ICOM

SERVICE MANUAL

144 MHz FM TRANSCEIVER

IC-229A
IC-229E
IC-229H

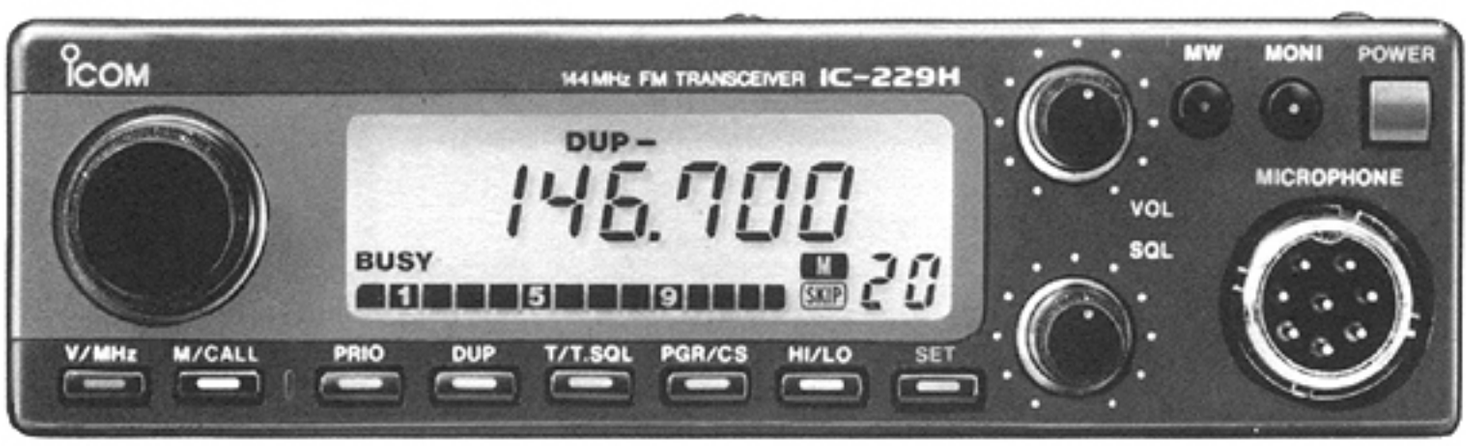
Icom Inc.

INTRODUCTION

This service manual describes the latest information for the following transceivers at the time of publication.

MODEL	VERSION NO.	VERSION	SYMBOL
IC-229H IC-229E	#02	Europe	EUR
	#03	Italy	ITA
IC-229H IC-229A	#05	U.S.A.	USA
	#07	Australia	AUS
	#08	Asia	SEA

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



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. Quality required

<SAMPLE ORDER>

1150000010 IC SC1019 IC-229A/E MAIN UNIT 5 pieces
8810006010 Screw FH M3×5 ZK BS IC-229A/E Top cover 10 pieces

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

DANGER

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

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

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

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

REPAIR NOTE

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from a power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB~ 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.
9. Each band unit **MUST** be serviced after the IC-901A/E adjustments have been completed.

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■ GENERAL

- ●Frequency coverage :

MODEL	VERSION	RECEIVER	TRANSMITTER
IC-229A/H	U.S.A.	136.000~174.000 MHz*	140.000~150.000 MHz*
IC-229A/H	Australia	144.000~148.000 MHz	144.000~148.000 MHz
IC-229A/H	Asia	136.000~174.000 MHz*	140.000~150.000 MHz*
IC-229E/H	Europe	144.000~146.000 MHz	144.000~146.000 MHz
IC-229E/H	Italy	136.000~176.000 MHz*	136.000~174.000 MHz*

*Specifications guaranteed 144~148 MHz.

- ●Mode : F3 (FM)
- ●Selectable tuning step (Initial) : 5,10, 12.5, 15, 20, 25 kHz or 1 MHz
- ●Memory channels : 20 plus 1 call channel
- ●Antenna impedance : 50Ω (unbalanced)
- ●Power supply requirement : 13.8 V DC±15% (negative ground)
- ●Current drain (IC-229H) : Receive 500 mA (squelched)
  800 mA (max. audio output)
  Transmit 4.0 A (LOW 1), 5.0 A (LOW 2), 7.5 A (LOW 3), 10.5 A (HIGH)
- ●Current drain (IC-229A/E) : Receive 500 mA (squelched)
  800 mA (max. audio output)
  Transmit 2.0 A (LOW 1), 3.2 A (LOW 2), 4.2 A (LOW 3), 6.0 A (HIGH)
- ●Usable temperature range : −10°C~+60°C (+14°F~+140°F)
- ●Frequency stability : ±10 ppm (−10°C~+60°C); (+14°F~+140°F)
- ●Dimensions : IC-229H 140 (W)×40 (H)×155 (D) mm; 5.5 (W)×1.6 (H)×6.1 (D) in
  IC-229A/E 140 (W)×40 (H)×105 (D) mm; 5.5 (W)×1.6 (H)×4.1 (D) in
  (Projections not included)
- ●Weight : IC-229H 1.0 kg (2.2 lb)
  IC-229A/E 0.75 kg (1.7 lb)

■ TRANSMITTER

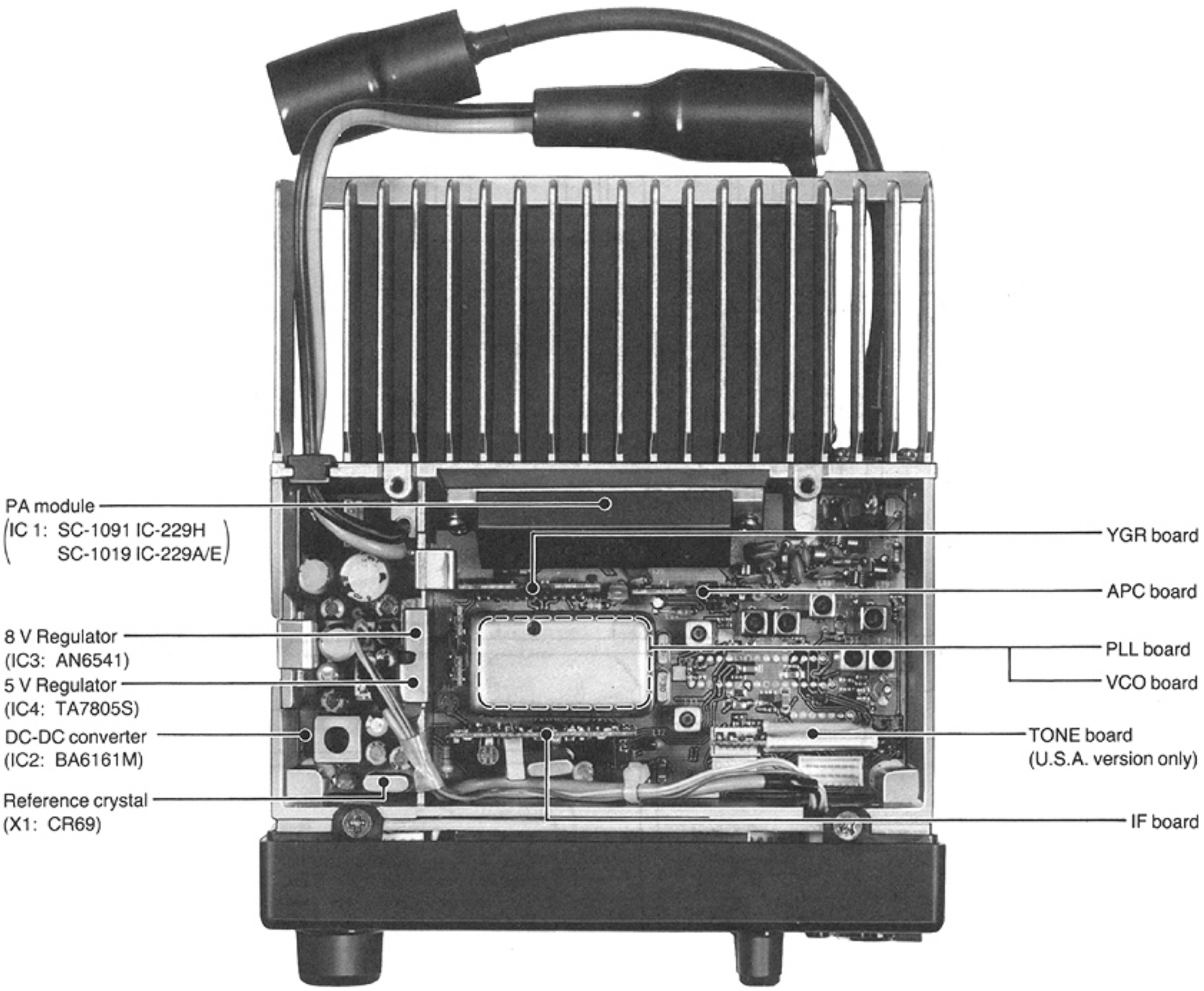
- ●Output power : IC-229H 50 W (HIGH), 25 W (LOW 3), 10 W (LOW 2), 5 W (LOW 1)
  IC-229A/E 25 W (HIGH), 10 W (LOW 3), 5 W (LOW 2), 1 W (LOW 1)
- ●Modulation system : Variable reactance frequency modulation
- ●Max. frequency deviation : ±5 kHz
- ●Spurious emissions : Less than ±60 dB
- ●Microphone impedance : 600Ω

■ RECEIVER

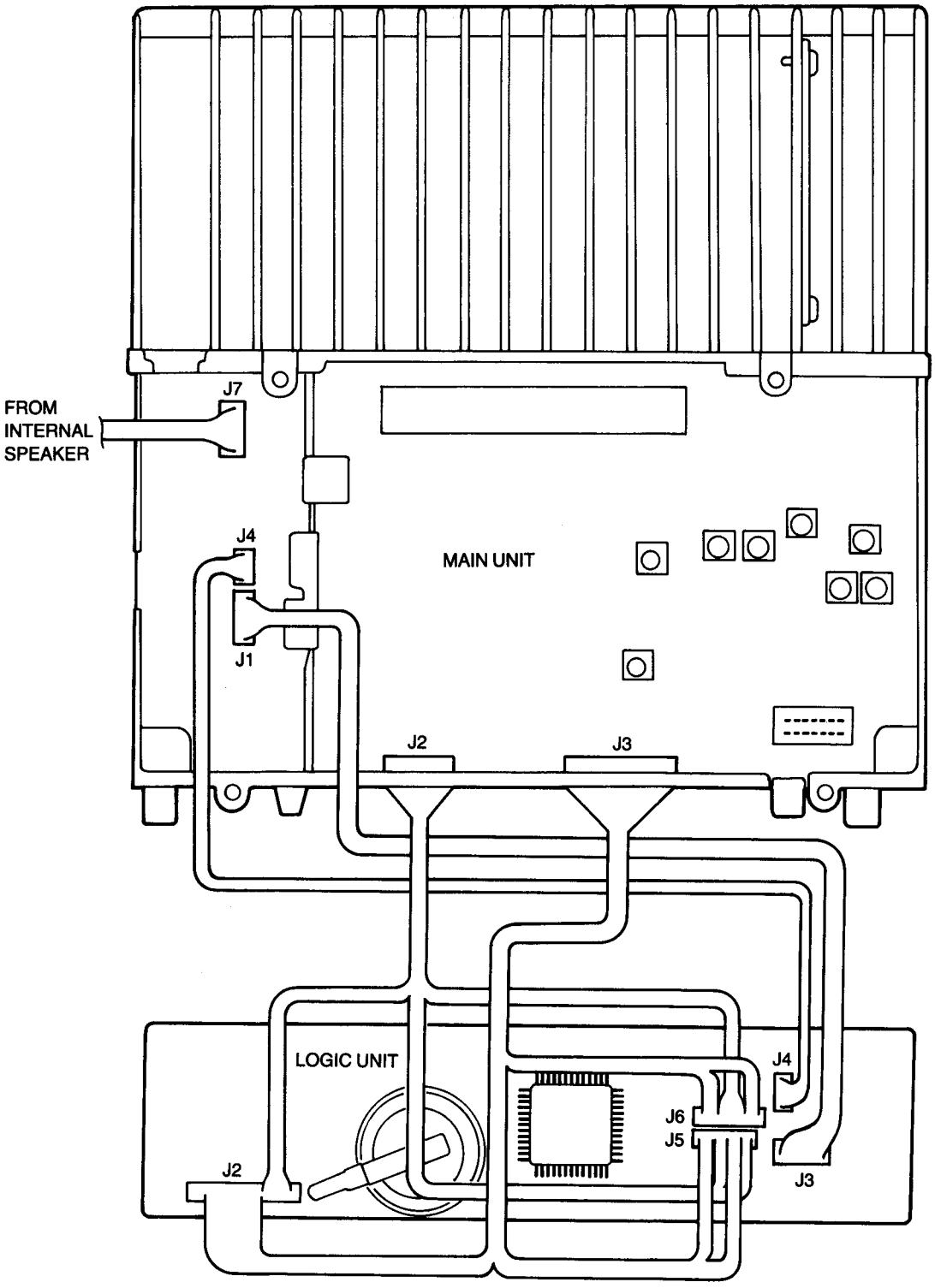
- ●Receive system : Double-conversion superheterodyne
- ●Intermediate frequencies : 1st 17.2 MHz
  2nd 455 kHz
- ●Sensitivity : 0.18 µV for 12 dB SINAD
- ●Selectivity : More than 15 kHz/−6 dB
  Less than 30 kHz/−60 dB
- ●Audio output power : More than 2.4 W at 10% distortion with an 8Ω load
- ●Audio output impedance : 8Ω

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

SECTION 2 INSIDE VIEWS



SECTION 3 CONNECTOR ASSEMBLY



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

The antenna switching circuit switches the transmit/receive circuit, functions as a low-pass filter while receiving and as a resonator circuit while transmitting.

Received signals enter the antenna connector and pass through a low-pass filter (L8~L11, C29~C32). The signals are applied to an antenna switching circuit (D5), and then to an RF circuit via a low pass filter (L19, L20, C89, C101, D18).

4-1-2 RF CIRCUIT (MAIN UNIT)

The RF circuit amplifies signals within the range of frequency coverage, and filters out out-of-band signals.

The signals from the antenna switching circuit pass through a one-stage bandpass filter (D15, L18, C95), and are applied to an RF amplifier (Q19). Amplified signals are applied to 3-stage bandpass filters (D12~D14, L15~L17, C82, C85, C88), and are then applied to a 1st mixer (Q18). The bandpass filters suppress out-of-band signals.

D12~D15 are varactor diodes that track the bandpass filters and resonator circuits and are controlled by the lock voltage of the PLL. These diodes tune the center frequency of RF circuits for wide band width reception and good image response rejection.

4-1-3 1ST MIXER CIRCUIT (MAIN UNIT)

The 1st mixer circuit converts the received signal to a fixed frequency of the 1st IF signal using a PLL output frequency. By changing a PLL frequency, only the desired frequency can be passed through a crystal filter located at the next stage of the 1st mixer.

The signals from the RF circuit are mixed with a 1st LO signal from the VCO circuit to produce a 17.2 MHz 1st IF signal.

4-1-4 1ST IF CIRCUIT (MAIN UNIT)

The 1st IF circuit amplifies a signal which is converted in the 1st mixer circuit.

After passing through a matching circuit (L13, C70), the 1st IF signal is applied to a pair of crystal filters (FI1) to suppress out-of-band signals. The 1st IF signal is amplified at an IF amplifier (Q17) and then enters a demodulator circuit.

4-1-5 2ND IF CIRCUIT (IF UNIT)

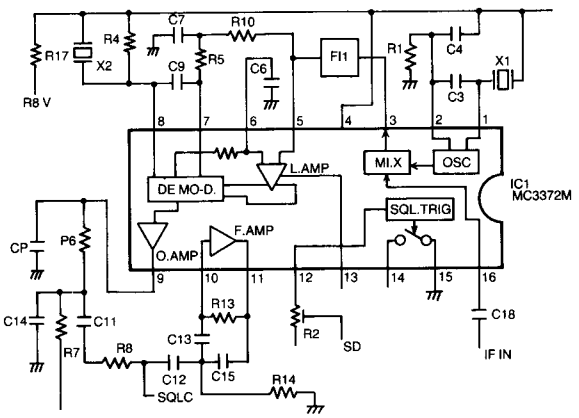
The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal. A double superheterodyne system (which converts the receive signal twice) improves the image rejection ratio and obtains stable receiver gain.

The 1st IF signal from Q17 is applied to a 2nd mixer section of IC1, and mixed with a 2nd LO signal to be converted to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, the local oscillator, limiter amplifier and quadrature detector circuits. The local oscillator section and X2 generates 16.745 MHz for the 2nd LO signal.

The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through a ceramic filter (FI1), where unwanted signals are suppressed. It is then amplified at the limiter amplifier section (IC1, pin 5) and applied to the quadrature detector section (IC1, pin 10 and ceramic discriminator X2) to demodulate the 2nd IF signal into an AF signal.

AF signals output from IC1 (pin 9) are applied to a squelch circuit and de-emphasis circuit (R7, C14). The de-emphasis circuit is an integrated circuit with frequency characteristics of −6 dB/octave. The resulting signal is applied to the AF circuit.



IF CIRCUIT

4-1-6 SQUELCH CIRCUIT (IF UNIT)

The 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 control circuits.

Some of the noise components in the AF signals from IC1 (pin 9) are applied to IC1 (pin 10). The [SQL] control (R41) on the LOGIC unit adjusts the IC1 (pin 10) input level.

The active filter section in IC1 amplifies noise components of frequencies of 20 kHz and above, and outputs the resulting signal from IC1 (pin 11). Output signals are rectified by D2 and are converted to DC voltage.

The DC voltage triggers the squelch switch (Q5). The signal is applied to the CPU (IC4, pin 18) on the LOGIC UNIT through the SQLS signal line.

4-1-7 AF CIRCUIT (MAIN UNIT)

The AF circuit amplifies the signals to drive a speaker. The AF circuit includes a mute circuit to mute a signal with a noise squelch.

The AF OUT signal through DETMUTE switch Q24, the BEEP signal, and the DTMF monitor signal buffered at Q21 are adjusted with the volume control on the front panel.

AF amplifier IC7 amplifies the signals to a sufficient level to drive the speaker. Mute transistor Q33 turns ON to cut the signal to be input to AF amplifier IC7 during TX and squelch operation.
If an external speaker is connected, the internal speaker is automatically disconnected.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER (MIC AMP UNIT)

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

An AF signal from the microphone is applied to microphone preamplifier Q1 through the MIC line. IC1b functions as an amplifier as well as a limiter for frequency deviation. IC1b also functions as a pre-emphasis circuit with −6 dB/octave characteristics.

4-2-2 MODULATION CIRCUIT (MIC AMP AND VCO UNITS)

The modulation circuit oscillates the transmit frequency with AF signal modulation.

The signal is filtered by a low-pass filter consisting of IC1a. IC1b has a feedback circuit which functions as a pre-emphasis circuit with +6 dB/octave characteristics.
The filtered signal is applied to the VCO circuit for FM modulation.

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

The drive amplifier circuit amplifies the VCO oscillating signal.

The VCO output (OUT1) filtered by a low-pass filter are amplified to approximately 25 dBm (approx. 300 mW) at Q1 and Q2 on the YGR UNIT.

4-2-4 POWER AMPLIFIER CIRCUIT (MAIN UNIT)

The power amplifier circuit amplifies the drive signal.

The amplified signal is applied to IC1 (pin 1). IC1 is a power module and amplifies the signals to approximately 55 W and 30 W for H type and A/E type respectively.
The output signal from IC1 (pin 4) is applied to D5 and then to a low-pass filter consisting of L8~L11 and C29~C32. The low-pass filter attenuates unwanted harmonic signals.

4-2-5 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

The antenna switching circuit applies the received signal to a receiver circuits and the transmitter signal to the antenna connector.

When transmitting, a diode switching circuit consisting of D17, D18 and D5 is turned ON by a signal of T8V.
Transmit signals are applied to the antenna connector through the low-pass filter.

When receiving, the diode switching circuit is turned OFF and received signals are applied to P1 through a π-type filter consisting of L19, L20 and C99~C101. The filter attenuates unwanted harmonic signals.

4-2-6 APC CIRCUIT (APC UNIT)

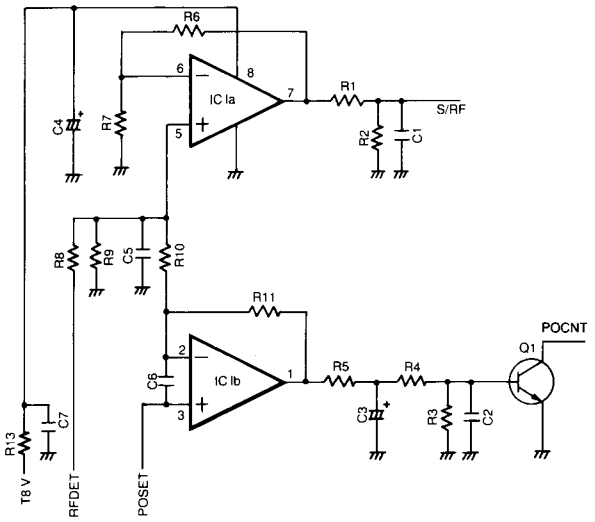
The APC circuit protects the power module from a mismatched output road and selects HIGH or LOW output power.

D3, D4, L6, R26~R29, C24 and C25 forms a mismatching detector circuit.

When the impedance of the connected antenna is matched with 50Ω, detected voltage at D3 and D4 is at a minimum. However, the voltage increases when the antenna impedance is not matched with 50Ω.

The detected voltage is applied to IC1 (pin 2) and a reference voltage is applied to IC1 (pin 3). Pins 2 and 3 form differential inputs and IC1 functions as a differential amplifier. The relation between the detected voltage level and output voltage level at IC1 (pin 1) is an inverse proportion.

If output power from IC1 (pin 4) is increased, detected voltage by D3 and D4 increases. The voltage is applied to IC1 (pin 2). IC1 (pin 1) output level becomes lower than when the output power is normal. The base voltage of Q1 becomes lower and the collector of Q9 on the MAIN UNIT also becomes lower. Therefore, applied voltages to the collector of Q2 on the YGR UNIT and IC1 (pin 2) on the MAIN UNIT decrease and the output power is controlled at a constant level.



APC CIRCUIT

4-3 PLL CIRCUITS (PLL UNIT)

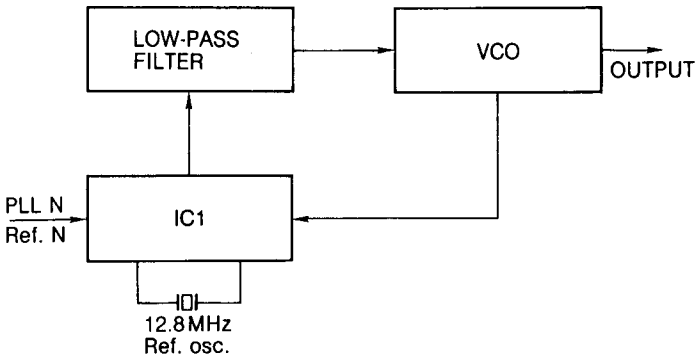
4-3-1 GENERAL

The PLL circuit steadily oscillates the transmit frequency and the receive local frequency. The PLL output frequency is controlled by the divided ratio of the programmable divider.

IC1 is one package of the PLL IC chip. The IC functions as a phase detector, reference oscillator, fixed divider and programmable divider.

IC1 accepts 200 MHz signals directly and divides them without a mixer or prescaler. Therefore, an important feature in IC1 is that it generates few spurious components.

The VCO output frequency is set by data signals from IC1 on the LOGIC UNIT.



PLL CIRCUIT BLOCK DIAGRAM

4-3-2 VCO CIRCUIT (VCO UNIT)

The VCO circuit generates receive and transmit frequencies and produces FM modulation.

The VCO circuit forms a Hartley oscillator circuit. Q1 oscillates the desired signal and Q2 functions as a buffer amplifier.

The higher harmonics of the OUT1 output signal is attenuated in the LPF consisting of L2, L3, C13, C14, and C15. It is sent to the Mixer circuit as the LO signal during transmission, and to the YGR section during reception.

The reference frequency signal entered in IC1 (PLL) is divided into the reference frequency in the reference program counter in IC1 (PLL) and then compared with the OUT2 output signal. The resulting difference is output as a pulse.

4-3-3 REFERENCE OSCILLATOR (MAIN UNIT)

The reference oscillator circuit oscillates the PLL reference frequency.

IC1 has an oscillator circuit for the PLL reference frequency signal in the chip. X1 is a crystal unit for oscillating a signal of 12.8 MHz.

4-3-4 CHARGE PUMP AND LOOP FILTER CIRCUITS (PLL UNIT)

These circuits convert the phase-detected signal to a DC voltage.

Phase-detected signals from pins 5 and 12 of the IC1 are converted to DC voltage by a charge pump circuit consisting of Q5~Q7. The signal is then applied to a low-pass filter circuit consisting of R2, R3, R8 and C1~C3.

Filtered DC voltage is applied to D1 and D2 in the VCO circuit for controlling the VCO output frequency and the gate of Q1 for producing receiver tuning voltages.

4-4 OTHER CIRCUITS

4-4-1 REGULATOR CIRCUITS (MAIN UNIT)

The regulator circuit converts +13.8 V DC to the voltage needed by each circuit.

IC3 is a 3-terminal voltage regulator IC chip. +13.8 V is applied to pin 1 and pin 3 output +8 V.
The regulated voltage is applied to each unit.

IC4 is a 3-terminal voltage regulator IC chip. +13.8 V is applied to an input terminal and the output terminal outputs +5 V.

IC2 is a voltage converter for applying approximately 30 V DC to the receiver RF circuit.

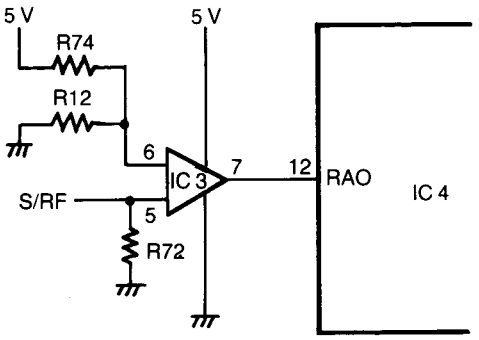
4-4-2 SUBAUDIBLE TONE ENCODER CIRCUIT (TONE UNIT)

IC5 is an IC chip for converting input data from serial to parallel form. The data is sent from IC4 on the LOGIC UNIT. IC1 is an IC chip for generating subaudible tone frequency signals from 67 Hz~250.3 Hz.

4-5 LOGIC CIRCUITS (LOGIC UNIT)

4-5-1 S/RF INDICATOR CIRCUIT•

•Relative signal strength indicator
The S/RF meter detection circuit of the indicator contains comparator IC3 and the 4-bit D/A converter consisting of 4 output ports of CPU (IC4) and resistors for the relative signal. The S/RF signal is applied to IC3 (pin 5). The relative signal is applied to IC3 (pin 6). The relative signal voltage changed by the 4-bit binary output signal from CPU IC4 is compared with the voltage detected by the S/RF meter.
The output signal from IC3 (pin 7) is read by the CPU and the detected voltage is indicated.

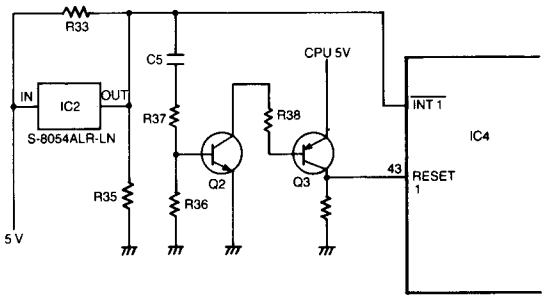


S/RF INDICATOR CIRCUIT

•RF output power selection indicator
The gain of IC1 a is set very high, so the output voltage at IC1a (pin 7) is saturated even if the input RF level is small. Then the "HIGH" voltage is applied to IC3 (pin 5) on the LOGIC.

4-5-2 RESET CIRCUIT

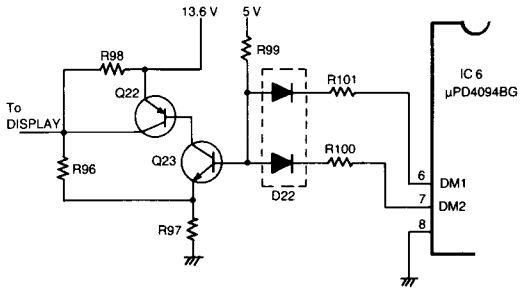
The CPU is reset when the RESET port changes from "HIGH" to "LOW" and then becomes "LOW" again. The RESET port remains "HIGH" except when the CPU is reset.



RESET CIRCUIT

4-5-3 DIMMER CIRCUIT

The 4 brightness level of the FUNCTION DISPLAY change by using combinations of output level at pin 6 and pin 7. By changing levels at DM1 and DM2, the base voltage and collector current changes. Therefore, the collector voltage is changed and brightness of lamps DS2, DS3 change.



DIMMER CIRCUIT

4-5-4 CPU PORT ALLOCATIONS

PIN NO.	Port Name	Signal Name	Description
1	R01	KEY S0	Initial matrix strobe signal output
2	R02	KEY S1	Initial matrix strobe signal output
3	R03	KEY S2	Initial matrix strobe signal output
4	R10	KEY I0	Initial matrix return signal input
5	R11	KEY I1	Initial matrix return signal input
6	R12	KEY I2	Initial matrix return signal input
7	R13	KEY I3	Initial matrix return signal input
8	R20	SRF O0	A/D Decode data output
9	R21	SRF O1	A/D Decode data output
10	R22	SRF O2	A/D Decode data output
11	R23	SRF O3	A/D Decode data output
12	RA0	SRF I	Detects an S/RF meter signal
13	RA1	PTT	Detects a PTT signal
14	R30	DIAL-UP	DIAL up input
15	R31	DIAL-DN	DIAL down input
16	R32	DIAL-CK	DIAL U/D clock input
17	R33	BACK-UP	Back up request input
18	R50	SQLS	SQL input
19	R51	———	Not used
20	R52	UNLK	Un-lock input
21	R53	———	Not used
22	R60	STBCC	Common control output
23	R61	STBOT	TSQL unit control output
24	R62	STBOD	DTMF unit control output
25	R63	CE	LCD drive select output
26	———	VCC	Connected to 5 V input
27	R40	SCK	Serial clock output
28	R41	SI	Serial data input
29	R42	SO	Serial data output
30	R43	P/S	Control signal output
31	R70	MIC-U/D	MIC up input
32	R71	MIC-CK	MIC clock input
33	R72	MW	SW input
34	R73	MONI	SW input
35	R80	SET	SW input
36	R81	H/L	SW input
37	R82	PGR/CS	SW input
38	R83	T/TSQL	SW input
39	R90	DIM	SW input
40	R91	PRIO	SW input
41	R92	M/CALL	SW input
42	R93	V/M	SW input
43	———	RESET	Reset signal input
44	TEST	———	Not used
45	OSC1	MPU OSC	OSC input
46	OSC2	MPU OSC	OSC output
47	———	GND	Connected to GND
48	D0	———	Not used
49	D1	STB PL	PLL strobe output
50	D2	S-TONE	Tone oscillation (88.5 kHz) output

51~64 are not used.

SECTION 5 MECHANICAL PARTS AND DISASSEMBLY

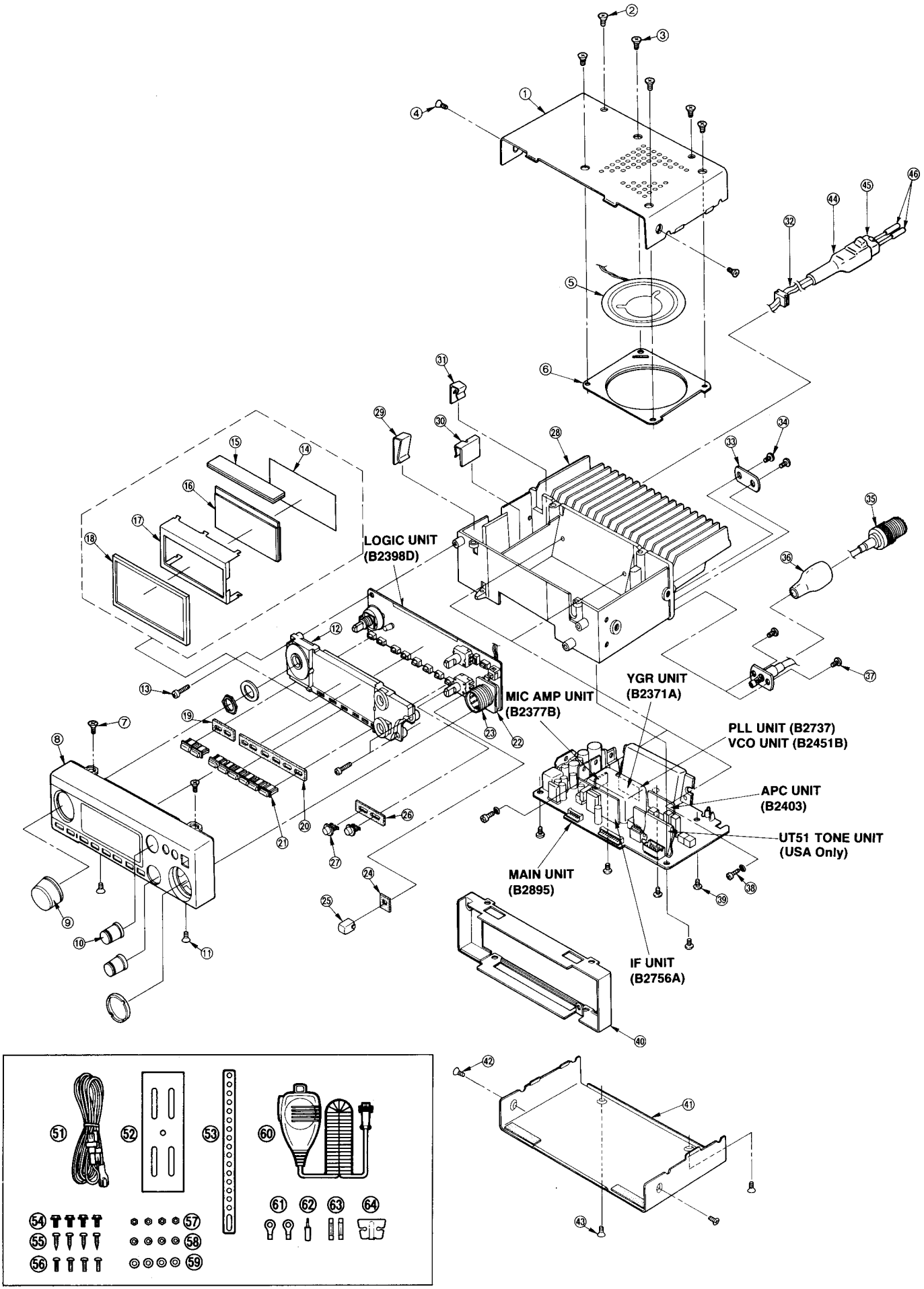
5-1 TRANSCEIVER

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8110004080	Top cover (IC-229A/E) (incl. ③,⑤,⑥)	1
	8110004040	Top cover (IC-229H) (incl. ③,⑤,⑥)	1
②	8810006010	Screw FH M3×5 BS	2
③	8810006230	Screw FH M2.6×4 ZK	4
④	8810006010	Screw FH M3×5 BS	2
⑤	2510000470	Speaker EAS-6P100SA	1
⑥	8930017810	833 Speaker holder	1
⑦	8810002160	Screw FH M3×5	2
⑧	8210005650	Front panel (IC-229A)	1
	8210005660	Front panel (IC-229E)	1
	8210005670	Front panel (IC-229H)	1
⑨	8610006500	Knob N154 [MAIN DIAL]	1
⑩	8610006490	Knob N153 [VOL, SQL]	2
⑪	8810002160	Screw FH M3×5	2
⑫	8010009740	LCD reflector	1
⑬	8810000260	Screw PH M3×12	3
⑭	8930017500	LCD filter	1
⑮	8930017730	LCD contact strip SRCN-833-W	1
⑯	5030000560	LCD LD-BU9496E	1
⑰	8930017760	LCD holder	1
⑱	8930017690	LCD rubber	1
⑲	8930018350	Switch sponge (B)	1
⑳	8930018340	Switch sponge (A)	1
㉑	8610006520	Button K150	8
㉒	8930012430	543 Mic spacer	1
㉓	6510000290	Mic connector 8S-S-E	1
㉔	8310019961	Switch sheet-1	1
㉕	8610006530	Button K151	1
㉖	8930017770	Switch sponge	1
㉗	8610006510	Button K152	2
㉘	8010009790	869 chassis (IC-229A/E)	1
	8010009830	835 chassis (IC-229H)	1
㉙	8930017940	AF-IC slider	1
㉚	8930018510	IC-slider	1
㉛	8930017950	TR-slider	1
㉜	8900002720	Power supply cable OPC-251	1
㉝	8510006440	ANT plate	1
㉞	8810001900	Screw FH M3×5 Ni BS	2
㉟	8900002450	ANT cable OPC-223	1
㊱	6950000040	M-type cap (Black)	1
㊲	8810001900	Screw FH M3×5 Ni BS	2
㊳	8810003250	Screw PH M3×8 Ni	2
㊴	8810001350	Screw PH M3×6	5
㊵	8510006450	LOGIC sheild	1
㊶	8110003880	Bottom cover	1
㊷	8810006010	Screw FH M3×5 BS	2
㊸	8810006010	Screw FH M3×5 BS	2
㊹	6950000180	Connector cover (included in ㉜)	2
㊺	6510004780	Connector LR-02-1V (included in ㉜)	1
㊻	6510005150	Pin SLM61T-2.0 (included in ㉜)	2

Screw abbreviations PH: Pan head FH: Flat head B0: Self-tapping screw ZK: Black Ni: Nickel

5-2 ACCESSORIES

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
㊿①	Optional product	Power cable OPC-044B (IC-229A/E)	1
	Optional product	Power cable OPC-025A (IC-229H)	1
㊿②	8010005180	Mounting bracket (B)	1
㊿③	8010004060	Mounting support bracket	1
㊿④	8820000530	Mounting bolt	4
㊿⑤	8810000950	Screw PH A M5×16	4
㊿⑥	8810000470	Screw PH M5×12 (+ −)	4
㊿⑦	8830000120	Nut M5	4
㊿⑧	8850000440	Spring washer N5 Ni	4
㊿⑨	8850000150	Flat washer M5 Ni BS	4
㊿⑩	Optional product	Microphone HM56 (USA)	1
	Optional product	Microphone HM58 (AUS, SEA)	1
	Optional product	Microphone HM59 (EUR, ITA)	1
㊿①	6510003070	Cable lug R5.5-8	2
㊿②	5610000020	AP313 3.5φ CS plug	1
㊿③	5210000120	Fuse FGP 15 A (IC-229A/E)	2
	5210000080	Fuse FGP 20 A (IC-229H)	2
㊿④	8930007300	Microphone hanger	1


LOGIC UNIT
(B2398D)
MIC AMP UNIT
(B2377B)
YGR UNIT
(B2371A)
PLL UNIT (B2737)
VCO UNIT (B2451B)
APC UNIT
(B2403)
UT51 TONE UNIT
(USA Only)
MAIN UNIT
(B2895)
IF UNIT
(B2756A)

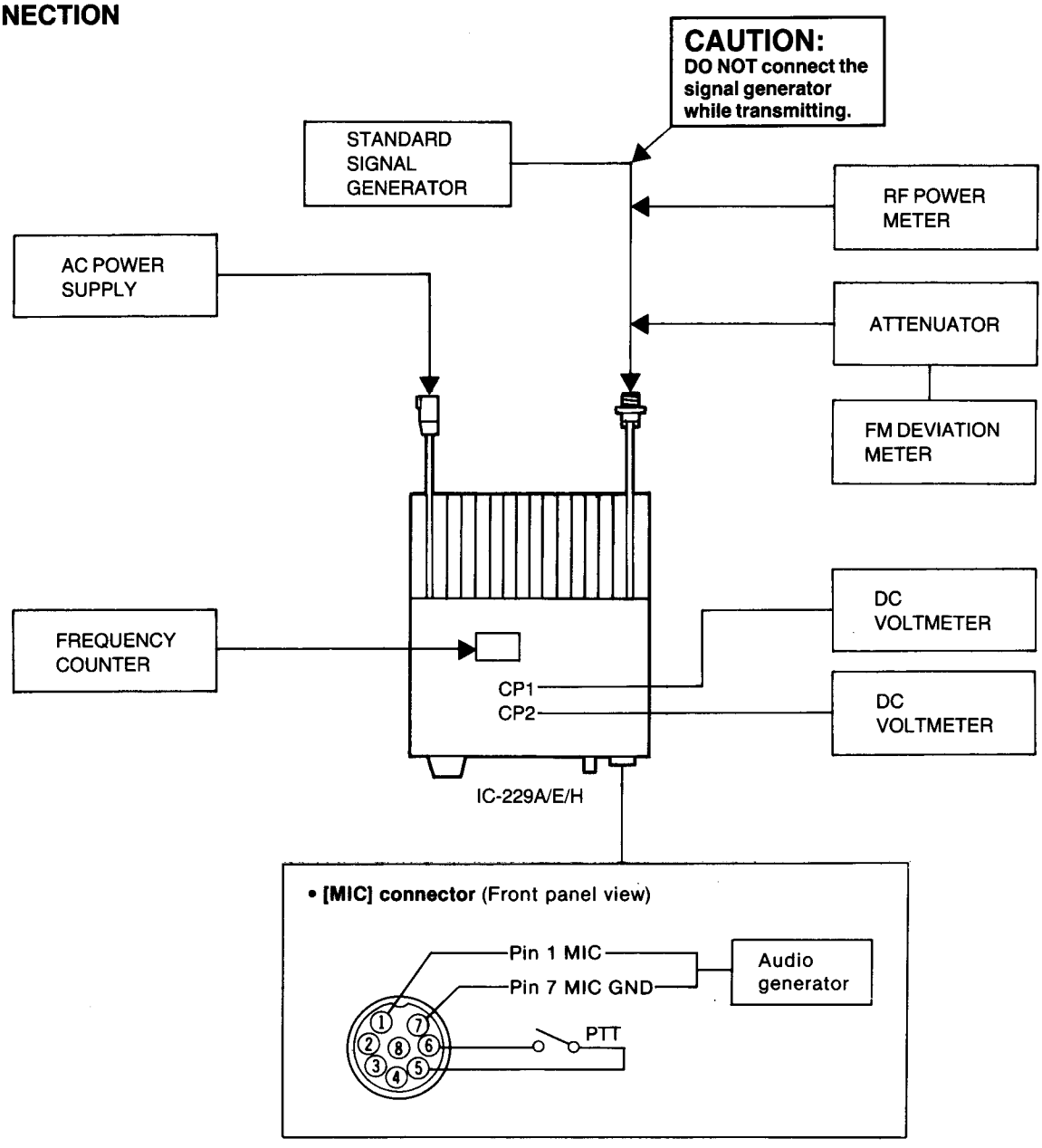
SECTION 6 ADJUSTMENT PROCEDURES

6-1 PREPARATION BEFORE SERVICING

■ REQUIRED TEST EQUIPMENT

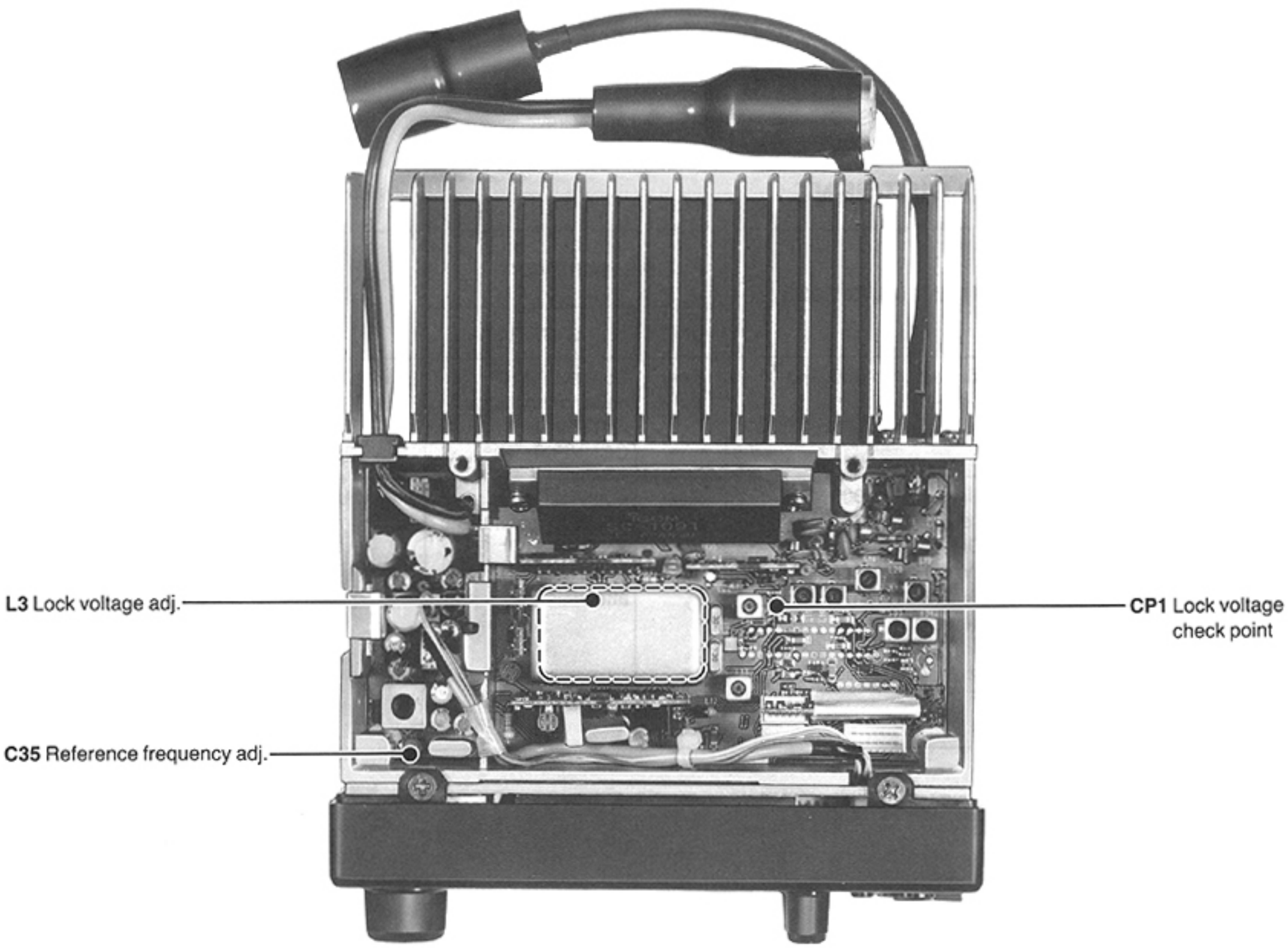
EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
AC power supply	Output voltage : 13.8 V DC±15% Current capacity : 15 A or more	Attenuator	Attenuation : 40 dB or 50 dB Capacity : At least 50 W
RF power meter	Terminated type Measuring range : 100 W Frequency range : 150 MHz Input impedance : 50Ω SWR : 1.2:1 or better	Standard signal generator	Frequency range : 0.1~180 MHz Output level : −127~−17 dBm (0.1 μV~ 32 mV)
		AF generator	Frequency range : 200~ 2000 Hz Output range : 2~200 mV
Frequency counter	Frequency minimum : 150 MHz Frequency accuracy : 1 ppm or better Sensitivity : 100 mV or better	FM deviation meter	Frequency minimum : 150 MHz Measuring range : 0~±10 kHz
DC voltmeter	Input impedance : 50 kΩ/V DC or better		

■ CONNECTION



6-2 PLL ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1	•Frequency display: 146.000 MHz	MAIN	Connect the DC voltmeter to CP1.	8 V	VCO	L3
REFERENCE FREQUENCY	1	•Frequency display: 145.000 MHz •Transmitting	MAIN	Loosely couple the frequency counter to the ANTENNA CONNECTOR.	145.000 MHz	MAIN	C35



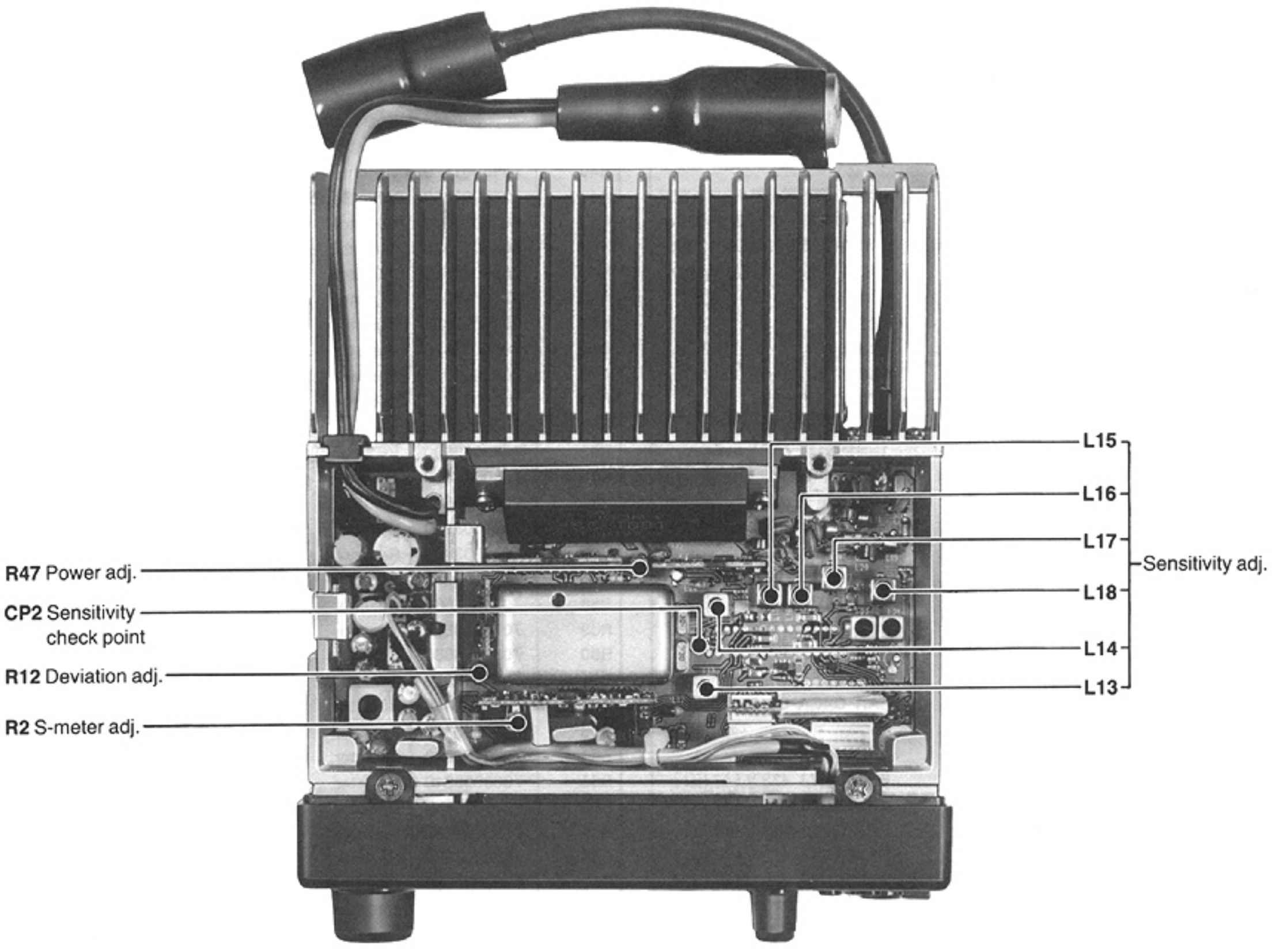
6-3 RECEIVER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1	•Frequency display: 145.000 MHz •Set the signal generator; Level: 3.16 μV* (−97 dBm) Dev.: ±3.5 kHz Mod.: 1 kHz •R2: Max. counterclockwise •Receiving	MAIN	Connect the DC voltmeter to the CP2.	Maximum	MAIN	Adjust in sequence L18 L17 L16 L15
	2	•Set the signal generator; Level: 3.16 μV* (−97 dBm) Dev.: ±7 kHz					L14 L13
		NOTE: Adjust the signal generator output each time until the DC voltmeter is at 30% on the full scale reading of the lowest range.					
S-METER	1	•Frequency display: 145.000 MHz •Set the signal generator; Level: 1 μV* (−107 dBm) Dev.: ±3.5 kHz Mod.: 1 kHz •Receiving	Function display	S/RF indicator	S3 (4 dots) 	IF	R2

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

6-4 TRANSMITTER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1	•Frequency display: 145.000 MHz •Output power: HIGH •Transmitting	Rear panel	Connect the RF power meter to the ANTENNA CONNECTOR.	25 W (IC-229A/E) 50 W (IC-229H)	MAIN	R47
DEVIATION	1	•Frequency display: 146.000 MHz •Apply an AF signal to the MIC CONNECTOR. Level: 20 mV/1 kHz (except USA) 65 mV/1 kHz (USA) •Set the FM deviation meter; HPF: 50 Hz LPF: 20 kHz •TONE: OFF •Transmitting	Rear panel	Connect the FM deviation meter to the ANTENNA CONNECTOR via the attenuator.	±4.8 kHz	MAIN	R12


L15
L16
L17
L18
L14
L13
Sensitivity adj.
R47 Power adj.
CP2 Sensitivity check point
R12 Deviation adj.
R2 S-meter adj.

SECTION 7 PARTS LIST

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130004190	IC	LC7582A
IC2	1110001500	IC	S-8054ALR-LN-T1
IC3	1120000430	IC	LA6393M-TP-T1
IC4	1140001460	IC	HD404019A38FS
IC5	1130003920	IC	TC4S69F (TE85R)
Q1	1590000410	Transistor	RN2404 (TE85R)
Q2	1530000160	Transistor	2SC2712-Y (TE85R)
Q3	1510000110	Transistor	2SA1162-Y (TE85R)
Q4	1530000160	Transistor	2SC2712-Y (TE85R)
Q5	1530000160	Transistor	2SC2712-Y (TE85R)
Q6	1530000160	Transistor	2SC2712-Y (TE85R)
Q7	1530001950	Transistor	2SC2712-GR (TE85R)
D1	1750000030	Diode	1SS187 (TE85R) IC-229A/H (U.S.A. SEA)
	1750000040	Diode	1SS190 (TE85R) IC-229A/H (AUS)
	1750000010	Diode	1SS181 (TE85R) IC-229E/H (EUR)
D2	1750000030	Diode	1SS187 (TE85R) IC-229E/H (ITA)
D3	1710000600	Diode	1SS254
D5	1710000600	Diode	1SS254
D6	1710000600	Diode	1SS254
D9	1750000030	Diode	1SS187 (TE85R)
D10	1750000010	Diode	1SS181 (TE85R)
D11	1750000050	Diode	1SS193 (TE85R)
D12	1750000050	Diode	1SS193 (TE85R)
D13	1730000840	Zener	RD9.1M-T2B2
D14	1750000050	Diode	1SS193 (TE85R)
DS1	5030000560	LCD	LD-BU9496E (E-5141-4)
DS2	5080000150	LED	HRS-7219A
DS3	5080000150	LED	HRS-7219A
X1	6060000230	Crystal	FAR-C4CA-04194000-M01
R1	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R2	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R3	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R4	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R5	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R6	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R7	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R8	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R9	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R10	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R11	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R12	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R13	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R14	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R15	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R16	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R17	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R18	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R19	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R20	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R21	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R22	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R23	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R24	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R25	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R26	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R27	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R28	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R29	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R30	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R31	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R32	7030003650	Resistor	ERJ3GEYJ 563 V (56 kΩ)
R33	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R34	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R35	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R36	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R37	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R38	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R39	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R40	7210001870	Variable Resistor	EVU-F2AF20A14 (10KA)
R41	7210001860	Variable Resistor	EVU-F2AF20B14 (10KB)
R43	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R44	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R45	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R46	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R47	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R48	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R49	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R50	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R51	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R52	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R53	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R54	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R55	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R56	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R57	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R58	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R59	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R60	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R61	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R62	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R63	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R64	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R65	7030003840	Resistor	ERJ3GEYJ 225 V (2.2 MΩ)
R66	7030003840	Resistor	ERJ3GEYJ 225 V (2.2 MΩ)
R67	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R68	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R69	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R70	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R71	7030000140	Resistor	MCR10EZH 10 Ω (100)
R72	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R73	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R74	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R75	7030003350	Resistor	ERJ3GEYJ 181 V (180 Ω)
R76	7030003350	Resistor	ERJ3GEYJ 181 V (180 Ω)
R77	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
C1	4030006830	Ceramic	C1608 SL 1H 331J-T-A
C2	4510001320	Electrolytic	6R3 MS5 47 μF
C3	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C4	4550000270	Tantalum	TESVA 1E 474M1-8L
C5	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C6	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C7	4510001320	Electrolytic	6R3 MS5 47 μF
C8	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C10	4030004760	Ceramic	C2012 JF 1E 104Z-T-A

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C11	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C12	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C13	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C14	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C15	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C16	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C17	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C18	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C19	4030006870	Ceramic	C1608 JB 1H 222K-T-A
C20	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C21	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C22	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C23	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C24	4030006710	Ceramic	C1608 SL 1H 470J-T-A
DS1	5030000560	LCD	LD-BU9496E (E-5141-4)
DS2	5080000150	LED	HRS-7219A
DS3	5080000150	LED	HRS-7219A
S1	2250000050	Switch	EVQ-WQGF15 24B
S2	2230000550	Switch	SPPH23079A
S3	2260000580	Switch	SKHLAD035A
S4	2260000580	Switch	SKHLAD035A
S5	2260000580	Switch	SKHLAD035A
S6	2260000580	Switch	SKHLAD035A
S7	2260000580	Switch	SKHLAD035A
S8	2260000580	Switch	SKHLAD035A
S9	2260000580	Switch	SKHLAD035A
S10	2260000580	Switch	SKHLAD035A
S11	2260000580	Switch	SKHLAD035A
S12	2260000580	Switch	SKHLAD035A
BT1	3020000020	Lithium Battery	BR2032-1T2
EP2	8930017730	LCD contact strip	SRCN-833-W
EP1	0910025303	P.C. Board	B 2398C

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1150000010	IC	SC1019 (IC-229A/E)
	1150000760	IC	SC1091 (IC-229H)
IC2	1110001270	IC	BA6161M
IC3	1110000490	IC	AN6541
IC4	1110002020	IC	TA7805S
IC5	1130000830	IC	μ PD4094BG-T1
IC6	1130000830	IC	μ PD4094BG-T1
IC7	1110000890	IC	μ PC1241H
IC8	1130004670	IC	BU4021BF-T1
Q1	1590000520	FET	2SJ106-GR (TE85R)
Q2	1590000520	FET	2SJ106-GR (TE85R)
Q3	1590000420	Transistor	RN1404 (TE85R)
Q5	1530002030	Transistor	2SC3772-3-TA
Q6	1530002030	Transistor	2SC3772-3-TA
Q8	1530002050	Transistor	2SC3661-TA
Q9	1520000380	Transistor	2SB1143 S (IC-229A/E)
	1520000390	Transistor	2SB1135 R (IC-229H)
Q10	1520000200	Transistor	2SB798-T2 DK

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q11	1530000160	Transistor	2SC2712-Y (TE85R)
Q12	1590000420	Transistor	RN1404 (TE85R)
Q13	1590000420	Transistor	RN1404 (TE85R)
Q14	1590000420	Transistor	RN1404 (TE85R)
Q15	1510000700	Transistor	2SA1736 (TE12R)
Q16	1590001000	Transistor	RN2427 (TE85R)
Q17	1530002030	Transistor	2SC3772-3-TA
Q18	1580000360	FET	3SK177-T2B U73
Q19	1580000360	FET	3SK177-T2B U73
Q21	1530000160	Transistor	2SC2712-Y (TE85R)
Q22	1520000200	Transistor	2SB798-T2 DK
Q23	1530000160	Transistor	2SC2712-Y (TE85R)
Q24	1590000520	FET	2SJ106-GR (TE85R)
Q31	1590000460	Transistor	RN1402 (TE85R)
Q32	1590000980	Transistor	DTB123EK T147
Q33	1530002550	Transistor	2SC3326-B (TE85R)
Q34	1590000690	Transistor	IMD6 T108
D1	1790000450	Diode	MA862 (TX)
D2	1790000450	Diode	MA862 (TX)
D3	1790000490	Diode	HSM88AS-TR
D4	1790000490	Diode	HSM88AS-TR
D5	1710000290	Diode	MI308 (IC-229A/E)
	1710000310	Diode	MI407 (IC-229H)
D6	1750000050	Diode	1SS193 (TE85R)
D7	1750000050	Diode	1SS193 (TE85R)
D8	1750000040	Diode	1SS190 (TE85R)
D9	1790000700	Diode	DSA3A1
D10	1750000050	Diode	1SS193 (TE85R)
D11	1790000450	Diode	MA862 (TX)
D12	1720000220	Varicap	1SV166-T2B
D13	1720000220	Varicap	1SV166-T2B
D14	1720000220	Varicap	1SV166-T2B
D15	1720000220	Varicap	1SV166-T2B
D16	1790000450	Diode	MA862 (TX)
D17	1710000290	Diode	MI308
D18	1710000290	Diode	MI308
D19	1750000020	Diode	1SS184 (TE85R)
D22	1750000010	Diode	1SS181 (TE85R)
D23	1750000020	Diode	1SS184 (TE85R)
D26	1750000070	Diode	1SS226 (TE85R)
D28	1750000040	Diode	1SS190 (TE85R)
X1	6050001990	Crystal	CR-69
FI1	2010000580	Filter	17M15B (FL-78)
L2	6200000770	Coil	LQN 2A 68NM
L3	6200000130	Coil	LQN 2A 47NM
L4	6180002650	Coil	RCR-875D-472K
L5	6200000760	Coil	LQN 2A 56NM
L6	6110001540	Coil	LA-234
L7	6170000230	Coil	LW-25
L8	6110001600	Coil	LA-243 (IC-229A/E)
	6110001540	Coil	LA-234 (IC-229H)
L9	6110001550	Coil	LA-235 (IC-229A/E)
	6110001540	Coil	LA-234 (IC-229H)
L10	6170000230	Coil	LW-25
L11	6110001600	Coil	LA-243 (IC-229A/E)
	6110001540	Coil	LA-234 (IC-229H)
L12	6180000900	Coil	LAL 03NA 101K
L13	6150003150	Coil	LS-331
L14	6150003150	Coil	LS-331
L15	6150002810	Coil	LS-291

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
L16	6150002810	Coil	LS-291
L17	6150002810	Coil	LS-291
L18	6150002810	Coil	LS-291
L19	6110001550	Coil	LA-235
L20	6110001550	Coil	LA-235
L24	6180001620	Coil	LAL 02KR R22K
R1	7030003570	Resistor	ERJ3GEYJ 123 V (12 kΩ) IC-229A/H (U.S.A)
	7030003630	Resistor	ERJ3GEYJ 393 V (39 kΩ) IC-229A/E/H (AUS. EUR. ITA SEA)
R2	7030003570	Resistor	ERJ3GEYJ 123 V (12 kΩ)
R4	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R5	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ) IC-229A/H (U.S.A)
	7030003470	Resistor	ERJ3GEYJ 182 V (1.8 kΩ) IC-229A/E/H (AUR. EUR. ITA. SEA)
R6	7030003450	Resistor	ERJ3GEYJ 122 V (1.2 kΩ) IC-229A/H (U.S.A)
	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ) IC-229A/E/H (AUR. EUR. ITA. SEA)
R7	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R8	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R9	7030003710	Resistor	ERJ3GEYJ 184 V (180 kΩ)
R10	7030003570	Resistor	ERJ3GEYJ 123 V (12 kΩ)
R11	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R12	4610001230	Trimmer	EVMLGGA00B14 (103)
R18	7030003500	Resistor	ERJ3GEYJ 332 V (3.3 kΩ)
R19	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R20	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R21	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R22	7030001010	Resistor	MCR50JZHJ 10 Ω (100)
R25	7030001190	Resistor	MCR50JZHJ 330 Ω (331) (IC-229A/E)
	7030001170	Resistor	MCR50JZHJ 220 Ω (221) (IC-229H)
R26	7030000450	Resistor	MCR10EZHJ 3.9 kΩ (392) (IC-229A/E ONLY)
R27	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω) (IC-229A/E)
	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ) (IC-229H)
R28	7030000450	Resistor	MCR10EZHJ 3.9 kΩ (392) (IC-229A/E ONLY)
R29	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω) (IC-229A/E)
	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ) (IC-229H)
R30	7010004720	Resistor	R50XJ 100 Ω
R31	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R32	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R33	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R34	7030003500	Resistor	ERJ3GEYJ 332 V (3.3 kΩ)
R35	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R36	7030000300	Resistor	MCR10EZHJ 220 Ω (221)
R37	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R38	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R39	7030003530	Resistor	ERJ3GEYJ 562 V (5.6 kΩ)
R41	7030000390	Resistor	MCR10EZHJ 1.2 kΩ (122)
R42	7030000390	Resistor	MCR10EZHJ 1.2 kΩ (122)
R43	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R44	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R45	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R46	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R47	4610001040	Trimmer	EVMLGGA00B54 (503) (IC-229A/E)
	4610001020	Trimmer	EVMLGGA00B24 (203) (IC-229H)
R48	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ) (IC-229A/E)
	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ) (IC-229H)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R49	7030003460	Resistor	ERJ3GEYJ 152 V (1.5 kΩ) (IC-229A/E)
	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ) (IC-229H)
R50	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ) (IC-229A/E)
	7030003470	Resistor	ERJ3GEYJ 182 V (1.8 kΩ) (IC-229H)
R51	7030003570	Resistor	ERJ3GEYJ 123 V (12 kΩ) (IC-229A/E)
	7030003530	Resistor	ERJ3GEYJ 562 V (5.6 kΩ) (IC-229H)
R52	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ) (IC-229A/E)
	7030003500	Resistor	ERJ3GEYJ 332 V (3.3 kΩ) (IC-229H)
R55	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R56	7010004760	Resistor	R50XJ 270 Ω
R59	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R60	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R61	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R62	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R63	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R64	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R65	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R66	7030003360	Resistor	ERJ3GEYJ 221 V (220 Ω)
R68	7030003500	Resistor	ERJ3GEYJ 332 V (3.3 kΩ)
R69	7030003550	Resistor	ERJ3GEYJ 822 V (8.2 kΩ)
R70	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R71	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R72	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R73	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R74	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R75	7030003200	Resistor	ERJ3GEYJ 100 V (10 Ω)
R76	7030003310	Resistor	ERJ3GEYJ 820 V (82 Ω)
R77	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R78	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R79	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R80	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R81	7030003500	Resistor	ERJ3GEYJ 332 V (3.3 kΩ)
R83	7030003460	Resistor	ERJ3GEYJ 152 V (1.5k Ω)
R84	7030003570	Resistor	ERJ3GEYJ 123 V (12 kΩ)
R90	7030003560	Resistor	ERJ3GEYJ 563 V (56 kΩ)
R91	7030003200	Resistor	ERJ3GEYJ 100 V (10 Ω)
R92	7030003610	Resistor	ERJ3GEYJ 273 V (27 kΩ)
R93	7030003740	Resistor	ERJ3GEYJ 334 V (330 kΩ)
R94	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R95	7030003360	Resistor	ERJ3GEYJ 221 V (220 Ω)
R96	7030003470	Resistor	ERJ3GEYJ 182 V (1.8 kΩ)
R97	7030003450	Resistor	ERJ3GEYJ 122 V (1.2 kΩ)
R98	7030001170	Resistor	MCR50JZHJ 220 Ω (221)
R99	7030003610	Resistor	ERJ3GEYJ 273 V (27 kΩ)
R100	7030003610	Resistor	ERJ3GEYJ 273 V (27 kΩ)
R101	7030003650	Resistor	ERJ3GEYJ 563 V (56 kΩ)
R102	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R104	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R105	7030000380	Resistor	MCR10EZHJ 1k Ω (102)
R106	7030000080	Resistor	MCR10EZHJ 3.3 Ω (3R3)
R107	7030000060	Resistor	MCR10EZHJ 2.2 Ω (2R2)
R108	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R109	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R110	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R111	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R112	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R113	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R114	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R115	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R116	7030003650	Resistor	ERJ3GEYJ 563 V (56 kΩ)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R117	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R118	7030003300	Resistor	ERJ3GEYJ 680 V (68 Ω)
R119	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R120	7030003350	Resistor	ERJ3GEYJ 181 V (180 Ω)
R121	7030003350	Resistor	ERJ3GEYJ 181 V (180 Ω)
R124	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R125	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R128	7030003370	Resistor	ERJ3GEYJ 271 V (270 Ω)
R129	7030003230	Resistor	ERJ3GEYJ 180 V (18 Ω)
R130	7030003370	Resistor	ERJ3GEYJ 271 V (270 Ω)
R131	7030003440	Resistor	ERJ3GEYJ 102 V (1.0 kΩ)
R132	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R133	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R134	7030000300	Resistor	MCR10EZHJ 220 Ω (221)
R135	7520000030	Posistor	PTH59F04BG222TS
C1	4550000530	Tantalum	TESVA 1V 104M1-8L
C2	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C3	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C4	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C5	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C6	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C7	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
C8	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C13	4030006610	Ceramic	C1608 SL 1H 100D-T-A
C14	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C15	4030006620	Ceramic	C1608 SL 1H 120J-T-A
C16	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C17	4020000620	Cylinder	UP050 SL 220J
C18	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C19	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C20	4550000450	Tantalum	TESVC 1C 106M-12L
C22	4550000450	Tantalum	TESVC 1C 106M-12L
C23	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C24	4010003930	Ceramic	DD06 SL 270K 500V (IC-229A/E)
	4010003950	Ceramic	DD06 SL 330K 500V (IC-229H)
C25	4010003930	Ceramic	DD06 SL 270K 500V (IC-229A/E)
	4010003950	Ceramic	DD06 SL 330K 500V (IC-229H)
C26	4010004120	Ceramic	DD07 B 102K 500V
C27	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C28	4010004120	Ceramic	DD07 B 102K 500V
C29	4010003880	Ceramic	DD06 SL 150K 500V (IC-229A/E)
	4010003910	Ceramic	DD06 SL 220K 500V (IC-229H)
C30	4010003940	Ceramic	DD06 SL 300K 500V (IC-229A/E)
	4010003960	Ceramic	DD06 SL 390K 500V (IC-229H)
C31	4010003940	Ceramic	DD06 SL 300K 500V (IC-229A/E)
	4010003960	Ceramic	DD06 SL 390K 500V (IC-229H)
C32	4010003880	Ceramic	DD06 SL 150K 500V (IC-229A/E)
	4010003910	Ceramic	DD06 SL 220K 500V (IC-229H)
C33	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C34	4030007050	Ceramic	C1608 CH 1H 220J-T-A
C35	4610000920	Trimmer	ECRGA010A30
C36	4030007050	Ceramic	C1608 CH 1H 220J-T-A
C37	4030004980	Ceramic	C2012 CH 1H 820J-T-A
C38	4030007090	Ceramic	C1608 CH 1H 470J-T-A

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C39	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
C40	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C41	4030006520	Ceramic	C1608 SL 1H 010C-T-A
C42	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
C43	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C45	4020000100	Cylinder	UP125 SL 220J
C47	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C48	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
C49	4510002710	Electrolytic	10 SS 33 μF
C50	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C51	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C52	4510003150	Electrolytic	35 SS 33 μF
C53	4510002970	Electrolytic	50 SS 4R7 μF
C54	4510003150	Electrolytic	35 SS 33 μF
C55	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C56	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C57	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C58	4510002640	Electrolytic	25 SS 47 μF
C59	4510002640	Electrolytic	25 SS 47 μF
C60	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C61	4510002640	Electrolytic	25 SS 47 μF
C62	4510002640	Electrolytic	25 SS 47 μF
C63	4510002820	Electrolytic	16 SS 1000 μF
C64	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C65	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C66	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C67	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C68	4030006880	Ceramic	C1608 JB 1H 472K-T-A
C69	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C70	4030006730	Ceramic	C1608 SL 1H 680J-T-A
C71	4030006540	Ceramic	C1608 SL 1H 030C-T-A
C72	4030006740	Ceramic	C1608 SL 1H 820J-T-A
C73	4030006730	Ceramic	C1608 SL 1H 680J-T-A
C74	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C75	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C76	4030006580	Ceramic	C1608 SL 1H 070D-T-A
C77	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C78	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C80	4030006570	Ceramic	C1608 SL 1H 060D-T-A
C81	4030006590	Ceramic	C1608 SL 1H 080D-T-A
C82	4030006520	Ceramic	C1608 SL 1H 010C-T-A
C83	4030006510	Ceramic	C1608 SL 1H 0R5C-T-A
C84	4030006610	Ceramic	C1608 SL 1H 100D-T-A
C85	4030006520	Ceramic	C1608 SL 1H 010C-T-A
C86	4030006510	Ceramic	C1608 SL 1H 0R5C-T-A
C87	4030006610	Ceramic	C1608 SL 1H 100D-T-A
C88	4030006520	Ceramic	C1608 SL 1H 010C-T-A
C89	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C90	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C91	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C92	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C93	4030006730	Ceramic	C1608 SL 1H 680J-T-A
C94	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C95	4030006510	Ceramic	C1608 SL 1H 0R5C-T-A
C96	4030006580	Ceramic	C1608 SL 1H 070D-T-A
C97	4030006750	Ceramic	C1608 SL 1H 101J-T-A
C98	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C99	4030006700	Ceramic	C1608 SL 1H 390J-T-A
C100	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C101	4010003890	Ceramic	DD06 SL 180K 500V
C102	4510002970	Electrolytic	50 SS 4R7 μF
C103	4550002980	Tantalum	TEMSVA 1C 225M-8L
C104	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C105	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C106	4030006480	Ceramic	GRM42-6 B 104K 50 PT
C107	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C108	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C109	4030006860	Ceramic	C1608 JB 1H 102K-T-A

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C112	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C113	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C114	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C115	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C116	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C117	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C125	4550000270	Tantalum	TESVA 1E 474M1-8L
C126	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C127	4510002640	Electrolytic	25 SS 47 μF
C128	4510002440	Electrolytic	16 SS 220 μF (8X11)
C129	4510002640	Electrolytic	25 SS 47 μF
C130	4510002440	Electrolytic	16 SS 220 μF (8X11)
C131	4030008760	Ceramic	C2012 X7R 1C 104K-T-A
C132	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C133	4030006890	Ceramic	C1608 JF 1H 103Z-T-A
C134	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C135	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C136	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C137	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C138	4550000450	Tantalum	TESVC 1C 106M-12L
C139	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C140	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C141	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C142	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C148	4030008600	Ceramic	GRM42-6 F 105Z 16 PT
C149	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C150	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C151	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C152	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C153	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C154	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C155	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C156	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C159	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C160	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C161	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C163	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C165	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C166	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C167	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C168	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C169	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C170	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C171	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C173	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C175	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C176	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C178	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C179	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C180	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C181	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C182	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C183	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C184	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C185	4510002870	Electrolytic	25 SS 100 μF (IC-229A/E)
	4030004800	Ceramic	C2012 CH 1H 030C-T-A (IC-229H)
C186	4030004800	Ceramic	C2012 CH 1H 030C-T-A (IC-229H ONLY)
C187	4030007050	Ceramic	C1608 CH 1H 220J-T-A (IC-229H ONLY)
C188	4030007050	Ceramic	C1608 CH 1H 220J-T-A (IC-229H ONLY)
EP1	0910028490	P.C. Board	B 2895

[PLL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130003650	IC	PLL2001S
Q1	1560000360	FET	2SK209-Y (TE85R)
Q2	1560000360	FET	2SK209-Y (TE85R)
Q3	1530000160	Transistor	2SC2712-Y (TE85R)
Q4	1510000110	Transistor	2SA1162-Y (TE85R)
Q5	1530002490	Transistor	2SC3324-GR (TE85R)
Q6	1510000760	Transistor	2SA1312-BL (TE85L)
Q7	1530002490	Transistor	2SC3324-GR (TE85R)
Q8	1510000110	Transistor	2SA1162-Y (TE85R)
D1	1750000050	Diode	1SS193 (TE85R)
L1	6180001300	Coil	LAL 02NA 100K
R1	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R2	7030000310	Resistor	MCR10EZHJ 270 Ω (271)
R3	7030000500	Resistor	MCR10EZHJ 10 kΩ (103)
R4	7030000970	Resistor	MCR10EZHJ 2.2 MΩ (225)
R5	7030000620	Resistor	MCR10EZHJ 100 kΩ (104)
R6	7030000640	Resistor	MCR10EZHJ 150 kΩ (154)
R7	7030000670	Resistor	MCR10EZHJ 270 kΩ (274)
R8	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)
R9	7030000620	Resistor	MCR10EZHJ 100 kΩ (104)
R10	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R11	7030000660	Resistor	MCR10EZHJ 220 kΩ (224)
R12	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R13	7030000590	Resistor	MCR10EZHJ 56 kΩ (563)
R14	7030000660	Resistor	MCR10EZHJ 220 kΩ (224)
R15	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R16	7030000670	Resistor	MCR10EZHJ 270 kΩ (274)
R17	7030000620	Resistor	MCR10EZHJ 100 kΩ (104)
R18	7030000520	Resistor	MCR10EZHJ 15 kΩ (153)
R19	7030000670	Resistor	MCR10EZHJ 270 kΩ (274)
R20	7030000660	Resistor	MCR10EZHJ 220 kΩ (224)
C1	4550000260	Tantalum	DN 1V 100M
C2	4550000260	Tantalum	DN 1V 100M
C3	4550003280	Tantalum	TEMSVB 1V 225M-12 L
C4	4550000530	Tantalum	TESVA 1V 104M1-8L
C5	4510001850	Electrolytic	16 MS5 4R7 μF
C6	4510001470	Electrolytic	50 MS5 1 μF
C7	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C8	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C9	4510001470	Electrolytic	50 MS5 1 μF
C10	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030004720	Ceramic	C2012 JB 1H 102K-T-A
EP1	0910027080	P.C. Board	B 2737

[VCO UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1560000130	FET	2SK125
Q2	1530002030	Transistor	2SC3772-3-TA
Q3	1530002030	Transistor	2SC3772-3-TA
Q4	1530002030	Transistor	2SC3772-3-TA
D1	1720000060	Varicap	1SV50 (1) E

[VCO UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
D2	1720000060	Varicap	1SV50 (1) E
L1	6200000480	Coil	MLF3216A 3R3M-T
L2	6200000480	Coil	MLF3216A 3R3M-T
L3	6130002350	Coil	LB-259
L4	6180001940	Coil	LAL 02NA 3R3K
L5	6110001650	Coil	LA-248
L6	6110001650	Coil	LA-248
R1	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)
R2	7030000180	Resistor	MCR10EZHJ 22 Ω (220)
R3	7030000180	Resistor	MCR10EZHJ 22 Ω (220)
R4	7030000520	Resistor	MCR10EZHJ 15 kΩ (153)
R5	7030000340	Resistor	MCR10EZHJ 470 Ω (471)
R6	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R7	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R8	7030000360	Resistor	MCR10EZHJ 680 Ω (681)
R9	7030000220	Resistor	MCR10EZHJ 47 Ω (470)
R10	7030000160	Resistor	MCR10EZHJ 15 Ω (150)
R11	7030000160	Resistor	MCR10EZHJ 15 Ω (150)
R12	7030000160	Resistor	MCR10EZHJ 15 Ω (150)
R13	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R14	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R15	7030000360	Resistor	MCR10EZHJ 680 Ω (681)
R16	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R17	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R18	7030000360	Resistor	MCR10EZHJ 680 Ω (681)
R19	7030000300	Resistor	MCR10EZHJ 220 Ω (221)
C1	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C2	4510001850	Electrolytic	16 MS5 4R7 μF
C3	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C4	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C6	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C7	4030004380	Ceramic	C2012 SL 1H 010C-T-A
C8	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C9	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C10	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C12	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C14	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C15	4010000120	Ceramic	DD104 SL 100D 50V
C16	4010000460	Ceramic	DD104 B 471K 50V
C18	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C19	4030004720	Ceramic	C2012 JB 1H 102K-T-A
EP1	0910025182	P.C. Board	B 2451B

[APC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110001240	IC	μ PC358G2-T1
Q1	1530000160	Transistor	2SC2712-Y (TE85R)
R1	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R2	7030000580	Resistor	MCR10EZHJ 47 kΩ (473)
R3	7030000440	Resistor	MCR10EZHJ 3.3 kΩ (332)
R4	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)

[APC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R5	7030000500	Resistor	MCR10EZHJ 10 kΩ (103)
R6	7030000660	Resistor	MCR10EZHJ 220 kΩ (224) (IC-229A/E)
	7030000610	Resistor	MCR10EZHJ 82 kΩ (823) (IC-229H)
R7	7030000510	Resistor	MCR10EZHJ 12 kΩ (123)
R8	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R9	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R10	7030000540	Resistor	MCR10EZHJ 22 kΩ (223)
R11	7030000730	Resistor	MCR10EZHJ 820 kΩ (824)
R13	7030000060	Resistor	MCR10EZHJ 2.2 Ω (2R2)
C1	4030004710	Ceramic	C2012 JB 1H 471K-T-A (IC-229A/E ONLY)
C2	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C3	4550000380	Tantalum	DN 1A 100M (IC-229A/E)
	4510001820	Electrolytic	10 MS5 10 μF (IC-229H)
C4	4510001820	Electrolytic	10 MS5 10 μF
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C6	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C7	4030008680	Ceramic	C2012 JF 1C 105Z-T-A
EP1	0910027150	P.C. Board	B 2403

[MIC-AMP UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110000960	IC	NJM4558M (T1)
Q1	1530002690	Transistor	2SC4116-GR (TE85R)
R1	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R2	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R3	7030003280	Resistor	ERJ3GEYJ 470 V (47 Ω)
R4	7030003420	Resistor	ERJ3GEYJ 681 V (680 Ω)
R5	7030003390	Resistor	ERJ3GEYJ 391 V (390 Ω)
R6	7030003740	Resistor	ERJ3GEYJ 334 V (330 kΩ)
R7	7030003750	Resistor	ERJ3GEYJ 394 V (390 kΩ)
R8	7030003790	Resistor	ERJ3GEYJ 824 V (820 kΩ)
R9	7030003710	Resistor	ERJ3GEYJ 184 V (180 kΩ)
R10	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R11	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R12	7030003670	Resistor	ERJ3GEYJ 823 V (82 kΩ)
R13	7030003670	Resistor	ERJ3GEYJ 823 V (82 kΩ)
R14	7030003670	Resistor	ERJ3GEYJ 823 V (82 kΩ)
R15	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
C1	4030001150	Ceramic	GRM40 F 104Z 25PT
C2	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C3	4030008660	Ceramic	C2012 JB 1H 333K-T-A
C4	4550000460	Tantalum	TESVA 1C 105M1-8L
C5	4030007020	Ceramic	C1608 CH 1H 120J-T-A
C6	4030001150	Ceramic	GRM40 F 104Z 25PT
C7	4030008690	Ceramic	C2012 SL 1H 821J-T-A
C8	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C9	4030006740	Ceramic	C1608 SL 1H 820J-T-A
C10	4030008650	Ceramic	C1608 JB 1H 332K-T-A
C11	4030006750	Ceramic	C1608 SL 1H 101J-T-A
C12	4550000660	Tantalum	TESVA 0G 335M1-8L
EP1	0910027122	P.C. Board	B 2377B

[YGR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530002240	Transistor	2SC3775-3-TA
Q2	1530002340	Transistor	2SC2954-T2B
D1	1750000070	Diode	1SS226 (TE85R)
D2	1750000050	Diode	1SS193 (TE85R)
L1	6200000210	Coil	NL 322522T-039M
L2	6200001020	Coil	NL 322522T-082M
L3	6200000200	Coil	NL 322522T-033M
L4	6200001010	Coil	NL 322522T-068M
R1	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R2	7030003450	Resistor	ERJ3GEYJ 122 V (1.2 kΩ)
R3	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R4	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R5	7030003430	Resistor	ERJ3GEYJ 821 V (820 Ω)
R6	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
C1	4030006660	Ceramic	C1608 SL 1H 220J-T-A
C2	4030006540	Ceramic	C1608 SL 1H 030C-T-A
C3	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C4	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C5	4030006610	Ceramic	C1608 SL 1H 100D-T-A
C6	4030006680	Ceramic	C1608 SL 1H 300J-T-A
C7	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C8	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C9	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C10	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C11	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C12	4030006660	Ceramic	C1608 SL 1H 220J-T-A
EP1	0910024841	P.C. Board	B 2371A

[IF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110002200	IC	MC3372MR
Q1	1530002280	Transistor	2SC4081 T107 S
Q2	1530002280	Transistor	2SC4081 T107 S
Q3	1590000830	Transistor	FMG2 T149
Q4	1530002280	Transistor	2SC4081 T107 S
Q5	1590000520	FET	2SJ106-GR (TE85R)
Q6	1530002280	Transistor	2SC4081 T107 S
Q7	1530002280	Transistor	2SC4081 T107 S
D1	1730000490	Zener	RD6.8M-T2B2
D2	1790000490	Diode	HSM88AS-TR
X1	6050003010	Crystal	CR-166
X2	6070000080	Discriminator	CDB455C/6
FI1	2020000550	Ceramic Filter	CFUM455E
R1	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R2	4610001360	Trimmer	EVML1GA00 15 100KB
R4	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)

[IF UNIT]

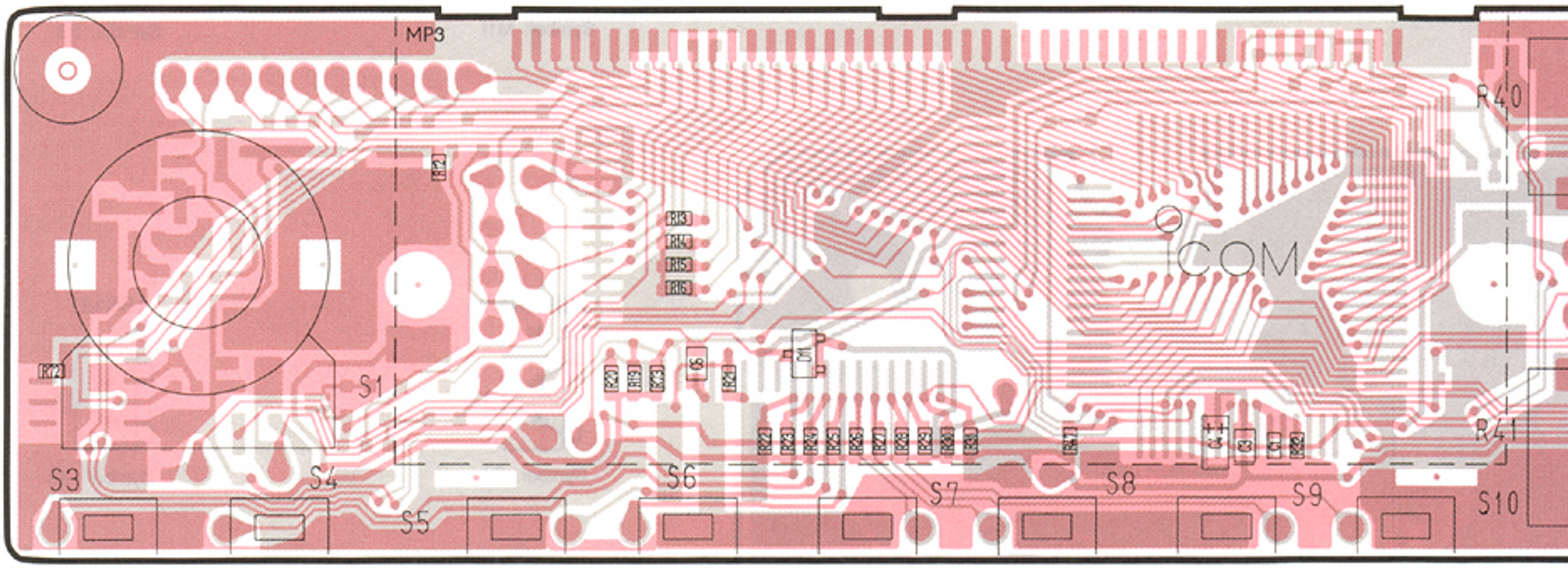
REF. NO.	ORDER NO.	DESCRIPTION	
R5	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R6	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R7	7030003440	Resistor	ERJ3GEYJ 102 V (1.0 kΩ)
R8	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R10	7030003470	Resistor	ERSM30J 182 V (1.8 kΩ)
R13	7030003730	Resistor	ERJ3GEYJ 274 V (270 kΩ)
R14	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R15	7030003630	Resistor	ERJ3GEYJ 393 V (39 kΩ)
R16	7030003710	Resistor	ERJ3GEYJ 184 V (180 kΩ)
R17	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
R19	7030003840	Resistor	ERJ3GEYJ 225 V (2.2 MΩ)
R20	7030003490	Resistor	ERJ3GEYJ 272 V (2.7 kΩ)
R21	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R23	7030003710	Resistor	ERJ3GEYJ 184 V (180 kΩ)
R24	7030003466	Resistor	ERJ3GEYJ 152 V (1.5 kΩ)
R25	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R26	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R27	7030003530	Resistor	ERJ3GEYJ 562 V (5.6 kΩ)
R28	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R29	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R30	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R31	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R32	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R33	7030003630	Resistor	ERJ3GEYJ 393 V (39 kΩ)
R34	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R36	7030003380	Resistor	ERJ3GEYJ 331 V (330 Ω)
R37	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R38	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R39	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R40	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R42	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R43	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
C1	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C2	4510001100	Electrolytic	16 MS7 10 μF
C3	4030006710	Ceramic	C1608 SL 1H 470J-T-A
C4	4030006760	Ceramic	C1608 SL 1H 121J-T-A
C5	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C6	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C7	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C8	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C9	4030006670	Ceramic	C1608 SL 1H 270J-T-A
C10	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C11	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C12	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C13	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C14	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C15	4030006690	Ceramic	C1608 SL 1H 330J-T-A
C16	4030006900	Ceramic	C1608 JB 1E 103K-T-A
C17	4510001150	Electrolytic	50 MS7 R47 μF
C18	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C19	4510001160	Electrolytic	50 MS7 1 μF
C20	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C21	4030006860	Ceramic	C1608 JB 1H 102K-T-A
C22	4030005110	Ceramic	C2012 JB 1E 473K-T-A
C23	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C24	4030006900	Ceramic	C1608 JB 1E 103K-T-A
C25	4030006900	Ceramic	C1608 JB 1E 103K-T-A
C26	4030006470	Ceramic	C2012 JB 1H 153K-T-A
C27	4030008660	Ceramic	C2012 JB 1H 333K-T-A
C28	4030008660	Ceramic	C2012 JB 1H 333K-T-A
C29	4030008670	Ceramic	C2012 JB 1H 562K-T-A
C30	4030008670	Ceramic	C2012 JB 1H 562K-T-A
C31	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C32	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C33	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
EP1	0910027112	P.C. Board	B 2376B

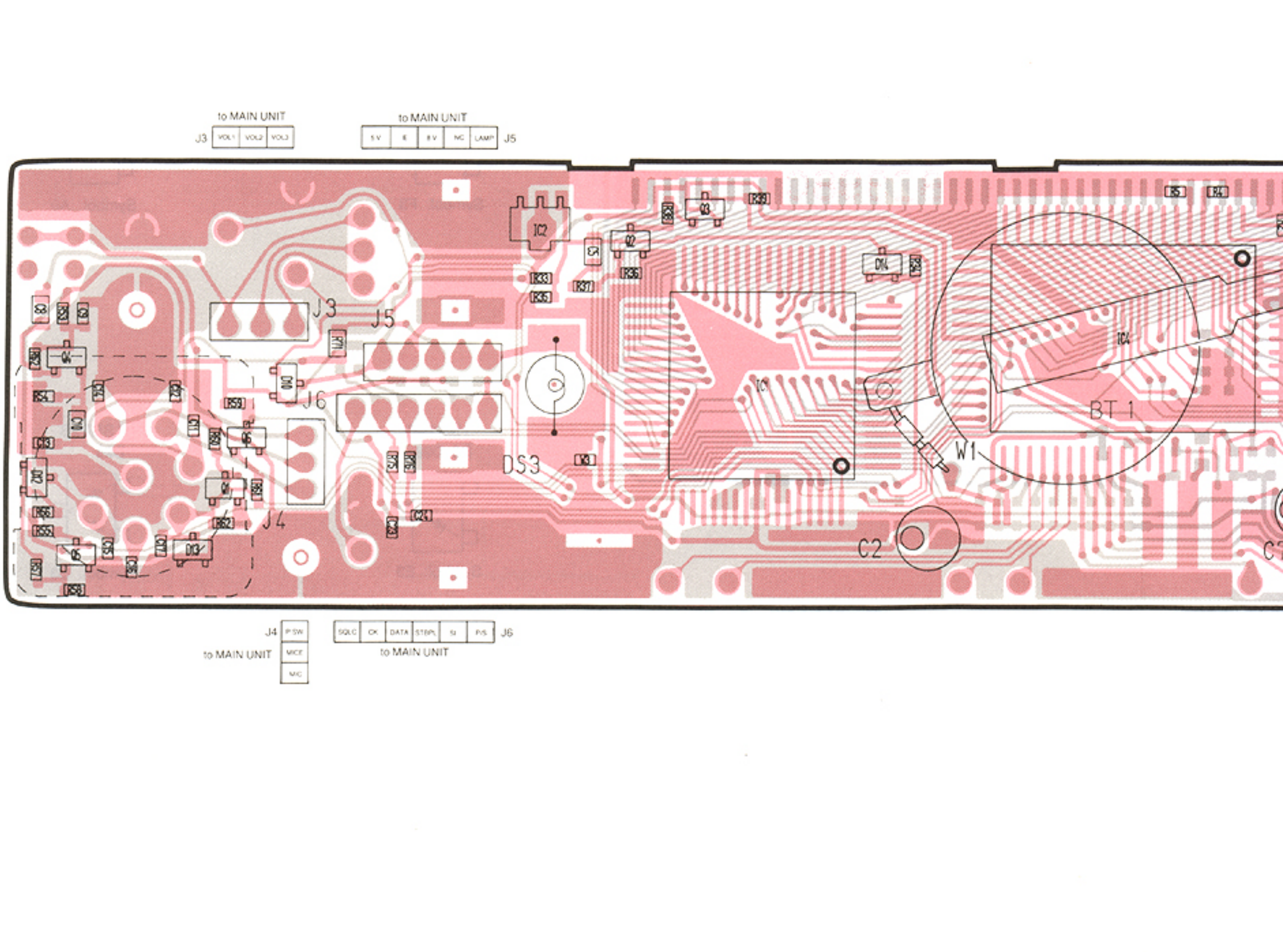
[TONE UNIT IC-229A/H (U.S.A ONLY)]

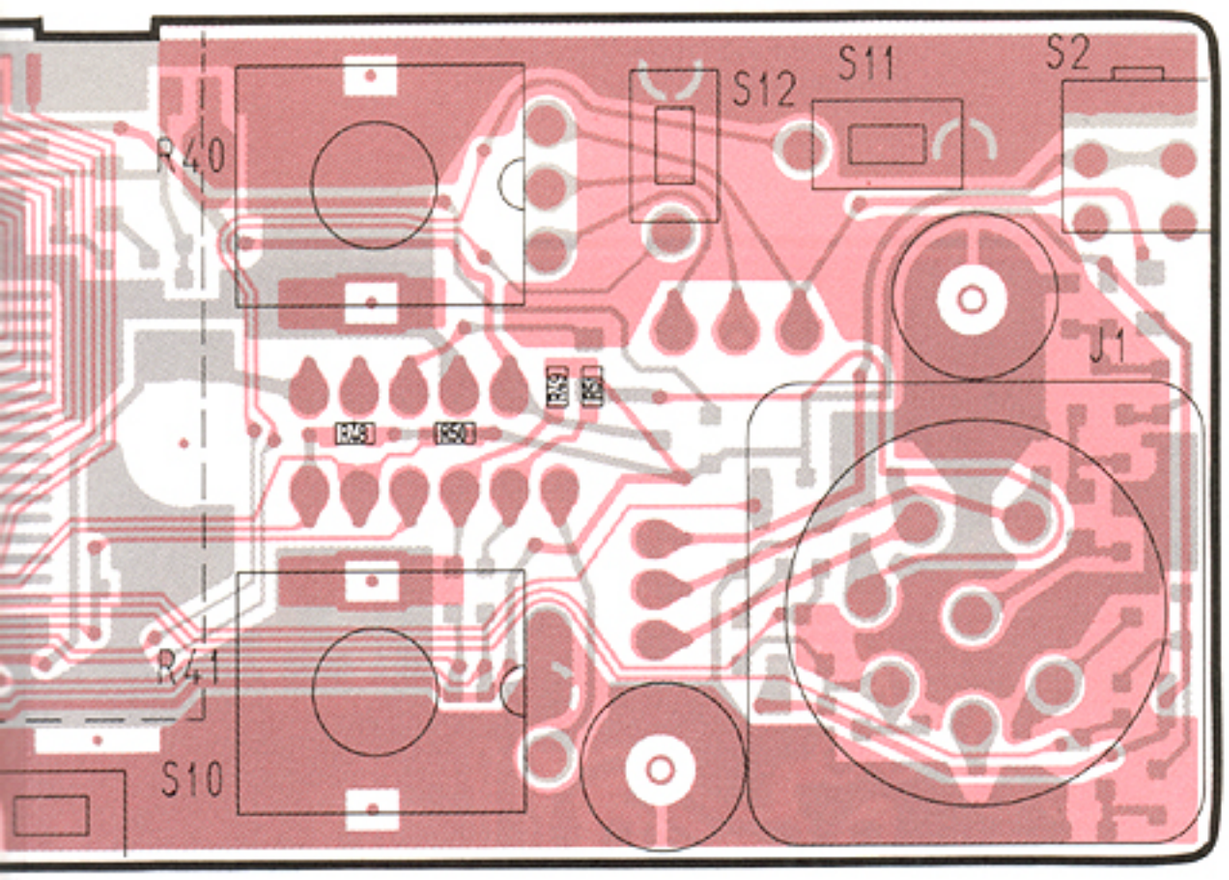
REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130000950	IC	S7116A
IC2	1130000830	IC	μ PD4094BG-T1
Q1	1530002060	Transistor	2SC4081 T107 R
X1	6050006020	Crystal	CR-288
R1	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R2	7030003620	Resistor	ERJ3GEYJ 333 V (33 kΩ)
R3	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R4	7030003460	Resistor	ERJ3GEYJ 152 V (1.5 kΩ)
R5	7310002600	Trimmer	RV-110 (RH03 A3AS4X0AA) 473
C1	4030006850	Ceramic	C1608 JB 1H 471K-T-A
C2	4550002950	Tantalum	TESVA 0J 335M1-8L
C3	4550000530	Tantalum	TESVA 1V 104M1-8L
C4	4030006690	Ceramic	C1608 SL 1H 330J-T-A
C5	4030006690	Ceramic	C1608 SL 1H 330J-T-A
C6	4550000270	Tantalum	TESVA 1E 474M1-8L
EP1	0910020165	P.C. Board	B 1942E

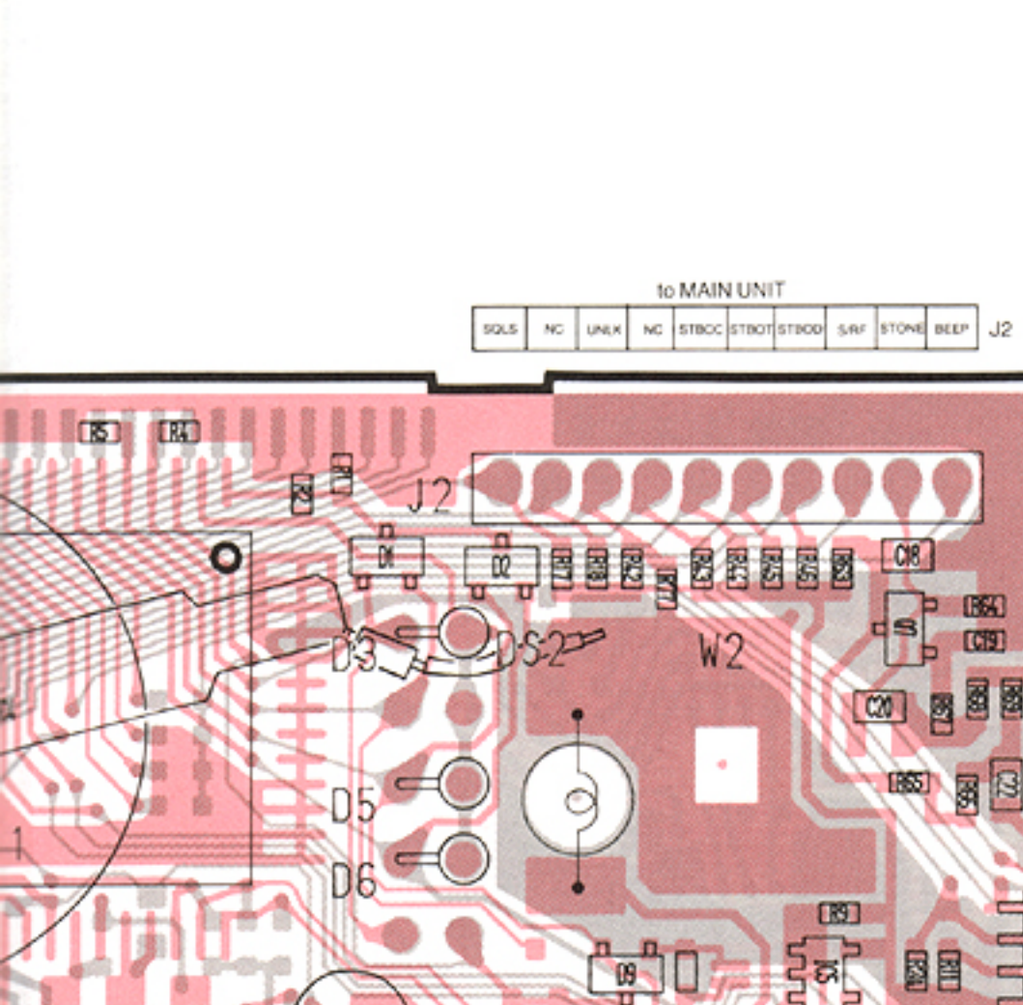
SECTION 8 BOARD LAYOUTS

8-1 LOGIC UNIT

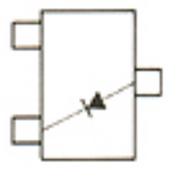






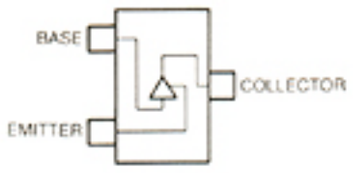


1SS190
D1 (AUS)



Symbol: E3

RN2404
Q1

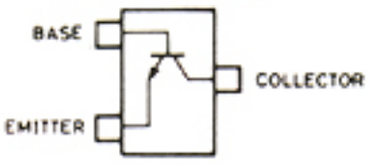


Symbol: YD

1SS187
D1 (USA, SEA), D2, D9

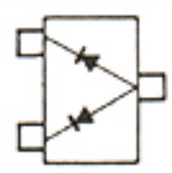
Symbol: D3

2SC2712Y
Q2, Q4, Q5, Q6



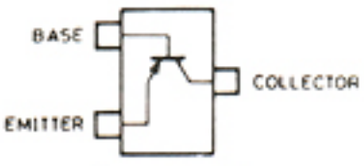
Symbol: LY

1SS181
D1 (EUR), D10



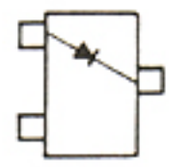
Symbol: A3

2SA1162Y
Q3



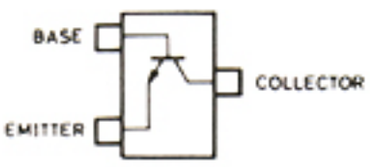
Symbol: SY

1SS193
D11, D12, D14



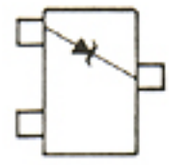
Symbol: F3

2SC2712GR
Q7



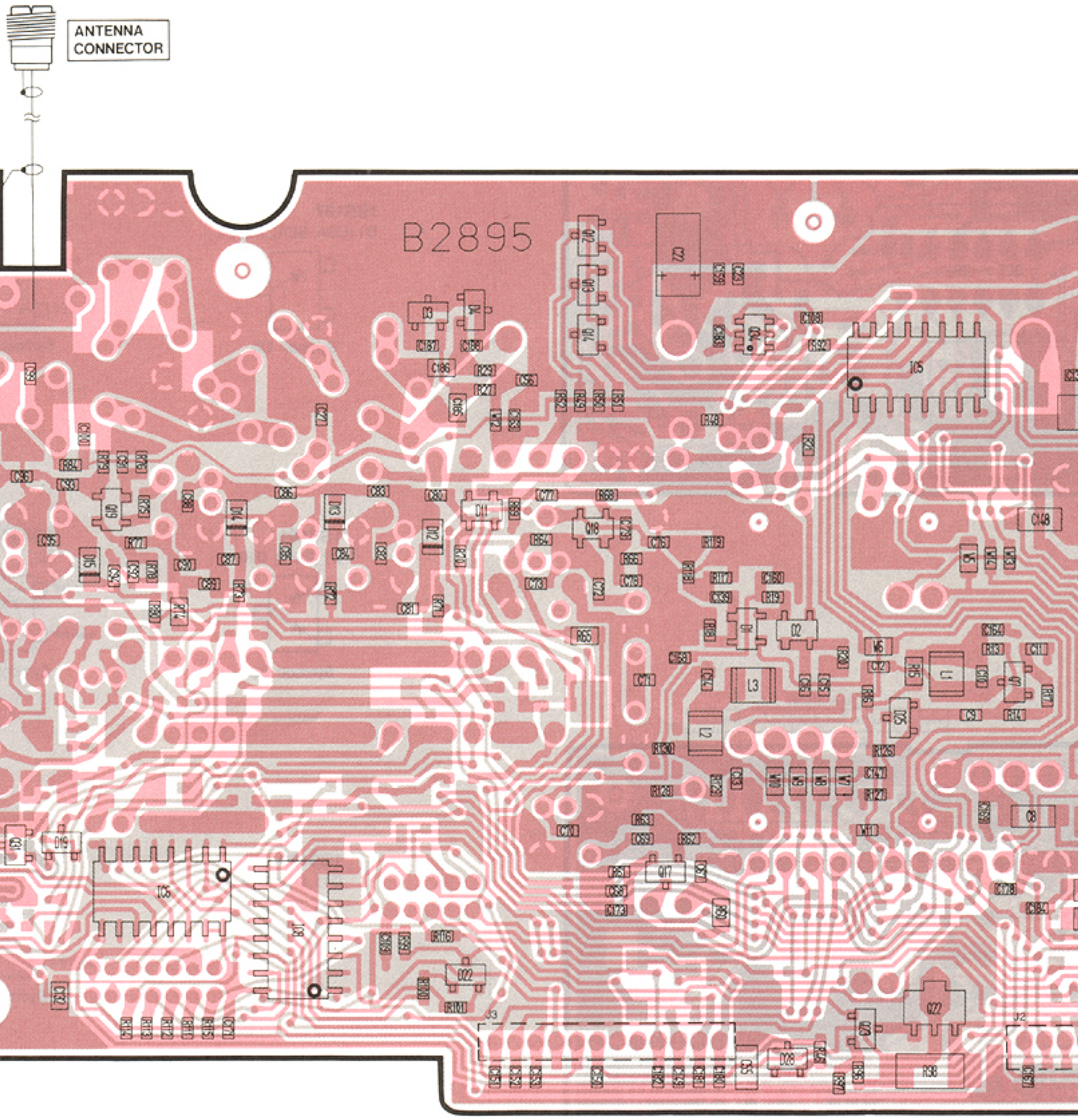
Symbol: LG

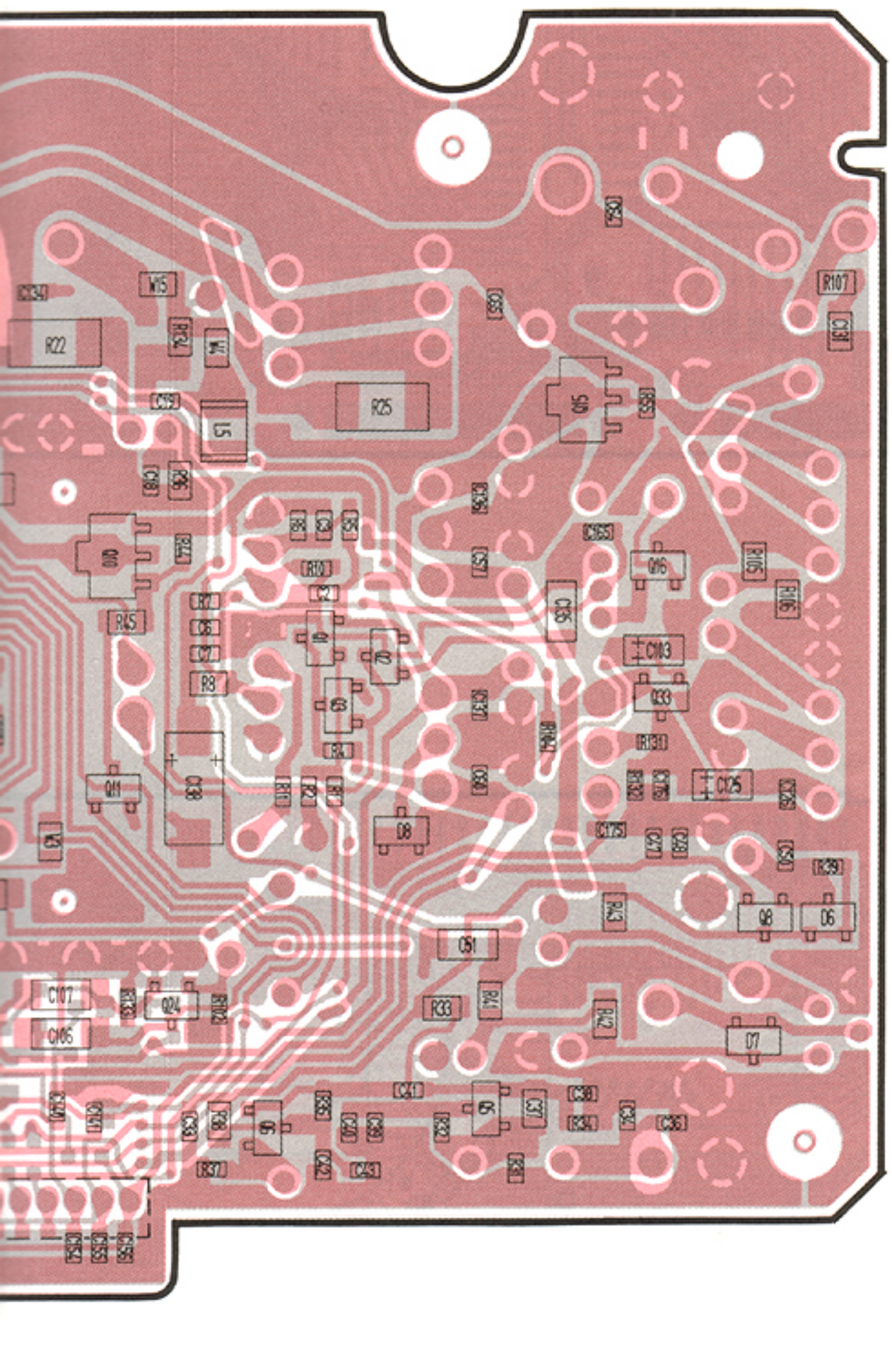
RD9.1MB2
D13



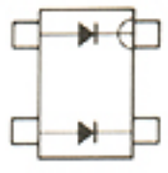
Symbol: 902

8-2 MAIN UNIT



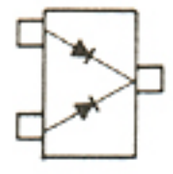


MA862
D1, D2, D11, D16, D21



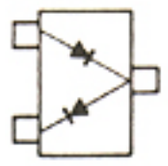
Symbol: M1I

1SS184
D19, D23



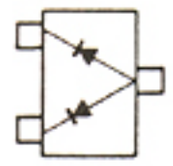
Symbol: B3

HSM88AS
D3, D4



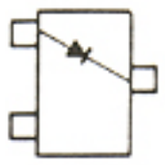
Symbol: C1

1SS181
D22



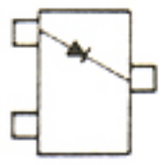
Symbol: A3

1SS193
D6, D7, D10



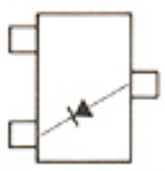
Symbol: F3

1SS153
D24



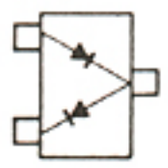
Symbol: A9

1SS190
D8, D28

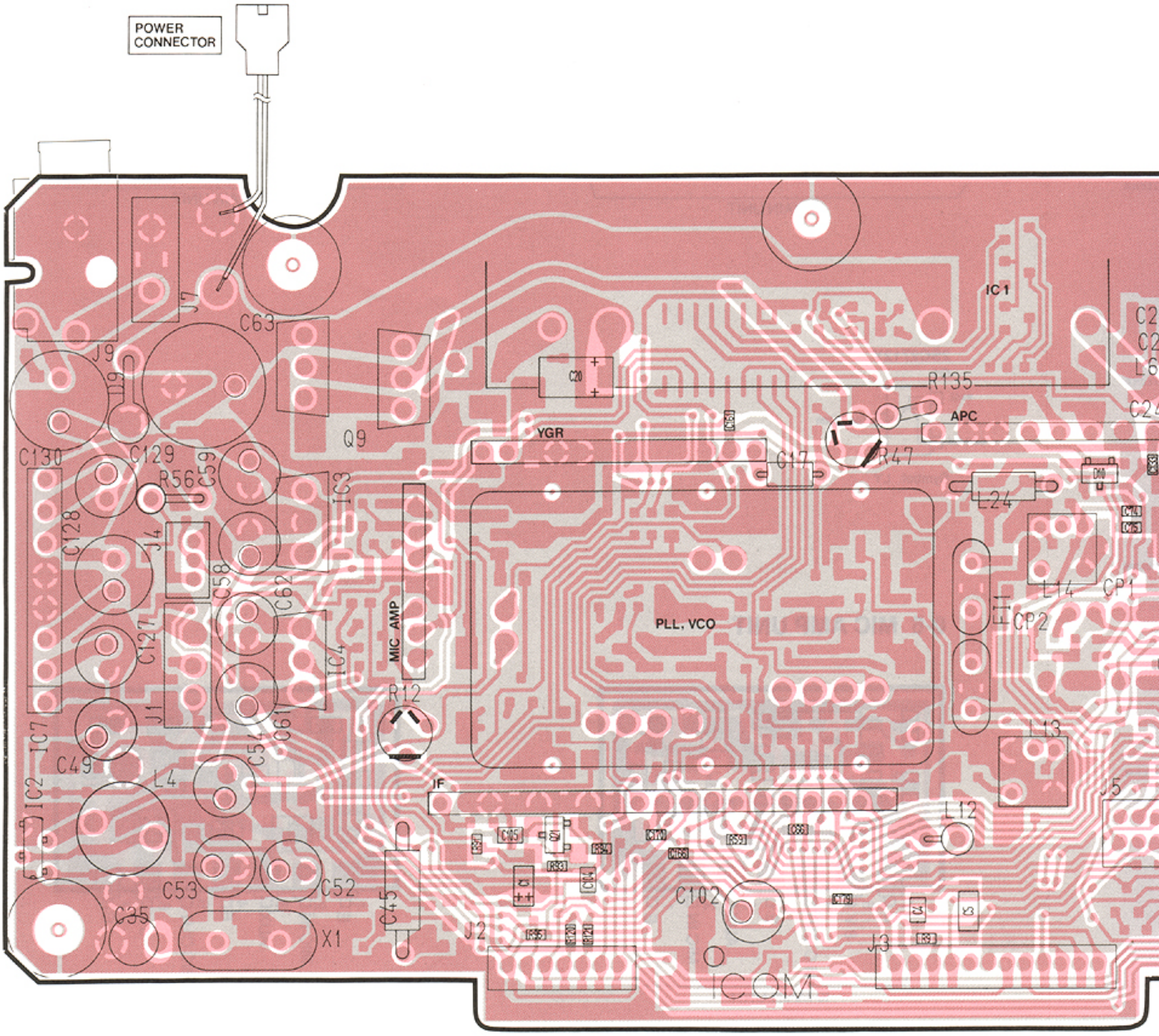


Symbol: E3

1SS226
D26



Symbol: C3



J2

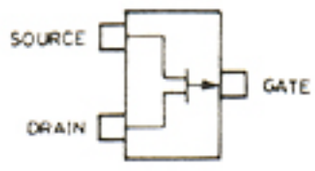
5 V	8 V	UNLK	DATA	CK	STBPL	BEEP

J3

STBCC	SI	STONE	P/S	NC	E

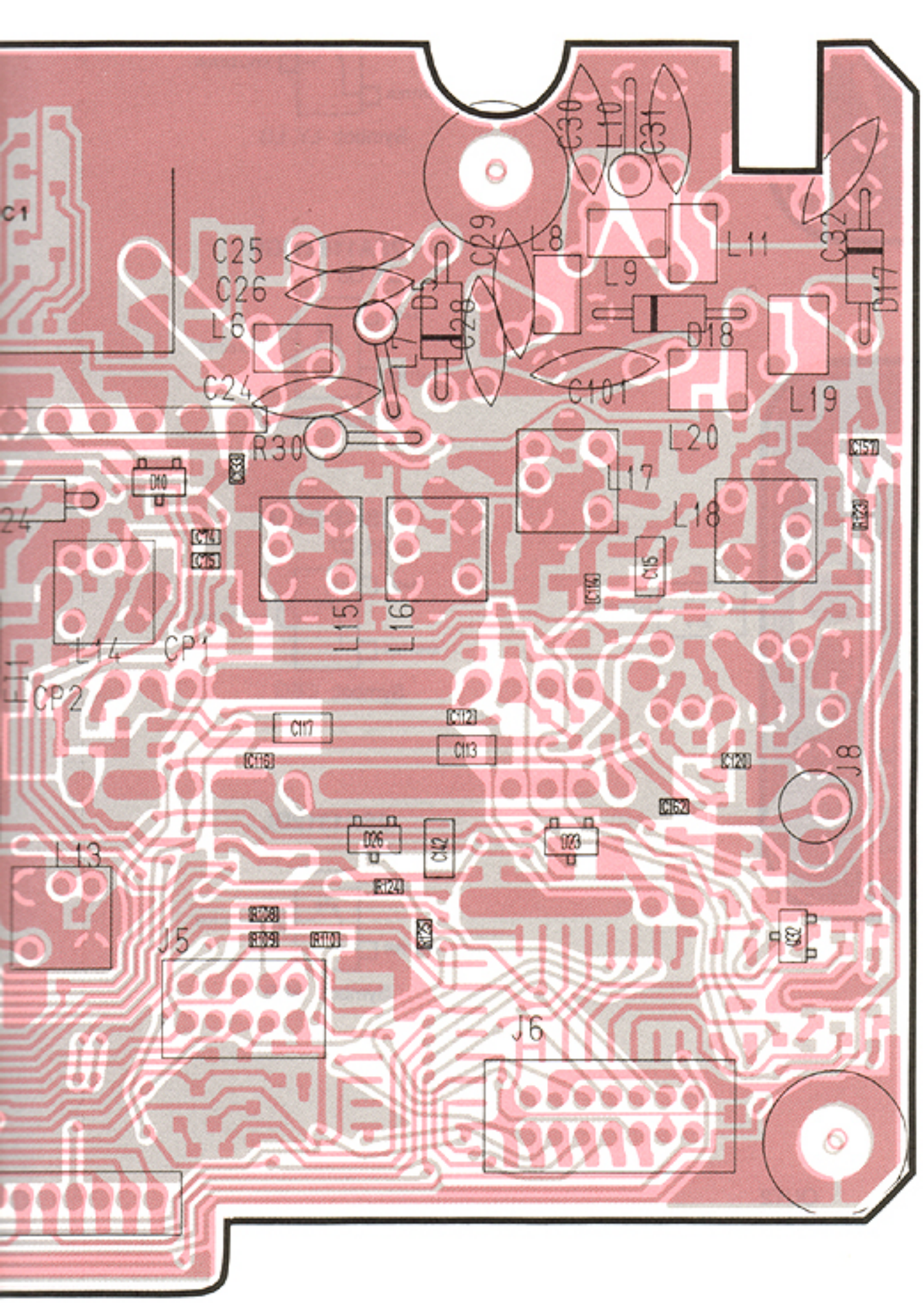
2SJ106GR

Q1, Q2, Q24

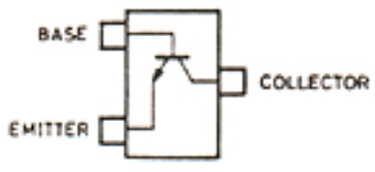


Symbol: VG

S

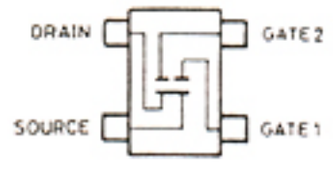


2SC3772¾
Q5, Q6, Q17, Q20



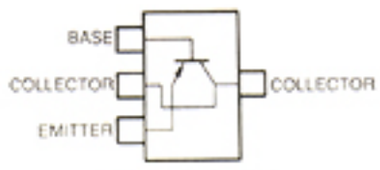
Symbol: LY3, LY4

3SK177U73/U74
Q18, Q19



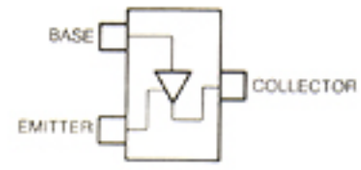
Symbol: U73/U74

2SB798DK
Q10, Q22



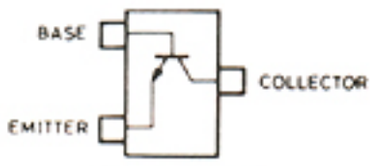
Symbol: DK

RN1402
Q25, Q31



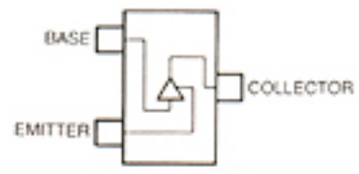
Symbol: XB

2SC2712Y
Q11, Q21, Q23



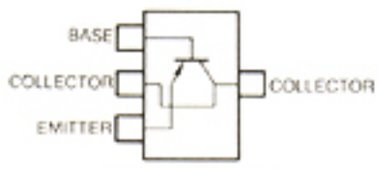
Symbol: LY

DTB123EK
Q26, Q32



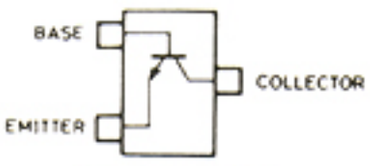
Symbol: FI2

2SA1736
Q15



Symbol: LD

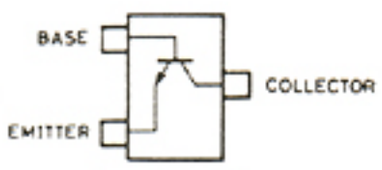
2SC3326B
Q33



Symbol: CCB

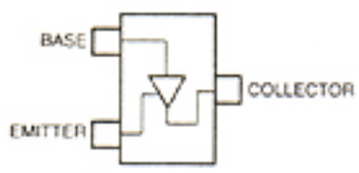
E	P/S	NC	E	LAMP	STBOD	STBOT	SQLC	SQLS	S/RF

2SC3661
Q8



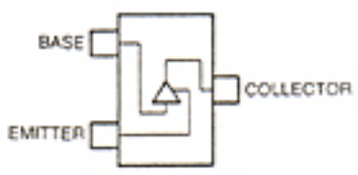
Symbol: FY

RN1404
Q3, Q12, Q13, Q14



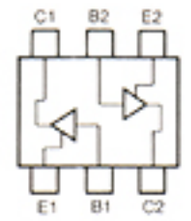
Symbol: XD

RN2427
Q16



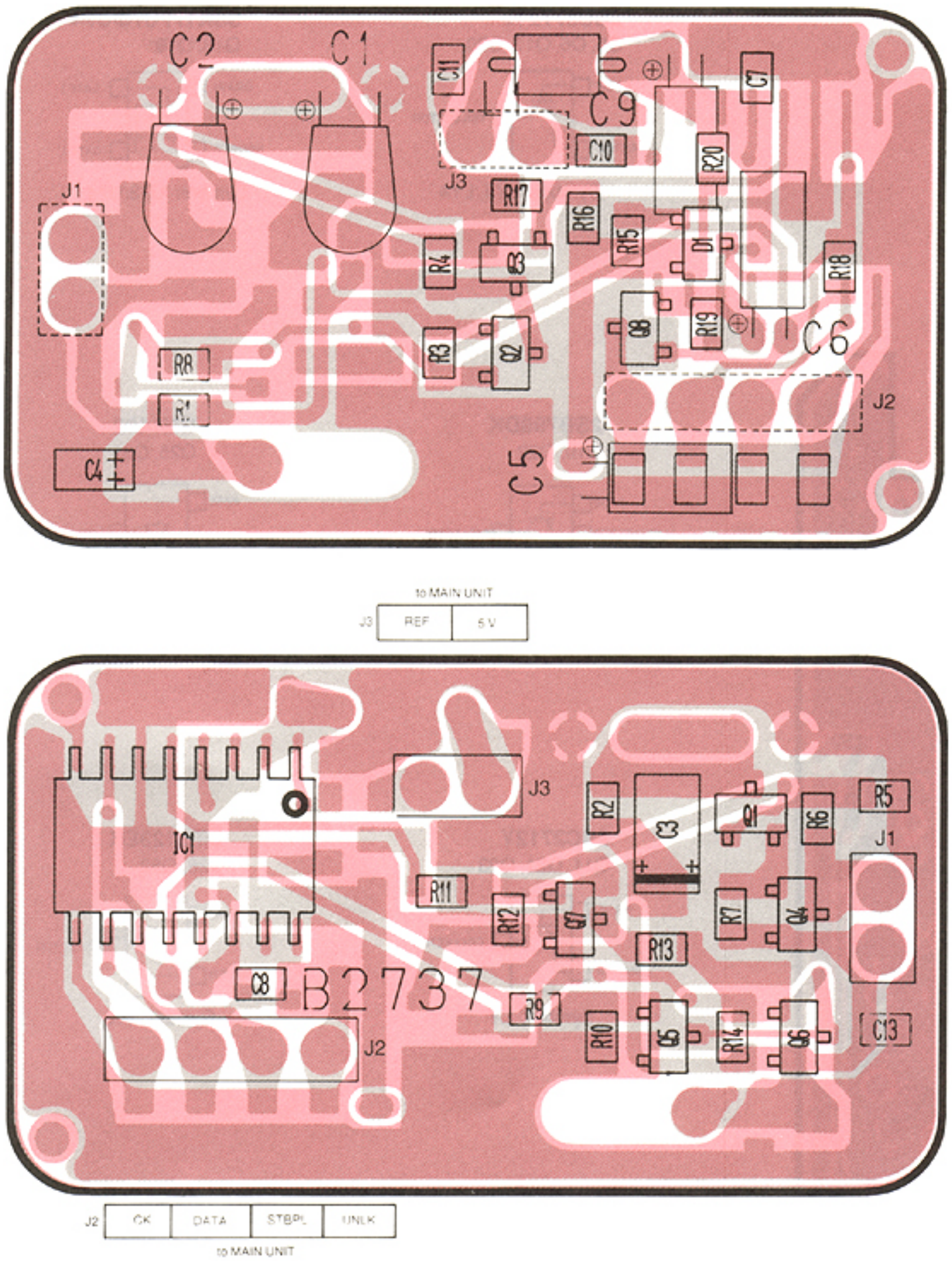
Symbol: RG

IMD6
Q34

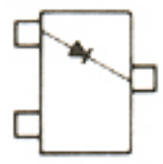


Symbol: D6

8-3 PLL UNIT



1SS193
D1

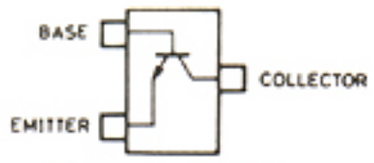


Symbol: F3

2SK209Y
Q1, Q2

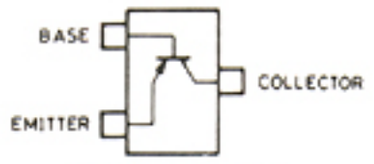
Symbol: XY

2SC2712Y/GR
Q3



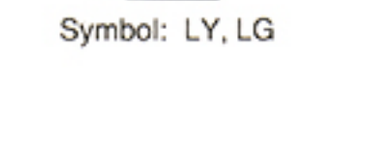
Symbol: LY, LG

2SA1162Y/GR
Q4, Q8



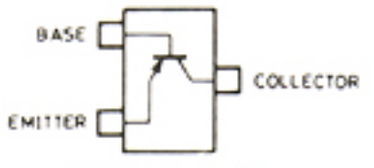
Symbol: SY, SG

2SC3324GR
Q5, Q7



Symbol: CBG

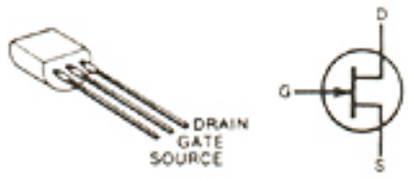
2SA1312BL
Q6



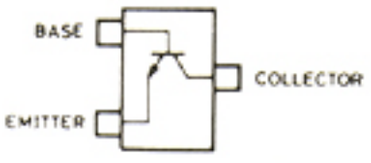
Symbol: ABB

8-4 VCO UNIT

2SK125
Q1

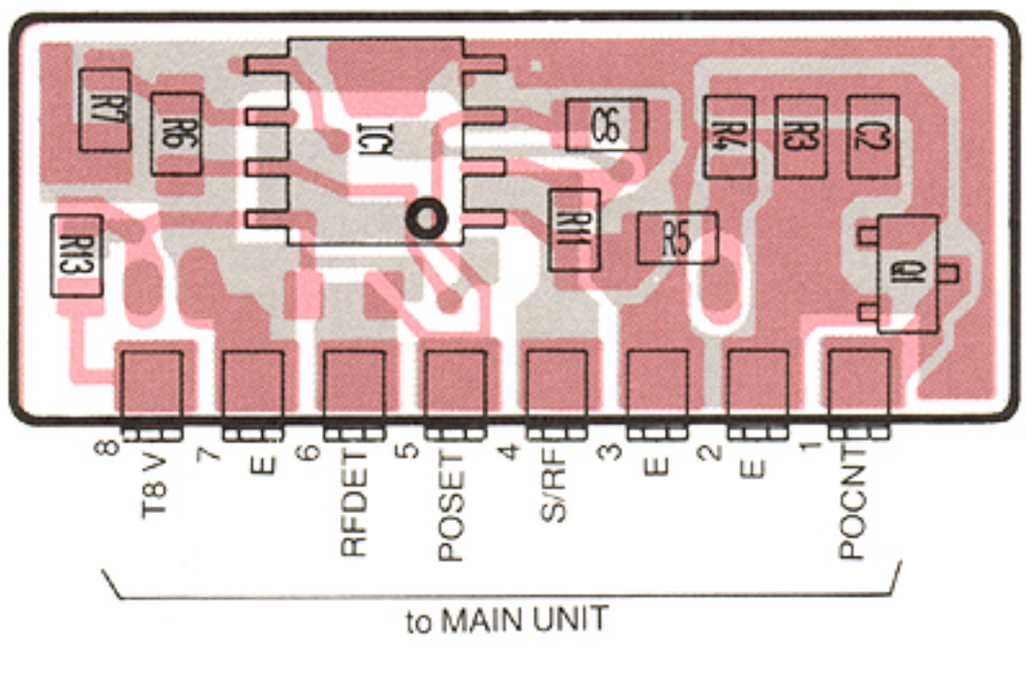


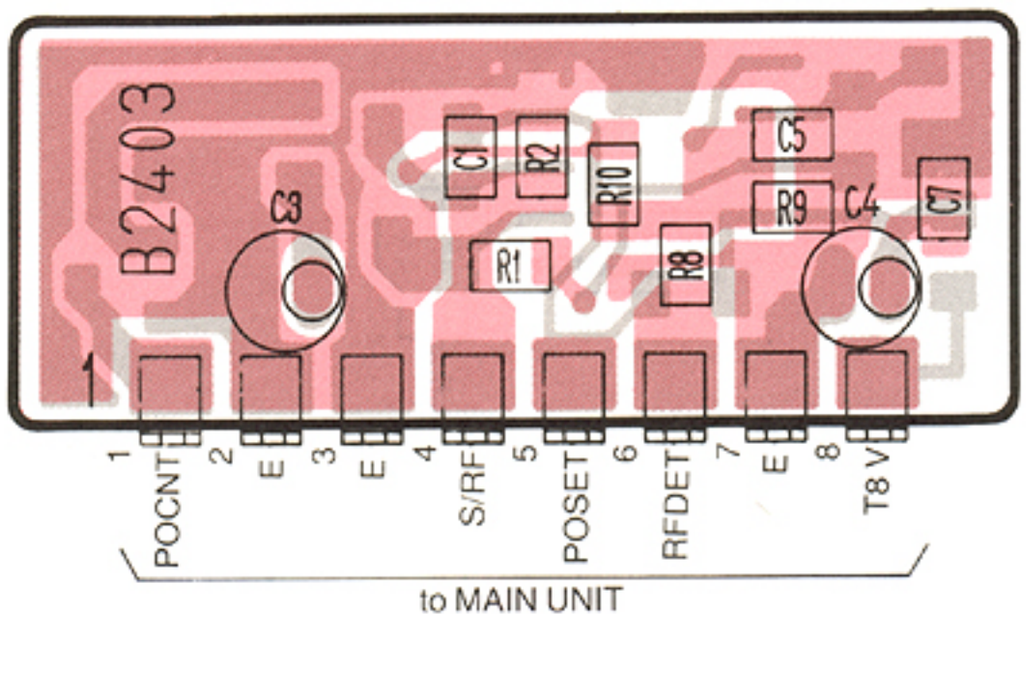
2SC3772¾
Q2, Q3, Q4



Symbol: LY3, LY4

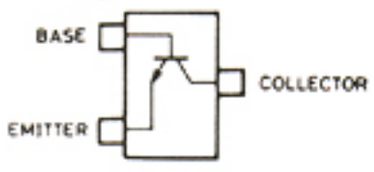
8-5 APC UNIT





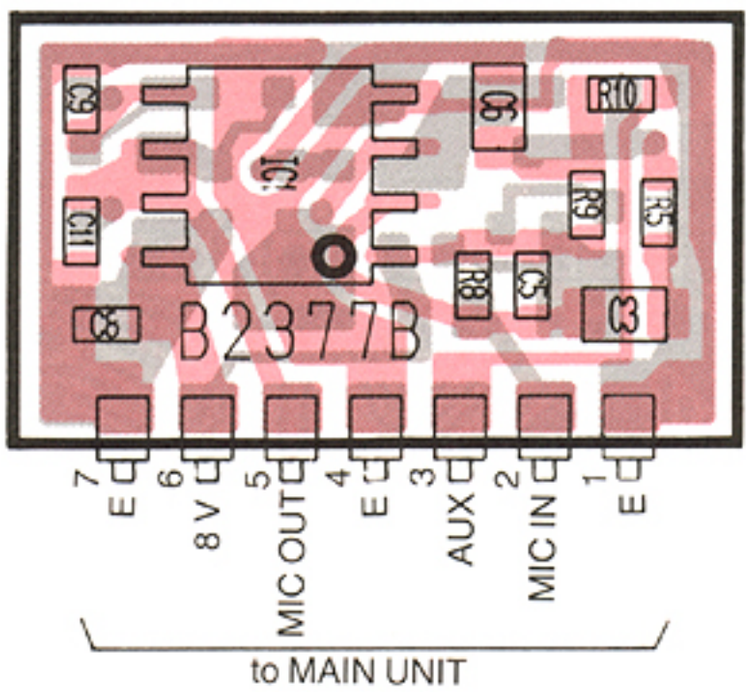
2SC2712Y

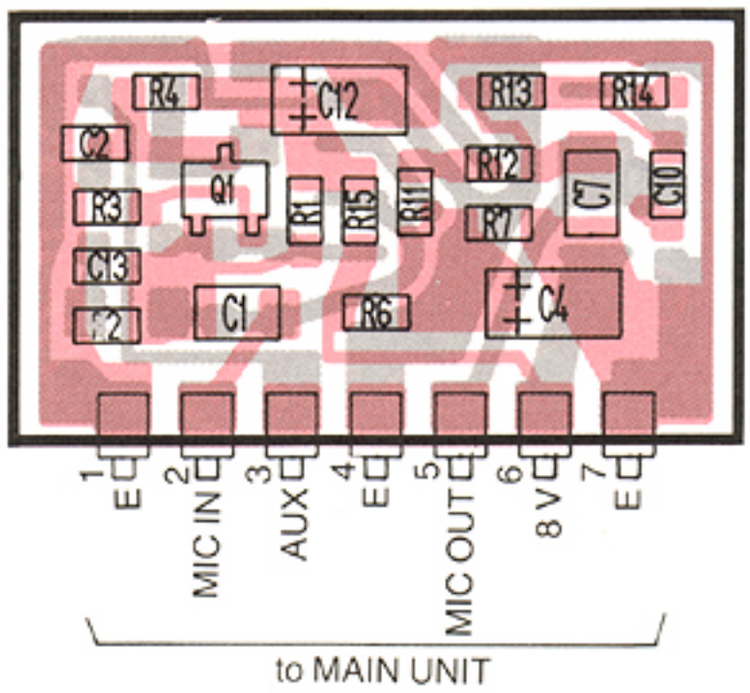
Q1



Symbol: LY

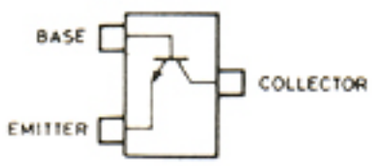
8-6 MIC AMP UNIT





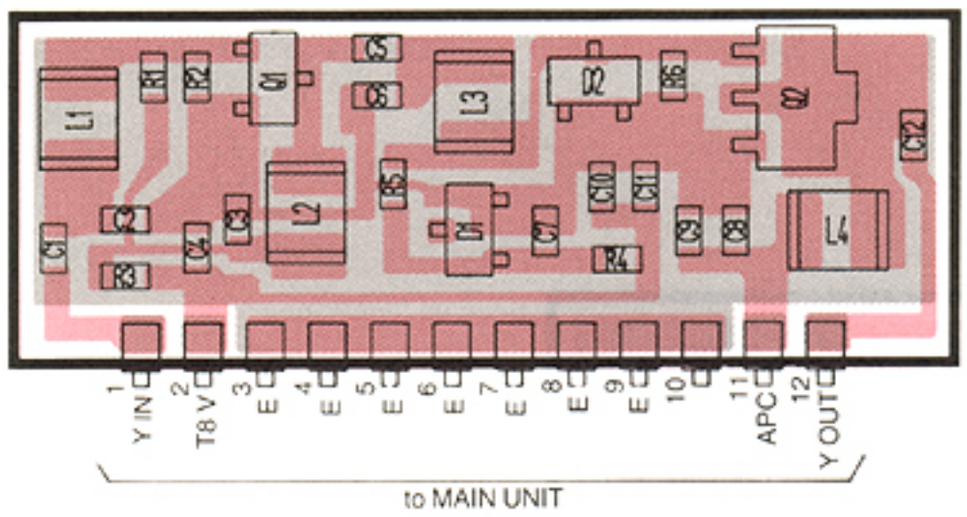
2SC4116GR

Q1

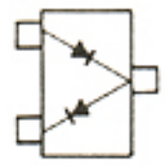


Symbol: LO

8-7 YGR UNIT

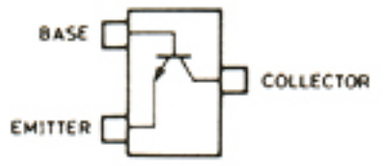


1SS226
D1



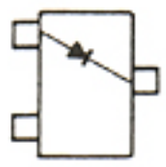
Symbol: C3

2SC3775¾
Q1



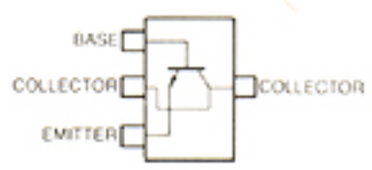
Symbol: OY3/OY4

1SS193
D2



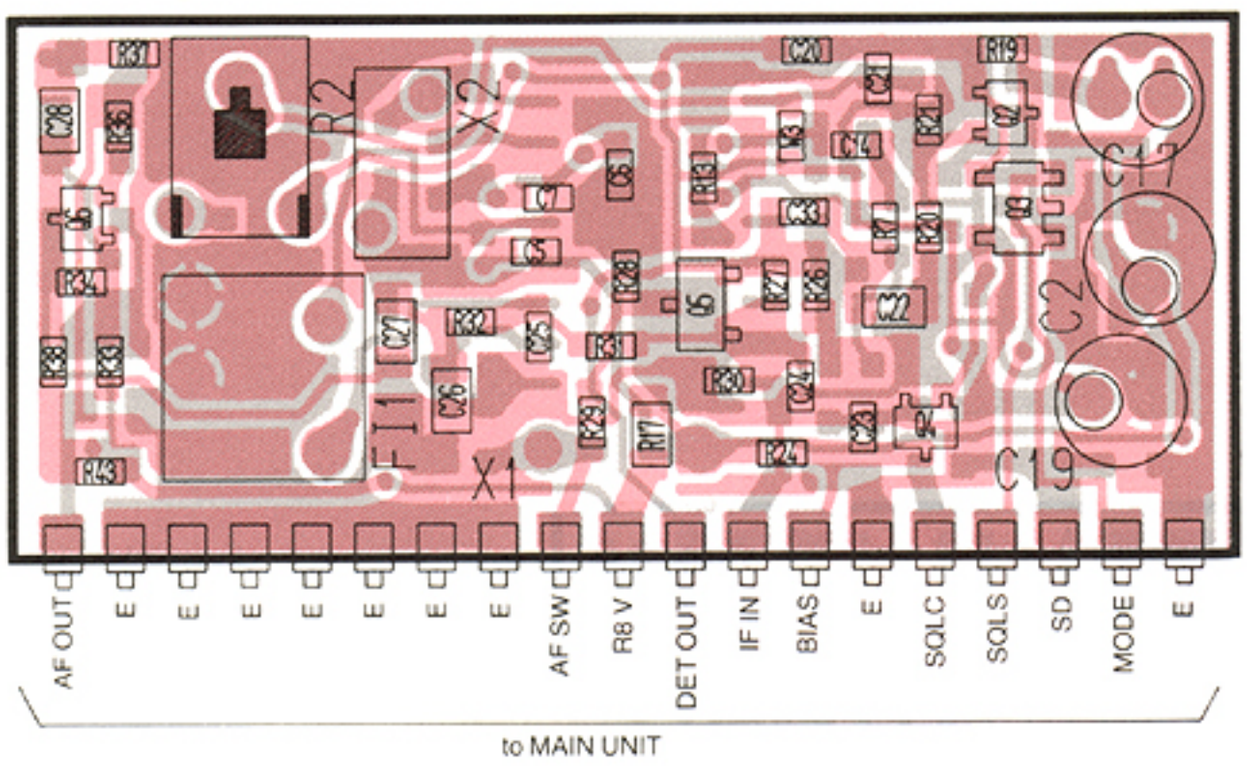
Symbol: F3

2SC2954
Q2

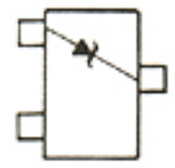


Symbol: QK

8-8 IF UNIT



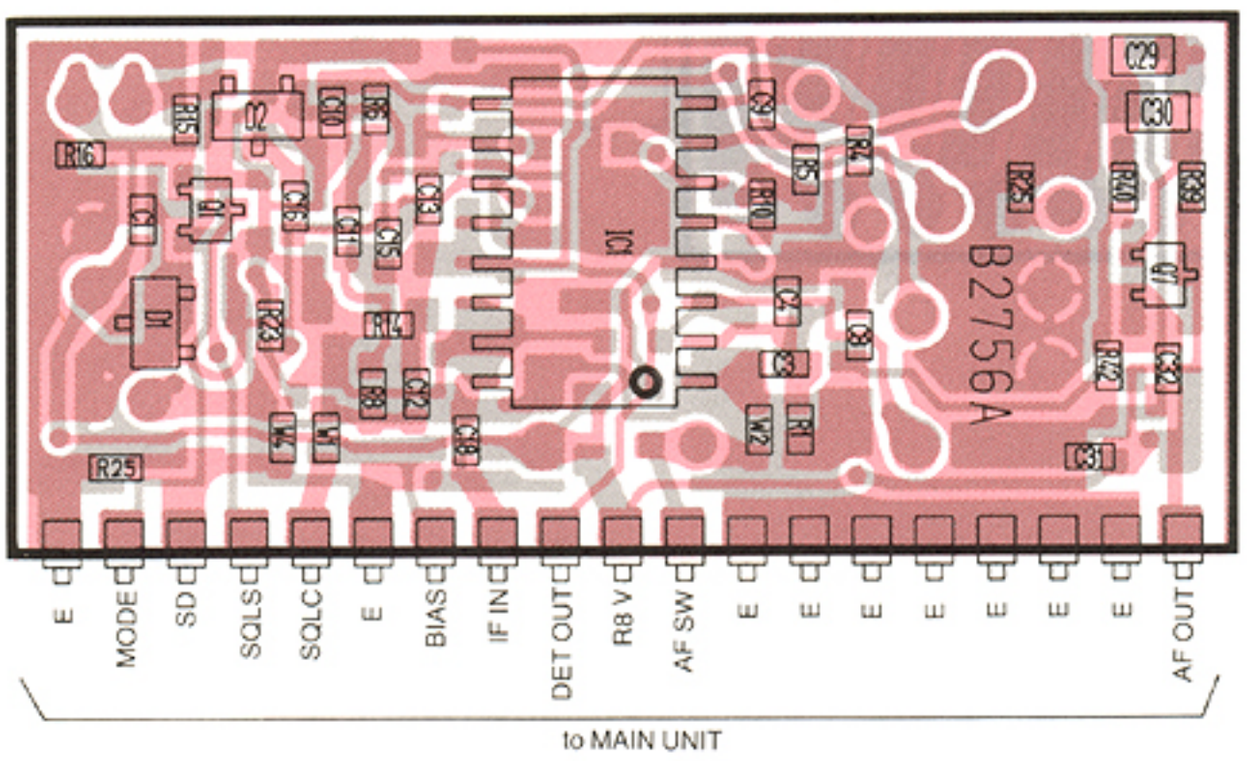
RD6.2MB2
D1



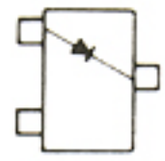
Symbol: 622

HSM88AS
D2

Symbol: C1

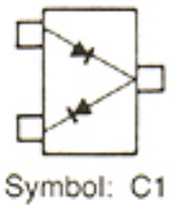


1SS193
D3



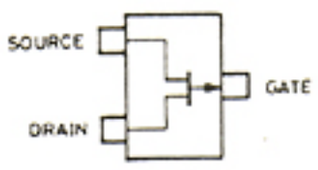
Symbol: F3

FMG2
Q3



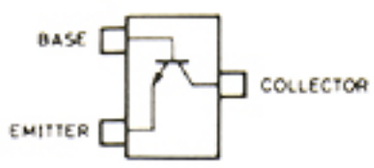
Symbol: G2

2SJ106GR
Q5



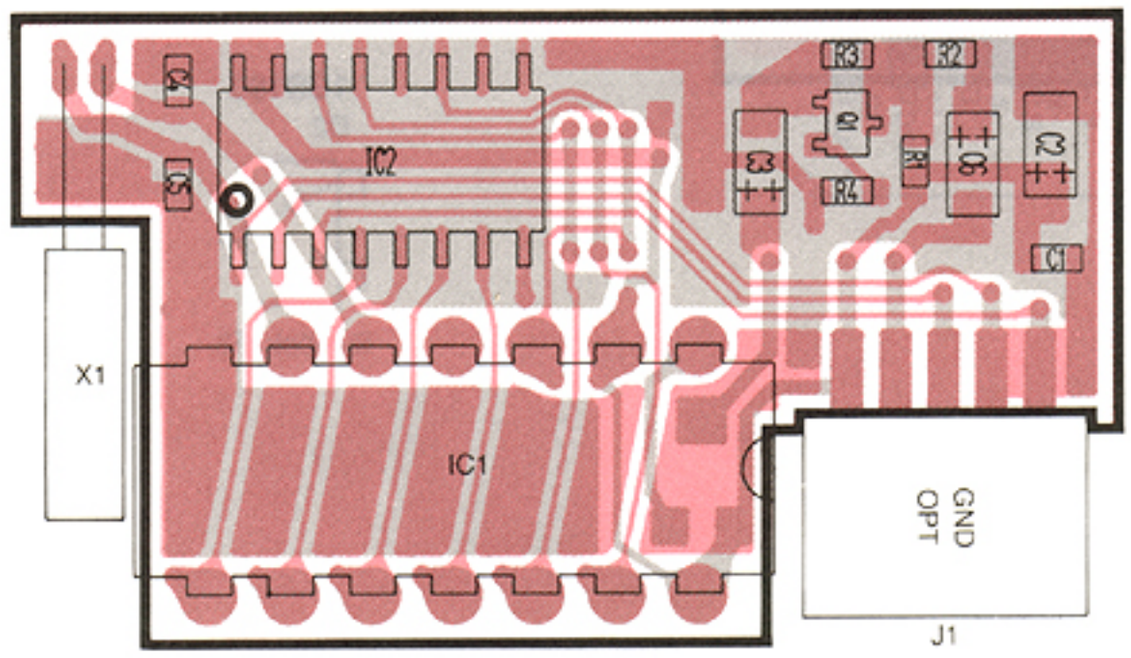
Symbol: VG

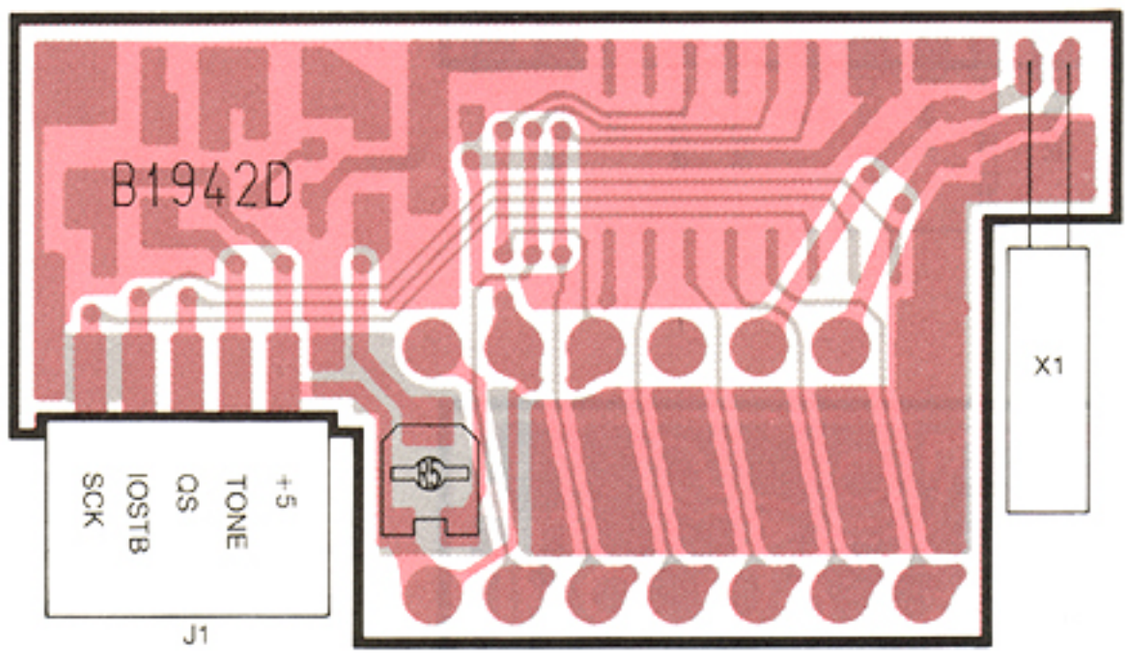
2SC4081S
Q1, Q2, Q4, Q6, Q7



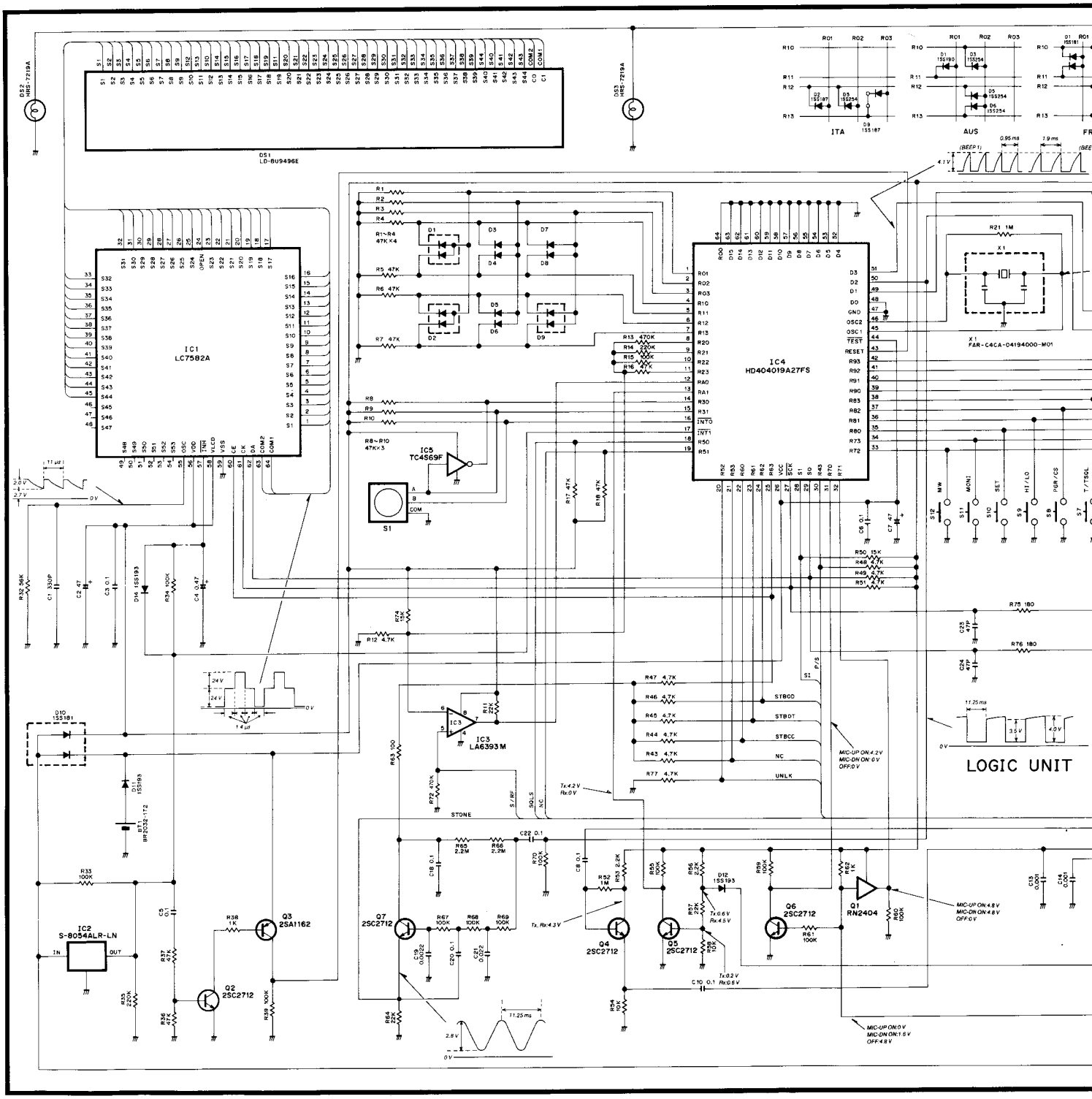
Symbol: BS

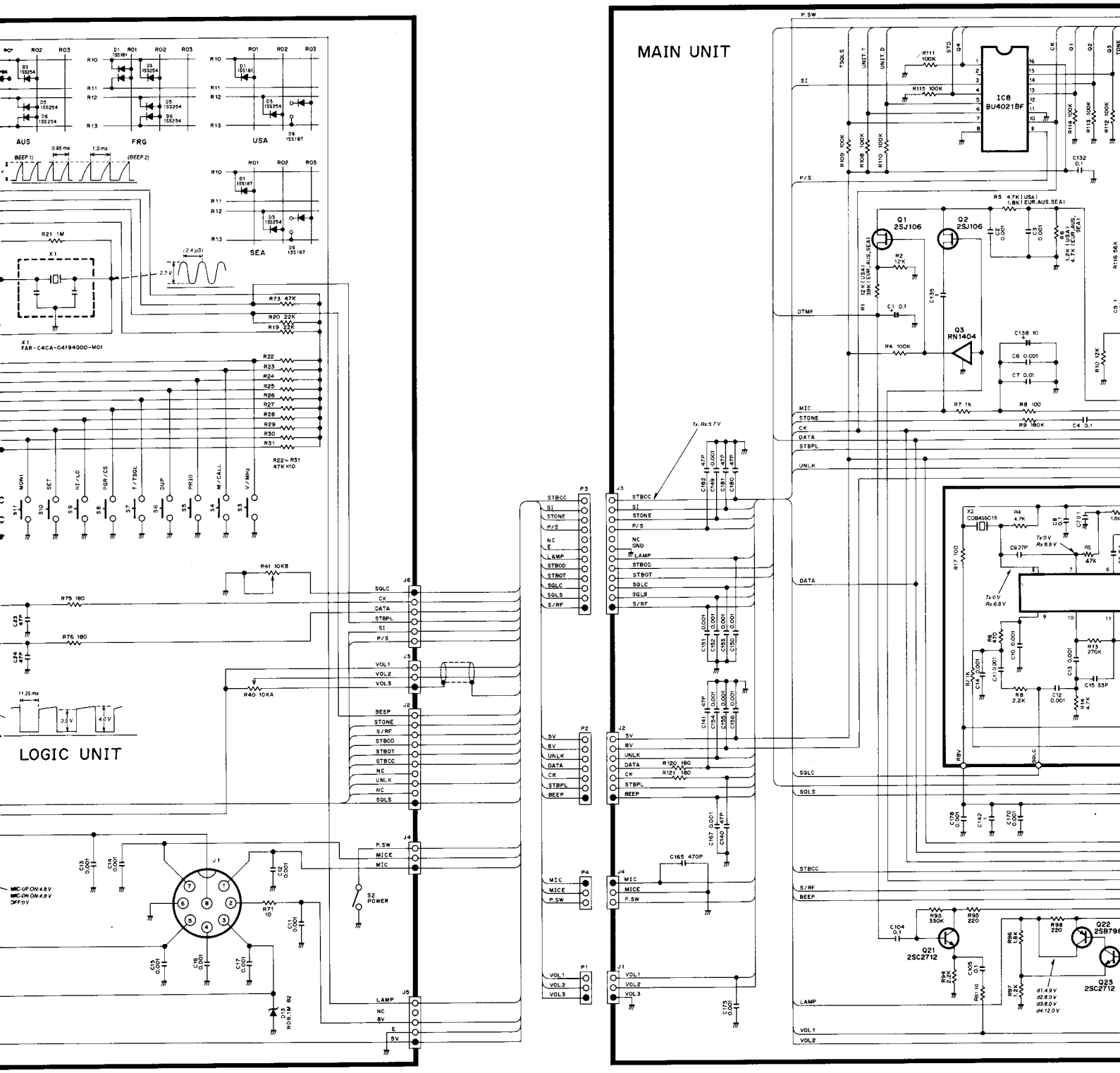
8-9 UT-51 TONE ENCODER UNIT (IC-229A/H USA Only)





SECTION 9 VOLTAGE DIAGRAM




MAIN UNIT
LOGIC UNIT
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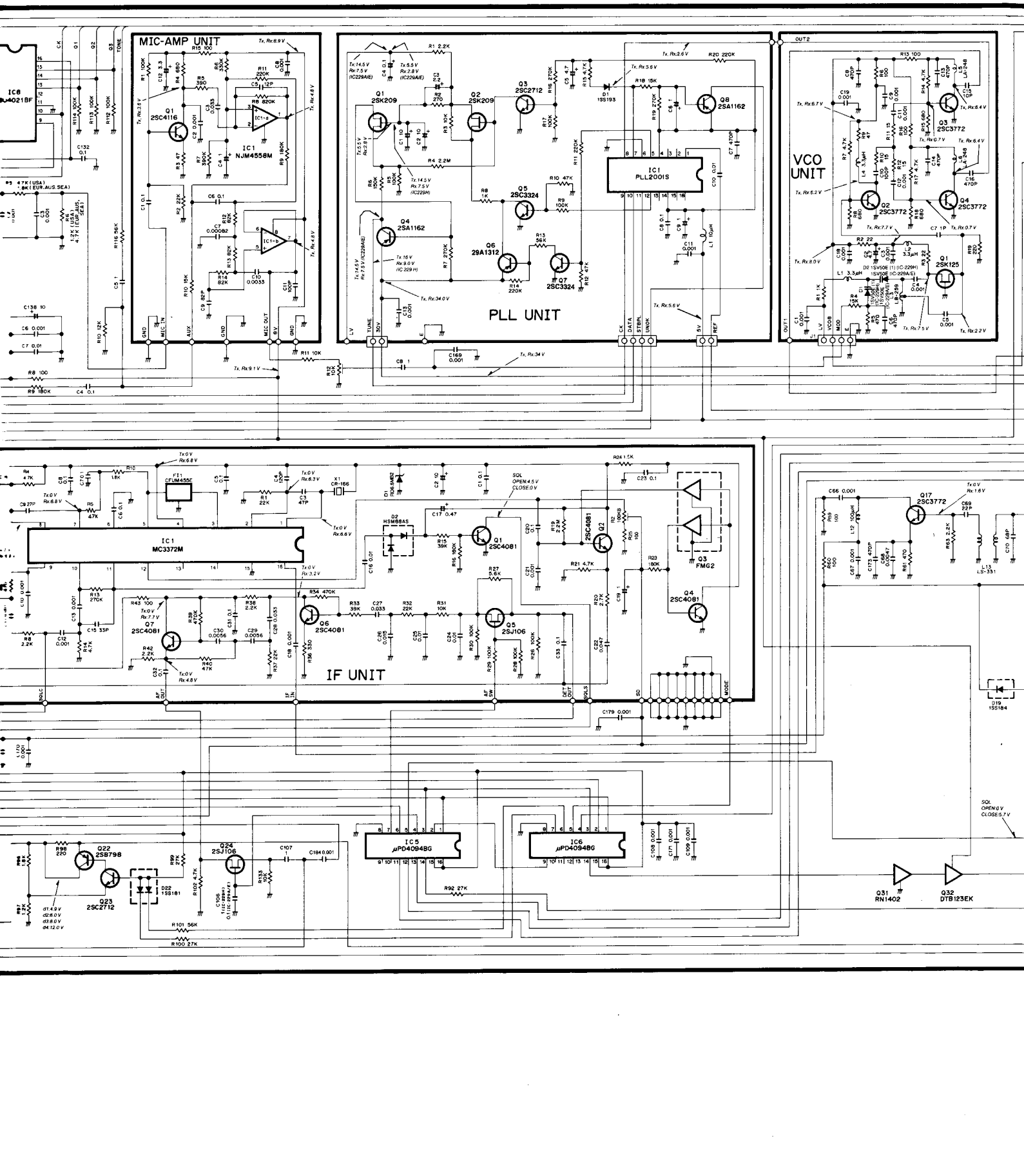
FRG
USA
SEA
IC8
BU4021BF
Q1
2SJ106
Q2
2SJ106
Q3
RN1404
Q21
2SC2712
Q22
2SB798
Q23
2SC2712
X1
FAR-C4CA-04194000-M01
X2
CDB455C16
J1
J2
J3
J4
J5
J6
P1
P2
P3
P4
S2
POWER
P.SW
MICE
MIC
STBCC
S/RF
BEEP
LAMP
VOL1
VOL2
VOL3
DTMF
STONE
DATA
STBPL
UNLK
SQLC
SQLS
MONI
SET
HI/LO
PGR/CS
T/TSQL
DUP
PRIO
M/CALL
V/MHz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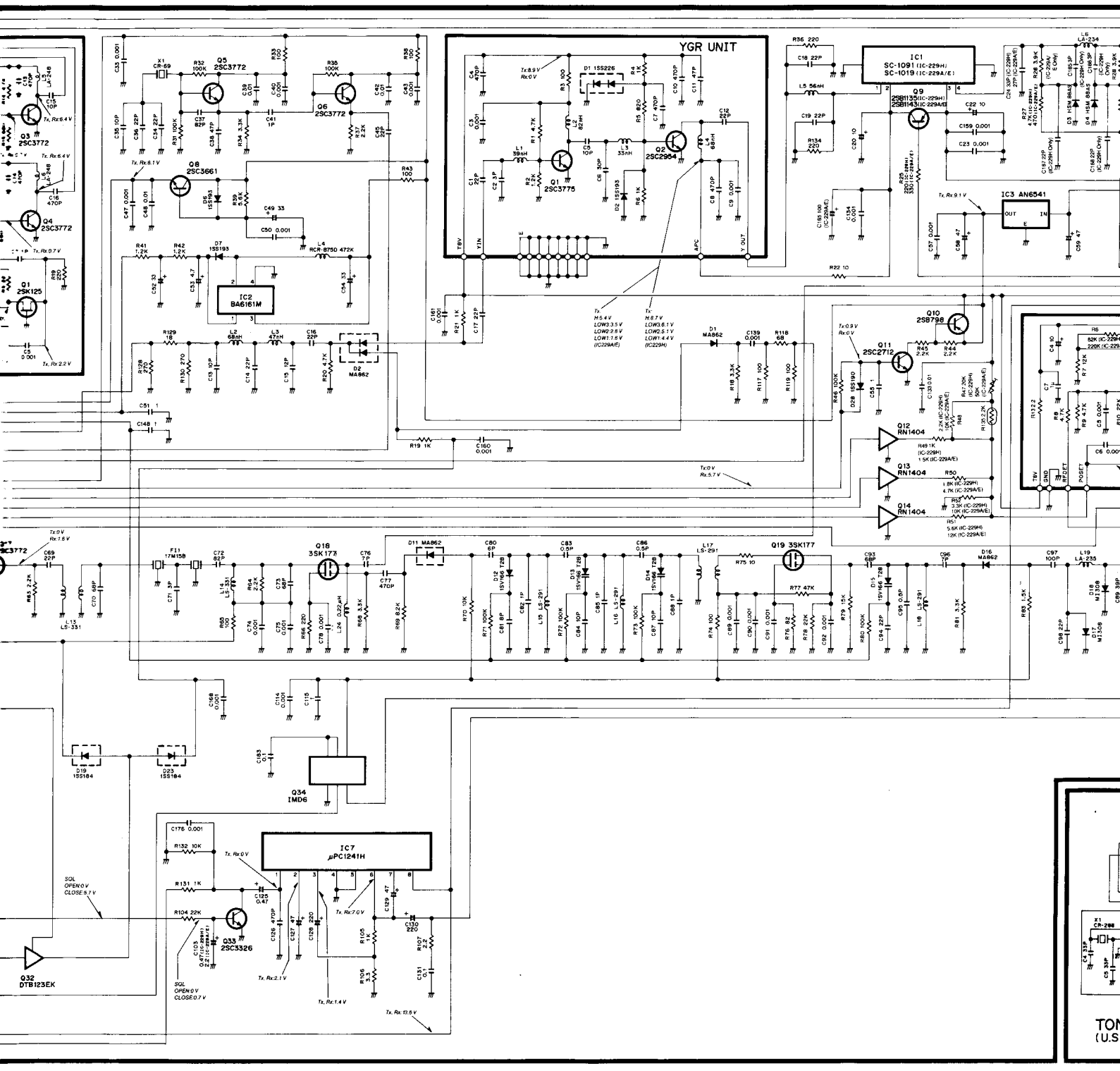
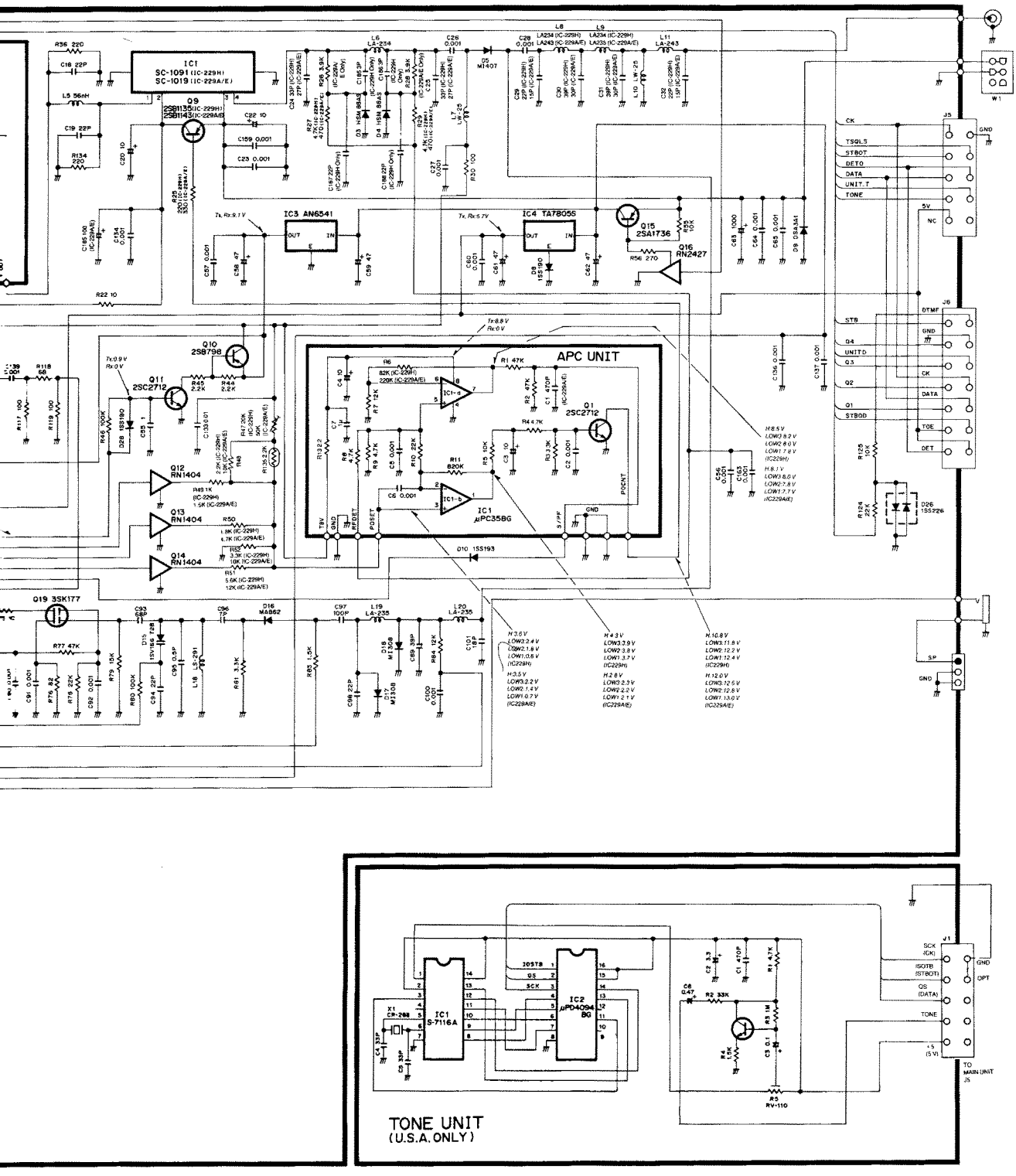
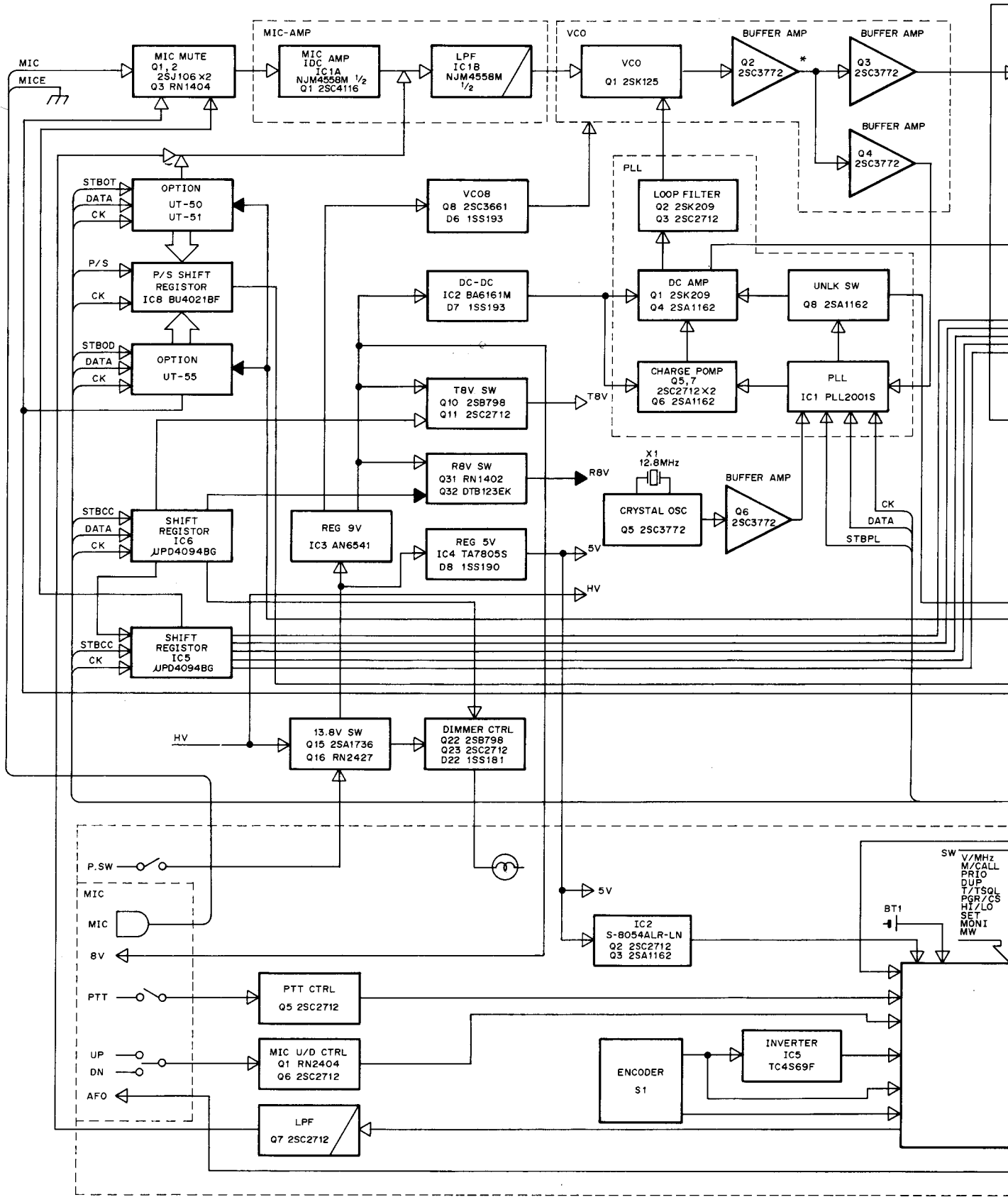
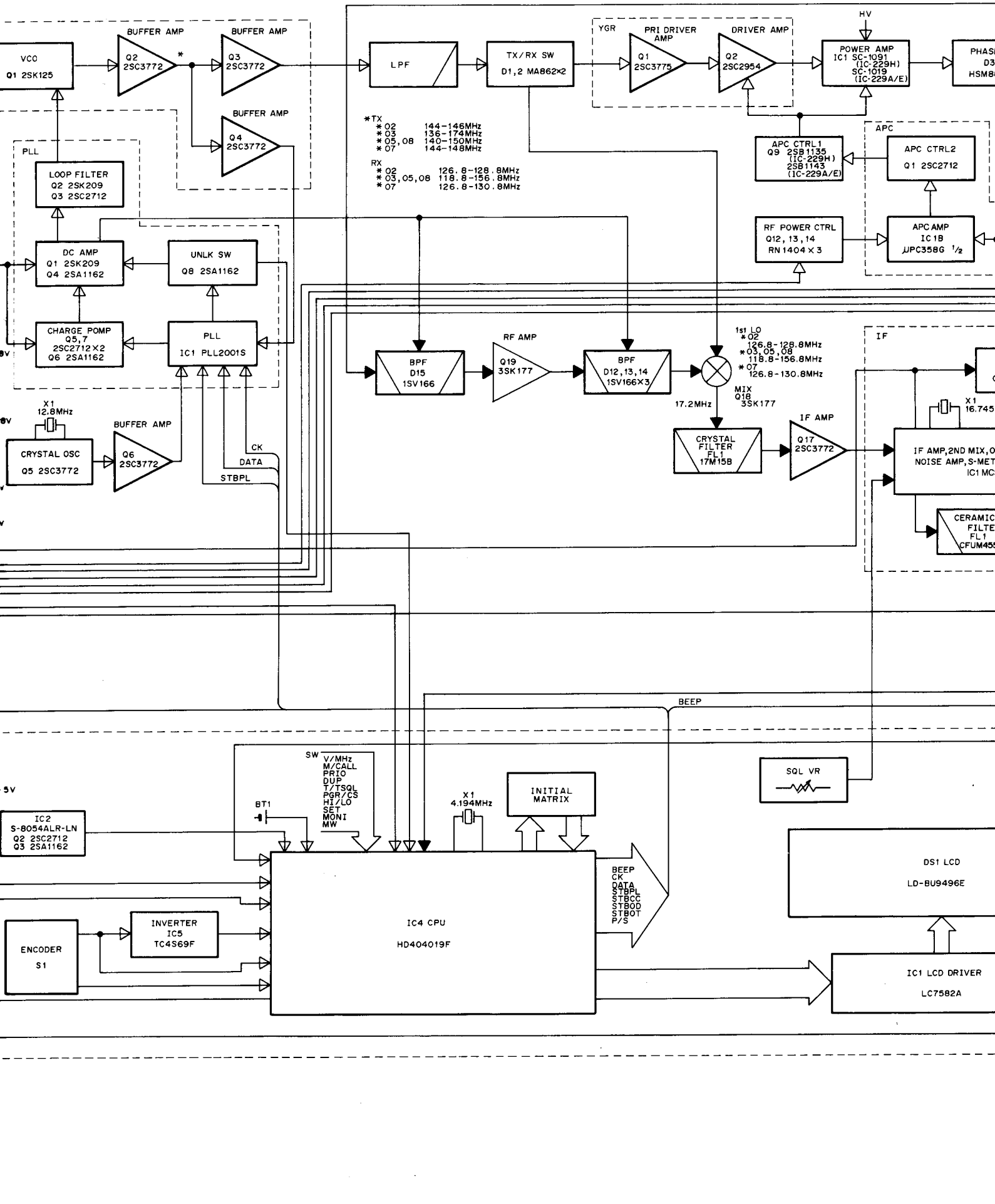
PLL UNIT
VCO UNIT
IF UNIT
IC1 NJM4558M
IC1 PLL2001S
IC1 MC3372M
IC5 μPD4094BG
IC6 μPD4094BG
Q1 2SC4116
Q1 2SK209
Q2 2SK209
Q3 2SC2712
Q4 2SA1162
Q5 2SC3324
Q6 29A1312
Q7 2SC3324
Q8 2SA1162
Q1 2SC4081
Q2 2SC4081
Q3 FMG2
Q4 2SC4081
Q5 2SJ106
Q6 2SC4081
Q7 2SC4081
Q1 2SC3772
Q2 2SC3772
Q3 2SC3772
Q4 2SC3772
Q1 2SK125
Q17 2SC3772
Q22 2SB798
Q23 2SC2712
Q24 2SJ106
Q31 RN1402
Q32 DTB123EK
D1 1SS193
D2 HSM88AS
D19 1SS184
FI1 CFUM455E
X1 CR-166
SQL OPEN:4.5 V CLOSE:0 V
SQL OPEN:0 V CLOSE:5.7 V

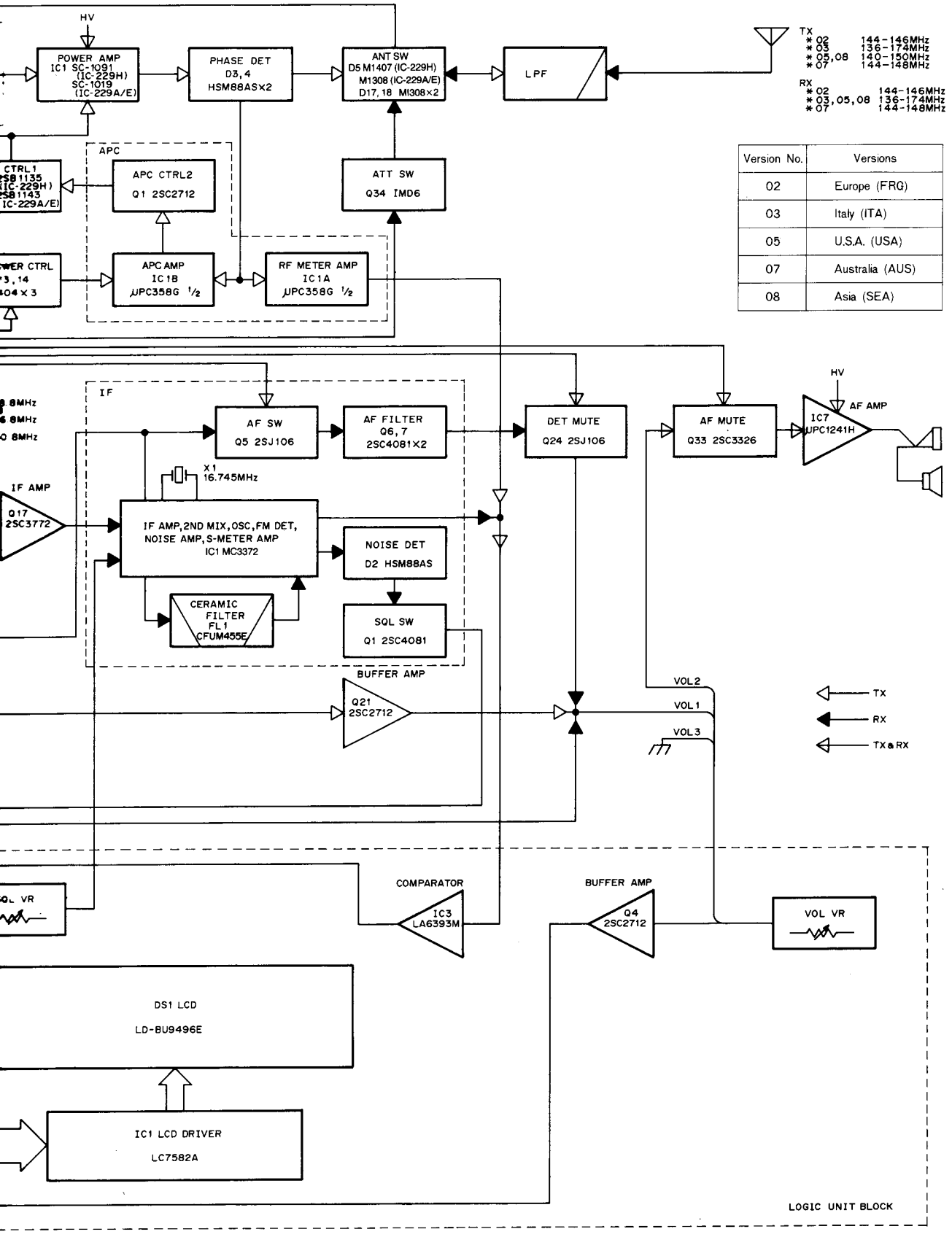

YGR UNIT
IC1
SC-1091 (IC-229H)
SC-1019 (IC-229A/E)
IC2
BA6161M
IC3 AN6541
IC7
μPC1241H
Q1 2SC3775
Q2 2SC2954
Q3 2SC3772
Q4 2SC3772
Q5 2SC3772
Q6 2SC3772
Q8 2SC3661
Q9 2SB1135 (IC-229H) 2SB1143 (IC-229A/E)
Q10 2SB798
Q11 2SC2712
Q12 RN1404
Q13 RN1404
Q14 RN1404
Q16 3SK177
Q19 3SK177
Q32 DTB123EK
Q33 2SC3326
Q34 IMD6
D1 MA862
D2 MA862
D11 MA862
D16 MA862
D19 1SS184
D23 1SS184
X1 CR-69
X1 CR-298
TONE
(U.S


IC1
SC-1091 (IC-229H)
SC-1019 (IC-229A/E)
IC3 AN6541
IC4 TA7805S
APC UNIT
IC1
μPC358G
Q1
2SC2712
Q9
2SB1135(IC-229H)
2SB1143(IC-229A/E)
Q10
2SB798
Q11
2SC2712
Q12
RN1404
Q13
RN1404
Q14
RN1404
Q15
2SA1736
Q16
RN2427
Q19 3SK177
D10 1SS193
D16
MA862
W1
J5
J6
CK
TSQL5
STBOT
DETO
DATA
UNIT.T
TONE
5V
NC
GND
DTMF
STB
Q4
UNITD
Q3
Q2
Q1
STBOD
TOE
DET
SP
V
TONE UNIT
(U.S.A. ONLY)
IC1
S-7116A
IC2
μPD4094
BG
X1
CR-288
J1
SCK
(CK)
ISOTB
(STBOT)
OS
(DATA)
TONE
+5
(5 V)
OPT
TO
MAIN UNIT
J5
RV-110

SECTION 10 BLOCK DIAGRAM




VCO
Q1 2SK125
BUFFER AMP
Q2 2SC3772
BUFFER AMP
Q3 2SC3772
BUFFER AMP
Q4 2SC3772
LPF
TX/RX SW
D1,2 MA862×2
YGR
PRI DRIVER AMP
Q1 2SC3775
DRIVER AMP
Q2 2SC2954
HV
POWER AMP
IC1 SC-1091 (IC-229H)
SC-1019 (IC-229A/E)
*TX
*02 144-146MHz
*03 136-174MHz
*05,08 140-150MHz
*07 144-148MHz
RX
*02 126.8-128.8MHz
*03,05,08 118.8-156.8MHz
*07 126.8-130.8MHz
APC
APC CTRL1
Q9 2SB1135 (IC-229H)
2SB1143 (IC-229A/E)
APC CTRL2
Q1 2SC2712
RF POWER CTRL
Q12,13,14
RN1404×3
APC AMP
IC1B
μPC358G 1/2
PLL
LOOP FILTER
Q2 2SK209
Q3 2SC2712
DC AMP
Q1 2SK209
Q4 2SA1162
UNLK SW
Q8 2SA1162
CHARGE POMP
Q5,7
2SC2712×2
Q6 2SA1162
PLL
IC1 PLL2001S
X1
12.8MHz
CRYSTAL OSC
Q5 2SC3772
BUFFER AMP
Q6 2SC3772
CK
DATA
STBPL
BPF
D15
1SV166
RF AMP
Q19
3SK177
BPF
D12,13,14
1SV166×3
1st LO
*02 126.8-128.8MHz
*03,05,08 118.8-156.8MHz
*07 126.8-130.8MHz
MIX
Q18
3SK177
17.2MHz
CRYSTAL FILTER
FL1
17M15B
IF AMP
Q17
2SC3772
IF
X1
16.745
IF AMP,2ND MIX,O
NOISE AMP,S-MET
IC1 MC
CERAMIC FILTE
FL1
CFUM455
BEEP
SW
V/MHz
M/CALL
PRIO
DUP
T/TSQL
PGR/CS
HI/LO
SET
MONI
MW
BT1
X1
4.194MHz
INITIAL MATRIX
SQL VR
IC2
S-8054ALR-LN
Q2 2SC2712
Q3 2SA1162
IC4 CPU
HD404019F
BEEP
CK
DATA
STBPL
STBCC
STBOD
STBOT
P/S
DS1 LCD
LD-BU9496E
ENCODER
S1
INVERTER
IC5
TC4S69F
IC1 LCD DRIVER
LC7582A



Version No.	Versions
02	Europe (FRG)
03	Italy (ITA)
05	U.S.A. (USA)
07	Australia (AUS)
08	Asia (SEA)

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