ICOM®

SERVICE MANUAL

LPD FM TRANSCEIVER

IC-4088E

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-4088E** LPD FM TRANSCEIVER at the time of publication.

To upgrade quality, all 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 uses more than 5.0 V. Such a connection could cause a fire or electric hazard.

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 (100mW) 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**>

5030002520 LCD	L2-0494TAY	IC-4088E	Main unit	5 pieces
8810009560 Screw	PH BO M2x6 ZK	IC-4088E	Chassis	10 pieces

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

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated turning 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 30 dB to 40 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

■ GENERAL

• Number of channel	: 69 channels (simplex; 433.075–434.775 MHz)
• Type of emission	: 16K0F3E (FM)
• Freqency stability	: ±2500 Hz (±5.7 ppm)
• Freqency resolution	: 25 kHz
• Power supply requirement (negative ground)	: 3 × AA (R6) dry, alkaline; or BP-202 (optionl battery pack)
• Current drain	: Less than 140 mA
• Operating temperature range	: –10˚C to +55˚C
• Number of CTCSS frequency	: 38(67.0–250.3 Hz)
• Dimensions (projections not included)	: 52.5 (W) × 102.5 (H) × 26.5 (D) mm
• Weight (included 3 cells)	: 200 g

■ TRANSMITTER

• Output power	: 10 mW
• Modulation system	: Variable reactance frequency modulation
• Max. frequency deviation	: ±5.0 kHz
• Spurious emissions	: 0.25 µW
• Adjacent channel power	: More than 47 dB
• External microphone connector	: 3-conductor 2.5(d) mm/2.2 kΩ

■ RECEIVER

• Receiving system	: Double conversion superheterodyne system
• Intermediate frequency	: 1st; 21.7 MHz 2nd; 450 kHz
• Sensitivity (12 dB SINAD)	: 0.2 µV; –14 dBµ
• Adjacent channal selectivity	: More than 40 dB
• Spurious response	: More than 40 dB
• Intermodulation	: More than 40 dB
• Audio output power	: 100mW at 10% distortion with an 8 Ω load
• External SP connector	: 2-conductor 3.5(d) mm(1/8")/8 kΩ

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

■ CHANNEL FREQUENCY LIST

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	433.0750	24	433.6500	47	434.2250
2	433.1000	25	433.6750	48	434.2500
3	433.1250	26	433.7000	49	434.2750
4	433.1500	27	433.7250	50	434.3000
5	433.1750	28	433.7500	51	434.3250
6	433.2000	29	433.7750	52	434.3500
7	433.2250	30	433.8000	53	434.3750
8	433.2500	31	433.8250	54	434.4000
9	433.2750	32	433.8500	55	434.4250
10	433.3000	33	433.8750	56	434.4500
11	433.3250	34	433.9000	57	434.4750
12	433.3500	35	433.9250	58	434.5000
13	433.3750	36	433.9500	59	434.5250
14	433.4000	37	433.9750	60	434.5500
15	433.4250	38	434.0000	61	434.5750
16	433.4500	39	434.0250	62	434.6000
17	433.4750	40	434.0500	63	434.6250
18	433.5000	41	434.0750	64	434.6500
19	433.5250	42	434.1000	65	434.6750
20	433.5500	43	434.1250	66	434.7000
21	433.5750	44	434.1500	67	434.7250
22	433.6000	45	434.1750	68	434.7500
23	433.6250	46	434.2000	69	434.7750

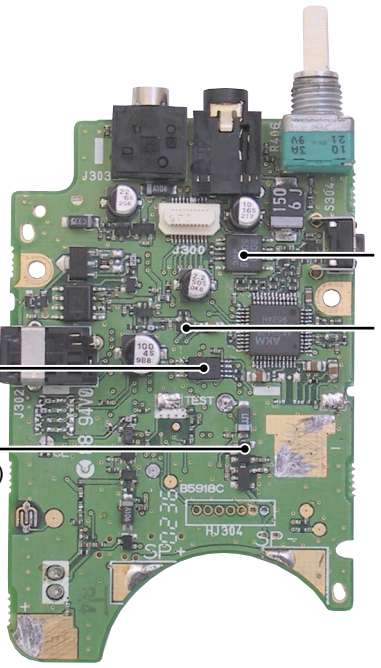
■CTCSS FREQUENCY LIST

Channel No.	Frequency (Hz)	Channel No.	Frequency (Hz)	Channel No.	Frequency (Hz)
1	67.0	14	107.2	27	167.9
2	71.9	15	110.9	28	173.8
3	74.4	16	114.8	29	179.9
4	77.0	17	118.8	30	186.2
5	79.7	18	123.0	31	192.8
6	82.5	19	127.3	32	203.5
7	85.4	20	131.8	33	210.7
8	88.5	21	136.5	34	218.1
9	91.5	22	141.3	35	225.7
10	94.8	23	146.2	36	233.6
11	97.4	24	151.4	37	241.8
12	100.0	25	156.7	38	250.3
13	103.5	26	162.2	---	OFF

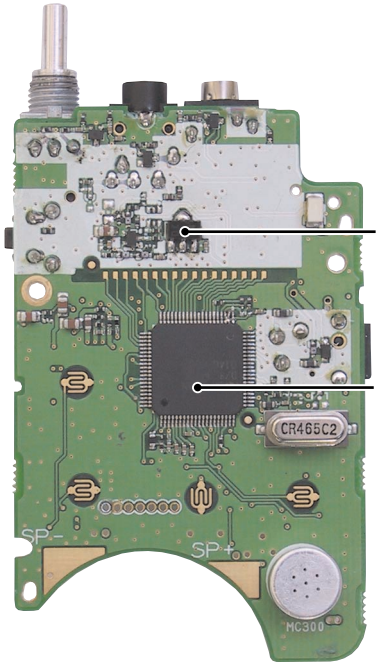
SECTION 2 INSIDE VIEWS

● MAIN UNIT

TOP VIEW

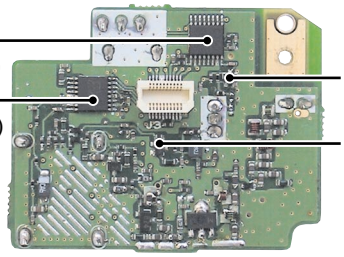


BOTTOM VIEW

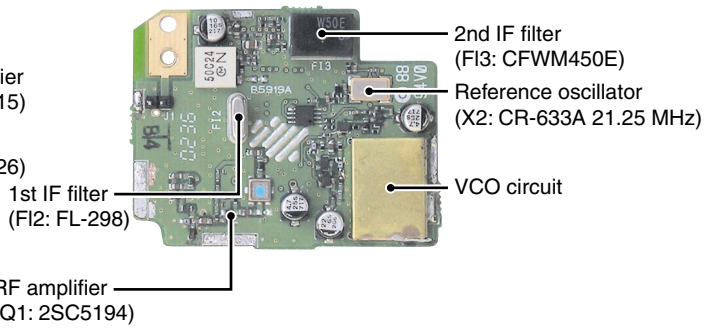


● RF UNIT

TOP VIEW



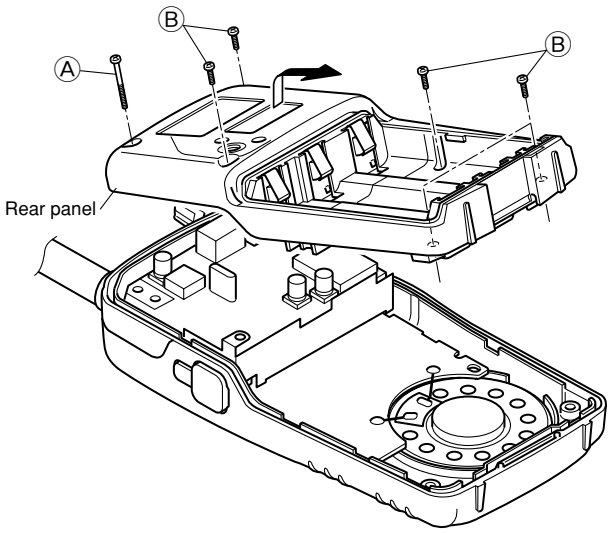
BOTTOM VIEW



SECTION 3 DISASSEMBLY INSTRUCTIONS

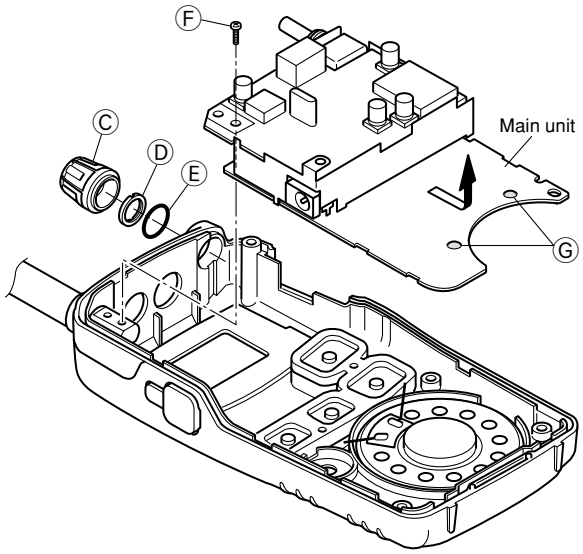
● REMOVING THE REAR PANEL

① Unscrew 1 screw Ⓐ , and 5 screws Ⓑ.
② Remove the rear panel in the direction of the arrow.



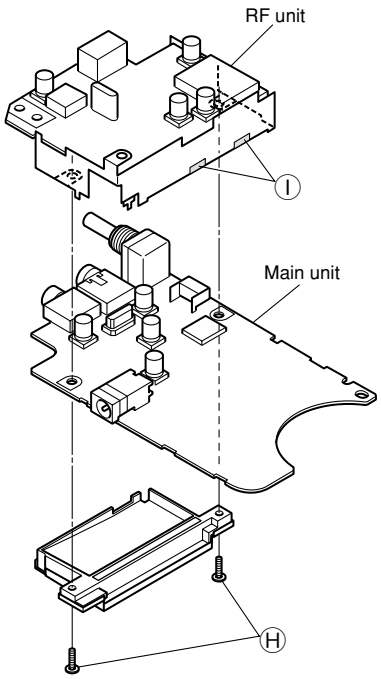
● REMOVING THE MAIN UNIT

① Remove 1 knob Ⓒ, unscrew 1 nut Ⓓ, and then remove 1 ring Ⓔ.
② Unscrew 1 screw Ⓕ.
③ Unsolder 2 points Ⓖ, and remove the MAIN unitin the direction of the arrow.



● REMOVING THE RF UNIT

① Unscrew 2 screws Ⓗ.
② Unsolder 2 points Ⓘ, and remove the RF unit.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

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

Received signals from the antenna connector are passed through the low-pass filter (L1–L3, C1–C5). The filtered signals are applied to the λ/4 type antenna switching circuit (D1 -D4, L5, L6, C9, C10).

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while D101 and D102 are turned ON (while transmitting). Thus transmit signals are blocked from entering the receiver circuits. The passed signals are then applied to the RF amplifier circuit.

4-1-2 RF CIRCUIT (RF UNIT)

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

The signals from the antenna switching circuit are amplified at the RF amplifier (Q1) and passed through the bandpass filter (FI1) to suppress out-of-band signals. The filtered signals are applied to the 1st mixer circuit (Q2).

4-1-3 1ST MIXER AND 1ST IF CIRCUITS (RF UNIT)

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

The signals from the bandpass filter are mixed at the 1st mixer circuit (Q2) with a 1st LO signal coming from the VCO circuit to produce a 21.7 MHz 1st IF signal. The 1st IF signal is applied to a crystal filter (FI2) to suppress out-of-band signals. The filtered 1st IF signal is applied to the IF amplifier (Q3), then applied to the 2nd mixer circuit (IC1, pin 16).

4-1-4 2ND MIXER AND DEMODULATOR CIRCUITS (RF UNIT)

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

The 1st IF signal from the IF amplifier (Q3) is applied to the 2nd mixer section in the FM IF IC (IC1, pin 16), and is mixed with the 2nd LO signal to be converted into a 450 kHz 2nd IF signal.

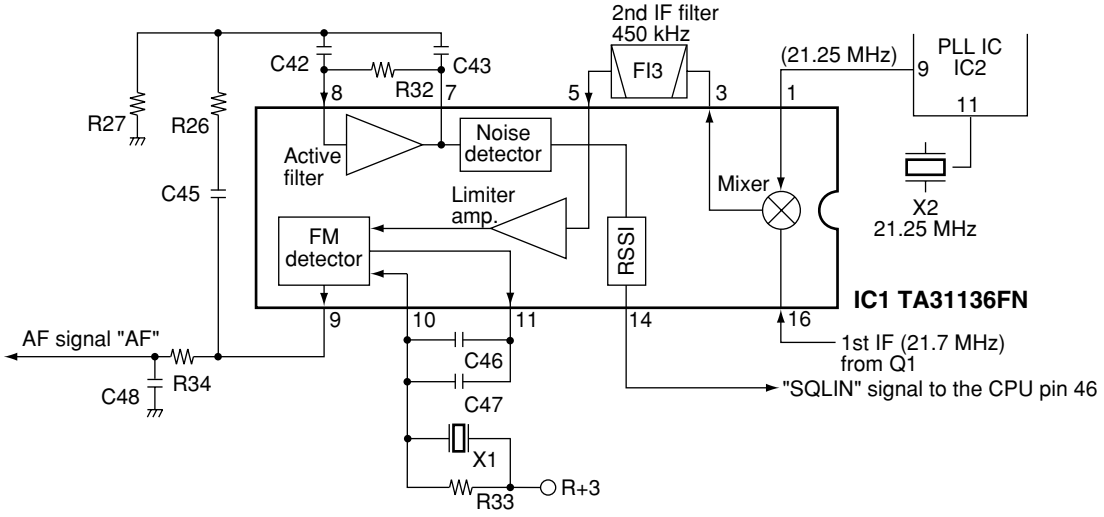
The FM IF IC contains a 2nd mixer, quadrature detector, noise amplifier and a limiter amplifier, etc. The PLL reference oscillator (X2) is used for the 2nd LO signal via the PLL IC (IC2, pins 11, 9), and is applied to pin 1 of the FM IF IC (IC1). The mixed 2nd IF signal is output from pin 3 and passed through the ceramic bandpass filter (FI3) to remove unwanted heterodyne frequencies. It is then amplified at the limiter amplifier section (IC1, pin 5) and applied to the quadrature detector section (IC1, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

4-1-5 AF CIRCUIT (RF AND MAIN UNITS)

AF signals from the FM IF IC (RF unit; IC1, pin 9) are applied to the MAIN unit via J300 pin 14.

The AF signal applied to the [VOL] control (MAIN unit; R406) to control the audio level via the volume mute switch (Q316). The level controlled AF signals are applied to the AF power amplifier (IC305, pin 2) to drive an internal speaker (SP300) via the [SP] jack (J301).

•2ND IF AND DEMODULATOR CIRCUITS



4-1-6 SQUELCH CIRCUIT (RF AND MAIN UNITS)

(1) NOISE SQUELCH

The noise squelch circuit cuts out AF signals when no RF signals are 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 (RF unit; IC2, pin 9) are applied to the active filter section (RF unit; IC2, pin 8). The active filter section amplifies and filters noise components. The filtered signals are applied to the noise detector section and output from pin 14 as the "SQLIN" signal.

The "SQLIN" signal from IC2 (pin 14) passes through J300, pin 12, and is then applied to the CPU (MAIN unit; IC301, pin 46). The CPU analyzes the noise condition and outputs the "RMUT" and "AFON" signals to toggle the volume mute (MAIN unit; Q316) and AF mute (MAIN unit; Q311) switches.

(2) TONE SQUELCH

The tone squelch circuit detects AF signals and opens the squelch only when receiving a signal containing a matching subaudible tone (CTCSS). When tone squelch is in use, and a signal with a mismatched or no subaudible tone is received, the tone squelch circuit mutes the AF signals even when noise squelch is open.

A portion of the AF signals from the FM IF IC (RF unit; IC1, pin 9) passes through the AF control (MAIN unit; IC304) to control the volume mute and AF mute switches.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT (MAIN UNIT)

AF signals from the internal/external microphone are applied to the microphone amplifier circuit and low-pass filter (IC304) via the microphone switch (Q313). The filiterd audio signals are applied to the modulation circuit on the RF unit via J300, pin 15 as the "MOD" signal.

2-2 MODULATION CIRCUIT (RF UNIT)

The filtered audio signals from J300, pin 15 (On the MAIN unit) are applied to the modulation circuit (D8, D9) to modulate transmit signals at the VCO circuit (Q8).

The modulated signal is applied to the drive amplifier circuit.

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

The amplifier circuit amplifies the VCO oscillating signal to the output power level.

The amplified transmit signal is passed through the antenna switching circuit (D1) and low-pass filter, and is then applied to the antenna.

The modulated transmit signal is amplified at the pre-drive and drive amplifiers (Q5, Q6) after being amplified at the buffer amplifier (Q8). The amplified signal is power amplified at the power amplifier (Q4) to obtain 10 mW of RF power.

The power amplified signal is then applied to the antenna via the low-pass filter circuits.

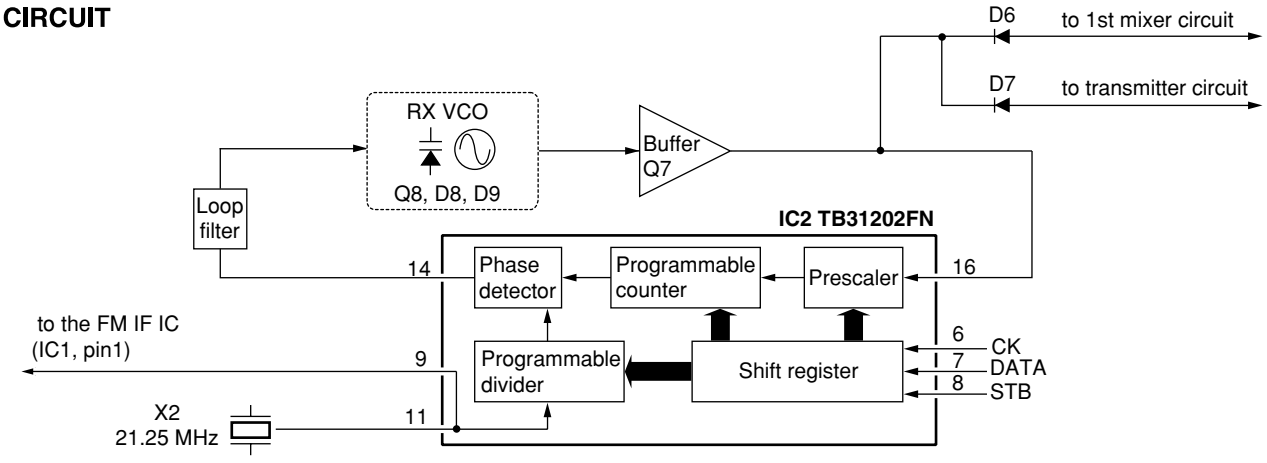
4-3 PLL CIRCUITS (RF UNIT)

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

The PLL circuit consists of the VCO circuit (Q8, D8, D9). An oscillated signal from the VCO passes through the buffer amplifier (Q7) is applied to the PLL IC (IC2, pin16) and is prescaled in the PLL IC based on the divided ratio (N-data). The reference signal is generated at the reference oscillator (X2) and is also applied to the PLL IC. The PLL IC detects the out-of-step phase using the reference frequency and outputs it from pin 14. The output signal is passed through the loop filter (R44, C67) and is then applied to the VCO circuit as the lock voltage.

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

• PLL CIRCUIT



4-4 POWER SUPPLY CIRCUITS

VOLTAGE LINE

LINE	DESCRIPTION
VCC	The voltage from the connected battery or power supply from DC IN (J302).
CPU3V	Common 3 V converted from the VCC line at the 3V regulator circuit (IC303). The circuit outputs the voltage regardless of the power ON/OFF condition.
+3V	Common 3 V converted from the VCC line at the +3V regulator circuit (Q303, D301).
R+3	Receive 3 V cotrolled by the R+3 regulator circuit (Q304) using the "RXV" signal from the CPU (IC301).
T+3	Transmit 3 V converted from the VCC line at the T+3 regulator circuit (Q305, Q308, D303, D304) using the "TXV" signal coming from the CPU (IC301).

4-5 PORT ALLOCATIONS

4-5-1 D/A CONVERTER (RF unit; IC3)

Pin number	Port name	Description
1	MODC	Outputs deviation control signal.
2	PWRC	Outputs TX power control signal.
3	FC	Outputs PLL reference frequency control signal.

4-5-2 CPU (MAIN unit; IC1)

Pin number	Port name	Description
27	TEST	Input port for the test mode switch.
31	EEPCK	Outputs the clock signal to the EEPROM (MAIN unit; IC300).
32	EEPDA	Outputs data signals to the EEPROM (MAIN unit; IC300).
33	DETOUT	Input port for the control signal of the tone detection
35	SHIFT	Outputs the shift control signal to the PLL IC (RF unit; IC2).
36	PLSTB	Outputs strobe signals for the PLL IC (RF unit; IC2).
37	CK	Outputs the clock signal to the PLL IC (RF unit; IC2).
38	DATA	Outputs data signals to the PLL IC (RF unit; IC2).
41	UNLK	Input port for the PLL unlock signal from the PLL IC (RF unit; IC2). Low : During unlock.
42	PTT	Input port for the PTT switch from the external mic jack (MAIN unit; J303). Low : External PTT switch is ON.
43	MICIN	Input port for the control signal from the external remote microphone.
44	TEMP	Input port for the transceiver's internal temperature.
46	SQLIN	Input port for the squelch level signal.
47	VIN	Input port for connected battery pack voltage.
51	MODE	Input port for the [MODE] switch.
52	POWSW	Input port for the [POWER] switch. Low : While the [POWER] switch is pushed.
53	BEEP	Outputs beep audio signal.
54	DOWN	Input port for the [DOWN] switch.
55	UP	Input port for the [UP] switch.
56	PTTSW	Input port for the internal [PTT] switch. Low : While the [PTT] switch is pushed.
57	LAMPO	Outputs the control signal of LCD back light.
58	AFON	Outputs the control signal of the AF amplifier regulator circuit (MAIN unit; Q306, Q307, Q311).
59	RXV	Outputs the control signal of the R+3 regulator circuit (MAIN unit; Q304).
61	MMUTE	Outputs the [MIC] mute signal for RING function. High : While RING signals are output, etc.
62	MICSW	Outputs internal microphone control signal. High : While the internal PTT switch is pushed.
63	POWER	Outputs the control signal of the +3V regulator circuit (MAIN unit; Q303, D301).
64	RMUTE	Outputs the control signal of the volume mute switch (MAIN unit; Q316). High : While squelched.
65	TXV	Outputs the control signal of the T+3 regulator circuit (Q305, Q308, D303, D304).
66	CHGC	Outputs the control signal of the charge circuit (Q312, Q314, D305, D308).

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

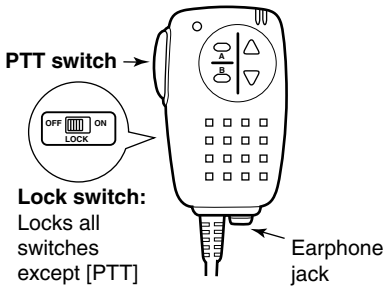
When adjusting IC-4088E, HM-75A OPTIONAL SPEAKER-MICROPHONE is required.
All adjustment items must be preformed at "ADJUSTMENT MODE" as show below.

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 4.5 V DC Current capacity : 1 A or more	FM deviation meter	Frequency range : 30–600 MHz Measuring range : 0 to ±10 kH
RF power meter (terminated type)	Measuring range : 1 mW–1 W Frequency range : 300–600 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–600 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–600 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better		

■ ENTERING THE ADJUSTMENT MODE

① Turn the transceiver's power OFF.
② While connecting the "TEST" on the MAIN board to "GND", then turn power ON.



■ OPERATION ON THE ADJUSTMENT MODE

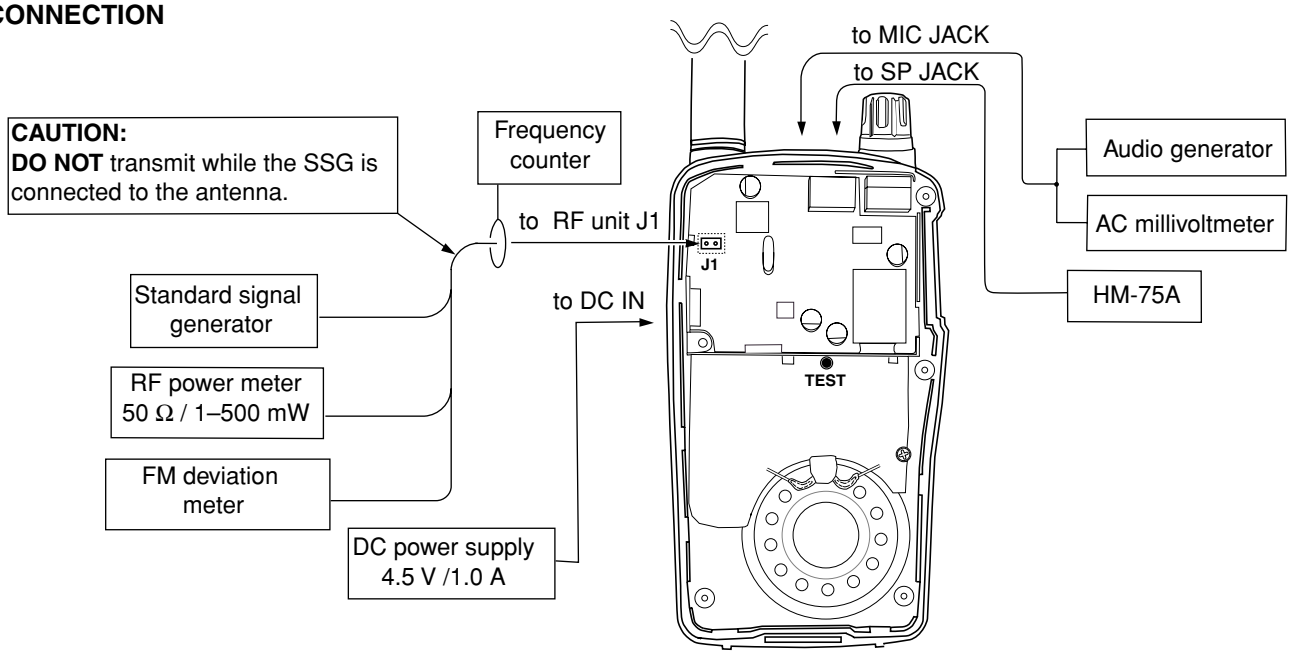
- Change the adjustment item : HM-75A's [B] key
- Change the adjustment value : HM-75A's [UP]/[DN] keys
- Verify the adjustment value : HM-75A's [A] key
- Change the adjustment channel : IC-4088E's [UP]/[DN] keys
- Change the adjustment group : IC-4088E's [MODE]+ [UP]/[DN] keys

■ ADJUSTMENT ITEMS

When entering adjustment mode, displayed adjustment items indicator on LCD as follow.

- Reference frequecy adjustment : Displayed Fr-88
- Output power adjustment : Displayed PL-88
- FM deviation adjustment : Displayed dL-88
- CTCSS adjustment : Displayed to-88
- Squelch adjustment : Displayed SQ-88

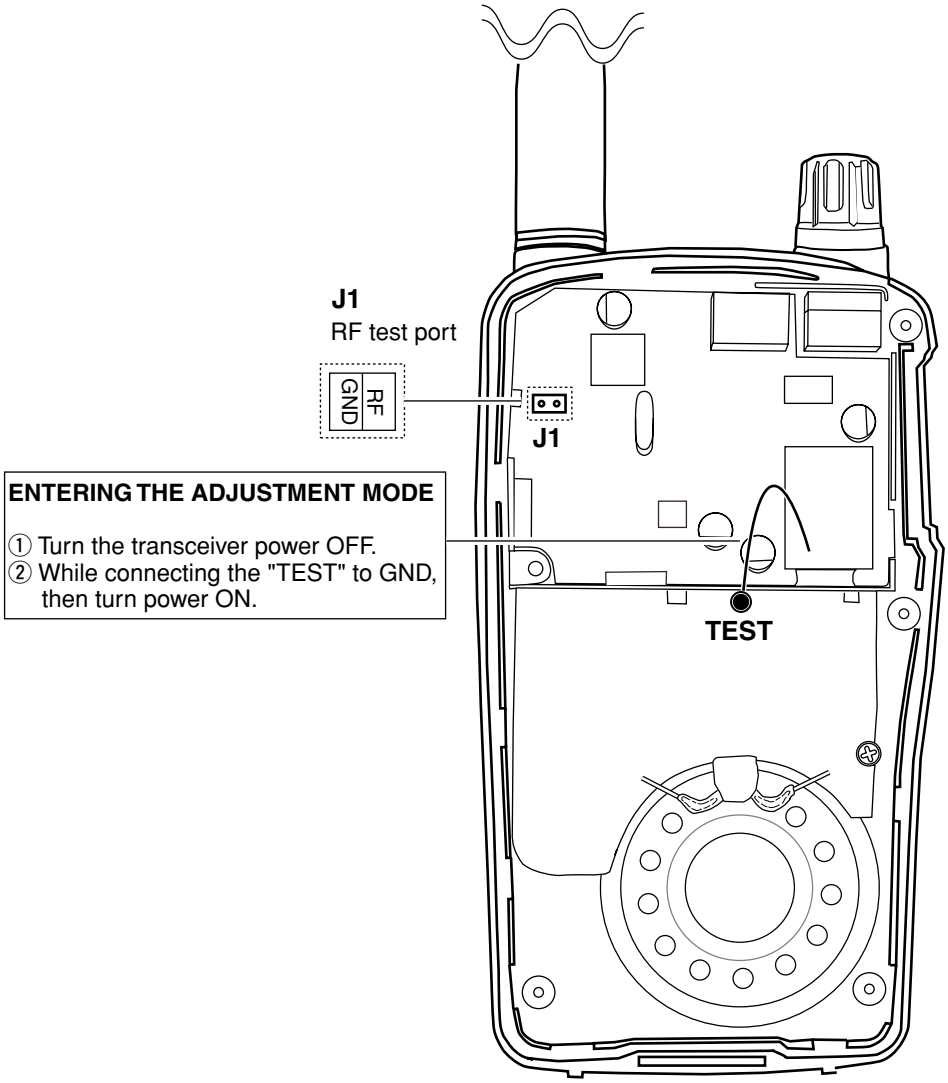
■ CONNECTION



5-2 ADJUSTMENT MODE ADJUSTMENTS

The following adjustment must be performed at “ADJUSTMENT MODE”.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT	VALUE	HM-75A’s KEY
REFERENCE FREQUENCY [Fr]	1	• Operating channel : Ch 35 • Transmitting	Loosely couple a frequency counter to the antenna.	433.925000 MHz	[UP]/[DN]
OUTPUT POWER [PL]	1	• Operating channel : Ch 35 • Transmitting	Connect an RF power meter to the RF test port J1.	10 mW	[UP]/[DN]
FM DEVIATION [dL]	1	• Operating channel : Ch 35 • Connect an audio generator to the [MIC] jack and set as :1 kHz/100 mV rms • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz or 15 kHz De-emphasis : OFF Detector : (P–P)/2 • Set group No. : OFF (– –) • Transmitting	Connect an FM deviation meter to the RF test port J1.	±4.1 kHz	[UP]/[DN]
CTCSS [to]	2	• Operating channel : Ch 35 • Set group No. : 01 • Transmitting		±0.70 kHz	[UP]/[DN]
SQUELCH [Sq]	1	• Operating channel : Ch 35 • Connect an SSG to J1 on the RF unit and set as: Level : 0.13 µV* (–125 dBm) Modulation : OFF • Receiving	speaker		[A]
	2	• Set an SSG as: Level : OFF • Receiving		Audio signal disappears.	Verify


J1
RF test port
RF
GND
J1
ENTERING THE ADJUSTMENT MODE
① Turn the transceiver power OFF.
② While connecting the "TEST" to GND, then turn power ON.
TEST

SECTION 6 PARTS LIST

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC300	1130011230	S.IC	BR24C02FV-WE2
IC301	1140011170	S.IC	μPD78F9418AGK-9EU
IC302	1110005820	S.IC	R3112N281A-TR
IC303	1180002430	S.REG	R1121N301B-TR
IC304	1130007382	S.IC	AK2342B
IC305	1110002810	S.IC	NJM2070M-T1
Q302	1590001330	S.TRANSISTOR	DTA114EUA T106
Q303	1590002490	S.TRANSISTOR	UMZ2N TR
Q304	1510000770	S.TRANSISTOR	2SA1586-GR (TE85R)
Q305	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)
Q306	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)
Q307	1510000580	S.TRANSISTOR	2SA1362-GR (TE85R)
Q308	1520000200	S.TRANSISTOR	2SB798-T2 DK
Q309	1590001050	S.TRANSISTOR	DTC114TUA T106
Q310	1590001040	S.TRANSISTOR	DTA113ZU T106
Q311	1530003090	S.TRANSISTOR	2SC4213-B (TE85R)
Q312	1590000430	S.TRANSISTOR	DTC144EUA T106
Q313	1560000840	S.FET	2SK1829 (TE85R)
Q314	1520000450	S.TRANSISTOR	2SB1132 T100 Q
Q315	1590002950	S.FET	HAT1023R-EL
Q316	1590001390	S.FET	2SJ144-Y (TE85R)
Q317	1590000430	S.TRANSISTOR	DTC144EUA T106
Q318	1590000850	S.TRANSISTOR	DTC114YUA T106
D301	1790001250	S.DIODE	MA2S111-(TX)
D302	1790001250	S.DIODE	MA2S111-(TX)
D303	1790001250	S.DIODE	MA2S111-(TX)
D304	1790001250	S.DIODE	MA2S111-(TX)
D305	1790000670	S.DIODE	SB07-03C-TB
D306	1750000880	S.DIODE	RB551V-30TE-17
D307	1790001240	S.DIODE	MA2S728-(TX)
D308	1790000860	S.DIODE	MA133 (TX)
D309	1790001250	S.DIODE	MA2S111-(TX)
D310	1790001250	S.DIODE	MA2S111-(TX)
D313	1790001250	S.DIODE	MA2S111-(TX)
D317	1790001250	S.DIODE	MA2S111-(TX)
X300	6050008860	S.XTAL	CR-465 (3.6864 MHz)
R300	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R301	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R304	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)
R305	7030009290	S.RESISTOR	ERJ2GEJ 562 X (5.6 kΩ)
R307	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R308	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)
R327	7030005700	S.RESISTOR	ERJ2GEJ 274 X (270 kΩ)
R328	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R329	7030005310	S.RESISTOR	ERJ2GEJ 124 X (120 kΩ)
R330	7030003880	S.RESISTOR	ERJ3GEYJ 244 V (240 kΩ)
R331	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R332	7030005100	S.RESISTOR	ERJ2GEJ 154 X (150 kΩ)
R333	7030009290	S.RESISTOR	ERJ2GEJ 562 X (5.6 kΩ)
R334	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)
R335	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)
R338	7030005100	S.RESISTOR	ERJ2GEJ 154 X (150 kΩ)
R340	7030008410	S.RESISTOR	ERJ2GEJ 392 X (3.9 kΩ)
R343	7030004970	S.RESISTOR	ERJ2GEJ 470 X (47 Ω)
R344	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)
R345	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R346	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)
R347	7030005000	S.RESISTOR	ERJ2GEJ 471 X (470 Ω)
R348	7030003880	S.RESISTOR	ERJ3GEYJ 244 V (240 kΩ)
R349	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)
R350	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)
R356	7030005080	S.RESISTOR	ERJ2GEJ 823 X (82 kΩ)
R357	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)
R358	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)
R359	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R360	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R361	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)
R362	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R363	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)
R364	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R365	7510001440	S.THERMISTOR	NTCG16 3NH 221KT
R366	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)
R368	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)
R369	7030007570	S.RESISTOR	ERJ2GEJ 122X (1.2 kΩ)
R373	7030005080	S.RESISTOR	ERJ2GEJ 823 X (82 kΩ)
R374	7030009140	S.RESISTOR	ERJ2GEJ 272 X (2.7 kΩ)
R375	7030007310	S.RESISTOR	ERJ2GEJ 155 X (1.5 MΩ)
R376	7030007570	S.RESISTOR	ERJ2GEJ 122X (1.2 kΩ)
R377	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)
R378	7030005230	S.RESISTOR	ERJ2GEJ 334 X (330 kΩ)
R381	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R382	7030008010	S.RESISTOR	ERJ2GEJ 123 X (12 kΩ)
R383	7030005710	S.RESISTOR	ERJ2GEJ 121 X (120 Ω)
R384	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R385	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)
R386	7030004980	S.RESISTOR	ERJ2GEJ 101 X (100 Ω)
R387	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R388	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)
R389	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)
R390	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R391	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R392	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R393	7030005570	S.RESISTOR	ERJ2GEJ 820 X (82 Ω)
R394	7030009290	S.RESISTOR	ERJ2GEJ 562 X (5.6 kΩ)
R395	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R396	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)
R397	7030000130	S.RESISTOR	MCR10EZHJ 8.2 Ω (8R2)
R399	7030005530	S.RESISTOR	ERJ2GEJ 100 X (10 Ω)
R400	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R401	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R402	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)
R403	7030004980	S.RESISTOR	ERJ2GEJ 101 X (100 Ω)
R404	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)
R405	7030004980	S.RESISTOR	ERJ2GEJ 101 X (100 Ω)
R406	7210001970	VARIABLE	RV-244 (RK0971110) 10KA
R409	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R410	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R412	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R413	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R414	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R415	7510001660	S.THRMISTOR	NTCG16 4LH 473KT
R416	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R417	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)
R418	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R419	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R420	7030007320	S.RESISTOR	ERJ2GEJ 225 X (2.2 MΩ)
R421	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)
R422	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R423	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)
R424	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)
R425	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R426	7030007290	S.RESISTOR	ERJ2GEJ 222 X (2.2 kΩ)
C300	4030017410	S.CERAMIC	ECJ0EC1H240J
C301	4030017410	S.CERAMIC	ECJ0EC1H240J
C303	4030016790	S.CERAMIC	ECJ0EB1C103K
C304	4030016930	S.CERAMIC	ECJ0EB1A104K
C311	4030016930	S.CERAMIC	ECJ0EB1A104K
C312	4030016930	S.CERAMIC	ECJ0EB1A104K
C313	4030017430	S.CERAMIC	ECJ0EC1H101J
C314	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C315	4550006620	S.TANTALUM	ECST0JY226R
C316	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T
C317	4030016930	S.CERAMIC	ECJ0EB1A104K
C319	4030016930	S.CERAMIC	ECJ0EB1A104K
C320	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C321	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C323	4030017040	S.CERAMIC	ECJ0EB1A333K
C324	4030016930	S.CERAMIC	ECJ0EB1A104K
C325	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C326	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C327	4030017720	S.CERAMIC	ECJ0EB1H331K
C328	4510005900	S.ELECTROLYTIC	ECEV0GA101SR

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C329	4030017420	S.CERAMIC	ECJ0EC1H470J
C330	4030016930	S.CERAMIC	ECJ0EB1A104K
C331	4030016930	S.CERAMIC	ECJ0EB1A104K
C332	4030017460	S.CERAMIC	ECJ0EB1E102K
C333	4030017730	S.CERAMIC	ECJ0EB1E471K
C334	4030016930	S.CERAMIC	ECJ0EB1A104K
C335	4030017440	S.CERAMIC	ECJ0EC1H221J
C336	4030017430	S.CERAMIC	ECJ0EC1H101J
C337	4030011810	S.CERAMIC	C1608 JB 1A 224K-T
C338	4030017730	S.CERAMIC	ECJ0EB1E471K
C339	4030017440	S.CERAMIC	ECJ0EC1H221J
C340	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C341	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C343	4550006390	S.TANTALUM	TEMSVA 1C 335M-8L
C344	4030016950	S.CERAMIC	ECJ0EB1A473K
C345	4030017730	S.CERAMIC	ECJ0EB1E471K
C346	4030017430	S.CERAMIC	ECJ0EC1H101J
C347	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C348	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR
C349	4030017460	S.CERAMIC	ECJ0EB1E102K
C350	4030016930	S.CERAMIC	ECJ0EB1A104K
C351	4030016930	S.CERAMIC	ECJ0EB1A104K
C352	4030016930	S.CERAMIC	ECJ0EB1A104K
C354	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C356	4030016930	S.CERAMIC	ECJ0EB1A104K
C357	4030017730	S.CERAMIC	ECJ0EB1E471K
C358	4550006880	S.TANTALUM	TEMSVD2 0J 157M-12R
C359	4030017720	S.CERAMIC	ECJ0EB1H331K
C360	4030017460	S.CERAMIC	ECJ0EB1E102K
C361	4030017730	S.CERAMIC	ECJ0EB1E471K
C362	4030016930	S.CERAMIC	ECJ0EB1A104K
C363	4030017460	S.CERAMIC	ECJ0EB1E102K
C364	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C365	4030016930	S.CERAMIC	ECJ0EB1A104K
C366	4030016930	S.CERAMIC	ECJ0EB1A104K
C367	4030017730	S.CERAMIC	ECJ0EB1E471K
C368	4030017720	S.CERAMIC	ECJ0EB1H331K
C369	4030017730	S.CERAMIC	ECJ0EB1E471K
C371	4030017720	S.CERAMIC	ECJ0EB1H331K
C372	4030016930	S.CERAMIC	ECJ0EB1A104K
C373	4030017460	S.CERAMIC	ECJ0EB1E102K
C374	4030017420	S.CERAMIC	ECJ0EC1H470J
C375	4030017730	S.CERAMIC	ECJ0EB1E471K
C376	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C377	4030017720	S.CERAMIC	ECJ0EB1H331K
C378	4030016930	S.CERAMIC	ECJ0EB1A104K
C379	4030017730	S.CERAMIC	ECJ0EB1E471K
C380	4030017730	S.CERAMIC	ECJ0EB1E471K
C381	4030017730	S.CERAMIC	ECJ0EB1E471K
C382	4030016790	S.CERAMIC	ECJ0EB1C103K
C383	4030016930	S.CERAMIC	ECJ0EB1A104K
C384	4030016790	S.CERAMIC	ECJ0EB1C103K
C385	4030017460	S.CERAMIC	ECJ0EB1E102K
C386	4030017460	S.CERAMIC	ECJ0EB1E102K
C387	4030017460	S.CERAMIC	ECJ0EB1E102K
C388	4030017460	S.CERAMIC	ECJ0EB1E102K
C389	4030016930	S.CERAMIC	ECJ0EB1A104K
C390	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
J300	6510023500	S.CONNECTOR	AXK6S20545P
J301	6450001060	CONNECTOR	HSJ1493-01-010
J302	6450002130	CONNECTOR	04-730A2-02BKA
J303	6450000130	CONNECTOR	HSJ1102-01-540
DS300	5030002520	LCD	L2-0494TAY
DS301	5040002230	S.LED	CL-200YG-C-TS
MC300	7700002160	MICROPHON	KUC3523-040245
S304	2260001900	SWITCH	SW-149 (SKHLLD)
W300	7030010040	S.JUMPER	ERJ2GE-JPW
W301	7030010040	S.JUMPER	ERJ2GE-JPW
W302	7120000470	JUMPER	ERDS2T0
W304	7030010040	S.JUMPER	ERJ2GE-JPW
W307	7030010040	S.JUMPER	ERJ2GE-JPW

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
EP1	0910055934	PCB	B-5918D
EP300	6910012350	S.BEAD	MMZ1608Y 102BT
EP301	6910014690	S.BEAD	MPZ1608S221A-T
EP302	6910014690	S.BEAD	MPZ1608S221A-T
EP303	8930059580	LCD CONTACT	SRCN-2628-SP-N-W

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1110003490	S.IC	TA31136FN (D,EL)
IC2	1110004150	S.IC	TB31202FN (EL)
IC3	1190001830	S.IC	BH2220FVM-TR
Q1	1530003620	S.TRANSISTOR	2SC5194-T1
Q2	1530002920	S.TRANSISTOR	2SC4226-T1 R25
Q3	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q4	1560001270	S.FET	2SK3078A (TE12L)
Q5	1530000370	S.TRANSISTOR	2SC3356-T1B
Q6	1530002940	S.TRANSISTOR	2SC4228-T1
Q7	1530003320	S.TRANSISTOR	2SC5108-Y (TE85R)
Q8	1530003320	S.TRANSISTOR	2SC5108-Y (TE85R)
Q9	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)
Q10	1510000770	S.TRANSISTOR	2SA1586-GR (TE85R)
Q11	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)
Q12	1590001450	S.FET	2SJ144-GR (TE85R)
Q13	1530003090	S.TRANSISTOR	2SC4213-B (TE85R)
D1	1790001260	S.DIODE	MA2S077-(TX)
D2	1790001260	S.DIODE	MA2S077-(TX)
D3	1790001260	S.DIODE	MA2S077-(TX)
D4	1790001240	S.DIODE	MA2S728-(TX)
D5	1790001240	S.DIODE	MA2S728-(TX)
D6	1790001260	S.DIODE	MA2S077-(TX)
D7	1790001260	S.DIODE	MA2S077-(TX)
D8	1720000640	S.VARICAP	1SV284 (TPH3)
D9	1720000640	S.VARICAP	1SV284 (TPH3)
D10	1790001250	S.DIODE	MA2S111-(TX)
D11	1790001250	S.DIODE	MA2S111-(TX)
D12	1750000770	S.VARICAP	HVC376BTRF
FI1	2040001800	S.SAW	NSVS972 (433.92MHZ)
FI2	2010002330	MONOLITH	FL-298 (21.700 MHz)
FI3	2020001270	CERAMIC	CFWLB450KE2A-B0 (CFWM450E)
X1	6070000190	S.DISCRIMINATOR	CDBCB450KCAY24-R0
X2	6050010481	S.XTAL	CR-633A (21.250 MHz)
L1	6200008430	S.COIL	0.20-1.0-4TL 15N
L2	6200008270	S.COIL	0.26-1.0-5TL 17N
L3	6200008270	S.COIL	0.26-1.0-5TL 17N
L4	6200005710	S.COIL	ELJRE 27NG-F
L5	6200005690	S.COIL	ELJRE 18NG-F
L6	6200005670	S.COIL	ELJRE 12NG-F
L7	6200007590	S.COIL	LL1608-FH27NJ
L8	6200005710	S.COIL	ELJRE 27NG-F
L9	6200003280	S.COIL	NL 252018T-2R2J
L10	6200004480	S.COIL	MLF1608D R82K-T
L11	6200010500	S.COIL	0.3-1.1-3TR 9.5N
L12	6200008680	S.COIL	0.26-0.8-3TR 6.8N
L13	6200005720	S.COIL	ELJRE 33NG-F
L14	6200005700	S.COIL	ELJRE 22NG-F
L15	6200005700	S.COIL	ELJRE 22NG-F
L16	6200005710	S.COIL	ELJRE 27NG-F
L17	6200005690	S.COIL	ELJRE 18NG-F
L18	6200003640	S.COIL	MLF1608E 100K-T
L19	6200007000	S.COIL	ELJRE 82NG-F
L20	6200005720	S.COIL	ELJRE 33NG-F
L21	6200002350	S.COIL	LQW31HN27NJ01L
L22	6200003640	S.COIL	MLF1608E 100K-T
L23	6200003640	S.COIL	MLF1608E 100K-T

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
L24	6200005630	S.COIL	ELJRE 5N6Z-F
R1	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)
R2	7030007260	S.RESISTOR	ERJ2GEJ 330 X (33 Ω)
R3	7030004970	S.RESISTOR	ERJ2GEJ 470 X (47 Ω)
R4	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R5	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R6	7030007570	S.RESISTOR	ERJ2GEJ 122X (1.2 kΩ)
R7	7030005000	S.RESISTOR	ERJ2GEJ 471 X (470 Ω)
R8	7030005030	S.RESISTOR	ERJ2GEJ 152 X (1.5 kΩ)
R9	7030005080	S.RESISTOR	ERJ2GEJ 823 X (82 kΩ)
R10	7030009270	S.RESISTOR	ERJ2GEJ 821 X (820 Ω)
R11	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)
R12	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R14	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)
R17	7030005290	S.RESISTOR	ERJ2GEJ 682 X (6.8 kΩ)
R18	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)
R19	7030005590	S.RESISTOR	ERJ2GEJ 680 X (68 Ω)
R20	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)
R21	7030005010	S.RESISTOR	ERJ2GEJ 681 X (680 Ω)
R22	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)
R23	7030009160	S.RESISTOR	ERJ2GEJ 181 X (180 Ω)
R24	7030009160	S.RESISTOR	ERJ2GEJ 181 X (180 Ω)
R25	7030009530	S.RESISTOR	ERJ2GEJ 270 X (27 Ω)
R26	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R27	7030008370	S.RESISTOR	ERJ2GEJ 561 X (560 Ω)
R28	7030008400	S.RESISTOR	ERJ2GEJ 182 X (1.8 kΩ)
R29	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)
R30	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)
R31	7510001670	S.THRMISTOR	NTCG16 4BH 103KT
R32	7030008310	S.RESISTOR	ERJ2GEJ 564 X (560 kΩ)
R33	7030007570	S.RESISTOR	ERJ2GEJ 122X (1.2 kΩ)
R34	7030005030	S.RESISTOR	ERJ2GEJ 152 X (1.5 kΩ)
R35	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)
R36	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)
R37	7030005010	S.RESISTOR	ERJ2GEJ 681 X (680 Ω)
R38	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)
R39	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)
R40	7030009160	S.RESISTOR	ERJ2GEJ 181 X (180 Ω)
R41	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)
R43	7030005210	S.RESISTOR	ERJ2GEJ 822 X (8.2 kΩ)
R44	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)
R45	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R46	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)
R48	7030010090	S.RESISTOR	ERJ2GEJ 180 X (18 Ω)
R49	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)
R50	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)
R51	7030005530	S.RESISTOR	ERJ2GEJ 100 X (10 Ω)
R64	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R65	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R66	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R67	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)
R68	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R69	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)
R70	7510001490	S.THERMISTOR	NTCG16 3NH 681KT
R77	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R78	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)
R79	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)
R80	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)
R82	7030007250	S.RESISTOR	ERJ2GEJ 220 X (22 Ω)
R83	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R84	7030004970	S.RESISTOR	ERJ2GEJ 470 X (47 Ω)
R85	7510001440	S.THERMISTOR	NTCG16 3NH 221KT
R86	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)
R87	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)
C1	4030006990	S.CERAMIC	C1608 CH 1H 080D-T
C2	4030006970	S.CERAMIC	C1608 CH 1H 060D-T
C3	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T
C4	4030007010	S.CERAMIC	C1608 CH 1H 100D-T
C5	4030009560	S.CERAMIC	C1608 CH 1H R75B-T
C6	4030006990	S.CERAMIC	C1608 CH 1H 080D-T
C7	4030006980	S.CERAMIC	C1608 CH 1H 070D-T
C8	4030007050	S.CERAMIC	C1608 CH 1H 220J-T
C9	4030006970	S.CERAMIC	C1608 CH 1H 060D-T
C10	4030006980	S.CERAMIC	C1608 CH 1H 070D-T
C11	4030006900	S.CERAMIC	C1608 JB 1H 103K-T
C12	4030017730	S.CERAMIC	ECJ0EB1E471K
C13	4030017730	S.CERAMIC	ECJ0EB1E471K
C14	4030007010	S.CERAMIC	C1608 CH 1H 100D-T

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C15	4030017730	S.CERAMIC	ECJ0EB1E471K
C16	4030007010	S.CERAMIC	C1608 CH 1H 100D-T
C17	4030017340	S.CERAMIC	ECJ0EC1H010B
C18	4030016950	S.CERAMIC	ECJ0EB1A473K
C19	4030017730	S.CERAMIC	ECJ0EB1E471K
C20	4030017730	S.CERAMIC	ECJ0EB1E471K
C21	4030017400	S.CERAMIC	ECJ0EC1H220J
C22	4030017620	S.CERAMIC	ECJ0EC1H100C
C23	4030017460	S.CERAMIC	ECJ0EB1E102K
C24	4030016950	S.CERAMIC	ECJ0EB1A473K
C25	4030017730	S.CERAMIC	ECJ0EB1E471K
C26	4030007000	S.CERAMIC	C1608 CH 1H 090D-T
C27	4030006990	S.CERAMIC	C1608 CH 1H 080D-T
C28	4030017460	S.CERAMIC	ECJ0EB1E102K
C29	4030017460	S.CERAMIC	ECJ0EB1E102K
C30	4030007070	S.CERAMIC	C1608 CH 1H 330J-T
C31	4030007070	S.CERAMIC	C1608 CH 1H 330J-T
C32	4030006990	S.CERAMIC	C1608 CH 1H 080D-T
C33	4030017730	S.CERAMIC	ECJ0EB1E471K
C34	4030017730	S.CERAMIC	ECJ0EB1E471K
C35	4030006960	S.CERAMIC	C1608 CH 1H 050C-T
C36	4030017730	S.CERAMIC	ECJ0EB1E471K
C37	4030009530	S.CERAMIC	C1608 CH 1H 030B-T
C38	4030017730	S.CERAMIC	ECJ0EB1E471K
C39	4510004650	S.ELECTROLYTIC	ECEV1EA4R7SR
C40	4030017460	S.CERAMIC	ECJ0EB1E102K
C41	4030017600	S.CERAMIC	ECJ0EC1H080C
C42	4030017730	S.CERAMIC	ECJ0EB1E471K
C43	4030017730	S.CERAMIC	ECJ0EB1E471K
C44	4030016930	S.CERAMIC	ECJ0EB1A104K
C45	4030017730	S.CERAMIC	ECJ0EB1E471K
C46	4030017400	S.CERAMIC	ECJ0EC1H220J
C47	4030017510	S.CERAMIC	ECJ0EC1H680J
C48	4030016950	S.CERAMIC	ECJ0EB1A473K
C49	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C50	4030017550	S.CERAMIC	ECJ0EC1H1R5B
C51	4030017530	S.CERAMIC	ECJ0EC1H0R5B
C52	4030017350	S.CERAMIC	ECJ0EC1H020B
C53	4030017350	S.CERAMIC	ECJ0EC1H020B
C54	4030017730	S.CERAMIC	ECJ0EB1E471K
C55	4030017570	S.CERAMIC	ECJ0EC1H040B
C56	4030017630	S.CERAMIC	ECJ0EC1H120J
C57	4030017630	S.CERAMIC	ECJ0EC1H120J
C58	4030017730	S.CERAMIC	ECJ0EB1E471K
C59	4510004650	S.ELECTROLYTIC	ECEV1EA4R7SR
C60	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T
C61	4030017380	S.CERAMIC	ECJ0EC1H050B
C62	4030016950	S.CERAMIC	ECJ0EB1A473K
C63	4030017730	S.CERAMIC	ECJ0EB1E471K
C64	4030017460	S.CERAMIC	ECJ0EB1E102K
C65	4030008880	S.CERAMIC	C1608 JB 1H 223K-T
C66	4030016790	S.CERAMIC	ECJ0EB1C103K
C67	4550006150	S.TANTALUM	ECST1CY105R
C69	4030017630	S.CERAMIC	ECJ0EC1H120J
C70	4030017400	S.CERAMIC	ECJ0EC1H220J
C71	4030017660	S.CERAMIC	ECJ0EC1H330J
C72	4030017460	S.CERAMIC	ECJ0EB1E102K
C73	4030016790	S.CERAMIC	ECJ0EB1C103K
C74	4030017730	S.CERAMIC	ECJ0EB1E471K
C75	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C76	4030016930	S.CERAMIC	ECJ0EB1A104K
C77	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T
C85	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T
C86	4030016950	S.CERAMIC	ECJ0EB1A473K
C87	4030016930	S.CERAMIC	ECJ0EB1A104K
C88	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T
C91	4030017420	S.CERAMIC	ECJ0EC1H470J
C92	4030017460	S.CERAMIC	ECJ0EB1E102K
C98	4030017460	S.CERAMIC	ECJ0EB1E102K
C99	4030017460	S.CERAMIC	ECJ0EB1E102K
C101	4030016930	S.CERAMIC	ECJ0EB1A104K
C102	4030016930	S.CERAMIC	ECJ0EB1A104K
C103	4030017730	S.CERAMIC	ECJ0EB1E471K
C104	4030017730	S.CERAMIC	ECJ0EB1E471K
J1	6510016890	CONNECTOR	IMSA-9210B-1-02R-T
J2	6510023490	S.CONNECTOR	AXK5S20340P

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
W4	7030010040	S.JUMPER	ERJ2GE-JPW
W5	7030010040	S.JUMPER	ERJ2GE-JPW
W6	7030010040	S.JUMPER	ERJ2GE-JPW
W8	7030010040	S.JUMPER	ERJ2GE-JPW
W9	7030010040	S.JUMPER	ERJ2GE-JPW
EP2	6910013310	S.BEAD	MMZ1608D121B
EP3	0910055942	PCB	B-5919B

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 CABINET PARTS

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
SP1	2510001120	Speaker SDRS-3650P-008	1
EP1	3310003060	Antenna 2628 ANT	1
MP1	8210019410	2628 Front panel	1
MP2	8110007920	2628 Rear cover	1
MP3	8210019420	2628 Rear panel	1
MP4	8310054740	2628 Window plate	1
MP5	8930059220	2628 Window sheet	1
MP6	8930059210	2628 SP JACK CAP	1
MP7	8610011270	Knob N-296	1
MP8	8930059240	2628 4-key	1
MP9	8930059250	2628 PTT rubber	1
MP10	8930059260	2628 A-terminal	1
MP11	8930059270	2628 B-terminal	1
MP12	8930059280	2628 Detect button	1
MP13	8930059280	2628 PTT sheet	1
MP14	8110007910	2628 Lock cover	1
MP15	8930059290	O-ring (AU)	1
MP16	8930059590	O-ring (AV)	1
MP17	8930045220	2045 BATT seal	1
MP19	8930045370	2045 C-terminal	2
MP20	8810008750	Screw PH B0 2x15 ZK (BT)	1
MP22	8930058310	2605 DC cap	1
MP25	8830000550	Nut (E)	1
MP32	8810009560	Screw PH B0 2x6 ZK (BT)	5
MP33	8810008620	Screw PH B0 2x20 ZK (BT)	1
MP35	8930059600	2628 Mic rubber	1
MP36	8930059610	Sponge (HC)	1

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R406	7210001970	RV-244	1
J301	6450001060	HSJ1493-01-01	1
J302	6450002130	04-730A-02BKA	1
J303	6450000130	HSJ1102-01-540	1
DS300	5030002520	LCD L2-0494TAY	1
MC300	7700002160	KUC3523-040245	1
S304	2260001900	SW-149	1
EP303	8930059580	LCD contact SRCN-2045-SP-N-W	1
MP301	8210019390	2628 Reflector	1
MP302	8930059230	2628 LCD holder	1
MP303	8810004890	Screw PH 2x6 ZK	2
MP304	8010019180	2628 CHASSIS	1

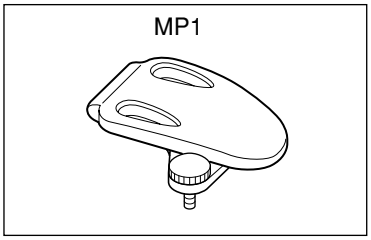
[RF UNIT]

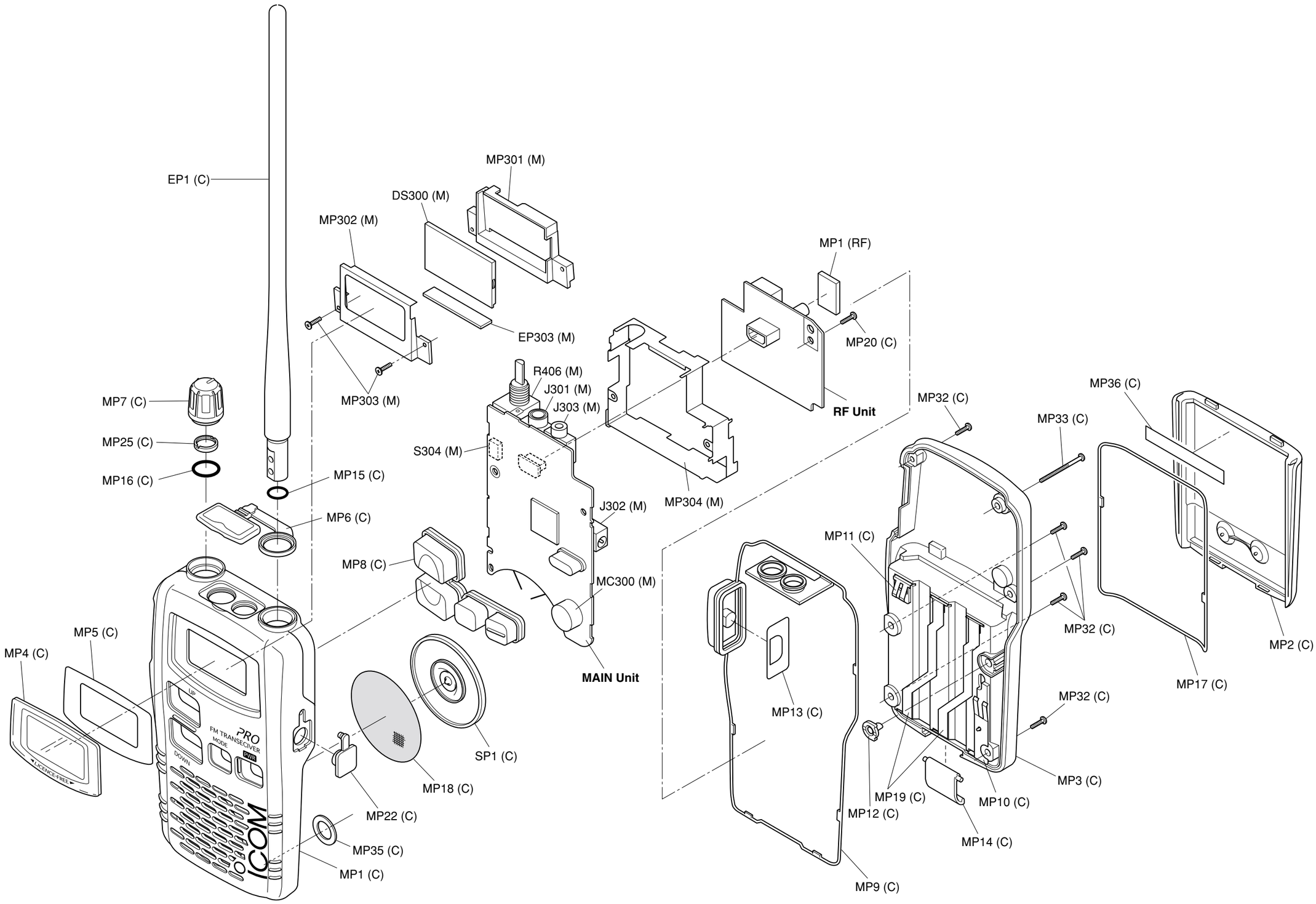
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8510011570	2405 VCO case	1

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

7-2 ACCESSORIES

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8930045331	2405 Belt clip-1	1

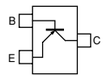
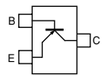
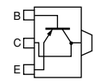
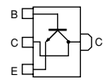
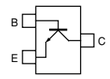
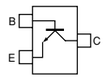
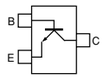
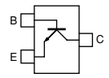
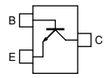
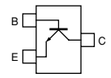
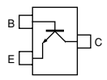
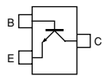
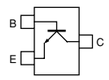
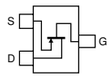
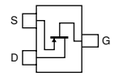
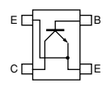
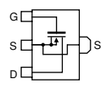
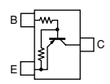
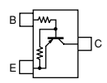
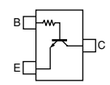
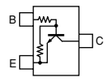
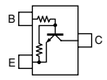
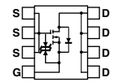
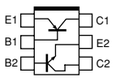




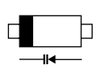
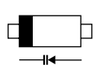
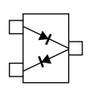
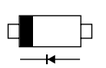
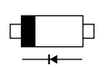
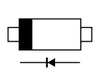
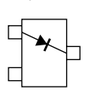
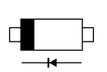
UNIT abbreviation (C): CHASSIS PARTS, (RF): RF UNIT, (M): MAIN UNIT

SECTION 8 SEMI-CONDUCTOR INFORMATION

• TRANSISTOR AND FET'S

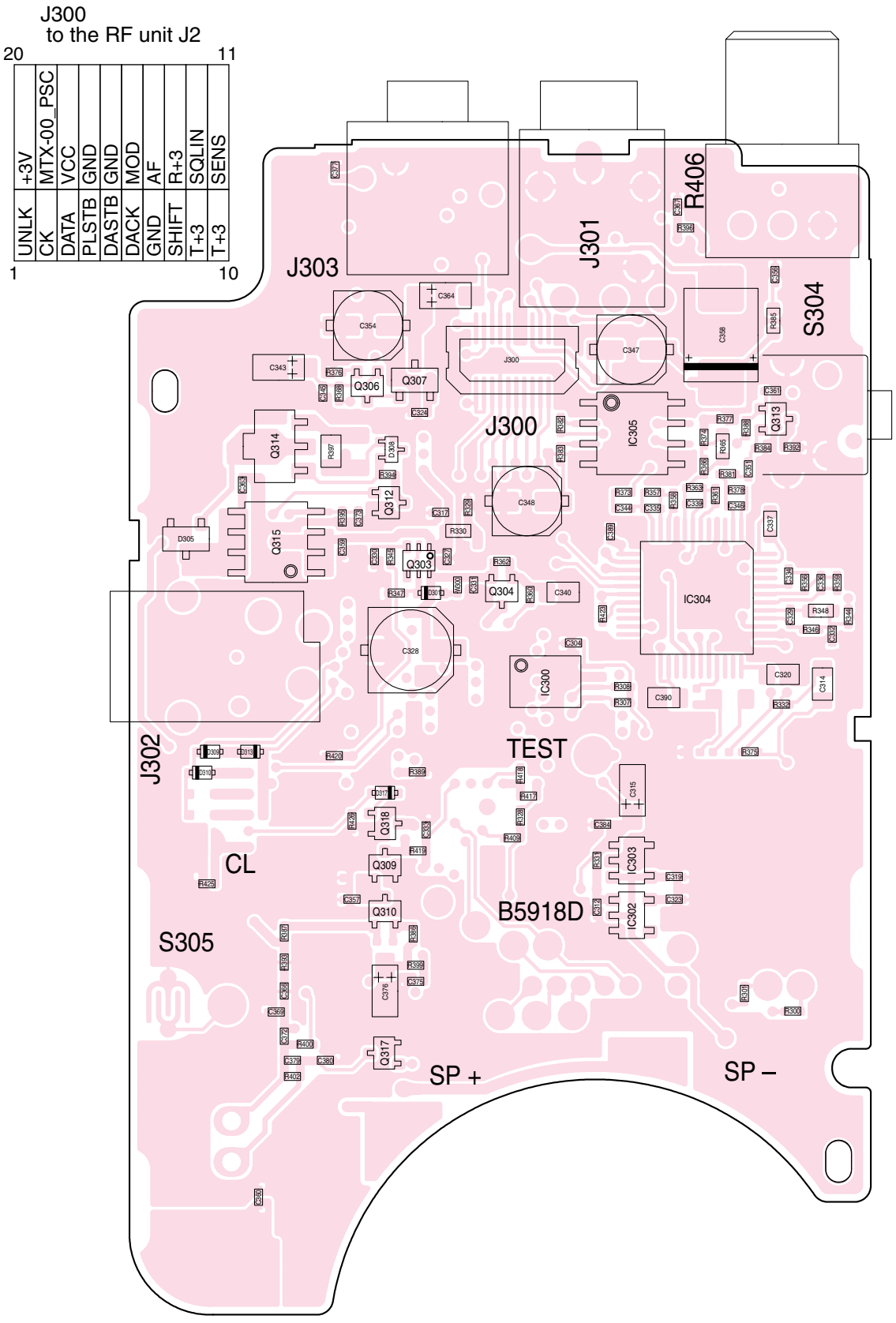
2SA1362 GR (Symbol: AEG) 	**2SA1586 GR** (Symbol: SG) 	**2SB1132Q** (Symbol: BA) 	**2SB798 DK** (Symbol: DK) 	**2SC3356** (Symbol: R22) 
2SC4116GR (Symbol: LG) 	**2SC4117GR** (Symbol: DG) 	**2SC4213 B** (Symbol: AB) 	**2SC4215 O** (Symbol: QO) 	**2SC4226 R25** (Symbol: R25) 
2SC4228 R44 (Symbol: R44) 	**2SC5108 Y** (Symbol: MC) 	**2SC5194** (Symbol: T88) 	**2SJ144GR** (Symbol: VG) 	**2SJ144 Y** (Symbol: VY) 
2SK1829 (Symbol: K1) 	**2SK3078A** (Symbol: UW) 	**DTA113ZU** (Symbol: 111) 	**DTA114 EU** (Symbol: 16) 	**DTC114TU** (Symbol: 04) 
DTC114YU (Symbol: 64) 	**DTC144EU** (Symbol: 26) 	**HAT1023R** (Symbol: 1023) 	**UMZ2N** (Symbol: Z2) 	

• DIODES

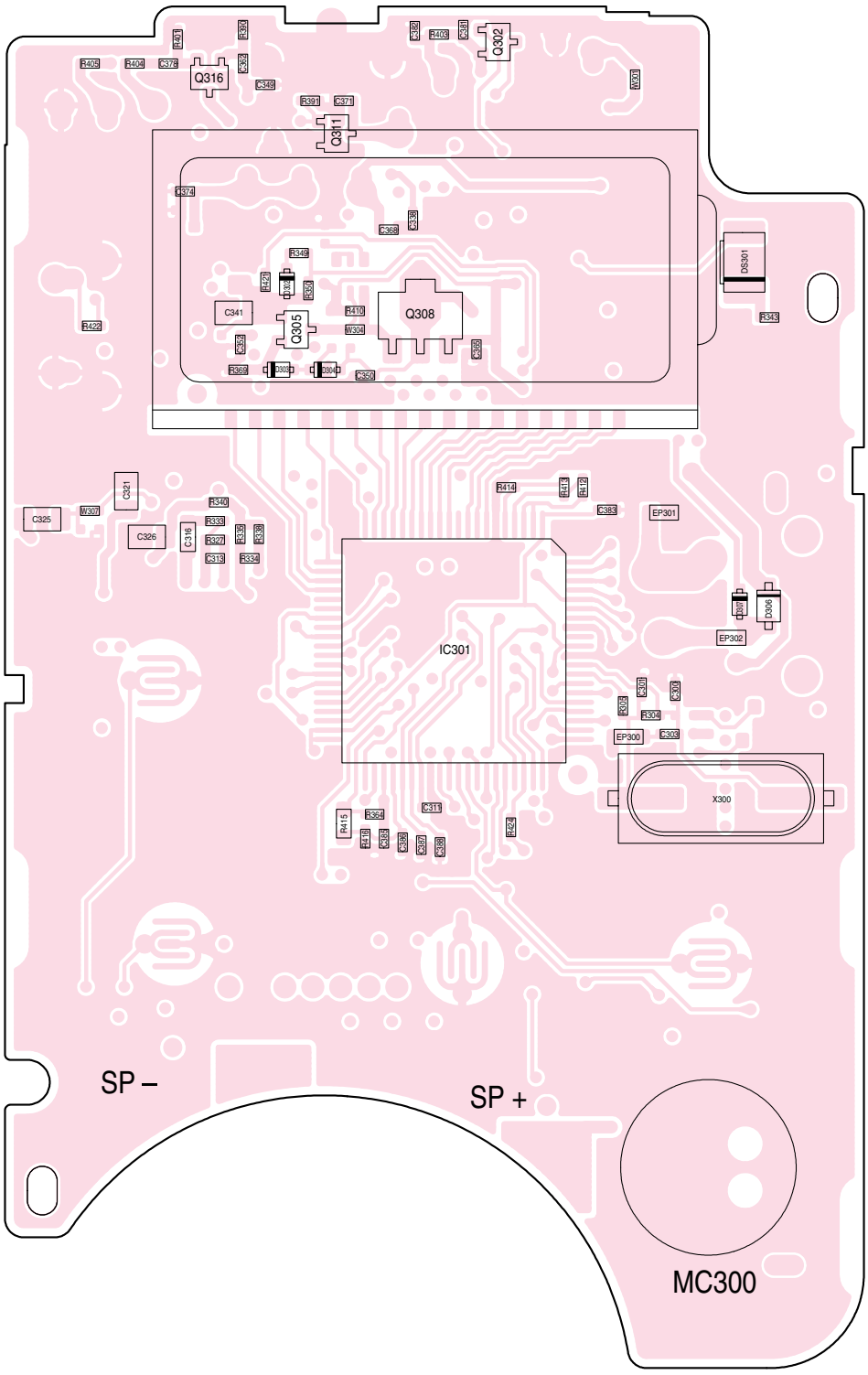
1SV284 (Symbol: TL) 	**HVC376B** (Symbol: B9) 	**MA133** (Symbol: MP) 	**MA2S077** (Symbol: S) 	**MA2S111** (Symbol: A) 
MA2S728 (Symbol: B) 	**SB07-03C** (Symbol: J) 	**RB551V-30** (Symbol: D) 		

SECTION 9 BOARD LAYOUTS

9-1 MAIN UNIT

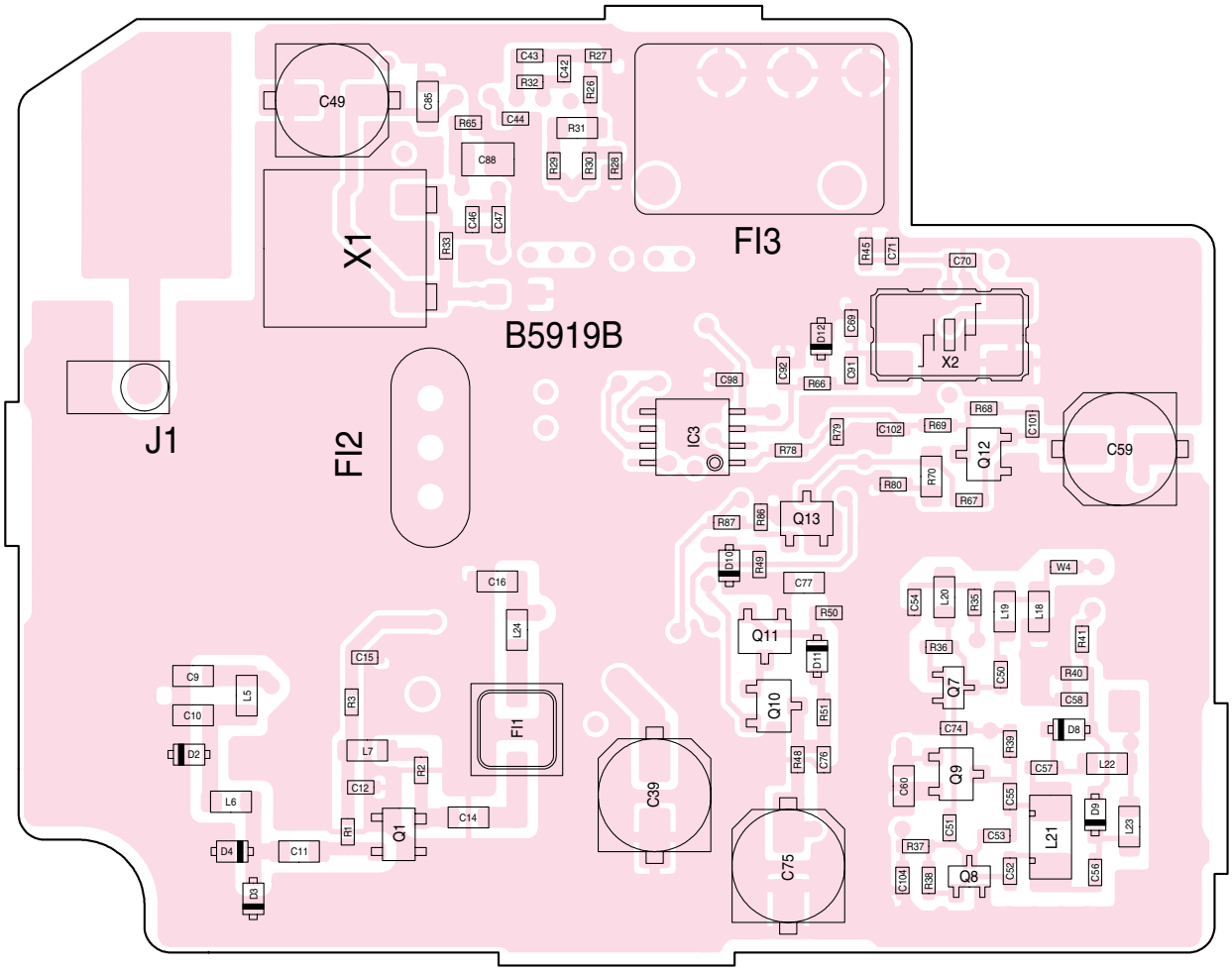


● **BOTTOM VIEW**



9-2 RF UNIT

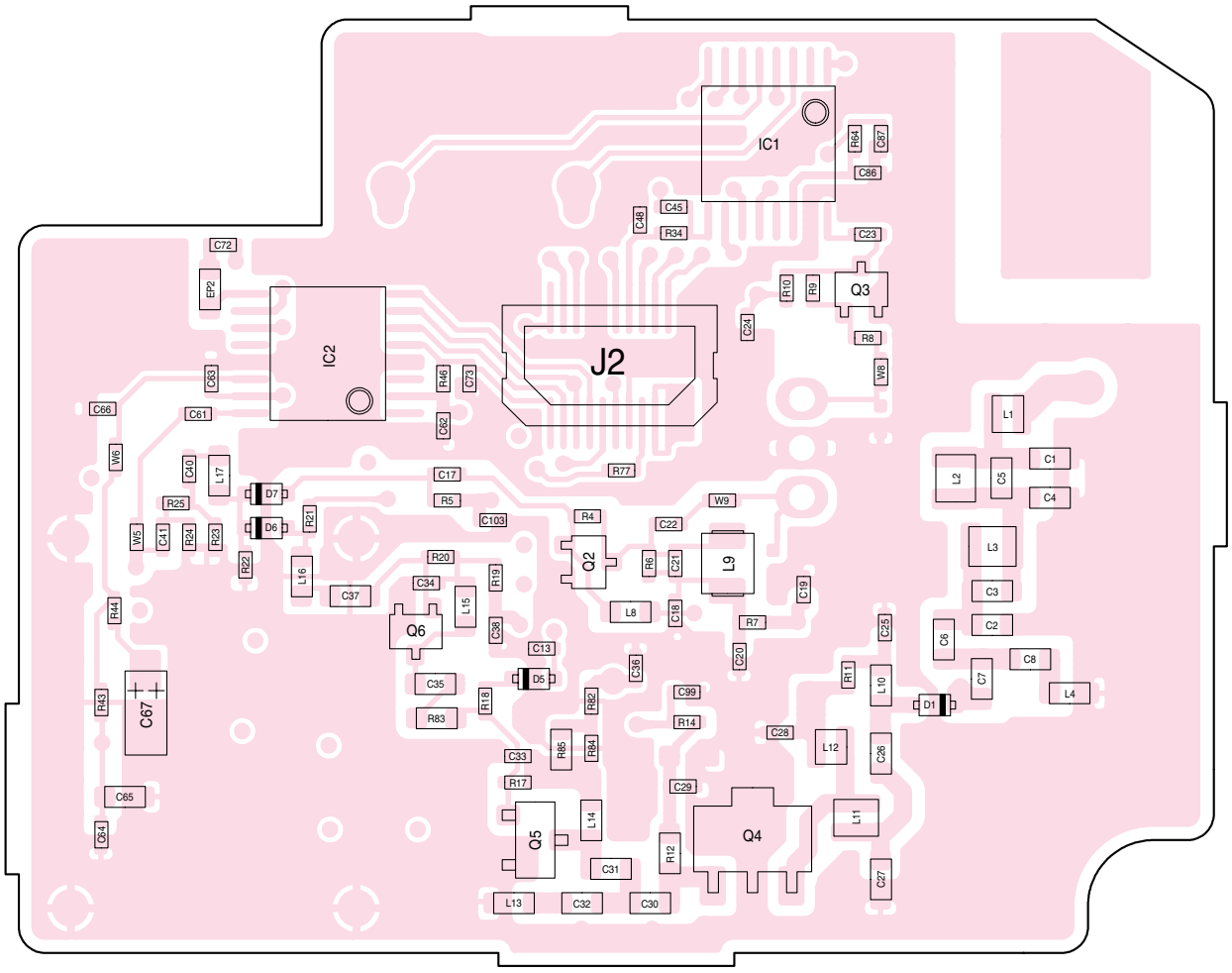
- **TOP VIEW**



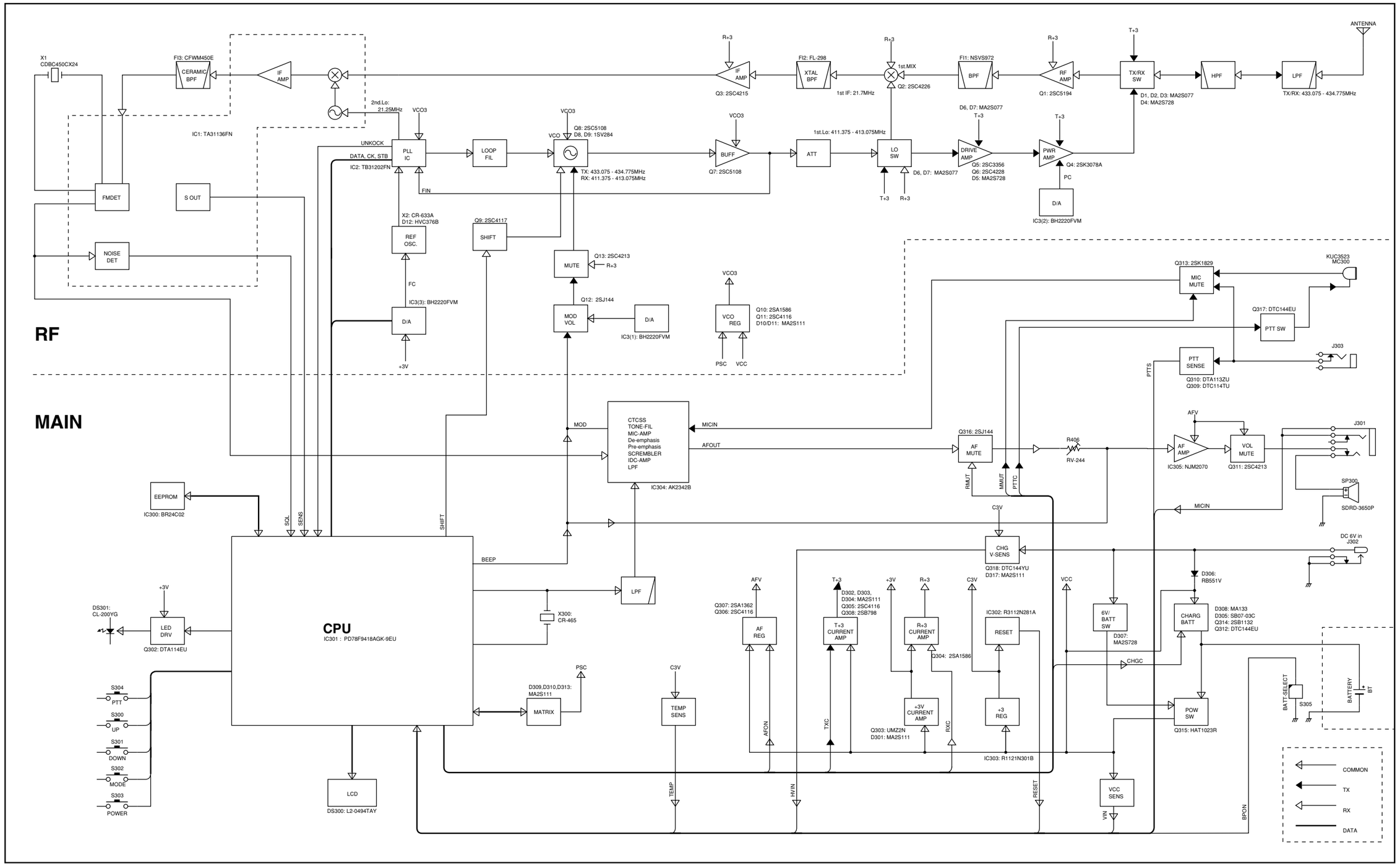
● **BOTTOM VIEW**

J2
to the MAIN unit J300

20		11
UNLK	+3V	
CK	MTX-00_PSC	
DATA	VCC	
PLSTB	GND	
DASTB	GND	
DACK	MOD	
GND	AF	
SHIFT	R+3	
T+3	SQLIN	
T+3	SENS	
1		10

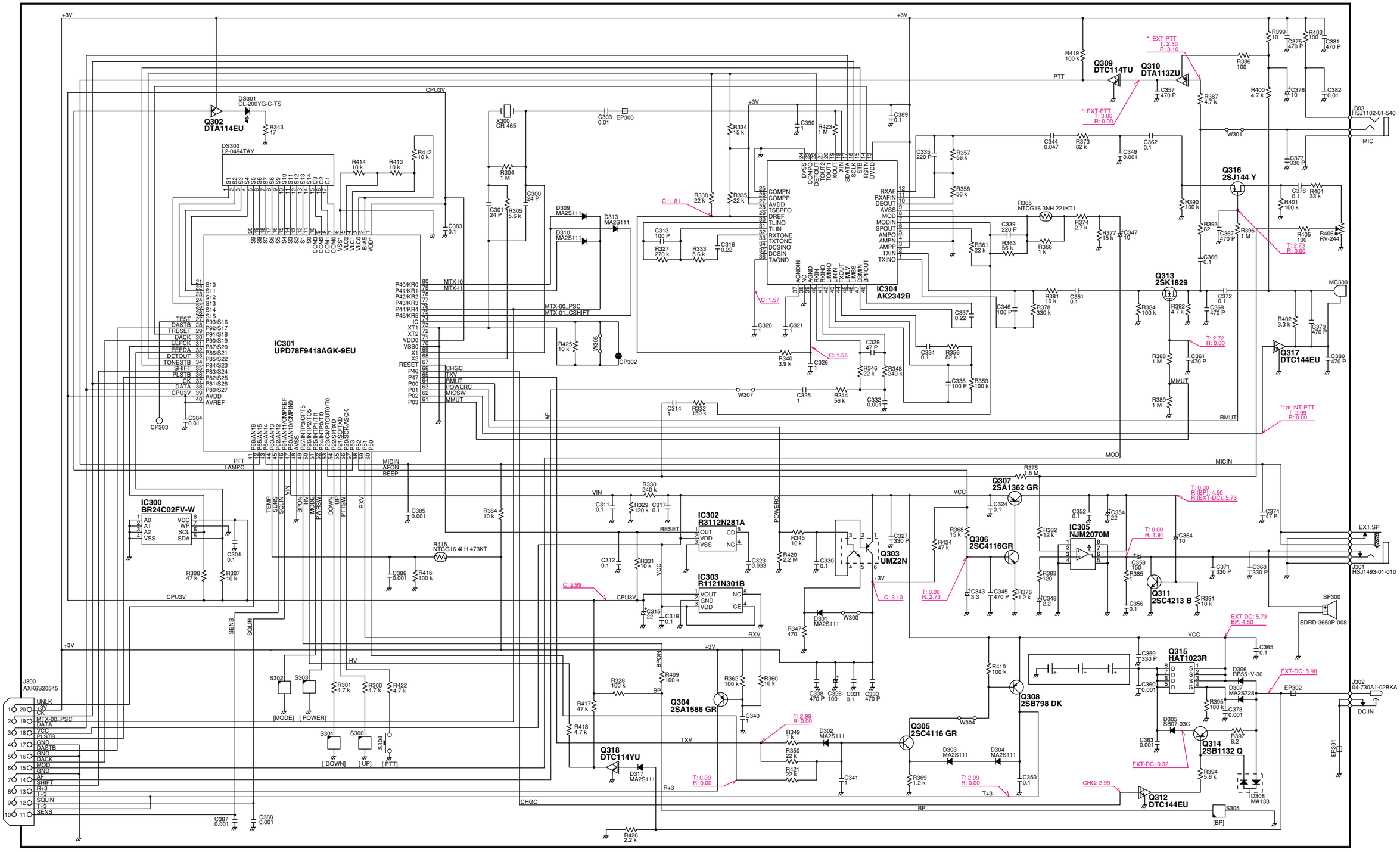


SECTION 10 BLOCK DIAGRAM

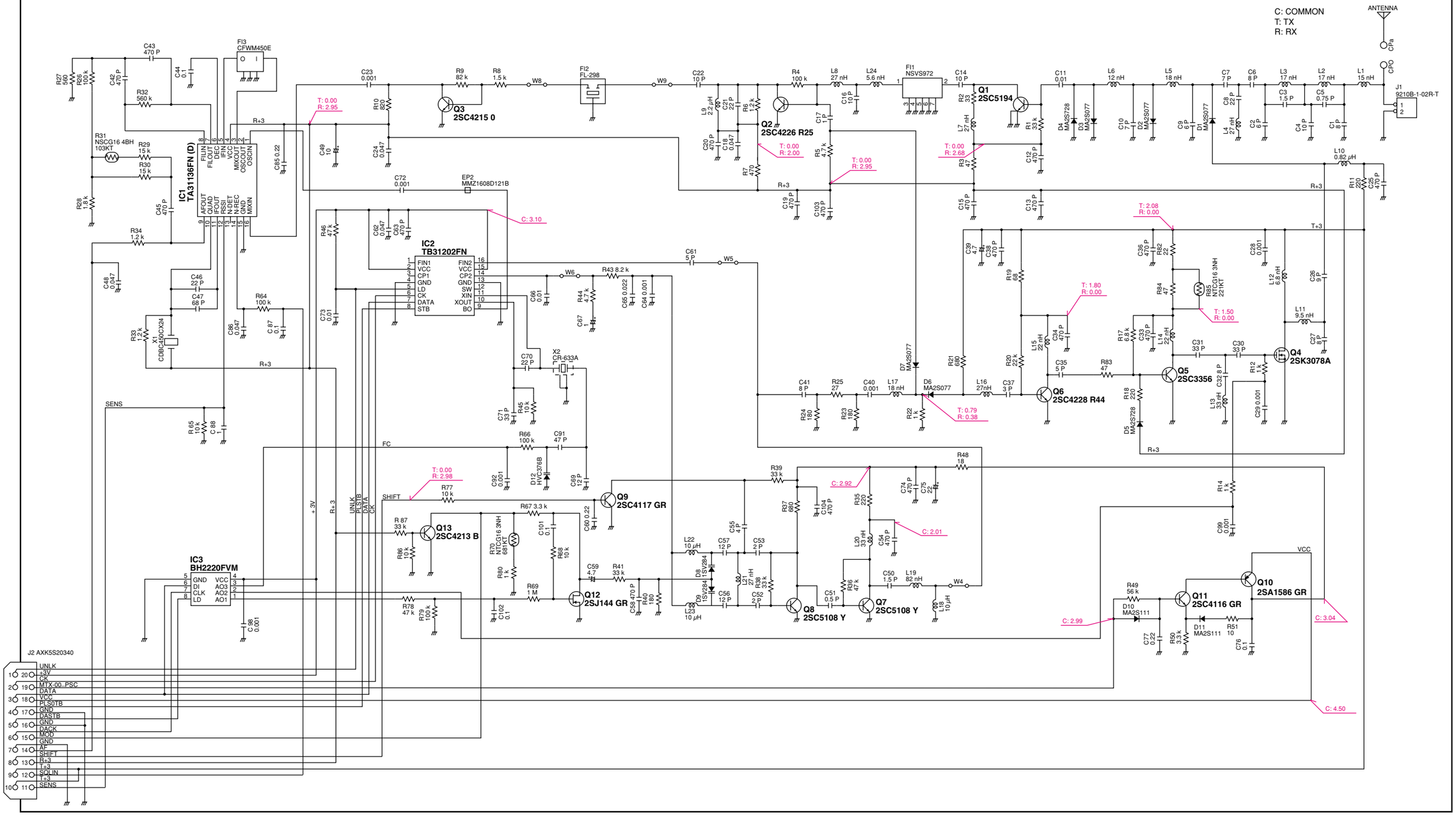


SECTION 11 VOLTAGE DIAGRAM

11-1 MAIN UNIT



11-2 RF UNIT


C: COMMON
T: TX
R: RX
ANTENNA
CPa
CPo
J1 9210B-1-02R-T
FI3 CFWM450E
FI2 FL-298
FI1 NSVS972
Q1 2SC5194
Q2 2SC4226 R25
Q3 2SC4215 0
IC1 TA31136FN (D)
IC2 TB31202FN
IC3 BH2220FVM
EP2 MMZ1608D121B
X1 CDBC450CX24
X2 CR-633A
Q4 2SK3078A
Q5 2SC3356
Q6 2SC4228 R44
Q7 2SC5108 Y
Q8 2SC5108 Y
Q9 2SC4117 GR
Q10 2SA1586 GR
Q11 2SC4116 GR
Q12 2SJ144 GR
Q13 2SC4213 B
D1 MA2S077
D2 MA2S728
D3 MA2S077
D4 MA2S728
D5 MA2S728
D6 MA2S077
D7 MA2S077
D8 1SV284
D9 1SV284
D10 MA2S111
D11 MA2S111
D12 HVC376B
T: 0.00 R: 2.95
T: 0.00 R: 2.00
T: 0.00 R: 2.68
T: 0.00 R: 2.98
T: 2.08 R: 0.00
T: 1.80 R: 0.00
T: 1.50 R: 0.00
T: 0.79 R: 0.38
C: 3.10
C: 2.92
C: 2.01
C: 2.99
C: 3.04
C: 4.50
R+3
T+3
+3V
SENS
FC
SHIFT
VCC
J2 AXK5S20340
UNLK
+3V
CK
MTX-00_PSC
DATA
VCC
PLSTB
GND
DASTB
GND
DACK
MOD
GND
AF
SHIFT
R+3
T+3
SQLIN
T+3
SENS

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