

ICOM

**SERVICE
MANUAL**

1200MHz FM REPEATER

IC-RP1220

INTRODUCTION

This service manual describes the latest service information for the **IC-RP1220** 1200 MHz FM REPEATER at the time of publication and covers the following versions:

VERSION NO.	VERSION	SYMBOL
#02	U.S.A.	USA
#03	Europe	EUR

DANGER

NEVER connect the repeater to a DC backup battery that uses more than 16 V. This will ruin the repeater.

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

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



ORDERING PARTS

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>

1110001000 IC μ PC1651G IC-RP1220 TX UNIT 5 pieces
8810004690 Screw BiH M4×5 ZK BS IC-RP1220 Top cover 10 pieces

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

REPAIR NOTE

1. Make sure a problem is internal before disassembling the repeater.
2. **DO NOT** open the repeater until the repeater 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 repeater 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 repeater 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 repeater.

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

SECTION 1 SPECIFICATIONS

GENERAL

- Frequency coverage : 1240~1300 MHz
- Mode : F3 (FM)
- Initial tuning step : 10 or 25 kHz (selectable)
- Antenna impedance : 50 Ω (unbalanced)
- Power supply requirement :

VERSION	VOLTAGE
U.S.A.	100~120 V AC or 13.8 V DC \pm 15 % (negative ground)
Europe	220~240 V AC or 13.8 V DC \pm 15 % (negative ground)

- Current drain (at 13.8 V DC) :

Transmit	High	6.0 A
	Low	3.0 A
Receive	Squelched	1.0 A
	Max. audio output	1.2 A

- Usable temperature range : $-10^{\circ}\text{C}\sim+60^{\circ}\text{C}$ ($+14^{\circ}\text{F}\sim+140^{\circ}\text{F}$)
- Frequency stability : ± 1.0 ppm ($-10^{\circ}\text{C}\sim+60^{\circ}\text{C}$; $+14^{\circ}\text{F}\sim+140^{\circ}\text{F}$)
- Dimensions : 425 (W) \times 149 (H) \times 368 (D) mm; 16.7 (W) \times 5.9 (H) \times 14.5 (D) in (Projections not included)
- Weight : 17 kg (37.5 lb)

TRANSMITTER

- Output power : 10 W (HIGH)
1 W (LOW)
- Modulation system : Variable reactance frequency modulation
- Max. frequency deviation : ± 5 kHz
- Spurious emissions : -50 dB (High output power)
 -40 dB (Low output power)
- Microphone impedance : 600 Ω

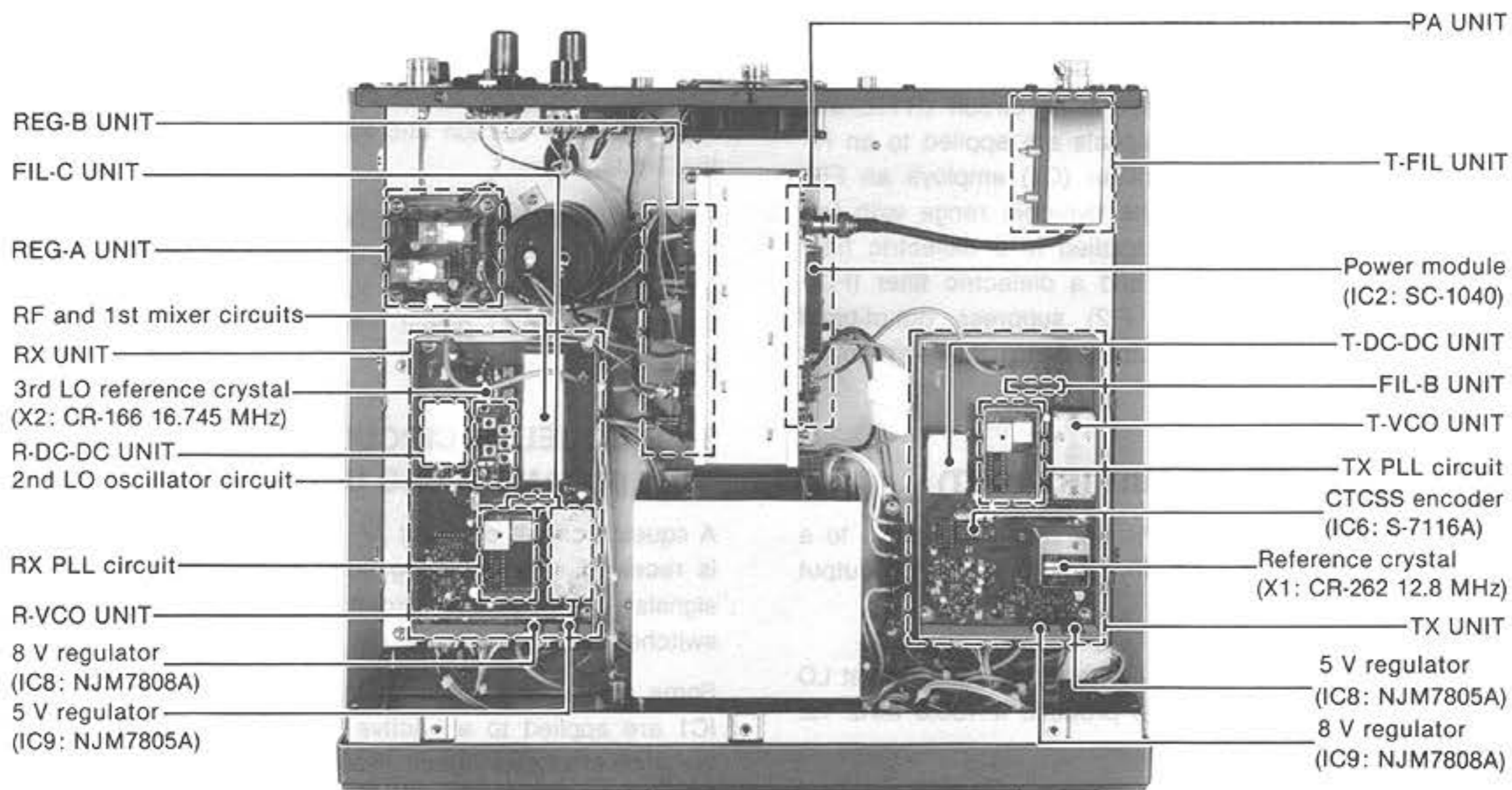
RECEIVER

- Receive system : Triple-conversion superheterodyne
- Intermediate frequencies : 1st 136.6 MHz
2nd 17.2 MHz
3rd 455 kHz
- Sensitivity : 0.32 μV for 12 dB SINAD
- Spurious rejection : -60 dB
- Audio output power : 1.7 W at 10 % distortion with an 8 Ω load
- Audio output impedance : 8 Ω

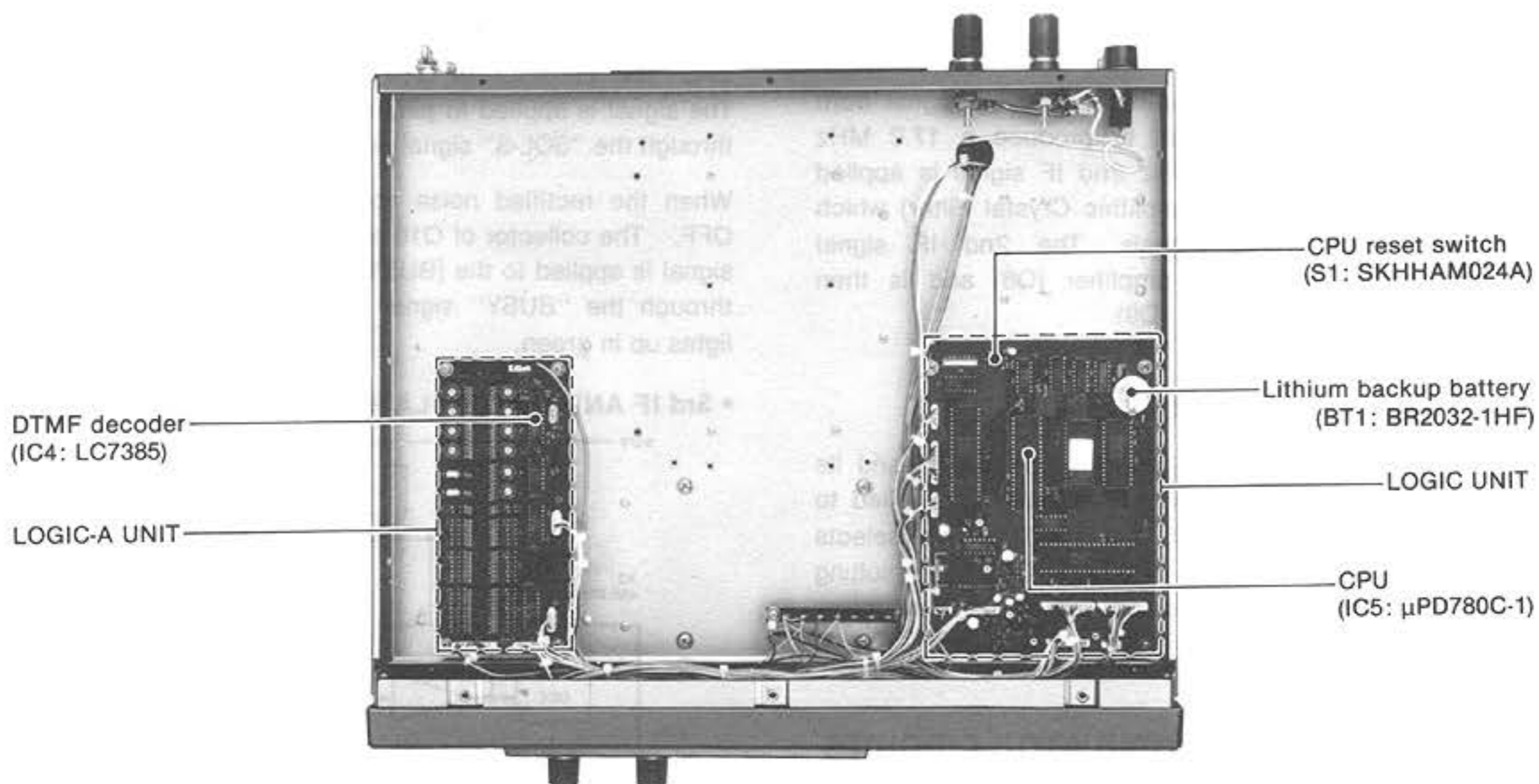
All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS

• TOP VIEW



• BOTTOM VIEW



SECTION 3 CIRCUIT DESCRIPTION

3-1 RECEIVER CIRCUITS

3-1-1 RF CIRCUIT (RX UNIT)

Received signals enter the antenna connector (J1) and pass through a bandpass filter circuit (R-FIL and FIL-A UNITS). The filtered signals are applied to an RF amplifier (Q1). The RF amplifier (Q1) employs an FET (MGF1202) which expands the dynamic range with low noise. The RF signals are applied to a dielectric filter (F11), an RF amplifier (Q3), and a dielectric filter (F12). The dielectric filters (F11, F12) suppress out-of-band signals. The signals are applied to the 1st mixer circuit (Q4).

3-1-2 1st MIXER CIRCUIT (RX UNIT)

The 1st mixer circuit converts the received signals to a fixed frequency of the 1st IF signal with a PLL output frequency.

The signals from the RF circuit are mixed with the 1st LO signal from the PLL circuit to produce a 136.6 MHz 1st IF signal.

3-1-3 1st IF AND 2nd MIXER CIRCUITS (RX UNIT)

After passing through the matching circuit (L1), the 136.6 MHz 1st IF signal is applied to a 1st IF amplifier (Q5) and is then to a bandpass filter (L2~L4, C32~C37) to suppress out-of-band signals. The 1st IF signal is applied to a 2nd mixer circuit (Q6).

The 1st IF signal is mixed with the 2nd LO signal from the 2nd LO oscillator circuit to produce a 17.2 MHz 2nd IF signal. The 17.2 MHz 2nd IF signal is applied to F13. F13 is an MCF (Monolithic Crystal Filter) which suppresses out-of-band signals. The 2nd IF signal is amplified at a 2nd IF amplifier (Q8) and is then applied to a 3rd mixer circuit (Q9).

3-1-4 2nd LO OSCILLATOR (RX UNIT)

An overtone oscillator (Q7) generates 39.8 MHz and its harmonic frequency using X1. The signal is applied to a bandpass filter (L8~L10, C48~C53) which selects the 3rd harmonic frequency of 39.8 MHz. The resulting 119.4 MHz 2nd LO signal is applied to the 2nd mixer circuit (Q6).

3-1-5 3rd IF AND DEMODULATOR CIRCUITS (RX UNIT)

The 3rd mixer circuit converts the 2nd IF signal to a 3rd IF signal.

The amplified signal is mixed with a 16.745 MHz 3rd LO signal to produce a 455 kHz 3rd IF signal.

The 455 kHz 3rd IF signal is applied to a ceramic filter (F14) where unwanted signals are suppressed and then to a limiter amplifier section in pin 5 of IC1.

IC1 contains the local oscillator circuit, limiter amplifier, quadrature detector circuit and active filter circuit. The local oscillator section and X2 generate 16.745 MHz for the 3rd LO signal.

The 3rd IF signal from the limiter amplifier (IC1, pin 5) is applied to the quadrature detector section (IC1, pin 8) and ceramic discriminator X3 to demodulate the 3rd IF signal into an AF signal. The AF signal is output from pin 9 of IC1.

3-1-6 SQUELCH CIRCUIT (RX AND LOGIC UNITS)

A squelch circuit cuts out AF signals when no RF signal is received. By detecting noise components in the AF signals, the squelch circuit switches the AF mute switches.

Some noise components in the AF signal from pin 9 of IC1 are applied to an active filter section (IC1, pin 10) via a de-emphasis circuit (R38, C75~C77). This circuit is an integrated circuit with frequency characteristics of -6 dB/octave. The [SQUELCH] control (R2) on the FRONT PANEL adjusts the input level of pin 10 of IC1.

The active filter section amplifies noise components of frequencies of 20 kHz and above and outputs the resulting signals from pin 11. Output signals are rectified by D5 and are then converted to DC voltage.

When the rectified noise voltage is "HIGH", Q10 turns ON. The collector of Q10 outputs the squelch signal. The signal is applied to pin 16 of IC9 on the LOGIC UNIT through the "SQL-S" signal line.

When the rectified noise voltage is "LOW", Q10 turns OFF. The collector of Q10 outputs the busy signal. The signal is applied to the [BUSY] indicator on the LED UNIT through the "BUSY" signal line. The [BUSY] indicator lights up in green.

• 3rd IF AND DEMODULATOR CIRCUITS

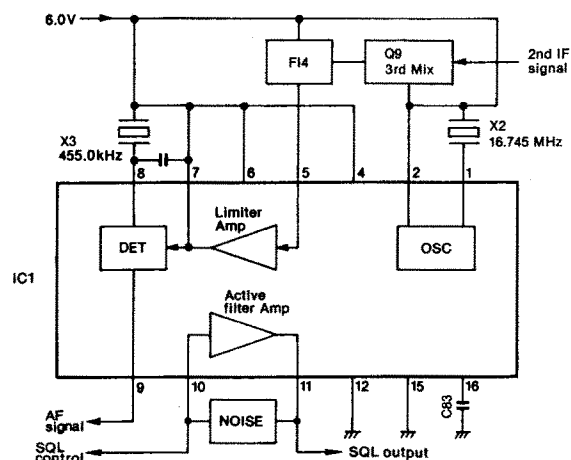


Fig. 1

3-1-7 AF AMPLIFIER CIRCUIT (RX AND AF UNITS)

The AF signal output from pin 9 of IC1 is applied to a monolithic IC (IC2, pin 3) which functions as high-pass and low-pass filters. The filtered signal is output from pin 7 of IC2 and is then applied to the [VOLUME] control (R1) on the FRONT PANEL through an AF mute switch (Q11). When the squelch is closed, Q11 cuts off the AF signal as an AF mute switch. The AF signal is power-amplified at an AF power amplifier (IC1) on the AF UNIT to drive a speaker.

3-2 TRANSMITTER CIRCUITS

3-2-1 MICROPHONE AMPLIFIER CIRCUIT (TX AND T-VCO UNITS)

The AF signal from the microphone is applied to a microphone amplifier (Q10). The amplified signal passes through a microphone mute switch (Q11) and is then mixed with the "MOD" signal from IC15 on the LOGIC UNIT. The signal is applied to a limiter (IC7, pin 3) and is then output from pin 1 of IC7.

The output signal is applied to the splatter filter circuit (IC7, R59, R62, R63, C84, C69~C71) which attenuates the components of frequencies of 3 kHz and above. Pin 7 of IC7 outputs a "MOD" signal. The "MOD" signal is applied to the T-VCO UNIT.

3-2-2 MODULATION CIRCUIT (T-VCO UNIT)

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signal.

The "MOD" signal from pin 7 of IC7 changes the reactance of varactor diodes (D1~D4) to modulate the oscillated signal at T-VCO (Q1). The oscillated signal is buffer-amplified at Q2.

3-2-3 DOUBLER CIRCUIT (TX UNIT)

The T-VCO output is buffer-amplified at IC1 and then passes through a low-pass filter. The filtered signal is re-amplified at Q2 and is then applied to a doubler circuit (D2, D3). The resulting signal is applied to a bandpass filter (FIL B UNIT) to suppress out-of-band signals. The signal is amplified at Q3 and Q4. The amplified signal is applied to a drive amplifier circuit.

3-2-4 DRIVE AMPLIFIER CIRCUIT (PA UNIT)

The drive amplifier (IC1) amplifies the signal to obtain 1 W (30 dBm).

The control voltage from the APC circuit is applied to IC1 (pin 3) for stable RF output power from a power amplifier (IC2).

3-2-5 RF POWER AMPLIFIER (PA UNIT)

IC2 is a power module which provides a stable 10 W (DC 13.8 V) of output power.

An RF signal from the drive amplifier (IC1, pin 5) is applied to pin 1 of IC2. The amplified signal is output from pin 5 of IC2 and applied to the RF detector circuit. The detected signal enters the T-FIL UNIT through J2 and is then applied to the antenna connector.

• MICROPHONE AMPLIFIER CIRCUIT

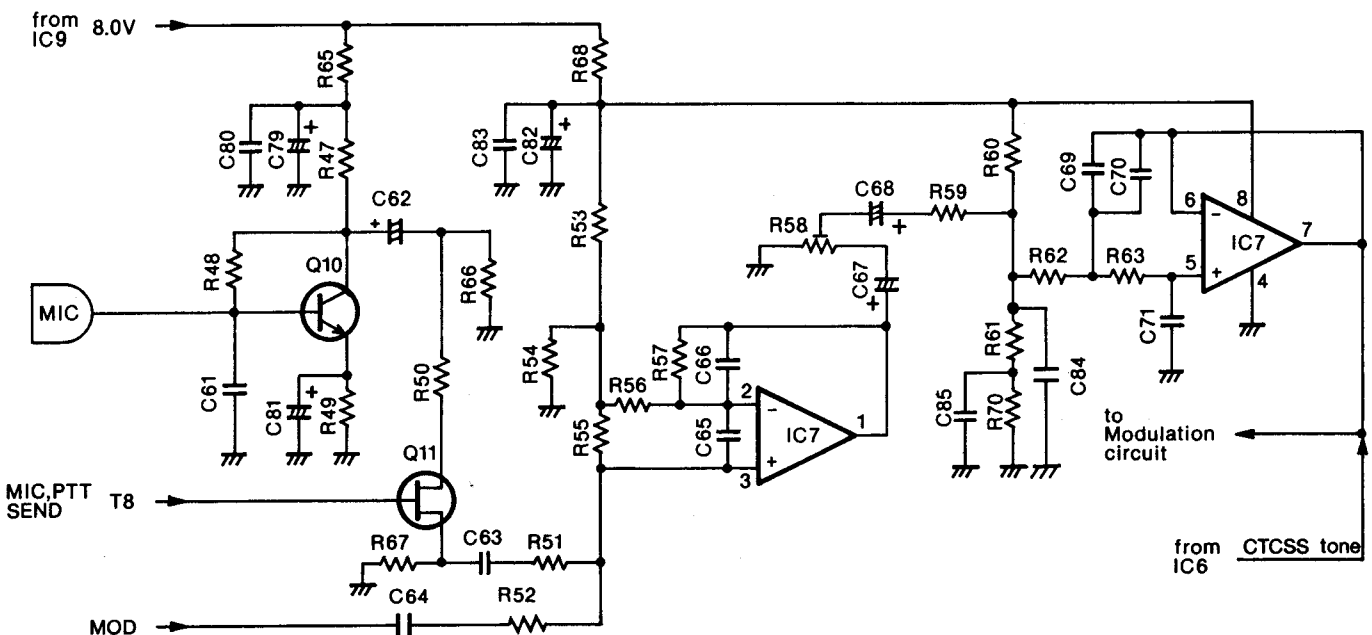


Fig. 2

3-2-6 APC CIRCUIT (PA UNIT)

This circuit controls a voltage of the buffer-amplifier (Q4) on the TX UNIT and the driver amplifier (IC1) to obtain stable RF output power.

The output power level from the power module is detected at the APC detector (D1). When the antenna impedance is matched at 50 Ω , the detected voltage by D1 is at its minimum. The detected voltage is applied to a differential amplifier (IC3, pin 6). The APC reference voltage is applied to pin 5 of IC3.

When the antenna impedance is mismatched, the voltage in pin 6 of IC3 exceeds the reference voltage in pin 5 of IC3. The output level from pin 7 of IC3 decreases. Q2 amplifies the current from the differential amplifier (IC3) which controls Q1. Q1 changes the supply voltage to IC1 and Q4 on the TX UNIT.

This decreases the output power from the drive amplifier (IC1) and buffer-amplifier (Q4) until the input voltage in pin 6 of IC3 reaches the same level as pin 5 of IC3.

• APC CIRCUIT

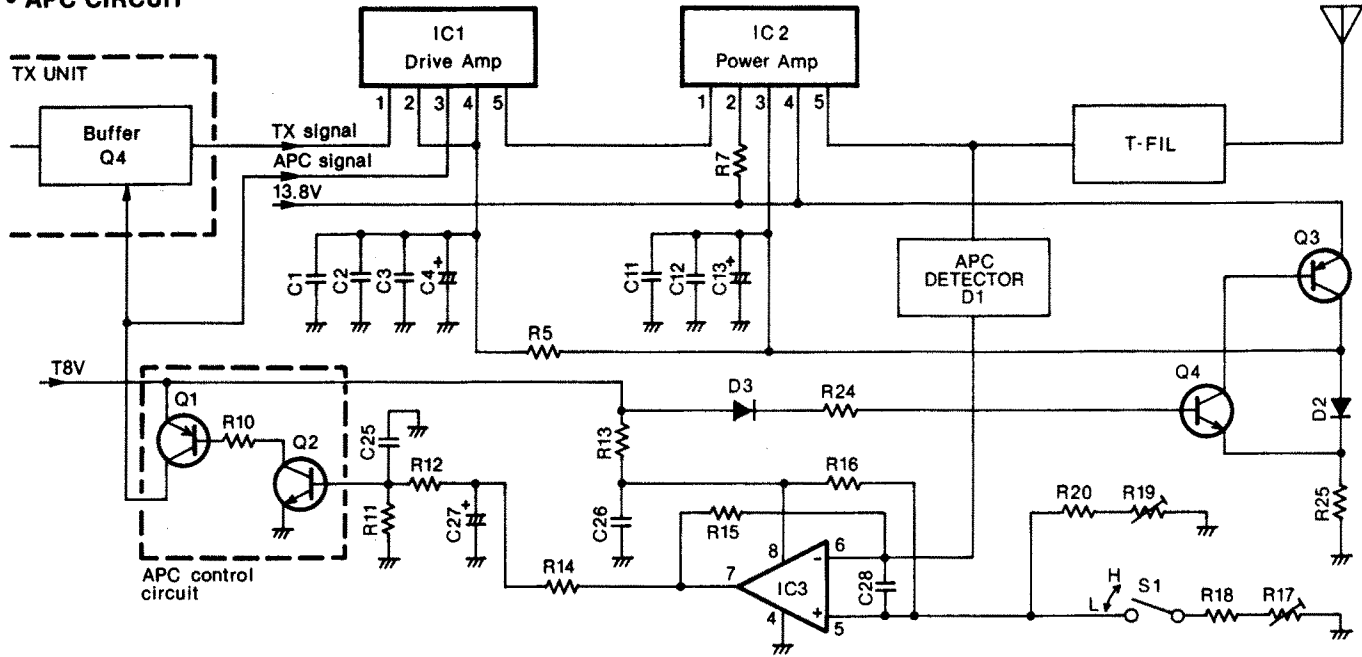


Fig. 3

3-3 PLL CIRCUITS

3-3-1 GENERAL

Each receiver and transmitter circuit has an independent PLL circuit for controlling frequencies. All PLL circuit are shielded and installed on the RX and TX UNITS.

PLL circuits steadily oscillate the transmit frequency and the receive local frequency. The PLL output frequency is controlled by the divided ratio (N-data) of the programmable divider.

3-3-2 RECEIVER PLL CIRCUIT (RX UNIT)

The PLL circuit, using a PLL IC (IC3) and dual modulus prescaler (IC4) on the RX UNIT, generates the 1st LO frequency with a Colpitts VCO (Q1) on the R-VCO UNIT. The PLL IC sets the dividing ratio based on serial data from the CPU and controls the dual modulus prescaler. The PLL IC compares the phases of a VCO signal with the reference oscillator frequency and detects the out-of-step phase. Then, the VCO signal is output from the PLL IC (pins 16 and 17).

3-3-3 RECEIVER REFERENCE OSCILLATOR CIRCUIT (RX AND TX UNITS)

A 12.8 MHz reference frequency is produced by the oscillator (X1) on the TX UNIT. The frequency is adjusted with R31. The reference frequency is buffer-amplified at Q7 and applied to the PLL IC (IC3, pin 2) on the RX UNIT.

3-3-4 RECEIVER LOOP FILTER AND DC-DC CONVERTER CIRCUITS (RX AND R-DC-DC UNITS)

Phase-detected signals from IC3 (pins 16 and 17) are converted to DC voltage by a loop filter consisting of an active filter (Q15, Q16).

The frequency at which the VCO oscillates is controlled by varactor diodes (D1~D4) on the R-VCO UNIT. DC voltage (PLL lock voltage) is provided through the integrator circuit (R44, C146).

The DC-DC converter circuit (IC1 and Q1) on the R-DC-DC UNIT creates approximately 20 V DC from 5 V DC to obtain wide range lock voltages for the PLL circuits.

3-3-5 RECEIVER VCO CIRCUIT (R-VCO UNIT)

The VCO circuit (Q1, D1~D4) generates the receive frequency. Strip lines are used for stable oscillation over a wide frequency range. Varactor diodes (D1~D4) provide frequency control. The buffer-amplifier (Q2) amplifies VCO oscillation and does not permit the latter circuit to affect the VCO oscillation. The signal is divided by 64 or 65 in the dual modulus prescaler (IC4). The phase-divided signal is output from pin 5 of IC4 and applied to the PLL IC (IC3, pin 6).

3-3-6 RECEIVER UNLOCK SENSOR CIRCUIT (RX AND LOGIC UNITS)

When the PLL circuit is unlocked, pin 13 of IC3 becomes "HIGH". The "HIGH" signal is applied to pin 14 of IC9 as an unlock signal on the LOGIC UNIT.

3-3-7 DOUBLER CIRCUIT (RX UNIT)

The R-VCO output is buffer-amplified at IC5 and then passes through a low-pass filter. The filtered signal is re-amplified at Q19 and is then applied to a doubler circuit (D7, D8). The resulting signal is applied to a bandpass filter (FIL C UNIT) to suppress out-of-band signals and then to a 1st mixer (Q4) to produce a 136.6 MHz 1st IF signal.

3-3-8 TRANSMITTER PLL CIRCUIT (TX UNIT)

The PLL circuit, using a PLL IC (IC2) and dual modulus prescaler (IC3) on the TX UNIT, generates the transmit frequency with a Colpitts VCO (Q1) on the T-VCO UNIT. The PLL IC sets the dividing ratio based on serial data from the CPU and controls the dual modulus prescaler. The PLL IC compares the phases of a VCO signal with the reference oscillator frequency and detects the out-of-step phase. Then, the VCO is output from the PLL IC (IC2, pins 16 and 17).

3-3-9 TRANSMITTER REFERENCE OSCILLATOR CIRCUIT (TX UNIT)

A 12.8 MHz reference frequency is produced by the oscillator (X1). The frequency is adjusted with R31. The reference frequency is buffer-amplified at Q7 and applied to the PLL IC (IC2, pin 2).

3-3-10 TRANSMITTER LOOP FILTER AND DC-DC CONVERTER CIRCUITS (TX AND T-DC-DC UNITS)

Phase-detected signals from IC2 (pins 16 and 17) are converted to DC voltage by a loop filter consisting of an active filter (Q5, Q6).

The frequency at which the VCO oscillates is controlled by varactor diodes (D1~D4) on the T-VCO UNIT. DC voltage (PLL lock voltage) is provided through the integrator circuit (R23, C87).

The DC-DC converter circuit (IC1 and Q1) on the T-DC-DC UNIT creates approximately 20 V DC from 5 V DC to obtain a wide range of lock voltages for the PLL circuits.

3-3-11 TRANSMITTER VCO CIRCUIT (T-VCO UNIT)

The VCO circuit (Q1, D1~D4) generates the transmit frequency and produces FM modulation. Strip lines are used for stable oscillation over a wide frequency range. Varactor diodes (D1~D4) provide frequency control. The buffer-amplifier (Q2) amplifies VCO oscillation and does not permit the latter circuit to affect the VCO oscillation. The signal is divided by 64 or 65 in the dual modulus prescaler (IC3). The phase-divided signal is output from IC3 (pin 5) and is applied to the PLL IC (IC2, pin 6).

• PLL CIRCUITS

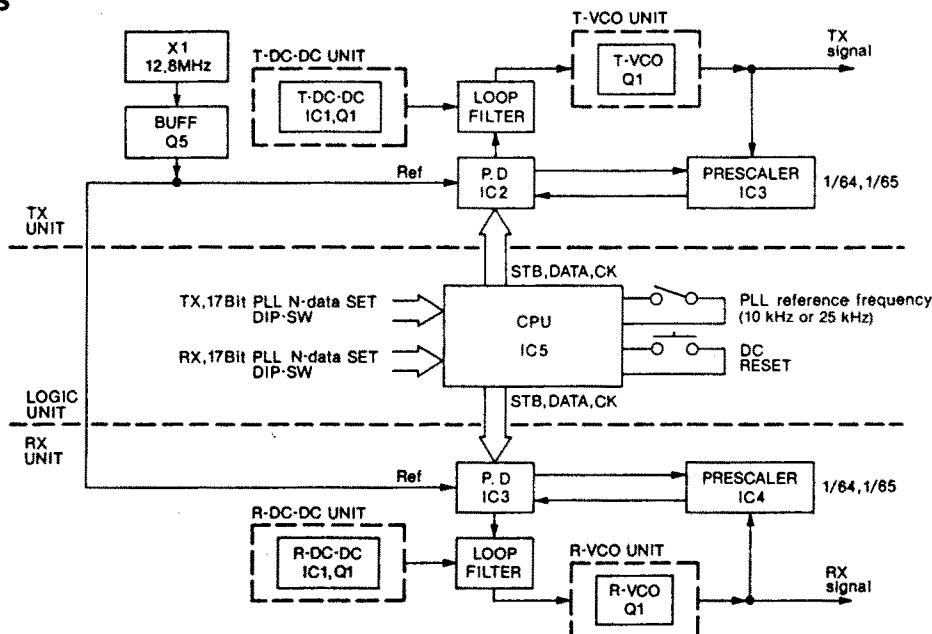


Fig. 4
3 - 4

3-3-12 TRANSCEIVER UNLOCK SENSOR CIRCUIT (TX AND LOGIC UNITS)

When the PLL circuit is unlocked, IC2 (pin 13) becomes "HIGH". The "HIGH" signal is applied to IC9 (pin 15) as an unlock signal on the LOGIC UNIT.

3-4 VOLTAGE LINES

LINE	DESCRIPTION
13.8 V	This voltage is generated at REG-A and REG-B UNITS.
5 V	Common 5 V converted from the 13.8 V line at IC9 on the RX UNIT, IC8 on the TX UNIT and IC16 on the LOGIC UNIT. These switching regulators convert the IC1 output level on the R-DC-DC or T-DC-DC UNIT into approximately 20 V DC.
8 V	8 V DC converted from the 13.8 V line at IC8 on the RX or IC9 on the TX UNIT.
T8	Transmit 8 V. When the "MIC, PTT" line is grounded or the "SEND" line becomes "HIGH", Q8 turns ON. The collector voltage (Q9) on the TX UNIT lights up the [TRANSMIT] INDICATOR. This voltage controls the buffer-amplifiers (IC1, Q2, Q3) and then is applied to the differential amplifier (IC3) on the PA UNIT.

3-5 REGULATOR CIRCUITS

The DC voltages are supplied from regulator circuits corresponding to the voltages. They are regulated at the following circuits using 13.8 V DC.

(1) 5 V REGULATOR

5 V DC are regulated by the following three-terminal voltage regulators.

REGULATOR UNIT	IC8	IC9	IC16	IC2
	TX	RX	LOGIC	REG-A

(2) 8 V REGULATOR (RX AND TX UNITS)

8 V DC are regulated by the three-terminal voltage regulators (IC8: RX UNIT and IC9: TX UNIT).

3-6 DTMF DECODER CIRCUIT

AF signals from the RX UNIT are applied to Q1 on the LOGIC-A UNIT through J5 and signals are amplified.

IC4 is an IC chip for the DTMF detector. An applied double-tone signal is detected at IC4 and outputs signals as a 4-bit binary code.

• DTMF DECODER CIRCUIT

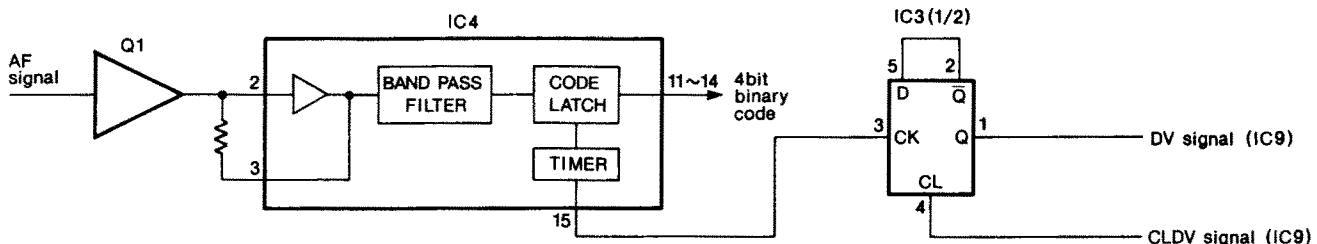


Fig. 5

3-7 OTHER CIRCUITS

3-7-1 CTCSS DECODER CIRCUIT (RX UNIT)

IC6 contains a CTCSS tone encoder/decoder, an AF amplifier circuit and a two-stage AF filter. The encoder is not used in this circuit.

The AF signal from pin 9 of IC1 is applied to Q17. Q17 is an active filter which functions as a low-pass filter. The filtered signals are applied to a programmable CTCSS tone decoder (IC6, pin 29) which decodes 67.0 Hz~250.3 Hz tone frequencies. The tone frequency is set by the dip switches (S3) on the LOGIC-A UNIT.

The AF signal from IC6 (pin 29) is applied to the AF amplifier circuit and then to the two-stage AF filter. The filtered signal is output as a tone squelch signal from pin 23 of IC6. The tone squelch signal is applied to pin 17 of IC9 on the LOGIC UNIT through the "T-SQL" signal line.

IC7 functions as a serial/parallel converter and supplies 8-bit parallel data to pins 3~6 of IC6. The following table shows the relation between the input data and output frequency from IC6.

• CTCSS TONE DECODER FREQUENCY TABLE

TONE NUMBER	TONE FREQUENCY (Hz)	S3						TONE NUMBER	TONE FREQUENCY (Hz)	S3						TONE NUMBER	TONE FREQUENCY (Hz)	S3					
		1	2	3	4	5	6			1	2	3	4	5	6			1	2	3	4	5	6
01	67.0	ON	—	—	—	—	—	14	107.2	—	ON	ON	ON	—	—	27	167.9	ON	ON	—	ON	ON	—
02	71.9	—	ON	—	—	—	—	15	110.9	ON	ON	ON	ON	—	—	28	173.8	—	—	ON	ON	ON	—
03	74.4	ON	ON	—	—	—	—	16	114.8	—	—	—	—	ON	—	29	179.9	ON	—	ON	ON	ON	—
04	77.0	—	—	ON	—	—	—	17	118.8	ON	—	—	—	ON	—	30	186.2	—	ON	ON	ON	ON	—
05	79.7	ON	—	ON	—	—	—	18	123.0	—	ON	—	—	ON	—	31	192.8	ON	ON	ON	ON	ON	—
06	82.5	—	ON	ON	—	—	—	19	127.3	ON	ON	—	—	ON	—	32	203.5	—	—	—	—	—	ON
07	85.4	ON	ON	ON	—	—	—	20	131.8	—	—	ON	—	ON	—	33	210.7	ON	—	—	—	—	ON
08	88.5	—	—	—	ON	—	—	21	136.5	ON	—	ON	—	ON	—	34	218.1	—	ON	—	—	—	ON
09	91.5	ON	—	—	ON	—	—	22	141.3	—	ON	ON	—	ON	—	35	225.7	ON	ON	—	—	—	ON
10	94.8	—	ON	—	ON	—	—	23	146.2	ON	ON	ON	—	ON	—	36	233.6	—	—	ON	—	—	ON
11	97.4	No assigned						24	151.4	—	—	—	ON	ON	—	37	241.8	ON	—	ON	—	—	ON
12	100.0	—	—	ON	ON	—	—	25	156.7	ON	—	—	ON	ON	—	38	250.3	—	ON	ON	—	—	ON
13	103.5	ON	—	ON	ON	—	—	26	162.2	—	ON	—	ON	ON	—								

—: OFF

3-7-2 CTCSS ENCODER CIRCUIT (TX UNIT)

The CTCSS encoder (IC6) encodes 67.0 Hz~250.3 Hz tone frequencies which are set by the dip switches (S11) on the LOGIC-A UNIT. The tone frequency is output from IC6 (pin 1) and is then applied to R40 for the deviation adjustment.

IC5 functions as a serial/parallel converter and supplies 8-bit parallel data to IC6. The following table shows the relation between the input data and the output frequency from IC6.

• CTCSS TONE ENCODER FREQUENCY TABLE

TONE NUMBER	TONE FREQUENCY (Hz)	S11						TONE NUMBER	TONE FREQUENCY (Hz)	S11						TONE NUMBER	TONE FREQUENCY (Hz)	S11					
		1	2	3	4	5	6			1	2	3	4	5	6			1	2	3	4	5	6
01	67.0	ON	—	—	—	—	—	14	107.2	—	ON	ON	ON	—	—	27	167.9	ON	ON	—	ON	ON	—
02	71.9	—	ON	—	—	—	—	15	110.9	ON	ON	ON	ON	—	—	28	173.8	—	—	ON	ON	ON	—
03	74.4	ON	ON	—	—	—	—	16	114.8	—	—	—	—	ON	—	29	179.9	ON	—	ON	ON	ON	—
04	77.0	—	—	ON	—	—	—	17	118.8	ON	—	—	—	ON	—	30	186.2	—	ON	ON	ON	ON	—
05	79.7	ON	—	ON	—	—	—	18	123.0	—	ON	—	—	ON	—	31	192.8	ON	ON	ON	ON	ON	—
06	82.5	—	ON	ON	—	—	—	19	127.3	ON	ON	—	—	ON	—	32	203.5	—	—	—	—	—	ON
07	85.4	ON	ON	ON	—	—	—	20	131.8	—	—	ON	—	ON	—	33	210.7	ON	—	—	—	—	ON
08	88.5	—	—	—	ON	—	—	21	136.5	ON	—	ON	—	ON	—	34	218.1	—	ON	—	—	—	ON
09	91.5	ON	—	—	ON	—	—	22	141.3	—	ON	ON	—	ON	—	35	225.7	ON	ON	—	—	—	ON
10	94.8	—	ON	—	ON	—	—	23	146.2	ON	ON	ON	—	ON	—	36	233.6	—	—	ON	—	—	ON
11	97.4	ON	ON	—	ON	—	—	24	151.4	—	—	—	ON	ON	—	37	241.8	ON	—	ON	—	—	ON
12	100.0	—	—	ON	ON	—	—	25	156.7	ON	—	—	ON	ON	—	38	250.3	—	ON	ON	—	—	ON
13	103.5	ON	—	ON	ON	—	—	26	162.2	—	ON	—	ON	ON	—								

—: OFF

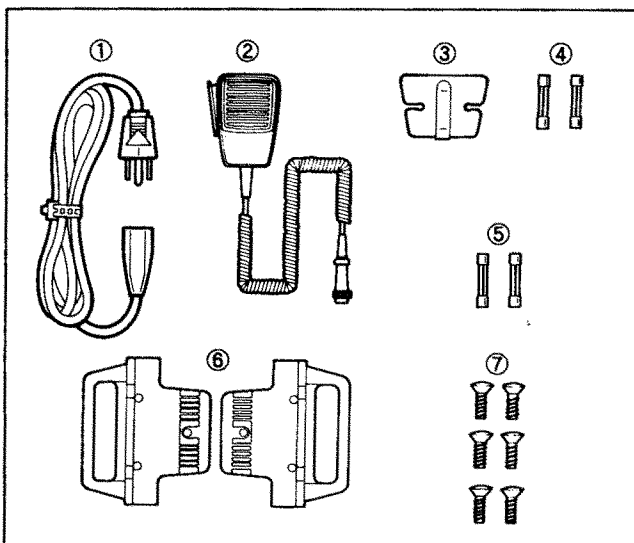
SECTION 4 MECHANICAL PARTS AND DISASSEMBLY

4-1 FRONT PARTS

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8210004841	Front panel (C)-1	1
②	8310017750	Front plate	1
③	8010008901	695 sub chassis-1	1
④	8930015660	695 speaker plate	1
⑤	8810001110	Screw PH B0 M3×6	13
⑥	8850000130	Flat washer M3 (3×8×0.5) NI BS	9
⑦	8930000070	Standoff (D)	2
⑧	8850000420	Spring washer M3 NI	2
⑨	8810003160	Setscrew A M3×6	5
⑩	8810004270	Screw BiH M4×6 ZK BS	4
⑪	8810003360	Setscrew C M3×6	2
⑫	2260001260	Switch SW-118 [POWER]	1
⑬	2510000040	Speaker C065K1210810	1
⑭	8610004170	Knob N122 [VOLUME], [SQUELCH]	2
⑮	8610002840	Button K79 [POWER]	1
⑯	8610005840	Button K89 (B) [CTCSS], [LOCAL INHIBIT], etc.	4
⑰	8810005290	Spring washer for FM 214	1
⑱	2230000380	Switch SPUE44067A [CTCSS], [LOCAL INHIBIT], etc.	1
⑲	5040000470	LED SPB-26MUW F [POWER]	1
⑳	5040001310	LED SLB-26UR 3F [TRANSMIT]	1
㉑	5040001130	LED SLB-26MG 3F [BUSY]	1
㉒	5040001360	LED TLG205 [CTCSS]	1
㉓	5040000650	LED TLY205 [LOCAL INHIBIT]	1
㉔	5040000640	LED TLR205 [MANUAL ID]	1
㉕	5040000650	LED TLY205 [COR SIMULATE]	1
㉖	8410000030	AF heatsink	1
㉗	7210000140	Variable resistor RK1631110D9DA [VOLUME]	1
㉘	7210000690	Variable resistor RK1631110D9CA [SQUELCH]	1
㉙	6510004820	Mic connector FM14RS-7SS [MICROPHONE]	1

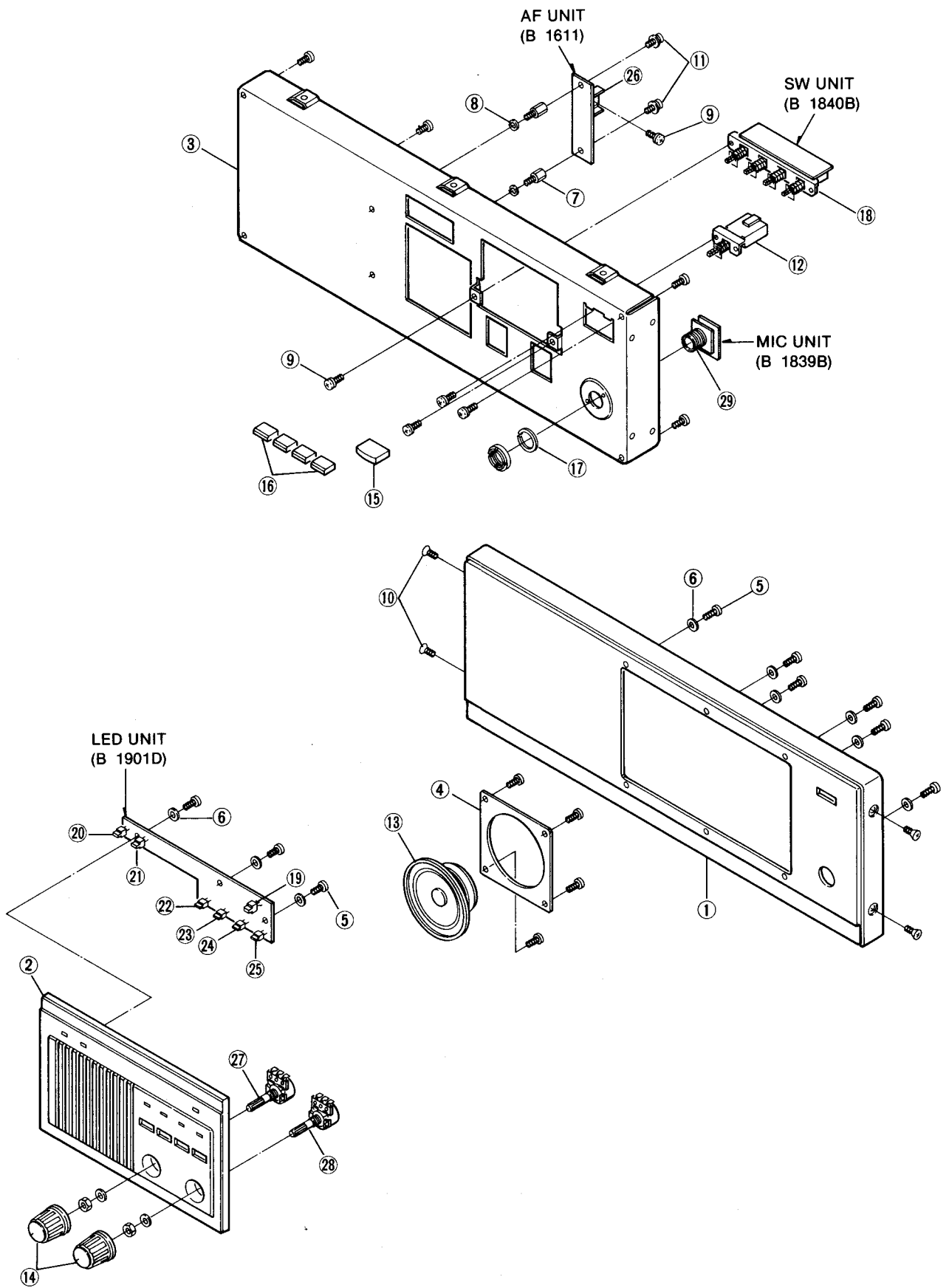
Screw abbreviations B0: Self-tapping screw BiH: Binding head PH: Pan head BS: Brass
 NI: Nickel ZK: Black

4-2 ACCESSORIES



LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8900000710	AC power cable OPC-048 A (#03)	1
	8900000330	AC power cable OPC-034 (#02)	1
②	Optional product	Microphone (HM-4)	1
③	8930007300	Microphone hook	1
④	5210000040	Spare fuse for AC line FGB 2A	2
⑤	5210000070	Spare fuse for DC line FGB 10A	2
⑥	8010006700	Rack mounting handle	2
⑦	8810006110	Screw OH M4×9 ZK	6

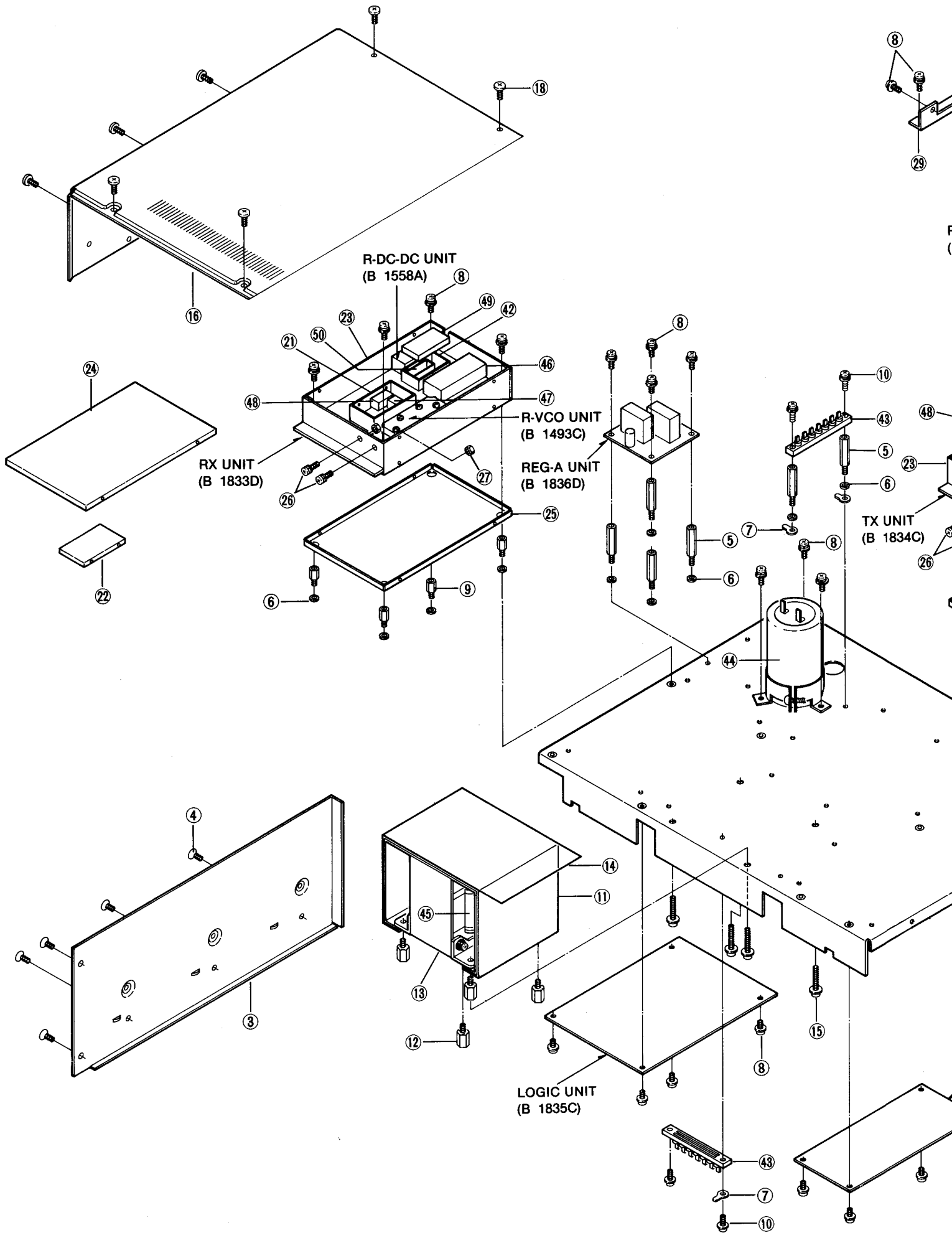
Screw abbreviations OH: Oval countersunk head
 ZK: Black

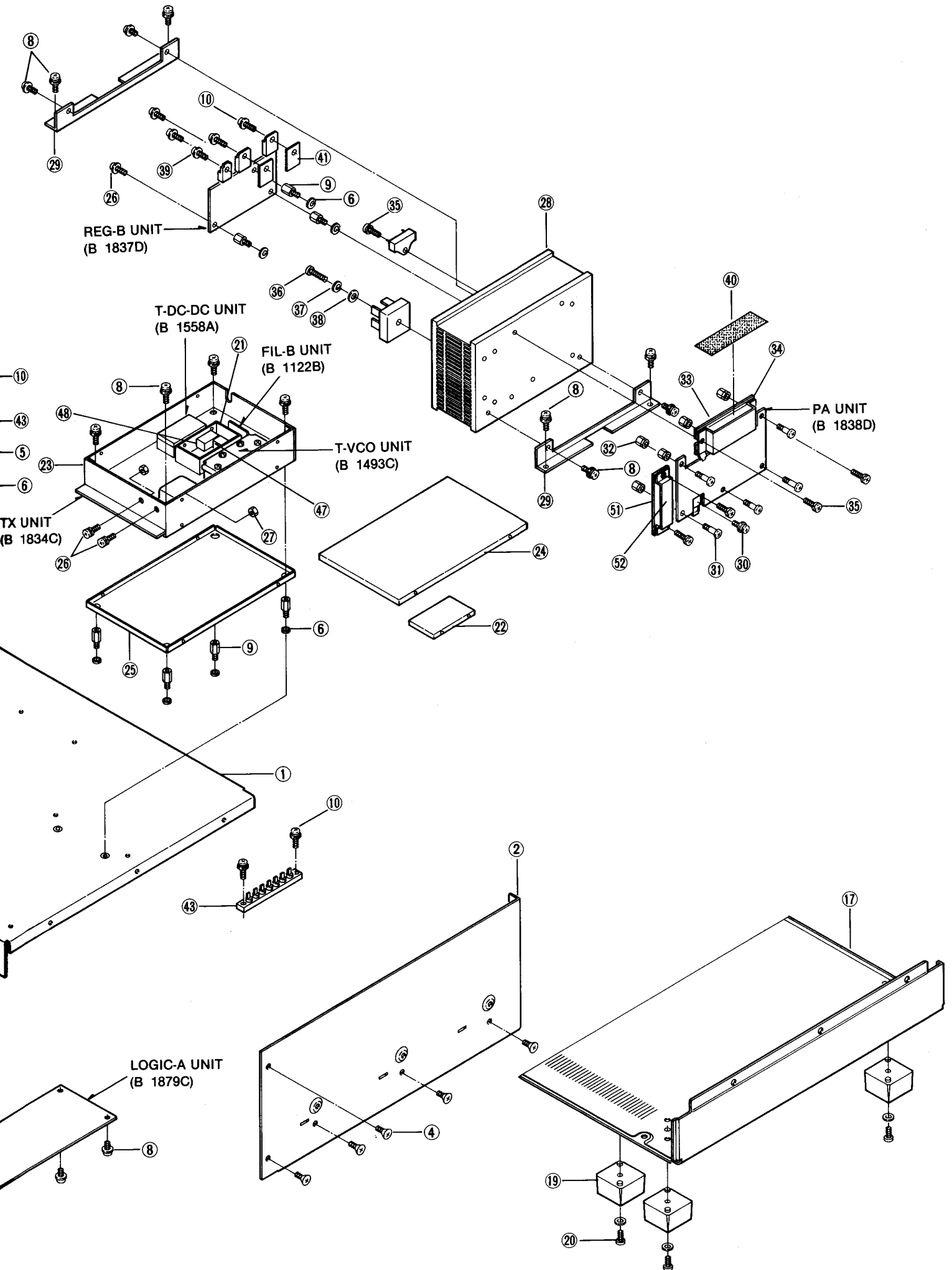


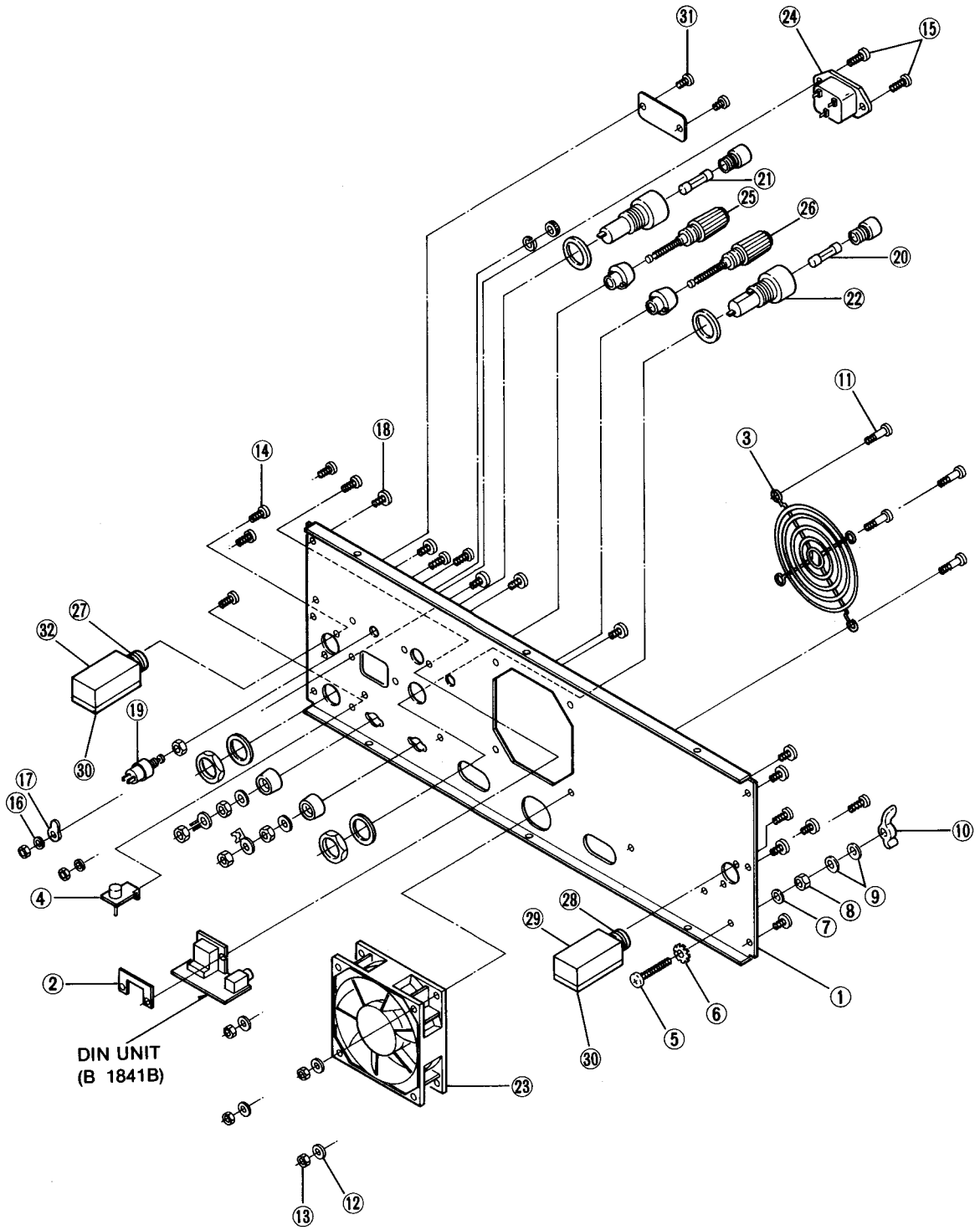
4-3 CHASSIS PARTS

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8010008911	695 chassis-1	1
②	8010008920	695 chassis (right side)	1
③	8010008930	695 chassis (left side)	1
④	8810002210	Screw FH M4 × 6	10
⑤	8930000230	Standoff (S)	6
⑥	8850000420	Spring washer M3 NI	17
⑦	8860000130	Grounding lug B5 (M3) AG BS	3
⑧	8810003360	Setscrew C M3 × 6	33
⑨	8930000070	Standoff (D)	11
⑩	8810003380	Setscrew C M3 × 10	8
⑪	8510006020	695 transformer shield plate	1
⑫	8930016040	Standoff (AZ)	4
⑬	8510006300	695 shield plate (A)	1
⑭	8110003790	695 transformer shield cover	1
⑮	8810003390	Setscrew C M4 × 8	4
⑯	8110003430	695 top cover	1
⑰	8110003441	695 bottom cover-1	1
⑱	8810004690	Screw BiH M4 × 5 ZK BS	18
⑲	8930011680	Rubber foot (G)	4
⑳	8810000390	Screw PH M4 × 12	4
㉑	8510001080	Shield case (A)	2
㉒	8510001101	Shield case (A) cover (A)-1	2
㉓	8510005870	695 shield case	2
㉔	8510005880	695 shield case top cover	2
㉕	8510005890	695 shield case bottom cover	2
㉖	8810003160	Setscrew A M3 × 6	7
㉗	8830000100	Nut M3	4
㉘	8410001460	695 heatsink	1
㉙	8410001360	695 heatsink BKT	2
㉚	8810003370	Setscrew C M3 × 8	1
㉛	8810003760	Icom screw C10	5
㉜	8930006080	Screw spacer-C	5
㉝	8510004181	443 10W module shield plate-2	1
㉞	8930011460	566 PA module plate	1
㉟	8810003170	Setscrew A M3 × 8	3
㊱	8810000420	Screw PH M4 × 18	1
㊲	8850000430	Spring washer M4 NI	1
㊳	8850000140	Flat washer M4 NI BS	1
㊴	8810003370	Setscrew C M3 × 8	1
㊵	8950001760	Electrical tape NO. 1245 L=70	1
㊶	8930011250	Transistor sheet TO-3P	2
㊷	8510000230	220 shield case	1
㊸	6510000570	Terminal ML-18 7P	3
㊹	4510000360	Electrolytic condenser HCG5A1E563Y (25L56000UF)	1
㊺	5910000600	Transformer TP-52	1
㊻	8510003360	DC-DC case	1
㊼	8510004700	566 shield case	2
㊽	8510004190	443 prescaler shield case	2
㊾	8510000241	220 shield case cover-1	1
㊿	8510002390	Mixer shield case	1
51	8510004690	YGR module shield plate	1
52	8930011480	YGR module plate	1

Screw abbreviations FH: Flat head BiH: Binding head PH: Pan head BS: Brass
 NI: Nickel ZK: Black







DIN UNIT
(B 1841B)

4-4 REAR PARTS

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8010008941	695 rear panel-1	1
②	8930008230	DIN plate	1
③	6910003290	Finger guard B-1	1
④	8930002360	Diode plate	1
⑤	8810001990	Screw PH M5 × 18 NI BS	1
⑥	8850000590	Star washer M5	1
⑦	8850000440	Spring washer M5 NI	1
⑧	8830000210	Nut M5 NI BS	1
⑨	8850000150	Flat washer M5 NI BS	2
⑩	8830000360	Wing nut M5 NI	1
⑪	8810003770	Icom screw C12	4
⑫	8850000130	Flat washer M3 (3 × 8 × 0.5) NI BS	4
⑬	8830000100	Nut M3	6
⑭	8810003720	Icom screw B6	7
⑮	8810003740	Icom screw B10	2
⑯	8850000420	Spring washer M3 NI	2
⑰	8860000130	Grounding lug B5 (M3) AG BS	1
⑱	8810004270	Screw BiH M4 × 6 ZK BS	10
⑲	2230000710	Switch DS-102-R [DC RESET]	1
⑳	5210000040	Fuse FGB 2A [AC FUSE]	1
㉑	5210000070	Fuse FGB 10A [DC FUSE]	1
㉒	5220000051	Fuse holder FH-032CT	2
㉓	2710000280	Fan MD1208PTS-1	1
㉔	6450000770	Jack CM-11 [AC]	1
㉕	6510000460	Terminal T3830 R [BACKUP BATTERY (+)]	1
㉖	6510000470	Terminal T3830 K [BACKUP BATTERY (-)]	1
㉗	6510000330	ANT.connector NR-DS [RX ANT]	1
㉘	6510000330	ANT.connector OPC-043A [TX ANT]	1
㉙	8510006380	Filter case (B)	1
㉚	8510001900	Filter case cover	2
㉛	8810001800	Screw PH M2.6 × 4 NI BS	2
㉜	8510006370	Filter case (A)	1

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

SECTION 5 PARTS LIST

[FRONT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7210000140	Variable Resistor	RK1831110D9DA (10KA) [VOLUME]
R2	7210000690	Variable Resistor	RK1831110D9CA (10KB) [SQUELCH]
S1	2260001260	Switch	SW-118 (SDDFA3) [POWER]
SP1	2510000040	Speaker	C065K1210810 [SPEAKER]

[MIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
EP1	0910019801	P.C. Board	B 1839B (MIC)

[AF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110000200	IC	μ PC2002V
R1	7010003280	Resistor	ELR20J 100 Ω
R2	7010003120	Resistor	ELR20J 4.7 Ω
R3	7010003320	Resistor	ELR20J 220 Ω
R4	7010003480	Resistor	ELR20J 4.7 k Ω
C1	4510000830	Electrolytic	18 RE 220 μ F
C2	4040000260	Barrier Layer	UZE 08X 104M
C3	4510000830	Electrolytic	18 RE 220 μ F
C4	4510000820	Electrolytic	18 RE 100 μ F
C5	4010000520	Ceramic	DD108 B 472K 50V
C6	4510000890	Electrolytic	50 RE 0.47 μ F
EP1	0910017010	P.C. Board	B 1611 (AF)

[SW UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
S1	2230000380	Switch	SPUE44067A [CTCSS, etc.]
EP1	0910019832	P.C. Board	B 1840B (SW)

[LED UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7010003400	Resistor	ELR20J 1 k Ω
R2	7010003400	Resistor	ELR20J 1 k Ω
R3	7010003400	Resistor	ELR20J 1 k Ω
R4	7010003400	Resistor	ELR20J 1 k Ω
R5	7010003400	Resistor	ELR20J 1 k Ω
R6	7010003400	Resistor	ELR20J 1 k Ω
DS1	5040000470	LED	SPB-26MUW F [POWER]
DS2	5040001310	LED	SLB-26UR 3F [TRANSMIT]
DS3	5040001130	LED	SLB-26MG 3F [BUSY]
DS4	5040001360	LED	TLG205 [CTCSS]
DS5	5040000650	LED	TLY205 [LOCAL INHIBIT]
DS6	5040000640	LED	TLR205 [MANUAL ID]
DS7	5040000650	LED	TLY205 [COR SIMULATE]
EP1	0910020104	P.C. Board	B 1901D (LED)

[CHASSIS UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1710000010	Diode	15CD11
D2	1730000070	Zener	RD3.9E B2
R1	7010004650	Resistor	R50XJ 10 Ω
C1	4510000360	Electrolytic	HCG5A1E563Y (25V 56000 μ F)
C2	4010004440	Ceramic	DE7090 B 102K VA1-KC
C3	4010004440	Ceramic	DE7090 B 102K VA1-KC
S1	2230000710	Switch	DS-102-R
F1	5220000051	Holder	FH-032CT
F2	5220000051	Holder	FH-032CT
T1	5910000600	Transformer	TP-52
EP1	5210000040	Fuse	FGB 2A
EP2	5210000070	Fuse	FGB 10A

[LOGIC-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130003960	IC	μ PD74HC238C
IC2	1130003960	IC	μ PD74HC238C
IC3	1130000750	IC	μ PD4013BC
IC4	1130004680	IC	LC7385 (DIP)
Q1	1530000040	Transistor	2SC1815-Y
D1	1710000180	Diode	1SS133
D2	1710000180	Diode	1SS133
D3	1710000180	Diode	1SS133
D4	1710000180	Diode	1SS133
D5	1710000180	Diode	1SS133
D6	1710000180	Diode	1SS133
D7	1710000180	Diode	1SS133
D8	1710000180	Diode	1SS133
D9	1710000180	Diode	1SS133
D10	1710000180	Diode	1SS133
D11	1710000180	Diode	1SS133
D12	1710000180	Diode	1SS133
D13	1710000180	Diode	1SS133
D14	1710000180	Diode	1SS133
D15	1710000180	Diode	1SS133
D16	1710000180	Diode	1SS133
D17	1710000180	Diode	1SS133
D18	1710000180	Diode	1SS133
D19	1710000180	Diode	1SS133
D20	1710000180	Diode	1SS133
D21	1710000180	Diode	1SS133
D22	1710000180	Diode	1SS133
D23	1710000180	Diode	1SS133
D24	1710000180	Diode	1SS133
D25	1710000180	Diode	1SS133
D26	1710000180	Diode	1SS133
D27	1710000180	Diode	1SS133
D28	1710000180	Diode	1SS133
D29	1710000180	Diode	1SS133
D30	1710000180	Diode	1SS133
D31	1710000180	Diode	1SS133
D32	1710000180	Diode	1SS133
D33	1710000180	Diode	1SS133
D34	1710000180	Diode	1SS133
D35	1710000180	Diode	1SS133
D36	1710000180	Diode	1SS133
D37	1710000180	Diode	1SS133
D38	1710000180	Diode	1SS133
D39	1710000180	Diode	1SS133
D40	1710000180	Diode	1SS133
D41	1710000180	Diode	1SS133
D42	1710000180	Diode	1SS133
D43	1710000180	Diode	1SS133
D44	1710000180	Diode	1SS133
D45	1710000180	Diode	1SS133
D46	1710000180	Diode	1SS133
D47	1710000180	Diode	1SS133
D48	1710000180	Diode	1SS133
D49	1710000180	Diode	1SS133
D50	1710000180	Diode	1SS133
D51	1710000180	Diode	1SS133
D52	1710000180	Diode	1SS133
D53	1710000180	Diode	1SS133
D54	1710000180	Diode	1SS133
D55	1710000180	Diode	1SS133
D56	1710000180	Diode	1SS133
D57	1710000180	Diode	1SS133
D58	1710000180	Diode	1SS133
D59	1710000180	Diode	1SS133
D60	1710000180	Diode	1SS133
D61	1710000180	Diode	1SS133
D62	1710000180	Diode	1SS133
D63	1710000180	Diode	1SS133
D64	1710000180	Diode	1SS133
D65	1710000180	Diode	1SS133
D66	1710000180	Diode	1SS133
D67	1710000180	Diode	1SS133
D68	1710000180	Diode	1SS133
D69	1710000180	Diode	1SS133

[LOGIC-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
D70	1710000180	Diode	1SS133
D71	1710000180	Diode	1SS133
D72	1710000180	Diode	1SS133
D73	1710000180	Diode	1SS133
D74	1710000180	Diode	1SS133
D75	1710000180	Diode	1SS133
D76	1710000180	Diode	1SS133
D77	1710000180	Diode	1SS133
D78	1710000180	Diode	1SS133
D79	1710000180	Diode	1SS133
D80	1710000180	Diode	1SS133
D81	1710000180	Diode	1SS133
D82	1710000180	Diode	1SS133
D83	1710000180	Diode	1SS133
D84	1710000180	Diode	1SS133
D85	1710000180	Diode	1SS133
D86	1710000180	Diode	1SS133
D87	1710000180	Diode	1SS133
D88	1710000180	Diode	1SS133
D89	1710000180	Diode	1SS133
D90	1710000180	Diode	1SS133
D91	1710000180	Diode	1SS133
D92	1710000180	Diode	1SS133
D93	1710000180	Diode	1SS133
D94	1710000180	Diode	1SS133
D95	1710000180	Diode	1SS133
D96	1710000180	Diode	1SS133
D97	1710000180	Diode	1SS133
X1	6050003120	Crystal	RF-4A3 FAA NKD (3.579545M)
R1	7010003620	Resistor	ELR20J 47 k Ω
R2	7010003630	Resistor	ELR20J 56 k Ω
R3	7010003620	Resistor	ELR20J 47 k Ω
R4	7010003360	Resistor	ELR20J 470 Ω
R5	7010003620	Resistor	ELR20J 47 k Ω
R6	7010003530	Resistor	ELR20J 10 k Ω
R7	7010003400	Resistor	ELR20J 1 k Ω
R8	7010003320	Resistor	ELR20J 220 Ω
R9	7410000210	Resistor Array	RMX- 8 472K
R10	7010003700	Resistor	ELR20J 220 k Ω
R11	7010003620	Resistor	ELR20J 47 k Ω
C1	4040000260	Barrier Layer	UZE 08X 104M
C2	4040000260	Barrier Layer	UZE 08X 104M
C3	4010000220	Ceramic	DD104 SL 330J 50V
C4	4010000220	Ceramic	DD104 SL 330J 50V
C5	4040000260	Barrier Layer	UZE 08X 104M
C6	4310000020	Mylar	F2D 50V 103K
C7	4550000320	Tantalum	DN 1V 0R1M
C8	4010000500	Ceramic	DD104 B 102K 50V
C9	4040000260	Barrier Layer	UZE 08X 104M
S1	2260001100	Switch	SSGM1A031A
S2	2260000610	Switch	SSGM17012A
S3	2260000820	Switch	SSGM16034A
S4	2260000790	Switch	SSGM12026A
S5	2260000580	Switch	SKHLAD035A
S6	2260000580	Switch	SKHLAD035A
S7	2260001090	Switch	DRS3016
S8	2260001090	Switch	DRS3016
S9	2260001100	Switch	SSGM1A031A
S10	2260000610	Switch	SSGM17012A
S11	2260000820	Switch	SSGM16034A
S12	2260000790	Switch	SSGM12026A
S13	2260001090	Switch	DRS3016
S14	2260001090	Switch	DRS3016
S15	2260001090	Switch	DRS3016
S16	2260001090	Switch	DRS3016
S17	2260001090	Switch	DRS3016
S18	2260001090	Switch	DRS3016
S19	2260001090	Switch	DRS3016
S20	2260001090	Switch	DRS3016
EP1	0910019533	P.C. Board	B 1879C (LOGIC-A)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130001270	IC	μ PD4069UBC
IC2	1130003970	IC	μ PD74HC393C
IC3	1130003320	IC	μ PD74HC4040C
IC4	1130003950	IC	μ PD74HC14C
IC5	1140000490	IC	μ PD780C-1
IC6	1130003620	IC	μ PD74HC32C
IC7	1130003700	IC	μ PD27C256AD
IC8	1130003930	IC	μ PD4464C
IC9	1130002640	IC	μ PD71055C
IC10	1130002640	IC	μ PD71055C
IC11	1110001750	IC	BA614
IC12	1110001750	IC	BA614
IC13	1130000040	IC	TC4011UBP
IC14	1110000540	IC	NJM4558D
IC15	1110000540	IC	NJM4558D
IC16	1180000190	IC	NJM7805A
IC17	1110001680	IC	S-8054ALB
Q1	1530000960	Transistor	2SC3399
Q2	1530000960	Transistor	2SC3399
Q3	1530000110	Transistor	2SC2458-GR
Q4	1530000960	Transistor	2SC3399
Q5	1530000960	Transistor	2SC3399
Q6	1590000310	FET	2SJ105-GR
D2	1710000160	Diode	1SS133
D3	1710000160	Diode	1SS133
D4	1710000160	Diode	1SS133
D5	1710000160	Diode	1SS133
X1	6060000380	Crystal	CSA4.00MG
R1	7010003780	Resistor	ELR20J 1 M Ω
R4	7010003620	Resistor	ELR20J 47 k Ω
R5	7010003620	Resistor	ELR20J 47 k Ω
R6	7010003530	Resistor	ELR20J 10 k Ω
R7	7010003280	Resistor	ELR20J 100 Ω
R8	7010003620	Resistor	ELR20J 47 k Ω
R9	7410000180	Resistor Array	RMX- 8 103K
R10	7010003530	Resistor	ELR20J 10 k Ω
R11	7010003530	Resistor	ELR20J 10 k Ω
R12	7010003530	Resistor	ELR20J 10 k Ω
R14	7010003660	Resistor	ELR20J 100 k Ω
R15	7010003400	Resistor	ELR20J 1 k Ω
R16	7010003460	Resistor	ELR20J 3.3 k Ω
R17	7010003530	Resistor	ELR20J 10 k Ω
R18	7010003440	Resistor	ELR20J 2.2 k Ω
R19	7010003530	Resistor	ELR20J 10 k Ω
R20	7010003700	Resistor	ELR20J 220 k Ω
R21	7310001850	Trimmer	RH0421CS4J08A (473)
R22	7010004340	Resistor	R20J 15 k Ω
R23	7310001850	Trimmer	RH0421CS4J08A (473)
R24	7010003280	Resistor	ELR20J 100 Ω
R25	7010003440	Resistor	ELR20J 2.2 k Ω
R26	7010003550	Resistor	ELR20J 15 k Ω
R27	7010003320	Resistor	ELR20J 220 Ω
R28	7010003550	Resistor	ELR20J 15 k Ω
R29	7010003600	Resistor	ELR20J 33 k Ω
R30	7010003620	Resistor	ELR20J 47 k Ω
R31	7010003530	Resistor	ELR20J 10 k Ω
R32	7010003620	Resistor	ELR20J 47 k Ω
R33	7310001710	Trimmer	RH0421C14J0KA (103)
R34	7010004450	Resistor	R20J 100 k Ω
R35	7010003280	Resistor	ELR20J 100 Ω
R36	7010003660	Resistor	ELR20J 100 k Ω
R37	7010003660	Resistor	ELR20J 100 k Ω
R38	7310001710	Trimmer	RH0421C14J0KA (103)
R39	7010003660	Resistor	ELR20J 100 k Ω
R40	7010003660	Resistor	ELR20J 100 k Ω
R41	7010004070	Resistor	R20J 100 Ω
R42	7010003660	Resistor	ELR20J 100 k Ω
R43	7010003670	Resistor	ELR20J 120 k Ω
R44	7010003490	Resistor	ELR20J 5.6 k Ω
R45	7310001710	Trimmer	RH0421C14J0KA (103)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R46	7010004410	Resistor	R20J 47 k Ω
R47	7010004320	Resistor	R20J 10 k Ω
R48	7010003600	Resistor	ELR20J 33 k Ω
C1	4010000810	Ceramic	DD105 CH 300J 50V
C2	4010000810	Ceramic	DD105 CH 300J 50V
C3	4040000190	Barrier Layer	UAT 05X 103K
C4	4040000190	Barrier Layer	UAT 05X 103K
C5	4040000190	Barrier Layer	UAT 05X 103K
C6	4040000190	Barrier Layer	UAT 05X 103K
C7	4040000190	Barrier Layer	UAT 05X 103K
C8	4510001300	Electrolytic	50 RC2 3.3 μ F
C9	4040000260	Barrier Layer	UZE 08X 104M
C10	4040000190	Barrier Layer	UAT 05X 103K
C11	4040000260	Barrier Layer	UZE 08X 104M
C12	4040000260	Barrier Layer	UZE 08X 104M
C13	4040000190	Barrier Layer	UAT 05X 103K
C14	4040000190	Barrier Layer	UAT 05X 103K
C15	4310000080	Mylar	F2D 50V 223K
C16	4040000260	Barrier Layer	UZE 08X 104M
C17	4510001220	Electrolytic	16 RC2 10 μ F
C18	4510001240	Electrolytic	25 RC2 47 μ F
C19	4040000260	Barrier Layer	UZE 08X 104M
C20	4310000010	Mylar	F2D 50V 102K
C21	4040000260	Barrier Layer	UZE 08X 104M
C22	4510001280	Electrolytic	50 RC2 1 μ F
C23	4040000260	Barrier Layer	UZE 08X 104M
C24	4510001220	Electrolytic	16 RC2 10 μ F
C25	4040000260	Barrier Layer	UZE 08X 104M
C26	4040000260	Barrier Layer	UZE 08X 104M
C27	4040000260	Barrier Layer	UZE 08X 104M
C28	4510001220	Electrolytic	16 RC2 10 μ F
C29	4510001280	Electrolytic	50 RC2 1 μ F
C30	4510001280	Electrolytic	50 RC2 1 μ F
C31	4040000260	Barrier Layer	UZE 08X 104M
C32	4040000260	Barrier Layer	UZE 08X 104M
C33	4550002430	Tantalum	DN 1V R33M
C34	4550000320	Tantalum	DN 1V 0R1M
C35	4510001210	Electrolytic	10 RC2 100 μ F
C36	4510001280	Electrolytic	50 RC2 1 μ F
DS1	5040000810	LED	SLN-210VC
S1	2260000080	Switch	SKHHAM024A
BT1	3020000070	Lithium Battery	BR2032-1HF
EP1	0910020193	P.C. Board	B 1835C (LOGIC)

[RX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110000630	IC	MC3357P
IC2	1110000580	IC	BA4558
IC3	1130002960	IC	TC9181P
IC4	1120000960	IC	TD6127BP
IC5	1110001000	IC	μ PC1651G
IC6	1130001830	IC	MN6520
IC7	1130000180	IC	TC4094BP
IC8	1180000470	IC	NJM7808A
IC9	1180000190	IC	NJM7805A
Q1	1590000030	FET	MGF1202
Q2	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q3	1530001780	Transistor	2SC3358
Q4	1530000400	Transistor	2SC3358
Q5	1530000370	Transistor	2SC3358-T2B
Q6	1580000050	FET	3SK121-Y
Q7	1530002030	Transistor	2SC3772-3-TA
Q8	1530002020	Transistor	2SC3770-3-TA
Q9	1530002020	Transistor	2SC3770-3-TA
Q10	1530000180	Transistor	2SC2712-Y (TE85RTEM)
Q11	1590000280	FET	2SJ105-Y
Q12	1530000980	Transistor	2SC3399
Q13	1530000980	Transistor	2SC3399
Q14	1530000860	Transistor	2SC1845B
Q15	1580000010	FET	2SK184-Y
Q16	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q17	1530000110	Transistor	2SC2458-GR
Q18	1530000860	Transistor	2SC1845B
Q19	1530001810	Transistor	2SC3355
D1	1730000640	Zener	RD4.3M-T2B1
D2	1750000030	Diode	1SS187 (TE85R)
D3	1750000070	Diode	1SS226 (TE85R)
D4	1730000730	Zener	RD6.2M-T2B2
D5	1790000490	Diode	HSM88AS-TR
D6	1710000160	Diode	1SS133
D7	1710000580	Diode	1SS265
D8	1710000580	Diode	1SS265
D9	1730000100	Zener	RD5.1E B2
X1	6050004880	Crystal	CR-240
X2	6050003010	Crystal	CR-166
X3	6070000010	Discriminator	CDB455C7A
X4	6050003110	Crystal	RF-4A3 FAC NKD (4.194304M)
FI1	2040000190	Filter	EZF-GC70BT11
FI2	2040000190	Filter	EZF-GC70BT11
FI3	2010000580	Filter	17M15B (FL-78)
FI4	2020000120	Ceramic	CFW455E
L1	6150002010	Coil	LS-265
L2	6150002050	Coil	LS-259
L3	6150002050	Coil	LS-259
L4	6150002050	Coil	LS-259
L5	6150002700	Coil	LS-272
L6	6150002010	Coil	LS-265
L7	6180000760	Coil	LAL 03NA R82M
L8	6150002050	Coil	LS-259
L9	6130002010	Coil	LB-217
L10	6150002050	Coil	LS-259
L11	6150002700	Coil	LS-272
L12	6180000900	Coil	LAL 03NA 101K
L13	6200000420	Coil	MLF3216A 1R0M-T
L14	6180002400	Coil	LAL 02NA 1R0K
L15	6140001490	Coil	LR-168
L16	6110001530	Coil	LA-233
L17	6180002400	Coil	LAL 02NA 1R0K
L18	6180001300	Coil	LAL 02NA 100K
R1	7030000240	Resistor	MCR10EZHZ 68 Ω (680)
R2	7030000140	Resistor	MCR10EZHZ 10 Ω (100)

[RX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R3	7030000400	Resistor	MCR10EZHZ 1.5 k Ω (152)
R4	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R5	7030000540	Resistor	MCR10EZHZ 22 k Ω (223)
R6	7030000480	Resistor	MCR10EZHZ 6.8 k Ω (682)
R7	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R8	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R9	7030000820	Resistor	MCR10EZHZ 100 k Ω (104)
R10	7030000560	Resistor	MCR10EZHZ 33 k Ω (333)
R11	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R12	7030000540	Resistor	MCR10EZHZ 22 k Ω (223)
R13	7030000480	Resistor	MCR10EZHZ 6.8 k Ω (682)
R14	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R15	7030000500	Resistor	MCR10EZHZ 10 k Ω (103)
R16	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R17	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R18	7030000500	Resistor	MCR10EZHZ 10 k Ω (103)
R19	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R20	7030000410	Resistor	MCR10EZHZ 1.8 k Ω (182)
R21	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R22	7010004020	Resistor	R20J 39 Ω
R23	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R24	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R25	7030000540	Resistor	MCR10EZHZ 22 k Ω (223)
R26	7030000460	Resistor	MCR10EZHZ 4.7 k Ω (472)
R27	7030000340	Resistor	MCR10EZHZ 1.5 k Ω (152)
R28	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R29	7030000530	Resistor	MCR10EZHZ 18 k Ω (183)
R30	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R31	7030000400	Resistor	MCR10EZHZ 1.5 k Ω (152)
R32	7030000590	Resistor	MCR10EZHZ 58 k Ω (583)
R33	7030000540	Resistor	MCR10EZHZ 22 k Ω (223)
R34	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R35	7030000400	Resistor	MCR10EZHZ 1.5 k Ω (152)
R36	7030000580	Resistor	MCR10EZHZ 47 k Ω (473)
R37	7030000400	Resistor	MCR10EZHZ 1.5 k Ω (152)
R38	7010004150	Resistor	R20J 470 Ω
R39	7030000680	Resistor	MCR10EZHZ 330 k Ω (334)
R40	7030000440	Resistor	MCR10EZHZ 3.3 k Ω (332)
R41	7030000420	Resistor	MCR10EZHZ 2.2 k Ω (222)
R42	7030000580	Resistor	MCR10EZHZ 47 k Ω (473)
R43	7010003530	Resistor	ELR20J 10 k Ω
R44	7030000460	Resistor	MCR10EZHZ 4.7 k Ω (472)
R45	7030000420	Resistor	MCR10EZHZ 2.2 k Ω (222)
R46	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R47	7030000350	Resistor	MCR10EZHZ 580 Ω (581)
R48	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R49	7030000400	Resistor	MCR10EZHZ 1.5 k Ω (152)
R50	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R51	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R52	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R53	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R54	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R55	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R56	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R57	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R58	7030000170	Resistor	MCR10EZHZ 18 Ω (180)
R59	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R60	7030000280	Resistor	MCR10EZHZ 100 Ω (101)
R61	7030000480	Resistor	MCR10EZHZ 6.8 k Ω (682)
R62	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R63	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R64	7030000170	Resistor	MCR10EZHZ 18 Ω (180)
R65	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R66	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R67	7030000210	Resistor	MCR10EZHZ 39 Ω (390)
R68	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R69	7010003630	Resistor	ELR20J 56 k Ω
R70	7010003630	Resistor	ELR20J 56 k Ω
R71	7010003720	Resistor	ELR20J 330 k Ω
R72	7010004270	Resistor	R20J 4.7 k Ω
R73	7030000520	Resistor	MCR10EZHZ 15 k Ω (153)
R74	7030000500	Resistor	MCR10EZHZ 10 k Ω (103)
R75	7030000420	Resistor	MCR10EZHZ 2.2 k Ω (222)
R76	7030000700	Resistor	MCR10EZHZ 470 k Ω (474)
R77	7030000500	Resistor	MCR10EZHZ 10 k Ω (103)

[RX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R78	7030000500	Resistor	MCR10EZJH 10 k Ω (103)
R80	7010003490	Resistor	ELR20J 5.8 k Ω
R81	7010003790	Resistor	ELR20J 1.2 M Ω
R82	7010003790	Resistor	ELR20J 1.2 M Ω
R83	7010004070	Resistor	R20J 100 Ω
R84	7010003510	Resistor	ELR20J 6.8 k Ω
R85	7010003510	Resistor	ELR20J 6.8 k Ω
R86	7010003450	Resistor	ELR20J 2.7 k Ω
R88	7030000500	Resistor	MCR10EZJH 10 k Ω (103)
R89	7010004410	Resistor	R20J 47 k Ω
R90	7010003600	Resistor	ELR20J 33 k Ω
R91	7010003610	Resistor	ELR20J 39 k Ω
R92	7010004190	Resistor	R20J 1 k Ω
R93	7010004410	Resistor	R20J 47 k Ω
R94	7010004070	Resistor	R20J 100 Ω
R95	7030000460	Resistor	MCR10EZJH 4.7 k Ω (472)
R96	7030000500	Resistor	MCR10EZJH 10 k Ω (103)
R97	7010003360	Resistor	ELR20J 470 Ω
R98	7010003580	Resistor	ELR20J 22 k Ω
R99	7030000400	Resistor	MCR10EZJH 1.5 k Ω (152)
C1	4030000600	Ceramic	GRM40 SL 080D 50PT
C2	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C3	4030001100	Ceramic	GRM40 B 102K 50PT
C4	4030001100	Ceramic	GRM40 B 102K 50PT
C5	4030001090	Ceramic	GRM40 B 471K 50PT
C6	4030001090	Ceramic	GRM40 B 471K 50PT
C7	4030001100	Ceramic	GRM40 B 102K 50PT
C8	4030001100	Ceramic	GRM40 B 102K 50PT
C9	4030001090	Ceramic	GRM40 B 471K 50PT
C10	4030001090	Ceramic	GRM40 B 471K 50PT
C11	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C12	4030001100	Ceramic	GRM40 B 102K 50PT
C13	4030001090	Ceramic	GRM40 B 471K 50PT
C14	4030000560	Ceramic	GRM40 SL 020C 50PT
C15	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C16	4030001100	Ceramic	GRM40 B 102K 50PT
C17	4550000460	Tantalum	TESVA 1C 105M1-8L
C18	4030000560	Ceramic	GRM40 SL 020C 50PT
C19	4030001090	Ceramic	GRM40 B 471K 50PT
C20	4030000560	Ceramic	GRM40 SL 020C 50PT
C21	4030000560	Ceramic	GRM40 SL 020C 50PT
C22	4030001090	Ceramic	GRM40 B 471K 50PT
C23	4030000560	Ceramic	GRM40 SL 020C 50PT
C24	4030001090	Ceramic	GRM40 B 471K 50PT
C25	4030001100	Ceramic	GRM40 B 102K 50PT
C26	4030001090	Ceramic	GRM40 B 471K 50PT
C27	4030001100	Ceramic	GRM40 B 102K 50PT
C28	4030000640	Ceramic	GRM40 SL 120J 50PT
C29	4030000660	Ceramic	GRM40 SL 180J 50PT
C30	4030001090	Ceramic	GRM40 B 471K 50PT
C31	4030001100	Ceramic	GRM40 B 102K 50PT
C32	4030000640	Ceramic	GRM40 SL 120J 50PT
C33	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C34	4030000620	Ceramic	GRM40 SL 080D 50PT
C35	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C36	4030000620	Ceramic	GRM40 SL 080D 50PT
C37	4030000590	Ceramic	GRM40 SL 050C 50PT
C38	4030001090	Ceramic	GRM40 B 471K 50PT
C39	4030001100	Ceramic	GRM40 B 102K 50PT
C40	4030000670	Ceramic	GRM40 SL 220J 50PT
C41	4030000670	Ceramic	GRM40 SL 220J 50PT
C42	4030000650	Ceramic	GRM40 SL 150J 50PT
C43	4610000380	Trimmer	ECRGA020E30
C44	4030000690	Ceramic	GRM40 SL 390J 50PT
C45	4030000700	Ceramic	GRM40 SL 470J 50PT
C46	4030001090	Ceramic	GRM40 B 471K 50PT
C47	4030001100	Ceramic	GRM40 B 102K 50PT
C48	4030000650	Ceramic	GRM40 SL 150J 50PT
C49	4030000550	Ceramic	GRM40 SL 010C 50PT
C50	4030000640	Ceramic	GRM40 SL 120J 50PT
C51	4030000550	Ceramic	GRM40 SL 010C 50PT
C52	4030003570	Ceramic	GRM40 SL 090D 50PT
C53	4030000600	Ceramic	GRM40 SL 080D 50PT
C54	4030001100	Ceramic	GRM40 B 102K 50PT
C55	4030000730	Ceramic	GRM40 SL 820J 50PT
C56	4030000580	Ceramic	GRM40 SL 040C 50PT

[RX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C57	4030000710	Ceramic	GRM40 SL 580J 50PT
C58	4030000670	Ceramic	GRM40 SL 220J 50PT
C59	4030001100	Ceramic	GRM40 B 102K 50PT
C60	4030001120	Ceramic	GRM40 B 472K 50PT
C61	4030001120	Ceramic	GRM40 B 472K 50PT
C62	4030001100	Ceramic	GRM40 B 102K 50PT
C63	4030001120	Ceramic	GRM40 B 472K 50PT
C64	4510001230	Electrolytic	25 RC2 4.7 μF
C65	4550000530	Tantalum	TESVA 1V 104M1-8L
C66	4030000750	Ceramic	GRM40 SL 121J 50PT
C67	4030000750	Ceramic	GRM40 SL 121J 50PT
C68	4030000700	Ceramic	GRM40 SL 470J 50PT
C70	4550002670	Tantalum	TESVB2 1C 335M-8L
C71	4510001230	Electrolytic	25 RC2 4.7 μF
C72	4030001150	Ceramic	GRM40 F 104Z 25PT
C73	4030000730	Ceramic	GRM40 SL 820J 50PT
C74	4550000530	Tantalum	TESVA 1V 104M1-8L
C75	4010000280	Ceramic	DD104 SL 470J 50V
C76	4040000090	Barrier Layer	UAT 04X 152K
C77	4010000500	Ceramic	DD104 B 102K 50V
C78	4030001100	Ceramic	GRM40 B 102K 50PT
C79	4030000680	Ceramic	GRM40 SL 330J 50PT
C80	4030001100	Ceramic	GRM40 B 102K 50PT
C82	4030001140	Ceramic	GRM40 F 103Z 50PT
C83	4030001100	Ceramic	GRM40 B 102K 50PT
C84	4010000500	Ceramic	DD104 B 102K 50V
C85	4510001210	Electrolytic	10 RC2 100 μF
C86	4030001150	Ceramic	GRM40 F 104Z 25PT
C87	4030001090	Ceramic	GRM40 B 471K 50PT
C88	4550000410	Tantalum	DN 1V 4R7M
C89	4030001150	Ceramic	GRM40 F 104Z 25PT
C90	4030001090	Ceramic	GRM40 B 471K 50PT
C91	4510002270	Electrolytic	6.3 RC2 47 μF
C92	4030001150	Ceramic	GRM40 F 104Z 25PT
C93	4510001220	Electrolytic	16 RC2 10 μF
C94	4030001090	Ceramic	GRM40 B 471K 50PT
C95	4510001220	Electrolytic	16 RC2 10 μF
C96	4030001110	Ceramic	GRM40 B 222K 50PT
C97	4030001110	Ceramic	GRM40 B 222K 50PT
C98	4030001140	Ceramic	GRM40 F 103Z 50PT
C99	4030001110	Ceramic	GRM40 B 222K 50PT
C100	4020000030	Cylinder	UP125 SL 2R2K
C101	4030000670	Ceramic	GRM40 SL 220J 50PT
C102	4030000670	Ceramic	GRM40 SL 220J 50PT
C103	4550000460	Tantalum	TESVA 1C 105M1-8L
C104	4030001100	Ceramic	GRM40 B 102K 50PT
C105	4030000580	Ceramic	GRM40 SL 040C 50PT
C106	4030000580	Ceramic	GRM40 SL 020C 50PT
C107	4030000580	Ceramic	GRM40 SL 040C 50PT
C108	4030000550	Ceramic	GRM40 SL 010C 50PT
C109	4030000580	Ceramic	GRM40 SL 040C 50PT
C110	4030000670	Ceramic	GRM40 SL 220J 50PT
C111	4030001090	Ceramic	GRM40 B 471K 50PT
C112	4030000750	Ceramic	GRM40 SL 121J 50PT
C113	4030000670	Ceramic	GRM40 SL 220J 50PT
C114	4030000700	Ceramic	GRM40 SL 470J 50PT
C115	4030001090	Ceramic	GRM40 B 471K 50PT
C116	4030001090	Ceramic	GRM40 B 471K 50PT
C117	4510001230	Electrolytic	25 RC2 4.7 μF
C118	4310000200	Mylar	F2D 50V 153K
C119	4310000170	Mylar	F2D 50V 682K
C120	4510001280	Electrolytic	50 RC2 1 μF
C121	4030001150	Ceramic	GRM40 F 104Z 25PT
C122	4030001150	Ceramic	GRM40 F 104Z 25PT
C123	4030000680	Ceramic	GRM40 SL 180J 50PT
C124	4030000680	Ceramic	GRM40 SL 180J 50PT
C125	4510002270	Electrolytic	6.3 RC2 47 μF
C127	4040000190	Barrier Layer	UAT 05X 103K
C128	4040000190	Barrier Layer	UAT 05X 103K
C129	4040000190	Barrier Layer	UAT 05X 103K
C130	4040000150	Barrier Layer	UAT 05X 472K
C131	4510002010	Electrolytic	50 RC2 0.33 μF
C132	4510001270	Electrolytic	50 RC2 0.47 μF
C133	4040000280	Barrier Layer	UZE 08X 104M
C134	4510001270	Electrolytic	50 RC2 0.47 μF
C135	4510001270	Electrolytic	50 RC2 0.47 μF
C136	4550000350	Tantalum	DN 1V 010M
C137	4550000340	Tantalum	DN 1C 100M

[RX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C138	4550000350	Tantalum	DN 1V 010M
C139	4550000340	Tantalum	DN 1C 100M
C140	4510001220	Electrolytic	18 RC2 10 μ F
C141	4010000460	Ceramic	DD104 B 471K 50V
C142	4010000500	Ceramic	DD104 B 102K 50V
C143	4010000500	Ceramic	DD104 B 102K 50V
C144	4040000190	Barrier Layer	UAT 05X 103K
C145	4030001090	Ceramic	GRM40 B 471K 50PT
C146	4550000530	Tantalum	TESVA 1V 104M1-8L
EP1	0910019174	P.C. Board	B 1833D (RX)

[R-VCO UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1580000130	FET	2SK125
Q2	1530000370	Transistor	2SC3356-T2B
D1	1720000090	Varicap	1T25
D2	1720000090	Varicap	1T25
D3	1720000090	Varicap	1T25
D4	1720000090	Varicap	1T25
L1	6170000180	Coil	LW-19
L2	6200000010	Coil	LQN 5N 1R0M
L3	6200000010	Coil	LQN 5N 1R0M
L4	6110001980	Coil	LA-222
R1	7010004370	Resistor	R20J 22 k Ω
R2	7030000340	Resistor	MCR10EZJH 470 Ω (471)
R3	7010004190	Resistor	R20J 1 k Ω
R4	7030000340	Resistor	MCR10EZJH 470 Ω (471)
R5	7030000180	Resistor	MCR10EZJH 15 Ω (150)
R6	7030000140	Resistor	MCR10EZJH 10 Ω (100)
R7	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R8	7030000460	Resistor	MCR10EZJH 4.7 k Ω (472)
R9	7030000400	Resistor	MCR10EZJH 1.5 k Ω (152)
R10	7030000260	Resistor	MCR10EZJH 100 Ω (101)
C1	4030001090	Ceramic	GRM40 B 471K 50PT
C2	4550000270	Tantalum	TESVA 1E 474M1-8L
C3	4550000450	Tantalum	TESVC 1C 108M-12L
C4	4030001090	Ceramic	GRM40 B 471K 50PT
C5	4030000570	Ceramic	GRM40 SL 030C 50PT
C6	4030000570	Ceramic	GRM40 SL 030C 50PT
C7	4030001090	Ceramic	GRM40 B 471K 50PT
C8	4030001090	Ceramic	GRM40 B 471K 50PT
C9	4030000550	Ceramic	GRM40 SL 010C 50PT
C10	4030001090	Ceramic	GRM40 B 471K 50PT
C11	4030001100	Ceramic	GRM40 B 102K 50PT
C12	4030000630	Ceramic	GRM40 SL 100D 50PT
C13	4030000580	Ceramic	GRM40 SL 040C 50PT
C14	4030000580	Ceramic	GRM40 SL 040C 50PT
EP1	0910015823	P.C. Board	B 1493C (R-VCO)

[R-DC-DC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110000900	IC	TL499ACP
Q1	1530000660	Transistor	2SC1845B
D1	1730000520	Zener	RD20E B2
L1	6190000220	Coil	S0971138-101K
L2	6180001120	Coil	FL 5H 101K
R1	7010003400	Resistor	ELR20J 1 k Ω
R2	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R3	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R4	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R5	7030000610	Resistor	MCR10EZJH 82 k Ω (823)
R6	7030000460	Resistor	MCR10EZJH 4.7 k Ω (472)
R7	7030000340	Resistor	MCR10EZJH 470 Ω (471)
C1	4030001090	Ceramic	GRM40 B 471K 50PT
C2	4510001120	Electrolytic	25 MS7 4R7 μ F
C3	4510001120	Electrolytic	25 MS7 4R7 μ F
C4	4510001120	Electrolytic	25 MS7 4R7 μ F
C5	4510002020	Electrolytic	25 MS7 47 μ F
C6	4550000320	Tantalum	DN 1V 0R1M
C7	4510002410	Electrolytic	6R3 MS7 100 μ F (6.3X7)
C8	4510004400	Electrolytic	6R3 MS7 330 μ F
C9	4510001100	Electrolytic	16 MS7 10 μ F
EP1	0910016901	P.C. Board	B 1558A (R-DC-DC)

[FIL-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C1	4030000570	Ceramic	GRM40 SL 030C 50PT
C2	4030003140	Ceramic	GRM40 SL 1R5C 50PT
C3	4030000570	Ceramic	GRM40 SL 030C 50PT
C4	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C5	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C6	4030000570	Ceramic	GRM40 SL 030C 50PT
C7	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C8	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C9	4030003140	Ceramic	GRM40 SL 1R5C 50PT
EP1	0910013362	P.C. Board	B 1121B (FIL-A)
EP2	6910001400	Lead Frame	VD2.54-0.7-7

[FIL-C UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C11	4030000580	Ceramic	GRM40 SL 040C 50PT
C13	4030000560	Ceramic	GRM40 SL 020C 50PT
C14	4030000680	Ceramic	GRM40 SL 330J 50PT
C15	4030000580	Ceramic	GRM40 SL 040C 50PT
C16	4030003140	Ceramic	GRM40 SL 1R5C 50PT
C17	4030003140	Ceramic	GRM40 SL 1R5C 50PT
C18	4030000570	Ceramic	GRM40 SL 030C 50PT
C19	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C20	4030000560	Ceramic	GRM40 SL 020C 50PT
EP1	0910013372	P.C. Board	B 1122B (FIL-C)
EP2	6910001400	Lead Frame	VD2.54-0.7-7

[TX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110001000	IC	μ PC1651G
IC2	1130002960	IC	TC9181P
IC3	1120000960	IC	TD6127BP
IC4	1130000180	IC	TC4094BP
IC5	1130000180	IC	TC4094BP
IC6	1130000950	IC	S-7118A
IC7	1110000580	IC	BA4558
IC8	1180000190	IC	NJM7805A
IC9	1180000470	IC	NJM7808A
Q1	1530000660	Transistor	2SC1645B
Q2	1530001810	Transistor	2SC3355
Q3	1530000370	Transistor	2SC3356-T2B
Q4	1530000370	Transistor	2SC3356-T2B
Q5	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q6	1560000010	FET	2SK184-Y
Q7	1530000591	Transistor	2SC2785 EL
Q8	1530000960	Transistor	2SC3399
Q9	1520000080	Transistor	2SB909M R
Q10	1530000100	Transistor	2SC2458-Y
Q11	1590000310	FET	2SJ105-GR
D1	1710000160	Diode	1SS133
D2	1710000580	Diode	1SS265
D3	1710000580	Diode	1SS265
D4	1710000160	Diode	1SS133
X1	8050005960	Crystal	CR-262
X2	8050003120	Crystal	RF-4A3 FAA NKD (3.579545M)
L1	6200000420	Coil	MLF3216A 1R0M-T
L2	6180002400	Coil	LAL 02NA 1R0K
L3	6140001490	Coil	LR-168
L4	6110001530	Coil	LA-233
L5	6180002400	Coil	LAL 02NA 1R0K
L6	6180001300	Coil	LAL 02NA 100K
L7	6910000670	Coil	BT01RN1-A61-001
L8	6180001510	Coil	LAL 02NA 101K
L9	6180002530	Coil	LAL 02NA R68K
L10	6180001740	Coil	LAL 02NA R62K
R1	7010003530	Resistor	ELR20J 10 k Ω
R2	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R3	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R4	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R5	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R6	7030000170	Resistor	MCR10EZHZ 18 Ω (180)
R7	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R8	7010004070	Resistor	R20J 100 Ω
R9	7030000480	Resistor	MCR10EZHZ 6.8 k Ω (682)
R10	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R11	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R12	7030000170	Resistor	MCR10EZHZ 18 Ω (180)
R13	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R14	7030000290	Resistor	MCR10EZHZ 180 Ω (181)
R15	7030000440	Resistor	MCR10EZHZ 3.3 k Ω (332)
R16	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R17	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R18	7030000440	Resistor	MCR10EZHZ 3.3 k Ω (332)
R19	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R20	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R21	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R22	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R23	7030000460	Resistor	MCR10EZHZ 4.7 k Ω (472)
R24	7030000420	Resistor	MCR10EZHZ 2.2 k Ω (222)
R25	7030000280	Resistor	MCR10EZHZ 100 Ω (101)
R26	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R27	7030000350	Resistor	MCR10EZHZ 560 Ω (561)
R28	7030000400	Resistor	MCR10EZHZ 1.5 k Ω (152)
R29	7030000380	Resistor	MCR10EZHZ 1 k Ω (102)
R30	7410000540	Resistor Array	RKM5LW 222J
R31	7310000750	Trimmer	RH0651C14J2WA (103)

[TX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R32	7030000400	Resistor	MCR10EZHZ 1.5 k Ω (152)
R33	7010003510	Resistor	ELR20J 6.8 k Ω
R34	7010003480	Resistor	ELR20J 4.7 k Ω
R35	7010003280	Resistor	ELR20J 100 Ω
R36	7010003530	Resistor	ELR20J 10 k Ω
R37	7010003440	Resistor	ELR20J 2.2 k Ω
R38	7010004110	Resistor	R20J 220 Ω
R39	7010004070	Resistor	R20J 100 Ω
R40	7310000780	Trimmer	RH0651CS4J25A (473)
R41	7010003780	Resistor	ELR20J 1 M Ω
R42	7010004320	Resistor	R20J 10 k Ω
R43	7010003400	Resistor	ELR20J 1 k Ω
R44	7010003530	Resistor	ELR20J 10 k Ω
R45	7010003620	Resistor	ELR20J 47 k Ω
R46	7010003660	Resistor	ELR20J 100 k Ω
R47	7010003490	Resistor	ELR20J 5.6 k Ω
R48	7010003790	Resistor	ELR20J 1.2 M Ω
R49	7010003340	Resistor	ELR20J 330 Ω
R50	7010003450	Resistor	ELR20J 2.7 k Ω
R51	7010003480	Resistor	ELR20J 4.7 k Ω
R52	7010003480	Resistor	ELR20J 4.7 k Ω
R53	7010003530	Resistor	ELR20J 10 k Ω
R54	7010003530	Resistor	ELR20J 10 k Ω
R55	7010003620	Resistor	ELR20J 47 k Ω
R56	7010003530	Resistor	ELR20J 10 k Ω
R57	7010003780	Resistor	ELR20J 1 M Ω
R58	7310000740	Trimmer	RH0651CS3J2KA (472)
R59	7010003710	Resistor	ELR20J 270 k Ω
R60	7010003670	Resistor	ELR20J 120 k Ω
R61	7010003620	Resistor	ELR20J 47 k Ω
R62	7010003590	Resistor	ELR20J 27 k Ω
R63	7010004380	Resistor	R20J 27 k Ω
R64	7010004410	Resistor	R20J 47 k Ω
R65	7010003320	Resistor	ELR20J 220 Ω
R66	7010003600	Resistor	ELR20J 33 k Ω
R67	7010003600	Resistor	ELR20J 33 k Ω
R68	7010004070	Resistor	R20J 100 Ω
R69	7030000280	Resistor	MCR10EZHZ 150 Ω (151)
R70	7010003600	Resistor	ELR20J 33 k Ω
C1	4010000500	Ceramic	DD104 B 102K 50V
C2	4510001210	Electrolytic	10 RC2 100 μ F
C3	4030001150	Ceramic	GRM40 F 104Z 25PT
C4	4030000670	Ceramic	GRM40 SL 220J 50PT
C5	4020000030	Cylinder	UP125 SL 2R2K
C6	4030000670	Ceramic	GRM40 SL 220J 50PT
C7	4550000460	Tantalum	TESVA 1C 105M1-8L
C8	4030001100	Ceramic	GRM40 B 102K 50PT
C9	4030000580	Ceramic	GRM40 SL 040C 50PT
C10	4030000560	Ceramic	GRM40 SL 020C 50PT
C11	4030000580	Ceramic	GRM40 SL 040C 50PT
C12	4030000550	Ceramic	GRM40 SL 010C 50PT
C13	4030000580	Ceramic	GRM40 SL 040C 50PT
C14	4030000670	Ceramic	GRM40 SL 220J 50PT
C15	4030000750	Ceramic	GRM40 SL 121J 50PT
C16	4030001090	Ceramic	GRM40 B 471K 50PT
C17	4030000670	Ceramic	GRM40 SL 220J 50PT
C18	4030000670	Ceramic	GRM40 SL 220J 50PT
C19	4030001090	Ceramic	GRM40 B 471K 50PT
C20	4030000570	Ceramic	GRM40 SL 030C 50PT
C21	4030000750	Ceramic	GRM40 SL 121J 50PT
C22	4030001090	Ceramic	GRM40 B 471K 50PT
C23	4030000560	Ceramic	GRM40 SL 020C 50PT
C25	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C26	4030000750	Ceramic	GRM40 SL 121J 50PT
C27	4030001090	Ceramic	GRM40 B 471K 50PT
C28	4030000570	Ceramic	GRM40 SL 030C 50PT
C29	4030001090	Ceramic	GRM40 B 471K 50PT
C30	4550000410	Tantalum	DN 1V 4R7M
C31	4030001150	Ceramic	GRM40 F 104Z 25PT
C32	4510002270	Electrolytic	6.3 RC2 47 μ F
C33	4030001090	Ceramic	GRM40 B 471K 50PT
C34	4030001150	Ceramic	GRM40 F 104Z 25PT
C35	4510001220	Electrolytic	16 RC2 10 μ F
C36	4030001090	Ceramic	GRM40 B 471K 50PT
C37	4510001220	Electrolytic	16 RC2 10 μ F
C38	4030001110	Ceramic	GRM40 B 222K 50PT

[TX UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C39	4030001110	Ceramic	GRM40 B 222K 50PT
C40	4030001140	Ceramic	GRM40 F 103Z 50PT
C41	4030001110	Ceramic	GRM40 B 222K 50PT
C42	4040000260	Barrier Layer	UZE 08X 104M
C43	4510001240	Electrolytic	25 RC2 47 μ F
C44	4040000150	Barrier Layer	UAT 05X 472K
C45	4040000150	Barrier Layer	UAT 05X 472K
C46	4010000580	Ceramic	DD106 F 103Z 50V
C47	4010000520	Ceramic	DD108 B 472K 50V
C48	4010000580	Ceramic	DD106 F 103Z 50V
C49	4010000380	Ceramic	DD107 SL 221J 50V
C50	4010000280	Ceramic	DD104 SL 470J 50V
C51	4010000480	Ceramic	DD104 B 471K 50V
C52	4010000180	Ceramic	DD104 SL 180J 50V
C53	4010000390	Ceramic	DD107 SL 271J 50V
C54	4010000330	Ceramic	DD105 SL 101J 50V
C55	4010000330	Ceramic	DD105 SL 101J 50V
C56	4510001220	Electrolytic	16 RC2 10 μ F
C57	4010000820	Ceramic	DD105 CH 330J 50V
C58	4010000820	Ceramic	DD105 CH 330J 50V
C59	4510001270	Electrolytic	50 RC2 0.47 μ F
C60	4510001280	Electrolytic	50 RC2 1 μ F
C61	4010000480	Ceramic	DD104 B 471K 50V
C62	4550000350	Tantalum	DN 1V 010M
C63	4010000480	Ceramic	DD104 B 471K 50V
C64	4010000480	Ceramic	DD104 B 471K 50V
C65	4010000480	Ceramic	DD104 B 471K 50V
C66	4010000120	Ceramic	DD104 SL 100D 50V
C67	4510001290	Electrolytic	50 RC2 2.2 μ F
C68	4510001230	Electrolytic	25 RC2 4.7 μ F
C69	4310000020	Mylar	F2D 50V 103K
C70	4310000010	Mylar	F2D 50V 102K
C71	4010000340	Ceramic	DD105 SL 121J 50V
C72	4510001230	Electrolytic	25 RC2 4.7 μ F
C73	4030001090	Ceramic	GRM40 B 471K 50PT
C74	4040000260	Barrier Layer	UZE 08X 104M
C75	4550000350	Tantalum	DN 1V 010M
C76	4550000340	Tantalum	DN 1C 100M
C77	4550000350	Tantalum	DN 1V 010M
C78	4550000340	Tantalum	DN 1C 100M
C79	4510001220	Electrolytic	18 RC2 10 μ F
C80	4010000480	Ceramic	DD104 B 471K 50V
C81	4510001220	Electrolytic	16 RC2 10 μ F
C82	4510001220	Electrolytic	16 RC2 10 μ F
C83	4010000480	Ceramic	DD104 B 471K 50V
C84	4040000090	Barrier Layer	UAT 04X 152K
C85	4010000500	Ceramic	DD104 B 102K 50V
C86	4030001090	Ceramic	GRM40 B 471K 50PT
C87	4550000530	Tantalum	TESVA 1V 104M1-8L
EP1	0910019483	P.C. Board	B 1834C (TX)

[T-VCO UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1580000130	FET	2SK125
Q2	1530000370	Transistor	2SC3358-T2B
D1	1720000090	Varicap	1T25
D2	1720000090	Varicap	1T25
D3	1720000090	Varicap	1T25
D4	1720000090	Varicap	1T25
L1	6170000180	Coil	LW-19
L2	6200000010	Coil	LQN 5N 1R0M
L3	6200000010	Coil	LQN 5N 1R0M
L4	6110001980	Coil	LA-222
R1	7010004370	Resistor	R20J 22 k Ω
R2	7030000340	Resistor	MCR10EZJH 470 Ω (471)
R3	7010004190	Resistor	R20J 1 k Ω
R4	7030000340	Resistor	MCR10EZJH 470 Ω (471)
R5	7030000160	Resistor	MCR10EZJH 15 Ω (150)
R6	7030000140	Resistor	MCR10EZJH 10 Ω (100)
R7	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R8	7030000460	Resistor	MCR10EZJH 4.7 k Ω (472)
R9	7030000400	Resistor	MCR10EZJH 1.5 k Ω (152)
R10	7030000260	Resistor	MCR10EZJH 100 Ω (101)
C1	4030001090	Ceramic	GRM40 B 471K 50PT
C2	4550000270	Tantalum	TESVA 1E 474M1-8L
C3	4550000450	Tantalum	TESVC 1C 106M-12L
C4	4030001090	Ceramic	GRM40 B 471K 50PT
C5	4030000570	Ceramic	GRM40 SL 030C 50PT
C6	4030000570	Ceramic	GRM40 SL 030C 50PT
C7	4030001090	Ceramic	GRM40 B 471K 50PT
C8	4030001090	Ceramic	GRM40 B 471K 50PT
C9	4030000550	Ceramic	GRM40 SL 010C 50PT
C10	4030001090	Ceramic	GRM40 B 471K 50PT
C11	4030001100	Ceramic	GRM40 B 102K 50PT
C12	4030000630	Ceramic	GRM40 SL 100D 50PT
C13	4030000580	Ceramic	GRM40 SL 040C 50PT
C14	4030000580	Ceramic	GRM40 SL 040C 50PT
EP1	0910015823	P.C. Board	B 1493C (T-VCO)

[T-DC-DC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110000900	IC	TL499ACP
Q1	1530000680	Transistor	2SC1845B
D1	1730000520	Zener	RD20E B2
L1	6190000220	Coil	S0971136-101K
L2	6180001120	Coil	FL 5H 101K
R1	7010003400	Resistor	ELR20J 1 k Ω
R2	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R3	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R4	7030000300	Resistor	MCR10EZJH 220 Ω (221)
R5	7030000610	Resistor	MCR10EZJH 82 k Ω (823)
R6	7030000460	Resistor	MCR10EZJH 4.7 k Ω (472)
R7	7030000340	Resistor	MCR10EZJH 470 Ω (471)
C1	4030001090	Ceramic	GRM40 B 471K 50PT
C2	4510001120	Electrolytic	25 MS7 4R7 μ F
C3	4510001120	Electrolytic	25 MS7 4R7 μ F
C4	4510001120	Electrolytic	25 MS7 4R7 μ F
C5	4510002020	Electrolytic	25 MS7 47 μ F
C6	4550000320	Tantalum	DN 1V 0R1M
C7	4510002410	Electrolytic	6R3 MS7 100 μ F (6.3X7)
C8	4510004400	Electrolytic	6R3 MS7 330 μ F
C9	4510001100	Electrolytic	16 MS7 10 μ F
EP1	0910016901	P.C. Board	B 1558A (T-DC-DC)

[FIL-B UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C11	4030000580	Ceramic	GRM40 SL 040C 50PT
C12	4030000620	Ceramic	GRM40 SL 080D 50PT
C13	4030000560	Ceramic	GRM40 SL 020C 50PT
C14	4030000680	Ceramic	GRM40 SL 330J 50PT
C15	4030000580	Ceramic	GRM40 SL 040C 50PT
C16	4030003140	Ceramic	GRM40 SL 1R5C 50PT
C17	4030003140	Ceramic	GRM40 SL 1R5C 50PT
C18	4030000570	Ceramic	GRM40 SL 030C 50PT
C19	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C20	4030000580	Ceramic	GRM40 SL 020C 50PT
EP1	0910013372	P.C. Board	B 1122B (FIL-B)
EP2	6910001400	Lead Frame	VD2.54-0.7-7

[PA UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1150000630	IC	SC1077
IC2	1150000190	IC	SC1040
IC3	1110000070	IC	μ PC358C
Q1	1510000370	Transistor	2SA1359-Y
Q2	1530000110	Transistor	2SC2458-GR
Q3	1520000210	Transistor	2SB1019-O
Q4	1530000110	Transistor	2SC2458-GR
D1	1790000480	Diode	1SS101
D2	1710000160	Diode	1SS133
D3	1710000160	Diode	1SS133
R1	7010003330	Resistor	ELR20J 270 Ω
R2	7010003980	Resistor	R20J 18 Ω
R3	7010003330	Resistor	ELR20J 270 Ω
R4	7010004650	Resistor	R50XJ 10 Ω
R6	7010004740	Resistor	R50XJ 150 Ω
R8	7010004230	Resistor	R20J 2.2 k Ω
R9	7010003270	Resistor	ELR20J 82 Ω
R10	7010003370	Resistor	ELR20J 560 Ω
R11	7010003530	Resistor	ELR20J 10 k Ω
R12	7010003620	Resistor	ELR20J 47 k Ω
R13	7010004070	Resistor	R20J 100 Ω
R14	7010003530	Resistor	ELR20J 10 k Ω
R15	7010003810	Resistor	ELR20J 2.2 M Ω
R16	7010003560	Resistor	ELR20J 18 k Ω
R17	7310001700	Trimmer	RH0421C13J09A (102)
R18	7010003300	Resistor	ELR20J 150 Ω
R19	7310001700	Trimmer	RH0421C13J09A (102)
R20	7010003300	Resistor	ELR20J 150 Ω
R21	7010003580	Resistor	ELR20J 22 k Ω
R22	7010003280	Resistor	ELR20J 100 Ω
R23	7010003480	Resistor	ELR20J 4.7 k Ω
R24	7010003400	Resistor	ELR20J 1 k Ω
R25	7010004150	Resistor	R20J 470 Ω
C1	4010000460	Ceramic	DD104 B 471K 50V
C2	4010000460	Ceramic	DD104 B 471K 50V
C3	4010000460	Ceramic	DD104 B 471K 50V
C4	4550000340	Tantalum	DN 1C 100M
C5	4010000460	Ceramic	DD104 B 471K 50V
C6	4010000460	Ceramic	DD104 B 471K 50V
C7	4550001040	Tantalum	DN 1C 3R3M
C8	4010000460	Ceramic	DD104 B 471K 50V
C9	4010000460	Ceramic	DD104 B 471K 50V
C10	4550000340	Tantalum	DN 1C 100M
C11	4010000460	Ceramic	DD104 B 471K 50V
C12	4010000460	Ceramic	DD104 B 471K 50V
C13	4550000340	Tantalum	DN 1C 100M
C14	4010000460	Ceramic	DD104 B 471K 50V
C15	4010000460	Ceramic	DD104 B 471K 50V
C16	4550000340	Tantalum	DN 1C 100M
C18	4010000010	Ceramic	DD104 SL 0R5C 50V
C19	4010000150	Ceramic	DD104 SL 150J 50V
C24	4550000320	Tantalum	DN 1V 0R1M
C25	4010000460	Ceramic	DD104 B 471K 50V
C26	4010000460	Ceramic	DD104 B 471K 50V
C27	4510001220	Electrolytic	16 RC2 10 μ F
C28	4010000460	Ceramic	DD104 B 471K 50V
C29	4010000260	Ceramic	DD104 SL 470J 50V
C30	4010000260	Ceramic	DD104 SL 470J 50V
C31	4010000460	Ceramic	DD104 B 471K 50V
S1	2220000020	Switch	SSSS31124A
EP2	8950001760	Electrical tape	ELECTRICAL TAPE NO.1245 L=70
EP1	0910019474	P.C. Board	B 1838D (PA)

[DIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
EP1	0910019162	P.C. Board B 1841B (DIN)

[REG-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
IC1	1110001040	IC MB3752M- G
IC2	1180000060	IC NJM78L05A
IC3	1110002000	IC BA10393
Q1	1520000080	Transistor 2SB909M R
D1	1710000350	Diode 1N4002
D2	1710000140	Diode U05G
D3	1710000350	Diode 1N4002
D4	1710000350	Diode 1N4002
D5	1710000350	Diode 1N4002
R1	7010003440	Resistor ELR20J 2.2 k Ω
R2	7010003440	Resistor ELR20J 2.2 k Ω
R3	7310000730	Trimmer RH0851CN3J01A (332)
R4	7010004190	Resistor R20J 1 k Ω
R5	7010003240	Resistor ELR20J 47 Ω
R6	7100000180	Resistor SRW2P 100 Ω (101)
R7	7310000800	Trimmer RH0851CJ5J01A (224)
R8	7010003690	Resistor ELR20J 180 k Ω
R9	7010004320	Resistor R20J 10 k Ω
C1	4010000500	Ceramic DD104 B 102K 50V
C2	4510002900	Electrolytic 25 SS 470 μ F
C3	4550000320	Tantalum DN 1V 0R1M
C4	4550002430	Tantalum DN 1V R33M
RL1	6330000710	Relay G2R- 117P- V- RP- US DC12V
RL2	6330000710	Relay G2R- 117P- V- RP- US DC12V
EP1	0910019154	P.C. Board B 1836D (REG- A)

[REG-B UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
Q1	1520000100	Transistor 2SB863- O
Q2	1520000100	Transistor 2SB863- O
Q3	1540000200	Transistor 2SD1406 Y
D1	1790000130	Diode S25VB20
R1	7010004070	Resistor R20J 100 Ω
R2	7010004150	Resistor R20J 470 Ω
R3	7100000190	Resistor SRW3P 0R03 Ω (R03)
R4	7100000190	Resistor SRW3P 0R03 Ω (R03)
R5	7100000190	Resistor SRW3P 0R03 Ω (R03)
R6	7100000190	Resistor SRW3P 0R03 Ω (R03)
C1	4010000530	Ceramic DD112 B 103K 50V
C2	4010000530	Ceramic DD112 B 103K 50V
C3	4010000530	Ceramic DD112 B 103K 50V
C4	4010000530	Ceramic DD112 B 103K 50V
S1	6910000030	Thermostat OHD 50M
EP1	0910019114	P.C. Board B 1837D (REG- B)

SECTION 6 ADJUSTMENT PROCEDURES

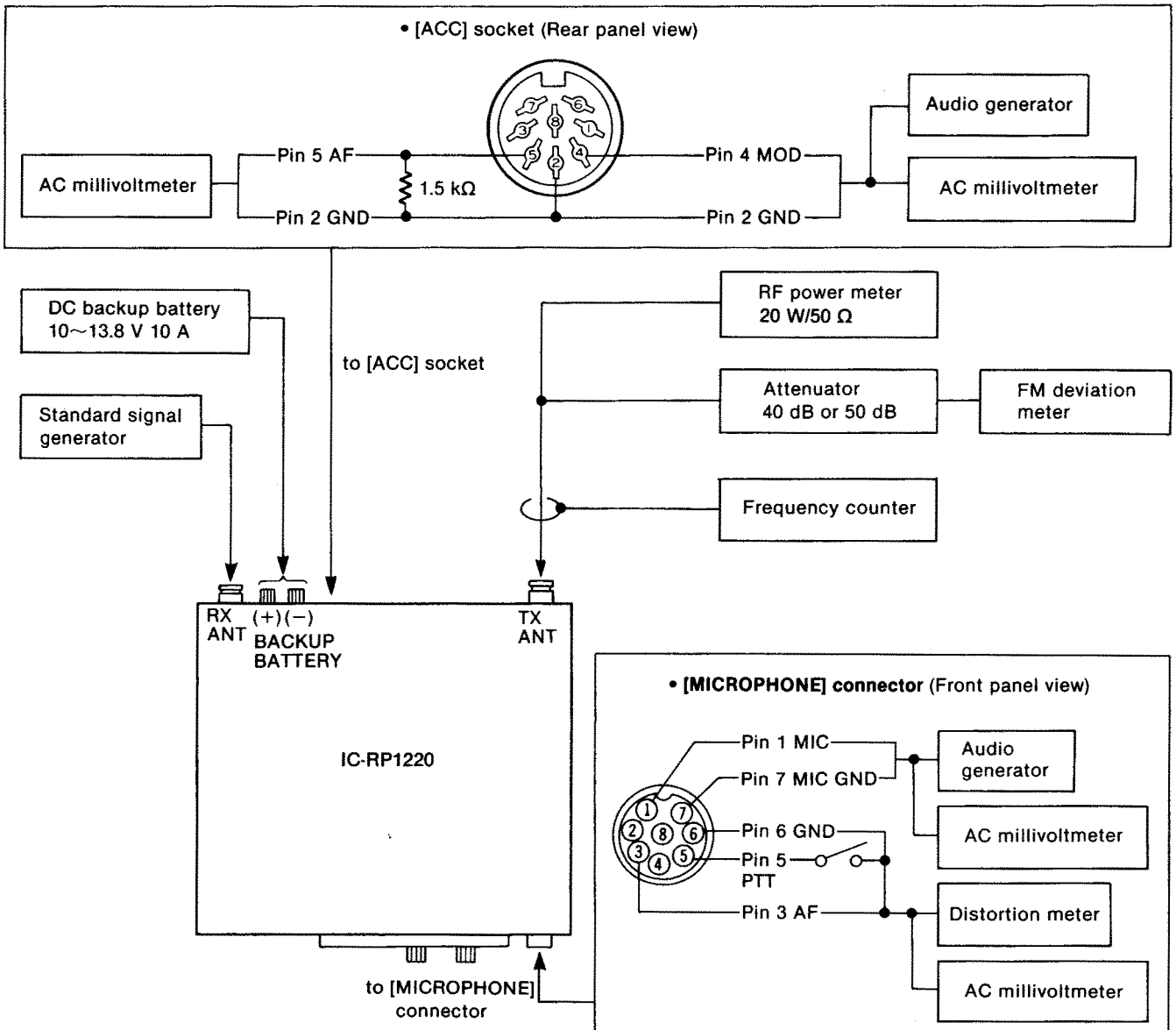
6-1 PREPARATION BEFORE SERVICING

REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC backup battery	Output voltage : 10~13.8 V DC Current capacity : 10 A or more	AC millivoltmeter	Measuring range : 10 mV~3 V
RF power meter (terminated type)	Measuring range : 1~20 W Frequency range : 1200~1300 MHz Impedance : 50 Ω SWR : Less than 1.2: 1	Audio generator	Frequency range : 300~3000 Hz Output level : 1~300 mV
Frequency counter	Frequency range : 0.1~1300 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Attenuator	Power attenuation : 40 or 50 dB Capacity : 60 W or more
Oscilloscope	Frequency range : DC~20 MHz Measuring range : 0.01~10 V	Distortion meter	Frequency range : 1 kHz±10 Hz Measuring range : 1~20 %
Standard signal generator (SSG)	Frequency range : 0.1~1300 MHz Output level : -127~-17 dBm (0.1 μV~32 mV)	FM deviation meter	Frequency minimum : 1300 MHz Measuring range : 0~±10 kHz
		DC voltmeter	Input impedance : 50 kΩ/DC or better
		RF voltmeter	Frequency range : 0.1~1300 MHz Measuring range : 0.01~10 V

CW: Clockwise CCW: Counterclockwise

CONNECTION

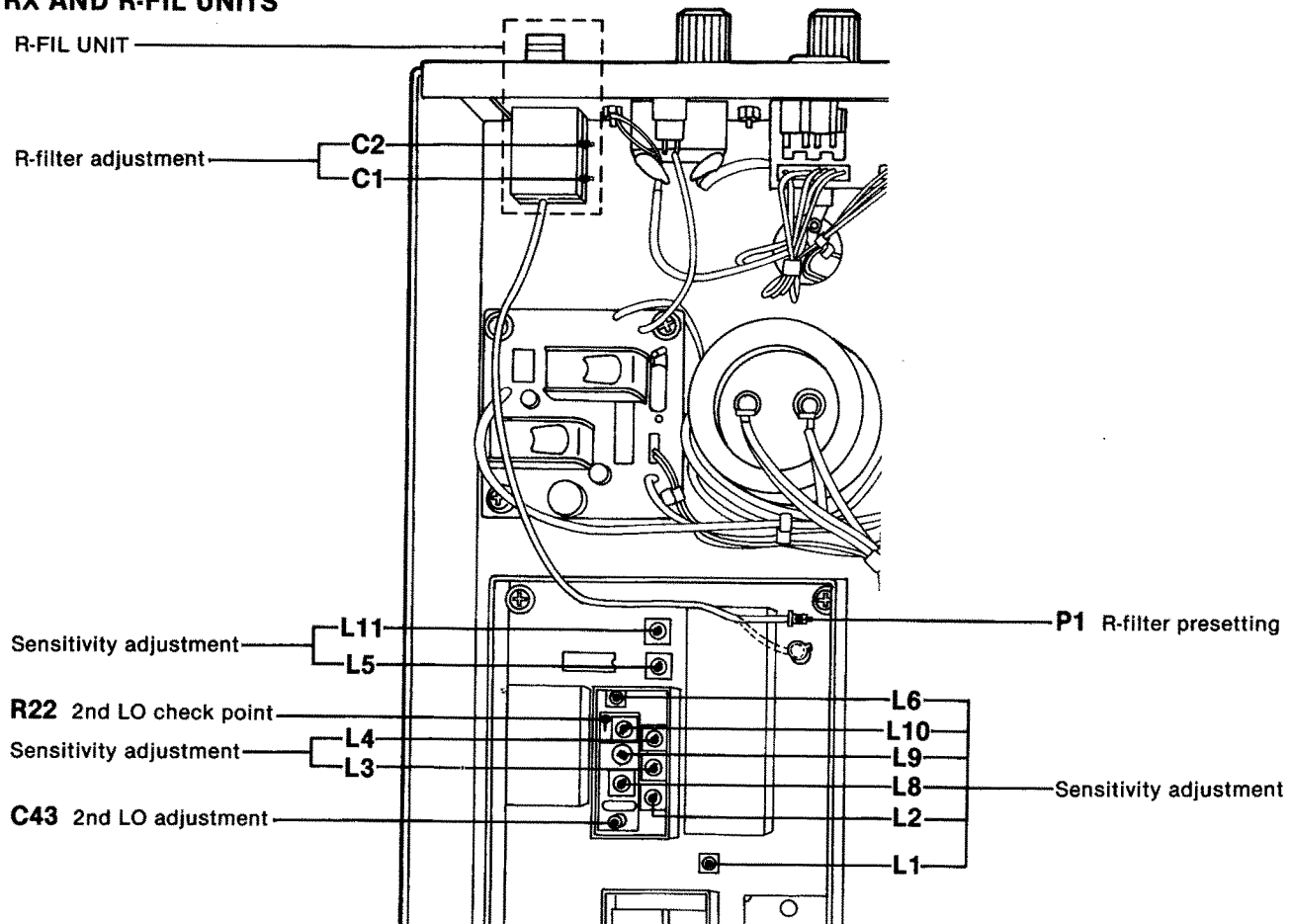


6-2 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
2nd LO	1 • Receiving	RX	Connect the frequency counter to R22.	119.40000 MHz	RX	C43
R-FILTER	1 • Connect the SSG to the [RX ANT] connector and set as: Frequency : receive frequency Level : 0.22 V* (0 dBm) Modulation: OFF • Receiving	Rear panel	Connect the RF voltmeter to P1.	Maximum	R-FIL	C1
	2 • Set the SSG as: Frequency : transmit frequency					Minimum
	3 Repeat steps 1 and 2 several times.					
SENSITIVITY	1 • [LOCAL INHIBIT] switch: ON • Connect the SSG to the [RX ANT] connector and set as: Frequency : receive frequency Level : 1.0 μ V* (-107 dBm) Modulation: 1 kHz Deviation : \pm 3.5 kHz • Receiving	Front panel	Connect the distortion meter to the [MICROPHONE] connector, pin 3 (AF) and pin 6 (GND) with an AC millivoltmeter.	Minimum distortion level	RX	Adjust in sequence L1, L2, L3, L4, L8, L9, L10, L6, L5, L11

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

• RX AND R-FIL UNITS

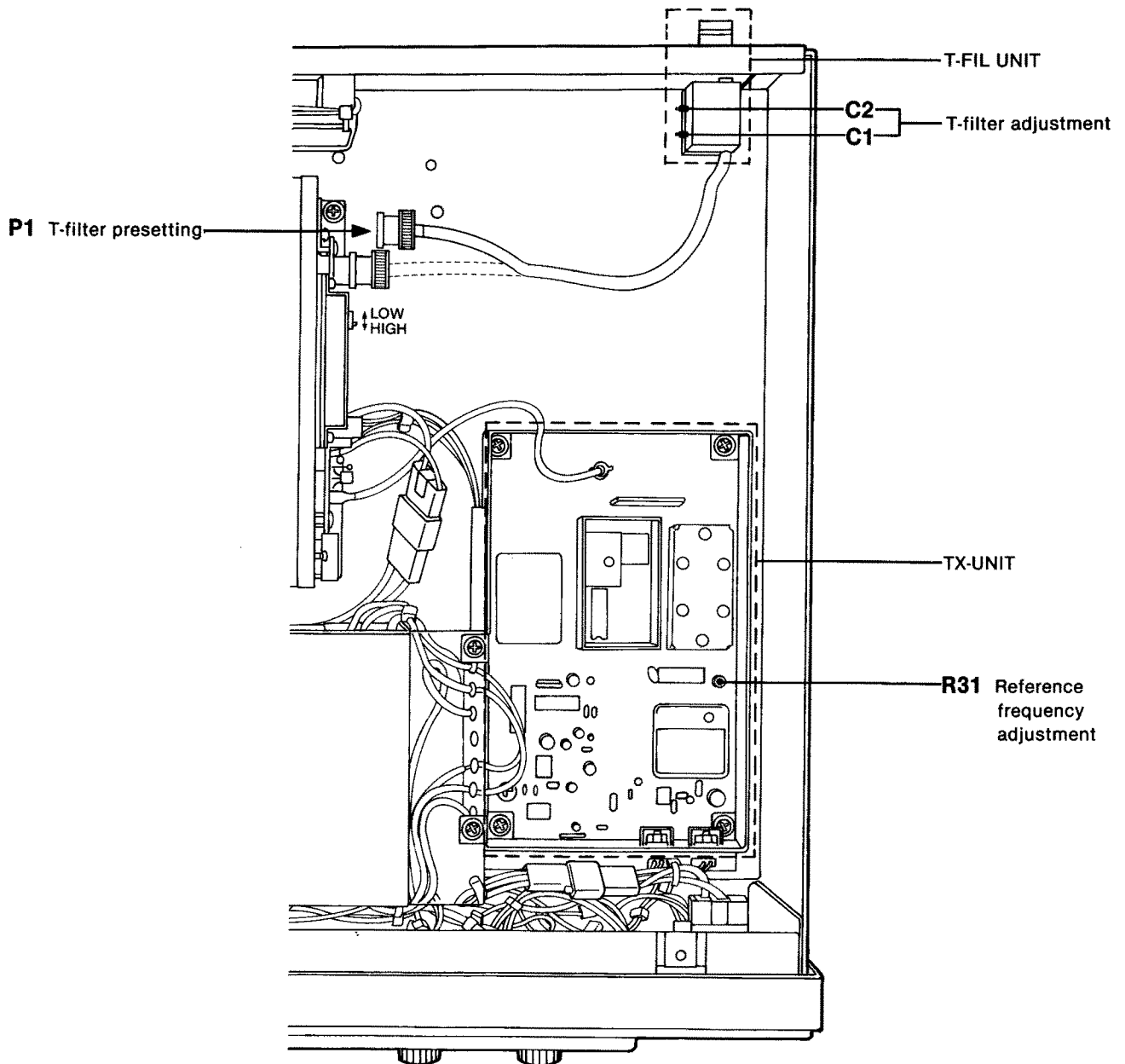


6-3 TRANSMITTER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> • Connect the RF power meter or a 50 Ω dummy load to the [TX ANT] connector. • Transmitting 	Rear panel	Loosely couple the frequency counter to the [TX ANT] connector.	Same as the identification frequency.	TX	R31
T-FILTER	1 <ul style="list-style-type: none"> • Connect the SSG to P1 and set as: Frequency : transmit frequency Level : 0.22 V* (0 dBm) • Receiving 	Rear panel	Connect the RF voltmeter to the [TX ANT] connector.	Maximum	T-FIL	C1, C2

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

• TX AND T-FIL UNITS

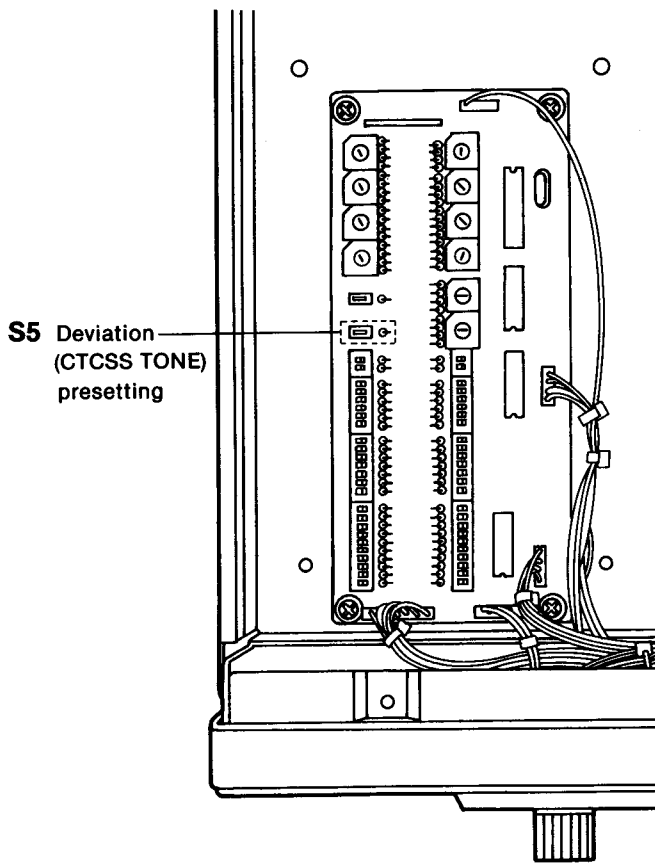


TRANSMITTER ADJUSTMENT (CONTINUED)

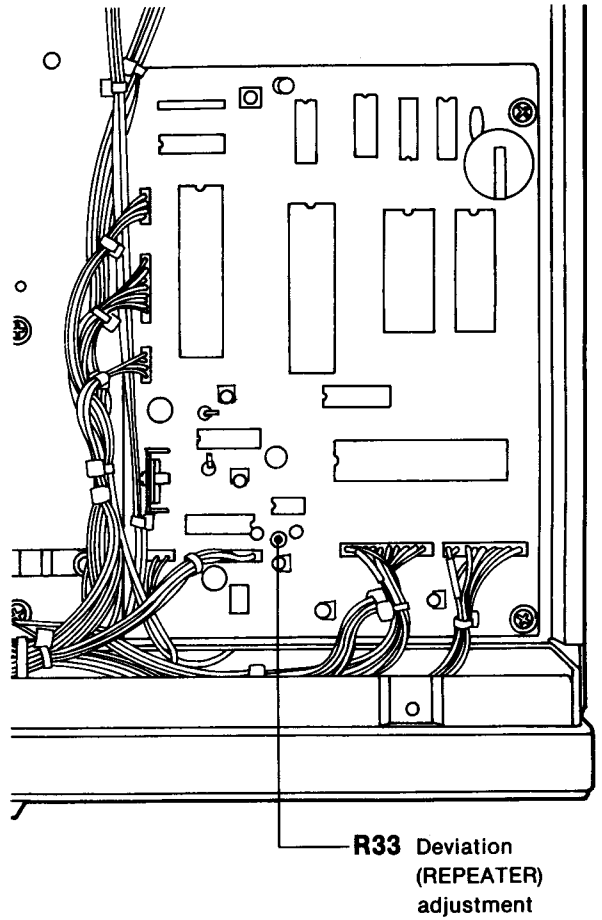
ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT				
		UNIT	LOCATION		UNIT	ADJUST			
DEVIATION (CTCSS) (TONE)	1	<ul style="list-style-type: none"> • [LOCAL INHIBIT] switch: ON • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting (Ground the [MICROPHONE] connector (pin 5).) 	Rear panel	Connect the FM deviation meter to the [TX ANT] connector via the attenuator.					
	2	<ul style="list-style-type: none"> • S5 (LOGIC-A UNIT) switch: push once 					0.8 kHz	TX	R40
	3	After adjustment, turn the [LOCAL INHIBIT] switch OFF, and push S5 again.							
DEVIATION (MICROPHONE)	1	<ul style="list-style-type: none"> • [LOCAL INHIBIT] switch: ON • Connect the audio generator to the [MICROPHONE] connector and set as: Level : 2 mV Modulation : 1.0 kHz • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting 	Rear panel	Connect the FM deviation meter to the [TX ANT] connector via the attenuator.	3.5 kHz	TX	R58		
	2	<ul style="list-style-type: none"> • Set the audio generator as: Level : 20 mV 						4.0~5.0 kHz	Verify
	3	After adjustment, turn the [LOCAL INHIBIT] switch OFF.							
DEVIATION (REPEATER)	1	<ul style="list-style-type: none"> • Connect the SSG to the [RX ANT] connector and set as: Level : 1.0 mV* (-47 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting 	Rear panel	Connect the FM deviation meter to the [TX ANT] connector via the attenuator.	3.5 kHz	LOGIC	R33		
	2	<ul style="list-style-type: none"> • Set the SSG as: Level : 1.0 mV* (-47 dBm) Modulation : 1 kHz Deviation : ±5.0 kHz 						3.7~4.5 kHz	Verify

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

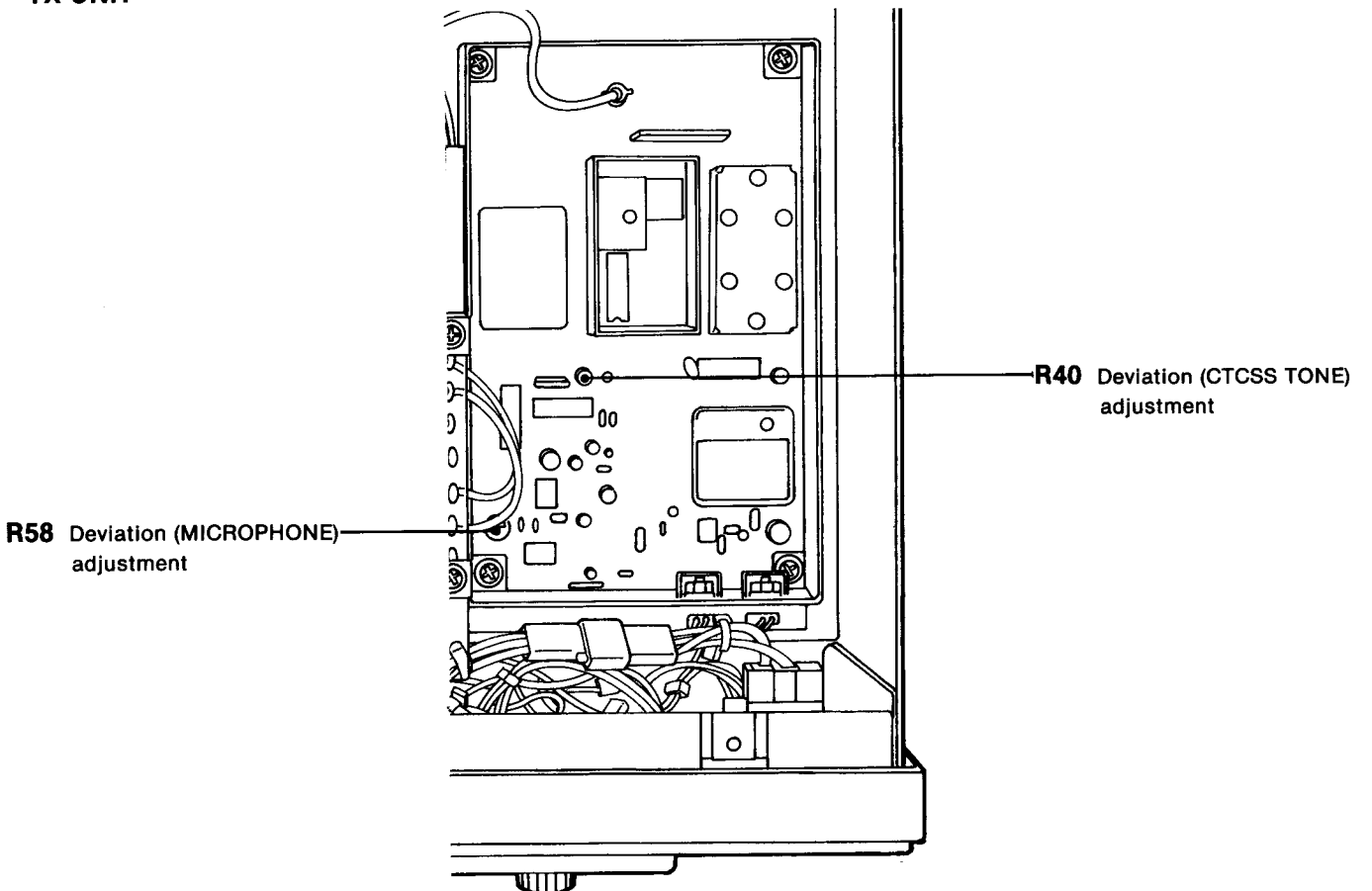
• LOGIC-A UNIT



• LOGIC UNIT



• TX UNIT

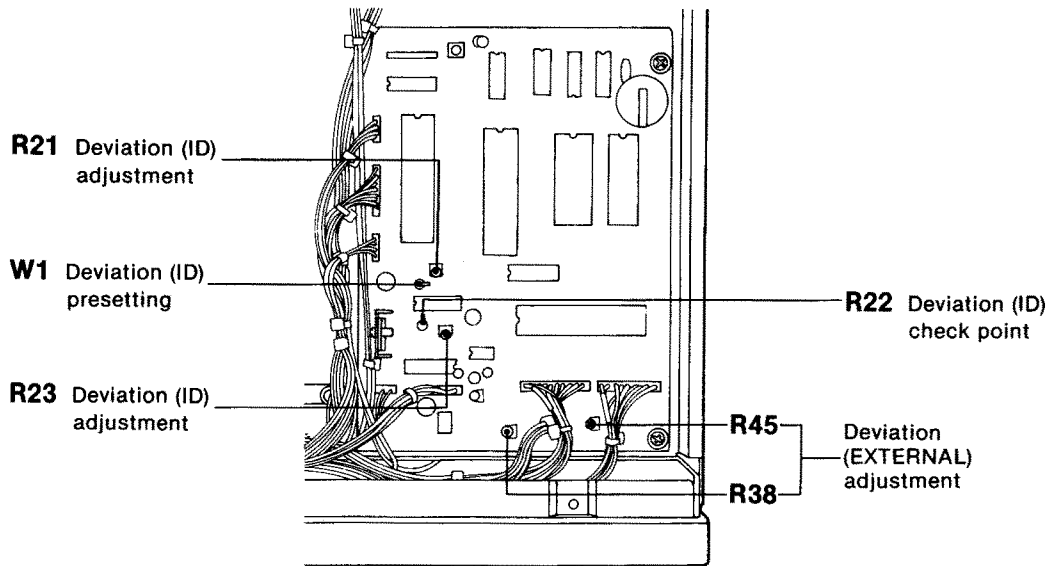


TRANSMITTER ADJUSTMENT (CONTINUED)

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
DEVIATION (ID)	1	<ul style="list-style-type: none"> • Connect W1 (LOGIC UNIT). • Connect the FM deviation meter to the [TX ANT] connector via the attenuator and set as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting (Ground the [MICROPHONE] connector (pin 5).) 	LOGIC	Connect the frequency counter to R22.	800 Hz	LOGIC	R21
	2		Rear panel	FM deviation meter	1 kHz		R23
	3	After adjustment, disconnect W1.					
DEVIATION (EXTERNAL)	1	<ul style="list-style-type: none"> • Connect the SSG to the [RX ANT] connector and set as: Level : 1.0 mV* (-47 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz 	Rear panel	Connect the AC millivoltmeter to the [ACC] socket, pin 5 (AF) and pin 2 (GND).	20 mV	LOGIC	R45
	2	<ul style="list-style-type: none"> • Connect the audio generator to the [ACC] socket, pin 4 (MOD) and pin 2 (GND) and set as: Level : 500 mV Modulation : 1 kHz • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 		Connect the FM deviation meter to the [TX ANT] connector via the attenuator.	3.5 kHz		R38

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

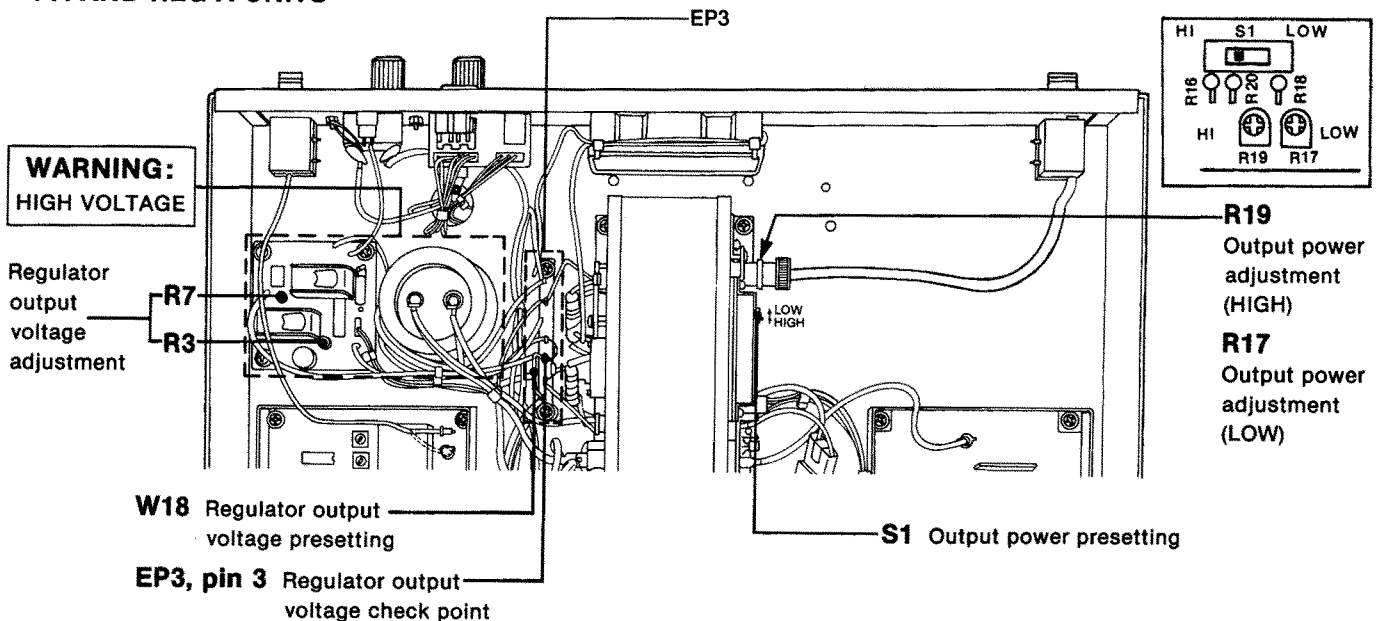
• LOGIC UNIT



TRANSMITTER ADJUSTMENT (CONTINUED)

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT		
		UNIT	LOCATION		UNIT	ADJUST	
OUTPUT POWER	1 <ul style="list-style-type: none"> • [LOCAL INHIBIT] switch: ON • S1 (PA UNIT): HIGH • Transmitting (Ground the [MICROPHONE] connector (pin 5).) 	Rear panel	Connect the RF power meter to the [TX ANT] connector.	10 W	PA	R19	
	2 <ul style="list-style-type: none"> • S1 (PA UNIT): LOW 			1 W		R17	
REGULATOR OUTPUT VOLTAGE	1 <ul style="list-style-type: none"> • Apply AC voltage to the [AC] connector. • Remove W18 (EP3). • Transmitting 	REG-A	Connect the DC voltmeter to EP3, pin 3.	14 V	REG-A	R3	
	2	Front panel	[POWER] indicator	Lights up in green.	Front panel	Verify	
	3	After adjustment, disconnect AC voltage.					
	4 <ul style="list-style-type: none"> • Apply DC voltage (10 V). • [DC RESET] switch: ON 	REG-A	Connect the DC voltmeter to EP3, pin 3.	0 V	REG-A	R7	
	5 <ul style="list-style-type: none"> • Apply DC voltage (12 V). • [DC RESET] switch: ON 			12 V		Verify	
	6	Front panel	[POWER] indicator	Lights up in red.	Front panel	Verify	
	7	After adjustment, reconnect W18.					

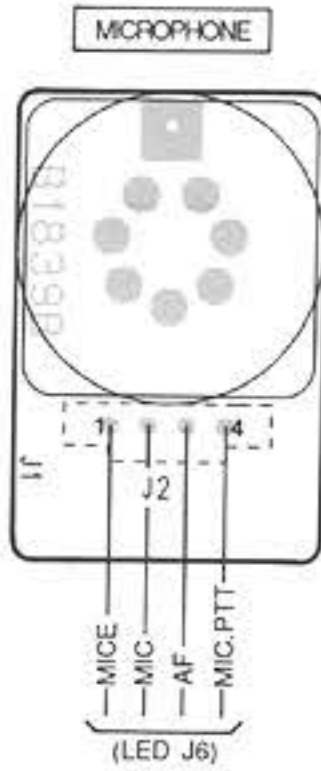
• PA AND REG-A UNITS



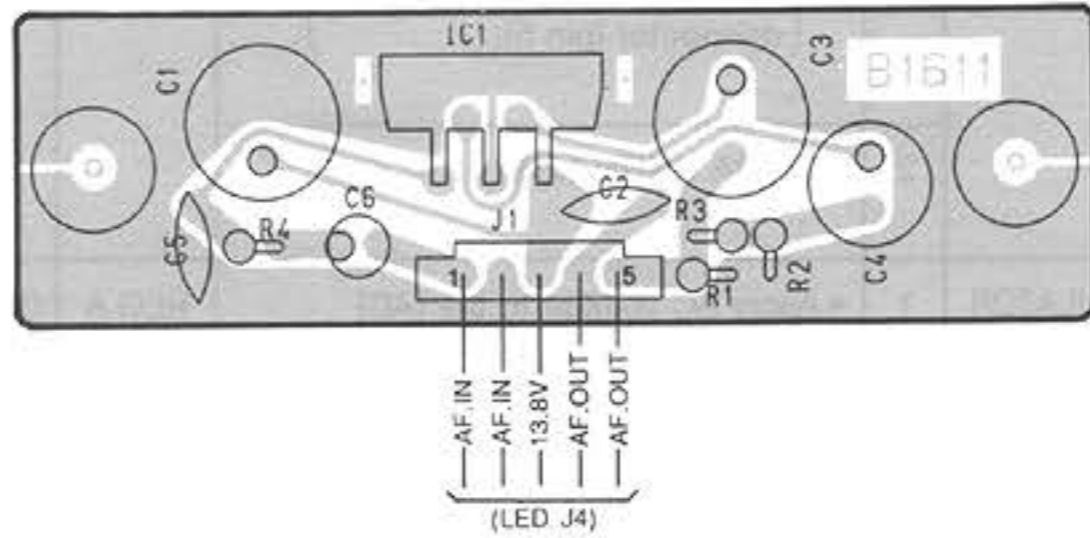
SECTION 7 BOARD LAYOUTS

7-1 FRONT UNIT

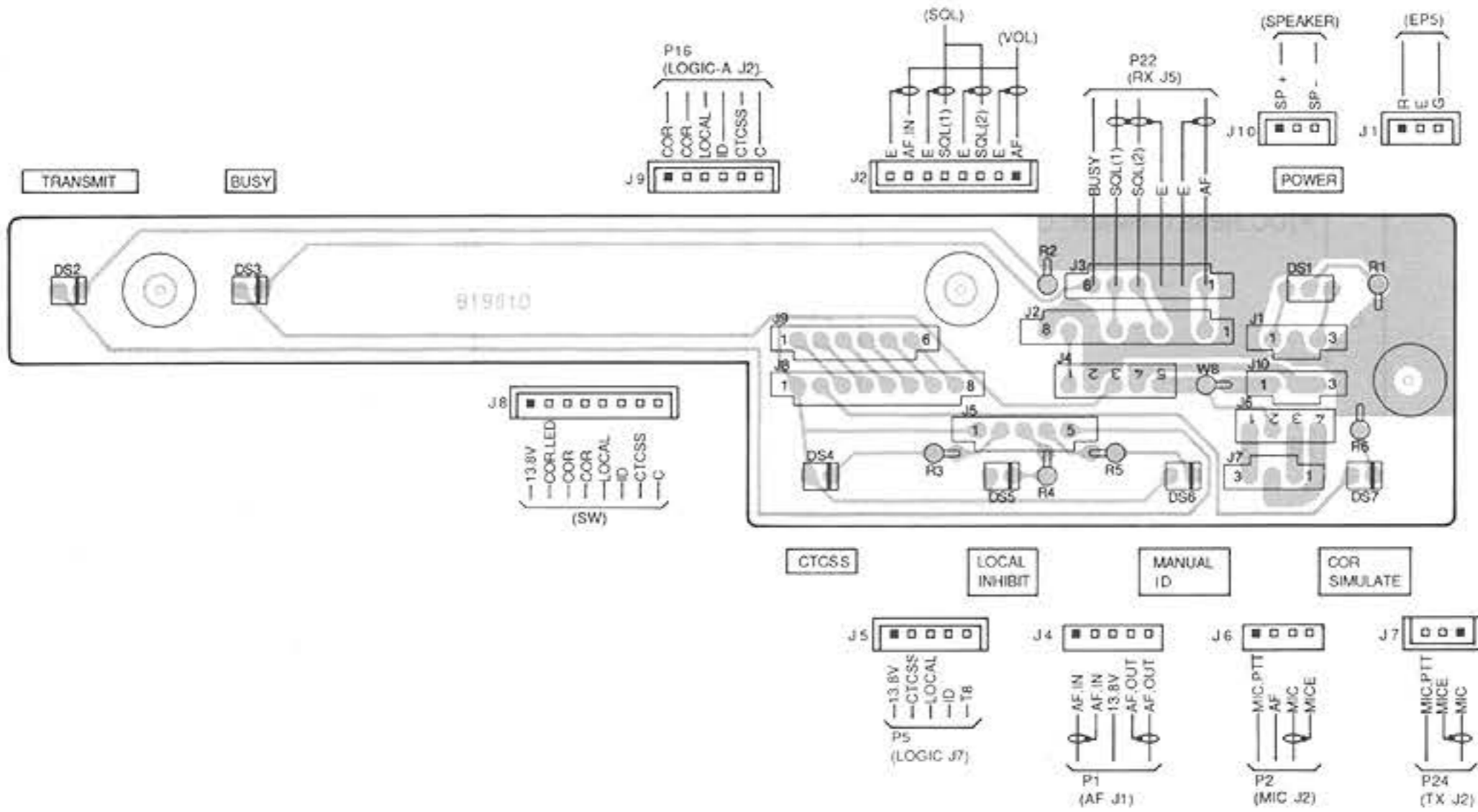
• MIC UNIT



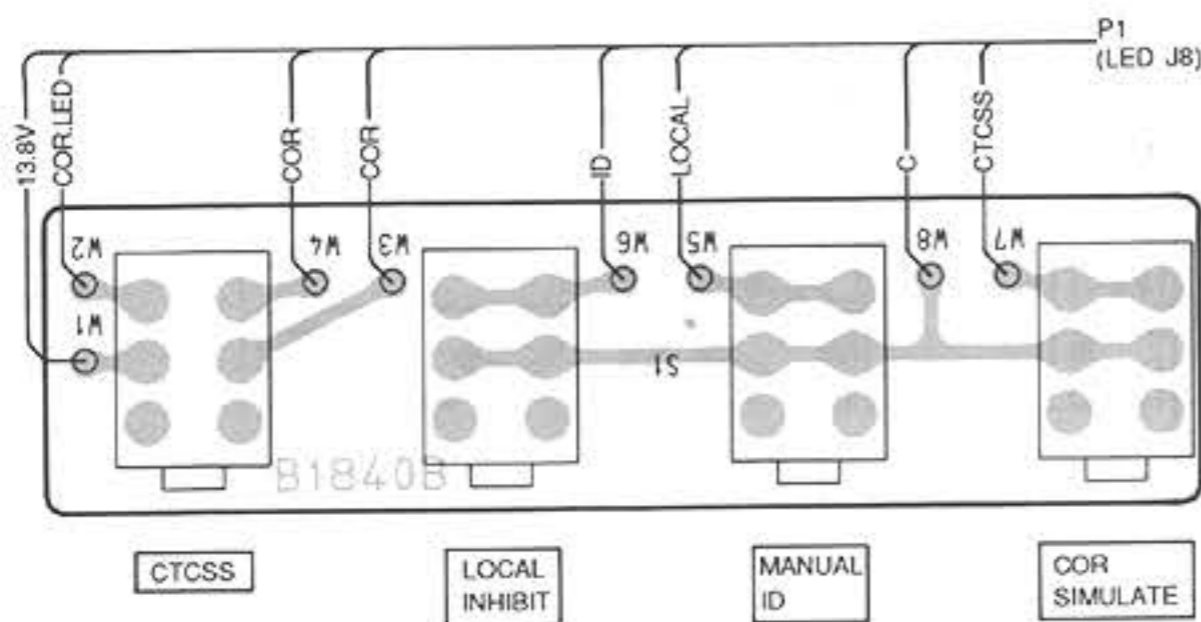
• AF UNIT



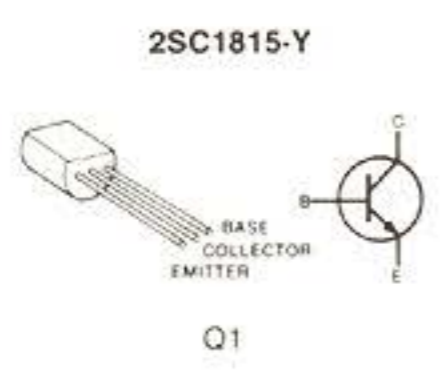
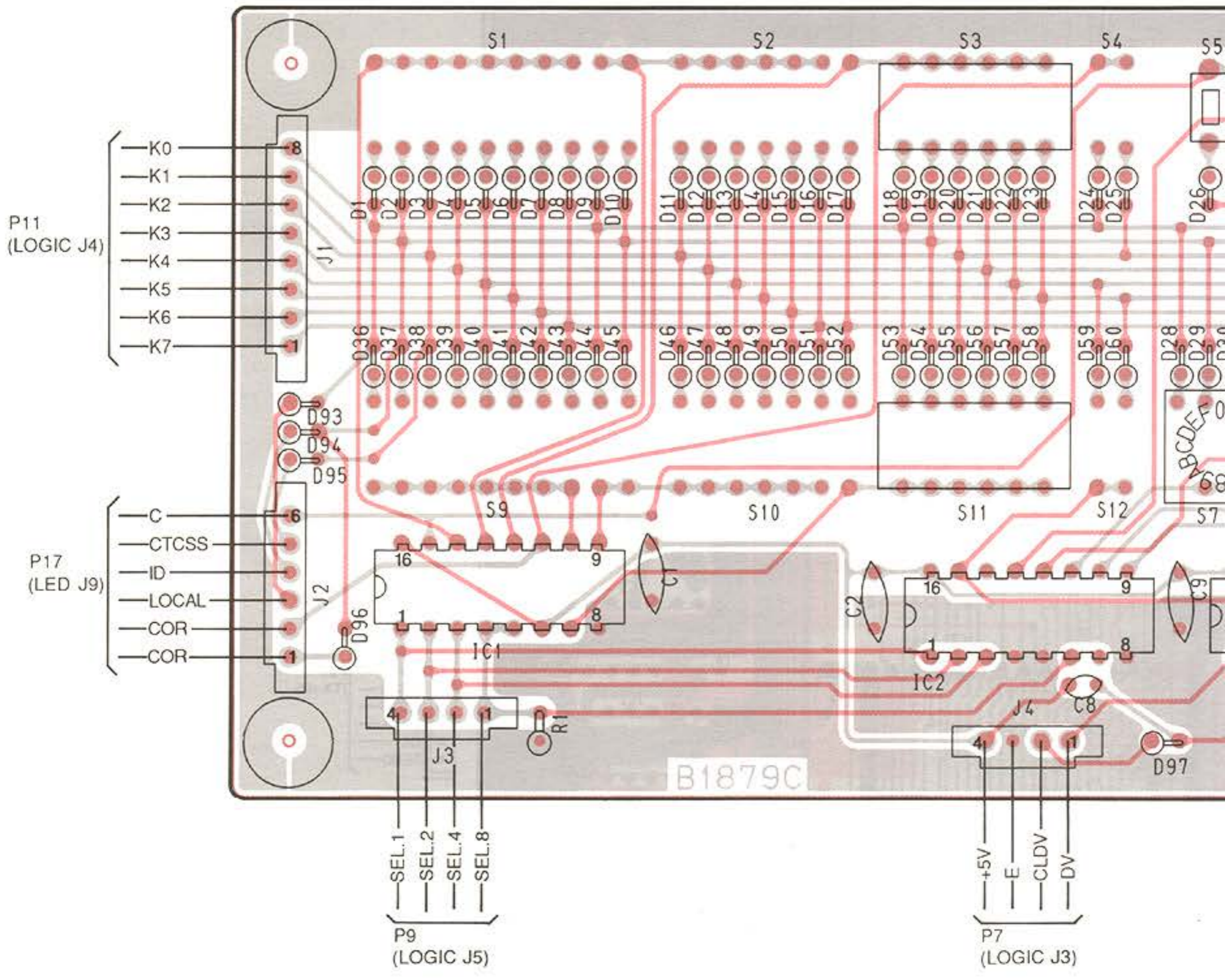
• LED UNIT

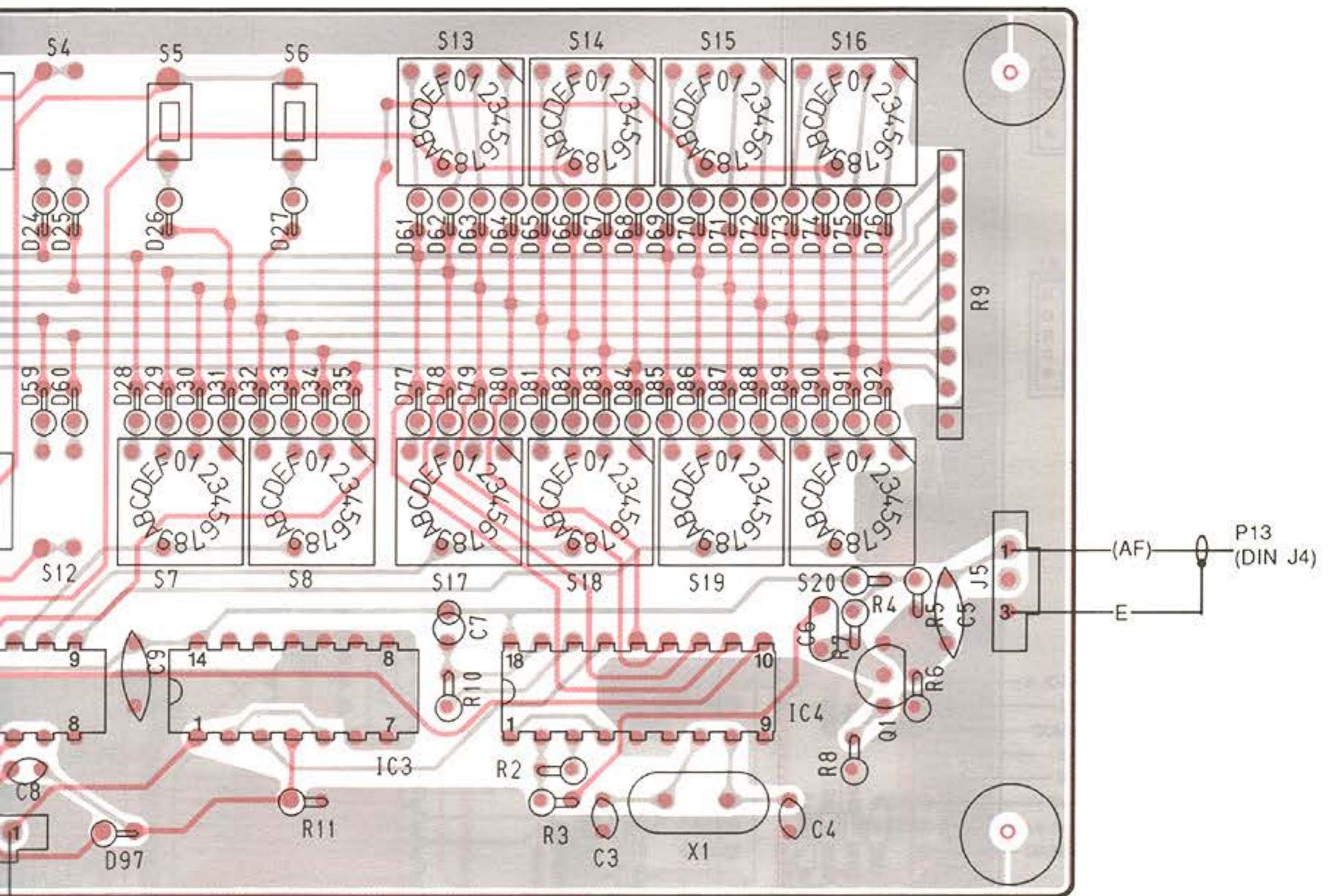


• SW UNIT

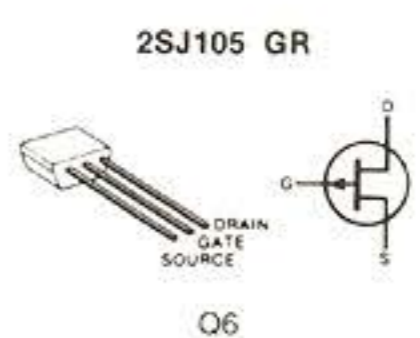
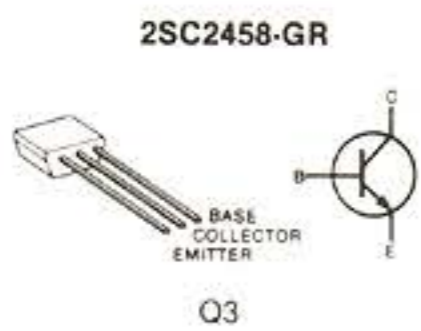
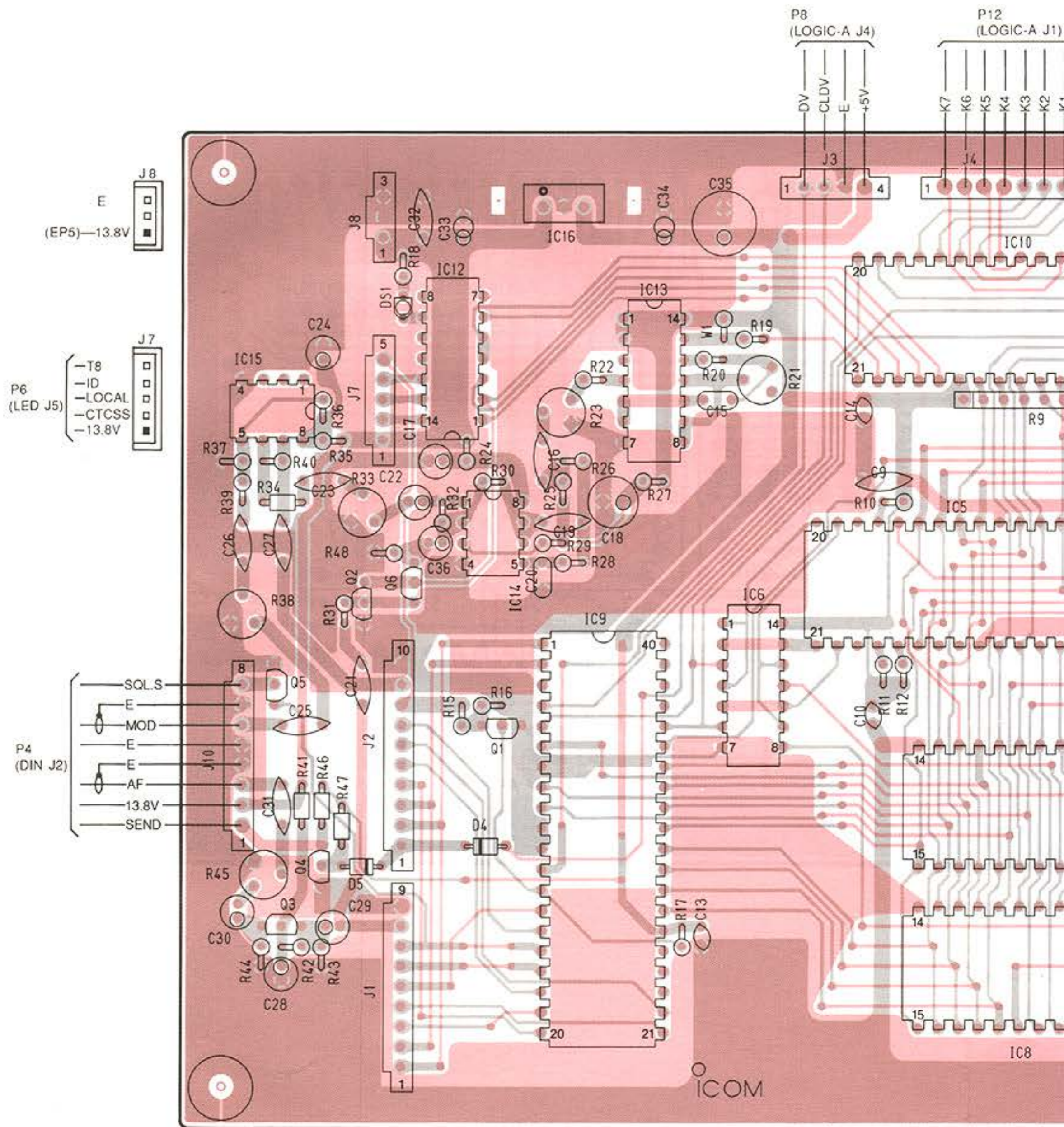


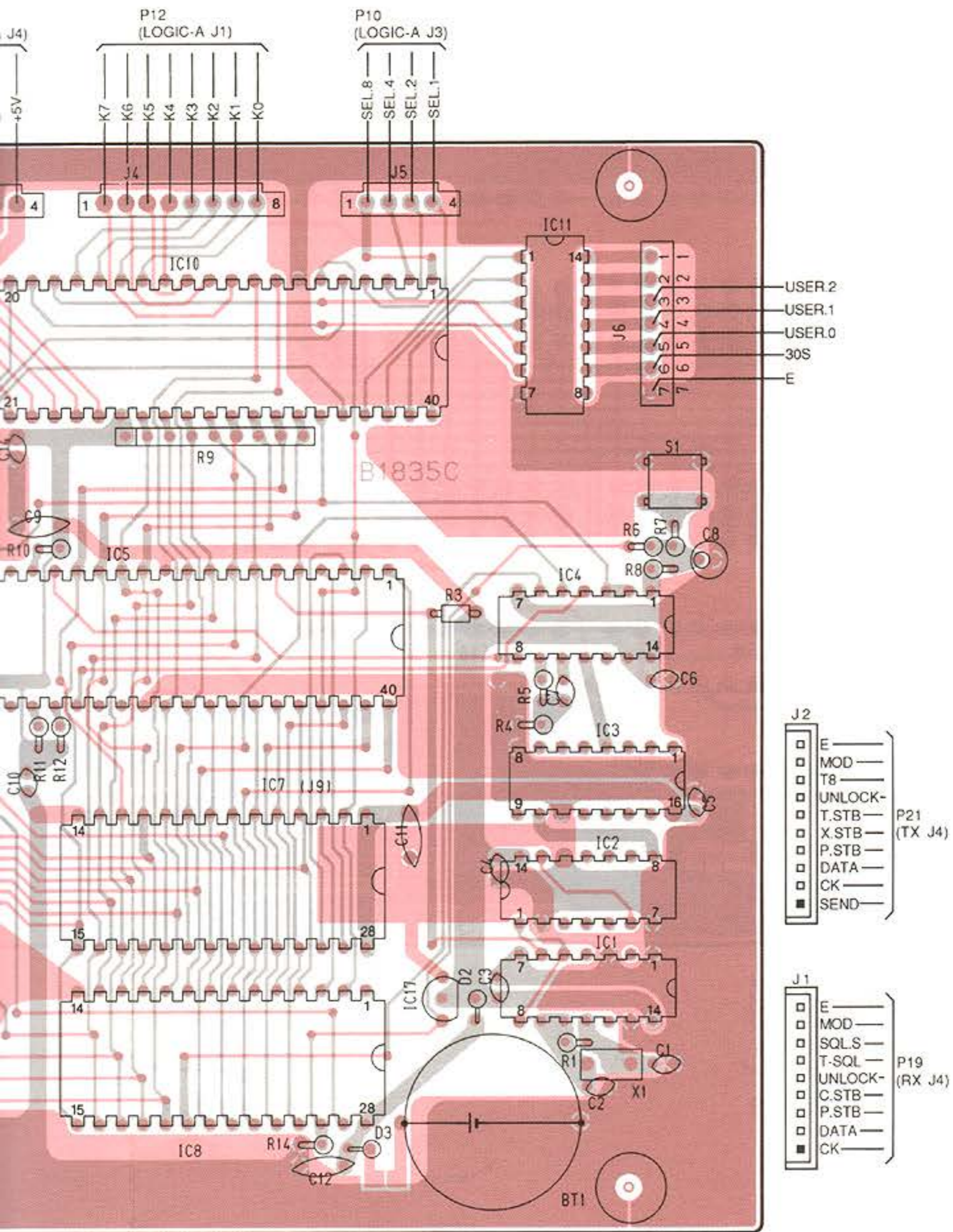
7-2 LOGIC-A UNIT





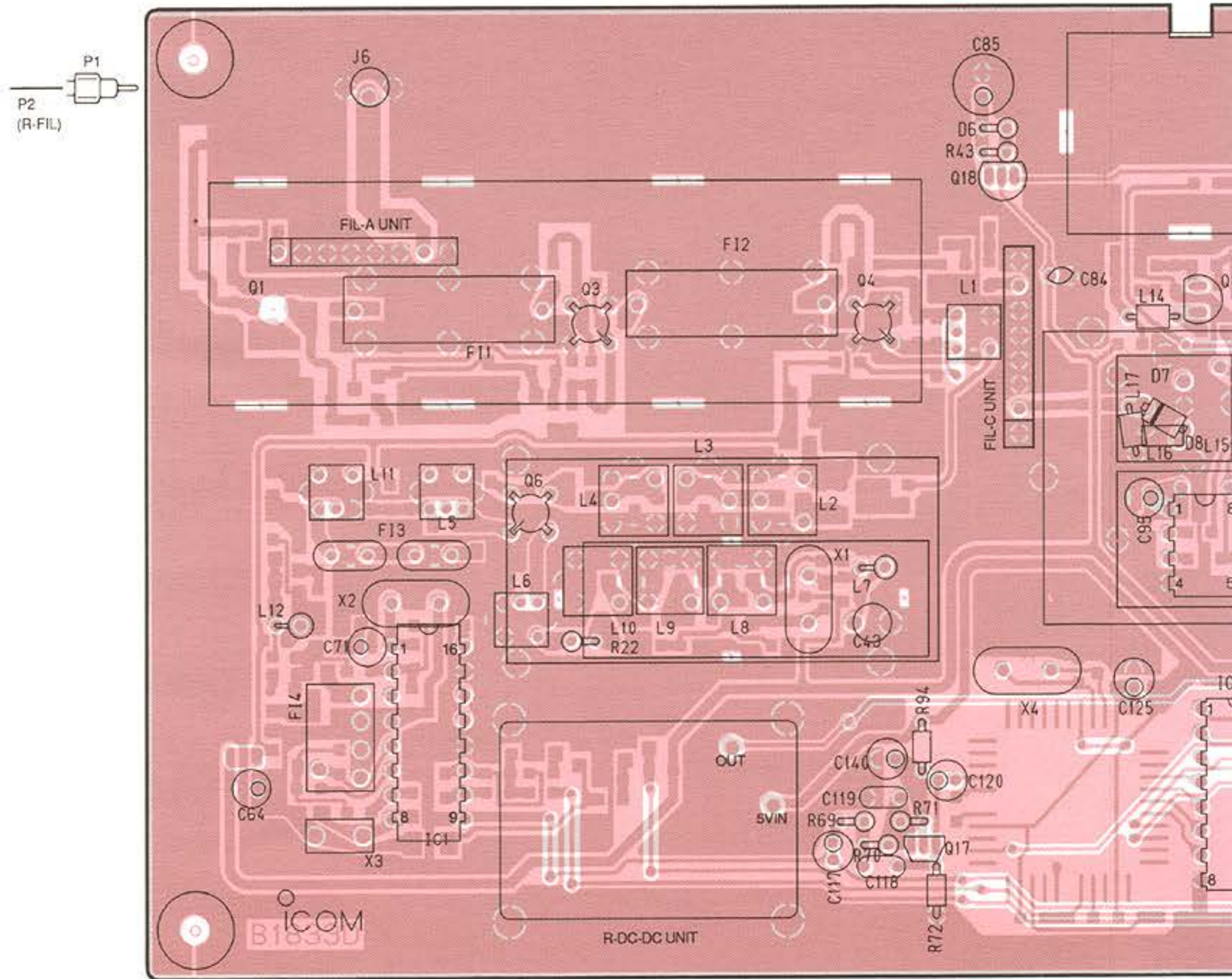
7-3 LOGIC UNIT



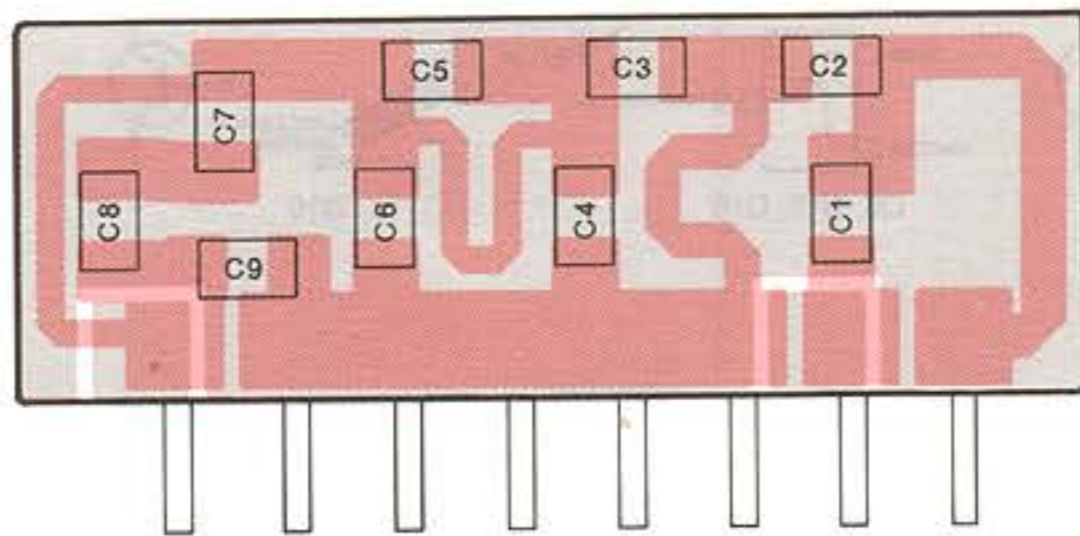


7-4 RX, FIL-A AND FIL-C UNITS

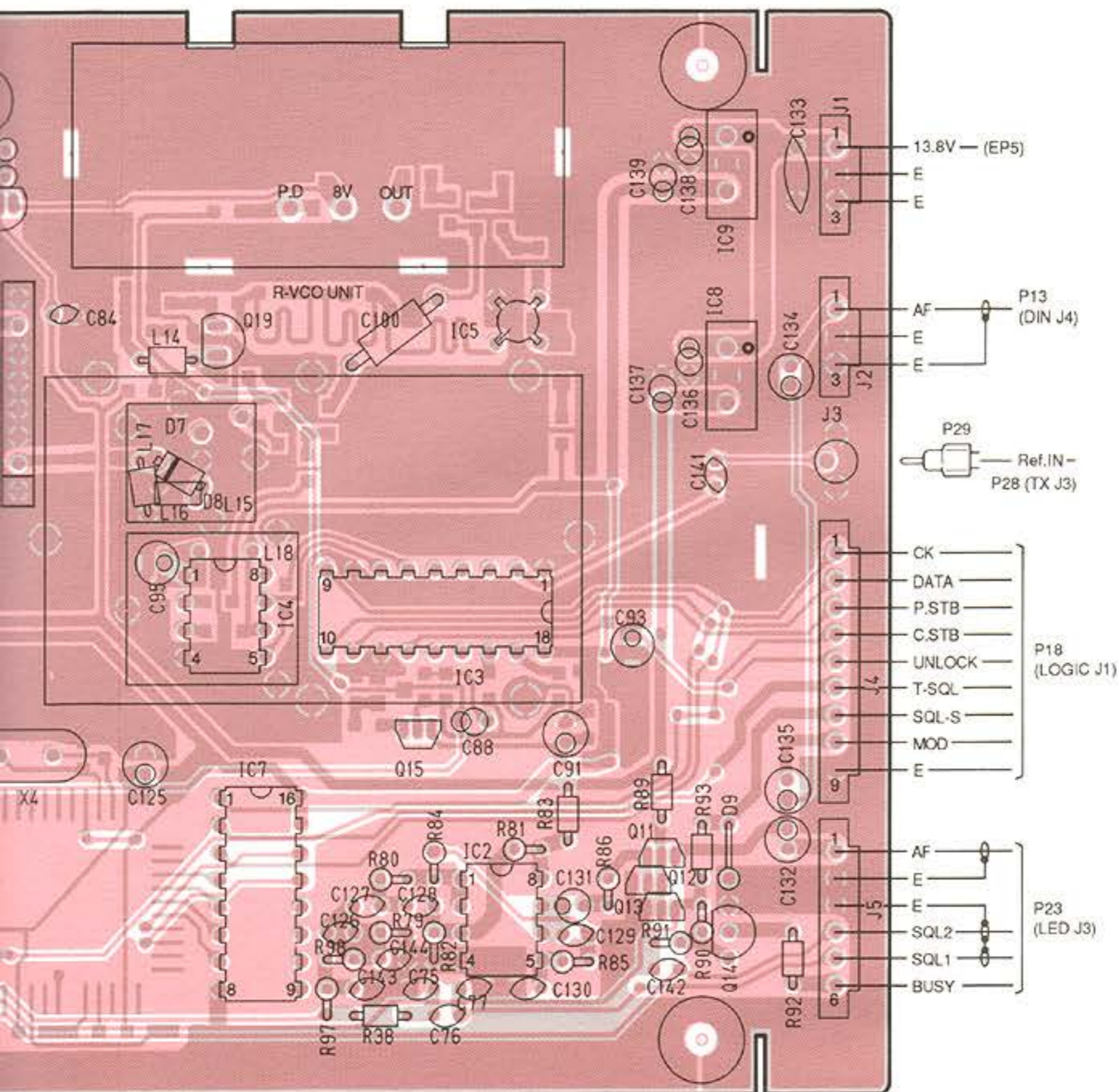
• RX UNIT



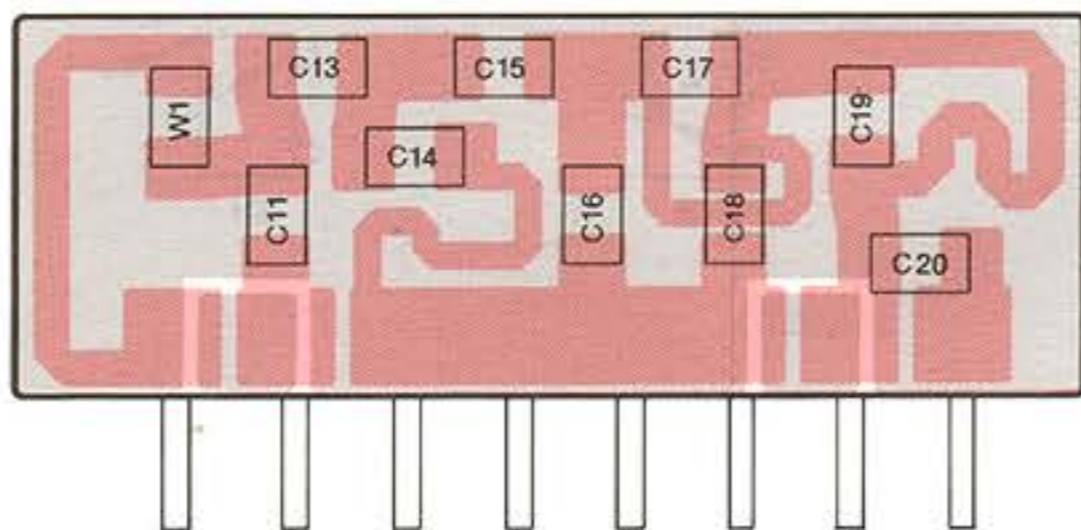
• FIL-A UNIT

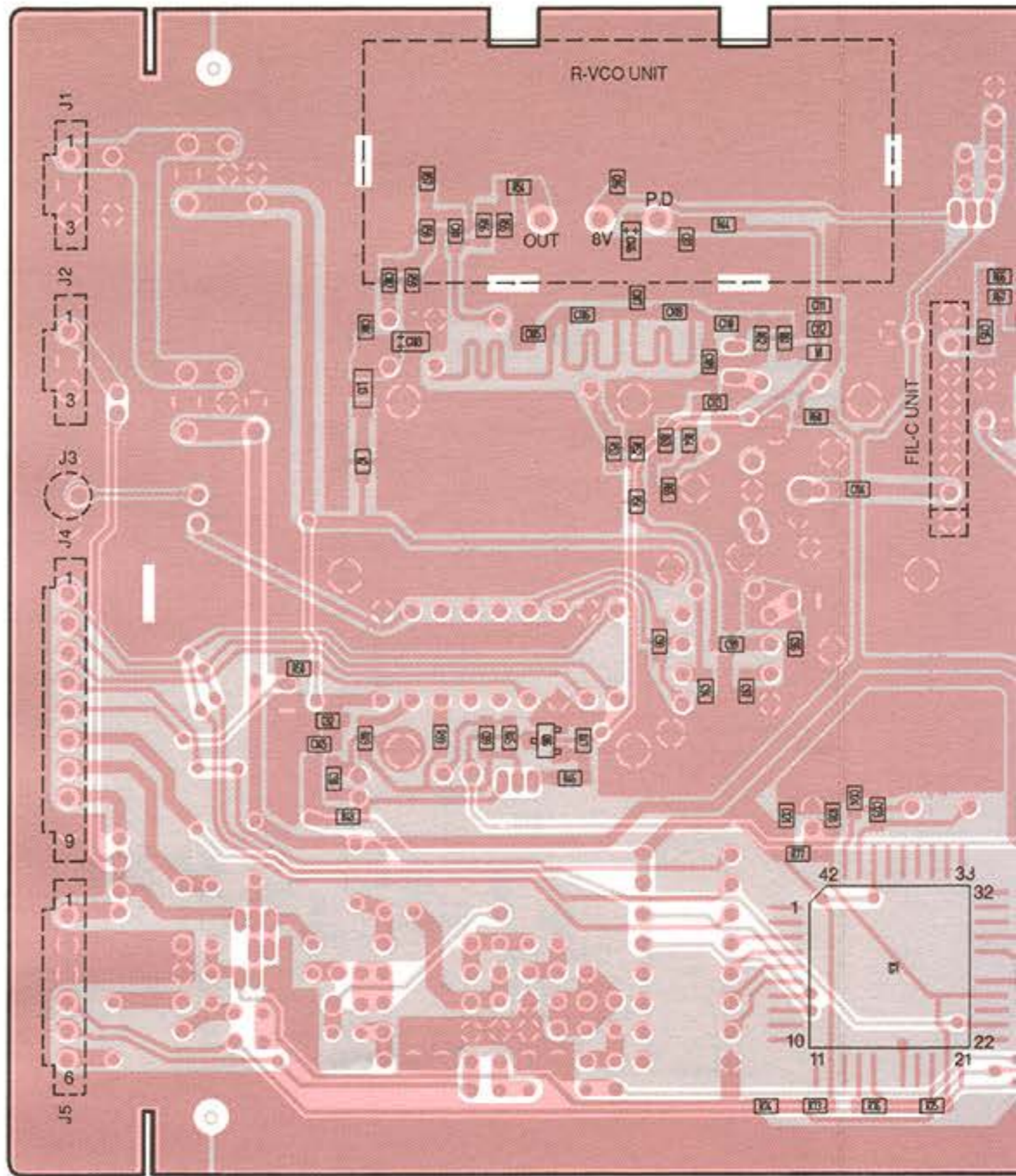


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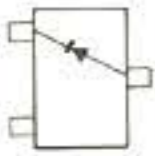


• FIL-C UNIT



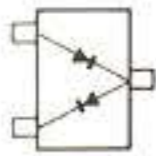


1SS187
(Symbol: D3)



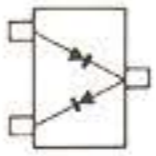
D2

1SS226
(Symbol: C3)



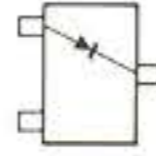
D3

HSM88AS
(Symbol: C1)



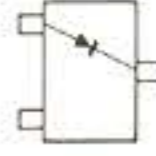
D5

RD4.3M-T2B1
(Symbol: 431)



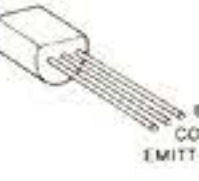
D1

RD6.2M B2
(Symbol: 622)



D4

2SC16



Q14, C

2SC3358
2SC3586

2SC3358: Q4
2SC3586: Q3

2SC3399

Q12, Q13

2SC3770 3
(Symbol: JY3)

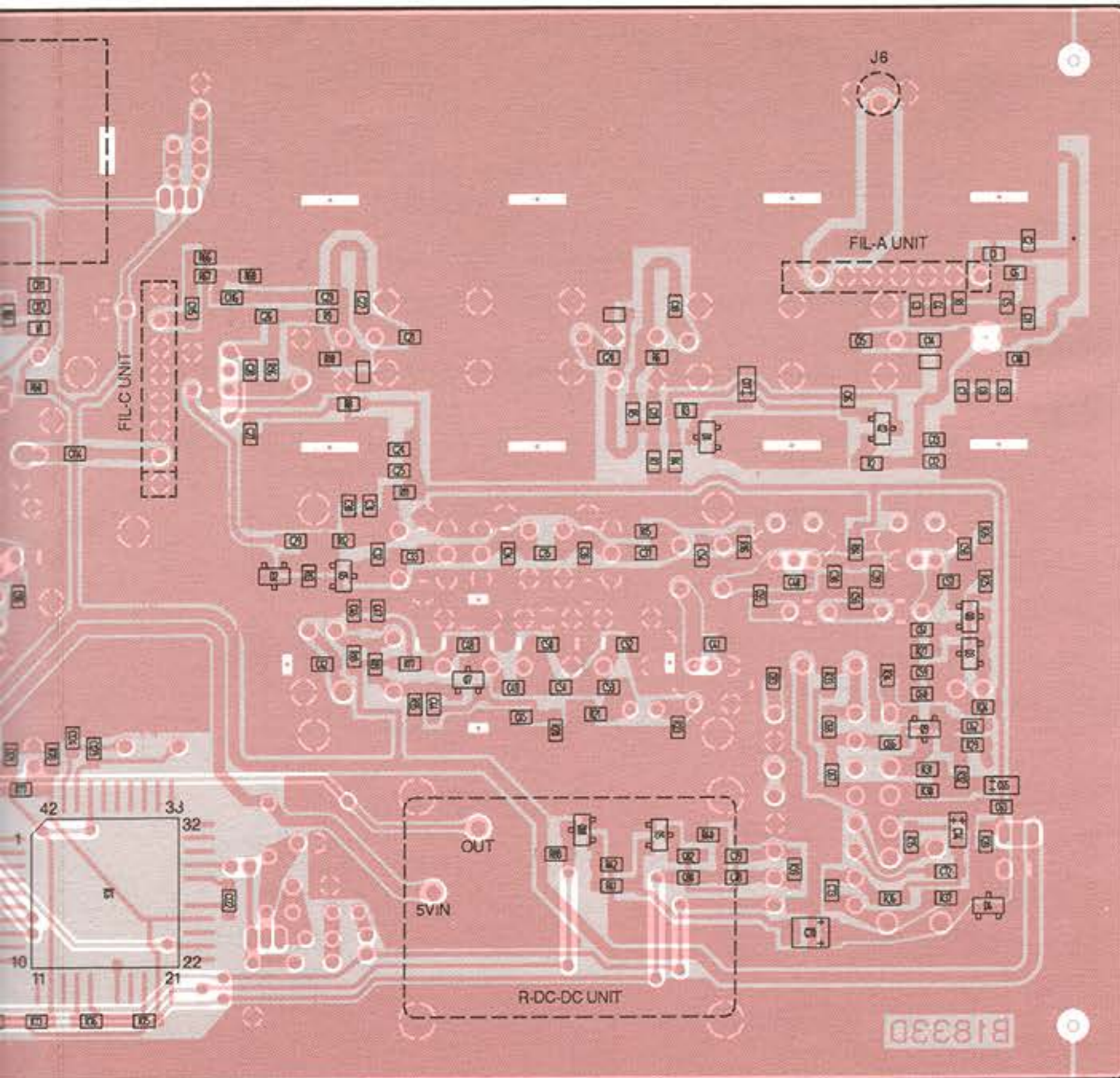
Q8, Q9

2SC3772 3
(Symbol: LY3)

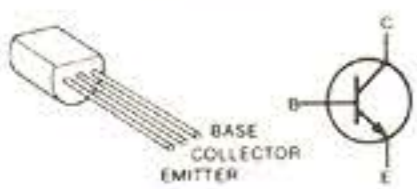
Q7

2SJ10

Q11



2SC1645B



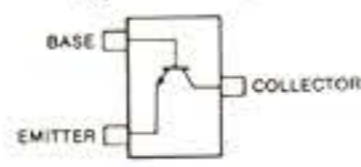
Q14, Q18

2SC2458-GR



Q17

2SC2712 Y
(Symbol: LY)



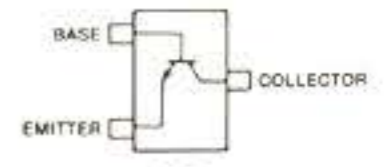
Q2, Q10, Q16

2SC3355



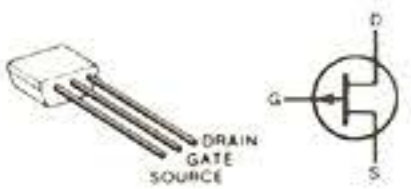
Q19

2SC3356
(Symbol: R22)



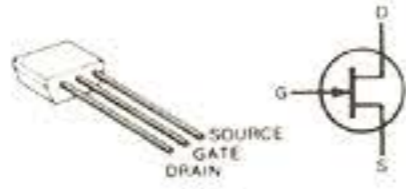
Q5

2SJ105-Y



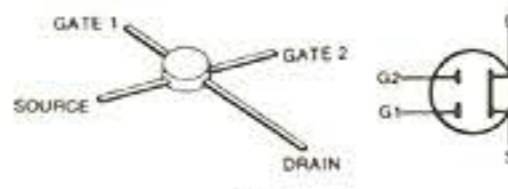
Q11

2SK184-Y



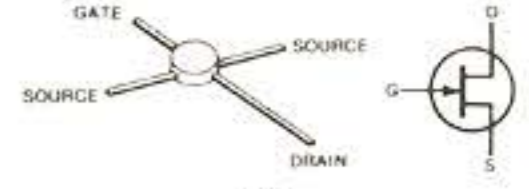
Q15

3SK121Y



Q6

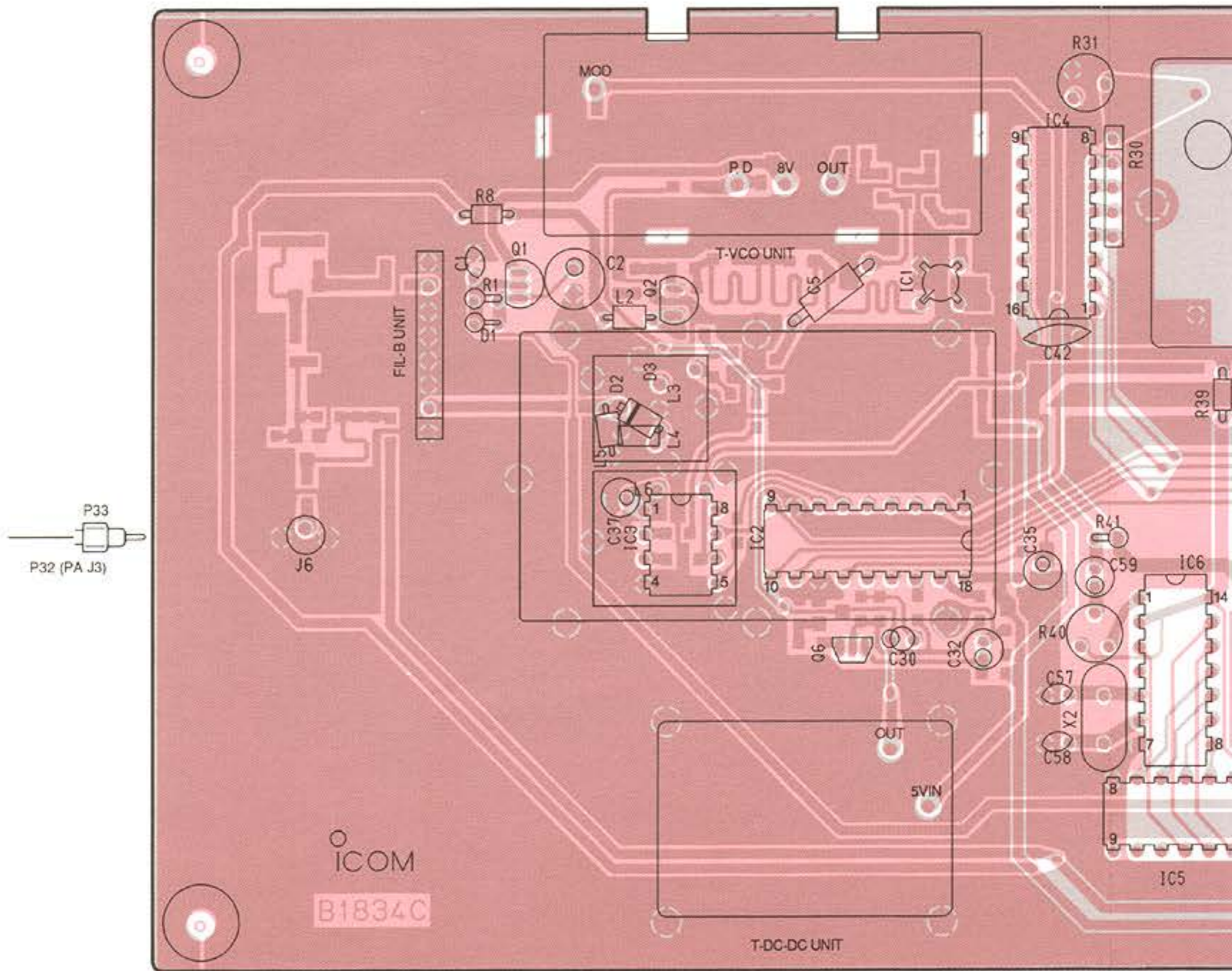
MGF1202



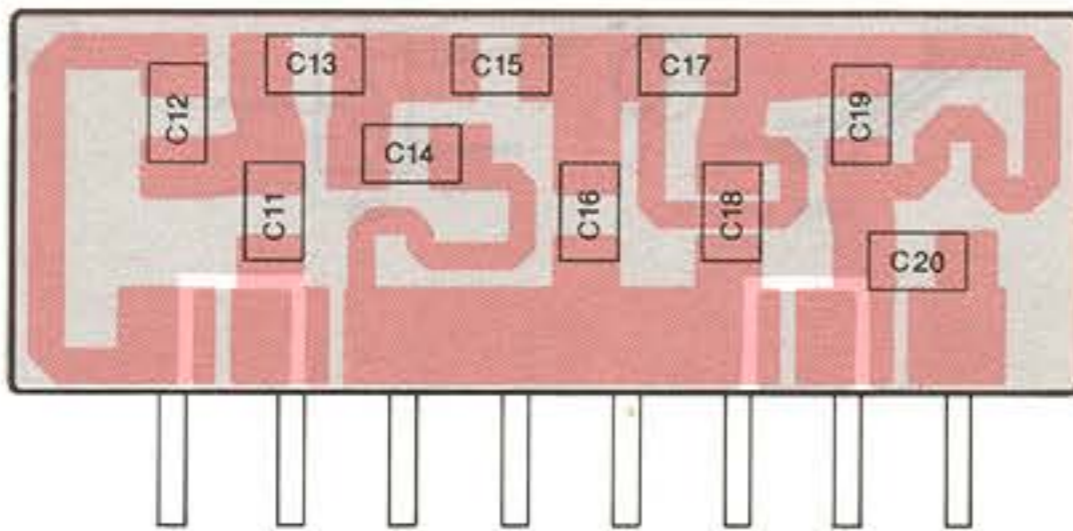
Q1

7-5 TX, FIL-B, R-VCO, T-VCO, R-DC-DC AND T-DC-DC UNITS

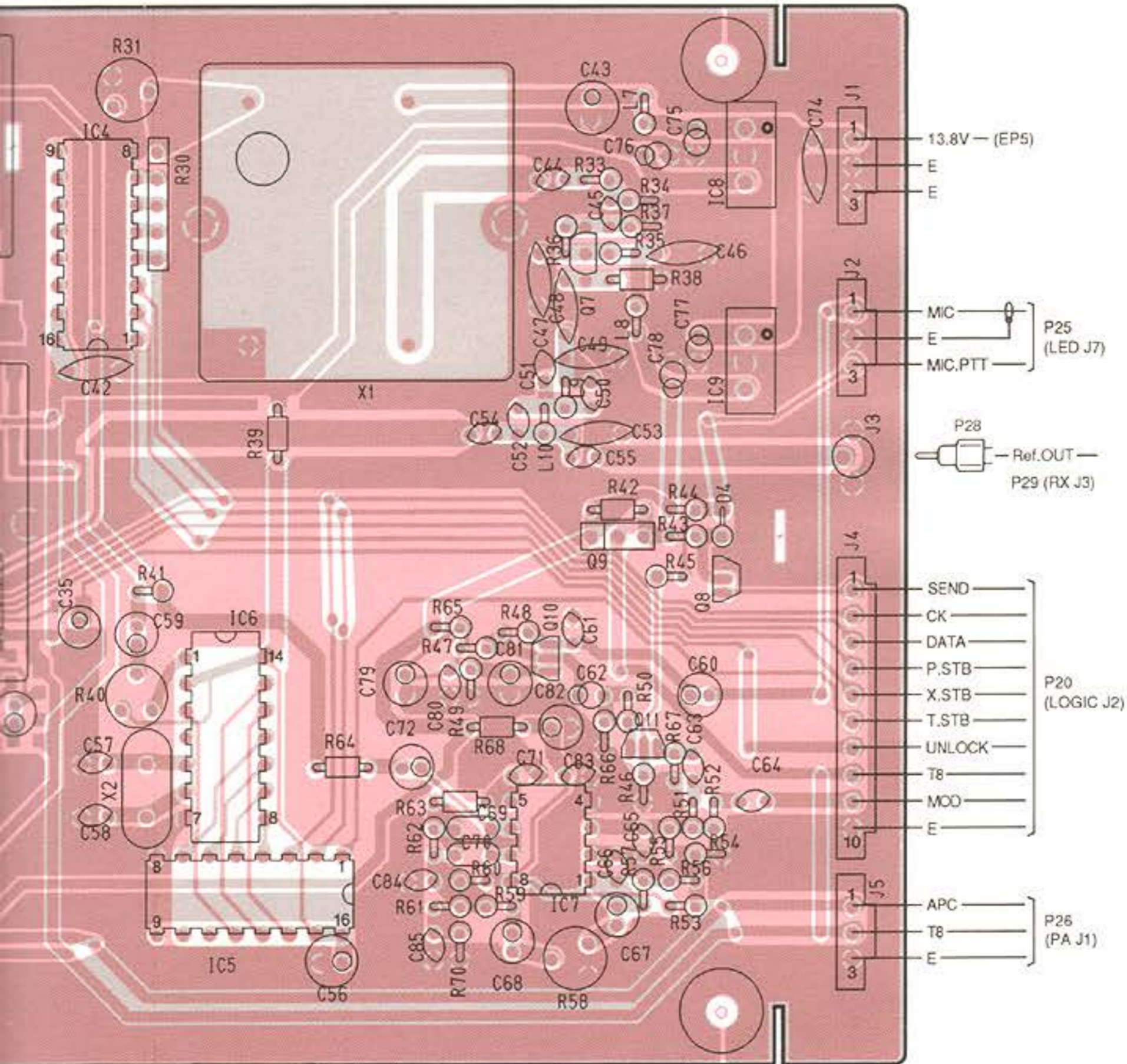
• TX UNIT



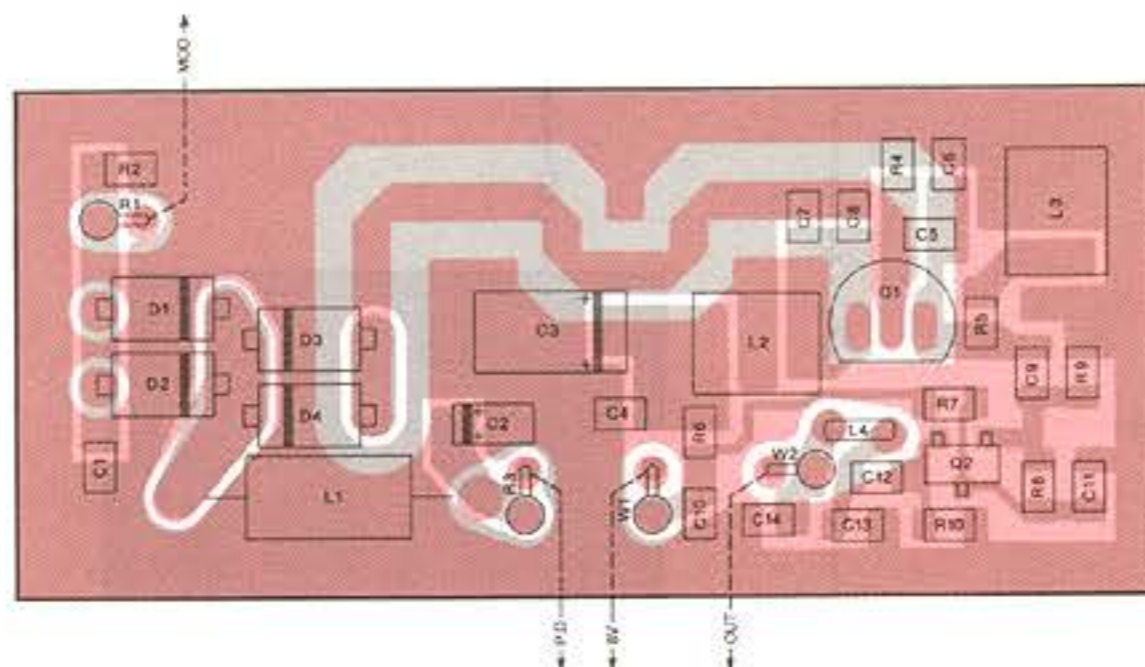
• FIL-B UNIT



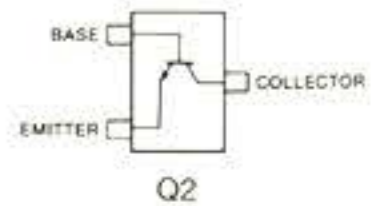
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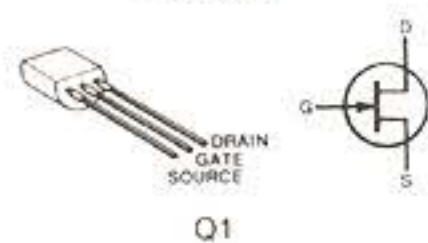
• R-VCO AND T-VCO UNITS

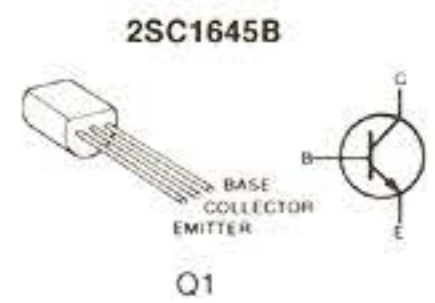
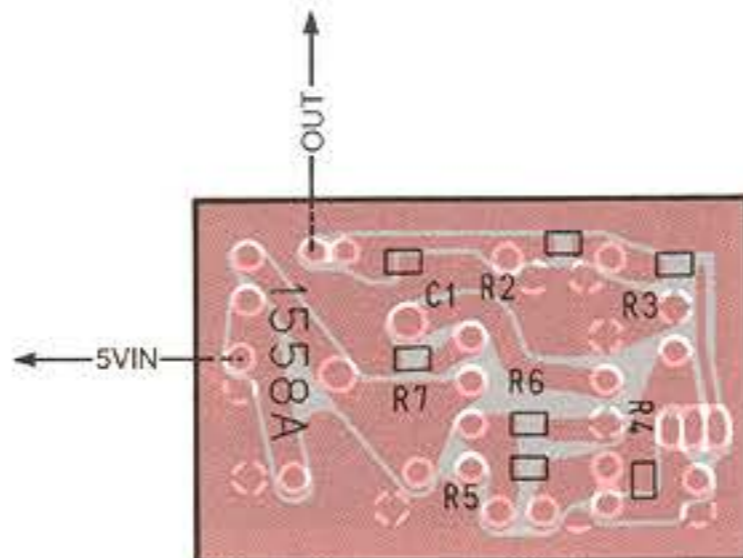
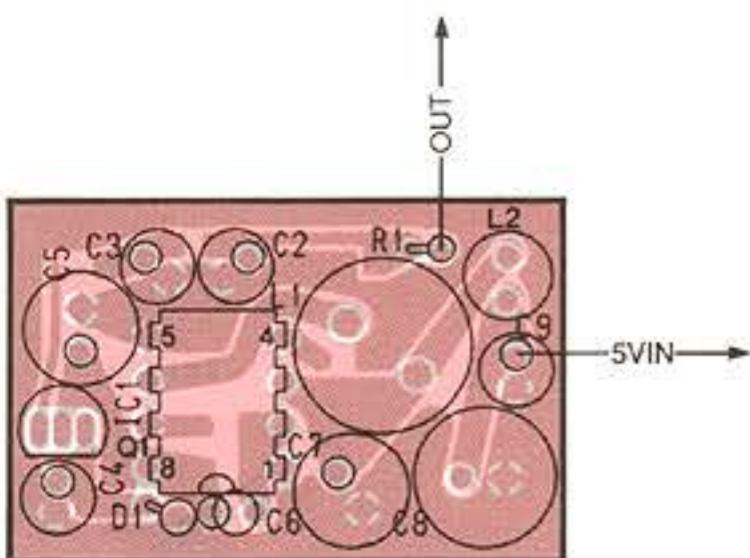
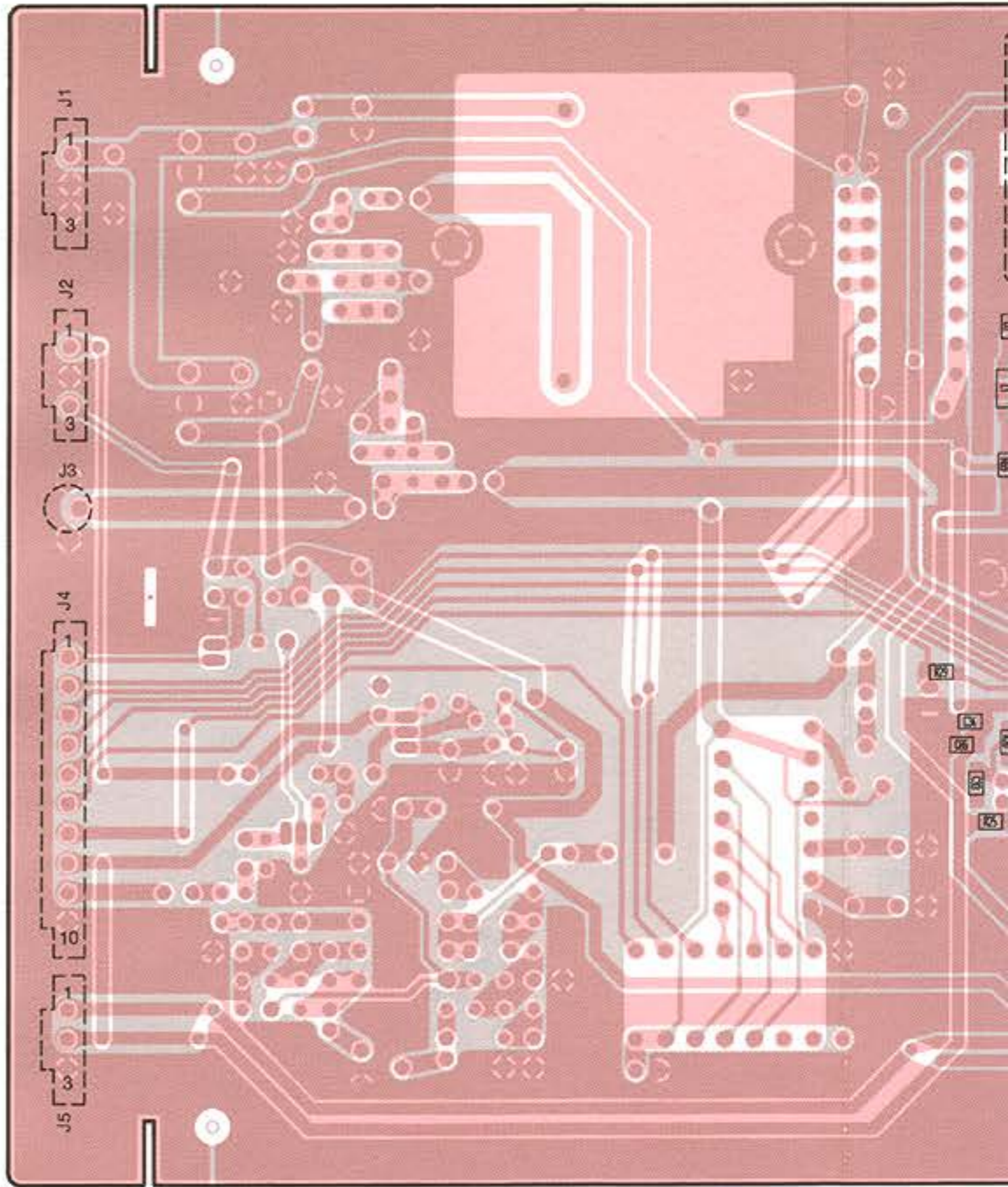


2SC3356
(Symbol: R22)



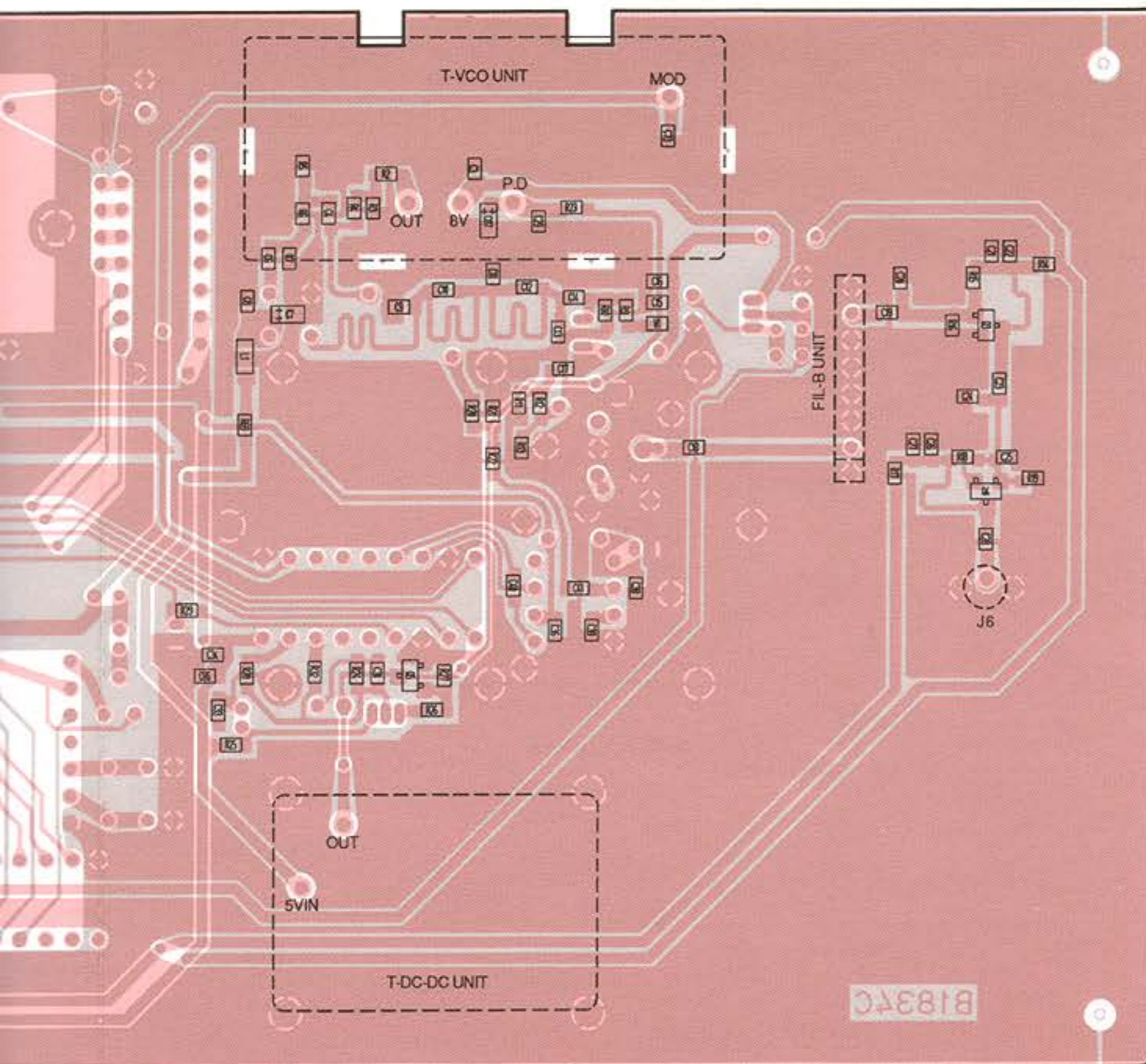
2SK125





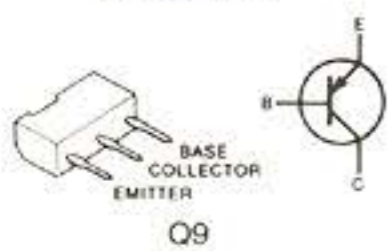
• TX UNIT



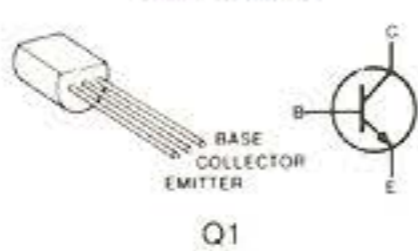


• TX UNIT

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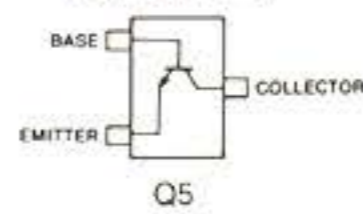
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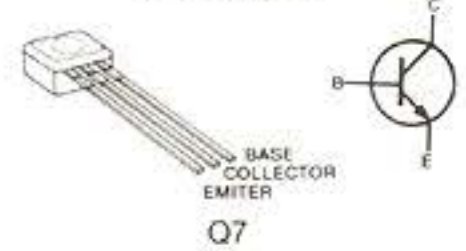
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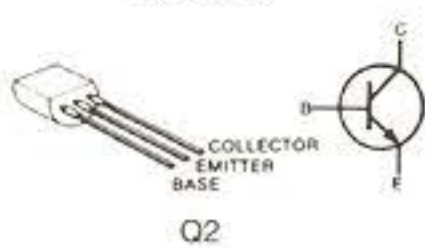
2SC2712 Y
(Symbol: LY)



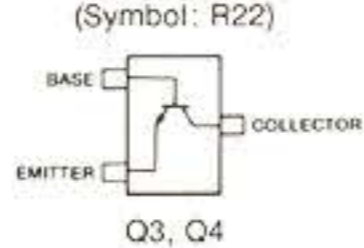
2SC2785 EL



2SC3355



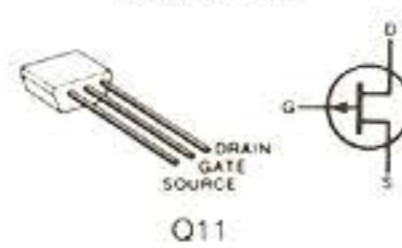
2SC3356
(Symbol: R22)



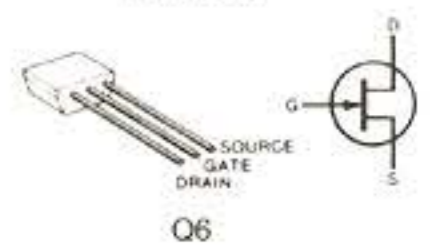
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2SJ105 GR

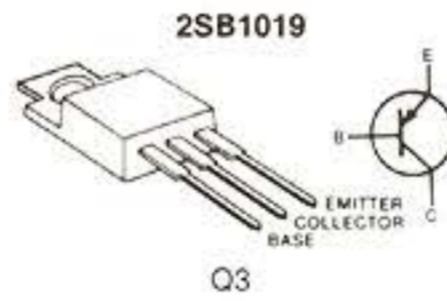
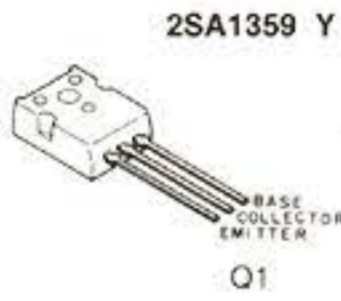
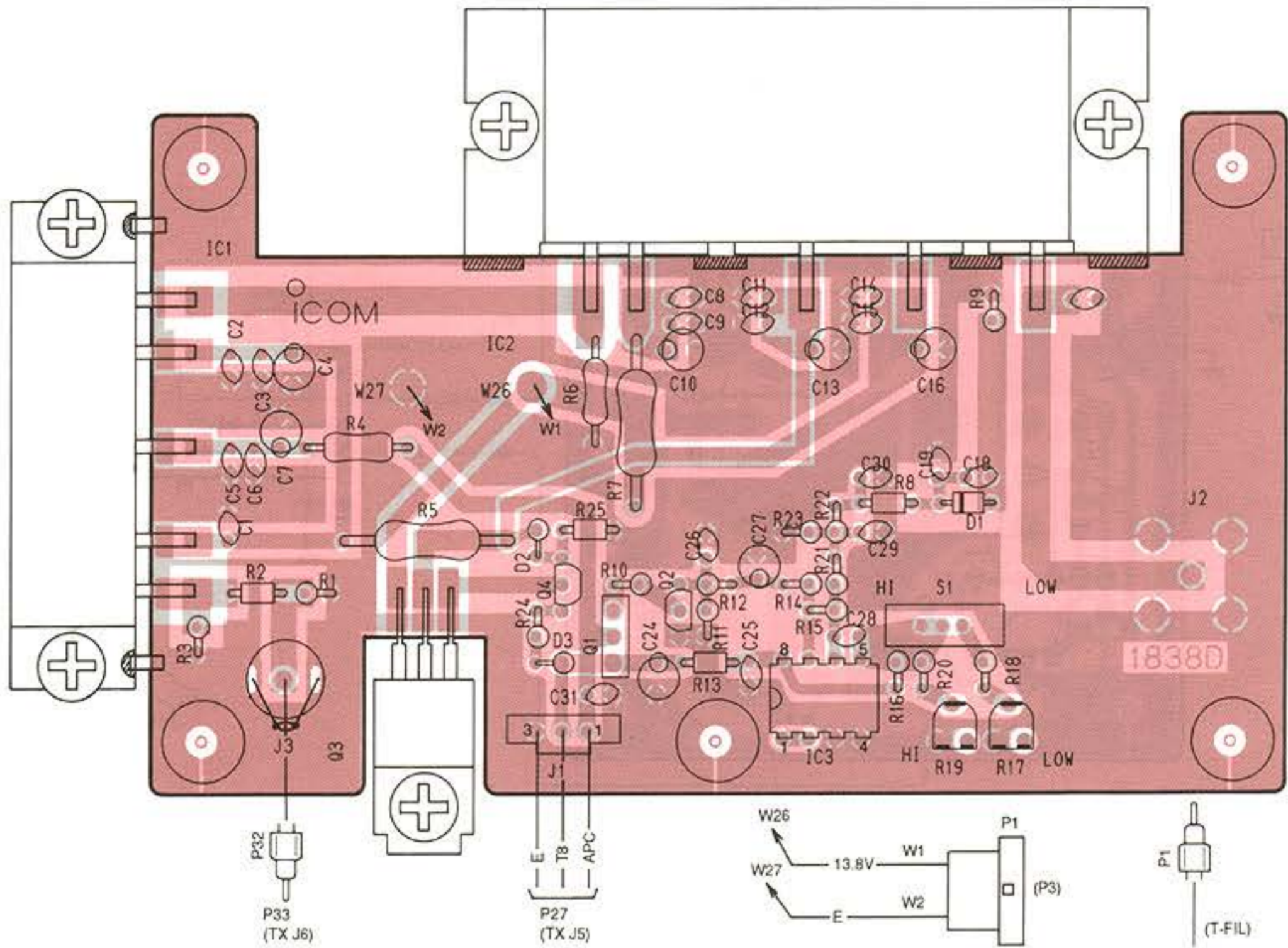


2SK184-Y

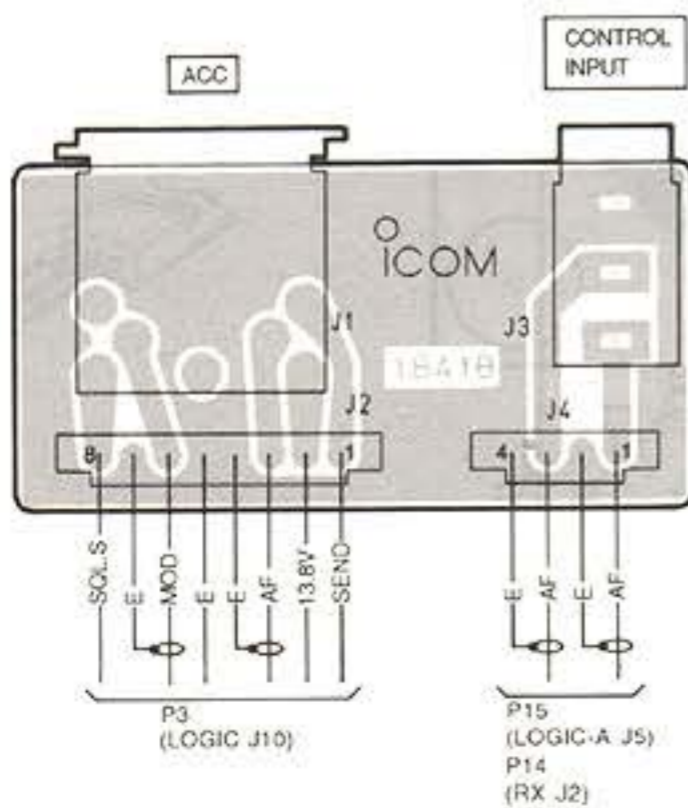


7-6 PA AND DIN UNITS

• PA UNIT

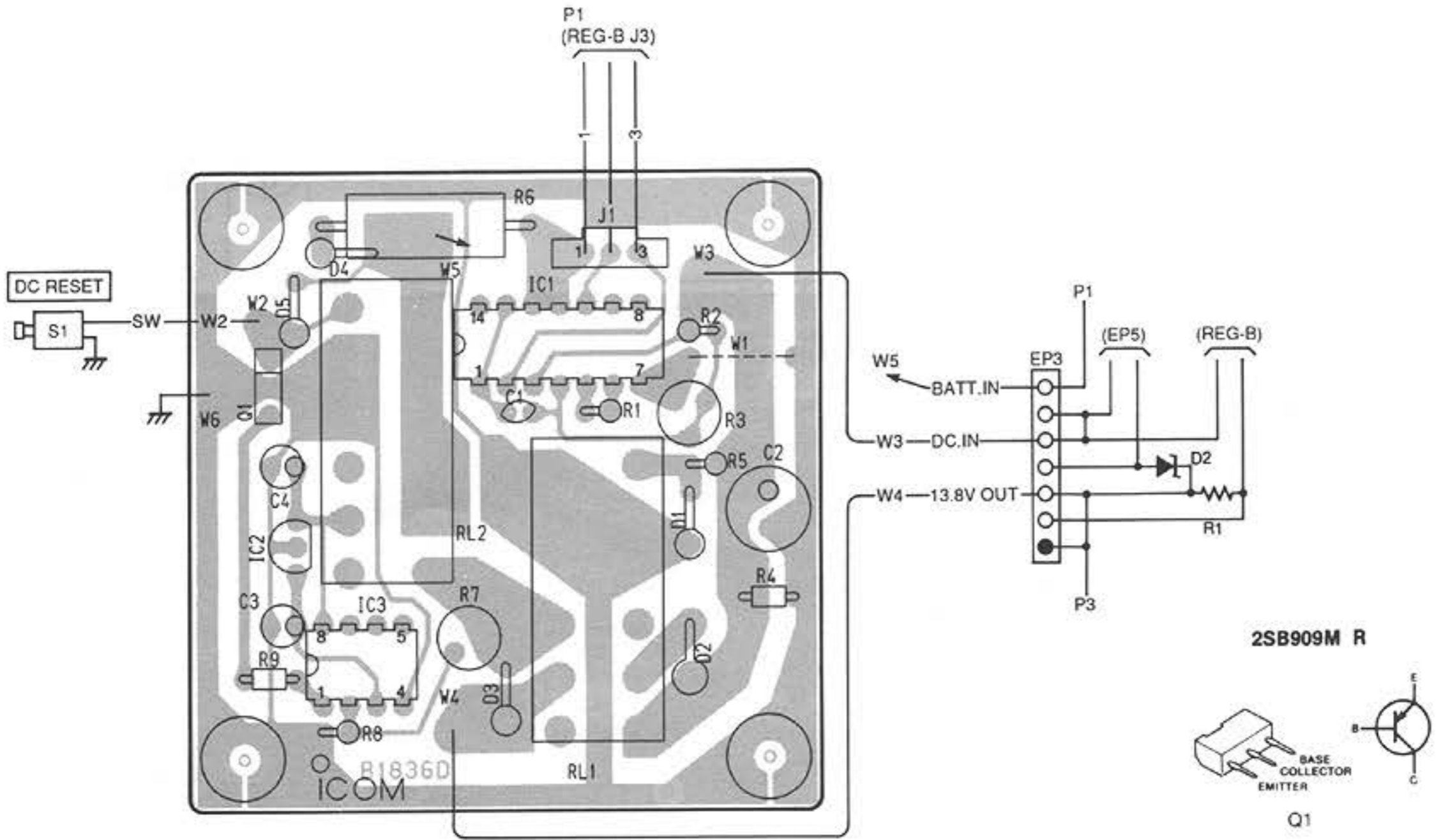


• DIN UNIT

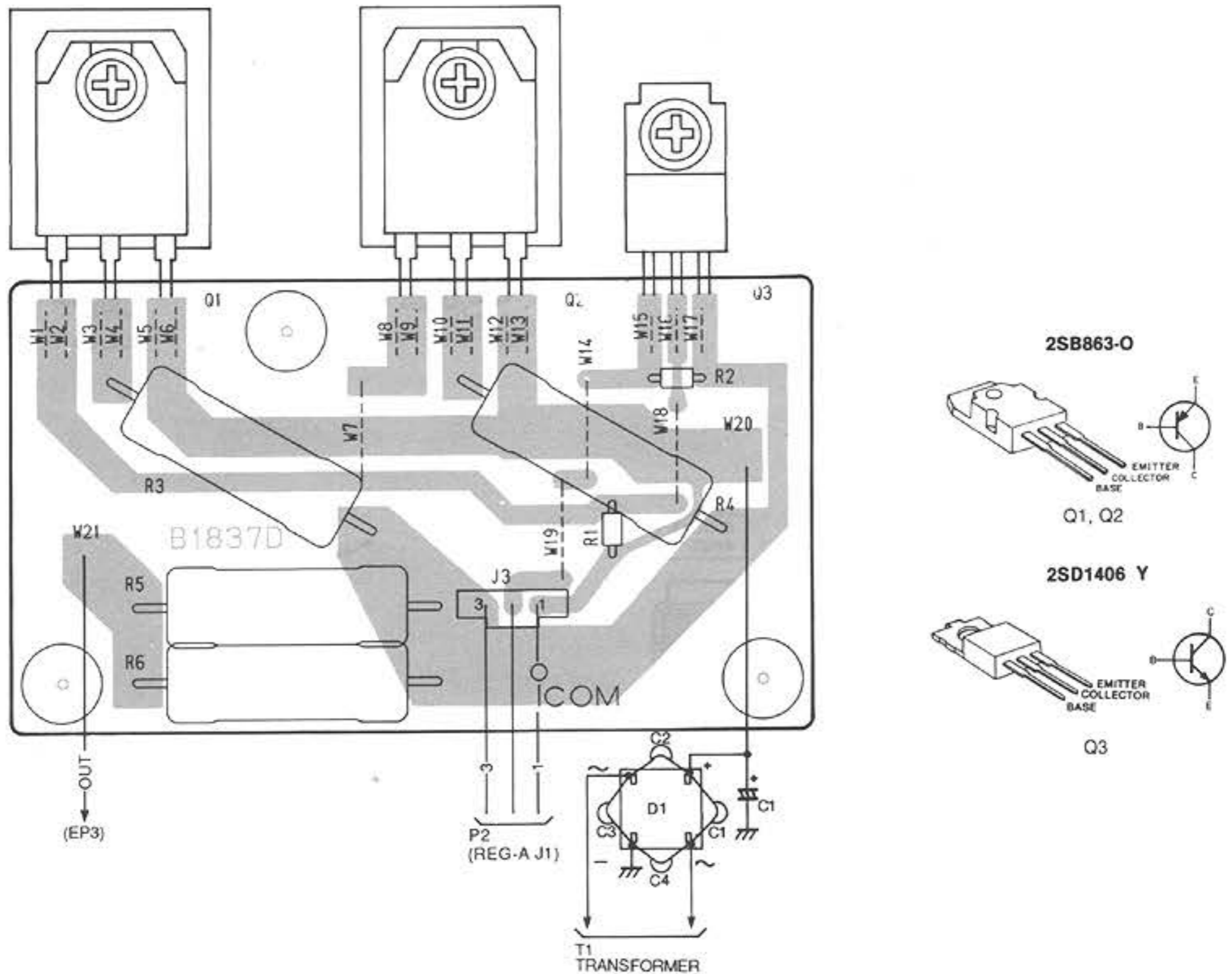


7-7 REG-A AND REG-B UNITS

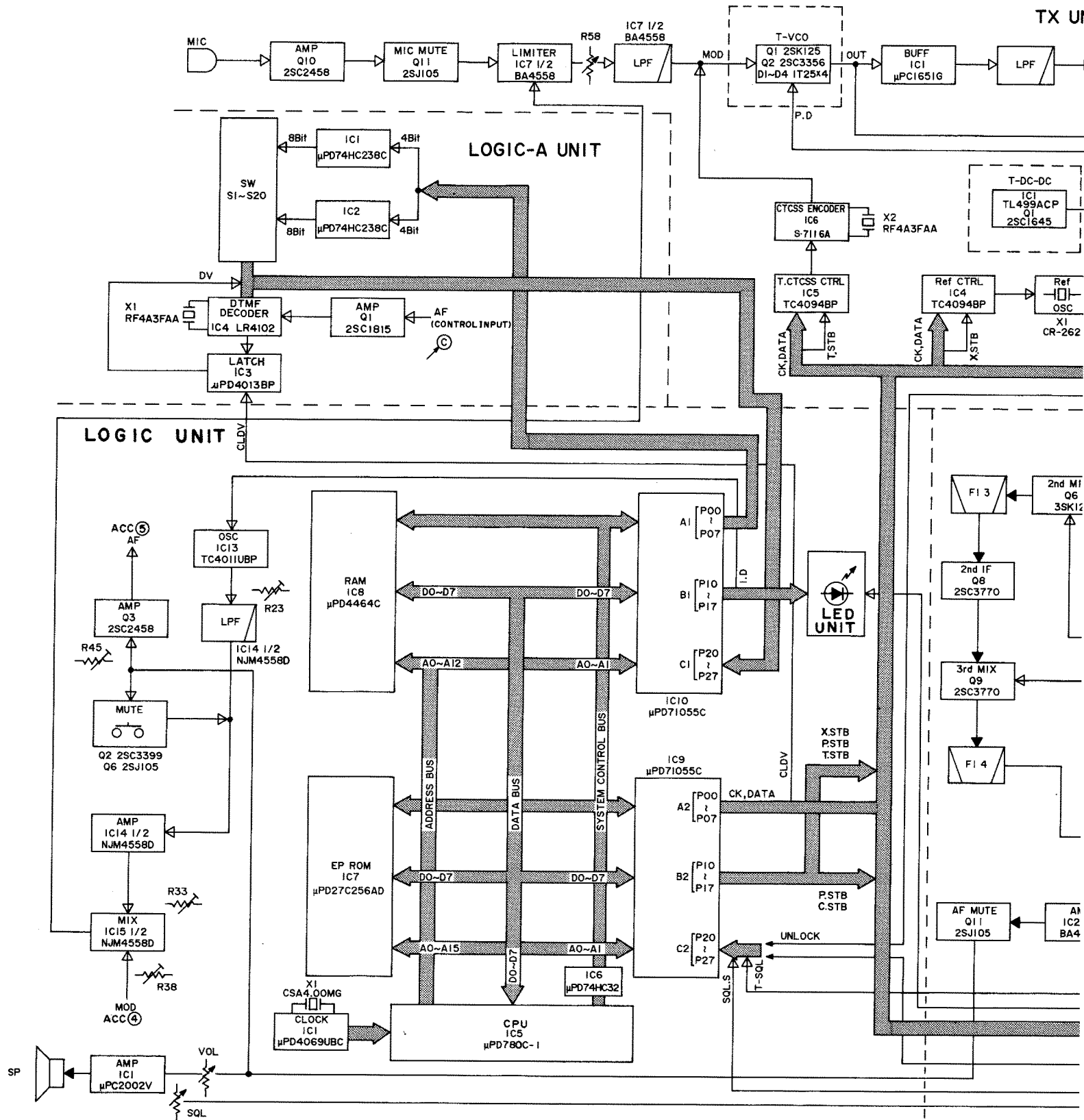
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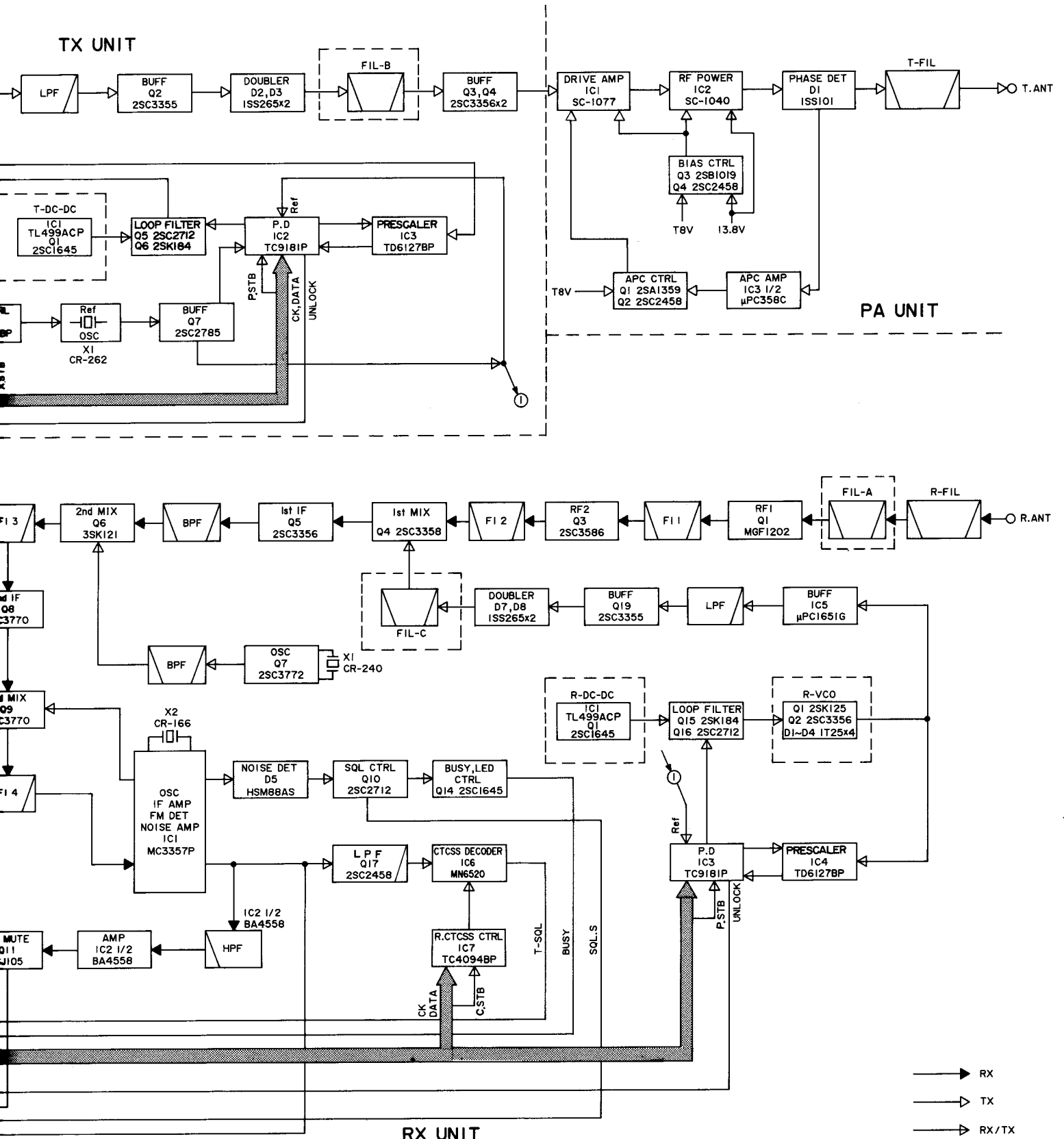


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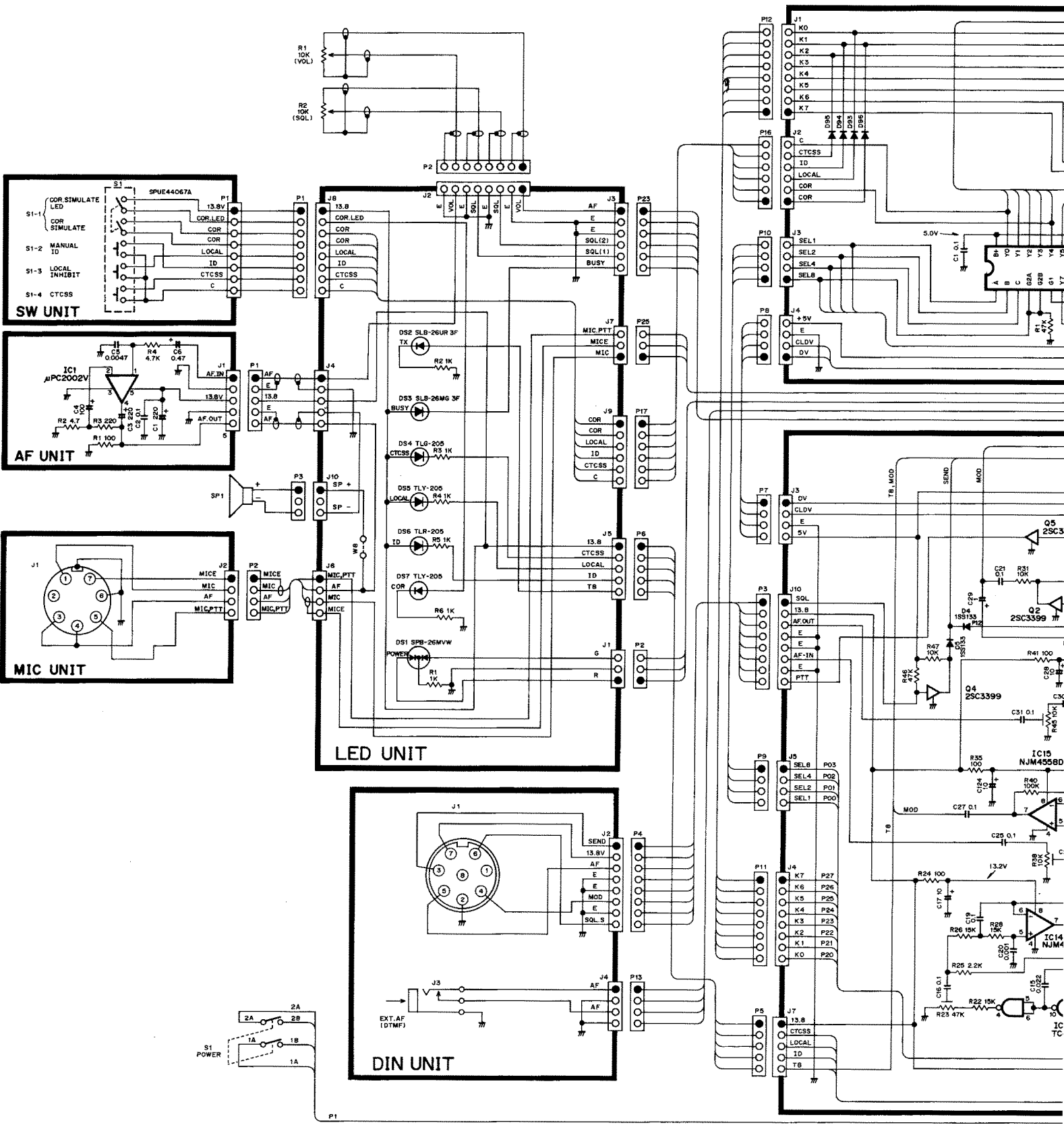


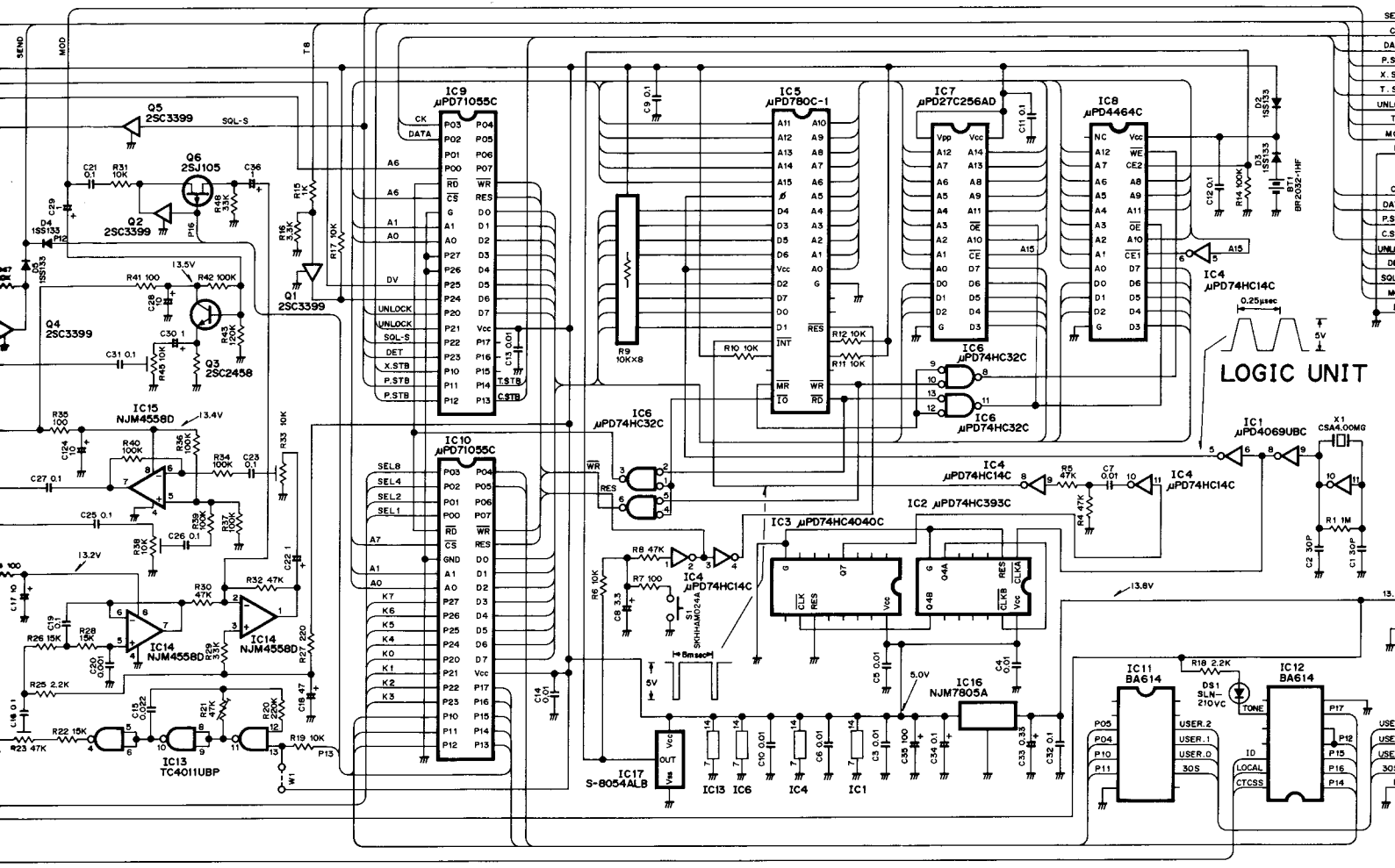
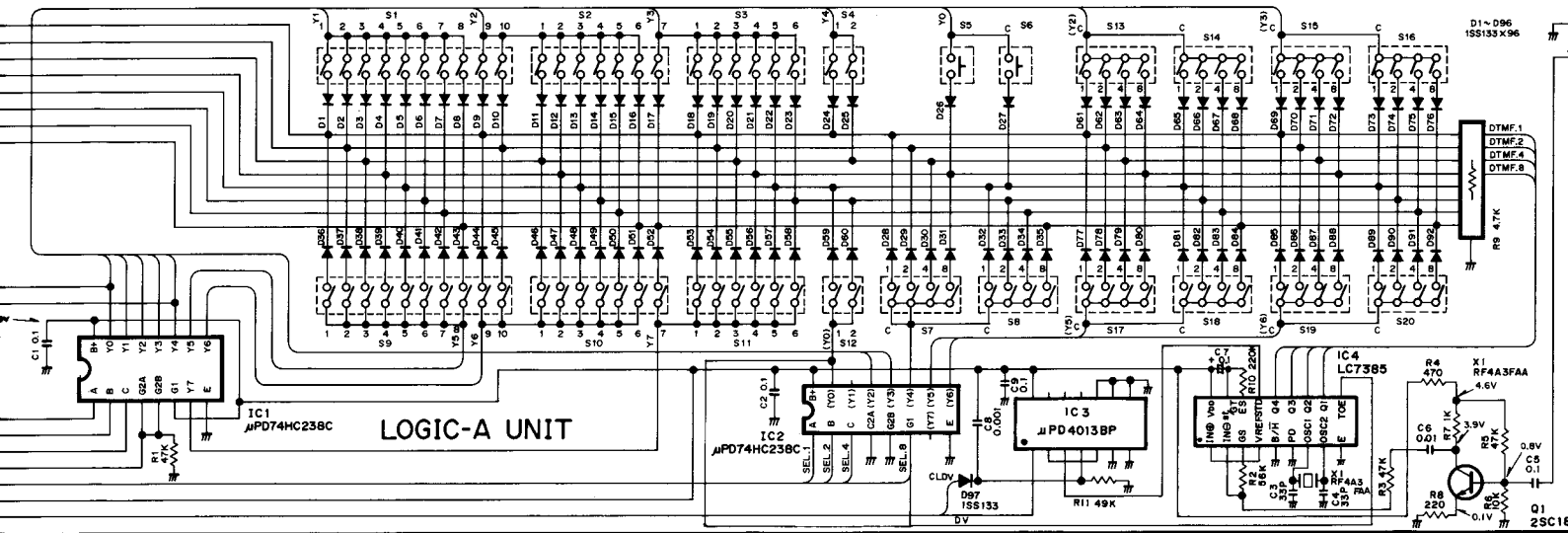
SECTION 8 BLOCK DIAGRAM

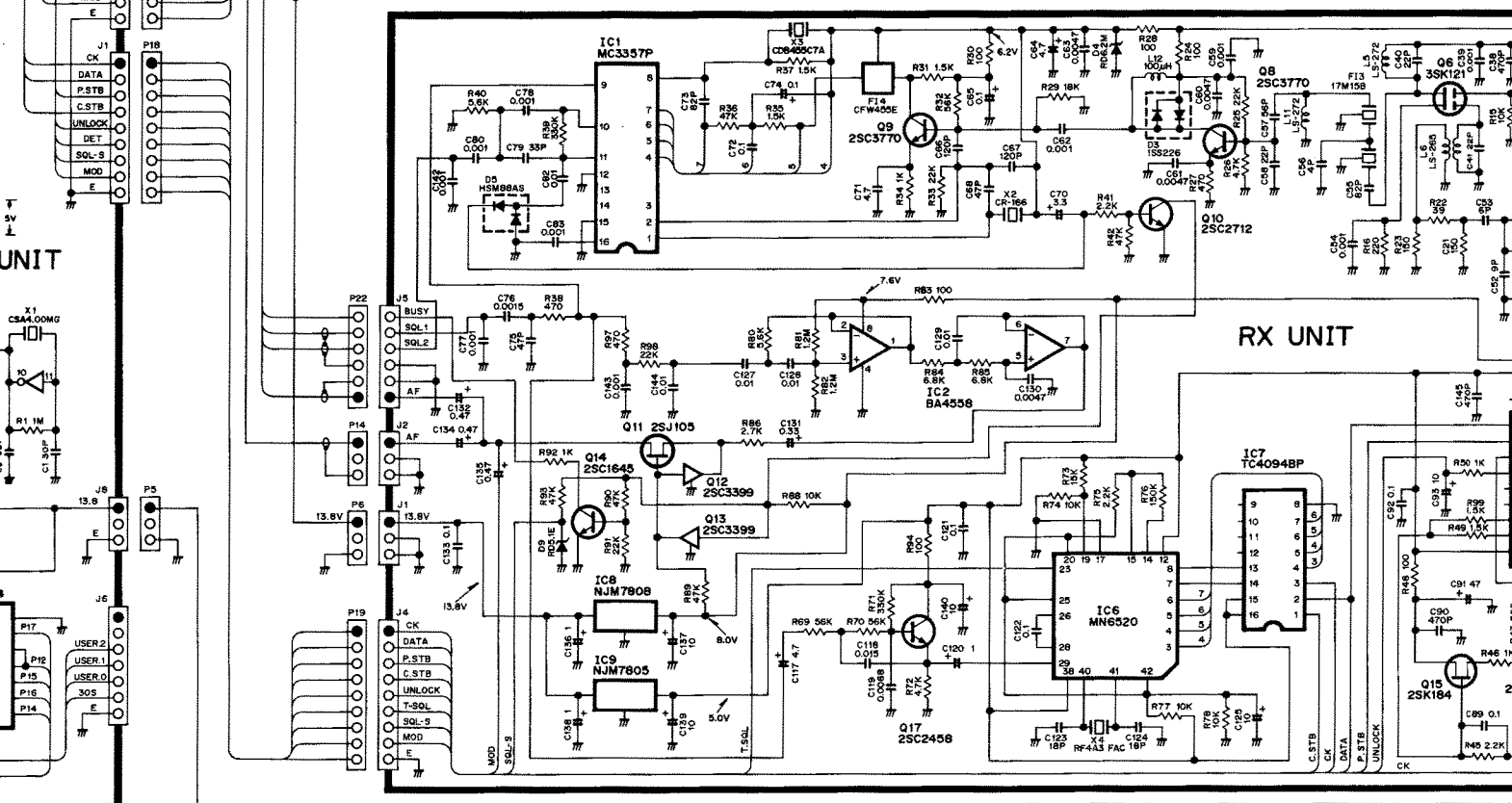
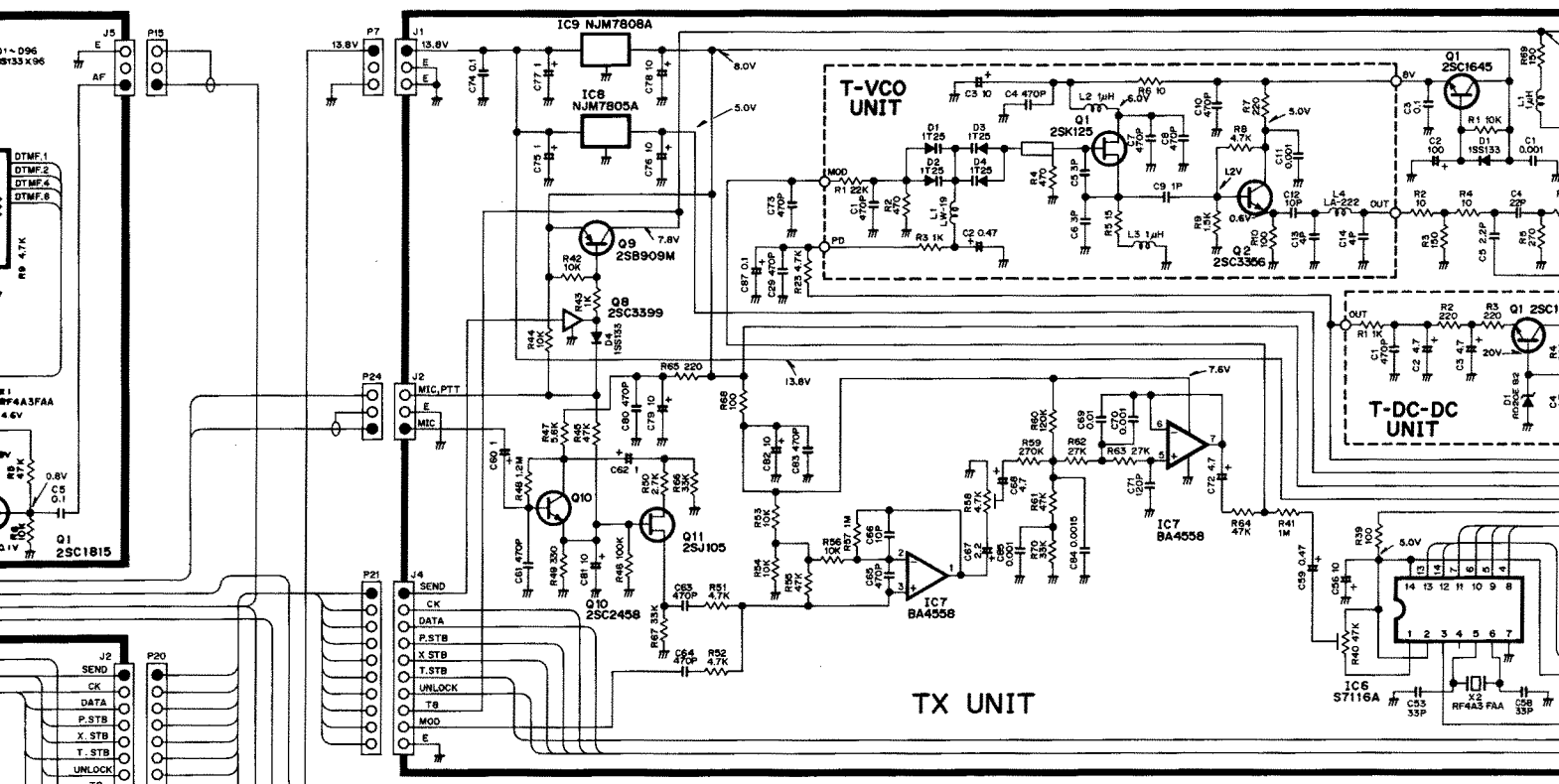


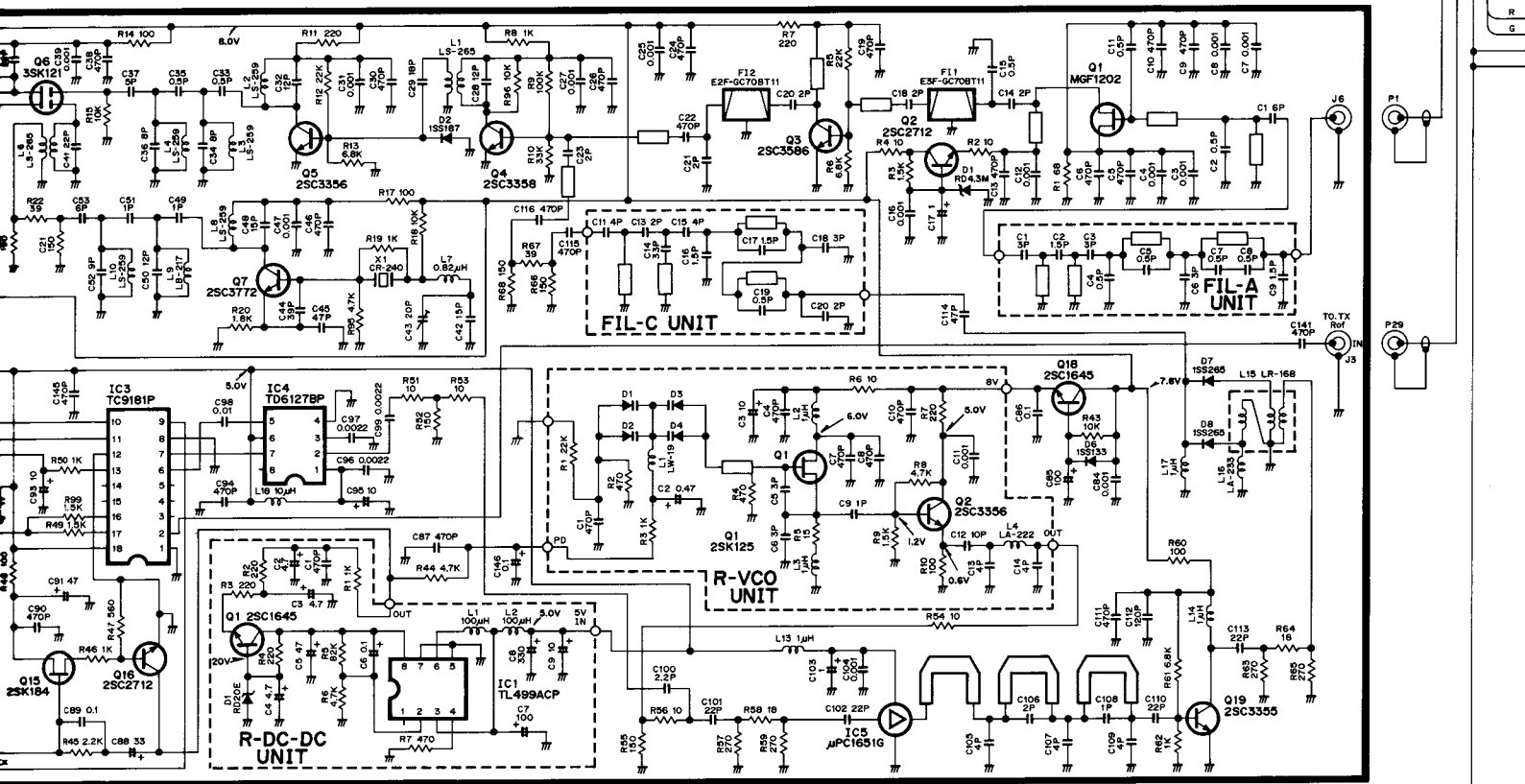
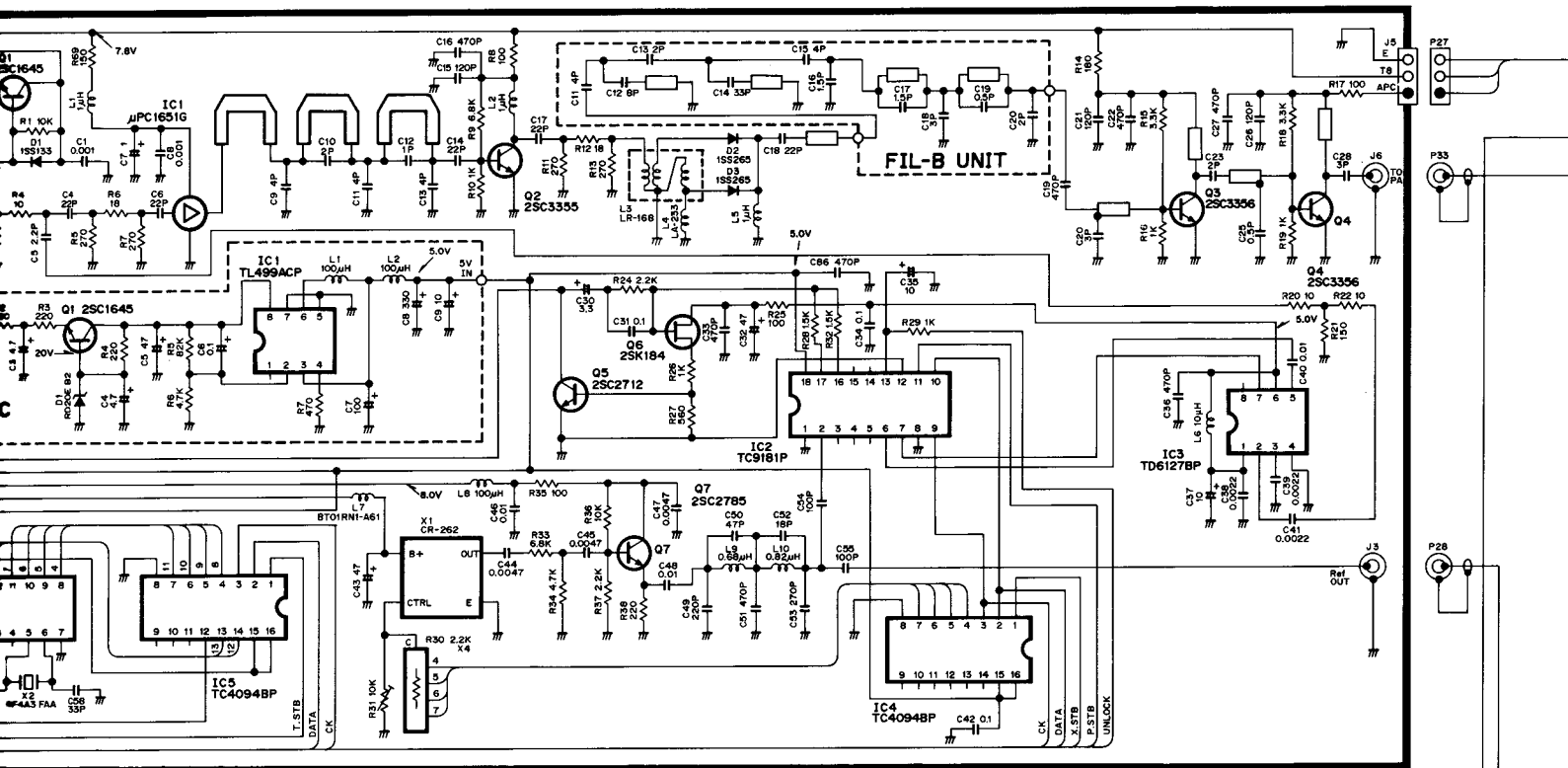


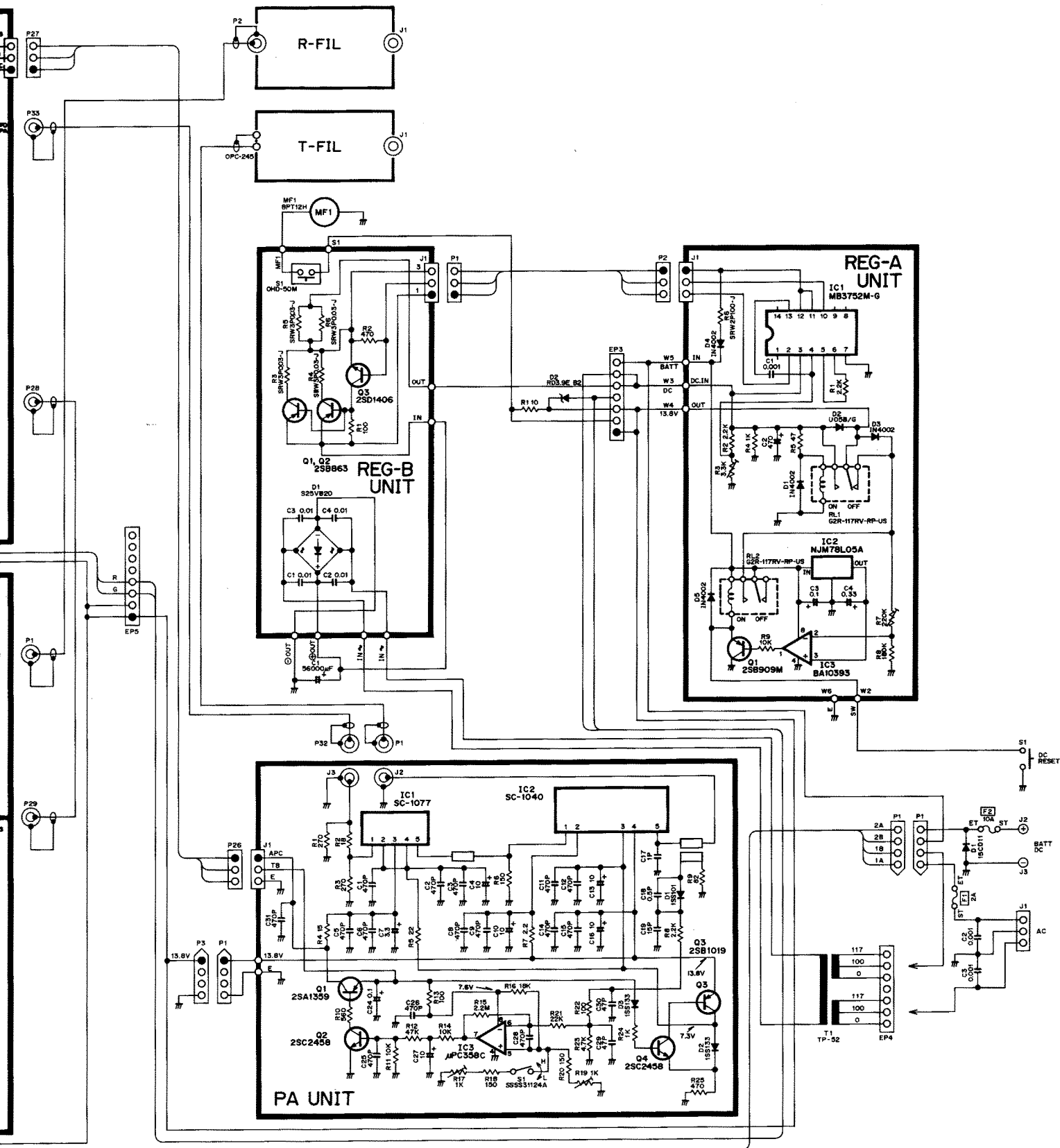
SECTION 9 VOLTAGE DIAGRAM











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