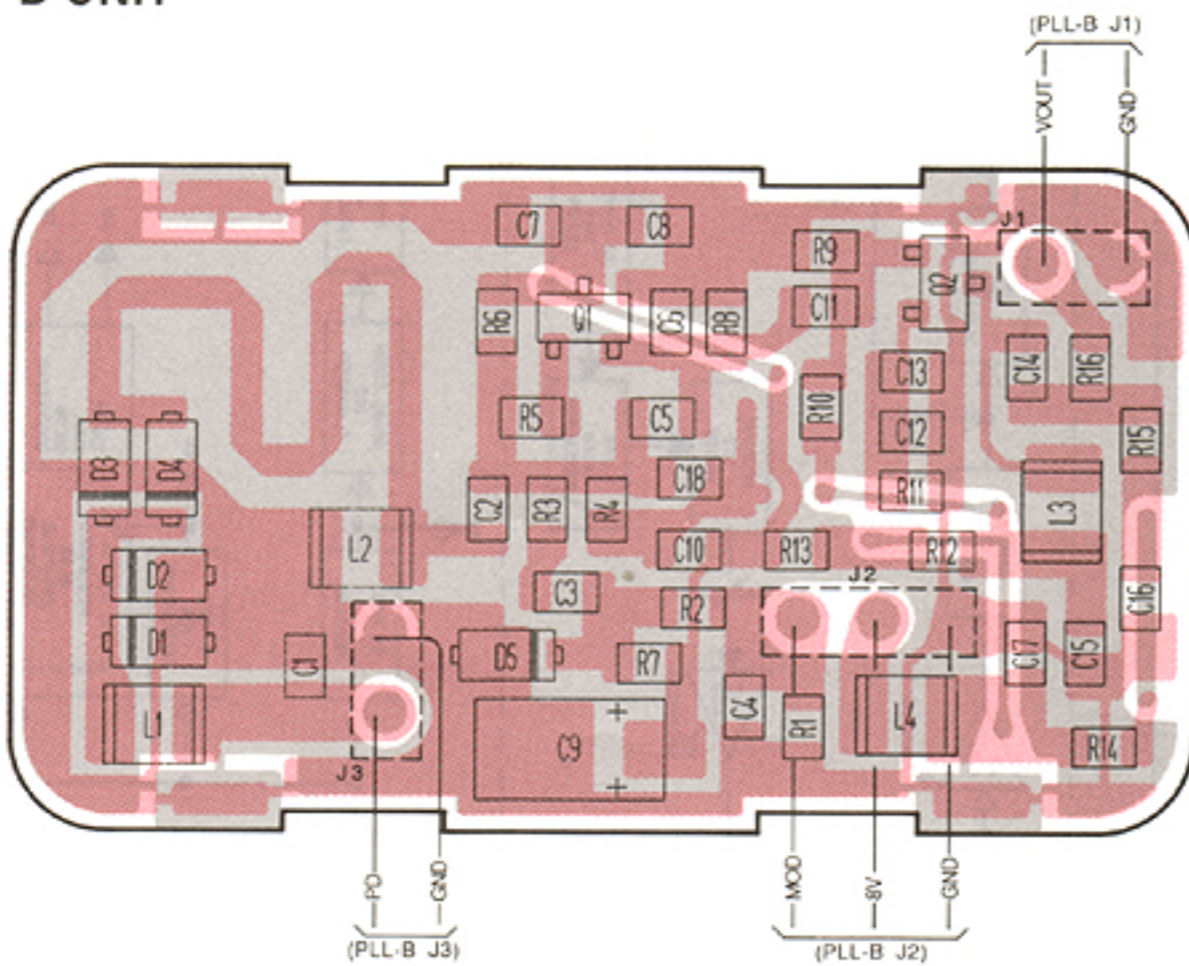




• PLL-B UNIT



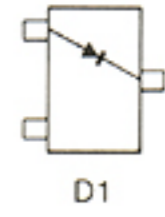
• VCO-B UNIT



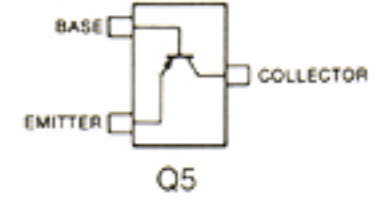
**1SS193**  
(Symbol: F3)



**1SV128**  
(Symbol: BB)



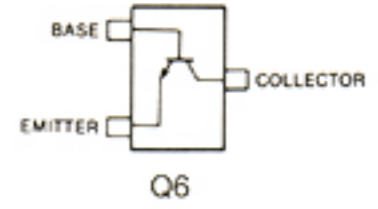
**2SA1576 S**  
(Symbol: FS)



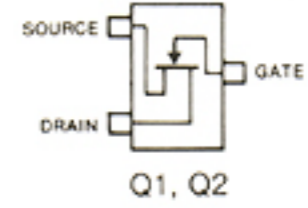
**2SC2712 GR**  
(Symbol: LG)



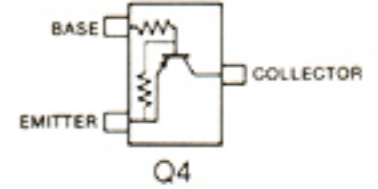
**2SC4081 S**  
(Symbol: BS)



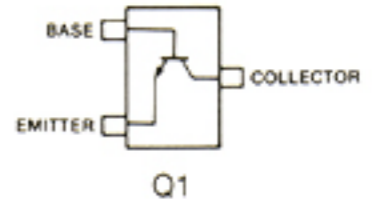
**2SK209 Y**  
(Symbol: XY)



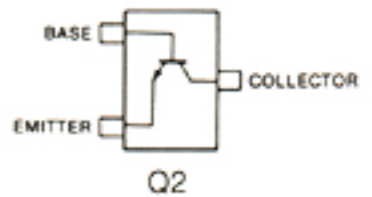
**RN2404**  
(Symbol: YD)



**2SC3356**  
(Symbol: R22)

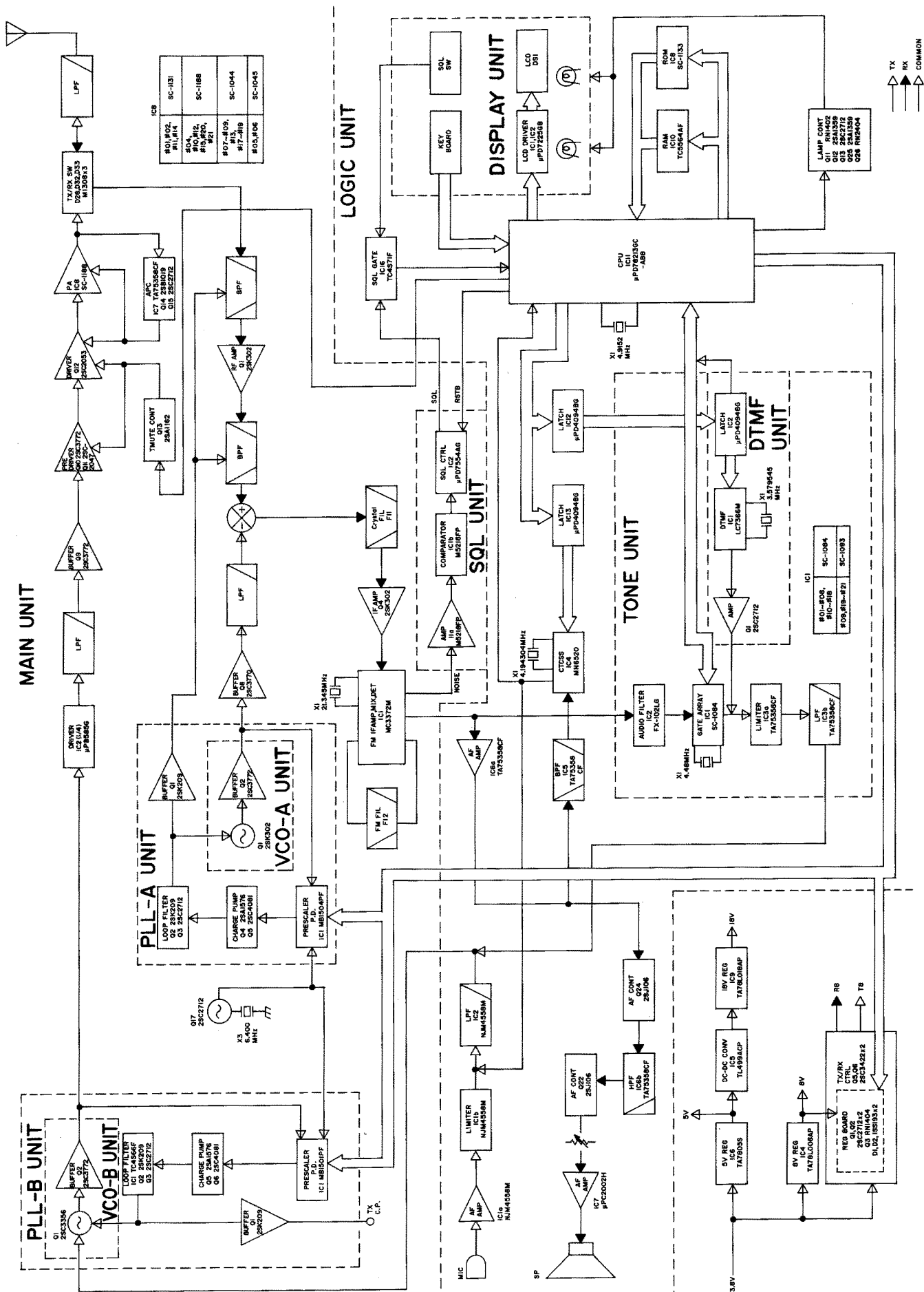


**2SC3772 3**  
(Symbol: LY3)

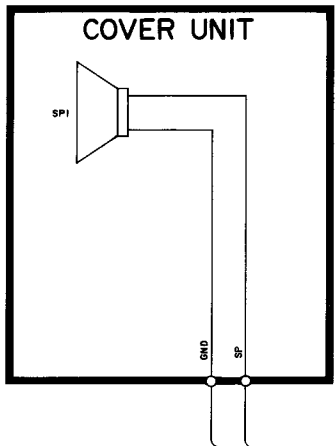
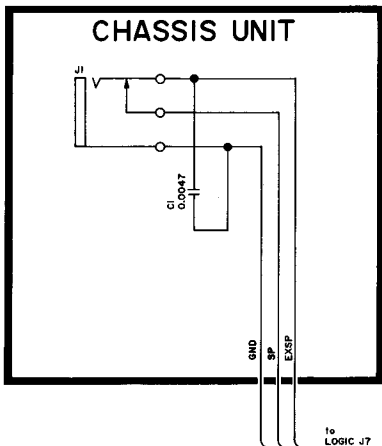
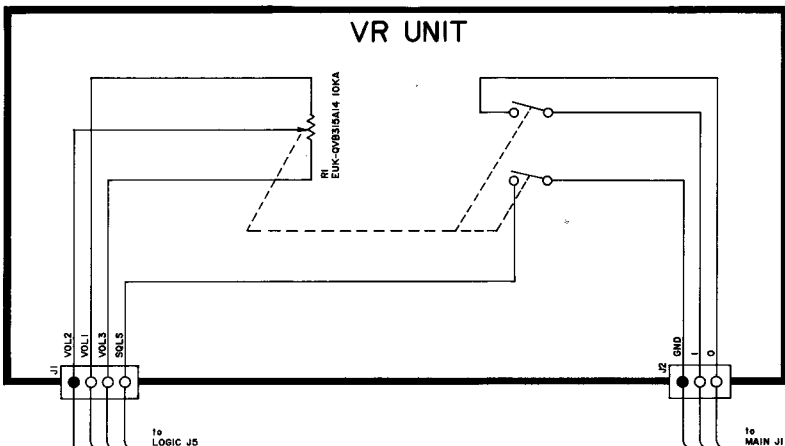
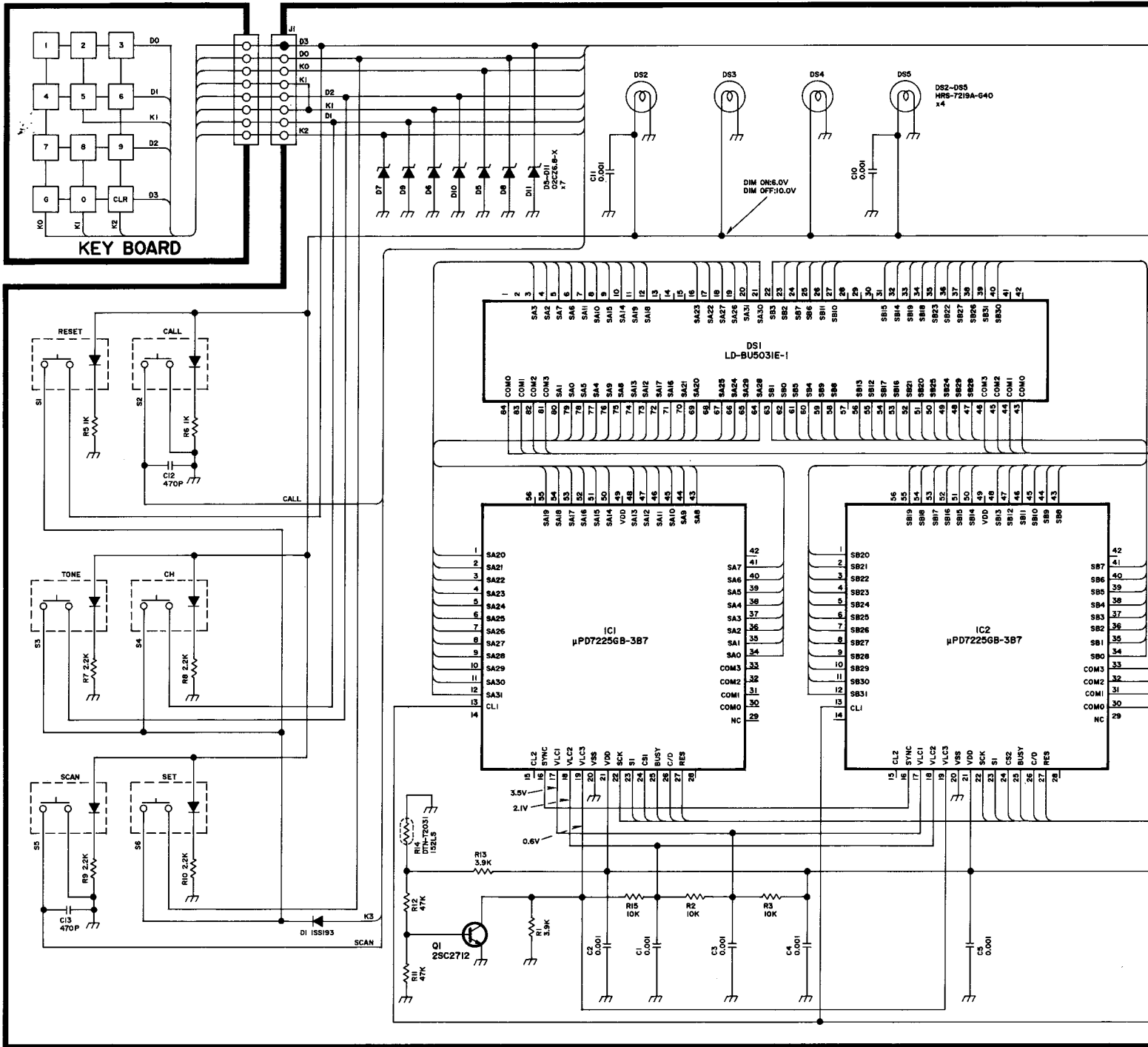


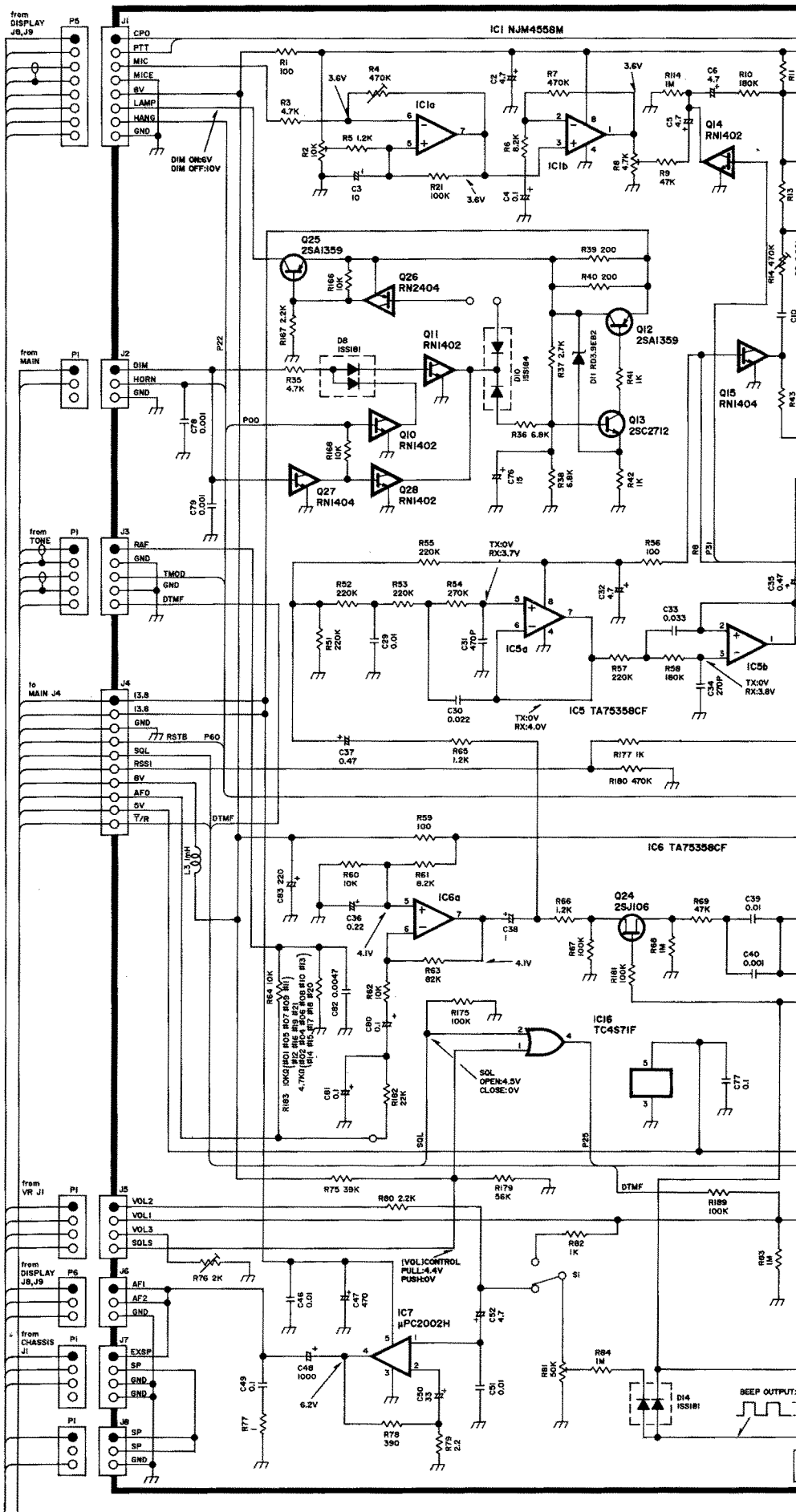
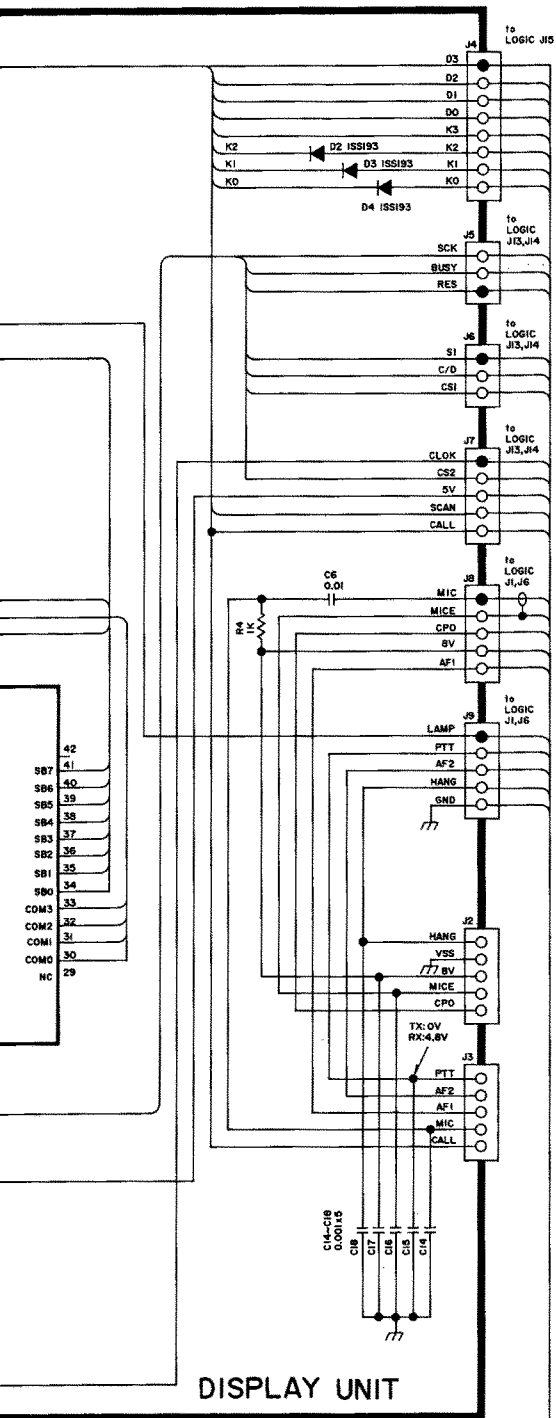


# SECTION 8 BLOCK DIAGRAM

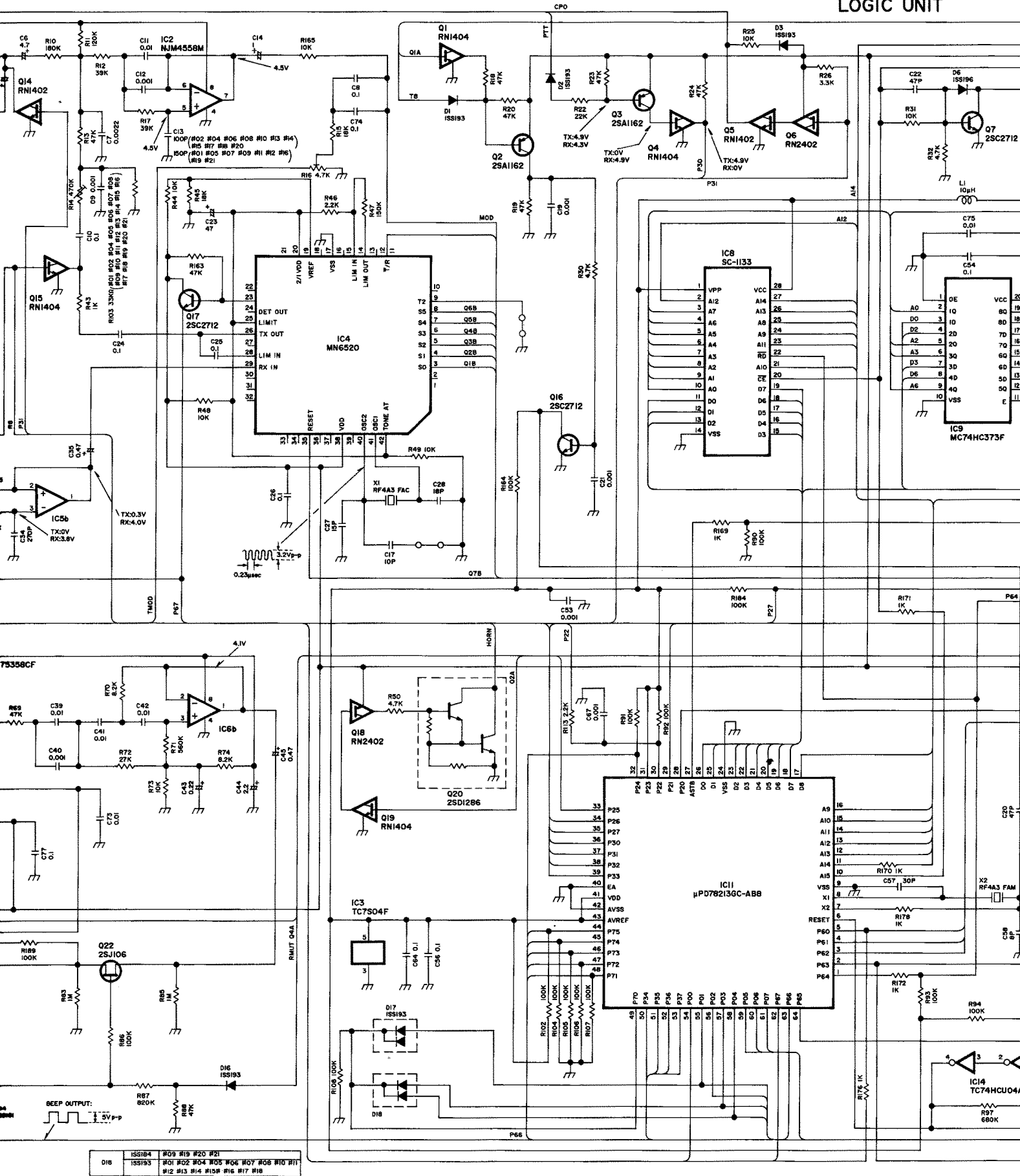


# SECTION 9 VOLTAGE DIAGRAM

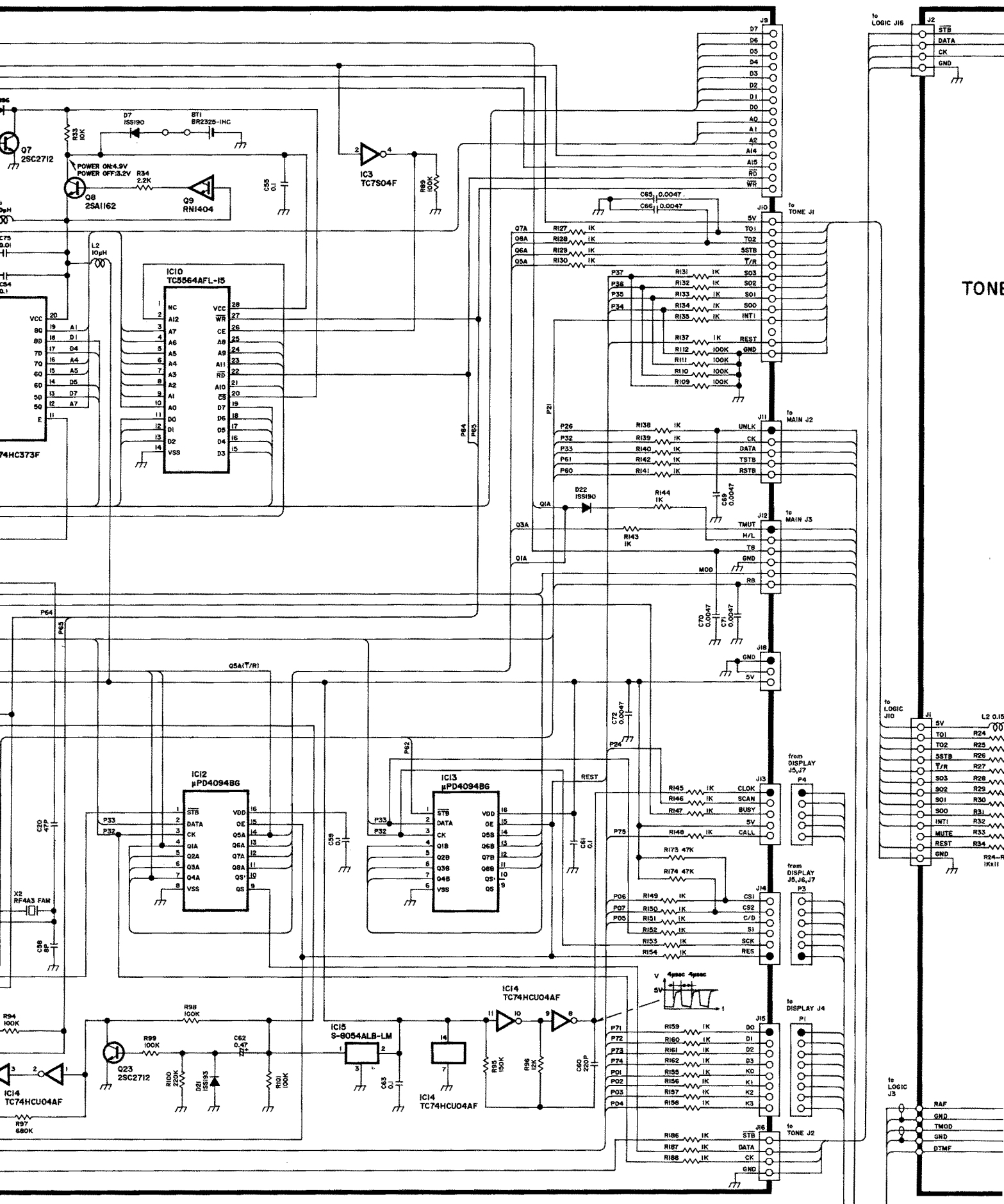




# LOGIC UNIT



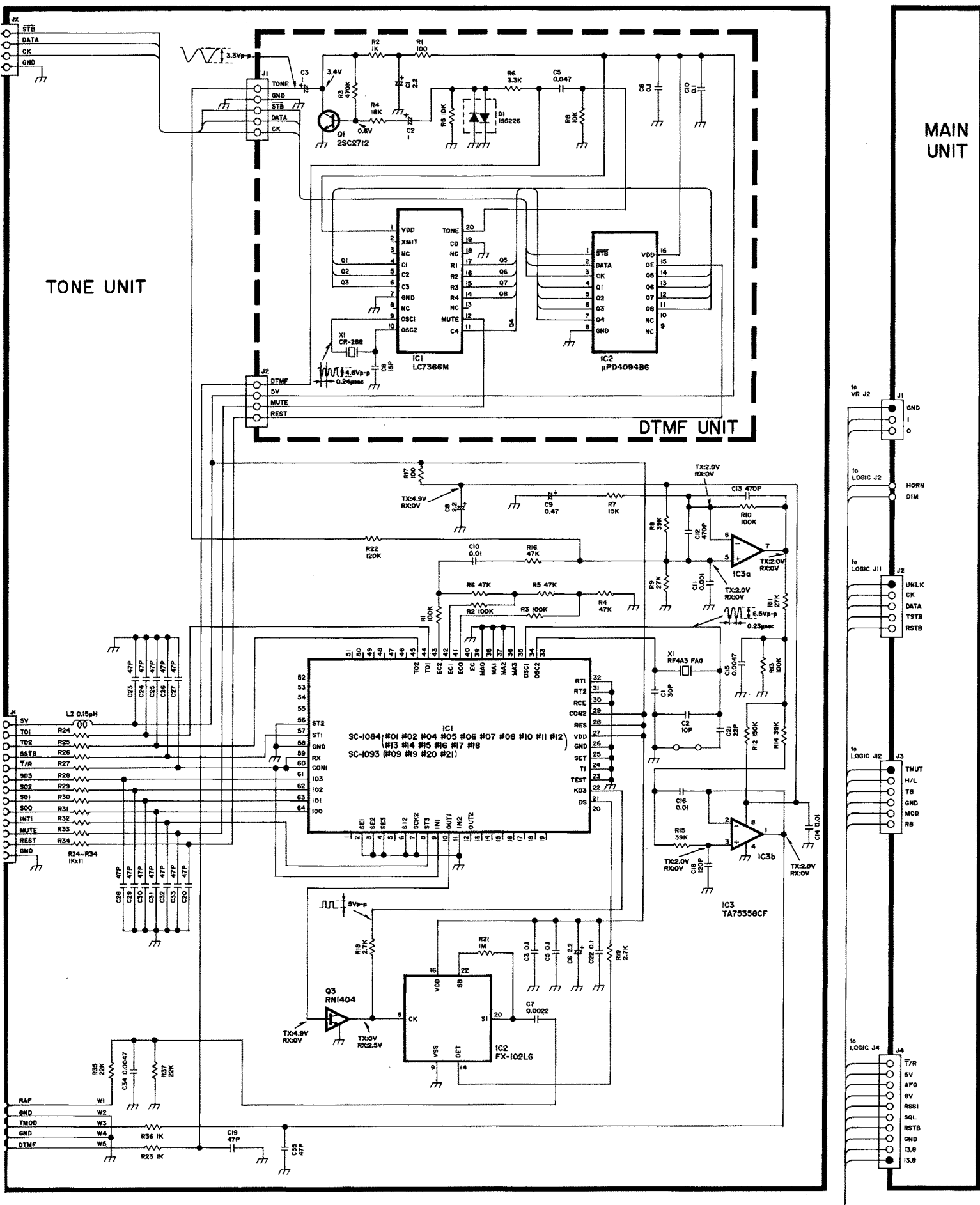




TONE

to LOGIC J10

to LOGIC J3

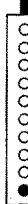
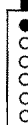
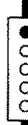
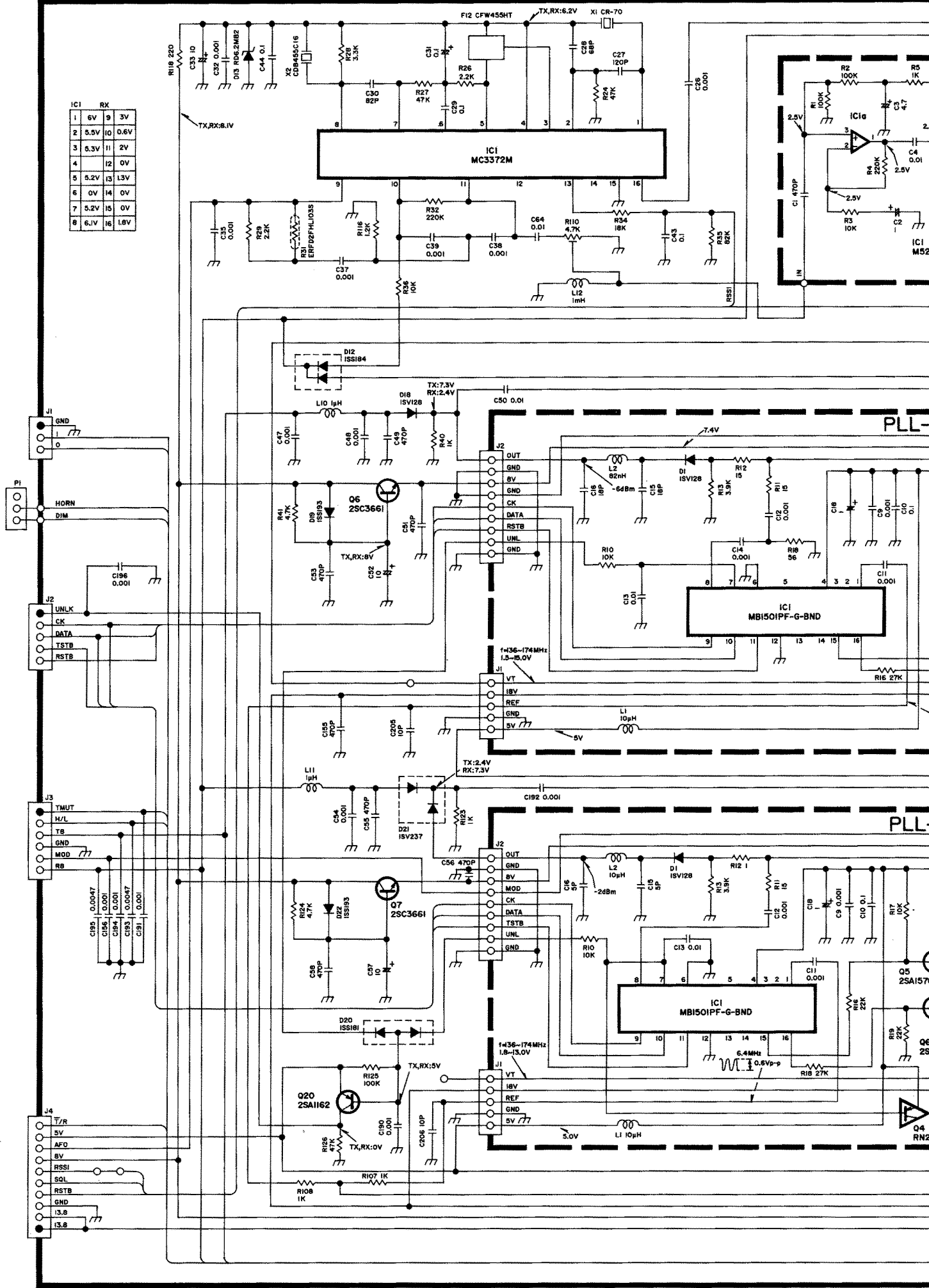


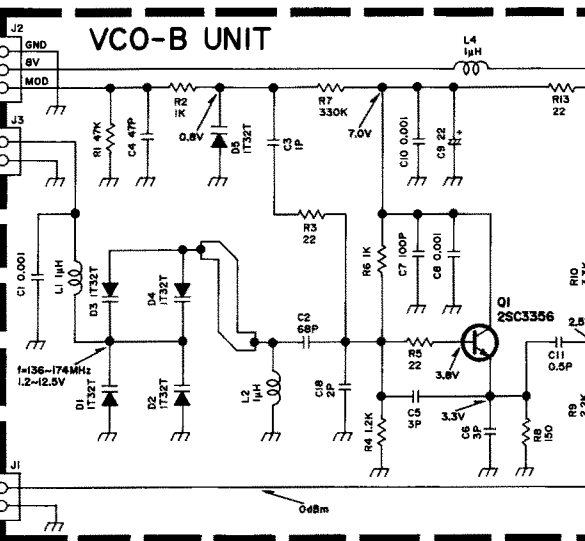
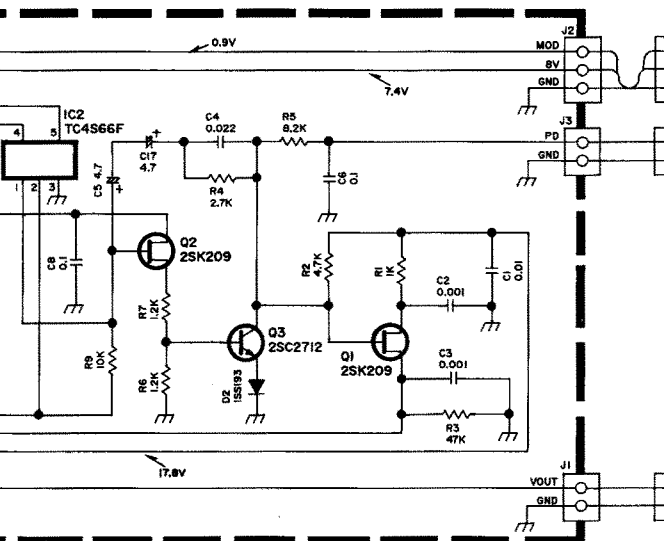
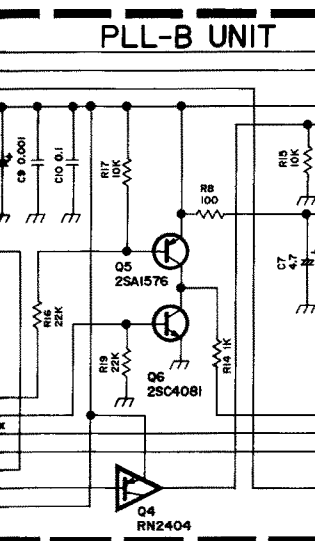
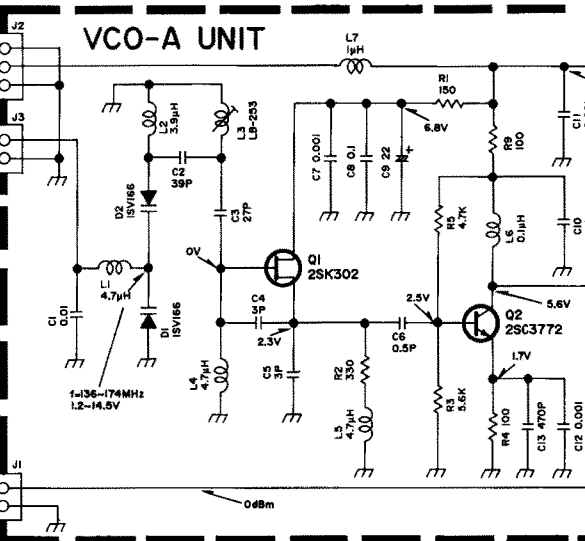
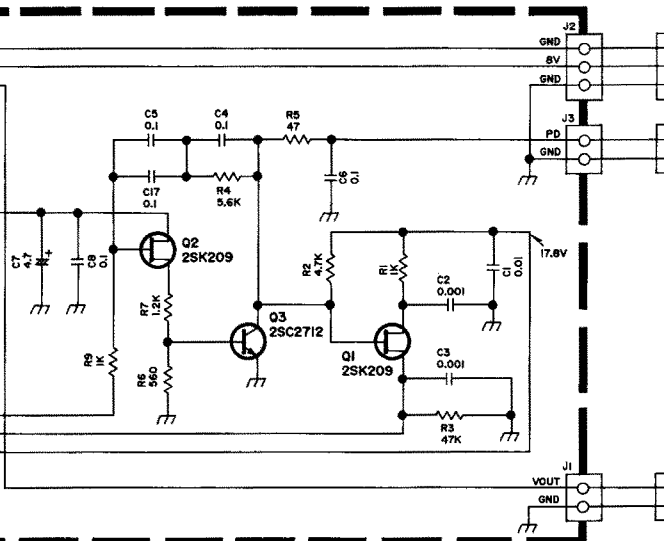
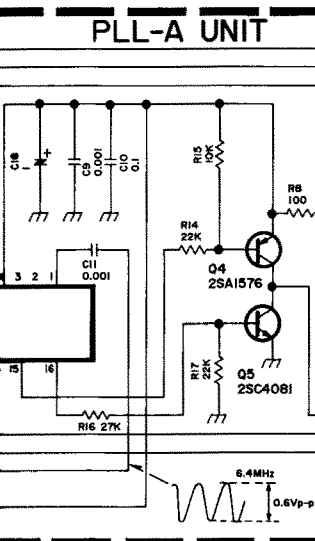
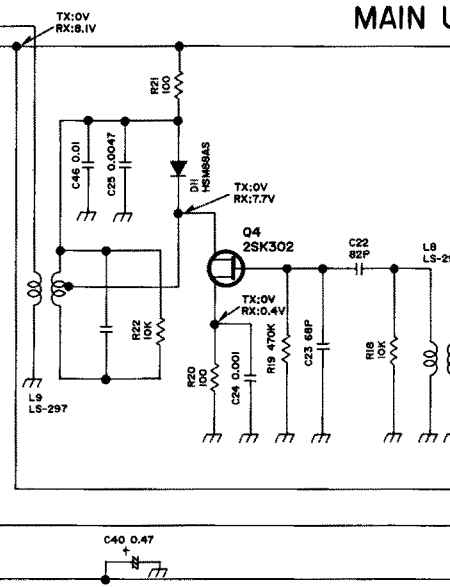
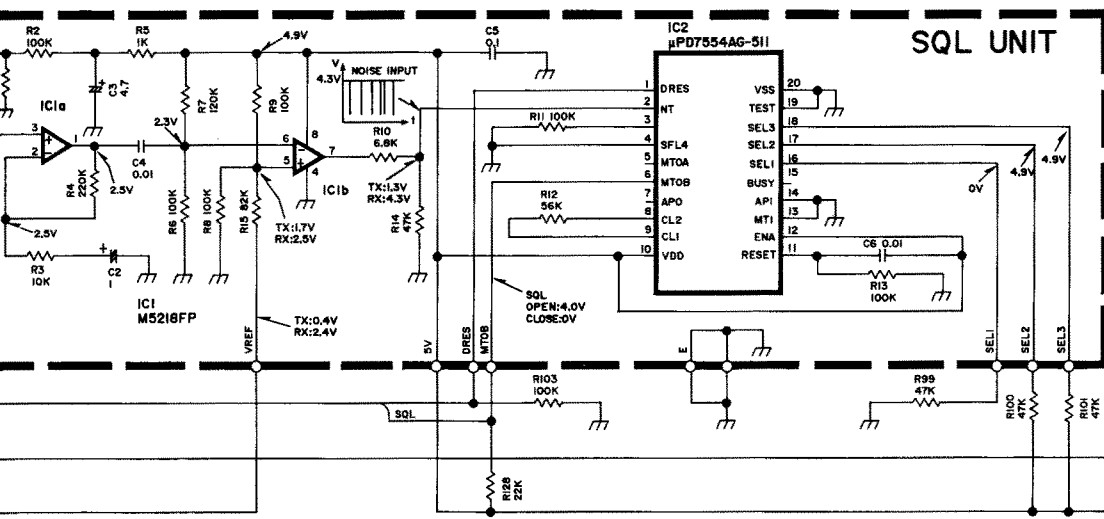
TONE UNIT

DTMF UNIT

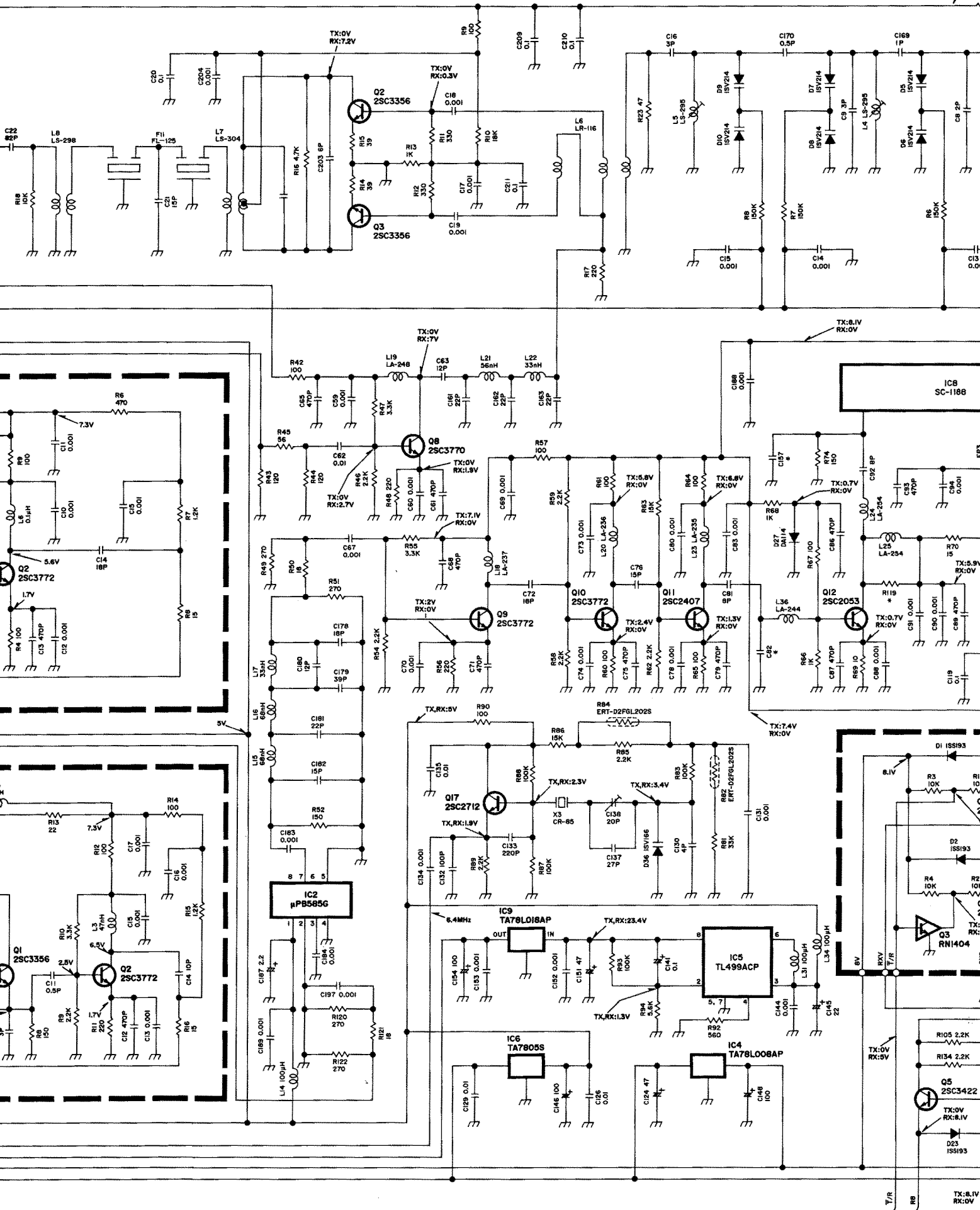
MAIN UNIT

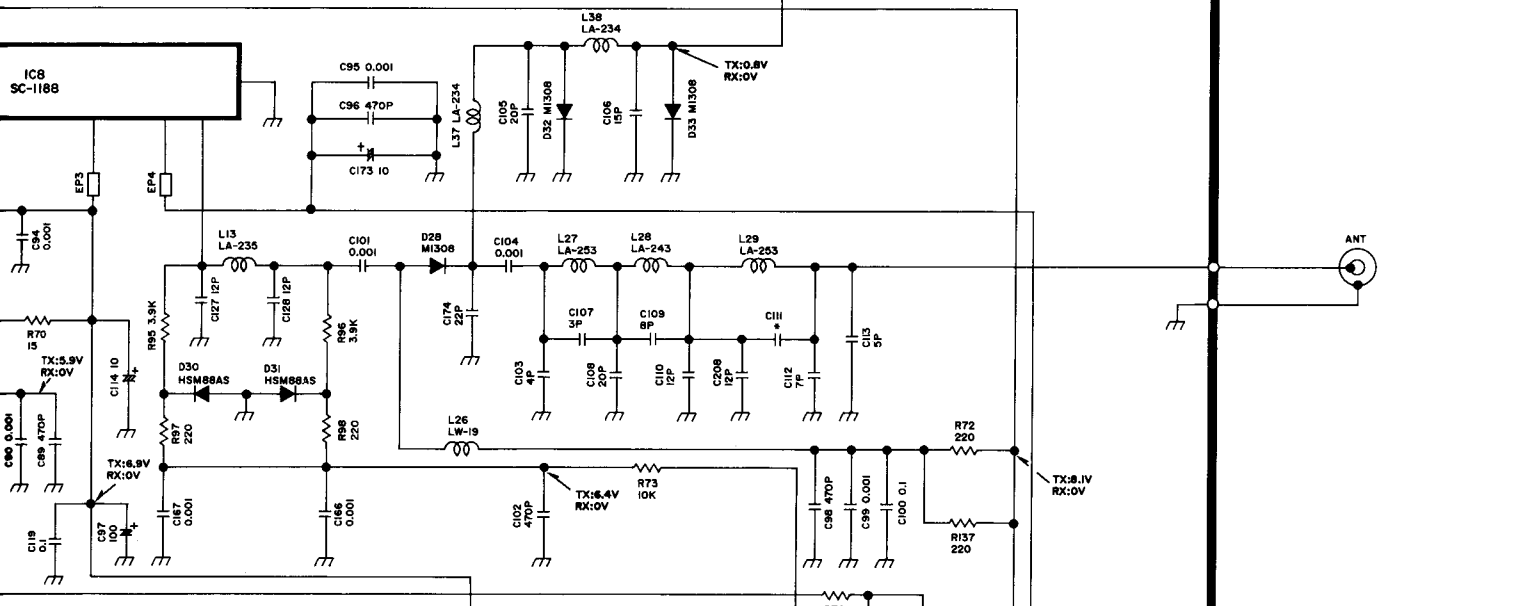
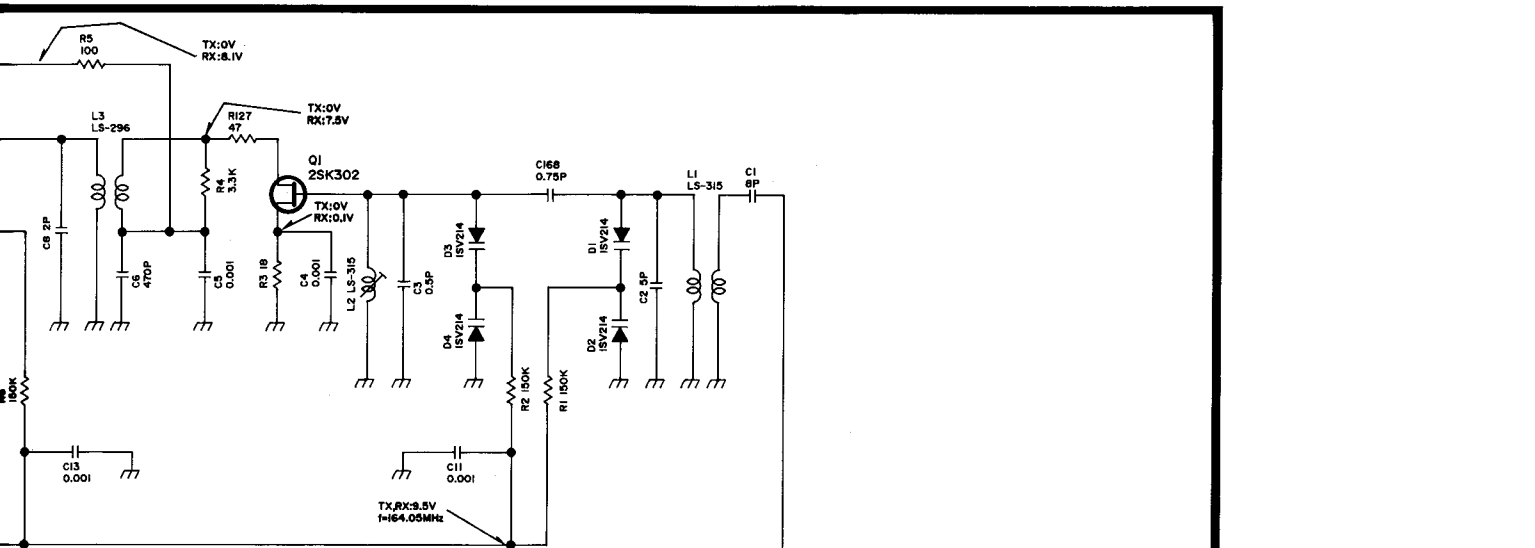
IC1	RX
1	6V
2	5.5V
3	5.3V
4	
5	5.2V
6	0V
7	5.2V
8	6.1V
9	3V
10	0.6V
11	2V
12	0V
13	1.3V
14	0V
15	0V
16	1.8V



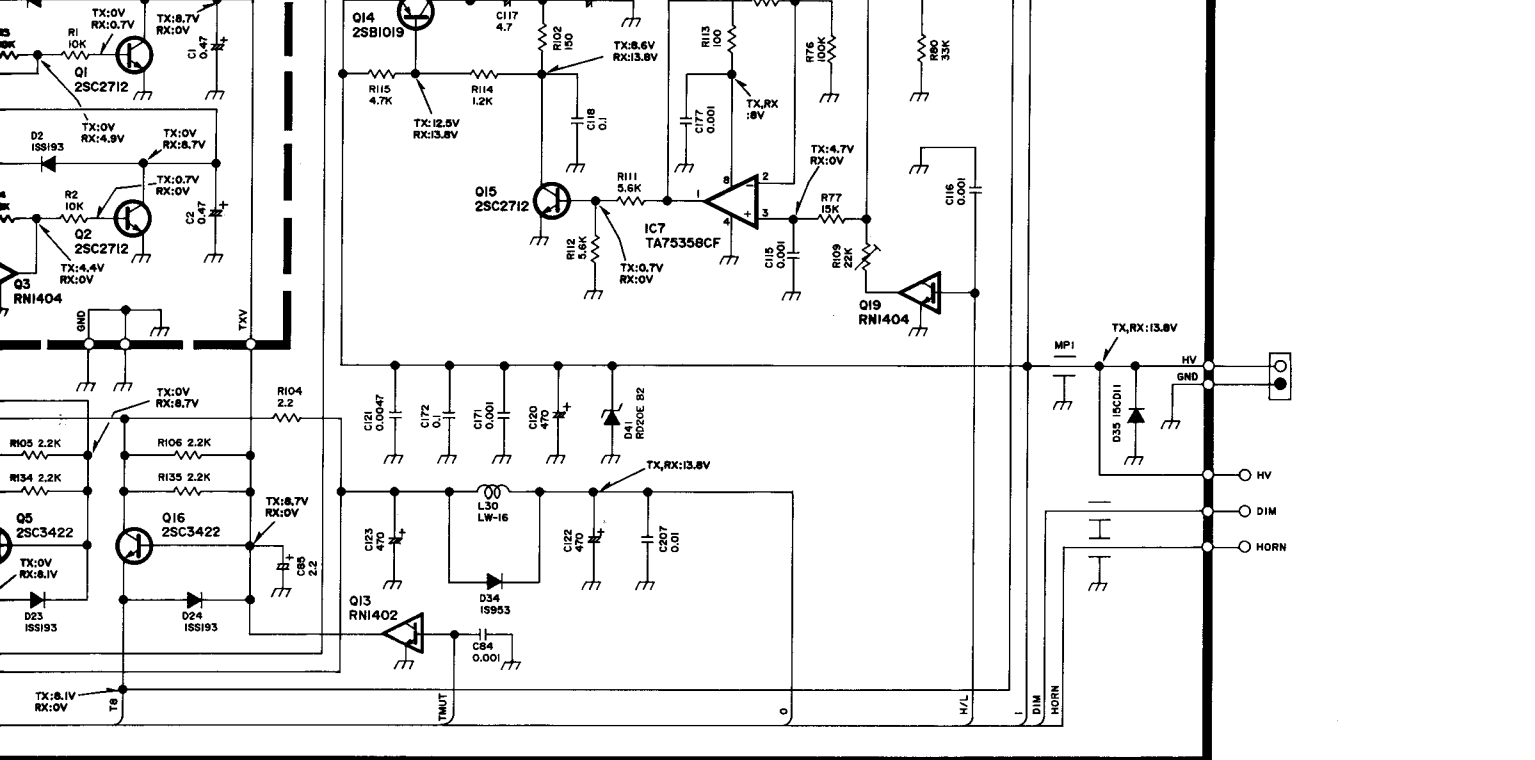


# MAIN UNIT





### REG UNIT



Refer to the schematic diagram and this table to know the specifications for each version.

**MAIN UNIT**

IC8	SC-1044	#07 #08 #09 #13 #16 #17 #18 #19
	SC-1045	#05 #06
	SC-1131	#01 #02 #11 #14
	SC-1188	#04 #10 #12 #15 #20 #21
F11	FL-125	#01 #05 #07 #09 #11 #12 #16 #19 #21
	FL-42	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
F12	CFW455E	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
	CFW455HT	#01 #05 #07 #09 #11 #12 #16 #19 #21
L13	LA-234	#05 #06
	LA-235	#01 #02 #04 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21
L27	LA-242	#05 #06 #07 #08 #09 #13 #16 #17 #18 #19
	LA-253	#01 #02 #04 #10 #11 #12 #14 #15 #20 #21
L28	LA-243	#01 #02 #04 #10 #11 #12 #14 #15 #20 #21
	LA-253	#05 #06 #07 #08 #09 #13 #16 #17 #18 #19
R26	1.5KΩ	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
	2.2KΩ	#01 #05 #07 #09 #11 #12 #16 #19 #21
R28	1.8KΩ	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
	3.3KΩ	#01 #05 #07 #09 #11 #12 #16 #19 #21
R32	220KΩ	#01 #05 #07 #09 #11 #12 #16 #19 #21
	56KΩ	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
R74	150Ω	#04 #10 #12 #15 #20 #21
	470Ω	#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19
R97	220Ω	#01 #02 #04 #10 #11 #12 #14 #15 #20 #21
	560Ω	#05 #06 #07 #08 #09 #13 #16 #17 #18 #19
R98	220Ω	#01 #02 #04 #10 #11 #12 #14 #15 #20 #21
	560Ω	#05 #06 #07 #08 #09 #13 #16 #17 #18 #19
R116	1.2KΩ	#01 #05 #07 #09 #11 #12 #16 #19 #21
	560Ω	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
R119	470Ω	#05 #06 #07 #08 #09 #13 #16 #17 #18 #19
C1	0.001	#01 #02 #05 #06 #11 #14
	12P	#07 #08 #09 #13 #16 #17 #18 #19
	8P	#04 #10 #12 #15 #20 #21
C21	15P	#01 #05 #07 #09 #11 #12 #16 #19 #21
	7P	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
C30	100P	#02 #04 #06 #08 #10 #13 #14 #15 #17 #18 #20
	82P	#01 #05 #07 #09 #11 #12 #16 #19 #21
C36	0.001	#01 #02 #04 #05 #06 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21
C39	0.001	#01 #02 #04 #05 #06 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21
C82	—	#04 #10 #12 #15 #20 #21
	1P	#01 #02 #05 #06 #11 #14
	4P	#07 #08 #09 #13 #16 #17 #18 #19
C92	10P	#05 #06 #07 #08 #09 #13 #16 #17 #18 #19
	8P	#01 #02 #04 #10 #11 #12 #14 #15 #20 #21
C107	18P	#05 #06 #07 #08 #09 #13 #16 #17 #18 #19
	3P	#04 #10 #12 #15 #20 #21
	5P	#01 #02 #11 #14
C108	20P	#04 #05 #06 #07 #08 #09 #10 #12 #13 #15 #16 #17 #18 #19 #20 #21
	24P	#01 #02 #11 #14
C109	10P	#01 #02 #05 #06
	5P	#07 #08 #09 #10 #13 #16 #17 #18 #19
	8P	#04 #11 #12 #14 #15 #20 #21
C111	—	#04 #10 #12 #15 #20 #21
	1P	#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19
C112	12P	#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19
	7P	#04 #10 #12 #15 #20 #21
C113	—	#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19
	5P	#04 #10 #12 #15 #20 #21
	12P	#01 #02 #04 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21
C127	18P	#05 #06
	12P	#01 #02 #04 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21
C128	12P	#01 #02 #04 #07 #08 #09 #10 #11 #12 #13 #14 #15 #16 #17 #18 #19 #20 #21
	18P	#05 #06
C157	—	#04 #10 #12 #15 #20 #21
	10P	#01 #02 #05 #06 #07 #08 #09 #11 #13 #14 #16 #17 #18 #19

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