ICOM

SERVICE MANUAL

VHF MARINE TRANSCIVER

IC-M3A

Icom Inc.

INTRODUCTION

This service manual describe the latest information for the IC-M3A at the time of publication.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. Such a connection could cause a fire hazard and/or electric shock.

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.

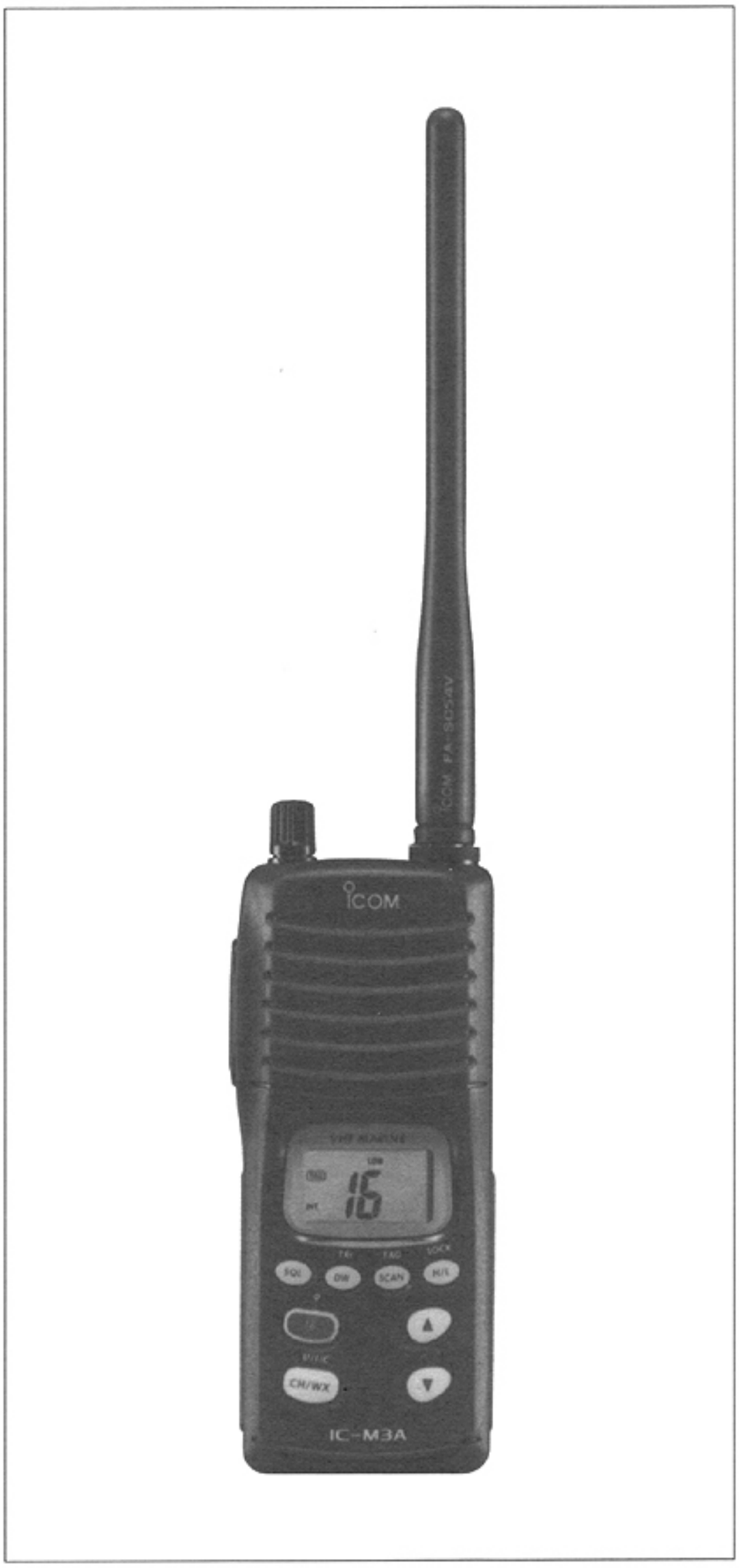
ORDERING PARTS

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>

1110001810	S.IC	TA7368F	IC-M3A	MAIN UNIT	1 piece
8810009510	Screw	B0 2 × 4 NI-ZU	IC-M3A	MAIN PCB	6 pieces

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



REPAIR NOTES

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

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■ GENERAL

• Frequency coverage	: 156.025–157.425 MHz (Tx)		
	156.025–163.275 MHz (Rx)		
• Mode	: 16K0G3E (FM)		
• Usable channels	: All USA, international and Canadian channels plus 10 weather channels*		
	*USA versions only		
• Acceptable power supply	: 7.2 V DC nominal (negative ground)		
• Usable temperature range	: –20°C to +60°C; –4°F to +140°F		
• Frequency stability	: ±10 ppm (–20°C to +60°C)		
• Current drain (at 7.2 V DC; typical)	: Transmit	at 5 W	1.6 A
		at 1 W	0.7 A
	Receive	max. audio	230 mA
		stand-by	60 mA (squelched)
		power saved	20 mA (average)
• Antenna impedance	: 50 Ω (nominal)		
• Dimensions (projections not included)	: 58(W)×140.5(H)×43.5(D) mm; 2 9/32(W)×5 17/32(H)×1 23/32(D) in		
• Weight (with ant., battery case and cells)	: 410 g; 14.4 oz		

■ TRANSMITTER

• Output power (at 7.2 V DC)	: High	5 W	
	Low	1 W	
• Modulation	: Variable reactance frequency modulation		
• Maximum frequency deviation	: ±5.0 kHz		
• Spurious emissions	: 65 dB		
• Adjacent channel power	: 60 dB		
• Residual modulation	: 40 dB		
• Audio harmonic distortion	: Less than 10% at 60% deviation		

■ RECEIVER

• Receive system	: Double conversion superheterodyne system		
• Intermediate frequencies	: 1st	31.05 MHz	
	2nd	450 kHz	
• Sensitivity	: 0.25 µV typical at 12 dB SINAD		
• Squelch sensitivity	: 0.25 µV typical		
• Adjacent channel selectivity	: 70 dB typical		
• Spurious response	: 70 dB typical		
• Intermodulation rejection ratio	: 70 dB typical		
• Hum and noise	: 40 dB		
• Audio output power (at 9.6 V DC)	: 500 mW typical at 10% distortion with an 8 Ω load		

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

■ VHF MARINE CHANNEL LIST

Channel No.			Frequency (MHz)		Channel No.			Frequency (MHz)		Channel No.			Frequency (MHz)	
USA	INT	CAN	Transmit	Receive	USA	INT	CAN	Transmit	Receive	USA	INT	CAN	Transmit	Receive
	01	01	156.050	160.650	21A		21A	157.050	157.050	73	73	73	156.675	156.675
01A			156.050	156.050		22		157.100	161.700	74	74	74	156.725	156.725
	02	02	156.100	160.700	22A		22A	157.100	157.100	75	75	75	Guard	Guard
02A			Guard	Guard		23	23	157.150	161.750	76	76	76	Guard	Guard
	03	03	156.150	160.750	23A			157.150	157.150	77*1	77	77*1	156.875	156.875
03A			156.150	156.150	24	24	24	157.200	161.800		78		156.925	161.525
	04		156.200	160.800	25	25	25	157.250	161.850	78A		78A	156.925	156.925
		04A	156.200	156.200	26	26	26	157.300	161.900		79		156.975	161.575
	05		156.250	160.850	27	27	27	157.350	161.950	79A		79A	156.975	156.975
05A		05A	156.250	156.250	28	28	28	157.400	162.000		80		157.025	161.625
06	06	06	156.300	156.300		60	60	156.025	160.625	80A		80A	157.025	157.025
	07		156.350	160.950	60A			Guard	Guard		81		157.075	161.675
07A		07A	156.350	156.350		61		156.075	160.675	81A		81A	157.075	157.075
08	08	08	156.400	156.400	61A		61A	156.075	156.075		82		157.125	161.725
09	09	09	156.450	156.450		62		156.125	160.725	82A		82A	157.125	157.125
10	10	10	156.500	156.500			62A	156.125	156.125		83	83	157.175	161.775
11	11	11	156.550	156.550		63		156.175	160.775	83A		83A	157.175	157.175
12	12	12	156.600	156.600	63A			156.175	156.175	84	84	84	157.225	161.825
13*1	13	13*1	156.650	156.650		64	64	156.225	160.825	84A			157.225	157.225
14	14	14	156.700	156.700	64A		64A	156.225	156.225	85	85	85	157.275	161.875
15*1	15*1	15*1	156.750	156.750		65		156.275	160.875	85A			157.275	157.275
16	16	16	156.800	156.800	65A	65A	65A	156.275	156.275	86	86	86	157.325	161.925
17*1	17	17*1	156.850	156.850		66		156.325	160.925	86A			157.325	157.325
	18		156.900	161.500	66A	66A	66A*1	156.325	156.325	87	87	87	157.375	161.975
18A		18A	156.900	156.900	67*1	67	67	156.375	156.375	87A			157.375	157.375
	19		156.950	161.550	68	68	68	156.425	156.425	88	88	88	157.425	162.025
19A		19A	156.950	156.950	69	69	69	156.475	156.475	88A			157.425	157.425
20	20	20*1	157.000	161.600	70*2	70*2	70*2	156.525	156.525					
20A			157.000	157.000	71	71	71	156.575	156.575					
	21	21	157.050	161.650	72	72	72	156.625	156.625					

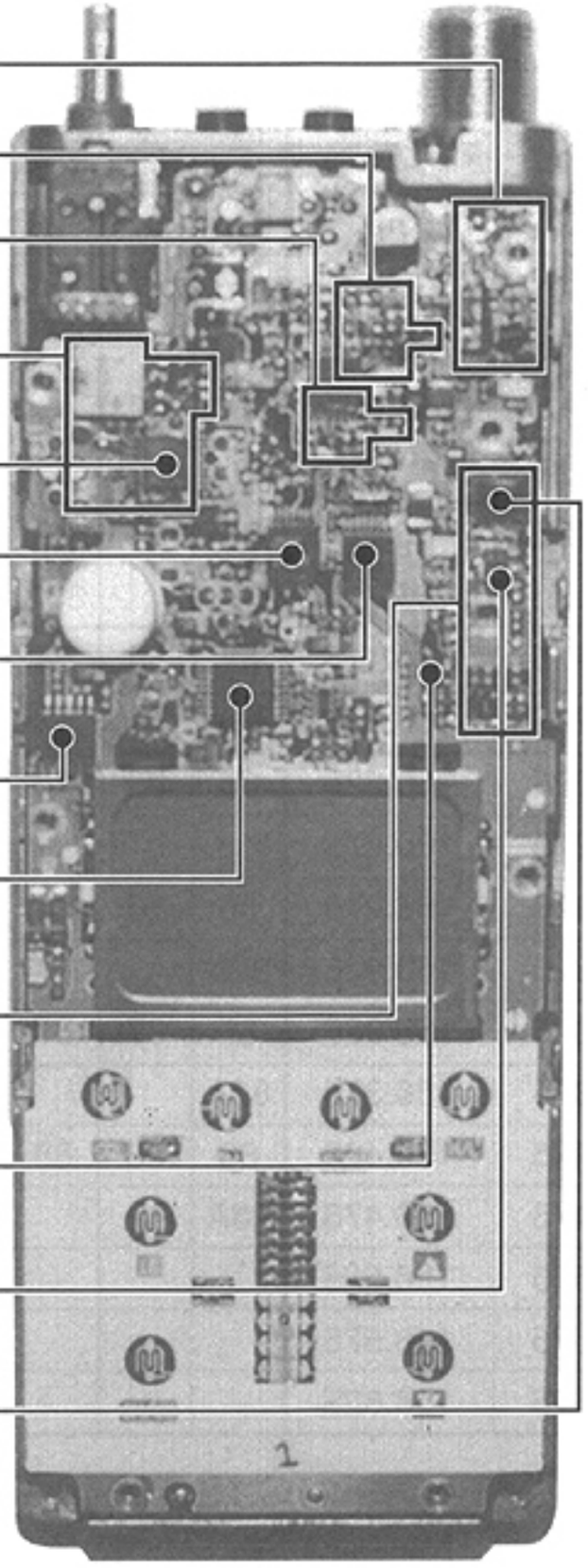
*1 Low power only, *2 Receive only

Weather channel	Frequency (MHz)		Weather channel	Frequency (MHz)	
	Transmit	Receive		Transmit	Receive
WX01	Receive only	162.550	WX06	Receive only	162.500
WX02	Receive only	162.400	WX07	Receive only	162.525
WX03	Receive only	162.475	WX08	Receive only	161.650
WX04	Receive only	162.425	WX09	Receive only	161.775
WX05	Receive only	162.450	WX10	Receive only	163.275

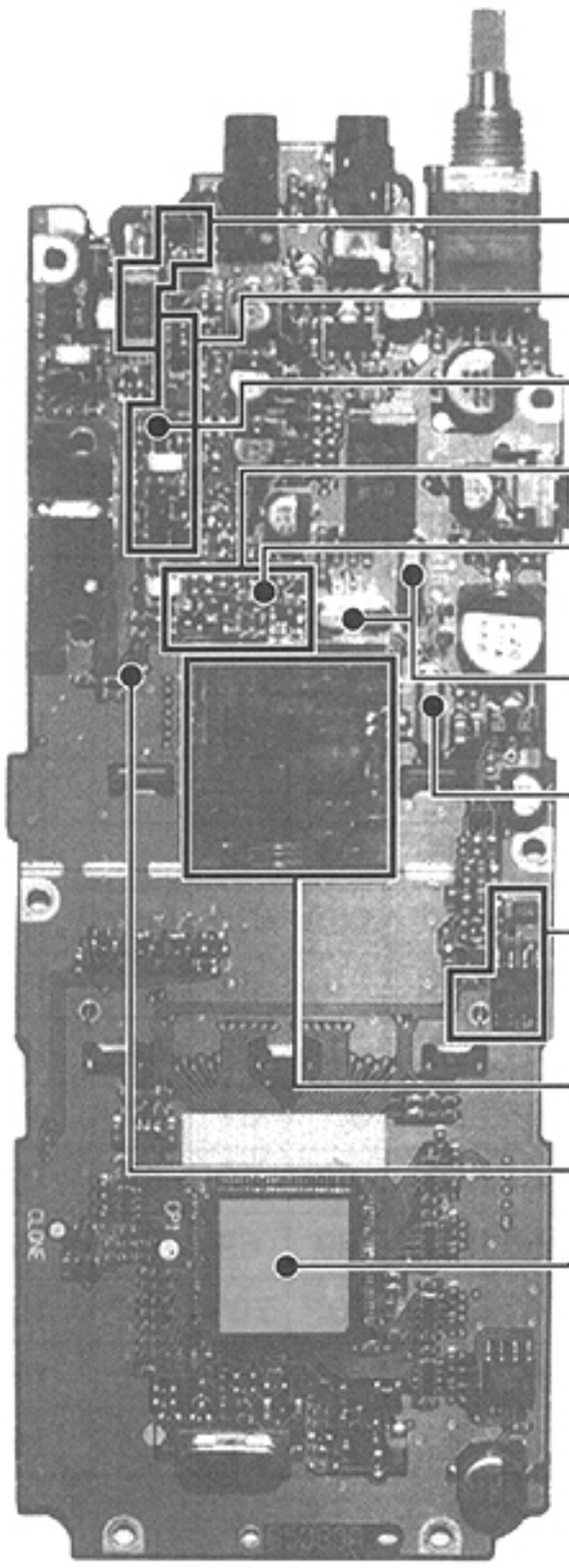
SECTION 2 INSIDE VIEWS

• MAIN UNIT

TOP VIEW



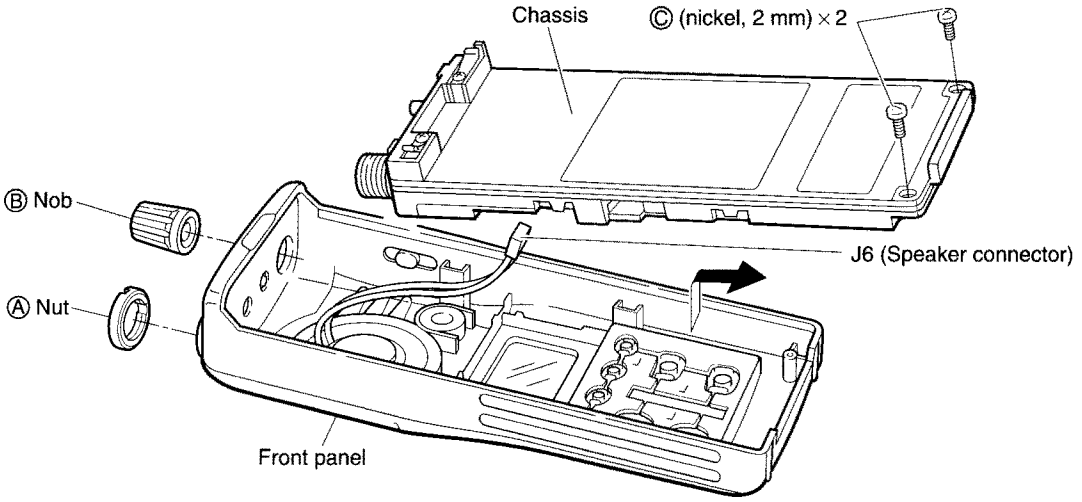
BOTTOM VIEW

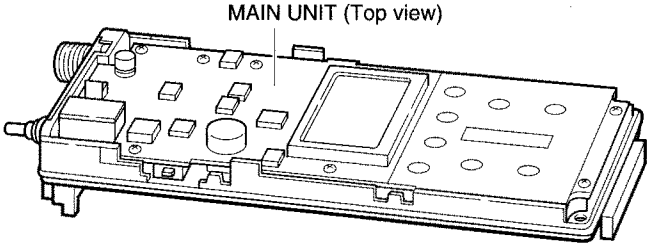


SECTION 3 DISASSEMBLY INSTRUCTIONS

• Removing the chassis panel

① Unscrew 1 nut Ⓐ, and remove 1 nob Ⓑ.
② Unscrew 2 screws, Ⓒ.
③ Take off the chassis in the direction of the arrow.
④ Unplug J6 to separate front panel and chassis.

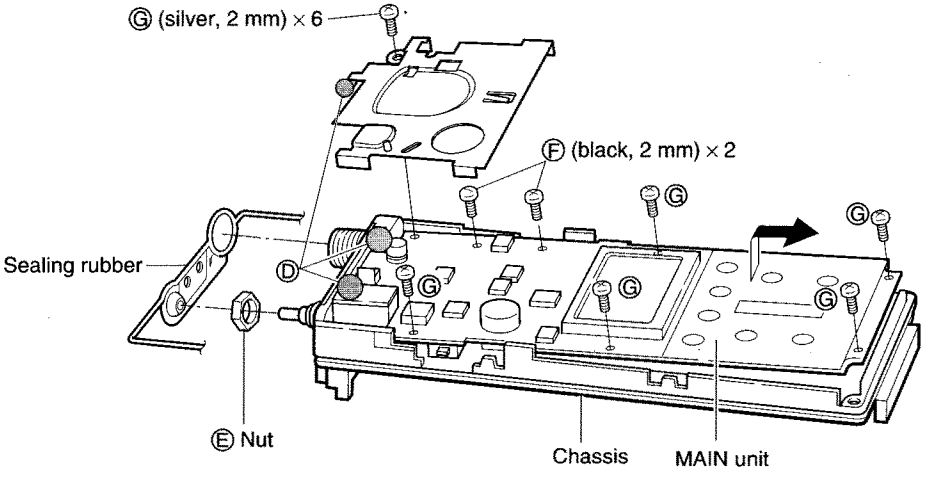




[Chassis panel]

• Removing the MAIN unit

① Remove the sealing rubber.
② Unsolder 3 points Ⓓ and unscrew 1 nut Ⓔ.
③ Unscrew 2 screws, Ⓕ, and 6 screws Ⓖ (silver, 2 mm), to separate the chassis and MAIN unit.
④ Take off the MAIN unit in the direction of the arrow.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

Received signals from the antenna connector are passed through the low-pass filter (L1–L3, C1–C7). The filtered signals are applied to the antenna switching circuit (D8).

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while D8 is turned ON. Thus transmit signals are blocked from entering the receiver circuits. The antenna switching circuit employs a λ/4 type diode switching system. The passed signals are then applied to the RF amplifier circuit.

4-1-2 RF CIRCUIT

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

The signals from the antenna switching circuit are amplified at the RF amplifier (Q12) after passing through the tunable bandpass filter (D9, D10, C83). The amplified signals are applied to the 1st mixer circuit (Q13) after out-of-band signals are suppressed at the tunable bandpass filter (D11, D12, D21, D22, C94).

Varactor diodes are employed at the bandpass filters that track the filters and are controlled by the T1–T4 signals from the CPU (IC13) via the output expander IC. These diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

4-1-3 1st MIXER AND 1st IF CIRCUITS

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

The signals from the RF circuit are mixed at the 1st mixer (Q13) with a 1st LO signal coming from the VCO circuit to produce a 31.05 MHz 1st IF signal.

The 1st IF signal is applied to a pair of crystal filters (FI1) to suppress out-of-band signals. The filtered 1st IF signal is applied to the IF amplifier (Q14), then applied to the 2nd mixer circuit (IC2, pin 16).

4-1-4 2nd IF AND DEMODULATOR CIRCUITS

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

The 1st IF signal from the IF amplifier is applied to the 2nd mixer section of the FM IF IC (IC2, pin 16), and is mixed with the 2nd LO signal to be converted into a 450 kHz 2nd IF signal.

The FM IF IC contains the 2nd mixer, limiter amplifier, quadrature detector and active filter circuits. The 2nd LO signal (30.6 MHz) is produced at the PLL circuit by doubling its reference frequency.

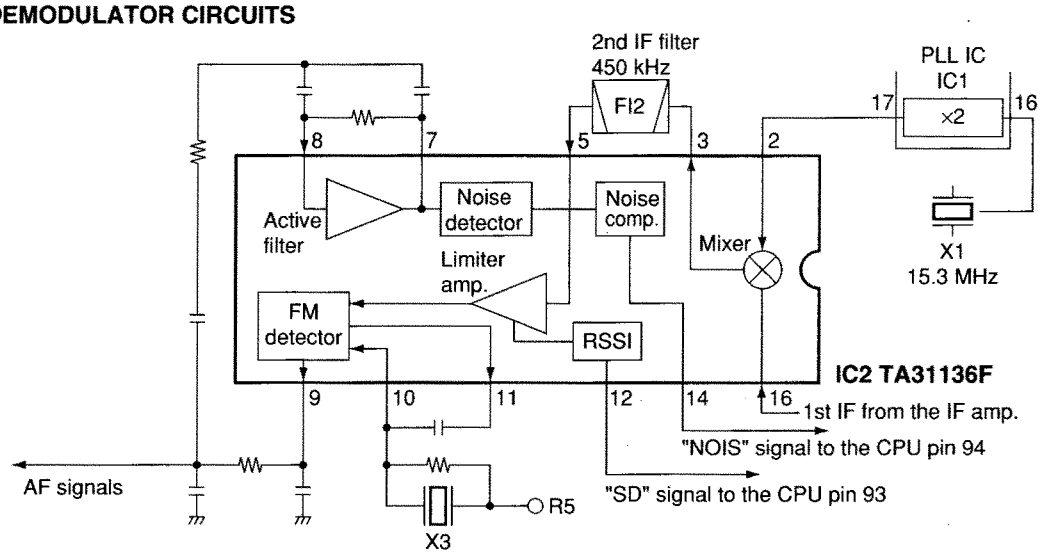
The 2nd IF signal from the 2nd mixer (IC2, pin 3) passes through a ceramic filter (FI2) to remove unwanted heterodyne frequencies. It is then amplified at the limiter amplifier (IC2, pin 5) and applied to the quadrature detector section to demodulate the 2nd IF signal into AF signals.

The AF signals are output from pin 9 of the FM IF IC (IC2) and are applied to the AF circuit.

4-1-5 AF CIRCUIT

AF signals from the demodulator circuit are applied to the analog switch (IC4, pin 1) via the high-pass filter (IC3b, pins 6, 7). The switched signals from pin 2 of the analog switch are passed through the low-pass filter (IC3d, pins 13, 14). The filtered signals are fed back to the analog switch (IC4, pins 10, 11) then applied to the AF power amplifier (IC5, pin 4) after passing through the [VOL] control (VR board, R1).

•2nd IF AND DEMODULATOR CIRCUITS



The AF power amplifier (IC5) amplifies the applied AF signals to a level needed to drive a speaker. The amplified AF signals are output from pin 10 and applied to the internal speaker (SP1) via J3.

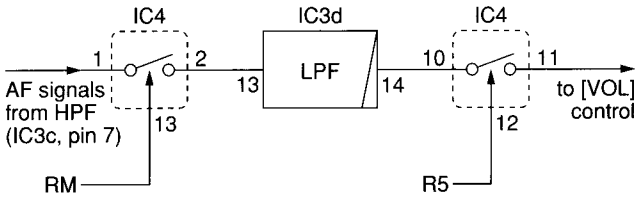
4-1-6 SQUELCH CIRCUIT

A squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the CPU controls one of the analog switches (IC4, pins 1, 2) as an AF mute switch.

A portion of the AF signals from the FM IF IC (IC2, pin 9) are applied to the active filter section (IC2, pin 8). The active filter section amplifies and filters noise components. The filtered signals are applied to the noise detector section and output from pin 14 as the "NOIS" (pulse type) signal. The "NOIS" signal is applied to the CPU (IC13, pin 94).

The CPU detects the receive signal strength from the number of the pulses, and outputs the analog switch control signal (RM) from pin 81. The RM signal is applied to the analog switch (IC4, pin 13) to cut the AF signal line.

• SQUELCH CIRCUIT



4-1-7 WEATHER ALERT DECODER CIRCUIT [USA versions only]

When the weather alert function is activated and a 1050 Hz alert tone signal from an NOAA weather radio broadcast is received, the "ALT" indicator in the function display (LCD) flashes to inform of an emergency weather report on the air.

AF signals from the FM IF IC (IC2, pin 9) are applied to the WX tone decoder (IC12, pin 3). When a 1050 Hz tone signal is detected, the tone decoder outputs a low level signal from pin 8 which is applied to the CPU (IC13, pin 47) to control the "ALT" indicator.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT

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

The AF signals from the microphone are amplified at the microphone amplifier circuit (IC3c, pins 10, 8) and are pre-emphasized with +6 dB/octave at the pre-emphasis circuit (R105, C133). The amplified AF signals are passed through the splatter filter circuit (IC3d, pins 13, 14) via the analog switch (IC4, pins 4, 3). The filtered AF signals are applied to the modulator circuit after passing through the analog switch (IC4, pins 8, 9).

4-2-2 MODULATION CIRCUIT

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

The applied audio signals change the reactance of a diode (D6) to modulate an oscillated signal at the VCO circuit (Q7, Q8). The oscillated signal is amplified at the buffer-amplifiers (Q4, Q6), then applied to the drive amplifier circuit via the T/R switch (D3).

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS

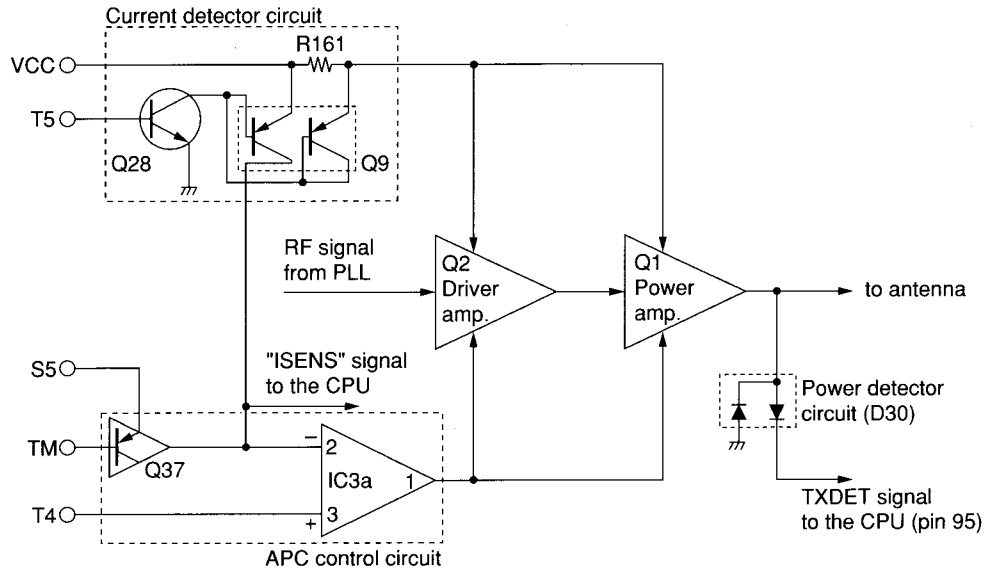
The modulated transmit signal from the VCO circuit passes through the T/R switch (D3) and is amplified at the buffer (Q3), drive (Q2) and power amplifier (Q1) to obtain 5 W of RF power (at 7.2 V DC). The amplified signal passes through the antenna switching circuit (D1), low-pass filter and is then applied to the antenna connector.

The bias current of the drive (Q2) and the power (Q1) amplifiers is controlled by the APC circuit.

4-2-4 CURRENT DETECTOR CIRCUIT

The current detector circuit (Q9, Q28, R161) detects the total driving current of the drive and the power amplifiers, using the current sensor (R161). The differential amplifier (Q9) detects the voltage difference of the current sensor input and output voltages, then outputs control voltage to the APC circuit and the CPU (IC13, pin 92).

• APC circuit



4-2-5 APC CIRCUIT

The APC circuit (IC3a, Q37) protects the drive and the power amplifiers from excessive current, and selects HIGH or LOW output power.

The control voltage from the current sensor circuit (Q9, Q28) is applied to the APC amplifier (IC3a, pin 2), and the "T4" signal from the expander (IC10, pin 14), controlled by the CPU (IC13), is applied to the other input for reference.

When the driving current is increased, input voltage of the APC amplifier (pin 2) will be increased. In such cases, the differential amplifier output voltage (pin 1) is decreased to reduce the driving current.

4-3 PLL CIRCUIT

A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by the divided ratio (N-data) of a programmable divider.

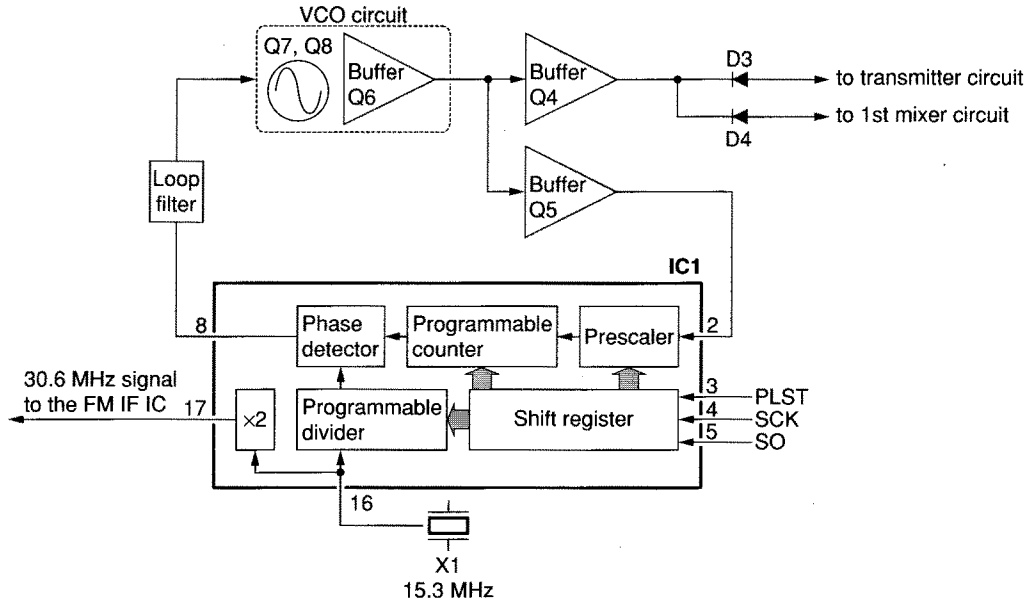
The PLL circuit contains the VCO circuit (Q7, Q8). The oscillated signal is amplified at the buffer-amplifiers (Q6, Q5) and then applied to the PLL IC (IC1, pin 2).

The PLL IC (IC1) contains a prescaler, programmable counter, programmable divider, phase detector and charge pump, etc. The divided signal is detected on phase at the phase detector using the reference frequency.

If the oscillated signal drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the oscillated frequency.

A portion of the VCO signal is amplified at the buffer-amplifier (Q4) and is then applied to the receive 1st mixer or transmit buffer-amplifier circuit via the T/R switch(D3, D4).

• PLL circuit



4-4 POWER SUPPLY CIRCUITS

Line	Description
HV	The voltage from the connected battery pack.
VCC	Same voltage as the HV line controlled by the [VOL] control.
5V	Common 5 V converted from the VCC line at the 5V regulator circuit (IC8, Q18, Q19).
CPU5	Common 5 V converted from the VCC line at the +5CPU regulator (IC6).
S5	Common 5 V converted from the 5V line at the S5 regulator circuit (Q20). The voltage is controlled by the S5C signal coming from the CPU for the power saver function.
R5	Receive 5 V converted from the 5V line at the R5 regulator circuit (Q21). The regulated voltage is applied to the receiver circuits.
T5	Transmit 5 V converted from the 5V line at the T5 regulator circuit (Q22).

4-5 PORT ALLOCATIONS

4-5-1 CPU (IC13)

Pin number	Port name	Description
11–18	ATIS0–ATIS7	Output ports for ATIS signals. (Activates ATIS versions only)
19	SCK	Outputs clock signal.
20	SI	Input port for data signal.
21	SO	Outputs data signal.
22	PLST	Outputs strobe signals for the PLL circuit.
23	DST	Outputs strobe signals for the output expander (IC10).
26	LIGHT	Outputs backlight LED control signal. High : While lit
36	16CH	Input port for the [16/9] switch.
37	CH/WX	Input port for the [CH/WX] switch.
38	SCAN	Input port for the [SCAN] switch.
39	DW	Input port for the [DW] switch.
40	SQL	Input port for the [SQL] switch.
41	H/L	Input port for the [H/L] switch.
42	UP	Input port for the [UP] switch.
43	DOWN	Input port for the [DOWN] switch.
45	PTT	Input port for the [PTT] switch.
46	UNLK	Input port for the PLL unlock signal. Low : While PLL is locked
47	ALT	Input/output port for weather alert tone signal.
77	WXV	Outputs the WX alert regulator circuit (Q39, Q43) control signal Low : While the WX alert is activated.
78	AFON	Outputs to the regulator circuit (Q15, Q16) for AF amplifier control signal. High : While receiving
79	BEEP	Outputs beep audio signals.
80	MM	Outputs microphone audio mute signal. Low : While muted
81	RM	Output receive mute control signal. Low : While squelched
82	TM	Outputs transmit mute control signal. Low : While muted
83	R5C	Outputs the R5 regulator (Q21) control signal. Low : While receiving
84	T5C	Outputs the T5 regulator (Q22) control signal. Low : While transmitting
85	S5C	Outputs the S5C regulator (Q20) control signal. High : While power saved
90	LVIN	Input port for the PLL lock voltage.
91	TEMPS	Input port for internal temperature detection.
92	ISENS	Input port for the current detector circuit (Q9, Q28, R161) for detecting driving current at the drive and power amplifiers.
93	SD	Input port for receive signal strength detection.
94	NOIS	Input port for noise signals (pulse-type) for squelch operation.
95	TXDET	Input port for the power detector (D30) for [TX] indicator operation.
96	BATT	Input port for the connected battery pack for low battery indication.

4-5-2 OUTPUT EXPANDER IC (IC10)

Pin number	Port name	Description
5	FRQCOM	Outputs the reference oscillator (X1) calibration signal.
6	MODCOM	Outputs transmit deviation calibration signal.
11–13	T1–T3	Output tunable bandpass filter control signal.
14	T4	Output port for: • Tunable bandpass filter control signal while receiving. • Output power control signal while transmitting.

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 7.2 V DC Current capacity : 3 A or more	Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
FM deviation meter	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz	AC millivoltmeter	Measuring range : 10 mV–10 V
DC voltmeter	Input impedance : 50 MΩ/V DC or better	External speaker	Input impedance : 8 Ω Capacity : 1 W or more
		Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more

■ TRIMMER ADJUSTMENT

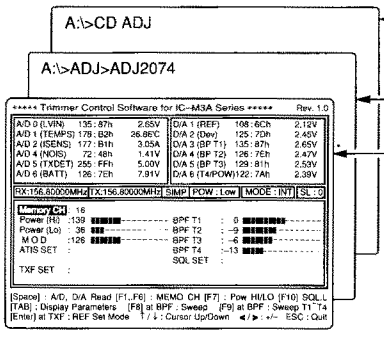
When you adjust the contents on page 5-4, TRIMMER ADJUSTMENT, the optional EX-2076 FIELD PROGRAMMING SOFTWARE (Rev. 1.0 or later) and OPC-478 CLONING CABLE are required. The transceiver must be disassembled when connecting to a computer.

• STARTING TRIMMER ADJUSTMENT

Turn the transceiver power ON, connect a computer to J3 on the MAIN unit using the optional OPC-478 CLONING CABLE, then start up the "ADJ2074" program in EX-2076.

• STARTING THE PROGRAM

① Boot up DOS.
② Insert the EX-2076 backup disk into drive A.
③ Type the following to start up the program:
ADJ>ADJ2074 [Enter]
• The adjustment screen appears after reading set data from the transceiver.
④ After the adjustment screen appears, set or modify the data as desired.



Boot up DOS, and change the directory.

Startup command.

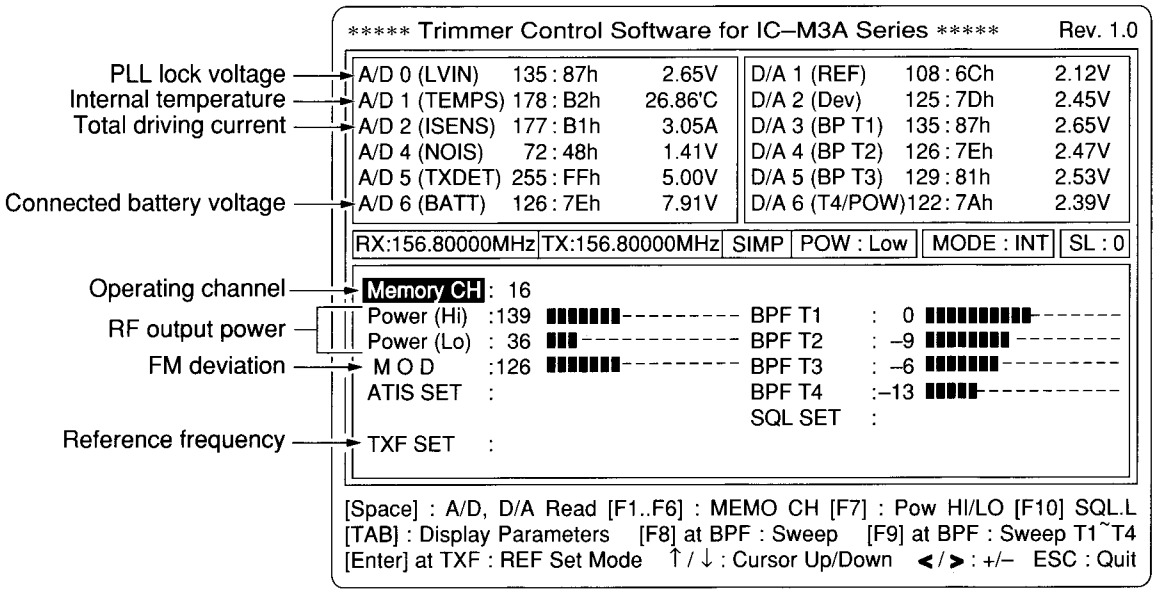
Program starts up, then the adjustment screen appears after reading set data from the transceiver.

NOTE: When the EEPROM (IC7) is replaced or the transceiver displays an error message and beeps, the following operation is necessary before starting the ADJUSTMENT.

1. Download the programmed data using the EX-2076 FIELD PROGRAMMING SOFTWARE (Rev. 1.0 or later) from an exact same version of the transceiver, then save it. (See the instructions for detailed operation.)
2. Return to DOS.
3. Copy the saved data into the "ADJ" directory as follows:
A>CD ADJ [Enter]
A>ADJ>PRG2074 [file name].ICF 1* [Enter]

*RS-232C port number. You have to type the "A>PRG2074 [file name].ICF 2" when the port number is set to "2". This setting can be confirmed in the SETUP window while EX-2076 is running.

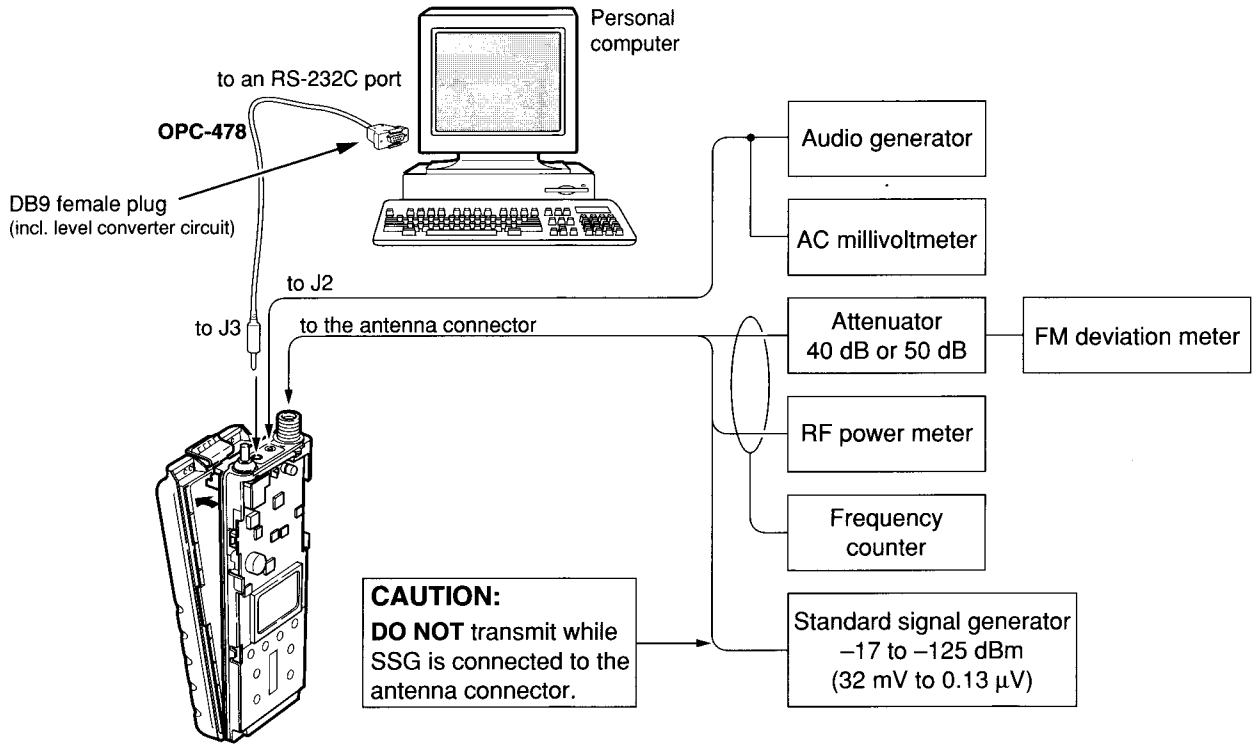
• SCREEN DISPLAY EXAMPLE



NOTE:
The above values for settings are examples only. Each transceiver has its own specific values for each setting.

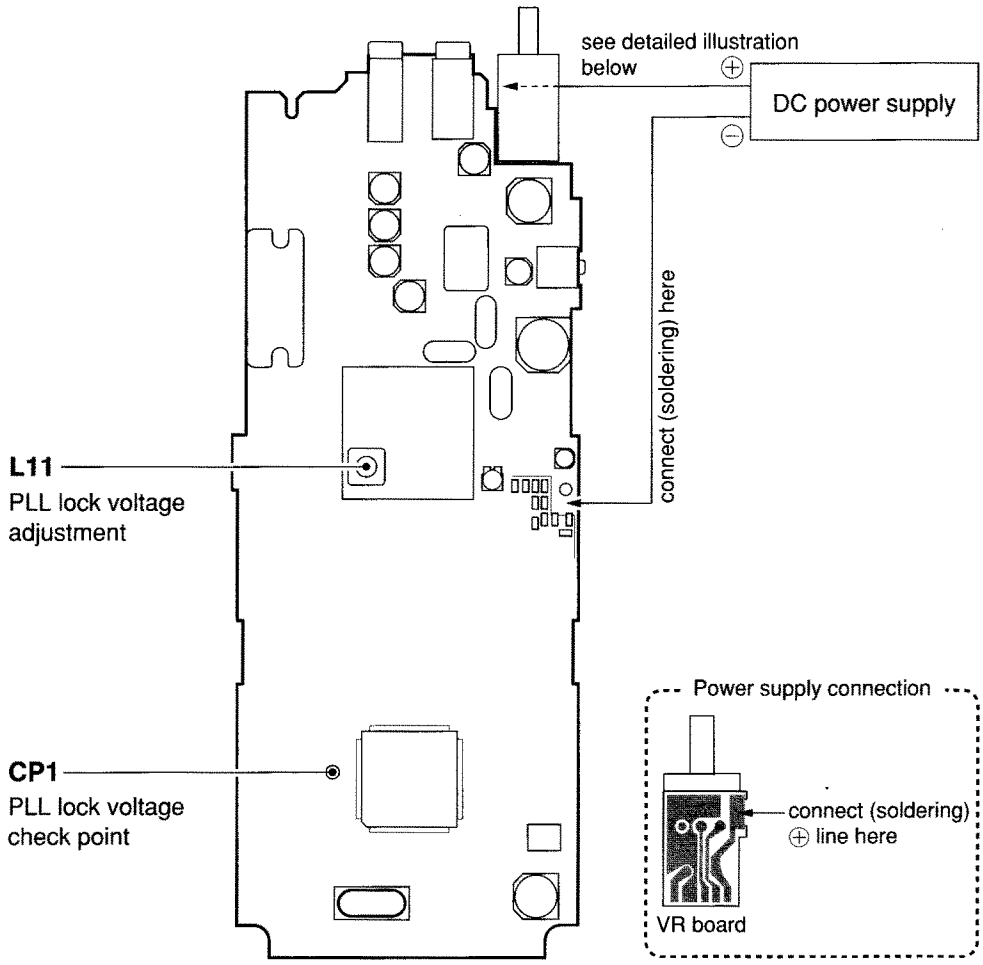
• CONNECTIONS

When connecting a computer to the transceiver for trimer adjustment, the transceiver **MUST BE** disassembled.
See page 3 -1 DISASSEMBLY INSTRUCTIONS for details about disassembly.



5-2 PLL ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT	
			UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1	• Operating channel : CH 16 • Receiving	MAIN	Connect a digital multimeter or an oscilloscope to the check point, "CP1".	2.6 V	MAIN	L11
	2	• Transmitting					Verify



5-3 TRIMMER ADJUSTMENT

Select an operation using [↑]/[↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE
			UNIT	LOCATION	
REFERENCE FREQUENCY [TXF SET]	1	• Operating channel : CH 16 • High/Low switch : Low ([F7] key on the keyboard) • Transmitting*	Top panel	Connect an RF meter or a terminator with loosely coupled frequency counter to the antenna connector.	156.8000000 MHz
	2	• Transmitting*			156.8015700 MHz
		***NOTE: DO NOT** return to receive mode until beep audio is emitted.			
OUTPUT POWER [Power (Hi)]	1	• Operating channel : CH 16 • High/Low switch : High ([F7] key on the keyboard) • Transmitting	Top panel	Connect an RF power meter to the antenna connector.	5.0 W
[Power (Lo)]	2	• High/Low switch : Low ([F7] key on the keyboard) • Transmitting			1.0 W
FM DEVIATION [MOD]	1	• Operating channel : CH 16 • High/Low switch : Low ([F7] key on the keyboard) • Connect an audio generator to J2 on the MAIN unit and set as: 1 kHz/150 mV • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Transmitting	Top panel	Connect an FM deviation meter to the antenna connector through an attenuator.	±4.3 kHz
RECEIVE SENSITIVITY [BPF T1]–[BPF T4]	1	• Operating channel : CH 16 • Connect a standard signal generator to the antenna connector and set as: Frequency : 156.800 MHz Level : 3.2 µV* (–97 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz • Receiving	MAIN	Connect a SINAD meter with an 8 Ω load to J3 on the MAIN unit.	Minimum distortion level
		CONVENIENT: The BPF T1–BPF T4 can be adjusted automatically using one of the following methods: ①-1 Set each to 0, then push the [F9] key. (The cursor must be set to the BPF T1 position.) ①-2 The connected PC tunes BPF T1–BPF T4 to peak levels. or ②-1 Set the cursor to one of BPF T1, T2, T3 or T4 as desired. ②-2 Push [F8] to start tuning. ②-3 Repeat ②-1 and ②-2 to perform additional BPF tuning.			
SQUELCH LEVEL [SQL SET]	1	• Operating channel : CH 16 • Connect an SSG to the antenna connector and set as : Level : 0.14 µV* (–124 dBm) Modulation : OFF • Receiving	MAIN	Connect a speaker (8 Ω) to J3 on the MAIN unit.	At the point where the audio noise just disappears.
	2	• Set an SSG as: Level : 0.45 µV* (–114 dBm) Modulation : OFF • Receiving			At the point where the audio noise just appears.
		NOTE: DO NOT change the stored setting until beep audio is emitted.			

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

SECTION 6 PARTS LIST

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1130007610	S.IC	µPD3140GS-E1 (DS8)
IC2	1110003490	S.IC	TA31136FN(D,EL)
IC3	1110003780	S.IC	NJM2902V-TE1
IC4	1130008090	S.IC	BU4066BCFV-E1
IC5	1110001810	S.IC	TA7368F(TP1)
IC6	1180001080	S.IC	S-81250PG-PD-T1
IC7	1140005620	S.IC	X25080SI-2.7T6
IC8	1180001170	S.IC	S-81250SG-QD-T1
IC10	1110003690	S.IC	M62354GP 75EC
IC11	1110003500	S.IC	S-80742SL-A6-T1
IC12	1110003640	S.IC	BA1604F-T
IC13	1140007260	S.IC	HD6433812SD05H
Q1	1560001050	S.FET	2SK2974
Q2	1560001020	S.FET	2SK2973 (MTS101P)
Q3	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q4	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q5	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q6	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q7	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q8	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q9	1590002160	S.TRANSISTOR	XP6401-(TX)
Q11	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q12	1580000610	S.FET	3SK239XR-TL
Q13	1580000490	S.FET	3SK166-2-T7
Q14	1530002360	S.TRANSISTOR	2SC2714-Y (TE85R)
Q15	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q16	1590001190	S.TRANSISTOR	XP6501-(TX).AB
Q17	1590002530	S.TRANSISTOR	UN911H(TX)
Q18	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q19	1590001190	S.TRANSISTOR	XP6501-(TX).AB
Q20	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q21	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q22	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q23	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q25	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q28	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q31	1590000660	S.TRANSISTOR	DTC144TU T107
Q32	1590000430	S.TRANSISTOR	DTC144EU T107
Q34	1560000540	S.FET	2SK880-Y (TE85R)
Q37	1590000720	S.TRANSISTOR	DTA144EU T107
Q38	1590000430	S.TRANSISTOR	DTC144EU T107
Q41	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q42	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q43	1590000860	S.TRANSISTOR	DTA114YU T107
D1	1790000620	S.DIODE	MA77(TW)
D3	1790000620	S.DIODE	MA77(TW)
D4	1790000620	S.DIODE	MA77(TW)
D5	1720000370	S.VARICAP	HVU350TRF
D6	1790001650	S.DIODE	MA77-(TX).AB
D7	1720000670	S.VARICAP	HVU17TRF
D8	1790000450	S.DIODE	MA862(TX)
D9	1720000370	S.VARICAP	HVU350TRF
D10	1720000370	S.VARICAP	HVU350TRF
D11	1720000370	S.VARICAP	HVU350TRF
D12	1720000370	S.VARICAP	HVU350TRF
D13	1720000370	S.VARICAP	HVU350TRF
D15	1790001280	S.DIODE	MA111(TX)
D19	1790001280	S.DIODE	MA111(TX)
D21	1720000370	S.VARICAP	HVU350TRF
D22	1720000370	S.VARICAP	HVU350TRF
D27	1750000130	S.DIODE	DA204U T107
D28	1790000620	S.DIODE	MA77(TW)
D29	1730002260	S.ZENER	MA8030-H(TX)
D30	1790000490	S.DIODE	HSM88AS-TR
D32	1790001280	S.DIODE	MA111(TX)
D33	1730000820	S.ZENER	RD8.2M-T2B3
FI1	2010002110	CRYSTAL	FL-270 (31.05 MHz)
FI2	2020001270	CERAMIC	CFWM450E

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
X1	6050010300	CRYSTAL	CR-611 (15.300 MHz)
X3	6070000210	S.DISCRIMINATOR	CDBCA450CX24
X4	6050010290	S.CRYSTAL	CR-610 (7.9872 MHz)
L1	6200008400	S.COIL	0.35-1.6-6TL 36N
L2	6200008450	S.COIL	0.35-1.6-5TL 28N
L3	6200008450	S.COIL	0.35-1.6-5TL 28N
L4	6200008460	S.COIL	0.26-0.9-5TR 15N
L5	6200008460	S.COIL	0.26-0.9-5TR 15N
L6	6200002320	S.COIL	LQN 1A 8N8J04
L7	6200006980	S.COIL	ELJRE R10G-F
L8	6200006980	S.COIL	ELJRE R10G-F
L9	6200006980	S.COIL	ELJRE R10G-F
L10	6200006980	S.COIL	ELJRE R10G-F
L11	6200004850	S.COIL	MC152-E558CN-100024
L12	6200003090	S.COIL	NL 322522T-2R7J-3
L13	6200003960	S.COIL	MLF1608A 1R0K-T
L14	6200007000	S.COIL	ELJRE 82NG-F
L15	6200002820	S.COIL	LQN 1A 47NJ04
L16	6200007160	S.COIL	LQN1H 54NK04
L17	6200007160	S.COIL	LQN1H 54NK04
L18	6200002360	S.COIL	LQN 1A 33NJ04
L19	6200002360	S.COIL	LQN 1A 33NJ04
L20	6200004790	S.COIL	MLF1608D R47K-T
L21	6200005740	S.COIL	ELJRE 47NG-F
L22	6200002820	S.COIL	LQN 1A 47NJ04
L23	6200002370	S.COIL	LQN 1A 39NJ04
L24	6200003090	S.COIL	NL 322522T-2R7J-3
L25	6200003960	S.COIL	MLF1608A 1R0K-T
L26	6200003590	S.COIL	EXCCL3225U1
L27	6200003590	S.COIL	EXCCL3225U1
L28	6200006670	S.COIL	ELJRE 68NG-F
L29	6200006980	S.COIL	ELJRE R10G-F
R1	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R2	7030005320	S.RESISTOR	RR0816P-103-D (10 kΩ)
R3	7030006460	S.RESISTOR	RR0816P-152-D (1.5 kΩ)
R5	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R7	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R8	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R9	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R10	7030003310	S.RESISTOR	ERJ3GEYJ 820 V (82 Ω)
R11	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R12	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R13	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R14	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R15	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R16	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R17	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R18	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R19	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R20	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R21	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R22	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R23	7030003420	S.RESISTOR	ERJ3GEYJ 681 V (680 Ω)
R24	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R25	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R26	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R27	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R28	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R29	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R30	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R31	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R32	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R33	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R34	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R35	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R41	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R42	7410000950	S.ARRAY	EXB-V8V 102JV
R45	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R49	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R51	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R52	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R53	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R54	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R55	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R57	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R58	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R59	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R61	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R62	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R63	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R64	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R65	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R66	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R67	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R68	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R69	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R70	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R72	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R75	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R77	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R79	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R80	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R81	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R82	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R83	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R84	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R85	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R86	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R87	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R88	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R93	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R94	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R95	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R96	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R97	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R98	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R99	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R100	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R101	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R102	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R104	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R105	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R106	7410000950	S.ARRAY	EXB-V8V 102JV
R108	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R109	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R112	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R114	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R115	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R116	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R117	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R120	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R121	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R122	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R123	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R126	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R127	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R128	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R130	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R131	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R132	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R133	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R134	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R135	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R137	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R139	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R141	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R142	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R144	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R145	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R146	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R147	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R148	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R149	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R151	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R153	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R154	7030008120	S.RESISTOR	RR0816P-682-D (6.8 kΩ)
R155	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R159	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R160	7030000280	S.RESISTOR	MCR10EZHJ 150 Ω (151)
R161	7030007330	S.RESISTOR	ERJ1WRSJR15U (0.15 Ω)
R162	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R163	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R166	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R167	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R168	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R174	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R175	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R176	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R177	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R178	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R181	7030005870	S.RESISTOR	RR0816R-104-D (100 kΩ)
R182	7510000910	S.THERMISTOR	NTCCF2012 4AH 473KC-T
R184	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R185	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R186	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R187	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R205	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R208	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R209	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R210	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R215	7030005520	S.RESISTOR	RR0816R-334-D (330 kΩ)
R216	7030005630	S.RESISTOR	RR0816R-154-D (150 kΩ)
R222	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R226	7410000950	S.ARRAY	EXB-V8V 102JV
R228	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R232	7410000950	S.ARRAY	EXB-V8V 102JV
R245	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R248	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R249	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R250	7030005320	S.RESISTOR	RR0816P-103-D (10 kΩ)
R251	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R252	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R253	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R255	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R258	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R259	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R261	7030007590	S.RESISTOR	RR0816R-433-D (43 kΩ)
R262	7030003840	S.RESISTOR	ERJ3GEYJ 225 V (2.2 MΩ)
R263	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R265	7410000950	S.ARRAY	EXB-V8V 102JV
R266	7410000950	S.ARRAY	EXB-V8V 102JV
R267	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R268	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R269	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R270	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R271	7410000950	S.ARRAY	EXB-V8V 102JV
R272	7410000950	S.ARRAY	EXB-V8V 102JV
R273	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R274	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R275	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R276	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R277	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R284	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R285	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R286	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R287	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R288	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R289	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R290	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R291	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R292	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R293	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R294	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R295	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R296	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R297	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R298	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R299	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R300	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R302	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R303	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R304	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R305	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R306	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R307	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R308	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R309	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R310	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
C1	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C2	4030011770	S.CERAMIC	C1608 CH 1H 060B-T-A

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C3	4030009990	S.CERAMIC	C1608 CH 1H 200J-T-A
C4	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C5	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C6	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C7	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C8	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A
C13	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C14	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C15	4030007160	S.CERAMIC	C1608 CH 1H 181J-T-A
C17	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C18	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C19	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C20	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C21	4510006970	S.ELECTROLYTIC	ECEV1CA330WR
C22	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C23	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C24	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C25	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C26	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C27	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C28	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C29	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C30	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C31	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C33	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C34	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C35	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C36	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C37	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C38	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A
C39	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C41	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C42	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C45	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C46	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C47	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C48	4550006170	S.TANTALUM	ECST1AY225R
C49	4550006590	S.TANTALUM	ECST1CY684R
C50	4550006200	S.TANTALUM	ECST0JY106R
C51	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C52	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C53	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C54	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C55	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C56	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C57	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C58	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C59	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C60	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C61	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C62	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C63	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
C64	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C65	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C66	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C67	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C69	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C70	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C73	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C75	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C76	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C78	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C79	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C80	4030009350	S.CERAMIC	C1608 CH 1H 3R5B-T-A
C81	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C82	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C83	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C84	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C85	4030007140	S.CERAMIC	C1608 CH 1H 121J-T-A
C86	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C87	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C88	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C89	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C90	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C91	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C92	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C93	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C94	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C95	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C96	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C97	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C98	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C99	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C100	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C101	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
C102	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C104	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C105	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C106	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
C107	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C108	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C109	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C110	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C111	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C112	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C113	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C114	4030008900	S.CERAMIC	C1608 JB 1C 333K-T-A
C115	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C116	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A
C117	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C118	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C119	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C120	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C121	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C122	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C123	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C124	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C125	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C126	4030008770	S.CERAMIC	C1608 JB 1H 562K-T-A
C128	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C129	4550006680	S.TANTALUM	ECST0JY156R
C131	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C132	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C133	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C134	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C135	4030007160	S.CERAMIC	C1608 CH 1H 181J-T-A
C136	4030010770	S.CERAMIC	C1608 JB 1H 392K-T-A
C137	4030008890	S.CERAMIC	C1608 JB 1C 273K-T-A
C138	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C139	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C140	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C141	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C142	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C143	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C144	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C145	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C146	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C147	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C149	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C150	4550006200	S.TANTALUM	ECST0JY106R
C151	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
C152	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C153	4510005370	S.ELECTROLYTIC	ECEV1AA221P
C154	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C155	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C156	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C157	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C158	4510005320	S.ELECTROLYTIC	ECEV0JA101SP
C159	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C160	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C161	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C162	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C163	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C164	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C165	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C166	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C167	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C168	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C169	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C171	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C172	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C173	4510005630	S.ELECTROLYTIC	ECEV1EA330SP
C174	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C175	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C176	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C177	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C179	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C194	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A
C199	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C204	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C205	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C211	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C212	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C217	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C218	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C229	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C230	4550006140	S.TANTALUM	ECST1EY474R
C231	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C232	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C233	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C234	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C237	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C238	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C239	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C240	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C241	4550006200	S.TANTALUM	ECST0JY106R
C242	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C243	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C244	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C245	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C256	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C258	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C259	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C260	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C261	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C262	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C263	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C273	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C274	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C277	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C278	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C280	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A
C281	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C282	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C283	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C284	4030008650	S.CERAMIC	C1608 JB 1H 332K-T-A
C287	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C288	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C289	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C290	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C291	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C292	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C293	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C294	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C295	4340000010	S.MYLAR	ECWU 1C 223JB5
C296	4550000460	S.TANTALUM	TESVA 1C 105M1-8L
C297	4550002890	S.TANTALUM	TESVA 1A 225M1-8L
C298	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C299	4550006050	S.TANTALUM	TEMSVA 0J 106M8L
C300	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C301	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C302	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C305	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C306	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C307	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C308	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C309	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C310	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C311	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C312	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C313	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C314	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C315	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C316	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C317	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C318	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C319	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C320	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C321	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C322	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C323	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C324	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C325	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C326	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C327	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C329	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C330	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A
C333	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C335	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C336	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C337	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C338	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C339	4030008650	S.CERAMIC	C1608 JB 1H 332K-T-A
C340	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
DS1	5030001330	LCD	LM-1403B
DS2	5010000160	S.LED	LNJ310M6URA
DS3	5010000160	S.LED	LNJ310M6URA
DS6	5010000120	S.LED	LN1371G-(TR)
DS7	5010000120	S.LED	LN1371G-(TR)
DS8	5010000120	S.LED	LN1371G-(TR)
DS9	5010000120	S.LED	LN1371G-(TR)
S1	2230000990	SWITCH	EVQ-PJ705K
J2	6450001680	CONNECTOR	HSJ1122-010010
J3	6450001690	CONNECTOR	HSJ1456-01-220
J6	6510007080	CONNECTOR	PI28A-02M
J7	6910010850	CONNECTOR	IMSA-9230B-1-05Z080-T
WS1	8600035800	OTHER	P01MA
SP1	2510000960	SPEAKER	K036NA500-26
MC1	7700002160	MICROPHONE	KUC3523-040245
EP1	0910049793	PCB	B 5089C
EP2	8930046420	LCD CONTACT	SRCN-2074-SP-N-W

[VR BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
R1	7210002950	VARIABLE	RV-312(RK0971110)
EP1	0910049801	PCB	B 5090A

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 CABINET PARTS

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8010017200	2078 Chassis	1
MP2	8210015350	2074 Front panel M3A	1
MP3	8930045840	2074 Key board	1
MP4	8210015370	2074 Contact base	1
MP5	8610010420	Knob N261	1
MP9	8930045890	2074 ANT seal	1
MP10	8310043350	2074 Top plate	1
MP12	8310043080	2074 Window plate	1
MP14	8930042090	1922 Plus terminal	1
MP15	8930042080	1922 Minus terminal	1
MP16	8950004670	Antenna connector-101	1
MP17	8930042030	1922 Main seal	1
MP19	8930046300	1902 Rear sheet (D) [USA]	1
	8930047040	1902 Rear sheet (F) [SEA]	1
MP21	8930042350	1922 MIC sheet	1
MP24	8830001250	ANT connector-101 nut	1
MP25	8830001010	HEX nut (A)	1
MP26	8810000100	Screw PH M2 × 4 ZK	2
MP27	8810009510	Screw PH B0 M2 × 4 NI-ZU (BT)	6
MP28	8810009510	Screw PH B0 M2 × 4 NI-ZU (BT)	1
MP29	8810009510	Screw PH B0 M2 × 4 NI-ZU (BT)	2
MP30	8810009560	Screw PH B0 M2 × 6 ZK (BT)	2
MP31	8810009560	Screw PH B0 M2 × 6 ZK (BT)	2
MP35	8930043760	1923 MIC seal	1
MP37	8930043610	Isolating plate EZ	1

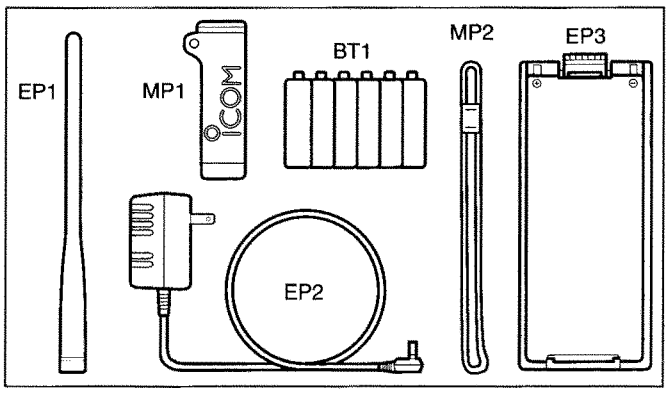
Screw abbreviations: PH: Pan head A0, B0: Self-tapping
NI: Nickel ZK: Black

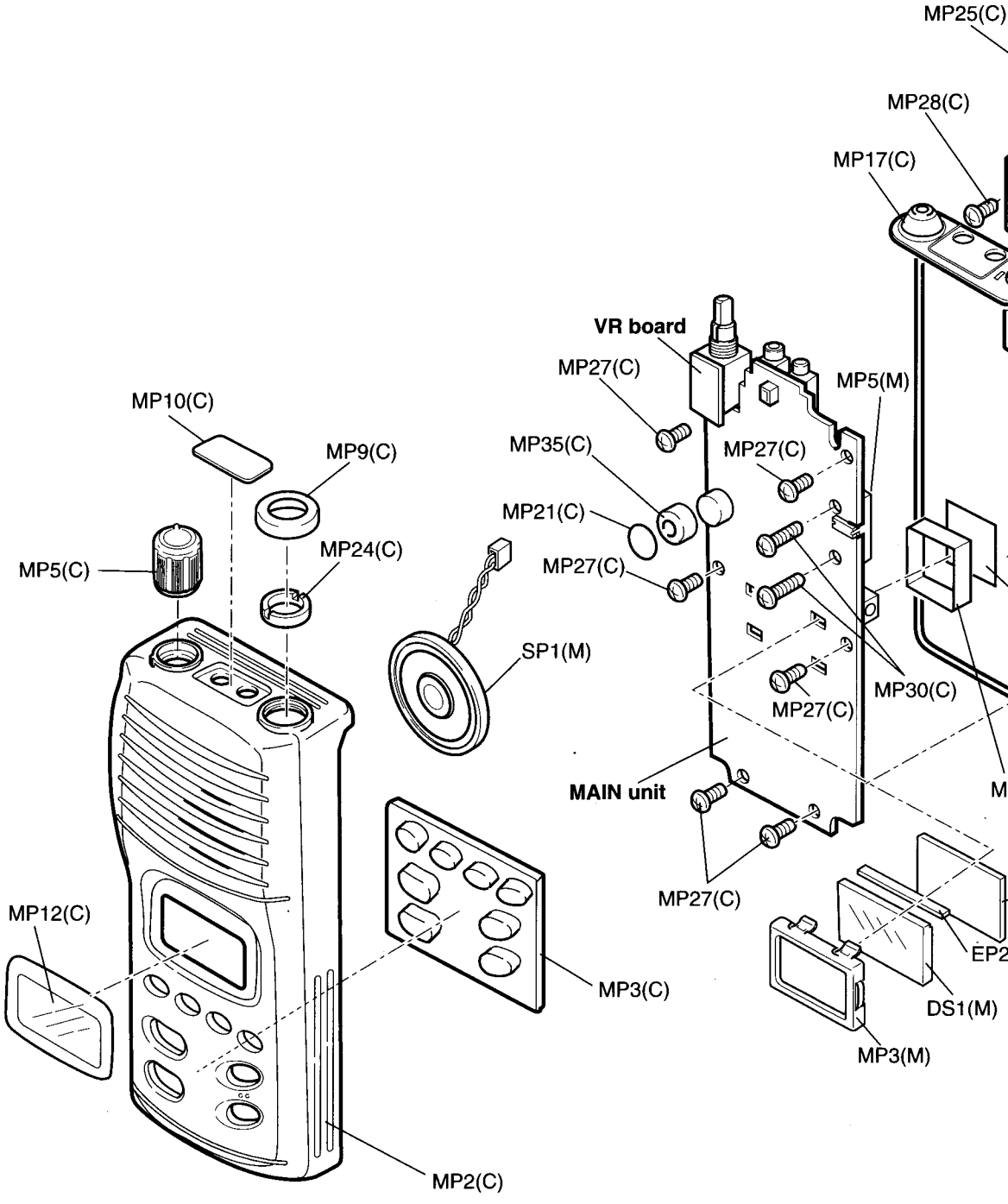
[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8510011111	1922 VCO case-1	1
MP2	8510011101	1922 VCO cover-1	1
MP3	8930045861	2074 LCD holder-1	1
MP4	8930045870	Reflector	1
MP5	8410002230	PA heatsink	1
DS1	5030001330	LCD LM-1403B	1
EP2	8930046420	LCD contact screen SRCN-2074-SP-N-W	1
SP1	2510000960	Specker K036NA500-26A27	1

7-2 ACCESSORIES

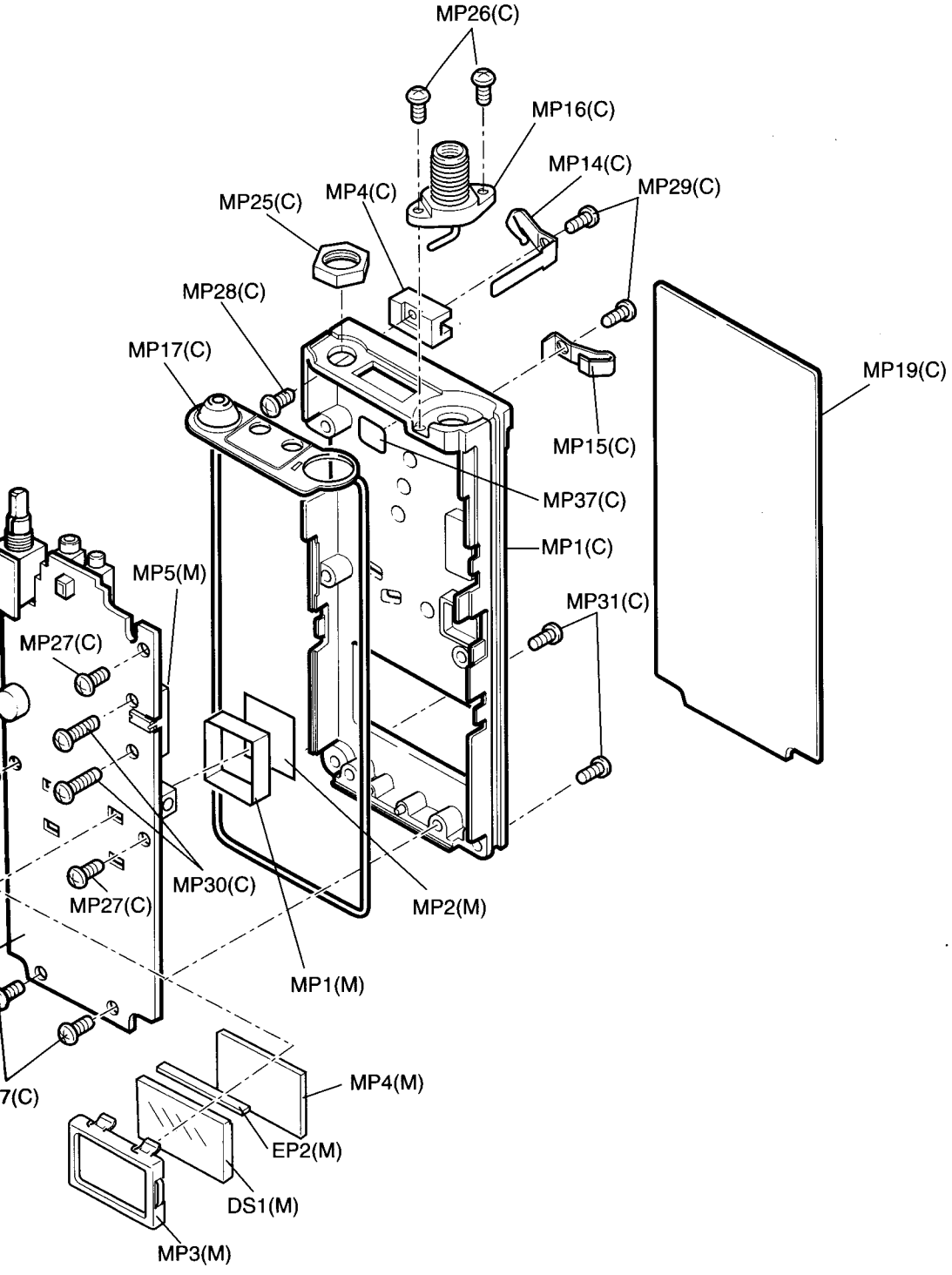
REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	Optional product	Antenna FA-SC54V-1	1
EP2	Optional product	Wall charger BC-131A [USA]	1
		Wall charger BC-110D [SEA] (depending on version)	1
EP3	Optional product	Battery case BP-204	1
BT1	3030000420	Ni-Cd cells KR0.7AAUR-SAFT	1
MP1	Optional product	MB-68	1
MP2	8010011960	Strap belt HK-005	1





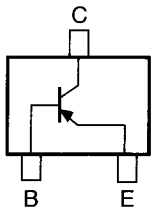
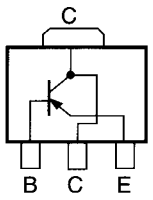
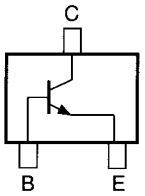
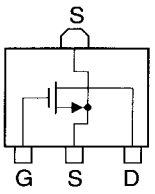
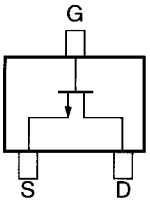
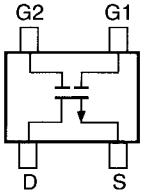
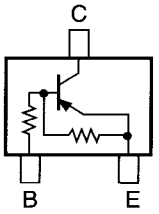
Note

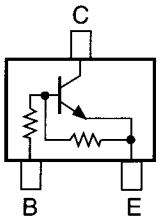
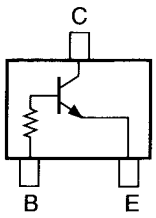
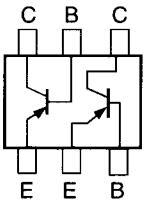
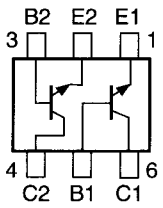
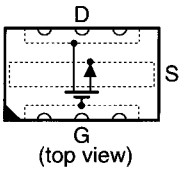
(M) : MAIN unit
(C) : CHASSIS


MP26(C)
MP16(C)
MP14(C)
MP29(C)
MP4(C)
MP25(C)
MP28(C)
MP17(C)
MP19(C)
MP15(C)
MP37(C)
MP1(C)
MP5(M)
MP31(C)
MP27(C)
MP30(C)
MP27(C)
MP2(M)
MP1(M)
7(C)
MP4(M)
EP2(M)
DS1(M)
MP3(M)

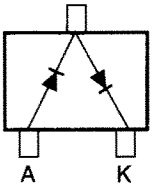
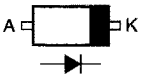
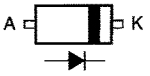
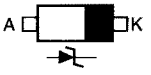
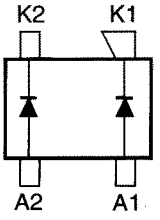
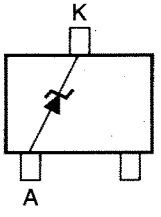
SECTION 8 SEMI-CONDUCTOR INFORMATION

8 - 1 TRANSISTORS

NAME	SYMBOL	INSIDE VIEW
2SA1588-GR	ZG	
2SB1132 - R	BAR	
2SC2712 - Y 2SC2714-Y 2SC4081 - R 2SC4215 - O 2SC4226 - R25	LY QY BR QO R25	
2SK2973	K1	
2SK880 - Y	XY	
3SK166 - 2 - T7 3SK239XR - TL	K XR	
DTA114YU DTA144EU UN911H	54 16 6P	

NAME	SYMBOL	INSIDE VIEW
DTC144EU	26	
DTC144TU	06	
XP6401	5O	
XP6501 - AB	5N	
2SK2974	K2974	

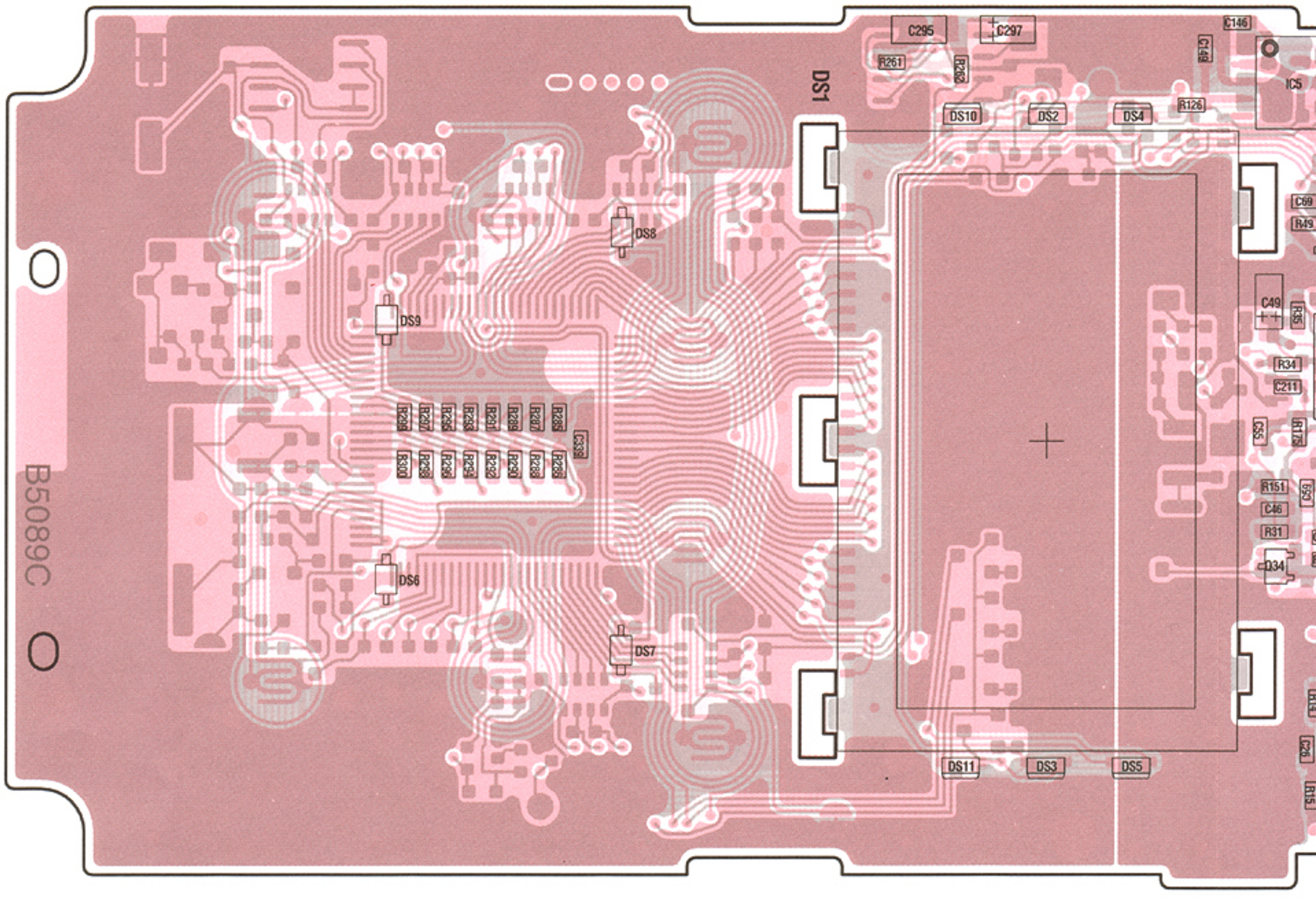
8 - 2 DIODES

NAME	SYMBOL	INSIDE VIEW
DA204U HSM88AS	K C1	
HVU17TRF	E	
MA77	4B	
MA111	1B	
MA8030 - H	3^0	
MA862	M1I	
RD8.2M-T2B3	823	

SECTION 9 BOARD LAYOUTS

9 - 1 MAIN UNIT

• TOP VIEW

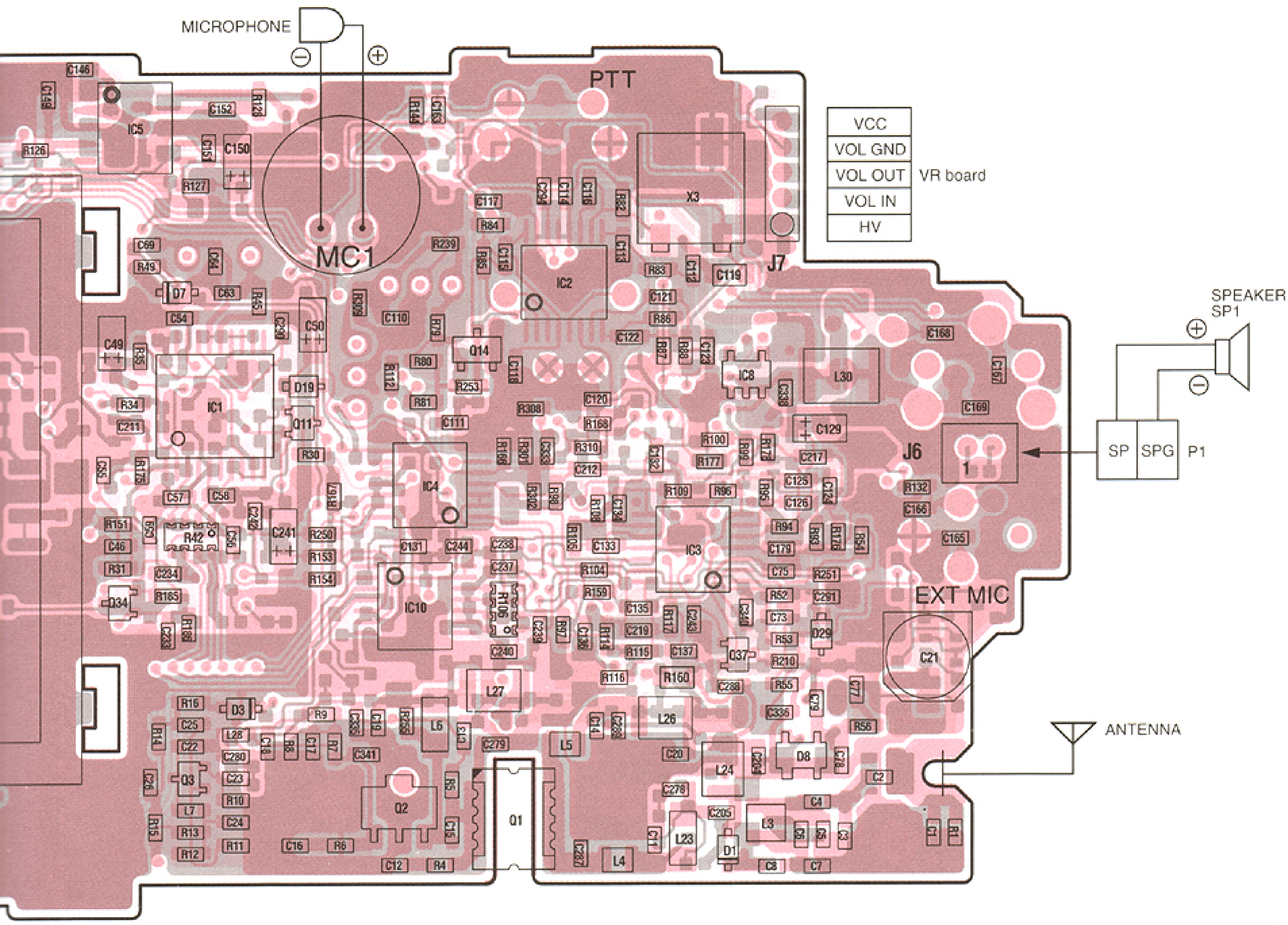


Surface Inside-1 Inside-2 Underside

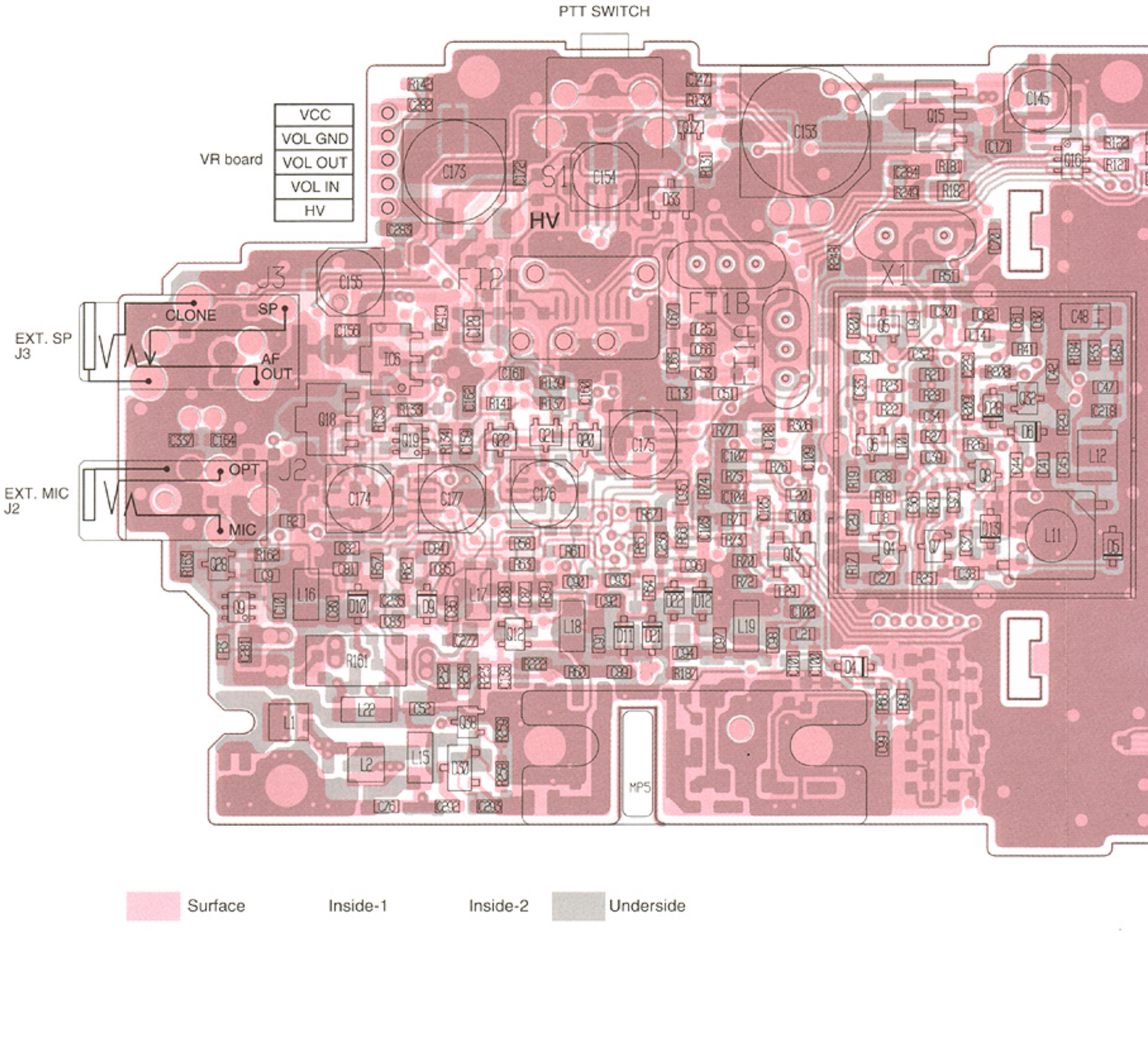
9 - 2 VR BOARD (common)

• TOP VIEW

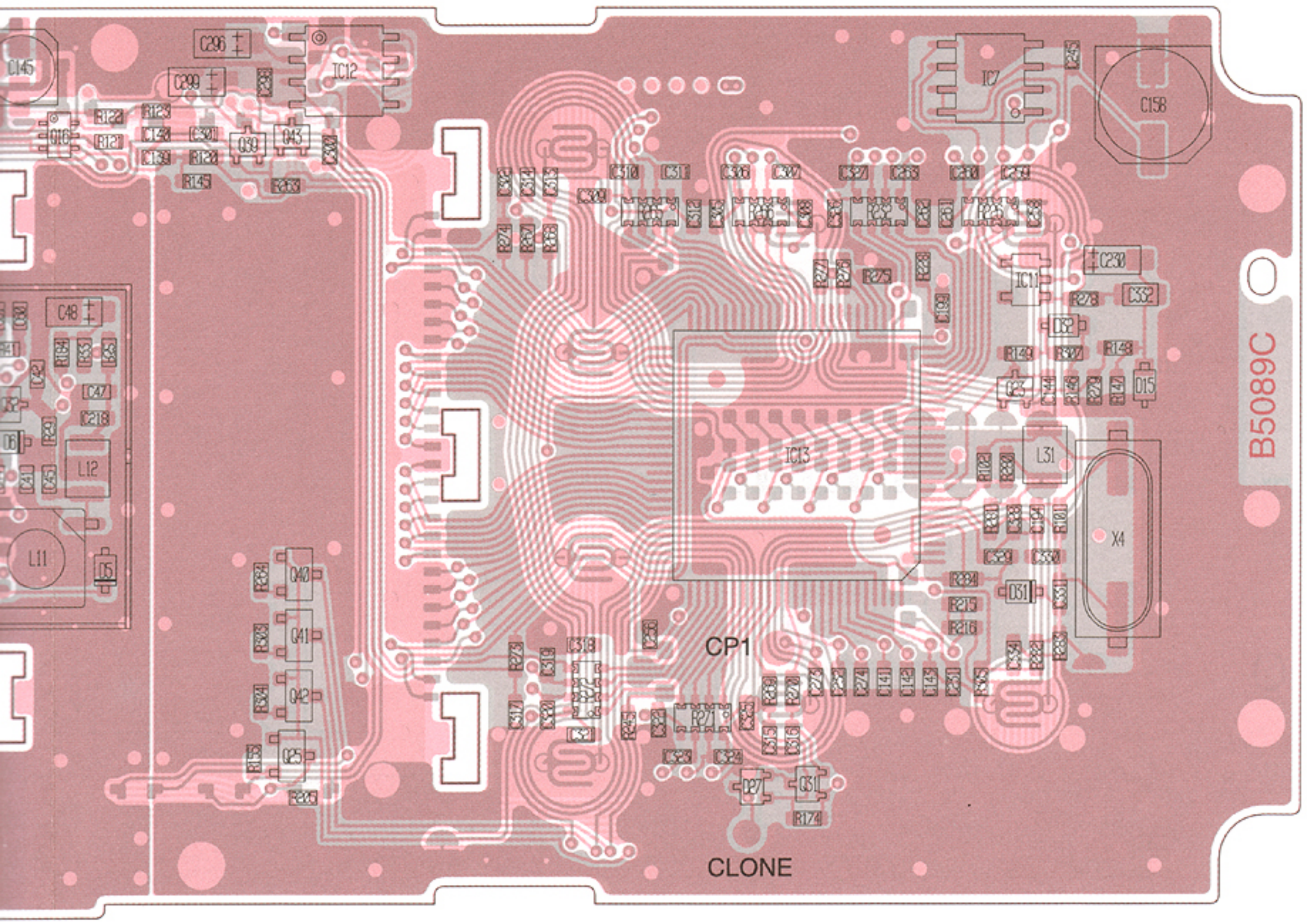
The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.



• **BOTTOM VIEW**

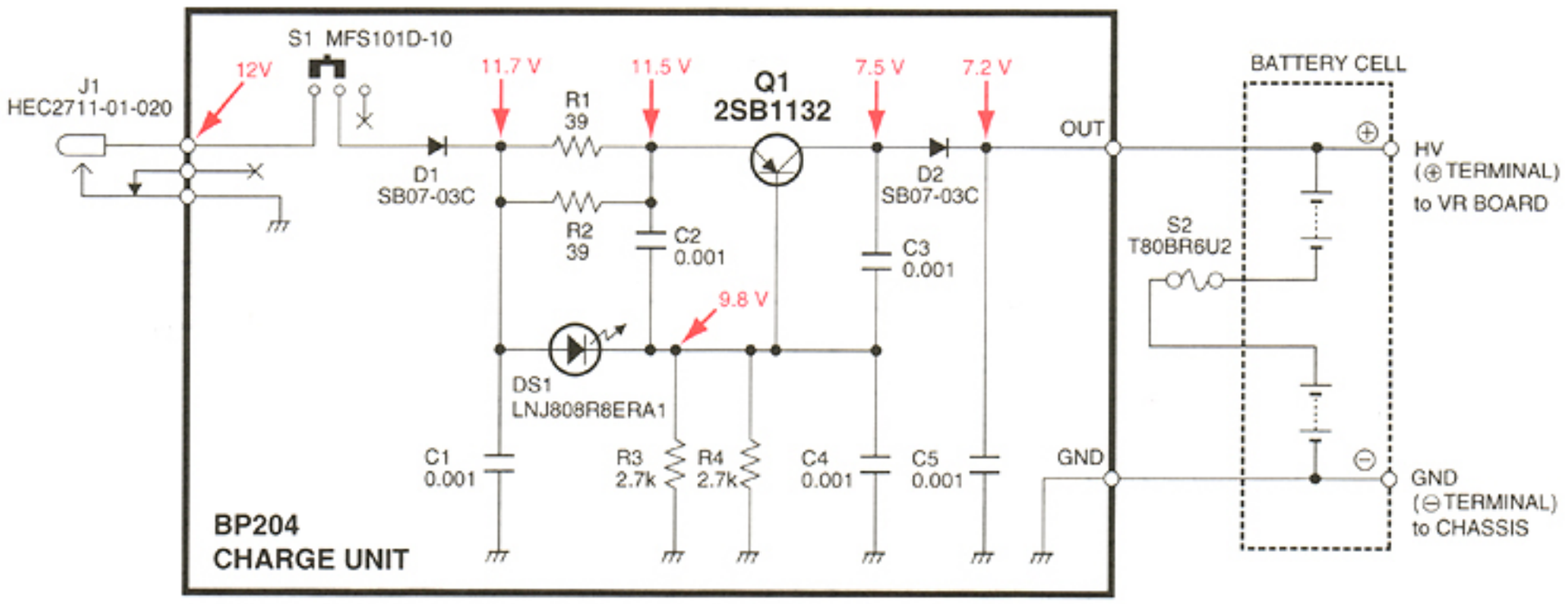

PTT SWITCH
VR board
VCC
VOL GND
VOL OUT
VOL IN
HV
EXT. SP
J3
CLONE
SP
AF
OUT
EXT. MIC
J2
OPT
MIC
S1
HV
FI2
FI1B
FI1A
X1
MP5
Surface
Inside-1
Inside-2
Underside

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

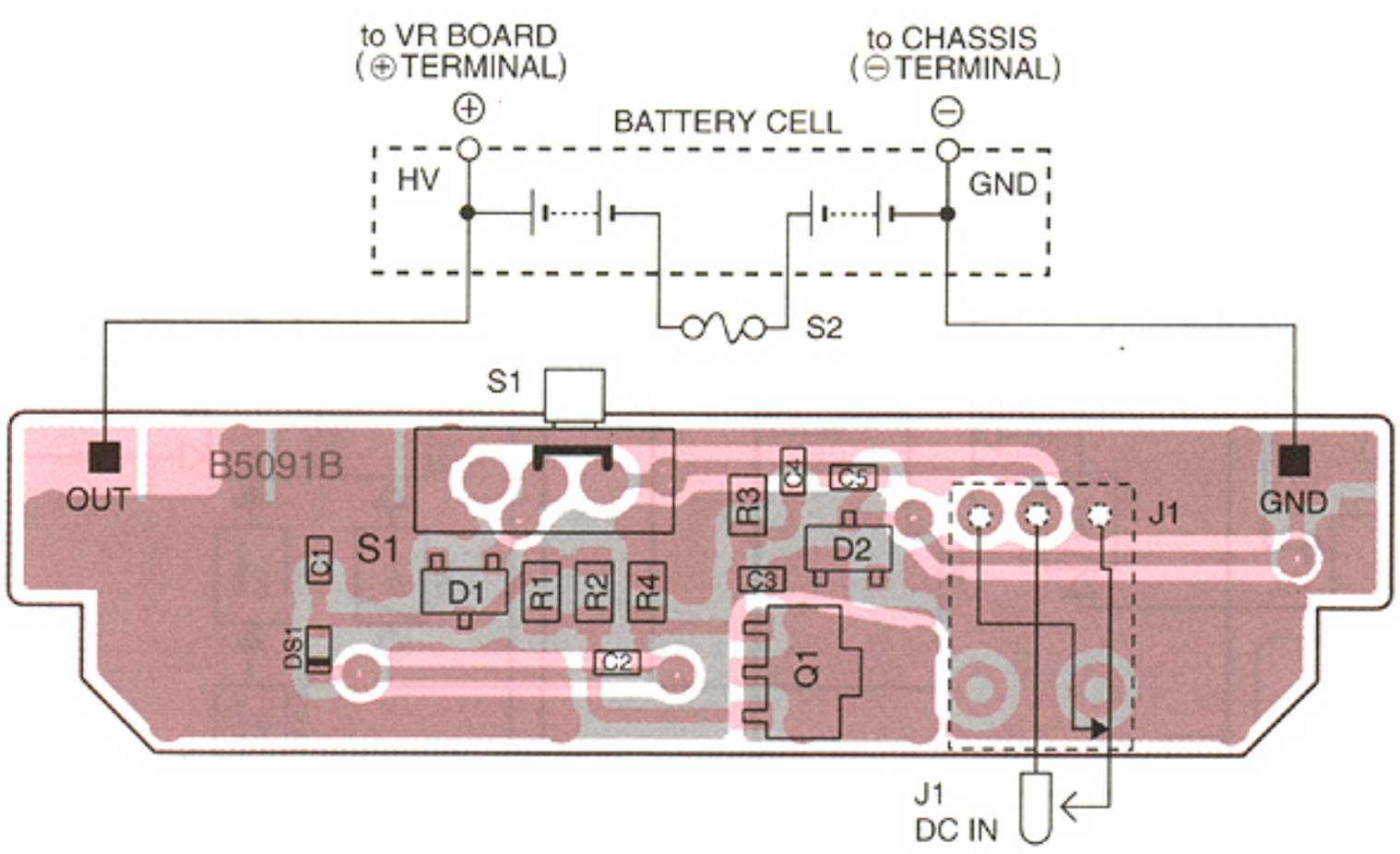


SECTION 10 BATTERY CASE

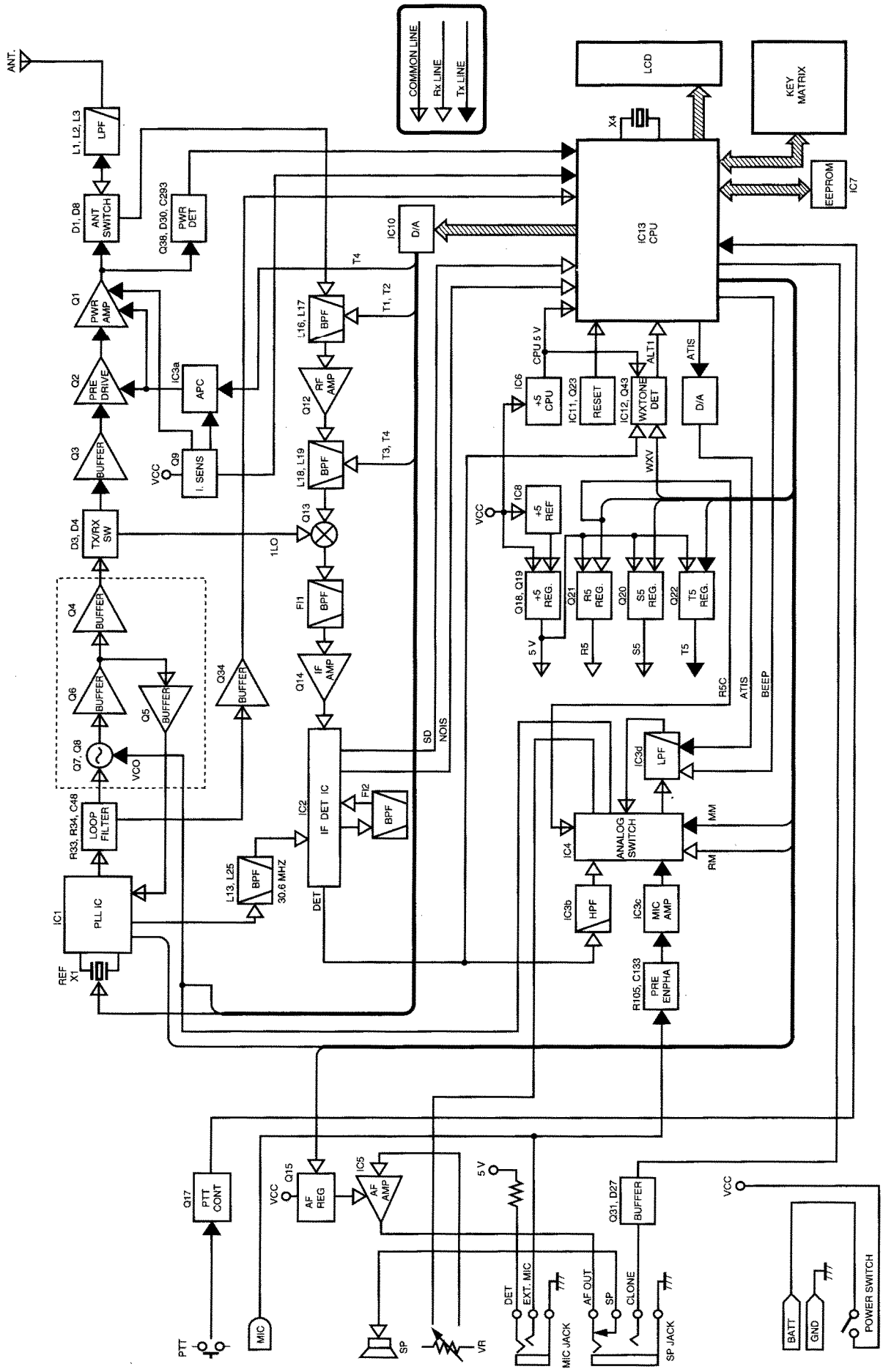
11-1 VOLTAGE DIAGRAM



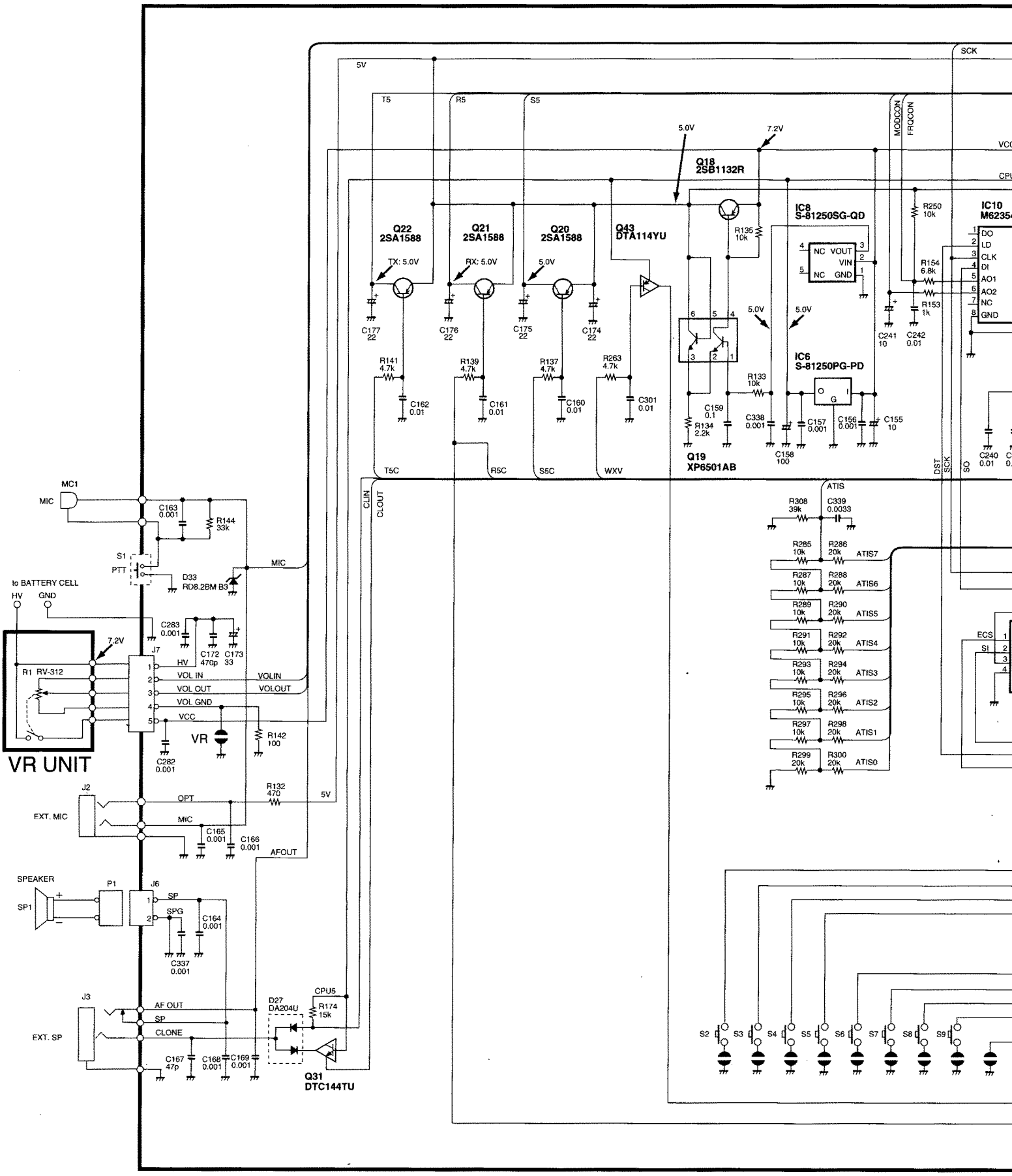
11-2 BOARD LAYOUT

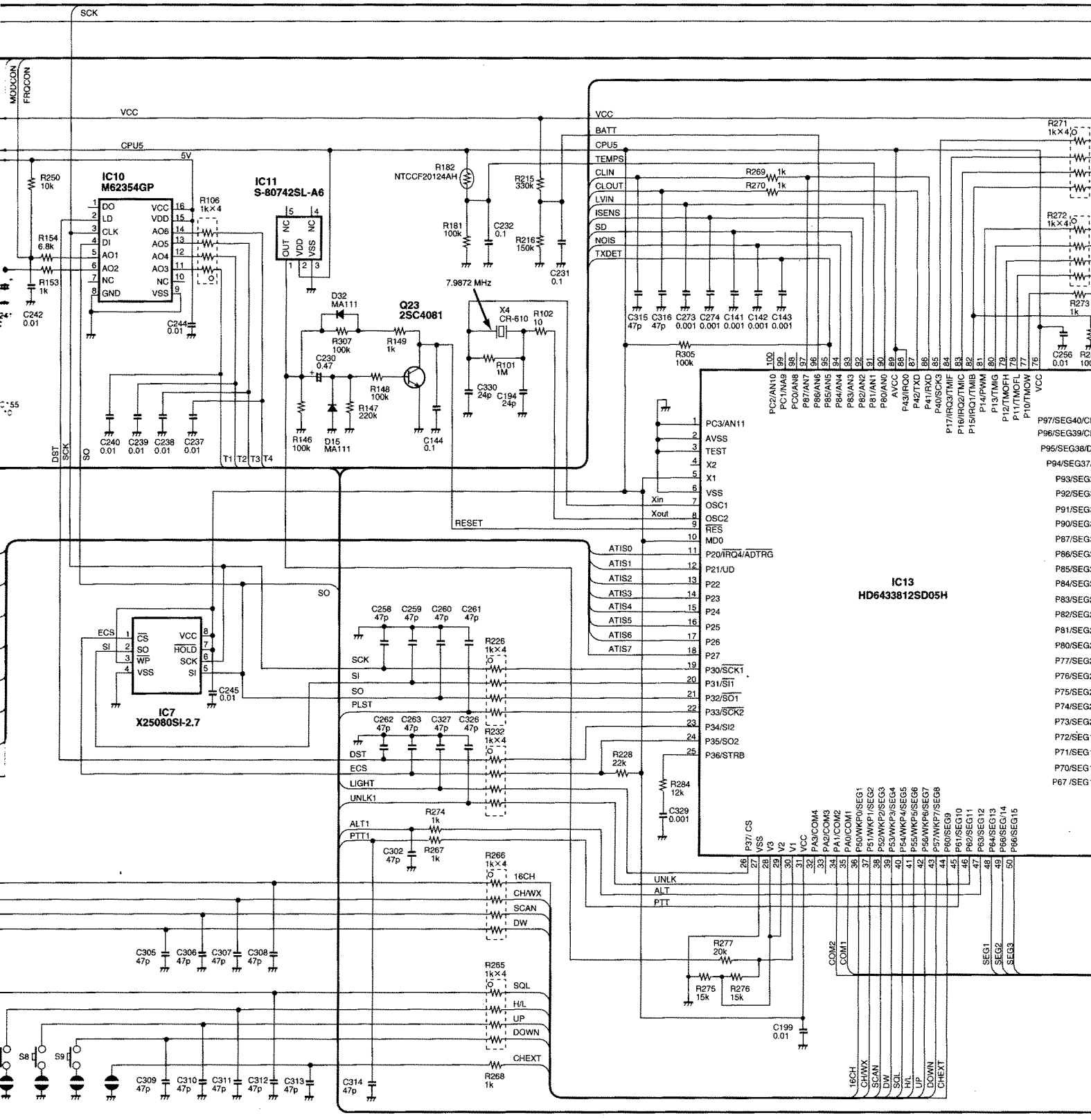


SECTION 11 BLOCK DIAGRAM

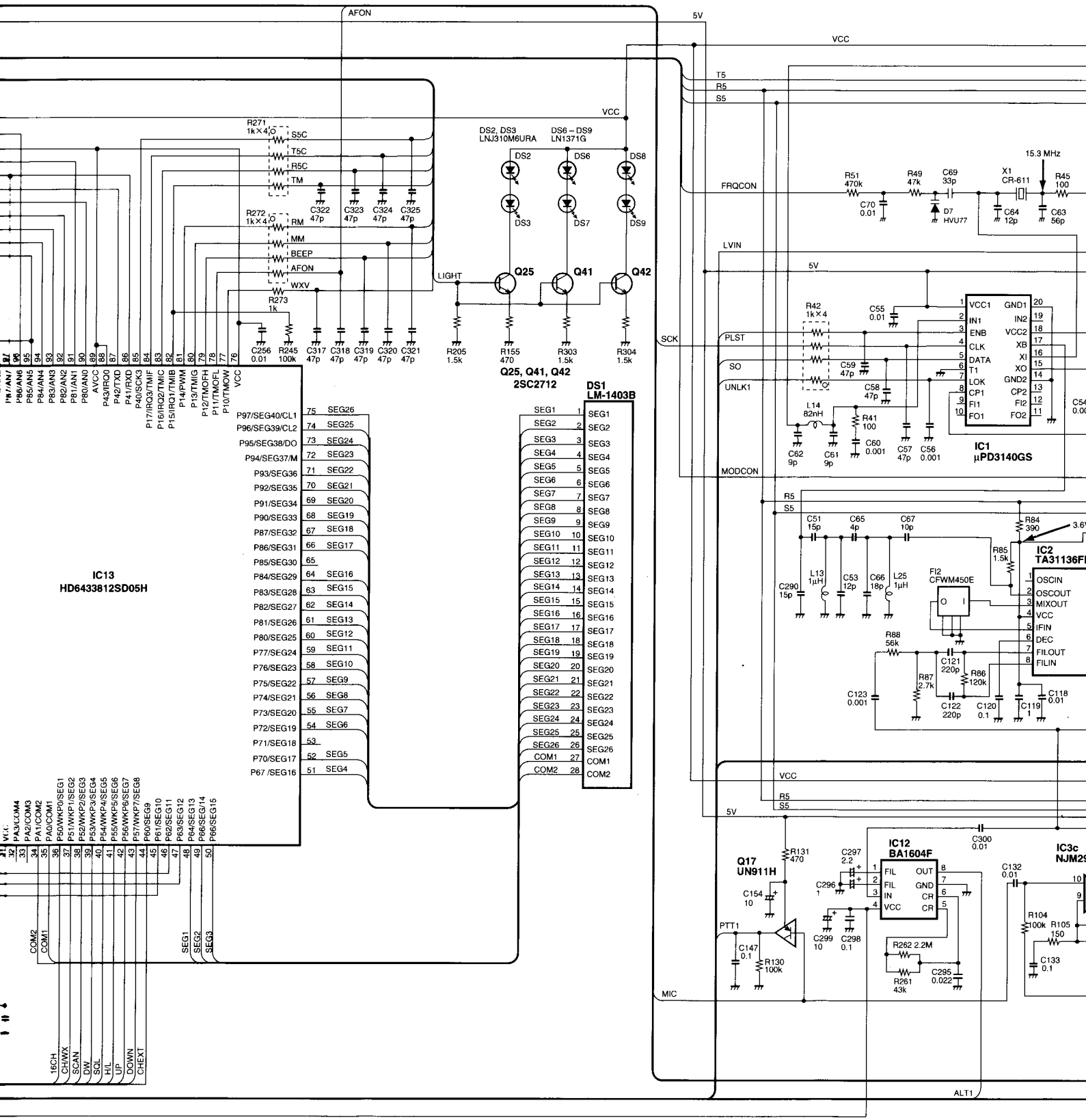


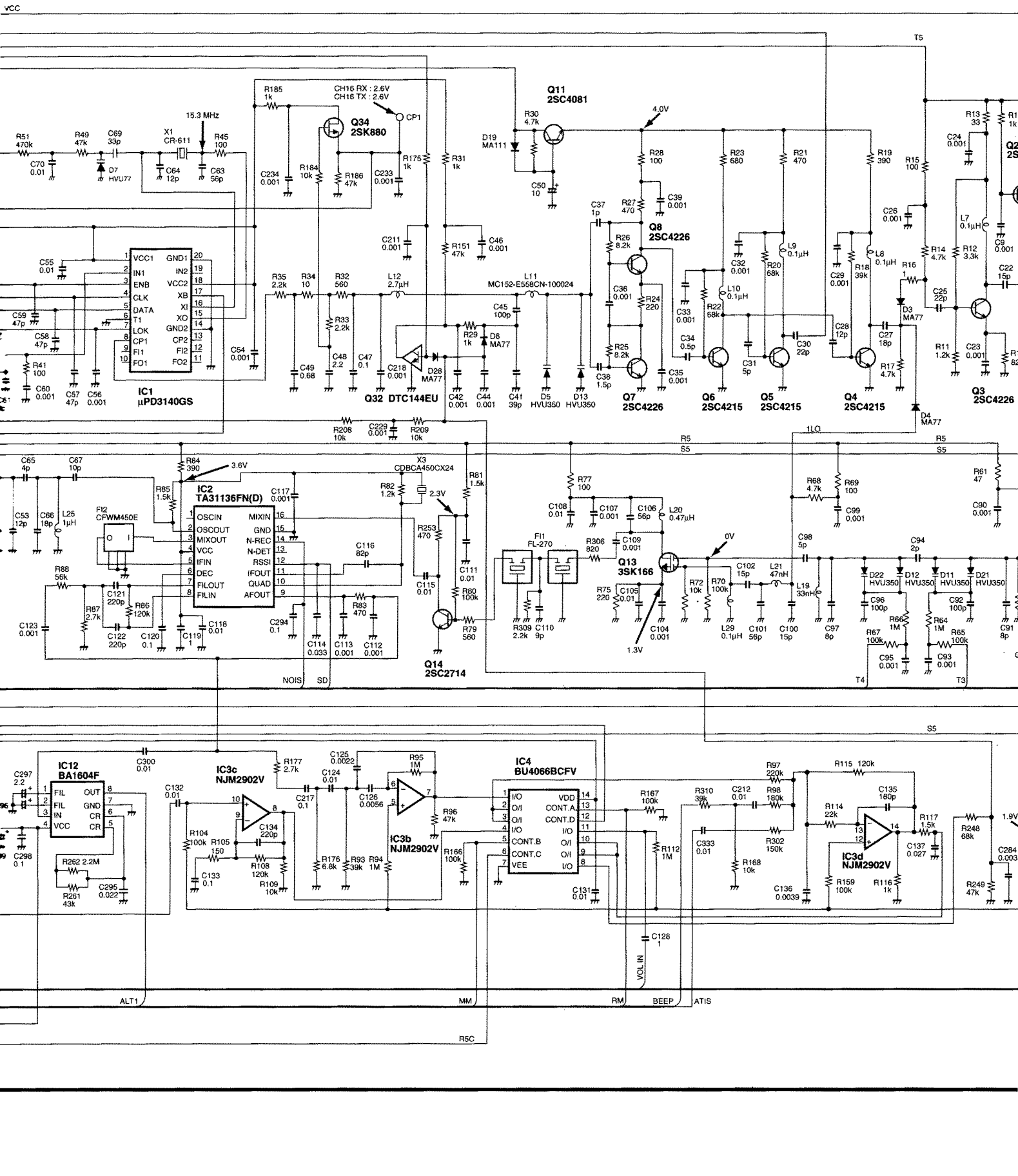
SECTION 12 VOLTAGE DIAGRAM

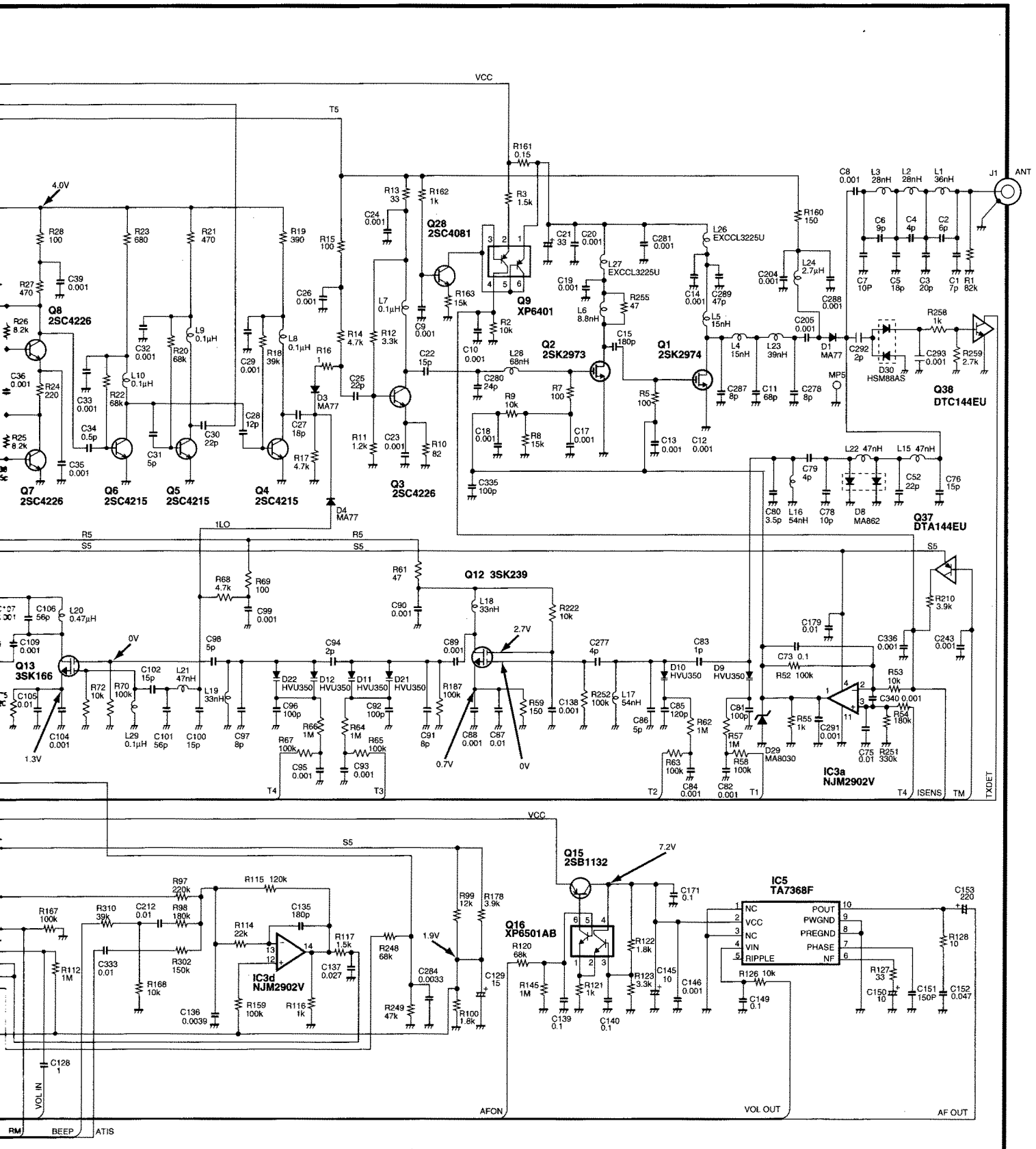



SCK
MODCON
FRQCON
VCC
CPU5
5V
IC10
M62354GP
IC11
S-80742SL-A6
R250 10k
R154 6.8k
R153 1k
C242 0.01
R106 1k×4
C244 0.01
R182 NTCCF20124AH
R181 100k
C232 0.1
R215 330k
R216 150k
C231 0.1
7.9872 MHz
X4 CR-610
R102 10
R101 1M
C330 24p
C194 24p
D32 MA111
Q23 2SC4081
R307 100k
R149 1k
C230 0.47
R148 100k
R147 220k
R146 100k
D15 MA111
C144 0.1
C240 0.01
C239 0.01
C238 0.01
C237 0.01
T1 T2 T3 T4
DST
SCK
SO
BATT
CPU5
TEMPS
CLIN
CLOUT
LVIN
ISENS
SD
NOIS
TXDET
R269 1k
R270 1k
C315 47p
C316 47p
C273 0.001
C274 0.001
C141 0.001
C142 0.001
C143 0.001
R305 100k
R271 1k×4
R272 1k×4
R273 1k
C256 0.01
RESET
Xin
Xout
IC13
HD6433812SD05H
ATIS0
ATIS1
ATIS2
ATIS3
ATIS4
ATIS5
ATIS6
ATIS7
R228 22k
R284 12k
C329 0.001
IC7
X25080SI-2.7
ECS
SI
C245 0.01
C258 47p
C259 47p
C260 47p
C261 47p
R226 1k×4
C262 47p
C263 47p
C327 47p
C326 47p
R232 1k×4
PLST
LIGHT
UNLK1
ALT1
PTT1
C302 47p
R267 1k
R274 1k
R266 1k×4
16CH
CH/WX
SCAN
DW
R265 1k×4
SQL
H/L
UP
DOWN
CHEXT
R268 1k
C305 47p
C306 47p
C307 47p
C308 47p
C309 47p
C310 47p
C311 47p
C312 47p
C313 47p
C314 47p
S8
S9
UNLK
ALT
PTT
R277 20k
R275 15k
R276 15k
C199 0.01
COM2
COM1
SEG1
SEG2
SEG3

MAIN UNIT


AFON
5V
VCC
T5
R5
S5
R271 1k×4
S5C
T5C
R5C
TM
R272 1k×4
RM
MM
BEEP
AFON
WXV
R273 1k
C322 47p
C323 47p
C324 47p
C325 47p
DS2, DS3 LNJ310M6URA
DS6 – DS9 LN1371G
DS2
DS6
DS8
DS3
DS7
DS9
LIGHT
Q25
Q41
Q42
Q25, Q41, Q42 2SC2712
R205 1.5k
R155 470
R303 1.5k
R304 1.5k
C256 0.01
R245 100k
C317 47p
C318 47p
C319 47p
C320 47p
C321 47p
P97/SEG40/CL1
P96/SEG39/CL2
P95/SEG38/DO
P94/SEG37/M
P93/SEG36
P92/SEG35
P91/SEG34
P90/SEG33
P87/SEG32
P86/SEG31
P85/SEG30
P84/SEG29
P83/SEG28
P82/SEG27
P81/SEG26
P80/SEG25
P77/SEG24
P76/SEG23
P75/SEG22
P74/SEG21
P73/SEG20
P72/SEG19
P71/SEG18
P70/SEG17
P67 /SEG16
SEG26
SEG25
SEG24
SEG23
SEG22
SEG21
SEG20
SEG19
SEG18
SEG17
SEG16
SEG15
SEG14
SEG13
SEG12
SEG11
SEG10
SEG9
SEG8
SEG7
SEG6
SEG5
SEG4
IC13
HD6433812SD05H
DS1
LM-1403B
SEG1
SEG2
SEG3
SEG4
SEG5
SEG6
SEG7
SEG8
SEG9
SEG10
SEG11
SEG12
SEG13
SEG14
SEG15
SEG16
SEG17
SEG18
SEG19
SEG20
SEG21
SEG22
SEG23
SEG24
SEG25
SEG26
COM1
COM2
15.3 MHz
X1 CR-611
R51 470k
R49 47k
C69 33p
R45 100
C70 0.01
D7 HVU77
C64 12p
C63 56p
FRQCON
LVIN
R42 1k×4
C55 0.01
C59 47p
C58 47p
L14 82nH
R41 100
C62 9p
C61 9p
C60 0.001
C57 47p
C56 0.001
IC1
µPD3140GS
VCC1
IN1
ENB
CLK
DATA
T1
LOK
CP1
FI1
FO1
GND1
IN2
VCC2
XB
XI
XO
GND2
CP2
FI2
FO2
SCK
PLST
SO
UNLK1
MODCON
C51 15p
C65 4p
C67 10p
R84 390
R85 1.5k
C290 15p
L13 1µH
C53 12p
C66 18p
L25 1µH
FI2 CFWM450E
IC2
TA31136FN
OSCIN
OSCOUT
MIXOUT
VCC
IFIN
DEC
FILOUT
FILIN
R88 56k
C121 220p
R86 120k
R87 2.7k
C123 0.001
C122 220p
C120 0.1
C119 1
C118 0.01
C300 0.01
Q17
UN911H
R131 470
C154 10
PTT1
C147 0.1
R130 100k
C297 2.2
C296 1
C299 10
C298 0.1
IC12
BA1604F
FIL
FIL
IN
VCC
OUT
GND
CR
CR
R262 2.2M
R261 43k
C295 0.022
C132 0.01
R104 100k
R105 150
C133 0.1
IC3c
NJM29
MIC
ALT1
PA3/COM4
PA2/COM3
PA1/COM2
PA0/COM1
P50/WKP0/SEG1
P51/WKP1/SEG2
P52/WKP2/SEG3
P53/WKP3/SEG4
P54/WKP4/SEG5
P55/WKP5/SEG6
P56/WKP6/SEG7
P57/WKP7/SEG8
P60/SEG9
P61/SEG10
P62/SEG11
P63/SEG12
P64/SEG13
P66/SEG14
P66/SEG15
COM2
COM1
SEG1
SEG2
SEG3
16CH
CH/WX
SCAN
DW
SQL
H/L
UP
DOWN
CHEXT


VCC
15.3 MHz
X1 CR-611
IC1 µPD3140GS
IC2 TA31136FN(D)
IC3c NJM2902V
IC3b NJM2902V
IC3d NJM2902V
IC4 BU4066BCFV
IC12 BA1604F
Q11 2SC4081
Q34 2SK880
Q8 2SC4226
Q7 2SC4226
Q6 2SC4215
Q5 2SC4215
Q4 2SC4215
Q3 2SC4226
Q32 DTC144EU
Q13 3SK166
Q14 2SC2714
CH16 RX : 2.6V
CH16 TX : 2.6V
4.0V
3.6V
2.3V
0V
1.3V
L11 MC152-E558CN-100024
X3 CDBCA450CX24
FI2 CFWM450E
FI1 FL-270
D19 MA111
D28 MA77
D6 MA77
D3 MA77
D4 MA77
D5 HVU350
D13 HVU350
D22 HVU350
D12 HVU350
D11 HVU350
D21 HVU350
T5
T4
T3
1LO
R5
S5
NOIS
SD
ALT1
MM
RM
BEEP
ATIS
VOL IN
R5C


VCC
T5
4.0V
Q8
2SC4226
Q7
2SC4226
Q6
2SC4215
Q5
2SC4215
Q4
2SC4215
Q3
2SC4226
Q28
2SC4081
Q9
XP6401
Q2
2SK2973
Q1
2SK2974
Q38
DTC144EU
Q37
DTA144EU
Q12 3SK239
Q13
3SK166
D3
MA77
D4
MA77
1LO
0V
1.3V
2.7V
0.7V
0V
J1
ANT
L26
EXCCL3225U
L27
EXCCL3225U
D1
MA77
D30
HSM88AS
MP5
L22 47nH
L15 47nH
D8
MA862
D10
HVU350
D9
HVU350
D22
HVU350
D12
HVU350
D11
HVU350
D21
HVU350
D29
MA8030
IC3a
NJM2902V
IC3d
NJM2902V
Q15
2SB1132
7.2V
Q16
XP6501AB
1.9V
IC5
TA7368F
NC
VCC
NC
VIN
RIPPLE
POUT
PWGND
PREGND
PHASE
NF
S5
R5
T1
T2
T3
T4
ISENS
TM
TXOET
AFON
VOL OUT
AF OUT
VOL IN
BEEP
ATIS
RM

Icom Inc.

6-9-16, Kamihigashi, Hirano-ku, Osaka 547-0002, Japan
Phone : 06 793 5302
Fax : 06 793 0013

Icom America Inc.

<Corporate Headquarters>
2380 116th Avenue N.E., Bellevue, WA 98004, U.S.A.
Phone : (425) 454-8155
Fax : (425) 454-1509
Telex : 152210 ICOM AMER BVUE

<Customer Service>
Phone : (206) 454-7619

Icom Canada

A Division of Icom America Inc.
3071 #5 Road, Unit 9, Richmond, B.C., V6X 2T4, Canada
Phone : (604) 273-7400
Fax : (604) 273-1900

Icom (Australia) Pty. Ltd.

A.C.N. 006 092 575
290-294 Albert Street, Brunswick, Victoria, 3056, Australia
Phone : 03 9387 0666
Fax : 03 9387 0022

Icom (Europe) GmbH

Communication Equipment
Himmelgeister Str. 100, D-40225 Düsseldorf, Germany
Phone : 0211 346047
Fax : 0211 333639

Icom Telecomunicaciones s.l.

"Edificio Can Castanyer" Crta. Gracia a Manresa km. 14,750
08190 Sant Cugat Del Valles Barcerona, SPAIN
Phone : (3) 589 46 82
Fax : (3) 589 04 46

Icom (UK) Ltd.

Unit 9, Sea St., Herne Bay, Kent, CT6 8LD, U.K.
Phone : 01227 741741
Fax : 01227 741742
Telex : 317210 BUREAU G

Icom France S.a

Zac de la Plaine, Rue Brindejonc des Moulinais
BP 5804, 31505 Toulouse Cedex, France
Phone : 561 36 03 03
Fax : 561 36 03 00
Telex : 521515 ICOM FRA

Count on us!

Icom Inc.
6-9-16, Kamihigashi, Hirano-ku, Osaka 547-0002, Japan

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