

**ICOM**

**SERVICE  
MANUAL**

VHF MARINE TRANSCEIVER

**IC-M58**

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## INTRODUCTION

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This service manual describes the latest service information for the **IC-M58** VHF MARINE TRANSCEIVER at the time of publication.

5 versions of the **IC-M58** have been designed. This service manual covers each version.

VERSION NO.	VERSION	SYMBOL
#01	U.S.A.	USA
#02	U.S.A.	USA-1
#03	Italy	ITA
#04	United Kingdom	UK
#05	France	FRA

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

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## DANGER

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

**DO NOT** expose the transceiver to rain, snow or any liquids. **DO NOT** reverse the polarities of the power supply when connecting the transceiver.

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



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## ORDERING PARTS

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

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

〈SAMPLE ORDER〉

1110003640 IC BA1604F IC-M58 MAIN UNIT 5 pieces  
8810008530 Screw BiH M3×8 SUS IC-M58 Rear Panel 10 pieces

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

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## REPAIR NOTES

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

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# SECTION 1 SPECIFICATIONS

		U.S.A. (#01, #02)	Europe (#03, #04, #05)
<b>GENERAL</b>	Frequency coverage	Transmit 156–157.5 MHz Receive 156–163 MHz	Transmit 156.025–157.425 MHz Receive 156.025–162.025 MHz (#03, #04) 156.3–162.025 MHz (#05)
	Mode	16K0G3E	
	Number of memory channels	25 (24 regular memories and 1 call channel)	
	Power supply requirement	13.8 V DC±15% (negative ground)	13.8 V DC±15% (floating ground) (#04, #05) 13.8 V DC±15% (negative ground) (#03)
	Current drain (at 13.8 V DC)	Transmit high power 6.0 A low power 1.5 A Receive standby 350 mA max. audio output 1.2 A	
	Frequency stability	±0.0005%	±800 Hz
	Usable temperature range	–20°C to +60°C [–4°F to +140°F]	–20°C to +60°C
	Dimensions (Projections not included)	140 (W)×155 (D)×55 (H) mm [5½ (W)×6¾ (D)×2¾ (H) in]	140 (W)×155 (D)×55 (H) mm
	Weight	1.0 kg (2.2 lb)	1.0 kg
<b>TRANSMITTER</b>	Output power	High 25 W Low 1 W	
	Modulation system	Variable reactance phase modulation	
	Maximum frequency deviation	±5.0 kHz	
	Spurious emissions	–70 dB or less	0.25 µW
	Microphone impedance	600 Ω	
	Audio frequency response	+1 dB to –3 dB of +6 dB/octave with 300–3000 Hz input	
	FM noise and hum	–40 dB	
<b>RECEIVER</b>	Receive system	Double-conversion superheterodyne	
	Intermediate frequency	1st 21.8 MHz 2nd 455 kHz	
	Sensitivity	0.32 µV for 12 dB SINAD	0.79 µV (emf) for 20 dB SINAD
	Squelch sensitivity	0.18 µV at threshold	0.5 µV (emf) at threshold
	Adjacent channel selectivity	–70 dB	
	Spurious response rejection	–70 dB	
	Intermodulation rejection	–70 dB	–68 dB
	Audio output power	3.5 W with a 4 Ω load	
	Audio output impedance	4 Ω	
Measurement method	EIA-152-C & EIA-204-D (E)	ETS300 162	

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



## VHF MARINE CHANNEL LIST

Channel number	Frequency (MHz)		INT1	INT2	USA	NOTE	Channel number	Frequency (MHz)		INT1	INT2	USA	NOTE
	Transmit	Receive						Transmit	Receive				
01	156.050	160.650	01	01	—		65	156.275	160.875	65	65	—	
01A	156.050	156.050	—	01A	01A		65A	156.275	156.275	—	65A	65A	
02	156.100	160.700	02	02	—		66	156.325	160.925	66	66	—	
02A	156.100	156.100	—	02A	02A		66A	156.325	156.325	—	66A	66A	
03	156.150	160.750	03	03	—		67	156.375	156.375	67	67	67	NOTE1
03A	156.150	156.150	—	03A	03A		68	156.425	156.425	68	68	68	
04	156.200	160.800	04	04	—		69	156.475	156.475	69	69	69	
04A	156.200	156.200	—	04A	04A		70	156.525	156.525	70	70	70	NOTE3
05	156.250	160.850	05	05	—		71	156.575	156.575	71	71	71	
05A	156.250	156.250	—	05A	05A		72	156.625	156.625	72	72	72	
06	156.300	156.300	06	06	06		73	156.675	156.675	73	73	73	
07	156.350	160.950	07	07	—		74	156.725	156.725	74	74	74	
07A	156.350	156.350	—	07A	07A		75	Guard	Guard	—	—	—	
08	156.400	156.400	08	08	08		76	Guard	Guard	—	—	—	
09	156.450	156.450	09	09	09		77	156.875	156.875	77	77	77	
10	156.500	156.500	10	10	10		78	156.925	161.525	78	78	—	
11	156.550	156.550	11	11	11		78A	156.925	156.925	—	78A	78A	
12	156.600	156.600	12	12	12		79	156.975	161.575	79	79	—	
13	156.650	156.650	13	13	13	NOTE1	79A	156.975	156.975	—	79A	79A	
14	156.700	156.700	14	14	14		80	157.025	161.625	80	80	—	
15	156.750	156.750	15	15	15	NOTE2	80A	157.025	157.025	—	80A	80A	
16	156.800	156.800	16	16	16		81	157.075	161.675	81	81	—	
17	156.850	156.850	17	17	17	NOTE3	81A	157.075	157.075	—	81A	81A	
18	156.900	161.500	18	18	—		82	157.125	161.725	82	82	—	
18A	156.900	156.900	—	18A	18A		82A	157.125	157.125	—	82A	82A	
19	156.950	161.550	19	19	—		83	157.175	161.775	83	83	—	
19A	156.950	156.950	—	19A	19A		83A	157.175	157.175	—	83A	83A	
20	157.000	161.600	20	20	20		84	157.225	161.825	84	84	84	
20A	157.000	157.000	—	20A	20A		84A	157.225	157.225	—	84A	—	
21	157.050	161.650	21	21	—		85	157.275	161.875	85	85	85	
21A	157.050	157.050	—	21A	21A		85A	157.275	157.275	—	85A	—	
22	157.100	161.700	22	22	—		86	157.325	161.925	86	86	86	
22A	157.100	157.100	—	22A	22A		86A	157.325	157.325	—	86A	86A	
23	157.150	161.750	23	23	—		87	157.375	161.975	87	87	87	
23A	157.150	157.150	—	23A	23A		87A	157.375	157.375	—	87A	—	
24	157.200	161.800	24	24	24		88	157.425	162.025	88	88	88	
25	157.250	161.850	25	25	25		88A	157.425	157.425	—	88A	88A	
26	157.300	161.900	26	26	26		Weather channel (U.S.A. version only)						
27	157.350	161.950	27	27	27								
28	157.400	162.000	28	28	28		Frequency (receive only; MHz)						
60	156.025	160.625	60	60	—		01	162.550					
60A	156.025	156.025	—	60A	60A		02	162.400					
61	156.075	160.675	61	61	—		03	162.475					
61A	156.075	156.075	—	61A	61A		04	162.425					
62	156.125	160.725	62	62	—		05	162.450					
62A	156.125	156.125	—	62A	62A		06	162.500					
63	156.175	160.775	63	63	—		07	162.525					
63A	156.175	156.175	—	63A	63A		08	161.650					
64	156.225	160.825	64	64	—		09	161.775					
64A	156.225	156.225	—	64A	64A		10	163.275					

NOTE1: USA channels 13 and 67 functions as momentary high power.

NOTE2: International channel 15 is low power only.

USA channel 15 is receive only.

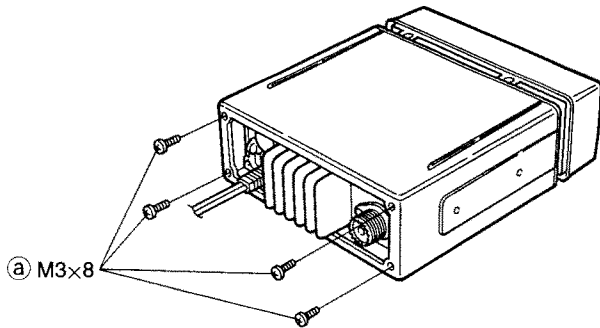
NOTE3: Both International and USA channels 17 and 70 are low power only.

## SECTION 2 DISASSEMBLY AND OPTION INSTALLATIONS

### ● REMOVING THE CASE

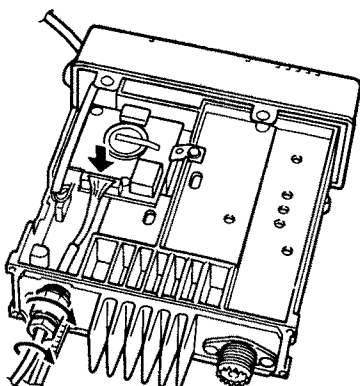
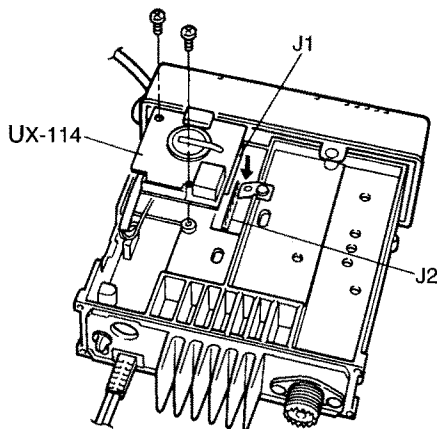
Remove the 4 screws (a), as shown below, and slide the case free of the chassis.

**Note:** When replacing the screws, 10–12 kg of torque MUST be applied to ensure water resistance.



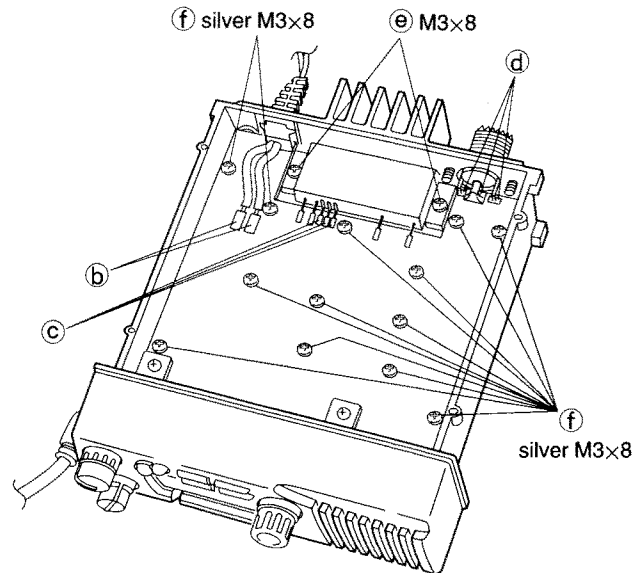
### ● UX-114 DSC UNIT INSTALLATION

- 1 Connect the UX-114 (J1) to the IC-M58 (J2), and secure the UX-114 with the 2 supplied screws as shown below.
- 2 Slide the UX-114's cable through the opening in the rear of the IC-M58.
- 3 Secure the cable to the IC-M58 by rotating the cable nut clockwise, and attach the end to the 7-pin plug on the UX-114.



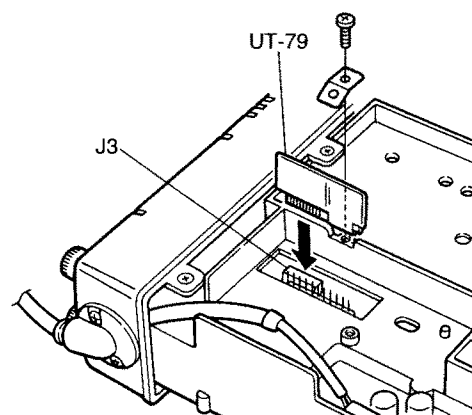
### ● REMOVING THE MAIN UNIT

- 1 Unsolder DC cable (b) (2 points), transistor (c) (3 points) and antenna connector (d) (3 points) as shown below.
- 2 Remove 2 screws (e) and 13 screws (f) to remove the MAIN unit.



### ● UT-79 VOICE SCRAMBLER UNIT INSTALLATION

- 1 Connect the UT-79 to the 14-pin plug (J3) of the IC-M58 as shown below.
- 2 Secure the UT-79 in place with the supplied screw and washer.



## SECTION 3 CIRCUIT DESCRIPTION

### 3-1 RECEIVER CIRCUITS

#### 3-1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit functions as a low-pass filter while receiving and as resonator circuit while transmitting. It switches the flow of the transmitting and receiving signal.

Received signal enter the MAIN unit from the antenna connector and pass through the low-pass filter (L23—L25, C155—C160). The signal are then applied to the antenna switching circuit (D16, D17).

#### 3-1-2 ATTENUATOR CIRCUIT [U.S.A. version only]

The current flow of D17 is controlled by the [SQUELCH] control and the DC amplifier (IC8a). When the [SQUELCH] control is set at deep rotation, the current of D17 is increased. In this case, D17 acts as an attenuator.

#### 3-1-3 RF CIRCUIT

The signal from the antenna switching circuit pass through a tuned bandpass filter (L3, D3) where the object signals are led to the RF amplifier (Q14).

The signals amplified at Q14 are applied to the 3-stage tuned bandpass filter (L2, L4, L5, D4—D6) to eliminate the out-of-band signals and improve the selectivity. The signals are then applied to the 1st mixer circuit (Q15, Q16).

The PLL lock voltage (PD signal) is used as control voltage of the varactor diodes (D3—D6). The PD signal from the PLL circuit (Q36) via Q34 is current-amplified by IC8b, and is then applied to these diodes.

#### 3-1-4 1ST MIXER CIRCUIT

The IC-M58 employs a balanced mixer circuit (Q15, Q16, L6) as a 1st mixer circuit to obtain a high intermodulation rejection ratio. The mixer circuit mixes the received signals and 1st LO signal from the VCO circuit (Q22) to produce a 21.8 MHz 1st IF signal.

#### 3-1-5 1ST IF CIRCUIT

The 1st IF signal from L7 is applied to F12. F12 is a pair of crystal filters which only picks up on object signal with sufficient selectivity. This signal is amplified by the IF amplifier (Q17) and is then applied to the 2nd mixer circuit.

#### 3-1-6 2ND IF AND FM DETECTOR CIRCUITS

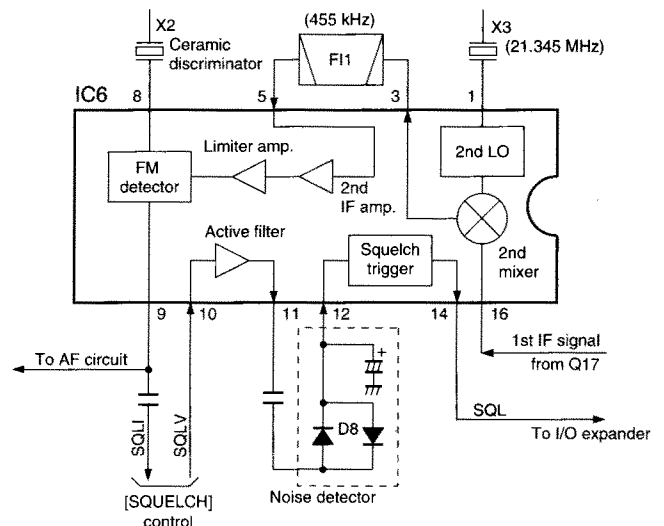
IC6 contains the 2nd LO circuit, 2nd mixer circuit, limiter amplifier circuit, quadrature detector circuit and squelch trigger circuit.

The 1st IF signal from Q17 is applied to the 2nd mixer section of IC6 (pin 16), and is mixed with a 21.345 MHz 2nd LO signal generated by X3 to produce a 455 kHz 2nd IF signal.

The 2nd IF signal from IC6 (pin 3) is passed through the ceramic filter (F11), where unwanted signals are suppressed, and is then applied to the 2nd IF and limiter amplifiers in IC6 (pin 5). The signal is applied to the FM detector section in IC6 to demodulate into an AF signal.

The FM detector circuit employs a quadrature detection method (linear phase detection), which uses a ceramic discriminator (X2) for phase delay to obtain non-adjusting circuit. The detected signal from IC6 (pin 9) is applied to the AF circuit.

#### FM DETECTOR AND SQUELCH CIRCUITS



#### 3-1-7 SQUELCH CIRCUIT

In an FM receiver, audio noise is produced in its IF and AF circuits when receiving no RF signal. However, the noise is suppressed when receiving a signal. The noise squelch circuit acts in accordance with this phenomenon.

Noise components in the detected signal (20 kHz or higher) from IC6 (pin 9) are passed through the [SQUELCH] control, and are amplified at the active filter in IC6 (pin 10). They are detected by D8 to convert to DC voltage. The squelch trigger circuit in IC6 (pin 12) converts to HIGH or LOW squelch switch signal (SQL).

The SQL signal from IC6 (pin 14) is applied to the CPU through the I/O expander (IC13, pin 6).

### 3-1-8 AF AMPLIFIER CIRCUIT

AF signal output from IC6 (pin 9) is entered to the optional voice scrambler unit to demodulate the scrambled audio, or bypassed the unit via the analog switch (IC11, pins 8, 9). The signal is then applied to the de-emphasis circuit (R43, C45). This de-emphasis circuit is an integrated circuit with frequency characteristics of  $-6$  dB/octave.

The resulting signal is applied to active filters (Q9, Q10). Q9 functions as a high-pass filter to suppress unwanted lower noise signals and Q10 functions as a low-pass filter to suppress higher noise signals.

The filtered signal is passed through the [VOL] control and AF mute switch (Q11), and is then applied to the AF power amplifier (IC5, pin 1). Output signal from IC5 (pin 4) drives the internal speaker.

## 3-2 TRANSMITTER CIRCUITS

### 3-2-1 MICROPHONE AMPLIFIER CIRCUIT

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

The signals from the microphone are amplified at the microphone amplifier (IC4). A capacitor (C25) and resistor (R15) are connected to the amplifier to obtain the pre-emphasis characteristics.

The amplified signals are entered to the optional voice scrambler unit to scramble the audio via the "MICA0" line, or bypassed the unit via R18 and the analog switch (IC11, pins 10, 11).

The signals pass through the analog switch (IC11, pins 3, 4) and are applied to the limiter amplifier (IC3a) to be limited in frequency deviation, and are then to the splatter filter (IC3b) where signals of 3 kHz or higher are eliminated.

### 3-2-2 MODULATION CIRCUIT

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

Audio signals from IC3b passed through the frequency deviation control (R34) are applied to the modulation circuit (D10) to change the reactance of D10, and modulate the oscillated signal.

### 3-2-3 DRIVE AMPLIFIER CIRCUIT

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

The VCO output is buffer-amplified by Q22 and Q23, and is applied to the Tx/Rx switch (D13). Tx signal from D13 is

amplified at the predrive (Q24) and drive (Q25) amplifiers to obtain an approximate  $+23$  dBm (200 mW) signal level. The signal is applied to the RF power amplifier (IC7).

### 3-2-4 POWER AMPLIFIER CIRCUIT

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

IC7 is a power module which has amplification capabilities of up to about 35 W. The output from IC7 (pin 4) is passed through the antenna switching circuit and is then applied to the antenna connector.

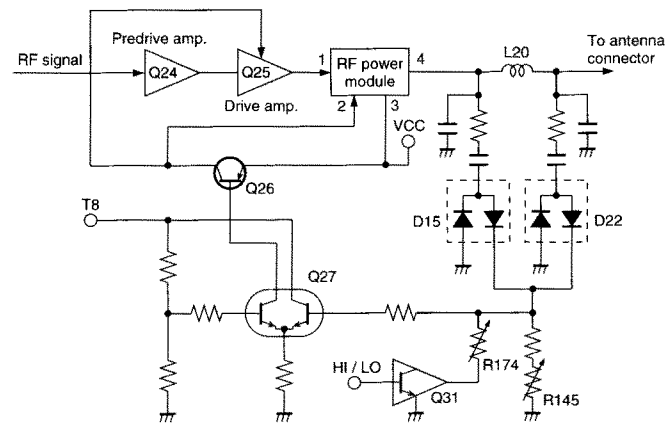
### 3-2-5 APC CIRCUIT

The APC circuit stabilizes RF output power with high/low power selection even when the supplied voltage changes.

A portion of the RF output from the power module (IC7) is detected by the power detection circuit (L20, D15, D22). The detected signal is passed through High/Low control circuit (R146, R174, Q31) and is applied to one of the differential amplifier input (Q27).

When the output power is lower than the set level, the differential amplifier (Q27) controls Q26 to increase the collector current. Thereby increases the power to the set level.

### APC CIRCUIT



## 3-3 PLL CIRCUITS

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

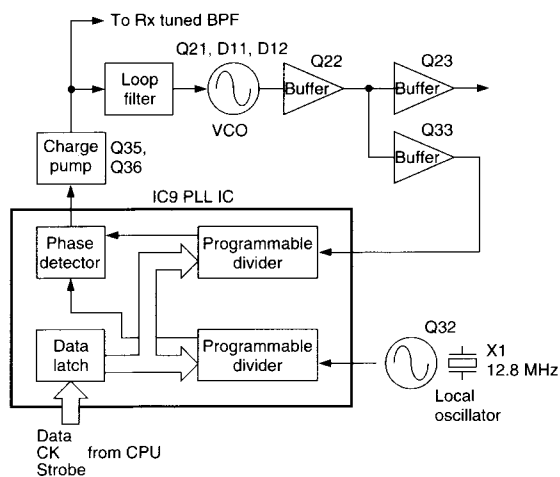
The oscillation output from Q21 is buffer-amplified at Q22 and Q33 and is then applied to the PLL IC (IC9, pin 5). IC9 divides this input with the serial data from the CPU and phase-detects it with the divided reference frequency and then outputs the phase difference as a pulse.

The output signals from IC9 (pin 7) are amplified by the charge pump (Q35, Q36) to expand the lock voltage. The amplified signal is then converted to DC voltage by the loop filter (R158, C195—C197) and controls the varactor diodes (D11, D12).

The DC voltage is also applied to the Rx tuned bandpass filters as the tuning signal via Q34.

The VCO output from Q21 is buffer-amplified at Q22 and Q23 and is then sent to Tx/Rx switch (D13). Rx local signal is applied to the 1st mixer (L6) through a low-pass filter, and Tx signal is applied to the predrive amplifier (Q24). A portion of the VCO output is re-applied to the PLL IC (IC9, pin 5) via Q33.

### PLL CIRCUIT BLOCK DIAGRAM



## 3-4 POWER SUPPLY CIRCUITS

### 3-4-1 VOLTAGE LINES (MAIN UNIT)

LINE	DESCRIPTION
13.8V	The external DC power from the power connector
VCC	The same line as the 13.8V line [#01, #02] 13.8 V DC passed through the relay (RL1) [#03—#05]
HV	13.8 V DC passed through the resistors (R9, R17, R42).
HVS	The same voltage as the HV line which is controlled by the power switch
5V	Common 5 V converted from the HVS line at IC1 in the LOGIC unit
8V	Common 8 V converted from the VCC line at IC2.
R8	Receive 8 V converted from the 8V line at Q4
T8	Transmit 8 V converted from the 8V line at Q3

## 3-5 PORT ALLOCATIONS

### 3-5-1 CPU (LOGIC UNIT IC2)

PIN NO.	PORT NAME	DESCRIPTION
1	D.STB	Outputs a strobe signal to the optional UX-114 DSC unit.
2	D.BSY	Input port for the selective call detection
3	S.STB	Outputs a strobe signal to the optional UT-79 voice scrambler unit.

PIN NO.	PORT NAME	DESCRIPTION
4	S.CON	Outputs a control signal to the optional UT-79 voice scrambler unit. "Low" when the scrambler function is ON
6	PTT	Input port for the PTT switch "Low" while PTT is pushed
7	KEY6	Input port for the [HI/LO] switch
8	BATT REF	Input port for the reference 5 V for detecting the power supply voltage
9	L.BATT	Input port for the divided voltage from the power supply for detecting the power supply voltage
10	UNLK	Input port for the PLL unlock signal from the PLL IC (MAIN unit IC9) "High" when PLL is unlocked
15	CK	Output port for a clock signal to the PLL IC, I/O expander IC, DSC unit, etc.
16	P.STB	Outputs a strobe signal to the PLL IC (MAIN unit IC9).
17	DATA	Outputs serial data to the PLL IC, I/O expander IC, DSC unit, etc.
18	OEX STB	Outputs a strobe signal to the I/O expander IC (MAIN unit IC9).
19	UP	Input ports for the channel selector
20	DOWN	
21	KEY1	Input port for the [16] switch
22	KEY2	Input port for the [CALL/(9)] switch
23	KEY5	Input port for the [MR] switch
24	KEY4	Input port for the [DUAL] switch
25	KEY3	Input port for the [U// (WX)] switch
26	IEX.P/S	Outputs a switching signal to the input expander ICs (MAIN unit IC12, IC13).
27	IEX.D	Data input port from the input expander ICs (MAIN unit IC12, IC13)
28	BEEP/ICF3.O	Outputs beep tone and cloning data.
30	ICF3.I	Input port for cloning data
31	SEG1—32, COM1—4	Output ports for the LCD drive
77—80	D0—D3	Output ports for the LCD contrast control

### 3-5-2 OUTPUT EXPANDER IC (MAIN UNIT IC10)

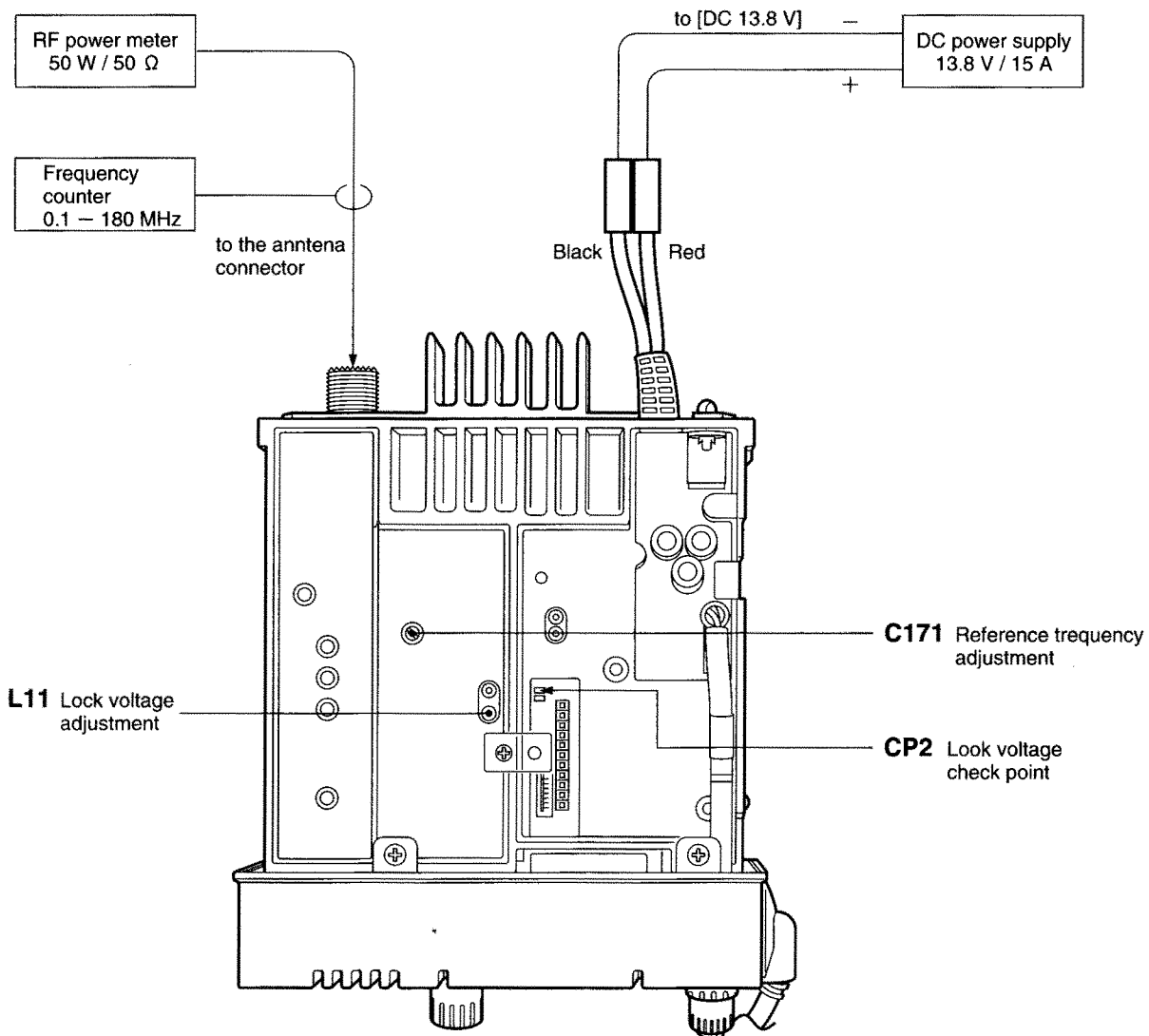
PIN NO.	PORT NAME	DESCRIPTION
4	OPT.CON	Outputs a optional units control signal.
5	PW.CON	Outputs a power ON/OFF control signal. "High" to turn power ON (common 8 V ON)
6	AF.CON	Outputs an AF power amplifier control signal. "High" to activate the AF power amplifier
7	SEND	Outputs a transmit/receive 8 V control signal. "High": transmit
11	RMUT	Outputs a audio mute signal. "High" to mute the audio
12	TMUT	Outputs a transmit mute signal. "High": transmit mute
13	S.TRU	Outputs an analog switch control signal. "High" to turn the switch ON (bypass the scrambler unit)
14	HI/LO	Outputs a transmit power control signal. "High": high power

# SECTION 4 ADJUSTMENT PROCEDURES

## 4-1 PLL ADJUSTMENTS

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1 <ul style="list-style-type: none"> <li>• Operating channel: 16</li> <li>• Connect the RF power meter or a 50 Ω dummy load to the antenna connector.</li> <li>• Receiving</li> </ul>	MAIN	Connect the digital voltmeter (input impedance: 1 MΩ/DC or better) to CP2.	3.5 V	MAIN	L11
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> <li>• Operating channel: 16</li> <li>• Connect the RF power meter or a 50 Ω dummy load to the antenna connector.</li> <li>• Transmitting</li> </ul>	Rear panel	Loosely couple the frequency counter to the antenna connector.	156.800000 MHz	MAIN	C171

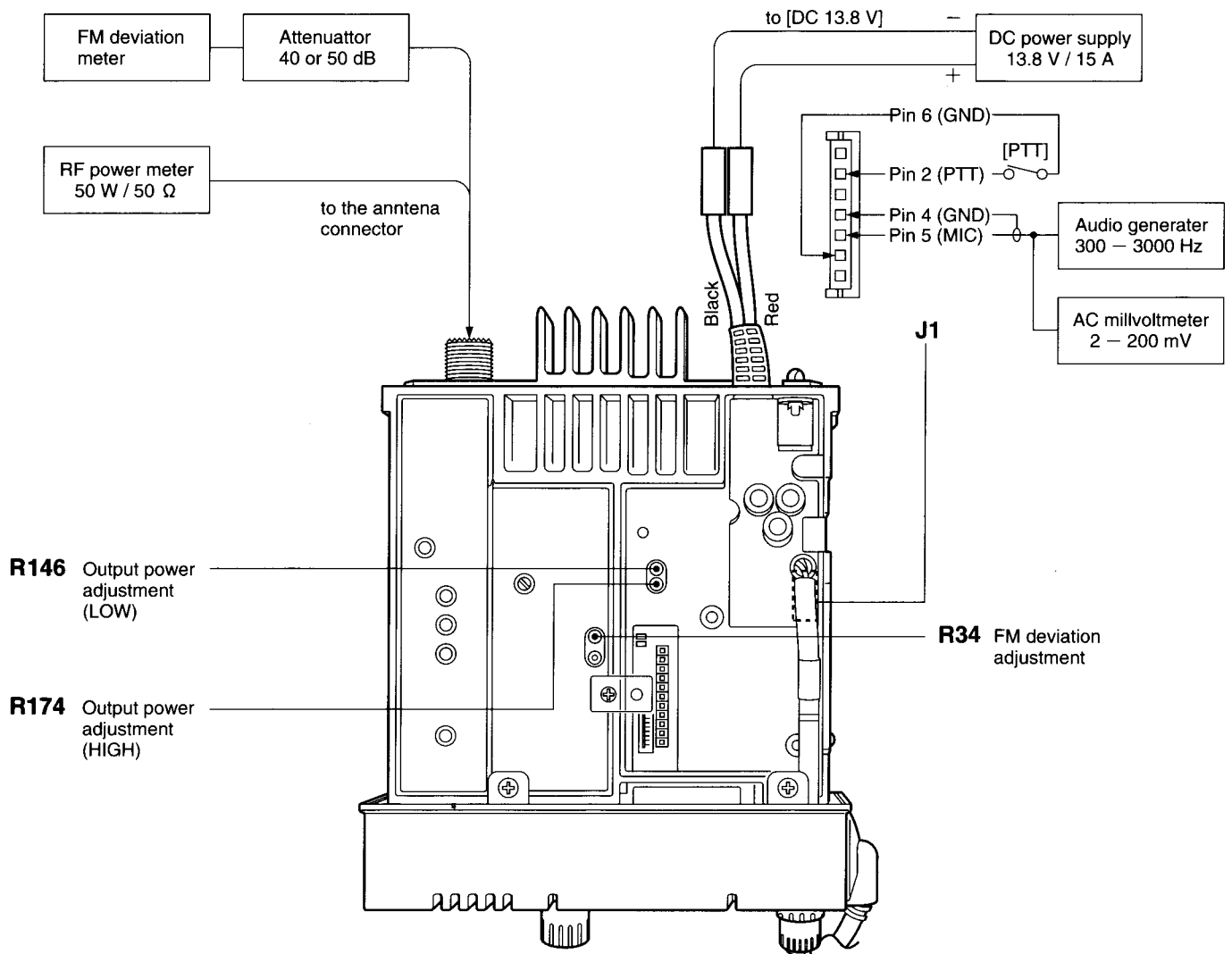
### • MAIN UNIT



## 4-2 TRANSMITTER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1 <ul style="list-style-type: none"> <li>• Operating channel: 16</li> <li>• Output power: HIGH</li> <li>• Transmitting</li> </ul>	Rear panel	Connect the RF power meter to the antenna connector.	25 W	MAIN	R174
	2 <ul style="list-style-type: none"> <li>• Output power: LOW</li> </ul>					
FREQUENCY DEVIATION	1 <ul style="list-style-type: none"> <li>• Operating channel: 16</li> <li>• Connect the audio generator to J1 (pin 5) with an AC millivoltmeter and set as:               <ul style="list-style-type: none"> <li>Frequency: 1 kHz</li> <li>Level: 40 mV</li> </ul> </li> <li>• Set the FM deviation meter as:               <ul style="list-style-type: none"> <li>HPF: OFF</li> <li>LPF: 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector: (P-P)/2</li> </ul> </li> <li>• Output power: LOW</li> <li>• Transmitting</li> </ul>	Rear panel	Connect the FM deviation meter to the antenna connector via the attenuator.	±4.3 kHz	MAIN	R34

### • MAIN UNIT

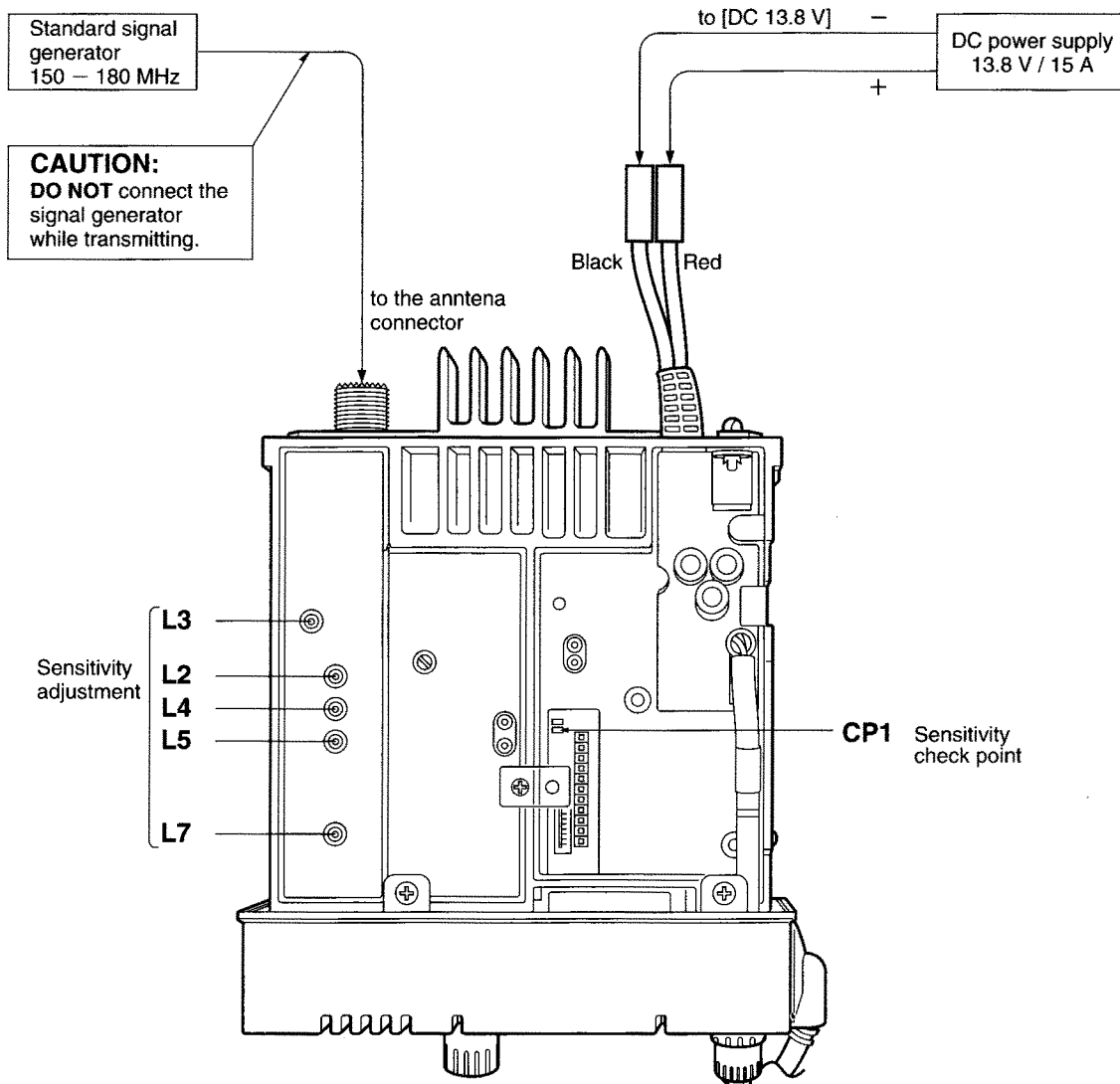


### 4-3 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1 <ul style="list-style-type: none"> <li>• Operating channel: 16</li> <li>• [SQUELCH] control: Max. counterclockwise</li> <li>• Connect the SSG to the antenna connector and set as:               <ul style="list-style-type: none"> <li>Frequency: 156.8 MHz</li> <li>Level: 1 <math>\mu</math>V* (-107 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: 3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul>	MAIN	Connect a DC voltmeter to CP1.	Maximum voltage	MAIN	Adjust in sequence L3, L2, L4, L5, L7

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

#### • MAIN UNIT





# SECTION 5 PARTS LIST

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1 <sup>Ⓞ</sup>	1110003640	S.IC	BA1604F-T
IC2	1180001250	S.IC	TA7808F(TE16L)
IC3	1110003750	S.IC	M5218AFP 600C
IC4	1130007370	S.IC	TA75S558F(TE85L)
IC5	1110003090	IC	LA4425A
IC6	1110002790	S.IC	MC3372DR
IC7	1150000460	IC	SC-1038
	1150001540	IC	SC-1302
IC8	1110003340	S.IC	μPC358GR-T1
IC9	1110003420	S.IC	M84073GP 600G
IC10	1130006350	S.IC	TC4094BF (TP1)
IC11	1130004730	S.IC	BU4066BF-T1
IC12	1130004670	S.IC	BU4021BF-T1
IC13	1130004670	S.IC	BU4021BF-T1
Q1	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q2	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q3	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q4	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q5	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q6	1540000420	S.TRANSISTOR	2SD1851-TA
Q7	1520000580	S.TRANSISTOR	2SB1124S-TD
Q8	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q9	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q10	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q11	1590000520	S.FET	2SJ106-GR (TE85R)
Q12	1540000420	S.TRANSISTOR	2SD1851-TA
Q13	1520000580	S.TRANSISTOR	2SB1124S-TD
Q14	1580000540	S.FET	3SK131-T2-LA
Q15	1530002030	S.TRANSISTOR	2SC3772-3-TA
Q16	1530002030	S.TRANSISTOR	2SC3772-3-TA
Q17	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q19	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q20	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q21	1560000270	S.FET	2SK302-Y (TE85R)
Q22	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q23	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q24	1530002240	S.TRANSISTOR	2SC3775-3-TA
Q25	1530002340	S.TRANSISTOR	2SC2954-T2B
Q26	1520000380	TRANSISTOR	2SB1143 S
Q27	1590000670	S.TRANSISTOR	FMW1 T148
Q29	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q30	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q31	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q32	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)
Q33	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q34	1560000540	S.FET	2SK880-Y (TE85R)
Q35	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)
Q36	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)
Q41	1510000580	S.TRANSISTOR	2SA1362-GR (TE85R)
Q42	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q43	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q44 <sup>Ⓞ</sup>	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q45 <sup>Ⓞ</sup>	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
D1	1790000700	DIODE	DSA3A1
D2	1750000070	S.DIODE	1SS226 (TE85R)
D3	1720000180	S.VARICAP	1SV164-T2B
D4	1720000180	S.VARICAP	1SV164-T2B
D5	1720000180	S.VARICAP	1SV164-T2B
D6	1720000180	S.VARICAP	1SV164-T2B
D7	1730000730	S.ZENER	RD6.2M-T2B2
D8	1790000690	S.DIODE	HSM88ASR-TR
D9	1750000110	S.DIODE	1SS272 (TE85R)
D10	1750000080	S.DIODE	1SS153-T2
D11	1790000540	S.VARICAP	MA338(TX)
D12	1790000540	S.VARICAP	MA338(TX)
D13	1790000450	S.DIODE	MA862(TX)
		[USA]	
		[Eur]	

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
D14	1750000060	S.DIODE	1SS196 (TE85R)
D15	1790000690	S.DIODE	HSM88ASR-TR
D16	1710000290	DIODE	MI308
D17	1710000290	DIODE	MI308
D18	1750000060	S.DIODE	1SS196 (TE85R)
D20	1730000410	S.ZENER	RD5.1M-T2B2
D21	1750000060	S.DIODE	1SS196 (TE85R)
		[Eur only]	
D22	1790000690	S.DIODE	HSM88ASR-TR
D23	1790000540	S.VARICAP	MA338(TX)
D24	1790001200	S.DIODE	MA6S121(TX)
D25	1730000730	S.ZENER	RD6.2M-T2B2
FI1	2020000120	CERAMIC	CFW455E
FI2	2010001710	XTAL	FL-210 (21.800MHz)
X1	6050009280	XTAL	CR-503 (12.8MHz)
X2	6070000090	DISCRIMINATOR	CDB455C16
X3	6050009060	XTAL	CR-488 (21.345MHz)
L1	6200002430	S.COIL	NL 252018T-082J
L2	6150003820	COIL	LS-440
L3	6150003820	COIL	LS-440
L4	6150003820	COIL	LS-440
L5	6150003820	COIL	LS-440
L6	6200003380	S.COIL	B4F-617PT-1026=P3
L7	6150002950	COIL	LS-304
L8	6200003280	S.COIL	NL 252018T-2R2J
L9	6200001980	S.COIL	NL 252018T-1R0J
L10	6200001980	S.COIL	NL 252018T-1R0J
L11	6130002360	S.COIL	LB-257
L12	6200001980	S.COIL	NL 252018T-1R0J
L13	6200001980	S.COIL	NL 252018T-1R0J
L14	6200001980	S.COIL	NL 252018T-1R0J
L15	6200002630	S.COIL	NL 252018T-R10J
L16	6200002630	S.COIL	NL 252018T-R10J
L17	6200002600	S.COIL	NL 252018T-047J
L18	6200002600	S.COIL	NL 252018T-047J
L19	6200002430	S.COIL	NL 252018T-082J
L20	6110001800	COIL	LA-243
L21	6110001800	COIL	LA-243
L22	6110001580	COIL	LA-238
L23	6110001130	COIL	LA-149
L24	6110001800	COIL	LA-243
L25	6110001870	COIL	LA-253
L26	6200002600	S.COIL	NL 252018T-047J
L27	6200002630	S.COIL	NL 252018T-R10J
L28	6170000180	COIL	LW-19
L29 <sup>Ⓞ</sup>	6200002600	S.COIL	NL 252018T-047J
L30 <sup>Ⓞ</sup>	6200002600	S.COIL	NL 252018T-047J
R1	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R2	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R3	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R4	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R5	7030003580	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R6	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R7	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R8	7030003580	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R9	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R10	7030001220	S.RESISTOR	MCR50JZHJ 560 Ω (561)
R11	7030003580	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R12	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R13	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R14	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 kΩ)
R15	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)

Ⓞ: USA only, Ⓞ: Eur only S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R16	7030003790	S.RESISTOR	ERJ3GEYJ 824 V (820 kΩ)
R17	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R18	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R19	7030003820	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R20	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R21	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R22	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R23	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R24	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R25	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R26	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R27	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R28	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R29	7030003670	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R30	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R31	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R32	7510000930	S.THERMISTOR	NTCCF2012 3NH 103KC-T
R33	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R34	7310002600	S.TRIMMER	RV-110 (RH03A3AS4X0AA) 473
R35	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R36	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R37	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R38	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R39	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R40	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R41	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R42	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R43	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R44	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R45	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R46	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)
R47	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R48	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R49	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R50	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R51	7030003820	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R52	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R54	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R55	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R56	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R57	7030001220	S.RESISTOR	MCR50JZHJ 560 Ω (561)
R58	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R59	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R60	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R61	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R62	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R63	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R64	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R65	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R66	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R67	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R68	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R69	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R70	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R71	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R72	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R73	7030003240	S.RESISTOR	ERJ3GEYJ 223 V (22 Ω)
R74	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R75	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R76	7030003290	S.RESISTOR	ERJ3GEYJ 560 V (56 Ω)
R77	7030003290	S.RESISTOR	ERJ3GEYJ 560 V (56 Ω)
R78	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R79	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R80	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R81	7030003600	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R82	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R83	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R84	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R85	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R86	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R87	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R88	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R89	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R90	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R92	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ) [USA] [Eur]
R93	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R94	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R95	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R96	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R97	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R98	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R99	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R100	7030003840	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R101	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R103	7030003850	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R104	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R105	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R106	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R107	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R108	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R109	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R110	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R111	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R112	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R113	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R114	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R115	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R116	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R117	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R118	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R119	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R120	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R122	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ) [USA] [Eur]
	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ) [Eur]
R123	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ) [USA] [Eur]
	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ) [Eur]
R124	7510000930	S.THERMISTOR	NTCCF2012 3NH 103KC-T
R125	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R126	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R127	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R128	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R130	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R131	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R132	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R133	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R135	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R136	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R137	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R138	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R139	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R140	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R141	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)
R142	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R145	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R146	7310002760	S.TRIMMER	RV-152 (RH03A3AJ4X0HA) 223
R147	7030003790	S.RESISTOR	ERJ3GEYJ 824 V (820 kΩ)
R148	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R149	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)
R150	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R151	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R152	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R153	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R154	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R155	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R156	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R157	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R158	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R159	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R160	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R161	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R162	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R163	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)

Ⓞ: USA only, Ⓜ: Eur only S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R164	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R165	7030003650	S.RESISTOR	ERJ3GEYJ 583 V (56 kΩ)
R166	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R167	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R168	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R169	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R170	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R171	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R172	7030001150	S.RESISTOR	MCR50JZHJ 150 Ω (151)
R173	7510000710	S.THERMISTOR	NTCCS2012 3FH 222KC-T
R174	7310002870	S.TRIMMER	RV-143 (RH03A3AS2) J471
R175	7410000720	S.ARRAY	EXB-V8V 473JV (47 kΩ)
R176	7410000720	S.ARRAY	EXB-V8V 473JV (47 kΩ)
R177	7410000720	S.ARRAY	EXB-V8V 473JV (47 kΩ)
R178	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)
R179	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R181	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R183	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R184	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R186	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R187	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R188	7410000990	S.ARRAY	EXB-V8V 470JV
R189	7410000990	S.ARRAY	EXB-V8V 470JV
R190	7410000990	S.ARRAY	EXB-V8V 470JV
R191	7410000990	S.ARRAY	EXB-V8V 470JV
R192	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R193	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R194	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R195	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
	7030003820	S.RESISTOR	[USA] ERJ3GEYJ 155 V (1.5 MΩ)
			[Eur]
R196 <sup>Ⓞ</sup>	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R198	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R200	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R201	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R202	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R203 <sup>Ⓞ</sup>	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R204 <sup>Ⓞ</sup>	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R205 <sup>Ⓞ</sup>	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R206 <sup>Ⓞ</sup>	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R207 <sup>Ⓞ</sup>	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R208 <sup>Ⓞ</sup>	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
C1 <sup>Ⓞ</sup>	4340000010	S.MYLAR	ECWU 1C 223JB5
C2	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C3	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C4	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C5	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C6	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C7	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C9	4510004630	S.ELECTROLITIC	ECEV1CA100SR
C10	4030006830	S.CERAMIC	C1608 JF 1C 104Z-T-A
C11	4030006830	S.CERAMIC	C1608 JF 1C 104Z-T-A
C12	4510004590	ELECTROLITIC	16 MV 470 HC
C13	4510004630	S.ELECTROLITIC	ECEV1CA100SR
C14	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C15	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C16	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C17	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C18	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C19	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C20	4030008470	S.CERAMIC	C1608 JB 1H 272K-T-A
C21	4030008770	S.CERAMIC	C1608 JB 1H 562K-T-A
C25	4550000510	S.TANTALUM	TESVA 1V 473M1-8L
C26	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C28	4550006530	S.TANTALUM	ECST0JY685R
C29	4030006850	S.CERAMIC	C1608 JB 1H 332K-T-A
C30	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A
C31	4030006830	S.CERAMIC	C1608 JF 1C 104Z-T-A
C32	4030006830	S.CERAMIC	C1608 JF 1C 104Z-T-A
C33	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C34	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C35	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C36	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C37	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A
C38	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A
C39	4030007140	S.CERAMIC	C1608 CH 1H 121J-T-A
C40	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C41	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C42	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C43	4510004630	S.ELECTROLITIC	ECEV1CA100SR
C44 <sup>Ⓞ</sup>	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C45	4550006130	S.TANTALUM	ECST1VY224R
C46	4030008890	S.CERAMIC	C1608 JB 1C 273K-T-A
C47	4030008890	S.CERAMIC	C1608 JB 1C 273K-T-A
C48	4030008870	S.CERAMIC	C1608 JB 1H 222K-T-A
C49	4030009490	S.CERAMIC	C1608 JB 1H 821K-T-A
C50	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C51	4550006170	S.TANTALUM	ECST1AY225R
C52	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C53	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C54	4030008180	S.CERAMIC	C1608 UJ 1H 030C-T-A
C55	4550006170	S.TANTALUM	ECST1AY225R
C56	4510004590	ELECTROLITIC	16 MV 470 HC
C57	4510004590	ELECTROLITIC	16 MV 470 HC
			[USA, ITA]
	4510004610	ELECTROLITIC	16 MV 1000 AG
			[UK, FRA]
C58	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C59	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C60	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A
C61	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C62	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C63	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C65	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C66	4010005560	CERAMIC	HM60SJ SL 050C 500V
C67	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C68	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C69	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C70	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C71	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C72	4030006830	S.CERAMIC	C1608 JF 1C 104Z-T-A
C73	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C74	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C75	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C76	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C77	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
C78	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
			[USA]
	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A
			[Eur]
C79	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A
			[USA]
	4030006920	S.CERAMIC	C1608 CH 1H 010C-T-A
			[Eur]
C80	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C81	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A
C82	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C83	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C84	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
			[USA]
	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A
			[Eur]
C85	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C86	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C87	4030006970	S.CERAMIC	C1608 CH 1H 060D-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	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C92	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C93	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C94	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C95	4030006890	S.CERAMIC	C1608 JF 1H 103Z-T-A
C96	4510004440	S.ELECTROLITIC	ECEV1HA010SR
C97	4510004440	S.ELECTROLITIC	ECEV1HA010SR
C98	4510005810	S.ELECTROLITIC	ECEV1HAR47R [USA]
	4510005800	S.ELECTROLITIC	ECEV1HAR33SR [Eur]
C99	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C100	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A

Ⓞ: USA only, Ⓞ: Eur only S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
C101	4030008630	S.CERAMIC C1608 JF 1C 104Z-T-A
C103	4550006170	S.TANTALUM ECST1AY225R
C104	4550006150	S.TANTALUM ECST1CY105R
C106	4030008680	S.CERAMIC C2012 JF 1C 105Z-T-A
C107	4030008660	S.CERAMIC C1608 JB 1H 102K-T-A
C108	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C109	4030007070	S.CERAMIC C1608 CH 1H 330J-T-A
C110	4030008300	S.CERAMIC C1608 UJ 1H 330J-T-A
C111	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C112	4030008680	S.CERAMIC C2012 JF 1C 105Z-T-A
C113	4030008680	S.CERAMIC C2012 JF 1C 105Z-T-A
C114	4030007050	S.CERAMIC C1608 CH 1H 180J-T-A
C115	4030007040	S.CERAMIC C1608 CH 1H 030B-T-A
C116	4030009530	S.CERAMIC C1608 CH 1H 030B-T-A
C117	4030009530	S.CERAMIC C1608 CH 1H 030B-T-A
C118	4030006860	S.CERAMIC C1608 CH 1H 390J-T-A
C119	4030009500	S.CERAMIC C1608 CH 1H 0R5B-T-A
C120	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C121	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C123	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C124	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C125	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C128	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C127	4030007080	S.CERAMIC C1608 CH 1H 390J-T-A
C128	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C129	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C130	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C131	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C132	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C133	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C134	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C135	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A
C137	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C138	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C139	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C140	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C141	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
	4030007080	S.CERAMIC C1608 CH 1H 390J-T-A [USA]
C142	4510005310	S.ELECTROLITIC ECEV1CA220SR
C143	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C144	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C145	4510004590	ELECTROLITIC 16 MV 470 HC
C146	4030009530	S.CERAMIC C1608 CH 1H 030B-T-A
C147	4010005840	CERAMIC HM60SJ SL 180J 500V
C148	4010005640	CERAMIC HM60SJ SL 180J 500V
C150	4010005790	CERAMIC HM60SJ YB 102K 500V
C151	4010005660	CERAMIC HM60SJ SL 220J 500V
C152	4010005650	CERAMIC HM60SJ SL 200J 500V
C153	4010005780	CERAMIC HM60SJ SL 101J 500V
C154	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C155	4010005510	CERAMIC HM60SJ SL 0R5C 500V [USA]
	4010005560	CERAMIC HM60SJ SL 050C 500V [Eur]
C156	4010005580	CERAMIC HM60SJ SL 070D 500V
C157	4010005610	CERAMIC HM60SJ SL 100D 500V
C158	4010005580	CERAMIC HM60SJ SL 050C 500V
C159	4010005650	CERAMIC HM60SJ SL 200J 500V [USA]
	4010005670	CERAMIC HM60SJ SL 240J 500V [Eur]
C160	4010005840	CERAMIC HM60SJ SL 180J 500V
C163	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C165	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C166	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C167	4550006150	S.TANTALUM ECST1CY105R
C169	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C170	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C171	4810001910	S.TRIMMER CTZ3E-10A-W1
C172	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A [USA]
	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A [Eur]
C173	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
C174	4030007080	S.CERAMIC C1608 CH 1H 390J-T-A
C175	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C176	4030007070	S.CERAMIC C1608 CH 1H 330J-T-A
C178	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C180	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C182	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C183	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C184	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C186	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C188	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C189	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C190	4030006860	S.CERAMIC C1608 CH 1H 102K-T-A
C191	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C192	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C193	4550006360	S.TANTALUM ECST1VY104R
C194	4030006890	S.CERAMIC C1608 JF 1C 103Z-T-A
C195	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C196	4550006250	S.TANTALUM TEMSVA 1A 106M-8L
C197	4550006250	S.TANTALUM TEMSVA 1A 106M-8L
C199	4030006860	S.CERAMIC C2012 JF 1C 105Z-T-A
C200	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C202	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C203	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C204	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C205	4510004610	ELECTROLITIC 16 MV 1000 AG [UK, FRA only]
C206	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C207	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C208	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C209	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C210	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C215	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C216	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C217	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C218	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C219	4550006170	S.TANTALUM ECST1AY225R
C220	4510004630	S.ELECTROLITIC ECEV1CA100SR
C222	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C223	4510005310	S.ELECTROLITIC ECEV1CA220SR
C224	4550006300	S.TANTALUM ECST1AY475R
C226	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C227	4030006890	S.CERAMIC C1608 JF 1H 103Z-T-A
C228	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C229	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C230	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C231	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C232	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C233	4030007080	S.CERAMIC C1608 CH 1H 390J-T-A
C234	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
RL1	6330001160	RELAY AJV5341(JV1AP-DC12V)
W1	6910001020	JUMPER IPS-1041-2
W2	6910001020	JUMPER IPS-1041-2
W3	6910001020	JUMPER IPS-1041-2
W4	6910001020	JUMPER IPS-1041-2
W5	6910001020	JUMPER IPS-1041-2
W6	6910001020	JUMPER IPS-1041-2
W7	6910001020	JUMPER IPS-1041-2
J1	6510003430	CONNECTOR B07B-EH-S
J2	6510017830	CONNECTOR 3022-11A
J3	6510012880	S.CONNECTOR CEW9114-0202
J4	6450001060	CONNECTOR HSJ1493-01-010
J5	6510017810	S.CONNECTOR IMSA-9811S-30C
EP1	0910043705	PCB B 4354E [USA]
	0910044901	PCB B 4506A [Eur]

Ⓢ: USA only, Ⓜ: Eur only S.=Surface mount

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1180000970	S.IC	AN78L05M-(E1)
IC2	1140005250	S.IC	HD404818D36H
IC3	1130004500	S.IC	TC4S11F (TE85R)
IC4	1140003610	S.IC	X24C04S8-2.7
IC5	1110001550	S.IC	S-8054ALB-LM-T1
Q1	1520000450	S.TRANSISTOR	2SB1132 T100 Q
Q2	1590002170	S.TRANSISTOR	FMW1 T148
Q3	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q4	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q5	1510000580	S.TRANSISTOR	2SA1382-GR (TE85R)
D1	1750000080	S.DIODE	1SS196 (TE85R)
D2	1750000080	S.DIODE	1SS196 (TE85R)
D3	1750000080	S.DIODE	1SS196 (TE85R)
D4	1750000080	S.DIODE	1SS196 (TE85R)
D5	1730000730	S.ZENER	RD6.2M-T2B2
X1	6050008860	S.XTAL	CR-465 (3.8864MHz)
R1	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R2	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)
R3	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R4	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R5	7030000190	S.RESISTOR	MCR10EZHZ 27 Ω (270)
R6	7030000190	S.RESISTOR	MCR10EZHZ 27 Ω (270)
R7	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R8	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R9	7410000820	S.ARRAY	EXB-V4V 223JV (22 kΩ)
R10	7410000720	S.ARRAY	EXB-V8V 473JV (47 kΩ)
R11	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R12	7030003580	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R13	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R14	7030003580	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R15	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R16	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R17	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R18	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R19	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R20	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R21	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R22	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R23	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R24	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R25	7030000250	S.RESISTOR	MCR10EZHZ 82 Ω (820)
R26	7030000250	S.RESISTOR	MCR10EZHZ 82 Ω (820)
C1	4510005860	S.ELECTROLITIC	ECEV1HA2R2SR
C2	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C3	4510005320	S.ELECTROLITIC	ECEV0JA101SP
C4	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C5	4510004630	S.ELECTROLITIC	ECEV1CA100SR
C6	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C7	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C8	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C9	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C10	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C11	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C12	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C13	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C14	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C15	4510004430	S.ELECTROLITIC	ECEV1CV220WR
C16	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C17	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C18	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C19	4030006710	S.CERAMIC	C1608 SL 1H 470J-T-A
C20	4030006710	S.CERAMIC	C1608 SL 1H 470J-T-A
C21	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C22	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C23	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
W1	8900005290	CABLE	OPC-501
DS1	5080000170	LAMP	HRS-7219A-Y2-30
DS2	5080000170	LAMP	HRS-7219A-Y2-30
DS3	5030001170	LCD	LD-HU4223J
S1	2260001980	S.SWITCH	EVQ-PJU 05K
S2	2260001980	S.SWITCH	EVQ-PJU 05K
S3	2260001980	S.SWITCH	EVQ-PJU 05K
S4	2260001980	S.SWITCH	EVQ-PJU 05K
S5	2260001980	S.SWITCH	EVQ-PJU 05K
S6	2260001980	S.SWITCH	EVQ-PJU 05K
J1	6510017810	S.CONNECTOR	IMSA-9611S-30C
J2	6510009410	CONNECTOR	B8B-ZR
J3	6510009350	CONNECTOR	B2B-ZR
J4	6510009360	CONNECTOR	B3B-ZR
EP1	0910043712	PCB	B 4355B

[VR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7210001010	VARIABLE	RK097111000AA (10KB)
EP1	0910043720	PCB	B 4356 FX-1542

[SW UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7210001500	VARIABLE	RK097111102AA (10KA)
WS1	8600033620		FX1542 P01*J01*02SW
EP1	0910043730	PCB	B 4357

[SENSOR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
S1	2260001400	ENCODER	SW-122 (RK097103H)
WS1	8600033630		FX1542 P01*J01SE
EP1	0910043741	PCB	B 4358

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	
W1	8900003500	CABLE	OPC-358
W4	8900005820	CABLE	OPC-580 [UK, FRA only]
SP1	2510000740	SPEAKER	F45G05-04(FIG1)
MC1	7700001390	MICROPHONE	EM-78
J1	6510004880	CONNECTOR	MR-DS-E 01
WS1	8600033610		FX1542 P01CH
EP1	8930034600	LCD CONTACT	ZNN-505(2.3WX62LX10.3T)

S.=Surface mount

# SECTION 6 MECHANICAL PARTS

## [CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510018200	Antenna connector MR-DSE-01 (#01—#03)	1
W1	8900003500	DC power connector OPC-356	1
W4	8900005820	Antenna connector with cable OPC-580 (#04, #05)	1
EP1	8930035100	LCD contact ZNN-505	1
MC1	7700001390	Microphone EM-78 (#01, #03—#05)	1
	7700001400	Microphone EM-79 (#02)	1
MP1	8410001961	1542 heat sink -1	1
MP2	8210011340	1542 reflector	1
MP3	8510009200	1542 case black (#01, #03—#05)	1
	8010015850	1542 case white (A) (#02)	1
MP4	8210011330	1542 front panel black (#01, #03, #04)	1
	8210011630	1542 front panel white (A) (#02)	1
	8210011640	1542 front panel black (B) (#05)	1
MP5	8930033480	1542 front key (#01, #02)	1
	8930033940	1542 front key (A) (#03, #04)	1
	8930033950	1542 front key (B) (#05)	1
MP6	8930033240	1542 R-sealing	1
MP7	8930034290	1542 F-sealing	1
MP8	8310034090	1542 window plate	1
MP9	8610009310	Knob N-221 (#01, #03—#05)	2
	8610009640	Knob N-221 (A) (#02)	2
MP10	8930034330	1542 cable plate	1
MP11	8930020860	IC-holder	1
MP12	8610009300	Knob N-220 (#01, #03—#05)	1
	8610009630	Knob N-220 (A) (#02)	1
MP13	8930033461	1542 jack seal -1	1
MP15	8930033470	1542 jack bush	1
MP16	8930034300	1542 antenna seal	1
MP18	8810008530	Screw BiH M3 x 8 SUS (#01—#03)	4
	8810005660	Screw BiH M3 x 10 SUS (#04, #05)	4
MP19	8930034340	1542 speaker net	1
MP20	8810008540	Screw FH M2.6 x 5	4
MP21	8930034320	1542 bush plate	1
MP22	8810008720	Screw PH B0 M3 x 6 NI (BT)	13
MP23	8810008560	Screw PH M3 x 8 SUS ZK (#01, #03—#05)	2
	8810008600	Screw PH M3 x 8 SUS (#02)	2
MP24	8810008570	Screw PH B0 M2.6 x 10	5
MP25	8810008530	Screw BiH M3 x 8 SUS	2
MP26	8810008530	Screw BiH M3 x 8 SUS	2
MP27	8930033220	1542 LCD holder	1
MP28	8930033230	1542 LCD rubber	1
MP29	8930033490	1542 jack cap	1
MP30	8930034950	O-ring	3
MP31	8930032370	Shaft tape (A)	3
MP32	8810008720	Screw PH B0 M3 x 6 (BT)	1
MP33	8930034610	1542 P.C.B. plate	1
MP34	8810008530	Screw BiH M3 x 8 SUS	1
MP37	8110005500	1542 heat sink cover (#04, #05)	1
MP38	8930016380	Rubber seat (B) (#04, #05)	4
MP39	8510009830	1542 shield plate (#03—#05)	1
MP40	8930036520	1542 module holder (#03—#05)	1
MP41	8510009840	1542 front A-shield (#03—#05)	1
MP42	8510009850	1542 front B-shield (#03—#05)	1
SP1	2510000740	Speaker F45G05-04	1

## [LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W1	8900005530	Flat cable OPC-501	1
DS3	5030001170	LCD E-4143	1

## [VR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210002680	Variable resistor RK097111000AA [SQUELCH] (incl. nut)	1

## [SW UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210002690	Variable resistor/Switch RK097111102AA [PWR/VOL] (incl. nut)	1

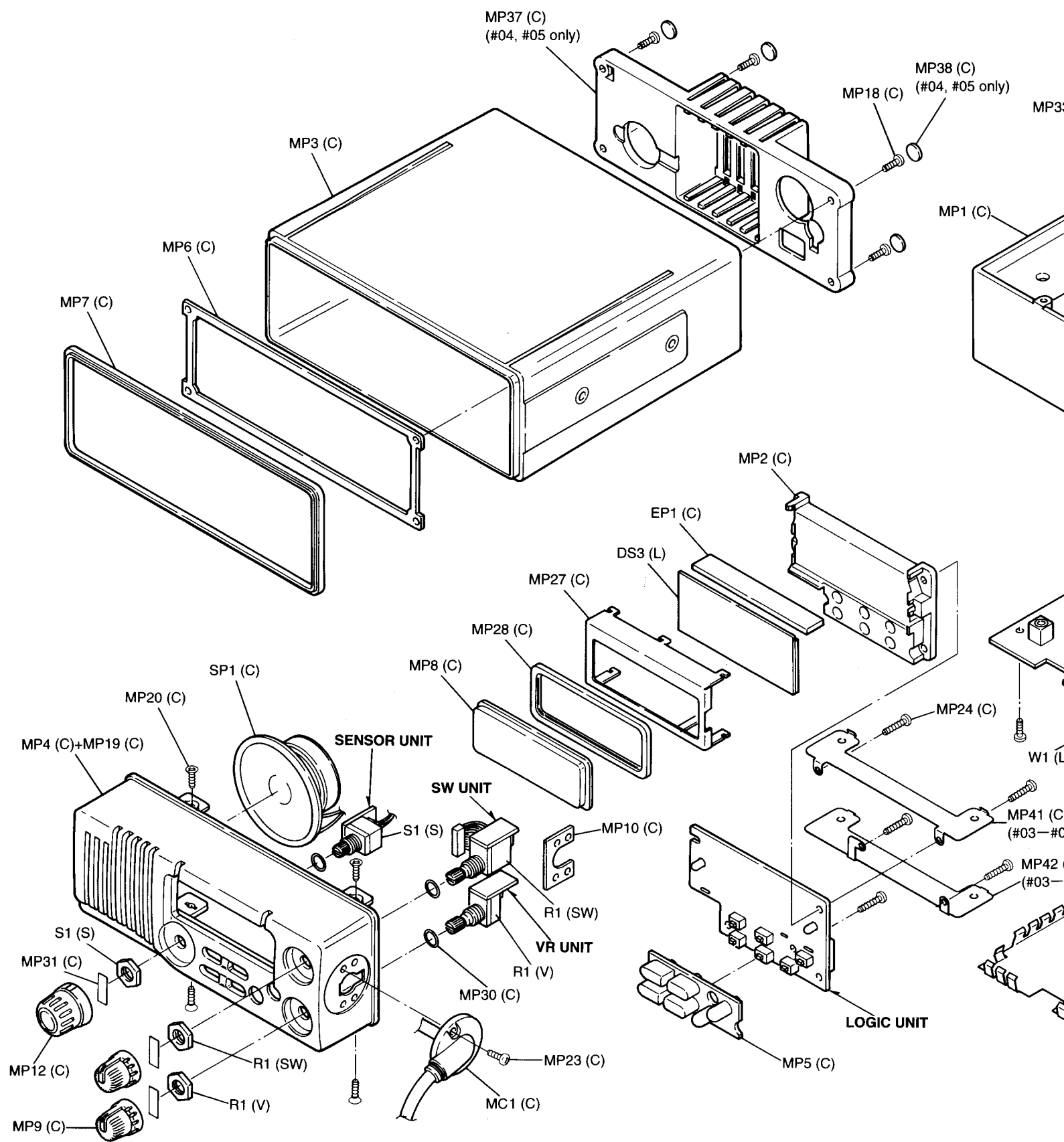
## [SENSOR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
S1	2260002190	Rotary switch SW-122 (RK097103H) [CHANNEL] (incl. nut)	1

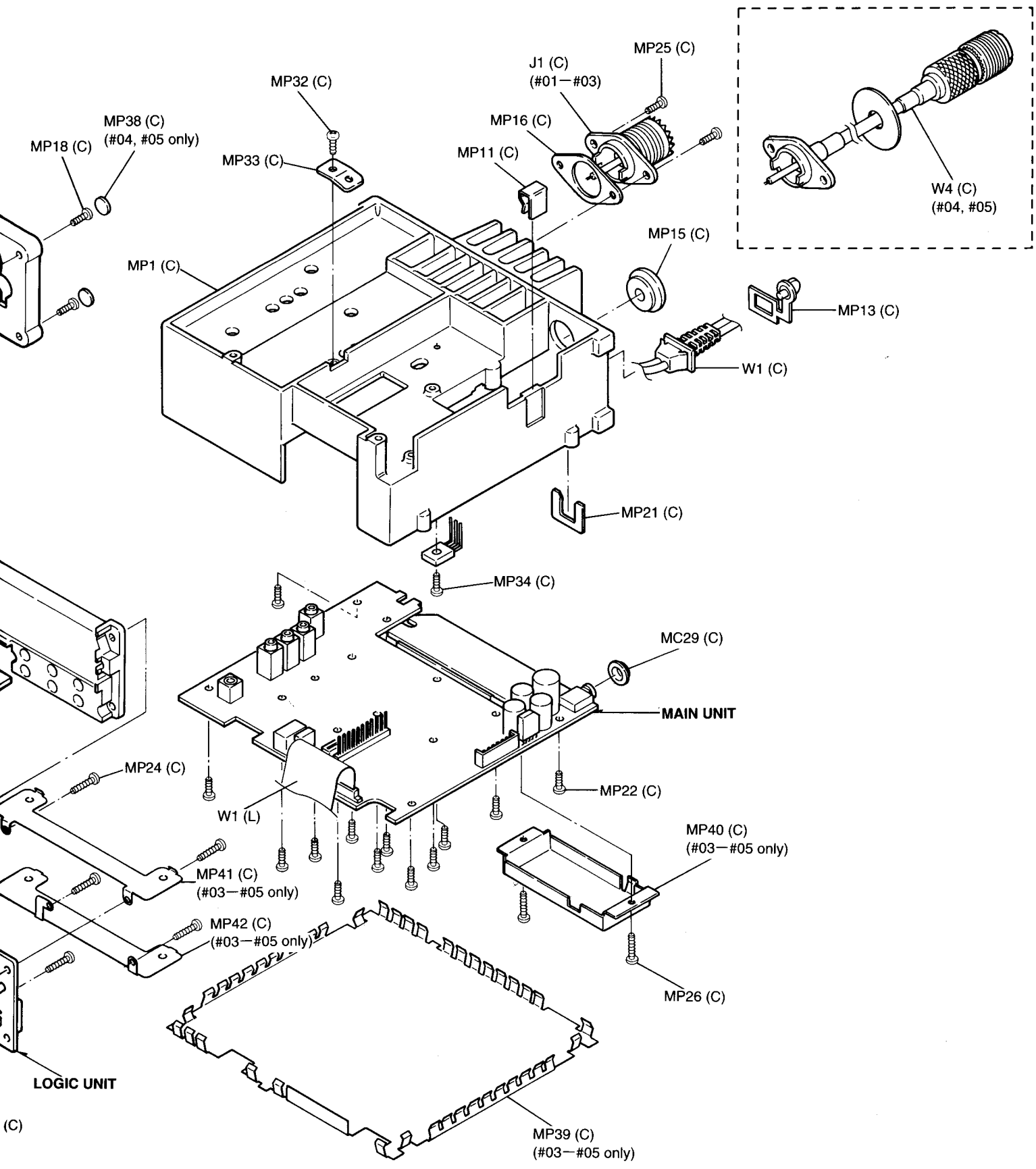
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REF. NO.	ORDER NO.	DESCRIPTION	QTY.
F1	5210000450	Fuse (10 A)	2
J1	5610000020	External speaker plug	1
W1	8900003490	DC power cable OPC-355	1
W2	8900005640	Microphone hanger OPC-562 (Black) (#01, #03—#05)	1
	8900005630	Microphone hanger OPC-562 (White) (#02)	1
MP1	8010015840	Mounting bracket (#01, #03—#05)	1
	8010015860	Mounting bracket (A) (#02)	1
MP2	8610009610	Mounting bracket knob	4
MP3	8850001400	Flat washer M4	2
MP4	8810008500	Mounting screw PH M5 x 20 SUS	4
MP5	8830001030	Nut M5 SUS	4
MP6	8850001410	Flat washer M5	8
MP7	8850001420	Star washer M5 SUS	4
MP8	8810008510	Mic hanger screw PH A0 M3.5 x 30 SUS	2
MP9	8810008520	Mounting screw PH A0 M5 x 20 SUS	4
MP10	8930034310	Mobil sheet	2
MP11	8930037040	Spare hole cover for rear panel (#04, #05)	1

**Screw abbreviations** A0, B0: Self-tapping PH: Pan head  
 FH: Flat head BiH: Bind head  
 NI: Nickel SUS: Stainless ZK: Black



**Unit abbreviations** (C): CHASSIS PARTS (L): LOGIC UNIT (V): VR UNIT (SW): SW UNIT (S): SENSOR UNIT

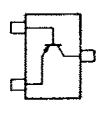
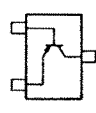
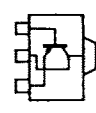
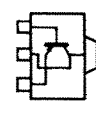
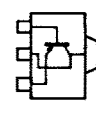
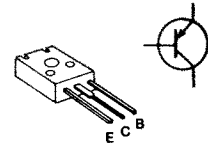
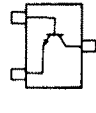
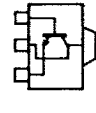
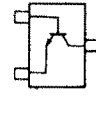
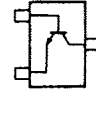
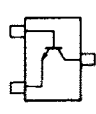
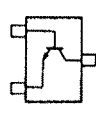
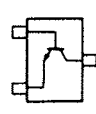
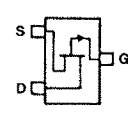
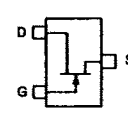
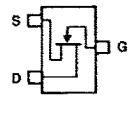
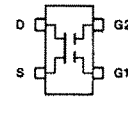
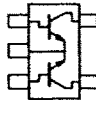
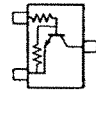
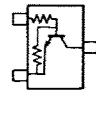


R UNIT

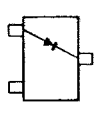
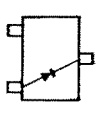
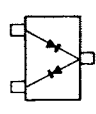
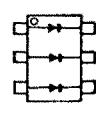
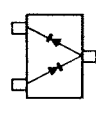
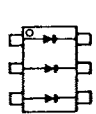
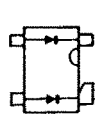
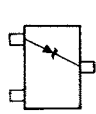
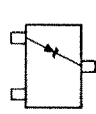


# SECTION 7 SEMI-CONDUCTOR INFORMATION

## • TRANSISTORS AND FET'S

<b>2SA1162 Y</b> (Symbol: SY) 	<b>2SA1362 GR</b> (Symbol: AEG) 	<b>2SB1124S</b> (Symbol: BG) 	<b>2SB1132 Q</b> (Symbol: BA) 	<b>2SB1132 R</b> (Symbol: BA RB) 
<b>2SB1143 S</b> 	<b>2SC2712 Y</b> (Symbol: LY) 	<b>2SC2954</b> (Symbol: QK) 	<b>2SC3772 3</b> (Symbol: LY3) 	<b>2SC3775 3</b> (Symbol: OY3) 
<b>2SC4117GR S</b> (Symbol: DG) 	<b>2SC4215 O</b> (Symbol: QO) 	<b>2SD1851</b> (Symbol: XY) 	<b>2SJ106 GR</b> (Symbol: VG) 	<b>2SJ302 Y</b> (Symbol: TY) 
<b>2SK880 Y</b> (Symbol: XY) 	<b>2SK131</b> (Symbol: V12) 	<b>FMW1</b> (Symbol: W1) 	<b>RN1402</b> (Symbol: XB) 	<b>RN1404</b> (Symbol: XD) 

## • DIODES

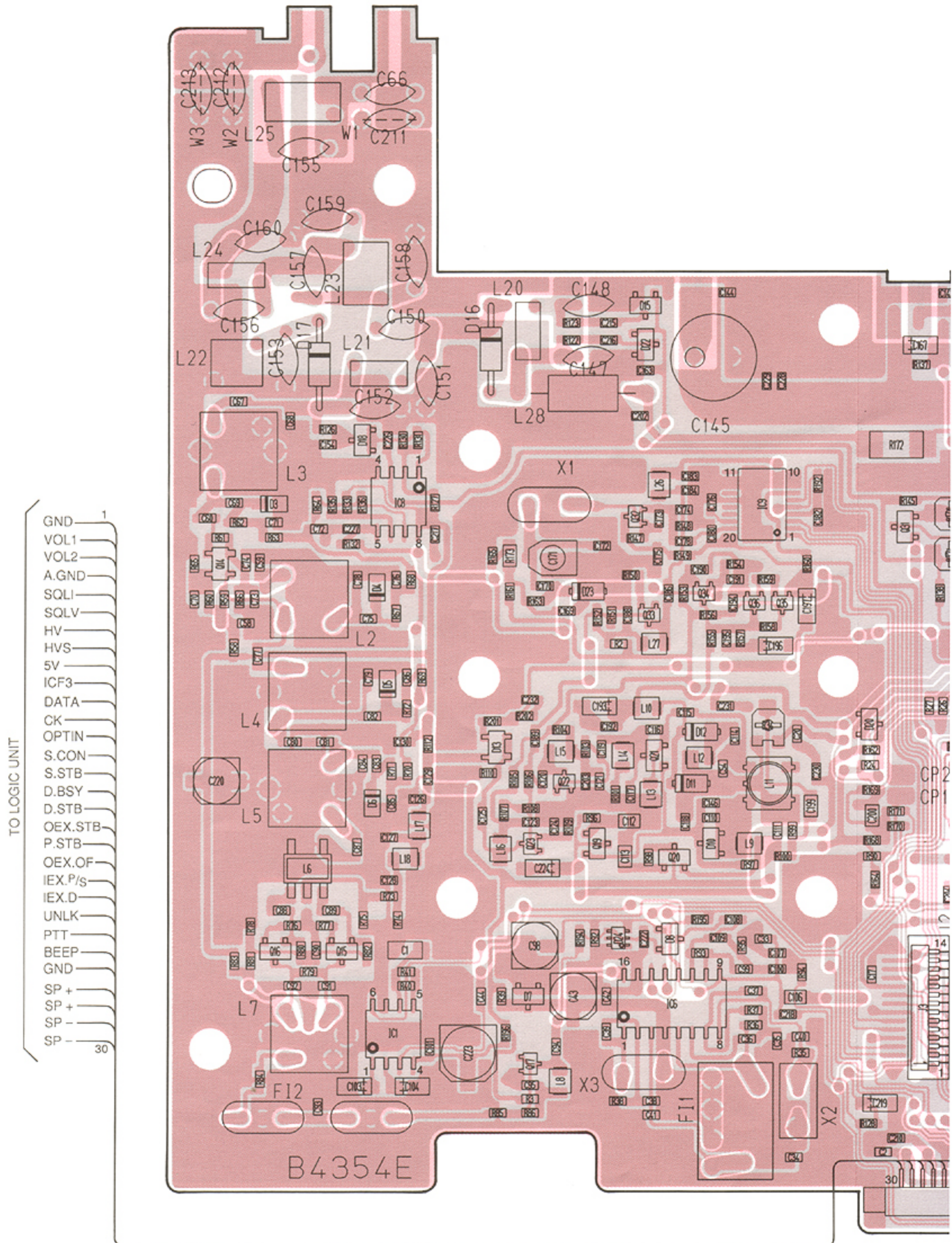
<b>1SS153</b> (Symbol: A9) 	<b>1SS196</b> (Symbol: G3) 	<b>1SS226</b> (Symbol: C3) 	<b>1SS272</b> (Symbol: A1) 	<b>HSM88ASR</b> (Symbol: C3) 
<b>MA6S121</b> (Symbol: M2D) 	<b>MA862</b> (Symbol: M11) 	<b>RD5.1M B2</b> (Symbol: 512) 	<b>RD6.2M B2</b> (Symbol: 622) 	



# SECTION 8 BOARD LAYOUTS

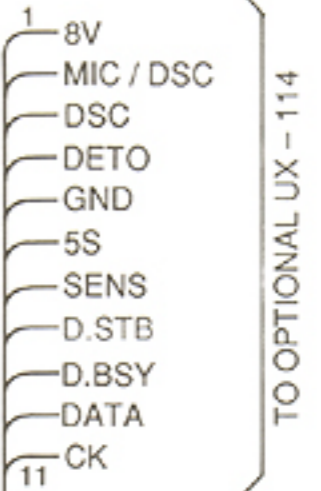
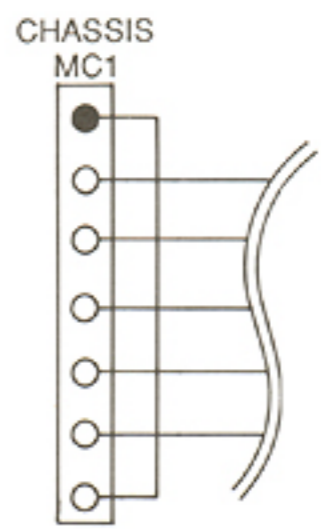
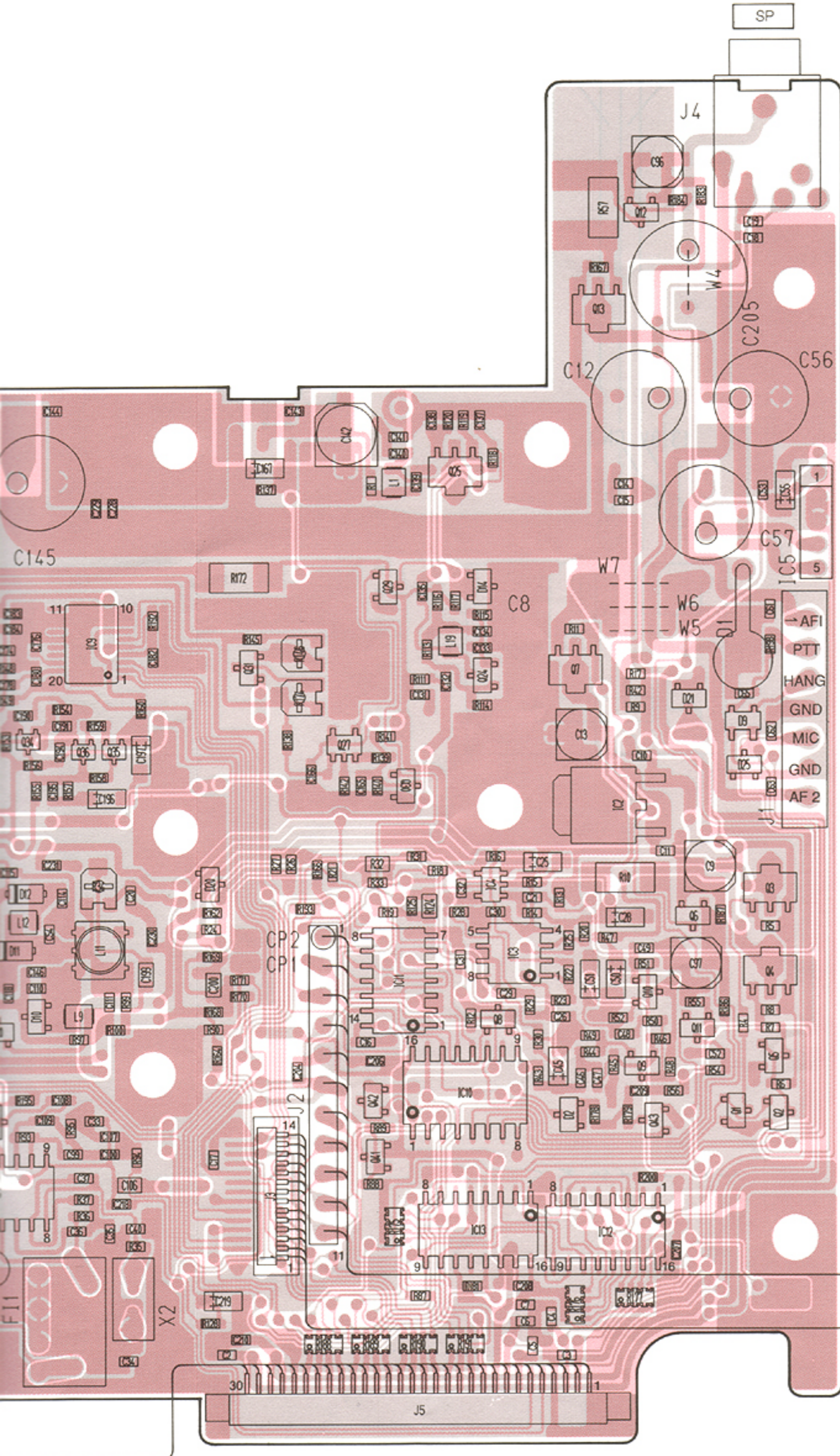
## 8-1 MAIN UNIT

● MAIN UNIT FOR U.S.A. VERSIONS

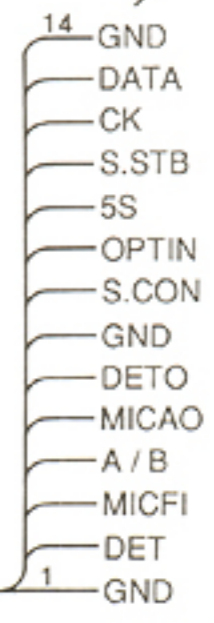




The combination of this page and the next page show the unit layout in the same configuration as the actual P.C. Board.



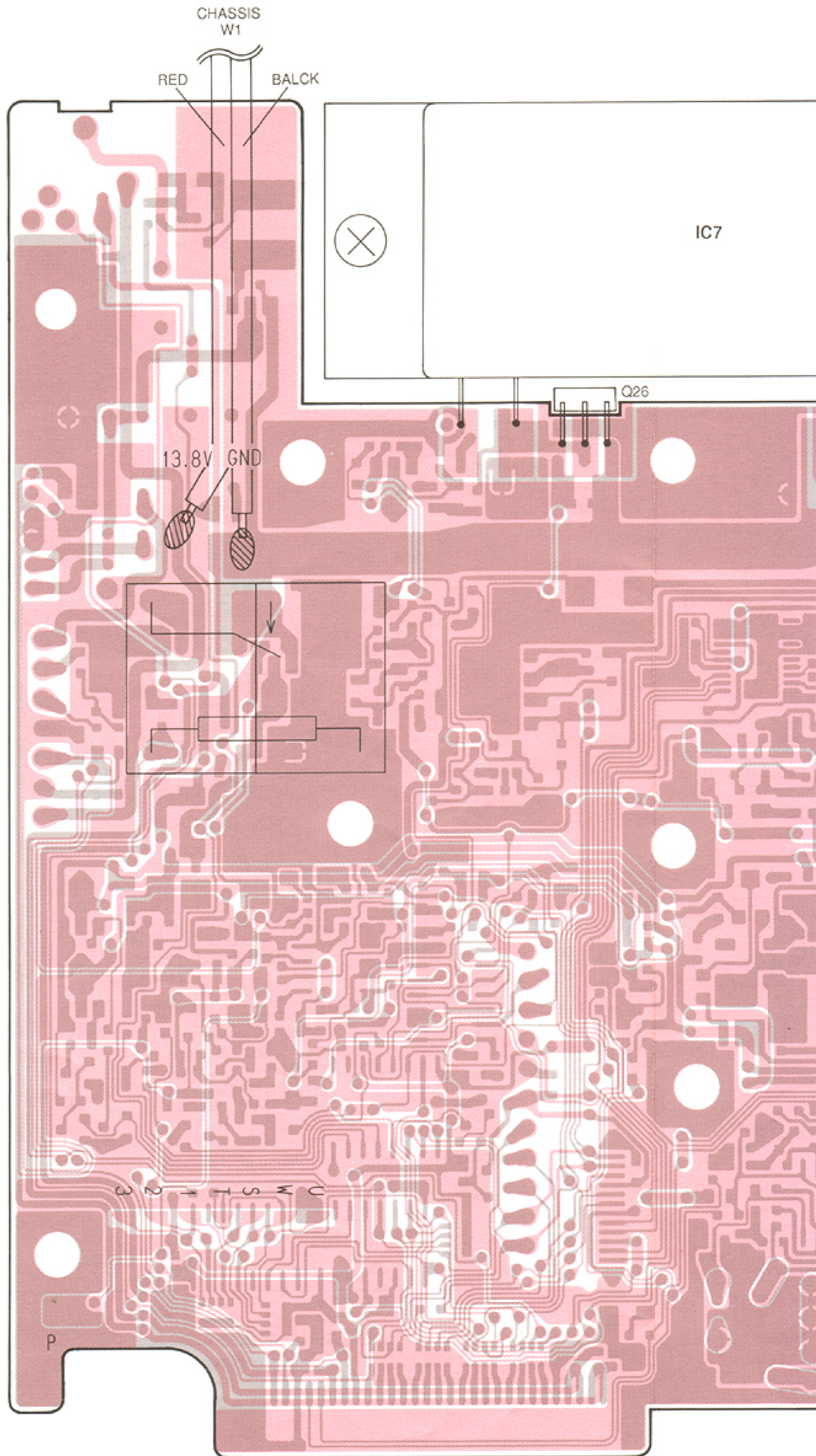
TO OPTIONAL UX - 114



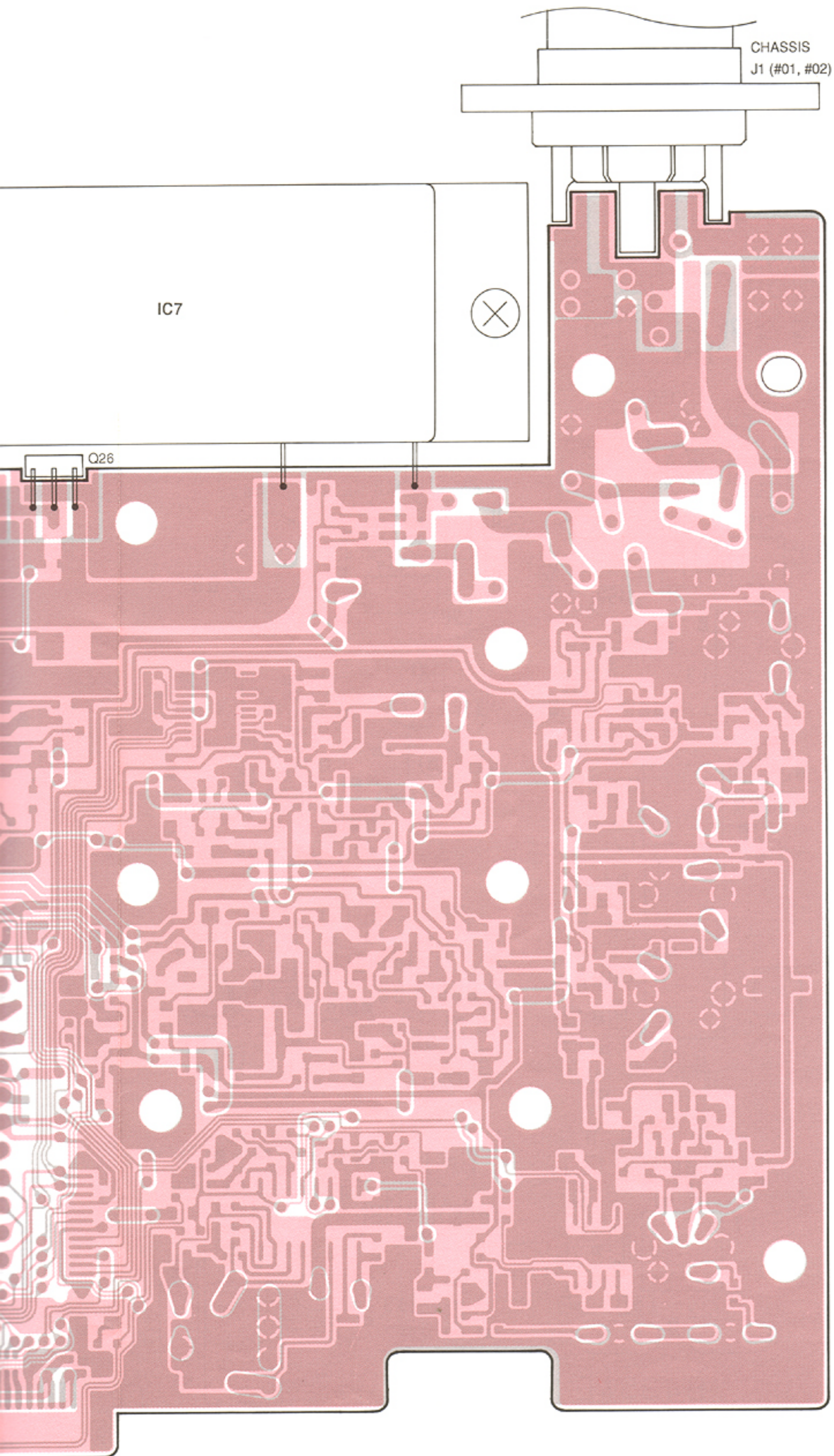
TO OPTIONAL UT - 79



● MAIN UNIT FOR U.S.A. VERSIONS

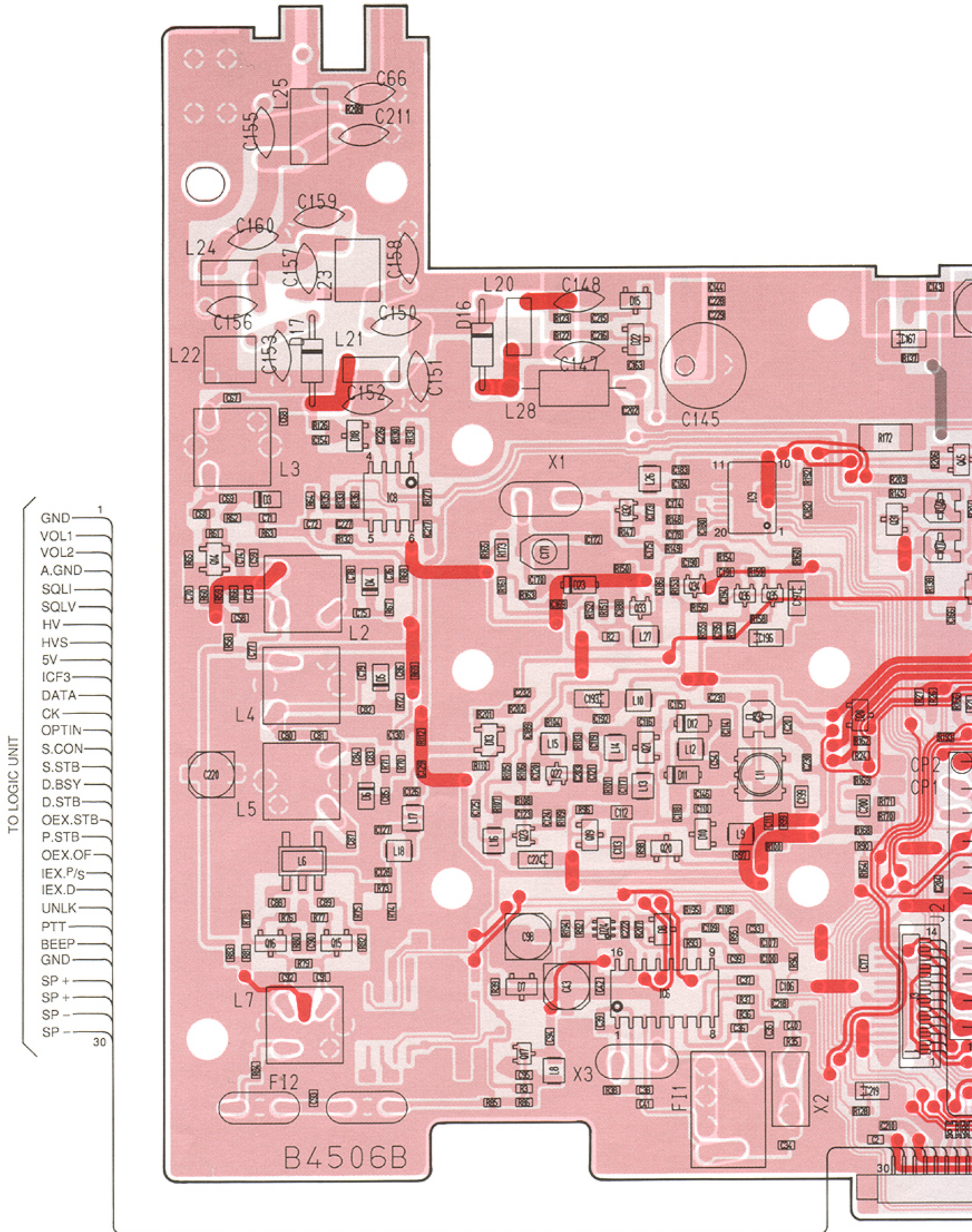






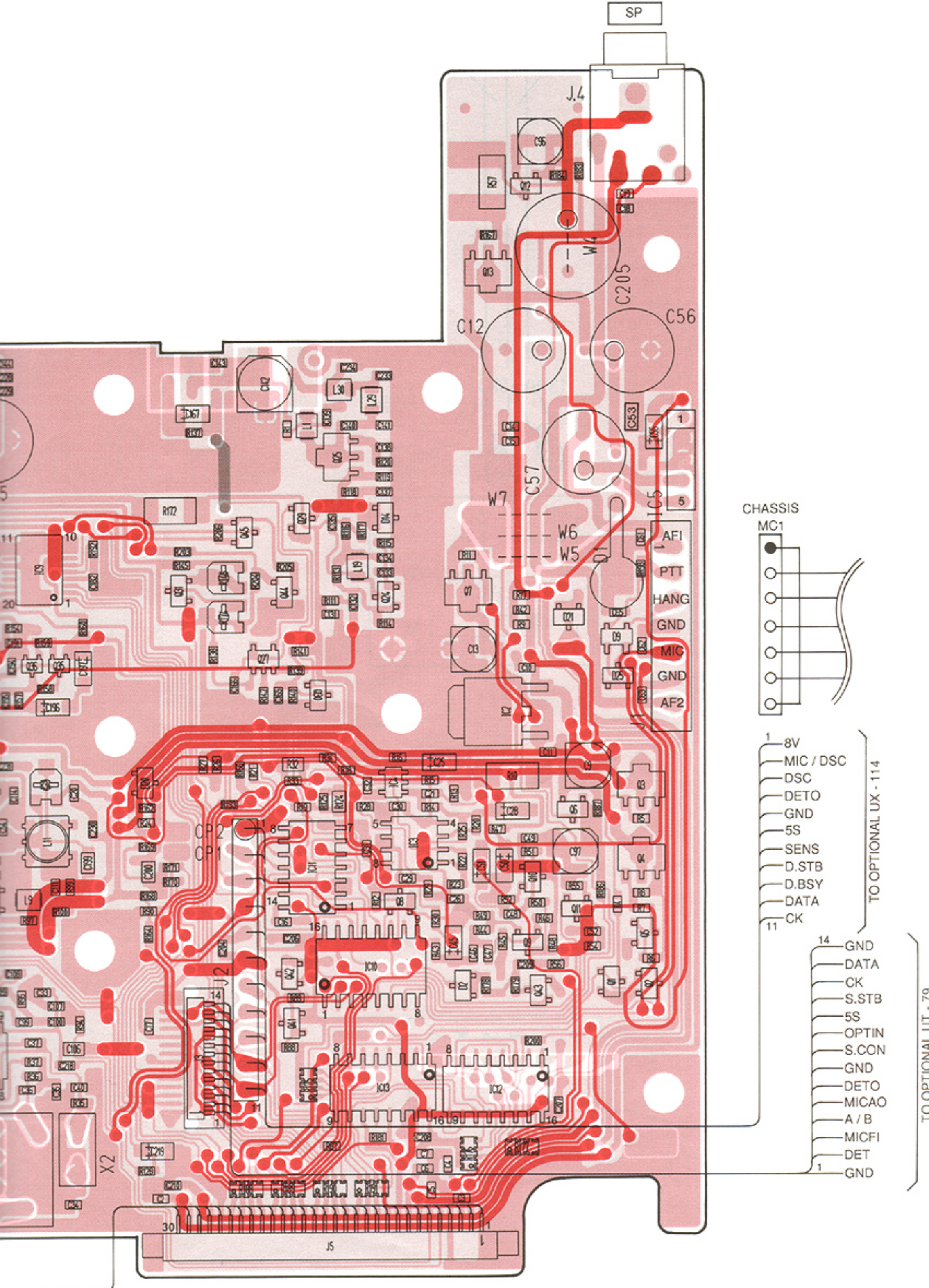


● MAIN UNIT FOR EUROPEAN VERSIONS

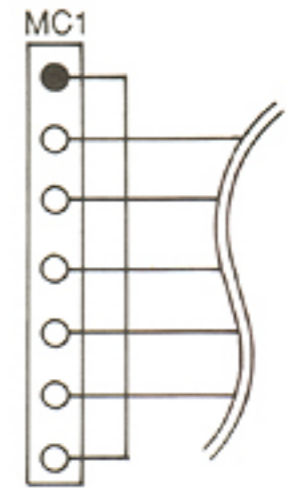




The combination of this page and the next page show the unit layout in the same configuration as the actual P.C. Board.



CHASSIS



- 1 8V
- MIC / DSC
- DSC
- DETO
- GND
- 5S
- SENS
- D.STB
- D.BSY
- DATA
- CK
- 11

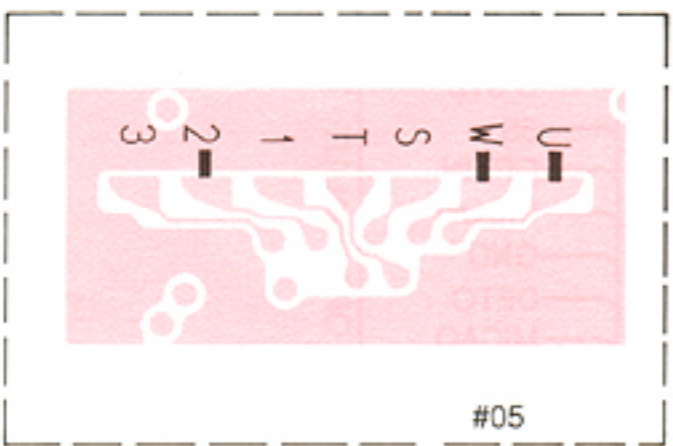
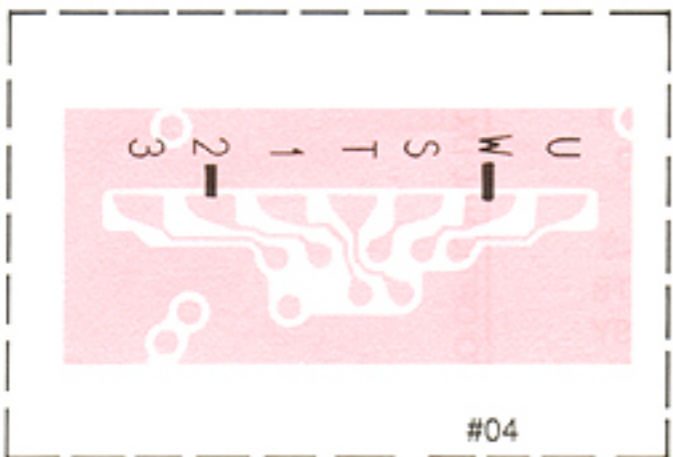
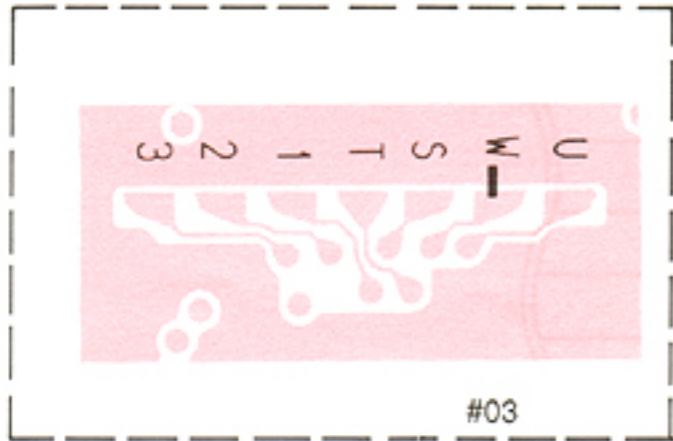
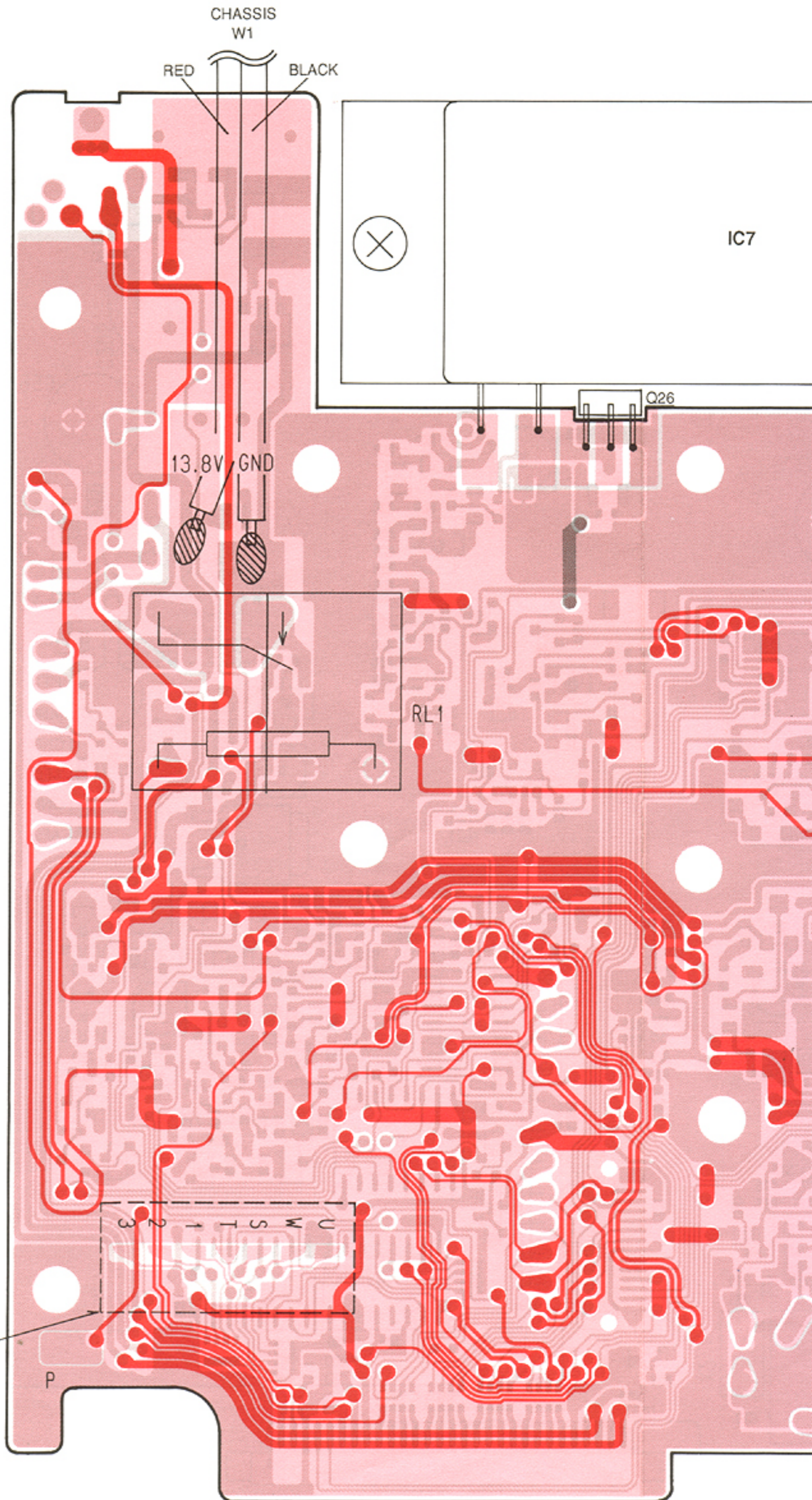
TO OPTIONAL UX - 114

- 14 GND
- DATA
- CK
- S.STB
- 5S
- OPTIN
- S.CON
- GND
- DETO
- MICA0
- A / B
- MICFI
- DET
- GND
- 1

TO OPTIONAL UT - 79

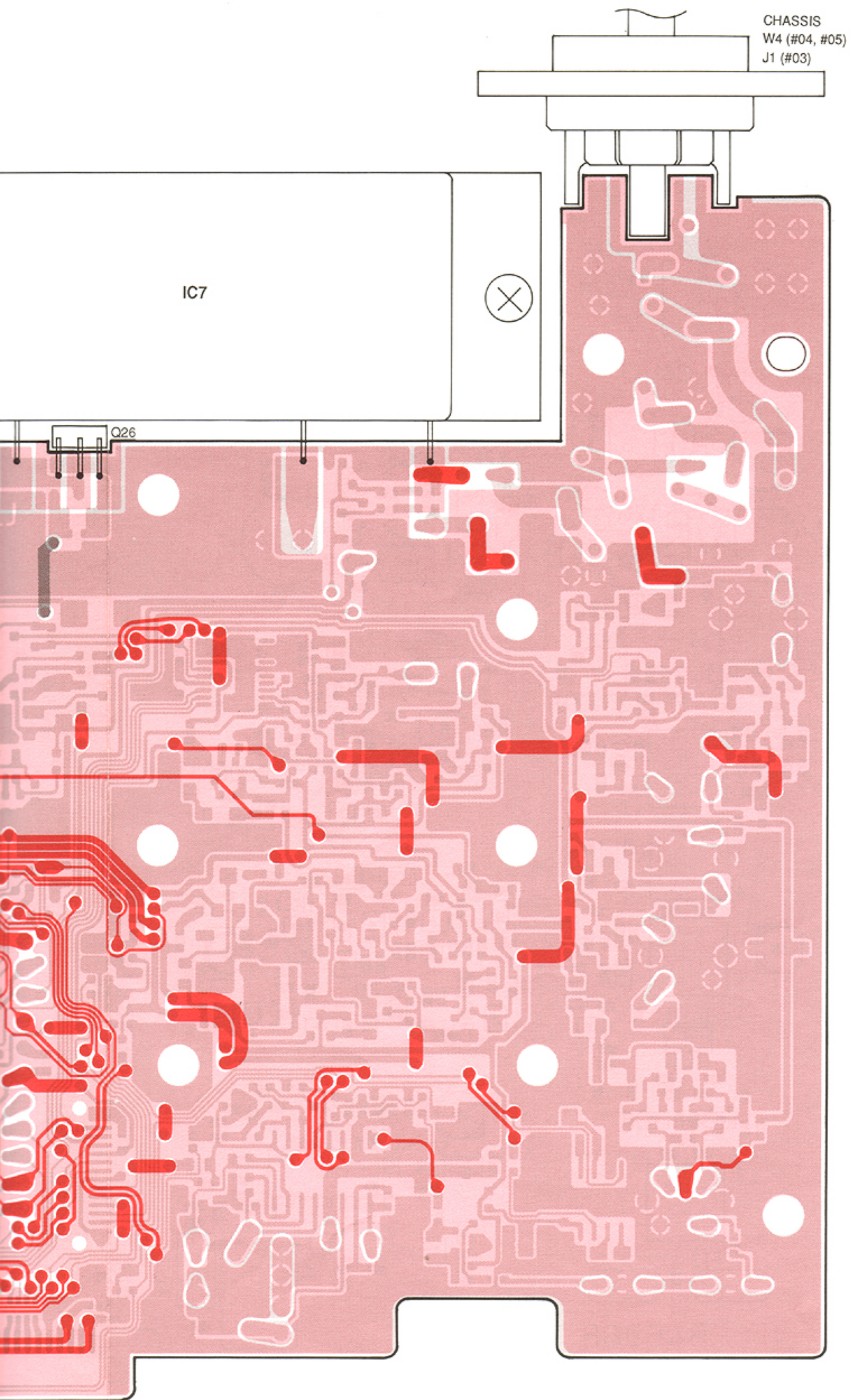


● MAIN UNIT FOR EUROPEAN VERSIONS



Solder bridges differ depending on versions. See above for details



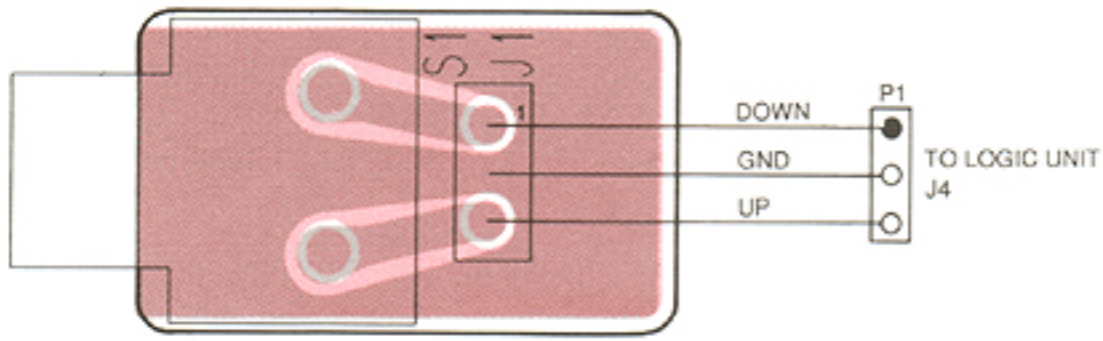




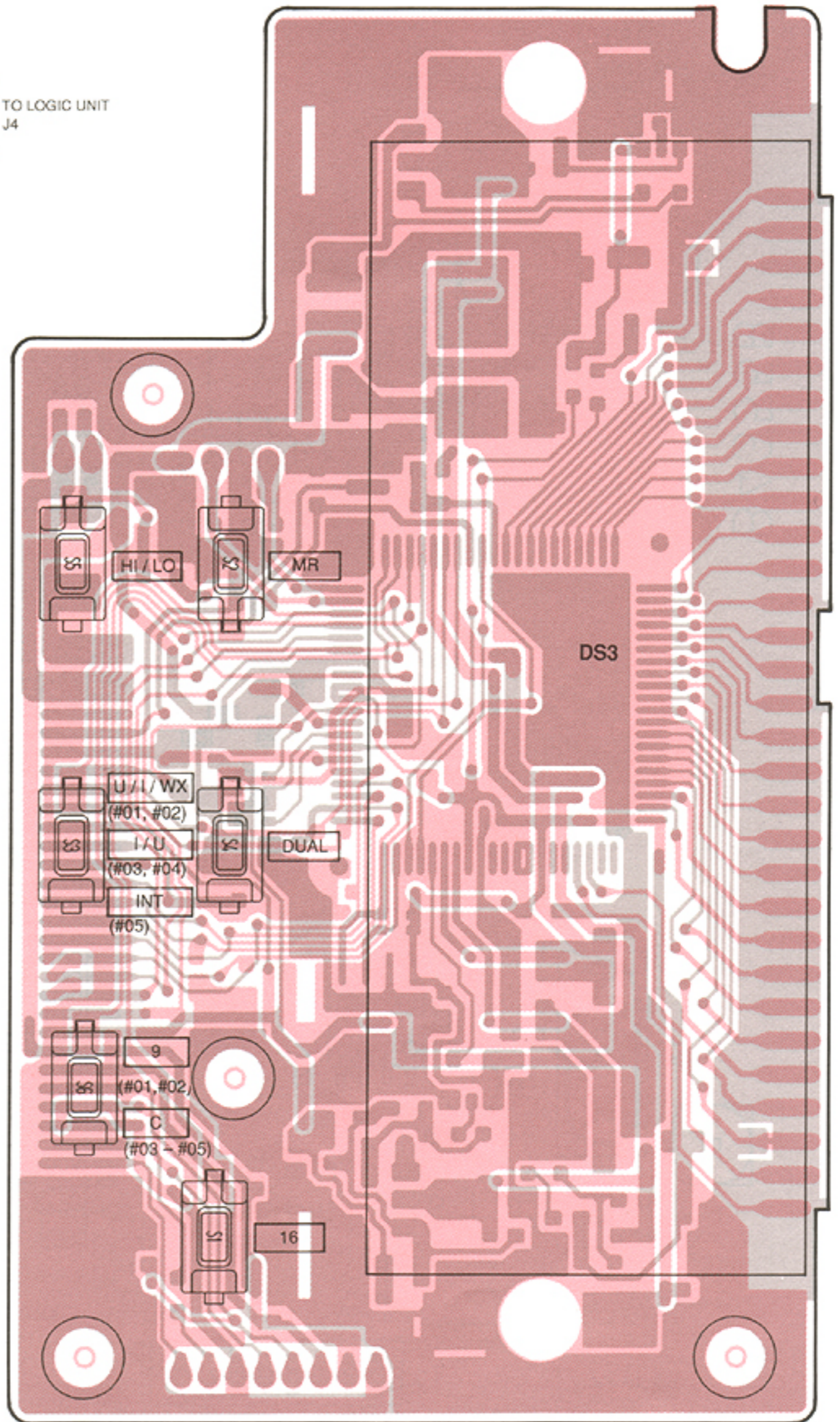
## 8-2 LOGIC UNIT

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

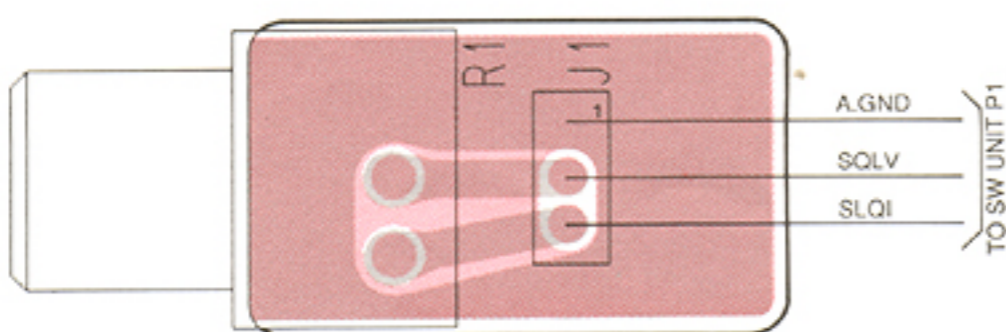
### ● SENSOR UNIT



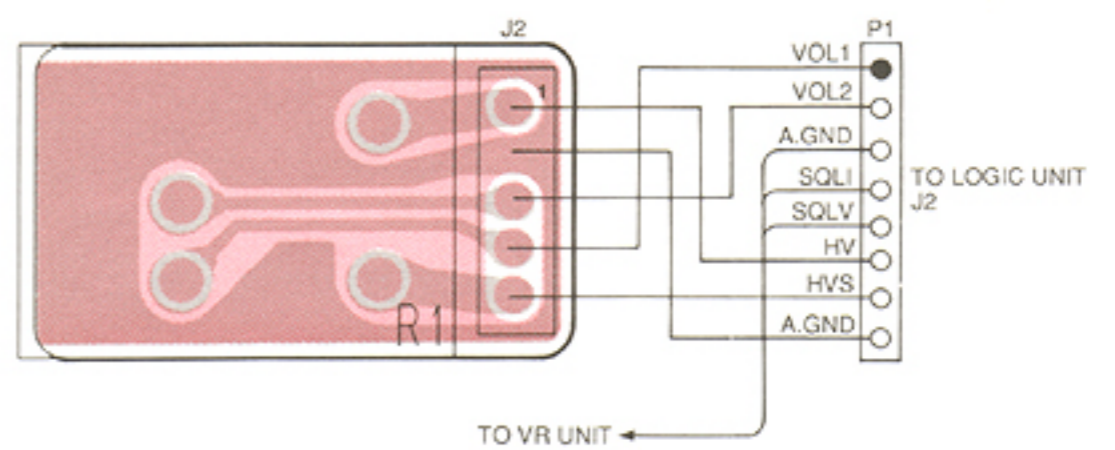
### ● LOGIC UNIT



### ● VR UNIT

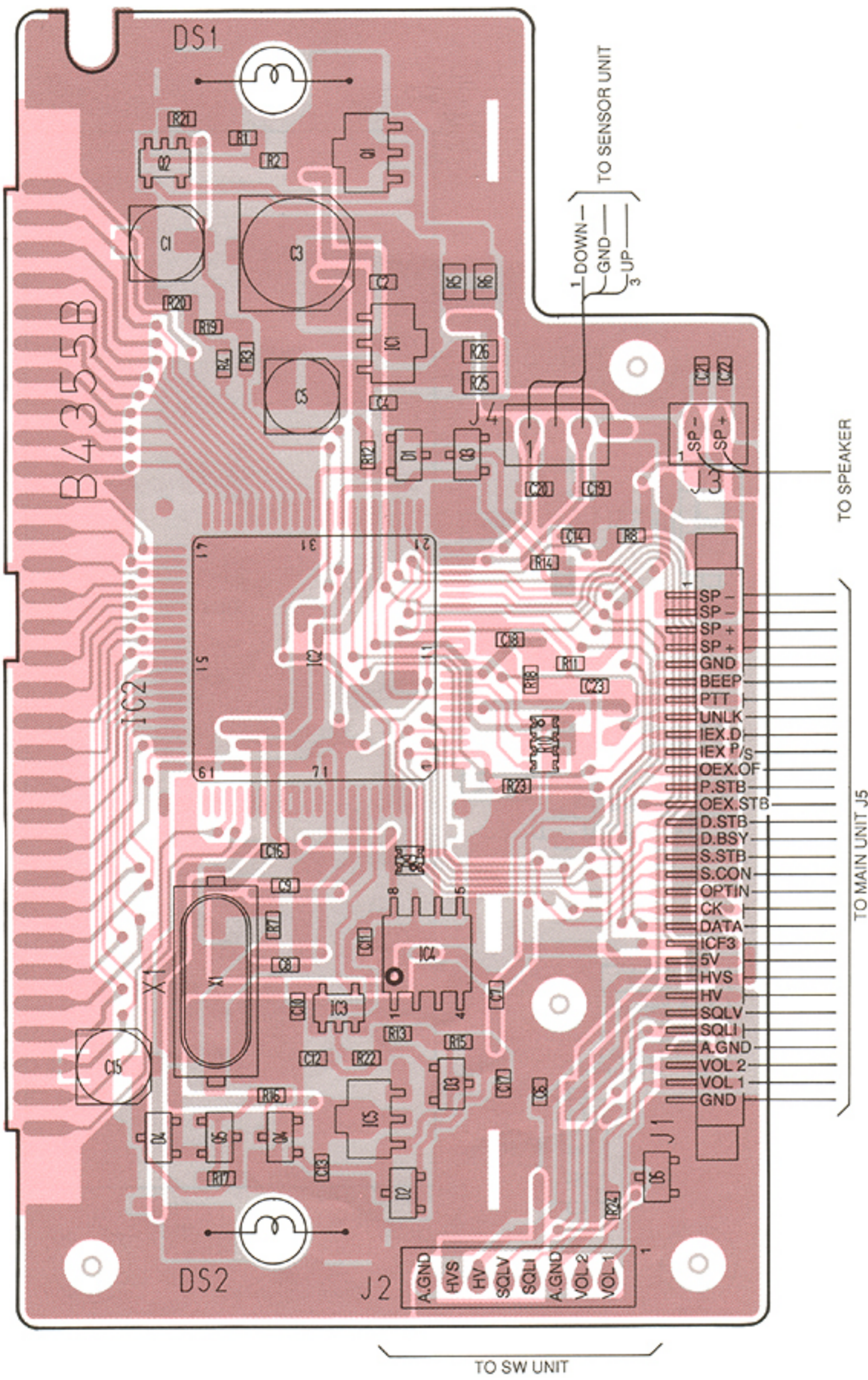


### ● SW UNIT





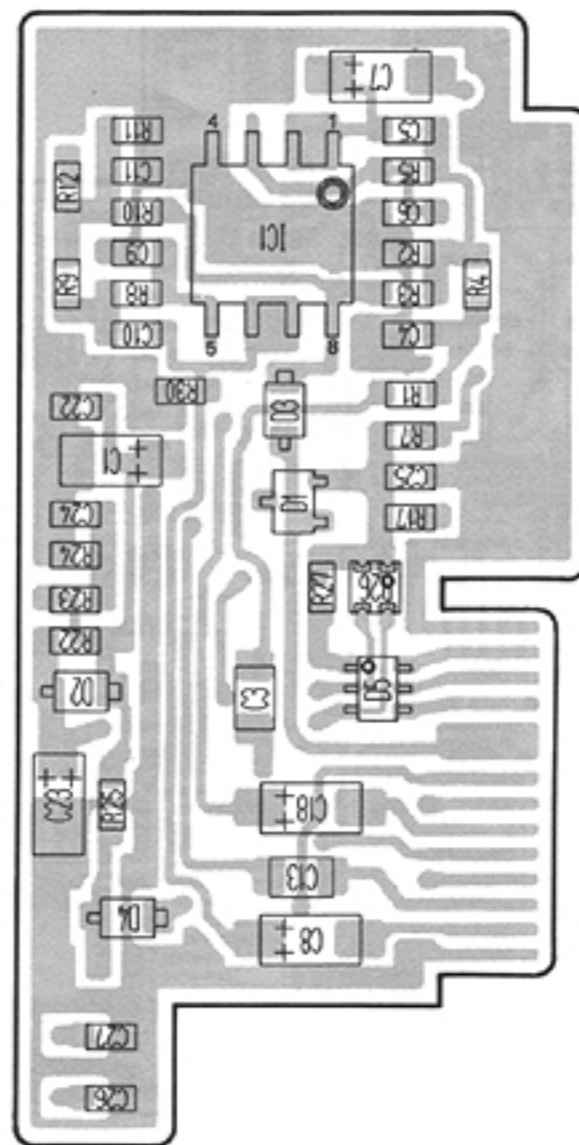
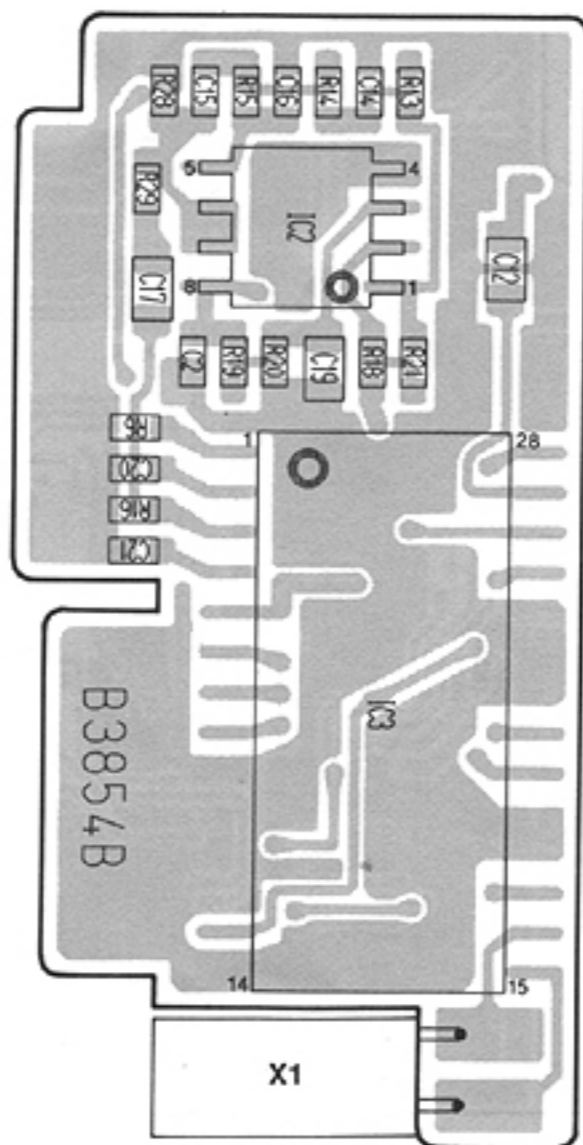
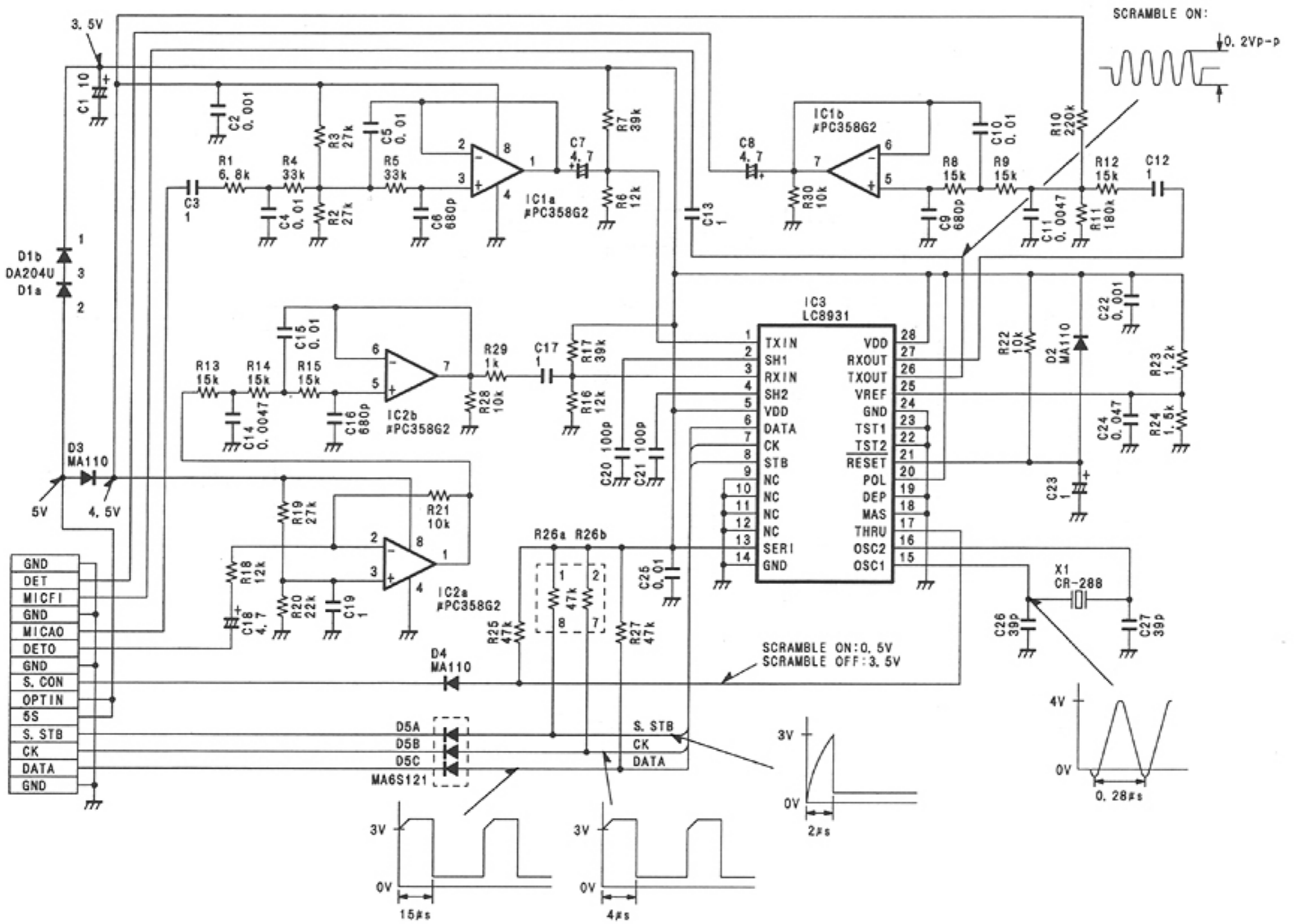
● LOGIC UNIT



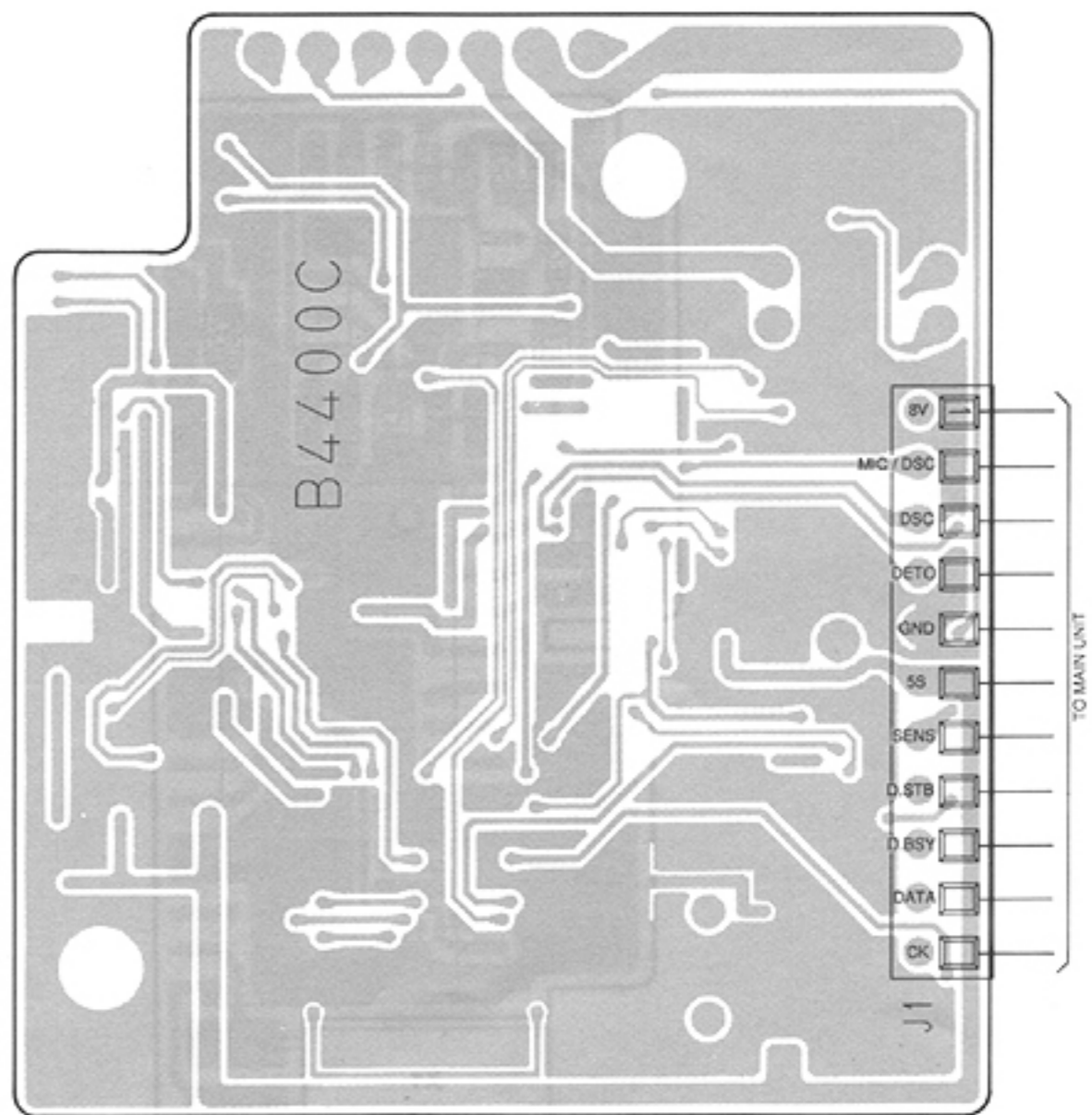
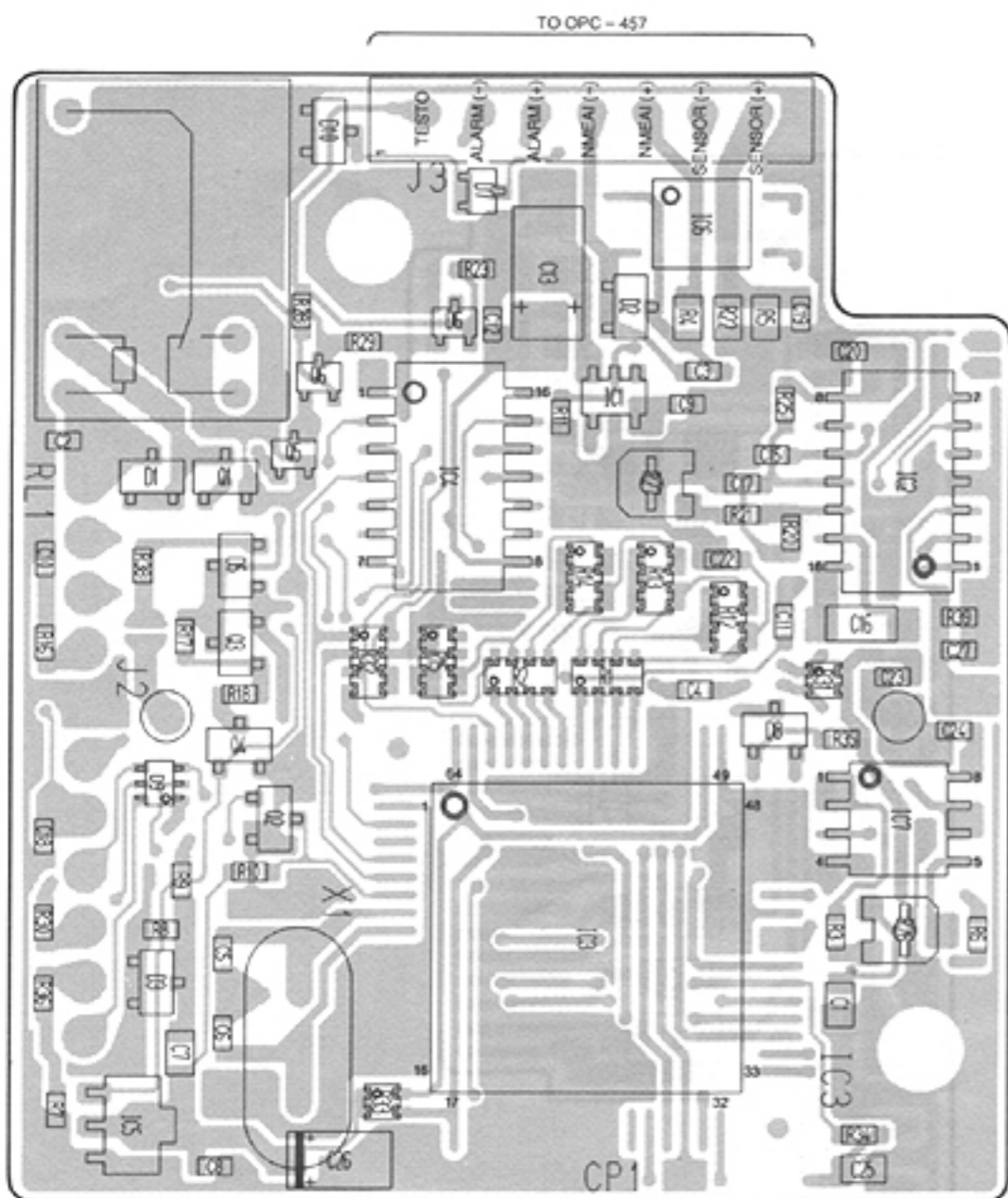
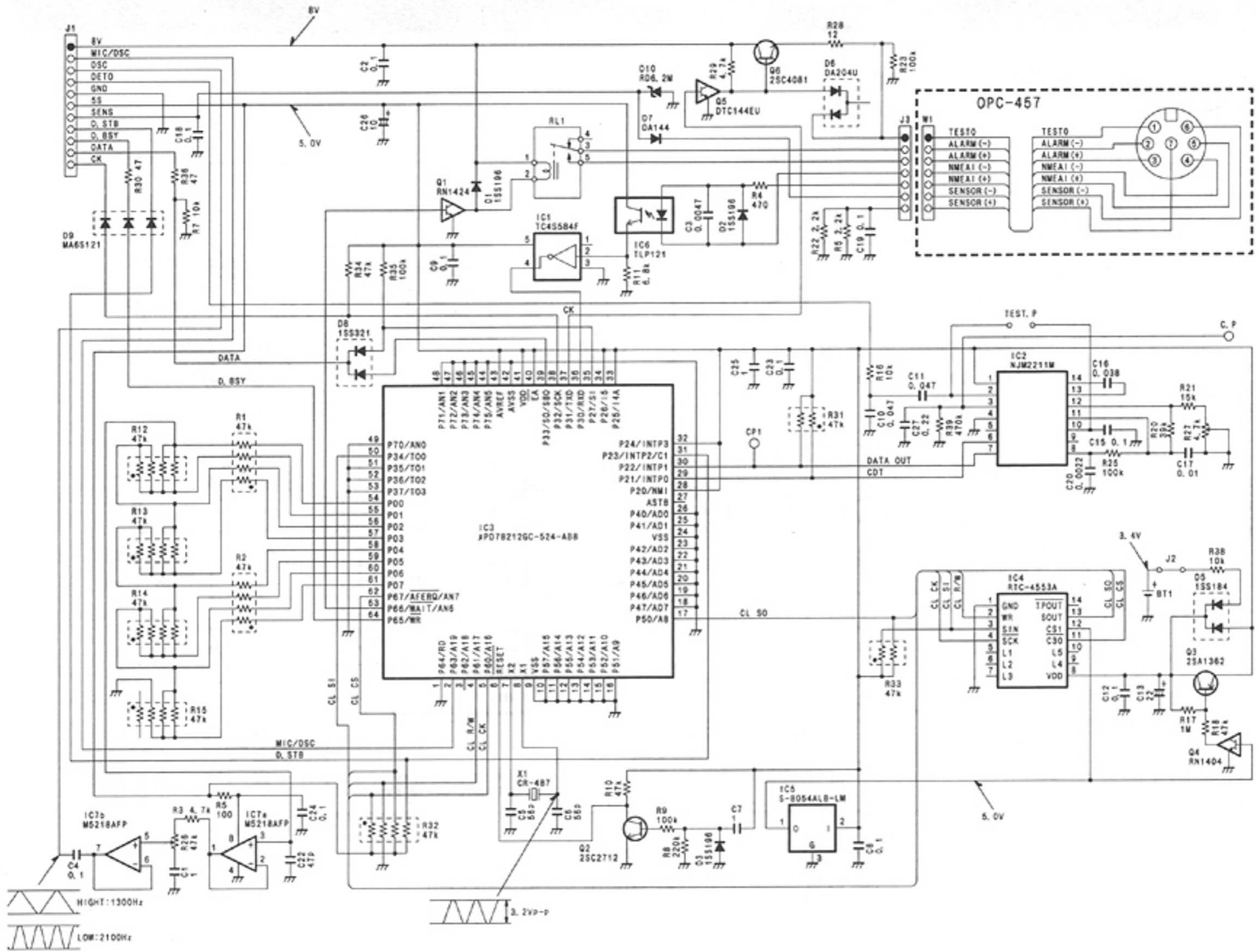


# SECTION 9 OPTIONAL UNITS

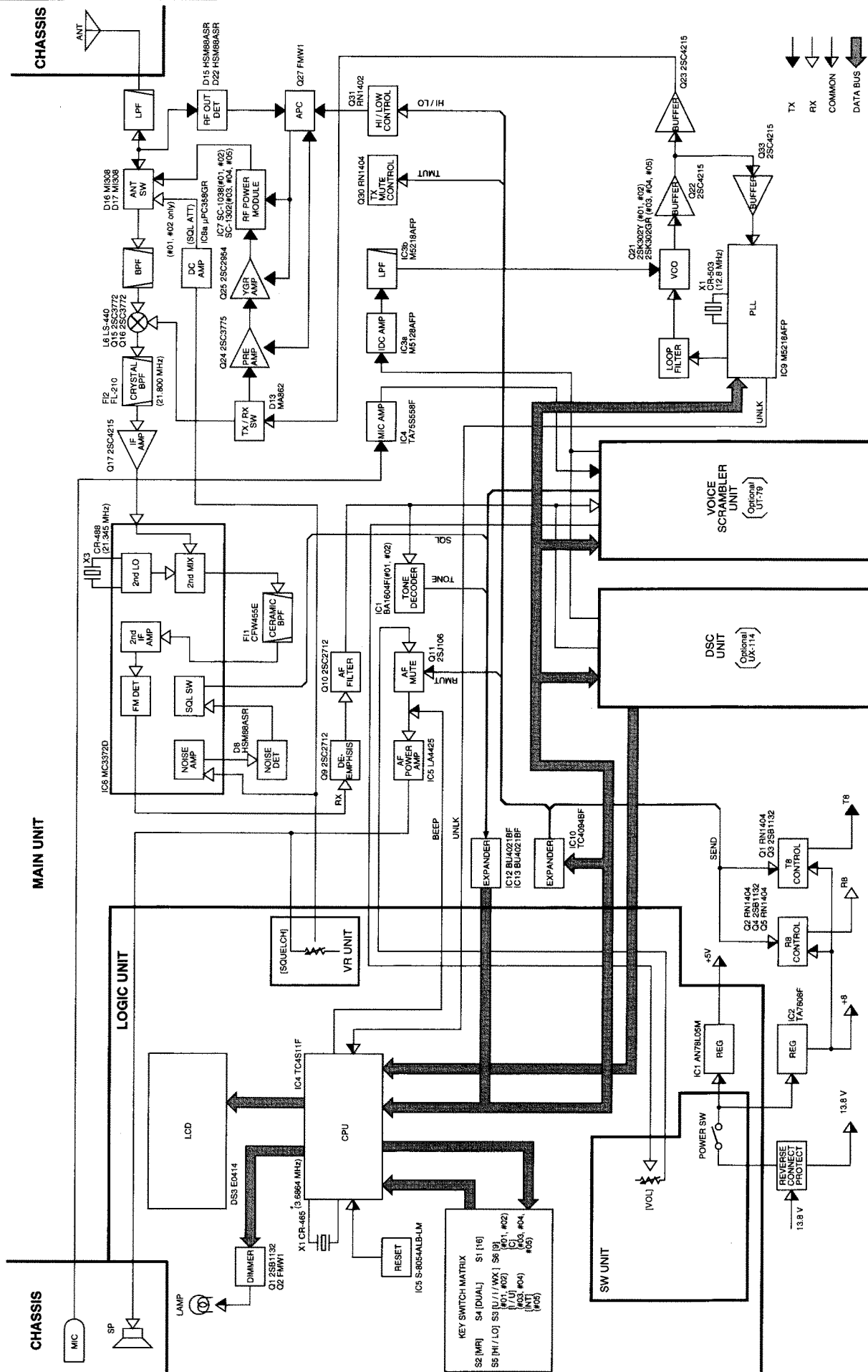
## • UT-79 VOICE SCRAMBLER UNIT



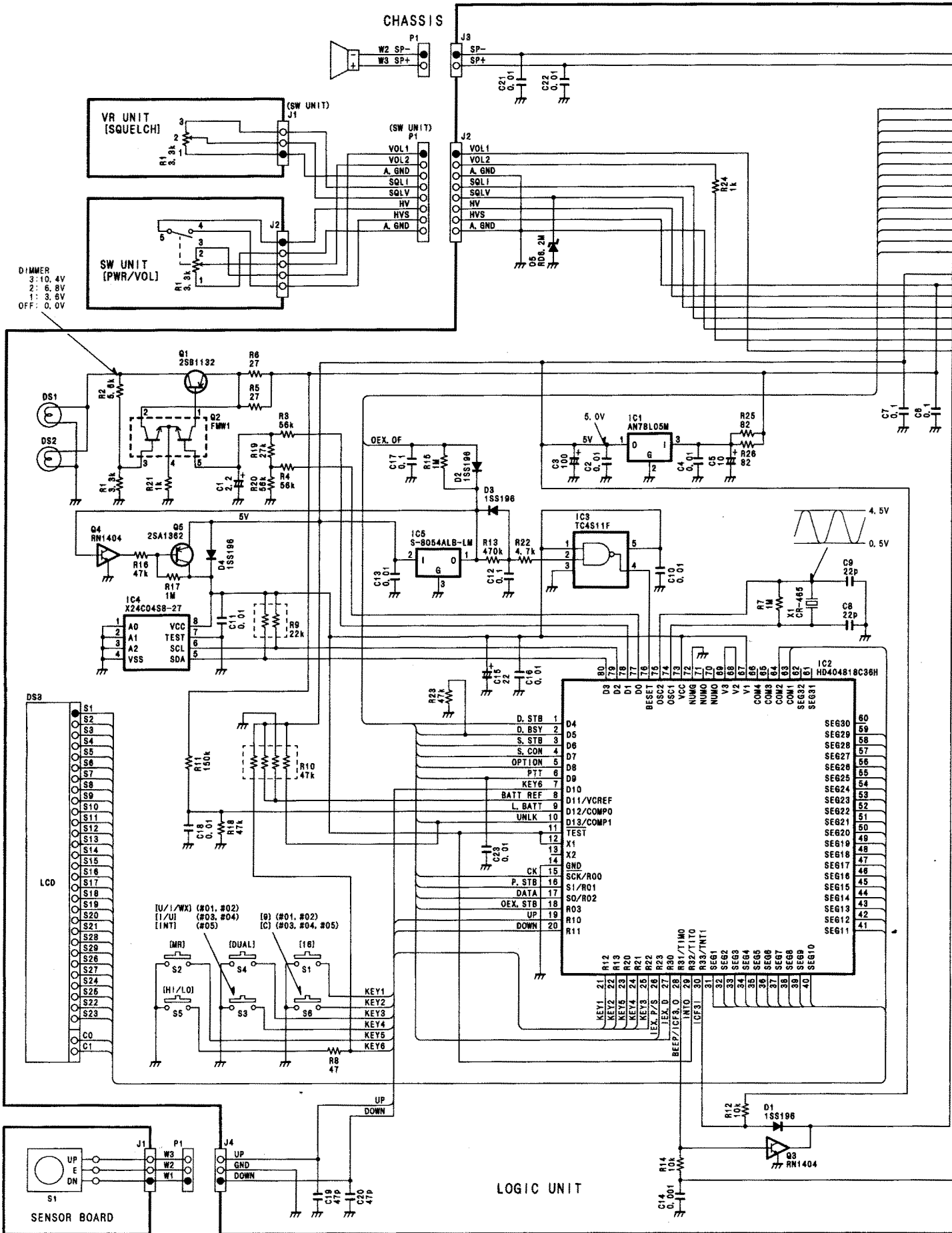
● UX-114 DSC UNIT

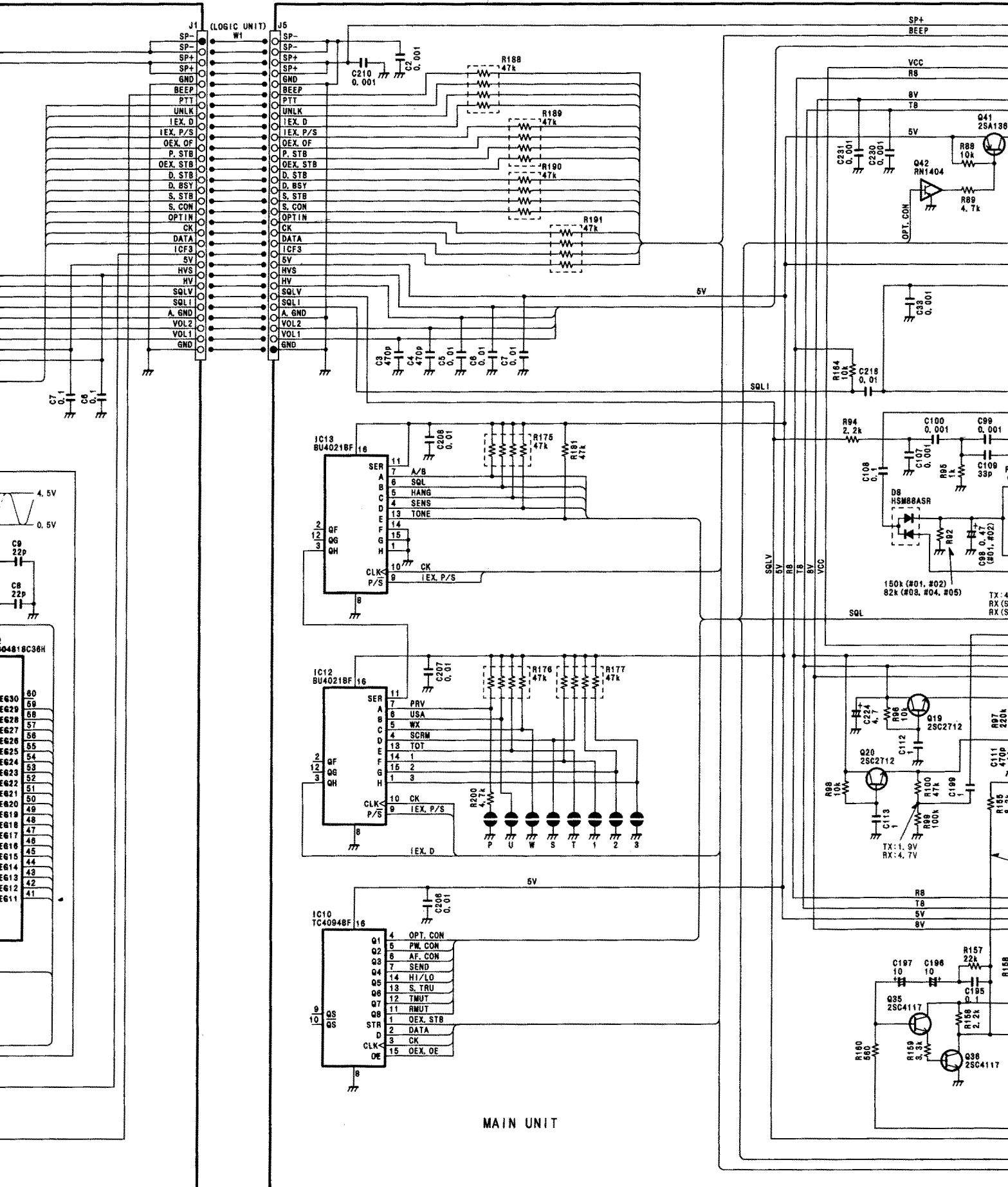


# SECTION 10 BLOCK DIAGRAM

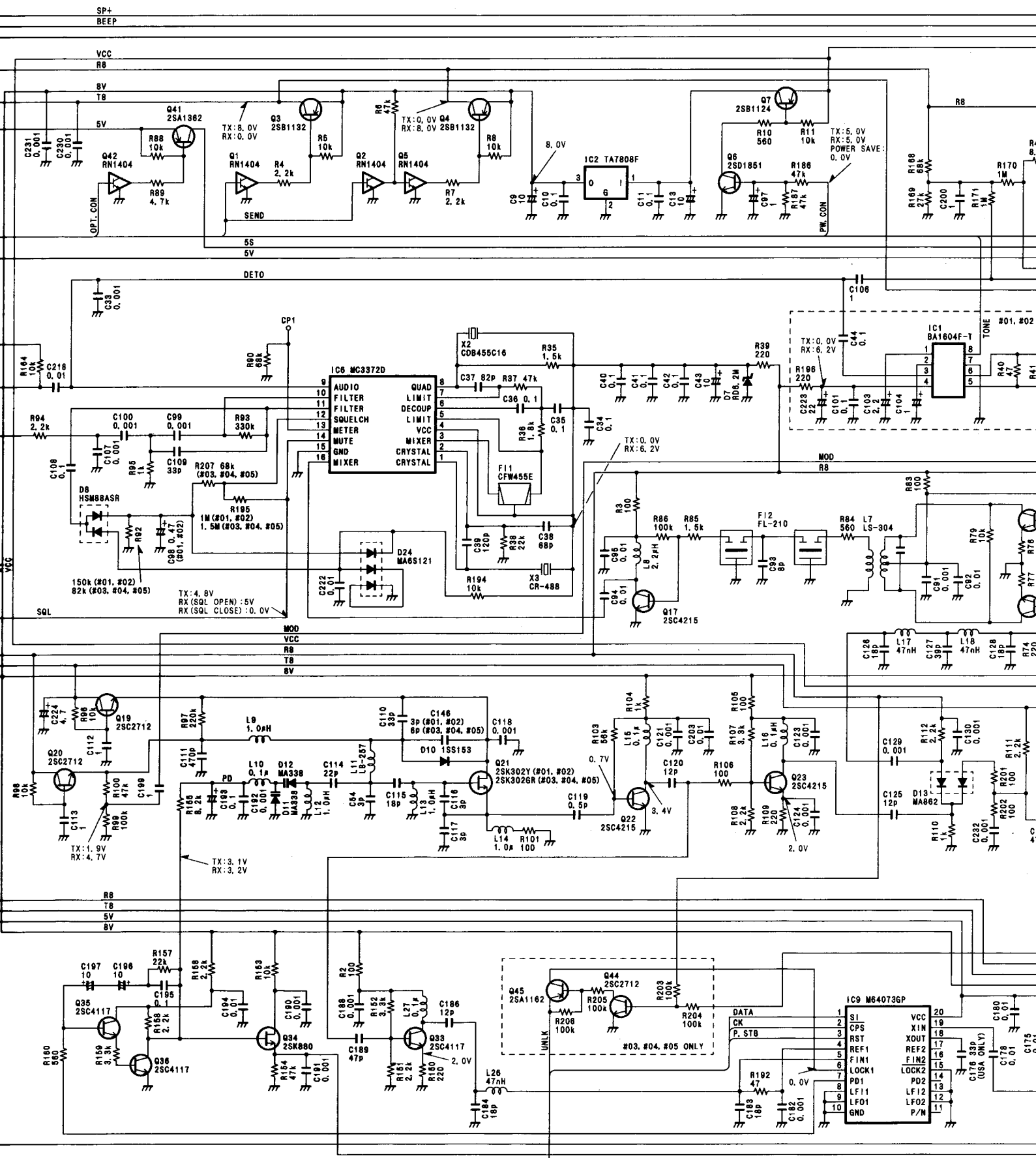


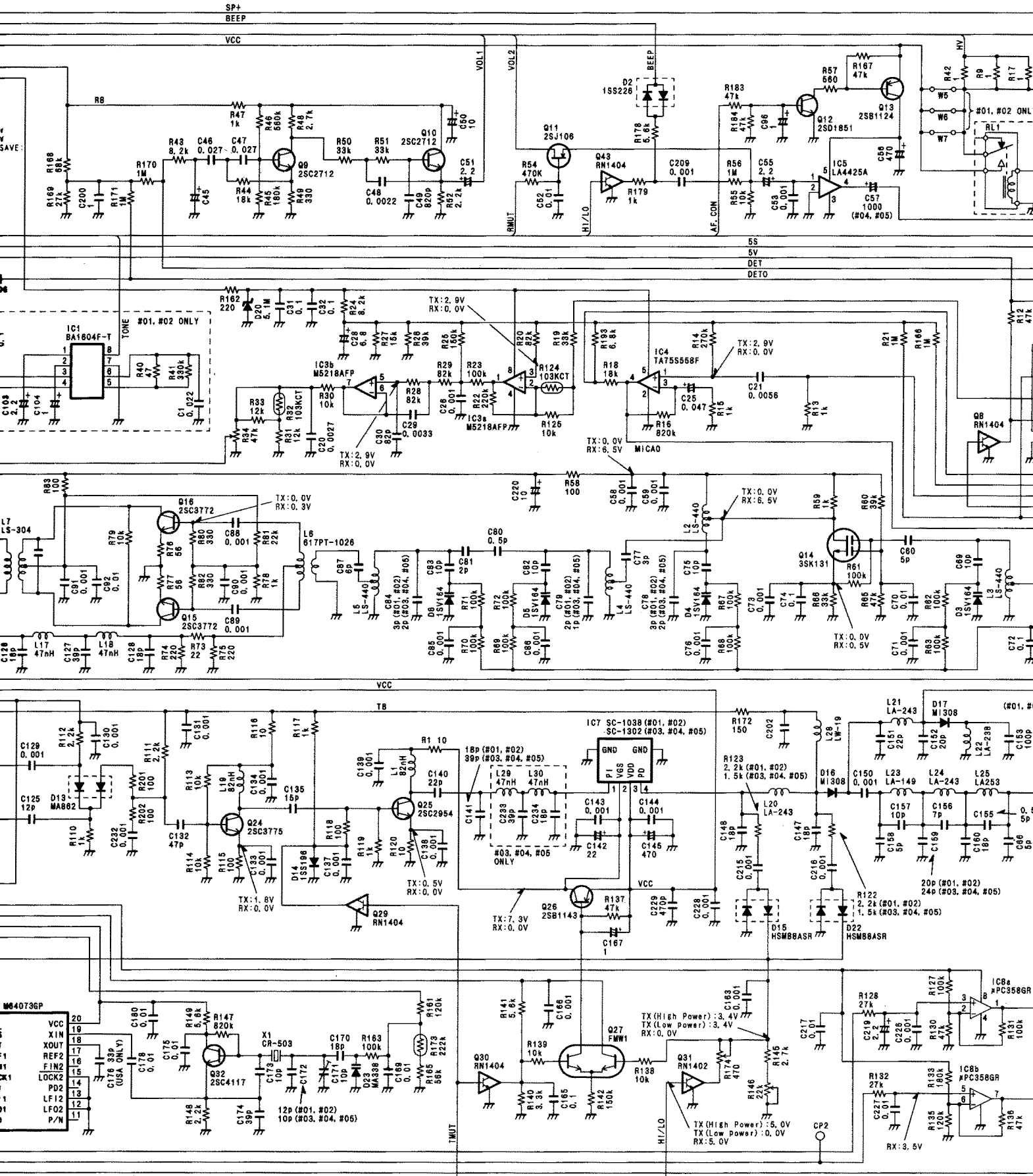
# SECTION 11 VOLTAGE DIAGRAM

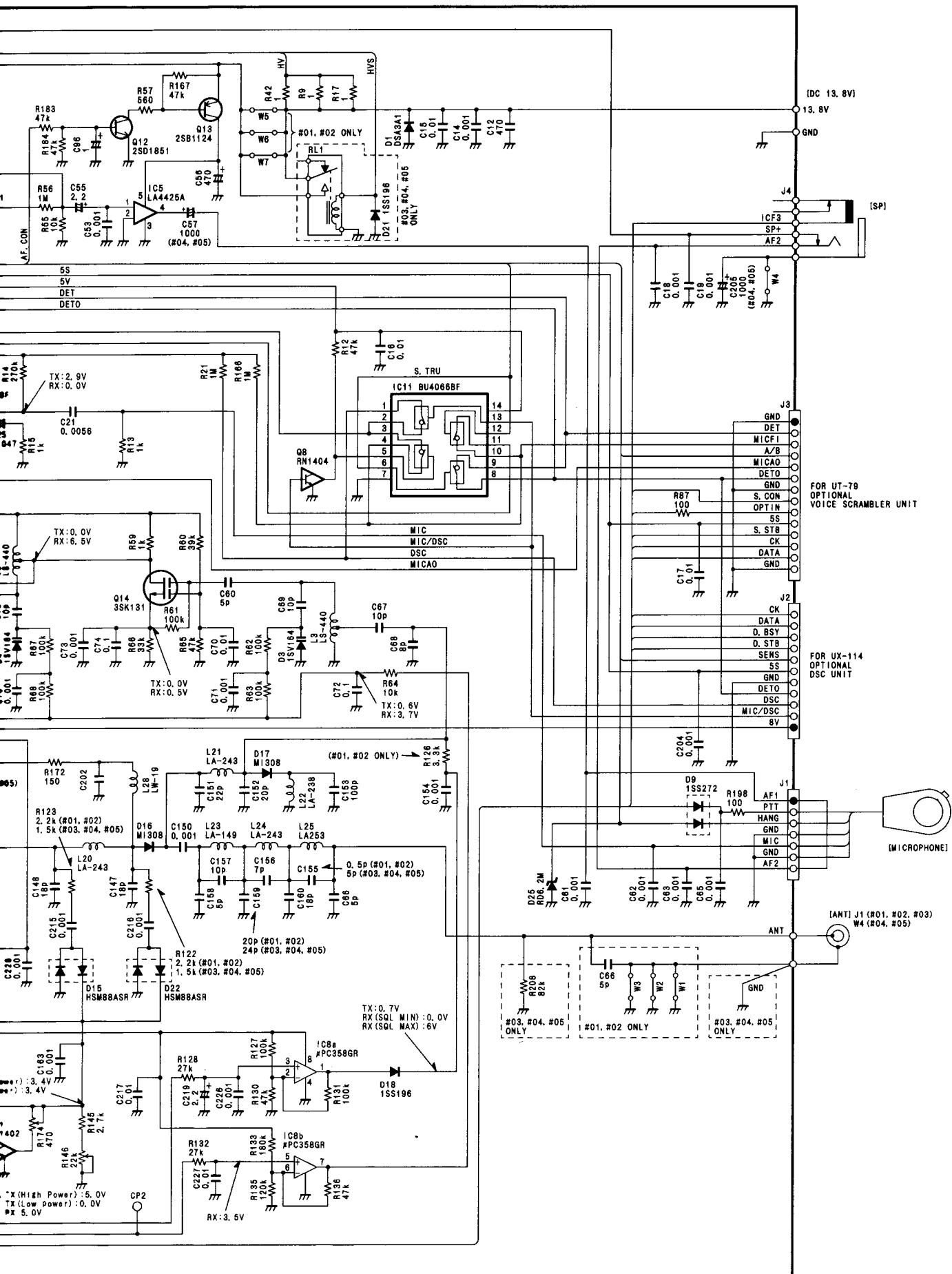












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