



SERVICE MANUAL

VHF MARINE TRANSCEIVER

IC-M10A

IC-M10E

INTRODUCTION

This service manual describes the latest information for the **IC-M10A** and **IC-M10E** VHF MARINE TRANSCEIVER at the time of publication.

MODEL	VERSION NUMBER	VERSION
IC-M10A	#01, #02	USA
IC-M10E	#03	EUR
	#04	UK
	#09	ITA
	#10, #11	FRA

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

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that used more than 15 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.

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〉

1110003330	S. IC	TA31136F(EL)	IC-M10	MAIN UNIT	5 pieces
8810005710	Screw	PH B0 M2×6 ZK	IC-M10	Rear Panel	10 pieces

Address 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 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.



TABLE OF CONTENTS

SECTION	1	SPECIFICATIONS	1 - 1 to 1 - 2
SECTION	2	DISASSEMBLY INSTRUCTIONS	2 - 1
SECTION	3	INSIDE VIEWS	3 - 1
SECTION	4	CIRCUIT DESCRIPTION	4 - 1 to 4 - 4
	4 - 1	RECEIVER CIRCUITS	4 - 1
	4 - 2	TRANSMITTER CIRCUITS	4 - 2
	4 - 3	PLL CIRCUIT	4 - 3
	4 - 4	POWER SUPPLY CIRCUITS	4 - 4
	4 - 5	PORT ALLOCATIONS	4 - 4
SECTION	5	ADJUSTMENT PROCEDURES	5 - 1 to 5 - 2
	5 - 1	PLL AND TRANSMITTER ADJUSTMENTS	5 - 1
	5 - 2	RECEIVER ADJUSTMENTS	5 - 2
SECTION	6	PARTS LIST	6 - 1 to 6 - 4
SECTION	7	MECHANICAL PARTS	7 - 1 to 7 - 2
SECTION	8	SEMI-CONDUCTOR INFORMATION	8 - 1
SECTION	9	BOARD LAYOUTS	9 - 1 to 9 - 2
SECTION	10	OPTIONAL UNITS	10 - 1 to 10 - 2
	10 - 1	UT-98	10 - 1
	10 - 2	BC-79	10 - 2
	10 - 3	AD-54	10 - 2
SECTION	11	BLOCK DIAGRAM	11 - 1
SECTION	12	VOLTAGE DIAGRAM	12 - 1

SECTION 1 SPECIFICATIONS

■ GENERAL

- Frequency range : Transmit 156.0-157.5 MHz
Receive 156.0-163.0 MHz
- Mode : FM (16K0G3E)
- Channel spacing : 25 kHz
- Power supply requirement : Icom battery packs BP-157A, BP-160, BP-174 or 6 dry cell batteries with BP-130A
- Current drain : Receive Power saved 19 mA
Max. audio 300 mA
Transmit High 1.8 A (0.9 A for France version)
Low 0.9 A (0.6 A for France version)
- Antenna impedance : 50 Ω (unbalanced)
- Usable temperature range : -20°C to $+60^{\circ}\text{C}$ (-4°F to $+140^{\circ}\text{F}$)
- Frequency stability : $\pm 0.0005\%$ (-20°C to $+60^{\circ}\text{C}$)
- Dimensions : with BP-130A/BP-160 60 (W) \times 127 (H) \times 40 (D) mm
2.4 (W) \times 5.0 (H) \times 1.6 (D) in
with BP-174 60 (W) \times 155 (H) \times 40 (D) mm
2.4 (W) \times 6.1 (H) \times 1.6 (D) in
(projections not included)
- Weight : with BP-130A 300 g; 10.6 oz (include 6 dry cells)
with BP-160 310 g; 10.9 oz
with BP-174 422 g; 14.9 oz

■ TRANSMITTER

- Output power (High/low) : 3 W/0.5 W (typical with BP-130A)
6 W/0.5 W (with BP-174)
1 W/0.25 W (France version)
- Modulation system : Variable reactance phase modulation
- Maximum frequency deviation : ± 5 kHz
- Spurious emissions : -65 dB ($0.25 \mu\text{W}^*$)
- Noise and hum : -40 dB
- Audio frequency response : -3 dB to $+1$ dB of $+6$ dB/octave with 300 Hz to 3000 Hz input
- Audio harmonic distortion : 10%

■ RECEIVER

- Receive system : Double conversion superheterodyne
- Sensitivity : $0.35 \mu\text{V}$ for 12 dB SINAD
- Intermediate frequencies : 1st 30.875 MHz
2nd 455 kHz
- Squelch threshold sensitivity : $0.3 \mu\text{V}$
- Adjacent channel selectivity : -60 dB
- Intermodulation rejection : -60 dB (-68 dB*)
- Spurious response rejection : -60 dB (-70 dB*)
- Audio output power : 500 mW at 10 % distortion with an 8 Ω load
- Noise and hum : -40 dB
- Audio frequency response : -3 dB to $+1$ dB of -6 dB/octave with 300 Hz to 3000 Hz modulation

*Values for European versions measured in accordance with ETS300 162.
All specifications are subject to change without notice or obligation.

■ VHF MARINE TRANSCEIVER CHANNEL CHART

Channel number			Frequency (MHz)		Channel number			Frequency (MHz)	
INT 1	INT 2	USA	Transmitter	Receiver	INT 1	INT 2	USA	Transmitter	Receiver
01	01		156.050	160.650	62	62		156.125	160.725
	01A	01A	156.050	156.050		62A	62A	156.125	156.125
02	02		156.100	160.700	63	63		156.175	160.775
	02A	02A	156.100	156.100		63A	63A	156.175	156.175
03	03		156.150	160.750	64	64		156.225	160.825
	03A	03A	156.150	156.150		64A	64A	156.225	156.225
04	04		156.200	160.800	65	65		156.275	160.875
	04A	04A	156.200	156.200		65A	65A	156.275	156.275
05	05		156.250	160.850	66	66		156.325	160.925
	05A	05A	156.250	156.250		66A	66A	156.325	156.325
06	06	06	156.300	156.300	67	67	67	156.375	156.375
07	07		156.350	160.950	68	68	68	156.425	156.425
	07A	07A	156.350	156.350	69	69	69	156.475	156.475
08	08	08	156.400	156.400	70	70	70	156.525	156.525
09	09	09	156.450	156.450	71	71	71	156.575	156.575
10	10	10	156.500	156.500	72	72	72	156.625	156.625
11	11	11	156.550	156.550	73	73	73	156.675	156.675
12	12	12	156.600	156.600	74	74	74	156.725	156.725
13	13	13	156.650	156.650	75	75	75	Guard	Guard
14	14	14	156.700	156.700	76	76	76	Guard	Guard
15	15	15*	156.750	156.750	77	77	77	156.875	156.875
16	16	16	156.800	156.800	78	78		156.925	161.525
17	17	17	156.850	156.850		78A	78A	156.925	156.925
18	18		156.900	161.500	79	79		156.975	161.575
	18A	18A	156.900	156.900		79A	79A	156.975	156.975
19	19		156.950	161.550	80	80		157.025	161.625
	19A	19A	156.950	156.950		80A	80A	157.025	157.025
20	20	20	157.000	161.600	81	81		157.075	161.675
	20A	20A	157.000	157.000		81A	81A	157.075	157.075
21	21		157.050	161.650	82	82		157.125	161.725
	21A	21A	157.050	157.050		82A	82A	157.125	157.125
22	22		157.100	161.700	83	83		157.175	161.775
	22A	22A	157.100	157.100		83A	83A	157.175	157.175
23	23		157.150	161.750	84	84	84	157.225	161.825
	23A	23A	157.150	157.150		84A		157.225	157.225
24	24	24	157.200	161.800	85	85	85	157.275	161.875
25	25	25	157.250	161.850		85A		157.275	157.275
26	26	26	157.300	161.900	86	86	86	157.325	161.925
27	27	27	157.350	161.950		86A	86A	157.325	157.325
28	28	28	157.400	162.000	87	87	87	157.375	161.975
60	60		156.025	160.625		87A		157.375	157.375
	60A	60A	156.025	156.025	88	88	88	157.425	162.025
61	61		156.075	160.675		88A	88A	157.425	157.425
	61A	61A	156.075	156.075					

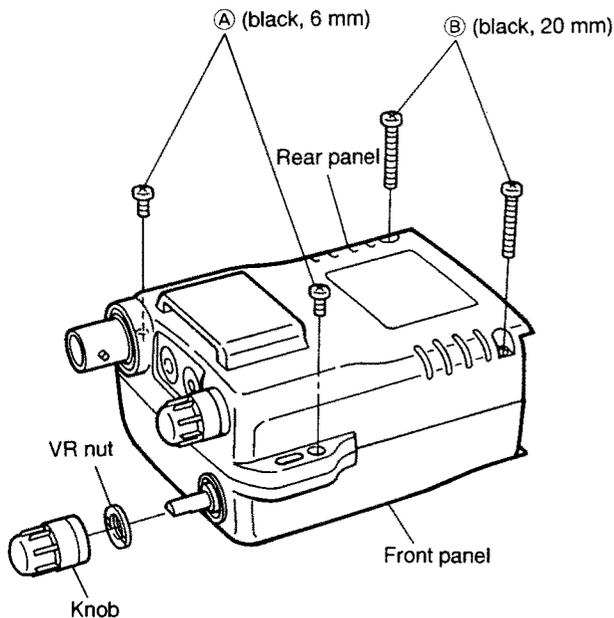
WX channel	Frequency (MHz)		WX channel	Frequency (MHz)	
	Transmitter	Receiver		Transmitter	Receiver
WX 01	RX only	162.550	WX 06	RX only	162.500
WX 02	RX only	162.400	WX 07	RX only	162.525
WX 03	RX only	162.475	WX 08	RX only	161.650
WX 04	RX only	162.425	WX 09	RX only	161.775
WX 05	RX only	162.450	WX 10	RX only	163.275

* U.S.A. channel 15 is a receive-only channel.

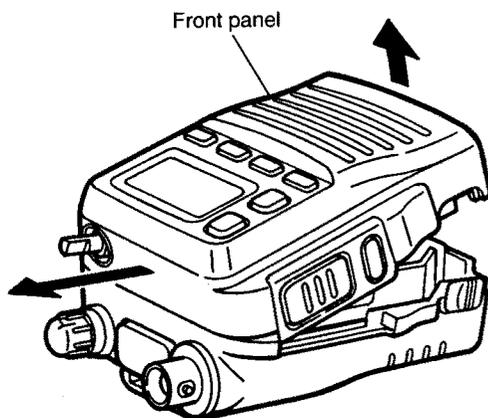
SECTION 2 DISASSEMBLY INSTRUCTIONS

● REMOVING THE FRONT PANEL

1. Turn the power OFF, then remove the battery pack.
2. Remove 4 screws (A) and (B) from the rear and front panels.
3. Pull off the [CHANNEL] knob, then remove the exposed VR nut.

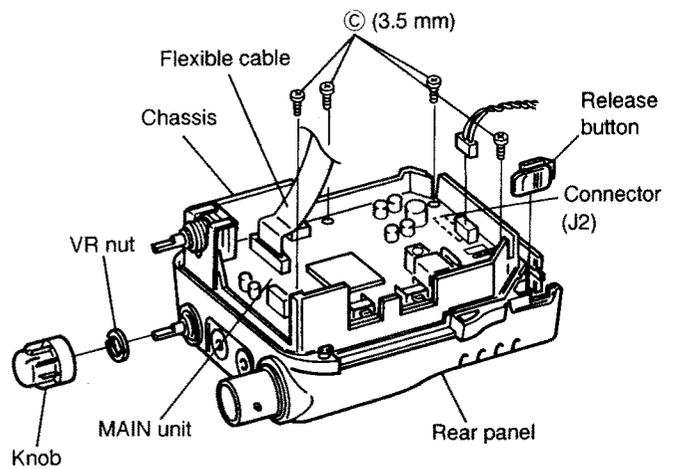


4. Carefully open the front panel from the bottom side.



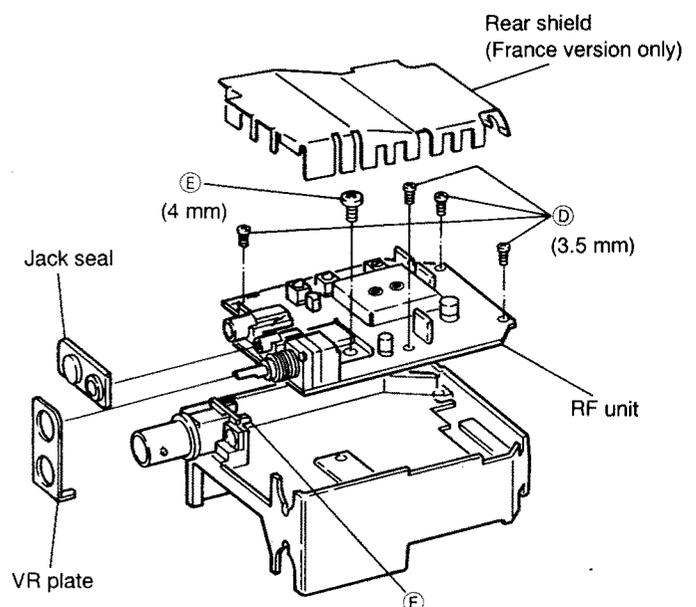
● REMOVING THE MAIN UNIT AND REAR PANEL

1. Unplug the flexible cable.
2. Remove the release button.
3. Pull off the [OFF/VOL] knob, then remove the exposed VR nut.
4. Remove 4 screws (C) from the MAIN unit.
5. Lift the MAIN unit to remove. (Disconnect J2 on reverse side of the MAIN unit to remove).
6. Carefully open the rear panel from the chassis.



● REMOVING THE RF UNIT

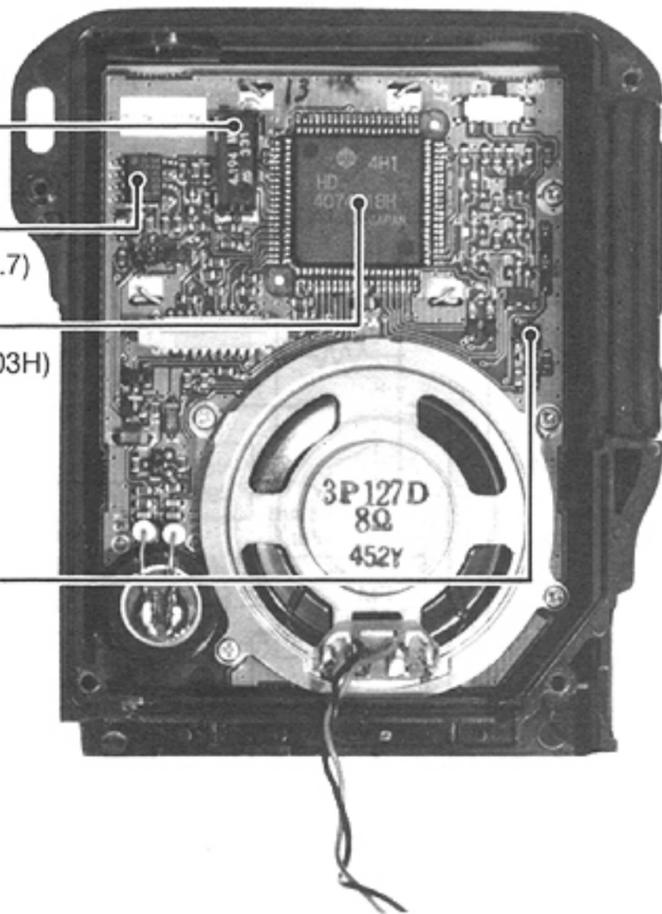
1. Remove the jack seal and VR plate. (For France version, take the rear shield off before removing.)
2. Remove 5 screws (D) and (E).
3. Unsolder the point (F), then remove the RF unit.



SECTION 3 INSIDE VIEWS

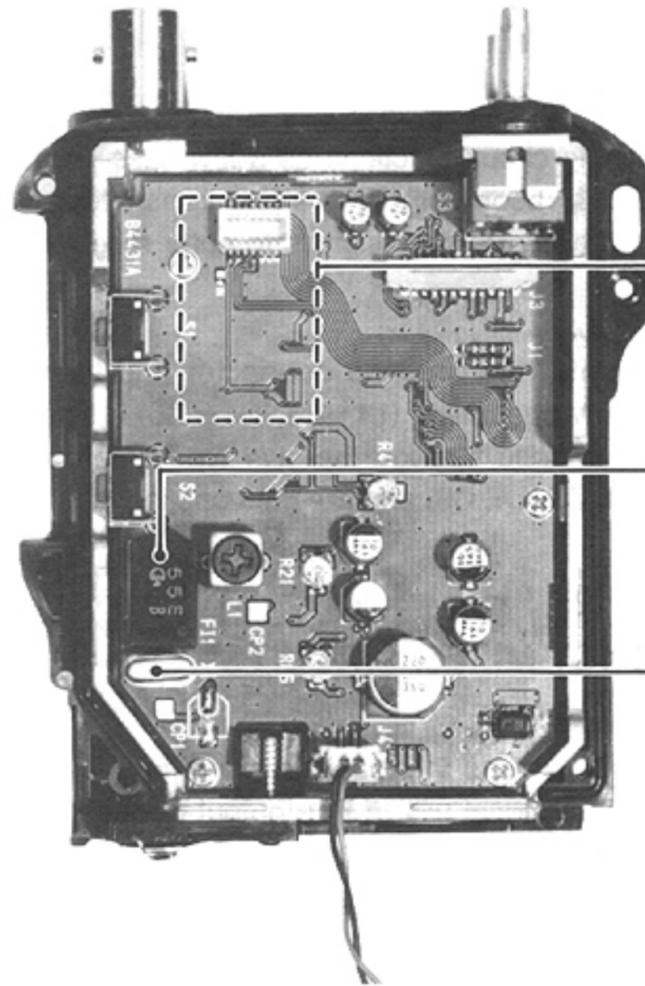
• LOGIC UNIT

- Crystal oscillator for CPU clock (X1: MA-416)
- Data expander (IC2: X24C04S8-2.7)
- CPU (IC1: HD404818D03H)
- LED driver (Q1: 2SC2712)



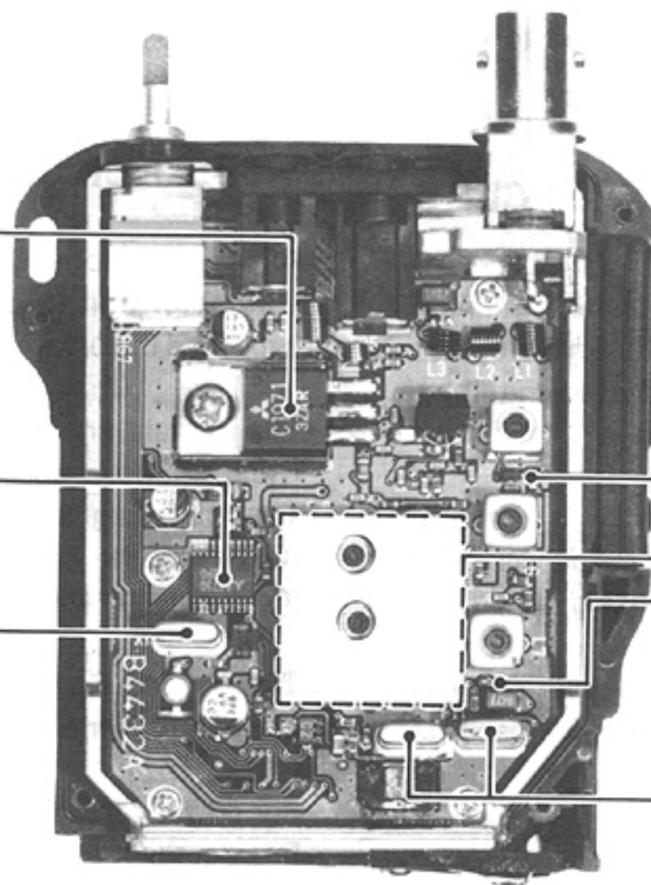
• MAIN UNIT

- Installation space for the UT-98
- 2nd IF filter (F11: CFW455E)
- 2nd LO crystal (X1: CR-473)



• RF UNIT

- Power amplifier (Q19: 2SC1971)
- PLL IC (IC1: M64073GP)
- PLL reference oscillator (X1: CR-503)



- RF amplifier on reverse side (Q1: 2SK882)
- VCO circuit
- 1st IF mixer on reverse side (Q2: 3SK131)
- Crystal filter (F11: FL-199)

SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

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

The antenna switching circuit functions as a low-pass filter while receiving and a resonator circuit while transmitting. The circuit does not allow transmit signals to enter receiver circuits.

Received signals enter the antenna connector and then pass through the low-pass filter (L1—L3, C1—C6). The filtered signals are passed through the $\lambda/4$ type antenna switching circuit (D1, D2, L4, C9) and are then applied to the RF amplifier circuit.

4-1-2 RF AND 1ST MIXER CIRCUITS (RF UNIT)

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 pair of crystal filters at the next stage of the 1st mixer.

The signals from the antenna switching circuit are passed through the tunable bandpass filter (L5, D3) and amplified at the RF amplifier (Q1). The amplified signals are again passed through the tunable bandpass filter (D4, D5, L6, L7). The signals are then mixed at the 1st mixer (Q2) with a 1st LO signal coming from the PLL circuit to produce a 30.875 MHz 1st IF signal. The 1st IF signal is passed through a pair of crystal filters (F11) and is then applied to the IF amplifier (Q3).

4-1-3 2ND IF AND DEMODULATOR CIRCUITS (MAIN UNIT)

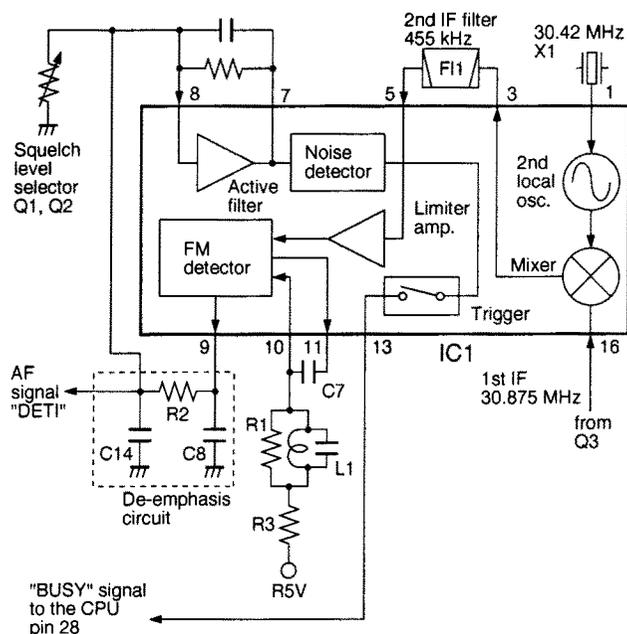
The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal. A double conversion superheterodyne system (which converts receive signal twice) improves the image rejection ratio and obtains stable receiver gain.

The 1st IF signal from the RF unit is applied to a 2nd mixer section of IC1 (pin 16). The signal is then mixed with a 2nd LO signal for conversion to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, local oscillator, limiter amplifier, quadrature detector and active filter. The local oscillator section generates 30.42 MHz using X1.

The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through ceramic filter (F11) to remove unwanted heterodyned frequencies. It is then amplified at the limiter amplifier (IC1, pin 5) and applied to the quadrature detector (IC1, pins 10, 11) to demodulate the 2nd IF signal into AF signals. The AF signals (detected signals) are applied to the AF circuit.

• 2nd IF AND DEMODULATOR CIRCUITS



4-1-4 AF CIRCUIT (MAIN UNIT)

AF signals from IC1 are entered to the optional voice scrambler unit to demodulate the scrambled audio, or bypassed the unit via the analog switch (IC5, pins 1, 2).

The signals are passed through the de-emphasis circuit (R52, C43) and applied to the active high-pass filter (Q12). The filtered signals are passed through the AF mute switch (Q13) and the [VOL] control (RF unit). The mute switch (Q13) cuts the audio line when the squelch closes.

The passed signals (via "AFIN") are amplified at the AF power amplifier (IC5) to a level needed to drive the speaker.

For power conservation, the power supply circuit (Q9, Q10, D1) does not supply Vcc voltage to the AF power amplifier (IC5) when the squelch closes.

4-1-5 SQUELCH CIRCUIT (MAIN UNIT)

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

A portion of the AF signals from the FM IF IC (IC1, pin 9) are applied to the active filter (IC1, pin 8) where noise components above 20 kHz are amplified and detected with internal noise detector. The squelch input level selector (Q1, Q2) is connected in parallel to the active filter input (pin 8) to control the input noise level.

The trigger circuit converts the detected signals to a HIGH or LOW signal and applies this to the CPU (LOGIC unit IC1, pin 27) as the "BUSY" signal. When the CPU receives LOW the CPU outputs the "RMUT" signal via the Data expander IC (MAIN unit IC4, pin 14) to cut the AF signals.

The "RMUT" signal switches the AF mute switch (Q13). At the same time, the "AFON" line becomes "HIGH" to deactivate the power supply circuit of the AF amplifier (Q9, Q10, D1). However, it activates while emitting beeps.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER (MAIN UNIT)

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 entered to the optional voice scrambler unit to scramble the audio, or bypassed the unit via analog switch (IC5, pins 5, 6).

The signals are amplified at the limiter amplifier (MAIN unit IC7b) which has a negative feedback circuit for +6 dB/octave pre-emphasis.

RF components are then filtered out at the splatter filter (IC7a) and applied to the RF unit as the "MOD" signal.

4-2-2 MODULATION CIRCUIT (RF UNIT)

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

The audio signals (MOD) change the reactance of D8 to modulate the oscillated signal at the transmitter VCO (Q11). The oscillated signal is amplified at the buffer amplifier (Q12, Q14), then applied to the drive amplifiers.

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS (RF UNIT)

The signal from the VCO circuit is passed through the transmit/receive switching circuit (D10) and amplified by the RF power amplifiers (Q16-Q19) to obtain 5 W of RF power (1 W for France version). The amplified signal is passed through the antenna switching circuit (D1), and low-pass filter (L1-L3, C1-C6) and is then applied to the antenna connector.

The bias current of the RF amplifiers (Q17, Q18) are controlled by the APC circuit to stabilize the output power.

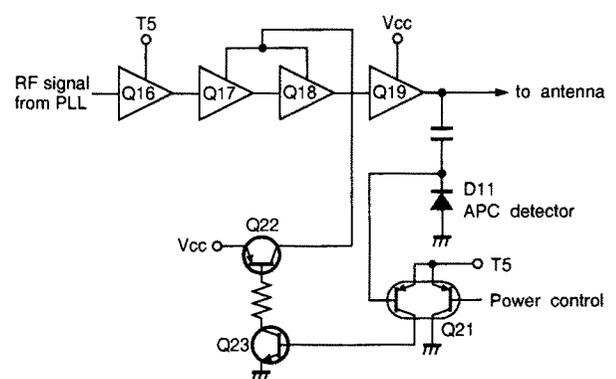
4-2-4 APC CIRCUIT (RF UNIT)

The APC circuit provides stable output power from the power amplifier (Q19) even when the input voltage or temperature changes; and, selects high or low output power.

The APC detector circuit (D11) detects the output power level. The detected voltage increases according to the output power level.

The detected voltage is applied to one of the differential amplifier inputs (Q21 pin 5) and a power setting voltage is applied to the other input (Q21). When the output power is increased, the detected voltage exceeds the APC output current (Q22 collector) via Q23 to decrease the output power.

● APC CIRCUIT



4-3 PLL CIRCUIT (RF UNIT)

A PLL circuit provides stable oscillation of the transmitter frequency and the receive frequency. The PLL output frequency is controlled by the divided ratio (N-data) of the programmable divider.

The IC-M10's PLL circuit contains a separate receiver VCO (Q10, D6) and transmitter VCO (Q11, D7). The oscillated signal is amplified at the buffer amplifier (Q12, Q13) and then applied to the PLL IC (IC1, pin 5).

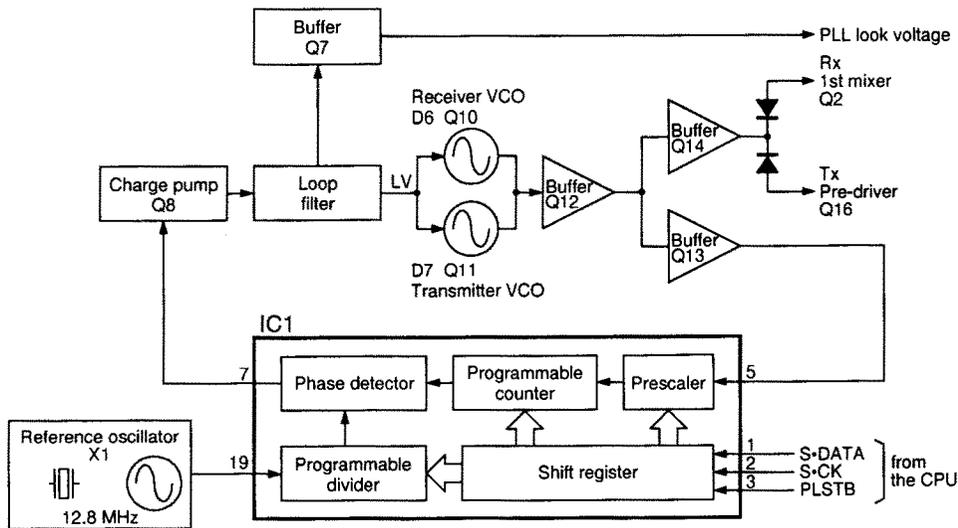
The PLL IC (IC1) contains a prescaler, programmable divider, and a phase detector, etc. The entered signal is divided at the prescaler and programmable counter sections by the N-data ratio from the CPU. The divided signals are detected on phase at the phase detector using the reference frequency.

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

One of VCO signals is amplified at the buffer amplifiers (Q12, Q14) and is then applied to the receive 1st mixer or transmit driver circuit.

The lock voltage is also used for the receiver tunable bandpass filters to match the filter's center frequency to the desired receive frequency. The lock voltage is amplified at the buffer amplifier (Q7) and then applied to the varactor diodes (D3, D4, D5).

● PLL CIRCUIT



4-4 POWER SUPPLY CIRCUITS

VOLTAGE LINES (MAIN UNIT)

LINE	DESCRIPTION
VCC	The same voltage as the battery voltage which is controlled by the power switch ([OFF/VOL] control).
+5	Common 5 V converted from the VCC line by the 5 V regulator circuit (Q7, Q8) using the reference regulator (IC2).
AFVCC	8 V for AF amplifier (IC5) controlled by "AFON" signal from IC4. The "AFVCC" regulator circuit consists of Q9, Q10 and D1.
T+5	5 V for transmitter circuit controlled by "TMUTE" signal from IC4 using the reference regulator (IC2). The "T+5" regulator circuit consists of Q5, Q6.
R+5	5 V for receiver circuit converted from the "+5" line circuit at Q6 on the RF unit. This voltage is controlled by "PSC" signal from IC4.

4-5 PORT ALLOCATIONS

4-5-1 EXPANDER IC (MAIN UNIT IC4)

PIN NO.	PORT NAME	DESCRIPTION
1	STB	Input port for a strobe signal from the CPU.
2	DATA	Input port for a data signal from the CPU.
3	CK	Input port for a clock signal from the CPU.
5	SC ON	Outputs a scrambler signal when an optional scrambler unit is in use.
6	PSC	Outputs a power save control signal to the R+5 regulator circuit.
7	SEND	Outputs a transmit/receive switching signal. "HIGH" when transmitting.
12	AF ON	Outputs an AF power amp control signal. "LOW" to activate the AF amp.
13	TMUTE	Outputs a transmit mute signal. "HIGH" to mute the T+5 V.
14	RMUTE	Outputs a receive mute signal. "HIGH" to mute the receive audio.

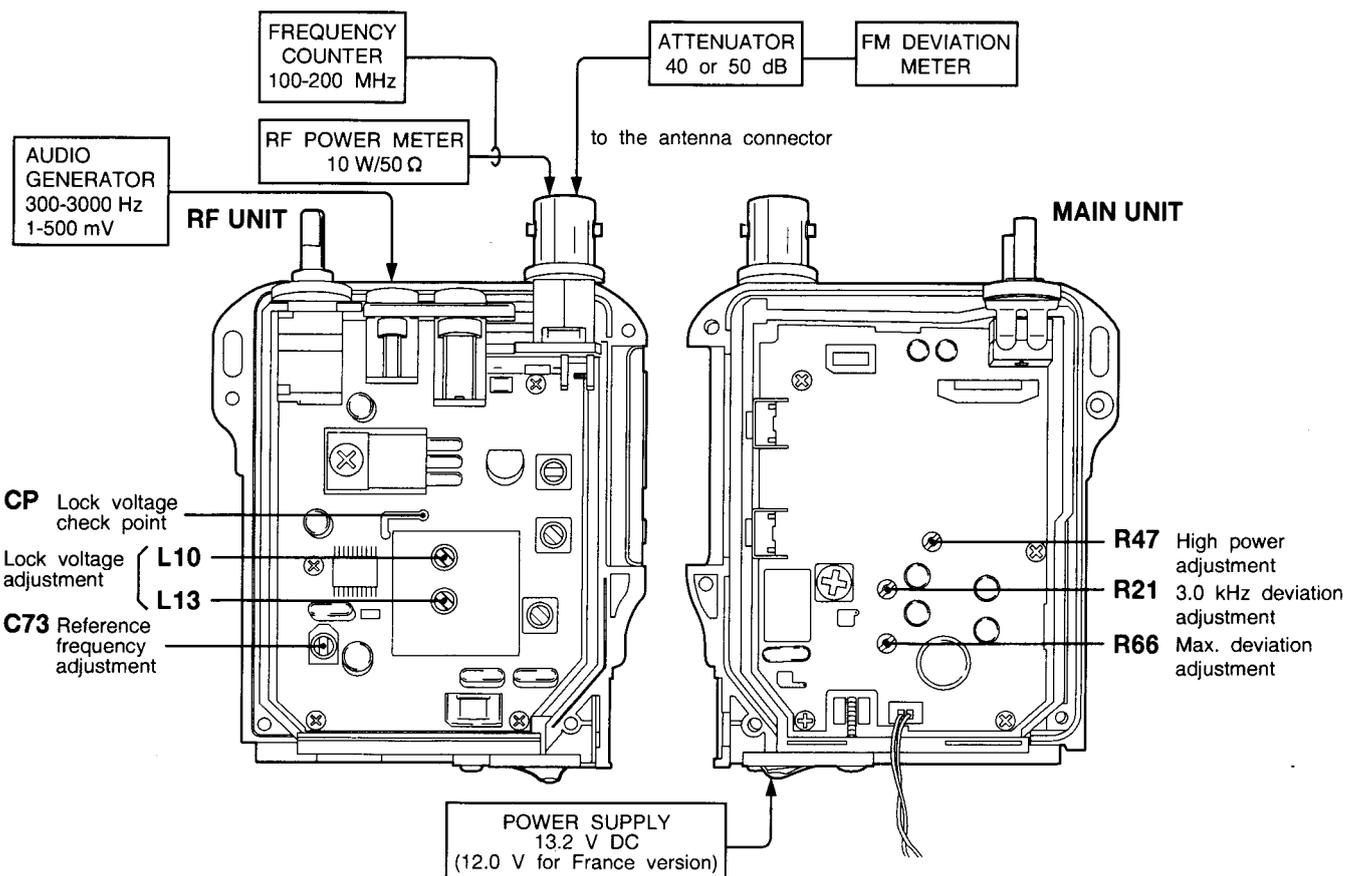
4-5-2 CPU (LOGIC UNIT IC1)

PIN NO.	PORT NAME	DESCRIPTION
1	OPSTB	Outputs a strobe signal to an optional scrambler unit.
2	EPSDA	Used for the memory backup EPROM (IC2).
3	EPSCL	
4	EXSTB	Outputs a strobe signal to the I/O expander ICs (MAIN unit IC3, IC4)
6	LAMPO	Outputs a display backlight signal. "HIGH" for backlight ON.
7	FUNC KEY	Input port for the [FUNC] switch.
8	DOWN	Input ports for the channel selector.
9	UP	
15-18	KI0-KI3	Input ports for the initial matrix and key matrix.
19-23	KS0-KS4	Output ports for the initial matrix and key matrix.
24	OPT IN	Input port for the optional scrambler unit connection.
25	PTT	Input port for the [PTT] switch.
27	BUSY	Input port for the noise squelch signal from the FM IF IC (MAIN unit IC1). "LOW" when the squelch closes.
28	BEEP	Outputs beep tone signals.
29	INT0	Input port for the interrupt signal. "LOW" for CPU stand-by. "HIGH" for CPU operation.
32-56	SEG2-SEG26	Output the LCD drive signal.
63	COM1	Output a common signal for the LCD display.
64	COM2	
74	OSC1	Terminals for CPU clock.
75	OSC2	
76	RESET	Input port for the CPU reset signal.
77	S.CK	Outputs clock signals.
78	UNLK	Input port for the PLL unlock signal.
79	S.DATA	Outputs serial data.
80	PLSTB	Outputs a strobe signal to the PLL IC (RF unit IC1).

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PLL AND TRANSMITTER ADJUSTMENTS

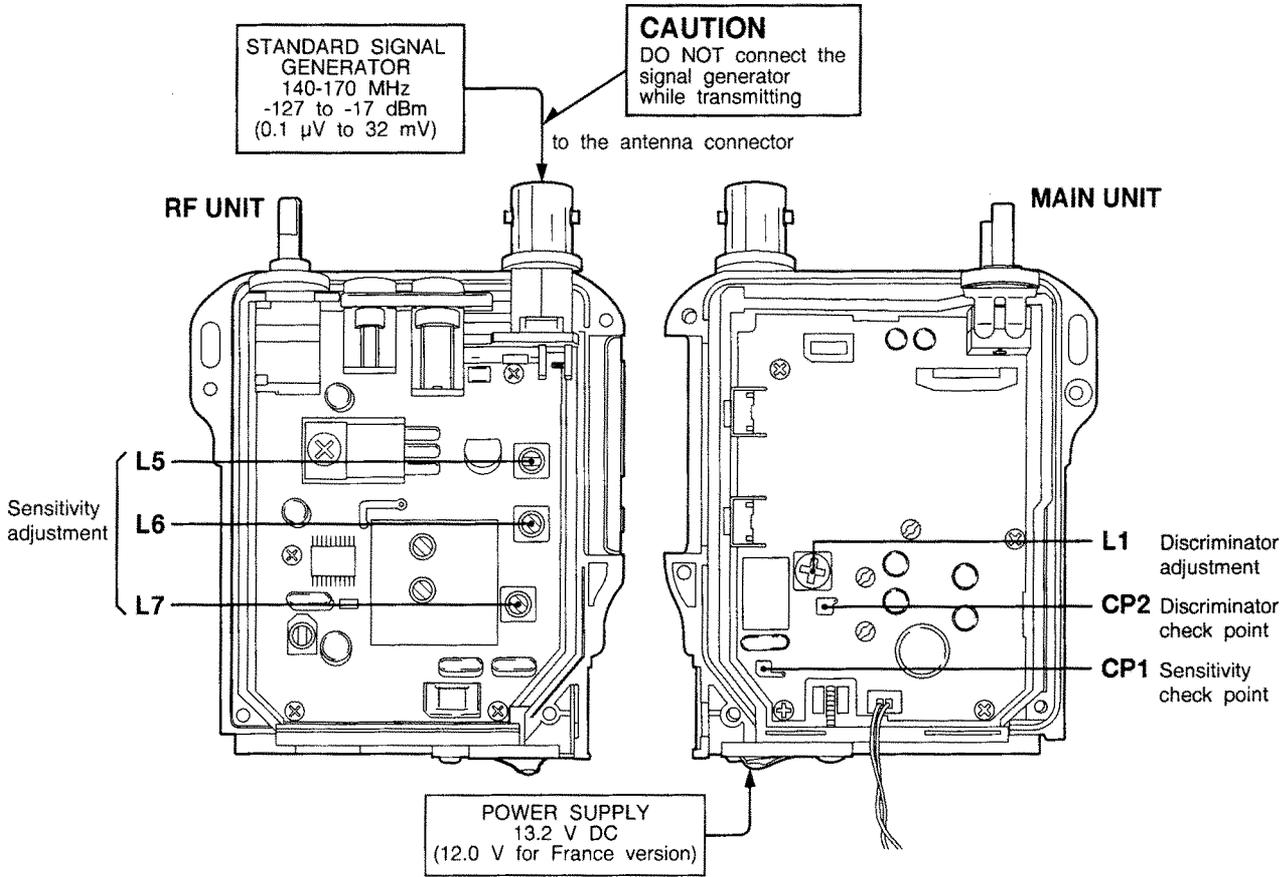
ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1 • Operating channel: 16 • Receiving	RF	Connect a digital multi-meter or oscilloscope to CP.	2.0 V	RF	L10
	2 • Transmitting					L13
PLL REFERENCE FREQUENCY	1 • Operating channel: 16 • Transmitting	Top panel	Loosely couple the frequency counter to the antenna connector.	156.800 MHz	RF	C73
OUTPUT POWER	1 • Operating channel: 16 • [HI/LOW] switch: HI • Transmitting	Top panel	Connect the RF power meter to the antenna connector.	6.0 W (1.0 W for France version)	MAIN	R47
FM DEVIATION	1 • Operating channel: 16 • Apply an AF signal to [EXT MIC] connector. 1 kHz/150 mVrms • Connect the FM deviation meter to the antenna connector and set as: HPF: OFF LPF: 20 kHz De-emphasis: OFF Detector: (P-P)/2 • Transmitting	Top panel	Connect the FM deviation meter to the antenna connector through the attenuator.	±4.5 kHz	MAIN	R66
	2 • Apply an AF signal to [EXT MIC] connector. 1 kHz/15 mVrms					±3.0 kHz



5-2 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1 <ul style="list-style-type: none"> • Operating channel: 16 • Connect the SSG to the antenna connector and set as: Frequency: 156.80 MHz Level: 32 μV* (-77 dBm) Modulation: OFF • Receiving 	MAIN	Connect a digital multi-meter or oscilloscope to CP1.	Maximum level	RF	Adjust in sequence: L5, L6, L7
DISCRIMI-NAOTR	1 <ul style="list-style-type: none"> • Operating channel: 16 • Connect the SSG to the antenna connector and set as: Frequency: 156.80 MHz Level: 1 mV* (-47 dBm) Modulation: OFF • Receiving 	MAIN	Connect a digital multi-meter or oscilloscope to CP2.	1.2 V	MAIN	L1

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



SECTION 6 PARTS LIST

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140005180	S.IC	HD404818D25H
IC2	1140003610	S.IC	X24C04S8-2.7
Q1	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q2	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q3	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q4	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q5	1590000420	S.TRANSISTOR	RN1404 (TE85R)
D2	1750000030	S.DIODE	1SS187 (TE85R) [IC-M10E only]
D3	1750000010	S.DIODE	1SS181 (TE85R) [IC-M10E only]
D4	1750000010	S.DIODE	1SS181 (TE85R) [EUR], [FRA]
	1750000030	S.DIODE	1SS187 (TE85R) [UK], [ITA]
D7	1750000010	S.DIODE	1SS181 (TE85R) [EUR], [UK], [GEN], [ITA], [FRA]
	1750000040	S.DIODE	1SS190 (TE85R) [USA]
D8	1750000390	S.DIODE	1SS353 TE-17
D9	1750000020	S.DIODE	1SS184 (TE85R)
D10	1750000390	S.DIODE	1SS353 TE-17
D11	1750000390	S.DIODE	1SS353 TE-17
D13	1750000390	S.DIODE	1SS353 TE-17
D14	1750000390	S.DIODE	1SS353 TE-17
D16	1730002340	S.ZENER	MA8047-M(TX)
MC1	7700001600	MICROPHONE	KUC2123-030245
X1	6050008420	S.XTAL	MA-416 (4.194304MHz)
R1	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 M Ω)
R2	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R3	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R4	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R5	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R6	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R7	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R8	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R9	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R10	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R11	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R12	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R13	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 k Ω)
R14	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R15	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 k Ω)
R16	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω)
R17	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R18	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R19	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 k Ω)
R20	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 k Ω)
R21	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 k Ω)
R22	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 k Ω)
R23	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R24	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R25	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R26	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R27	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R28	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R29	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R31	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 k Ω)
R32	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R34	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R35	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R36	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 k Ω)
R37	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R38	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R39	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R40	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R41	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
C1	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C2	4030008650	S.CERAMIC	C1608 JB 1H 471K-T-A
C3	4030008650	S.CERAMIC	C1608 JB 1H 471K-T-A
C4	4030008660	S.CERAMIC	C1608 JB 1H 102K-T-A
C5	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C7	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C8	4550006050	S.TANTALUM	TEMSVA 0J 106M8L
C9	4030006640	S.CERAMIC	C1608 SL 1H 180J-T-A
C10	4030006640	S.CERAMIC	C1608 SL 1H 180J-T-A
C11	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C12	4550006050	S.TANTALUM	TEMSVA 0J 106M8L
DS1	5040001920	S.LED	SML-110MT T86
DS2	5040001920	S.LED	SML-110MT T86
DS3	5030000950	LCD	LD-BU5579J
W3	7120000010	JUMPER	JPW 02A
W4	7120000010	JUMPER	JPW 02A
W5	8900005310	CABLE	OPC-518
J1	6510017640	S.CONNECTOR	52558-2090
S7	2220000500	S.SWITCH	SW-141 (SSSS81)
SP1	2510000650	SPEAKER	EAS-3P127D
EP1	0910044694	PCB	B 4433D
EP2	8930035290	LCD CONTACT	SRCN-1620 ZCC

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110003330	S.IC	TA31136F(EL)
IC2	1110003390	S.IC	AN8005M-(E1)
IC3	1130007700	S.IC	BU4094BCF-T1
IC4	1130007700	S.IC	BU4094BCF-T1
IC5	1110001810	S.IC	TA7368F(TP1)
IC6	1140003830	S.IC	TC4W86F(TE12L)
IC7	1110002490	S.IC	M5218FP-73A
Q1	1590001400	S.TRANSISTOR	XP1214(TX)
Q2	1590001400	S.TRANSISTOR	XP1214(TX)
Q5	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q6	1590001930	S.TRANSISTOR	IMX2 T108
Q7	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q8	1590001930	S.TRANSISTOR	IMX2 T108
Q9	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q10	1590001930	S.TRANSISTOR	IMX2 T108
Q11	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q12	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q13	1590001450	S.FET	2SJ144-GR (TE85R)
Q14	1590000430	S.TRANSISTOR	DTC144EU T107
Q15	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)

S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1730000820	S.ZENER	RD8.2M-T2B3
F11	2020000120	CERAMIC	CFW455E
X1	6050008810	XTAL	CR-473 (30.41909MHZ)
L1	6150002770	COIL	LS-293
L2	6200003230	S.COIL	NL 322522T-181J
R1	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 k Ω)
R2	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R3	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R4	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 k Ω)
R5	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 k Ω)
R6	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 k Ω)
R7	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 k Ω)
R8	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 k Ω)
R9	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 k Ω)
R12	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 k Ω)
R13	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 k Ω)
R14	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 k Ω)
R15	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 k Ω)
R16	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 k Ω)
R17	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 k Ω)
R18	7030003880	S.RESISTOR	ERJ3GEYJ 244 V (240 k Ω)
R19	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R20	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 k Ω)
R21	7310002790	S.TRIMMER	RV-155 (RH03A3AE5) 154
R22	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 k Ω)
R23	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 k Ω)
R24	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 k Ω)
R25	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 k Ω)
R26	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 k Ω)
R27	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R28	7510000770	S.THERMISTOR	NTCCS2012 35H 223KC-T
R29	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R30	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R31	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω)
R32	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 k Ω)
R33	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 k Ω)
R34	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R35	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R36	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 k Ω)
R37	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R40	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R41	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R42	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R43	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R44	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R45	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
			[except FRA]
	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
			[FRA]
R46	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R47	7310002770	S.TRIMMER	RV-153 333
R48	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 k Ω)
			[except FRA]
	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 k Ω)
			[FRA]
R49	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R50	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 k Ω)
R51	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 k Ω)
R52	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 k Ω)
R53	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 k Ω)
R55	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 k Ω)
R56	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R57	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 M Ω)
R58	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 M Ω)
R59	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω)
R60	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 k Ω)
R61	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R62	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R63	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R65	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 k Ω)
R66	7310002600	S.TRIMMER	RV-110 473
R67	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R68	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R69	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R70	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
C1	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C2	4030006720	S.CERAMIC	C1608 SL 1H 580J-T-A
C3	4030006640	S.CERAMIC	C1608 SL 1H 180J-T-A
C4	4030006860	S.CERAMIC	C2012 JF 1C 105Z-T-A
C5	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C6	4030009960	S.CERAMIC	C2012 JF 1C 224Z-T-A
C7	4030006610	S.CERAMIC	C1608 SL 1H 100D-T-A
C8	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C9	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C10	4030006800	S.CERAMIC	C1608 SL 1H 221J-T-A
C11	4030006800	S.CERAMIC	C1608 SL 1H 221J-T-A
C12	4030006900	S.CERAMIC	C1608 JB 1H 102K-T-A
C13	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C14	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C15	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C17	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C18	4510004650	S.ELECTROLYTIC	ECEV1EA4R7SR
C19	4030008860	S.CERAMIC	C1608 JB 1C 153K-T-A
C20	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C21	4030008860	S.CERAMIC	C1608 JB 1C 153K-T-A
C22	4030008850	S.CERAMIC	C1608 JB 1H 471K-T-A
C23	4030008850	S.CERAMIC	C1608 JB 1H 471K-T-A
C24	4550000530	S.TANTALUM	TESVA 1V 104M1-8L
C25	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C26	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C27	4030008650	S.CERAMIC	C1608 JB 1H 332K-T-A
C28	4030006740	S.CERAMIC	C1608 SL 1H 820J-T-A
C29	4510005800	S.ELECTROLYTIC	ECEV1CS100SR
C30	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C31	4510005800	S.ELECTROLYTIC	ECEV1CS100SR
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C33	4030008850	S.CERAMIC	C1608 JB 1H 471K-T-A
C34	4550006200	S.TANTALUM	ECST0JY106R
C35	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C36	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T-A
C38	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C39	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C40	4030008850	S.CERAMIC	C1608 JB 1H 471K-T-A
C41	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C42	4030008860	S.CERAMIC	C2012 JF 1C 105Z-T-A
C43	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C44	4030008860	S.CERAMIC	C1608 JB 1C 223K-T-A
C45	4030008860	S.CERAMIC	C1608 JB 1C 223K-T-A
C46	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C47	4030008860	S.CERAMIC	C2012 JF 1C 105Z-T-A
C48	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C49	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C51	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C52	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C53	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C54	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C55	4030008850	S.CERAMIC	C1608 JB 1H 471K-T-A
C56	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C57	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C58	4510005370	S.ELECTROLYTIC	ECEV1AA221P
C59	4030008860	S.CERAMIC	C1608 JB 1H 102K-T-A
C61	4030008860	S.CERAMIC	C2012 JF 1C 105Z-T-A
C62	4030008860	S.CERAMIC	C2012 JF 1C 105Z-T-A
C63	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C64	4030008860	S.CERAMIC	C1608 JB 1H 472K-T-A
C65	4510005830	S.ELECTROLYTIC	ECEV1HAN010R
C67	4030008850	S.CERAMIC	C1608 JB 1H 471K-T-A
J1	6510018430	S.CONNECTOR	53307-1491
J2	6510018040	S.CONNECTOR	52357-2490
J3	6510017640	S.CONNECTOR	52559-2090
J4	6510014960	S.CONNECTOR	B2B-ZR-SM3-TF
S1	2260001900	SWITCH	SW-149 (SKHLLD)
S2	2260001900	SWITCH	SW-149 (SKHLLD)
S3	2250000200	ENCODER	TP90N00E20-18F-1517
EP1	0910044674	PCB	B 4431D

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110003420	S.IC	M64073GP 800G
Q1	1560000550	S.FET	2SK882-Y (TE85R)
Q2	1580000280	S.FET	3SK131-T1
Q3	1530002360	S.TRANSISTOR	2SC2714-Y (TE85R)
Q4	1590000970	S.TRANSISTOR	FMA2 T148
Q5	1590002040	S.TRANSISTOR	HN1B01F-GR (TE85R)
Q6	1590001080	S.TRANSISTOR	FMC2 T148
Q7	1560000540	S.FET	2SK880-Y (TE85R)
Q8	1590001930	S.TRANSISTOR	IMX2 T108
Q10	1560000330	S.FET	2SK210-GR (TE85R)
Q11	1560000330	S.FET	2SK210-GR (TE85R)
Q12	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q13	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q14	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q15	1530002380	S.TRANSISTOR	2SC4215-Y (TE85R)
Q16	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q17	1530002340	S.TRANSISTOR	2SC2954-T2B
Q18	1530000850	TRANSISTOR	2SC2538
Q19	1530000790	TRANSISTOR	2SC1971
Q20	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q21	1590000620	S.TRANSISTOR	FMS1 T148
Q22	1520000480	S.TRANSISTOR	2SB1132 T100 R
Q23	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q24	1590001720	S.TRANSISTOR	DTC144GU T108 [IC-M10E] only
D1	1790000620	S.DIODE	MA77(TW)
D2	1790000450	S.DIODE	MA862(TX)
D3	1720000370	S.VARICAP	HVU350TRF
D4	1720000370	S.VARICAP	HVU350TRF
D5	1720000370	S.VARICAP	HVU350TRF
D6	1790000640	S.VARICAP	MA363B(TX)
D7	1790000640	S.VARICAP	MA363B(TX)
D8	1790000640	S.VARICAP	MA363B(TX)
D9	1790000540	S.VARICAP	MA338(TX)
D10	1790000450	S.DIODE	MA862(TX)
D11	1790000660	S.DIODE	MA728(TW)
D12	1790000660	S.DIODE	MA728(TW) [IC-M10E] only
F11	2010001600	XTAL	FL-199 (30.875MHz)
X1	6050009280	XTAL	CR-503 (12.8MHz)
L1	6110002070	COIL	LA-227
L2	6110002070	COIL	LA-227
L3	6110002140	COIL	LA-384
L4	6200004430	S.COIL	LL1608-F56NK
L5	6150003120	COIL	LS-321
L6	6150003600	COIL	LS-404
L7	6150003430	COIL	LS-378
L8	6200003030	S.COIL	NL 322522T-R47J-3
L9	6200000750	S.COIL	LQH 3N 4R7M
L10	6130002360	S.COIL	LB-257
L11	6200000750	S.COIL	LQH 3N 4R7M
L12	6200000750	S.COIL	LQH 3N 4R7M
L13	6130002370	S.COIL	LB-258
L14	6200000750	S.COIL	LQH 3N 4R7M
L15	6200002630	S.COIL	NL 252018T-R10J
L16	6200002630	S.COIL	NL 252018T-R10J
L17	6200002600	S.COIL	NL 252018T-047J
L18	6200001510	S.COIL	MLF2012D R10K-T
L20	6200002760	S.COIL	LL2012-F56NK
L21	6200004080	S.COIL	MLR1608M 33NJ-T
L22	6200004380	S.COIL	LL1608-F18NK
L23	6200002760	S.COIL	LL2012-F56NK
L24	6110002050	COIL	LA-229
L25	6110002010	COIL	LA-224
L27	6200003330	S.COIL	NL 322522T-1R0J-3
L28	6200004460	S.COIL	MLF1608D 82NM-T

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 M Ω)
R2	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R3	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R4	7030003790	S.RESISTOR	ERJ3GEYJ 824 V (820 k Ω)
R5	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 M Ω)
R6	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 M Ω)
R7	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R12	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R13	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 k Ω)
R14	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R15	7030003410	S.RESISTOR	ERJ3GEYJ 581 V (580 Ω)
R16	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 k Ω)
R17	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R18	7030003480	S.RESISTOR	ERJ3GEYJ 152 V (1.5 k Ω)
R19	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R20	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R21	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R22	7510000710	S.THERMISTOR	NTCCS2012 3FH 222KC-T
R23	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 k Ω)
R24	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R25	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 k Ω)
R26	7030003790	S.RESISTOR	ERJ3GEYJ 824 V (820 k Ω)
R27	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 k Ω)
R28	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R29	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R30	7030003410	S.RESISTOR	ERJ3GEYJ 581 V (580 Ω)
R31	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R32	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 k Ω)
R33	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 k Ω)
R34	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω)
R35	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 k Ω)
R36	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R37	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 k Ω)
R38	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R39	7030003310	S.RESISTOR	ERJ3GEYJ 820 V (82 Ω)
R40	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 k Ω)
R41	7030003420	S.RESISTOR	ERJ3GEYJ 681 V (680 Ω)
R42	7030003420	S.RESISTOR	ERJ3GEYJ 681 V (680 Ω)
R43	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 k Ω)
R44	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 k Ω)
R45	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R46	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R47	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R48	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 k Ω)
R49	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 k Ω)
R50	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R51	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 k Ω)
R52	7030000280	S.RESISTOR	MCR10EZHZ 150 Ω (151)
R53	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R54	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R55	7030000100	S.RESISTOR	MCR10EZHZ 4.7 Ω (4R7)
R56	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R58	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R59	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 k Ω)
R60	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R61	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R62	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 k Ω)
R63	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 k Ω)
R64	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R65	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω)
R66	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 k Ω)
R67	7210002520	VARIABLE	TP96N00N-16F-10KA-1517
R68	7030003530	S.RESISTOR	ERJ3GEYJ 582 V (5.8 k Ω)
R69	7030003550	S.RESISTOR	ERJ3GEYJ 101 V (8.2 k Ω)
R70	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R71	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R72	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 k Ω)
R74	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R76	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R78	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R79	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 k Ω)
R80	7030001150	S.RESISTOR	MCR50ZHZ 150 Ω (151)
R81	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 k Ω) [IC-M10E] only
R82	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω) [IC-M10E] only

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R83	7030003870	S.RESISTOR	ERJ3GEYJ 823 V (82 k Ω) [UK], [FRA] only
C1	4030006580	S.CERAMIC	C1808 SL 1H 050C-T-A
C2	4030008440	S.CERAMIC	C1808 SL 1H 1R5C-T-A
C3	4030008640	S.CERAMIC	C1808 SL 1H 180J-T-A
C4	4030008570	S.CERAMIC	C1808 SL 1H 060D-T-A
C5	4030009230	S.CERAMIC	C1808 SL 1H 240J-T-A
C6	4030008800	S.CERAMIC	C1808 SL 1H 090D-T-A
C8	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C9	4030008640	S.CERAMIC	C1808 SL 1H 180J-T-A
C10	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C11	4030008510	S.CERAMIC	C1808 SL 1H 0R5C-T-A
C12	4030008970	S.CERAMIC	C1808 CH 1H 060D-T-A
C13	4030008860	S.CERAMIC	C1808 CH 1H 102K-T-A
C14	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C15	4030009500	S.CERAMIC	C1808 JB 1H 0R5B-T-A
C16	4030006930	S.CERAMIC	C1808 CH 1H 020C-T-A
C17	4030008970	S.CERAMIC	C1808 CH 1H 060D-T-A
C18	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C19	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C21	4030008630	S.CERAMIC	C1808 JF 1C 104Z-T-A
C22	4030006960	S.CERAMIC	C1808 CH 1H 050C-T-A
C23	4030006960	S.CERAMIC	C1808 CH 1H 050C-T-A
C24	4030008580	S.CERAMIC	C1808 SL 1H 050C-T-A
C25	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C26	4030007100	S.CERAMIC	C1808 CH 1H 560J-T-A
C27	4030008880	S.CERAMIC	C1808 JB 1C 223K-T-A
C28	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C29	4030008960	S.CERAMIC	C1808 CH 1H 050C-T-A
C30	4030007020	S.CERAMIC	C1808 CH 1H 120J-T-A
C31	4030008900	S.CERAMIC	C1808 JB 1E 103K-T-A
C32	4030008860	S.CERAMIC	C2012 JF 1C 105Z-T-A
C33	4030008900	S.CERAMIC	C1808 JB 1E 103K-T-A
C34	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C35	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C36	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C37	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C38	4510004480	S.ELECTROLYTIC	ECEV0JA330P
C39	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C40	4030008860	S.CERAMIC	C1808 JF 1C 104Z-T-A
C41	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C42	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C43	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C44	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C45	4030008900	S.CERAMIC	C1808 JB 1E 103K-T-A
C46	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C47	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C48	4030010070	S.CERAMIC	C1808 X7S 1C 104K-T-A
C49	4030008870	S.CERAMIC	C1808 SL 1H 270J-T-A
C50	4030008570	S.CERAMIC	C1808 SL 1H 060D-T-A
C51	4030008550	S.CERAMIC	C1808 SL 1H 040C-T-A
C52	4030009500	S.CERAMIC	C1808 CH 1H 0R5B-T-A
C53	4030009500	S.CERAMIC	C1808 CH 1H 0R5B-T-A
C54	4550004010	S.TANTALUM	TEMSVA2 1A 105M-8L
C55	4030008750	S.CERAMIC	C1808 SL 1H 101J-T-A
C56	4030008920	S.CERAMIC	C1808 CH 1H 010C-T-A
C57	4030008950	S.CERAMIC	C1808 CH 1H 040C-T-A
C58	4030008940	S.CERAMIC	C1808 CH 1H 030C-T-A
C59	4030009500	S.CERAMIC	C1808 CH 1H 0R5B-T-A
C60	4030009500	S.CERAMIC	C1808 CH 1H 0R5B-T-A
C61	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C62	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C63	4030008620	S.CERAMIC	C1808 SL 1H 120J-T-A
C64	4030008810	S.CERAMIC	C1808 SL 1H 100D-T-A
C65	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C66	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C67	4030008620	S.CERAMIC	C1808 SL 1H 120J-T-A
C68	4030008640	S.CERAMIC	C1808 SL 1H 180J-T-A
C69	4030008640	S.CERAMIC	C1808 SL 1H 180J-T-A
C70	4030008640	S.CERAMIC	C1808 SL 1H 180J-T-A
C71	4030008900	S.CERAMIC	C1808 JB 1E 103K-T-A
C72	4030007040	S.CERAMIC	C1808 CH 1H 180J-T-A
C73	4610001910	S.TRIMMER	CTZ3E-10A-W1
C74	4030007010	S.CERAMIC	C1808 CH 1H 100D-T-A

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C75	4030007100	S.CERAMIC	C1808 CH 1H 560J-T-A
C76	4030007100	S.CERAMIC	C1808 CH 1H 560J-T-A
C77	4030008900	S.CERAMIC	C1808 JB 1E 103K-T-A
C78	4030008900	S.CERAMIC	C1808 JB 1E 103K-T-A
C80	4030008660	S.CERAMIC	C1808 SL 1H 220J-T-A
C81	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C82	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C83	4030008630	S.CERAMIC	C1808 SL 1H 150J-T-A
C85	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C86	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C87	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C88	4030008620	S.CERAMIC	C1808 SL 1H 120J-T-A
C89	4030008620	S.CERAMIC	C1808 SL 1H 120J-T-A
C90	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C91	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C92	4030008860	S.CERAMIC	C1808 SL 1H 102K-T-A
C93	4030006730	S.CERAMIC	C1808 SL 1H 680J-T-A
C94	4030006780	S.CERAMIC	C1808 SL 1H 181J-T-A
C95	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C96	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C97	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C98	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C99	4030008850	S.CERAMIC	C1808 JB 1H 471K-T-A
C100	4030008670	S.CERAMIC	C1808 SL 1H 270J-T-A
C102	4030008670	S.CERAMIC	C1808 SL 1H 270J-T-A
C103	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C104	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C105	4030009500	S.CERAMIC	C1808 CH 1H 0R5B-T-A
C106	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C107	4030008850	S.CERAMIC	C1808 JB 1H 471K-T-A
C108	4030008850	S.CERAMIC	C1808 JB 1H 471K-T-A
C109	4030008630	S.CERAMIC	C1808 JF 1C 104Z-T-A
C110	4030009000	S.CERAMIC	C2012 JB 1C 224K-T-A
C111	4510004650	S.ELECTROLYTIC	ECEV1EA4R7SR
C113	4030009570	S.CERAMIC	C1808 CH 1H 0R3B-T-A
C114	4030008960	S.CERAMIC	C1808 CH 1H 050C-T-A
C115	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C116	4550006360	S.TANTALUM	ECST1VY104R
C117	4030008740	S.CERAMIC	C1808 SL 1H 820J-T-A
C118	4030008860	S.CERAMIC	C1808 SL 1H 220J-T-A
C119	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C121	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A
C122	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C123	4030009500	S.CERAMIC	C1808 CH 1H 0R5B-T-A
C124	4030008850	S.CERAMIC	C1808 JB 1H 471K-T-A
C125	4030008850	S.CERAMIC	C1808 JB 1H 471K-T-A
C126	4030008850	S.CERAMIC	C1808 JB 1H 471K-T-A
C127	4030008570	S.CERAMIC	C1808 SL 1H R75C-T-A [IC-M10E] only
C128	4030008860	S.CERAMIC	C1808 JB 1H 102K-T-A [IC-M10E] only
W1	7120000380	JUMPER	JPW 01 R-01
W2	7030003860	S.JUMPER	ERJ3GE JPW V [IC-M10A] only
J2	6450001440	CONNECTOR	HSJ1403-01-010
J3	6450001430	CONNECTOR	HSJ1462-01-010
J4	6510016080	S.CONNECTOR	53281-2490
EP1	0910044684	PCB	B 4432D

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	
J1	6510005240	CONNECTOR	BNC-RM 107

S.=Surface mount

SECTION 7 MECHANICAL PARTS

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510005240	Antenna connector BNC-RM107	1
MP1	8010015590	1517 chassis	1
MP3	8930032520	1517 contact base	1
MP4	8930034460	1620 keyboard (for IC-M10A)	1
	8930034850	1620 keyboard (A) (for IC-M10E)	1
MP7	8310034830	1620 window plate	1
MP8	8930029121	1257 release button (A) -1	1
MP9	8210012100	1620 front panel (for IC-M10A)	1
	8210012120	1620 front panel (B) (for IC-M10E w/SCRM)	1
	8210012130	1620 front panel (C) (for IC-M10E wo/SCRM)	1
MP10	8210011112	1517 rear panel -2	1
MP12	8930032560	1517 PTT rubber	1
MP14	8930034230	1518 jack seal	1
MP15	8810006620	Screw PH No. 0 M2×3.5 NI	1
MP16	8810008580	Screw PH M2×10 NI	1
MP17	8810006620	Screw PH No. 0 M2×3.5 NI	4
MP18	8810006620	Screw PH No. 0 M2×3.5 NI	4
MP19	8810006620	Screw PH No. 0 M2×3.5 NI	2
MP21	8810006040	Screw PH M3×4 NI	1
MP22	8610009200	Knob N214 [CHANNEL]	1
MP23	8610009250	Knob N216 [OFF/VOL]	1
MP24	8830000570	VR nut (A)	2
MP25	8810005710	Screw PH B0 M2×6 ZK	1
MP26	8810008620	Screw PH BT M2×20 ZK	2
MP27	8810005710	Screw PH B0 M2×6 ZK	1
MP28	8810005900	Screw PH B0 No. 0-3 M1.4×3.5 NI	5
MP29	8930030041	1452 contact spring -1	2
MP30	8930033650	1556 mic seal	1
MP31	8930035090	1517 rear seal	1
MP32	8510009570	1620 VR plate	1
MP33	8930035000	1620 VR seal	2
MP34	8930032530	1517 connector seal	1
MP36	8510009960	1620 rear shield [UK], [ITA], [FRA] only	1

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS3	5030000950	LCD LD-BU5579J	1
EP2	8930035290	LCD contact SRCN-1620-ZCC	2
MC1	7700001600	Microphone KUC2123-030245	1
SP1	2510000650	Speaker EAS-3P127D	1
MP1	8930014870	752 LCD holder	1
MP2	8930034470	1620 SP plate	1
W5	8900005310	Flexible cable OPC-518 (N: 20, L: 100)	1
WS1	8600034080	Connector	1

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
S1	2260001900	Switch SW-149 (SKHLLD) [PTT]	1
S2	2260001900	Switch SW-149 (SKHLLD) [FUNC]	1
S3	2250000200	Encoder TP90N00E20-16F-1517 [CHANNEL]	1

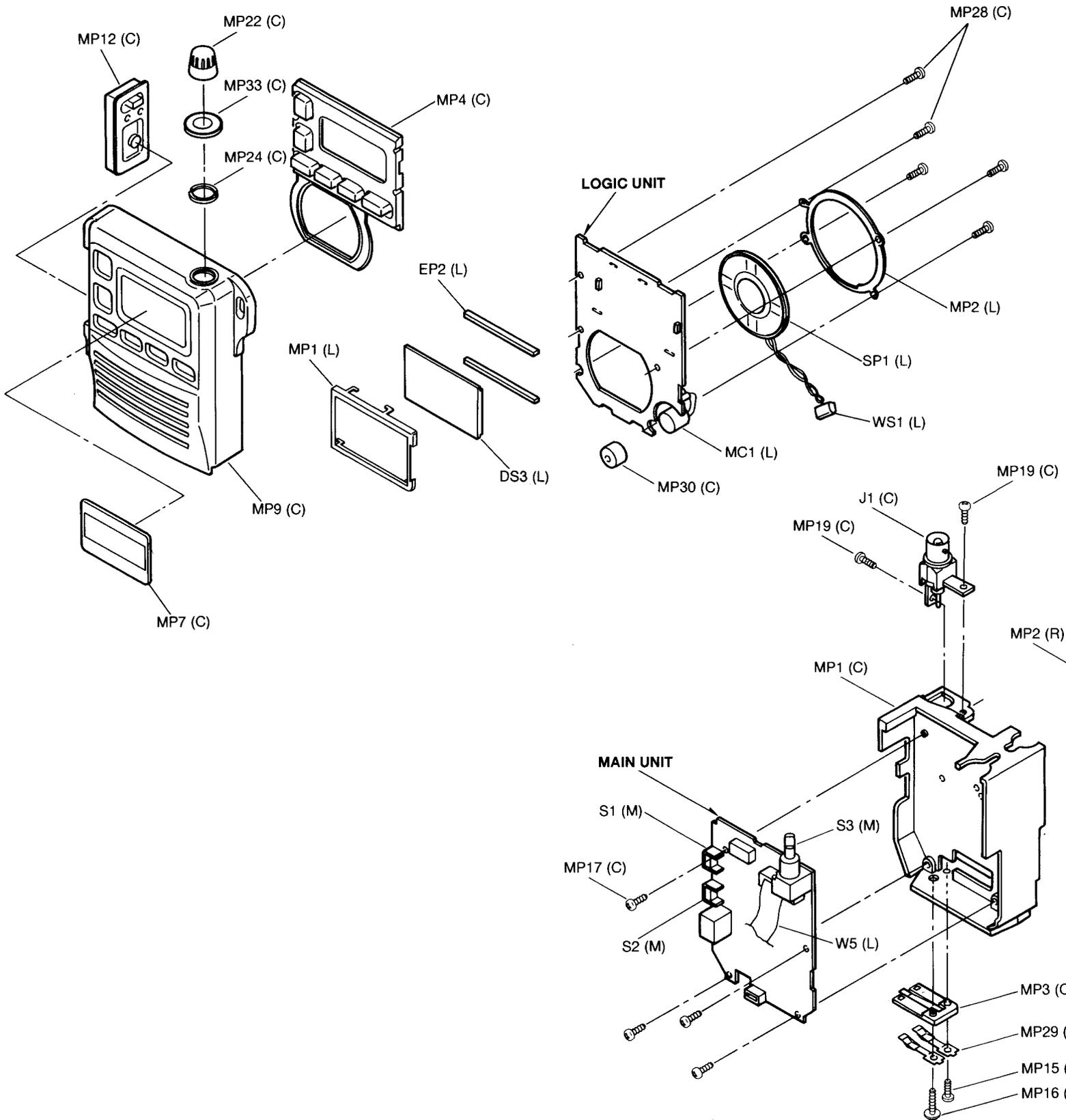
[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J2	6450001440	Connector HSJ1403-01-010 [SP]	1
J3	6450001430	Connector HSJ1462-01-010 [MIC]	1
R67	7210002520	Switch/Variable resistor TP96N00N-16F-10KA-1517 [OFF/VOL]	1
MP1	8510009460	1620 VCO case	1
MP2	8930033180	1517 TR plate	1
MP3	8930032550	1517 terminal	1

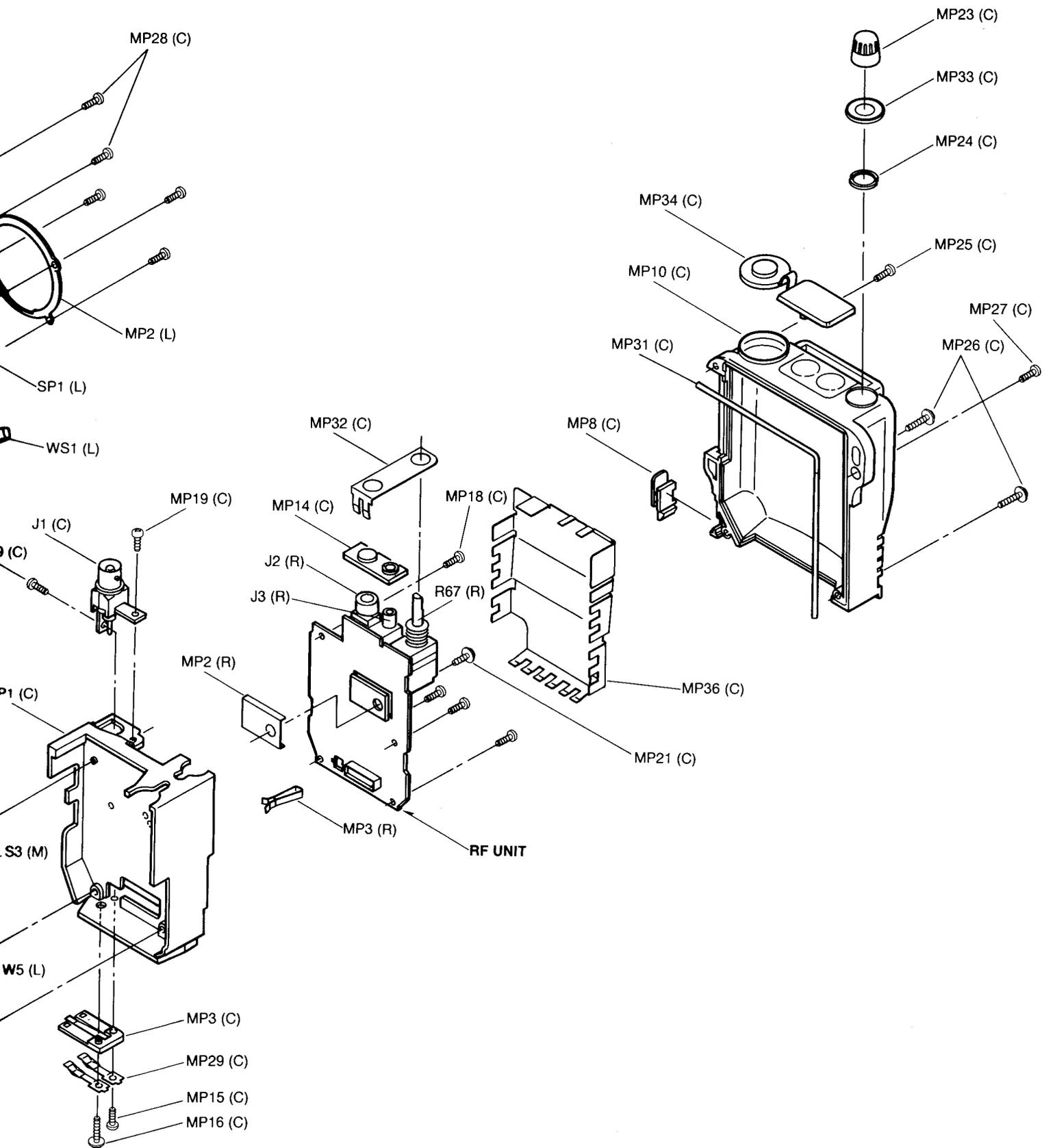
[UNPACKING]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	3310001520	FA-B55V flexible antenna	1
EP2	Optional product	Battery pack BP-130A, BP-157A, BP-160 or BP-174	1
EP3	Optional product	AD-54 BATTERY CHARGE ADAPTER	1
EP4	Optional product	AC adapter BM-113U or BM-113E	1
MP1	8010015600	1517 belt clip	1
MP3	8010011960	Hand strap HK-005	1

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

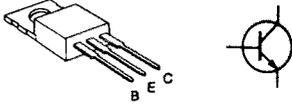
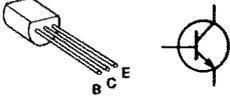
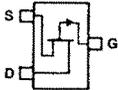
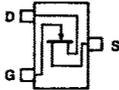
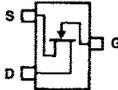
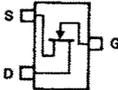
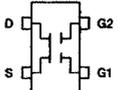


Unit abbreviations (C): CHASSIS PARTS (L): LOGIC UNIT (M): MAIN UNIT (R): RF UNIT



SECTION 8 SEMI-CONDUCTOR INFORMATION

• **TRANSISTORS**

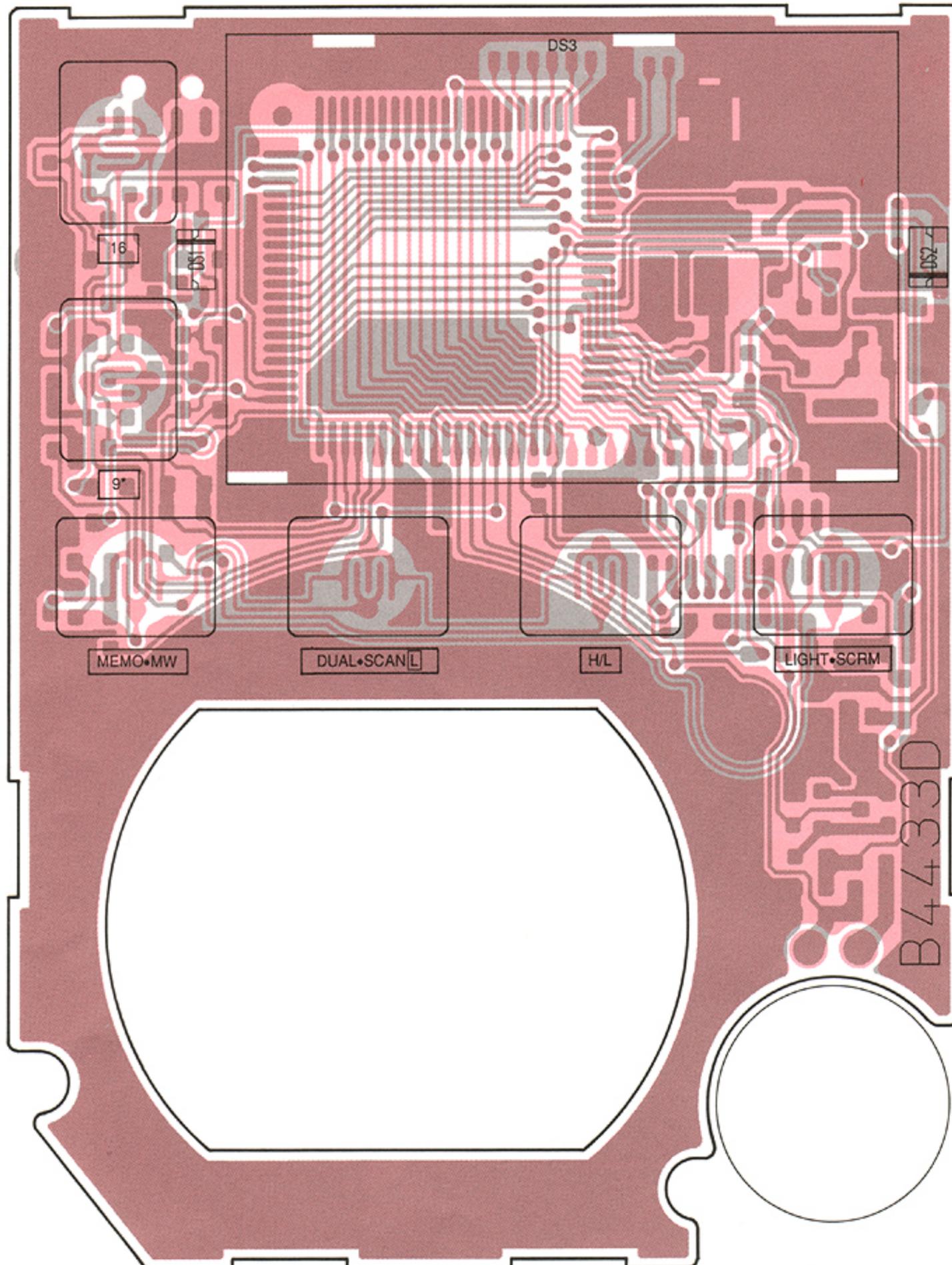
<p>2SA1162 Y (Symbol: SY) TR22</p> 	<p>2SB1132 R (Symbol: BARB) TR100</p> 	<p>2SC1971 TR40</p> 	<p>2SC2538 TR7</p> 	
<p>2SC2712 Y (Symbol: LY) TR28</p> 	<p>2SC2714 Y (Symbol: QY) TR28</p> 	<p>2SC2954 (Symbol: QK) TR102</p> 	<p>2SC4215 O (Symbol: QO) TR28</p> 	<p>2SC4215 Y (Symbol: QY) TR28</p> 
<p>2SC4226 R25 (Symbol: R25) TR28</p> 	<p>2SJ144 GR (Symbol: VG) TR35</p> 	<p>2SK210 GR (Symbol: YG) TR27</p> 	<p>2SK880 Y (Symbol: XY) TR26</p> 	<p>2SK882 Y (Symbol: TY) TR26</p> 
<p>3SK131 T1 (Symbol: V13)</p> 	<p>DTC144EU (Symbol: 26) TR25</p> 	<p>DTC144GU T106 (Symbol: K26)</p> 	<p>FMA2 (Symbol: A2) TR67</p> 	<p>FMC2 T148 (Symbol: C2)</p> 
<p>FMS1 (Symbol: SI) TR49</p> 	<p>IMX2 T108 (Symbol: X2) TR97</p> 	<p>RN1402 (Symbol: XB) TR25</p> 	<p>RN1404 (Symbol: XD) TR25</p> 	<p>XP1214 (TX) (Symbol: 9H) TR97</p> 

• **DIODES**

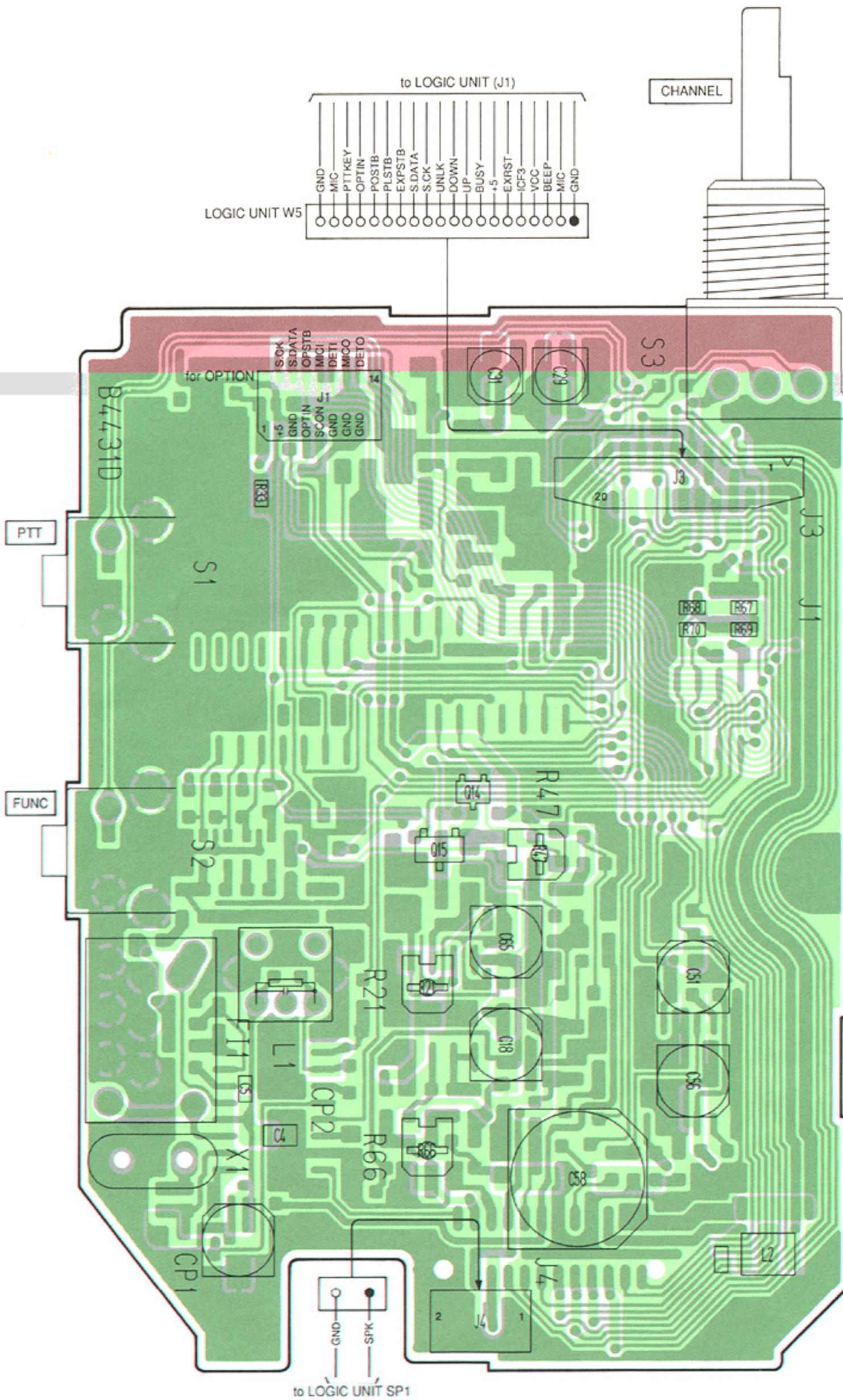
<p>1SS181 (Symbol: A3) DR3</p> 	<p>1SS184 (Symbol: B3) DR4</p> 	<p>1SS187 (Symbol: D3) DR5</p> 	<p>1SS190 (Symbol: SY) DR6</p> 	<p>HVU350TRF (Symbol: 4) DR19</p> 
<p>MA363B (Symbol: 6D on anode area) DR20</p> 	<p>MA862 (Symbol: M11) DR14</p> 	<p>RD8.2M T2B3 (Symbol: 823) DR1</p> 		

SECTION 9 BOARD LAYOUTS

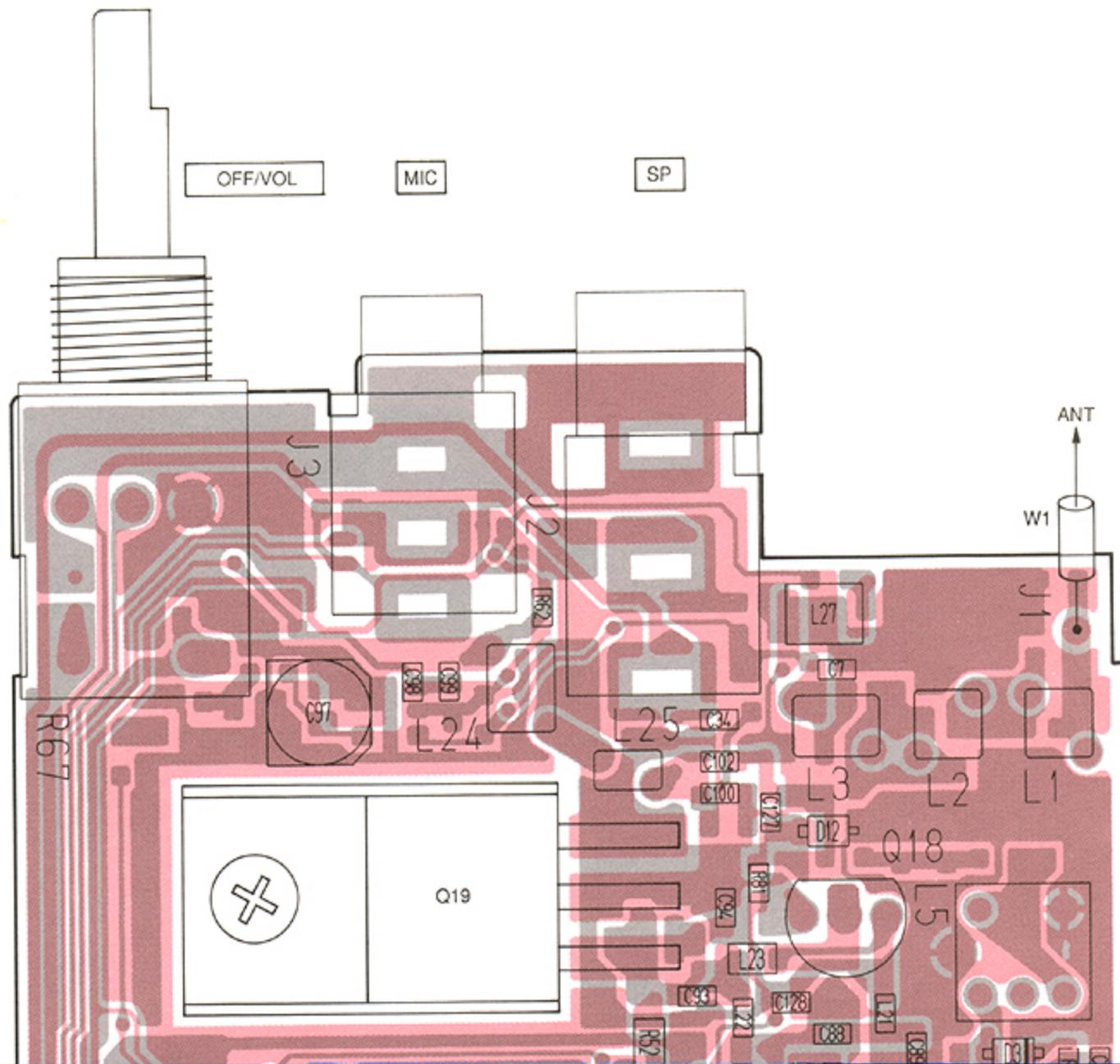
• LOGIC UNIT



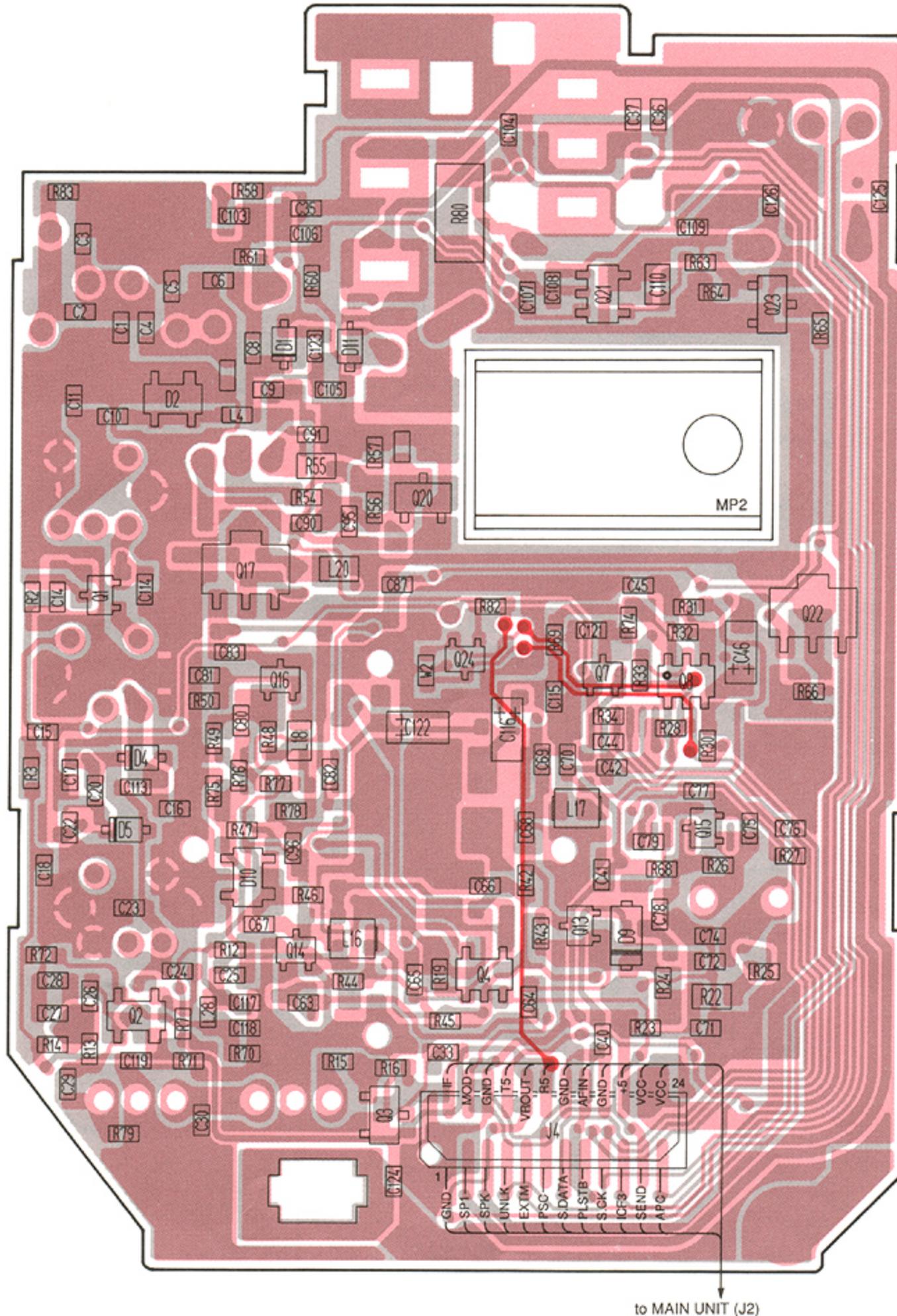
● MAIN UNIT



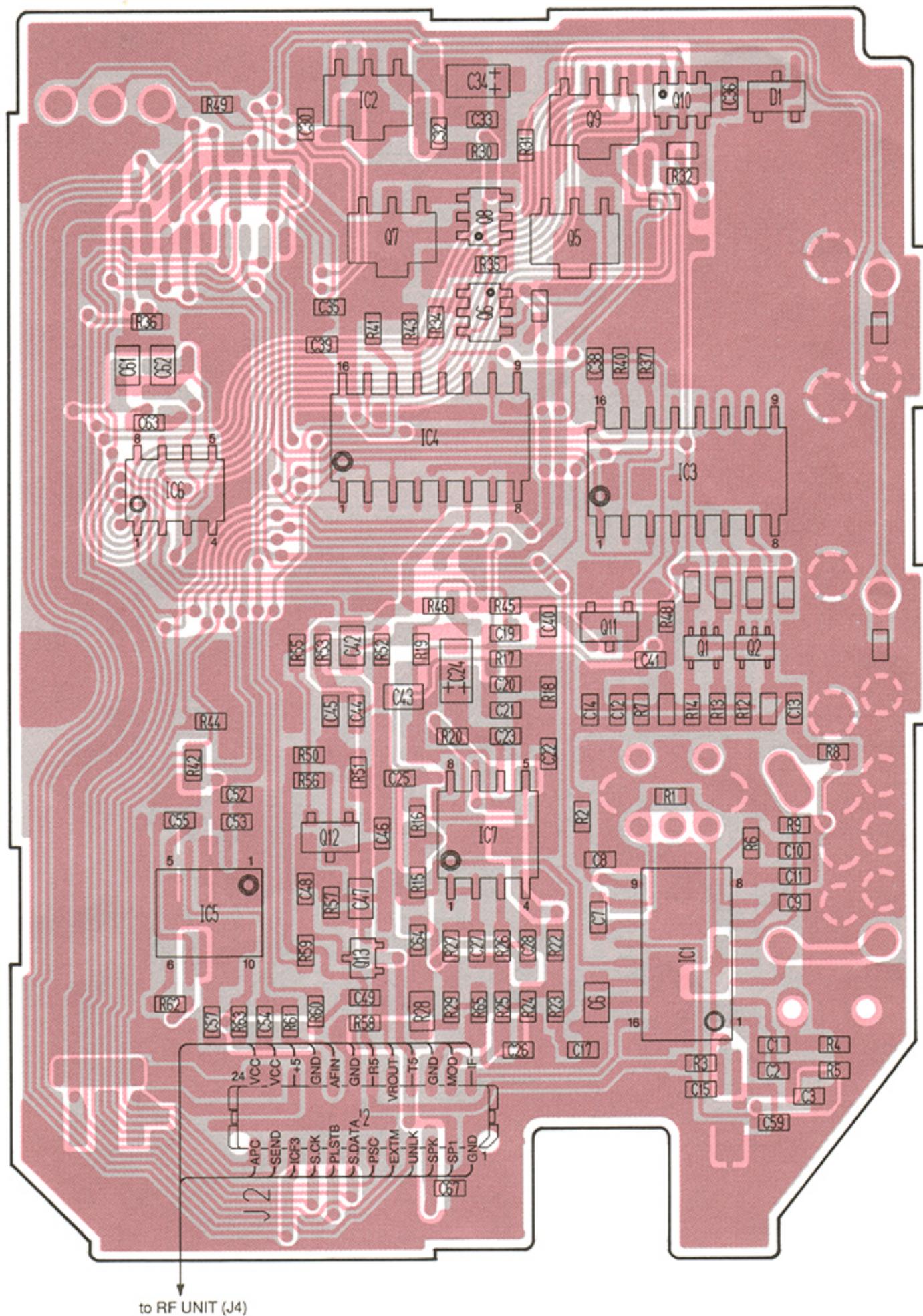
• RF UNIT



● RF UNIT

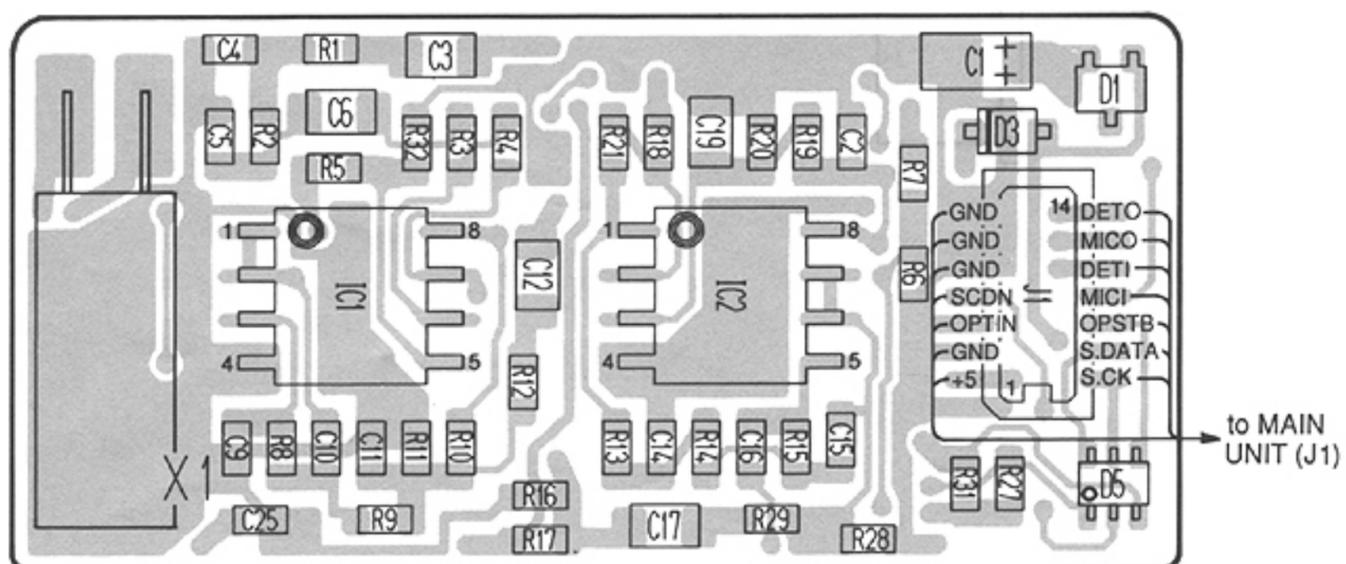
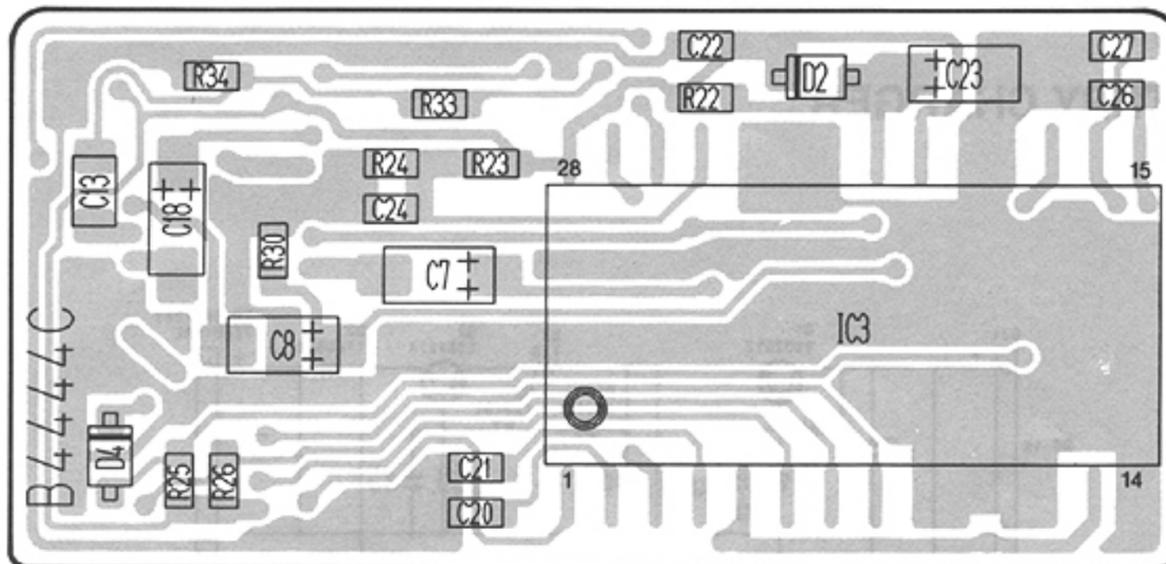
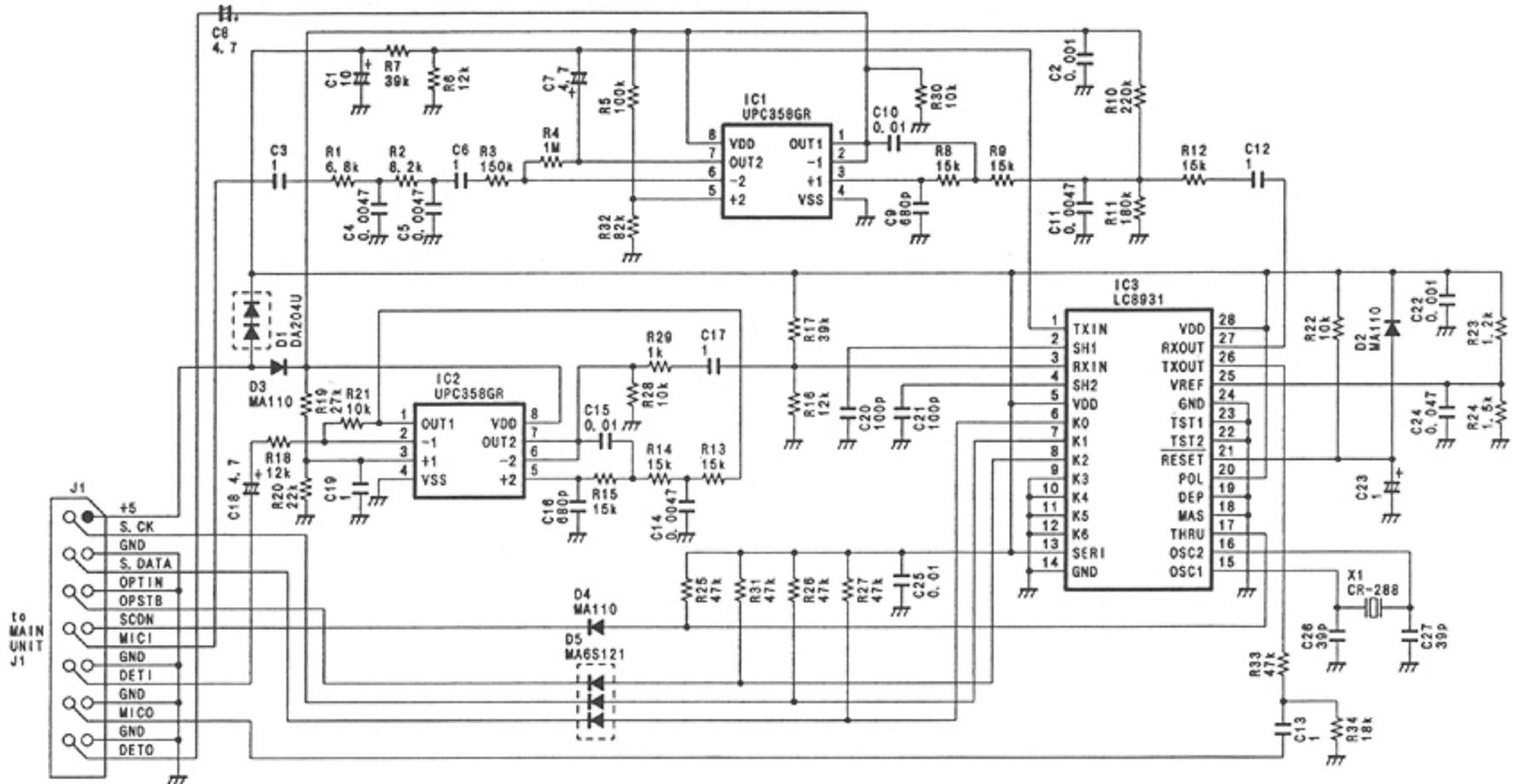


● MAIN UNIT

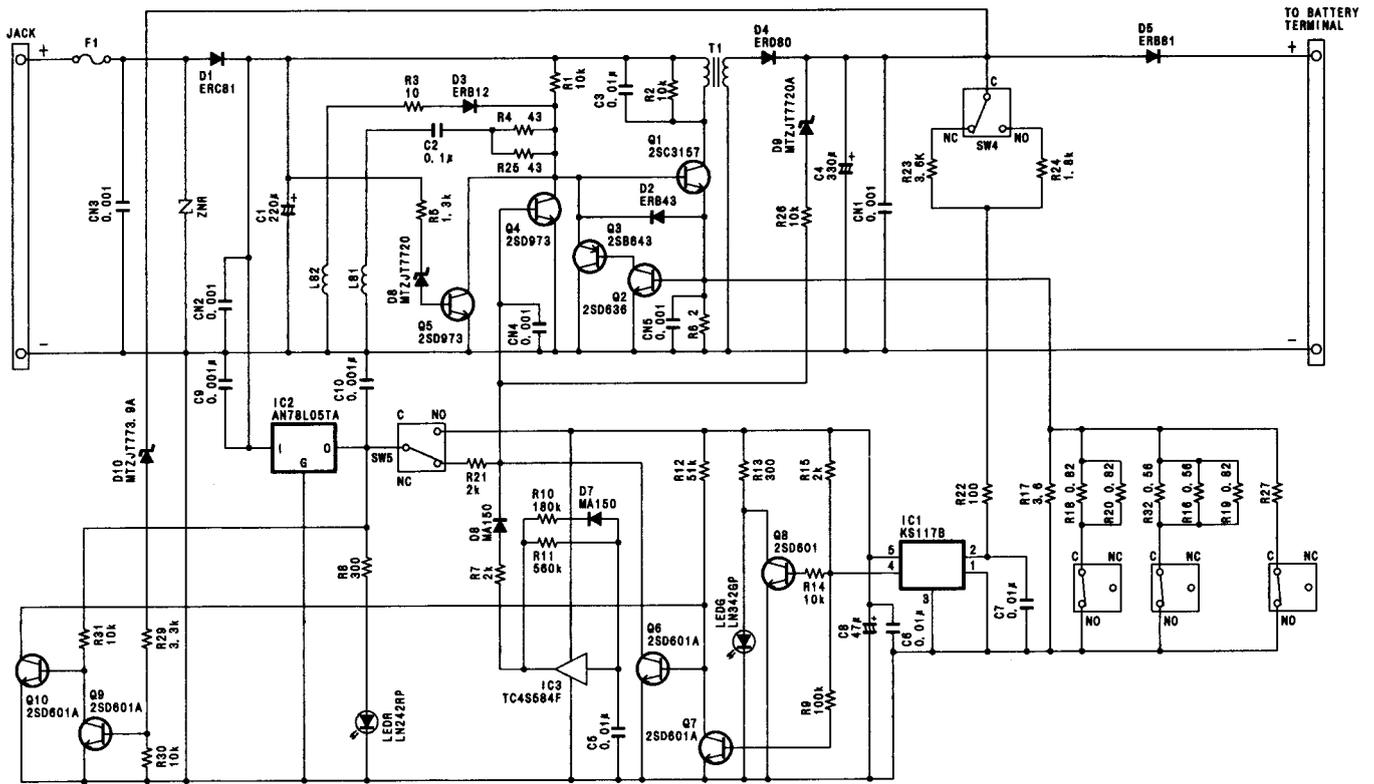


SECTION 10 OPTIONAL UNITS

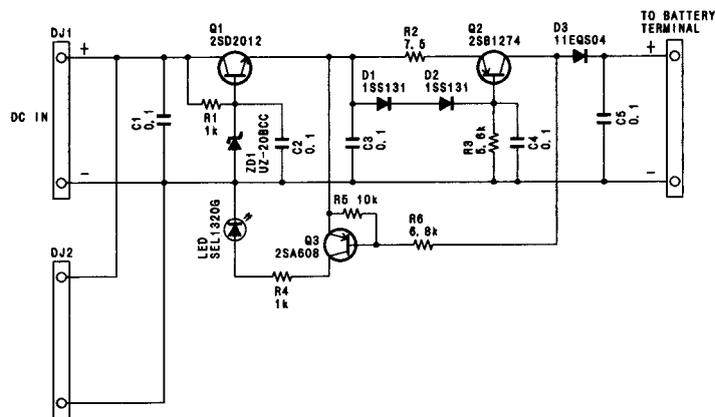
10-1 UT-98 VOICE SCRAMBLER UNIT



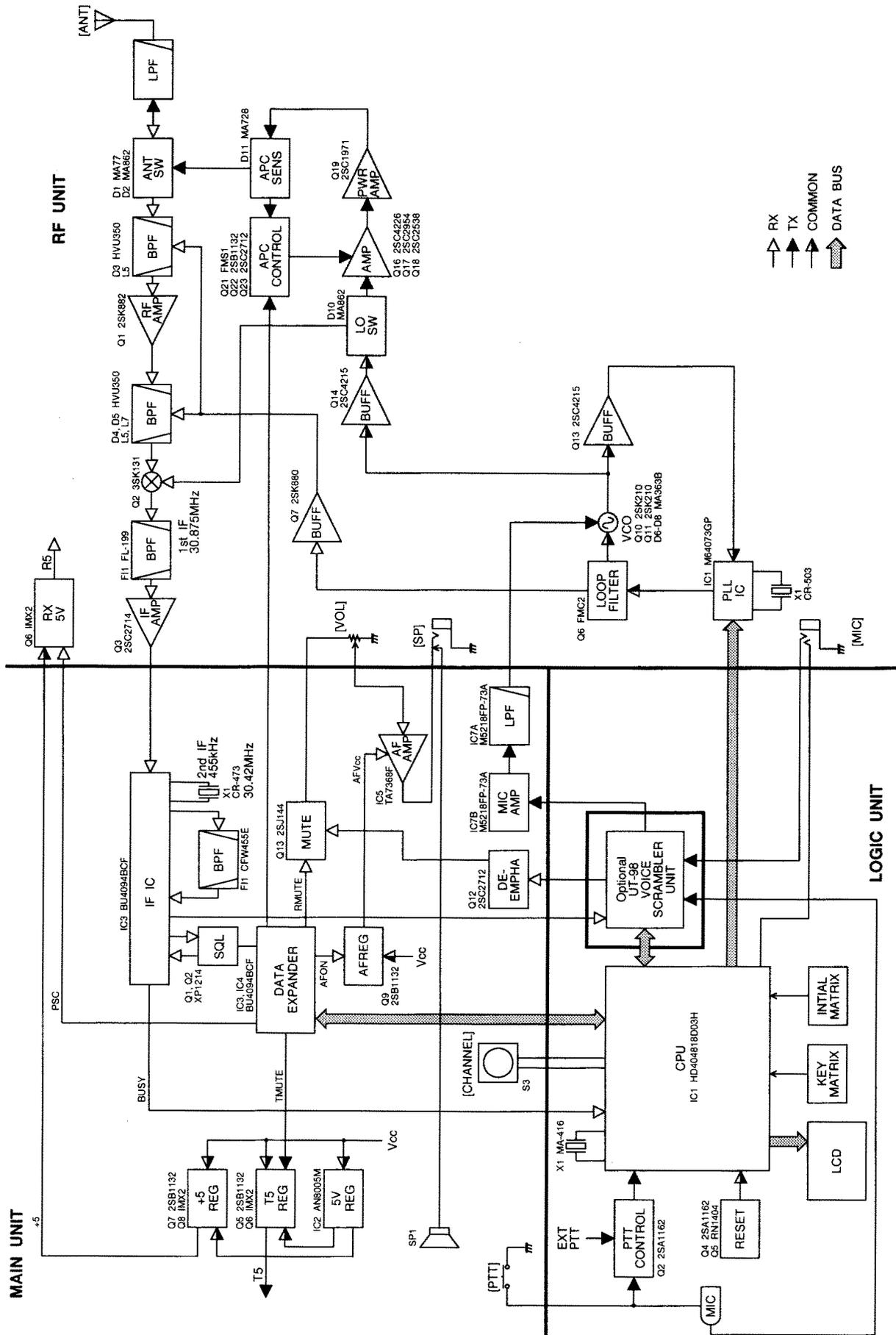
10-2 BC-79 DESKTOP CHARGER



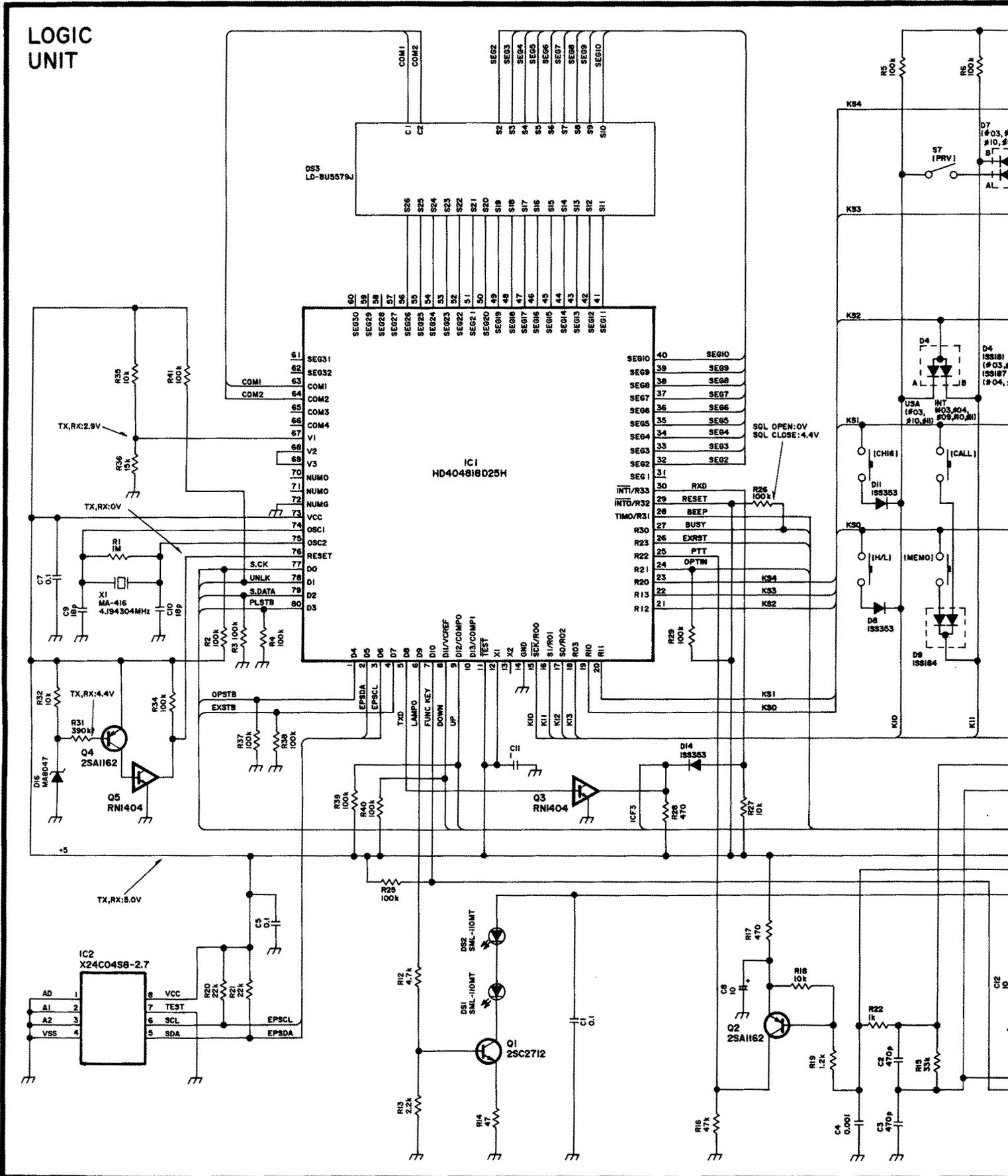
10-3 AD-54 BATTERY CHARGER

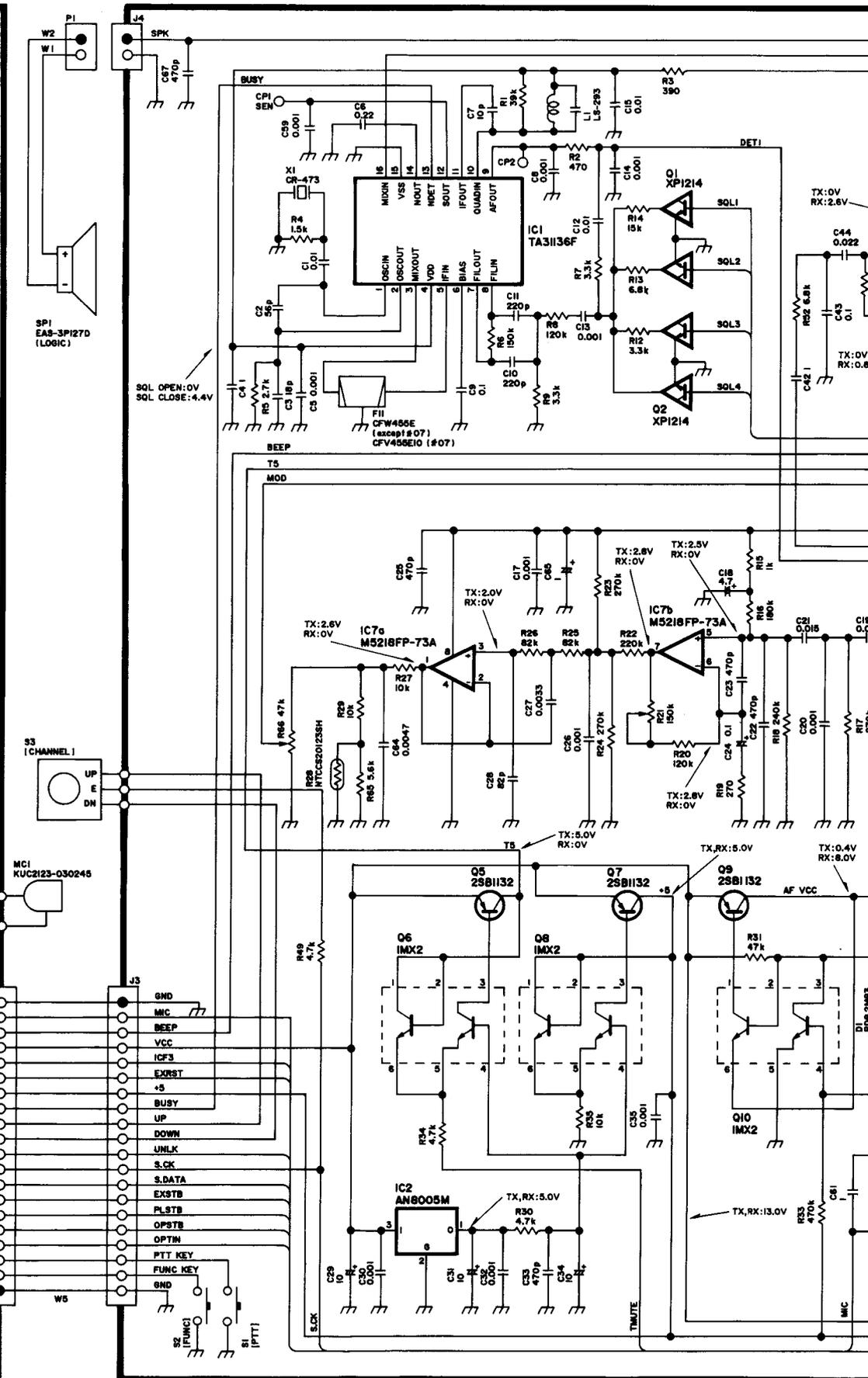
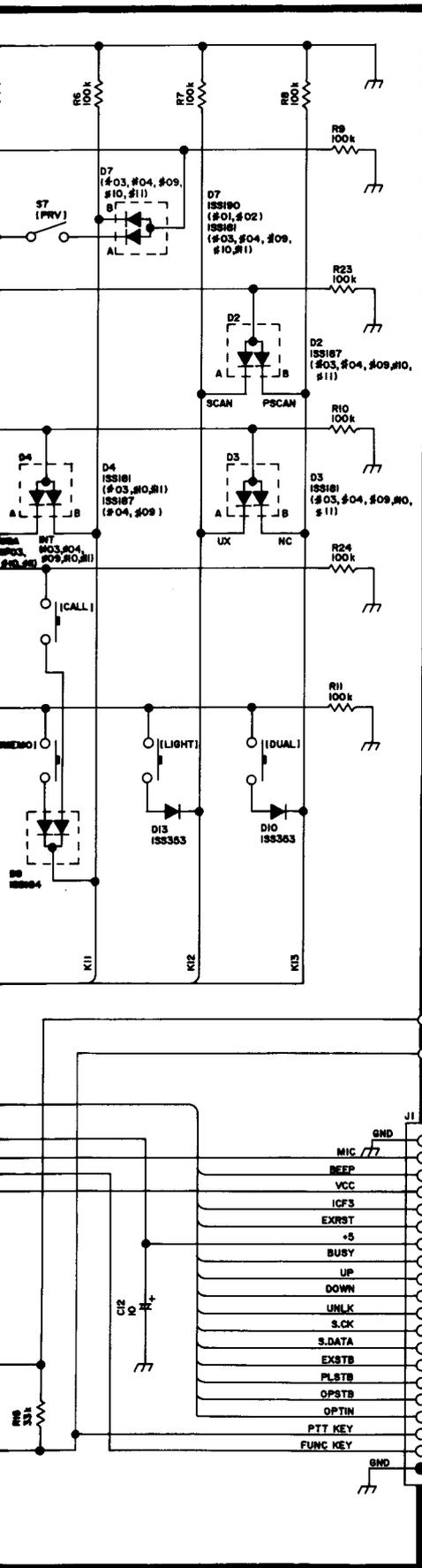


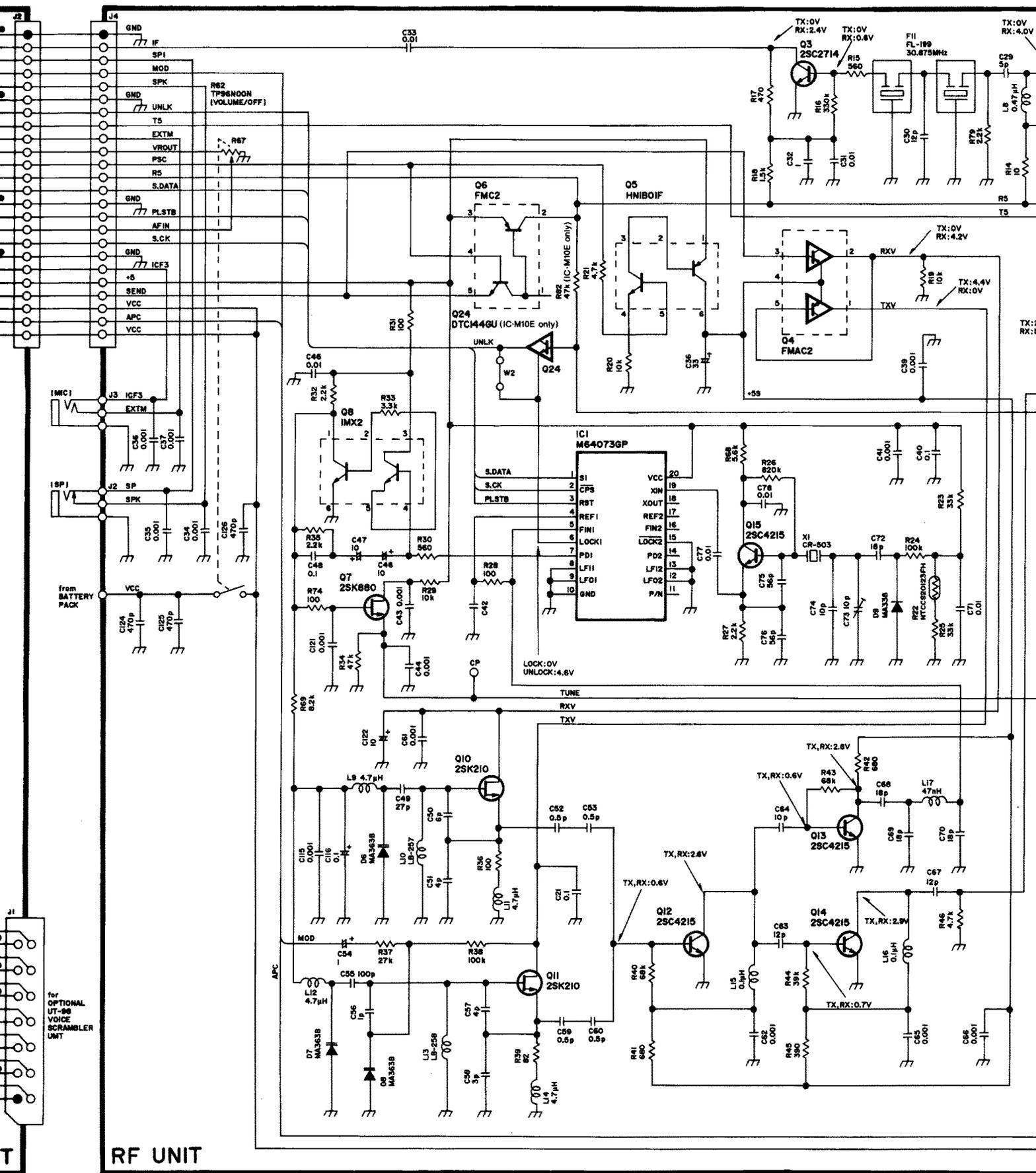
SECTION 11 BLOCK DIAGRAM



SECTION 12 VOLTAGE DIAGRAM







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